CONTRIBUTIONS FROM THE GRAY HERBARIUM
OF HARVARD UNIVERSITY

No. CLIV.

154–164

PUBLISHED BY
THE GRAY HERBARIUM OF HARVARD UNIVERSITY
CAMBRIDGE, MASS., U. S. A.
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I.—PUBLICATION OF JACQUIN'S ICONES PLANTARUM RARIORUM

By Bernice G. Schubert

The dates of publication of the three volumes of Jacquin's Icones Plantarum Rariorum apparently have never been thoroughly investigated. The dates given on the title-page for volume I which contains twenty pages of text and two hundred plates are 1781–1786; those for volume II, which contains twenty-two pages of text and two hundred fifty-four plates (numbered from 201–454), are 1786–1793; and for volume III, which contains twenty-four pages of text (including a list of the plates in the three volumes) and one hundred ninety-four plates (numbered from 455–648), are also 1786–1793.

The plants represented by plates in these three volumes were, for the most part, newly or very fully described in the Miscellanea[1] or Collectanea[2] by Jacquin, so that only brief diagnoses and synonymy were required as text for the Icones. The diagnoses are numbered and arranged in order, according to the Linnean system, and the plates are similarly numbered and bound. In some cases however, the generic or specific names or both, which appeared on the plates, were later changed in the text. The difficulty in ascertaining proper dates of publication for the plates lies in the fact that they were not issued in the

[1] N. J. Jacquin, Miscellanea Austriaca ad Botanicam, Chemiam, et Historiam Naturalem spectantia, cum figuris partim coloratis. 2 Volumes. Ex officina Krausiana, Vindobonae.

[2] N. J. Jacquin, Collectanea ad Botanicam, Chemiam, et Historiam Naturalem spectantia cum figuris. 5 Volumes, of which the fifth is a supplement to the fourth. Ex officina Wappleriana, Vindobonae.

In some cases in volume I references on the plates are given to Miscell. 3. In a note in volume I of the Collectanea, however, the author explains that he has changed the title of the Miscellanea after publication of the second volume and that the work is continued as the Collectanea.

order in which they were bound, but rather in fascicles of twenty-five each, as they happened to be completed. It is necessary, therefore, to know the composition of each of the fascicles. In the case of volume I, I have been successful in finding numbered lists for the first four fascicles only. These appeared in a review of the fascicles in the Göttingische Anzeigen von gelehrten Sachen[1], in which each of the one hundred names was followed by a plate-number (which did not agree with the plate-numbers in the bound volume indicating the order of the Linnean system). It seems natural, therefore, to assume that these numbers are an indication of the order in which the plates appeared in the fascicles, numbers 1–25 composing fascicle 1, 26–50 fascicle 2, 51–75 fascicle 3, and 76–100 fascicle 4. In the table which follows I have indicated these fascicle-numbers. Those names which do not have fascicle-numbers represent the remaining plates, those of fascicles 5–8 which, according to two reviews, were issued together. Of the reviews studied, in addition to that of the Göttingische Anzeigen von gelehrten Sachen noted above, one, with an unnumbered list of plates, appeared in the Allgemeine Literatur-Zeitung, no. 230b for Wednesday, September 24, 1788; and the other, a complete review of the whole volume, with the text-list but slightly modified, and a detailed discussion, in the Magazin für Botanik[2]. The latter review contained the editors' statements that the first four fascicles had been received, one a year, beginning in 1781, whereas the last four had been received together, the previous Easter (*i. e.* April, 1787). Although both the reviewers of the last four fascicles give the dates of publication 1781–1786, as stated on the title-page, neither of their reviews was published before 1788 and Römer & Usteri made it clear that their copy was not received until 1787. The date 1786, for publication of fascicles 5–8 and the text is therefore, still somewhat questionable.

Otto Kuntze[3] questioned the dates of publication of volumes II and III, feeling certain that one volume must have been published after the other. Actually the four hundred forty-eight

[1] Göttingische Anzeigen von gelehrten Sachen, ii. 1329 (1784).
[2] Römer & Usteri, Mag. für Botanik, 1[3]. 42–62 (1788).
[3] Rev. Gen. Pl. i. cxxxi (1891).

plates of volumes II and III were issued in fascicles[1] (as were the plates of volume I), in an order also quite unrelated to that in which they were bound. With the publication of the 16th and last fascicle the text of volume II and volume III was issued, therefore the identical title-page dates are correct. Fortunately, lists of the plates which were included in each of the sixteen fascicles of the two volumes have been found and the fascicle-numbers are appended to the list of plates which follows.

In addition to the lists of plates (one for volume I and one for volumes II and III together), there follows a table listing review-dates for the Miscellanea and Collectanea, a table with dates of

DATES OF REVIEWS OF THE MISCELLANEA OF JACQUIN

Vol.	Title-page Date	G. G. A. Rev.[2] Date	Beckman Rev.[3] Date
I	1778	Apr. 8, 1780 i. 232 (1780)	x³. 374 (1779)
II	1781	June 17, 1782 i. 588 (1782)	xii². 210 (1782)

DATES OF REVIEWS OF THE COLLECTANEA OF JACQUIN

Vol.	Title-page Date	G. G. A. Rev. Date	A. L.-Z. Rev.[4] Date
I	1786	Oct. 8, 1787 iii. 1615 (1787)	no. 53, Mon., Feb. 22, 1790
II	1788	Sept. 5, 1789 iii. 1429 (1789)	no. 53, Mon., Feb. 22, 1790
III	1789	Aug. 16, 1790 ii. 1315 (1790)	no. 363, Sun., Dec. 5, 1790
IV	1790	Feb. 18, 1792 i. 260 (1792)	
(V) Suppl.	1796		no. 144, Sat., May 6, 1797

[1] Each of the fascicles contained twenty-five plates except the last (16th) which contained seventy-four.

[2] References under this heading are to reviews in the Göttingische Anzeigen von Gelehrten Sachen. The same heading will be used for references in other tables.

[3] References under this heading are to reviews in the "Physikalisch-ökonomische Bibliothek worinn den neuesten Büchern, welche die Naturgeschichte, Naturlehre und die Land- und Stadtwirthschaft betreffen, zuverlässige und vollständige Nachrichten ertheilet werden", by Johann Beckmann, published in Göttingen.

[4] See footnote to column 5 in the table of Dates of Reviews of the Icones, p. 6.

the reviews of the Icones and a series of notes compiled from statements of special interest made by the reviewers.

Dates of Reviews of the Icones Plantarum Rariorum of Jacquin

Vol.	Fasc.	Mag. für Bot. Rev. date[1]	Ann. der Bot. Rev. date[2]	A. L.-Z. Rev. date[3]	G. G. A. Rev. date[4]	Probable date of publication (based on reviewers' notices)
I	1				See under fasc. 4	1781
	2				See under fasc. 4	1782
	3				See under fasc. 4	1783
	4				Aug. 19, 1784 ii. 1329 (1784)	1784
	5	See under text-list I		See under fasc. 8		1787 (?)
	6	See under text-list I		See under fasc. 8		1787 (?)
	7	See under text-list I		See under fasc. 8		1787 (?)
	8	See under text-list I		No. 230b Wed. Sept. 24, 1788		1787 (?)
	Text-list I	i^3. 42-62 (1788)				1787 (?)

[1] The journal to which references are given in column 1, the Magazin für Botanik of Römer & Usteri, was published in Zurich. The twelve numbers under joint editorship were followed in 1794 by the Neues Magazin für die Botanik, edited by Römer. The latter journal was carried on for but one year.

[2] In 1791 the Neues Magazin für Botanik was superseded by a journal edited by Usteri and published in Leipzig, the Annalen der Botanik. With number seven of this journal a new series was begun, Neue Annalen der Botanik. The only change incurred seems to be the appearance of two title-pages, one bearing the number in the series of the Annalen and one, facing it, bearing the number in the series of the Neue Annalen. All our references are given to the old series; the corresponding numbers of the Neue Annalen being given here: Annalen xi = Neue Ann. v; Annalen xix = Neue Ann. xiii; Annalen xx = Neue Ann. xiv; Annalen xxi = Neue Ann. xv.

[3] This column contains references to the Allgemeine Literature-Zeitung, published in Halle and Leipzig, a trade journal issued several times a week. The paper contained reviews, notices of publication, announcement of sales and other items of interest.

[4] References here cited are to the Göttingische Anzeigen von gelehrten Sachen which has been mentioned previously. The reviews in this work are arranged according to cities in which publication took place.

DATES OF REVIEWS OF THE ICONES PLANTARIUM RARIORUM OF JACQUIN—*Cont.*

II & III	1	ii^{1}. 61 (1788)		No. 230b Wed. Sept. 24, 1788	May 3, 1788 i. 704 (1788)	1787	
	2	See under fasc. 3			See under fasc. 3	1789	or 1788
	3	iii^{9}. 92 (1790)			Oct. 3, 1789 ii. 1600 (1789)	1789	
	4	See under fasc. 5				1789	
	5	iv^{11} .172 (1790)				1789	
	6		See under fasc. 7			1790	
	7		i. 126 (1791)			1790	
	8		iii. 216 (1792)		Dec. 1, 1792 ii. 1913 (1792)	1792	
	9		See under fasc. 12	See under fasc. 15		1792	
	10		See under fasc. 12	See under fasc. 15		1792	
	11		See under fasc. 12	See under fasc. 15	See under fasc. 12	1792	or 1793
	12		v. 110 (1793)	See under fasc. 15	Sept. 20, 1794 ii. 1503 (1794)	1792	
	13		See under fasc. 15	See under fasc. 15		1794	
	14		See under fasc. 15	See under fasc. 15		1794	or 1793
	15		xi. 121 (1794)	No. 29 Tues. Jan. 26, 1796		1794	
	16		xix. 65 (1796)			1795	
	Text-list II		xx. 58 (1796)			1795	
	Text-list III		xxi. 72 (1797)			1795	

Notes on the Reviews of Volume I:—

1. *Göttingische Anzeigen von gelehrten Sachen* (ii. 1329 (1784)). —The editors apologize here for not previously mentioning this work of Jacquin which, according to them, began in 1781 and of which the fourth fascicle reached them in 1784. As noted on page 4, a list with plate-numbers is given.

2. *Allgemeine Literatur-Zeitung* (no. 230b, Wednesday, September 24, 1788).—In this announcement of publication of fascicles 5–8 of volume I, a list of plates is given. The date 1786, printed without comment, was presumably taken from the fascicle-cover.

3. *Magazin für Botanik* (i^{3}. 42–62 (1788)).—In this detailed review, part of which has already been discussed (on page 4) there is included the text-list, statement that 1781–1784 are the dates of publication for the first four fascicles, and the implication that 1787 is the proper date for the last four which were received together.

Notes on the Reviews of Volumes II and III:—

1. *Magazin für Botanik:*

ii^{1}. 61 (1788)—Fasc. 1—In this announcement of publication a list of the plants represented by the plates of the fascicle is given and the significant statement is made that the descriptions of and observations on the species will appear in the second volume of the *Collectanea* expected by the coming Easter. The date, 1787, presumably taken from the fascicle-cover, is given without comment.

iii^{9}. 92 (1790)—Fasc. 2 and 3—No comment is made on the date 1789 which is given for publication. The lists also appear without comment. Only 23 names are listed for fascicle 2, however.

iv^{11}. 172 (1790)—Fasc. 4 and 5—No comment is made on the date, 1789, given for publication, nor on the lists of plates presented.

2. *Annalen der Botanik:*

i. 126 (1791)—Fasc. 6 and 7—1790 is the publication-date according to this announcement. A list of plates is given for each of the two fascicles.

iii. 216 (1792)—Fasc. 8—In this review 1790 is given as the date of publication, according to the information presumably copied from the fascicle-cover; it is followed, however, by the editor's statement, in parentheses, "1792 ausgegeben". The editor also says that "according to a note on the cover of this fascicle the work is to be ended with about 100 more plates which are ready. These plates are still to be added to the second volume, and therefore it will be more important than the first". [Translation ours.[1]] The plates in this fascicle are double-folio size.

v. 110 (1793)—Fasc. 9–12—A list of names of the twenty-five plants represented in each fascicle is given. The dates copied from the fascicle-covers are, for fascicle 9—1790; fascicle 10—1791; fascicle 11—1791; fascicle 12—1792. The reviewer noted after these dates however, that, "each of the fascicles 25 plates strong (was issued at the end of the year 1792 and the beginning of 1793, at Wappler's [*i. e.* the publisher in Vienna])". The reviewer remarks too, that "the author has . . . changed his decision to terminate the work with the 12th fascicle; he will not do this until the 16th fascicle so that the 2nd and 3rd volumes will then contain 200 plates as the first volume. The text of both volumes will appear with the final 16th fascicle, perhaps still in this year."

xi. 121 (1794)—Fasc. 13–15—The date 1793, from the fascicle-cover, is here followed by the reviewer's statement "(1794 ausgegeben)". The lists appear without comment.

xix. 65 (1796)—Fasc. 16—The date 1794 from the fascicle-cover is followed by the statement: "with this fascicle, issued at the end of the year 1795 the costly and excellent work is completed. The text of the second and third volumes was issued simultaneously with it. The next number of the Annales will offer further details of this. In the meantime, there follows here the list of the plants represented in the 16th and last fascicle." Seventy-four names follow.

3. *Allgemeine Literatur Zeitung:*

No. 230b, Wednesday, September 24, 1788—Fasc. 1—The date and names given here agree with those in other reviews.

No. 29, Tuesday, January 26, 1796—Fasc. 9–15—The date 1793 is given for these seven fascicles, along with the lists.

[1] The reviews in all cases are in German and when quoted have been translated by the author.

4. *Göttingische Anzeigen von gelehrten Sachen:*
i. 704 (1788)—Fasc. 1—The reviewer makes no comment here, simply presenting title, date and list.
iii. 1600 (1789)—Fasc. 2 and 3—It is here stated that these two fascicles appeared together in 1788. The names which follow are arranged in order according to the Linnean system and although Latin specific names are used the generic names are the German popular ones.
ii. 1913 (1792)—Fasc. 8—Only 1790 the date from the fascicle-cover is given here. The reviewer indicates receipt of notice that the third volume may not be completed.
ii. 1503 (1794)—Fasc. 11 and 12—The dates "1791–1792" are given and followed by a statement regarding completion of the work with the 16th fascicle [see under Ann. der Bot., v. 110 (1793)].

Species Represented in Volume I

Pl. no.	Reference	Fasc. no.	Name
16	Misc. 3		Agrostis tenacissima
64	Misc. 3	3	Albuca abyssinica
63	Coll. 2		Albuca altissima
62	Misc. 2	1	Allium ramosum
138	Misc. 3		Althaea narbonensis
79	Misc. 3		Andromeda lucida
103	Misc. 2	3	Anemone fragifera
117	Misc. 2	2	Antirrhinum hirtum
116	Misc. 2	2	Antirrhinum versicolor
102	Misc. 3	3	Aquilegia viridiflora
125	Coll. 1		Arabis ovirensis
83	Coll. 1		Arenaria biflora
188	Misc. 2	2	Aristolochia bilobata
172	Misc. 3		Artemisia hispanica
199	Coll. 1		Asplenium angustifolium
152	Misc. 2	2	Astragalus asper
153	Misc. 3		Astragalus hians
154	Misc. 2	2	Astragalus leontinus
155	Misc. 1	1	Astragalus uralensis
57	Coll. 1		Athamanta Matthioli
23	Coll. 1		Avena sterilis
189	Misc. 2	2	Axyris ceratoides
60	Misc. 2	4	Bromelia humilis
56	Coll. 1		Bupleurum petraeum
168	Misc. 3		Cacalia laciniata
166	Misc. 3	4	Carduus arabicus
73	Misc. 3		Cassia chinensis
74	Misc. 3		Cassia Crista
72	Misc. 3	4	Cassia multiglandulosa
71	Misc. 3		Cassia ruscifolia

Species Represented in Volume I—*Cont.*

Pl. no.	Reference	Fasc. no.	Name
70	Misc. 3		Cassia sennoides
51	Misc. 2	3	Celosia procumbens
178	Misc. 3		Centaurea Verutum
171	Misc. 3	4	Chrysocoma dichotoma
97	Misc. 2	1	Cistus canariensis
95	Misc. 3		Cistus cretensis
98	Misc. 2	1	Cistus foetidus
99	Misc. 2	1	Cistus mutabilis
96	Misc. 3	3	Cistus syriacus
118	Misc. 3	4	Citharexylum villosum
104	Coll. 1		Clematis angustifolia
34	Misc. 3		Convolvulus floridus
32	Coll. 1		Cortusa Matthioli
1	Coll. 1		Costus arabicus
128	Misc. 2	4	Crambe orientalis
129	Misc. 2	1	Crambe Tataria
164	Misc. 3		Crepis albida
144	Misc. 3	4	Crotalaria caerulea
194	Misc. 3		Croton glandulosum
54	Misc. 2	2	Cynanchum extensum
21	Misc. 2		Cynosurus caeruleus
22	Misc. 2	3	Cynosurus domingensis
20	Misc. 2		Cynosurus sphaerocephalus
47	Coll. 1		Cyrilla racemiflora
147	Misc. 3	4	Cytisus tener
77	Coll. 1		Dais laurifolia
101	Coll. 1		Delphinium urceolatum
82	Coll. 1		Dianthus sylvestris
29	Misc. 3		Diodia virginica
145	Misc. 3		Dolichos Soja
112	Coll. 1		Dracocephalum austriacum
53	Misc. 3		Echites domingensis
30	Misc. 3	4	Echium candicans
48	Act. helv. 9	2	Elaeodendron orientale
55	Scop. Carn. 1	4	Eryngium alpinum
169	Misc. 3		Eupatorium scandens
170	Misc. 2	2	Eupatorium syriacum
89	Misc. 3	4	Euphorbia Characias
85	Misc. 3		Euphorbia clava
88	Misc. 2	3	Euphorbia diffusa
87	Misc. 3	4	Euphorbia divaricata
86	Coll. 1		Euphorbia linifolia
100	Misc. 3	4	Fothergilla Gardeni
150	Misc. 3		Galega ochroleuca
131	Misc. 3		Geranium glutinosum
134	Coll. 1		Geranium macrorrhizum
133	Misc. 3		Geranium revolutum
132	Misc. 3		Geranium tetragonum
93	Misc. 3		Geum aleppicum
94	Misc. 2	1	Geum hybridum
146	Misc. 3		Glycine caribaea
69	Misc. 2	2	Haloragis alata

Species Represented in Volume I—*Cont.*

Pl. no.	Reference	Fasc. no.	Name
143	Coll. 1		Hibiscus pentacarpos
141	Misc. 3		Hibiscus praemorsus
142	Coll. 1		Hibiscus virginicus
163	Misc. 3		Hieracium saxatile
149	Misc. 2	1	Hippocrepis balearica
66	Misc. 2	1	Hyacinthus viridis
165	Misc. 2	1	Hypochaeris helvetica
114	Misc. 3		Hyptis capitata
113	Misc. 3		Hyptis verticillata
36	Coll. 1		Ipomoea hederacea
35	Coll. 2		Ipomoea luteola
192	Misc. 2	1	Juglans cinerea
191	Misc. 2	1	Juglans nigra
61	Act. helv. 9	1	Lachenalia tricolor
162	Misc. 3	4	Lactuca intybacea
58	Coll. 1		Laserpitium Archangelica
106	Misc. 2	1	Lavandula pinnata
33	Misc. 3		Lisianthus glaucifolius
37	Misc. 3	2	Lonicera tartarica
84	Coll. 1		Lychnis grandiflora
140	Misc. 2	1	Malva balsamica
139	Misc. 3		Malva scoparia
109	Misc. 2	1	Marrubium astracanicum
156	Misc. 3		Medicago carstiensis
198	Misc. 3	3	Mimosa speciosa
120	Misc. 3		Myagrum arborescens
52	Coll. 1		Nerium coronarium
167	Misc. 2	1	Onopordon acaule
185	Misc. 3	3	Ophrys crucigera
184	Misc. 2	3	Ophrys myodes
180	Misc. 3		Orchis mascula
182	Misc. 3	3	Orchis moravica
181	Misc. 3		Orchis palustris
183	Misc. 3	3	Orchis rubra
179	Misc. 3		Osteospermum caeruleum
12	Misc. 2	3	Panicum coloratum
13	Misc. 3		Panicum maximum
11	Misc. 3		Paspalum virgatum
187	Misc. 3		Passiflora incarnata
186	Coll. 1		Passiflora rubra
115	Misc. 2	2	Pedicularis rosea
151	Misc. 2	2	Phaca alpina
14	Coll. 1		Phleum asperum
15	Coll. 1		Phleum schoenoides
110	Coll. 1		Phlomis caribaea
111	Misc. 3		Phlomis zeylanica
39	Misc. 2	3	Physalis barbadensis
38	Misc. 3		Physalis prostrata
193	Scop. Carn. 2		Pinus Mughus
8	Coll. 1		Piper medium
9	Coll. 1		Piper obtusifolium
28	Misc. 3		Plantago aegyptiaca

Species Represented in Volume I—*Cont.*

Pl. no.	Reference	Fasc. no.	Name
27	Misc. 2	3	Plantago Cornuti
26	Misc. 3		Plantago maxima
17	Misc. 2	2	Poa abyssinica
19	Misc. 2		Poa disticha
18	Misc. 3		Poa peruviana
92	Misc. 2	3	Potentilla astracanica
91	Misc. 3	2	Potentilla opaca
90	Coll. 1		Prunus Chamaecerasus
105	Misc. 2	3	Ranunculus canadensis
78	Journ. It. 2	4	Rhododendron ponticum
49	Misc. 2	2	Ribes petraeum
195	Misc. 2	2	Ricinus inermis
196	Misc. 2	2	Ricinus lividus
148	Misc. 3		Robinia vesicaria
25	Misc. 3		Rubia fruticosa
119	Misc. 2	2	Ruellia patula
67	Misc. 3		Rumex glaucus
76	Misc. 3		Ruta legitima
6	Coll. 1		Salvia abyssinica
3	Misc. 3		Salvia serotina
7	Coll. 1		Salvia spinosa
4	Misc. 2	2	Salvia viridis
5	Misc. 2	1	Salvia viscosa
59	Misc. 3	4	Sambucus racemosa
81	Coll. 1		Saxifraga petraea
80	Misc. 2		Saxifraga stolonifera
24	Misc. 2		Scabiosa monspeliensis
10	Coll. 1		Schoenus umbellatus
75	Coll. 1		Schotia speciosa
65	Misc. 3		Scilla hyacinthoides
176	Act. helv. 9	1	Sclerocarpus africanus
160	Misc. 3	4	Scorzonera taraxacifolia
174	Misc. 2		Senecio graminifolius
136	Misc. 3	3	Sida atrosanguinea
135	Misc. 3	3	Sida carpinifolia
137	Misc. 2	2	Sida mauritiana
127	Misc. 3	3	Sinapis millefolia
124	Misc. 3	4	Sisymbrium hispanicum
122	Misc. 3	4	Sisymbrium molle
123	Misc. 3	4	Sisymbrium pannonicum
41	Misc. 3		Solanum aculeatissimum
43	Misc. 2	1	Solanum coccineum
40	Misc. 3		Solanum corymbosum
42	Misc. 3	4	Solanum fuscatum
46	Misc. 3		Solanum lycioides
45	Misc. 3		Solanum marginatum
44	Misc. 2	3	Solanum stramonifolium
161	Misc. 3		Sonchus fruticosus
108	Misc. 3	2	Stachys canariensis
107	Misc. 2	3	Stachys lanata
68	Misc. 3	4	Stellera Passerina
197	Coll. 1		Terminalia Catappa

Species Represented in Volume I—*Cont.*

Pl. no.	Reference	Fasc. no.	Name
121	Misc. 2	2	Thlaspi alliaceum
31	Misc. 3		Tournefortia cymosa
190	Misc. 2	3	Tragia involucrata
157	Misc. 2	1	Tragopogon mutabilis
159	Misc. 3		Tragopogon porrifolius
158	Misc. 2	1	Tragopogon undulatus
200	Coll. 1		Trichomanes canariense
126	Coll. 1		Turritis hirsuta
175	Misc. 3	4	Verbesina gigantea
50	Misc. 3		Vitis vinifera
130	Misc. 2	3	Waltheria indica
2	Misc. 2	1	Wulfenia carinthiaca
173	L. Suppl. p. 365		Xeranthemum fulgidum
177	Misc. 3		Zoegea aleppica

Species Represented in Volumes II and III

Vol. no.	Pl. no.	Reference	Fasc. no.	Name
III	620	Coll. 3	9	Acalypha alopecuroidea
III	492	Coll. 3	9	Aconitum tauricum
III	646	Coll. 3	10	Adiantum striatum
III	564	Coll. 2	8	Aeschynomene bispinosa[1]
II	379	Coll. 2	8	Agave foetida
II	378	Coll. 2	1	Agave virginica
II	441	Coll. 4	15	Albuca aurea
II	442	Coll. 4	16	Albuca caudata
II	444	Coll. 4	16	Albuca flaccida
II	443	Coll. 5	16	Albuca major
II	440	Coll. 5	16	Albuca setosa
II	439	Coll. 5	16	Albuca spiralis
II	446	Coll. 5	15	Albuca viridiflora
II	445	Coll. 5	16	Albuca viscosa
II	365	Coll. 3	6	Allium illyricum
II	366	Coll. 5	16	Allium striatum
II	364	Coll. 2	2	Allium suaveolens
II	202	Coll. 4	12	Alpinia comosa
III	503	Coll. 2	3	Alyssum gemonense
II	362	Coll. 4	12	Amaryllis longifolia
III	465	Coll. 2	3	Andromeda coriacea[2]
III	630	Coll. 1	6	Andropogon distachyos
III	631	Coll. 3	7	Andropogon undatus
II	410	Coll. 5	13	Anthericum bipedunculatum
II	415	Coll. 5	13	Anthericum exuviatum
II	414	Coll. 5	15	Anthericum filifolium
II	412	Coll. 5	16	Anthericum flexifolium
II	409	Coll. 5	13	Anthericum hispidum
II	408	Coll. 3	7	Anthericum latifolium
II	413	Coll. 5	13	Anthericum longifolium
II	404	Coll. 5	16	Anthericum longiscapum

[1] The names used by Jacquin in the Collectanea were often changed by him on the plates (where both names are given) and in the text-list (where the earlier identification is in synonymy). Wherever such changes occurred we will give in a footnote the name first used. For example: *Aeschynome bispinosa* was first called by Jacquin *Ae. Sesban.*

[2] *A. mariana* is the name first used for this species.

Species Represented in Volumes II and III—*Cont.*

Vol. no.	Pl. no.	Reference	Fasc. no.	Name
II	407	Coll. 5	13	Anthericum nutans
II	418	Coll. 5	16	Anthericum physodes
II	416	Coll. 5	15	Anthericum pilosum
II	406	Coll. 5	13	Anthericum praemorsum
II	405	Coll. 5	16	Anthericum pugioniforme
II	417	Coll. 5	16	Anthericum pusillum
II	403	Coll. 5	15	Anthericum rostratum
II	419	Coll. 3	7	Anthericum subtrigynum
II	411	Coll. 5	16	Anthericum undulatum
III	499	Coll. 4	12	Antirrhinum parviflorum
III	608	Coll. 3	5	Aristolochia barbata
III	586	Coll. 1	2	Arnica glacialis
III	613	Coll. 3	8	Arum helleborifolium
II	343	Coll. 2	2	Asclepias citrifolia
III	561	Coll. 2	1	Astragalus exscapus
III	619	Coll. 3	8	Begonia dichotoma
III	618	Coll. 1	5	Begonia minor
III	644	Coll. 3	6	Blechnum occidentale
II	314	Coll. 3	4	Borago zeylanica
II	307	Coll. 2	8	Buddleja capitata
II	351	Coll. 2	3	Bupleurum arborescens
III	581	Coll. 5	14	Cacalia peucedanifolia
III	580	Coll. 2	3	Cacalia villosa
III	583	Coll. 2	2	Calea aspera
III	596	Coll. 3	5	Calendula arborescens
III	553	Coll. 1	2	Camellia japonica
II	334	Coll. 2	3	Campanula Zoysii
III	579	Coll. 2	1	Carduus acaulis
III	615	Coll. 4	11	Carex hermaphrodita
III	460	Coll. 4	11	Cassia polyphylla
III	459	Coll. 2	6	Cassia sensitiva
II	339	Coll. 2	1	Celosia virgata
III	497	Coll. 2	1	Celsia linearis
II	344	Coll. 2	2	Chenopodium caudatum
II	345	Coll. 2	3	Chenopodium guineense
III	629	Coll. 4	10	Cissampelos smilacina
III	501	Coll. 3	5	Citharexylum erectum
II	294	Coll. 3	6	Commelina longicaulis
II	293	Coll. 3	7	Commelina mollis
II	315	Coll. 2	1	Convolvulus crenatus
II	316	Coll. 4	12	Convolvulus pentanthus
III	585	Coll. 2	1	Conyza carolinensis
III	595	Coll. 5	12	Coreopsis artemisiaefolia
III	594	Coll. 2	2	Coreopsis limensis
III	504	Coll. 5	14	Crambe filiformis
II	352	Coll. 4	12	Crassula Umbella
II	363	Coll. 5	16	Crinum tenellum
III	621	Coll. 1	5	Croton punctatum
III	622	Coll. 5	14	Croton pungens
II	447	Coll. 4	12	Cyanella orchidiformis
II	342	Coll. 2	1	Cynanchum carolinense

SPECIES REPRESENTED IN VOLUMES II AND III—*Cont.*

Vol. no.	Pl. no.	Reference	Fasc. no.	Name
II	340	Coll. 4	9	Cynanchum monspeliacum
II	341	Coll. 1	1	Cynanchum obliquum
II	298	Coll. 2	8	Cyperus alternifolius
II	299	Coll. 3	8	Cyperus distans
II	297	Coll. 3	8	Cyperus longus
II	296	Coll. 3	6	Cyperus tenuiflorus
II	295	Coll. 5	12	Cyperus viscosus
III	467	Allion. pedem. no. 1545	16	Dianthus atrorubens
III	627	Coll. 2	8	Dioscorea triphylla
III	626	Coll. 2	6	Dioscorea villosa
III	559	Coll. 1	2	Dolichos acinaciformis
III	560	Coll. 2	1	Dolichos gladiatus
III	614	Coll. 3	5	Dorstenia Contrajerva
II	448	Coll. 2	8	Dracaena terminalis
III	612	Coll. 4	10	Dracontium lanceaefolium
II	377	Coll. 5	16	Drimia ciliaris
II	373	Coll. 5	15	Drimia elata
II	375	Coll. 5	16	Drimia media
II	374	Coll. 5	14	Drimia pusilla
II	376	Coll. 5	16	Drimia undulata
III	502	Coll. 5	16	Duranta Plumieri
II	312	Coll. 2	3	Echium glaucophyllum
II	305	Coll. 2	4	Elymus Hystrix
III	605	Coll. 3	7	Epidendrum cochleatum
III	604	Coll. 3	10	Epidendrum elongatum
II	421	Coll. 5	16	Eriospermum lanceaefolium
II	420	Coll. 5	16	Eriospermum latifolium
II	422	Coll. 5	16	Eriospermum parvifolium
III	509	Coll. 5	15	Erodium ribifolium
III	508	Coll. 4	11	Erodium trilobatum
II	347	Coll. 1	5	Eryngium aquaticum
II	449	Coll. 4	16	Eucomis bifolia
III	486	Coll. 3	5	Eugenia baruensis
III	582	Coll. 2	2	Eupatorium myosotifolium
III	481	Coll. 2	4	Euphorbia angulata
III	480	Coll. 1	2	Euphorbia cyathophora[1]
III	482	Coll. 2	5	Euphorbia literata
III	485	Coll. 2	4	Euphorbia nicaeensis
III	479	Coll. 3	5	Euphorbia nudiflora
III	477	Coll. 3	5	Euphorbia picta
III	478	Coll. 2	3	Euphorbia pilulifera
III	484	Coll. 3	5	Euphorbia punicea
III	476	Coll. 5	13	Euphorbia scordifolia
III	483	Coll. 2	3	Euphorbia serrata
III	554	Coll. 2	4	Fumaria acaulis
II	291	Coll. 4	16	Galaxia ovata
II	292	Coll. 5	16	Galaxia plicata
III	574	Coll. 2	1	Galega capensis
III	575	Coll. 2	3	Galega cinerea
III	576	Coll. 4	11	Galega dubia

[1] For this species the name *E. heterophylla* was first used by Jacquin.

SPECIES REPRESENTED IN VOLUMES II AND III—*Cont.*

Vol. no.	Pl. no.	Reference	Fasc. no.	Name
III	573	Coll. 2	3	Galega filiformis
III	572	Coll. 2	5	Galega longifolia
III	457	Coll. 1	2	Gaura fruticosa
III	557	Coll. 2	4	Genista hispanica
III	556	Coll. 2	4	Genista sericea
III	546	Coll. 2	3	Geranium argenteum
II	259	Coll. 4	13	Gladiolus alatus
II	256	Coll. 5	16	Gladiolus albidus
II	269	Coll. 4	13	Gladiolus anceps
II	252	Coll. 4	9	Gladiolus angustus
II	240	Coll. 5	13	Gladiolus bicolor
II	249	Coll. 4	13	Gladiolus brevifolius
II	255	Coll. 2	7	Gladiolus carneus
II	267	Coll. 5	14	Gladiolus crispus
II	257	Coll. 5	16	Gladiolus cuspidatus
II	268	Coll. 4	13	Gladiolus fissifolius
II	254	Coll. 4	13	Gladiolus floribundus
II	258	Coll. 4	13	Gladiolus galeatus
II	246	Coll. 4	14	Gladiolus gracilis
II	236	Coll. 2	7	Gladiolus gramineus
II	250	Coll. 4	13	Gladiolus hirsutus
II	242	Coll. 4	16	Gladiolus hyalinus
II	234	Coll. 4	10	Gladiolus iridifolius
II	235	......	16	Gladiolus iridifolius var.
II	232	Coll. 4	13	Gladiolus laccatus
II	262	Coll. 5	14	Gladiolus longiflorus
II	263	Coll. 5	14	Gladiolus longiflorus var.
II	230	Coll. 4	13	Gladiolus Merianus
II	231	Coll. 5	16	Gladiolus Merianus var.
II	253	Coll. 4	13	Gladiolus mucronatus
II	237	Coll. 4	9	Gladiolus plicatus
II	238	Coll. 4	7	Gladiolus plicatus var. angustifolius
II	247	Coll. 4	13	Gladiolus punctatus
II	241	Coll. 5	16	Gladiolus refractus
II	261	Coll. 5	16	Gladiolus roseus
II	270	Coll. 4	13	Gladiolus silenoides
II	260	Coll. 5	13	Gladiolus striatus
II	239	Coll. 3	9	Gladiolus sulphureus
II	248	Coll. 3	10	Gladiolus tenellus
II	243	Coll. 4	13	Gladiolus tristis var.
II	244	Coll. 5	13	Gladiolus tristis var.
II	245	Coll. 4, no. 457	10	Gladiolus tristis
II	264	Coll. 5	13	Gladiolus tubatus
II	265	Coll. 5	16	Gladiolus tubatus var.
II	266	Coll. 3	9	Gladiolus tubiflorus
II	229	Coll. 4	10	Gladiolus tubulosus
II	251	Coll. 3	7	Gladiolus undulatus
II	233	Coll. 3	9	Gladiolus Watsonius
II	346	Coll. 2	1	Gomphrena brasiliensis
III	591	Coll. 1	2	Gorteria asteroides

SPECIES REPRESENTED IN VOLUMES II AND III—*Cont.*

Vol. no.	Pl. no.	Reference	Fasc. no.	Name
II	338	Coll. 3	5	Gronovia scandens
III	461	Coll. 2	8	Guilandina Moringa
II	335	Coll. 3	7	Hamellia chrysantha
III	565	Coll. 3	5	Hedysarum gyrans
III	568	Coll. 5	16	Hedysarum muricatum
III	567	Coll. 2	8	Hedysarum pictum
III	566	Coll. 2	8	Hedysarum vespertilionis
III	506	Coll. 3	7	Heliophila integrifolia
II	453	Coll. 2	2	Helonias pumila
III	551	Coll. 2	8	Hibiscus diversifolius
III	550	Coll. 3	10	Hibiscus domingensis
III	578	Coll. 2	4	Hieracium incarnatum
II	309	Coll. 2	6	Hypecoum littorale
II	371	Coll. 5	15	Hypoxis obliqua
II	367	Coll. 5	16	Hypoxis plicata
II	369	Coll. 4	16	Hypoxis serrata
II	372	Coll. 5	14	Hypoxis sobolifera
II	368	Coll. 4	16	Hypoxis stellata
II	370	Coll. 5	16	Hypoxis villosa
II	310	Coll. 4	10	Ilex ligustrina
III	571	Coll. 2	3	Indigofera dendroides
III	570	Coll. 2	3	Indigofera hendecaphylla
III	569	Coll. 2	6	Indigofera hirsuta
II	317	Coll. 2	3	Ipomoea angustifolia
II	318	Coll. 2	1	Ipomoea leucantha
II	319	Coll. 2	2	Ipomoea pentaphylla
II	220	Coll. 4	10	Iris flavissima
II	222	Coll. 4	9	Iris tricuspis
II	221	Coll. 3	15	Iris tripetala
II	223	Coll. 2	10	Iris virginica
II	273	Coll. 5	16	Ixia anemonaeflora
II	279	Coll. 4	15	Ixia angusta[1]
II	271	Coll. 3	7	Ixia Bulbocodium
II	272	Coll. 4	15	Ixia chloroleuca
II	288	Coll. 4	15	Ixia corymbosa
II	290	Coll. 5	15	Ixia cruciata
II	276	Coll. 4	10	Ixia falcata
II	289	Coll. 3	10	Ixia fenestrata
II	274	Coll. 5	15	Ixia fragrans
II	282	Coll. 5	16	Ixia incarnata
II	281	Coll. 5	16	Ixia lancea
II	278	Coll. 5	16	Ixia leucantha
II	275	Coll. 3	9	Ixia polystachya
II	287	Coll. 5	15	Ixia punicea
II	286	Coll. 3	9	Ixia purpurea
II	286	......	16	Ixia purpurea var.
II	280	Coll. 5	15	Ixia radiata
II	285	Coll. 3	7	Ixia rubrocyanea
II	277	Coll. 4	16	Ixia secunda
II	283	Coll. 4	7	Ixia uniflora
II	284	Coll. 3	7	Ixia villosa

[1] This species was first called *I. linearis* by Jacquin in the Collectanea.

SPECIES REPRESENTED IN VOLUMES II AND III—*Cont.*

Vol. no.	Pl. no.	Reference	Fasc. no.	Name
III	623	Coll. 1	1	Jatropha gossypifolia
II	205	Coll. 3	5	Justicia bracteolata
II	206	Coll. 4	6	Justicia caracasana
II	204	Coll. 3	12	Justicia pulcherrima
III	628	Coll. 2	2	Kiggelaria integrifolia
II	300	Coll. 4	7	Kyllinga incompleta
II	381	Coll. 5	16	Lachenalia angustifolia
II	391	Coll. 5	15	Lachenalia glaucina
II	382	Coll. 5	16	Lachenalia hyacinthoides
II	401	Coll. 5	15	Lachenalia isopetala
II	402	Coll. 5	14	Lachenalia lanceaefolia
II	387	Coll. 5	15	Lachenalia liliflora
II	395	Coll. 4	12	Lachenalia luteola
II	392	Coll. 3	6	Lachenalia mediana
II	390	Coll. 3	6	Lachenalia orchioides
II	383	Coll. 3	6	Lachenalia orthopetala
II	384	Coll. 4	12	Lachenalia patula
II	400	Coll. 3	6	Lachenalia pendula
II	397	Coll. 2	6	Lachenalia punctata
II	393	Coll. 5	12	Lachenalia purpurea
II	388	Coll. 5	14	Lachenalia purpurocoerulea
II	385	Coll. 5	16	Lachenalia pusilla
II	386	Coll. 3	6	Lachenalia pustulata
II	396	Coll. 5	16	Lachenalia quadricolor
II	398	Coll. 5	15	Lachenalia rubida
II	399	Coll. 5	16	Lachenalia tigrina
II	389	Coll. 5	16	Lachenalia unicolor
II	394	Coll. 4	12	Lachenalia violacea
II	349	Coll. 1	2	Laserpitium peucedanoides
III	464	Coll. 2	2	Ledum latifolium
III	588	Coll. 2	6	Leysera gnaphalodes
III	602	Coll. 4	10	Limodorum altum[1]
III	603	Coll. 4	10	Limodorum diurnum
III	463	Coll. 3	5	Limonia trifoliata
II	353	Coll. 3	6	Linum africanum
II	313	Coll. 4	12	Lithospermum tenuiflorum
III	597	Coll. 1	9	Lobelia siphilitica
II	203	Coll. 5	13	Lopezia mexicana
III	549	Coll. 2	8	Malachra alceaefolia
III	548	Coll. 2	3	Malachra fasciata
III	470	Coll. 2	2	Malpighia coccigera
III	469	Coll. 4	10	Malpighia glandulifera
II	337	Coll. 4	11	Mangifera indica
III	498	Coll. 4	10	Manulea tomentosa
II	201	Coll. 4	10	Maranta lutea
II	452	Coll. 5	16	Melanthium eucomoides
II	451	Coll. 5	16	Melanthium junceum
II	450	Coll. 4	9	Melanthium uniflorum
III	507	Coll. 2	3	Melochia caraccasana
III	487	Coll. 2	2	Mesembryanthemum cordifolium
III	488	Coll. 2	2	Mesembryanthemum cuneifolium

[1] *Limodorum tuberosum* is the name used for this species in the Collectanea.

Species Represented in Volumes II and III—*Cont.*

Vol. no.	Pl. no.	Reference	Fasc. no.	Name
III	489	L. Sp. Pl. 698	2	Mesembryanthemum pomeridianum
III	632	Coll. 4	12	Mimosa caracasana
III	633	Coll. 4	12	Mimosa portoricensis
II	226	Thunb. diss. no. 13	7	Moraea collina
II	227	Coll. 3	7	Moraea palmifolia
II	225	Coll. 5	16	Moraea sordescens
II	224	Coll. 4	9	Moraea vegeta
II	228	Coll. 3	7	Moraea virgata
III	617	Coll. 3	5	Morus mauritiana
II	311	Coll. 4	12	Myginda Rhacoma
III	625	Coll. 2	1	Myrica segregata
III	601	Coll. 3	5	Neottia minor
III	600	Coll. 3	9	Neottia speciosa
II	321	Coll. 4	10	Ochrosia maculata
III	495	Coll. 4	12	Ocymum gratissimum
III	455	Coll. 3	7	Oenothera nocturna
III	456	Coll. 5	14	Oenothera odorata
III	598	Coll. 2	4	Orchis militaris
III	599	Coll. 2	1	Orchis variegata
II	423	Coll. 2	8	Ornithogalum caudatum
II	435	Coll. 5	16	Ornithogalum coarctatum
II	426	Coll. 2	4	Ornithogalum comosum
II	428	Coll. 3	4	Ornithogalum conicum
II	437	Coll. 3	4	Ornithogalum flavescens
II	436	Coll. 5	16	Ornithogalum flavissimum
II	429	Coll. 5	16	Ornithogalum fuscatum
II	434	Coll. 5	16	Ornithogalum lacteum
II	424	Coll. 2	8	Ornithogalum latifolium
II	438	Coll. 3	4	Ornithogalum miniatum
II	432	Coll. 5	16	Ornithogalum odoratum
II	430	Coll. 5	16	Ornithogalum polyphyllum
II	425	Coll. 2	8	Ornithogalum pyramidale
II	433	Coll. 5	16	Ornithogalum secundum
II	431	Coll. 2	4	Ornithogalum suaveolens
II	427	Coll. 2	4	Ornithogalum tenellum
III	472	Coll. 3	6	Oxalis multiflora[1]
III	473	Coll. 3	6	Oxalis polyphylla
III	471	Coll. 3	6	Oxalis rubella
III	634	Coll. 4	16	Panax aculeatum
II	302	Coll. 5	16	Paspalum racemosum
III	606	Coll. 3	5	Passiflora cuprea
III	607	Coll. 2	1	Passiflora lutea
III	458	Coll. 4	11	Paullinia cauliflora
III	552	Coll. 3	5	Pavonia urens
III	535	Coll. 5	15	Pelargonium anemonaefolium
III	511	Coll. 3	4	Pelargonium astragalifolium[2]
III	543	Coll. 5	14	Pelargonium balsameum
III	513	Coll. 4	11	Pelargonium barbatum
III	531	Coll. 5	16	Pelargonium betonicum

[1] The names used first for this and the following two species were: plate 472, *Oxalis hirta* var.; plate 473, *O. versicolor;* plate 471, *O. hirta.*

[2] First called *Geranium astragalifolium* by Jacquin.

SPECIES REPRESENTED IN VOLUMES II AND III—*Cont.*

Vol. no.	Pl. no.	Reference	Fasc. no.	Name
III	530	Coll. 5	14	Pelargonium bullatum
III	512	Coll. 4	11	Pelargonium carneum
III	529	Coll. 5	14	Pelargonium caucalifolium
III	523	Coll. 5	14	Pelargonium chamaedryfolium
III	519	Coll. 4	11	Pelargonium ciliatum
III	528	Coll. 5	14	Pelargonium coriandrifolium
III	526	Coll. 5	14	Pelargonium coronopifolium
III	539	Coll. 5	14	Pelargonium cortusaefolium
III	522	Coll. 5	15	Pelargonium daucoides
III	520	Coll. 4	11	Pelargonium depressum
III	540	Coll. 4	11	Pelargonium fuscatum
III	545	Coll. 5	14	Pelargonium hermanniaefolium
III	516	Coll. 4	11	Pelargonium heterophyllum
III	536	Coll. 5	15	Pelargonium hirtum
III	532	Coll. 5	14	Pelargonium lacerum
III	533	Coll. 5	14	Pelargonium longicaule
III	521	Coll. 4	11	Pelargonium longiflorum
III	518	Coll. 4	11	Pelargonium longifolium
III	514	Coll. 4	11	Pelargonium melananthon
III	534	Coll. 5	16	Pelargonium multicaule
III	517	Coll. 4	11	Pelargonium nervifolium
III	525	Coll. 2	3	Pelargonium Oenotherae[1]
III	541	Coll. 4	11	Pelargonium patulum
III	510	Coll. 4	11	Pelargonium rapaceum
III	538	Coll. 5	15	Pelargonium ribifolium
III	542	Coll. 2	3	Pelargonium scabrum[2]
III	544	Coll. 5	12	Pelargonium ternatum
III	537	Coll. 5	15	Pelargonium tomentosum
III	524	Coll. 5	16	Pelargonium trichostemon
III	515	Coll. 4	11	Pelargonium triphyllum
III	527	Coll. 5	14	Pelargonium violareum
III	558	Coll. 1	1	Phaseolus semierectus
II	301	Coll. 3	5	Phleum Gerardi
III	616	Coll. 2	8	Phyllanthus speciosa
II	333	Coll. 2	4	Phyteuma hemisphaerica
II	210	Coll. 5	14	Piper aduncum
II	218	Coll. 3	5	Piper blandum
II	212	Coll. 3	5	Piper clusiaefolium
II	214	Coll. 4	9	Piper cuneifolium
II	213	Coll. 3	9	Piper magnoliaefolium
II	215	Coll. 4	11	Piper marginatum
II	219	Coll. 4	7	Piper pereskiaefolium
II	217	Coll. 3	5	Piper stellatum
II	211	Coll. 5	16	Piper tuberculatum
II	216	Coll. 2	9	Piper umbellatum
II	306	Coll. 5	16	Plantago patagonica
II	304	Coll. 2	4	Poa ciliaris
II	303	Coll. 2	2	Poa sicula
II	380	Coll. 5	16	Polyanthes pygmaea
III	642	Coll. 2	6	Polypodium alpinum
III	639	Coll. 3	9	Polypodium fraxinifolium

[1] First called *Geranium ovatum* by Jacquin.

[2] First called *Geranium scabrum* by Jacquin.

Species Represented in Volumes II and III—*Cont.*

Vol. no.	Pl. no.	Reference	Fasc. no.	Name
III	641	Coll. 3	8	Polypodium Hippocrepis
III	640	Coll. 3	10	Polypodium molle
III	643	Coll. 3	8	Polypodium multifidum
III	637	Coll. 4	12	Polypodium phymatodes
III	638	Coll. 3	8	Polypodium trifoliatum
III	490	Coll. 2	4	Potentilla salisburgensis
III	491	Coll. 2	4	Potentilla subacaulis
III	609	Coll. 4	12	Pothos crassinervia
III	611	Coll. 4	9	Pothos digitata[1]
III	610	Coll. 4	10	Pothos grandifolia
III	562	Coll. 4	10	Psoralea bipedunculata
III	563	Coll. 4	12	Psoralea phymatodes
III	645	Coll. 2	1	Pteris caudata
III	474	Coll. 3	7	Reseda fruticulosa
III	475	Coll. 1	2	Reseda mediterranea
II	336	Coll. 2	4	Rhamnus volubilis
III	593	Coll. 5	12	Rudbeckia alata
III	592	Coll. 5	12	Rudbeckia amplexifolia
II	209	Coll. 2	2	Salvia pseudococcinea
II	348	Coll. 2	1	Sanicula marylandica
III	494	Coll. 2	4	Satureja rupestris
III	466	Coll. 1	9	Saxifraga mutata
III	496	Coll. 3	7	Selago fasciculata
III	587	Coll. 1	1	Senecio rosmarinifolius
III	547	Coll. 2	3	Sida palmata
III	505	Coll. 2	3	Sisymbrium lippizense
II	323	Coll. 4	11	Solanum aggregatum
II	331	Coll. 2	1	Solanum carolinense
II	322	Coll. 2	3	Solanum diphyllum
II	324	Coll. 3	9	Solanum fugax
II	328	Coll. 4	10	Solanum giganteum
II	329	Coll. 2	1	Solanum lanceaefolium
II	330	Coll. 4	11	Solanum Milleri
II	326	Coll. 2	3	Solanum nodiflorum
II	327	Coll. 2	1	Solanum peruvianum
II	325	Coll. 3	10	Solanum stellatum
II	332	Coll. 2	1	Solanum virginianum
II	350	Coll. 3	6	Spananthe paniculata
III	555	Coll. 2	3	Spartium decumbens[2]
II	308	Coll. 3	11	Spermacoce hirta
III	584	Coll. 3	9	Spilanthus exasperata
III	493	Coll. 5	14	Stachys rugosa
III	468	Coll. 3	6	Stellaria bulbosa
II	359	Coll. 5	16	Strumaria angustifolia
II	361	Coll. 3	7	Strumaria filifolia[3]
II	356	Coll. 5	16	Strumaria linguaefolia
II	358	Coll. 5	16	Strumaria rubella
II	357	Coll. 5	16	Strumaria truncata
II	360	Coll. 5	16	Strumaria undulata
II	320	Coll. 4	12	Tabernaemontana persicariaefolia

[1] Corrected from *Pothos palmata* by Jacquin.
[2] Corrected from *Genista humifusa.*
[3] First called *Leucojum strumosum.*

Species Represented in Volumes II and III—*Cont.*

Vol. no.	Pl. no.	Reference	Fasc. no.	Name
II	354	Coll. 4	9	Tradescantia erecta
II	355	Coll. 3	7	Tradescantia multiflora
III	577	Coll. 2	3	Tragopogon capensis
III	648	Coll. 2	4	Tremella clavariaeformis
III	647	Coll. 2	6	Tremella juniperina
III	462	Coll. 4	9	Tribulus maximus
III	624	Coll. 2	4	Trichosanthes foetidissima
II	454	Coll. 5	16	Triglochin bulbosum
II	207	Coll. 2	4	Verbena mutabilis
II	208	Coll. 2	2	Verbena prismatica
III	500	Coll. 3	8	Volkameria Kaempferi
III	636	Coll. 3	8	Zamia angustifolia
III	635	Coll. 3	8	Zamia integrifolia
III	589	Coll. 5	11	Zinnia elegans
III	590	Coll. 5	11	Zinnia tenuiflora

2.—STUDIES IN THE BEGONIACEAE,—I.

By

Lyman B. Smith & Bernice G. Schubert

A—Miscellaneous Novelties

(Plates I and II)

Begonia biserrata Lindl., var. **glandulosa** Smith & Schubert, var. nov., ramis juvenilibus petiolis pedunculis pedicellis et ovariis glanduloso-setosis.

MEXICO: Guerrero: wet cliffs, near Acapulco, June 25, 1935, *O. M. Clark 7223* (NY, type; phot. G).

Begonia (§ Begoniastrum) **Ekmanii** Houghton in herb., spec. nov., acaulis, humilis; rhizomate repente, gracili, 3–4 cm. longo, stipulis densissime obtecto; foliis suborbicularibus vel reniformibus, basi cordatis, 18–22 mm. latis, grosse crenatis, utrinque sparsissime pilosis, petiolis gracilibus, 2–4 cm. longis, glabris, stipulis suborbicularibus, vix 3 mm. latis, lacerato-serratis, brunneis, membranaceis; pedunculo erecto, 6–11 cm. longo, glabro; inflorescentiis 1–2-floris; bracteis persistentibus, late obovatis, fimbriatis, 2–3 mm. longis, brunneis, membranaceis; pedicellis gracillimis, 9–13 mm. longis; tepalis masculinis 4, albis, integris, exterioribus late ellipticis, obtusis, 10 mm. longis, interioribus angustis, paulo brevioribus; staminibus paucis, columna insertis, antheris ellipticis quam filamentis longioribus, connectivo producto, obtuso; bracteolis femineis nullis; tepalis femineis 5, subaequalibus, ellipticis, obtusis, 8 mm. longis; stylis basi multo connatis, breviter bifidis, ovario subgloboso, placentis bifidis; capsula inaequaliter 3-alata, alis subtriangularibus. Tab. I.

CUBA: ORIENTE: on shaded rocks, Arroyo Bayajá, Sierra Maestra, south of Nagua, alt. 200–400 m., August 8, 1922, *Ekman 14770* (NY, TYPE; phot. G).

Begonia Ekmanii is closely related to *B. rotundifolia* Lam. but differs in its smaller habit, white tepals with the inner staminate ones merely obtuse instead of emarginate and its small number of stamens.

BEGONIA (§ BEGONIASTRUM) **militaris** Smith & Schubert, spec. nov., planta 18–21 cm. alta; rhizomate repente, haud ultra 2 mm. diametro, plus minusve piloso internodiis brevibus sed distinctis; foliis peltatis, late ovatis vel ellipticis, abrupte acutis, 5–6 cm. longis, 3–4 cm. latis, integris vel levissime undulatis, supra glabris, subtus sparse pilosis, petiolis 5–10 cm. longis, gracilibus, pilosis, stipulis persistentibus, ad 1 cm. longis, anguste triangularibus, in seto acuminatis, brunneis; pedunculo folia superante; inflorescentia laxissime subsecundeque paniculata, glabra; bracteis mox deciduis, parvis, late ellipticis; pedicellis gracillimis, ad 8 mm. longis; tepalis masculinis 4, integris, exterioribus ellipticis, 6 mm. longis, roseis, interioribus lineari-obovatis; staminibus in columna brevi insertis, antheris obovatis, quam filamentis longioribus, connectivo producto, obtuso; bracteolis femineis ellipticis, ovarium subaequantibus; tepalis femineis 5, anguste ellipticis, obtusis, integris, ad 7 mm. longis, exterioribus roseis; stylis 3, breviter bifidis; ovario ellipsoideo, placentis bipartitis; capsulis 3-alatis, alis duabus parvis lunatis, tertia anguste triangulari patente, 14–17 mm. lata. Tab. II.

GUATEMALA: ALTA VERAPAZ: on banks and among rocks, Chamá, alt. 270 m., May 15, 1920, *H. Johnson 178* (US, TYPE; CM, ISOTYPE; phot. G).

In habit *Begonia militaris* resembles species of section *Magnusia* but its tepals place it in *Begoniastrum*. It is easily distinguished by its peltate leaves and one-sided inflorescence.

BEGONIA (§ MAGNUSIA) **plantaginea** Smith & Schubert, spec. nov., rhizomate brevi; foliis dense aggregatis, laminis rectis asymmetricis, lanceolatis vel anguste ovatis, acuminatis, basi inaequaliter cordatis, 6–12 cm. longis, 2–6 cm. latis, integris, carnosulis, supra glabris, subtus ad nervos pilosis, petiolis 4–14 cm. longis, dense ferrugineo-pilosis, stipulis persistentibus, anguste ovatis, setoso-acuminatis, 7–8 mm. longis, integris, brunneis, chartaceis; scapo gracili, 3–6 cm. longo, dense piloso; inflorescentia pauciflora, abbreviata, quam foliis multo breviori; bracteis deciduis, ovatis, 5 mm. longis, integris, brunneis, membranaceis; pedicellis gracillimis, ad 25 mm. longis; floribus albis; tepalis masculinis 2, late ellipticis, ad 12 mm. longis, integris; staminibus in columna brevi connatis, antheris oblongis, quam filamentis longioribus, connectivo producto, late obtuso; bracteolis femineis ignotis, verisimiliter nullis; tepalis femineis 2, eis masculinis similibus sed minoribus; stylis 3, alto connatis, breviter bifidis; ovario 3-loculato, placentis bilamellatis, undique ovuliferis; capsula perjuvenili solum cognita, verisimiliter deflexa, ellipsoidea, inaequaliter trialata, ala maxima ovata, obtusa, ad basin capsulae versus extensa, reliquis marginiformibus. Tab. I.

MEXICO: CHIAPAS: Finca Irlanda, May, 1914, *Purpus 7295* (G, TYPE; Mo, US, ISOTYPES).

In most respects *Begonia plantaginea* appears close to *B. ludicra*, but it has a definite if short staminal column and the leaves are never lobed.

BEGONIA (§ BEGONIASTRUM) **rhodochlamys** Smith & Schubert, spec. nov. e fragmentis solum cognita sed verisimiliter fere metralis, herbacea, monoica, omnino glabra, plus minusve glauca; caule simplici, fere recta; foliis valde asymmetricis, oblique ellipticis, palmate 7-nerviis, paulo lobatis (tum venis primariis tum secundariis in lobis terminant), ad 17 cm. longis et 19 cm. latis, petiolis 7 cm. longis, stipulis mox deciduis, ignotis; pedunculis axillaribus, 2–7.5 cm. longis; inflorescentia laxe cymosa, pauciflora; bracteis deciduis, ellipticis, acutis, 15–22 mm. longis, integris, membranaceis, fulgide roseis; pedicellis 15–20 mm. longis; tepalis masculinis 4, integris, roseis, exterioribus late ellipticis, obtusis, 15 mm. longis, interioribus angustioribus; staminibus numerosis, columna insertis, antheris late obovoideis, connectivo non producto; bracteolis femineis nullis; tepalis femineis 5, subaequalibus, anguste ellipticis, obtusis, 12 mm. longis, roseis; stylis 3, basi connatis, bifidis, stigmatibus spiraliter cinctis; ovario ellipsoideo, placentis bifidis; capsulis 3-alatis, alis duabus minoribus angustioribus, tertia ovata, ad 2 cm. lata. Tab. I.

MEXICO: MICHOACAN: Dist. Apatzingan, Rancho Viejo, alt. 650 m., Sept. 18, 1939, *Hinton 15190* (G, TYPE).

Begonia rhodochlamys is notable for its large petaloid bracts which make the young inflorescences a uniformly brilliant rose.

The base of the plant is not known but it is probably tuberous as in *B. gracilis* and *B. Palmeri* to which it appears related.

BEGONIA (§ CASPARYA) **Trapa** Smith & Schubert, spec. nov., suffruticosa, 1–2 m. alta (! Gehriger), ramis carnosis, mox glabris; foliis obliquis, asymmetricis, anguste ovatis vel lanceolatis, acuminatis, basi cordatis, ad 6 cm. longis, 2.5 cm. latis, duplicato-serratis, ciliatis, supra dissite hirsuta, viridibus, subtus pallidioribus, ad nervos hirsutis, petiolo 10–25 mm. longo, rufo-piloso, stipulis deciduis, lanceolatis, acuminatis, integris, 4–8 mm. longis; pedunculis axillaribus, 2–6 cm. longis; cymis paucifloris, 3–8 cm. diametro, bracteis ellipticis, 8 mm. longis, apice fimbriatis, deciduis; pedicellis 5–10 mm. longis, rufo-pilosis; tepalis masculinis 4, exterioribus late ovatis, obtusis, apice minutissime fimbriatis, 11 mm. longis, albo-viridiscentibus, extus sparse hirsutis, apice maculis 3 vel 4 parvis viridibus ornatis, interioribus late obovatis, 8 mm. longis, albis; staminibus ultra 40, liberis, filamentis quam antheris oblongis brevioribus, connectivo valde producto, ovato; bracteolis femineis bracteis similibus sed angustioribus; tepalis femineis 5, minute fimbriatis, 2 exterioribus suborbicularibus, ad 8 mm. longis, interioribus late obovatis, brevioribus; stylis 3, multiramosis; ovario 3-loculato, placentis bilamellatis, undique ovuliferis; capsula lata turbinata, fructum *Trapae* in animo revocans, 6 mm. longa, apice columna brevissima late conica aucta, aequaliter 3-cornuta, cornubus parvis, obtusis, verisimiliter horizontaliter complanatis. Tab. I.

VENEZUELA: MERIDA: Mucurubá, Quebrada del Pueblo, by the water or hanging from shady rather moist slopes, 2600 m., July 1, 1930, *Gehriger 274* (CM, TYPE; Mo, NY, ISOTYPES; phot. G).

Begonia Trapa appears to be related to *B. trispathulata* (A. DC.) Warb. but is easily distinguished from that species by its small leaves, long peduncles, much produced staminal connective and small capsule-appendages. The pistillate flowers of *B. trispathulata* are not known.

BEGONIA URUAPENSIS Sessé & Moc., var. **Rosei** Smith & Schubert, var. nov., inflorescentia puberula.

MEXICO: DURANGO: no further locality, 1310 m., August 15, 1897, *Rose 2297* (US, TYPE, NY, ISOTYPE; phot. G).

B—Begonia of Sessé and Mociño

(Plate II)

Through the courtesy of the Chicago Natural History Museum the material of *Begonia* of Sessé and Mociño[1] has been made available for study by the authors. As stated in a previous paper on some of the Sessé and Mociño collections[2], usually two specimens of each number exist, one of the Herbarium of the Madrid Botanic Garden, the other of the Chicago Museum. Unless otherwise specified all numbers listed are in both herbaria, and except in cases of mixed collections the herbaria will not be designated; where mixtures occur however, the herbarium of the Madrid Botanic Garden will be designated—(Mad.) and the Chicago (Field) Museum—(CM).

The following list is of the species of *Begonia* described by Sessé and Mociño; only one, *B. uruapensis* is now maintained; following each of the other names is the earlier name (of which it is a synonym) which must be taken up.

B. tuberosa, Pl. Nov. Hisp. 162 (1890); Fl. Mex. ed. 2: 218 (1896) = **B. gracilis** HBK., var. **Martiana** (Link & Otto) A. DC.
B. syphillitica, Pl. Nov. Hisp. 162 (1890); Fl. Mex. ed. 2: 219 (1896) [as *B. syphilitica*] = **B. monoptera** Link & Otto.
B. macrophylla, Pl. Nov. Hisp. 162 (1890); Fl. Mex. ed. 2: 219 (1896) = **B. Barkeri** Knowles & Westc.
B. uruapensis, Pl. Nov. Hisp. 163 (1890); Fl. Mex. ed. 2: 219 (1896).
B. palmata, Pl. Nov. Hisp. 162 (1890) = **B. biserrata** Lindl.
B. peltata, Fl. Mex., ed. 2: 219 (1896) = **B. nelumbiifolia** Schlecht. & Cham.
B. repens, Fl. Mex. ed. 2: 219 (1896) = **B. glabra** Aubl.
B. decandra, Fl. Mex. ed. 2: 219 (1896) = **B. decandra** Pav. ex A. DC.

Identifications of all the specimens and both taxonomic and nomenclatural notes on the species are given here. For the sake of simplicity the species considered will be taken up in alphabetical order.

[1] This material was collected by Sessé, Mociño, Castillo and Moldonado during the period 1787—1795—1804.
[2] B. G. Schubert, *Hedysarum of Sessé and Mociño (in part) in* Contrib Gray Herb. cxxxv. 112, 113 (1941).

B. ANGUSTILOBA A. DC. in Ann. Sci. Nat. ser. 4. xi. 126 (1859); Prod. xv[1]. 307 (1864). *B. dentata* Pav. ex A. DC. l. c. in synon.

The specimen which is probably a portion of the type-collection of this species is number 4509 (Mad., and represented by a fragment at CM, their number 849973). Another collection, 4510 (composed of three sheets Mad. and one CM, their number 851084) is mixed. Although the material of 4509 and 4510 is all labeled *B. palmata*, only the specimens of one full sheet and portions of two others belong to that species which will be discussed under *B. biserrata*. The material here treated as *B. angustiloba* has been most frequently identified as *B. bicolor* S. Watson, a name which now must be reduced to synonymy.

B. BARKERI Knowles & Westc. Fl. Cab. iii. 179, t. 135 (1840). *B. megaphylla* A. DC. in Ann. Sci. Nat. ser 4. xi. 133 (1859); Prod. xv[1]. 341 (1864). *B. macrophylla* Sessé & Mociño, Pl. Nov. Hisp. 162 (1890); Fl. Mex. ed. 2: 219 (1896), non Lam. Encyc. i. 394 (1783).

The specimens numbered 4501 compose a mixed collection and only the fragment consisting of one leaf in the Chicago Museum collection (their sheet no. 850010) is *B. Barkeri* (*B. macrophylla* Sessé & Mociño). Material of number 4501 in the Madrid collection is another species (*B. uruapensis*), and is considered below.

B. BISERRATA Lindl. in Journ. Hort. Soc. ii. 313 (1847). *B. palmata* Sessé & Mociño, Pl. Nov. Hisp. 163 (1890), non Don Prod. Fl. Nepal. 223 (1825). *B. palmaris* A. DC. in Ann. Sci. Nat. ser. 4. xi. 126 (1859); Prod. xv[1]. 307 (1864). *B. palmata* Pav. ex A. DC. l. c. in synon.

Material of this species is numbered 4510 (a mixed collection noted under *B. angustiloba*, of which one full sheet, Mad. and CM no. 851084, p.p. belong here) and 4520.

B. DECANDRA Pav. ex A. DC. in Ann. Sci. Nat. ser. 4. xi. 122 (1859); Prod. xv[1]. 288 (1864); Sessé & Mociño, Fl. Mex. ed. 2: 219 (1896).

This species was said by Sessé and Mociño to come from Puerto Rico. DeCandolle (Prod.) reported it from Mexico with some doubt. O. E. Schulz (in Urb. Symb. Ant. vii. 9 (1911)) said: "Specimen originarium . . . sine dubio a Sessé et Mociño in Portorico nec a Pavon in Mexico est collectum". The type is in herb. Boissier. The material we have seen is numbered 4515, Mad.; CM, fragment only.

B. extranea Smith & Schubert in Contrib. Gray Herb. cxxvii. 27, tab. 2, fig. 16–18 (1939).

These specimens are labeled with an unpublished name which need not be taken up. The Madrid material numbered 4516 and labeled "21–8" [unpublished name] "4516" and the CM fragment (no. 850051) are that part of a large and mixed collection belonging here.

B. glabra Aubl. Guian. ii. 916, t. 349 (1775). *B. repens* Sessé & Mociño, Fl. Mex. ed. 2: 219 (1896), non Lam. Dict. i. 394 (1783).

Material numbered 4512 (CM, 849972, fragments of 2 leaves) and another fragment, 4943, p.p. (CM, 847798; Mad. pocket material, p.p.) seems to be the only material of this species, but the identity is quite clear.

B. gracilis HBK., var. Martiana (Link & Otto) A. DC. Prod., xv[1]. 309 (1864). *B. tuberosa* Sessé & Mociño, Pl. Nov. Hisp. 162 [t. 427, ined.] (1890); Fl. Mex. ed. 2: 218 (1896), non Lam. Dict. i. 393 (1783). *B. Martiana* Link & Otto, Ic. Pl. Rar. 49, t. 25 (1828).

Material of this variety, which is glabrous throughout, is numbered 4503, 4504 and 4505. On one of the Madrid sheets numbered 4503 there is a small specimen of *B. gracilis*, var. *nervipilosa* A. DC. (l. c.), obviously not included in the description of *B. tuberosa*.

B. heracleifolia Schlecht. & Cham. in Linnaea v. 603 (1830). There is only one sheet of this material (Mad.), number 4511. It is labeled with a name never published by Sessé & Mociño nor used for any plant of the New World. Although the name was used by Graham for an Old World species there seems no need to give it any status here.

B. manicata Brongn. ex Cels. in Journ. Jard. xi. 104 and 256, tab. s. n. (1842) [Ann. Fl. et Pom.]; l'Hort. Univ. iv. 33 (1843); Cels. ex Vis. Orto de Padov. 135 (1842).

Material of this species is numbered 4508. Although not so scaly as some specimens there is no question of the identity of the material. A name not later published by Sessé & Mociño ap pears on the labels but since it has been published and used for a South American species it will not be given here.

B. MONOPHYLLA Pavon ex A. DC., Prod. xv^1. 284 (1864). *B. unifolia* Rose ex Trelease in Rept. Mo. Bot. Gard. xv. 80 (1904).

This species has been considered earlier[1] and the assumption made then on the basis of study of the type-photograph is now confirmed by study of the material. There are two collections, one, number 4517 is labeled *B. monophylla* and the other, number 4518 which is identical with it, labeled with an unpublished name.

B. MONOPTERA Link & Otto, Ic. Pl. Rar. 27, t. 14 (1828). *B. reniformis* Pav. ex A. DC., Prod. xv^1. 308 (1864) in synon. *B. syphillitica* Sessé & Mociño, Pl. Nov. Hisp. 162 (1890); Fl. Mex. ed. 2: 219 (1896) [as *syphilitica*].

Collection-number 4516 (Mad.) labeled "1889 21.2" "Begonia Reniformis" is this species in small part; another sheet of the same number (Mad.) is also this species in small part. Of two specimens numbered 4516 (CM) one, (their no. 851104) is this species and another (their no. 851083) with "Begonia reniformis 1889" is this species, excluding the pocket material. The Madrid specimen 4513, which is labeled *B. reniformis* also belongs here.

B. NELUMBIIFOLIA Schlecht. & Cham. in Linnaea v. 604 (1830); A. DC. Prod. xv^1. 343 (1864). *B. peltata* Sessé & Mociño. Fl. Mex. ed. 2: 219 (1896) non Otto & Dietr. Allgem. Gartenzeit. ix. 58 (1841), nec Hassk. in Hoev. & DeVriese, Tijdschr. x. 133 (1843), nec A. DC. in Ann. Sci. Nat. ser. 4. xi. 138 (1859), nec Elmer, Leafl. Philipp. Bot. vii. 2556 (1915).

Number 4506 (Mad.) belongs here; also the fruiting material of 4943 (Mad.).

B. OAXACANA A. DC., Prod. xv^1. 312 (1864).

This material, number 4519, labeled with an unpublished name, is fragmentary, but sufficient for identification here.

B. PUSTULATA Liebm. in Kjoeb. Vidensk. Meddel. [Mexic. Begon.] for 1852. 6 (1853).

[1] Smith & Schubert in CONTRIB. GRAY HERB. cxxvii. 26 (1939).

Only one collection, consisting of a few leaves and a scrap of inflorescence in a pocket of 4943 (Mad.), belongs here.

B. **relicta** Smith & Schubert, spec. nov., e fragmentis solum cognita, herba cum caule simplice in speciem; caule striato glabroque; foliis oblique rectangulis cum tribus lateribus plerumque lobatis, basi cordatis, chartaceis, glabris undique, marginibus minutissime laxeque denticulatis et puberulentibus, cum venis praecipuis (plerumque 5) existitis palmate, diffunditur dichotome et in apicibus loborum terminantibus, 5–9.5 cm. longis, 7–12 cm. latis; stipulis mox deciduis in speciem, nullis visis; petiolis tenuibus, striatulis, glabris, 3.5–7.5 cm. longis; bracteis non visis; floribus masculinis cum 4 tepalis, duobus exterioribus orbiculato-ovatis cum apice late acuto et basi aliquatenus profunde lobato, marginibus denticulatis supra medium, circa 7 mm. longis et 8 mm. latis, duobus interioribus tenuissimis, acutis, circa 4.5 mm. longis et 1.5 mm. latis, staminibus numerosis, filamentis liberis, antheris orbiculatis, pedicellis 2–4 mm. longis; floribus femineis valde immaturis. Tab. II.

The type of the species and the only collection we have seen is *Sessé, Mociño et al.*, no. 4507 (CM, no. 850042, Mad.). The CM sheet is labeled with a name not published by Sessé & Mociño but later used by another author for a Brazilian species. Close study of the material has eliminated it from a place in any known Mexican species. Its closest relative seems to be *B. extranea* Smith & Schubert, a member of the section *Huszia*.

B. TOVARENSIS Kl. in Monatsb. Berl. Acad. 122 (1854) [March].

Material of collection 4516 (CM, no. 851083, p.p.; Mad. 2 sheets, p.p.) belongs to this species.

B. URUAPENSIS Sessé & Mociño, Pl. Nov. Hisp. 162 (1890); Fl. Mex. ed. 2: 219 (1896). *B. asteroides* Smith & Schubert in CONTRIB. GRAY HERB. cxxvii. 30, t. 2, fig. 28–30 (1939).

One specimen numbered 4500 (Mad.) and one 4501 (Mad., excluding CM 850010 which is noted under *B. Barkeri*), both of which were identified as *B. macrophylla*, and two numbered 4502 are *B. uruapensis*, the only species of Sessé & Mociño we have been able to maintain.

3.—STUDIES IN THE BROMELIACEAE—XIII

By Lyman B. Smith

(Plates III and IV)

Aechmea (**Lamprococcus**) **brevicollis,** spec. nov., acaulis, stolonibus elongatis procreans; foliis paucis, subdistiche imbricatis, utrinque adpresse albo-lepidotis, vaginis magnis, utriculum graciliter ovoideum formantibus, ovatis, ad 16 cm. longis, inermibus, laminis ligulatis, acutis, basi paulo angustatis, 12–25 cm. longis, 16–26 mm. latis, planis, spinis patentibus 2–3 mm. longis laxe armatis, exterioribus valde reductis; scapo gracili, in utriculo fere omnino occultato; scapi bracteis ellipticis, acutis, membranaceis; inflorescentia dense pauciramosa, 5 cm. longa; bracteis primariis lanceolatis, acutis, spicas superantibus, laxe serrulatis, albo-flocculosis; spicis distiche 5–7-floris, flexuosis, paulo flocculosis; bracteis florigeris navicularibus, ad 7 mm. longis, quam ovariis multo brevioribus, minutissime apiculatis, integris, tenuibus; floribus sessilibus, suberectis, aureis (! L. Williams); sepalis late rotundatis, basi ad 1 mm. connatis, lobis ca. 2.5 mm. longis; petalis sublinearibus, obtusis cucullatisque, 10 mm. longis, basi ligulis binis fimbriatis auctis; ovario cylindrico, 10 mm. longo, tubo epigyno magno, placentis apicalibus, ovulis apiculatis. Tab. III, fig. 1, 2.

VENEZUELA: Amazonas: epiphytic, Maroa, Río Guainía, alt. 127 m., Feb. 11, 1942, *L. Williams 14267* (US, type; phot. G); Cerro Yapacana, upper Río Orinoco, alt. ca. 100 m., April, 1931, *Holt & Blake 728* (G, cotype).

COLOMBIA: Uaupes: dense forest, San Felipe, Rio Negro, alt. 100 m., Jan. 29, 1930, *Holt & Gehriger 336* (US; phot. G, doubtfully referred here because of the poor condition of the inflorescence).

Aechmea brevicollis is most nearly related to *Ae. corymbosa* (Mart.) Mez, but differs in its much shorter sepals, well developed floral bracts and cylindrical ovary.

Billbergia amoena (Lodd.) Lindl. var. **viridis,** var. nov., petalis omnino viridibus.

BRAZIL: Espirito Santo: terrestrial in the shade, Santa Tereza, July 27, 1939, *M. B. & R. Foster 246* (G, type).

Billbergia chlorantha, spec. nov., florifera 35 cm. alta (si inflorescentia pendula erigitur); foliis 3 dm. longis, utrinque densissime adpresseque albido-lepidotis, pallide viridibus, purpureo-maculatis, vaginis ellipticis, quam laminis bene latioribus, laminis ligulatis, ultra 3 cm. latis, ad basin versus paulo angustatis, apice rotundatis breviter mucronatisque, spinis subrectis ad 2 mm. longis laxe armatis; scapo gracili, curvato, mox glabro; scapi bracteis erectis, amplis, imbricatis, ellipticis, apiculatis, vivis albidis (! Foster), dense adpresseque albo-lepidotis; inflorescentia paniculata, 17 cm. longa; bracteis primariis eis scapi similibus, magnis, flores ante anthesin occultantibus; ramis brevibus, 1–2-floris; bracteis florigeris suborbicularibus, apiculatis, haud 2 mm. longis; floribus sessilibus; sepalis oblongis, obtusis, paulo asymmetricis, 16 mm. longis; petalis linearibus, obtusis, 4 cm. longis, omnino albido-viridibus, basi ligulis binis fimbriatis auctis, stamina superantibus; staminibus liberis, pollinis granulis ellipsoideis, reticulatis, siccis sulcatis; ovario cylindrico, 15 mm. longo, tubo epigyno nullo sed lacunis tribus profunde infundibuliformibus inter carpella collocatis; placentis linearibus; ovulis caudatis. Tab. III, fig. 3–6.

BRAZIL: ESPIRITO SANTO: Santa Tereza, collected July 28, 1939, cultivated and flowering Jan. 1942, *M. B. & R. Foster 287* (G, TYPE).

In the shape of its inflorescence, *Billbergia chlorantha* closely resembles *B. Sanderiana* E. Morr., but it has minute floral bracts and wholly green petals. The caudate character of the ovules is rare in the genus and the presence of three pockets between the carpels instead of an epigynous tube is most unusual throughout the *Bromeliaceae.*

Billbergia leptopoda, spec. nov., florifera 3–4 dm. alta; foliis paucis, breviter tubuloso-rosulatis, interioribus 2–3 dm. longis, subtus lepidibus albis adpressis vestitis, pallido-maculatis, vaginis ellipticis, magnis, pallide purpureis, laminis ligulatis, acutis, 25–35 mm. latis, spinis ad 2 mm. longis laxe armatis; scapo erecto, gracili, glabro; scapi bracteis erectis et supremis imbricatis, lanceolatis, acutis, 4–5 cm. longis, roseis; inflorescentia simplicissima, erecta, pauciflora, laxa, glabra; rhachi gracillima, geniculata; bracteis florigeris eis scapi similibus, minimum ovarium superantibus; floribus divergentibus; pedicellis gracilibus, 5–20 mm. longis; sepalis anguste ellipticis, rotundatis minute apiculatisque, 18–21 mm. longis; petalis linearibus, apice atro caeruleo excepto viridibus, 35–45 mm. longis, stamina superantibus, basi ligulis binis serratis auctis; pollinis granulis ellipsoideis, eporatis; ovario ellipsoideo, 13–17 mm. longo, fere laeve, tubo epigyno crateriforme, distincto, placentis linearibus, ovulis obtusis. Tab. III, fig. 7, 8.

BRAZIL: ESPIRITO SANTO: terrestrial and near the ground on tree trunks, Santa Tereza, alt. 765 m., July 28, 1939, *M. B. & R. Foster 304* (G, COTYPE); MINAS GERAES: on shaded rocks, Gob. Valadores (Figueiro), by the Rio Doce, July 28, 1940, *M. B. & R. Foster 765* (G, TYPE).

This species is distinguished from the closely related *Billbergia Lietzei* E. Morr. by its spotted leaves and broadly rounded sepals.

Catopsis nutans (Sw.) Gris. var. **robustior** var. nov., scapo erecto vel suberecto, robustiore, ad 3 mm. diametro; scapi bracteis minus remotis vel aliquis paulo imbricatis.

GUATEMALA: CHIQUIMULA: epiphyte, Cerro Brujo, in vicinity of Río Negro, below Montaña Montenegro, near village of Brujo, alt. 1500–2000 m., Nov. 1, 1939, *Steyermark 30960* (Chicago Museum); QUEZALTENANGO: along old road between Finca Pirineos and Patzulín, alt. 1200–1400 m., Feb. 9, 1941, *Standley 87157* (CM, TYPE; G); epiphyte, lower south-facing slopes of Volcán Santa María between Finca Pirineos and Los Positos, between Santa María de Jesús and Calahuaché, alt. 1300–1500 m., Jan. 8, 1940, *Steyermark 33803* (CM).

Catopsis pedicellata, spec. nov., florifera ad 6 dm. alta; foliis multis, cyathiformi-rosulatis, ad 2 dm. longis et 45 mm. latis, subellipticis, cum vaginis vix distinctis, acutis vel subacutis apiculatisque, angustissime pallido-marginatis, glabris; scapo erecto, gracili; scapi bracteis ellipticis, acutis, erectis et supremis exceptis imbricatis; inflorescentia laxe tripinnatim paniculata, 19 cm. longa; bracteis primariis ovatis, acutis, parvis; ramis suberectis, laxe florigeris; bracteis florigeris late ovatis, pedicellos paulo superantibus; pedicellis gracilibus et valde distinctis, 1–1.5 mm. longis; sepalis late ellipticis, obtusis, subsymmetricis, 2.5 mm. longis, tenuibus; petalis 5 mm. longis, delapsis solum cognitis; staminibus ignotis; capsula gracili, acuta, 12–13 mm. longa. Tab. IV, fig. 1.

GUATEMALA: CHIQUIMULA: epiphytic in pine and oak woods, southern slope near top of pine ridge, Cerro Tixixí, 3–5 miles north of Jocotán, alt. 500–1500 m., Nov. 10, 1939, *Steyermark 31641* (CM, TYPE; phot. G).

Catopsis pedicellata is unique in the genus in its slenderly pedicellate flowers.

Greigia Steyermarkii, spec. nov., terrestris; caule robusto, 1.5–2.4 m. longo; foliis 1 m. et ultra longis, patentibus vel adscendentibus, vaginis anguste triangulari-ovatis, atro castaneis, extus membrana albida obtectis, intus subglabris, ad apicem versus spinis atris robustis ad 4 mm. longis subdense armatis, laminis linearibus, longe acuminatis, basi paulo constrictis canaliculatisque, ad 3 cm. latis, supra glabris, subtus albido-lepidotis, spinis pallidis ad 1.5 mm. longis armatis; inflorescentia densa, pauciflora; bracteis exterioribus triangulari-ovatis, acuminatis, pungentibus, atro-castaneis, albido-lepidotis, grosse serratis; bracteis florigeris lanceolatis, acuminatis, integris, carinatis, pungentibus, 26 mm. longis, a sepalis superatis, albo-lepidotis, ad apicem versus castaneis; floribus 4 cm. longis; sepalis bracteis florigeris similibus, 22 mm. longis; petalis 30–32 mm. longis, albis (! Steyermark); staminibus styloque inclusis. Tab. IV, fig. 2.

GUATEMALA: ZACAPA: by little stream in cloud forest, upper slopes along Río Repollal to summit of mountain, alt. 2100–2400 m., Jan. 12–13, 1942, *Steyermark 42553* (CM, TYPE; phot. G).

In my key (CONTRIB. GRAY HERB. xcviii. 8), this species comes out next to *G. Macbrideana* from which it differs in its shorter floral bracts and its sepals with a terminal rather than a subapical mucro.

Tillandsia brachycaulos Schlecht. var. **multiflora,** var. nov., robustior; spicis elongatis, sublaxis, ad 4-floris. Tab. IV, fig. 3.

GUATEMALA: ZACAPA: trail between Río Hondo and waterfall, alt. 250–400 m., Oct. 10, 1939, *Steyermark 29465* (CM, TYPE; phot. G).

Tillandsia deflexa, spec. nov., acaulis; foliis crateriforme rosulatis, ad 8 dm. longis, vaginis ellipticis, viridibus, utrinque obscure punctulato-lepidotis, laminis ligulatis, acuminatis, 35 mm. latis, supra glabris, subtus punctulato-lepidotis; scapo deflexo, 4 dm. longo; scapi bracteis foliaceis, erectis, densissime imbricatis; inflorescentia laxe bipinnatim paniculata, 2 dm. longa, glabra; bracteis primariis inferioribus subfoliaceis, vaginis suis spicas aequantibus vel superantibus; spicis patentibus, lanceolatis, acutis, complanatis, 6–7 cm. longis, haud 2 cm. latis, ca. 6-floris; bracteis florigeris erectis, dense imbricatis, lanceolatis, acutis, 5 cm. et ultra longis, acute carinatis, subcoriaceis, sublucidis; floribus sessilibus; sepalis lineari-lanceolatis, acutis, 28 mm. longis, posticis alte connatis; petalis staminibusque ignotis; capsula sepala subaequanti. Tab. IV, fig. 4, 5.

GUATEMALA: SAN MARCOS: above Finca El Porvenir, up Cerro de Mono, south-facing slopes of Volcán Tajumulco, alt. 1400–1700 m., Mar. 9, 1940, *Steyermark 37390* (CM, TYPE; phot. G).

In its hanging lax inflorescence, *Tillandsia deflexa* is reminiscent of *T. Standleyi*, but it has nearly concolorous leaves with ligulate blades, larger floral bracts and connate posterior sepals.

Tillandsia fasciculata Sw. var. **rotundata,** var. nov., inflorescentia globosa; bracteis primariis suborbicularibus, apiculatis; spicis ovatis, complanatis, 4–6 cm. longis; bracteis florigeris cucullatis, ex sicco plus minusve rugosis. Tab. IV, fig. 6, 7.

GUATEMALA: ZACAPA: San Lorenzo, alt. 1600 m., Jan. 24, 1942, *Steyermark 43158* (G, CM); HUEHUETENANGO: Carrizal, Aug. 17, 1942, *Steyermark 50809* (CM, TYPE; phot. G).
HONDURAS: COMAYAGUA: epiphytic in forest near El Achote, above the plains of Siguatepeque, alt. 1350 m., July 15, 1936, *Yuncker, Dawson & Youse 5897* (CM).

This variety is easily distinguished by its very short broad primary bracts and spikes.

Tillandsia Krukoffiana, spec. nov., e fragmentis solum cognita, verisimiliter bimetralis vel ultra; foliis verisimiliter rosulatis, ad 8 dm. longis, vaginis subellipticis, ca. 2 dm. longis, utrinque dense minuteque ferrugineo-lepidotis, laminis ligulatis, acutis vel acuminatis, 6 cm. latis, glabris; scapo ignoto; inflorescentia maxima, laxissime 3-pinnatim paniculata; axibus gracilibus, glabris; bracteis primariis ovatis, acutis, 4 cm. longis, quam basibus sterilibus elongatis ramorum multo brevioribus; ramis patentibus, ad 35 cm. longis, basi bracteis sterilibus 1–5 auctis; bracteis secundariis eis primariis similibus sed paulo minoribus, quam spicis subduplo brevioribus; spicis patentibus vel deflexis, anguste lanceolatis, acutis, complanatis, 45–65 mm. longis, 10–15 mm. latis, subdense 5–7-floris, basi bracteis sterilibus reductis binis auctis; bracteis florigeris imbricatis, ellipticis, acutis, ad apicem versus carinatis, ad 25 mm. longis, sepala bene superantibus, subchartaceis, valde nervatis, utrinque dissite obscureque lepidotis; floribus subsessilibus; sepalis ellipticis, 19 mm. longis, nervatis, glabris, posticis carinatis, ad 4 mm. connatis; petalis staminibusque ignotis. Tab. III, fig. 9–11.

BOLIVIA: LA PAZ: Prov. S. Yungas, basin of Rio Bopi, San Bartolome (near Calisaya), alt. 750–900 m., July, 1939, *Krukoff 10503* (G, TYPE; NY).

There can be little doubt that *Tillandsia Krukoffiana* belongs in the subgenus *Allardtia,* where its elongate branches and spreading to reflexed spikes immediately distinguish it.

Tillandsia ponderosa, spec. nov., verisimiliter acaulis, florifera 7–8 dm. alta; foliis inflorescentiam subaequantibus, vaginis magnis, ellipticis, flavo-viridibus vel purpureis, utrinque punctulato-lepidotis, laminis lineari-triangularibus, acuminatis, 4–5 cm. latis, utrinque lepidibus adpressis cinereis centro brunneis dense vestitis; scapo erecto, valido; scapi bracteis foliaceis, magnis, erectis, densissime imbricatis; inflorescentia densissime bipinnatim paniculata, ponderosa, late ellipsoidea vel subglobosa; bracteis primariis suberectis, subfoliaceis, vaginis suis suborbicularibus, quam spicis axillaribus bene brevioribus, laminis spicas inferiores superantibus; spicis breviter stipitatis, late lanceolatis, acutis, complanatis, ad 15 cm. longis, 4 cm. latis, ca. 8-floris; bracteis florigeris erectis, dense imbricatis, ad 55 mm. longis, sepala superantibus, ellipticis, acutis, acute carinatis, leviter incurvatis, coriaceis, laevibus vel leviter nervatis, glabris, vivis rubris vel aureis; sepalis liberis, oblongis, late acutis, 4–5 cm. longis; petalis linearibus, purpureis; antheris exsertis. Tab. IV, fig. 8, 9.

GUATEMALA: EL PROGRESO: hills north of Finca Piemonte, between Finca Piemonte and summit of Volcán Santa Luisa, alt. 2400–3333 m., Feb. 5, 1942, *Steyermark 43524* (G, CM); ZACAPA: pine forest, Sierra de las Minas, near summit of ridge, below Finca Alejandria, alt. 1700–2000 m., Oct. 12, 1939, *Steyermark 29797* (CM, TYPE); upper slopes along Río Repollal to summit of mountain, Sierra de las Minas, alt. 2100–2400 m., Jan. 12–13, 1942, *Steyermark 42570* (G, CM); JALAPA: epiphyte in cloud forest on top, Volcán Jumay, north of Jalapa, alt. 1300–2200 m., Dec. 1, 1939, *Steyermark 32318* (CM); HUEHUETENANGO: on oak tree on upper slopes, La Sierra (Tujimach), across river from San Juan Atitán, Sierra de los Cuchumatanes, alt. 2500–2900 m., Sept. 8, 1942, *Steyermark 51999* (G, CM).

Among North American species, *Tillandsia ponderosa* keys out to the vicinity of *T. Bourgaei,* but differs in its stouter inflorescence, larger glabrous spikes and free sepals as well as in several other obvious characters. Actually it is probably more nearly related to *T. imperialis,* although it fails to arrive there in the key because of the relatively short sheaths of its primary bracts.

Tillandsia tricolor Schlecht. & Cham. var. **picta,** var. nov., foliorum vaginis plus minusve pallido-maculatis.

GUATEMALA: ALTA VERAPAZ: on tree, along Río Polochic, above Tamahú, alt. ca. 1200 m., April 10, 1941, *Standley 92046* (CM, TYPE).

Vriesia pycnantha, spec. nov., florifera 7–8 dm. alta; foliis cyathiformi-rosulatis, fere 6 dm. longis, vaginis ellipticis, ultra 10 cm. longis, basi atro-castanea excepta viridibus, lepidibus minutis brunneis dissite vestitis, laminis ligulatis, acutis apiculatisque, 3–4 cm. latis, planis, omnino viridibus, supra glabris, subtus minute obscureque lepidotis; scapo erecto, 1 cm. diametro; scapi bracteis erectis imbricatisque, foliaceis vel subfoliaceis; inflorescentia simplicissima, perdensa, oblongo-elliptica, complanata, 8–14 cm. longa; rhachi recta, sulcata, rhachis internodiis 6 mm. longis vel minus; bracteis florigeris juvenilibus solum cognitis, latissime ovatis, subacutis apiculatisque, 35 mm. longis, ad apicem versus paulo carinatis, tenuibus, valde rugosis, dissite brunneo-lepidotis, pallido-viridibus; floribus nullo modo secundis; pedicellis 3–4 mm. longis, valde angulatis; sepalis late oblongo-ellipticis, paulo asymmetricis, truncatis vel paulo retusis, 18 mm. longis, basi carinatis, subcoriaceis, glabris, castaneis; petalis staminibusque ignotis; capsula graciliter ellipsoidea, 35 mm. longa, seminum coma pulchre rubro-brunnea. Tab. IV, fig. 10–12.

GUATEMALA: QUEZALTENANGO: epiphytic, high barranco along Río Samalá between Santa Maria de Jesús and Calahuaché, alt. 1200–1300 m., Jan. 9, 1940, *Steyermark 33902* (CM, TYPE; phot. G).

Its rugose floral bracts and simple inflorescence would appear to place *Vriesia pycnantha* among the species around *V. gladioliflora,* but it is unlike any of these in the delicate texture of its floral bracts and in the extreme density of its inflorescence with floral bracts 6 to 8 times as long as the internodes.

Explanation of Plate III

Fig. 1. Aechmea brevicollis L. B. Smith (*L. Williams 14267*), primary bract and spike × 1.
2. Same, sepals × 1.
3. Billbergia chlorantha L. B. Smith (*Foster 287*), section of inflorescence × ½.
4. Same, sepal × 1.
5. Same, longitudinal section of ovary × 1.
6. Same, ovule × ca. 5.
7. Billbergia leptopoda L. B. Smith (*Foster 765*), habit × ½.
8. Same, sepal × 1.
9. Tillandsia Krukoffiana L. B. Smith (*Krukoff 10503*), branch of inflorescence × ⅕.
10. Same, spike × ½.
11. Same, sepals × 1.

Explanation of Plate IV

Fig. 1. Catopsis pedicellata L. B. Smith (*Steyermark 31641*), old flower with capsule × 1.
2. Greigia Steyermarkii L. B. Smith (*Steyermark 42553*), floral bract and flower × 1.
3. Tillandsia brachycaulos Schlecht. var. multiflora L. B. Smith (*Steyermark 29465*), spike × 1.
4. Tillandsia deflexa L. B. Smith (*Steyermark 37390*), primary bract and spike × ½.
5. Same, posterior sepals × ½.
6. Tillandsia fasciculata Sw. var. rotundata L. B. Smith (*Steyermark 50809*), inflorescence × ½.
7. Same, sepal × ½.
8. Tillandsia ponderosa L. B. Smith (*Steyermark 29797*), inflorescence × ½.
9. Same, sepal × 1.
10. Vriesia pycnantha L. B. Smith (*Steyermark 33902*), apex of leaf × ½.
11. Same, inflorescence × ½.
12. Same, old flower with capsule × 1.

4.—TWO NEW SPECIES OF BOMAREA FROM PERU

César Vargas C.

(Plates V and VI)

My recent collecting and investigations into the flora of the Department of Cuzco, Peru, and in particular, a critical study of the genus *Bomarea* of the *Amaryllidaceae* have led me to propose new species from this region, two of which are the following:

1. BOMAREA **Herrerae,** n. sp. tab. V, caule volubili, ca. 4 m. longo, crasso, glabro, angulari; foliis lanceolatis, subtus cano-puberulentibus, ad 10 cm. longis et 2 cm. latis; radiis umbellae ca. 8, bracteolatis, puberulis, 4–6 cm. longis; sepalis oblanceolatis, aureis, 3–4 cm. longis, 1.2–1.8 cm. latis; petalis spathulatis, aureis, purpureo-maculatis, ad 1.8 cm. latis; ovario rufo-tomentuloso.

I am happy to dedicate this species to my colleague and former teacher Dr. Fortunato L. Herrera, as a tribute to his accomplishments in the Department of Botany at the University of Cuzco.

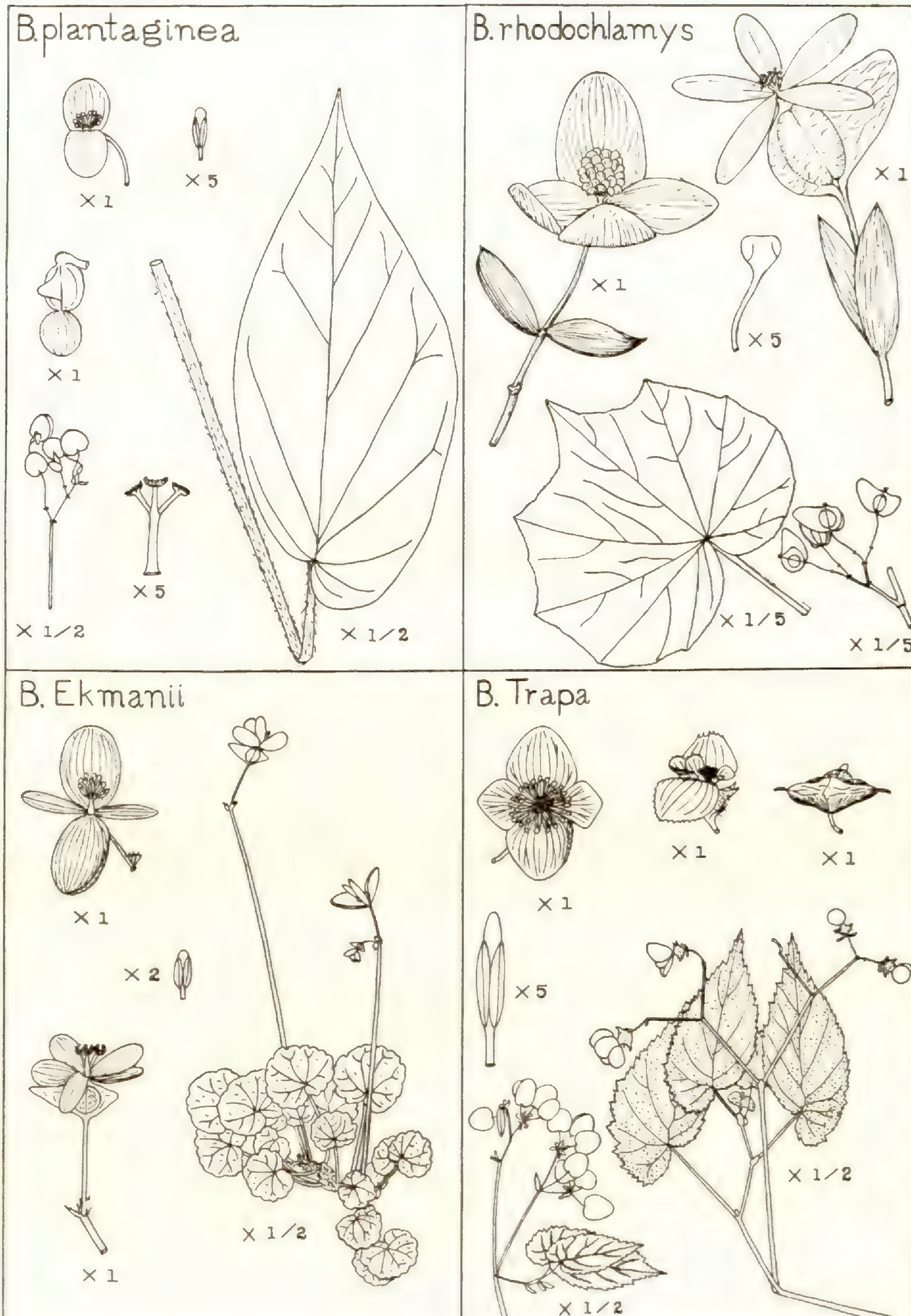
PERU: CUZCO: procede de la Cordillera de Tres Cruces, Paucartambo, 3600 m. alt., octubre de 1941, *C. Vargas C.*, no. 2258 (TYPE in Herb. Vargas, Univ. de Cuzco; ISOTYPES in Herb. Gray. and U. S. Nat. Herb.).

This species is very close to *Bomarea superba* Herbert (Amaryllidaceae, 117, pl. 6, fig. 1 (1837)) for the leaf-shape of both species is similar, however, the leaves of *B. Herrerae* are not glabrous but pilose; also the two species resemble each other in perianth-color, but *B. Herrerae* has the petals spotted. There is, in addition, a difference in form and size of segments which I consider of specific importance.

2. B. **densifolia,** n. sp. tab. VI, caule erecto, crasso, non-nihil curvato in cacumine, glabro vel rufo-tomentuloso, folioso; foliis appressis, lanceolatis, ad 6 cm. longis, 1 cm. latis, glabris vel utrinque aureo-puberulentibus; radiis primariis umbellae ad 8, 1- vel 2-furcatis; bracteis ovato-lanceolatis, 3.5 cm. longis, 1.8 cm. latis; bracteolis oblongis, persistentibus; sepalis linearibus, oblongis, roseis, ca. 5 cm. longis, 1.2 cm. latis, nonnihil viridi-tinctis; petalis spathulatis sepalis subaequalibus, aureo- vel viridi-tinctis.

PERU: CUZCO: en la área de las ruinas antiguas, Puyupatamarca, Urubamba, 3200–3600 m. alt., 28 de agosto de 1942, *C. Vargas C.*, no. 2725 (TYPE in Herb. Vargas, Univ. de Cuzco; ISOTYPES in Herb. Gray, and U. S. Nat. Herb.).

No allied species in the flora of Peru has been found nor has study of the treatment of the Peruvian species of *Bomarea* by Killip (in Macbride, Fl. Peru, Field Mus. Pub. Bot. xiii. 633–662 (1936)) revealed any close relatives to *B. densifolia*.


B. plantaginea
× 1
× 5
× 1
× 1/2
× 5
× 1/2
B. rhodochlamys
× 1
× 1
× 5
× 1/5
× 1/5
B. Ekmanii
× 1
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B. Trapa
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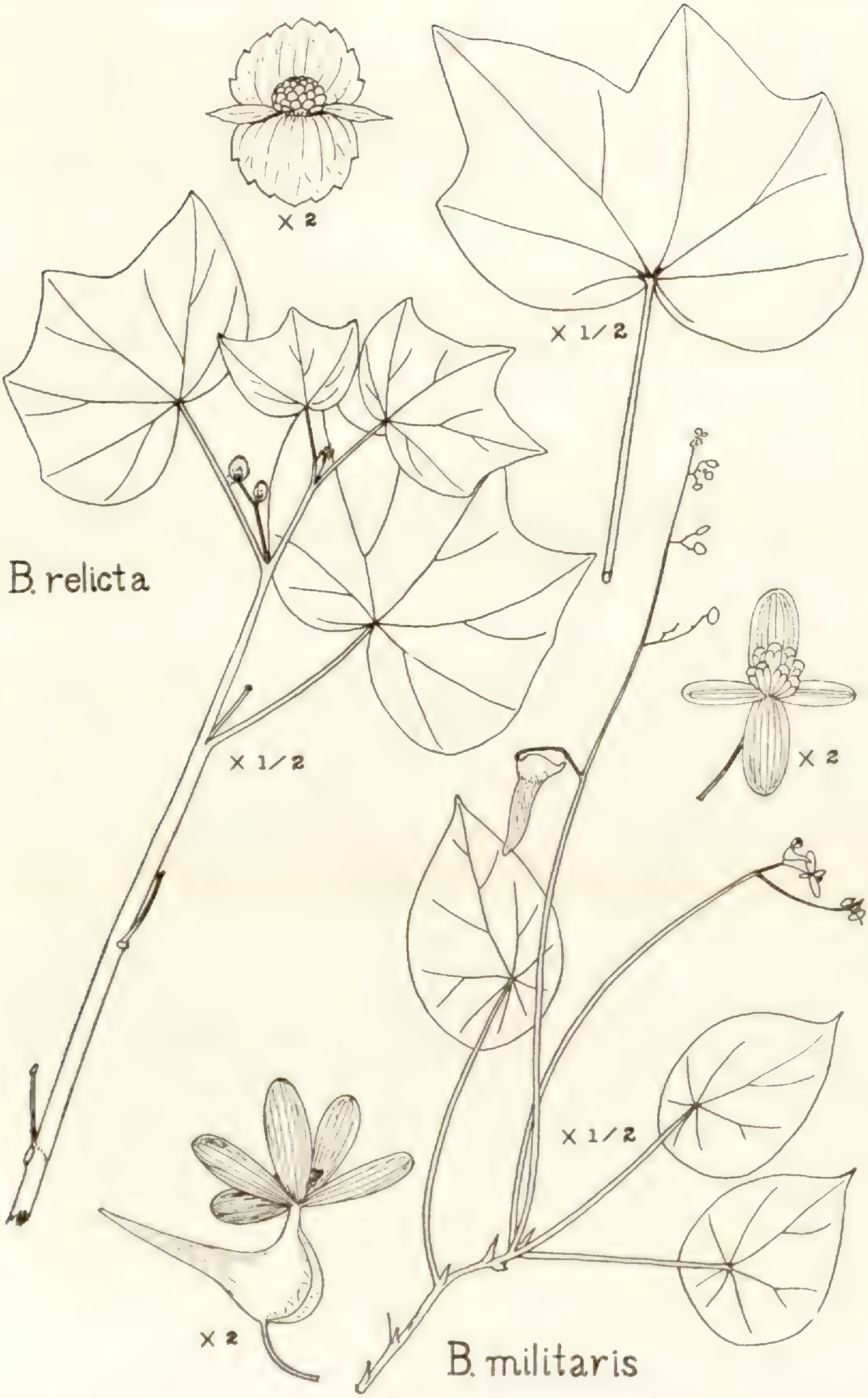
Begonia



Begonia

Fig. 1–2, AECHMEA BREVICOLLIS L. B. Sm.; 3–6, BILLBERGIA CHLORANTHA L. B. Sm.; 7–8, B. LEPTOPODA L. B. Sm.; 9–11, TILLANDSIA KRUKOFFIANA L. B. Sm.

Fig. 1, CATOPSIS PEDICELLATA L. B. Sm.; 2, GREIGIA STEYERMARKII L. B. Sm.; 3, TILLANDSIA BRACHYCAULOS Schlecht. var. MULTIFLORA L. B. Sm.; 4–5, T. DEFLEXA L. B. Sm.; 6–7, T. FASCICULATA Sw. var. ROTUNDATA L. B. Sm.; 8–9, T. PONDEROSA L. B. Sm.; 10–12, VRIESIA PYCNANTHA L. B. Sm.

Bomarea Herrerae Vargas

BOMAREA DENSIFOLIA Vargas

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New scientific names are printed in full-face type

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1. STUDIES IN THE IRIDACEAE,—III.

The third paper of this series presents studies of several small groups of American *Iridaceae*, with miscellaneous notes and descriptions of novelties in groups currently under consideration. In addition to the material in the Gray Herbarium (G), I have seen material from the following institutions: United States National Herbarium (US), Chicago Natural History Museum (F), New York Botanical Garden (NY), Missouri Botanical Garden (MBG), Philadelphia Academy of Sciences (P), and the Bebb Herbarium of the University of Oklahoma (O). To the administrative officers of these herbaria I am much indebted for their generosity in making this material available to me.

I. Three New Genera of South American Iridaceae.

Among the undetermined, or tentatively determined, specimens of South American *Iridaceae* in the Gray Herbarium, there are several which have puzzled me for some time, and which had, therefore, been set aside for concentrated study. Now that it has been possible to study them in detail, the reason for the inability to place them in their proper categories is apparent. Without doing undue violence to generic concepts, they cannot be allocated to any genera recognized at the present time. Nor, indeed, do they seem referable to any known species. Consequently, with considerable reluctance, I am erecting three genera to contain the six species here described as new.

i. **Cardenanthus,** gen. nov. Herbae parvae, bulbosae, subacaulescentes. Folia pauca, anguste linearia. Inflorescentia subsessilis, spathae terminales, flores perbreve pedicellati. Flores basi infundibuliformes, tepala basi in tubo coalita, multo inaequalia, exteriora oblanceolato-spathulata, interiora reducta, angustissime lineari-subulata vel anguste lineari-oblanceolata. Staminum filamenta monadelpha; antherae in tubo sessiles vel subsessiles, ad styli ramos oppositae. Stylus filiformis, trifurcatus, rami bifidi, canaliculati, apice stigmatosi. Capsula seminaque non visa.

Type-species: *C. boliviensis.*

The four species which constitute this new genus are, at present, unique in being the only bulbous American irids with a true perianth-tube. The only other New World irids with a true tube are *Iris*, *Phaiophleps*, *Solenomelus*, and *Chamelum*, all of which have a rhizome or a subrhizomatous rootstock. With stamens opposite the style-arms, this genus would fall into either the cypelloid or the tigridioid group. The style, with its canaliculate bifid arms and apical stigmatose areas, is definitely not cypelloid, although the reduced inner tepals and the infundibuliform base of the flower suggest *Mastigostyla*, which also has a rudimentary perianth-tube. Consequently, *Cardenanthus* may be placed in the tigridioid group.

The name is derived from that of the collector of the first material studied, the distinguished Bolivian botanist, Professor Martín Cárdenas, combined with the Greek word for flower.

KEY

a. Inner tepals glandular at base or apex of claw; perianth-tube 3–4 mm. long.
  b. Inner tepals 5 mm. long, or less, the linear blade less than 0.5 mm. wide. . . . . 1. *C. boliviensis*
  b. Inner tepals 10 mm. long, the narrowly oblanceolate blade 1.5 mm. wide. . . . . 2. *C. Shepardae*
a. Inner tepals not glandular; perianth-tube not over 2 mm.
  c. Inner tepals narrowly deltoid, to 3.5 mm. long, widest at the base (1 mm.). . . . . 3. *C. tunariensis*
  c. Inner tepals narrowly oblanceolate, to 8 mm. long, widest above the middle (1 mm.). . . . . 4. *C. Venturii*

1. CARDENANTHUS **boliviensis,** spec. nov. Herba bulbosa, subacaulescens (caule subterraneo 2–4 cm.). Bulbus ovoideus, ad 2 cm. altus, 1 cm. latus, tunicis brunneis, laevigatis. Folia basalia 0; folia caulina 2, spathas subtendentia, inferius ad 9 cm. longum, 1 mm. latum, superius ad 4 cm. longum, 1 mm. latum, linearia, glabra. Spathae herbaceae, exterior 1.5–2 cm. longa, acuta, interior 2–2.5 cm. longa, obtusa, retusa, 2–3-fl., floribus subsessilibus. Ovarium ca. 3 mm. longum, ellipsoideum, glabrum. Flores coerulei, plus minusve infundibuliformes; perianthii tubus ad 4 mm. longus; tepala exteriora ad 1.4 cm. longa, 4–5 mm. lata, ovata, acuminata, apice subobtusa; tepala interiora ad 5 mm. longa, linearia, basi tumescentia, glandulosa (?), parte tumescente 0.75 mm. longa, lamina ca. 0.33 mm. lata, non acuminata. Staminum columna 5 mm. longa, apice perianthii tubi inserta; antherae 5 mm. longae. Stylus ca. 8–9 mm. longus; styli rami 3.5 mm. longi, semibifidi, parte stigmatosa ciliata. BOLIVIA: POTOSÍ: Potosí, 4000 m. alt., January, 1932, *M. Cárdenas*, no. 124 (TYPE, G).

Of this species, the type of the genus, there are no data available as to habitat, but it may, like the next, grow in sandy places.

Like its congeners, it has small flowers, and great care and patience are necessary for dissecting out the inner tepals and style in which the technical characters are found. So far as can be seen, the blade of the inner tepals is completely linear, with a blunt apex, a marked contrast to the other members of the genus.

2. C. **Shepardae,** spec. nov. Bulbus ovoideus, 1.5 cm. altus, 0.5–1 cm. latus. Folia basalia 1–2, ad 4 cm. longa, 1 mm. lata, linearia, acuta, glabra; folium caulinum unicum, spathas subtendens, subspathiforme, ad 2.7 cm. longum, 1 mm. latum, subfalcatum. Caulis (plerumque subterraneus) 1–1.5 cm. longus, simplex. Spathae herbaceae, exterior ad 2.2 cm. longa, acuminata, acuta, interior ad 2.5 cm. longa, in apicem obtusa, retusa, attenuata, 2-fl., pedicelli anthesin ca. 4 mm. longi. Ovarium ca. 5 mm. longum, ellipsoideum, glabrum. Flores pallide purpurea; perianthii tubus 3.25 mm. longus; tepala exteriora ca. 1.5 cm. longa, ca. 4 mm. lata, oblanceolato-spathulata; tepala interiora ca. 1 cm. longa, 1.5 mm. lata, anguste oblanceolata, ad apicem unguis areola ovale glandulosa. Staminum columna ca. 1.1 cm. longa; antherae 4 mm. longae. Stylus columnam longitudine aequans; styli rami 2.5–3 mm. longi, bifidi paene ad basin. PERU: PUNO: Huancané: Umuchi, in sandy places, 3125 m. alt., Dec. 10, 1919, *Mrs. R. S. Shepard*, no. 99 (TYPE, G).

Like *C. boliviensis*, this species has an apparently glandular tumescent spot on the claws of the inner tepals, but at the apex, instead of at the base, and the inner tepals are narrowly oblanceolate, instead of linear. The style-arms are more deeply bifid than is the case in *C. boliviensis*.

3. C. **tunariensis,** spec. nov. Planta subacaulescens; bulbus ovoideus, ad 2 cm. altus, ca. 1 cm. latus. Folium basale unicum, 7–12 cm. longum, 1 mm. latum; folium caulinum unicum, spathas subtendens, 4–8 cm. longum, 1 mm. latum, glabrum. Spathae herbaceae, exterior ad 3 cm. longa, acuta, acuminata, interior 1.7–2.6 cm. longa, subobtusa, 2-fl., pedicelli ad 1.3 cm. longi. Ovarium ellipsoideum, glabrum, 4 mm. longum. Flores coerulei vel purpurei; perianthii tubus ad 2 mm. longus; tepala exteriora 1 cm. longa, 4 mm. lata, oblanceolata; tepala interiora ad 3.5 mm. longa, ad basin 1 mm. lata, anguste lanceolato-deltoidea vel -subulata, acuta, acuminata, eglandulosa. Staminum columna 5 mm. longa; antherae 3–3.5 mm. longae, in tubo subsessiles, penicillato-apiculatae. Stylus columnam longitudine aequans; styli rami 1.5 mm. longi, bifidi paene ad basin. BOLIVIA: COCHABAMBA: near snow-line, Mt. Tunari, 1891, *M. Bang*, no. 1042 (TYPE, G; COTYPES, MBG, US).

Unlike the preceding two species, *C. tunariensis* appears to lack the tumescent glandular areas on the inner tepals. These, moreover, are very distinct from those of *C. boliviensis* in being broadest at the base. The type-collection was cited in Mem. Torr. Club vi. 125 (1898) as *Nemastylis nana* S. Wats. This is a Mexican species, and its appearance in Bolivia would be most unlikely. It is clear from this identification that no serious attempt at dissection of the material could have been made, or, if it were, that the structures seen were completely misinterpreted.

4. C. **Venturii,** spec. nov. Planta subacaulescens; bulbus ovoideus, 1.5–2 cm. altus, 1–1.5 cm. latus. Folia basalia 1–2, ad 10 cm. longa, 1 mm. lata, linearia, glabra; folium caulinum unicum, spathas subtendens, ad 6.5 cm. longum, 1 mm. latum. Caulis plerumque subterraneus, 1–2 cm. longus. Spathae herbaceae, ad 2.5 cm. longae, vel interior brevior et obtusa, exterior acuta, 2-fl., pedicelli ad 5 mm. longi anthesin. Ovarium ellipsoideum, glabrum, ca. 4 mm. longum. Flores coerulei; perianthii tubus 2 mm. longus; tepala exteriora ad 1.5 cm. longa, 3 mm. lata, oblanceolato-spathulata, subobtusa; tepala interiora 8 mm. longa, 1 mm. lata, lanceolato-linearia, acuta, nec glandulosa nec tumescentia. Staminum columna 7 mm. longa; antherae in tubo sessiles, 2.5 mm. longae. Stylus columnam longitudine aequans; styli rami 1.5 mm. longi, bifidi 0.5 mm. ARGENTINA: JUJUY: Humahuaca: Cerro La Soledad, 3500 m. alt., January 25, 1928, *S. Venturi*, no. 9025 (TYPE, G; isotype, US).

Like *C. Shepardae* this species has narrowly oblanceolate inner tepals, but here these are neither glandular nor even tumescent on the claws. The style-arms are shorter, and bifid for only about one-third of their length instead of being bifid nearly to the base. No data are available as to habitat.

ii. **Eurynotia,** gen. nov. Planta bulbosa, caulescens; bulbus tunicatus, tunicis castaneis, laevigatis. Folia pauca, lanceolato-linearia. Inflorescentia terminalis, floribus longe pedicellatis. Flores textura crassa; tepala basi in tubo breve coalita, deinde campanulatus, laminae plus minusve patentes; tepala subequalia. Filamenta ad basin crassa, breve coalita deinde libera; stamina cum styli ramis alterna. Stylus crassus, quam partem coalitam filamentorum longus; styli rami percrassi, conduplicati, supra clavato-ampliati, supra medium latissimi, apice retusi, velutini, quam antheras breviores. Capsula seminaque ignota.

TYPE-SPECIES: *E. Penlandii.*

The name of this new genus is derived from the Greek, *eury-*

notos, broad-shouldered, and has reference to the widening of the style-arms above the middle. In attempting to place this genus by any key, it might be traced to *Calydorea*, but the points of difference are so marked that, despite its real relationship with that genus, it does not seem possible to include it in that group. The first point to be noted in examining it is the very thick texture of the flower, quite unlike the thin, delicate texture of *Calydorea*. In the second place, it has a short but definite, thick perianth-tube. The thick filaments are briefly united at the base and the stamens exceed the style-branches. In contrast with the thin, delicate style with thin, canaliculate branches in *Calydorea*, this plant has a short thick style, with the branches becoming very broad above the middle, conduplicate, and markedly velutinous at the retuse apex. Like the style, the branches are exceedingly thick. Without undue flippancy, the entire flower might be said to resemble a *Calydorea* with general elephantiasis.

EURYNOTIA **Penlandii,** spec. nov. Bulbus ovoideus, 2.5 cm. altus, 1.3 cm. latus, tunicae membranaceae. Folia basalia 2, lanceolato-linearia, basi et apice attenuata, ad 30 cm. longa, 5–8 mm. lata, glabra, plicata; folia caulina 2, inferius 20 cm. longum, 8 mm. latum, superius reductum, plerumque vaginans, 5.5 cm. longum. Caulis simplex, teres, glaber, 40 cm. altus. Spathae herbaceae, 2.6–3.5 cm. longae, exterior quam interiorem brevior, ca. 5-fl., pedicelli anthesi spathas aequantes. Ovarium oblongo-ellipsoideum, ca. 4 mm. longum. Flores atroviolacei; tepala ad basin 2.5 mm. coalita in tubo crasso, exteriora ad 2 cm. longa, 1.1 cm. lata, ovato-obovata, obtusa (apiculata ?), interiora ca. 1.6 cm. longa, 8 mm. lata, ovato-obovata, apice rotundata, longe apiculata. Staminum filamenta 1.5 mm. ad basin coalita, supra libera et 2.5 mm. longa; antherae 4 mm. longae. Stylus brevem columnam longitudine aequans; styli rami percrassi, supra medium 2 mm. lati complanati, 5 mm. longi, quam antheras breviores. ECUADOR: PROV. IMBABURA: Lake Cuicocha, 3100 m. alt., May 28, 1939, *C. W. Penland & R. H. Summers*, no. 736 (TYPE, G).

Some years ago, this specimen was determined (by me), with some doubt, as *Nemastylis Pearcei* Baker. At that time, the single flower was firmly pressed in waxed paper, from which it could not be separated without serious injury. Since then, fortunately, the waxed paper has become detached from the flower and it has been possible, for the first time, to make a dissection, with the results given above. Although lacking in the elaborate details of the cypelloid style, the style of this plant is one of the most strikingly distinctive structures in American *Iridaceae.*

iii. **Pseudotrimezia,** gen. nov. Planta bulbosa, tunicis fibrosis; caulescens. Folia pauca, teretia vel subquadrangulata, filiformia. Spathae terminales, flores pedicellati. Tepala subaequalia. Stamina cum styli ramis alterna; filamenta libera, brevia. Stylus filiformis, deinde trifurcatus, rami simplices, canaliculati, apice stigmatosi. Capsula seminaque non visa.

Type-species: *P. Barretoi.*

The generic name has been given because of the resemblance which this plant has habitally to many of the species placed in *Trimezia.* This is especially true of the fibrous tunics of the bulb. However, in *Trimezia* the stamens are opposite the style-arms, the outer and inner tepals are markedly dissimilar in size and shape, and the stigmas are definitely transverse, being overtopped by two style-crests which are reduced to low cusps. In this new genus, the stamens seem to be alternate with the style-arms (numerous dissections were made to settle this point), the outer and inner tepals are subequal, or at least not markedly dissimilar in size and shape, and the entire (not even subbifid) style-arms have unquestionably apical, not transverse, stigmatic areas. Habitally, it is like many of the species of *Trimezia,* especially in the rootstock; in technical floral characters, it resembles *Calydorea.* Since it cannot be placed in either genus without too great distortion of generic concepts, it has finally seemed advisable to segregate it.

Pseudotrimezia **Barretoi,** spec. nov. Bulbus ovoideo-conicus vel globosus, 1.5–2.5 cm. latus, 1.5–2 cm. altus, tunicis fibrosis in collum longum productis. Caulis simplex, teres, glaber, 6–22 cm. longus. Folium basale unicum, ad 7 cm. longum (vel longius ?), filiforme vel subquadrangulatum; folia caulina 2, anguste spathiformia, paene opposita, inferius longius, 1.3–4 cm. longa, valde striata, 3–6.5 cm. infra inflorescentiam. Spathae herbaceae, inaequales, interior longior, 8–16 mm. longae, valde striatae, acutae vel obtusae, 2–3-fl., pedicelli spatham interiorem aequantes. Ovarium glabrum, subturbinatum, 1.5 mm. longum. Tepala subaequalia, obovato-spathulata, ad 1.6 cm. longa, 6 mm. lata, obtusa, lutea. Filamenta 1 mm. longa; antherae 3–4.5 mm. longae. Stylus 3.5 mm. longus; styli rami 1.5 mm. longi, apice papillosi. BRAZIL: Minas Geraes: Neco Motta, Diamantina, campo logar humido, Nov. 4, 1937, *Mello Barreto*, no. 9441 (TYPE, G).

As has been said, there is no doubt in my mind of the generic distinctness of this plant. There is, however, some question as to whether it may not have been described before by Klatt in his treatment of the genus *Lansbergia* (now treated as a synonym of *Trimezia*) in Mart. Fl. Bras. iii (1). 525–527 (1871). Unfortunately, Klatt described his first five species as having the style-arms "stigmatibus bifidis", or "laciniis trifidis", which, if true, would exclude them from *Pseudotrimezia*. Having had some experience with Klatt's work on *Iridaceae*, and having seen specimens of two different genera on one herbarium sheet labelled by him as belonging to a third genus, I feel a natural reluctance to accept all his statements without carefully checking them against the types. If the types of the first five species described by him in *Lansbergia* have been destroyed at Berlin, it may be necessary to start *ab initio* in this group. This new species, then, is described with the full realization that there is a strong possibility that it may be reduced to synonymy under an earlier name, when (or if) certain European types again become available.

The reasons given previously for excluding *P. Barretoi* from *Trimezia* serve also as a bar to the resurrection of *Ennealophus* N. E. Br. in Kew Bull. 1909: 361 to contain this species. This genus was described from living material, with the following statement concerning the style: "*Stylus* ad apicem trifidus; rami in cristas 3 oblongas fimbriato-dentatas divisi, duabus interioribus collateralibus erectis, tertia supra antheras patente, basi utrinque puncto stigmatico instructa." This description certainly cannot apply to the plant here under consideration, and it seems best to follow Diels, in Engl. & Pr. Nat. Pflanzfam. (ed. 2) xva. 497 (1930), in considering *Ennealophus* a synonym of *Trimezia*.

II. The North American Species of Sphenostigma Baker

Recently, some determinative work on Mexican specimens of *Sphenostigma* Baker disclosed the fact that the styles and general floral characters of some of these plants seemed rather familiar. It soon became clear that the style of *Sphenostigma longispathum* (Herb.) Benth. & Hook. f. is very similar to that of the monotypic genus *Salpingostylis* Small. It also became clear that at least three distinct species were included under the too-inclusive name, *S. longispathum.* Consequently, it seems desirable to review this small group of plants.

The genus *Sphenostigma* was erected by Baker, in Journ. Linn. Soc. Bot. xvi. 124 (1877), to contain the Brazilian plant originally described as *Alophia Sellowiana* Klatt in Linnaea, xxxi. 557 (1861–62). Since this was the only species transferred by Baker, it automatically became the type of the genus. On an earlier page of the same long paper, Baker had created the genus *Cardiostigma* (Baker, l. c. 102), to which he transferred the plant first described as *Gelasine longispatha* Herb. in Benth. Pl. Hartw. 53 (1840). As this, likewise, was the only species included in the new genus, it is the type. When Bentham and Hooker treated the *Iridaceae* in their Genera Plantarum, it was apparent that there were several South American species which belonged with *S. Sellowianum,* while only the one Mexican species of *Cardiostigma* was known. It was probably for this reason that, in uniting the two genera, they maintained *Sphenostigma*, reducing *Cardiostigma* to complete synonymy. *Cardiostigma* was treated as a section of *Sphenostigma* by Pax in Engl. & Prantl, Nat. Pflanzfam. ii (5). 149 (1888), and as a subgenus by Baker, Handbk. Irid. 105 (1892), and by Diels in Engl. & Prantl, Nat. Pflanzfam. (ed. 2) xva. 473 (1930). In view of the rotate perianth, with the segments subequal, as contrasted with most of the South American species with two more or less dissimilar series of tepals, I am following Baker and Diels in considering the group as a subgenus. With the possible exception of one South American species, *S. boliviense* Baker, which Baker placed in the subgenus *Gomphostigma* because of the monadelphous filaments (see his Handbk. Irid. 105), but which has subequal tepals, the subgenus *Cardiostigma* is confined to North America, so far as our present knowledge goes.

Synoptic Treatment

Sphenostigma, subgenus Cardiostigma. Bulbous herbs; basal leaves 1–2, narrow, or broad and plicate; stem simple or sometimes few-branched, with 0–2 cauline leaves, bearing terminal few-flowered spathes; flowers semi-cernuous, the perianth rotate, regular, lacking a perianth-tube, the tepals subequal;

filaments free or slightly united at the base, the anther-connective narrow; style becoming trumpet-shaped upwards, appearing unilateral, the stigmas almost sessile or on style-arms, these entire or partially bifid; capsule and seeds much as in *Sphenostigma* proper.—Baker, Handbk. Irid. 105 (1892); Diels in Engl. & Prantl, Nat. Pflanzfam. (ed. 2) xva. 473 (1930). *Cardiostigma* Baker in Journ. Linn. Soc. Bot. xvi. 102 (1877). *Sphenostigma*, section *Cardiostigma* (Baker) Pax in Engl. & Prantl, Nat. Pflanzfam. ii (5). 149 (1888). *Salpingostylis* Small in Journ. N. Y. Bot. Gard. xxxii. 161 (1931); syn. nov.

TYPE-SPECIES of the subgenus: *S. longispathum* (Herb.) Benth. & Hook. f.

KEY

a. Cauline leaf subtending the spathes; style-arms present and entire, the upper portion of the style and the arms conspicuously puberulent, the cuneate stigmas coarsely several-toothed, ciliate and puberulent; cauline and basal leaves glabrous.
  b. Cauline leaf 12–20 cm. long, the blade 2–3 mm. wide. . 1. *S. longispathum*
  b. Cauline leaf 4–8 cm. long, the blade 1 mm. wide, or less. 1a. *S. longispathum* var. *filiforme*
a. Cauline leaf not subtending the spathes; style-arms present or absent, the style glabrous.
  c. Cauline leaf (or leaves) large, 15–30 cm. long, 0.4–1.8 cm. wide, not reduced, coarsely short-ciliate on midribs and near margins; Mexico.
    d. Cauline leaf inserted about 2–7 cm. below the terminal inflorescence and exceeding it; one basal leaf exceeding inflorescence; true style-arms absent, the cuneate-reniform stigmas sessile (or nearly so) on the style. . 2. *S. mexicanum*
    d. Cauline leaves below the middle of the stem, usually shorter than the inflorescence; style-arms deeply and broadly retuse, Y-shaped, minutely puberulent. . . . . .3. *S. Hintonii*
  c. Cauline leaf (upper leaf, if 2 are present) reduced, 3–9 cm. long, 1–2 mm. wide, inserted 5–9 cm. below the inflorescence, its apex seldom exceeding the base of the inflorescence, glabrous; style-arms entire, glabrous, the reniform-cuneate stigmas toothed and ciliate; Florida. . . . . .4. *S. coelestinum*

1. S. LONGISPATHUM (Herb.) Benth. & Hook. f. Bulb small, ovoid, to 1 cm. diam., the tunics dark-brown, membranous, firm. Basal leaf 1, with occasionally a reduced (6 cm.) sheath below the true leaf, narrowly lanceolate, acute, glabrous, plicate, 22–32 cm. long, (2–) 5–6 mm. wide, sheathing at the base. Stem simple, terete, glabrous, about 2.6–5.3 dm. long, mostly exceeding the basal leaf, bearing at the apex a spathiform cauline leaf, 12–20 cm. long, the narrowly lanceolate or linear blade 2–3 mm. wide, the amplexicaul base surrounding the base of the true spathes. Spathes few-flowered (to 4), 5–8 cm. long, the outer one longer or shorter than the inner, the longer often acuminate, acute. Pedicels filiform, glabrous, shorter than the spathes. Ovary glabrous, oblong, about 3 mm. long. Tepals about 3 cm.

long, 1.6 cm. wide, obovate, blue or purple-blue. Filaments 3–5 mm. long, united at the base for 1–1.5 mm.; anthers oblong, 5–6 mm. long. Style about 1.5 cm. long, the entire style-arms and stigmas 3 mm. long, the upper portion of the style puberulent; stigmas cuneate, conspicuously ciliate and puberulous, coarsely and erosely toothed. Capsule and seeds not seen.—Gen. Pl. iii. 695 (1883); Baker, Handbk. Irid. 107 (1892). *Gelasine longispatha* Herb. in Benth. Pl. Hartw. 53 (1840). *Botherbe longispatha* (Herb.) Klatt in Linnaea, xxxi. 564 (1861–62). *Calydorea longispatha* (Herb.) Baker in Journ. Bot. xiv. 188 (1876). *Cardiostigma longispatha* (Herb.) Baker in Journ. Linn. Soc. Bot. xvi. 102 (1877). Specimens seen:—MEXICO: without definite locality, *Ehrenberg*, no. 782 (G); GUERRERO: Taxco, July 12, 1937, *Ruth Q. Abbott*, no. 235 (G). MICHOACÁN: Anganguio, in pascuis montanis, 1840, *Hartweg*, no. 403 (NY, isotype). JALISCO: mts. near Bolaños, 6000–8000 ft., 1935, *R. M. Zingg*, no. 21 (F).

In view of the great variation shown by specimens, in American herbaria, which have been determined as *S. longispathum*, it has been very fortunate to have an isotype available for comparison. The original description was of a plant 16 inches tall (17 inches to the base of the inflorescence on the isotype), lacking cauline leaves, "ebracteato", the simple stem exceeding the single acuminate leaf, which was $\frac{3}{16}$ of an inch wide ($\frac{1}{16}$ on the isotype), with the "outer spathe" 4.5 inches long (4.25 inches on the isotype), acuminate. To this, Baker added, Handbk. Irid. 107 (1892), from an examination of the type, that the anthers were $\frac{1}{6}$ of an inch (about 4.2 mm.) long, and the filaments very short. What Herbert regarded as an outer spathe, I have interpreted as a cauline leaf immediately subtending the true spathes. Similar cases have been observed in some South American specimens of other genera of the *Iridaceae*. The style was described as exceeding the anthers, which it certainly does on the isotype, and the stigma as obtusely trilobed, which is correct. On the whole, Herbert's description, with Baker's amplifications, is so well-supported by the isotype, is so well-matched by such specimens as *Abbott*, no. 235, and is at such variance with others, such as *Hinton*, nos. 4614, 8010, 13957, and 13996, that I cannot regard the latter as conspecific with *S. longispathum*. One specimen seen, *Zingg*, no. 21, is included under the species with some hesitation. It consists of five broken-off flower-clusters, of which two are quite unlike the others in several ways. It is possible that more complete material would result in at least varietal segregation.

1a. S. LONGISPATHUM var. **filiforme,** var. nov. A *S. longispatho* folio radicale et folio caulino angustiore, longe acuminato, breviore, et spathae valva exteriore longe acuminato differt.

Stem filiform, 15–26 cm. long. Basal leaf 12–15 cm. long, 1–1.5 mm. wide, long-acuminate; cauline leaf 4–8 cm. long, 1 mm. wide, the base more spathiform than in the species. Outer spathe 3.5–4 cm. long, very narrow above the clasping base, less than 0.5 mm. wide, long-acuminate, much longer than the inner spathe. Tepals about the same size as in the species, but possibly a deeper blue. Filaments about 3 mm. long, united at the base for about 0.5 mm., the anthers 5 mm. long. Style 1.1 cm. long, the style-arms and stigmas 4 mm. long, with the shape and puberulence of those of the species. Specimens seen:—MEXICO. MÉXICO: Dist. Temascaltepec: Crucero Agua Blanca, 3170 m. alt., llano, Aug. 30, 1933, *G. B. Hinton*, no. 4614 (TYPE, G). NAYARIT (TEPIC): between San Blascito and Aguacata, Aug. 5, 1897, *J. N. Rose* (US, no. 842737).

As indicated by the diagnosis, this is a much smaller and more slender plant than *S. longispathum*, so different in its slender stiffness that it is a temptation to regard it as specifically distinct; but I find no significant differences in the technical characters of the flowers to support such a course. Until more material, both of the species and of the variety, becomes available, it seems best to leave it in its present status.

2. S. **mexicanum,** spec. nov. Bulbus anguste ovoideus, ad 3 cm. longus, tunicis membranaceis atrobrunneis, supra in collum productis. Folia radicalia 2, inferius vagina, ca. 5 cm. longa, superius ad 30 cm. longum, ad 6 mm. latum, inflorescentiam excedens, nervo medio marginibusque breve et crasse ciliatis, plicatum, acuminatum; folium caulinum 1, ad 24 cm. longum, ad 4 mm. latum, inflorescentiam excedens. Caulis simplex vel 1-ramosus, teres, glaber; inflorescentiae terminales. Spatha exterior ad 5–8 cm. longa, longe acuminata, interior ad 4.5 cm. longa, acuta, pluriflora, pedicellis filiformibus, apice curvatis. Ovarium glabrum, clavatum, 6 mm. longum. Tepala ad 3 cm. longa, ca. 8 mm. lata, ovata, vel obovata, obtusa. Filamenta libera, ad 4 mm. longa; antherae 7 mm. longae, apice subbifidae. Stylus ad 1.6 cm. longus, antheras excedens; stigmata cuneato-reniformia (vel paene obcordata), papillosa, ciliata, apice retusa. Capsula seminaque non visa. MEXICO: MÉXICO: Dist. Temascaltepec: Carboneras, Aug. 20, 1935, *Hinton et al.*, no. 8010 (TYPE, G; isotypes in F, US, MBG, NY); Mina de Agua, 1990 m.,

Aug. 22, 1932, *Hinton*, no. 1401 (F, NY, MBG); Bejucos, 610 m., Aug. 24, 1932, *Hinton*, no. 1453 (F, US, NY, MBG).

Superficially, *S. mexicanum* shows considerable similarity to *S. longispathum* (in fact, all material seen was distributed under that name), but there are several marked differences. The basal leaves are much longer, about equalling or even exceeding the inflorescence, and are broader. Below the inflorescence, about 2–7 cm., the cauline leaf, similar to the basal leaf, is inserted, while the cauline leaf of *S. longispathum* immediately subtends the spathes. In *S. mexicanum*, the cauline leaf is conspicuously set along the midrib and on the ribs close to the margin with a short thick ciliation; this is present, but less conspicuous on the basal leaves. Most of the isotypes show the presence of an axillary branch, at different stages of growth, in the axil of the cauline leaf. The filaments are completely free, and the cuneate-reniform, almost obcordate, stigmas are virtually sessile on the style, while the stigmas are much less conspicuously puberulent than in *S. longispathum;* true style-arms, such as are found in the first species, are not present.

3. S. **Hintonii,** spec. nov. Bulbus ignotus. Folia basalia 0 (?); folia caulina 2, sub medio inserta, distantia vel paene opposita, ad 30 cm. longa, ad 0.7–1.8 cm. lata, plicata, sparse ciliata. Caulis simplex, teres, glaber, ad 53 cm. longus; inflorescentia terminalis. Spatha exterior ad 5 cm. longa, breviter acuminata, interior ad 4 cm. longa, pluriflora; pedicelli filiformes, apice curvati. Ovarium glabrum, clavatum, 5 mm. longum. Tepala ad 3.3 cm. longa, 1.5 cm. lata, obovata, apice obtusa. Filamenta ad 4 mm. longa, basin 1 mm. coalita; antherae 7 mm. longae, apice subretusae. Stylus ad 1.5 cm. longus; styli rami 4 mm. longi, apice profunde lateque retusi, lobis 2 mm. longis, divergentibus, ciliatis, oblongo-spathulatis, antheras excedentibus. Capsula matura seminaque non visa.—MEXICO: MICHOACÁN: Dist. Coalcomán: Sierra Torrecillas, 2350 m. alt., in a pine forest, July 25, 1939, *Hinton et al.*, no. 13996 (TYPE, G; isotypes, US, NY); Sierra Naranjillo, 1300 m. alt., in oak woods, July 16, 1939, *Hinton et al.*, no. 13957 (G, US, NY).

Like *S. mexicanum*, these collections were distributed as *S. longispathum*, but the very broad, long, and sometimes nearly opposite leaves, inserted below the middle or near the base of the stem, the apparent lack of basal leaves, and the lack of a long-produced cauline leaf near or subtending the spathes—all serve to differentiate it from the other Mexican species. The leaves are less conspicuously short-ciliate than in the case of *S. mexicanum*, but the ciliation is present. In addition, there is the important technical difference that the three style-arms are deeply and broadly retuse for half their length, so that a Y is formed by each style-arm. The flowers, as noted by Mr. Hinton, are blue.

4. S. **coelestinum** (Bartr. ex Willd.), comb. nov. Bulb ovoid or globose, about 1.5 cm. in diam., the tunics very dark brown. Basal leaves 1–3, with occasionally a short, brownish, reduced sheath below them, shorter than the stem, linear, attenuate, acute, plicate, glabrous, sheathing at the base, 4–22 cm. long, 1–4 mm. wide; cauline leaf 1 (rarely 2), reduced somewhat, sheathing at the base, 2.5–9 cm. long, 1–2 mm. wide, borne above the middle of the stem and 5–9 cm. below the inflorescence. Stem simple or rarely branched, terete, glabrous, 18–36 cm. long. Spathes closely convolute, 1–2-flowered, the outer 2.5–4 cm. long, the inner 4–5.5 cm. long, both acute. Pedicels filiform, glabrous, shorter than the spathes, apically curved at anthesis, erect in fruit. Ovary glabrous, oblong-clavate, about 3 mm. long. Flowers at most only slightly zygomorphic, the subequal tepals blue-purple or violet, with a white "eye," to 3.5 cm. long, 1.7 cm. wide, obovate, or cuneate-obovate, obtuse. Filaments free, about 4 mm. long; anthers about 5 mm. long, sagittate at the base, apically somewhat retuse. Style about 8 mm. long, glabrous; the entire style-arms and stigmas about 3 mm. long; stigmas reniform or reniform-orbicular, toothed, the teeth markedly ciliate. Capsule ellipsoid or obovoid-ellipsoid, 1.5–2 cm. long; seeds dark brown, angular, about 2.5 mm. long.—*Ixia caelestina* Bartr. Trav. (Philad. ed.) 155, t. 3 (1791), *nomen illegitimum;* ex Willd. Sp. Pl. i. 200 (1797), as *I. coelestina*, the spelling which must be used. *Trichonema coelestinum* (Bartr.) Sweet, Hort. Brit. (ed. 1) 399 (1827). *Marica coelestina* (Bartr.) Ker, Irid. Gen. 19 (1827), at least as to name. *Nemastylis coelestina* (Bartr.) Nutt. in Trans. Amer. Phil. Soc. v. 157 (1835), as to name, but not as to Arkansas plants cited; Baker in Journ. Linn. Soc. Bot. xvi. 103 (1877); Baker, Handbk. Irid. 111 (1892). *Beatonia coelestina* (Bartr.) Klatt in Linnaea, xxxi. 567 (1861–62), as to name but not as to plant. *Salpingostylis coelestina* (Bartr.) Small in Journ. N. Y. Bot. Gard. xxxii. 161 (1931). Specimens seen:—UNITED STATES: FLORIDA: without locality, *Mary Treat*, in 1877 (G), pine barrens, East Florida, April, 1876, *Mary Treat* (G); *Rugel*, no. 53 (MBG, US); Duval or Nassau Co.: near Thomas Creek, branch of the Nassau River, *Herb. Philad. Acad.*, no. 706650 (P); Clay Co.: Green Cove Springs, Apr. 25, 1883,

Herb. Everhart (MBG); Flemming's Island, 7 miles south of Green Cove Springs, May, 1940, *Katherine B. Canova* (P); between Doctor's Inlet and Orange Park, Apr. 23, 1933, *Mary W. Diddell* (NY); rather dry flatwoods, Doctor's Inlet, May 21, 1940, *W. A. Murrill* (MBG), the same locality, June 15, 1939, *Murrill* (MBG); 6.5 miles northeast of Keystone Heights, May 12, 1939, *Murrill* (MBG); Baker Co.: flatwoods 1 mile north of Manning, May 19, 1940, *Murrill* (MBG); Bradford Co.: 2 miles north of Starke, June 11, 1931, *J. K. Small* (NY), 3 miles north of Starke, July 30, 1931, *Small* (NY); Union Co.: open flatwoods of longleaf pine, north of Raiford, June 2, 1940, *Murrill* (MBG); Putnam Co.: 4 miles north of Palatka on Jax Rd., June 4, 1940, *Murrill* (MBG); Palatka, April, 1897, *C. S. Williamson* (P); originally collected by Bartram west of Kanapaha Prairie, Alachua Co. (see Harper in Trans. Amer. Phil. Soc. xxxiii (2). 210 [1943]).

From the synonymy given, it can be seen that this species has a long, and rather unfortunate, nomenclatural history. Discovered by William Bartram, and reasonably well-figured in his Travels, the name given by him is illegitimate. As Rickett has pointed out, in Rhodora, xlvi. 389–391 (1944), Bartram used a mixture of binomial and polynomial nomenclature, which is forbidden by the International Rules, so that even his binomials have to be treated as illegitimate. The earliest valid use of the same name which I have found is that of Willdenow, so that the basonym should be cited as Bartr. ex Willd. Since Dr. Small has reviewed the history of the plant in detail, in Journ. N. Y. Bot. Gard. xxxi. 156–161 (1931), demonstrating that it is amply distinct from *Ixia*, *Marica* (now *Neomarica*), *Nemastylis*, and *Beatonia* (now placed in *Tigridia*), it seems unnecessary to repeat these details, especially since the synonymy given here has all the required bibliographic references. As a result of his studies, especially on living material, Small erected the genus *Salpingostylis* to contain the plant. At the time, it seemed a final disposition of the species.

In the introductory remarks to this study, the resemblance between the styles of *Salp. coelestina* and *Sph. longispathum* was noted. The excellent photograph of the former species, in Journ. N. Y. Bot. Gard. xxxiv. 4 (1935), Small's figure showing the dissected parts of the flower, in his Man. Se. Fl. 326 (1933), in addition to a few well-pressed flowers available to me, in comparison with the Mexican material of *Sphenostigma*, leave no doubt in my mind that *Salpingostylis* must become a synonym of *Sphenostigma* subgenus *Cardiostigma*. In both cases, the flowers are semicernuous, with nearly equal tepals, the filaments nearly or entirely free, the style (pendulous and appearing unilateral because of the carriage of the flower, with a subsequent effect of zygomorphy) becoming enlarged upwards ("trumpet-shaped", as Small says), and the reniform to cuneate or suborbicular stigmas spreading on short erect style-branches, if these latter are present. Consequently, it is with regret that the species is here transferred to the seventh genus in its nomenclatural history.

III. The Genus Rigidella Lindl.

The necessity for identifying some material of *Rigidella* has shown that there is some confusion as to specific identities, for most of the material in our herbaria under the name *R. flammea* Lindl. is not that species. Furthermore, the most distinctive of the three species described has sometimes been treated as a synonym of *R. flammea*, an error apparently originated by J. G. Baker. To clarify the matter, this summary is presented.

The genus *Rigidella* Lindl., in Bot. Reg. xxvi. t. 16 (1840), was created to contain the plant therein named *R. flammea* Lindl. Due to lack of material and an unwillingness to dissect any of the few flowers then available (see Bot. Reg. xxvi. Misc. 35, no. 64), it was characterized at first as having only three large perianth-segments, a point corrected in the Miscellany just mentioned. There, Lindley noted that there were three inner segments about 8 mm. long, "yellowish orange, ovate, unguiculate, and erect, with the sides rolled inward," these being completely concealed by the convolute claws of the outer segments.

A year later, a second species, *R. immaculata* Herb., and, five years later, a third, *R. orthantha* Lem., were described, completing the list of species. These three, found in the mountains of southern Mexico and Guatemala, are, even today, rather uncommon in herbaria.

The principal features separating this genus from *Tigridia* are the cernuous flowers, the compact, campanulate cup formed by the claws of the outer segments in two of the species, the very small inner tepals, concealed by the claws of the outer series, or, if apparent, closely appressed against the staminal column, and the dorsal appendage on each style-arm below the point of bifidness, in the type-species. This appears to be lacking in *R. immaculata* and *R. orthantha.* In its erect flowers, spreading outer tepals, and lack of the dorsal appendages on the style-arms, this last species tends to break down the distinction between the two genera, but its small erect inner tepals, closely appressed, are a reason for retaining it in *Rigidella.*

RIGIDELLA Lindl. Rootstock a corm with thick membranous tunics. Basal leaves several, usually broad, plicate, glabrous, acute; cauline leaves several, similar to the basal leaves, or the upper reduced, equalling or exceeding the inflorescence. Stem simple or few-branched, the inflorescences borne terminally on the stem and branches. Spathes herbaceous, large, acute, 2–4-flowered; pedicels filiform, or thicker, the flowers strongly cernuous or nearly erect. Perianth-tube absent, the tepals markedly dimorphic; the three outer usually connivent by their claws into a compact cup at the base, the blades strongly reflexed, or the outer tepals spreading, the inner tepals much smaller, completely concealed by the claws of the outer and glandular on the ventral surface of the blade, or, if apparent, as long as and appressed against the staminal column. Stamens opposite the style-arms; filaments long, united in a column; anthers linear, the connective about as broad as the narrow loculi. Style as long as the column; style-arms usually shorter than the anthers, bifid nearly to the base, with or without a dorsal appendage on each arm below the point of bifidness; stigmas terminal. Capsule oblong, trigonal, glabrous; seeds subglobose, or ovoid, the raphe and chalaza very conspicuous.—Bot. Reg. xxvi. t. 16, Misc. 35, no. 64 (1840); Baker in Journ. Linn. Soc. Bot. xvi. 134 (1877), Handbk. Irid. 70 (1892); Diels in Engl. & Prantl, Nat. Pflanzfam. (ed. 2) xva. 497 (1930).

TYPE-SPECIES: *R. flammea* Lindl.

KEY

a. Flowers cernuous; inner tepals short (8–10 mm.), concealed by the base of the outer tepals.
  b. Leaves broad, 2–3 cm.; outer tepals with numerous short purple lines at base of blade; style-arms with dorsal appendages. . . . . 1. *R. flammea*
  b. Leaves narrower, 1 cm.; tepals unmarked; dorsal appendages absent. . . . . 2. *R. immaculata*
a. Flowers erect at anthesis, or nearly so; inner tepals as long as the staminal column (to 2.7 cm.), not concealed; dorsal appendages absent. . . . . 3. *R. orthantha*

1. RIGIDELLA FLAMMEA Lindl. Corm ovoid, to nearly 4 cm. diam., the tunics membranous, dark-brown. Basal leaves 2 (–3),

to 6 dm. long, 2–3 cm. broad, subpetiolately narrowed at the base and gradually narrowed to the acute apex, strongly plicate; cauline leaves 1–2 (or more if the stem is branched), resembling the basal leaves, to nearly 30 cm. long, and over 1 cm. wide. Stem simple or branched, bearing a pair of 4-flowered spathes at each apex, to 6 dm. long, or longer. Spathes herbaceous, to 8 cm. long, the outer slightly longer than the inner; pedicels recurved at the apex at anthesis, erect in fruit. Ovary glabrous, oblong, to nearly 1 cm. long. Outer tepals scarlet or flame-color, the broad claws (1 cm. long and 8 mm. wide) narrowed slightly at the summit, connivent, forming a campanulate cup, the blades to 3 cm. long, 1.2 cm. wide, oblong-ovate, subobtuse, strongly reflexed, with short dark stripes or dots at the base; inner tepals 8–9 mm. long, the claw 2 mm. long and the glandular blade ovate-deltoid, acute, 6–7 mm. long and 4 mm. wide at the base, completely concealed. Staminal column about 3 cm. long; anthers 1 cm. long. Style a little longer than the staminal column; style-arms linear, to 1 cm. long (from slightly shorter than to equalling or slightly exceeding the anthers), bifid for 7 mm., and bearing a dorsal appendage below the sinus in each style-arm. Capsule clavate-oblong, about 2.5 cm. long; seeds subglobose.—Bot. Reg. xxvi. t. 16 (1840); Paxt. Mag. vii. 247 (1840); Sweet, Ornam. Fl. Gard. ii. t. 131 (1854); Baker in Journ. Linn. Soc. Bot. xvi. 135 (1877); Baker, Handbk. Irid. 70 (1892). Specimens seen:—MEXICO: GUERRERO: Mina Dist.: Teotepec, 2900 m., oak and pine forest, July 15, 1939, *Hinton et al.*, no. 14432 (G, US, NY).

Of all the material labelled *R. flammea* in our herbaria, this is the only collection which seems actually to be that species. The flowers are so badly damaged that it is impossible to determine if the basal dark marks are present on the blade of the tepals, but it can be assigned to this species with some confidence because of the size and shape of the inner tepals, and because of the appendages on the style-arms. These seem much longer than those shown in the original figure.

2. R. IMMACULATA Herb. Corm ovoid, to 3.5 cm. long, 1.5–2 cm. wide, the tunics brown, membranous. Basal leaves 1–2, to 30 cm. long, 1 cm. wide, narrowed above the sheathing base, lance-linear, tapering to the acute apex, strongly plicate; cauline leaves 2 (or more if the stem is branched), resembling the basal leaves, to 25 cm. long, 7–13 mm. wide. Stem simple or branched, to 4–6 dm. tall, bearing 2–3-flowered spathes at the apices of axis and branches. Spathes herbaceous, usually narrow, acuminate, acute, 6–8 cm. long, the outer distinctly shorter than the inner; pedicels shorter than the spathes at anthesis. Outer tepals with

claws about 1.2 cm. long, forming a cup, the reflexed blades clear unmarked scarlet, oblong-ovate, to 2.5 cm. long, 1 cm. wide, subobtuse; inner tepals yellow, nearly as long as the claws of the outer, completely concealed, unguiculate, the blade almost sagittate at the base, ovate, long-acuminate. subobtuse or acutish. Staminal column to 2 cm. long; anthers to 6 mm. long. Style as long as the column; style-arms 3 mm. long, bifid for 2 mm., dorsal appendages lacking. Capsule oblong, 2.5–3 cm. long; seeds ovoid, 3 mm. long.—Bot. Reg. xxvii. t. 68, Misc. 133 (1841); Fl. des Serres (Sér. I) v. t. 502 (1849), (Sér. II) xi. t. 2215 (1875); Sweet, Ornam. Fl. Gard. ii. t. 132 (1854); Baker in Journ. Linn. Soc. Bot. xvi. 135 (1877), Handbk. Irid. 70 (1892). Specimens seen:—MEXICO: OAXACA: Sierra de San Felipe, 10000 ft., June 29 (fl.), Nov. 9 (fr.), 1894, *Pringle*, no. 4721 (G, NY, Phil, US, MBG). GUATEMALA: HUEHUETENANGO: near Tunimá, Sierra de los Cuchumatanes, 3300–3500 m., July 6, 1942, *Steyermark*, no. 48256 (F); wet meadow along creek, 2.5 miles east of San Mateo Ixtatán, Sierra de los Cuchumatanes, 2500 m., July 31, 1942, *Steyermark*, no. 49885 (F); Sierra de los Cuchumatanes, along road beyond La Pradera, km. 32, alt. ca. 3300 m., in dense limestone Juniperus forest, Dec. 31, 1940, *Standley*, no. 81771 (F); near crossing of Rio San Juan Ixtán, east of San Rafael Pétzal, alt. ca. 1730 m., open oak forest, Jan. 9, 1941, *Standley*, no. 83028 (F); Yalambohoch, Aug. 21, 1896, *C. & E. Seler*, no. 3192 (G); valley above Todos los Santos, May 29, 1906, *O. F. Cook*, no. 49 (US); Todos los Santos, 3000–3500 m., June 19, 1896, *C. & E. Seler*, no. 2807 (G, US); SACATEPÉQUEZ: slopes of Volcán de Agua, above Santa María de Jesús, 2250–3000 m., pine forest, Feb. 11, 1939, *Standley*, no. 65283 (F); Volcán de Agua, Nov. 22, 1937, *J. R. Johnston*, no. 810 (F); CHIMALTENANGO: Santa Elena, 2400–2700 m., July 17, 1933, *Skutch*, no. 436 (US); slopes of Volcán de Acatenango, above Las Calderas, 2700–2900 m., Jan. 3, 1939, *Standley*, no. 61879 (F).

Of the Guatemalan specimens cited, the four Standley collections are in very ripe fruit, and so their identity cannot be positively established, but I feel that they are probably this species, especially since the leaves are usually quite narrow.

Baker remarked (Handbk. Irid. 70) of this: "Perhaps not distinct from *R. flammea* . . . " There are several points of difference which leave no doubt in my mind as to its distinctness. Aside from the generally slighter aspect of the plants, the outer spathe is shorter than the inner, the pedicels are shorter than the spathes at anthesis, elongating as the fruit matures, the inner tepals are very different in shape, having a long bluntish acumen to the blade instead of coming abruptly to an acute point, and the dorsal appendages of *R. flammea* are not present in any of the material examined. These points, I think, are quite enough to keep *R. immaculata* separate from *R. flammea.*

3. R. ORTHANTHA Lem. Corm ovoid, to 5 cm. high, 3 cm. wide, the tunics dark-brown, thick, tough. Basal leaves several, the lower short, the upper (or inner) as tall as the stem, the largest to 1.5–5 cm. wide, glabrous, strongly plicate, acute, narrowed at the base and apex; cauline leaves several, similar to the basal leaves, 25–35 cm. long, 1–2 cm. wide, sheathing at base, plicate, acute. Stem branched, each branch subtended by a cauline leaf, the main axis 4.5–7 dm. tall, terete, glabrous. Spathes herbaceous, the outer somewhat shorter than the inner, 6–8 cm. long, acute, 4–6-flowered; pedicels mostly well-exserted from the spathes at anthesis, glabrous. Outer tepals to 3.5–4.5 cm. long and the blade 1.4 cm. wide, oblong-obovate, obtuse or subacute, the broad claws at first forming a cup, the entire tepals ultimately spreading broadly, orange or orange-scarlet; inner tepals to 2.5 cm. long (as long as the staminal column), briefly unguiculate, the blade about 4–5 mm. wide, contracted below the middle, expanding into a lance-linear shape, acute, erect, appressed against the staminal column. Filaments united to the apex, to 2.5–2.7 cm. long; anthers to 1.3 cm. long. Style about as long as the column; style-arms bifid nearly to the base, to 8 mm. long, dorsal appendages lacking. Capsule oblong, trigonous, to 3 cm. long; seeds ovoid, to 3 mm. long.—Fl. des Serres (Sér. I) i. 107 (1845); Paxt. Mag. xiv. 121 (1848); Baker in Journ. Linn. Soc. Bot. xvi. 135 (1877), Handbk. Irid. 70 (1892), as syn. of *R. flammea.* Specimens seen:—MEXICO: OAXACA: northwest slope of Mt. Zempoaltepec, 8000–10000 ft., July 10, 1894, *E. W. Nelson*, no. 662 (US); bleak summit of Cerro Zempoaltepetl, 2500–2900 m., May 25, 1939, *R. E. Schultes*, no. 506 (G); Cerro San Felipe, 3000 m., May 22, 1898, *Gonzalez & Conzatti*, no. 705 (G, US); Yalina to Cuarentena, 2500 m., Feb. 26, 1919, *B. P. Reko*, no. 4001 (US); rich alluviums, Sierra de San Felipe, 8500–10000 ft., June 5 (fl.), Aug. 29 (fr.), 1894, *Pringle*, no. 4874 (G, US, NY, Phil, MBG). CHIAPAS: pine forest, July and August, in the "Terre froide", 1864–70, *Ghiesbreght*, no. 825 (G).

It was of this species that Baker remarked in 1892 (Handbk. Irid. 70): "apparently a mere form of *R. flammea*, with shorter stouter erect pedicels." Comparison of *R. orthantha* and *R. flammea* shows numerous and marked differences, which apparently had some weight with Baker in 1877, for he then kept the two apart. In *R. orthantha*, the flowers are erect or nearly so, as opposed to cernuous. The outer tepals are spreading, with the bases not convolute into a cup, although in most pressed specimens they appear to be so. This is probably due to the stage at which they were collected, for the original description says of the broad claws, "d'abord dressés et enveloppant la base du double appareil sexuel . . . " In other words, they are at first contracted into a cup and ultimately spread as shown in the original figure and in Paxton, both plates being drawn from living material. In any case, whether the basal cup is present or not, the two species can be distinguished at a glance by the long, narrow, visible inner tepals of *R. orthantha*, as opposed to the short, hidden tepals of *R. flammea*. It is as unlike that species as possible, and should certainly be kept distinct, as Diels, in fact, has done, in Engler & Prantl, Nat. Pflanzfam. (ed. 2) xva. 497 (1930).

IV. Notes on Mastigostyla Johnston

The genus *Mastigostyla* was erected by Johnston, in Contrib. Gray Herb. lxxxi. 85 (1928), to contain a Peruvian irid with a remarkable style-structure, *M. cyrtophylla* Johnston. Two years later, in Engl. & Prantl, Nat. Pflanzfam. (ed. 2) xva. 498 (1930), Diels reduced the genus to synonymy under *Cypella*, transferring the single species to that genus. In this, he has been followed by Macbride, in Field Mus. Bot. xiii (part 1, no. 3). 716 (1936). After a re-examination of the type of *M. cyrtophylla*, I am unable to accept this disposition of the genus, a conclusion strengthened by a study of the type-photograph of the species here described as *M. Hoppii*, and of dissections from the other species also described as new.

In his discussion of the new genus, Johnston (l. c.) laid most stress on the wing-margined style-branches, each arm deeply bifid, each portion continued beyond the stigma in a flagellum. This is important, but it can, to some extent, be approximated in some undoubted material of *Cypella* from Argentina, *Lossen*, no. 543, in which the flagelliform style-crests are about 5 mm. long. More important, to me, is the fact that in *Mastigostyla* the style-arms are bifid to a point well below the insertion of the stigmas, thus making it appear as if the stigmas were inserted above the base of the style-crests.

The type-species of the genus *Cypella*, *C. Herberti* (Lindl.) Herb., has extremely short stamen-filaments which are united for much of their length. Of the other species of the genus known to me, most have longer filaments, united for only a short distance at the base. Consequently, the appearance of a long (8–12 mm.) staminal column in *Mastigostyla* is important. Moreover, in the species of *Cypella* known to me, the anthers are attached by their apices to the style-arms just below the stigmas. In *Mastigostyla*, the anthers are free from the style.

Another point which is certainly worthy of consideration is the shape of the flower. That of *Cypella* is more or less crateriform, with at least the outer tepals spreading widely from a broad, shallow, basal cup. In *Mastigostyla*, a rudimentary perianth-tube is present, the tepals then erect, so that their claws form a narrow infundibuliform base to the flower. Further, the inner tepals are much more reduced than is true in *Cypella*. On the basis of these characters, it seems to me, *Mastigostyla* should be retained as a distinct genus.

One additional point can be cleared up. In his original description, Johnston stated that he was unable to determine whether the stamens were opposite or alternate with the style-arms, tending to think the latter condition true. A flower from *Weberbauer*, no. 6838, which had not been too severely pressed was dissected. The style-arms and anthers were relatively undistorted and showed beyond question that the stamens were opposite the style-arms, not alternate with them.

Mastigostyla **Cardenasii,** spec. nov. Bulbus ovoideus, 2–2.5 cm. altus, 1.5 cm. diam., tunicae atrobrunneae, membranaceae, supra in collum productae. Folia basalia 1–2, 10–22 cm. longa, 0.5–2 mm. lata, lineari-attenuata, glabra; folium caulinum unicum, ramum subtendens, basi spathiforme caulem amplectens, ad 24 cm. longum, 2 mm. latum, acutum, glabrum, inflorescentiam terminalem excedens. Caulis 1-ramosus ad basin, 8–12 cm. longus (supra terram), teres, glaber. Spathae herbaceae, 3–4-fl., exterior basi marginibus 6–7 mm. coalitis, 3.7–4.8 cm. longa, acuminata, interior marginibus latis papyraceis hyalinis, 4.2–4.8 cm. longa, acuta; pedicelli filiformes, quam spathas breviores. Ovarium ellipsoideo-obovoideum, glabrum, ca. 8 mm. longum. Tepala exteriora atrocoerulea, unguiculata, obovata, obtusa, ad 3 cm. longa, 1.6 cm. lata; tepala interiora reducta, ca. 8 mm. longa, 2 mm. lata, lanceolata. Staminum columna 8–12 mm.

longa, filamenta supra libera 1–2 mm.; antherae lineares, 6 mm. longae. Stylus ca. 1.2 cm. longus; styli rami et appendices saltem 1 cm. longi, bifidi saltem 5 mm., longitudinus flagellorum incertus. Capsula seminaque non visa.—PERU: Cuzco: Saxaihuamán, 3400 m. alt., March, 1943, *Martín Cárdenas*, no. 2337 (TYPE, G).

In habit, this species is easily distinguished from both *M. cyrtophylla* and the next species to be described, *M. Hoppii*. The former is branched well above the base and the basal leaf is reduced to little more than a sheath; its anthers are sessile on the column. The latter is a much smaller plant, unbranched, with the compact inflorescence immediately subtended by two cauline leaves. Because of the scarcity of materials, I am unable to be positive about the inner tepals of *M. Cardenasii;* in the two flowers available to me, they appear to be considerably reduced. The style-crests became somewhat damaged in dissection, but the remnants indicate that they are shorter and broader than is the case in *M. cyrtophylla*, probably lacking the true flagellar development of that species. The new species is named for its collector, the distinguished Bolivian botanist, Professor Martín Cárdenas, who has sent many interesting Bolivian and Peruvian plants to the Gray Herbarium.

M. **Hoppii,** spec. nov. Bulbus ovoideus vel subglobosus, 1.5–2 cm. altus, 1–1.5 cm. latus, tunicae atrobrunneae. Folium basale unicum, quam caulem brevius, 3.5–5 cm. longum, vaginante; folia caulina 2, inflorescentiam subtendens, inferius ad 18 cm. longum, basi spathiforme amplectens, lamina lineari-attenuata, acuta, glabra, 1–2 mm. lata, folium superius simile, 2.5–7 cm. longum, 1–1.5 mm. latum. Caulis simplex, teres, glaber, 3–7 cm. longus, inflorescentia terminalis, compacta. Spathae herbaceae, exterior ad 2 cm. longa, acuta, interior ad 2.5 cm. longa, obtusa, 2–4-fl., pedicelli quam spathas breviores. Ovarium oblongum, glabrum, ca. 5–6 mm. longum. Tepala exteriora violacea, ad 2.5 cm. longa, obovata, unguiculata, lamina ca. 8–10 mm. lata, obtusa; tepala interiora probabiliter reducta, quam exteriora valde minora. Staminum columna ad 1 cm. longa; styli rami et appendices saltem 7 mm. longi. Capsula oblongo-ellipsoidea, trigona, ca. 1 cm. longa; semina atrobrunnea, angulata, 1.5–2 mm. longa.—*Cypella Hoppii* Diels ex Macbride in Field Mus. Bot. xiii (part 1, no. 3). 717 (1936), without Latin diagnosis, and therefore invalid. Specimens seen:—PERU: Arequipa: Arequipa [before Dec. 1925], *Hopp* (TYPE, Berlin, not seen; photo, G); open gravelly soil, above Arequipa, 2500–2600 m., Apr. 7–16, 1925, *Pennell*, no. 13173 (G).

This distinct little species has an unfortunate nomenclatural history. Named for the collector by Professor Diels, the binomial apparently was never published until Macbride did so in 1936, crediting it to Diels. Since there was no Latin diagnosis given, this binomial is invalid. Although the type has presumably been destroyed, there is an excellently clear photograph of it (Field Mus. Neg. 11094), from which measurements of some of the floral parts can be safely taken. The one point which is not certain to me is the size of the inner tepals; these may be similar to those of *M. cyrtophylla*, or they may be even more reduced. It is obvious from the photograph that the long stamen-filaments are united in a column and the anthers free from the style, so that there is no doubt as to the genus to which it belongs. The Pennell specimen cited here is in fruit, but its size, short stem, most of which is clearly subterranean, and the cauline leaves immediately subtending the spathes warrant assigning it to this species, rather than to *M. cyrtophylla*, under which it was cited by Johnston and by Macbride.

M. **Johnstoni,** spec. nov. Bulbus ovoideus, 1–2.5 cm. altus, 6–10 mm. diam., tunicae atrobrunneae, membranaceae. Folia basalia 0, vel vagina unica reducta ad basin caulis; folium caulinum unicum, infra inflorescentiam 4–8 cm., lanceolato-lineare, basi attenuatum, acutum, plicatum, glabrum, saltem 15 cm. longum, 3–5 mm. latum. Caulis simplex, teres, glaber, 10–20 cm. longus. Spathae herbaceae, exterior 3.4–4.4 cm. longa, acuminata, acuta, interior 3.2–4 cm. longa, subobtusa, retusa, 1–3-fl., pedicelli 2.5–3.5 cm. longi. Ovarium ellipsoideum, glabrum, ad 8 mm. longum. Flores violacei; tepala exteriora saltem 1.8 cm. longa, longe unguiculata, lamina obovata (?), saltem 6 mm. lata, interiora valde reducta, 5–6 mm. longa, ca. 2 mm. lata, ovato-oblanceolata, acuta, unguis perbrevis tumescens, fortasse glandulosus. Staminum columna 6 mm. longa; antherae 5 mm. longae, in columnam paene sessiles. Stylus columnam longitudine aequans; styli rami et appendices saltem 6 mm. longi, rami 3 mm. integri, deinde bifidi. Capsula matura seminaque non visa.—ARGENTINA: TUCUMÁN: Dep. Chichigasta: Las Pavas, 3200 m. alt., December, 1926, *S. Venturi*, no. 4636 (TYPE, G).

It gives me much pleasure to name this remarkable species, which so greatly extends the range of the genus, for Dr. I. M. Johnston who first recognized the generic distinctness of the original Peruvian species. From *M. cyrtophylla* and *M. Cardenasii*, *M. Johnstoni* is easily separated by its smaller flowers, with ovate to oblanceolate inner tepals, narrower, longer, fewer-flowered spathes, with the flowers long-pedicellate, and by the shorter stylar appendages. It is unlikely to be confused with the dwarf *M. Hoppii*, with most of its stem subterranean and its cauline leaves immediately subtending the spathes.

Addendum

Just before this manuscript was sent to the printer, there was received from the United States National Herbarium a sheet of *Cárdenas*, no. 2491, collected at 3900 m. alt. at Ansaldo, Cochabamba, Bolivia. Although it bears an unpublished name in another genus, I can find nothing to separate it from the type of *Mastigostyla Cardenasii* from near Cuzco, Peru. The flowers of this example are beautifully preserved, and all important details can be ascertained without dissection, a most unusual state of affairs! The inner tepals are about 5 mm. long and 1 mm. wide, narrowly elliptic-lanceolate. There is a definite perianth-tube, 2 mm. long. The style-arms and appendages (crests) are 1 cm. long, the bifid part being 5 mm. long. The stigmatic projections are clearly shown and are about 1.5 mm. long. The crests above the stigmas are about 2 mm. long, the earlier conjecture that they were "shorter and broader than is the case in *M. cyrtophylla*, probably lacking the true flagellar development of that species" being fully supported.

V. A Revision of the North American Species of Nemastylis Nutt.

Even a cursory study of *Nemastylis* suffices to show that the genus, as currently interpreted, is an agglomeration of discordant elements. In fact, even in its origin, it was a mixture, at least nomenclaturally. When Nuttall described it, in 1835, he included two species which were truly congeneric, but, through an error, the first of these was incorrectly identified with and based nomenclaturally upon *Ixia coelestina* Bartr. ex Willd., although the plant actually described had nothing to do with that species. It has been shown in a previous section of this study that *I. coelestina* belongs in the genus *Sphenostigma*, and the transfer has been made. Britton and Brown, Illust. Fl. (ed. 2) i. 541 (1913), unfortunately selected *N. coelestina* as the type of the genus

Nemastylis. If their choice were to stand, the awkward situation would then be created of having the nomenclatural type of *Nemastylis* transferred to another genus. Fortunately, however, Britton and Brown's typification cannot stand. In Bot. Mag. lxvi. sub t. 3779 (1840), Herbert discussed the question of whether *N. coelestina* and *N. acuta* (Barton) Herb. were actually congeneric. The latter name, incidentally, was used by Herbert in place of *N. geminiflora* Nutt., his action being correct at that time. Expressing doubt of the propriety of placing the two species in the same genus, he then named *N. acuta* as "the type of the Genus", thereby antedating Britton and Brown by seventy-three years and preventing a nomenclatural upheaval which would follow, were the action of the later authors accepted without question.

To the original members of the genus, described by Nuttall in Trans. Am. Phil. Soc. v. 157 (1835), two more were added in 1840 by Herbert (l. c.), *N. purpurea* and *N. coelestina* var. *tenuis*. In 1876, Baker erected the genus *Chlamydostylus*, in Journ. Bot. xiv. 185, with four species, one of which was South American, the others being *C. tenuis* (Herb.) Baker, *C. multiflorus* Baker, and *C. cernuus* Baker. The genus *Chlamydostylus* was reduced (as *Chlamydostylis*) to outright synonymy under *Nemastylis* by Bentham and Hooker, Gen. Pl. iii. 696 (1883), no transfers being actually made. The necessary transfers were made by Baker, Handbk. Irid. 112–114 (1892), who accepted the reduction but treated *Chlamydostylis* (for he accepted the correction of the spelling, as well) as a subgenus of *Nemastylis*, a course followed by subsequent workers. The canon established by Baker in 1892 included seventeen species. Since that year, nine more species have been described and several older names have been transferred to *Nemastylis*, some of these replacing names originally given in that genus.

The systematic position of the genus in the family has been accepted, relatively without question, for nearly seventy years. Baker, in Journ. Linn. Soc. Bot. xvi. 74 (1877), assigned it to the group of genera including *Calydorea* and *Eleutherine*. Pax, in Engl. & Pr. Nat. Pflanzfam. ii (5). 148 (1888), juggled genera to some extent, but continued to associate *Nemastylis* with *Gelasine*, *Calydorea*, and *Cipura*. Baker, in 1892, specifically included the genus in the tribe *Sisyrinchieae*, defining the tribe, in part, by "Style-branches alternate with the anthers." This was accepted by Diels, in Engl. & Pr. Nat. Pflanzfam. (ed. 2) xva. 469 (1930).

If this disposition of the genus is accepted, then many of the species which both Baker and Diels have assigned to *Nemastylis* cannot be keyed to it by either of their keys. This group includes (to name only North American species) *N. Bequaertii* Standl., *N. brunnea* S. Wats., *N. latifolia* Weatherby, *N. Lehmannii* Standl., *N. multiflora* (Baker) Baker, *N. Seleriana* Loes., *N. silvestris* Loes., *N. triflora* Herb., and *N. versicolor* S. Wats. All these species have the style-arms incompletely bifid, and any reasonably careful dissection shows that the anthers are *opposite* the incompletely bifid style-arms, not alternate with them. Thus, if Baker and Diels are followed, a considerable portion of the North American species would belong in another tribe, the *Moraeeae*.

Following this discovery, two questions naturally arose. 1: Are the style-arms of the remaining North American species completely or incompletely bifid? 2: Are the stamens really alternate with the style-arms in these species? Many dissections have been made, and apparently both questions must be answered in the negative. In some individuals of *N. geminiflora*, the division seems almost complete, but in others it is clearly not complete. In *N. tenuis*, *N. floridana*, *N. caerulescens*, and *N. Nuttallii*, for example, the style-arms are definitely not completely bifid in the individual flowers examined. It is this fact which first suggested a negative answer to the second question, for in these dissections, the incompletely bifid style-arms could be seen clasping the anthers. Undistorted flowers or bud-dissections show this beyond question, but still more evidence is available. The stamen-filaments in *N. tenuis*, for example, are united into a column. Favorable material, in which the color has been removed by boiling, shows the vascular system of the column and of the style. It is possible to tear a strip from the column by pulling an anther directly downward, thus disclosing the undivided portion of the style. In this, sometimes even by reflected light, a vascular strand can be seen opposite each stamen. This strand divides at the apex of the style, and the two parts pass into the two halves of the incompletely bifid style-arm clasping the stamen. It seems to me that this evidence warrants the conclusion that *Nemastylis* does not belong in the *Sisyrinchieae*, but in the *Moraeeae*, being related to *Alophia* and *Tigridia*.

Closely connected with the problem of the systematic position of the genus in the family is the question of the circumscription of the genus. As a result of the present study, it has seemed desirable to return to the earlier conception of Nuttall, excluding a rather large proportion of the species which have been assigned to *Nemastylis* by later workers. These which are excluded will probably be transferred to *Tigridia* or to some segregate of that genus; no actual transfers will be made here for that would be incorrect before *Tigridia* and its allies are studied in detail. By thus limiting the concept of *Nemastylis* to the species with a flat, rotate perianth, the tepals being subequal, the style filiform and shorter than or rarely equal to the slender, subulate or canaliculate, divergent style-arms, the anthers with a narrow connective and coiling downwards from the apex with age, but exceeding the style-arms—by this means, a clear, well-defined, and homogeneous group is established. The excluded species have broadly campanulate to crateriform perianths, the tepals varying from subequal to markedly dimorphic, the style much longer than the style-arms, these often with tooth-like projections beneath or at the sinuses, the anther-connective usually broad, and the anthers seldom coiling downward from the apex.

Synoptic Treatment

Nemastylis Nuttall. Herbaceous perennials, with an ovoid or subglobose bulb. Leaves linear to lance-attenuate, or lance-ensiform, often plicately nerved. Stems simple or branched. Spathes herbaceous, 1–several-flowered. Ovary small, oblong-ellipsoid, subclavate, or subturbinate. Flowers erect or somewhat nutant, rotate, regular, fugacious, the tepals very briefly united at the base, equal or subequal. Stamens inserted on the tepals near the base, the filaments free or more or less united; the anthers longer than the filaments, with a narrow connective, coiling downward from the apex with maturity. Style equal to or usually shorter than the style-arms, the three style-arms bifid almost to the base, opposite the stamens; the stigmas apical, subcapitate or tufted, or sometimes minutely two-parted. Capsule more or less oblong-ellipsoid, opening by six deltoid teeth at the apex; seeds yellow- or dark-brown, irregularly closely pitted, about 2 mm. long, angular.—Trans. Amer. Phil. Soc. v. 157

(1835). *Nemostylis* [variant spelling employed by] Herbert in Bot. Mag. lxvi. sub t. 3779 (1840). *Chlamydostylus* Baker in Journ. Bot. xiv. 185 (1876).

Type-species: *N. geminiflora* Nutt.

A small genus confined to the New World; represented in the area under discussion by four species and four varieties. In view of the homogeneity of the group, no subgenera or sections are felt to be necessary.

Key

a. Cauline leaves well-developed, 5–11 mm. wide; filaments free or only slightly connate at the base. . . . . 1. *N. geminiflora*
a. Cauline leaves reduced, or if developed, narrow, 1–4 mm. wide; filaments wholly or partially united (except in no. 4c).
  b. Filaments united in a column.
    c. Fall-blooming; 4–15 dm. tall; inflorescence often complexly branched; Florida. . . . . 2. *N. floridana*
    c. Spring- or summer-blooming; to 4 dm. tall; inflorescence simple or branched (not complexly).
      d. Plant (2–) 3–4 dm. tall, almost never branched; Missouri, Arkansas, Oklahoma. . . . . 3. *N. Nuttallii*
      d. Plant rarely over 3 dm. tall; Mexico.
        e. Plant 15–30 cm. tall; style-arms ca. 4 mm. . . . . 4. *N. tenuis*
        e. Plant 2–9 cm. tall; style-arms ca. 2–2.5 mm. . . . . . . 4a. *N. tenuis* var. *nana*
  b. Filaments free, in part.
    f. Filaments united 1–2 mm., less than half their length; tepals ca. 2 cm. long.
      g. Tepals slightly puberulent internally at the base; filaments united 1–2 mm. . . . . 4b. *N. tenuis* var. *caerulescens*
      g. Tepals glabrous; filaments almost free. . . . . 4c. *N. tenuis* var. *Purpusii*
    f. Filaments united 3–4 mm., over half their length; tepals ca. (2–) 3 cm. long. . . . . 4d. *N. tenuis* var. *Pringlei*

1. Nemastylis geminiflora Nutt. Bulb broadly ovoid to subglobose, 2–2.5 cm. high, the brittle, membranous brown tunics prolonged upward into a collar around the base of the stem and leaves. Basal leaves 2–3, 20–40 cm. long, or longer, 3–6 mm. wide, glabrous, plicate, lance-linear or narrowly linear-ensiform; cauline leaves 2–3, 15–35 cm. long, 5–11 mm. wide, at least one of them usually much exceeding the inflorescence, the upper one somewhat reduced. Total height of plant 12–46 cm., the stem terete, glabrous, sometimes branched near the base, usually several-branched above the middle. Spathes herbaceous, unequal, the outer 2–4.2 cm. long, the inner 3.5–4.7 cm. long, (1-) 2-flowered, the pedicels filiform, glabrous, not well-exserted at anthesis. Ovary ovoid-turbinate, glabrous, to 4 mm. long. Tepals subequal, to 3 cm. long, 1.7 cm. wide, ovate-obovate, obtuse or acutish, blue (lighter at the base, giving the effect of

an "eye"). Filaments free or only slightly connate at the base, to 2.5 mm. long; anthers to 1.5 cm. long. Style to 3 mm. long; style-arms to 5 mm. long. Capsule 1.5–2 cm. long, well-exserted, oblong-turbinate; seeds angular, brown.—Trans. Amer. Phil. Soc. v. 157 (1835); VanHoutte in Fl. des Serres (Sér. II) xi. 45, t. 2171 (1875). *Ixia acuta* Barton, Fl. N. Am. ii. 89, t. 66 (1822), not *I. acuta* Lichtenst. in Roem. & Schult. (1817). *Nemastylis acuta* (Barton) Herb. in Bot. Mag. lxvi. sub t. 3779 (1840); Baker in Journ. Linn. Soc. Bot. xvi. 103 (1877), in Bot. Mag. cix. t. 6666 (1883), Handbk. Irid. 111 (1892); Small, Fl. Se. U. S. 292 (1903), in large part; Small in Journ. N. Y. Bot. Gard. xxxii. 261–262, fig. 1 (1931); Small, Man. Se. Fl. 326 (1933); Dormon, Wild Fls. La. 27, t. 6 (1934). *Beatonia coelestina* (Bartr.) Klatt in Linnaea, xxxi. 567 (1861–62), as to plant in part, but not as to name. *Gelasine ? texana* Herb. in Bot. Mag. lxvi. sub t. 3779 (1840). *Calydorea texana* (Herb.) Baker in Journ. Bot. xiv. 188 (1876); Handbk. Irid. 109 (1892). Representative material:—UNITED STATES: MISSOURI: Franklin Co.: Gray's Summit, May 15, 1926, *J. M. Greenman*, no. 4492 (MBG); Washington Co.: moist rocky hills, Cotosi, May–June, collector not named (F); St. Genevieve Co.: Bloomsdale, May 6, 1928, *J. H. Kellogg*, no. 1666 (MBG); Iron Co.: dry exposed hill, Arcadia, April, 1900, *C. Russell* (MBG); Cass Co.: rocky slopes, Prairie, June, 1865, *G. C. Broadhead* (MBG). ARKANSAS: "from near Fort Smith on the Arkansas to the banks of Red River," *Nuttall* (TYPE, P; isotype, NY); Red River, *Nuttall* (P); Hampstead Co.: sandy woods, Fulton, Apr. 22, 1914, *E. J. Palmer*, no. 5347 (MBG), same locality, Apr. 23, 1905, *B. F. Bush*, no. 2403 (G, MBG); Miller Co.: Texarkana, August, 1898, *Heller* (NY). LOUISIANA: Caddo Co.: Shreveport, *Mrs. Lilian H. Trichel* (NY, photo); Nachitoches Co.: Ashland, heavy clay soil, Apr. 16, 1930, *Caroline Dormon* (NY), dry woods, May, 1930, *Dormon* (NY); Nachitoches, upland woods, Apr. 24, 1915, *E. J. Palmer*, no. 7363 (MBG, P, US). KANSAS: Greenwood Co.; May 1, 1879, *G. C. Broadhead* (MBG); Wilson Co., 1896, *W. H. Haller* (in *Pl. Kansas*), no. 828 (G, NY, MBG, US); Cowley Co., May, 1898, *Mark White* (MBG); Winfield, 1901, *M. S. Carter* (P); Sumner Co.: near Genda, May 1, 1887, *T. Rassler* (US). OKLAHOMA: Osage Co.: grassy prairie at Camp McClintock, May 10, 1941, *T. Johnson*, no. 86 (O); Rogers Co.: Catoosa, May 8, 1895, *B. F. Bush*, no. 1166 (G, NY, MBG); Tulsa Co.: low marshy spot, rich black sandy loam, 4 miles southeast of Tulsa, on Katy R. R., May 10, 1941, *H. A. Hawk*, no. 13 (O); Creek Co.: Sapulpa, Apr. 29, 1895, *B. F. Bush*, no. 969 (MBG); clay soil prairie, 7 miles west of Depew, Apr. 29, 1939, *U. T. Waterfall*, no. 912 (NY); Okmulgee Co.: Okmulgee, Apr. 29, 1891, *M. A. Carleton*, no. 97 (US); Pittsburgh Co., May, 1935, *J. E. McClary* (O); Atoka Co.: Limestone Gap, Apr. 9–11, 1903, *H. A. Pilsbry* (P), prairies 10 miles north of Limestone Gap, Apr. 23, 1877, *G. D. Butler*, no. 11507 (MBG); Pushmataha Co.: lowland, Kiamichi Mts., Apr. 9, 1928, *Phyllis Draper* (O); Choctaw Co.: Fort Towsen, 1884, *Dr. Edwards* (NY); Bryan Co.: vicinity of Durant, 1931, *W. L. Blain*, no. 10 (US); Payne Co.: Stillwater, May 19, 1899, *E. E. Bogue* (MBG, P); Pottawatomie Co.: prairie east of Tecumseh, Apr. 22, 1932, *E. D. Buckley*, no. 67 (O); roadside, clay soil, Wanette, Apr. 25, 1936, *M. Faulkner*, no. 4 (O); Murray Co.: Platt National Park, Apr. 12, 1935, *Merrill & Hagan*, no. 109 (US), May 8, 1935, *Merrill*, no. 337 (NY), Sulphur, Apr. 9, 1935, *Merrill*, no. 103 (O); Love Co.: prairie, along railroad track, near Mariette, Apr. 18, 1913, *G. W. Stevens*, no. 81 (G, MBG, NY); Caddo Co. ?: on the False Washita, between Ft. Cobb and Ft. Arbuckle, 1868, *E. Palmer*, no. 336 (US); Comanche Co.: vicinity of Ft. Sill, May 16, 1916, *Mrs. J. Clemens*, no. 11538a (MBG). TEXAS: Fannin Co.: Bonham, May 1, 1896, *Mrs. J. M. Milligan* (US); Lamar Co.: 2.75 miles north of Paris, May 21, 1937, *V. L. Cory*, no. 23089 (G); Young Co.: rough stony hillside, 1 mile southwest of Alney, Apr. 1, 1938, *W. L. McCart*, no. 856 (NY); Collin Co.: along railroad track, 5 miles south of Celina, Apr. 14, 1939, *McCart*, no. 1562 (NY); Van Zandt Co.: Van Zandt, Apr. 29 (no year given), *J. B. Henderson*, no. 5700 (US); Dallas Co.: rich prairies, near Dallas, May, June, *Reverchon in Curtiss*, no. 2861* (G, US, F, NY), same locality, Apr. 15, 1900, *B. F. Bush*, no. 603 (MBG, US, NY); Tarrant Co.: valley of the Trinity, near Fort Worth, Apr. 10, May 15, 1913, *A. Ruth*, no. 271 (MBG; other specimens of this number, with different dates, NY, US, F); Shackelford Co., Apr. 1, 1883, *G. W. Holstein* (P); Johnson Co.: prairies near Bushman, June 13, 1898, *H. Eggert* (MBG); Nacogdoches Co.: "Nagadoches", *Dr. Leavenworth* (NY); San Augustine Co.: San Augustine, *G. L. Crocket* (US); Anderson Co.: grassy places near Long Lake, June 9, 1899, *Eggert* (MBG); Brown Co.: limestone barrens, Brownwood, Mar. 31, 1917, *E. J. Palmer*, no. 11431 (G, MBG, US, NY); McLennan Co.: Waco, *L. Pace*, no. 206 (MBG); Burnett Co., August, 1892, *F. G. Schaup* (NY); Williamson Co.: dry woods, Georgetown, March, 1890, *J. E. Bodin*, no. 269 (US); Bell Co.: low prairie near Holland, May 13, 1931, *S. E. Wolff*, no. 2920 (US); Robertson Co.: Calvert, Mar. 27, 1886, *F. J. H. Merrill* (NY); Walker Co.: 14 miles southwest of Huntsville, Mar. 11, 1934, *Cory*, no. 7831 (G); Montgomery Co.: moist sand, Willis, Mar. 10, *S. R. Warner*, no. 15 (MBG); Washington Co., *Miss Hobart* (G); Travis Co.: Austin, 500 ft. alt., Apr. 19, 1930, *G. L. Fisher*, no. 101 (F); near Barton Creek, Austin, Apr. 18, 1928, *E. J. Palmer*, no. 33409 (G); Austin, Apr. 8, 1922, *Tharp*, no.

2824 (US); Hays Co.: San Marcos, spring of 1898, *S. W. Stanfield* (NY); Gillespie Co.: Big Branch, *G. Jermy*, no. 332 (MBG); 8 miles north of Fredericksburg, on Highway 16, Apr. 14, 1941, *Innes & Warnock*, no. 776 (G); Comal Co.: New Braunfels, April, 1851, *Lindheimer*, no. 562 (G, MBG); Harris Co.: wet prairies, Houston, Apr. 12, 1872, *E. Hall*, no. 638 (G, F, MBG, NY, US); Galveston Co.: Galveston Bay, spring, 1834, *Drummond*, III, no. 415 (type of *Gelasine ? texana*, not seen; photo, NY; isotypes, G, NY, P); Jackson Co.: prairie banks, Ganado, Mar. 6, 1916, *E. J. Palmer*, no. 9075 (US, MBG); Victoria Co.: prairies near Victoria, Apr. 6 & 8, 1900, *Eggert* (MBG); Bexar Co.: San Antonio, Apr. 29, 1911, *Mr. & Mrs. J. Clemens*, no. 142 (MBG); prairies, San Antonio, March, 1884, *Havard*, no. 35 (G, US); Kleberg Co.: Kingsville, Mar. 27, 1920, *M. M. High*, no. 77 (MBG). One specimen in the New York Botanical Garden, collected by Dr. I. Eights, has a label stating that it came from East Tennessee. No other material from Tennessee has been seen, and the correctness of the label may be questioned for the time being.

The earliest specific name for this plant, *acuta*, was, unfortunately, a later homonym in *Ixia*, in which it was first described, and since there is a valid synonym available, it is necessary to apply the binomial *N. geminiflora* to this species.

To the synonymy usually given, there have been added, with little hesitation, the names *Gelasine ? texana* Herb. and *Calydorea texana* (Herb.) Baker. Although the actual type of Herbert's species is at Kew, and has not been available to me, there is a photograph of it at the New York Botanical Garden, with a memorandum by Mr. N. Y. Sandwith, dealing with several questions raised by Dr. J. K. Small. In addition, four sheets of the type-number have been studied. When Herbert described his new species as a doubtful *Gelasine*, he stated at the beginning: "*Nem. acutae* affinis." The critical question is whether the style-arms are entire or bifid, and on this, too, Herbert hedged somewhat, by means of parentheses, saying "antheris stigma tenuiter et suberecte (ni fallor in sicco) trilobum superantibus." Concerning this matter, Mr. Sandwith stated, in the memorandum mentioned, after an examination of the type and an isotype at Kew, that of the three specimens on the type, one was damaged, a second *seemed* to have undivided style-arms, and the third unquestionably had divided style-arms, as did the isotype. He noted that the style-arms had the characteristic blue tips of

Nemastylis, and expressed serious doubt that the style-arms of the second specimen on the type were really simple. The photograph of the type is certainly *N. geminiflora* in habit. All four sheets of *Drummond*, no. 415, which I have studied are *N. geminiflora.* In one flower only, there appear to be simple style-arms, but this flower shows evidence of damage to the style, and the anthers are disposed in such a way that they may very well cover portions of the style. Furthermore, on more than one occasion, in studying this species, I have felt that the style-arms were simple in some individuals, only to find, on dissection, that the branches were truly bifid, the portions having been concealed by the anthers.

Additional confusion was added by Engelmann and Gray, Pl. Lindh. 27 (1845), who endeavored in a footnote to distinguish *Alophia* from *Herbertia*, and who noted that "Under No. 415, we have *Nemostylis acuta* (*geminiflora* Nutt. Ixia acuta, *Barton*,) as well as *Gelasine Texana*. In the latter the filaments are certainly monadelphous, and the style has two or three short and simple lobes." One sheet of *Drummond*, no. 415, in the Gray Herbarium, bears a single flower in a pocket labelled, by Gray, *Gelasine Texana*, a similar flower being found on the New York sheet of this number. The filaments of the flower in this pocket are monadelphous, but after patient dissection it was found that two style-arms had been concealed by the loculi of anthers, while the third had been drawn out of position and was adhering to the staminal column and part of an outer tepal. On straightening them, it was found that one arm was broken short, and the other two were bifid near the apex, while the inner tepals were much shorter, darker, and different in shape from the outer tepals. In other words, this single flower is *Alophia Drummondii*[1]. Incidentally, Herbert stated in the original

[1] According to the International Rules, Art. 70, Note 4, the genitive and adjectival forms of a personal name are different epithets. Consequently, since it is necessary to retain the original spelling, which was a genitive, and since I cannot find that that form has been transferred to *Alophia*, the transfer is made here:

ALOPHIA **Drummondii** (R. Grah.), comb. nov. *Cypella Drummondii* R. Grah. in Edinb. New Phil. Journ. xx. 190 (1836). *Herbertia Drummondii* (R. Grah.) Small in Addisonia, xx. 3 (1937). *Alophia Drummondiana* Herb. in Bot. Mag. lxvi. sub t. 3779 (1840); possibly intended as a new combination, but actually an illegitimate renaming of the species. *Herbertia Drummondiana* Herb. in Bot. Reg. xxviii. Misc. 65 (1842); as a new species. *Trifurcia caerulea* Herb. in Bot. Mag. lxvi. sub t. 3779 (1840). *Herbertia caerulea* (Herb.) Herb. in Bot. Mag. lxvii. t. 3862 (1841). *Iris brachystigma* Scheele in Linnaea, xxii. 348 (1849). *Herbertia Watsoni* Baker, Handbk. Irid. 71 (1892).

description: "Filamenta in sicco libera." Since *Drummond*, III, no. 414, is *Alophia Drummondii*, it is quite possible that some mixture occurred in sorting, as Engelmann and Gray suggested. In any case, the evidence seems to point most strongly to the suggestion that Herbert was misled by appearances, made no dissection, and redescribed *N. geminiflora* in another genus. Baker annotated the type as *Calydorea texana*, but after experience with a number of Baker's types, which showed no sign of dissection when they were received (thus accounting for the fact that many of them were described in the wrong genera), I am not unduly impressed by his opinion that it belongs in *Calydorea*. It is beyond question that all of *Drummond*, no. 415, seen by me, with the exception of single flowers in pockets on two herbarium sheets, is *N. geminiflora*.

2. N. FLORIDANA Small. Bulb ovoid or globose, to 2.5 cm. high, the dark brown membranous tunics sometimes prolonged upward in a short collar around the base of the stem and radical leaves. Basal leaves about 3, lance-attenuate, shorter than the inflorescence, or about equalling it, to 11.4 dm. long, 1–3 mm. wide, plicate, glabrous; cauline leaves 2–4, the longest to 60 cm. long, 7 mm. wide, linear to ensiform, plicate, the upper ones reduced progressively. Stem (below the inflorescence) 4–15 dm. (*fide* Small), terete, glabrous, few- to many-branched at the apex, in a loose inflorescence, the branches often filiform. Spathes 2-flowered, the outer 1.2–2 cm. long, the inner about twice as long, closely convolute; pedicels glabrous, exserted at anthesis. Oavery glabrous, turbinate-clavate, about 4 mm. long. Tepals subequal, to 2 or 2.5 cm. long, nearly 1 cm. wide, obovate-elliptic, obtuse or subacute, concolorous or lighter at the base, violet-purple. Filaments united, 1.5–2 mm. long; anthers about 7–9 mm. long. Style 2 mm. long; style-arms 5 mm. long (sometimes longer). Capsule obovoid, to 1.3 cm. long; seeds light red-brown, 2 mm. long, angular, D-shaped, irregularly pitted.—Journ. N. Y. Bot. Gard. xxxii. 266, fig. 2 (1931); Journ. N. Y. Bot. Gard. xxxiv. 1–5, fig. 1 (1934); Man. Se. Fl. 326 (1933). Specimens seen:—UNITED STATES: FLORIDA: Volusia Co.: 12 miles east of New Smyrna, Oct. 9, 1934, *Mary F. Baker* (US); marshes 7 miles west of New Smyrna, Sept. 19, 1931, *Small, Lord & West* (NY); near Ormond, Deland Road, Oct. 6, 1943, *Eileen H. Butts* (G); Hawkinsville, Sept. 2, 1910, *S. C. Hood* (MBG); Daytona, Aug. 18, 1896, *H. J. Webber*, no. 457 (MBG); Lake Co. ?: along St. Johns River, on the Cheney-Dixie Highway, Sept. 24, 1927, *Burger & West* (NY); Seminole Co.: low pine-

lands, Celery Delta, near Sanford, Oct. 1931, *S. Rapp* (NY); low pinelands, Sanford, Sept. 1931 (NY); Orange Co.: flatwoods in low places along State Road no. 8, about 2 miles from Ocean City, July 31 (fl.), Sept. (fr.), 1931, *McFarlin*, no. 6325 (NY); Brevard Co.: swamp, Okeechobee region, Sept. 10, 1903, *Fredholm*, no. 6001 (G); wet ground, Eau Gallie, Indian River, Sept. 18, 1896, *A. H. Curtiss*, no. 5777 (G, NY, US); wet hammock near Courtenay, Merritt Island, Sept. 18, 1931, *J. K. Small* (NY, US); Merritt Island, Sept. 18, 1931, *Small, Lord & West* (NY); marshes west of Indian River City, Sept. 19, 1931, *Small, Lord & West* (NY).

This interesting and long-unrecognized species has had its history well-told by Dr. Small in the papers referred to above. It is apparently endemic in the upper coastal region of eastern Florida, and is the only species of the genus to be found in that state. There is little chance that it will be confused with any other iridaceous plant in its native home, for it is a fall-bloomer, while the plant with which it has been confused in herbaria, *Sphenostigma coelestinum* (Bartr. ex Willd.) R. C. Foster, is a spring-bloomer.

✓ 3. N. **Nuttallii** Pickering in herb., nom. nov. Bulb ovoid to subglobose, about 1.5–2 cm. high, the tunics dark brown to chestnut brown. Basal leaves 2–3, the lowest the shortest, 15–40 cm. long, 1–3.5 (–5) mm. wide, linear-ensiform, long-acute, glabrous, the wider ones somewhat plicate, rarely equalling or exceeding the inflorescence; cauline leaves 2, the lower 9–23 cm. long, to 4 mm. wide, sometimes exceeding the inflorescence, the upper reduced, 1.5–8 cm. long, rarely with a branch in its axil. Stem simple, (20–)30–40 cm. tall, very infrequently 1-branched above the middle, terete, glabrous, with the axis terminated by a 1- (rarely 2-) flowered pair of spathes. Spathes closely convolute, equalling or somewhat exceeding the pedicel at anthesis, glabrous, the outer 2–3 cm. long, the inner 3–5 cm. long. Ovary 4–5 mm. long, glabrous, turbinate to subclavate. Tepals subequal, to 2 cm. long, 4–5 mm. wide, ovate to obovate, rather obtuse, or subacute, blue, concolorous (?). Filaments 1–2 mm. long, united in a column; anthers about 5 mm. long. Style 2 mm. long, usually slightly longer than the staminal column; style-arms 2 mm. long. Capsule more or less oblong-clavate, trigonous, 2 cm. long; seeds dark red-brown, closely pitted, angular, to 2 mm. long.—*N. coelestina* (Bartr. ex Willd.) Nutt. in Trans. Amer. Phil. Soc. v. 157 (1835), as to plant described, but not as to name; Small, Fl. Se. U. S. 292 (1903), in part; *N. acuta* (*N. geminiflora*) of authors probably includes some material of this species. Specimens seen:—United States: Missouri: Dallas

Co.: Niangua River, ½ mile upstream from mouth of Donisenburg Creek, 5 miles southwest of Long Lane, Aug. 5, 1937, *Steyermark*, no. 24244 (MBG, F); Laclede Co.: Highway 66, June 3, 1938, *George Moore* (F); Wright Co., without locality, June 25, 1888, *F. Bush* (US); headwaters of Bryant Creek, 2 miles southeast of Cedar Gap, July 28, 1937, *Steyermark*, no. 23726 (G, F, MBG); Webster Co.: along Niangua River, 2 miles southwest of Forkner's Hill, July 29, 1937, *Steyermark*, no. 23818 (MBG, F); Christian Co.: 4 miles east of Garrison, July 11, 1937, *Steyermark*, no. 23272 (MBG, F); Taney Co.: Swan, June 9, 1898, *B. F. Bush*, no. 182 (G, US, NY, F, MBG); Stone Co.: along Piney Creek, 4 miles southwest of Cape Fair, near the Barry Co. line, June 22, 1937, *Steyermark*, no. 22580 (MBG, F); Barry Co.: Eagle Rock, Aug. 14, 1905, *B. F. Bush*, no. 3240 (MBG); bluffs along King's River, north of Allen Ford, 4 miles southwest of Viola, June 21, 1937, *Steyermark*, no. 22559 (MBG, F); McDonald Co.: Anderson, July 24, 1892, *B. F. Bush* (MBG). ARKANSAS: without definite locality, but probably near the Red River, *Nuttall* (TYPE, P; tracing in G); near the Red River, *Nuttall* (P). OKLAHOMA: Muskogee Co.: without definite locality, *E. L. Little, Jr.*, nos. 1745, 1747 (O); Atoka Co.: Limestone Gap, June, 1875, *G. D. Butler* (MBG), same locality, May 22, 1877, *G. D. Butler* (MBG, F).

For some time, this species has passed in herbaria or in the literature either as *N. coelestina* or *N. acuta*. It has been shown (see Small in Journ. N. Y. Bot. Gard. xxxi. 155–161 (1931) and Section II of the present study) that the former plant is not a *Nemastylis* and that it is confined to Florida. From *N. acuta*, properly *N. geminiflora*, *N. Nuttallii* differs in its few, narrow leaves, its rarely-branched stem, with the upper cauline leaf bract-like, the usually smaller flowers with shorter styles and style-arms, the filaments united, and the rather longer and more oblong capsule, which is narrower in proportion to its length.

The existence of this species as an entity distinct from *N. geminiflora* had been suspected from a few specimens and from a tracing in the Gray Herbarium. Additional material confirmed this, and in the material borrowed from the Philadelphia Academy two Nuttall collections were found, one being that from which the tracing in the Gray Herbarium had been made. This bears the label, in Nuttall's hand, "N. *Nuttallii C. P. Ark. Nutt.", with an additional label in the hand of Sereno Watson, saying, "I do not know what this is. There is nothing like it in herb. Gray, & it seems to be undescribed." It is this specimen which has been selected as the type. Apparently, Nuttall realized that his material of *Nemastylis* included two distinct species, one of which Pickering named in his honor. Before publishing on his Arkansas material, however, Nuttall must have concluded that the plant named for him was conspecific with *Ixia coelestina* Bartr. ex Willd., for he suppressed Pickering's herbarium name. This supposition is supported by the second Nuttall specimen at Philadelphia, for this was originally labelled *Ixia coelestina*, with *Nemastylis Nuttallii* C. P. substituted. It would appear that Nuttall twice changed his mind as to the identity of his plant.

Few of the specimens seen, except those of Dr. J. A. Steyermark, have data as to habitat. From these exceptions, however, the following points may be noted: "under cedar on limestone glade" (no. 22559); "acid open slopes bordering cedar woods" (no. 22580); "limestone barren" (no. 23272); "cherty open slopes above limestone slopes" (no. 23726); "cherty open woods above limestone glade" (no. 23818); "in chert at zone of contact above limestone glade" (no. 24244). It is to be noted, too, that the Butler specimens from Oklahoma came from, or near, Limestone Gap. Possibly, *Steyermark*, no. 5305 (F, MBG), from Big Cedar Hollow, 4 miles south of Ocie, 6 miles southeast of Protem, Taney Co., Missouri, collected on cherty wooded slopes, below limestone glade and above limestone woods, Apr. 30, 1938, belongs to *N. Nuttallii*, but the specimens lack flowers and fruit; the leaves, however, resemble those of his no. 22580, which is assigned to this species.

4. N. TENUIS (Herb.) Baker. Bulb ovoid to subglobose, to 2.5 cm. high, 2 cm. wide, the castaneous or dark brown tunics prolonged upward in a collar around the base of the stem. Basal leaves 2–3, linear, filiform, acute, to 25 cm. long, 1–3 mm. wide, often scabrous on the margins and on the midrib; cauline leaf usually somewhat reduced, to 6–9 cm. long. Stem 15–30 cm. long, terete, glabrous, simple or few-branched. Spathes unequal, the outer 1–2 cm. long, acute, the inner to 2.5 cm. long, 1– or rarely 2–3-flowered, the pedicels included at anthesis or slightly exserted. Ovary glabrous, ovoid or ellipsoid, to 3–4 mm. long. Tepals subequal, to 1.5 cm. long, 6–7 mm. wide (occasionally much larger), obovate, obtuse, blue. Filaments entirely united, 1.5–2.5 mm. long; anthers 6–7 mm. long, sometimes dis-

tinctly apiculate. Style as long as the column; style-arms to 4 mm. long. Capsule oblong-ellipsoid or turbinate, to 1.5 cm. long; seeds more or less pyriform, dark brown, 2 mm. long.—Baker, Handbk. Irid. 112 (1892), incorrectly attributed to Benth. *N. coelestina* var. *tenuis* Herb. in Bot. Mag. lxvi. sub t. 3779 (1840). *Chlamydostylus tenuis* (Herb.) Baker in Journ. Bot. xiv. 185 (1876); Baker in Journ. Linn. Soc. Bot. xvi. 107 (1877).

Material seen:—MEXICO: CHIHUAHUA: near Colonia Garcia in the Sierra Madres, 7500 ft. alt., *Townsend & Barber*, no. 255 (G, MBG, US, NY); foothills of the Sierra Madre near Colonia Juarez, June, 1899, *E. W. Nelson*, no. 6164 (US, NY). COAHUILA: Sierra de Santa Rosa, Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, *E. G. Marsh*, no. 1467 (G). NUEVO LEON: Guajuco, March, 1880, *E. Palmer*, no. 2008 (G). AGUASCALIENTES: in pascuis Aguas Calientes, 1839, *Hartweg*, no. 229 (isotypes, G, NY). MÉXICO: Valley of Mexico, near Guadelupe, Sept. 23, 1903, *Rose & Painter*, no. 7297 (US; intermediate to var. *nana*); near Santa Fé, 1905, *Rose & Painter*, no. 8663 (US); near Tlalnepantla, July 6, 1905, *Rose, Painter & Rose*, no. 8413 (US). PUEBLA: vicinity of Puebla, Teponuchitla (?), July 16, 1910, *Arsène* (coll. *F. Nicolas*), no. 5309 (US). JALISCO: grassy slopes of the barranca of Guadalajara, 4500 ft. alt., July 31, 1902, *Pringle*, no. 11190 (G, US, MBG, NY); hills near Guadalajara, June 28, 1889, *Pringle*, no. 2916 (G); damp thin soil near Guadalajara, July 17, 1893, *Pringle*, no. 4462 (G, US, NY, MBG, P); near Guadalajara, Sept. 30, 1903, *Rose & Painter*, no. 7460 (NY, US); road between Mesquitac and Monte Escobedo, Aug. 26, 1897, *Rose*, no. 2600 (US; intermediate to var. *nana*); in grassy openings, Rio Blanco, July, 1886, *E. Palmer*, no. 165 (G, P, US, NY); Sierra de San Esteban, 5700 ft. alt., Sept. 28, 1908, *Barnes & Land*, no. 179 (F). GUATEMALA: DEPT. SANTA ROSA: Santa Rosa, 3000 ft. alt., June, 1892, *J. D. Smith, Pl. Guat.* (leg. *Heyde & Lux*), no. 3532 (US); DEPT. JALAPA: dry rocky pine-clad hills, between Monjos and Jalapa, about 10 km. south of Jalapa, 1000 m. alt., Nov. 29, 1939, *Steyermark*, no. 32618 (F; in fruit, and determination not certain); mountains along road between Jalapa and San Pedro Pinula, 1400–1800 m. alt., Nov. 12, 1940, *Standley*, no. 77014 (F).

Consideration of the various species of *Nemastylis* (*sensu stricto*) which have been described from Mexico leaves the feeling that specific lines have been drawn with undue fineness. Since *N. tenuis* is the oldest binomial in the complex, that has been retained and three others have been reduced to varietal status under it. The lines of differentiation are by no means so sharp in all cases as might be desired, and in a sense these varieties are perhaps better regarded as trends or tendencies. Even within what has been taken as *N. tenuis* in the restricted sense, there is still a high degree of polymorphism, the chief variations being in size of plant, size of flower, and degree of branching, but not in technical characters of style and stamens.

Two of these variations might be noted here. The first is a rather large-flowered form in which the tepals are much longer and wider (to 2–2.5 cm. long) than usual. This is found in DURANGO: vicinity of the city of Durango, Apr.-Nov. 1896, *E. Palmer*, no. 332 (G, US, MBG, F); Otinapa, July 25–Aug. 5, 1906, *E. Palmer*, no. 428 (G, MBG, F, US). The second variant is one in which the branches are more or less fascicled in the axils of spathiform bracts. Here, too, however, the technical characters of style and stamens are unaltered. This is found in NUEVO LEON: near Monterey, *Dr. Edwards* (NY); Diente Canyon, mountains near Monterrey, July 18, 1933, *C. H. & M. T. Mueller*, no. 5 (G, F); and in TAMAULIPAS: El Gavilan, vicinity of San José, 1700 ft. alt., July 1, 1930, *H. H. Bartlett*, no. 10005 (F, US).

4a. N. TENUIS var. **nana** (S. Wats.), comb. nov. Bulb ovoid, to 1.5 cm. high, 1 cm. wide, the dark brown tunics somewhat prolonged upward in a collar around the base of the stem. Basal leaves 2–3, 6–15 cm. long, 1–2 mm. wide, linear or linear-subulate, often exceeding the inflorescence, glabrous or coarsely scabrous on the midrib and margin, especially near the base; cauline leaf 1, 6–8 cm. long, 1–2 mm. wide, usually much exceeding the inflorescence. Stem simple, or occasionally 1-branched, 2–9 cm. long, terete, glabrous, terminated by a 1-flowered pair of spathes. Spathes usually closely convolute, unequal, the outer 1.3–1.8 cm. long, gradually acuminate, the inner 1.7–2.3 cm. long, abruptly acute; pedicel filiform, included. Ovary to 5 mm. long, glabrous, oblong-ovoid. Tepals subequal, 1–1.8 cm. long, 2–3 mm. wide, narrowly oblong-lanceolate or obovate, obtuse, pale blue (sometimes darker ?). Filaments united, 1–2.5 mm. long; anthers 3.5–6 mm. long. Style as long as the column; style-arms 2–2.5 (rarely 3) mm. long. Capsule oblong-ovoid, 6 mm. long; seeds dark brown, 1.5 mm. long, ovoid.—*N. nana* S. Wats. in Proc. Am. Acad. xviii. 160 (1883); Baker, Handbk. Irid. 112 (1892). Material seen:—MEXICO: SAN LUIS POTOSÍ: in montibus Escabrillos, 1876, *Schaffner*, no. 539 (G); region of San Luis Potosí, 22 N. Lat., 6000–8000 ft. alt., 1878, *Parry & Palmer*, no. 887 (TYPE, G). HIDALGO: between Pachuca and

Real del Monte, July 19, 1905, *Rose, Painter & Rose*, no. 8064 (US). TLAXCALA: in sand near river, 13 km. northeast of Tlaxcala, 7800 ft. alt., July 20, 1942, *J. N. Weaver*, no. 815 (G); Cantadero, Aug. 3, 1901, *Rose & Hay*, no. 5955 (US). MÉXICO: Dist. Temascaltepec: Limones, in oak woods, 910 m. alt., Sept. 12, 1933, *Hinton*, no. 4741 (G, US, NY); Valley of Mexico, near Santa Fé, Aug. 23, 1903, *Rose & Painter*, no. 6524 (US). PUEBLA: Nuria Atoyac, vicinity of Puebla, June 20, 1910, *Arsène* (coll. *F. Nicolas*), no. 5202 (US). OAXACA: Cerro San Antonio, 1700 m. alt., June 26, 1906, *Conzatti*, no. 1402 (G).

In the original description, it is stated that the color of the flower is greenish-white, but unless some information was available then which is not available to me at present, it seems more probable that the color was a pale blue or bluish-white, and that the greenish tinge was produced in drying. Separation of this variety from *N. tenuis* is not altogether satisfactory, but in general the plants are quite dwarf, with much of the short stem underground, and most or all of the leaves exceeding the 1-flowered inflorescence.

4b. N. TENUIS var. **caerulescens** (Greenm.), comb. nov. Bulb buried 5–10 cm., ovoid to subglobose, 1.5–3 cm. high, 1–2.5 cm. wide, the dark brown tunics produced upward in a long collar around the base of the stem and leaves. Basal leaves several, the outermost reduced to sheaths, the 1 or 2 produced leaves 10–26 cm. long, 1–2 mm. wide, usually exceeding the inflorescence; cauline leaf reduced to a spathiform bract, 3–6.5 cm. long. Stem to 22 cm. long, sometimes simple, but usually branched above, terete, glabrous. Spathes unequal, the outer 2–3 cm. long, the inner longer, 2-flowered; pedicels not greatly exserted at anthesis. Ovary to 3 mm. long, turbinate-clavate, glabrous. Tepals somewhat unequal, the outer unguiculate, to 2 cm. long, 1 cm. wide, the inner to 1.8 cm. long, 5–6 mm. wide, ovate or obovate, rather obtuse, white or pale bluish-white, slightly puberulent within above the base. Filaments basally united for 1–1.5 (–2) mm., the free portion 2–2.5 mm. long; anthers 1 cm. long. Style 1–2 mm. long; style-arms 3.5–5 mm. long. Capsule obovoid, 7–10 mm. long; seeds angular, yellow-brown, finely and subregularly pitted, 2 mm. long.—*N. caerulescens* Greenm. in Proc. Am. Acad. xxxii. 296 (1897). Material seen:—MEXICO: MORELOS: dry gravelly soil, at 5200 ft. alt., near Cuernavaca, June, 1896, Pringle, no. 6324 (TYPE, G; NY, US, MBG, P); grassy slopes of barranca of Cuernavaca, June 18, 1904, *Pringle*, no. 13218 (G, F, US); Cuernavaca, July 7, 1900, *C. C. Deam*, no. 42 (G, F, US); Cuernavaca, May 27–30, 1899, *Rose & Hough*, no. 4425 (US).

This variety, which is apparently narrowly endemic in the region of Cuernavaca, is more sharply defined than some of the other varieties of *N. tenuis.* It can easily be distinguished from the typical state by the fact that its filaments are free for more than half their length, and by the slight puberulence on the lower part of the inner surface of the tepals. It is distinctly shorter and often more branched than the two succeeding varieties of *N. tenuis.*

4c. N. TENUIS var. **Purpusii,** var. nov. Bulbus ovoideus vel subglobosus, ad 2 cm. altus, 1.5 cm. latus. Folia basalia 1–2, (5–) 10–30 cm. longa, 1–2 mm. lata, linearia, acuta, basi marginibus et nervo primario subscabridis vel glabris; folium caulinum unicum, 5–10 cm. longum. Caulis 13–28 cm. longus, simplex vel fere ramosus, glaber, teres. Spathae inaequales, interior longior; exterior 2–3.3 cm. longa, acuta vel acuminata, interior 2.3–3.8 cm. longa, acuta, 1- (raro 2-) fl., pedicellus plerumque anthesin exsertus. Ovarium glabrum, oblongo-ellipsoideum, ca. 4 mm. longum. Tepala subaequalia, ad 2 cm. longa, 8–9 mm. lata, oblongo-obovata, obtusa, pallide coerulea. Filamenta 2–3.5 mm. longa, basi libera vel 1 mm. coalita; antherae ca. 7 mm. longae. Stylus 1.5–2 mm. longus; styli rami 4–4.5 mm. longi. Capsula seminaque non visa.—MEXICO: SAN LUIS POTOSÍ: Minas de San Rafael, Bargre, May, 1911, *Purpus*, no. 5396 (TYPE, G; MBG, NY, US, F); same locality, July, 1911, *Purpus*, no. 5723 (G, F, MBG, US, NY).

This is to be distinguished from var. *caerulescens* by the glabrous tepals and by its usually much greater height. It differs from var. *Pringlei* in its branching, which is almost always present, and by the nearly free filaments.

4d. N. TENUIS var. **Pringlei** (S. Wats.), comb. nov. Bulb ovoid or subglobose, ca. 1.5 cm. wide and 2–2.5 cm. high, the tunics dark brown. Basal leaves 2–3, 6–28 cm. long, 1–2.5 mm. wide, linear, acute, coarsely scabrous on the midrib and margins, especially near the base; cauline leaf 1, 6–15 cm. long, 1–2 (–3) mm. wide, scabrous like the basal leaves. Stem simple or occasionally 1-branched, 12–30 cm. high, terete, glabrous. Spathes unequal, the outer to 2.5 cm. long, the inner to 4 cm. long, glabrous, 1- (rarely 2-) flowered, the pedicels shorter than the spathes at anthesis. Tepals subequal, to 3 cm. long, but usually about 2 cm., to 9 mm. wide, the inner slightly shorter and narrower, oblong-ovate or oblanceolate, obtuse, pale blue. Filaments 3–4.5 mm. long, united at the base for 2–3 mm.; anthers 8–10 mm. long. Style usually shorter than the staminal column; style-arms to 3 or 3.5 mm. long. Capsule oblong-ellipsoid, to

2.5 cm. long; mature seeds not seen.—*N. Pringlei* S. Wats. in Proc. Am. Acad. xxiv. 85 (1889); Baker, Handbk. Irid. 112 (1892); Johnston in Journ. Arnold Arb. xxv. 80 (1944). Material seen:—UNITED STATES: ARIZONA: Cochise Co.: Huachuca Mts., 1882, *Lemmon*, no. 3110 (G); Garden Canyon, Huachuca Mts., 5900 ft. alt., Aug. 2, 1938, *R. H. Peebles*, no. 14072 (US). TEXAS: Jeff Davis Co.: rocky open ground in canyons, Davis Mts., June 12, 1926, *E. J. Palmer*, no. 30821 (MBG); upper Limpia Canyon, Davis Mts., 2100 m. alt., July 28, 1936, *L. C. Hinckley* (G). MEXICO: CHIHUAHUA: Majalca, 8500 ft. alt., *H. LeSueur*, no. Mex-151 (G, F); Culebra Mts., 8500 ft. alt., Aug. 18, 1936, *LeSueur*, no. 583 (F); Dist. San Nicolas, in clay, 24 miles east of Cuauhtémoc, 6800 ft. alt., July 27, 1937, *Shreve*, no. 8045 (F, US); gravelly plains near Cusihuiriachic, Aug. 27, 1887, *Pringle*, no. 1378 (G, NY, US, MBG, P). COAHUILA (or CHIHUAHUA ?): wet rocky hillside at El Tule, southern foothills of Sierra Hechiceros, about 24 km. north of Castillon, June 13, 1941, *R. M. Stewart*, no. 498 (G). Cult. MBG from Horsford's bulbs, June 25, 1891 (MBG no. 209546).

In the original description, the following statement occurs: "Collected by Mr. C. G. Pringle in 1887 (n. 1378) in the mountains of Chihuahua in fruit, and described from plants in flower at the Cambridge Botanic Garden in July, 1888." Unfortunately, a search in the Gray Herbarium for pressed specimens of these "plants in flower" has been unsuccessful, so that it must be concluded that there is no longer a type-specimen for *N. Pringlei*. Among the material received from the Missouri Botanical Garden, there was a cultivated specimen from Horsford's bulbs, Pringle himself having probably been the the original source. This apparently was photographed before it was prepared for the herbarium, for there is an excellent photograph, said to be natural size, corresponding to the specimen. If the supposition is correct that Horsford's material came from Pringle, then this specimen is the most nearly authentic material now available for the plant in flower, just as *Pringle*, no. 1378, is the standard for fruiting material.

EXCLUDED SPECIES

Although the present treament includes only the North American species of *Nemastylis*, most of the South American species could be included in this list. It seems only too probable that a monograph of the South American species of the genus would consist of the following statement: "There are no South American species of *Nemastylis*."

N. Bequaertii Standl. in Journ. Arnold Arb. xi. 47 (1930).

N. brunnea S. Wats. in Proc. Am. Acad. xxv. 162 (1890).

N. coelestina (Bartr. ex Willd.) Nutt. in Trans. Am. Phil. Soc. v. 157 (1835), as to name but not as to plant, = SPHENOSTIGMA COELESTINUM (Bartr. ex Willd.) R. C. Foster.

N. Dugesii S. Wats. in Proc. Am. Acad. xxiv. 86 (1889).

N. flava Robinson in Proc. Am. Acad. xxix. 323 (1894).

N. latifolia Weatherby in Proc. Am. Acad. xlv. 423 (1910).

N. Lehmannii Standl. in Field Mus. Bot. iv. 199 (1929).

N. multiflora (Baker) Baker, Handbk. Irid. 114 (1892).

N. punctata (Herb.) Hemsl. Biol. Centr.-Am. Bot. iii. 329 (1884).

N. purpurea Herb. in Bot. Mag. lxvi. sub t. 3779 (1840) = EUSTYLIS PURPUREA (Herb.) Engelm. & Gray.

N. Seleriana Loes. in Verh. Bot. Ver. Brand. lviii. 137 (1917).

N. silvestris Loes. in Fedde, Repert. Spec. Nov. xvi. 200 (1919).

N. trichantha (Baker) Diels in Engl. & Prantl, Nat. Pflanzfam. (ed. 2) xva. 473 (1930).

N. triflora Herb. in Benth. Pl. Hartw. 95 (1842).

N. versicolor S. Wats. in Proc. Am. Acad. xxii. 456 (1887).

VI. MISCELLANEOUS DIAGNOSES AND NOTES

CYPELLA **Rosei,** spec. nov. Bulbus ovoideus vel subglobosus, 2–2.5 cm. altus, 1.5–2 cm. latus, tunicae atrobrunneae, sursum in collum brevem vix productae. Folia basalia 3–5, 2–3 exteriora brevia, ad 8 cm. longa, plerumque vaginantia, 1–2 interiora ad 16–31 cm. longa, 2.5–6 mm. lata, glabra, plicata, lineari-attenuata; folia caulina 2, 3–7 cm. longa, plus minusve spathiformia. Caulis teres, vel vix sulcatus, glaber, 17–20 cm. longus, 2–3-ramosus, inflorescentiae terminales. Spathae herbaceae, convolutae, inaequales, exterior 2.2–3.1 cm. longa, interior 3–4.5 cm. longa, 1–2-fl., pedicelli filiformes, ad 3 cm. longi. Ovarium oblongum vel turbinatum, 4 mm. longum, glabrum. Tepala subinaequalia, exteriora longiora, ad 3 cm. longa, ca. 1 cm. lata, longe unguiculata, obovata, interiora paullo breviora et angustiora. Filamenta libera, ad 7 mm. longa; antherae oblongae, ad 7 mm. longae. Stylus 1 cm. longus; styli rami et cristae ca. 5 mm. longi, cristae lineari-petaloideae. Capsula seminaque non visa. MEXICO: SINALOA: between Concepcion and Rosario, Aquizanca, July 5, 1897, *J. N. Rose*, no. 1538 (TYPE, US, no. 300382); Rosario, July 23, 1897, *Rose*, no. 3256 (US).

Although this is the first published record of the occurrence of this genus in Mexico, its presence in that country had previously been noted by Mr. C. V. Morton in his determinations of the *Iridaceae* collected by the late Mr. G. B. Hinton. Among his specimens there were several which proved to represent an undescribed species of *Cypella*. The present species differs from the unpublished one in having much larger, lighter-colored flowers. The style and style-arms and -crests, the anthers and filaments, likewise, are much longer.

Among some material of Mexican *Nemastylis*, one specimen proved, on dissection, to be a *Cypella*, which should probably be associated with the type of *C. Rosei*. The flower is slightly smaller, but in virtually every other respect, they are similar. Unfortunately, the style-arms became somewhat broken in dissection, but the style is about 1 cm. long, and the crests appear to have been at least 4 mm. long, so that the probability is strong that this specimen is *C. Rosei*. This example came from GUERRERO: Mina dist.: Anonas, 300 m. alt., in wet sand, July 27, 1936, *Hinton et al.*, no. 9163 (G).

CYPELLA **Herrerae** Diels ined., spec. nov. Bulbus ovoideus vel subglobosus, ad 2.5 cm. altus, 2 cm. diam. Folia basalia 1–2, linearia vel lanceolato-linearia, ad 4.8 dm. longa et 7–8 mm. lata, plerumque breviora et angustiora, glabra, acuta; folia caulina 1–2, 7–21 cm. longa, spathiformia, basi vaginantia, lamina lineari-attenuata, 1 mm. lata. Caulis simplex vel 1–2-ramosus, teres, glaber, ad 50 cm. longus. Spathae herbaceae, ad 5 cm. longae, exterior acuminata, interior acuta, pluri-fl., pedicelli anthesin non exserti. Ovarium turbinato-clavatum, glabrum, 8 mm. longum. Tepala exteriora violacea, ovata vel obovata, subacuta, ad 4 cm. longa, 1.5 cm. lata; tepala interiora pallidiora, panduriformia, unguis latus apicem versus contractus, inter sinus luteo-barbata, lamina parva, tepalum totum ca. 3 cm. longum, 5 mm. latum. Filamenta 8 mm. longa; antherae 6 mm. longae. Stylus 1.5 cm. longus; styli rami et cristae 4 mm. longi. Capsula ellipsoideo-oblonga, ad 2 cm. longa; semina tenuia, brunnea, 2 mm. diam.—Diels ex Macbride in Field Mus. Bot. xiii (part 1, no. 3). 717 (1936), invalid because lacking Latin diagnosis. Specimens seen:—PERU: CUZCO: Sacsahuamán, 3500 m. alt., March, 1929, *Herrera*, no. 2348 (TYPE, Berlin, not seen; photo, G), 3600 m. alt., April, 1932, *Herrera*, no. 3504 (US); Sacsahuamán, above Cuzco, 3500–3600 m. alt., Apr. 24, 1925, *Pennell*, no. 13570 (G, US); faldas del cerro del Recoleta, Cuzco, 3350 m. alt., March, 1927, *Herrera*, no. 1506 (G); Colina de Kénko, vicinity of Cuzco, March, 1937, *César Vargas*, no. 192 (G); Cuzco, 3000–3600 m. alt., July, 1935, *Herrera* (US, nos. 1190008 and 1190009).

Since this binomial has already appeared in print, it has seemed advisable to validate it by giving a Latin diagnosis. The type, which was at Berlin, has presumably been destroyed, but an excellent photograph (Field Mus. Neg. 11093) is available. Many of the details in the description given here have been drawn from the other specimens cited.

CALYDOREA **guatemalensis** (Standl.), comb. nov. *Eleutherine guatemalensis* Standl. in Field Mus. Bot. iv. 200 (1929).

In *Eleutherine*, the inflorescence appears pseudolateral, because it is usually somewhat deflexed and then ascending in the axil of a subtending cauline leaf. The integuments of the bulb are thick and purple or purple-brown on the exterior of each layer. The style-arms are more subulate than linear and are broadest at the middle or near it. In *E. guatemalensis*, however, the inflorescence is clearly terminal, with the nearest cauline leaf some distance below it on the stem. The tunics are thin, brown or blackish-brown. The style-arms are linear and are apparently of the same width throughout. These are characters of *Calydorea*, and accordingly the species is transferred to that genus.

CALYDOREA **approximata,** spec. nov. Cormus ovoideus, ad 1.5 cm. altus, ca. 1 cm. diam., tunicis membranaceis brunneis summo in collum brevem productis. Folia basalia 2–4, 3.5–14 cm. longa, 0.4–1 mm. lata (plerumque quam 1 mm. minora), acuta, glabra; folium caulinum unicum, basem spatharum amplectens, 4–7.5 cm. longum, erectum vel paullum divergens, lamina lineari-attenuata, 0.5–1 mm. lata. Caulis simplex, filiformis, glaber, 5–10 cm. longus. Inflorescentia terminalis, spathae 1-fl.; spatha interior 1.4–2 cm. longa, exterior quam interiorem ad 8 mm. brevior, herbaceae, acutae, pedicelli filiformes, quam spathas anthesin breviores. Ovarium 3–4 mm. longum, oblongum, glabrum. Tepala subinaequalia, exteriora ad 1.5 cm. longa, 4 mm. lata, interiora ad 1 cm. longa, 2–2.5 mm. lata, subobovata, obtusa, coerulea (?), basi pallidiora. Filamenta 2.5 mm. longa; antherae 2.5–3 mm. longae, senectute spiraliter tortae. Stylus 2.5 mm. longus; styli rami 2–2.5 mm. longi. Capsula seminaque non visa. BOLIVIA: TARIJA: Toldos, bei Bermejo, 1850 m. alt., Dec. 5, 1903, *Fiebrig*, no. 2344 (TYPE, G).

The type-collection, of which two sheets have been available, was distributed under the name *Calydorea azurea* Klatt. A photograph of the type of that species, *Lorentz*, no. 135, from

Concepcion del Uruguay, is before me. It shows two specimens, the left-hand one being about 25 cm. tall, with a simple stem, the basal leaves destroyed, and two cauline leaves present, the lower being 2 mm. wide, and the upper a much reduced bract-like leaf about 3.5 cm. below the inflorescence. The other specimen is larger, branched, with the basal leaves at least 4 mm. wide, and the spathes 2-flowered; the upper cauline leaf in this, too, is about 3.5 cm. below the inflorescence. It is obviously quite unlike the new species.

A later hand has annotated *Fiebrig*, no. 2344, as *Calydorea campestris* (Klatt) Baker. The original description of this species cited four Brazilian collections; the first of these, *Sello*, no. 4730, from São Paulo, has been photographed as the type, and since it agrees reasonably well with the original description, it may be so accepted. It shows a plant very similar to the Fiebrig specimens, with the obvious difference that the cauline leaf is inserted on the stem about 1.5–2.3 cm. below the inflorescence. The photograph is so clear that measurements of some of the floral parts can be made and used in connection with the original description. The outer tepals are larger, 1.4–1.7 cm. long and 7–8 mm. wide, the style about 1.5 mm. long, and the style-arms 3.5 mm. long. These are less striking differences than that of the location of the cauline leaf, but, taken in conjunction with that, they are, it seems to me, enough to warrant the description of a new species. It should be noted that the location of the cauline leaf contradicts the generic character given for *Calydorea* by Baker, Handbk. Irid. 108 (1892), a characterization supported by the type-species and all other species in the genus known to me. Nevertheless, the plant is unmistakably a *Calydorea*. The specific name given refers to the closeness of cauline leaf and spathes.

Calydorea xiphioides (Poepp.) Espinosa in Rev. Chil. Hist. Nat. xxvi. 18 (1922). *Sisyrinchium xiphioides* Kuntze ex Poepp. in Froriep, Notiz. (Ser. I) xxiii. 277 (1829), as syn. of *S. grandiflorum* Poepp.; Poepp. Fragm. 4 (1833), validated. *S. grandiflorum* Poepp. in Froriep, Notiz. (Ser. I) xxiii. 277 (1829), not Cavanilles (1788). *S. speciosum* Hook. in Bot. Mag. lxiv. t. 3544 (1837). *Calydorea speciosa* (Hook.) Herb. in Bot. Reg. xxix. Misc. 85 (1843). *Botherbe bulbosa* Steud. ex Klatt in Linnaea, xxxi. 562 (1861–62).

Since this combination was published in a volume which, for some reason, appears non-existent in this country, it seems desirable to repeat it, as well as the next combination given here, with a complete synonymy. As a point of interest, it might be noted that of the three collections cited by Klatt under his *Botherbe bulbosa*, one was listed as "ab Besser no. 162." In the Bernhardi Herbarium, now incorporated in the Herbarium of the Missouri Botanical Garden, there is an old specimen (MBG, no. 209553) numbered 162, and annotated as follows: "Coll. Poeppig. Chili." This is a slender and unbranched example of *C. xiphioides*, and may well be the collection cited by Klatt, although possibly not the actual specimen.

ALOPHIA LAHUE (Mol.) Espinosa in Rev. Chil. Hist. Nat. xxvi. 9 (1922). *Ferraria Lahue* Molina, Sagg. Stor. Hist. Chil. (ed. 2) 110 (1810).

Like the previous combination, this has been generally unknown, and for the same reason. In addition to that fact, it is worth mentioning here because the plant is usually identified as *Alophia pulchella* (Sweet) Benth. & Hook. f. From that species it differs, however, in its smaller flowers, with very much smaller inner tepals, and in its smaller size, generally. With regard to the nomenclature of *A. pulchella*, this combination was actually made, not implied, by Bentham & Hooker f., Gen. Pl. iii. 692 (1883), who wrote: "*A. pulchella*, nob., includit Herbertiam pulchellam, Sweet, et *H. lineatam*, Klatt." The combination was subsequently remade by Otto Kuntze, Rev. Gen. Pl. iii. 304 (1898), but this was superfluous, and he should not be cited as the author of the combination.

SPHENOSTIGMA **Penlandianum,** spec. nov. Bulbus ovoideus, ca. 2.5 cm. altus, 2 cm. latus, tunicis membranaceis, brunneis. Folium basale unicum, lineari-attenuatum, ad 36 cm. longum, 4 mm. latum, glabrum, plicatum, acutum; folia caulina 2, inferius 21–35 (?) cm. longum, 3–5 mm. latum, superius reductum, 5–8 cm. longum. Caulis simplex, teres, glaber, ad 42 cm. longus. Spathae herbaceae, 2.5–3.5 cm. longae, exterior quam interiorem brevior, ca. 7-fl., pedicelli anthesi spathas aequantes. Ovarium 6 mm. longum, glabrum, ellipsoideo-clavatum. Flores violacei, tepala basi lutea, lamina cum macula alba coeruleo-marginata; tepala exteriora saltem 1.5 cm. longa (ad 2 cm. ?), ca. 1 cm. lata, obovata, obtusa; tepala interiora breviora, saltem 5 mm. lata, oblongo-cuneata, apiculata, apiculus 1 mm. longus, unguis brevis cum macula cuneata, glandulosa. Staminum columna ca. 5 mm. longa; antherae in columna sessiles, 3 mm. longae. Stylus et columna aequilongi; styli rami et stigmata petaloidea, magna, late cordato-sagittata, lateribus involutis, multo lacerato-fimbriata, pars centralis apiculatus. Capsula seminaque non visa. ECUADOR: PROV. BOLÍVAR: Hacienda Talahua, 3200 m. alt., May 1, 1939, *C. W. Penland & R. H. Summers*, no. 604 (TYPE, G).

This extremely interesting species, which belongs to the subgenus *Gomphostigma* Baker, was originally determined, without adequate dissection, as *Nemastylis Pearcei* Baker ?. Having made the original misdetermination, I am glad to make amends by naming the plant for Professor Penland, who very kindly sent the material to the Gray Herbarium. Of the other two species in the subgenus, one, *S. boliviense* Baker, differs in having inner tepals of a very different shape, slightly apiculate (this detail being taken from an isotype in the Gray Herbarium), and in having relatively simple, cuneate-reniform style-arms; the second, *S. Spruceanum*, which is from Ecuador, is described as having very small inner tepals, the staminal column 3 mm. long, and the style-arms small, cuneate. The new species has exceedingly striking, large, petaloid, deeply lacerate-fimbriate, infolded stigmas, their appearance being so extraordinary that at first it was difficult to believe the plant could be a *Sphenostigma*.

ORTHROSANTHUS CHIMBORACENSIS var. **exsertus,** var. nov. A specie capsulis exsertis differt. MEXICO: FEDERAL DISTRICT: on the sides of ravines near Eslaba, May 27, 1904, *Pringle*, no. 8827 (TYPE, G; flowers and young fruit); shaded banks near Eslaba, 8000 ft. alt., Nov. 17, 1903, *Pringle*, no. 11707 (G; mature fruit). MÉXICO: Dist. Temascaltepec: Cumbre-Gavia, in pine forest, Jan. 19, 1936, *Hinton et al.*, no. 8835 (G); Comunidad, Apr. 8, 1932, *Hinton*, no. 500 (G); same locality, in pine woods, 2480 m. alt., Mar. 17, 1933, *Hinton*, no. 3503 (G). PUEBLA: river banks below Honey Station, 5400 ft. alt., Apr. 25, 1904, *Pringle*, no. 13219 (G). MICHOACÁN: Dist. Coalcomán: Sierra Torrecillas, pine forest, 2400 m. alt., Apr. 11, 1939, *Hinton*, no. 13702 (G); Barroloso, pine forest, 2300 m. alt., Aug. 12, 1939, *Hinton et al.*, no. 15106 (G).

The genus *Orthrosanthus* is very close to *Sisyrinchium*, so close, in fact, that the chief characters separating them are the nearly or entirely free filaments and the capsules enclosed by the spathes in the former genus. This second point is that relied on by Diels in his key in Engl. & Prantl. Nat. Pflanzfam. (ed. 2) xva. 470 (1930), and by Hutchinson, Fam. Fl. Pls. ii. 138 (1934), as well as by Baker, Handbk. Irid. 118 (1892), in his characterization of the genus *Orthrosanthus.* Consequently, it is rather striking to find this group of Mexican plants exhibiting, even in very young fruit, definitely exserted capsules. At the early stage, usually only one or two developing capsules are exserted, but in maturer stages most or all of the capsules are well exserted, thus helping to break down one of the most marked points of difference between *Orthrosanthus* and *Sisyrinchium.*

Some Additions and Corrections to Previous Papers

In Contrib. Gray Herb. cxix. 79 (1937), in the last specimen-citation under *Iris verna* L., the collector's name and number were inadvertently omitted. The specimen was *E. J. Palmer*, no. 38924.

In my revision of *Geissorhiza*, in Contrib. Gray Herb. cxxxv. (1941), I overlooked the fact that the basonyms of three binomials are later homonyms, and that, by Art. 69 of the International Rules, the binomials in question must be treated as new names, not as new combinations. The three names concerned are *G. bicolor, G. monantha,* and *G. secunda.*

Under the description of *Geissorhiza Burchellii* R. C. Foster in Contrib. Gray Herb. cxxxv. 26 (1941), *Schlechter*, no. 2160, was designated as the type, and *Burchell*, no. 7322b, was cited, with the proviso that it might be "regarded as a co-type, if the locality-data can be ascertained." Now, thanks to Mrs. H. M. McKay's admirable researches, especially in Journ. S. Afr. Bot. ix (2). 27–78 (1943), it is possible to follow Burchell's routes and discover the necessary data. From p. 64 of the paper cited, it appears that no. 7322b was collected on Jan. 14, 1815, "in the ascent of the Craggy Peak in the Great Range at Swellendam," with a note by Mrs. McKay to the effect that Burchell's collecting-station was close to the Drostdy. In her previous publications of Burchell's South African notebooks, as well as in this paper, Mrs. McKay has performed a valuable service. A similar treatment of Burchell's South American material is equally desirable.

In the description of *Geissorhiza Lewisae* R. C. Foster in Contrib. Gray Herb. cxxxv. 45 (1941), there was somehow omitted a statement that the species was named for Miss G. J. Lewis, who has done much valuable work on South African *Iridaceae*, the assumption being made that Miss Lewis and the "G. Lewis" who collected the type were the same.

VII. Tentative Keys to the Indigenous American Genera

In earlier sections of this paper, I have described three new genera, reinstated a fourth, and transferred a fifth from one tribe to another, well-removed from its former position in the family. Consequently, it may be desirable to give a key to the indigenous American genera which will include these changes and additions. Two tentative keys are presented here; the Natural Key does not embody any final ideas on systematic arrangement, and both will undoubtedly be altered as further detailed studies are made. An attempt has been made, however, to use characters which hold, despite the occasional presence of aberrant species in some genera. Criticisms and suggestions for improvement from those who may use these keys will be welcomed.

To avoid misinterpretation, a brief statement defining the terms used here for parts of the style may be in order. The word *style* is used only for the undivided portion; in *Solenomelus*, alone, the entire style is undivided, with a single terminal capitate stigma. The term *style-arms* refers to the three primary divisions above the undivided style; these may be entire, or bifid in varying degrees. In most genera, the stigmas or stigmatic areas are apical, or apical and spreading laterally downward on the inner face of the entire or bifid style-arm. In six genera, however, *e. g. Iris* and *Cypella*, the stigmas are transverse, more or less horizontal tongues, lips, or flaps. They are then found at the base of the more or less petaloid *style-crests* which rise above them to a greater or less degree. In one genus, *Mastigostyla*, the style-arms are bifid below the stigmas, which are found at the base of the true style-crests. It should be noted, too, that such genera as *Eustylis* and the excluded species of *Nemastylis* are included, for the time being, under *Tigridia, sensu lato.*

Natural Key

a. Stamens alternate with the style-arms (these absent in one genus).
  b. Rootstock a rhizome or subrhizomatous.
    c. Perianth-tube absent, the tepals nearly free, or a rudimentary tube present.
      d. Tepals dimorphic, the inner series much longer than the outer .... *Libertia*
      d. Tepals subequal, or the inner series shorter than the outer.
        e. Filaments nearly free; flowers mostly short-pedicellate, the capsules not exserted (except in one Mexican variety); rhizome short, coarse .... *Orthrosanthus*
        e. Filaments more or less connate; flowers long-pedicellate, the capsules exserted; rhizome short or almost entirely absent.
          f. Spathes (1-) 2-several-flowered; roots often tuberous-fasciculate; annual or perennial; North and South America, widespread .... *Sisyrinchium*
          f. Spathes 1-flowered on very short stems; roots fibrous; low, densely tufted perennial; coastal Chile, Valdivia to Cape Horn .... *Tapeinia*
    c. Perianth-tube present.
      g. Style-arms absent .... *Solenomelus*
      g. Style-arms present.
        h. Style-arms long, subulate; anthers versatile. *Phaiophleps* (*Symphyostemon*)
        h. Style-arms merely short cusps; anthers not versatile .... *Chamelum*
  b. Rootstock a bulb or corm.
    i. Bulb- or corm-tunics membranous, not fibrous.
      j. Style-arms narrowly linear-subulate or -canaliculate.
        k. Filaments free.
          l. Leaves very narrow, or, if broader, not strongly plicate; inflorescence not pseudolateral, or, if so, spathes 1-flowered; tunics castaneous or blackish-brown, thin .... *Calydorea*
          l. Leaves broad, strongly plicate; inflorescence pseudolateral; bulb-tunics purple or purple-brown, very thick .... *Eleutherine*
        k. Filaments united .... *Gelasine*
      j. Style-arms not narrowly linear-subulate.
        m. Inner tepals connivent; style-arms obovate, or elliptic, entire .... *Cipura*
        m. Inner tepals not connivent.
          n. Style long, often trumpet-shaped; style-arms and stigmas shorter than the style; perianth-tube absent .... *Sphenostigma*
          n. Style short, not trumpet-shaped; style-arms longer than the style; rudimentary perianth-tube present .... *Eurynotia*
    i. Bulb-tunics fibrous .... *Pseudotrimezia*
a. Stamens opposite the style-arms.
  o. Rootstock a tunicated bulb or corm, or, at least, not rhizomatous.
    p. Stigmatic areas apical, or lateral, descending from the apex, but not transverse; style-crests absent; tunics membranous.
      q. Perianth-tube absent.

r. Tepals subequal, not apiculate, the flower rotate, not nutant. . . . . *Nemastylis*

r. Tepals usually unequal, one or both series often apiculate; if subequal, the flower narrowly or broadly campanulate or crateriform.

s. Tepals markedly unequal.

t. Inner tepals spreading, or at least not appressed against the staminal column.

u. Style-arms briefly bifid. . . . . *Alophia*

u. Style-arms deeply bifid. . . . . *Tigridia*

t. Inner tepals appressed against the staminal column. . . . . *Rigidella*

s. Tepals subequal, flower campanulate or crateriform, often, or usually, nutant. . . . . *Tigridia*

q. Perianth-tube present. . . . . *Cardenanthus*

p. Stigmas transverse, at the base of the style-crests.

v. Tunics fibrous.

w. Style-crests 2, reduced to small tubercles or cusps. . . . . *Trimezia*

w. Style-crests 3, more or less lanceolate. . . . . *Neomarica*

v. Tunics membranous.

x. Inner tepals much reduced; anthers free from style-arms; style-arms bifid below the stigmas. . . . . *Mastigostyla*

x. Inner tepals less reduced; anthers apically attached to style-arms; style-arms not bifid below the stigmas. . . . . *Cypella*

o. Rootstock a rhizome.

y. Perianth-tube obsolete; stem strongly flattened, ancipitous or foliar; inner tepals more or less panduriform; anthers somewhat adherent to the angles of the style. . . . . *Neomarica*

y. Perianth-tube present, often well-developed; stems not flattened, ancipitous, nor foliar; inner tepals not panduriform; anthers free from style-arms. . . . . *Iris*

Artificial Key

a. Rootstock neither a bulb nor a corm.

b. Perianth-tube absent.

c. Tepals unequal, the outer series shorter than the inner. . . . . *Libertia*

c. Tepals subequal, or the outer series longer than the inner.

d. Style-arms entire; stigmas apical; stamens alternate with the style-arms.

e. Filaments nearly free; flowers mostly short-pedicellate, the capsules not exserted (except in one Mexican variety); rhizome short, coarse. . . . . *Orthrosanthus*

e. Filaments more or less connate; flowers long-pedicellate, the capsules exserted; rhizome short or almost entirely absent.

f. Spathes (1-) 2–several-flowered; roots often tuberous-fasciculate; annual or perennial; North and South America, widespread. . . . . *Sisyrinchium*

f. Spathes 1-flowered on very short stems; roots fibrous; low, densely tufted perennial; coastal Chile, Valdivia to Cape Horn. . . . . *Tapeinia*

d. Style-arms with 2 (-3) style-crests overtopping the transverse stigmas; stamens opposite the style-arms. . . *Neomarica*

b. Perianth-tube present, often well-developed.

g. Style entire. . . . . *Solenomelus*

g. Style-arms present.

h. Style-crests absent; stigmatic areas apical.
i. Style-arms long, subulate; anthers versatile .... *Phaiophleps*
i. Style-arms short cusps; anthers not versatile .... *Chamelum*
h. Style-crests present; stigmas transverse horizontal lips, or tongues, at base of crests .... *Iris*
a. Rootstock a bulb or corm.
j. Perianth-tube absent.
k. Tunics membranous.
l. Stigmatic areas apical or lateral downward from the apex, but not transverse; style-crests absent.
m. Stamens alternate with the style-arms.
n. Style-arms narrowly linear to subulate, entire, or rarely briefly bifid at the apex.
o. Filaments free.
p. Leaves very narrow, or, if broader, not strongly plicate; inflorescence not pseudolateral, or, if so, spathes 1-flowered; tunics castaneous or blackish-brown, thin .... *Calydorea*
1. Leaves broad, strongly plicate; inflorescence pseudolateral; tunics purple or purple-brown, very thick .... *Eleutherine*
o. Filaments united .... *Gelasine*
n. Style-arms not narrowly linear-subulate.
q. Inner tepals connivent; style-arms obovate or elliptic, entire .... *Cipura*
q. Inner tepals not connivent; style-arms cuneate or reniform, sometimes retuse, usually erose and ciliate .... *Sphenostigma*
m. Stamens opposite the style-arms.
r. Style-arms deeply divided.
s. Tepals subequal.
t. Flower rotate, not nutant .... *Nemastylis*
t. Flower campanulate, or crateriform, at least at the base of the tepals, often nutant .... *Tigridia*
s. Tepals markedly unequal.
u. Inner tepals small, appressed against the staminal column .... *Rigidella*
u. Inner tepals larger, spreading .... *Tigridia*
r. Style-arms briefly bifid at the apex .... *Alophia*
l. Stigmas transverse at base of style-crests .... *Cypella*
k. Tunics fibrous.
v. Style-crests reduced to tubercles or cusps .... *Trimezia*
v. Style-crests 3, more or less lanceolate .... *Neomarica*
j. Perianth-tube present.
w. Stigmas apical, or lateral downward from the apex; style-crests not present.
x. Style-arms simple .... *Eurynotia*
x. Style-arms divided .... *Cardenanthus*
w. Stigmas transverse, at base of style-crests; style-arms bifid below the stigmas; perianth-tube more or less rudimentary for the size of the flower .... *Mastigostyla*

2. A SYNOPSIS OF PHYSOSTEMON MART. & ZUCC.

Physostemon Mart. & Zucc. is a small genus of the *Capparidaceae*, containing seven annual species, ranging from Argentina to Mexico; one collection from Cuba has been seen, but the material is in such condition that it is still somewhat doubtful if this specimen actually belongs in this genus.

The following synopsis includes a key, the description of a new species, a new combination, synonymy, and occasional comments on necessary points.

In addition to the material in the Gray Herbarium (G), loans have been received from the following institutions: Chicago Natural History Museum (F), the United States National Herbarium (US), and the New York Botanical Garden (NY). To the administrative officers of these institutions I am much indebted for their kindness in making this material available to me.

Physostemon Mart. & Zucc. in Flora, vii (1, Beil. 4). 139 (1824); Nov. Gen. & Spec. i. 72 (1824); Schult. Syst. vii. 51 (1829); Bong. in Bull. Sc. Acad. Pétersb. i. 113 (1836); Benth. in Hook. Journ. Bot. iv. 99 (1841); Walp. Rep. i. 195 (1842); Eichl. in Mart. Fl. Bras. xiii (1). 243 (1865); Pax in Engl. & Prantl, Nat. Pflanzfam. iii (2). 224 (1891); Pax & Hoffm. in Engl. & Prantl, Nat. Pflanzfam. (ed. 2) xviib. 221 (1936). *Physostemum* [variant spelling employed by] Bong. in Mém. Acad. Sc. Pétersb. v. t. 2 (1839). *Cleome*, section *Physostemon* (Mart. & Zucc.) Benth. & Hook. f. Gen. Pl. i. 105 (1862).

Key

a. Capsules linear or linear-oblong.
  b. Apophyses at apices of filaments, forming a collar around the anther-bases. . . . . 1. *P. aureum*
  b. Apophyses not at apices of filaments; or, if so, not forming a collar around the anther-bases.
    c. Leaves very narrowly linear, sessile. . . . . 2. *P. guyanense*
    c. Leaves broader, lanceolate or linear-lanceolate, at least the lower ones petiolate. . . . . 3. *P. lanceolatum*
a. Capsules not linear.
  d. Ovary and capsule glabrous; Mexico. . . . . 4. *P. Hemsleyanum*
  d. Ovary and capsule puberulous or pubescent; South America.
    e. Leaves narrow, linear-filiform. . . . . 5. *P. tenuifolium*
    e. Leaves broad, elliptic-ovate or oblong.
      f. Apophyses globose, at apices of filaments; leaves narrowing gradually to base of blade. . . . . 6. *P. Hasslerianum*
      f. Apophyses pyriform, below apices of filaments; leaves abruptly rounded at base of blade. . . . . 7. *P. rotundifolium*

1. P. **aureum,** spec. nov. Annua, 14–30 cm. alta; cauils simplex vel supra basin ramosus, ramis divergentibus, paullum angulatus, summo nudus vel minute bracteatus. Folia alterna, sessilia, linearia vel lineari-subulata, marginibus strigosis, ad 3 cm. longa, 0.5 mm. lata. Inflorescentia racemus terminalis, pauciflorus, flos infimus a ceteris remotus. Flores pedicellati, pedicellis 3–8 mm. longis; sepala lanceolato-ovata, acuta, marginibus ciliatis, ad 3 mm. longa; petala aurea, 2 superiora basi laminae limite semilunata aurantiaca, breviter unguiculata, oblongo-spathulata, obtusa, ad 6 mm. longa, 4 mm. lata. Stamina 6; 2 longa, petala excedentia; 4 breviora filamentis apice in apophysin incrassatis. Ovarium sessile vel subsessile, glabrum; stylus longus (ad 4–5 mm.), paullum arcuatus, persistens; capsula lineari-oblonga, glabra, striata, 1–1.8 cm. longa; semina 2–9, reniformia, brunnea, transverse rugosa et aculeato-tuberculata, 2 mm. diam. Specimens seen:—MEXICO: GUERRERO: Mina Dist.: Parotas Filo, llano, Aug. 31, 1936, *Hinton et al.*, no. 9408 (G, F); Placeres, 400 m. alt., grassy hill, Aug. 20, 1937, *Hinton et al.*, no. 10537 (TYPE, G; isotype, F). MICHOACÁN: Zitácuaro Dist.: Tuzantla-Tiquicheo, 650 m. alt., dry hillside, Oct. 1, 1938, *Hinton et al.*, no. 13297 (G, F). MÉXICO: Temascaltepec Dist.: Coyuca-Querendas, July 12, 1934, *Hinton et al.*, no. 6282 (G).

It is improbable that this species will be confused with *P. guyanense* (Aubl.) Malme. The inflorescences are terminal, and the larger flowers are a much brighter and deeper yellow. The greatest differences lie in the stamens; in *P. guyanense* the apophyses are simple globose swellings below the apices of the filaments; in *P. aureum* the apophyses are found at the apices, and consist of two gibbous collars more or less surrounding the bases of the anthers, each collar prolonged downward, on one side only, into a blunt swollen spur. From *P. Hemsleyanum* (Bullock) Foster, with broadly ovoid or almost rhomboid capsules, it is easily distinguished by its linear-oblong capsules, as well as by its stamens.

Of the material cited, nos. 10537, 9408, and 6282 were distributed as *Cleome ephemera* T. S. Brandg. Originally, it was my intention to consider *Hinton*, no. 13297, as the type, and material so labelled has been distributed; with the acquisition of more material, *Hinton*, no. 10537, was found to be better, and I am therefore designating it as the type.

2. P. GUYANENSE (Aubl.) Malme in Bihang till K. Sv. Vet. Akad. Handl. xxiv (Afd. 3, no. 6). 26 (1898). *Cleome guyanensis*

Aubl. Pl. Guian. Fr. ii. 675, t. 273 (1775). *P. guianense* (Aubl.) Briq. in Ann. Conserv. & Jard. Bot. Genève, xvii. 390 (1914). *P. ambiguum* Bong. in Bull. Sc. Acad. Pétersb. i. 115 (1836). *P. intermedium* Moric. Pl. Nouv. Amér. 62, t. 42 (1839). *Cleome ephemera* T. S. Brandg. in Proc. Calif. Acad. Sci. (ser. II) iii. 112 (1891). Specimens seen:—MEXICO: BAJA CALIFORNIA: San José del Cabo, Oct. 2, 1890, *T. S. Brandegee* (G; isotype of *Cleome ephemera*). VERA CRUZ: Palmilla, July, 1920, *Purpus*, no. 8547 (G). ZACATECAS: near San Juan Capistrano, Aug. 22, 1897, *Rose*, no. 2464 (G). NAYARIT (TEPIC): between Concepcion and Acaponeta, July 29, 1897, *Rose*, no. 1895 (G). GUERRERO: Mina Dist.: Placeres Bejucos, 400 m. alt., wet llano, July 13, 1936, *Hinton et al.*, no. 9075 (G); Coyuca Dist.: Chacamerito, July 13, 1934, *Hinton et al.*, no. 6289 (G). OAXACA: Picacho, July, 1914, *Purpus*, no. 7142 (G, F). CUBA: without locality, *Wright*, no. 1867 (G). ?. COLOMBIA: Llanuras de Nueva Huila, ca. 500 m., Dec. 1930, *E. P. A. & Duque*, no. 680 (US). BRITISH GUIANA: Berbice, 1837, *Schomburgk*, no. 204 (G, US, F). BRAZIL: without locality, *Burchell*, no. 8316 (G), *Herb. Hooker* (NY); beach at Santarem, *Traill*, no. 17 (G); falls of the Madeira, Oct. 1886, *Rusby*, no. 1160 (G, US); BAHIA: Serra Jacobina, 1839, *Blanchet*, no. 2717 (F); CEARÁ: *Gardner*, no. 2394 (G, US, NY); MATTO GROSSO: Cuyabá, Nov. 18, 1902, *Malme*, II, 2612 (G, F).

Within this widespread species, there seems to be little more than the usual size-variation. In no way can I distinguish the Mexican *Cleome ephemera* Brandg., of which I have seen an isotype, from South American material of *P. guyanense*. The single West Indian collection cited, *Wright*, no. 1867, is in such poor condition that its attribution to this species must be doubtful.

3. P. LANCEOLATUM Mart. & Zucc. in Flora, vii (1, Beil. 4). 139 (1824); Nov. Gen. & Spec. i. 73, t. 45 (1824). Specimens seen:—BRAZIL: RIO GRANDE DO NORTE: Angicos, May 29–30, 1934, *Swallen*, no. 4729 (US); CEARÁ: in 1839, *Gardner*, no. 2395 (G, F, NY).

Molfino, in Physis, vii. 53 (1923), recorded a collection of *P. lanceolatum* from Argentina; Itacuararé to Apóstoles, in the southern part of the territory of Misiones, in February, 1922. From the description given, the identification seems correct. He also noted the range as being from the Guianas to Paraguay, but I have, as yet, seen no material from Paraguay.

In his treatment of this species in Mart. Fl. Bras. xiii (1). 244 (1865), Eichler cited, in synonymy, *Cleome stenophylla* Klotzsch in R. Schomb. Reise, iii. 1164 (1848), this being a *nomen nudum*. Under *C. stenophylla*, Klotzsch cited *Schomburgk*, no. 740, from the Rio Pirara in British Guiana. This number was seen and cited by Eichler, with *Schomburgk*, no. 466, from Mt. Roraima, under an unnamed variety of *P. lanceolatum*, which he characterized as "foliis angustioribus, saepius margine revoluto subsetaceis." A sheet of no. 466 has been seen by me; it does not belong in *Physostemon*, since it lacks the apophyses on the stamens. The name *Cleome stenophylla* was validated by Urban, Symbol. Ant. iv. 251 (1905). Of the four collections cited by Urban, two sheets of *Sintenis*, no. 3314, from Puerto Rico, have been available to me. They appear to be conspecific with *Schomburgk*, no. 466, and with several other South American collections which I have seen. In its leaves, sessile ovary and capsule, general character of the flower, and general habit, *Cleome stenophylla* comes very close, indeed, to breaking down the generic distinction between *Physostemon* and the entire-leaved species of *Cleome*.

4. P. **Hemsleyanum** (Bullock), comb. nov. *Cleomella Hemsleyana* Bullock in Kew Bull. 1936: 388. *Cleome mexicana* Hemsl. Diagn. Pl. Nov. pars alt. 20 (1879), and Biol. Centr.-Amer. Bot. i. 41 (1879), non *Cleome mexicana* (Sessé & Moc.) D. Dietr. Syn. Pl. ii. 1068 (1840). Specimens seen:—MEXICO: GUERRERO: Mina Dist.: Placeres, 400 m. alt., llano, July 18, 1936, *Hinton et al.*, no. 9110 (G); rocky headlands in front of Hotel Mirador, Acapulco, 300–400 ft. alt., Aug. 21, 1935, *L. H. McDaniels*, no. 159 (F); vicinity of Acapulco, Oct. 1894–Mar. 1895, *Palmer*, no. 214 (G). OAXACA: Oaxaca, April, 1840, *Galeotti*, no. 3194 (TYPE, not seen; photo, F); Picacho-San Geronimo, Oct. 1913, *Purpus*, no. 6856 (G).

On the basis of capsule-shape, Bullock transferred *Cleome mexicana* Hemsl., itself a later homonym, to *Cleomella*, where the presence of *Cleomella mexicana* Sessé & Moc. ex DC. Prodr. i. 237 (1824) forced the renaming of the species. In making this transfer, it seems to me, Bullock overlooked two important points. The stamens of *Cleomella* are all exapophysate, and both ovary and capsule are long-stipitate. Before me there are a photograph of a sheet of the type-collection, *Galeotti*, no. 3194, and a sheet of *Palmer*, no. 214, cited by Bullock as belonging to this species. It is clear from these two items that the ovary and capsule of *Cleome mexicana* Hemsl. are sessile or very nearly so, certainly not long-stipitate. Flowers on *Palmer*, no. 214 (supporting Hemsley's amplified description in the Biol. Centr.-Amer.) show at least two apophysate stamens. Consequently, since the capsule is not unlike that of *Physostemon tenuifolium*, Mart. & Zucc., I regard the plant as belonging to that genus.

One further point arises. Briquet, in Ann. Conserv. & Jard. Bot. Genève, xvii. 390 (1914), treated *Cleome mexicana* Hemsl. as conspecific with *Cleomella medicaginea* Turcz. in Bull. soc. nat. Mosc. xxvii (2). 313 (1854), making the combination *Physostemon medicagineum* (Turcz.) Briq. Examination of the original description of *Cleomella medicaginea* makes this union seem improbable. It was described as having compound leaves, the leaflets petiolulate, cuneate-obovate, retuse or emarginate; the ovary stipitate; the whole plant glabrous, and branched from the top; the bracts almost always trifoliolate; and the style as very briefly setuliform. In contrast, *Cleome mexicana* Hemsl. was described (the description being corroborated by the specimens here cited) as having simple, linear, mucronate-aculeate leaves; the ovary is shown by the specimens to be nearly sessile; the whole plant strigillose, and branched even from the base; the pedicels ebracteate; and the style long-filiform. What Turczaninow had, I do not know, but it seems quite impossible that it was related to the plant here treated as *Physostemon Hemsleyanum.*

5. P. TENUIFOLIUM Mart. & Zucc. in Flora, vii (1, Beil. 4). 139 (1824); Nov. Gen. & Spec. i. 73, t. 46 (1824). Specimens seen:—BRAZIL: PIAUHY: *Gardner*, no. 2036 (G, US, F, NY).

6. P. HASSLERIANUM Chod. in Bull. Herb. Boiss. (sér. II) iii. 797 (1903). Specimens seen:—PARAGUAY: Sierra de Maracayú, Yerbales, Rio Capibary, Sept., *Hassler*, no. 4434 (isotypes, G, F); Caaguazu, near the Rio Yhú, October, 1905, *Hassler*, no. 9506 (G).

7. P. ROTUNDIFOLIUM Mart. & Zucc. in Flora, vii (1, Beil. 4). 139 (1824); Nov. Gen. & Spec. i. 74, t. 47 (1824). Specimens seen:—BRAZIL: BAHIA: Serra do Jacobina, 1839, *Blanchet*, no. 2710 (F, NY); Rio San Francisco, near Joazeiro, *Martius*, no. 2319 (TYPE, not seen; photos in G, F); ALAGOAS: *Gardner*, no. 1239 (G, NY).

Doubtful or Excluded Species

P. melanospermum incorrectly ascribed to S. Wats. by Pax & Hoffm. in Engl. & Pr. Nat. Pflanzfam. (ed. 2) xviib. 221 (1936). This was described by Watson, in Proc. Amer. Acad. xxi. 415 (1885), as *Cleome* (*Physostemon*) *melanosperma*, the type being *Palmer*, no. 94 (of his 1885 collections). I have examined this and find that it has compound leaves, a stipitate pod (the stipe being up to 6 mm. long), and all filaments lacking apophyses. Consequently, it seems incorrect to include it in *Physostemon*.

P. medicagineum (Turcz.) Briq. Reasons for the exclusion of this species are given in the discussion under *P. Hemsleyanum*.

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3. THE REDISCOVERY OF RIESENBACHIA PRESL

The genus *Riesenbachia*, described by Presl, Rel. Haenk. ii. 36, t. 54 (1831), from an incomplete specimen of Haenke's, stated to have been collected in Mexico, has, since that time, remained something of a mystery. In 1909, Rose, in Contrib. U. S. Nat. Herb. xii. 295, said of it: "This is one of the plants which should be carefully looked for by Mexican collectors." It is unlikely that the late Mr. G. B. Hinton "carefully looked for" it, or that he had even heard of it, but, at different times in Michoacán and Guerrero, he collected four numbers of an onagraceous plant which, it seems to me, must be *Riesenbachia racemosa* Presl, l. c.

A difficulty arises from the fact that Presl described the monotypic genus with the phrase "Corolla nulla", a statement borne out by the details of his plate. Further, he described the calyx as "infundibuliformis corollinus", and his artist showed the calyx-lobes as large and somewhat petaloid, with one lobe larger than the others. No petaloid staminode was mentioned or figured. In every other respect, however, Presl's description and the details of the plate agree perfectly with the Hinton specimens, as well as with a sheet of *Langlassé*, no. 651 (which was found among the unnamed sheets of *Lopezia* in the Gray Herbarium). The correspondence is so great that terminal portions of the plants superimposed on the plate agreed in dimensions to within ½ mm. in most cases. Structural details were the same.

It seems to me unlikely that there could be two genera in the small lopezioid group of the *Onagraceae* showing such identity of detail in capsule, seeds, calyx-tube, adnation of the style to two sides of the calyx-tube, thus bisecting it, pubescence, size, and annual habit, and differing only in the presence or absence of petals and the sterile staminode. Moreover, it was stated by Count von Sternberg in his preface to Presl's work (p. xi), that Haenke landed at Acapulco and, in November, 1791, travelled alone to Mexico City, returning to Acapulco in December, 1791. Upon finding the locations for the Hinton collections, it was obvious that they had been obtained at low altitudes in the very region of Guerrero that Haenke had to traverse twice on his journey to and from Mexico City, and were collected at the same time of year, November and December.

There remains only the question of the corolla and staminode. It is possible, of course, that Haenke secured an aberrant specimen which really lacked these parts, with a compensating enlargement of the calyx-lobes, but another explanation occurs to me. In making my own dissections, it was difficult (sometimes nearly impossible) to separate petals from calyx-lobes, so firmly were they matted together by pressure. Unless such a dissection were carefully done, it is quite understandable that the flower-structure could be misinterpreted. When the petals adhere to the sepals in this manner, the effect of large, petaloid calyx-lobes is readily produced. I suggest that some such misinterpretation is what occurred and that, in view of the otherwise complete correspondence between the recent collections and Presl's description and figure, the diagnoses of the genus and species should be emended.

Riesenbachia Presl, emend. Calyx-lobes approximately equal. Corolla present, petals 4; sterile staminode present, petaloid.

R. **racemosa** Presl, emend. Calyx-lobes linear or lance-linear, 3 mm. long. Posterior petals linear-oblong to narrowly oblanceolate, 4 mm. long, 1 mm. wide, more or less obtuse, short-clawed, with an oblique, arcuate "gland" or tubercle at the base of the blade; anterior petals 4 mm. long, obovate-spatulate, short-clawed, the blade 2.5 mm. wide, obtuse. Sterile staminode with an obcordate blade 2.5 mm. long, with an 0.75 mm. apiculus at the apex; fertile stamen 4–4.5 mm. long, the filament 2.5–3 mm., thick, swollen at the middle, the anther 1.5 mm. long.

Style as long as the filament. The color of the flower is reported as purple or pink by Hinton, and as "rouge violacé" by Langlassé.

The following material has been seen:—MEXICO: Michoacán or Guerrero: Cajiniouilar, sol granitique, 300 m. alt., Nov. 19, 1898, *Langlassé*, no. 651. Michoacán: Coalcomán Dist.: Huizontla, 400 m. alt., in woods, Nov. 17, 1938, *Hinton et al.*, no. 12596. Guerrero: Galeana Dist.: Atoyac, 240 m. alt., wooded hill, *Hinton et al.*, no. 10974; Montes de Oca Dist.: Vallecitos, Dec. 10, 1937, *Hinton et al.*, no. 11652; same locality, Nov. 29, 1937, *Hinton et al.*, no. 11620. All specimens cited are in the Gray Herbarium.

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4. A NOTE ON THE LOCALITY-DATA OF ECKLON AND ZEYHER'S AND DRÈGE'S SOUTH AFRICAN COLLECTIONS

Several years ago, while going over the material of some South African *Iridaceae* in the Gray Herbarium, I was puzzled by certain specimens, obviously old, bearing small printed labels, with the name of the species and a double number on each, but with no indication of collector or locality. On inquiry, it appeared that, for want of other information, these were known as "Sieber numbers." An investigation was begun which ultimately yielded results. Recently, among material of *Micranthus* borrowed from several other American herbaria, a few more of these specimens have been found. The sheets from two of these institutions bear special labels with the collectors' names, but locality-data are lacking. Consequently, it may be worthwhile to record my results, briefly.

In the first place, a comparison of the labels with those of known Sieber specimens showed that the type and paper used in printing were different from Sieber's, and no more time was spent on the hypothesis that these might be Sieber collections. Examination of more of our South African material brought to light many more of these unknowns, with one sheet whose label solved part of the problem immediately. This label read as follows: "Geissorhiza No. 218. E. Z. 70.10." It was obvious that the initials stood for two of the great South African collectors, Ecklon and Zeyher. On going through the specimens of

Geissorhiza cited by Baker in Fl. Cap. vi. 67–76 (1896), this number was found under *G. foliosa* Klatt, recorded as having been collected by Ecklon and Zeyher near Riet Kuil in Swellendam Division, Cape Province. Turning to the original description of *G. foliosa*, in Linnaea, xxxiv. 658 (1865–66), it was found that *Ecklon & Zeyher*, no. 218 was the type-collection, being the only one cited. However, Klatt gave the data as "Zwellendam, am Berge bei Puspasvallei." There, in this disagreement between Klatt and Baker, the matter rested for a time. Not long after, on receiving the Kew material of *Geissorhiza*, no example of this collection was found, although Baker (l. c.) indicated that he had seen one.

Shortly after this, the rest of the problem was solved. It was found that in Linnaea, xix. 583–589 (1847), J. F. Drège had given an explanation of the incomprehensible numbers, and a list of the localities represented by each. An addendum was given in Linnaea, xx. 258 (1847). Checking the number 70.10 in the list gave this result: "70. Zwellendam, am Berge bei *Puspasvallei*, *Voormansbosch*, *Duivelsbosch*, und am Fluss *Keurcboomrivier*, 1000–4000′." The second part of the number, 10, represents the month in which the collection was made, October.

Following this tabulation, Drège gave a comparison of Ecklon and Zeyher's collections with his own, Linnaea, xix. 599–680, continued in Linnaea, xx. 183–257. By means of the data on p. 222 of the second comparative article, the discrepancy between Baker and Klatt was cleared up. Baker, in addition to citing *Ecklon & Zeyher*, no. 218, also cited *Zeyher*, no. 3961, from the same locality, Riet Kuil. Drège gave the following information: "E. Z. 218 = Z. III, 3961 (124.10)." From the explanation of signs on p. 600 of the first comparative article, this is to be translated as follows: Ecklon and Zeyher, no. 218 is the same as Zeyher's no. 3961, of his third set, collected in October, along the banks of the Buffeljagdrivier, from Swellendam to Riet Kuil [for Zeyher, naturally, used the same numerical locality-code; see Linnaea, xix. 590]. That is, Baker became confused and applied 124.10 to *Ecklon & Zeyher*, no. 218, when it belonged only to *Zeyher*, no. 3961, as Drège's explanation of the parentheses showed. From these lists and articles, it has been possible to secure reasonably exact locality-data for any Ecklon and Zeyher specimen bearing the original label or an exact copy of it.

In American herbaria there are probably fewer Drège collections than there are of Ecklon and Zeyher, but several have recently been sent to me from the New York Botanical Garden, and several dozen were found when the extra-New England collections of the Boston Society of Natural History were transferred to the Gray Herbarium in 1941. At the same time that the Ecklon and Zeyher investigation was going on, an attempt was being made to secure data for some Drège sheets which were already in the Gray Herbarium prior to 1941. Obviously, since Baker had given data for most of his Drège citations in the Flora Capensis, the information existed somewhere. A fortunate accident, while checking an obscure reference, made the search brief, for it was discovered that Drège's plants had been enumerated, with an outline of the geographic areas recognized and the locality-symbols employed by him, by E. Meyer in a supplement to the second part of Flora for 1843. Much later, it was found that the system employed had been fully explained by Knoblauch in Notizbl. xi. 627–628 (1932). By using Meyer's index and outline, it has been possible to discover the locality-data for most of the Drège specimens which I have seen.

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5. MISCELLANEOUS DIAGNOSES AND TRANSFERS

Lopezia **Hintoni,** spec. nov. Planta 1.5 m. alta, caulis inferne tetragonus, dense longeque strigosus, inflorescentia glabrescens. Folia opposita, sessilia vel brevipetiolata, petioli ad 3 mm. longi, dense strigosi; laminae ovatae vel lanceolato-ellipticae, acutae, serratulae, utrinque dense et longe strigosae, ad 3.5 cm. longae et 1.8 cm. latae. Inflorescentia terminalis, laxe racemoso-paniculata, pedicelli filiformes, patento-adscendentes, glabri vel ad basin subpuberuli, anthesin 1–2 cm. longi; bracteae parvae, ad 4–5 mm. longae, lineares vel subulatae, apice strigosae. Ovarium glabrum; sepala glabra vel ad basin subsetulosa vel glanduloso-puberula, ca. 8 mm. longa, 1.5 mm. lata, apice subcucullata; petala posteriora ad 1 cm. longa, spathulata, lamina 3 mm. lata, obtusa, unguis brevis et crassus, lamina basi subappendiculata super discos duos glandulosos; petala anteriora breviunguiculata (unguis ca. 2 mm. longus), lamina suborbicularis, subcrenulata, ad 6 mm. longa; stamen sterile anguste oblanceolatum, 8 mm. longum; stamen fertile 6.5 mm. longum (anthera 2 mm. longa); stylus ca. 2 mm. longus; capsula glabra, globosa, ad 5 mm. longa, seminibus numerosis; semina immatura brunnea, dense brevi-papillosa, 1 mm. longa.—MEXICO: Guerrero: Mina Dist.: Yesceros-Cruz Pacifica, 2550 m. alt., rocky slope in oak forest, Nov. 26, 1939, *Hinton et al.*, no. 14902 (TYPE, G).

This species belongs to the small group which has been segregated by some workers as the genus *Jehlia*, as by Rose in Contrib. U. S. Nat. Herb. xii. 297 (1907), Sprague & Riley in Journ. Bot. lxii. 12–13 (1924), and Standley in Contrib. U. S. Nat. Herb. xxiii. 1075 (1924). From these species, *L. Hintoni* differs in its dense pubescence, and in its smaller and glabrous flowers with circular "glandular" patches at the base of the blade of the posterior petals.

When Professor Fernald considered the generic segregates of *Helianthemum*, in Rhodora, xliii. 609–614 (1941), he showed that these segregates rest upon characters which hardly hold for the American species he was dealing with, and therefore should be abandoned. There is one Mexican species, described in *Halimium*, which it becomes necessary to transfer to *Helianthemum*.

Helianthemum **exaltatum** (Rose & Standl.), comb. nov. *Halimium exaltatum* Rose & Standl. in Contrib. U. S. Nat. Herb. xxiii. 833 (1923). To the two Pringle collections cited in the original description, the following may be added: MEXICO: México: Dist. Temascaltepec: Pineda, dry hill, Jan. 22, 1933, *Hinton*, no. 3190 (G). Michoacán: Coalcomán Dist.: Coalcomán, in woods, 1000 m. alt., Feb. 8, 1939, *Hinton et al.*, no. 12960 (G).

Cuphea **michoacana,** spec. nov. Planta annua, herbacea, ad 45 cm. alta. Caulis subglaber vel unifariter puberulus. Folia plerumque sessilia vel subsessilia, raro petiolis 2.5 mm. longis, anguste elliptica vel oblanceolata, 4–8 cm. longa, 8–12 mm. lata, basi attenuata, apice acuminata, obtusa, supra atroviridia et persparse pilosa, margine strigulosa, subtus pallide argenteo-viridia, nervi pilis longis paucis. Inflorescentia terminalis; pedicelli breves (2 mm.), puberulentes, bracteolae 3–4 setae bulbosae. Calyx 5–6 mm. longus, lobus dorsalis productus, externe plerumque glaber, nervi inconspicue bulboso-setulosi, setulae viridescentes vel pallidae, appendices breves, rotundati, apicibus uncinatis inflexis; interne glaber. Petala dorsalia 2, ca. 2 mm. longa, lutea vel albido-lutea, obovata, obtusa; petala ventralia desunt. Stamina 11, inclusa, filamentis glabris. Ovarium magnum, glabrum, stylus glaber ovarium ⅓ aequans, stigma capitatum; ovula 3–4 (–5); discus angustus, deflexus, apice plus minusve incurvus; semina 2 mm. longa, minute scrobiculata, atrobrunnea, maculata, plerumque (2–) 3.—MEXICO: Michoa-

CÁN: Dist. Coalcomán: Puerto Zarzamora, 1720 m. alt., Sept. 27, 1938, *Hinton et al.*, no. 12268 (TYPE, G), and no. 12269 (G).

The sessile or subsessile leaves and the deflexed disc appear to place this species in Section *Brachyandra*, Subsection *Micranthium*, but the dorsal lobe of the calyx is so produced as to suggest Subsection *Lophostomopsis*. In that group, however, the leaves are petiolate and the disc suberect, although an exception is found in *C. Ferrisiae* Bacig., which has been placed in *Lophostomopsis* despite its decidedly deflexed disc. The type has the calyx brilliant red, with the throat yellowish green, while the other specimen cited has the calyx paler green, and leaves more attenuate at the base. The difference in color of the calyx may be due to the greater maturity of the flowers.

CUPHEA **vesiculigera,** spec. nov. Herba annua, 15–45 cm. alta. Caulis simplex vel ramosus, dense strigosus, pilis multo longioribus laxis rubro-purpureis intermixtis. Folia longe petiolata, petioli 7–11 mm. longi, laminae 2.5–8 cm. longae, 1.2–3.5 cm. latae, infimae lanceolatae vel aliquanto lanceolato-ovatae, superiores ovatae, supra remote strigulosae, pilis longis albis intermixtis, subtus dense strigulosae, pilis longioribus rigidis secundum nervos. Inflorescentia dense vel laxe racemoso-paniculata, bracteae parvae; pedicelli 1 mm. longi, strigulosi, bracteolae lanceolato-ovatae, 0.5 mm. longae, marginibus ciliatis. Calyx ad 6–7 mm. longus, externe aliquanto strigulosus, pilis longis albis vel pallide rubris remotis ad costas; lobus dorsalis aliquanto productus; intus infra stamina dorsalia villosus, ceterum glaber; vesiculae infrastaminales 8. Petala dorsalia 2, longe unguiculata, ad 4.5–5 mm. longa, laminae ovatae vel suborbiculatae; petala ventralia ad 2 mm. longa, oblanceolata vel subspathulata. Stamina 11, inclusa, filamentis 4 sparse villosis. Ovarium, apice excepto, glabrum; stylus breviter pilosus, apice subbilobus, inclusus; ovula 3; discus parvus, suberectus; semina 2 mm. longa, exalata, minute scrobiculata.—MEXICO: GUERRERO: Dist. Montes de Oca: llano at Vallecitos, July 6, 1937, *Hinton et al.*, no. 10570 (TYPE, G); Dist. Mina: Placeres, 400 m. alt., July 28, 1936, *Hinton et al.*, no. 9166 (G); Dist. Coyuca: Cutzamala Rancho, Aug. 13, 1925, *Hinton et al.*, no. 8164 (G). MÉXICO: Dist. Temascaltepec: Ixtapan, 1000 m. alt., Aug. 3, 1933, *Hinton*, no. 4478 (G).

This species belongs in Section *Brachyandra*, Subsection *Lophostomopsis*, since its calyx-length, slightly produced dorsal lobe, ovule-number, stamen-number, and suberect disc are quite characteristic of that subsection. From the other members of the subsection, it can be distinguished immediately by the presence of infrastaminal vesicles, from which it takes its specific name.

CUPHEA **pertenuis,** spec. nov. Herba annua, 10–60 cm. alta. Caulis simplex vel multiramosus, pilosulus vel strigulosus, setis plurimis purpureis bulbosis ornatus. Folia petiolata, petioli ad 5–6 mm. longi; laminae lanceolato-ovatae, inferiores basi cordatae vel subcordatae, superiores basi obtusae vel in petiolum abrupte contractae, acuminatae, ad 3 cm. longae, 1.5 cm. latae, utrinque strigulosae, subtus nervis paululum hispidulis. Inflorescentia terminalis, racemosa vel paniculata, bracteata; pedicelli ad 7 mm. longi, glabri, bracteolati, bracteolis parvis, ciliatis. Calyx 3–6 mm. longus, rotundato-calcaratus vel calcar subnullus, abrupte et valde in fauce dilatatus, hispidulus, pluribus setis purpureis interspersis; interne glaber. Petala dorsalia 2, 3.5–4.5 mm. longa, obovato-spathulata; petala ventralia 4, 2.5 mm. longa, cuneato-spathulata, omnia purpurea. Stamina 11, filamenta glabra, raro pilosula, perlonge exserta. Ovarium glabrum, magnum; stylus glaber, exsertus; ovula 8–10; discus minutus, subulatus, deflexus; semina vix 1 mm. longa, pallide brunnea.—MEXICO: MÉXICO: Dist. Temascaltepec: Volcán, Nov. 5, 1932, *Hinton*, no. 2504 (G), same locality, in a barranca, Oct. 11, 1935, *Hinton et al.*, no. 8545 (G); oak woods, Tejupilco-San José, Dec. 3, 1934, *Hinton et al.*, no. 7083 (G); Tenayac, Nov. 17, 1933, *Hinton*, no. 5113 (G), same locality, Oct. 17, 1935, *Hinton et al.*, no. 8361 (G); Temascaltepec, 2790 m. alt., Dec. 14, 1932, *Hinton*, no. 2790 (G). MICHOACÁN: Dist. Coalcomán: woods, Coalcomán, 1000 m. alt., Dec. 31, 1938, *Hinton et al.*, no. 12845 (G); Dist. Zitácuaro: in sparse oak forest, Zitácuaro-Guanoro, 1900 m. alt., Nov. 18, 1938, *Hinton et al.*, no. 13460 (TYPE, G). GUERRERO: Mina Dist.: oak woods, Zihuagio, 1200 m. alt., Oct. 17, 1936, *Hinton*, no. 9717 (G).

It is strange that a species apparently as common as this should so long have gone undescribed, yet I can neither match it nor trace it to any species described. It is difficult, too, to place it in its proper position in the genus. In some respects this species seems to resemble *C. delicatula* T. S. Brandg., a species placed by Koehne (in his unpublished *Atlas Lythracearum*) in an unnamed subsection following Subsection *Oidemation* in Section *Euandra*. The two plants are annuals, with a very slight and fragile habit of growth, thus being distinguished at once from the shrubs and subshrubs, or rhizomatous perennial herbs, which make up the rest of the section. Yet the new species is quite distinct from *C. delicatula*. The calyx is basally slightly gibbous, or rounded-spurred, the disc is small and almost absent, possibly actually absent in some individuals, there are 8 or more ovules, instead of 4, with usually 5 maturing into seeds, and the stamens are very much exserted.

CUPHEA WRIGHTII var. **compacta,** var. nov. A *C. Wrightio* inflorescentia dense compacta, foliis semper cordatis, staminum filamentis basi sparse villosis, differt.—MEXICO: MICHOACÁN: Sierra Naranjillo, in oak forest, Aug. 22, 1939, *Hinton et al.*, no. 15125 (TYPE, G). MORELOS: moist hillsides near Cuernavaca, 5000 ft., July 26, 1896, *Pringle*, no. 6387 (G). MÉXICO: Nepantla, August, 1903, *Rose & Painter*, no. 6616 (G).

In general, the cordate leaves and densely compact inflorescences serve to distinguish the variety from the species, in which the flowers are more distantly scattered in a loose raceme, and in which the leaves are seldom more than subcordate at the base. *Goldsmith*, no. 95, from Hacienda San Bartolo, Teccoman, Colima (G), is more or less intermediate, with the inflorescence less compact than in the variety, but with truly cordate leaves.

CUPHEA BRACTEATA Hook. & Arn. (1841) is a later homonym of *C. bracteata* Lag. (1811), and was renamed *Parsonsia Arnottiana* by Standley. I cannot find that this name has been transferred to *Cuphea*, and accordingly do so:

CUPHEA **Arnottiana** (Standl.) comb. nov. *Parsonsia Arnottiana* Standl. in Contrib. U. S. Nat. Herb. xxiii. 1020 (1924). *C. bracteata* Hook. & Arn. Bot. Beech. Voy. 289, 423 (1841), not Lagasca (1811).

CUPHEA **trichochila,** spec. nov. Suffrutex vel suffruticulosus. Caulis brunneus vel rubro-brunneus, juventute unifariter puberulus, pilis paucis longioribus intermixtis, caules seniores glabrati. Folia sessilia, opposita, anguste oblongo-elliptica, 0.5–2.5 cm. longa, 1–4 mm. lata, basi perattenuata, apice obtusa, margines remote ciliati, pilis longis. Inflorescentia terminalis, rhachis dense glanduloso-villosus; pedicelli ad 1 cm. longi, glanduloso-villosi, bracteolae ca. 0.75 mm. longae, brunneo-setulosae. Calyx 2.5–3 cm. longus, glutinoso-hispidus et breviter strigulosus, lobi marginibus dense ciliati; interne alae dorsuales sparse villosulae, ceterum glaber. Petala desunt. Stamina 11, filamenta sparse villosa, 4 exserta (2 cum antheris abortis). Ovarium glabrum, ovula ca. 20; stylus glaber, demum longe exsertus; discus dorsualis, crassus, perpendiculariter deflexus,—MEXICO: GUERRERO: Mina Dist.: barranca at Manchon, Sept. 26, 1936, *Hinton et al.*, no. 9583 (TYPE, G).

It is unfortunate that only a fragment of the original plant has been available, and that no details as to height are given on the label; but it is apparent that the species is rather shrubby and that it must have an appearance unlike that of any other shrubby species of *Cuphea* known to occur in Mexico. In Koehne's key to the genus, this falls into Section *Melvilla*, Subsection *Erythrocalyx*, series 3, between *C. Caeciliae* Koehne and *C. platycentra* Lemaire, although it has no real resemblance to the latter. The specific name refers to the densely ciliate margin of the calyx and, although less accurately, to the hairy margin of the leaves.

Cuphea **ornithoides,** spec. nov. Suffrutex, ca. 1 m. altus. Caulis strigulosus et unifariter puberulus, pilis curvatis. Folia sessilia vel raro petiolata, petioli ad 2 mm. longi, utrinque strigulosa, 2.5–5 cm. longa, 5–18 mm. lata, folia inferiora lanceolata vel lanceolato-ovata, basi attenuata, apice acuminata, folia superiora non nunquam lineari-lanceolata. Inflorescentia foliata, flores interaxillares, pedicelli 8–10 mm. longi, unifariter puberuli, apice pilis paucis longis rubris, bracteolae lineari-subulatae, 1.25 mm. longae. Calyx totus ad 1.8 cm. longus, calcar conspicuum 7 mm. longum, rubescens, valde glanduloso-hirsutus, lobus dorsalis brevissimus; interne bicostatus, infra stamina glaber, in fauce supra stamina sparse villosus. Petala dorsalia 2, ad 1.2 cm. longa, breve unguiculata, lamina late oblongo-ovata vel oblongo-spathulata, obtusa, atropurpurea; petala ventralia 4, 1–2 mm. longa, purpurea, subspathulata vel non nunquam lineari-subulata. Stamina 11, 4 exserta, filamenta plerumque sparse villosula. Ovarium glabrum; stylus glaber, breviter exsertus; ovula 10; discus suberectus vel subhorizontalis, apice paulo recurvatus.—MEXICO: Guerrero: Mina Dist.: Rio Frio, oak woods, 1300 m. alt., Sept. 17, 1937, *Hinton et al.*, no. 10678 (type, G); Chiriagua-Rio Frio, 1760 m. alt., Nov. 19, 1936, *Hinton et al.*, no. 9859 (G); Pilas, pine forest, 1500 m. alt., Nov. 20, 1936, *Hinton et al.*, no. 9863 (G).

Although I consider this species to belong to Section *Diploptychia*, Subsection *Leioptychia*, series 2, there is a definite resemblance, in the habit of the flower with its very much upturned spur, to *C. avigera* Robins. & Seat., a member of Section *Ornithocuphea*. *C. ornithoides* is much larger, possesses a disc which is unlike that of the members of *Ornithocuphea*, and the leaves are basally attenuate or acute, instead of more or less cordate-clasping.

Cuphea **pulcherrima,** spec. nov. Herba annua. Caulis 0.5–1.5 m. altus, pilis appressis. Folia sessilia vel subsessilia, lanceolata, basi subobtusa, apice acuta, superne sparse hispidula, subtus densiora hispidula, praecipue nervis. Inflorescentia racemosa vel paniculata, pluriflora, pedicelli 3–10 mm. longi, divaricati, bracteolae deltoideo-subulatae, 0.5 mm. longae. Calyx totus ad 1.8–2 cm. longus, calcar rectum vel curvatum non nunquam 9–10 mm. longum, minute puberulus, pilis longioribus glandulosis rubris ornatus, calcar et area dorsalis rubescentes, lobi deltoideo-acuminati pallide rubro-purpurei, infra sinus pilis setosis albis comati; interne valde bialatus, in fauce supra stamina dense longi-villosus, squamulae luteae tuberculato-subulatae, paulo brevi-villosae. Petala dorsalia 2, valde reflexa, ad 7 mm. longa, 4 mm. lata, obovato-spathulata, unguis breve pubescens, nervus primarius superne pubescens; petala ventralia 4, ad 1 cm. longa, 7 mm. lata, obovata, pallide rubra vel pallide purpu ea. Stamina 11, triseriata, plerumque exserta, filamenta villosa. Ovarium glabrum, ovula (5–) 10 (raro 11); stylus glaber, paulo exsertus; discus longus, subulatus, calyci adnatus et in calcar projectus; semina 5–10, atrobrunnea, minute scrobiculata, nigromaculata, 1–1.5 mm. longa.—MEXICO: Guerrero: Mina Dist.: Campo Morado, steep slope in oak forest, 1600 m. alt., Nov. 13, 1939, *Hinton et al.*, no. 14837 (type, G), same locality, edge of oak forest, 1620 m. alt., Feb. 1, 1938, *Hinton et al.*, no. 11157 (G); Teotepec, oak forest, 1850 m. alt., Nov. 7, 1939, *Hinton et al.*, no. 14813 (G); Chiriagua, 1600 m. alt., Nov. 18, 1936, *Hinton*, no. 9850 (G); Mesa Frijolar, Oct. 14, 1936, *Hinton*, no. 9691 (G); Petlacala, Montecito, cleared overgrown slope, 1880 m. alt., Dec. 18, 1937, *Ynes Mexia*, no. 8994 (G); Bravos Dist.: Pueblo Viejo, 1950 m. alt., Nov. 8, 1939, *Hinton et al.*, no. 14820 (G); Adama Dist.: Achota, trail west of Suriana, 635 m. alt., Nov. 12, 1934, *Mexia*, no. 8808 (G).

A member of Section *Ornithocuphea*, this plant is obviously close to *C. Hintoni* Bullock, but can be distinguished from that species, as well as from *C. avigera*, by the fact that the two dorsal petals are distinctly smaller than the ventral petals and are strongly reflexed backwards. In addition, it has usually twice as many ovules as *C. Hintoni*, is lighter in color, and somewhat larger in size. The dorsal lobe of the calyx is much shorter than the others, giving an oblique mouth to the calyx, as in *C. cyanea* DC. and *C. Hookeriana* Walp. From *C. avigera*, it is further to be distinguished by the presence of a disc, and by the bracteoles on the pedicels.

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New scientific names are printed in full-face type

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CONTRIBUTIONS FROM THE GRAY HERBARIUM
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CLVI

BOTANICAL SPECIALTIES OF THE SEWARD FOREST AND ADJACENT AREAS OF SOUTHEASTERN VIRGINIA

M. L. FERNALD

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BOTANICAL SPECIALTIES OF THE SEWARD FOREST AND ADJACENT AREAS OF SOUTHEASTERN VIRGINIA[1]

M. L. Fernald

(Plates 876–911)

Part I. Two Visits to the Seward Forest in 1944

Dr. Alfred Akerman, Director of the Seward Forest, and Mr. J. B. Lewis, Naturalist of the Forest, most kindly renewing invitations for me to return for study of the local flora at seasons different from those when I had visited the area in October of 1942 and in April, 1943, I gladly returned on June 19, 1944, for a week of local exploration. Lewis had been saving his gasoline-coupons against our needs but, naturally, we could not go far from Triplett, although we did get one trip, specially seeking further limits of range of *Asarum Lewisii* Fernald in Rhodora, xlv. 398, plates 774 and 775 (1943), as far as Poplar Creek, draining into the Roanoke in southwestern Brunswick County. We did not need to go far for interesting returns, for within the limits of Seward Forest and the immediate vicinity of Triplett there was plenty to occupy us. The fruit of *Rubus* was ripening and, since some of the species of this region of the outer Piedmont were quite unlike those I knew on the Coastal Plain, I made a point of securing a good series (and of testing the fruits). There

[1] The cost of plates defrayed through grants from the American Philosophical Society and from the Department of Biology of Harvard University.

are several strikingly different species. Some of these will be discussed in Part II.

As we drove from the train, at Emporia, to the Seward Forest, Lewis said, "Don't forget to remind me to show you a strange *Baptisia* when we get to Philadelphia Church. It's the only colony I ever saw of it". So, when we got to the locality we stopped and I promptly said "*Baptisia tinctoria*". "But the flowers are so small. What I know as *Baptisia tinctoria* has larger flowers and leaves". It is the typical Coastal Plain extreme, the plant separated by Small as *B. Gibbesii* from "Sandy woods, Coastal Plain, S. C.", although, as I showed in Rhodora, xxxix. 414 (1937), *B. Gibbesii* is a close match for the type of *B. tinctoria* (L.) R. Br., while the common inland and northern plant, with which Lewis had been familiar, is the usually coarser *B. tinctoria*, var. *crebra* Fernald, l. c. Since I had just sent for issue in Rhodora, xlvi. 281 (1944) a note by Dr. Robert Clausen, in which he expressed the opinion that "Var. *crebra* . . . seems scarcely tangible", Lewis's unsolicited tribute to its worth was interesting. Certainly, nowhere else in the region have I seen anything so small-flowered and -fruited as the colony near Philadelphia Church.

This intrusion into the upland flora of the Piedmont in Brunswick and western Greensville Counties of plants more characteristic of the Coastal Plain was emphasized by me in my last paper on the Virginian work[1]; and now, again, we met at almost every turn a singular mixture of inland or upland species (sometimes specialties of the Appalachian Upland or of the Mississippi Basin) and those which are primarily on the Coastal Plain, although, naturally, only a few of the latter have intruded so far inland. In fact, the first plant I collected after getting into old clothes, the everywhere abundant representative of *Rubus* § *Cuneifolii*, was at once impressive on account of the 5-foliolate leaves of the primocanes, with very narrow leaflets. To me it seems a close match for *R. sejunctus*, described by Bailey from material collected by Long and me near Branchville, 30 miles to the east and well out on the Coastal Plain in southern Southampton County—there also on Meherrin drainage.

[1] *Virginian Botanizing under Restrictions*, Contrib. Gray Herb. no. clxix. Rhodora xlv. 357–413, 445–480, 485–511 (1943)—especially pp. 374–377.

Two stations, one of them within the Seward Forest, the other barely not, are specially noteworthy. The most distinctive is the little spring-fed and (originally) *Sphagnum*-carpeted Magnolia swamp, which is called the "Ram-hole" or "Ram-hole Swamp", because of the ram once installed for pumping the spring-water. I have previously noted it and in September it yielded more than its share of Coastal Plain specialties. In June, however, these were scarcely evident, the most notable plant then being a long-arching and doming blackberry such as I had never met, but which proved to be characteristic across the county, even to its southwestern corner, and eastward into Greensville County. Since it is so characteristic of the Seward Forest and its vicinity I shall describe and illustrate it (PLATES 890 and 891) in Part II and there take the liberty of naming it for the Director of the Forest, although, if he could discover it, he would doubtless prefer his name to be associated with a new tree! Further discussion of "Ram-hole Swamp" will be deferred until I record the September trip.

The area which in June had the greatest mixture of upland and Coastal Plain types was the "Moseley flat pineland"[1], near Triplett. It was here that Lewis had found *Cynoctonum sessilifolium* (Walt.) J. F. Gmel., at the only known station north of the savannas of the Coastal Plain of North Carolina, and *Hypericum setosum* L., a characteristic southern species already known very locally from the Coastal Plain of Virginia, forty-five miles away. Here in June the most striking plant was a *Fimbristylis*, forming dense and tough hassocks, with many already fruiting tufts arising from bulbous bases crowded on the stout and short rhizomes. This was new to me (also to Virginia). Its identification has necessitated a prolonged study of its section of the genus, which will be detailed in Part II. Briefly, it is *F. Drummondii* Boeckl., described from New Orleans but found (though commonly misidentified) in pine or oak barrens, on sterile meadows, prairies, etc., from Florida to eastern Texas, northward, very locally, to Long Island, and, more generally, in the Interior to southern Michigan, Illinois and Missouri. With it, and giving further inland atmosphere to the spot, was *Psoralea psoralioides*

[1] The labels for this station got printed "*mostly flat pineland*". If any of them chanced to be distributed without correction, the error should be noted.

(Walt.) Cory, var. *eglandulosa* (Ell.) F. L. Freeman, widely dispersed from interior Georgia to eastern Texas, northward to the upland of North Carolina and to Ohio, Indiana, Illinois, Missouri and eastern Kansas, with its only previously known Virginian station in similar flat pineland at McKenney, 25 miles to the north, in Dinwiddie County. And with these two characteristically inland plants *Juncus Longii* Fernald in Rhodora, xxxix. 397, pl. 777, figs. 1–4 (1937), and *J. scirpoides* extended inland from the Coastal Plain, and the common Coastal Plain *Scleria pauciflora* formed loose tussocks. Near the margin of a small branch which borders this flat pineland I was puzzled by a very lax *Carex* with the flaccid culms loosely arching, so that the inflorescences lop to the ground. We had never had it in southeastern Virginia, but it proves to be the chiefly inland *C. hirsutella* Mackenzie. The "Moseley flat pineland" is an interesting tract.

The day we visited the Roanoke drainage in southwestern Brunswick County we drove directly to Ebony, where we made the first stop. Near there a bit of undisturbed swaley thicket looked promising. Here was the long-arching new *Rubus* of the "Ram-hole Swamp", 12 miles to the northeast; and when, another day, I got it in abundance near Brink in Greensville County, thus demonstrating its occurrence over a belt at least 20 miles across, it was evident that I was dealing with a true species, not merely a clone. The *Rubus* leaned out of a clump of the unusual form of Willow-Oak, *Quercus Phellos*, with the lower leaf-surfaces white with fine silk, forma *intonsa* Fernald in Rhodora, xliv. 392 (1942), typical and abundant *Q. Phellos* having the leaves green and glabrous on both sides. And here, almost in Mecklenburg County and 120 miles inland from the coast, where true *Juncus dichotomus* occurs, was the very different species, which elsewhere pushes inland and which passes as a mere flat-leaved variety of that coastal species, *J. dichotomus*, var. *platyphyllus* Wiegand. Its specific claims will be discussed in Part II.

Poplar Creek, emptying into the Roanoke, has good bottomland woods, with an abundance of *Acer floridanum* and its very definite var. *Longii* Fernald in Rhodora, xliv. 426, pl. 726 (1942), the latter previously known only from calcareous slopes to the lower James in James City County, ninety miles away. Beneath them was a fruiting *Aesculus.* Without flowering material I balk at naming it. *Geum canadense,* var. *brevipes* Fernald in Rhodora, xxxix. 410, pl. 479, figs. 1–3 (1937), supposed to be endemic on the bottomlands of the Nottoway, forty-five miles to the northeast, in Sussex County, abounded. It presumably will be found along the Roanoke in North Carolina. So, likewise, will be *Boltonia caroliniana* (Walt.) Fernald in Rhodora, xlii. 487, pl. 642 (1940), of southeastern Virginia and the lower Santee Valley of South Carolina, for here, on Poplar Creek, it is almost in North Carolina and far inland from its center on the Coastal Plain.

The "Chamblis bigwoods" of the Seward Forest, a vast tract for which I learned in September to have a vast respect (having been lost there for three hours), had yielded on my two previous visits some choice and apparently isolated inland or montane plants, enumerated in the last Virginian paper: *Panicum flexile, Polygala Senega,* var. *latifolia,* and *Zizia trifoliata,* for instance. In June these woods were equally productive. *Festuca paradoxa* Desv. (*F. Shortii*), common in rich woods of the Coastal Plain, was here abundant, although, from the range given by Hitchcock and his map (chiefly from western North and South Carolina and northwestern Georgia to Iowa, Missouri, eastern Oklahoma and northeastern Texas), one would never guess it. *Cypripedium Calceolus* L., var. *pubescens* (Willd.) Correll, was frequent, as was the southern *Sanicula Smallii* Bicknell. Young shrubs of *Nyssa* produced puzzling atypical leaves and I stumbled upon a few straggling shrubs of *Castanea neglecta* Dode, supposed by some to be a hybrid of *C. dentata* and *C. pumila,* but here, as in calcareous woodlands farther east, where it occurs, *C. pumila* would be out of place and *C. dentata* of acid woodland would scarcely have thrived. But the great excitement was a knoll in rich woods bordering the swamp along Quarrel's Creek, a slope covered with abundant *Sanicula Smallii, Carex oxylepis* and other species of rich southern woodland. On this knoll the leaves of a low *Circaea* were of a pale yellowish green, the margins of the rounded-cordate blades undulate, the pedicels purple-based, the sepals somewhat villous on the back, the tiny fruits as in the northern *C. canadensis* Hill (*C. intermedia* Ehrh.).

Outside of Europe *C. canadensis* is known from the Gaspé Peninsula of eastern Quebec to Lake St. John, and south to Nova Scotia, southern Maine, southern New Hampshire, western Massachusetts and Connecticut, New York and upland West Virginia. Its associates are northern, not southern species. We as yet know the little plant of Seward Forest from only this one spot. Its characters, however, justify its separation from the northern plant which, superficially, it suggests. In Part II it will be described and illustrated (PLATE 896).

Two old clearings within the area of the "Chamblis bigwoods" are, like most such habitats, largly given over to brambles (*Rubus*). Two species here specially interested me, both of them doming and forming intricate mounds, with the long and coarse overarching canes eventually trailing at tip, as in the wide-ranging plant already noted, members of my § *Tholiformes*. These were both very different from each other and quite unlike anything I can find described. One of them was in the clearings about the old Chamblis place and also in the clearing near the old Taylor place, the other was noted only in the latter locality. The former of these two abounds near an old outhouse where, in June, a brood of young turkey-buzzards very unsociably ran to a corner and tried to hide from our gaze and where, in September, they still clung to the old home. Since most descriptive specific names in *Rubus* are preempted I shall, in Part II, name this very characteristic blackberry (plates 892 and 893) for the buzzards upon whose domain we rudely forced ourselves in collecting it. The other (plates 894 and 895) I am naming for the very antithesis of a buzzard, the generous and scholarly founder of the Seward Forest, Dr. WALTER SEWARD.

I kept hearing of Quarrel's Creek and Pair's Store. These geographic names, coupled with Triplett (which our non-meddlesome government rules should be spelled "Triplet", in spite of the name of the original settler—on a tributary to Fontaine, not "Fountain", Creek), struck my whimsical sense of humor, for the combination of pairs, triplets and quarrels would intrigue even a dull imagination. So we went from Triplett to Pair's Store and thence followed down Quarrel's Creek to its junction with Fontaine Creek. Swaley open woods not far from Pair's Store looked interesting but, alas, most of the area had been under the plow; elsewhere it had been burned. The only plant of note there was the white-flowered *Polygala sanguinea*, a form I had rarely seen. The bottomland woods had passed the interesting period of early spring and had not reached the autumnal phase which is always interesting, but at the margin of the bottomland I was delighted to come upon the first thicket of *Amorpha fruticosa*, but not the last, I had ever seen, for in a few days we found it along Fontaine Creek near Round Hill Church, also in Greensville County, but nearer the Fall Line.

On my first trip to Seward Forest we had gone to the Meherrin River at Westward Bridge (or Mill), south of Edgerton. The greatest excitement there was the discovery on the bottomland of *Muhlenbergia glabriflora* Scribn., previously known only from southwestern Indiana and Illinois to Texas. With this rather startling isolation in mind we returned to Westward Bridge. I had many times tried to cap one good discovery with another, but usually it hadn't worked. So I was prepared for the worst. Wallowing through the deep and retarding tangle on the bottom, I suddenly halted. The *Tripsacum* there didn't look right. Its slender staminate inflorescence had narrow and sharply acuminate glumes, whereas I remembered the glumes as broad and blunt. Three or four plants were taken "just in case", and this time luck was with me. I cannot separate the Meherrin River plant from an isotype and other Texan material of the recently described *Tripsacum dactyloides*, var. *occidentale* Cutler & Anderson, the variety known to them only from the Davis and the Chisos Mountains in western Texas. When in doubt take a specimen!

Lewis and Dr. Akerman again saved up gasoline, and in September it seemed possible to get about a little. So, on September 11, I reached Seward Forest. This time we conserved all possible motive power for a final day, and our longest trip away from the Forest, until I had to return to Emporia to take the night-train home, was to the Meherrin at Westward Bridge. My arrival had broken the all-summer drouth[1]; consequently the muddy shore of the river, where I hoped for good things,

[1] For several summers, whenever Long and I reached our old center at Petersburg, it would begin to rain. So regularly did this occur that we were always greeted: "I knew you had come; the drouth has broken".

was drowned under more than opaque red-brown water. But the woods contained the very heavily pubescent *Elephantopus carolinianus*, forma *vestitus* Fernald, which we had known only from the bottomland of Adams Swamp, seventy miles to the east in Nansemond County; the mass of ordinary pink-flowered *Polygonum pensylvanicum* contained scattered plants with bright white flowers. The *Pycnanthemum incanum* certainly was not the northern plant with more or less divergent pubescence. Neither did it look like the southern var. *Loomisii* (Nutt.) Fernald, with the internodes and calyces densely canescent. It looked too glabrescent. At the risk of possibly overloading with material of the latter, already much collected farther east, I took a specimen. It is the extreme of *P. incanum* recently described as *Pycnanthemum puberulum* Grant & Epling, its type from southwestern Georgia. At any rate, I got one specimen! But I took twenty sheets of the next plant of note. This is *Dicliptera brachiata* (Pursh) Spreng., a very definite member of the *Acanthaceae*. Some years ago Long and I made frequent visits to the intermittently drowned bottomland of the Meherrin just before it leaves Virginia, below Haley's Bridge (between southeastern Greensville and southwestern Southampton Counties), for in early summer we had there found young foliage of a strange member of the *Acanthaceae*. Repeated or long-continued drownings delayed the identification until finally, in October, the water receded and we got the *Dicliptera* in flower and fruit. That has been the only station known in Virginia. Now, directly under the northern end of Westward Bridge, we have another.

Hoping that the once flooded but now fully overgrown bottom where the dam had gone out at old Clipper's Mill on Rattlesnake Creek, southwest of Triplett, would have some worth-while shore-vegetation, we tried there. For the most part the old bottom is a dense and very deep swale of *Pilea*, *Boehmeria* and their ilk, but here was an inland station, pretty well back from the Coastal Plain, of *Rhynchospora corniculata*, and in one area there is an *Erianthus* with peculiarly silvery and pale panicles. It didn't quite register; I had never met it growing, for it is *E. alopecuroides*, an inland species which we have not had on the Virginian Coastal Plain. Not far away, in a mossy bottom, *Dryopteris cristata*, very local in southeastern Virginia, abounds, but, so far as I saw, that is the only specialty of note there.

Visiting the lower mile of Quarrel's Creek and again following down to its confluence with Fontaine Creek, we were amazed that the bottomland woods had none of the big *Compositae* we should have expected. However, as we entered the woods near the station of *Amorpha fruticosa*, we got into a tangle of *Vitis cinerea*, frequent farther down the Meherrin system on the Coastal Plain, although generally treated as western or very southern: "Centr. Ill. to Kan. and Tex."—*Gray;* "Indiana, southwestern Wisconsin, Illinois, Missouri, Kansas, Arkansas, Oklahoma, eastern Texas, Louisiana, Alabama, western Georgia"—Bailey, Gent. Herb. iii. 316. Farther down, where the often flooded bottoms by Quarrel's Creek merge with those of Fontaine Creek, we established some new inland extensions of Coastal Plain types, such as *Scirpus divaricatus, Juncus repens* and *Ludwigia glandulosa.* And farther up Quarrel's Creek, in the swamp where it flows through the "Chamblis bigwoods", I was delighted to find an inland colony of *Cornus foemina* Willd. (*C. stricta* Lam.). Searching near-by for mature fruit of the new *Circaea* (now completely dessicated and ruined by prolonged drouth), I was impressed by a nearly smooth creeping *Desmodium,* much smoother than *D. rotundifolium* with which it grows. It proves, according to Dr. Schubert, to be only the Coastal Plain *D. lineatum,* which, in former years, I had learned to pass without emotion. This station, very rich and damp woodland, is so unlike the relatively sterile and dry woods where I had known it that I was fooled. Beside it was another plant which registered with some doubt; so I took a couple of specimens. It is fortunate that I did so, for it is *Polymnia Uvedalia,* var. *densipila* Blake, described from Louisiana, Oklahoma and Texas; also Bermuda. That was the last important collection in the "Chamblis bigwoods".

Lewis had announced, while I was in the swamp, that it was time to start home; but very soon he commented on the shouts, like those of a woman calling, from deep in the woods. He said it was a Barred Owl, and I suppose he was right. Nevertheless, when I came out of the swamp and whistled for my companion and guide, he was gone. My masculine shouts did not interest him; and, reasoning that he had gone on ahead and had ascribed to me a greater degree of wood-craft than I possess, especially on a rainy and sunless day in a strange and extensive "bigwood", I followed broken plants and some remembered landmarks to what I thought the proper place to break out toward the waiting car, soon got tangled and twisted around in impenetrable briars and towering dog-fennel (*Eupatorium capillifolium*) ten feet high, and, taking again to the woods, made broad circles for three hours, until, finally, by sighting on tall trees and following a straight course, I came out, rather surprised at myself, at the car. After that I carried raisins as well as a compass in my hip-pocket! As we approached headquarters a truck, with the Director and a crew, had started out as a searching-party. The whole community soon had the story, but I insisted on pretending to wonder whether the womanish calls which had lured Lewis away were really those of an owl!

Dr. Akerman wanted us to see one of the eastern extensions of the Seward Forest, in the extreme eastern edge of Brunswick County, south of Ante. As we entered the dry pines the first herbaceous plant we noticed was the essentially glabrous Coastal Plain *Tephrosia virginiana*, var. *glabra* Nutt. Then we walked through acres and acres of *Asarum Lewisii*, forming broad and open carpets to the exclusion of anything else. This, the most extensive colony yet known, is in ordinary dry or dryish woods, largely of Loblolly Pine. Here, in the spring, we may be able to secure the unknown fruit, for so extensive a colony must spread largely by seed.

I could not leave Seward Forest without spending some hours in the little "Ram-hole Swamp", so near-by that we were apt to overlook it. We already knew it as the only station yet discovered in the Manual range for the southern square-stemmed *Solidago salicina* Ell., here isolated by 100 miles from the northernmost known station in North Carolina; also as an isolated inland station for the beautiful *Lobelia glandulifera* (Gray) Small (See Rhodora, xlv. 377 (1943)), the *Lobelia* delighting in just such spots on the Virginian Coastal Plain. Unfortunately, fire has ruined much of the sphagnous carpet and inevitable brambles are rapidly monopolizing the area, but enough of the original bog remains to maintain the *Solidago* and the *Lobelia*.

In September the Coastal Plain *Helianthus angustifolius* and *Cirsium virginianum,* including the cut-leaved forma *revolutum* (Small) Fernald, abound and here we got our most inland stations in southeastern Virginia for *Rhynchospora globularis* (Chapm.) Small, var. *recognita* Gale, *Lycopus americanus,* var. *Longii* Benner, typical *Eupatorium hyssopifolium* (See RHODORA, xliv. 459), *Solidago rugosa,* var. *celtidifolia* (Small) Fernald and *Fuirena squarrosa* (*F. hispida* Ell.). The latter was tangled in and rather overwhelmed by the dominating Coastal Plain *Panicum lucidum* and a very slender but long-since overripe *Rhynchospora* which must be collected earlier another season. These are not all. A problematic low shrub of some species of *Pyrus,* subg. *Aronia,* is quite like low and simple-stemmed shrubs from pine barrens and savanna of the southeastern Coastal Plain, its identity yet to be worked out; and some other puzzles, still awaiting study, were secured. One of them, the tiniest alder I know, fruiting shrubs only 2 to 3 feet high, with scattered simple and erect stems, mature leaves only 1 to 2 inches long and very small staminate aments, cones and fruits, is like similarly dwarf shrubs once collected by Long and me in a bushy sphagnous swamp, with *Sarracenia flava* and *Lachnocaulon anceps,* in Prince George County. This is so strikingly unlike other eastern Virginian alders, that I have dug out from hiding a study of the Swamp Alders of eastern America, a study begun nearly 40 years ago but several times shelved or pigeon-holed. This I am aiming to bring to a conclusion for publication in the near future. This little remnant of a springy and sphagnous bog is one of the unique and most interesting habitats in the Seward Forest. What a place it must have been before fire (Dr. Akerman's scrupulously avoided and most dreaded foe throughout the forest) got into the place!

At last it was time to leave. It had rained intermittently through five days out of seven and, of course, we got some of the downpour at the western border of the hurricane of the period. In early July of 1943 Long and I had discovered on the sandy beach of Whitefield's Millpond, southwest of Corinth in Southampton County, very young plants of an annual which closely simulated the southern and southwestern *Eryngium prostratum,* originally described from Arkansas. The material was too young, but its fruit did not seem quite typical of *E. prostratum*, unknown within some hundreds of miles of southeastern Virginia. In October, 1943, after a week of downpour, following months of drouth, Akerman, Lewis and I visited Whitefield's Pond in search of ripe material. But the elements were not on our side. As I wrote in my last Virginian paper: "When we got to Sedley we were told that we could not get at Whitefield's Pond from the south, for the road was completely under water and the dam itself flooded. That sounded pretty bad, and when we reached Whitefield via Corinth, there was the overflowing pond extending back into the woods. The farmer living near-by told us that in the forty years he had lived there the water had never been so low as it was until the five-day rain came on. We could have wept. Locating a spot where the little *Eryngium* should be, I walked in to shoulder-depth (I was already drenched by rain), ducked and grabbed. Nothing but floating *Utricularia* and debris came up. The *Eryngium* still evades us"—Rhodora, xlv. 390 (1943).

That defeat had been rankling for two years; and when I reached Seward Forest I had urged that we use the accumulated gasoline with rigid economy, in order to try again on the last day, before I should take the night-train north from Emporia. So on Monday, the 18th, disappointed that Dr. Akerman must give up the trip with us, Lewis and I started for Whitefield's Pond. It still rained, so hard as seriously to obscure our vision, but we figured on getting to Whitefield by 9 in the morning and then having a full day for exploration. But Fate was still not wholly reconciled to our programme. On the way to Sedley, reached by a road full of unexpected angles and forkings, we were undecided which of two surfaced forks to take. Driving up to what in the rain looked like a filling station, we suddenly went bang! bang! A rear and a front wheel were down to their hubs in rotted tar pavement! The filling station had been deserted and we were alone on a deserted road. Luckily a friendly board-pile was soon discovered and eventually we pried ourselves out. It was afternoon when we got to Whitefield. Twenty feet of beach were still undrowned. The *Eryngium*, with sky-blue flowering and paler fruiting heads, made repent mats and by rapid work we secured a splendid type-series

(PLATES 897 and 898) before the early twilight. We had finally won! There was no time for exploration of the four miles of beach and marshy shore, but while uprooting the trailing branches of the undescribed *Eryngium*, I snatched a single plant of a *Ludwigia* which looked unfamiliar. It is; I can find nothing quite like it in the herbarium, but without fuller material I withhold further comment. The carpet of *Polygonum* bordering the outlet of Whitefield's Pond looked strange: with the very narrow (almost linear) leaves and thick finger-like panicles suggesting *P. opelousanum* Riddell, but the flowers deep pink, not greenish. A hastily snatched bunch had to suffice, but the plant proves to be a very definite new variety (PLATE 884) of *P. hydropiperoides*, represented in the Gray Herbarium by an old collection of Rugel's from Norfolk County; otherwise only from the region of Wilmington in southeastern North Carolina—a geographic segregation repeated by very many plants of the Coastal Plain of southeastern Virginia. Whitefield's Pond needs close study! The next morning, September 19, in a few short hours a regular cloud-burst precipitated 6 inches of rain over southeastern Virginia and caused disastrous floods. We had got the *Eryngium;* one day later we should have missed it.

Thus the two short visits to Seward Forest, with a total of 14 half-days or one week of field-work, brought their botanical returns in unexpected number, and it is possible to close off the very brief season of 1944 with a record of discovery not at all discreditable in view of the limitations. These results would have been impossible without the cordial and genuine hospitality and helpfulness of the Director, Staff and families of the Seward Forest. My gratitude to them all is very great.

PART II. TECHNICAL NOTES AND REVISIONS

As usual in this series of papers, the more important range-extensions are briefly assembled, even though already noted in the journal. Plants thought to be previously unrecorded from Virginia are indicated by an asterisk (*) and in all except the several technical studies, the names of collectors, *Fernald & Long, Fernald & Lewis*, etc., are omitted, the numbers sufficing. Since, for the most part, Lewis has a separate series of numbers, plants collected by us both and of which only my own series of numbers are available are cited as *Fernald* (with *Lewis*), etc. Some studies which have resulted from earlier collections in the state by Mr. Bayard Long and me are included; a few plants, recently recorded by me elsewhere and new to Virginia, are briefly noted, that their records may be easily available; and the last discussion, although not growing immediately out of our field-work, is here included, since most of the plants discussed are Virginians. As for several years past, I am greatly indebted to Dr. Bernice G. Schubert for her skill in preparing the plates. The cost of engraving has been met through grants from the American Philosophical Society and from the Department of Biology of Harvard University.

Dryopteris cristata (L.) Gray. Brunswick Co.: bottomland woods near old Clipper's Mill, southwest of Triplett, no. 14,680. Not recorded by Massey from Brunswick Co. See p. 101.

Festuca paradoxa Desv. Local range extended inland to Brunswick Co.: low woods along Meherrin River near Westward Bridge (or Mill), no. 14,554. Seen in other rich woodlands. See p. 97.

Vulpia **Elliotea** (Raf.), comb. nov. *?Festuca quadriflora* Walt. Fl. Carol. 81 (1788), not Honkeny, Verz. Aller Gew. Teutschl. 268 (1782). *F. monandra* Ell. Sk. i. 170 (1816), in obs. on misapplied name *F. myuros* L., the full description being of the indigenous plant of S. C. *Dasiola elliotea* Raf. Neogen. 4 (1825). *Festuca sciurea* Nutt. in Trans. Am. Phil. Soc. n. s. v. 147 (1835). *V. sciurea* (Nutt.) Henrard in Blumea, ii. 323 (1937).

The earliest available name for this characteristic American (including Virginian) species is *Dasiola Elliotea* Raf. (1825), Rafinesque defining the new genus *Dasiola* with the single species *D. Elliotea* based on the very fully described *Festuca monandra* Elliott. Elliott's description is unequivocal; he called the plant the Old World *F. myuros* L., but said "I once considered this plant as distinct from the Linnaean F. myurus, and named it F. monandra; the description however of Lamarck . . . renders it probable that it is the same: the only circumstances which still occasion any doubt, the hairy corolla and solitary filaments, are omitted in his description". The hairy "corolla" is distinctive of the native southern plant; and this comment, as well as Elliott's full account, leaves no question as to the identity of his plant, therefore of Rafinesque's *Dasiola Elliotea*. Elliott's *Festuca monandra* can not be taken up. He published it only as a *provisional* name which he had himself abandoned.

V. OCTOFLORA (Walt.) Rydb., var. **tenella** (Willd.), comb. nov. *Festuca tenella* Willd. Sp. Pl. i. 419 (1797). *F. octoflora*, var. *tenella* (Willd.) Fernald in RHODORA, xxxiv. 209 (1932).

V. OCTOFLORA, var. **glauca** (Nutt.), comb. nov. *Festuca tenella*, β. *glauca* Nutt. in Trans. Am. Phil. Soc., ser. 2, v. 147 (1835). *F. octoflora*, var. *glauca* (Nutt.) Fernald, l. c. (1932).

It is difficult to understand why the genus *Vulpia* has not been generally taken up in America, except that Piper, in his *North American Species of Festuca*, Contrib. U. S. Nat. Herb. x. pt. 1 (1905), followed Hackel in treating it as *Festuca*, subg. *Vulpia* and Hitchcock and others have followed Piper. The two groups, true *Festuca* L. and *Vulpia* K. C. Gmelin, are very different in morphology and in geographic occurrence. *Festuca* is a genus of perennials, occurring in temperate regions of both northern and southern hemispheres and extending to the Arctic and to high-alpine habitats. The florets open regularly and the plumose stigmas emerge from the sides of the lemmas; the 3 free anthers are exserted and, as we know, are so distinctive as to offer clear and diagnostic specific characters. The grain is ellipsoid or ovoid. In most species of true *Festuca* the 2nd glume is merely pointed, though sometimes awned, and the acute to blunt lemmas may be awnless or awned.

Vulpia, on the other hand, is a group chiefly of annuals, with the lower glume often greatly reduced, the upper one frequently awned, and the slender lemmas long-attenuate to long-awned. The florets do not open, but remain closed (cleistogamous) and are enlarged upward when the anther is mature, the 1 (rarely 3) included anther being appressed to the lemma or to the included stigmas and with nearly suppressed filament; and the linear-cylindric grains are attenuate to each end. This characteristic group occurs in temperate Europe and the Mediterranean region (North Africa and southwestern Asia), in temperate (not frigid) North America and in western South America.

The fact that Hackel in his earlier work and in Engler & Prantl merged *Vulpia* with *Festuca* is hardly sufficient ground for maintaining an artificial union. Hackel, likewise, merged other groups which, in Washington, have been officially segregated.

Thus, by Hackel, in his monumental Andropogoneae in DC. Mon. vi. (1889), *Sorghum*, *Sorghastrum* (*Chrysopogon*), including *Rhaphis, Vetiveria, Cymbopogon, Hyparrhenia* and *Heteropogon*, all maintained with us as genera, were merged into *Andropogon;* and just imagine how the ultraconservative and very accurate Hackel would have groaned at the segregation of *Panicum* as he conceived it; to him *Digitaria, Trichachne, Brachiaria, Echinochloa*, etc., were mere sections of *Panicum*. Since all or nearly all of his sections in *Panicum* and his subgenera in *Andropogon* (as well as in many other groups) are taken up in America as full genera, why discriminate against his *Festuca*, subg. *Vulpia?* In Europe and Africa nearly all, if not quite all, recent close students of the *Gramineae* regularly maintain *Vulpia* as a genus: Beck von Managetta, Rouy, Hegi, Lindman, Henrard and such sound and conservative British authorities on grasses as Bews, C. E. Hubbard and Vaughan. It seems reactionary to persist in merging *Vulpia* with *Festuca*[1].

Eragrostis multicaulis Steud. Synop. Pl. Glum. i. 426 (1855). *Glyceria airoides* Steud. l. c. 287 (1854), not Reichenb. (1827). *E. pilosa*, var. *Damiensiana* Bonnet in Naturaliste, iii. 412 (1881). *E. pilosa*, var. *condensata* Hackel in Allg. Bot. Zeitschr. vii. 13 (1901). *E. peregrina* Wiegand in Rhodora, xix. 95 (1917). *E. Damiensiana* (Bonnet) Thell. in Fedde, Repert. xxiv. 323 (1928).

I am indebted to Capt. Stanley J. Smith for calling my attention to the correct name for the ruderal annual which has rapidly spread in eastern North America and which is currently known as *Eragrostis peregrina* Wiegand. In their Grasses of Mauritius and Rodriguez, 43 (1940) the two distinguished English specialists on grasses, C. E. Hubbard and R. E. Vaughan, give the above bibliography of *E. multicaulis*, "Native of eastern Asia; introduced into Europe, America and Australia". Steudel originally described the species as *Glyceria airoides* from Japan but a year later, describing it under *Eragrostis*, he rightly gave a new specific name, since his earlier name, *Glyceria airoides*, was a later homonym. Now that we know *E. multicaulis* (*E. peregrina*) to be introduced from eastern Asia, not indigenous, its behavior, suddenly appearing and then rapidly spreading, is easily understood. It well matches eastern Asiatic specimens.

[1] For a scholarly discussion see Henrard, Th., *A Study in the Genus Vulpia*. Blumea, ii. 299–326 (1937).

PHLEUM PRATENSE L., var. NODOSUM (L.) Schreb. Local range extended inland to GREENSVILLE Co.: roadside bordering sandy woods and thickets along Fontaine Creek, near Round Hill Church, no. 14,556.

PANICUM AGROSTOIDES Spreng., var. RAMOSIUS (Mohr) Fernald. Local range extended inland to western GREENSVILLE Co.: bottomland woods along Fontaine Creek, at mouth of Quarrel's Creek, no. 14,688.

P. ROANOKENSE Ashe. Range extended inland from Coastal Plain to western GREENSVILLE Co.: low woods, Mitchell's Millpond, west of Brink, no. 14,563.

* SETARIA FABERII Herrm. See RHODORA, xlvi. 57, 58 (1944). Abundantly naturalized in ROANOKE and BOTETOURT Cos., *C. E. Wood, Jr.*

ERIANTHUS ALOPECUROIDES (L.) Ell. BRUNSWICK COUNTY: abundant in bottomland woods along Rattlesnake Creek, at old Clipper's Mill, southwest of Triplett, no. 14,690. Chiefly an inland species, here at our first station in the southeastern counties. See p. 100.

* TRIPSACUM DACTYLOIDES L., var. OCCIDENTALE Cutler & Anders. in Ann. Mo. Bot. Gard. xxviii. 258 (1941). BRUNSWICK COUNTY: border of low woods, Meherrin River at Westward Bridge (or Mill), no. 14,565. HALIFAX COUNTY: Lawson Creek, southwest of South Boston, June 21, 1938, *Fosberg*, no. 15,412. See p. 99.

Recently distinguished as a supposed endemic of the Davis and the Chisos Mts. of western Texas, on account of the long and narrow acuminate glumes of the staminate spikelets. The plant at Westward Bridge is closely associated with *Muhlenbergia glabriflora* Scribn., there at its first known station east of the Mississippi Basin (southwestern Indiana and Illinois to Texas)—see Fernald in RHODORA, xlv. 379 and 385 (1943). It is a very close match for the TYPE-collection of var. *occidentale* (*Moore & Steyermark*, no. 3092). Material from near Nashville, Tennessee, *Gattinger*, has even longer and narrower glumes and is comparable with coarse extremes of var. *occidentale* from Texas (Chisos Mts., *Mueller*, no. 7891 and *Warnock*, July 12, 1937, and Presidio Co., *L. C. Hinckley*, no. 1691).

THE IDENTITY OF CYPERUS VIRENS Michx. (PLATE 876, FIGS. 1–4).—In sorting the large accumulation of photographs of types assembled before the present war I have, rather naturally, been amazed to note that the type (FIG. 1, × ½) of *Cyperus virens* Michx. Fl. Bor.-Am. i. 28 (1803), "*Hab.* in Carolina", is very characteristic material of *C. pseudovegetus* Steud., Syn. Cyp. 24 (1855) and not at all the plant which Steudel and all his followers have erroneously called *C. virens*. *C. virens* (figs. 1 and 3) is a relatively slender plant, with culms 3–7.5 dm. high; leaves nearly equaling the culm and 2–5 mm. wide, not strongly spongy below; the ovate spikelets (fig. 4, × 5) very flat and soon, by spreading of the narrow scales, with slightly excurved mucronate tips (fig. 5), displaying the rachilla. The much coarser plant, erroneously passing as *C. virens*, has stout culms 0.5–1.2 (in the tropics –1.8) m. high; its spongy-based leaves much shorter than the culms ("Folia culmo parum breviora"—*Kükenthal*) and 5–13 mm. wide; the slightly narrower spikelets relatively plump, with the broader and straight scales (fig. 5, × 5) rather closely imbricated at base, so that the rachilla remains partly hidden. Differences in the achenes and other characters not evident in the photograph of Michaux's type need not now concern us. The Michaux type (fig. 1, × ½, and fig. 2, × 10) is very evidently the same as *C. pseudovegetus* (figs. 3 and 4) and not at all the coarser and largely tropical plant. If Kükenthal's synonymy is safer to follow than his identifications of species (for Kunth's types should certainly have been available to him, even if inhibition and Germanic self-satisfaction kept him from seeing Michaux's in Paris), the coarser plant may perhaps be *C. robustus* Kunth, Enum. ii. 4 (1837). I have not yet checked that point, as it concerns a species as yet known only outside the area upon which I must chiefly concentrate. Michaux's *C. virens* was from Carolina. Of the slender species which perfectly matches his type there are before me 12 sheets from North Carolina, 9 from South Carolina, 16 from Virginia and others from Delaware, Maryland, the District of Columbia and New Jersey. Of the coarse tropical and subtropical species the northernmost specimen (the only one I have seen from the state) is from Washington County, on Albemarle Sound, in North Carolina (so near the Virginia line that I may yet have to settle the name!), with 5 sheets from river-swamps and tidal reaches of South Carolina. Michaux got the ubiquitous species of the Carolinas.

Cyperus (§ Umbellati) **Plukenetii,** sp. nov. (tab. 877), rhizomate subligneo crasso abbreviato; culmo subrigido scabro-puberulo 0.3–1 m. alto; foliis firmis scabris planis 4–8 mm. latis attenuatis; involucro 3–7-phyllo, foliis quam radiis brevioribus scabris; radiis 4–12, subrigidis scabris adscendentibus ad 2.5 dm. longis; spicis turbinato-obovoideis 1–2.3 cm. longis; spiculis 75–125 lineari-subulatis valde appresso-reflexis 6–7 mm. longis; squamis 4 vel 5 striatis terminale involuta firma subacerosa; acheniis linearibus 2.5–3 mm. longis.—Dry or moist sands and rocks, Florida to Texas, north to New Jersey (possibly Long Island), southern Ohio and southeastern Missouri. TYPE: sandy pinelands, The Desert, Cape Henry, Virginia, July 28 and 29, 1934, *Fernald & Long*, no. 3734 (in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.), distrib. as *C. retrofractus* (L.) Torr.

Cyperus Plukenetii, named for LEONARD PLUKENET (1641–1706), who originally described and illustrated it (our FIG. 1) from Virginia, has been erroneously passing as *C. retrofractus* (L.) Torr., Fl. N. Y. ii. 344 (1843), Torrey's combination resting on the *Scirpus retrofractus* L. Sp. Pl. 70 (1753), our PLATE 878. Linnaeus, like Torrey and some others after him, confused two quite distinct species. His original account was very brief:

> *retrofractus. 17.* SCIRPUS culmo triquetro, umbella simplici: spicarum flosculis retrofractis.
> Cyperi genus indianam, panicula speciosa, spiculis propendentibus atris. *Pluk. phyt.* 415. *f.* 4.
> *Habitat in* Virginia.

As is so often the case, everyone since 1753 has taken the easier course. It was perfectly simple to turn to Plukenet and see his very characteristic figure (our FIG. 1); it would have required more effort and considerable trouble to find out what Linnaeus actually had before him. If they had taken this trouble, it would have been evident that the Linnean TYPE (PLATE 878, FIGS. 1 and 2) is not like the Plukenet plant, for Linnaeus had from Virginia a very characteristic specimen of *Cyperus hystricinus* Fernald in RHODORA, viii. 127 (1906), our PLATE 878, FIG. 3. In PLATE 878 I show the type (FIGS. 1 and 2) of *Scirpus retrofractus*, × ⅓ and ½, from a photograph received from Mr. Savage. With it, × 1, is an umbel from the type of *Cyperus hystricinus*[1]. That they are quite the same no one, who really understands *Cyperus*, can doubt.

True *C. retrofractus* (*C. hystricinus*) differs in many characters from *C. Plukenetii* (*C. retrofractus* sensu Torrey, for the most

[1] This type, from Haddonfield, New Jersey, was collected by *C. F. Parker*, not C. F. Austin, as erroneously stated with the original description.

part, and most later authors, incl. Kükenthal in Engler, Pflanzenr. iv[20]. fig. 56 (1935), the latter an excellent illustration of *C. Plukenetii*). The chief differences are as follows:

C. retrofractus: rhizome relatively slender and elongate, the corms (when more than 1) remote; culm smooth and glabrous; leaves smooth and glabrous, the basal 2–5 mm. wide; rays of umbel smooth, when fully mature mostly shorter than the smooth and narrow involucral leaves; spikes cylindric or cylindric-obovoid; spikelets golden brown, not pungent, soon loosely reflexed and promptly falling; achenes 2–2.5 mm. long.

C. Plukenetii: rhizome stoutish, the corms (when more than 1) approximate; culm scabrous-puberulent; leaves harsh and pubescent, the basal 4–8 mm. wide; rays of umbel scabrous, when mature mostly much longer than the involucral leaves; spikes strongly turbinate-obovoid, tapering to acute obconic base; spikelets greenish, becoming drab or dull brown, pungent, soon tightly appressed-reflexed, long-persistent; achenes 2.5–3 mm. long.

If one takes Kükenthal's bibliography at its face value it will be found as unreliable for North American plants as his treatment of many of our species. Besides *Scirpus retrofractus* L. and the resultant combinations under *Cyperus* and *Mariscus* he gives, without the slightest indication of doubt, the synonym *Mariscus pubescens* Presl, Reliq. Haenk. i. 181 (1830). Now, *Cyperus retrofractus* sensu Kükenthal (*C. Plukenetii*), with, to quote Kükenthal, involucral leaves (like the basal) "4–8 mm. lata plana", the "spicae obovato-turbinatae", "Spiculae omnes retroflexae", occurs from Florida to eastern Texas, north to New Jersey, southern Ohio and southeastern Missouri. *Mariscus pubescens* Presl was originally said to be from Monterey, California, its "Involucella setacea", the "Spicae cylindraceae", "Spiculae horizontales". Kükenthal has another guess coming, if he survives the war. He evidently accepted, without looking up the Presl plant or description, the entry in Index Kewensis, fasc. iii. 169 (1894) under *Mariscus:* "*pubescens*, J. & C. Presl, Rel. Haenk. i. 181 = retrofractus". In the first fascicle, 697 (1893) the editor, Jackson, had entered the same plant as a maintained species of *Cyperus:* "pubescens, J. & C. Presl, Rel. Haenk. i. 181—Calif.", thus making a new and superfluous name, for there was already a *C. pubescens* Steud. (1855)[1].

Plate 876, figs. 1–4, Cyperus virens Michx.: fig. 1, type, × ½, photograph after *Cintract;* fig. 2, spikelets, × 10, from type; fig. 3, inflorescences,

[1] *Mariscus pubescens* was named for the very pubescent culm and leaves. So far as I can find, nothing like it is known in California. It might have come from western Mexico, the Philippine Islands, Peru or some other Pacific area. Steudel, Syn. Pl. Cyp. 50 (1855) had a *Cyperus pubescens* from the Island of Bourbon.

× ½, of characteristic *C. pseudovegetus* Steud. from Accomac, Virginia, *Fernald, Long & Fogg*, no. 5225; FIG. 4, spikelet, × 5, from no. 5225. FIG. 5, *C. robustus* Kunth (*C. virens* sensu Steudel and later auth., not Michx.): spikelet, × 5, from Walterboro, Colleton Co., South Carolina, *Wiegand & Manning*, no. 523.

PLATE 877, CYPERUS PLUKENETII Fernald: FIG. 1, Plukenet's figure of *Cyperi genus indianam*, etc. from Virginia, included by Linnaeus under his mixed *Scirpus retrofractus;* FIG. 2, inflorescence, × 1, of TYPE; FIG. 3, characteristic base, × 1, from Cypress Bridge, Southampton Co., Virginia, *Fernald & Long*, no. 6040.

PLATE 878, C. RETROFRACTUS (L.) Torr. as to type: FIG. 1, TYPE, × ⅓, of *Scirpus retrofractus* L., courtesy of Mr. *S. Savage;* FIG. 2, inflorescence, × ½, of TYPE; FIG. 3, inflorescence, × 1, of type of *C. hystricinus* Fernald; FIG. 4, characteristic rhizome, × 1, from Joyner's Bridge, Isle of Wight Co., Virginia, *Fernald, Griscom & Long*, no. 6528.

C. ODORATUS L. Sp. Pl. i. 46 (1753). *C. ferax* Richard in Act. Soc. Hist. Nat. Par. i. 106 (1792).—Frequent in saline and brackish marshes or on shores along the coast.

Since some have questioned the identity of these two species, a memorandum by Dandy in Exell, Cat. Vasc. Pl. So. Tomé, 360 (1944), is important to quote. Under *C. odoratus* L. he says:

> This species is the true *C. odoratus* of Linnaeus, which was based on the Jamaican plant named *Cyperus odoratus, panicula sparsa, spicis strigosioribus viridibus* by Sloane, Cat. Pl. Ins. Jam. 35 (1696); Voy. Jam. Nat. Hist. I. 116, t. 74, fig. I (1707). . . . The original specimen from which Sloane's figure was drawn is preserved in Herb. Sloane (vol. II. fol. 46) at the British Museum, and is identical with *C. ferax* Rich. There was no specimen of *C. odoratus* in the Linnean Herbarium in 1753, and the type of the species is Sloane's figure (since Linnaeus did not see the actual specimen). The name *C. odoratus* has been misapplied to *C. polystachyos* and other species.

C. TENUIFOLIUS (Steud.) Dandy in Exell, Cat. Vasc. Pl. So. Tomé, 363 (1944).—Seen along wet woodroads in the Seward Forest, but not collected; common farther east.

C. tenuifolius (Steud.) Dandy is the plant generally known as *Kyllinga pumila* Michx. (1803), the genus *Kyllinga* now very generally reduced to *Cyperus*. Its essential synonymy, as given by Dandy, is as follows:

> C. TENUIFOLIUS (Steud.) Dandy, l. c. (1944). *Kyllinga pumila* Michx. (1803), not *C. pumilus* L. (1756). *K. elongata* Kunth (1816), not *C. elongatus* Steud. (1855). *K. caespitosa* Nees (1842), not *C. caespitosus* Poir (1806). *K. tenuifolia* Steud. (1855). *K. rigidula* Steud. in part (1855), not *C. rigidulus* Vahl (1806). *C. densicaespitosus* Mattf. & Kükenth. (1936).

* FIMBRISTYLIS DRUMMONDII Boeckl. BRUNSWICK COUNTY: damp openings in woods, "Moseley flat pineland", near Triplett, *Fernald* (with *J. B. Lewis*), no. 14,568. See p. 95.

Fimbristylis Drummondii has been variously confused with a number of other species, particularly with the tropical South American and very distinct *F. spadicea* (L.) Vahl and the halophilous North American *F. castanea* (Michx.) Vahl and *F. caroliniana* (Lam.) Fernald (= *F. puberula* (Michx.) Vahl). *F. castanea* is the coarse and densely cespitose, rigid plant of salt marshes and saline shores, from the West Indies and Florida to Texas, extending northward on saline marshes to Long Island. Its coriaceous dark sheaths, rigid culms up to 1 m. tall, its lustrous and coriaceous broadly rounded scales and the castaneous broad-ovoid achenes clearly mark it. *F. caroliniana* (Lam.) Fernald in Rhodora, xlii. 246 (1940) is the same as *F. puberula* (Michx.) Vahl and its habit was clearly shown in Rhodora xxxvii. t. 388 (1935). It is contrasted with *F. castanea* by its small soft-based tufts, with paler sheaths, its prolonged and slender cord-like scaly stolons, its thinner and membranaceous scales, at least the outer ones puberulent, and the narrower and paler achene. It occurs on brackish or saline sands, flats or marshes and in dune-hollows along the coast from Florida to Texas, northward to New Jersey.

Fimbristylis Drummondii, on the other hand, is nonstoloniferous; its culm-bases are enlarged and bulbous and when fully developed it makes dense tussocks with the stout rhizome forking into thick crowns covered with the bulbous-based tufts. Too many specimens in herbaria, however, merely pulled off from the rhizome, fail to display this distinctive character and very young and first-fruiting plants often have only poorly developed rhizomes. They have, however, the bulbous bases which are characteristic, the puberulent scales and the pale achenes. This plant, which has recently been confused with the others, is a species of peats, sterile meadows, pine and oak barrens, and other acid habitats. It occurs from Florida to eastern Texas, northward to Virginia, southeastern Pennsylvania, the New Jersey pine barrens and the Hempstead Plains of Long Island; in the interior across Tennessee and Arkansas to southern Michigan, Illinois and Missouri. Whereas the halophilous *F. castanea* and *F. caroliniana* fruit from late July to October, the inland *F. Drummondii* is mature from May into July, the Virginia material, collected in June, being over-ripe. One other species of this series should be noted, *F. interior* Britton in Britt. & Br. Ill. Fl. ed. 2, i. 320, fig. 785 (1913), a species of the Great Plains, from east-central Nebraska to eastern Colorado, south to Texas. Somewhat resembling both *F. caroliniana* and *F. Drummondii*, the material has bulbous-based tufts of the latter but shows no tendency to produce subligneous rhizomes and occasionally it develops stolons suggesting those of the former species. Its scales, however, are firmer and glabrous or glabrescent and its achenes with many more longitudinal ribs than in the others. It seems to be a well defined campestrian species.

The correct application of the name *Fimbristylis Drummondii* needs clarification, for its author, Boeckeler, created a confusion regarding it, the effects of which still linger. Boeckeler published his first *F. Drummondii* in Flora, xli. 603 (1858), a plant with "basi valde bulboso-incrassato, bulbo (crassitie nucis Coryli minoris) vaginis . . . coreaceis. . . . obtecto . . . squamis . . . omnibus puberulis", etc. This species consisted of two varieties: "*α. minor;* culmo subpedali, umbella subsimplici, spicis magis ovatis foliis superne scabris. Prope N. Orleans legit D r u m m o n d. (In hrb. ej. sub Nro. 416.)" and "*β. major;* culmis elatis (sesquipedalibus); spicis paulo majoribus subglobosis, involucellis squamisque glabrescentibus. Ad rio Brazas terrae Texanae legit D r u m m o n d". Since var. *α. minor* was the first defined and since two sheets of Drummond's no. 416 from New Orleans before me have the puberulent scales as described in Boeckeler's full description I am taking these to be isotypes of *F. Drummondii.* His var. *β. major* seems to contradict his fuller description in having "squamis glabrescentibus". Boeckeler cited no number and, presumably, his type is now destroyed. If it came from the upper Brazos it might have been *F. interior* Britton; if from the tidal reaches of the lower Brazos it might have been the glabrous-scaled *F. castanea* (Michx.) Vahl, which abounds in coastwise Texas. The latter species does not have bulbous bases, however; but Boeckeler's "squamis glabrescentibus" is not easily reconciled with his "squamis . . . omnibus puberulis" of his primary description of *F. Drummondii.* Although the identity of var. *β. major* can not now be settled, the identity of var. *α. minor* is clear. It is the plant I am taking up as *F. Drummondii.*

In 1836 Torrey, treating the all-inclusive *Isolepis*, placed together in one series two species, *I. capillaris*, the tiny capillary-leaved annual now known as *Bulbostylis capillaris*, and the new *I. Drummondii* Torr. & Hook. in Ann. Lyc. Nat. Hist. N. Y. iii. 350 (1836), this being a very tall plant, with firm "*Culm* 3 feet high . . . *Spikes* half an inch long . . . *Scales* closely appressed [coriaceous], smooth . . . Hab. Texas, *T. Drummond!*", the authors stating that it has the habit of *Fimbristylis spadicea*. I have not seen the type but the description suggests *F. castanea*. Still another Drummond plant from Texas was described by Boeckeler, this his *F. anomala* in Flora, xliii. 242 (1860), "Caespitosa; radice valide fibrosa stolonifera; stolonibus tenuibus (crass. pennae corvinae) . . . culmo 1–2 pedali rigido . . . spicis 3–4 lin. longis 1⅓ lin. latis . . . ; squamis arcte imbricatis . . . , inferioribus puberulis . . . Texas. Herb. D r u m m o n d. Nr. 445." This number, likewise, I have not seen. The point in bringing into the discussion *Isolepis Drummondii*, with culms "3 feet high" and smooth scales, and *F. anomala*, 1–2 feet high, stoloniferous, with lower scales puberulent, is that they both soon figured under another name, *F. Drummondii* (Torr. & Hook.) Boeckeler in Linnaea, xxxvii. 21 (1871), based nomenclaturally upon *Isolepis Drummondii* Torr. & Hook., with *F. anomala* cited as a synonym, this plant stoloniferous, the subsolitary culms 1½–2½ feet high, the scales of the spikelet *membranaceous-margined*, "nitidulis".

Naturally, there can be no second valid *Fimbristylis Drummondii* (Torr. & Hook.) Boeckl. (1871), in view of the earlier and different *F. Drummondii* Boeckl. (1858), which is the eastern species with bulbous-based tufts arising from stout caudices or hard rhizomes, with the outer scales of the spikelets puberulent. Whether *F. anomala* is an earlier name for *F. interior* I do not know; only examination of Boeckeler's type or of an unquestioned isotype can settle that. But for our plant the name *F. Drummondii* Boeckl. (1858) seems to be the correct one.

Scirpus polyphyllus Vahl. To the very few stations in the southeastern counties add one in Brunswick Co.: margin of Mill Creek, southwest of Ebony, no. 14,566.

S. divaricatus Ell. Local range extended inland to western Greensville Co.: bottomland woods along Quarrel's Creek below Pair's Store, no. 14,567. See p. 101.

Fuirena squarrosa Michx. (*F. hispida* Ell.). Local range extended into the Piedmont in Brunswick Co.: springy sphagnous and argillaceous bog, Ram-hole Swamp, Seward Forest, near Triplett, no. 14,692; culms weak and reclining. See p. 103.

Rhynchospora corniculata (Lam.) Gray. Range extended back into the Piedmont. Greensville Co.: bottomland woods along Fontaine Creek, at mouth of Quarrel's Creek, no. 14,694. Brunswick Co.: bottomland woods along Rattlesnake Creek, at old Clipper's Mill, southeast of Triplett, no. 14,693. See p. 100.

R. globularis (Chapm.) Small, var. recognita Gale (*R. cymosa* sensu Torr. and later auth., not Ell.). Local range extended from Coastal Plain inland to Brunswick Co.: springy sphagnous and argillaceous bog, Ram-hole Swamp, Seward Forest, near Triplett, no. 14,569; damp openings in woods, Moseley flat pineland, near Triplett, nos. 14,570 and 14,571. See p. 103.

Scleria pauciflora Muhl. To the counties from which this species is known (see Rhodora, xxxix. 392) add Greensville Co.: swaley clearing along Quarrel's Creek, below Pair's Store, no. 14,573. Also Brunswick Co.: damp woods along branch, east of Moseley flat pineland, near Triplett, no. 14,574. See p. 96.

Carex hirsutella Mackenzie. Brunswick County: woods, Moseley flat pineland, near Triplett, no. 14,581, our first station in the southeastern counties. Plant very lax, with flaccid, loosely divergent culms, the inflorescences lopping to the ground. See. p. 96.

Commelina virginica L. (*C. hirtella* Vahl). Ordinarily with erect flowering stems, the plants in bottomland woods along Meherrin River at Westward Bridge (or Mill) have them depressed or trailing (no. 14,695).

Since the summer had been one of unusual drouth and the *Commelina* was well above the level of the river in mid-September the trailing habit was, obviously, not induced, at least during this season, by drowning.

The Identity of Juncus tenuis (Plate 879).—*Juncus tenuis* was described by Willdenow, Sp. Pl. ii[1]. 214 (1800)[1], as follows:

> *23. JUNCUS **tenuis** W.
> J. culmo teretiusculo indiviso, foliis linearibus canaliculatis, corymbo terminali, calycinis foliolis acuminatis capsula triquetra obtusa longioribus. W.
> Schlanke Simse. W.

[1] Although the title-page gives the date 1799, vol. ii. pt. 1, was apparently not issued until early in 1800.—See Schubert in Rhodora, xliv. 147–150 (1942).

Habitat in America boreali.[1] ♃ (v. s.)
Culmus *dodrantalis teretiusculus subcompressus basi foliosus.* Folia *ut in praecedente.* Flores *ut in praecedente* [i. e. *J. bulbosus* sensu Willd. incl. *J. compressus* Jacq. and *J. Gerardi* Loisel.] *sed duplo majores et rami laterales corymbi majis elongati.*
Foliola *calycina lanceolata acuminata capsula paulo longiora.* Capsula *triquetra truncato-obtusa.* W.

Practically without exception the name *Juncus tenuis* was thereafter correctly applied to a widespread and very common species with drab or pale brown young sheaths, flattish (though on drying often inrolled) leaves with whitish scarious and friable margins to the sheaths, the elongate-oblong or lanceolate auricles thin and scarious or thin-hyaline, the inflorescence greatly overtopped by 2 or more flattish bracts, the flowers, in more open inflorescences, inclined to be grouped in 3's, the perianth overtopping the oblong-ovoid capsule which is retuse at summit and partially 3-locular. So firmly established was the name *J. tenuis* Willd. for this clear-cut and wide-ranging species (much of North America, Europe, Australia, New Zealand, etc.) that it came as a shock when, in 1929, the late Kenneth K. Mackenzie announced:

"*Juncus tenuis* Willd. (Sp. Pl. **2**: 214. 1799), 'Habitat in America boreali,' is *Juncus dichotomus* Elliott (Bot. S. Carolina & Georgia **1**: 406. 1817), and is not the plant appearing as *Juncus tenuis* in our current manuals. Dr. Diels, Director of the Botanical Garden and Museum at Berlin, has very kindly sent me from Willdenow's material portions showing the leaf-blade, the mouth of the sheath, the inflorescence, and the seeds. The leaf-blade is not flattened, and the auricles are rounded cartilaginous and not conspicuously prolonged.

"I was brought to look into this matter by noting that Steudel (Syn. Pl. Glum. **2**: 305. 1855) described *Juncus tenuis* Willd. as with 'vaginis adpressis ore nudis'. On the same page he described a new species *Juncus germanorum* ('J. tenuis Auctor. Germ.') as with 'vaginis laxiusculis ore in marginem membranaceum utrinque productis (ligulam mentientem)'. This last, of course, is a very accurate description of the plant appearing in our manuals as *Juncus tenuis*"—Mackenzie in Bull. Torr. Bot. Cl. lvi. 25 (1929).

That seemed to settle the matter and I promptly fell into the unintentional trap. In my search for the earliest name for *Juncus tenuis* of most authors I found, while in England, that the earliest available name (if *J. tenuis* Willd. is indeed only *J.*

[1] The "*Habitat in* America boreali" of Willdenow is rendered by Index Kewensis as "Europ.; Ind. occ.; Austral."

dichotomus Ell.) seemed to be *J. macer* S. F. Gray, Nat. Arr. Brit. Pl. ii. 104 (1821). This decision I announced in Journ. Bot. lxviii. 366 (1930) and, most unfortunately, my interpretation has been generally accepted in America, Europe and Australia.

The difficulty seems to be, that Willdenow had mixed material. From Mackenzie's account the fragments sent to him were apparently from *J. dichotomus* Ell. That species (FIGS. 5–7), however, is strongly distinguished from *J. macer* (*J. tenuis* of Rostkovius, Engelmann, Buchenau, Gray, Britton, etc.), FIGS. 1–4, by many characters:

J. MACER: (1) Tufts or tussocks relatively soft; young membranaceous sheaths drab or pale brown to greenish; (2) with whitish friable broad scarious margins; (3) the uninjured auricles lance-triangular to -oblong, scarious or thin-hyaline and much longer than broad; (4) leaf-blades flat or broadly canaliculate; (5) lower involucral bract and ordinarily 1 or 2 others much prolonged beyond the cyme; (6) cyme either compact or open and with elongate outer branches, each branch or branchlet (in the typical form) with 2–6 (commonly 3) approximate flowers; (7) prophylla thin or membranaceous, greenish or drab; (8) sepals much longer than capsule; (9) capsule retuse, 3-locular; (10) anthers much shorter than filaments; etc.

J. DICHOTOMUS Ell.: (1) Dense and hard tussocks with inner firm sheaths purple-tinged, the outer brown, (2) without friable margins; (3) short rounded auricles firm and cartilaginous; (4) leaf-blades filiform, merely slenderly channeled on upper side; (5) lower involucral bract shorter than or but slightly exceeding cyme, the others shorter; (6) cyme with flowers mostly secund and alternate along the branchlets; (7) prophylla coriaceous, pale to deeper-brown; (8) sepals and capsule subequal; (9) capsule rounded at summit, 1-locular; (10) anthers nearly equaling filaments.

Willdenow's original description, of course, has final significance. This was beautifully supplemented by the dissertation on *Juncus* by Rostkovius—De Iunco (1801)—for Rostkovius definitely states that his dissertation for the degree of Doctor of Medicine[1] was based upon the material of *Juncus* in Willdenow's Herbarium: "Cum absoluto cursu academico de specimine inaugurali meditarer, inter varia argumenta suasu optimi Praeceptoris Clarissimi W I L L D E N O W I I, Professoris Historiae naturalis Berolini, e ditissimo Suo Herbario Iunci genus selegi, quod benevolentia Celeberrimorum Virorum L I N K I I, M Ü H L-

[1] How our M. D's. have slumped! One of them in Cambridge came to see me and asked: "Are there any plants around here which might poison a child? I was called up to see a sick child and I can't make out what is the trouble". "There's one right there", I replied, pointing to *Datura Stramonium*. "All right", he said, "I'll treat him for Stramonium-poisoning". Another, also a professor in a distinguished medical school, argued at me throughout the length of a dinner, that there must be some simple formula (like the silver spoon with toadstools) by which any one can tell whether any wild plant is poisonous or edible!

enbergii, Stephanii, et Hoppii valde auctum evasit, spe fretus hocce tentamen Botanophilis haud ingratum fore".—Rostk. Iunc. Praefatio (1801). Not only did Rostkovius (his p. 24) evidently study the plant which Willdenow had described as *J. tenuis;* he gave a very detailed description of it and an illustration of the characteristic and wholly distinctive inflorescence (our plate 879, fig. 1). Here is the account by Rostkovius:

18. *Iuncus tenuis.* Tab. Nost. I. fig. 3.

I. culmo folioso simplici teretiusculo, foliis canaliculatis, corymbo terminali dichotomo foliis floralibus breviore, capsula oblongo obtusa petalis breviore.
I. culmo teretiusculo indiviso, foliis linearibus canaliculatis, corymbo terminali, calycinis foliolis acuminatis capsula triquetra obtusa longioribus. *Sp. pl. ed. W.* 2. *p.* 214.
I. foliolus minimus campestris et nemorensis *Gron. virg.* 152.
Gramen iunceum virginianum calyculis paleaceis bicorne *Moris. hist.* 3. *p.* 228. *f.* 8. *t.* 9. *f.* 15.
Gramen iunceum elatius pericarpiis ovatis americanum *Pluk. alm.* 179. *t.* 92. *f.* 9.

Habitat in America *boreali.* ♃.

Culmus semipedalis vel pedalis erectus simplex teretiusculus basi foliosus.

Folia linearia canaliculata.

Corymbus terminalis dichotomus, ramis multifloris.

Folia floralia bina, sub corymbo, linearia canaliculata, quorum alterum corymbo quadruplo longius, alterum longitudine corymbi vel paulo longius.

Calyx bivalvis membranaceus, valvulis lanceolatis acutis.

Corolla hexapetala, petalis lanceolatis acuminatis margine membranaceis, interioribus parum brevioribus.

Capsula oblonga triquetra obtusa basi styli persistentis coronata, trilocularis trivalvis polysperma, petalis brevior.

Similis praecedenti [*J. bulbosus* sensu Willd., i. e. *J. compressus* and *J. Gerardi*], sed corymbo dichotomo paucifloro, petalis acuminatis capsula longioribus diversus. Flores fere ut in Iunco bufonio. Synonyma Iunci nodosi a Linnaeo adducta huc per.

Now if we make an analysis of the differential characters of *Juncus tenuis,* as originally desc.ibed by Willdenow, almost immediately thereafter and i great detail by Rostkovius from Willdenow's material, and by Engelmann, Buchenau, Wiegand and others who have maintained it in the sense of *J. macer,* (our figs. 1–4) and those of *J. tenuis* sensu Steudel and Mackenzie and those of us who have supposed that they were right (i. e. *J. dichotomus* Ell.), our FIGS. 5–7, we get the following results. The index-numbers are those used in the contrasts given on p. 119.

	J. TENUIS as defined by Willdenow and by Rostkovius from Willdenow's material	J. DICHOTOMUS Elliott (*J. tenuis* sensu Steudel and Mackenzie)
(1) Habit	No statement (Willd.)	"very small tufts" (Ell.)
(2) basal sheaths	No statement (Willd.)	No statement (Ell.)
(3) auricles	No statement (Willd.)	No statement (Ell.)
(4) basal leaves	linear, channeled (Willd., Rostk.); "readily distinguished . . . by its flat leaves, . . . only . . . on the margin slightly involute" (Engelm.); "lax, flat and soft, rarely slightly involute" (Wieg.); "folia . . . plana" (Buch.)	nearly terete, channeled on the upper side (Ell.); "terete . . ., marked by a shallow groove on their upper side" (Engelm.); "nearly terete, rarely much channeled" (Wieg.); "subteres, anguste canaliculata" (Buch.)
culms	nine inches high (Willd.); ½–1 ft. (Rostk.); a few inches to 2 ft. (Engelm.); 2–6 dm., commonly spreading (Wieg.); 10–40 (rarely –90) cm. (Buch.)	1–2 ft. (Ell.); 3–10 dm., stiff, erect (Wieg.); 20–80 cm., strict (Buch.)
(5) lower involucral bracts	2, linear-canaliculate, 4 times as long as corymb (Rostk.); 2, rarely 3, foliaceous, much exceeding inflorescence (Wieg.); 2 (rarely 1 or 3), frondose, "inflorescentia . . . longe superata" (Buch.)	"One . . . sometimes longer than the panicle, the others much shorter" (Ell.); "either longer or shorter" (Wieg.); "bractea infima frondosa inflorescentia nunc longior, nunc brevior" (Buch.)
(6) cyme	lateral branches much elongate (Willd.); "ramis multifloris" (Rostk.); fig. of Rostk. with flowers in 3's at tips of branches; flowers somewhat aggregated at ends of very unequal branches (Wieg.); open, mostly many-flowered, anthelate (Buch.)	dichotomus, flowers alternate and terminal (Ell.); anthelate, dense, rarely open (Buch.)
(7) prophylla	membranaceous (Rostk.)	coriaceous
(8) comparative length of sepals and capsule	longer than capsule (Willd.); "*Capsula*, . . . petalis brevior" (Rostk.); exceeding capsule (Engelm.); "capsule . . . shorter than the perianth" (Wieg.); "Fructus tepalis brevior" (Buch.)	"Capsule . . . , when mature, as long as the calyx" (Ell.); "capsule ¾–⅞ the length of the perianth" (Wieg.); "Fructus perigonium fere aequantia" (Buch.)

	J. tenuis as defined by Willdenow and by Rostkovius from Willdenow's material	J. dichotomus Elliott (*J. tenuis* sensu Steudel and Mackenzie)
(9) capsule	"Capsula *triquetra* truncato-obtusa" (Willd.); "*Capsula* oblonga triquetra obtusa . . . , trilocularis" (Rostk.); retuse (Engelm.); "thin-walled, obtuse", "3-celled" (Wieg.)	"oval, nearly globose" (Ell.); "subglobose, . . . but never retuse . . . the ripe pods assume a mahogany color" (Engelm.); "ovate-oblong, rounded", "1-celled" (Wieg.); trigonous-spherical or -ovate, obtuse (Buch.)

From this summary of the characters recognized by the original authors and by the closest students of the group in the past (with length of stamens and some other characters not mentioned by Willdenow or Rostkovius omitted) it should be apparent that the plant which Willdenow and, after him, Rostkovius, redescribing the Willdenovian material, had before them was of the species which Kunth, E. Meyer, Engelmann, Gray, Wiegand, Britton, Buchenau and most others have regularly and correctly recognized as *J. tenuis*, the plant which, most unfortunately, I took up in 1930 as *J. macer* S. F. Gray. The plant called *J. tenuis* by Steudel in 1855 and by Mackenzie in 1929 was obviously not what Willdenow diagnosed and Rostkovius more fully described and illustrated. Whether it was contemporaneous in the Willdenow Herbarium with the material actually described by him we may never know. At any rate, we cannot accept it as the type of his very different species; it is obviously material of *J. dichotomus* Ell.

Confusions in the old and much handled herbaria are common and no specimen in them should be accepted as the type of the briefly described old species unless it agrees with the description. That seems axiomatic, but too many students overlook the necessity to eliminate the demonstrably extraneous or subsequently acquired specimens. In case of the Willdenow Herbarium, now tragically lost, to the incalculable detriment of our science, such confusions have been demonstrated. Thus, as pointed out by Weatherby in Contrib. Gray Herb. no. cxxiv. 19 (1939), various students were misled by a confusion regarding the type of *Acrostichum lanuginosum* Willd. Quite similarly in Rhodora, xxxv. 193–195 (1933), I showed that students had been taking the wrong plant as the type of *Elymus striatus*

Willd. *Juncus tenuis* seems to be another case in which early confusion of material crept in. At any rate, we may now, happily, come out of the misinterpretation which has recently prevailed and again use the name *Juncus tenuis* as Willdenow described it and as most botanists up to Mackenzie have correctly interpreted it. With this reinstatement of long-established and erroneously abandoned temporary usage the following combination becomes necessary:

*Juncus tenuis Willd., forma **discretiflorus** (F. J. Hermann), comb. nov. *J. macer*, forma *discretiflorus* F. J. Hermann in Rhodora, xl. 82 (1938).

Although Hermann had seen forma *discretiflorus* only from the southern third of Indiana, it is of wider range, south at least into Tennessee and eastward to New York, Pennsylvania and Virginia. The following Virginian material is much larger than Hermann's largest specimen ("ultimate branches of inflorescence . . . frequently 7 cm. long"), for its longer branches have a length of 15 cm.:

Sussex County: wooded bottomland, Jones Hole Swamp, west of Coddyshore, *Fernald & Long*, no. 10,187.

Although, as noted by me in Journ. Bot. lxviii. 365 (1930), the Michaux material of his *Juncus bicornis*, Fl. Bor.-Am. i. 191 (1803) "is without question . . . *J. dichotomus*", the earlier and often misinterpreted name of Michaux cannot be taken up to replace Elliott's later one. After his not too convincing diagnosis of *J. bicornis* Michaux confused matters by giving as an exact synonym "*J. tenuis.* Rostk. 24. t. l. f. 3", the *J. tenuis* of Rostkovius being identical with and based upon *J. tenuis* Willd. (1800). By the present International Rules the name *J. bicornis* is, therefore, illegitimate, for Michaux was giving a new name and not taking up the valid earlier one as he should have done.[1] *J. dichotomus* Ell., therefore stands but

[1] Unfortunately the application of this rule to Michaux's Flora Boreali-Americana (1803) results in the following mishaps. For the first combinations I offer the superfluous apology that, my name as author of plant-names being abbreviated "Fern.", I occasionally feel justified in touching up the nomenclature of that group!

Pteretis **pensylvanica** (Willd.), comb. nov. *Onoclea nodulosa* Michx. Fl. Bor.-Am. ii. 272 (1803), as to description and type-specimen preserved in Michx. Herb., not as to synonyms and habitat stated; Sw. Synop. Fil. 111 (1806); Schkuhr, Krypt. Gew. i. 96, t. 104 (1809). *Struthopteris pensylvanica* Willd. Sp. Pl. v. 289 (1810). *S. nodulosa* (Michx.) Desv. Mém. Soc. Linn. Paris, vi². 287 (1827). *S. germanica*, var. *pensylvanica* (Willd.) Lowe, Ferns, Brit. and Exot. ii. 138 (1862). *Matteuccia nodu-*

another plant which has been associated with it seems to be specifically distinct from it. It is discussed in the following notes.

Juncus **platyphyllus** (Wiegand), stat. nov. Plate 880. *J. dichotomus* Ell., var. *platyphyllus* Wiegand in Bull. Torr. Bot. Cl. xxx. 448 (1903). *J. tenuis* Willd., var. *platyphyllus* (Wiegand) Cory in Rhodora, xxxviii. 405 (1936). See p. 96.

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losa (Michx.) Fernald in Rhodora, xvii. 164 (1915). *Pteretis nodulosa* (Michx.) Nieuwl. in Am. Mid. Nat. iv. 334 (1916). *P. Struthiopteris*, var. *pensylvanica* [as *pennsylvanica*] (Willd.) Farwell in Rep. Mich. Acad. Sci. xxi. 346 (1920). *S. Struthiopteris*, var. *pensylvanica* (Willd.) Farw. in Am. Mid. Nat. xii. 252 (1931).

P. pensylvanica, forma **pubescens** (Terry), comb. nov. *Struthiopteris germanica*, f. *pubescens* Terry in Clute in Fern Bull. xvi. 5 and 47 (1908), originally published by Clute as "Ostrich Fern var. pubescens". *Onoclea Struthiopteris*, var. *pubescens* (Terry) Clute, l. c. (1908). *S. pubescens* (Terry) Clute in Fern Bull. xvi. 48 (1908). *S. pensylvanica*, f. *pubescens* (Terry) Clute, l. c. (1908). *Matteuccia pubescens* (Terry) Clute, l. c. (1908). *M. Struthiopteris*, f. *pubescens* and var. *pubescens* (Terry) Clute, l. c. (1908). *Pteretis nodulosa*, f. *pubescens* (Terry) Fernald in Rhodora, xxxvii. 219 (1935). *P. Struthiopteris*, var. *pensylvanica*, subvar. *pubescens* (Terry) Clute in Am. Fern. Journ. xxxvii. 15 (1937).

P. pensylvanica, forma **obtusilobata** (Clute), comb. nov. *Onoclea Struthiopteris*, f. *obtusilobata* Clute in Fern. Bull. xviii. 111 (1910). *Struthiopteris germanica*, f. *obtusilobata* Clute, l. c. (1910). *P. nodulosa*, f. *obtusilobata* (Clute) Fernald in Rhodora, xxxvii. 219 (1935). *P. Struthiopteris*, var. *pensylvanica*, subvar. *obtusilobata* (Clute) Farwell in Am. Fern Journ. xxvii. 15 (1937).

P. pensylvanica, forma **foliacea** (Farw.), comb. nov. *P. Struthiopteris*, var. *pensylvanica*, subvar. *foliacea* Farwell in Am. Fern Journ. xxvii. 15 (1937). *P. nodulosa*, f. *foliacea* (Farw.) Broun, Index N. Am. Ferns, 150 (1938).

Unfortunately the combination *Pteretis nodulosa* is based upon an illegitimate name. When he published his *Onoclea nodulosa* Michaux gave what he thought two earlier synonyms for it. Although these do not apply to the plant he described, he nevertheless thought that they did. He should, therefore, have taken up the earlier specific name of the two. Both Swartz (1806) and Schkuhr (1809) repeated the supposed synonyms. Willdenow (1810) described his *Struthiopteris pensylvanica* from Muhlenberg material and gave no earlier name for it. His name is the first legitimate one for our plant.

Scirpus **rubricosus**, nom. nov. *S. Eriophorum* Michx. Fl. Bor.-Am. i. 33 (1803), as to plant described "spiculis copiosissimis, rufidulis, ovatis, omnibus distincte pedicellatis" and the "*Hab.* a Virginia ad Georgiam," not as to synonym, *Eriophorum cyperinum* L., cited.

Michaux well described the tall southeastern species (Florida to Tex., north to southeastern Massachusetts, Long Island, New Jersey, southeastern Pennsylvania, Maryland, West Virginia, Indiana and Illinois) with spikelets drooping on long pedicels and with bractlets, scales, etc., red-ochre in color (whence the new name); and his southern material, preserved at Paris, is unequivocal. He complicated matters, however, by giving the synonym *Eriophorum cyperinum* L. If, as he thought, his species was the Linnean one he should have used the latter's specific name. *S. cyperinus* (L.) Kunth, however, is a relatively northern species with the spikelets sessile in glomerules (Newfoundland to Minnesota, south to upland North Carolina and to Oklahoma). When Willdenow described the inclusive *S. thyrsiflorus* Willd. Enum. Hort. Berol. 78 (1809) he cited as mere synonyms *S. Eriophorum* Michx. and *Eriophorum cyperinum* L. Here again he neglected to take up the earliest specific name and by the International Rules of 1935 his *S. thyrsiflorus* is illegitimate.

S. rubricosus, forma **praelongus** (Fernald), comb. nov. *S. Eriophorum*, f. *praelongus* Fernald in Rhodora, xliv. 383 (1942).

Although Wiegand distinguished his var. *platyphyllus* from *J. dichotomus* merely by its "Leaves expanded and flat, otherwise as in the type", he and those who have seen only that character (less evident in dry foliage), overlooked several important points. *J. dichotomus* is a stiffly erect or ascending plant of the outer coastal strip, forming hard tussocks, with the inner firm sheaths purple-tinged, the outer ones brown. Its leaf-blades are stiff, filiform, or merely very slenderly channeled on the upper side, with short rounded firm and cartilaginous basal auricles (PLATE 879, FIG. 4). The lustrous hard perianth equals or but slightly exceeds the strongly lustrous brown obscurely 1-locular capsule (PLATE 879, FIG. 6).

In *J. platyphyllus* (a hardly descriptive name), on the other hand, the small tufts are relatively soft, although the fresh inner sheaths are purple-tinged; the blades are flat (FIG. 2) or, on drying, merely inrolled; the auricles (FIG. 2) are truncate or merely round-tipped, of firm-membranaceous texture and drab or fuscous, about as broad as long (these differing from the whitish scarious and friable lance-triangular or -oblong auricle of the green- to drab-sheathed *J. tenuis* Willd.); and the relatively soft perianth (FIG. 3) exceeds the paler-brown partially 3-locular capsule, in which the partitions extend half-way to the axis. Other characters in the bracteoles, seeds, etc. are good, but less obvious. Whereas *J. dichotomus* is strictly a coastwise species, *J. platyphyllus* extends far inland (to central Maine, western New York, the Piedmont of Pennsylvania, etc.). In Virginia it is common on the inner Coastal Plain and at least the outer Piedmont: to westernmost Brunswick Co., near the Mecklenberg line, 120 miles due west of False Cape, on the coast, where *J. dichotomus* prevails.

The collections (many more could have been made) of *Juncus platyphyllus* are the following from BRUNSWICK Co.: springy sphagnous and argillaceous bog, Ram-hole Swamp, Seward Forest, near Triplett, no. 14,585; damp thicket northeast of Ebony, no. 14,583.

PLATE 879, FIGS. 1–4, JUNCUS TENUIS Willd. (*J. macer* S. F. Gray): FIG. 1, inflorescence, × 1, of TYPE, after *Rostkovius;* FIG. 2, characteristic inflorescence, × 1, from Middletown, Rhode Island, July 4, 1909, *E. F. Williams;* FIG. 3, summit of sheath, showing friable hyaline margin and thin, prolonged and easily shriveled auricle, × 5, from Southington, Connecticut, *L. Andrews*, no. 189; FIG. 4, mature fruits, × 6, from Knight's Island, North Hero, Vermont, July 14, 1901, *Ezra Brainerd*. Figs. 5–7, J. dichotomus Ell. (*J. tenuis* sensu Steudel, Mackenzie and their followers, not Willd.): fig. 5, summit of sheath and base of leaf, × 10, from Angier, Hartnett Co., South Carolina, *Godfrey*, no. 4266; fig. 6, inflorescence, × 1, from no. 4266; fig. 7, fruit, × 6, from no. 4266.

Plate 880, J. platyphyllus (Wiegand) Fernald: fig. 1, inflorescence, × 1, from near Burgess Station, Dinwiddie Co., Virginia, *Fernald & Long*, no. 10,185; fig. 2, summit of sheath and base of leaf, × 10, from no. 10,185; fig. 3, capsules, × 6, from no. 10,185.

A second Station for Juncus Griscomi.—Two species of *Juncus* § *Genuini* are among the rarest plants of the eastern United States. The famous *J. gymnocarpus* Coville has a few remote stations, the northernmost in a sphagnous swamp on top of Broad Mountain in Schuylkill Co., Pennsylvania, where it was discovered by the late *Charles E. Smith*, the species appropriately called *J. Smithii* Engelm., but, on account of the earlier use of that name, changed to *J. gymnocarpus*. The other is *J. Griscomi* Fernald in Rhodora, xxxviii. 401, pl. 445, figs. 1–4 (1936), suggesting a lax-flowered extreme of *J. effusus* L., but with the flowers mostly on filiform pedicels up to 1 cm. long, the capsules rounded to the summit and definitely beaked (instead of emarginate and beakless). This remarkable plant was discovered by Griscom and me by lucky chance. Botanizing on a terrifically hot June day in 1935, on Little Neck in Princess Anne County, Virginia, we were panting with thirst when we saw children emerge from the rich woods with pails of water. Quick to take the hint, we followed the foot-path and came to a spring-rill and mossy swale in the deciduous woods, the swale solidly occupied by the strange new *Juncus*. Search by my companions and me during eight seasons has failed to reveal another station for it.

At the meeting of the New England Botanical Club on the evening of June 2nd last, I showed these two famously rare species and urged the members to watch for them in New England or elsewhere. I little expected immediate results; but promptly on the morning of June 3, looking through the miscellaneous unidentified *Junci* at the Gray Herbarium, I was surprised and delighted to find a beautifully characteristic specimen of *J. Griscomi*, sent in unidentified and collected on June 20, 1922, by *L. F. & Fannie R. Randolph* (no. 403) in "moist rich soil, Powhatan Swamp ½ mile southwest of Five Forks, James City County", Virginia. As usual the Randolphs saw and prepared beautiful material of a great rarity.

J. REPENS Michx. Local range extended inland to western GREENSVILLE CO.: open muddy border of Fontaine Creek, near mouth of Quarrel's Creek, no. 14,696. See p. 101.

J. LONGII Fernald. Local range extended inland from Coastal Plain to BRUNSWICK CO.: damp openings in woods, scarce, Moseley flat pineland, near Triplett, no. 14,586, there associated with other Coastal Plain types, such as *Hypericum setosum* L. and *Cynoctonum sessilifolium* (see RHODORA, xlv. 374, 376, 453 and 457), as well as such essentially inland plants as *Fimbristylis Drummondii* (p. 95), *Carex hirsutella* (p. 96) and *Psoralea psoralioides*, var. *eglandulosa* (p. 95).

J. SCIRPOIDES Lam. Local range extended back into the Piedmont in BRUNSWICK CO.: with the last, no. 14,587. See p. 96.

SOME VARIETIES AND FORMS OF JUNCUS CANADENSIS (PLATES 881 and 882).—Even after the removal from the complex *Juncus canadensis* J. Gay, as conceived by Engelmann, of *J. brachycephalus* (Engelm.) Buchenau, *J. brevicaudatus* (Engelm.) Fernald and *J. subcaudatus* (Engelm.) Coville & Blake, the remaining stiffly ascending *J. canadensis* is still a complex and highly variable plant. Generally, throughout its range, its capsule barely to but slightly exceeds the perianth and is gradually rounded at summit to a short and rather abrupt beak, but from southeastern Virginia to Georgia there occurs a very similar plant (PLATE 881, FIGS. 1–3), always with a large cyme (1–3.3 dm. long and 5–16 cm. broad), closely resembling large plants of typical *J. canadensis*[1], but with prolonged capsule tapering gradually to summit, much as in the northern *J. brevicaudatus* and the extremely southern *J. trigonocarpus*. This constitutes a well defined geographic variety which I am calling

*JUNCUS CANADENSIS J. Gay, var. **euroauster,** var. nov. (TAB. 881, FIG. 1–3), planta robusta 0.9–1.2 m. alta, culmo ad basin 4–7 mm. diametro; cyma 1–3.3 dm. longa 5–16 cm. alta; capitulis hemisphericis vel subglobosis multifloris distinctis vel paullo aggregatis; perianthiis 3–4 mm. longis; capsula acuta sensim attenuata valde exserta.—Southeastern Virginia to Georgia. VIRGINIA: pool in sandy barrens, Cape Henry, Sept. 23, 1933, *Fernald & Griscom*, no. 2811; sphagnous springy swales bordering Whiteoak Swamp, west of Elko Station, Henrico Co., Sept. 21, 1938, *Fernald & Long*, no. 9294; moist argillaceous pineland about 2 miles east of Stony Creek, Oct. 11 and 12, 1933, *Fernald & Long*, no. 9553; wet sandy and peaty shore, near entrance to Portsmouth Ditch, Lake Drummond, Great Dismal Swamp,

[1] See Fernald in RHODORA, xxxii. 83–88 (1930).

west of Wallaceton, Norfolk Co., Sept. 6, 1941, *Fernald & Long*, no. 13,588 (TYPE in Herb. Gray., ISOTYPE in Herb. Phil. Acad.); fresh reed-marsh and swale along Northwest River, near Northwest, Norfolk Co., Oct. 11, 1941, *Fernald & Long*, no. 13,913; sphagnous bog about 1 mile northwest of Dahlia, Greensville Co., Sept. 18, 1938, *Fernald & Long*, no. 9293. NORTH CAROLINA: drainage-ditch near Sea Level, Cartaret Co., Sept. 1, 1938, *Godfrey*, no. 6505. SOUTH CAROLINA: without stated locality, *M. A. Curtis;* drainage-ditch, 15 miles northwest of Georgetown, Georgetown Co., Aug. 25, 1939, *Godfrey & Tryon*, no. 1693. GEORGIA: swamp (at sea-level) Satella River, near Woodbine, Camden Co., Aug. 23, 1902, *Harper*, no. 1564.

In its slender, long-exserted and tapering capsule *Juncus canadensis*, var. *euroauster* suggests *J. trigonocarpus* Steud., but in all other characters, including the very large cyme, it belongs with *J. canadensis.*

Typically and through most of its range *Juncus canadensis* has a relatively short and apically rounded and abruptly short-beaked capsule, and the perianth is only 2.5–rarely 3.5 mm. long, but in the plant of Newfoundland, the northern regions of Quebec and locally southward into Nova Scotia and eastern Maine, rarely on Cape Cod, var. *sparsiflorus* Fernald (PLATE 881, FIGS. 4 and 5) in RHODORA, xxiii. 241 (1921), the perianth is 3.5–4 mm. long, much as in the extreme southern var. *euroauster.* The remaining large series which passes as *J. canadensis* presents three rather striking forms—forms because, although sometimes more abundant in definite ecological conditions, they occur wholly within the broad range of typical *J. canadensis.* In order to show their distinctive characteristics I am indicating the varieties and forms in a key.

a. Capsule plump, gradually rounded at summit to the rather abrupt short beak....*b.*
- *b.* Perianth 2.5–3.3 (rarely –3.5) mm. long; cyme (except in forma *conglobatus*), with spreading-ascending branches (rays) and branchlets, 0.4–3 dm. high....*c.*
  - *c.* Heads chiefly or wholly scattered in anthelate fashion along the branches of the open cyme; cyme 0.4–3 dm. high, with some elongate branches.
    - Heads densely 8–20-flowered, hemispherical to subglobose.......................... ***J. canadensis,* var. *typicus.***
    - Heads turbinate to subhemispherical, 2–7-flowered Var. ***typicus,*** forma ***apertus.***
  - *c.* Heads all or many densely crowded into irregular glomerules or masses, globose, many-flowered, the glomerules sessile or on short rays up to 1–3 cm. long. Var. ***typicus,*** forma ***conglobatus.***

b. Perianth 3.5–4 mm. long; cyme with stiffly erect branches and branchlets, 0.3–1.5 (–2) dm. high............Var. *sparsiflorus.*

a. Capsule slender, gradually attenuate to acute tip, long-exserted; cyme open, 1–3.3 dm. high; glomerules hemispherical to subglobose, many-flowered; perianth 3–4 mm. long.....................................Var. *euroauster.*

J. CANADENSIS J. Gay, var. **typicus.** PLATE 882, FIGS. 1–3. *J. canadensis* J. Gay in Laharpe, Mon. Junc. 134 (1827), in large part (α); Engelm. Trans. St. Louis Acad. ii. 436 (1866—var. *longicaudatus*) and 474 (1868—var. *longecaudatus*); Coville in Britton & Brown, Ill. Fl. i. 394, fig. 955 (1896); Fernald in RHODORA vi. 35 (1904) and xxxii. 83 et seq. (1930).—Widely distributed from southern Quebec and Ontario to Georgia, Tennessee and Louisiana.

*Forma **apertus,** f. nov. (TAB. 882, FIG. 4–6), cyma 1–3 dm. longa laxe aperta, capitulis remotis turbinatis vel subhemisphaericis 2–7-floris.—Scattered in the range of var. *typicus.* NOVA SCOTIA: gravelly margin of brook, Sydney, Aug. 18, 1902, *Fernald;* roadside-pool, Yarmouth, June 22–29, 1901, *Howe & Lang,* no. 131. MAINE: Labrador Pond, Sumner, Aug. 9, 1890, *J. C. Parlin.* MASSACHUSETTS: sandy and cobbly beach of Seth's Pond, West Tisbury, Aug. 16, 1928, *Fernald & Fogg,* no. 865. RHODE ISLAND: edge of pond-hole, northwest shore of Block Island, Aug. 11, 1919, *C. B. Graves.* CONNECTICUT: ponds, Wethersfield, *Chas. Wright.* NEW YORK: woody swale east of north end of Duck Lake, Conquest, Aug. 12, 1916, *F. P. Metcalf,* no. 6164. NEW JERSEY: border of white-cedar swamp along Scotland Run, Malaga, Gloucester Co., Nov. 1, 1936, *Bayard Long,* no. 49,279 (TYPE in Herb. Gray.). VIRGINIA: quaking margin of pond-hole about 2 miles east of Bowling Green, Oct. 15, 1941, *Fernald & Long,* no. 13,914; sandy swampy ground, Chisel's Run, west of Williamsburg, July 16, 1921, *Grimes,* no. 4040; sphagnous border of shallow pond-hole ½ mile east of Centerville, James City Co., July 26, 1941, *Fernald & Long,* no. 13,296. SOUTH CAROLINA: creek, 8 miles southeast of Columbia, Lexington Co., Aug. 8, 1939, *Godfrey & Tryon,* no. 1346. GEORGIA: bushy place, south of Kennesaw Mt., Cobb Co., July 12, 1900, *Harper,* no. 995.

*Forma **conglobatus,** f. nov. (TAB. 882, FIG. 7), culmo stricto 2–10 dm. alto; cyma 1–12 cm. longa; capitulis globosis multifloris in glomerulis subglobosis vel lobatis plerumque aggregatis, ramibus nullis vel ad 1–4 cm. longis.—Through much of the area of var. *typicus,* especially concentrated near the Atlantic coast from southern Maine to Maryland. The following are selected from a large representation. MAINE: brackish marsh, Winnegance Creek, Phippsburg, Aug. 23, 1909, *Fernald,* no. 1559. NEW HAMPSHIRE: marsh, Rye Beach, Aug. 18, 1886, *W. Deane.* MASSACHUSETTS: Plum Island, Essex Co., 1896, *A. A. Eaton;*

Kent's Island, Byfield, Aug. 18, 1904, *J. H. Sears;* Dorchester, Aug. 28, 1853, *Wm. Boott;* Sept. 3, 1882, *C. W. Swan;* damp open sandy soil near Kelly's Pond, West Dennis, Dennis, Aug. 10, 1918, *Fernald & Long*, no. 16,544; cranberry bog near beach, Hyannis, Oct. 5, 1911, *C. A. Weatherby*, no. 2833 (TYPE in Herb. Gray, ISOTYPE in Herb. New Engl. Bot. Cl.). RHODE ISLAND: Cat Swamp, Providence, Sept. 4, 1892, *J. F. Collins;* Middletown, Sept. 13, 1908, *E. F. Williams;* dryish fresh to slightly brackish borders of marshes east of Trim's Pond and Great Salt Pond, Block Island, Aug. 20, 1913, *Fernald & Long*, no. 9206; borders of brackish pools and salt marshes, vicinity of Watch Hill Pond, Westerly, Aug. 31, 1919, *Weatherby & Collins.* CONNECTICUT: wet meadow, East Windsor, Aug. 14, 1906, *Bissell;* moist field, Waterbury, Aug. 21, 1911, *Blewitt*, no. 510; fresh-water swamp near Saybrook Point, Saybrook, Sept. 7, 1908, *Blewitt;* edge of salt meadows, Fairfield, Aug. 20, 1909, *Eames.* NEW YORK: edge of salt marsh, Oceanside, Nassau Co., Sept. 20, 1917, *House*, no. 18; Westbury Prairie, Butler, Wayne Co., Oct. 5, 1916, *Metcalf & Wright.* NEW JERSEY: Hackensack Marshes, Sept., 1848, *J. Carey* (the specimen given by Engelmann an appropriate but unpublished formal name but one preoccupied in the specific category). DELAWARE: moist soil, Rehoboth, Sept. 6, 1908, *Churchill:* wet hollows in sand dunes, south of Bethany Beach and on Fenwick Island, Sussex Co., Aug. 28, 1936, *Fogg*, nos. 11,225 and 11,301. MARYLAND: wet sand, border of brackish marsh, north of Ocean City, Worcester Co., Sept. 12, 1936, *Fogg*, no. 11,429. VIRGINIA: "Ram-hole Swamp," Seward Forest, Brunswick Co., Dec. 1, 1944, *Lewis.* NORTH CAROLINA: marsh near Leechville, Hyde Co., Oct. 13, 1938, *Godfrey & White*, no. 6852. SOUTH CAROLINA: wet ground near a spring, Aiken, Oct. 8, 1866, *H. W. Ravenel* in Engelm. Herb. Junc. Bor.-Am., no. 86. GEORGIA: shallow grassy pond, alt. 250 ft., near Adams Park, Twiggs Co., Sept. 7, 1903, *Harper*, no. 1972. MICHIGAN: wet ground, Hersen Island, mouth of St. Clair R., Sept. 17, 1908, *C. K. Dodge*, no. 39; drying mucky shore of Lake Sixteen, Black Lake State Forest, Presque Isle Co., Aug. 27, 1935, *F. J. Hermann*, no. 7010 (transitional). WISCONSIN: St. Croix Co., 1861, *T. J. Hale.* ILLINOIS: Englewood, South Chicago, Sept. 2, 1893, *Churchill.* MINNESOTA: Minneapolis 1861, *T. J. Hale;* moist sandy soil, shores of Moore Lake, Anaka Co., Oct. 3, 1927, *Rosendahl*, no. 5472, Sept. 6, 1936, *Rosendahl & Rydberg*, no. 5124.

From its strong tendency along the Atlantic coast to abound at the upper borders of salt marshes forma *conglobatus* might be thought a good variety (and perhaps it is), but it also occurs in acid peats and sands and extends as far west as typical *J. canadensis.* Many specimens, difficult to place, occur, these making every conceivable transition to the latter plant, with more open cyme, elongate rays and mostly scattered or anthelate heads. As noted in one case, Engelmann gave an appropriate but preoccupied formal name to this plant.

Var. SPARSIFLORUS Fernald in RHODORA, xxxiii. 241 (1921). PLATE 881, FIGS. 4 and 5.—Newfoundland to the Laurentide Mts. of Quebec, south to Nova Scotia and eastern Maine, rarely on Cape Cod, Mass.

Var. EUROAUSTER Fernald, supra. PLATE 881, FIGS. 1–3.—Southeastern Virginia to Georgia.

PLATE 881, FIGS. 1–3, JUNCUS CANADENSIS J. Gay, var. EUROAUSTER Fernald: FIG. 1, portion of TYPE, × ½; FIG. 2, portion of glomerule, × 10, from TYPE; FIG. 3, seeds, × 10, from TYPE. FIGS. 4 and 5, var. SPARSIFLORUS Fernald: FIG. 4, inflorescence, × 1, from Quarry, Newfoundland, *Fernald & Wiegand*, no. 5129; FIG. 5, glomerule, × 10, from no. 5129.

PLATE 882, FIGS. 1–3, J. CANADENSIS, var. TYPICUS: FIG. 1, inflorescence, × 1, from Iona Island, Hudson River, Rockland Co., New York, *Muenscher & Curtis*, no. 5833; FIG. 2, flower, × 10, from no. 5833; FIG. 3, seeds, × 10, from no. 5833. FIGS. 4–6, forma APERTUS Fernald, all figs. from TYPE: FIG. 4, inflorescence, ×½; FIG. 5, glomerule, × 10; FIG. 6, seeds, × 10. FIG. 7, forma CONGLOBATUS Fernald: two inflorescences, × 1, from TYPE.

*SMILAX BONA-NOX L., var. EXAURICULATA Fernald in RHODORA, xlvi. 36 and 37, t. 811. fig. 3 (1944). Type from Norfolk, *Reed?*

DIOSCOREA BATATAS Dcne. To the relatively few stations recorded add one in BRUNSWICK Co.: climbing over bushes, dry thicket near old Taylor Place, Seward Forest, near Triplett, no. 14,593.

CYPRIPEDIUM CALCEOLUS L., var. PUBESCENS (Willd.) Correll. To the few recorded stations in the southeastern counties add one in BRUNSWICK Co.: rich woods, "Chamblis bigwoods", Seward Forest, near Triplett, no. 14,594. See p. 97.

QUERCUS PHELLOS L., forma INTONSA Fernald in RHODORA, xliv. 392 (1942). To the two recorded Virginia stations add one in BRUNSWICK Co.: damp thicket northeast of Ebony, no. 14,598. See p. 96.

CASTANEA NEGLECTA Dode. To the few recorded stations add two in BRUNSWICK Co.: rich woods "Chamblis bigwoods", Seward Forest, near Triplett, no. 14,597; mixed woods, Seward Forest, southeast of Ante, no. 14,698.

Here, as in the more eastern counties, *Castanea neglecta* is a straggling or loosely branched shrub of rich woodland. We have never found it fruiting, nor have we found it with *C. pumila* nor in habitats where *C. dentata* might formerly have grown. See p. 97.

The Indigenous Variations of Ulmus americana.—*Ulmus americana*, the most wide-spread of the American species and the tree probably more generally recognized than any other by the layman in the East, is far from being a definite unit. As one collects material in foliage he promptly becomes aware of four different forms. These first came to my attention when, in late May, 1904, I visited my parents in central Maine, just as the fruit of the elms was dropping and the foliage well expanding. I then made collections to display the forms and have subsequently waited in vain for some of the specialists on trees to clarify the situation. In brief, *Ulmus americana* may have the leaves smooth or essentially smooth to touch on the upper surface, or the latter may be almost as harshly scabrous as in the Slippery Elm, *U. rubra* Muhl. (*U. fulva* Michx.)—see last notes in this paper. In each series the young branchlets may be pubescent or quite glabrous. In the flowering condition, obviously, these strongly marked extremes can hardly be recognized; in the foliage-material they are striking.

As early as 1789 Aiton, Hort. Kew. i. 319, 320 (1789) recognized varieties of *Ulmus americana* with scabrous or with smoothish leaves and Spach (1841) and Walpers (1852–53) took these up or augmented them; but so far as I can find, the actual type of Linnaeus has not been closely examined, to determine to which of the four variations it belongs. The photograph of it before me is wholly inconclusive. Nor can I get what I consider true geographic varieties in the species. Each of the variations appears throughout most or all of the broad range of the species, trees with scabrous or smooth leaves and with pubescent or glabrous new branchlets occurring, for example, in New England, while two or three of these trends are represented in the Gray Herbarium from Virginia, Ontario and Oklahoma. I am, therefore, treating them as forms, with the clear understanding that when the actual types of Linnaeus, Aiton and others can be studied some shifting in the application of the names may be required. It is better to have names by which the forms can be designated than to call them all one, without differentiation. As I see these forms they are as follows:

Leaves smooth or smoothish above.
Young branchlets pubescent . . . . Forma *pendula*.
Young branchlets glabrous . . . . Forma *laevior*.
Leaves harshly scabrous above.
Young branchlets pubescent . . . . Forma *alba*.
Young branchlets glabrous . . . . Forma *intercedens*.

U. AMERICANA L., forma **pendula** (Ait.), stat. nov. *U. americana γ. pendula* Ait. Hort. Kew. i. 320 (1789); Willd. Sp. Pl. 1^2. 1326 (1798); Spach in Am. Sci. Nat. Bot. sér. 2, xv. 364 (1841). *U. americana, α. glabra* Walp. Annal. iii. 424 (1852–53), illegitimate substitute for var. *pendula* Spach.

The following Virginian specimen is clearly referable here. HENRICO CO.: south shore of James R., Richmond, April 20, 1915, *J. R. Churchill.*

*Forma **laevior,** f. nov. foliis supra laevibus vel sublaevibus; ramulis novellis glabris.—TYPE: river-bank, Orono, Maine, May 30, 1904, *Fernald* (in Herb. Gray.; ISOTYPE in Herb. New Engl. Bot. Club).

The following Virginian specimens are before me. PRINCESS ANNE CO.: Oceana, *Fernald & Long,* nos. 3911 and 3912. ISLE OF WIGHT CO.: below Rushmere, *F. & L.* no. 13,325.

*Forma **alba** (Ait.), stat. nov. *U. americana, β. alba* Ait. l. c. (1789); Willd. l. c. (1798). *U. americana, β. scabra* Spach, l. c. (1841), illegitimate substitute for var. *alba* Ait.

The following Virginian specimen belongs here. NEW KENT CO.: Pamunkey R., southeast of White Horse, *F. & L.,* no. 11,560.

*Forma **intercedens,** f. nov., foliis supra scaberrimis; ramulis novellis glabris. TYPE: Franconia, New Hampshire, Sept. 15, 1910, *G. G. Kennedy* (Herb. Gray.).

The following Virginian specimen is characteristic. FAUQUIER CO.: Bull Run Mts., *Allard,* no. 1037.

ASARUM LEWISII Fernald in RHODORA, xlv. 398, plates 774 and 775 (1943). Range extended slightly to the northeast in BRUNSWICK CO.: very abundant, forming extensive carpets in pine (*Pinus Taeda*) or mixed woods, even far removed from streams, Seward Forest, southeast of Ante, no. 14,699. Leaves varying from short-reniform (nearly twice as broad as long) through cordate-rotund or cordate-ovate outlines to subhastate or narrowly ovate. See p. 102.

SO-CALLED RUMEX BRITANNICA NOT A VIRGINIAN. (PLATE 883).—In his Materia Medica, 59 (1749) Linnaeus, describing the Water Dock of northern Europe, *Rumex Hydrolapathum* Huds., stated that its root was known in pharmacy as "HERBAE BRITANNICAE Radix" and that it occurred in Europe:

177. RUMEX floribus hermaphroditis, valvulis integerrimis nudis, foliis cordato-lanceolatis. *Fl. Suec.* 292. β.
Lapathum aquaticum, folio cubitali. *Boerh. pin.* 116.
Loc: Europae nostrae paludes. *Perennis, vulgaris.*
Pharm: HERBAE BRITANNICAE Radix.—L. Mat. Med. 59 (1749).

Three years later, in Sp. Pl. 334 (1753) there appeared, immediately following *Rumex verticillatus* from Virginia, another reputed Virginian:

Britannica. 5. RUMEX floribus hermaphroditis: valvulis integerrimis: omnibus graniferis, foliis lanceolatis: vaginis obsoletis. *Mat. med.* 17.
Rumex aquatica, calycis foliolis omnibus aequalibus, radice exterius nigra vel flava. *Cold. noveb.* 83.
Lapathum foliis longis latis vix acuminatis costis caulibusque rubentibus, radice intus crocea. *Gron. virg.* 39.
Habitat in Virginia. ♃.
In praecedenti stipula cylindrica membranacea fere ad dimidium vaginans internodium, in hac vero non item, sed ut in Europaeis. Pedicelli in priori crassiores in hac capillares; prior magis spicata; hac magis paniculata. Plantam Gron. in Fl. virginica habui a Cl. Authore, quae non rubra erat caule aut costis.

The first reference, to "*Mat. med.* 17", was apparently meant for his no. 177, with the description somewhat altered but belonging to the European plant. The Colden plant, *Rumex aquatica*, etc. from New York was probably the American species which now passes as *R. Britannica* but the Clayton (Gronovian) material from Virginia was "something else again". Asa Gray, studying the Gronovian material reported as follows:

*Rumex Britannica L. I think I have been able to determine the *Rumex* to which Linnaeus gave this unfortunate name. The source of the name is to be found by following up his reference to "*Mat. Med.* 17," i. e. Materia Medica, paragraph 177 (not 17), where, under reference to Fl. Suec. 292, "Europae nostrae paludes," is added "*Pharm. Herbae Britannicae radix.*" The North American plant to which he applied this name was one in his herbarium sent to him by Gronovius from Clayton's herbarium of the Flora Virginica. The fruit of it is not well developed, but the slender pedicels and the foliage show that it is the *R. orbiculatus* of the later edition of my Manual. But the specimen retained in Clayton's herbarium to represent the species, and the only Rumex in that herbarium, is quite different, has some long-awned teeth to the valves, and is, I believe, *R. obtusifolius*. The difference in the plants accounts for the remark of Linnaeus: "Plantam Gron. in Fl. Virginica habui a Cl. Authore, quae non rubra erat caule aut costis." For Clayton's character, as printed by Gronovius in the first edition of

> Flora Virginica, was:—"Lapathum foliis longis latis vix acuminatis, *costis caulibusque rubentibus*, radice intus crocea." That probably relates to the plant retained by Gronovius. And the specimen sent was perhaps Clayton's other species, viz.,—"Lapathum aquaticum foliis longis," &c., which Linnaeus referred to *R. verticillatus*. As to the *R. Britannica* of Michaux, Pursh, and even Meisner, it is uncertain whether they had in view the plant called by me in the Manual by that name, but named by Professor Wood *R. altissimus*, or that which Wood and probably Pursh took for *R. Britannica*, and I named *R. orbiculatus*. The latter proves to be the Linnaean species, and must claim the name, unless that be regarded as a *nomen falsum*, in which case we must take up that of *R. Claytoni*[*i*] Campdera, who may be presumed to have meant the Linnaean plant, although there is nothing in his character to certify it. A considerable difficulty in identifying the Linnaean species by the description grew out of the comparison in the species Plantarum with *R. verticillatus*, with which when in fruit it has little in common, except the slender pedicels. It should also be noticed that there is a transposition in the naming of the specimens in the Linnaean Herbarium, which, however, has been corrected by Smith.—Gray, Proc. Am. Acad. viii. 399 (1872).

Gray referred to the fragment sent by Gronovius to Linnaeus as having "the fruit . . . not well developed, but the slender pedicels and the foliage show that it is the *R. orbiculatus* of the later edition of my Manual", while the specimen in the Clayton (Gronovian) collection seemed to him *R. obtusifolius*. Of the latter a photograph (our PLATE 883) before me is convincing; it is very characteristic *R. obtusifolius*, adventive from Europe. As to the bit preserved in the Linnean Herbarium Rechinger wrote:

> The name *R. Britannica* is used here in the sense of Trelease and subsequent authors. The identity of this plant with Linné's *R. Britannica* is not clear to me. Earlier authors seem to have confused it with *R. altissimus* Wood. Perhaps it would be more cautious to use the name *R. orbicularis* [*orbiculatus*] Gray.
>
> Mr. H. W. Pugsley of London kindly undertook to examine for me the specimen of *R. Britannica* in the Linné Herbarium. He wrote that the specimen deposited there under the name *R. Britannica* is not absolutely a type, because there is no evidence of the date at which it was inserted in the herbarium. It consists of a small branch with narrow leaves, without axillary branches. The fruiting pedicels are 7–15 mm. long and the valves triangular, about 5 mm. long and broad. These characters for the most part seem not to agree with *R. Britannica* of authors.—Rechinger, North American Species of Rumex, Field Mus. Nat. Hist. Bot. Ser. xvii. no. 1. 126 (1937).

It is not without significance that we do not know the subaquatic plant which regularly passes as *Rumex Britannica* so far south as Virginia. The southernmost material in the Gray Herbarium from the Atlantic States is from northern New Jersey and northeastern Pennsylvania, although Mr. Long informs me that it reaches south, rarely, to southern New Jersey and southeastern Pennsylvania; Trelease said "south to New Jersey" and Rechinger cites nothing from south of northern New Jersey.

Since *Rumex Britannica* started out as a European species but, in spite of references to the latter in 1753, when the binomial was published, had its "*Habitat in* Virginia", and since the only fragment in the Linnean Herbarium is something else, while the Virginian specimen in Clayton's herbarium is the adventive *R. obtusifolius* L., it is difficult to see why *R. Britannica* is not an absolute *nomen confusum.* I must view it so and am taking up for our indigenous representative of the European *R. Hydrolapathum* the unequivocal R. ORBICULATUS Gray, Man. ed. 5: 420 (1867).

When he published the name *Rumex orbiculatus* for the northern subaquatic American species with orbicular or round-ovate to subcordate fruiting valves all grain-bearing, Gray took up for the mixed Virginian material the ill-begotten name *R. Britannica* and placed in its synonymy *R. Claytonii* Campdera, "which name is to be adopted if we reject that inconsiderately assigned by Linnaeus, who transferred the obscure *Herba Britannica* of the old writers to a Virginian species". Campdera, however, in publishing *R. Claytonii* Mon. Rumex, 99 (1819) with "Hab. ad rivulos Virginiae et Carolinae", started off with the Gronovian description of the red-veined *R. obtusifolius* L., which Gronovius had from Clayton, then the Colden reference to the aquatic plant of New York, then the description of the European plant in Materia Medica, etc., and described the valves as scarcely grain-bearing (sepalis interioribus vix granulatis). Since our northern subaquatic species is very definite, in having the three valves all grain-bearing, Campdera's *R. Claytonii* was almost as confused a concept as was the original *R. Britannica;* and any one who is familiar with the "rivulos Virginiae et Carolinae" knows that the abundant plant at their margins is *R. verticillatus* L. Specimens of *R. altissimus* Wood, with which Gray in 1867 identified *R. Claytonii,* could be found by Trelease southward in the East only to the District of Columbia; while Rechinger saw Virginian material only from the Potomac near Washington and none from farther south in Virginia or from the Carolinas. Within the area known to Clayton the only material of *R. altissimus* we know is a small patch recently and casually introduced into the yard of the Norfolk and Western Railroad at Petersburg. The Norfolk and Western did not exist in Clayton's time. *R. Claytonii*, then, is a hopelessly confused concept, the plant "ad rivulos Virginiae et Carolinae" being the earlier published *R. verticillatus* L.!

Four sheets in the Gray Herbarium were marked by Gray *Rumex orbiculatus* "Man. ed. 3", although actually in ed. 5. In ed. 3 he merely suggested that our plant, which he then called *R. Hydrolapathum*, var. *americanus*, was probably a distinct species. As TYPE of *R. orbiculatus* I am designating a sheet from New Haven, Connecticut, coll. *D. C. Eaton*.

*POLYGONUM PENSYLVANICUM L., forma **albinum**, f. nov., calycis albidis.—Wooded bottomland of Meherrin River at Westward Bridge, Brunswick Co., VIRGINIA, Sept. 16, 1944, *Fernald* (with *J. B. Lewis*), no. 14,702 (TYPE in Herb. Gray.). An albino of typical *P. pensylvanicum* (with glandular peduncles). See p. 100.

*P. MINUS Huds., var. SUBCONTINUUM (Meisn.) Fernald in RHODORA, xix. 134 (1917). GREENSVILLE Co.: roadside, Emporia, no. 14,600. Not previously recorded, apparently, from south of Pennsylvania.

*P. HYDROPIPEROIDES Michx., var. **euronotorum**, var. nov. (TAB. 884), foliis anguste linearibus vel lanceolato-linearibus plerumque 6–12 cm. longis 4–14 mm. latis longe attenuatis supra glabrescentibus vel sparsissime minuteque strigillosis subtus minute puberulis marginibus revolutis; ochreis strigosis ciliis vaginas subaequantibus; paniculis densis 5–8 mm. crassis; ochreolis arctis supra turbinatis inferioribus ciliis 3–5 mm. longis, mediis ciliis 1.5–2 mm. longis; pedicellis vix exsertis; calyce fructifero anguste rhomboideo 3–3.5 mm. longo achenio trigono arcte adpresso.—Southeastern Virginia and southeastern North Carolina. VIRGINIA: Western Branch, Norfolk Co., August, 1840, *Rugel*, no. 113; moist sandy and peaty shore of Whitefield's Millpond, southwest of Corinth, Southampton Co., Sept. 18, 1944, *Fernald*, no. 14,701 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). NORTH CAROLINA: along shore of lake at Lakeview, Moore Co., July 18, 1938, *Godfrey*, no. 5112; Greenfield Lake, Wilmington, New Hanover Co., June 29, 1938, *Godfrey & Wells*, no. 4808 (in bud); drainage-ditch at Carolina Beach, New Hanover Co., July 18, 1938, *Godfrey*, no. 4656. See p. 105.

Var. *euronotorum* (of southeast winds) is one of the very narrow-leaved extremes of *Polygonum hydropiperoides.* In foliage and in its dense panicle it simulates *P. opelousanum* Riddell, but its deep pink flowers with relatively slender calyces 3–3.5 mm. long and completely investing the achene, place it clearly in the former species, the usually greener and plumper calyx of *P. opelousanum* being only 1.5–2 mm. long and shorter than the achene.

P. hydropiperoides, var. *euronotorum* has the long cilia of the ochreolae (fig. 4) as in var. *Bushianum* Stanford in Rhodora, xxviii. 27 (1926) but that plant (plate 885, figs. 1–3) of Oklahoma, Kansas and possibly Missouri has broadly lanceolate leaves and the panicles (figs. 2 and 3) loose and open with very long-exserted pedicels. Occasionally typical *P. hydropiperoides* (plate 885, figs. 4–6) has as narrow leaves, but its panicles are more slender and the cilia of the ochreae 2–4 mm. long (fig. 4), those of the ochreolae 0.5–1 mm. long (fig. 6), the uninjured ochreae of var. *euronotorum* having cilia 5–7 mm. long, those of the ochreolae 1.5–2 mm. long. The local var. *breviciliatum* Fernald in Rhodora, xlii. 448 (1940), our plate 886, as yet known only from Dinwiddie Co., Virginia, has lanceolate leaves 1.5–3.2 mm. broad, the cilia of the ochreae only 0.8–1.2 mm. long (fig. 2), those of the ochreolae (fig. 3) wanting or at most 0.4 mm. long, the panicle (figs. 1 and 3) slender and open, with long-exserted pedicels.

In its apparent concentration on the coastal plain of southeastern Virginia and in the region of Wilmington and adjacent southeastern North Carolina var. *euronotorum* joins a considerable group of plants of similarly bicentric ranges.

Plate 884, Polygonum hydropiperoides Michx., var. euronotorum Fernald, all figs. from type: fig. 1, portion of plant, × 3/5; fig. 2, summit of ochrea, × 4; fig. 3, panicle, × 1; fig. 4, portion of panicle, to show ochreolae, × 10.

Plate 885, figs. 1–3, P. hydropiperoides, var. Bushianum Stanford, all figs. from the type, *Bush*, no. 509 from Sapulpa, Oklahoma: figs. 1 and 2, summit of plant, × 1; fig. 3, portion of panicle, to show ochreolae, × 10. Figs. 4–6, typical P. hydropiperoides: fig. 4, ochrea, × 4, from northwest of Raynor, Isle of Wight Co., Virginia, *Fernald & Long*, no. 13,330; fig. 5, panicle × 1, from no. 13,330; fig. 6, portion of panicle, to show ochreolae, × 10, from no. 13,330.

Plate 886, P. hydropiperoides, var. breviciliatum Fernald, all figs. from type, south of Burgess Station, Dinwiddie Co., Virginia, *Fernald & Long*, no. 8698: fig. 1, flowering tip, × 1; fig. 2, ochrea, × 4; fig. 3, portion of panicle, showing ochreolae and distant flowers, × 10.

AMARANTHUS GRAECIZANS L. Sp. Pl. 990 (1753). *A. blitoides* S. Wats. in Proc. Am. Acad. vii. 273 (1877). PLATE 887.

This is a disconcerting but apparently necessary change, for the name *Amaranthus graecizans* for the erect or bushy-branched *A. albus* L. Syst. ed. 10: 1268 (1759), the plant with elongate pungent bracts, has been erroneously used for the latter ever since Uline and Bray took it up in Bot. Gaz. xix. 316 (1894). Unfortunately they did not see even a photograph of the Linnean *A. graecizans* and, consequently, did not appreciate the significance of Linnaeus's contrast between the two when, in 1759, he published the second species of the pair as *A. albus*, a species with stiffish ascending whitish stems and prolonged subulate bracts, as contrasted with the prostrate purplish and slightly succulent stems and blunter and shorter bracts of *A. graecizans* L. (*A. blitoides*).

Amaranthus graecizans was known to Linnaeus only from the Clayton material from Virginia:

> *graecizans.* 5. AMARANTHUS floribus triandris conglomeratis axillaribus, foliis lanceolatis obtusis.
> Amaranthus floribus lateralibus congestis, foliis lanceolatis obtusis. *Gron. virg.* 116.
> *Habitat in* Virginia. ⊙

A photograph, × ⅖, of the Clayton plant, received from the British Museum of Natural History through Dr. John Ramsbottom, is shown as PLATE 887, FIG. 1; FIG. 2 is the text at bottom of the sheet, slightly enlarged from that on the original photograph, for ease of reading. The last two words of the first line are, therefore, since the line is a long one, moved up above their original position. Beside these, FIG. 3 shows a portion, × 1, of one of the specimens (the type) marked by Watson *A. blitoides.* Since no type of Watson's species was indicated, I am now designating as its TYPE a sheet from Ames, Iowa, sent by the late *C. E. Bessey* with the critical notes which evidently drew Watson's attention to it. Watson had originally identified the plant as *A. Blitum* L., but Bessey wrote: "Plant prostrate, spreading from a central root, resembling the habit of *Portulaca oleracea*, often with a reddish or purplish cast". Then, for full measure, "☞ This plant with us *never* is ascending in growth, but is always prostrate". It was upon these characters and the "bracts nearly equal, ovate-oblong, shortly acuminate,

. . . little exceeding the . . . sepals" that Watson distinguished his *A. blitoides* from *A. albus*, of "usually erect diffusely branched habit . . . bracts subulate, rigid, pungently awned". Unfortunately, he seems to have overlooked *A. graecizans* L. (1753).

There is, however, no reason why we should not take up the latter name for *A. blitoides*, thus restoring *A. albus* L. for the stiffer species with slender spinescent bracts, which for more than half a century has wrongly passed as *A. graecizans*.

The name *graecizans* is not at once of obvious meaning. In his Flora Virginica, after giving the diagnosis, which was copied as well as altered by Linnaeus, Gronovius made a guess that the plant was "Amaranthus Graecus sylvestris angustifolius" of Tournefort. The specific name, then, is comparable to that of *Galium circaezans* L., meaning, approximately, simulating *A. graecus*.

The following transfer is necessitated:

Amaranthus albus L., var. **pubescens** (Uline & Bray), comb. nov. *A. graecizans*, var. *pubescens* Uline & Bray in Bot. Gaz. xix. 317 (1894). *A. pubescens* (Uline & Bray) Rydb. in Bull. Torr. Bot. Cl. xxxix. 313 (1912).

Xanthorhiza simplicissima Marsh. To the relatively few recorded stations in the eastern counties add one in Greensville Co.: sandy woods and thickets along Fontaine Creek, near Round Hill Church, no. 14,605.

Menispermum canadense L. To the few recorded stations on the Coastal Plain add one in Greensville Co.: rich woods along Meherrin River, below Emporia, no. 14,606; very rank, the very shallowly to hardly lobed leaves 1.4 dm. broad and on petioles 2 dm. long.

Litsea **aestivalis** (L.), comb. nov. *Laurus aestivalis* L. Sp. Pl. 370 (1753). *Laurus geniculata* Walt. Fl. Carol. 133 (1788). *Tetranthera geniculata* (Walt.) Nees, Syst. Laurin. 567 (1836). *Litsea geniculata* (Walt.) Benth. & Hook. f. Gen. Pl. iii. 162 (1883) and Nichols. Dict. Gard. ii. 287 (1885). *Malapoenna geniculata* (Walt.) Coult. in Mem. Torr. Bot. Cl. v. 164 (1894). *Glabraria geniculata* (Walt.) Britton in Britt. & Brown, Ill. Fl. ed. 2, ii. 135, fig. 1970 (1913). Plate 888.

It is most astounding to note how generally *Laurus aestivalis* and *L. Benzoin* L. l. c. (1753) have been merged by authors as one species under the competitive generic names *Lindera* and *Benzoin*. As usual, Linnaeus was too keen a student to publish two species, one next the other and both received from Virginia, if they were identical. His account in Species Plantarum was simple and clear:

aestivalis. 8. LAURUS foliis venosis oblongis acuminatis annuis, ramis supra-axillaribus.
Laurus foliis lanceolatis enervibus annuis. *Gron. virg.* 159.
Laurus foliis enervibus ovatis utrinque acutus. *Gron. virg.* 46.
Habitat in Virginia ad ripas rivulorum. ♄.
Pedunculi hujus fructiferi colorati sunt.

Benzoin. 9. LAURUS foliis enerviis ovatis utrinque acutis integris annuis. *Hort. Cliff.* 154. *Mat. med.* 195. *Gron. virg.* 46. *Roy. lugdb.* 226.
Arbor virginiana, citreae vel limoni folio, Benzoinum fundens. *Comm. hort.* I. *p.* 189, *t.* 97.
Arbor virginiana, pishaminis folio, baccata Benzoinum redolens. *Pluk. alm.* 42, *t.* 139. *f.* 3. 4.
Habitat in Virginia.

One must note, in the first place, the error of citing the same reference to Gronovius, p. 46 for both species and the further Linnean error of misquoting under the second species his own original and correct diagnosis in Hortus Cliffortianus, in which the leaves are described "foliis . . . obverse ovatis", i. e. *obovate*, not, as Linnaeus carelessly wrote in 1753, "ovatis", and the same error made in transcribing from Gronovius.

In the original and fuller account in Hortus Cliffortianus, Linnaeus gave a clear definition of our Spicebush, *Lindera Benzoin* (L.) Blume: "Involucrum *sessile, tetraphyllum, corni simillimum, includens flosculis quinque petiolatas, longtiudine involucro*", etc. The identity of the shrub of Virginia, with entire obovate leaves, called *Laurus Benzoin,* and having the involucrate inflorescences sessile and suggesting those of *Cornus mas,* can hardly be questioned and the photograph, sent me by Dr. Ramsbottom (our PLATE 889) of the Hortus Cliffortianus specimen, which must stand as the TYPE, is unequivocal.

Excluding from the account of *Laurus aestivalis* the reference to the obovate-leaved shrub of Virginia, erroneously cited under it as well as under *L. Benzoin,* for Gronovius had merely copied and cited the diagnosis given in Hortus Cliffortianus, we have left the real *Laurus aestivalis.* This was a shrub which had been collected by Clayton and Clayton's own note, not reprinted by Linnaeus, was of real significance: "Lauro affinis aquatilis". This, added to the lanceolate or oblong leaves and the supra-axillary branching, clearly indicate the rare shrub of ponds and inundated swamps, Pond-spice, which Walter later described as *Laurus geniculata*. In this shrub the umbels, instead of being sessile along the main branches, are on short and scattered branchlets (our fig. 3, from Georgia). It is, then, exactly as it should be: the type of *Laurus aestivalis* in the Linnean Herbarium (our plate 888, figs. 1 and 2) is the same as *Laurus geniculata* Walt. The type has Linnaeus's annotation: species no. "8. *aestivalis*" and a further annotation (fig. 2) giving Clayton's account, "Laurus affinis aquatilis", etc. *Laurus aestivalis* of Linnaeus obviously is not at all his *L. Benzoin*!

So far as we know *Litsea aestivalis* has not been found in Virginia since Pursh collected it in Southampton County. It should be sought at pond-margins.

Plate 888, Litsea aestivalis (L.) Fernald: fig. 1, type of *Laurus aestivalis* L., × ½, courtesy of Mr. *S. Savage;* fig. 2, Clayton's description from bottom of sheet, × ⅔; fig. 3, flowering branch, × 1, of characteristic *Litsea geniculata* (Walt.) Benth. & Hook. f., from Schreven Co., Georgia, *Eyles*, no. 6748, as *Glabraria geniculata* (Walt.) Britton.

Plate 889, Lindera Benzoin (L.) Blume: type, × ⅖, of *Laurus Benzoin* L., courtesy of Dr. *John Ramsbottom.*

(*To be continued*)

BOTANICAL SPECIALTIES OF THE SEWARD FOREST AND ADJACENT AREAS OF SOUTH-EASTERN VIRGINIA

M. L. Fernald

(*Continued from page 142*)

Persea Borbonia (L.) Spreng., forma **pubescens** (Pursh), stat. nov. *Laurus caroliniensis β. pubescens* Pursh Fl. Am. Sept. i. 276 (1814). *P. caroliniensis α.* Nees, Syst. Laur. 150 (1836). *Tamala palustris* Raf. Sylv. Tellur. 137 (1838). *P. caroliniensis β. pubescens* (Pursh) Meisn. in DC. Prodr. xv[1]. 51 (1864). *P. caroliniensis*, var. *palustris* (Raf.) Chapm. Fl. So. U. S. 393 (1860). *P. pubescens* (Pursh) Sarg. Silva N. A. vii. 7, t. 302 (1895). *Tamala pubescens* (Pursh) Small, Fl. Se. U. S. ed. 2: 822 and 1375 (1913). *P. palustris* (Raf.) Sarg. in Bot. Gaz. lxvii. 229 (1919).

After closely watching, collecting, and intensively studying the Red Bay, as it occurs in eastern Virginia, I have abandoned the futile attempt to see two species or two varieties in the glabrous-leaved material and that with leaves densely pubescent beneath, and I cannot look upon them as anything but glabrous and pubescent forms of one species, *P. Borbonia* (L.) Spreng. The bibliography of the latter is

P. Borbonia (L.) Spreng. Syst. ii. 268 (1825). *Laurus Borbonia* L. Sp. Pl. 370 (1753). *L. axillaris* Lam. Encycl. iii. 453 (1789). *L. caroliniensis* Michx. Fl. Bor.-Am. i. 245 (1803). *L. caroliniana* Poir. in Lam. Encycl. Suppl. iii. 323 (1813). *L. caroliniensis, α. glabra* Pursh, Fl. Am. Sept. i. 276 (1814). *P. caroliniensis* (Michx.) Nees, Syst. Laur. 150 (1836). *Tamala Borbonia* (L.) Raf. Sylv. Tellur. 136 (1838). *P. caroliniensis, α. glabriuscula* Meisn. in DC. Prodr. xv[1]. 51 (1864). *P. palustris*, forma *laevifolia* Fernald in Rhodora, xliv. 399 (1942).

Hoping against hope that, with most of our American herbarium material interned (or destroyed?) in Holland, there might be some erudite difference which I could not discover, I went so far in 1942 as to distinguish a glabrous-leaved form of the pubescent-leaved *Persea palustris*, although it already had a plethora of names. Now, having to dispose of *Laurus axillaris* Lam., a photograph of the type of which is before me, I have again sought characters aside from the superficial and very obvious and variable one of pubescence. In the first place, *Laurus axillaris* Lam. is not, as indicated by *Index Kewensis*, *Litsea geniculata* (i. e. *L. aestivalis* supra); the type is a very immature branch of *Persea Borbonia* with very young (therefore short-peduncled) inflorescences. It was sent by Fraser from South Carolina and Lamarck merely suggested its relationship to the *Litsea*: "*An Laurus geniculata* Walt." In the second place, I can get nothing stable out of the supposed specific differences: *P. Borbonia*, according to Sargent's Silva, with "Peduncles short; leaves oblong or oblong-lanceolate, obscurely veined, glabrous; branchlets puberulous"; *P. palustris* (or *pubescens*) with "Peduncles elongated; leaves oval or lanceolate, conspicuously veined, tomentose on the lower surface; branchlets coated with tomentum".

Persea Borbonia, according to Sargent, with "Peduncles short; leaves oblong or oblong-lanceolate, obscurely veined", started in L., Hort. Cliff. 154 (1737), and by Linnaeus was described as having the *peduncles long* (pediculis longis), instead of "short", the *leaves lanceolate*, instead of "oblong or oblong-lanceolate" and the *veins transverse* (*evident to Linnaeus*)! The full account was:

> 3. Laurus foliis lanceolatis, nervis transversalibus, fructus calicibus baccatis.
> Borbonia fructu oblongo nigro, calyce coccineo. *Plum. gen.* 4?
> Laurus caroliniensis, foliis acuminatis, baccis coeruleis, pediculis longis rubris insidentibus. *Catesb. ornith.* 63, *t.* 63.
> *Crescit in* Carolina.

In Species Plantarum (1753), under *Laurus Borbonia*, the only changes were the dropping of the reference to Plumier, the adding of references to Gronovius, Virg. 46, and to Royen, and the change to "*Habitat in* Carolina, Virginia". According to Daydon Jackson there was no specimen in the Linnean Herbarium in 1753. We can, of course, not get at the Hortus Cliffortianus material now, but Catesby's plate is a definite, though much distorted representation, with petioles often much longer than in nature and obviously not differentiated by the artist from the "foot-stalks [peduncles] of two or three inches long". "These Trees . . . not common in *Virginia*, except in some places near the Sea. In *Carolina* . . . every where seen, particularly in low swampy lands." In the collections represented in the Gray Herbarium nearly glabrous-twigged and

-leaved branches may have peduncles only 1 cm. long or up to the length shown in Catesby's plate. Similarly, branches with densely velvety cortex and lower leaf-surfaces (merely taking the Virginian series) may have fruiting peduncles anywhere from 1.5–7 cm. long. As forms the essentially glabrous and the heavily pubescent extremes are striking, but there are altogether too many transitional trees for them to be called geographic varieties and surely not different species. It is inconvenient that the very pubescent form is much commoner than the glabrescent type of the species. At least, in the material which has accumulated in the Gray Herbarium since the bulk of specimens was sent on loan to Utrecht, the heavily pubescent form outnumbers the other two to one.

*MAGNOLIA VIRGINIANA L., var. AUSTRALIS Sargent in Bot. Gaz. lxvii. 231 (1919). Range extended from southeastern North Carolina northward into southeastern Virginia. DINWIDDIE Co.: along stream near Petersburg, May 13, 1935, *E. Puette & M. Ellyson.* PRINCESS ANNE Co.: rich pine woods, Munden, *Fernald & Griscom*, no. 4408, with note: "Trunk 1 ft. in diameter; trees 30 ft. high."

This southern large extreme with silky white pubescence on new branchlets, petioles and often the lower side of the leaf, was pronounced by Sargent a larger tree than glabrous true *M. virginiana* and "Swamps in the neighborhood of Wilmington, North Carolina, is the most northern station from which I have seen specimens of this tree". The Munden material is thoroughly typical; that from Petersburg even more heavily pubescent than any from Florida to Louisiana.

In the Gray Herbarium there is extreme material of var. *australis* from Tyrrell Co., North Carolina: south of Columbia, *Godfrey*, no. 3928. This station is on Albemarle Sound, only 40 miles south of Munden, whereas Wilmington is nearer 190 miles from Munden.

*CRATAEGUS AESTIVALIS (Walt.) T. & G. PRINCESS ANNE Co.: low woods along Back Bay, Long Island, no. 10,671. The first from north of South Carolina.

C. FLAVA Ait. NANSEMOND Co.: dry pine and oak woods about 2 miles southeast of Cleopus, no. 9578 (vegetative sprouts with characteristic glandular-margined stipules). ISLE OF WIGHT Co.: dry sandy woods northwest of Raynor, no. 14,339; border of dry sandy woods south of Zuni, no. 6818. SOUTHAMPTON Co.:

about Franklin, June, 1893, *Heller*, no. 978 as *C. glandulosa* Moench, the identification changed by Eggleston to *C. flava;* frequent on higher ridges, Franklin, Aug., 1908. *Eggleston*, no. 4011, with the note: "Only known Manual station". Greensville Co.: rich deciduous woods by Metcalf Branch, east of Emporia, no. 8293. Brunswick Co.: wooded swamp along Quarrel's Creek, "Chamblis bigwoods", Seward Forest, near Triplett, no. 14,710.

Although included by Eggleston in Britton & Brown, Ill. Fl. ed. 2, from southeastern Virginia, *C. flava* is given by Tidestrom in Small's Manual as coming north only to Georgia.

Geum canadense Jacq., var. brevipes Fernald in Rhodora, xxxix. 410, pl. 479, figs. 1–3 (1937). This characteristic plant, heretofore known only from the bottoms of the Nottoway, is now found along Roanoke drainage in southwestern Brunswick Co.: bottomland woods along Poplar Creek, southwest of Ebony, no. 14,619. See p. 97.

Rubus (§ Flagellares) connixus Bailey, Gent. Herb. v. 273, fig. 113 (1943). Range extended 45 miles southeastward from the type-locality (Keysville, Charlotte Co.) to eastern Brunswick Co.: trailing in argillaceous flatland along Sawmill Branch, Seward Forest, near Triplett, no. 14,617.

The specimens closely match Bailey's figure and his description, including (for most leaves) his "leaves of primocanes . . . leaflets . . . not subcordate at base", although one leaf retained at the Gray Herbarium fits Bailey's contradictory key-character: "Odd or terminal leaflet of primocane leaves . . more or less cordate".

R. (§ Cuneifolii) sejunctus Bailey, Gent. Herb. v. 201, fig. 205 (1943). To the original stations in Southampton Co. add one in Brunswick Co.: dry thicket, Seward Forest, near Triplett, no. 14,611. Very abundant; seen over much of the region. See p. 94.

*Rubus (§ Tholiformes) **Akermani,** sp. nov. (tab. 890 et 891), valde arcuans deinde depressis cannis tholos formantibus, cannis vel ramibus ad 2–3 m. longis apicibus prostratis rare radicantibus; primocannis simplicibus 4–8 mm. diametro glabris remote armatis; aculeis rectis horizontalis vel vix recurvatis subulatis 3–6 mm. longis basi 2–5 mm. latis; primocannae foliis ternatis firmis supra strigoso-pilosis subtus dense tomentulosis; foliolis ovatis acuminatis duplicato serratis basi subrotundatis, foliolo terminali 5–8 cm. longo 2.5–5.5 cm. lato, petiolulo armato 1.5–2.5 cm. longo; floricannis intricate ramosis ramibus porrectis vel divergentibus rigidis; floricannae foliis ternatis, foliolis ellipticis vel anguste cuneato-obovatis acutis vel obtusis subtus pilosis, foliolo terminali 1.5–6 cm. longo; inflorescentiis perbrevibus corymbiformibus foliosis 1–4-floris, bracteis trifoliolatis vel superne simplicibus quam pedicellis superantibus; pedicellis villosis plerumque inarmatis adscendentibus 0.7–1.8 cm. longis; calycis pilosis inarmatis segmentis deinde reflexis; fructibus ad 1.8 cm. diametro.—Brunswick and Greensville Counties, VIRGINIA: springy sphagnous and argillaceous bog, Ram-hole Swamp, Seward Forest, near Triplett, Brunswick Co., June 22, 1944, *Fernald* (and *Lewis*)[1], no. 14,614 (TYPE in Herb. Gray., ISOTYPE in Herb. Phil. Acad.); damp thicket northeast of Ebony, Brunswick Co., June 21, 1944, *Fernald* (and *Lewis*), no. 14,613; dry woods near Mitchell's Millpond, west of Brink, Greensville Co., June 29, 1944, *Fernald* (and *Lewis*), no. 14,618.

Rubus Akermani, with which it is a great pleasure to associate the name of ALFRED AKERMAN, Director of the Seward Forest, to whom I am under great obligation, is a relatively unique species. Its doming and long-arching habit is striking, as are the very leafy few-flowered and -fruited corymbs with the fruits mostly hidden among the leaves. It is much coarser than the species with slender and closely trailing floricanes (the Dewberries), and I am not able to place it definitely near any described species. See p. 95.

*R. (§ THOLIFORMES) **cathartium,** sp. nov. (TAB. 892 et 893), valde arcuans cannis tholos altos formantibus, cannis vel ramibus ad 2.5 m. longis apicibus prostratis plus minusve radicantibus; primocannis simplicibus vel ramosis longe arcuatis flexuosis subteretibus glabris ad 7 mm. diametro armatis; aculeis oblique deltoideo-subulatis recurvatis vel unguiculatis 3–5 mm. longis basi 3–6 mm. latis; primocannae foliis imis ternatis mediis superioribusque quinatis submembranaceis supra strigoso-pilosis subtus piloso-tomentulosis pilis fulvescentibus; petiolo valde unguiculato-armato; foliolis ovatis vel elliptico-ovalibus grosse duplicato-serratis acuminatis basi rotundatis, foliolo terminali 8–14 cm. longo 5–10 cm. lato, petiolulo armato 1.5–3 cm. longo; floricannis subsimplicibus subrigidibus; foliis membranaceis ternatis, petiolo piloso sparse stipitato-glanduloso setosisque, foliolis rhomboideo-oblongis acutis vel subacutis duplicato serratis 4–7 cm. longis; racemis corymbiformibus 1–7-floris, bracteis imis ternatis supernis simplicibus quam pedicellis valde brevioribus; pedicellis erectis filiformibus pilosis plus minusve stipitato-glandulosis setosisque plerumque 2–4 cm. longis; calycis pilosis plus minusve glanduliferis deinde reflexis.—

[1] Lewis did not take specimens.

Brunswick County, Virginia: dry thickets near old Taylor Place, Seward Forest, near Triplett, June 23, 1944, *Fernald* (and *Lewis*), no. 14,615 (type in Herb. Gray.; isotype in Herb. Phil. Acad.); dry thicket, Old Chamblis Place, Seward Forest, June 20, 1944, *Fernald* (and *Lewis*), no. 14,612.

Rubus cathartium (*cathartium*, of buzzards, from *Cathartes*, the Turkey-buzzard[1] because, in collecting the type (see p. 98), we seriously disturbed a brood of young buzzards whose home was in the shed near-by) is, like *R. exsularis* Bailey, Gent. Herb. v. 386, fig. 175 (1943), "a rampageous very prickly woody grower making deep tangled mounds or heaps" (*Bailey*, p. 243), "a fearsome briar to handle"[2] (his p. 388), and the pubescence, glandularity and prickles are similarly distributed. The pedicels in the New York *R. exsularis* are illustrated as much shorter than and overtopped by the leafy bracts. In *R. cathartium* they greatly overtop their subtending bracts, thus suggesting the inflorescences of *R. flagellaris*. From the latter *R. cathartium* is quickly distinguished by its coarse and doming habit, the densely velvety lower surfaces of the primocane-foliage, the broad-based prickles and the glandular inflorescence.

*R. (§ Tholiformes) **Sewardianus,** sp. nov. (tab. 894 et 895), valde arcuans cannis tholos formantibus, cannis vel ramibus ad 2 m. longis apicibus longe arcuatis; primocannis deinde divergente ramosis 5–7 mm. diametro glabris vel apice pilosis remote armatis; aculeis rectis horizontalis subulatis 3–5 mm. longis basi 2–3 mm. latis; primocannae foliis ternatis vel quinatis membranaceis supra remote strigosis subtus tomentulosis, petiolo unguiculato-armato superne piloso; foliolis ovatis acuminatis duplicato serrato-dentatis basi rotundatis, foliolo terminali 8–12 cm. longo 5–7.5 cm. lato basi cordato, petiolulo piloso armato 2.5–3 cm. longo; floricannis inextricabiliter divergenterque ramosis valde arcuato-depressis ramis unguiculato-aculeatis; floricannae foliis ternatis, foliolis anguste elliptico-ovalibus acuminatis duplicato serratis 4–7 cm. longis subtus minute pilosis; inflorescentiis breviter racemoso-corymbosis 2–8-floris;

[1] I have been told that the specific name *cathartium* (of turkey-buzzards) will inevitably be misspelled and interpreted as coming from *catharticum*, a cathartic. As a matter of fact, the very rich and juicy fruit of *Rubus cathartium* would make the finest of blackberry-cordial, the famous old domestic cure for diarrhoea. Turkey-buzzards, unless scrupulously cleaned and thoroughly cooked before eating, might give uncomfortable results.

[2] In his rather unconventional descriptions of "rampageous" and "fearsome" briars Bailey consistently uses in his Latin diagnoses the Latin ablative "*canis*," spelled like the classical nominative for a *dog*, instead of the more conventional *cannis*, from *canna*, a *cane*. Sometimes the scratchy and "fearsome" canes certainly suggest a dog.

bracteis imis ternatis, superne simplicibus parvis quam pedicellis; pedicellis divergenter adscendentibus 1–2.5 cm. longis retrorse villosis plus minusve armatis; calycibus pilosis segmentis acuminatis deinde reflexis; fructibus 1.5–1.8 cm. diametro.—Brunswick County, VIRGINIA: dry thicket near old Taylor Place, Seward Forest, near Triplett, June 23, 1944, *Fernald* (and *Lewis*), no. 14,616 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). See p. 98.

Rubus Sewardianus is named for the late Dr. WALTER SEWARD of Triplett, Virginia, through whose munificence the University of Virginia received the original Seward Forest and its initial endowment. Not referable to any of the doming species accounted for by Bailey, Gent. Herb. v. part v (1943). Very striking on account of the divergently branched overarching canes, which, because of the long and intricate branching and the strong prickles, become almost inextricable. Notable also because the prickles of the primary axes of the primocanes and the floricanes are straight and horizontally divergent, those of the branches strongly unguiculate. The very broad leaflets of the primocane-foliage, with the terminal leaflet cordate, and the acuminate leaflets of the floricanes at once distinguish it from firmer-leaved *R. Akermani*. From *R. cathartium* it is quickly told by its chiefly 3-foliolate leaves, those of the primocanes with low and relatively small dentation (rather than coarse and sharp serration), by the glandless petioles of the floricane-leaves and glandless pedicels and calyx, by the more compact inflorescence, and by the unusual disparity in the toothing of the leaves, those of the primocanes dentate, of the floricanes sharply serrate. The differences between prickles of primary and secondary axes and between toothing of primocane- and floricane-foliage are unusual features. *R. Sewardianus, R. Akermani* and *R. cathartium* are neighbors. No one would confuse them and, except for growth-habit, they are very different plants.

PLATES 890 and 891, RUBUS AKERMANI Fernald, all figs. from TYPE. PLATE 890, floricane: FIG. 1, portion of cane, bearing solitary fruits, × 1; FIG. 2, another cane with 3-fruited spurs, × ⅓; FIG. 3, lower surface of leaf, × 10; FIG. 4, summit of pedicel and base of calyx, × 5. PLATE 891, primocane: FIG. 1, portion of cane and typical leaf, × 1; FIGS. 2 and 3, upper and lower leaf-surfaces, × 10.

PLATES 892 and 893, RUBUS CATHARTIUM Fernald, all figs. from TYPE. PLATE 892, floricane: FIG. 1, portion of cane in fruit, × 1; FIG. 2, lower surface of leaf, × 10; FIG. 3, summit of pedicel and base of calyx, × 5. PLATE 893, primocane: FIG. 1, two leaves, × ½; FIG. 2, portion of cane, × 1; FIGS. 3 and 4, upper and lower leaf-surfaces, × 10.

Plates 894 and 895, Rubus Sewardianus Fernald, all from type. Plate 894, all figs, × 1: fig. 1, primary axis of floricane, to show straight prickles; fig. 2, upper fruiting branchlets; fig. 3, portion of lateral branch (showing unguiculate prickles) and of leafy branch. Plate 895, fig. 1, primocane and primocane-leaf, × 5/6; fig. 2, lower, and fig. 3, upper leaf-surface, × 10; fig. 4, summit of pedicel and calyx, × 5.

Rosa multiflora Thunb. Well naturalized around Triplett, Brunswick Co.: no. 14,713.

Baptisia tinctoria (L.) R. Br., typical. Brunswick Co.: very local, seen only in thicket near Philadelphia Church, no. 14,621. See p. 94.

Tephrosia virginiana (L.) Pers., var. glabra Nutt.; see Rhodora, xlv. 452 (1943). Local range extended inland from the Coastal Plain to Brunswick Co.: dry pine woods, Seward Forest, southeast of Ante, no. 14,715. See p. 102.

Amorpha fruticosa L. Greensville Co.: thicket along Quarrel's Creek, below Pair's Store, no. 14,623; sandy woods and thickets along Fontaine Creek, near Round Hill Church, no. 14,624. Closely approaching the Coastal Plain. See p. 99.

Psoralea psoralioides (Walt.) Cory, var. eglandulosa (Ell.) F. L. Freeman. To the single recorded Virginian station, in Dinwiddie Co. (see Rhodora, xlv. 366 and 452) add one in Brunswick Co.: damp openings in woods, Moseley flat pineland, near Triplett, no. 14,630. See p. 95.

Desmodium lineatum (Michx.) DC. Local range extended inland to Brunswick Co.: rich low woods, "Chamblis bigwoods", Seward Forest, near Triplett, no. 14,716. See p. 101.

*Polygala sanguinea L., forma albiflora (Wheelock) Millsp. Greensville Co.: swaley clearing along Quarrel's Creek, below Pair's Store, no. 14,632. See p. 99.

*Cyrilla racemiflora L., var. subglobosa Fernald in Rhodora, xlvi. 46, t. 813, figs. 1 and 2 (1944). Known only from a wooded swamp along Mill Creek, north of Skipper's, Greensville Co.

The Identity of Michaux's Acer barbatum.—For many years the northern and montane Sugar-Maple, *Acer saccharum* Marsh., at least in part, was called *A. barbatum* Mich. Fl. Bor.-Am. ii. 252 (1803). This name was used by Sargent, Silva, ii. 97 (1891), Sargent then including under it the northern Sugar-Maple, *A. saccharum* Marsh., the Black Sugar-Maple, *A. nigrum* Michx. f., the Southern Sugar-Maple or Sugartree, *A. floridanum* (Chapm.) Pax, the southwestern *A. grandidentatum* Nutt. and some others—an all-inclusive species later better understood and broken up by him (Man. Trees N. A.) into five species: *A. saccharum* with bark "becoming on large trunks ½′–¾′ thick and broken into deep longitudinal furrows, . . . gray-brown", leaves pale beneath and "glabrous" (or in the var. *Schneckii* Rehd. of the Interior pubescent beneath), "calyx . . . greenish yellow, hairy on the outer surface", fruit "glabrous", etc.; *A. nigrum* Michx. f. with bark "becoming on old trunks thick, deeply furrowed, and sometimes almost black", leaves "with a broad sinus usually more or less closed . . . , dull green on the upper surface, yellow-green and soft-pubescent . . . on the lower surface, . . . with drooping sides", "flowers yellow, . . . calyx . . . pilose on the outer surface near the base", "fruit glabrous"; *A. floridanum* (Chapm.) Pax, with bark "thin, smooth, pale", leaves "at maturity . . . pale and pubescent below", "rounded, truncate or slightly cordate at the broad base", calyx "ciliate on the margin with long pale hairs", fruit "villose until fully grown"; the shrubby green-leaved and light-barked *A. leucoderme* Small, with "calyx glabrous or slightly villose", "fruit villose . . . until nearly grown"; and the western *A. grandidentatum* Nutt.

When, in Rhodora, xliv. 359 and 360 and 426–428, plates 725–727 (1942), I discussed the variations of *Acer floridanum*, I mistakenly assumed that the almost universal[1] reduction by students of trees of *A. barbatum* Michx. to the glabrous-leaved northern and montane *A. saccharum* (or *A. saccharophorum* K. Koch) meant that they had settled that point, in my general ignorance of trees supposing it unnecessary to look up my notes made in 1903, when I studied the Michaux material. Michaux in his Flora Boreali-Americana showed clear understanding of our maples, and the specimens in his herbarium closely match his descriptions. Passing *A. pensylvanicum, montanum, rubrum* and *Negundo*, we have three species of his Flora to consider: *A. saccharinum* "L.", *A. barbatum* Michx. and *A. eriocarpum* Michx. As said, the material in the Michaux Herbarium at Paris definitely fits his descriptions.

A. eriocarpum was described: "foliis palmato-5-lobis, inaequaliter dentatis, subtus glabriusculis glaucisque; sinubus obtusis: floribus fertilibus subsessiliter conglomeratis. *A. tomentosum. Hort. paris.* Obs. Fructus junior lanosus; maturus

[1] In Rhodora, xxiv. 79 (1922) Ashe spoke of *A.* "*barbatum* Mx. (*A. floridanum*) (Chap.) Pax" but he did not here discuss his identification.

pubens, alis amplissimis, decussato-convergentibus". This is, as it should be from the description, the River-Maple, *A. saccharinum* L., not Wangenheim and others.

Acer saccharinum of Michaux (following Wangenheim) included the two northern Sugar-Maples, *A. saccharum* Marsh. in part (*A. saccharophorum*) and *A. nigrum* Michx. f. There are two sheets in the Michaux Herbarium, with the small labels probably interchanged by the post-Michauxian mounter. The labels read: "Rivière Sagney et tout le Canada" and "Kentucky, Ohio et Tenassee". One is, as my notes say, "the common Sugar Maple of New England and Quebec", i. e. *A. saccharum*. The other, the tree collected by Michaux on his trip down the Ohio, is, my notes say, "the best kind of *A. nigrum*". When we compare these, "*Hab.* a sinu *Hudson* ad Carolinam et Tennassée", with Michaux's "*Obs.* Habitus *A. platanoidis*. Folia modo, uti supra dicti, subtus glabella, modo pubentia", it is evident that the *A. saccharinum* of Michaux was both the glabrous-leaved *A. saccharum* and the pubescent-leaved *A. nigrum*. That being the case and Michaux a remarkable observer, why should he describe the Sugar-Maple of the North all over again, in the very next paragraph, and why give the name *A. barbatum* (bearded) to the glabrous or essentially glabrous northern and montane tree which he so well knew?

The answer is, that *Acer barbatum* Michaux, as shown by his material, is *A. floridanum* (Chapm.) Pax (1886). *A. barbatum* "*Hab.* in Carolina" "foliis breviter trilobis" had the "flores pallido-viriduli", the "Calyces masc. intus densissima barba obsiti", whence the specific name. The calyces of *A. floridanum* are striking in anthesis on account of the long setiform beard projecting from the summit, the beard particularly conspicuous in the hermaphrodite flowers because it also covers the prolonging ovary. Now, more than 40 years late, I read in my notes on the Michaux material, examined when I had never heard of the pubescent-leaved southern *A. floridanum* (Chapm.) Pax with bearded calyx, these items: "*A. barbatum*, flowering branches of *very pubescent A. saccharum* (Sugar-Maple), nos. 1, 2, 3, 4, & 5. 6 = leaves and 7 fruit of *A. rubrum!*", the latter doubtless due to confusion during handling.[1]

[1] Torrey and Gray, neither of them knowing *Acer floridanum*, wrote: "We suspect,

In view of the general abundance in the Piedmont and Coastal-plain areas of the Carolinas, thence to Florida and west to Texas (inland to southeastern Missouri), of this characteristic tree with thin and pale bark, leaves pale and pubescent beneath, and flowers bearded at summit, it would seem very strange if the tree were not separated until Chapman noted it in 1860 as a variety, and that its specific separation should have waited for Pax in 1886. Michaux knew it and gave it a descriptive name in 1803!

This interpretation gains support from the known ranges of *A. saccharum* and *A. floridanum* in North Carolina. I quote from Coker and Totten, Trees of North Carolina, 79 (1916). Under *A. saccharum*, Sugar-Maple, they say: "plentiful in our mountain valleys and slopes . . . Ayers and Ashe remark that it is 'Common . . . above an elevation of 2000 feet on cold moist soil'", while *A. floridanum*, Southern Sugar-Maple, "takes its place in the Piedmont and coastal plain regions of this state and from thence southward". Michaux, with vast experience in the North, where *A. saccharum* (his *A. saccharinum*) grew on "Rivière Sagney et tout de Canada", but also, more broadly, "a sinu *Hudson* ad Carolinam et Tennassée", would not redescribe it in the very next paragraph, if he considered it identical with the more northern and upland trees just described, as a second species from Carolina, with copiously bearded calyx-throat and there collect specimens with flowering branches very pubescent. Such a tree from eastern Carolina, with its characteristically paler and smoother bark could hardly have been missed by him. While I regret the necessity to change, I feel that *Acer barbatum* should finally be recognized for what it is. I am, therefore, forced to the following transfers.

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indeed, that the description of A. barbatum, *Michx.* was drawn up, at least as to the flowers and fruit, from specimens of A. saccharinum [meaning Sugar-Maple]; the only species, so far as we are aware, which has the sepals bearded inside"—T. & G. Fl. i. 249 (1835). In the Supplement, after Gray had seen the Michaux material, he reaffirmed this judgment, saying: "*A. barbatum* (Michx.!) should be discarded as a species, it having been founded (as we had indeed long suspected) upon the flowers of A. saccharinum, the fruit of A. rubrum, and a leaf of something else, apparently of A. spicatum, (v. sp. in *herb. Michx. propr. & herb. Richard.*)—T. & G. l. c. 684 (1840). Gray, apparently, was not disturbed by the very pubescent branchlets; neither was he troubled when he found that "*A. saccharinum* was wholly established by Linnaeus upon a specimen (leaves only) received from Kalm; which specimen, we find on inspection, belongs to A. dasycarpum! Still as the A. saccharinum of Wangenheim, Michaux, and all succeeding authors, is the true *Sugar-Maple*, a change in the application of the name would be unwarrantable."—T. & G. l. c. That happy period is gone.

Acer barbatum Michx. Fl. Bor.-Am. ii. 252 (1803), not Sargent and later auth. *A. floridanum* (Chapm.) Pax, var. *villipes* Rehder in Sargent, Trees and Shrubs, ii. 255 (1913). *A. floridanum*, forma *villipes* (Rehder) Fernald in Rhodora, xliv. 426, t. 725, fig. 3, and 727, fig. 4 (1942).

A. barbatum, forma **floridanum** (Chapm.), stat. nov. *A. saccharinum*, var. *floridanum* Chapm. Fl. So. U. S. 81 (1860). *A. floridanum* (Chapm.) Pax in Engler, Bot. Jahrb. vii. 243 (1886). *A. barbatum*, var. *floridanum* (Chapm.) Sargent, Garden & Forest, iv. 148 (1891) and Silva, ii. 100, t. xci. fig. 4 (1891); Fernald in Rhodora, l. c. t. 725, figs. 1 and 2, and 727, fig. 3 (1942).

A. barbatum, var. **Longii** (Fernald), comb. nov. *A. floridanum*, var. *Longii* Fernald in Rhodora, l. c. t. 726 (1942).

A. barbatum, var. Longii, forma **platylobum** (Fernald), comb. nov. *A. floridanum*, var. *Longii*, forma *platylobum* Fernald, l. c. t. 727, figs. 1 and 2 (1942).

To the Virginian records add the following from the Roanoke drainage.

A. barbatum Michx., forma floridanum (Chapm.) Fernald, supra. Brunswick Co.: bottomland woods along Poplar Creek, southwest of Ebony, no. 14,636. See p. 96.

A. barbatum, var. Longii (Fernald) Fernald, supra. With the last, no. 14,637. See p. 96.

Vitis cinerea Engelm. Local range extended inland to western Greensville Co.: bottomland woods along Quarrel's Creek, below Pair's Store, no. 14,723. See p. 101.

Viola Stoneana House. To the single record from southeastern Virginia (Princess Anne Co.) in Rhodora, xxxviii. 436 (1936) add the following. Norfolk Co.: rich deciduous wooded ridge above swamp, near Gertie, no. 14,201. Dinwiddie Co.: border of swampy woods southwest of Carson, no. 7542. Greensville Co.: rich deciduous woods by Metcalf Branch, east of Emporia, no. 9102; rich deciduous wooded slope by Three Creek, slightly above the "fall-line", northwest of Emporia, no. 11,872. Brunswick Co.: mixed woods, Seward Forest, south of Hobbs Store, no. 14,725. Mecklenburg Co.: dry wooded ridge north of Roanoke River, near Goode's Ferry, no. 7115.

Other specimens, one from Stony Man Mountain, identified by Brainerd in 1914, coll. *Steele & Steele*, no. 106, others from Alexandria Co., *Steele*, are in the Gray Herbarium. It is, therefore, a bit surprising to note the restricted range recorded by Brainerd in his Violets of North America, 21 (1921): "It is of limited range—moist woodlands New Jersey, eastern Pennsylvania to the vicinity of the District of Columbia". The Check-list of Plants in the Washington-Baltimore Area (1941) does not mention it. Very slight effort would probably extend its range from southeastern Virginia into eastern North Carolina.

*Rhexia virginica L., var. septemnervia (Walt.) Pursh. Frequent on the Coastal Plain, all collections but the first by *Fernald & Long*. James City Co.: Sphagnum-Magnolia swamp, 4 miles west of Williamsburg, *Grimes*, no. 4315. Norfolk Co.: wet peaty clearings in woods of *Pinus serotina*, south of Grassfield, no. 4063. Nansemond Co.: low sandy woods along Nansemond River, east of Cahoon Pond, northwest of Suffolk, no. 13,701; border of low woods northeast of Baines Hill School, no. 13,979. Sussex Co.: border of wet woods, Coppahaunk Swamp, southeast of Waverly, no. 10,746; swampy woods north of Jarratt, no. 12,749. Prince George Co.: exsiccated argillaceous swale about 3 miles southeast of New Bohemia, nos. 6299 and 6842.

Rhexia virginica, var. *septemnervia* is the extremely coarse variation of the species, originally described by Walter, Fl. Carol. 130 (1788) with "caule 4 s. 5-pedali". It is not only much taller than typical *R. virginica;* its aggregate of characters mark it as a good variety of the southern Coastal Plain, occurring from Florida to Louisiana, northward to southeastern Virginia, whereas the smaller typical *R. virginica* occurs from Nova Scotia to southern Ontario and Minnesota, thence south to Georgia, Alabama, Tennessee and Missouri, often ascending to high altitudes (up to 2300 ft. in North Carolina and Tennessee). I distinguish the two as follows

R. virginica (typical): stem 1–5 (exceptionally to 10) dm. high, 1–4.5 mm. thick toward base (excluding spongy tissue when present), its angles with wings 0.1–rarely 1 mm. wide; larger leaves 0.5–3 cm. broad, those at base of inflorescence 0.5–2 cm. broad, their longer teeth 0.5–1.2 mm. long; flowers 1–50 (rarely –100).

Var. septemnervia: stem (0.6–) 0.8–1.6 m. high, 5–8 mm. thick, its conspicuous thin wings 1–2 mm. wide; larger leaves 2–4 cm. broad, those at base of inflorescence 1.5–3 cm. broad, their longer teeth 1–1.5 mm. long; flowers 20–200 or more.

Ludwigia glandulosa Walt. Local range extended inland from Coastal Plain to western Greensville Co.: border of Mitchell's Millpond, west of Brink, no. 14,641; muddy margin of Fontaine Creek, at mouth of Quarrel's Creek, no. 14,727. See p. 101.

*Circaea canadensis Hill, var. **virginiana**, var. nov. (tab. 896, fig. 1–4) rhizoma firma 2.5–3 mm. crassa; foliis firmis cordatis undulato-dentatis; racemi rhachi pedicellisque valde villosis, pedicellis ad basin purpurascentibus; sepalis dorso villosis.—Brunswick County, Virginia: rich woods, associated with *Sanicula Smallii* Bickn., "Chamblis bigwoods", Seward Forest, near Triplett, June 23, 1944, *Fernald* (and *J. B. Lewis*), no. 14,643 (type in Herb. Gray; isotype in Herb. Phil. Acad.). See p. 97.

Circaea canadensis Hill (1756), as revived by me in Rhodora, xix. 86, 87 (1917), is a plant of rich or alluvial woods; in America occurring from the Gaspé Peninsula to Lake St. John, Quebec, south to Nova Scotia, southern Maine, southern New Hampshire, western Massachusetts and Connecticut, New York and upland West Virginia. Although having the essential characters of the more northern plant, var. *virginiana* differs in some notable points: its rhizome is stiffer and thicker than in most of the northern material, though in occasional northern plants quite as stout; its leaves are of firmer texture than in most (but not all) of the northern series, the petiole relatively short, the definitely cordate blade (figs. 1 and 2) merely undulate-dentate (in typical *C. canadensis* (fig. 5) the membranaceous long-petioled blade merely rounded or subcordate, rarely definitely cordate, at base, and coarsely sharp-dentate); in var. *virginiana* the bases of the pedicels (and sometimes the adjoining rachis) are conspicuously deep purple (in typical *C. canadensis* only faintly so); in var. *virginiana* the backs of the calyx-lobes are somewhat spreading-villous, in typical *C. canadensis* mostly glabrous. It may prove that the petals are shorter in var. *virginiana*, the material being too inadequate to warrant a definite assertion. The 2-locular fruits seem inseparable from those of *C. canadensis.*

Var. *virginiana* is geographically far removed from the typical northern (and Eurasian) plant. Its type-station is in rich woods at the base of a slope (alt. about 200 feet) in the Seward Forest, where, as stated, it is associated with unusually abundant and southern *Sanicula Smallii* (Florida to eastern Texas, north to southern Virginia, Tennessee and southeastern Missouri), other occupants (some of them scarce) of these rich woods including such southern species as *Zizia trifoliata* (Michx.) Fern. (*Z. Bebbii* (Coult. & Rose) Britton), *Ligusticum canadense* (L.) Britt., *Carex oxylepis* Torr. & Hook. and *C. flaccosperma* Dew., *Polymnia Uvedalia*, var. *densipila* Blake (Bermuda, and Missouri to Louisiana and eastern Texas), etc. These are not the northern species with which typical *Circaea canadensis* is usually associated. Further collections, which will doubtless be made elsewhere in the South, may reveal other and stronger differences.

PLATE 896, FIGS. 1–4, CIRCAEA CANADENSIS Hill, var. VIRGINIANA Fernald, all from TYPE: FIG. 1, a plant, × ½; FIG. 2, leaf, × 1; FIG. 3, portion of inflorescence, × 10; FIG. 4, fruit, × 10. FIG. 5, typical C. CANADENSIS: half of characteristic leaf, × 1, from Frankfort, Maine, *Fernald & Long*, no. 14,208.

SANICULA SMALLII Bickn. To the few recorded Virginian stations add a prosperous one in BRUNSWICK Co.: rich woods, "Chamblis bigwoods", Seward Forest, near Triplett, no. 14,644. See p. 97.

*ERYNGIUM PROSTRATUM Nutt., var. **disjunctum,** var. nov. (TAB. 897, FIG. 1–3, TAB. 898, FIG. 1), fructu plus minusve obconico 0.6–0.9 mm. longo 0.5–0.6 mm. lato.—Southampton Co., VIRGINIA: moist sandy and peaty shore of Whitefield's Millpond, southwest of Corinth, July 7, 1943, *Fernald & Long*, no. 14,375; Sept. 18, 1944, *Fernald* (with *J. B. Lewis*), nos. 14,728 (TYPE in Herb. Gray.; ISOTYPES in Herb. Phil. Acad. and elsewhere), 14,729 and (in wet litter and humus under shrubs at upper border of beach) 14,730. See p. 103.

Eryngium prostratum Nutt. has the usually depressed-cupuliform or subglobose fruits (PLATE 897, FIG. 4) 0.8–1 mm. broad and mostly shorter (0.4–0.6 mm. high or long), with the scattered papillae capitate or barely stalked. It occurs from northern Florida to eastern Texas, northward to southeastern South Carolina, southwestern Georgia, southwestern Kentucky and western Tennessee, southeastern Missouri and eastern Oklahoma. It thus has a wide Coastal Plain range, largely on the Gulf Coastal Plain and along the Mississippi Embayment. Var. *disjunctum*, removed by 360 miles from the northeastern known limit of typical *E. prostratum* (Cambahee River, southwest of Hendersonville, Colleton Co., South Carolina, *Wiegand & Manning*, no. 2263), by about 500 miles from the nearest station (muddy shore of small pond near Flint River, Sumter Co., (*Harper*, no. 1047) in Georgia, and by 600 miles, with the Cumberland Plateau and the Appalachian Upland intervening, from the easternmost station in Kentucky (gravelly edge of small creek, 3 miles south of Murray, Calloway Co., *Smith & Hodgdon*, no. 4149), shows a type of geographic affinity which we find in many plants of southeastern Virginia.

Superficially and in the great range of ecological variation in response to lack of or abundance of moisture and shade, the plant of Whitefield's Pond closely matches typical *E. prostratum*, but its fruits (PLATE 897, FIG. 3) are usually more elongate, tending to obconic, usually narrower than in the typical form and with stipitate papillae. At the type-locality the plant is excessively variable. When discovered in early July, 1943, the loosely ascending stems were only 5–15 cm. long. In mid-September, 1944, they were prostrate, rooting at all but the lower nodes and up to 4.5 (rarely –6) dm. long. On open sand the basal leaf-blades ranged from 1.5–3 cm. long and 0.8–2 cm. broad, the cauline leaves 2–10 mm. wide (PLATE 897, FIG. 1). Nearer the water the leaves were thinner and larger, while in the loose litter and humus in the shade of the thicket the plants (PLATE 898, FIG. 1) scarcely yet fruiting, had basal blades 4–7 cm. long and 2–4.3 cm. broad, the cauline leaves often nearly as broad.

The latest treatment of the genus with us seems to be the *Synopsis of the North American Species of Eryngium* by Mathias and Constance in Am. Midl. Nat. xxv. 361–387 (1941). There they assign our two prostrate species, *E. prostratum* Nutt. and *E. Baldwini* Spreng., the following ranges: *E. prostratum*, "Tennessee to Florida west to Missouri and Texas"; *E. Baldwini* "Southeastern Georgia to Florida". Much earlier, in 1888, Coulter & Rose, Revis. N. Am. Umbelliferae, 102 (1888), cited *E. prostratum* from Georgia and Kentucky, and later, in their *Monograph of the North American Umbelliferae*, Contrib. U. S. Nat. Herb. vii. no. 1: 46 (1900), they also cited material of *E. prostratum* from Indian Territory (now Oklahoma). In the small representation in the Gray Herbarium *E. prostratum* is represented from South Carolina, Georgia, Florida, Kentucky, Tennessee, Mississippi, Missouri, Arkansas, Louisiana, Oklahoma and Texas, as well as Virginia (var. *disjunctum*). It is too bad that the authors of the recent *Synopsis*, who (their p. 361) cite the Gray Herbarium as having lent material of the genus, did not check the representation there (and evidently in other herbaria).

Although in their Monograph of 1900 Coulter & Rose, l. c. 45, assign the quite distinct *Eryngium Baldwini* (altered by them to *"baldwinii"*) the range "from Georgia and Florida to Louisiana and Missouri", they added the significant "although all the material we have seen is from Florida". The small series in the Gray Herbarium shows 3 numbers from Georgia, many from Florida, but none from farther west; but, in view of the many characters distinguishing *E. Baldwini* and *E. prostratum*, the only distinctions given in the recent *Synopsis* are bound to perplex the beginner:

"Involucral bracts shorter than the heads; bractlets exceeding the fruit; fruit 1 mm. in diameter..................39. *E. Baldwini.*
Involucral bracts equalling the heads; bractlets shorter than the fruit; fruit 2 mm. in diameter................40. *E. prostratum.*"

In attempting to identify plants by these characters one quickly finds the length of bracts very unstable but the length of bractlets very constant, while it is most difficult in *E. prostratum* to find any ripe fruits more than half the diameter here assigned them (see PLATE 897, FIG. 4), unless, perchance, they referred to the persistent calyx-segments which cap the fruit. In *E. prostratum*, typical, the cauline leaves have dilated, flat and entire to coarsely toothed or cleft blades, in *E. Baldwini* (PLATE 899), to quote Coulter & Rose, they are "3-parted (rarely entire or lobed), the divisions from lanceolate to filiform". In *E. prostratum* all but sometimes the uppermost bractlets are shorter than the flowers, so that the summits of the loosely spreading-ascending perianth are evident, the bractlets, often appressed to the young flower, being coarsely trident-shaped, with the 2 lateral lobes broad, thus suggesting the bracts of *Betula populifolia;* the mature head is 3–10 mm. long and subtended by an involucre of variable length, sometimes (but rarely) as prescribed, equaling the heads (PLATE 898, FIG. 2), often (FIG. 3) two thirds as long, again (FIG. 4) barely half as long, and sometimes (FIG. 5) so short as scarcely to equal half the diameter of the head! In *E. Baldwini* (PLATE 899), on the other hand, the bractlets are as stated by Mathias & Constance, "exceeding the fruit", so that the erect and connivent calyx-segments are prevented from spreading. Incidentally the long bractlets are lance-attenuate and entire (not broadly 3-lobed). The mature head (FIGS. 3–5) is 2–6 mm. high, usually with very short involucres (FIG. 3) but sometimes with them half as long as the head (fig. 4) or rarely quite as long (fig. 5). The best character, in addition to the foliage and bractlets, is in the mature fruit. In *E. prostratum* the large calyx-segments, capping the fruits (plate 897, figs. 3 and 4), are divergent to only loosely ascending and the papillae on the body of the fruit are scattered. In *E. Baldwini* the persistent calyx-segments are erect and strongly connivent above (plate 899, fig. 2) and the papillae are closely crowded.

Since the strongest specific characters of these two species have been previously so little clarified, it seems desirable to show them in the accompanying plates. It is also important to discuss the characteristic and strictly erect plant of the South which passes as *Eryngium integrifolium* Walt. Fl. Carol. 112 (1788). Taking the characters chiefly from Coulter & Rose, Contrib. U. S. Nat. Herb. vii. 48, we get

> Erect, 3 to 9 dm. high, branching above; leaves oblong or oblong-obovate, the basal ones entire or crenately toothed [very rarely entire; Small says simply "serrate-crenate"], upper ones becoming sharply serrate or even laciniately toothed; bracts linear and entire or with 2 to 4 prickly teeth longer than the heads; bractlets equally 3-cuspidate, longer than the flowers.

Now, taking the characters of *E. prostratum* chiefly from Coulter & Rose, l. c. 45, we get

> Prostrate, diffusely branched; lower leaves oblong, entire, few-toothed, or lobed at base, the upper ovate, few-toothed or entire, with some additional trifid ones; bractlets very small [broadly trifid above].

The reason for intruding *Eryngium integrifolium* into the discussion is, that Walter, in describing it, may have had *E. prostratum* Nutt. before him. Torrey & Gray, uniting *E. prostratum* and *E. Baldwini* as a single species, referred *E. integrifolium* with doubt to the aggregate; and in other works, like Watson's *Bibliographic Index* and *Index Kewensis*, it has been similarly referred to *E. prostratum* as a doubtful earlier name, but not formally taken up, since no *E. prostratum* was actually known from South Carolina. Now, however, with good material of it known from near Hendersonville in Colleton Co., only about 45 miles from Charleston, Walter's species comes into the picture. Here is Walter's account *integrifolium* 3. caule procumbente ramoso; foliis radicalibus rotundatis, integris, planis; foliis caulinis nervosis, ovato lanceolatis, apice serratis basi integris, serraturis subspinosis; foliis floralibus trifidis; paleis trifurcis; capitulis parvis caeruleis.

Obviously *caule procumbente* is far from good for the tall (up to 9 dm.) and erect so-called *Eryngium integrifolium* of recent treatments (*E. virgatum* Lam.), but it is the striking habital character of *E. prostratum*. *Caule ramoso* would do for either (if the larger and somewhat forking plants of *E. virgatum* are considered). *Foliis radicalibus rotundatis* is as poor for one as for the other. *Foliis integris* is perfect for most material of the procumbent *E. prostratum*, not at all good for characteristic *E. virgatum*. *Foliis caulinis nervosis, ovato-lanceolatis* would do for either, while *apice serratis basi integris* is good for *E. prostratum*, not for *E. virgatum;* and *serraturis subspinosis* is perfect for *E. virgatum*. *Foliis floralibus trifidis* is good for *E. virgatum*, in which occasional involucral bracts are 3-cleft; and *paleis trifurcis* is unquestionably good for the long 3-cleft bractlets of the latter, the 3-forked pales (bractlets) of *E. prostratum* being hidden in the head. *Capitulis parvis caeruleis* is all right for either. It is difficult to reconcile the procumbent stem, entire basal leaves and cauline leaves with entire bases and teeth only at apex, with *E. virgatum*. The other characters, when not shared by both species, are better for that than for *E. prostratum*. It is also difficult to imagine Walter confusing such very different species. When Coulter & Rose, considered whether Walter's *E. integrifolium* might be either *E. Baldwini* or *E. prostratum*, they concluded: "But Walter's description is so meagre [mixed or confused would have been better], and the two species in question so variable, that there seems to be no way of positively determining which one of them is *E. integrifolium* Walter"—C. & R., Revis. N. Am. Umbelliferae, 102 (1888). Soon thereafter, two distinguished botanists at the British Museum of Natural History, James Britten and Edmund G. Baker, took up the point:

> E. INTEGRIFOLIUM Walt. Fl. Carol. 112 (1788). Messrs. Coulter & Rose . . . say that it "seems impossible to determine" this plant. The specimen in Walter's Herbarium, however, although fragmentary, is clearly identical with *E. virgatum* Lam. as was indeed correctly indicated by Sprengel (Syst. i. 870) in 1825. Walter's name must therefore

be substituted for Lamarck's.—Britten & E. G. Baker, Journ. Bot. xxxviii. 244 (1900).

In view of the facts, that Walter's own herbarium is lost, that the series which John Fraser carried to England was many times handled[1] and its specimens given to those who were specially interested,[2] and that it had at least one change of lodging before it reached the British Museum, one can hardly escape the conviction that the specimen discussed by Britten & Baker does not tell the whole story.

Plate 897, figs. 1–3, Eryngium prostratum Nutt., var. disjunctum Fernald: fig. 1, portion of type, × 1; fig. 2, head, × 5, from type; fig. 3, fruits, × 10, from type. Fig. 4, typical E. prostratum: fruits, × 10, from Saratoga, Mississippi, *Tracy*, no. 8631.

Plate 898, figs. 2–5, Eryngium prostratum Nutt., heads, × 5: fig. 2, from Chattahoochee River, Seminole Co., Georgia, *Eyles*, no. 7081; fig. 3, from Lake Charles, Louisiana, *Allison*, no. 210; fig. 4, from Sapulpa, Oklahoma, *Bush*, no. 193; fig. 5, from southwest of Hendersonville, South Carolina, *Wiegand & Manning*, no. 2263. Fig. 1, var. disjunctum Fernald; base of very large plant, × 1, from type-station, *Fernald*, no. 14,730.

Plate 899, Eryngium Baldwini Spreng.: fig. 1, base and median node, × 1, from Indian River, Florida, *Curtis*, no. 1002; fig. 2, fruits, × 10, from north of Waverly, Camden Co., Georgia, *Wiegand & Manning*, no. 2259; fig. 3, head, × 5, from no. 2259; fig. 4, head, × 5, from Shell Island, Florida, *Tracy*, no. 7446; fig. 5, head, × 5, from Fort Myers, Florida, *J. P. Standley*, no. 108.

Cornus foemina Willd. (*C. stricta* Lam.). Range extended inland to Brunswick Co.: wooded swamp along Quarrel's Creek, "Chamblis bigwoods", Seward Forest, near Triplett, no. 14,732. See p. 101.

Nyssa sylvatica Marsh., var. biflora (Walt.) Sarg. Local range extended inland to Brunswick Co.: along Sawmill Branch, Seward Forest, near Triplett, no. 14,647.

N. sylvatica, var. caroliniana (Poir.) Fernald in Rhodora, xxxvii. 436, pl. 400 (1935). Local range extended to Brunswick Co.: "Chamblis bigwoods", Seward Forest, near Triplett, no. 14,648.

Rhododendron canescens (Michx.) Sweet. Local range extended inland to Brunswick Co.: by small branch in woods, Seward Forest, east of Hobbs Store, no. 14,733.

*Leucothoe axillaris (Lam.) D. Don., var. **ambigens**, var. nov. (tab. 901), a var. typica differt foliis lanceolatis vel lanceolato-oblongis superna sensim angustatis acuminatis; racemorum

[1] "Walter in his Flora Caroliniana has another species . . . Of this plant I was not able to find any information in his Herbarium."—Pursh, Fl. Am. Sept. 415 (1814). If we accept the reputation given Pursh by Thomas Nuttall and other contemporaries, it is a wonder that any of Walter's plants were preserved for inspection by later students!

[2] See Fernald & Griscom, Rhodora, xxxix. 497 (1937).

bracteis subrotundis obtusis; sepalis oblongo-ovatis obtusis.—Swampy woods and clearings, southeastern Virginia to Florida. VIRGINIA: by Lake Drummond, Great Dismal Swamp, Norfolk Co., April 8, 1939, *J. T. Baldwin, Jr.*, no. 120; swampy woods, west end of Lake Drummond, Nansemond Co., Dec. 30, 1938, *Fernald & Long*, no. 9683; border of pine woods near Benefit, Norfolk Co., May 7, 1935, *Fernald & Griscom*, no. 4480; low woods, Adams Swamp, Nansemond Co., April 9, 1937, *Fernald & Long*, no. 7124; Goodman Swamp, near St. Mary's Church, southwest of Whaleyville, Nansemond Co., Sept. 17, 1937, *Fernald & Long*, no. 7565; wet woods and clearings, Great Dismal Swamp, southeast of Whitemarsh School, Nansemond Co., Oct. 12, 1929, *Fernald & Long*, no. 11,600 (autumnal flowering); swampy thickets in sandy and peaty pine barrens, east of Cox Landing, south of South Quay, Nansemond Co., May 10, 1940, *Fernald & Long*, no. 11,887 (TYPE in Herb. Gray.); swampy pine woods south of Yadkin, Norfolk County, April 21, 1942, *Fernald Long & Abbe*, no. 14,213. NORTH CAROLINA: low oak-pine woods, 8 miles south of Williamston, Martin Co., June 21, 1927, *Wiegand & Manning*, no. 2373. SOUTH CAROLINA: locality not stated, type of *Andromeda axillaris, β.* Lam.; rich pine woods, Pine Island, Horry Co., April 9, 1932, *Weatherby & Griscom*, no. 16,608. FLORIDA: several sheets without further data, *Chapman*.

Leucothoe axillaris, var. *ambigens* is so named because of the extreme doubt, which, until after the war, cannot be removed, as to its exact identity. That it is an extreme variety of *L. axillaris* (Lam.) D. Don there can be no doubt, but whether it has one or more earlier names is the problem. The type of *Andromeda axillaris* Lam. Encycl. i. 157 (1783) is shown in PLATE 890, FIG. 1. It is the extreme of the species with ovate, oval or ovate-oblong leaves abruptly short-tipped, the shrub which abounds on the Coastal Plain, from Florida to Louisiana, northward to North Carolina and, less characteristically and locally, into southeastern Virginia (swamp of Nottoway River, Smith's Ferry, Southampton Co., *Fernald & Long*, no. 7935; swampy woods north of Whitemarsh School, Nansemond Co., *F. & L.*, no. 10,764), both of the Virginia collections being transitional to var. *ambigens*.

There are two very similar species, *Leucothoe axillaris* of the Coastal Plain, and the shrub of the mountain-region which passes, perhaps incorrectly, as *L. Catesbaei* (Walt.) Gray (PLATE 902). *L. axillaris*, when it lives up to the type (PLATE 900, FIG. 1) and to Gray's description in the Synoptical Flora, "leaves from oval to oblong-lanceolate . . . , mostly with an abrupt acumination, serrulate mainly toward the apex," is easily distinguished because the bracts of the young raceme are broadly rounded and the broad ovate-oblong sepals blunt, whereas the mountain species which we call *L. Catesbaei* (PLATE 902) has "leaves ovate-lanceolate to lanceolate and tapering into a long and slender acumination, serrulate throughout" and the bracts are acute, the acutish sepals narrow. *L. axillaris*, var. *ambigens* has leaves which can easily be matched by those of the upland species and in some collections, such as *Fernald & Long*, no. 7565, sharp serrulations extend three-fourths to the base, more strongly than in much of *L. "Catesbaei"*.

Now the difficulty is, that Walter could hardly have escaped seeing either typical *Leucothoe axillaris* or transitional forms or var. *ambigens* somewhere in the eastern Carolinas or Georgia, for either typical *L. axillaris*, the extreme described as *L. platyphylla* Small in Bull. Torr. Bot. Cl. xxviii. 290 (1901) (PLATE 900, FIGS. 2 and 3), or intermediates or extreme var. *ambigens* are in his territory, as shown by abundant specimens. Nevertheless, the only evergreen *Andromeda* of this affinity described by Walter was his

> *A. Catesbaei* 3. racemis ovatis axillaribus, corollis ventricoso tubulosis bracteatis; foliis alternis petiolatis, ovato-lanceolatis, serrulatis, crassis, perennantibus.—Walt. Fl. Carol. 137 (1788).

When, not realizing that the Coastal Plain species may also have ovate-lanceolate or narrower leaves "serrulatis", Gray examined Walter's type he merely made the memorandum that it " = *A. spinulosa* Pursh." But Pursh had some points scrambled, for he described *A. axillaris*, with a var. *longifolia* (foliis lineari-lanceolatis *longissimis*) from "the mountains of Virginia to Georgia", whereas the type of *A. axillaris* is of the shortest- and broadest-leaved extreme of the Coastal Plain species! As to *A. spinulosa* Pursh, with *A. Catesbaei* cited as a synonym, his description seems to be that of the montane species, although he specifically assigned it to "Lower Carolina", the Coastal Plain region.

Since none of the original descriptions note any of the really distinctive characters, while those botanists who early applied or misapplied the names did not seem to understand them, we are left with the problems as to the true identities of *Andromeda Catesbaei* Walt. and of *A. spinulosa* Pursh. It is not unreasonable to suppose that, when the types can be studied with the real specific differences in mind, we may have to reduce *A. Catesbaei* Walt. to the Coastal Plain species and to decide on the proper name for the montane one.

It is not without interest that Lamarck recognized two varieties of his *Andromeda axillaris:* the typical plant, "foliis ovatis", and β. "foliis lanceolatis", but he gave no name to the latter; the specimen, as shown by a photograph of it, being *Leucothoe axillaris* var. *ambigens* from South Carolina.

PLATE 900, LEUCOTHOE AXILLARIS (Lam.) D. Don: FIG. 1, TYPE of *Andromeda axillaris* Lam., × ½, after *Cintract;* FIG. 2, flowering branch of *L. platyphylla* Small, × 1, from Emanuel Co., Georgia, *Harper*, no. 2093; FIG. 3, portion of inflorescence, to show blunt bracts and calyx-segments, × 4, from near Augusta, Georgia, *Olney & Metcalf*.

PLATE 901, L. AXILLARIS, var. AMBIGENS Fernald: FIG. 1, portion of TYPE, × 1; FIG. 2, portion of inflorescence of TYPE, to show blunt bracts and calyx-segments, × 4.

PLATE 902, L. CATESBAEI (Walt.) Gray, as usually interpreted: FIG. 1, portion of flowering branch, × 1, from Biltmore, North Carolina, *Bilt. Herb.*, no. 1280^b; FIG. 2, portion of inflorescence, to show acute bracts and calyx-segments, × 4, from no. 1280^b.

VACCINIUM TENELLUM Ait. Range extended inland to GREENSVILLE Co.: sandy woods and thickets along Fontaine Creek, near Round Hill Church, no. 14,651.

LYSIMACHIA LANCEOLATA Walt. Very local in BRUNSWICK Co.: border of rich woods, Seward Forest, near Triplett, no. 14,652.

FRAXINUS CAROLINIANA Mill., var. PUBESCENS (M. A. Curtis) Fernald. Local range extended inland to western BRUNSWICK Co.: bottomland woods along Poplar Creek, southwest of Ebony, no. 14,653.

LIGUSTRUM SINENSE Lour. To the records from more easterly counties add one from GREENSVILLE Co.: thicket by Meherrin River, below Emporia, no. 14,604.

*PHACELIA FALLAX Fernald in RHODORA, xlvi. 51, t. 814 (1944). Known in Virginia only from GILES Co.: May, 1869, *Canby*.

*P. DUBIA (L.) Trel., var. INTERIOR Fernald in RHODORA, xlvi. 54, t. 816, fig. 4 (1944). ALLEGHANY Co.: dry roadside, Covington, *Hunnewell*, no. 4080.

*HELIOTROPIUM AMPLEXICAULE Vahl. HENRICO COUNTY: waste ground, Richmond, May 11, 1884, *J. R. Churchill* as *H. anchusaefolium* Poir.; waste places and roadsides, Richmond, *Fernald, Long & Smart*, no. 5904, as *H. europaeum* L. DINWIDDIE COUNTY: waste ground and cinders of freight-yard of

Atlantic Coast Line Railroad, Petersburg, *Fernald & Long*, no. 12,172, as *H. europaeum*.

H. amplexicaule Vahl, a decumbent perennial, with many soon forking branches, sessile or but short-petioled narrowly oblong-lanceolate leaves and lilac flowers in at first dense cymes, has fruit very similar to that of *H. indicum*. It was formerly erroneously reported as *H. europaeum*, an annual with 4-lobed (instead of 2-lobed) fruits and long-petioled elliptic leaves. The latter is before me from streets of Alexandria, Virginia, September 28, 1897, *Steele*. *H. amplexicaule* (with an often misleading name) is naturalized from South America.

Scutellaria parvula Michx., var. **Leonardi** (Epling), comb. nov. *S. Leonardi* Epling in Am. Journ. Bot. xxvi. 20 (1939). *S. parvula*, var. *ambigua* sensu Fernald in Rhodora, iii. 201 (1901), not *S. ambigua* Nutt. Gen. ii. 37 (1818). *S. ambigua* sensu Leonard in Contrib. U. S. Nat. Herb. xxii. 729 (1927), not Nutt. (1818).

When I identified this smoothish extreme of *Scutellaria parvula* as *S. ambigua* Nutt. I was apparently in error. Epling has stated that the Nuttall material at Kew, as well as the representation of it at the Philadelphia Academy, suggests a mixture of *S. nervosa* Pursh with *S. parvula*, var. *Leonardi*, only Epling, naturally, did not use the latter combination. He speaks of Leonard "who, in his careful and useful revision, recognized the specific distinctions clearly but, lacking access to the type, was misled as to the name." The "specific" distinctions are those of superficial pubescence and size and slight difference of shape of leaf-outline, points which, if treated as "specific", would break such a complex transcontinental series as *S. epilobiifolia* A. Hamilt. into many such "species". Yet Epling, in spite of a very real difference in the nutlets, throws the latter, not even as one of his "subspecies", back into the Old World *S. galericulata* L. As to the "specific distinctions clearly" "recognized" in Leonard's revision one finds himself in some perplexity. On p. 729 of his study, Leonard said under *S. parvula*: "*Scutellaria parvula* is closely related to *S. ambigua*, since both species have similar flowers and roots and resemble each other in habit. There are, however, certain striking differences. The stem of *S. ambigua* is glabrous, or, at most, roughened or finely puberulent on the angles, while its leaves are rather narrowly ovate or more nearly lanceolate, strongly involute, and not exceeding 7 mm. in width. . . . Plants are not uncommon, however, in the ample material of the U. S. National Herbarium, which seem to be intermediate between the two species."

Remembering, then, that *S. ambigua* sensu Leonard is "strikingly" different from *S. parvula* because its "stem is glabrous, or, at most roughened or finely puberulent on the angles" and the leaves are "strongly involute", we turn to the discussion of the former at the bottom of the page and read: "*Scutellaria ambigua* is a well-marked species, *readily distinguished from S. parvula by its minutely puberulent stem and* more pointed *leaves with revolute margins*" (italics mine). Furthermore, although Nuttall, in describing *S. ambigua*, definitely said, "Hab. In dry and open forests, Ohio", Leonard says: "Type locality: Council Bluff on the Missouri." It is too bad that the name *S. ambigua* does not really belong here. Some such name is needed for the "specific distinctions clearly" "recognized" in these quotations.

As I understand the Nuttall type of *Scutellaria ambigua*, Dr. Pennell having kindly sent me the specimen at the Philadelphia Academy for study, it is a stiff and thick-leaved extreme of *S. nervosa* Pursh, with the larger cauline leaves unusually small and subentire or barely dentate, narrowly ovate and 1.5–2.5 cm. long by 8–15 mm. broad. It is highly localized: on Linnaean Hill in the District of Columbia (*Steele* in U. S. Nat. Herb.), somewhere in Ohio, presumably near the Ohio River (Nuttall's type), near Blue Licks in northern Kentucky (*Short*) and on limestone outcrops at Mascot, Tennessee (*Billings, Cain & Drew*).

Typical *Scutellaria nervosa* is much more flexuous, with the leaves membranaceous, the larger median cauline ones broadly to narrowly ovate and dentate with several teeth on each margin, 2–5 cm. long by 1–3.25 cm. broad, the young foliage abundantly strigose on the upper face. This plant is of broad range in the Piedmont region and Appalachian Upland (Pursh's type, which Dr. Pennell has kindly sent me for study, coming from Winchester, Virginia) and only slightly and exceptionally intruding into the lower or flatter marginal areas. In its narrower- and firmer-leaved extremes it merges into *S. ambigua*. Superficially resembling typical *S. nervosa* is the plant of the outer Piedmont and Atlantic Coastal Plain region, crossing westward mostly north of the Appalachian Upland, as far as Iowa and found at relatively low levels along the Mississippi Valley. This extreme, which has the upper surfaces of the leaves glabrous, was called to my attention by Mr. Bayard Long. It and typical *S. nervosa* are neighbors near Philadelphia and Washington and at some points along the Ohio River but the general avoidance of the Appalachian Upland of the plant with upper leaf-surface glabrous is so evident from the 118 sheets of specimens before me that I am looking upon *S. nervosa* as consisting of three geographic varieties as follows. For the use of the material in their care I am greatly indebted to Dr. Fred J. Seaver of the New York Botanical Garden, Dr. Francis W. Pennell and Mr. Bayard Long of the Academy of Natural Sciences, Philadelphia, and Dr. William R. Maxon of the United States National Herbarium.

Scutellaria nervosa Pursh, var. **typica.** *S. nervosa* Pursh, Fl. Am. Sept. 412 (1814) from "the banks of rivulets: Virginia", Winchester, in the mountains. *S. gracilis* Nutt. Gen. ii. 37 (1818). *S. parviflora* Raf. ex A. Hamilt. Mon. Scut. 37 (1832) as a syn. of *S. gracilis* Nutt., without diagnosis. [Epling, Univ. Calif. Pub. Bot. xx. no. 1. 20 (1942) gives as the first synonym of *S. nervosa* "*S. teucrifolia* J. E. Smith, *in* Rees Cycl. 32, No. 15, 1816; a synonym, based upon the preceding [*S. nervosa*]". But, if he had looked up Smith's publication of 1819, not 1816, he could hardly have made that statement, for as no. 6 Smith maintained *S. nervosa*, taking his account from Pursh; while his no. 15, the new *S. teucrifolia*, was a segregation from the mixed *S. integrifolia* L. (1753), and he did not mention *S. nervosa* in his account of it. In fact, at the end of his discussion of *S. teucrifolia*, Smith explicitly said: "Mr. Pursh seems not to have recognized this plant. At least we can refer it to none of his species." See discussion under *S. elliptica* at end of this Contribution].—Eastern Pennsylvania to central Ohio, southern Indiana and southeastern Illinois, south in the Piedmont and among the mountains to western North Carolina and eastern Tennessee; also northwestern Louisiana.

*Var. **calvifolia,** var. nov., a var. *typica* recedit foliis supra glabris.—Northern New Jersey to southern Ontario, west to southeastern Iowa, s. on or near the Coastal Plain to Virginia, and in the interior to southern Ohio, southern Indiana and western Tennessee. The following are referred here. New Jersey: Little Falls, Aug. 22, 1889, *Geo. D. Hulst;* rare at foot of bluff in woods north of Weston's Mills below New Brunswick, *Mackenzie*, no. 7041; Lambertville, June 2, 1886, *R. E. Schuh*, May 28, 1921, *Mackenzie;* Princeton, 1883, *J. E. Peters;* along Crosswick's Creek, Bordentown, *Long*, no. 10,139. PENNSYLVANIA: along East Swamp Creek, Milford Square, *Long*, no. 34,645; Telford, *Benner*, no. 430½; Rockhill, July, 1882, *Fretz;* West Rockhill, June 6, 1926, *F. H. Strohm;* near Quakertown, June 3, 1894, *S. Brown;* near Tinicum Creek, Ottsville, *Long*, no. 33,392; Palm, June 18, 1925, *Mary H. Williams;* Sumneytown, May 30, 1903, *Albrecht Jahn;* near Ridge Valley Creek, Finland, *Long*, no. 24,787; Ivy Rock, May, 1894, *S. Brown*, May, 1906, *Long;* Byberry, *Martindale;* Manayunk, *C. E. Smith* and others; Fairmount Park, Philadelphia, *C. E. Smith;* banks of Schuylkill near Philadelphia, July, 1844, *Thurber;* ne. of Friedensburg, *Wilkens*, no. 5526; slope of Wagenhorst Hill, nw. of Kutztown, *Wilkens*, no. 5137; Conewago, May 28, 1889, *Heller*, *Small*, May 29, 1889, *Small;* limestone bluffs on Conestoga, above Lancaster, June 22, 1913, *Long;* Aspinwall, June 8, 1901, *J. A. Shafer*. DELAWARE: near Perry's Tavern, June 12, 1897, *Canby*. MARYLAND: Conowingo, May 30, 1907, *Bartram*, June 24, 1907, *J. J. Carter*. DISTRICT OF COLUMBIA: Insane Asylum woods, in vicinis Washington, May 21, 1879, *L. F. Ward*, May 26, 1889, *Coville*. VIRGINIA: rich sandy and loamy wooded slopes and clearings along Appomattox River, just above the "fall-line", about 2 miles west of Petersburg, May 12, 1940, *Fernald & Long*, no. 11,905 (TYPE in Herb. Gray., ISOTYPE in Herb. Phil. Acad.). ONTARIO: near Kingsville, *J. Macoun*, no. 54,679. OHIO: Florence, Erie Co., 8/7, 1897, *Moseley;* Muskingum, Herb. *Schweinitz;* Columbus, 1837, and 1840, *Sullivant;* "Fernbank"—ad ripas fluminis Ohio, prope "North Bend", *Short*. INDIANA: Seymour, *Pennell*, no. 11,751, *Friesner*, no. 16,774. TENNESSEE: woods along river, Clarksville, *E. J. Palmer*, no. 17,601; bank of Tennessee R., Rockport, *Harger*, no. 7893. ILLINOIS: Tazewell Co., July, 1889, *F. E. McDonald;* Athens, Menard Co., 1861, *E. Hall;* Olney, Richland Co., *E. J. Palmer*, no. 15,585; Madison Co., June, 1877, *Eggert;* St. Clair Co., June, 1877, *Eggert;* near No. 13, Saline Co., *Pepoon & Barrett*, no. 5154. IOWA: Cedar Creek, Stockport, *E. W. Graves*, no. 2052; (In the U. S. Nat. Herb. there is a sheet without locality on the original label, but with an annotation which seems to be "Knobs. Ia. Mohr lg. 1854." The specimens are of the strigose-leaved var. *typica*, such as one expects from the Knobs of Kentucky and Tennessee, but not from Iowa. The disparity in the two handwritings on the label suggests some error).

Var. **ambigua** (Nutt.), comb. nov. *S. ambigua* Nutt. Gen. ii. 37 (1818) not sensu Leonard in Contrib. U. S. Nat. Herb. xxii. 729 (1927). *S. parvula*, var. *ambigua* (Nutt.) Fernald in RHODORA,

iii. 201 (1901) as to basonym only.—See discussion on pp. 172 and 173.

Agastache nepetoides (L.) Ktze. Charles City Co.: old clearing in dry woods above Chickahominy River, Eagle Bottom, *F. & L.*, no. 11,724. Surry Co.: rich wooded ravine, northwest of Ingersoll, no. 11,723; rich alluvial thickets back of sand-beach of James River, below Sunken Meadow Beach, no. 8443.

These stations are here cited because, from the most recent map of ranges of *Agastache*, Lint & Epling in Am. Mid. Nat. xxxiii. map 1, p. 213 (1945) one is likely to assume that the species is not in southeastern Virginia—the map showing an eastern boundary from near Washington southwestward across western Virginia, more than 200 miles west of Surry County.

*Glechoma hederacea L., forma acutiloba Neuman. The form with sharp-toothed leaves. Surry Co.: roadside bank about 3 miles southwest of Surry Courthouse, no. 13,127.

*Pycnanthemum **monotrichum,** sp. nov. (tab. 903), planta habitu *P. aristato* simillima; caule puberulo 0.8–1.2 m. alto ramulis elongatis deinde floriferis; foliis ovatis vel ovato-lanceolatis acuminatis viridibus serrato-dentatis, majoribus 4–5.5 cm. longis, 2–3 cm. latis, venis lateralibus 5–8-jugis venis superioribus supra medium laminae exortis; dentibus calycis lanceolato-aristatis subaequalibus 2.5–3 mm. longis, plerumque trichoma longum flexuosum multicellare infra apicem gerentibus.—Dry sandy woods and clearings, southeastern Virginia; northeast of Homeville, Sussex County, July 20, 1936, *Fernald & Long*, no. 6380 (type in Herb. Gray.; isotype in Herb. Phil. Acad.); Kilby, Nansemond County, September 11, 1935, *Fernald, Long & Fogg*, nos. 5023, 5024 and 5025; all distributed as *P. clinopodioides* T. & G.

As noted, *Pycnanthemum monotrichum* (from the usually solitary long trichomes near the tips of the calyx-teeth) was distributed as *P. clinopodioides*. That was on account of the long flexuous bristle just referred to; but its calyx is nearly regular, with essentially uniform teeth, all 2.5–3 mm. long, whereas *P. clinopodioides* has the calyx definitely bilabiate, with the longer (lower) and merely acuminate (instead of aristate) teeth only 1–1.5 mm. long, while its leaves are membranaceous, those of *P. monotrichum* subcoriaceous. Grant & Epling have labelled all the specimens as a probable hybrid of *P. hyssopifolium* Benth. and *P. Tullia* Benth. (i. e. *P. pycnanthemoides* (Leavenw.) Fern., the name required by the International Rules but which Grant and Epling refuse to take up[1]). Just why it should be called such

[1] Dr. Epling rejects the name required by the International Rules, *Pycnanthemum*

a hybrid (see Grant & Epling, *Study of Pycnanthemum*, Univ. Calif. Pub. Bot. xx. no. 3: 234 (1943)) I do not know and such a disposition of it would certainly be better supported if the plant grew within flying-distance for bees of *P. pycnanthemoides!* *P. monotrichum* occurs in acid sandy woods of the Coastal Plain, near where both *P. hyssopifolium* and *P. setosum* Nutt. (see note at end of discussion, p. 178) are found, but the only station in Virginia cited by Grant & Epling for true *P. pycnanthemoides* (*P. Tullia*), on their p. 211, is in Patrick County at the base of the Blue Ridge, 150 miles west of the westernmost station for *P. monotrichum*, altogether too long a flight for the pollen-carrying bee![1] Their most eastern station in North Carolina (Durham County) is, to be sure, a little nearer, only 115 miles away, but even that would require a tremendous relay of bees to carry the necessary pollen-grain.

If *P. monotrichum* had been called a hybrid of *P. pycnanthemoides*, var. *viridifolium* Fern. in RHODORA, xxxix. 445 (1937), our PLATE 904, the relay of bees required would be less, but this plant, type from the inner Coastal Plain in Greensville County, Virginia, is treated by those authors as one of their so-called species, *P. viridifolium* (Fern.) Grant & Epling, l. c. (1943), which, in spite of the type-station on the Coastal Plain, is said in their key (p. 203) to be "plants of the Appalachian Mountains from Virginia and West Virginia to Alabama", not a significant morphological character. But even so, *P. pycnanthemoides*, var. *viridifolium* (PLATE 904) is a plant of richer, basic to calcareous soils and its nearest stations to *P. monotrichum* are too far away (18–35 miles) to make the guess very plausible. Incidentally, *P. pycnanthemoides* and its var. *viridifolium* would scarcely suggest themselves as related to *P. monotrichum* to those who know the plants. Besides the very large leaves and outer bracts and broad open inflorescences, with multicellular flexuous trichomes very numerous on calyx-teeth and inner bracts, *P.*

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pycnanthemoides, presumably because it seems meaningless. Would he carry this philosophy so far as to exclude *Arctostaphylos Uva-ursi* (*Arctostaphylos* being the Greek, *Uva-ursi* the Latin for bearberry), *Clethra alnifolia* (*Clethra* the ancient Greek equivalent of the Latin *Alnus*) and all others in which the trivial repeats the meaning of the generic name?

[1] Although radio-listeners have for several years gained the impression that "*The Flight of the Bumblebee*" is never ending, the flights of that busy individual are actually limited in extent, rarely two miles I am told.

pycnanthemoides and its variety have the calyx strongly bilabiate; and, as originally illustrated and described by Leavenworth, when he set up the genus *Tullia* with a single species, the corolla is very large for the genus, deep pink to purple and with the lateral lobes of the lower lip spreading-ascending. Unfamiliar with such striking field-characters, the recent monographers of *Pycnanthemum* made nothing of the large purple to deep pink corolla! In brief, *P. monotrichum*, with its nearly regular calyx, mostly solitary long trichomes on the aristate calyx-teeth, small whitish corollas, etc., shows no more influence of *P. pycnanthemoides* (or *Tullia*) than do *P. hyssopifolium* and *P. setosum*, i. e. none at all.

P. monotrichum seems to be a definite species of the sandy Coastal Plain. Although with broad foliage somewhat suggesting that of *P. setosum*, it differs in several characters from it. It is generally taller, its leaves are more ovate and acuminate, sharply serrate-dentate, its calyx-teeth 2.5–3 mm. long and usually with a subterminal divergent long trichome, the calyx-teeth of *P. setosum* (PLATE 905, FIG. 4) 1.3–2.5 mm. long and without the long trichome. In some characters *P. monotrichum* is as near *P. hyssopifolium* (PLATE 905, FIGS. 1–3), but that species is grayish in tone, not full green, commonly with many short and suppressed axillary branches, instead of elongate and finally flowering ones; its entire or subentire leaves are narrowly oblong to oblong-lanceolate or -linear, blunt, at most 0.5–1.5 cm. broad and with the uppermost of the 3–5 pairs of lateral veins arising at or below the middle of the blade (in *P. monotrichum* the serrate-dentate, ovate, acuminate leaves mostly 2–3 cm. broad, the uppermost of the 5–8 pairs of lateral veins borne well above the middle of the blade). In *P. hyssopifolium* the bristleless calyx-teeth are 2.3–5 mm. long; in *P. monotrichum* the usually bristle-tipped teeth only 2–3 mm. long.

The name *Pycnanthemum setosum* Nutt. in Journ. Acad. Phil. vii. 100 (1834) must, under the International Rules, replace *P. aristatum* Michx. Fl. Bor.-Am. ii. 8, t. 33 (1803). There is no question about the plant clearly described and illustrated by Michaux but, unfortunately, he cited as an unquestioned synonym of it *Nepeta virginica* L. (1753). That being his interpretation, he should have used the earlier specific name, for it had not then been used under *Pycnanthemum.* Under the International Rules the name *P. aristatum* is illegitimate.

*P. **umbratile,** sp. nov. (TAB. 906), a *P. clinopodioide* differt caule arcuato-pilosis nec divergente villosis; foliis ovatis obtusis viridibus integris vel subintegris basi late rotundatis subtus ad costas sparse puberulis, majoribus 2.5–3.5 cm. latis; corymbis terminalibus hemisphaericis bracteis externis foliaceis ellipticis vix reductis; bracteis internis breviter hirtellis; calycibus bilabiatis dentibus apice subulatis breviter hirtellis.—VIRGINIA: border of rich bottomland woods along Blackwater River, southeast of Ivor, Southampton County, September 16, 1937, *Fernald & Long*, no. 7595 (TYPE in Herb. Gray.).

Pycnanthemum umbratile (from the deep shade of its type-station) has been only once collected. The type, snatched at the end of the day, was found upon study to be unique in another sense. When we later returned for more of it, the road-machinery had done its work. Soil to the depth of several feet had been removed for use in construction of the neighboring 4-lane trunk-road and the station obliterated. The plant, obviously, will later be found elsewhere on the wooded bottomland where abound many other rather local species. I do not hesitate to describe the unicate, for it is very distinctive. By current treatments it would be placed with *P. clinopodioides* T. & G. The distinctions are as follows. In *P. clinopodioides* (PLATE 907) the short curving hairs of the stem are mixed with longer spreading trichomes; in *P. umbratile* the long and spreading hairs are wanting. *P. clinopodioides* has the pale green leaves lance-acuminate, tapering gradually to the petiole and often with sharp serrations, with the veins beneath hirtellous, the primary blades only 1–2 cm. broad; *P. umbratile* has the full green leaves oval, bluntish, essentially entire, broadly rounded to the petiole, and barely puberulent on the midrib beneath, the larger blades 2.5–3.5 cm. broad. In *P. clinopodioides* the glomerules terminate the branches or are verticillastrate; in the type of *P. umbratile* there is a single terminal, open corymb. In *P. clinopodioides* the calyx-teeth are appendaged near their tips, like the inner bracts, by long, flexuous, divergent multicellular trichomes; in *P. umbratile* these long trichomes are lacking. Until fuller material is at hand distinctions in the flowers cannot safely be stated.

*P. incanum (L.) Michx., var. **puberulum** (Grant & Epling), stat. nov. *P. puberulum* Grant & Epling in Univ. Calif. Pub. Bot. xx. no. 3: 212 (1943). Described from Florida and Alabama, northward into North Carolina and West Virginia. Virginia now comes into the range. Brunswick Co.: rich wooded bluff by Meherrin River at Westward Bridge (or Mill), no. 14,738. See p. 100.

Plate 903, Pycnanthemum monotrichum Fernald, all figs. from the type: fig. 1, plant, × ½; fig. 2, leaf, × 1; fig. 3, back of leaf, to show venation, × 4; fig. 4, portion of glomerule, to show flower, × 5; fig. 5, portion of glomerule, to show bristles, × 10; fig. 6, calyx, × 10.

Plate 904, P. pycnanthemoides (Leavenw.) Fernald, var. viridifolium Fernald: fig. 1, portion of inflorescence, × 1, of topotype, *Fernald & Long*, no. 11,130; fig. 2, portion of glomerule, to show flower and bristle-tipped calyx-segments, × 8, from no. 11,130.

Plate 905, figs. 1–3, P. hyssopifolium Benth.: figs. 1 and 2, foliage and inflorescence, × 1, from southwest of Cypress Bridge, Southampton Co., Virginia, *Fernald & Long*, no. 6374; fig. 3, calyx, × 10, from no. 6374. Fig. 4: P. setosum Nutt.: calyx, × 10, from Forked River, New Jersey, Sept. 3, 1893, *MacElwee*.

Plate 906, P. umbratile Fernald, all figs. from type: fig. 1, summit of plant, × 1; fig. 2, portion of stem, to show curving pubescence, × 10; fig. 3, lower surface of leaf, to show pubescence, × 10; fig. 4, calyx, × 10.

Plate 907, P. clinopodioides Torr. & Gray: figs. 1 and 2, portions of plant, × 1, from Rye, New York, *Asa Gray;* figs. 3, portion of stem, and 4, lower surface of leaf, to show pubescence, × 10, from the standard specimen, New Jersey, 1841, *Carey;* fig. 5, calyx, × 10, from Palisades, New Jersey, 1860, *C. F. Austin.*

Lycopus americanus Muhl., var. Longii Benner. Local range extended back into the outer Piedmont. Brunswick Co.: springy sphagnous and argillaceous bog, Ram-hole Swamp, Seward Forest, near Triplett, no. 14,740. See p. 103.

Var. *Longii* has been accredited an inland occurrence about the Great Lakes. It is, however, apparently confined to the Atlantic Coastal Plain and its intrusions into the Piedmont. The plant of the Interior is

Lycopus americanus Muhl., var. **scabrifolius,** var. nov., internodiis supernis villosis, villis multicellulis; foliis bracteatis lineari-lanceolatis superne scabro-puncticulatis.—Southern Michigan to Illinois, south to Louisiana and Texas. Type: wet sandy prairie, Havana, Illinois, August 15, 1903, *H. A. Gleason* in Herb. Gray.

Var. *scabrifolius*, at least of northern Indiana, as well as northern Ohio plants which I have not seen, was originally included in the Coastal Plain *L. americanus*, var. *Longii* Benner in Bartonia, no. 16: 46 (1934). The latter plant, occurring from Long Island, New York, to eastern Virginia, has the upper surfaces of the leaves smooth and not puncticulate. All the material I have seen from Michigan, Indiana, Illinois, Oklahoma, Louisiana and Texas has the upper surfaces harsh with minute crowded point-like trichomes. It seems to be a more inland and western extreme. Whether the gap in the representation in the Gray Herbarium—between Indiana and Illinois at the north and Oklahoma and Louisiana at the south—is to be overcome by collections from western Kentucky, western Tennessee and Missouri, must depend upon further collecting.

DICLIPTERA BRACHIATA (Pursh) Spreng. To the single recorded Virginian station (bottomland of Meherrin River at Haley's Bridge, Southampton Co.) add an extensive one about 30 miles inland (much more as the river flows) farther up the valley. BRUNSWICK Co.: wooded bottomland of Meherrin River at Westward Bridge (or Mill), no. 14,741. See p. 100.

*RUELLIA PURSHIANA Fernald in RHODORA, xlvii, 27, t. 845 and t. 846, fig. 3 (1945).—Stations cited in FREDERICK, ROCKINGHAM, ROCKBRIDGE, BOTETOURT, WASHINGTON, ROANOKE, AMELIA and HENRICO Cos.

*R. PURSHIANA, forma CLAUSTROFLORA Fernald, l. c. 29, t. 846, figs. 1 and 2 (1945).—Cited from ROCKBRIDGE Co.

*R. HUMILIS Nutt. (typical). See Fernald, l. c. 52, tt. 854 and 855 (1945).—Cited from GILES Co.

*R. HUMILIS, var. FRONDOSA Fernald, l. c. 54, t. 857 (1945).—Cited from SHENANDOAH and WYTHE Cos.

*R. HUMILIS, var. CALVESCENS Fernald, l. c. 60, t. 860 (1945).—Stations in FREDERICK and SHENANDOAH Cos.

*R. CAROLINIENSIS (Walt.) Steud., var. SEMICALVA Fernald, l. c. 73, t. 864 (1945).—Type from SOUTHAMPTON Co.

R. CAROLINIENSIS, var. MEMBRANACEA Fernald, l. c. 76, tt. 865 and 866 (1945).—The common plant which has passed, erroneously, as *R. parviflora*, *R. ciliosa* or *R. caroliniensis*. Cited from FAIRFAX, ALEXANDRIA, NORTH, MIDDLESEX, MATHEWS, GLOUCESTER, YORK, JAMES CITY, CHARLES CITY, PRINCESS ANNE, NORFOLK, ISLE OF WIGHT, SURRY, SOUTHAMPTON, SUSSEX, GREENSVILLE, DINWIDDIE, AMELIA, BRUNSWICK, CAMPBELL, BEDFORD and ROCKBRIDGE Cos.

*R. CAROLINIENSIS, var. MEMBRANACEA, forma HYPOPSILA Fernald, l. c. 78, t. 867, figs. 1–3 (1945).—Recorded from ELIZABETH CITY, NORFOLK, SURRY, SOUTHAMPTON and SUSSEX Cos.

*R. CAROLINIENSIS, var. MEMBRANACEA, forma LAEVIOR Fernald, l. c. 79, t. 868 (1945).—Recorded from SOUTHAMPTON, GREENSVILLE and AMELIA Cos.

*R. CAROLINIENSIS, var. NANELLA Fernald, l. c. 79, tt. 869 and 870, fig. 1 (1945).—Cited from NANSEMOND and PRINCESS ANNE Cos.

*R. caroliniensis, var. nanella, forma eciliata Fernald, l. c. 80, t. 870, figs. 2–4 (1945).—Cited from Southampton and Sussex Cos.

*R. caroliniensis, var. cheloniformis Fernald, l. c. 80, tt. 871 and 872 (1945).—Recorded from Clarke, Northampton, Gloucester, Elizabeth City, James City, Princess Anne, Norfolk, Dinwiddie, Mecklenburg and Halifax Cos.

*R. caroliniensis, var. cheloniformis, forma **candida,** f. nov., corollis albidis.—Brunswick Co., Virginia: Triplett, 1945, *J. B. Lewis* (type in Herb. Gray.).

*R. caroliniensis, var. dentata (Nees) Fernald, l. c. 83, tt. 874 and 875 (1945).—Cited from Fairfax, James City, Henrico, Princess Anne, Norfolk, Isle of Wight, Sussex, Halifax and Orange Cos.

(To be continued)

BOTANICAL SPECIALTIES OF THE SEWARD FOREST AND ADJACENT AREAS OF SOUTH-EASTERN VIRGINIA

M. L. Fernald

(*Continued from page 182*)

Cephalanthus occidentalis L., var. pubescens Raf. To the previously cited stations, on the Coastal Plain, add an extensive one in the outer Piedmont. Greensville Co.: border of Mitchell's Millpond, west of Brink, no. 14,665; the dull or lustreless foliage, downy beneath, strongly contrasting with the bright green foliage of typical glabrous *C. occidentalis.*

Elephantopus carolinianus Willd., forma vestitus Fernald in Rhodora, xliv. 458 (1942). To the single known station (in Nansemond Co.) add one in Brunswick Co.: woods along Meherrin River at Westward Bridge (or Mill), no. 14,742. See p. 100.

Eupatorium hyssopifolium L. (typical). See Rhodora, xliv. 459, pl. 737, fig. 1 (1942). Local range extended inland from the

Coastal Plain to Brunswick Co.: springy sphagnous and argillaceous bog, Ram-hole Swamp, Seward Forest, near Triplett, no. 14,744. See p. 103.

E. **cordigerum** (Fernald), stat. nov. (plate 908). *E. rotundifolium* L. var. *cordigerum* Fernald in Rhodora, xlv. 477 (1943).

At the time I published *E. rotundifolium*, var. *cordigerum* I was following the interpretation of Fernald & Griscom in Rhodora, xxxvii. 180 and 181 (1935), in which all members of the *rotundifolium* series were merged as one variable species. In that paper, however, certain seemingly constant and morphologically significant characters were overlooked and too much weight was placed on the variable ones, like the occurrence of occasional alternate branching as opposed to predominantly opposite branching. No note was made of the very striking fact that in *E. rotundifolium* the principal cauline leaves (plate 909, figs. 1–3) have their bases straight, entire and subtruncate to broadly cuneate, with the toothing starting above this entire base; furthermore, it was not noted that in *E. rotundifolium* (plate 909, figs. 2 and 3) the ascending and prolonged prominent lateral veins arise from the base of the midrib. In the other three species, *E. verbenaefolium* Michx. (1803) = *E. lanceolatum* Muhl. ex Willd. (1804), our plate 910, *E. pubescens* Muhl. ex Willd. (1804), our plate 911, and *E. cordigerum*, plate 908, the principal leaves are toothed to the base and the elongating lateral veins tend to be united at base to the midrib, coming off from it well above its base. The uppermost leaves of *E. verbenaefolium* are greatly reduced, becoming narrowly lanceolate to linear and entire, while in the other three species they are more ovate and toothed. The involucre of *E. verbenaefolium* (plate 910, fig. 4) is about 1 mm. shorter than in the others, the inner phyllaries rather abruptly tipped. Northeast of the upland region of Virginia and Kentucky *E. verbenaefolium* is primarily a coastwise plant, of acid peats and sands northeastward to southern New England. Reexamination of a photograph of Michaux's type (our plate 910, fig. 1) indicates that an error was made when, in 1935, it was stated as identifiable with *E. pubescens* (plate 911). In regard to earlier names of Walter which, perhaps, might be applicable to *E. verbenaefolium*, it is unsafe to take them up until his plants can be actually studied. Walter's diagnoses were very brief, he did not realize the complexity of the genus in the Southeast, and his names could well belong to plants quite different from *E. verbenaefolium.*

E. pubescens, E. cordigerum and *E. rotundifolium* have the inner phyllaries attenuate to acute or slender tips. In *E. pubescens* the leaves are oblong to ovate, gradually rounded to base, the plant more general in the Piedmont area than *E. verbenaefolium*, occurring in moist or dry woods, thickets, etc., from Florida to Louisiana, northward to southern Maine, Massachusetts, southeastern New York, New Jersey, Pennsylvania, western Virginia and West Virginia.

E. rotundifolium, with characteristic straight and untoothed leaf-base, broadly deltoid-ovate to suborbicular rugose-veiny blades, with the prolonged ascending lower veins springing from the base of the midrib, characterizes siliceous, argillaceous or peaty soils from Florida to Texas, north only to Long Island, New Jersey, Maryland, Tennessee and Arkansas; while *E. cordigerum* is characteristic of river-marshes, swales and bogs of the Coastal Plain of southeastern Virginia and eastern North Carolina. Its strongly cordate-clasping leaves are unique in the group and their prolonged lateral veins are united to the midrib much higher than in the others, the type showing compound bases of the midrib up to 1.5 cm. long. In *E. rotundifolium* the inner phyllaries taper to slender pointed tips, in *E. pubescens* they are merely acuminate, but in *E. cordigerum* they are prolonged into long arching, linear, scarious appendages.

After several days of checking and rechecking the characters I feel that *E. verbenaefolium, pubescens, cordigerum* and *rotundifolium*, although some of them may hybridize, are quite as clear species as *E. rugosum* (*E. urticaefolium*) and *E. aromaticum*, or as *E. dubium* (*verticillatum*), *E. maculatum* and *E. fistulosum* of the *purpureum* series.

Plate 908, Eupatorium cordigerum Fernald: fig. 1, portion of type, × 1; fig. 2, base of leaf, to show fusing of lateral nerves and midrib, × 1½, from type; fig. 3, involucre, × 10, from *Fernald*, no. 14,502.

Plate 909, E. rotundifolium L.: fig. 1, type (two stems), × ⅕, photo. by *B. L. Robinson;* fig. 2, characteristic leaves, to show subtruncate and entire base and basal lower lateral veins, × 1, from south of Grassfield, Norfolk Co., Virginia, *Fernald & Long*, no. 4219; fig. 3, base of leaf, to show venation, × 2, from no. 4219; fig. 4, involucre, × 10, from no. 4219.

Plate 910, E. verbenaefolium Michx.: fig. 1, type, × ¼, photo. by *B. L. Robinson;* fig. 2, characteristic foliage, × 1, from Winterham, Amelia Co., Virginia, *Fernald & Long*, no. 9168; fig. 3, base of leaf, to show venation, × 2, from no. 9168; fig. 4, involucre, × 10, from no. 9168.

Plate 911, E. pubescens Muhl.: fig. 1, type, × ¼, photo. by *B. L. Robinson;* fig. 2, median leaves, × 1, from Auburn, New Jersey, *Long*, no. 18,060; fig. 3, base of leaf, to show fusion of lower lateral veins and midrib, × 2, from no. 18,060; fig. 4, involucre, × 10, from no. 18,060.

*E. aromaticum L., var. lacerum Gray.—Princess Anne County: rich woods, Virginia Beach, no. 5075 (distrib. as a hybrid). Sussex County: rich woods and bushy clearing north of Double Bridge, about 6 miles northwest of Jarratt, no. 11,452.

Typical thick-leaved *Eupatorium aromaticum* has the dark green leaves ovate, rounded to subtruncate at base, blunt and with blunt teeth. Var. *lacerum*, described from Florida, has the thinner, pale green, rhombic- or triangular-ovate, acuminate blades cuneate at base and sharply, sometimes lacerately, toothed, and on slender petioles. Transitions occur but the variety seems to be southern.

*E. sessilifolium L., var. Brittonianum Porter. Giles County: woods on dry shaly hillslope along New River, 1.5 miles south-southwest of Goodwin's Ferry, *Fogg*, no. 14,991.

Typical *Eupatorium sessilifolium* has relatively thin, lanceolate leaves, usually with rather prominent toothing. It is apparently frequent in calcareous areas in Virginia, where both vars. *Brittonianum* and *Vaseyi* (Porter) Fernald & Griscom are found. The species consists of three somewhat pronounced varieties, though, like all true varieties, their characters merge. As stated, the leaves of true *E. sessilifolium* are relatively thin, lanceolate and commonly with prominent teeth. It is rare and mostly uncharacteristic in New England and most of New York, where var. *Brittonianum* is the usual variety, this plant having firmer to subcoriaceous ovate-lanceolate to ovate leaves, with the teeth relatively fine. Like typical *E. sessilifolium* its leaves are slenderly acuminate and the larger ones range from 0.8–1.8 dm. long. Measurements of the thin- and lanceolate-leaved series (25 nos.) gives a range in size of the largest leaves of 0.9–1.8 dm. long by 2–4 cm. wide, with an average of 14 cm. long and 2.5 cm. wide, five to six times as long as broad. Var. *Brittonianum* (45 sheets), an isotype of which is before me, gives a range of 0.8–1.8 cm. long by 3–6 cm. wide, with an average of 12.9 cm. long by 4.4 cm. wide, about three times as long as wide. That these proportions are significant is apparent from the rarity of typical *E. sessilifolium* or its absence in New England, interior New York, Wisconsin, Illinois and Missouri, and the tendency of var. *Brittonianum* to follow the higher mountains to western North Carolina and eastern Kentucky.

Var. *Vaseyi* has the upper half of the stem puberulent or minutely pilose, sometimes glutinous, the duller green leaves oblong-ovate, merely acute or short-acuminate, the larger ones 4–12 cm. long by 2.3–6 cm. broad (about twice as long as broad) and scabrous beneath with minute puberulence. The type (U. S. Nat. Herb.) is quite characteristic of the narrower-leaved plants of this variety. It occurs in less calcareous habitats than the others, from southeastern Pennsylvania and eastern Maryland to West Virginia, south to eastern Virginia, North Carolina and eastern Tennessee.[1]

SOLIDAGO RUGOSA (Ait.), var. CELTIDIFOLIA (Small) Fernald. Local range extended inland from Coastal Plain to BRUNSWICK Co.: springy sphagnous and argillaceous bog, Ram-hole Swamp, Seward Forest, near Triplett, no. 14,751. See p. 103.

*HAPLOPAPPUS DIVARICATUS (Nutt.) Gray. (*Isopappus divaricatus* (Nutt.) T. & G.). Range extended northward into BRUNSWICK Co.: fallow field, south of Seward Forest Headquarters, Triplett, Nov., 1944, *Lewis*.

A characteristic erect and late-flowering southern annual of dry open woods, clearings and fields, often weedy. In his Genus Haplopappus, 212, 213 (1928), Hall gave its range, from Florida to Texas, northward to South Carolina and Arkansas, and its height as "2 to 7 dm." It has been found, however, in North Carolina: old field, McCuller's, Wake Co., Oct. 12, 1937, *Godfrey;*

[1] The following *Eupatoria*, although not from Virginia, may be noted here.

E. RESINOSUM Torr., var. **kentuckiense**, var. nov., *E. resinoso* habitu simillima; caulis internodiis supernis corymbi ramibusque pilosis, pilis elongatis curvatis.—Nelson County, KENTUCKY: marshy area, Bean's Lake, September 8, 1932, *Sister Rose Agnes* (TYPE in Herb. Gray).

Closely matching the endemic *Eupatorium resinosum* of pine-barren bogs of New Jersey and Delaware in habit, foliage, involucres, etc., but differing in the longer pubescence, typical *E. resinosum* being minutely puberulent. Sister Rose Agnes correctly identified the plant as *E. resinosum* but the late Dr. Robinson, evidently without a close study of the plant, relabeled it *E. perfoliatum*, var. *cuneatum* Engelm. The involucre and the narrow leaves without the broadly cuneate, entire base of *E. perfoliatum*, var. *cuneatum* are identical with those of the New Jersey plant.

E. DUBIUM Willd., forma **elutum**, f. nov., foliis ovatis triplinerviis subtus viscido-granulatis scabris; involucris floribusque albidis.—TYPE: low ground near Long Island Sound, Saybrook Junction, Connecticut, September 14, 1914 (colony of about 100 plants), *R. W. Woodward* in Herb. Gray.

E. MACULATUM L., forma **Faxoni**, f. nov., foliis anguste ovatis utrinque attenuatis irregulariter grosse serratis subtus scabris; corymbo supra complanato; phyllariis floribusque albidis.—TYPE: Gate of Crawford Notch, New Hampshire, September 2, 1884, *Charles E. Faxon* in Herb. Gray.

disturbed soil on sandhill, south of Aberdeen, Scotland Co., *Godfrey*, no. 6938; one of the Godfrey specimens 1 m., the other 1.4 m. high. Mr. Lewis states that his plant was 6 ft. (1.8 m.) high. Small individuals from Georgia are only 1.5 dm. high. The species, like most annuals of disturbed soils, will evidently respond to the amount of nutrition.

Boltonia caroliniana (Walt.) Fernald in Rhodora, xlii. 487, pl. 642 (1940). Range extended inland to western Brunswick Co.: bottomland woods along Poplar Creek, southwest of Ebony, no. 14,668. See p. 97.

Boltonia caroliniana, known only from eastern South Carolina and southeastern Virginia, is here found along Roanoke drainage. It is presumably along the lower Roanoke River and its tributaries in North Carolina.

*Polymnia Uvedalia L., var. densipila Blake in Rhodora, xix. 48 (1917). Brunswick Co.: rich low woods (bordering swamp of Quarrel's Creek), "Chamblis bigwoods", Seward Forest, near Triplett, no. 14,754. See p. 101.

Differing from typical *Polymnia Uvedalia*[1] and its var. *floridana* Blake in the very dense and essentially glandless pilosity of the branches of the inflorescence. Originally described from Louisiana, Oklahoma and Texas; also from Bermuda. More recently extended northward in the Mississippi Basin to Missouri. Its seeming isolation in southeastern Virginia reminiscent of several other plants.

Helianthus angustifolius L. Noted (but not collected) at several places in Brunswick Co. See p. 103.

Eclipta prostrata (L.) L. *E. alba* (L.) Hassk.—Common in the southeastern counties.

Here entered in order to call attention to the correct name, as taken up by Exell in his Cat. Vasc. Pl. S. Tomé, 225 (1944). The earliest names (omitting later ones for this cosmopolitan species) as enumerated by Exell are

> *Verbesina alba* L. Sp. Pl. ii. 902 (1753); *V. prostrata* L., l. c. (1753). *Eclipta prostrata* (L.) L. Mant. Pl. Alt. 286 (1771). *E. erecta* L. l. c. (1771), *nomen illegitimum*. *E. alba* (L.) Hassk. Pl. Jav. Rarior. 528 (1848).

[1] I am often asked about the specific name *Uvedalia*. The species was named for the Rev. Dr. Robert Uvedale (1642–1722), an English botanist, mentioned by Plukenet and a correspondent of Magnol, Sloane, Sherard and other leading botanists of his time. The genus *Uvedalia* was dedicated to him by Robert Brown.

Since *Verbesina alba* L. and *V. prostrata* L. are considered conspecific and are of even date, the first of them taken up must stand. This is *E. prostrata* (L.) L. (1771).

CIRSIUM VIRGINIANUM (L.) Michx. Range extended inland to BRUNSWICK CO.: springy sphagnous and argillaceous bog, Ramhole Swamp, Seward Forest, near Triplett, no. 14,757. Also noted in dry pine woods near by. See p. 103.

C. VIRGINIANUM, forma REVOLUTUM (Small) Fernald in RHODORA, xlv. 509 (1943). BRUNSWICK CO.: with the last, no. 14,758. See p. 103.

SOME INCONVENIENT UPHEAVALS OF FAMILIAR NAMES AND AUTHOR-CITATIONS.—Tiring of trying to find even recognizable formal, not to say varietal, differences in some recently proposed "subspecies", I turned, for a let-up in the tension, to the problem of exact dates of issue of certain publications which I had found cited. These involved three works of nearly competing dates: Sprengel, Florae Halensis Tentamen Novum, with the date on the title-page 1806; Sprengel, Mantissa Prima Florae Halensis, with the title-page dated 1807; and Persoon, Synopsis, pars ii. dated 1807. Fortunately the date of publication of pp. 1–272 of vol. ii. of Persoon was established by Blake in RHODORA, xvii. 134, footnote (1915), he correctly stating that:

> Although the second volume of Persoon's Synopsis is dated 1807, its first section (pp. 1–272) was issued in the autumn of 1806, as is shown by a review in the Regensb. Bot. Zeit. v. 321 (21 Nov. 1806).

That pushes a large part of Persoon's 2nd volume into competition with other publications of 1806. The resulting changes have not been checked.

My special purpose in the present notes is to draw attention to two other works, one of which seems to have been overlooked by the editors of *Index Kewensis* and by others who have followed that work in assigning many specific names to the wrong author. On May 30, 1807, Johann Friedrich Theodor Biehler issued his doctor's dissertation, printed in Halle. It was entitled PLANTARUM NOVARUM EX HERBARIO SPRENGELII CENTURIAM . . . and it was reviewed in the Regensburg Botanische Zeitung for 15 October, 1807; in other words it was definitely published in late spring or summer of 1807. Biehler having done a piece of descriptive work considered by Sprengel sufficient for his thesis, Sprengel promptly absorbed it and as the second part of his own Mantissa Prima (pp. 27–58) put it out under his own name as *Novarum Plantarum ex Herbario meo Centuria.* The latter work, containing Biehler's unacknowledged descriptions and differently paged, did not come out in time to be reviewed in the Botanische Zeitung for 1807. Biehler's original publication was clearly the earlier of the two; yet all of the 100 species described are regularly cited from the second publication and Sprengel is as regularly and unjustifiably cited as the author. Some of the proposed species were described from garden plants, others from India, New Caledonia, New Zealand, St. Helena, The Caucasus, Cuban, Mongolia, etc., while a few were from North America, chiefly received from Muhlenberg. Since these, as well as the Old World species, have been regularly cited as of Sprengel, I am here noting such in our own flora as require the replacement of that author's name by Biehler's.

Scirpus lupulinus Biehler, Plant. Nov. Herb. Spreng. Cent. 4 (1807); Spreng. Mant. Prima Fl. Hal. 30 (1807). Generally identified with *Cyperus filiculmis* Vahl (1806).

Panicum pensylvanicum Biehler, l. c. 6 (1807); Spreng. l. c. 31 (1807). Not identified; type needs examination.

P. discolor Biehler, l. c. (1807); Spreng. l. c. (1807). Type needs critical examination.

Polypogon setosus Biehler, l. c. 7 (1807); Spreng. l. c. (1807). Basis of Muhlenbergia setosa (Biehler) Trin. ex Jackson, Ind. Kew. iii. 209 (1894); Fernald in Rhodora, xlv. 237, plates 755 and 756 (1943).

Agrostis clandestina Biehler, l. c. 8 (1807); Spreng. l. c. 32 (1807). Basis of Sporobolus clandestinus (Biehler) Hitchc. in Contrib. U. S. Nat. Herb. xii. 150 (1908).

Aira nitida Biehler, l. c. 8 (1807); Spreng. l. c. 32 (1807). Basis of Sphenopholis nitida (Biehler) Scribn. in Rhodora, viii. 144 (1906).

A. pallens Biehler, l. c. (1807); Spreng. l. c. (1807). Basis of Sphenopholis pallens (Biehler) Scribn. l. c. 145 (1906).

Poa caroliniana Biehler, l. c. 10 (1807); Spreng. l. c. 33 (1807). Basis of Eragrostis caroliniana (Biehler) Scribn. in Mem. Torr. Bot. Cl. v. 49 (1894).

Although Hitchcock reduces *Poa caroliniana* to the synonymy of *Eragrostis pectinacea* (Michx.) Nees, emend., and illustrates the "linear" spikelets as 10–15-flowered, the original description of *P. caroliniana* called for "spiculis lanceolatis . . . quinquefloris". The "ligula abbreviata obtusa" of *P. caroliniana* does not well describe the long tuft of hairs at the orifice of the sheath in *E. pectinacea*. The type needs critical examination.

FESTUCA NUTANS Biehler, l. c. 10 (1807); Spreng. l. c. 34 (1807), not Moench (1794) and F. OBTUSA Biehler, l. c. 11 (1807); Spreng. l. c. (1807).

Since *Festuca nutans* of Sprengel (*i. e.* Biehler) has generally been referred to *F. obtusa*, it is noteworthy that both Biehler and Sprengel (neither of whom were "splitters") described them both "*E. Pensylvania. Mühlenberg*". Their *F. nutans* was strict, 3 feet high, with lanceolate leaves, the panicle erect but nodding at summit; the ovate-oblong, obtuse spikelets 5-flowered, the oblong glumes muticous; the grain oblong. *F. obtusa* had decumbent, geniculate and weak culms and glaucous, linear leaves; the panicle "aequali" (evidently equaling the culm), flaccid, with few spikelets, these pedicellate, oblong and 3-flowered, the unequal glumes much smaller than the lemmas. In other words, *F. obtusa* was the familiar, weak and usually sprawling plant with usually 3-flowered spikelets and soon diffuse panicle which correctly passes under that name (incorrectly as of Sprengel instead of Biehler); while for *F. nutans* Biehler gave a good description of *F. paradoxa* Desv. Opusc. 105 (1831) or *F. Shortii* Kunth ex Wood, Class-bk. 794 (1861), a species long known to grow in Muhlenberg's area, about Lancaster. The earlier *F. nutans* Moench (1794) invalidates *F. nutans* Biehler.

EPILOBIUM COLORATUM Biehler. l. c. 18 (1807); Spreng. l. c. 39 (1807); Muhl. ex Willd. Enum. Hort. Berol. 411 (1809).

Although *Index Kewensis* caught the Sprengel citation of 1807, it entered it as somehow secondary to that of Muhlenberg ex Willdenow (1809) and quite overlooked the earlier publication of Biehler, based on material sent by Muhlenberg to Sprengel. Biehler's detailed description in 12 lines is much more decisive than the 2-line diagnosis of Muhlenberg ex Willdenow. The easy-going faith in "authority" is illustrated by the regular taking up of *E. coloratum* as of Muhl. ex Willd. (1809), with the 1807 publication of the species by Sprengel (who absorbed it from the still earlier Biehler) as a secondary citation only. There seems to be no escape from writing E. COLORATUM Biehler.

SCUTELLARIA INCANA Biehler, l. c. 25 (1807); Spreng. l. c. 44 (1807).

Sprengel as the author must give way to Biehler. The plant was received from Muhlenberg as his *S. pubescens* Muhl. in Trans. Am. Phil. Soc. iii. 173 (1793), *nomen nudum,* but, published as a synonym of *S. incana,* it should have the following additional references: *S. pubescens* Muhl. ex Biehler, l. c. (1807) as synonym; Spreng. l. c. (1807) as synonym.

S. ELLIPTICA Muhl. ex Biehler. l. c. 26 (1807); Spreng. l. c. 44 (1807); but originally and legitimately published by Muhl. in Trans. Am. Phil. Soc. iii. 173 (1793).

S. elliptica Muhl. (1793) must take the place of *S. ovalifolia* Pers. Syn. ii. 136 (1806), the *S. pilosa* Michx. (1803), not Hill (1768). In his *American Species of Scutellaria,* Univ. Calif. Pub. Bot. xx. no. 1: 86 (1942), Epling cited *S. ovalifolia* as of Persoon (1807) but, as noted on p. 197, the first section of Pers. Syn. ii. came out in 1806. Under his needless *S. ovalifolia,* subsp. *mollis* Epling, l. c. (based on the same type as *S. ovalifolia*) he cites the valid publication of *S. elliptica* as starting with Sprengel, l. c., "probably based upon a specimen sent by Muhlenberg". Sprengel, literally copying from Biehler, left no "probably" in the matter since he definitely gave Muhlenberg as the author: "Sc. elliptica Mühlenb. *in lit.*", the plant "E. Pensylvania".

In the same treatment Epling cites as a synonym *S. elliptica* Muhl. in Trans. Am. Phil. Soc. iii. 173 (1793), "nomen nudum". Now, although most of the new names published by Muhlenberg in his *Index Florae Lancastriensis,* Trans. Am. Phil. Soc. iii. 157–184 (1793) and in his *Supplementum Indicis Florae Lancastriensis,* l. c. iv. 235–242 (1799) were merely *nomina nuda,* in a very few cases Muhlenberg based his species on plants collected by Clayton and described by Gronovius in his Flora Virginica, ed. 2 (1762) or described by Marshall or others. If the species of Linnaeus (or his contemporaries), based wholly on earlier polynomials of himself or others are valid, then, surely, Muhlenberg's binomials, given to clearly cited and earlier described plants of others are equally valid. In the case of *Scutellaria elliptica* Muhl. in Trans. Am. Phil. Soc. iii. 173 (1793) Muhlenberg was definite:

Scutellaria elliptica, Claytoni. 92. N. S.

That, expanded, is *S. elliptica* of Clayton (or Gronovius), Fl. Virg. ed. 2: 92 (1762). Turning to Gronovius (or Clayton) we find on p. 92 only one species of *Scutellaria*, described in perfectly clear terms:

> SCUTELLARIA *foliis ovatis, utrinque acutis, obtuse serratis.*
> Scutellaria virginiana foliis dentatis. *Moris. hist.* III. *p.* 416. *t.* 19. *f.* 3.
> Cassida foliis Betonicae, flore ex albo & violaceo variegato. *Clayt. n.* 758.
> OBS. *Bracteae seu folia floralia parva, ovata integerrima, corollis dimidio breviora.*

That is a perfectly good account of the common plant of eastern Virginia which has passed as *Scutellaria pilosa* Michx. and which has recently passed as *S. ovalifolia* Pers. Aside from the Clayton material, no. 758, Morison's *Scutellaria virginiana foliis dentatis* was cited. Morison's account and figure (Sect. 11, t. 19, fig. 23, miscited by Gronovius), were perfect, the latter showing the characteristic rhombic-oval leaves, and the description was adequate. Surely, when Muhlenberg based his *S. elliptica* upon such antecendent descriptions and figure he was not publishing a "nomen nudum". It may be inconvenient, but there seems to be perfectly sound reason for taking up

SCUTELLARIA ELLIPTICA Muhl. in Trans. Am. Phil. Soc. iii. 173 (1793); ex Biehler, Plant. Nov. Herb. Spreng. Cent. 26 (1807); ex Spreng. Mant. Prim. Fl. Hal. 44 (1807). *S. integrifolia* L. Sp. Pl. 599 (1753), excl. Gronovian citation. *S. pilosa* Michx. Fl. Bor.-Am. ii. 11 (1803), not Hill (1768). *S. ovalifolia* Pers. Syn. ii. 136 (1806). *S. nemorosa* Raf. in Am. Mo. Mag. ser. 2. ii. 120 (1817). *S. teucrifolia* J. E. Sm. in Rees Cycl. xxxii. no. 15 (1819). *S. pilosa*, var. *ovalifolia* (Pers.) Benth. in DC. Prodr. xii. 423 (1848), nomenclaturally based on *S. ovalifolia* Pers. (which, according to Epling, l. c. 86, was "based apparently upon Plukenet's figure" of a plant from Virginia, so that it is difficult to follow him in his statement that *S. pilosa*, var. *ovaliolia* (Pers.) Benth. had its "type collected in New Jersey near Princeton (N. Y. Bot. Gard.)". It is probable that the Princeton specimen which Bentham cited, not as a "type", is in the Bentham or the DeCandolle Herbarium). *S. ovalifolia*, subsp. *mollis* Epling, l. c. 86 (1942).

The taking up of SCUTELLARIA ELLIPTICA forces the following change:

SCUTELLARIA ELLIPTICA Muhl., var. **hirsuta** (Short), comb. nov. *S. hirsuta* Short in Transylv. Jour. Med. viii. 582 (1836). *S. pilosa* Michx., var. *hirsuta* (Short) Gray, Syn. Fl. N. Am. ii^1.

379 (1878). *S. ovalifolia* Pers., subsp. *hirsuta* (Short) Epling, l. c. 86 (1942). *S. ovalifolia* Pers., var. *hirsuta* (Short) Fernald in RHODORA, xliv. 433 (1942).

It is in some ways fortunate that *Scutellaria elliptica* of Muhlenberg (1793) is so clearly applicable for we are thus saved from the complication started when Linnaeus became confused in publishing *S. integrifolia* L. Sp. Pl. 599 (1753). His account was as tangled as was his understanding of hosts of other American plants:

6. SCUTELLARIA foliis sessilibus ovatis: inferioribus obsolete serratis; superioribus integerrimis. *integrifolia.*
Scutellaria foliis integerrimis *Gron. virg.* 67.
Scutellaria caerulea virginiana, lamii aut potius teucrii folio, minor. *Pluk. alm.* 338. *t.* 313. *f.* 4.
Scutellaria, teucrii folio, marilandica. *Raj. Suppl.* 310.
Habitat in Virginia, Canada.

This was immediately followed by

7. SCUTELLARIA foliis lanceolatis. *Gron. virg.* 167. *hyssopifolia.*
Cassida mariana hyssopifolia. *Pet. act. angl.*
Habitat in Virginia.

The diagnosis "foliis . . ovatis: inferioribus obsolete serratis", the Plukenet description and drawing and the Ray account all belong to the plant above discussed as *S. elliptica,* while the Gronovian account and the Clayton specimen (photograph, × 1, before me) from which Linnaeus got the epithet *integrifolia* are of the plant currently so called; while the type of *S. hyssopifolia* (photograph, × 1, before me) is only a narrow-leaved individual of our familiar *S. integrifolia.* Neither element of the bipartite Linnean species is known from Canada!

Now, a complication might seem to arise from the treatment by J. E. Smith in Rees Cyclopaedia, xxxii. nos. 15 and 16 (1819). There Smith, possessor of the Linnean Herbarium, pointed out the original confusion, described as new *S. teucrifolia,* the ovate- and obsoletely serrate-leaved element of the Linnean bipartite *S. integrifolia* (excluding the entire- and narrow-leaved plant of Gronovius), and concluded, regarding the name *integrifolia,* "This appellation, however, being erroneous, and having caused much confusion among subsequent botanists, is best laid aside, and we have preferred one taken from the very apt synonyms of Plukenet and Ray." And, forthwith, Smith reduced to *S. hyssopifolia* L. (1753) the Gronovian element, "S. foliis integerrimis", of the original *S. integrifolia.* On its surface, since *S. hyssopifolia* was of the same date as *S. integrifolia,* that would seem to dispose of the latter in the current sense, since it was reduced by Smith to *S. hyssopifolia.*

Further search, however, shows that Michaux, Fl. Bor.-Am. ii. 12 (1803), had already restricted *Scutellaria integrifolia* to the plant with all but the lowest leaves "oblongis, integris" and clearly said under it: "*S. hyssopifolia.* L. hujusce varietas est". Aiton went further in Hort. Kew. ed. 2, iii. 428 (1811), there taking up *S. integrifolia* "foliis oblongis linearibusve obtusis integris . . . *Linn.* sp. pl. 836. (secundum synon. Gronovii; reliquis exclusis.)" and flatly citing *S. hyssopifolia* as an unequivocal synonym. We are, then, quite right in maintaining *S. integrifolia* as emended by Michaux and by Aiton.[1]

Turning again to Muhlenberg's new names published in his *Index Florae Lancastriensis* and its Supplement, most of them, as stated, are unquestioned *nomina nuda.* Some of them, like "Arabis integrifolia, Clayton 99. n. 745 ?", Muhl. in Trans. Am. Phil. Soc. iii. 174 (1793), must be left as they are because of the doubt expressed by Muhlenberg as to the identity. The following case, unfortunately, is clear.

ULMUS RUBRA Muhl. in Trans. Am. Phil. Soc. iii. 165 (1793). Muhlenberg was renaming the perhaps misidentified *Ulmus americana* of Marshall:

Ulmus rubra. N. S. americana, Marshalli.

There is no question as to *Ulmus americana* Marshall, Arb. Am. 156 (1785). To the "larger" tree with "leaves . . . smooth on the upper surface, of thinner texture and softer than those of the first kind [Marshall's *U. americana*]. The seed-vessels . . . considerably smaller, end nicked or cleft, and ciliated or fringed on the margin" Marshall gave a new name, *U. mollifolia.* This, of course, was *U. americana* as commonly interpreted. Marshall's second species was

[1] Pursh, who got many clues from the more scholarly Flora Boreali-Americana of Michaux, took the hint conveyed by Michaux's statement under the emended *Scutellaria integrifolia,* "*S. hyssopifolia.* L. hujusce varietas est" and, in Pursh, Fl. Am. Sept. 413 (1814), formally made the varietal combination *S. integrifolia* β. *hyssopifolia.* This varietal combination is ascribed by Epling, l. c. 90, to "Millsp., Fl. W. Va. 427, 1892"; but Millspaugh simply listed the name without even any author and with no word of diagnosis nor bibliography.

> Ulmus americana. *American rough leaved Elm-Tree,* rises to the height of about thirty feet, . . . with a lightish coloured rough bark. The leaves are oblong, oval and sharp-pointed, somewhat unequally sawed at the edges, . . . very rough on their upper surface and hairy underneath. The flowers are produced thick upon the branches, upon short, collected footstalks; and are succeeded by oval, compressed, membranaceous seed-vessels, with entire margins.

That is certainly Slippery or Red Elm, *Ulmus fulva* Michx. Fl. Bor.-Am. i. 172 (1803) the species which was later and independently described as *U. rubra* Michx. f., Hist. Arb. Am. iii. 278, t. 6 (1813). The younger Michaux, although not accepting the name given by his father but preferring to give a new one, unwittingly used the earliest name for the species, for there seems no way to avoid taking up for *U. fulva* Michx. (1803) the much earlier U. rubra Muhl. (1793).

Photo. B. G. Schubert.

Cyperus virens: fig. 1, type, × ½, after *Cintract;* fig. 2, spikelets, × 10, from fig. 1; fig. 3, two inflorescences, × ½, of *C. pseudovegetus*, fig. 4, spikelet, × 5, from fig. 3
C. robustus: fig. 5, spikelet, × 5

Photo. B. G. Schubert.

Cyperus Plukenetii: fig. 1, Plukenet's figure of a plant from Virginia; fig. 2, inflorescence of type, × 1; fig. 3, characteristic base, × 1

Photo. B. G. Schubert.

CYPERUS RETROFRACTUS: FIG. 1, TYPE, $\times \frac{1}{3}$, of *Scirpus retrofractus* L.; FIG. 2, inflorescence of TYPE, $\times \frac{1}{2}$; FIG. 3, inflorescence, $\times 1$, of type of *C. hystricinus;* FIG. 4, rhizome, $\times 1$

Photo. B. G. Schubert.

Juncus tenuis: fig. 1, inflorescence, × 1, of type, after *Rostkovius;* fig. 2, two inflorescences, × 2, of *J. macer;* fig. 3, sheath and auricle, × 5; fig. 4, mature fruits, × 6
J. dichotomus: fig. 5, summit of sheath and base of leaf, × 10; fig. 6, inflorescence, × 1; fig. 7, fruits, × 6

Photo. B. G. Schubert.

JUNCUS PLATYPHYLLUS: FIG. 1. inflorescence, × 1; FIG. 2, summit of sheath and base of leaf, × 10; FIG. 3. capsules, × 6

Photo. B. G. Schubert.

JUNCUS CANADENSIS, var. EUROAUSTER: FIG. 1. portion of TYPE, × ½; FIG. 2, portion of glomerule, × 10, from TYPE; FIG. 3, seeds, × 10, from TYPE Var. SPARSIFLORUS: FIG. 4, inflorescence, × 1; FIG. 5, glomerule, × 10

Photo. B. G. Schubert.

JUNCUS CANADENSIS, var. TYPICUS: FIG. 1, inflorescence, × 1; FIG. 2, flower, × 10; FIG. 3, seeds, × 10

Forma APERTUS, all figs. from TYPE: FIG. 4, inflorescence, × ½; FIG. 5, glomerule, × 10; FIG. 6, seeds, × 10

Forma CONGLOBATUS: FIG. 7, two inflorescences, × 1, from TYPE

RUMEX BRITANNICA: the Clayton (Gronovian) specimen from Virginia, photo. from Dr. *John Ram bottom* = R. OBTUSIFOLIUS L.

Photo. B. G. Schubert

POLYGONUM HYDROPIPEROIDES, var. EURONOTORUM, all figs. from TYPE: FIG. 1, portion of plant, × 3/5; FIG. 2, summit of ochrea, × 4; FIG. 3, panicle, × 1; FIG. 4, portion of panicle, showing ochreolae, × 10

Photo. B. G. Schubert.

Polygonum hydropiperoides (typical): fig. 4, ochrea, × 4; fig. 5, panicle, × 1; fig. 6, portion of panicle, to show ochreolae, × 10
Var. Bushianum, all figs. from type: figs. 1 and 2, summit of plant, × 1; fig. 3, portion of panicle, to show ochreolae, × 10

Photo. B. G. Schubert.

Polygonum hydropiperoides, var. breviciliatum, all figs. from type: fig. 1, flowering tip, × 1; fig. 2, ochrea, × 4; fig. 3, portion of panicle, to show ochreolae and distant flowers, × 10

Photo. B. G. Schubert.

AMARANTHUS GRAECIZANS: FIG. 1, TYPE, $\times \frac{2}{5}$, from photograph from Dr. *John Ramsbottom;* FIG. 2, text from bottom of sheet; FIG. 3, portion of type, $\times$ 1, of *A. blitoides*

Photo. B. G. Schubert.

LITSEA AESTIVALIS: FIG. 1, TYPE of LAURUS AESTIVALIS L., × ½, courtesy of Mr. *S. Savage;* FIG. 2, Clayton's description from bottom of sheet; FIG. 3, flowering branch, × 1, of *Litsea geniculata* (Walt.) Benth. & Hook. f.

LINDERA BENZOIN: TYPE, × $^2/_5$, of LAURUS BENZOIN L., after photograph from Dr. *John Ramsbottom*

Photo. B. G. Schubert.

RUBUS AKERMANI (floricane), all figs. from TYPE: FIG. 1, portion of cane, × 1; FIG. 2, portion with 3-fruited spurs, × 1/3; FIG. 3, lower surface of leaf, × 10; FIG. 4, summit of pedicel and base of calyx, × 5

Photo. B. G. Schubert.

RUBUS AKERMANI (primocane), all figs. from TYPE: FIG. 1, portion of cane and typical leaf, × 1; FIGS. 2 and 3, upper and lower leaf-surfaces, × 10

Photo. B. G. Schubert.

RUBUS CATHARTIUM (floricane), all figs. from TYPE: FIG. 1, portion of cane in fruit, × 1; FIG. 2, lower surface of leaf, × 10; FIG. 3, summit of pedicel and base of calyx, × 5

Photo. B. G. Schubert.

RUBUS CATHARTIUM (primocane), all figs. from TYPE: FIG. 1, two leaves, × 1; FIG. 2, portion of cane, × 1; figs. 3 and 4, upper and lower leaf-surfaces, × 10

Photo. B. G. Schubert.

RUBUS SEWARDIANUS (floricane), all figs. (× 1) from TYPE: FIG. 1, primary axis, showing straight prickles; FIG. 2, upper fruiting branchlets; FIG. 3, portion of lateral branch, showing unguiculate prickles, and of leafy branch

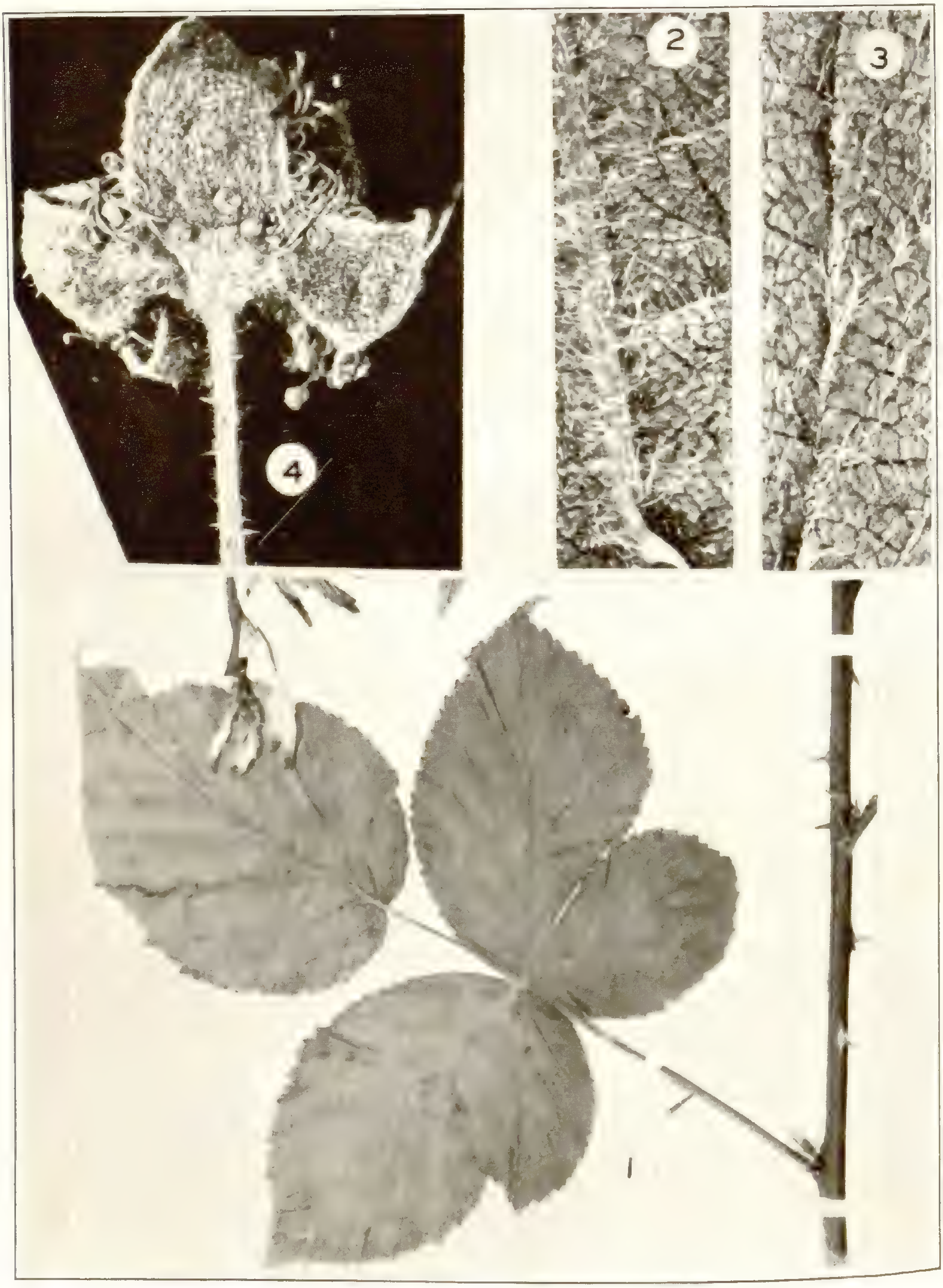

Photo. B. G. Schubert.

RUBUS SEWARDIANUS, all figs. from TYPE: FIG. 1, portion of primocane with leaf, × 5/6; FIGS. 2 and 3, lower and upper surfaces of primocane-leaf; FIG. 4, summit of pedicel and calyx, × 5

Photo. B. G. Schubert.

Circaea canadensis: fig. 5, half of leaf, × 1
Var. virginiana, all figs. from type: fig. 1, plant, × ½; fig. 2, leaf, × 1; fig. 3, portion of inflorescence, × 10; fig. 4, fruit, × 10

Photo. B. G. Schubert.

ERYNGIUM PROSTRATUM: FIG. 4, fruits, × 10
Var. DISJUNCTUM, all figs. from TYPE: FIG. 1, portion of plant, × 1; FIG. 2, head, × 5; FIG. 3, fruits, × 10

Photo. B. G. Schubert.

ERYNGIUM PROSTRATUM: FIGS. 2–5, heads, × 5, from different colonies
Var. DISJUNCTUM: FIG. 1, base of large plant. × 1, from type-locality

Photo. B. G. Schubert.

Eryngium Baldwini: fig. 1, base and median node, × 1; fig. 2, fruits, × 10; figs. 3–5, heads, × 5, from different stations

Photo. B. G. Schubert.

LEUCOTHOE AXILLARIS: FIG. 1, TYPE, × ½, of *Andromeda axillaris* Lam., after *Cintract*; FIG. 2, flowering branch, × 1, of *L. platyphylla* Small; FIG. 3, portion of inflorescence, to show blunt bracts and calyx-segments, × 4

Photo. B. G. Schubert.

LEUCOTHOE AXILLARIS, var. AMBIGENS: FIG. 1, portion of TYPE, × 1; FIG. 2, portion of inflorescence of TYPE, × 4

Photo. B. G. Schubert.

LEUCOTHOE CATESBAEI, as usually interpreted: FIG. 1, flowering branch, × 1; FIG. 2, portion of inflorescence, to show acute bracts and calyx-segments, × 4

Photo. B. G. Schubert.

PYCNANTHEMUM MONOTRICHUM, all figs. from TYPE: FIG. 1, plant, × ½; FIG. 2, leaf, × 1; FIG. 3, venation of back of leaf, × 4; FIG. 4, flower, × 5; FIG. 5, portion of glomerule, × 10; FIG. 6, calyx, × 10

Photo. B. G. Schubert.

PYCNANTHEMUM PYCNANTHEMOIDES, var. VIRIDIFOLIUM, all figs. from TOPOTYPE: FIG. 1, portion of inflorescence, × 1; FIG. 2, portion of glomerule, with corolla, × 8

Photo. B. G. Schubert.

PYCNANTHEMUM HYSSOPIFOLIUM: FIGS. 1 and 2, foliage and inflorescence, × 1; FIG. 3, calyx, × 10
P. SETOSUM: FIG. 4, CALYX, × 10

Photo. B. G. Schubert.

PYCNANTHEMUM UMBRATILE, all figs. from TYPE: fig. 1, summit of plant, × 1; FIG. 2, portion of stem, × 10; FIG. 3, lower surface of leaf, × 10; FIG. 4, calyx, × 10

Photo. B. G. Schubert.

Pycnanthemum clinopodioides: figs. 1 and 2, portions of plant, × 1; fig. 3, portion of stem, × 10; fig. 4, lower surface of leaf, × 10; fig. 5, calyx, × 10

Photo. B. G. Schubert.

EUPATORIUM CORDIGERUM: FIG. 1, portion of TYPE, × 1; FIG. 2, venation of lower leaf-surface, 1½; FIG. 3, old involucre, × 10

Photo. B. G. Schubert.

EUPATORIUM ROTUNDIFOLIUM: FIG. 1, TYPE, × ⅕, after *B. L. Robinson;* FIG. 2, median leaves, × 1; FIG. 3, venation of lower leaf-surface, × 2; FIG. 4, involucre, × 10

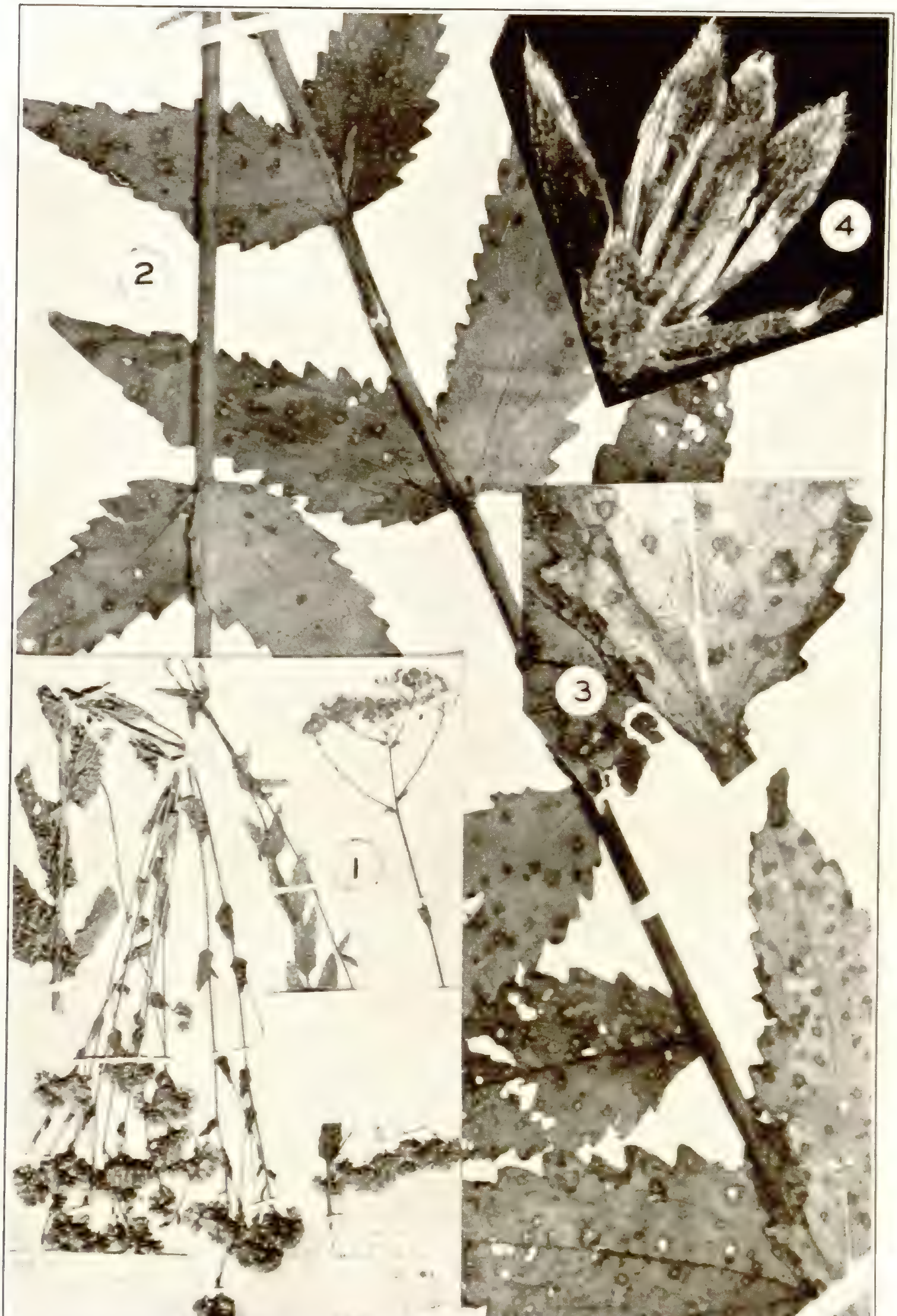

Photo. B. G. Schubert.

EUPATORIUM VERBENAEFOLIUM: FIG. 1, TYPE, $\times \frac{1}{4}$, after *B. L. Robinson;* FIG. 2, foliage, $\times$ 1; FIG. 3, lower veins of lower leaf-surface, $\times$ 2; FIG. 4, involucre, $\times$ 10

Photo. B. G. Schubert

Eupatorium pubescens: fig. 1, type, × 1/4, after *B. L. Robinson;* fig. 2, median leaves, × 1; fig. 3, involucre, × 10; fig. 4, venation of lower leaf-surface, × 2

INDEX

New scientific names are printed in full-face type

Reprinted from RHODORA, Vol. 47, July–September, 1945

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY

CLVII

By M. L. FERNALD

DATES OF ISSUE

Pages 221 to 235, plates 912 to 944 . . . . 10 July, 1945
Pages 239 to 257, plates 945 to 960 . . . . 6 August, 1945
Pages 265 to 271, plates 961 and 962 . . . . 5 September, 1945

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLVII

M. L. Fernald

(Plates 912–962)[1]

During recent studies of four somewhat complex and often misinterpreted genera, as represented in northeastern America, the following notes have accumulated. Since the proper interpretation of many of the species and varieties is greatly aided by careful illustration, I have asked Dr. Bernice G. Schubert to prepare plates which show the essential characters, these derived chiefly from types, isotypes or other authentic specimens.

I. KEY TO ANTENNARIA OF THE "MANUAL RANGE"

(Plates 912–958)[2]

From the time when its diversity and great interest first impressed our botanists in 1897 there was a concentration of our most active field-botanists upon this genus in the East for about thirty-five years. By the end of that period essentially all the wide-ranging species were apparently well collected and understood, although local or endemic species are still likely to be

[1] The cost of preparing the plates and of the engraver's blocks largely met through grants from the American Philosophical Society and from the Department of Biology of Harvard University.

[2] The cost of printing the plates met through a gift from Mr. Bayard Long, Associate Curator of Botany of the Academy of Natural Sciences of Philadelphia.

The inflorescences, especially whitish ones mounted on white paper, are most difficult to photograph. Their outlines, at least, are partly visible in the plates. It should be remembered that the fresh pistillate involucres are much more cylindric than the loosened ones of dried specimens, which alone are here shown.

found in unexplored areas of Newfoundland and perhaps of Gaspé. So thoroughly have these plants been studied and so clear-cut are their differential characters, ranges and flowering seasons that we more active explorers of the "effete East" thought that we had them well in hand. Beginning with the publication by Greene in May, 1897, of *A. neglecta*, PLATES 924–926, (and a few western species), the recognition of species in the region to be covered by the next "Manual" has proceeded until the differentiation by Stebbins in July, 1935, of a probable but tiny grandfather and grandmother of some of them, *A. virginica* (PLATE 937) of the ancient Appalachian Upland. So many morphological characters are found in habit, leaves, leaf-tips or appendages, pubescence, inflorescences, involucres and their phyllaries, receptacles, corollas, pappus and achenes, that keen students like the late B. L. Robinson, a life-long specialist on the *Compositae*, S. F. Blake, another sound and generally recognized specialist on the *Compositae*, and Ledyard Stebbins, outstanding morphologist and student of phylogeny, have clearly understood the differences; while some of us who have, through decades, had a tremendous experience with them in the field and the herbarium recognize the amazing stability of the essential characters. It is, then, at least surprising to be told by one "who blew in from the West" so recently that his field-experience with the plants of the "Manual range" as delimited by him (from Gaspé County, Quebec, to western Minnesota, south to southern Virginia, Kentucky and Missouri) must have been more limited than that of lifelong explorers of the area,—it is startling to be assured that in all this diverse area we have only "three fairly well-marked species" and that the segregations which have been recognized by a host of our best technical students and most observant amateurs are "too dependent on temporary whim, or at best on individual opinion, to justify specific recognition".[1]

Now it so happens that in the on-the-whole satisfactorily systematized series of eastern *Antennaria* (I can say nothing of the sort for the western species nor for the undifferentiated stacks in some other large herbaria) in the two collections before me, those of the Gray Herbarium and of the New England Botanical Club, there are approximately 2500 numbers or sheets of *Anten-*

[1] Cronquist, RHODORA, xlvii. 183 (1945).

naria from the "Manual range" (in my case including Newfoundland as well as Gaspé); and more than 700 of these were collected by myself or by my companions (Robinson, Wiegand, Collins, Pease, Long, Fogg, St. John, Stebbins, Weatherby or others) and me with such intelligence as the Lord vouchsafed us. It is, furthermore, amazing, if the recognition of our species is merely "dependent on temporary whim", that there should be, in case of all species in their own areas, essential unanimity in the identifications made by the 150 quite unwhimsical and lucid collectors and students of this vast series. I enumerate in the footnote[1] only about half of these students, none of them toadies and most of them ready to disagree if they cannot concur, some of them always seeking an opportunity to do so.

Since some readers, in spite of the stated editorial policy, still assume that everything published in RHODORA has the editorial stamp of approval, I hasten to put on record the key which is prepared for the next edition of Gray's Manual. That work will include Newfoundland; consequently 10 species here appear (nos. 1, 3, 4, 5, 6, 7, 9, 10, 13 and 14) which are outside the range covered by the projected Illustrated Flora. These are here included, although they were rather fully treated and illustrated in RHODORA, xxxv. 327–346, plates 263–268 (1933). Of the 22 species occurring from Gaspé Co., Quebec, to Minnesota and southward 8 are pontificated upon by Cronquist; the remaining 14 have not received his approval even as forms. Since, by his interpretation, they are presumable local whimsies I have asked Dr. Schubert to put concretely into plates some of the characters of most of those which have not previously been carefully illustrated. I am not at this time publishing the detailed drawings of them which have been prepared for the Manual.

It certainly would seem strange, if we have in the region from

[1] Allard, Ball (C. R.), Bartram (E. B.), Bicknell, Bissell, Blake (S. F.), Blanchard, Brainerd, Brunel, Bush, Chamberlain (E. B.), Chase (Agnes), Collins (J. F.), Deam, Deane, Dodge (C. K.), Eames (A. J.), Eaton (A. A.), Eggleston, Farwell, Fassett, Faxon (Edwin), Forbes (F. F.), Gates (F. C.), Greene, Greenman, Grimes, Griscom, Harper, Hermann, Herriot, Hill, (A. F.). Hill (E. J.), Holm, House, Hunnewell, Kennedy (G. G.), Klugh, Knowlton (C. H.), Krotkov, Lansing (O. E.), Long, Louis-Marie, McDonald (F. E.), Mackenzie, Macoun (John), Macoun (J. M.), Malte, Marie-Victorin, Maxon, Moore (J. W.), Muenscher, Palmer (E. J.), Parlin, Pease, Peck (C. H.), Rand (E. L.), Raup, Robinson, Rolland-Germain, Rousseau, Seymour (F. C.), Smith (L. B.), Standley, Stebbins, St. John, Tatnall (R. R.). Taylor (T. M. C.), Wahl, Weatherby, Webb (R. J.), Wiegand, Williams (E. F.), etc., etc.

Gaspé County westward and southward only three species, *A. neglecta, plantaginifolia* and *solitaria,* that two tiny plants, *A. vexillifera* (PLATE 913) and *A. Peasei* (PLATE 915), utterly unlike any of the three elect, should have taken the whim to isolate themselves near or above such arctic-alpine companions as *Lycopodium alpinum* L., *Deschampsia atropurpurea* (Wahlenb.) Scheele, *Carex nardina* Fries, *C. rariflora* (Wahlenb.) Sm., *Juncus castaneus* Sm., *Luzula confusa* Lindeb., *Salix herbacea* L., *Betula glandulosa* Michx., *Oxyria digyna* (L.) Hill, and others likewise never found with *Antennaria neglecta* of low altitudes much farther south. These being "small-leaved", they have to go, apparently, into Cronquist's hodgepodge "*A. neglecta.*"[1] True lowland *A. neglecta* (PLATES 924–926) has prolonged and nearly naked flagelliform stolons, the midrib of the basal leaves excurrent as a subulus, the inflorescence at first glomerulate but by elongation of the rachis (sometimes up to 1.5 dm. long) finally becoming spicate or racemose. As a result of the crazy whim by which, if the latest interpretation is valid, they isolated themselves on alpine and subalpine spots hundreds of miles away from the relatively southern true *A. neglecta*, they lost the flagelliform stolons and became compact, with crowded assurgent leafy offshoots, stubbed off the terminal subulus of the rosette-leaves (thus taking on a character of the large arctic-alpine series to which they really belong), and changed their inflorescences from ultimate racemes to mere unaspiring corymbs, and lost the characteristic papillae which occur on at least the young and undried achenes of *A. neglecta,* as well as of the other relatively southern species. In the latter character they belong with the great bulk of the Arctic and Eurasian series,[2] not with the common species of the eastern United States.

If, furthermore, the latest interpretation of *Antennaria* is not

[1] Although the title of Dr. Cronquist's paper emphasizes "the northeastern United States", his inclusion, as one of his varieties, of *A. gaspensis* indicates a broader eastern extension of his limits; for *A. gaspensis* is known only from the calcareous mountains, bluffs and slopes of easternmost Gaspé County (Mt. Ste.-Anne and coastal cliffs at Percé; Cap Gaspé; Le Forillon to Grande-Grève; Cap Rosier and Anticosti) and western Newfoundland. Since *A. gaspensis* of the extreme eastern tip of the Gaspé Peninsula is included by Cronquist it must be assumed that species found on the Peninsula farther west, *A. vexillifera, Peasei, subviscosa* and *appendiculata*, automatically come within his range, although he does not account for them in his "three fairly well-marked species" of the whole "Manual range".

[2] See the very significant article, *On the "Papillose" Achenes in the Genus Antennaria* by Morten P. Porsild in RHODORA, xxxiv. 213–222 (1931).

itself "too dependent on temporary whim" (as it seems to be) and is a sound and sensible treatment, we must also put *A. subviscosa* (PLATES 916 and 917) into all-inclusive *A. neglecta*, already defined, for, unlike the two alpine species just discussed, *A. subviscosa* has papillate achenes. If it is only *A. neglecta* in complete disguise it has been playing a great joke. *A. neglecta* has slender, lash-like stolons ending in tardily developed rosette-leaves, which are completely rotted off during the second year; its cauline leaves end in scarious appendages; its involucres are 6.5–9 mm. high; its corollas 5–6.2 mm. long; the style usually purple; the longer pappus-bristles 6–9 mm. long. Greatly excited, if the latest flash-interpretation is correct, by freeing itself from sex, which so generally characterizes *A. neglecta* and, therefore, by the theory involved, makes it a species, and getting into a sweeter soil than the sour and worn-out old fields and pastures where the relatively southern male and female *A. neglecta* persist in growing together, *A. subviscosa* must have taken a broad jump to the limestone walls which face north toward the vast lower River St. Lawrence and the Gulf, there finding new neighbors, Arctic, northern Cordilleran or North Pacific calcicolous specialties such as *Woodsia glabella* R. Br., *Festuca saximontana* Rydb., *Calamagrostis purpurascens* R. Br., *Carex concinna* R. Br., *Cerastium beeringianum* Cham. & Schl., *Arabis Holboellii* Hornem., *Saxifraga cespitosa* L., *Potentilla nivea* L., etc. Landed there, among neighbors who could never know of its earlier sexual existence farther south, and now safely apomictic, it further shook off any supposed alliance with *A. neglecta* by taking on a suffruticose habit, the larger plants (PLATE 916) trailing out as long-lived mats a full meter across, with the crowded branches heavily invested with long-marcescent basal foliage, the latter without the subulus of *A. neglecta*, the cauline leaves merely mucronate or subulate-tipped, the corymb viscid with glandular secretions, the pale involucre only 5–6.5 mm. high, the corollas shrinking down to a length of only 3.8–4.3 mm., the styles becoming diluted to a creamy tone, and the longer pappus-bristles shortening to only 4.5–5 mm. On the larger mats the old branches carry for many years the ancient flowering stems, holding on as marcescent remnants. Who ever saw any of our other eastern Antennarias do that? In fact, no one who understands *Antennaria* would guess that *A. subviscosa* belongs with or ever had anything to do with *A. neglecta*. That, however, is the only place for it if, in all the Manual range, we are given a choice of only "three fairly well-marked species".

These three species and many more from Gaspé or elsewhere in Canada and the northernmost states, as well as some from farther south, have real characters, as real as those of *Polygonum viviparum* L., *Saxifraga cernua* L. and a host of other sexless and morphologically definite plants; and by those who, happily, still believe the stable morphological characters of more importance than "large" or "small" leaves alone they will be maintained. Furthermore, if the recent student of the genus were consistently retaining as species and varieties of *Antennaria* only those which are bisexual, he would be at least logical; but he includes as a variety under his "*A. neglecta*", the strictly apomictic and tremendously isolated *A. gaspensis*, which differs from everything else he puts into *A. neglecta* in its receptacle being higher than broad (instead of broader than high), a character which in *Eupatorium* is considered subgeneric (or even generic). If his treatment of *Antennaria* is typical of what is to be expected for other groups in the new Illustrated Flora, it would seem that that work will be an abbreviated pocket-novel, the next Gray's Manual a family bible.

Key to Antennaria to be used in the next Gray's Manual

N. B.—The pistillate involucres only are intended in the measurements (unless otherwise specified); the counts and descriptions of *upper* cauline leaves refer to those *below* the inflorescence and exclude the bracteal leaves in the corymb.

a. Basal leaves erect, oblanceolate to elliptic-acuminate, 2–18 cm. long, similar to the cauline ones; involucres of pistillate heads deep-brown to blackish; achenes glabrous, not papillate.

Flowering stem with 4–10 leaves; pistillate corollas 3–4.3 mm. long; exserted tip of mature style three-fourths as long as corolla; longer pappus-bristles 6–7 mm. long; phyllaries of staminate heads fuscous; staminate corollas 3–4 mm. long. . . . . 1. *A. eucosma.*

Flowering stem with 6–12 leaves; pistillate corollas 4.5–5.2 mm. long; exserted tip of mature style at most one third length of corolla; longer pappus 9–11 mm. long; phyllaries of staminate heads whitish; staminate corollas 4–5 mm. long. . . . . 2. *A. pulcherrima.*

a. Basal leaves spreading, forming depressed rosettes, strongly contrasting in outline with the cauline leaves; plants humifuse to stoloniferous. . . . *b.*

b. Larger basal leaves only 1–5 mm. wide, blunt or only obscurely mucronulate, whitened above; flowering stems only 0.05–1.8 dm. high; only pistillate plants known, their involucres deep-brown to blackish or, if pale, at most 7 mm. high. . . .*c.*

c. Cauline leaves 15–28, very crowded (except in old individuals), the upper 7–20 with twisted scarious tips 2–3 mm. long; taller stems up to 4 (rarely –6) cm. high; involucre with 3–4 very unequal series of conspicuously imbricated phyllaries; achenes glabrous. . . . . .3. *A. columnaris.*

c. Cauline leaves 4–16, only the upper 1–7 with scarious tips; flowering stems mostly 4–18 cm. high; involucres with phyllaries subequal or in 2 or 3 unequal series (or in 4–6 series in no. 10, which has only 8–10 remote cauline leaves, with 3–5 appendaged, and pale involucres). . . .*d.*

d. Involucres deep-brown to blackish; phyllaries subequal or in 2–3 unequal series. . . .*e.*

e. Involucres with the lower half prolonged, green and viscid, the phyllaries closely and firmly appressed or agglutinated to form an ellipsoid-campanulate falsely gamophyllous cup 7–9 mm. high; corollas 5–5.5 mm. long; achenes glabrous. . . . . .4. *A. Foggii.*

e. Involucres with loose and distinct phyllaries; corollas 3–5 mm. long. . . .*f.*

f. Phyllaries conspicuously unequal, in 3 series, the outer about half as long as the inner; corollas 4–5 mm. long

Cauline leaves 6–9, the 2 or 3 upper with unguiculate subulate tips 0.6–1.5 mm. long; involucres 6–7 mm. high, their outer and median phyllaries with scarious tips 1.2–2 mm. wide; style included or nearly so, subentire; achenes papillate, 1.1–1.4 mm. long. . . . . .5. *A. Bayardi.*

Cauline leaves 8–14, the 4 or 5 upper with flat scarious tips 2–3.5 mm. long; involucres 7.5–9 mm. high, their outer and median phyllaries with scarious tips 2–2.5 mm. broad; style exserted, 2-cleft; achenes glabrous, 1.8 mm. long. . . . . .6. *A. brunnescens.*

f. Phyllaries subequal, in 2 or 3 series, the outer nearly as long as the inner; corollas 3–4.5 mm. long; achenes glabrous. . . .*g.*

g. Flowering stems at most 1.2 dm. high, with 5–8 leaves; the 3–6 upper leaves with flag-like oblong-lanceolate flat tips.

Involucres 7–10 mm. high, with squarrose pale brown phyllary-tips 1.3–2 mm. broad; upper 3 or 4 cauline leaves appendaged; corollas 4–4.5 mm. long; achenes 1.2–1.4 mm. long. . . . . .7. *A. cana.*

Involucres 6–7 mm. high, with ascending fulvous phyllary-tips rarely more than 1 mm. broad; upper 4–6 cauline leaves appendaged; corollas 3–4 mm. long; achenes 1.6–1.8 mm. long. . . . . .8. *A. vexillifera.*

g. Flowering stems slender, up to 18 cm. high, their 8–15 leaves mostly subulate-tipped, only the uppermost with lance- or linear-involute scarious tips; involucres 5–6 mm. high, the outer ascending tips 1–1.7 mm. broad.................................9. *A. confusa.*

d. Involucres milk-white or ochroleucous or pale brown; achenes glabrous....*h.*

h. Cauline leaves 5–10; involucres pale brown or stramineous, sometimes roseate or greenish, 5–7 mm. high; corollas 3.7–5 mm. long; mature pappus 4.5–5 mm. long....*i.*

i. Involucres of 4–6 series of conspicuously unequal phyllaries, stramineous to pale brown.....10. *A. straminea.*

i. Involucres of 2 or 3 series of subequal phyllaries.

Flowering stems 3–7 cm. high, not glandular; upper cauline leaves with oblong-lanceolate scarious appendages 2–3 mm. long; involucres not glandular; achenes glabrous...........11. *A. Peasei.*

Flowering stems 5–18 cm. high, glandular above; upper cauline leaves with subulate or involute tips; involucres glandular-viscid at base; achenes papillose.....................12. *A. subviscosa.*

h. Cauline leaves 9–15; involucres milk-white or ochroleucous, 4.5–6 mm. high; corollas 3–3.3 mm. long; mature pappus 4–4.3 mm. long...............13. *A. albicans.*

b. Larger basal leaves mostly wider, 0.2–5.5 cm. broad, usually distinctly apiculate or mucronate, green and glabrous to white-tomentose above; flowering stems, 0.4–5 dm. high; involucres whitish, greenish, pale brown or fulvous, 5–11 mm. high; staminate plants of some species known....*j.*

j. Rosette-leaves comparatively small, 0.2–2.1 cm. wide, with only the midrib prominent to the tip beneath, the lateral ribs short and evanescent....*k.*

k. Middle and upper cauline leaves of pistillate plants terminated by a flat or merely inrolled scarious appendage....*l.*

l. New rosette-leaves bright green and glabrous or promptly glabrate on the upper face....*m.*

m. Rosette-leaves spatulate to cuneate-oblanceolate or narrowly cuneate-obovate, scarcely petioled, rounded at tip or only subacute, terminated by a mucro less than 0.5 mm. long; heads 1–6; plants of Nfld. and e. Que.....*n.*

n. Basal offshoots crowded, scarcely elongate; basal leaves 6–13 mm. long, 2–4 mm. wide; flowering stem 5–13 cm. high, its longer leaves barely 1 cm. long; involucres brown, 6–8 mm. high; corollas 4.5 mm. long; achenes glabrous. 14. *A. Wiegandii.*

n. Basal offshoots elongate, when well developed cord-like; basal leaves 1–3.5 cm. long, 4–12 mm. wide; flowering stem 0.5–3 dm. high, its longer leaves 1–2.5 cm. long; involucres whitish, 7–11 mm. high; corollas 4.8–6 mm. long; achenes papillate.

Rosette-leaves broadly rounded at summit; lower and median cauline leaves obtuse, merely mucronate-tipped, the upper 1–3 with scarious appendages...........15. *A. spathulata.*

Rosette-leaves subacute to round-tipped; all or all but the very lowermost cauline leaves ending in prolonged scarious appendages. 16. *A. appendiculata.*

m. Rosette-leaves oblanceolate to narrowly obovate, somewhat narrowed to acute tip and tapering to a subpetiolar base, tipped by a sharp mucro 0.5–1.5 mm. long; heads 3–18; plant of broad continental range; achenes (at least when young) papillate. . . . . .17. *A. canadensis.*

l. New rosette-leaves grayish- or whitish-tomentulose or -sericeous on upper face; achenes (at least when young) papillate. . . . *o.*

o. Rosette-leaves cuneate-oblanceolate, -obovate or -spatulate, mostly 1.5–6.5 cm. long, 0.5–1.8 cm. broad, the old ones becoming green with weathering; stolons filiform, lash-like or cord-like, elongate; heads crowded in a glomerule or becoming loosely racemose; corollas 5–6.2 mm. long; continental plants, both staminate and pistillate.

Stolons flexuous and lash-like; rosette-leaves cuneate-oblanceolate to -spatulate, narrowed to a subpetiolar base, 0.5–1.3 cm. broad; stems of pistillate plants elongating in fruit to 1.5–4 dm. high; pistillate heads in maturity becoming spicate to racemose; staminate involucres 4–6 mm. high; eastern species. . 18. *A. neglecta.*

Stolons stiffer, cord-like; rosette-leaves narrowly cuneate-obovate, broad-based, 0.6–1.8 cm. broad; stems of pistillate plants 0.4–2 dm. high; pistillate heads closely glomerulate; staminate involucres 6–8 mm. high; Great Plain species. . . . . .19. *A. campestris.*

o. Rosette-leaves oblanceolate or narrowly obovate, acute or acutish, 0.5–2 cm. long, 2–5 mm. broad, strongly whitened; basal offshoots crowded, very short and assurgent, consisting chiefly of depressed rosettes; heads loosely corymbose (or solitary); corollas 4–4.5 mm. long; staminate plant unknown; species of e. Que. and Nfld. . .20. *A. gaspensis.*

k. Middle and upper cauline leaves of pistillate plants blunt or with subulate or subulate-aristate tips (only those about the corymb with flat scarious appendages); achenes (at least when young) papillate. . . . *p.*

p. Stolons and basal offshoots short and assurgent, ending in depressed rosettes; rosette-leaves oblanceolate to broadly obovate, often with definite petioles. . . . *q.*

q. Rosettes-leaves and cauline leaves all or nearly all with a naked terminal mucro or subulus; eastern and northeastern species.

Basal leaves oblanceolate or narrowly spatulate-obovate, acute or subacute, scarcely petioled; flowering stem stiff, its 8–18 leaves subapproximate and evenly spaced; corymb compact; involucres greenish or light brown only at base, with firm chartaceous milk-white to creamy-brown blunt phyllaries mostly 1.4–2 mm. broad; pits of denuded receptacle narrower than the ridges....................21. *A. rupicola.*

Basal leaves narrowly to broadly obovate, mostly rounded to tip, petioled; flowering stem usually becoming flexuous upon elongation, its 4–10 (–14) leaves often becoming remote; pistillate involucres greenish-, purplish- or brown-tinged, their thin and usually scarious pale-tipped phyllaries 0.4–1.4 mm. broad; pits of old receptacle broader than ridges.

Plants all or chiefly all pistillate, these with stems 0.5–5 dm. high; rosette-leaves 1–5.5 cm. long, 0.3–2 cm. wide; lower cauline leaves 1.5–4 cm. long, 2–6 mm. broad; pistillate involucres 6–9 mm. high, with 30–60 or more phyllaries; florets 50–140; corollas 4–6 mm. long; pits of receptacle deep; staminate involucre 5–6.5 mm. high; wide-ranging from Nfld. to n. Ont., s. to N. S., N. E., L. I., Va., Ind., Wisc. and Minn.............................22. *A. neodioica.*

Plants about equally staminate and pistillate; the pistillate ones with very slender stems 0.6–2 dm. high; rosette-leaves 1–2.5 cm. long, 3–8 mm. wide; lower cauline leaves 1–1.3 cm. long, 1–2 mm. wide; pistillate involucre 5–7 mm. high, with 25–35 phyllaries; florets 40–70; corollas 3.2–4.5 mm. long; pits of receptacle shallow; staminate involucre 3.8–5 mm. high; plant of Appalachian Upland, Va., W. Va. and Pa., very locally to w. Vt.....................23. *A. virginica.*

q. Rosette-leaves and all or nearly all the cauline leaves blunt, without an evident subulus; Great Plains species.............................24. *A. aprica.*

p. Stolons elongate, lash- or cord-like, only tardily developing terminal rosettes; rosette-leaves cuneate-oblanceolate to spatulate-obovate..........25. *A. petaloidea.*

j. Rosette-leaves comparatively large, 0.7–5.5 cm. broad, with 3–7 nerves somewhat prominent and prolonged beneath; achenes (at least when young) papillate....*r.*

r. Heads in corymbs; stolons assurgent and leafy or with assurgent leafy tips....*s.*

s. Pistillate involucres 7–11 (rarely only 6 in no. 30) mm. high; central corollas 4.5–7 mm. long; achenes 1.3–2.2 mm. long; mature pappus (longer bristles) 5.5–9 mm. long....*t.*

t. Rosette-leaves mostly subtruncate, abruptly constricted above the middle to a concave curve arching to the prolonged slenderly cuneate base; mature pappus 5.5–6 mm. long; local species of upper Great Lakes.....................26. *A. Farwellii.*

t. Rosette-leaves acutish or gradually rounded at summit, more gradually narrowed to the base; mature pappus 6–9 mm. long....*u.*

u. Blades of larger rosette-leaves 2.5–8 cm. long above the petiolar base, minutely canescent, or glabrous or glabrate; mature flowering stems (pistillate) 1.5–5 dm. high; involucres 7–11 mm. high; corollas 5–7 mm. long; longer pappus 6–9 mm. long.

Rosette-leaves spatulate to narrowly spatulate-obovate, strongly rounded at summit, closely canescent-tomentose above; heads glomerulate or densely crowded; longer mature pappus 8–9 mm. long; stems glandless . . . . 27. *A. munda.*

Rosette-leaves broadly obovate-spatulate to obovate and subacute to suborbicular and rounded above; heads densely to loosely corymbed; longer mature pappus 6–8.5 mm. long; stems frequently glandular above.

New rosette-leaves permanently and closely canescent-tomentulose above; stems and involucres rarely purple; mature achenes 1.3–1.6 mm. long, densely papillose, their longer pappus 6–8 mm. long; summit of plant glandless or glandular . . . . 28. *A. fallax.*

New rosette-leaves bright green and glabrous or only lightly canescent and glabrate; stems and involucres frequently purplish; mature achenes 1.6–2.2 mm. long, smooth or slightly papillose, their longer pappus 7.5–8.5 mm. long; summit of stem usually glandular . . . . 29. *A. Parlinii.*

u. Blades of larger rosette-leaves 1.5–3.5 cm. long, strongly rounded, loosely tomentose above; mature flowering stem (pistillate) 1.3–3.5 dm. high, with stipitate glands at summit and in the corymb; involucres 6–8.5 mm. high; corollas 4.5–5.5 mm. long; longer pappus 6–7 mm. long . . . . 30. *A. Brainerdii.*

s. Pistillate involucres 5–7 mm. high; central corollas 2.5–4.3 mm. long; achenes 1–1.5 mm. long; mature pappus 4–5.5 mm. long; rosette-leaves oblanceolate, obovate or suborbicular, minutely canescent above . . . . 31. *A. plantaginifolia.*

r. Heads solitary; stolons filiform, lash-like, tardily producing terminal rosettes of sessile to broad-petioled obovate- to broadly oblong-spatulate leaves . . . . . 32. *A. solitaria.*

1. A. EUCOSMA Fernald & Wiegand in RHODORA, xiii. 23 (1911); Fernald, l. c. xxxv. 330 (1933).—Straits of Belle Isle to Bay St. George, Nfld. Both staminate and pistillate. *Fl.* mid-July, Aug. PLATE 912.

2. A. PULCHERRIMA (Hook.) Greene, Pittonia, iii. 176 (1897). *A. carpatica* sensu Hook. Fl. Bor.-Am. i. 329 (1834), not Wahlenb. *A. carpatica*, γ. *pulcherrima* Hook. l. c. (1834).—Anticosti I., Gaspé Co., Que.; w. Ungava to n. Alta., s. in Rocky Mts. Both staminate and pistillate. June–early Aug.

3. A. COLUMNARIS Fernald in RHODORA, xxxv. 331, t. 263 (1933).—Near St. John and Ingornachoix Bays, Nfld. Pistillate only. July, early Aug.

4. A. Foggii Fernald, l. c. 332, t. 264 (1933).—Near St. John and Ingornachoix Bays, Nfld. Pistillate only. July, early Aug.

5. A. Bayardi Fernald, l. c. 333, t. 265 (1933).—Bonne Bay and Bay of Islands, Nfld. Pistillate only. July, early Aug.

6. A. brunnescens Fernald, l. c. 336, t. 266 (1933).—Alpine crest, Mt. Killdevil, Bonne Bay, Nfld. Pistillate only. Aug.

7. A. cana (Fernald & Wieg.) Fernald, l. c. xviii. 236 (1916) and xxxv. 337, t. 267 (1933). Straits of Belle Isle to Bonne Bay (ascending to alpine areas), Nfld.; n. B. C. Pistillate only. July, early Aug.

8. A. vexillifera Fernald, l. c. xxvi. 99, t. 142, fig. 4 (1924), xxxv. 338 (1933). Nw. Nfld.; Shickshock Mts. (at 3500 ft.), Gaspé Pen., Que. Pistillate only. July. Plate 913.

9. A. confusa Fernald, l. c., t. 268 (fig. at left) (1933). W. Nfld. Pistillate only. July, Aug.

10. A. straminea Fernald, l. c. xvi. 130 (1914), xxvi. 100, t. 145, fig. 8 (1924) and xxxv. 340 (1933). N. and w. Nfld. Pistillate only. July, early Aug. Plate 914.

11. A. Peasei Fernald, l. c. xxvi. 101, t. 142, fig. 11 (1924). Alpine region, Shickshock Mts., Gaspé Pen., Que. Pistillate only. July. Plate 915.

12. A. subviscosa Fernald, l. c. xvi. 131 (1914) and xxxv. 334 (1933). Rimouski Co. to Gaspé Co., Que. Late June, July. Pistillate only. Plates 916 and 917.

13. A. albicans Fernald, l. c. xvi. 197 (1914), xxvi. 100, t. 145, fig. 6 (1924) and xxxv. 340 (1933). W. Nfld. Pistillate only. July, early Aug. Plate 918.

14. A. Wiegandii Fernald, l. c. xxviii. 238 (1926), xxxv. 240 (1933). W. Nfld. Pistillate only. July, early Aug. Plate 919.

15. A. spathulata Fernald, l. c. xvi. 196 (1914), xxxv. 340 (1933). *A. canadensis*, var. *spathulata* Fernald, l. c. 132 (1914). *A. spathulata*, var. *continentis* Fernald & St. John in St. John, Bot. Exped. No. Shore Gulf St. Lawr. 55 (1922). Nfld. and St. P. et Miq.; Côte Nord, Anticosti and Lake Mistassini, Que. Pistillate only. Late June-early Aug. Plate 920.

16. A. appendiculata Fernald, l. c. xxiii. 295 (1922). Nw. Nfld.; Anticosti and Gaspé Pen., Que.; w. Ungava. Pistillate only. Plate 921.

17. A. canadensis Greene, Pittonia, iii. 275 (1898). Var. *Randii* Fernald in Proc. Bost. Soc. Nat. Hist., xxviii. 246 (1898). *A. neglecta*, var. *Randii* (Fernald) Cronquist in Rhodora, xlvii. 184 (1945). Gaspé Co., Que., to n. Man., s. to N. S., N. E., N. Y., mts. of Pa. and Va., n. Ind. and Mich. Pistillate chiefly; staminate plants comparatively rare. May–early July (–Aug. in mts.). Plates 922 and 923.

18. A. NEGLECTA Greene, Pittonia, iii. 173 (1897). *A. neglecta*, var. *neglecta* (Greene) Cronquist in RHODORA, xlvii. 183 (1945). N. S. and Me. to s. Ont., s. to Va., W. Va., O., Ind., Mo. and Kans. Both staminate and pistillate. Late April–July. PLATES 924–926.

Antennaria neglecta is the earliest-flowering species. In eastern Massachusetts (north of Cape Cod) its flowering period in normal seasons begins about April 20 and extends to May 20; that of *A. plantaginifolia* April 25–May 20; of *A. canadensis*, *A. neodioica*, *A. petaloidea*, *A. Parlinii* and *A. fallax* May 10–June 17; of *A. munda* May 20–June 15. When, watching for the coming of Spring, one finds the first expanded flowers of *A. neglecta* (exceptionally on April 1) he knows that *A. plantaginifolia* will soon follow, but that he must wait two or three weeks for the others and even a month for *A. munda*. These are not trifling differences nor "temporary whims", although the element of time is involved!

A. NEGLECTA, forma SIMPLEX (Peck) Fernald, l. c. xxxviii. 230 (1936). *A. simplex* Peck, Bull. N. Y. State Mus. lxvii. Bot. vi. 33 (1906). Sporadic, Me. and N. Y. PLATE 927.

19. A. CAMPESTRIS Rydberg in Bull. Torr. Bot. Cl. xxiv. 304 (1897). No. B. C. to Man., s. to Okla., e. to Thunder Bay Distr., Ont., Mich. and Mo. Both staminate and pistillate. Late April–June. PLATE 928.

20. A. GASPENSIS Fernald, l. c. xxxv. 341, t. 268, plant at right (1933). *A. neodioica*, var. *gaspensis* Fernald in Ottawa Nat. xix. 156 (1905). *A. neglecta*, var. *gaspensis* (Fernald) Cronquist, l. c. 184 (1945). W. Nfld.; Anticosti I. and e. Gaspé Pen., Que. Pistillate only. Late June–Aug.

21. A. RUPICOLA Fernald in RHODORA, i. 74 (1899) and xxxv. 342 (1933). *A. neodioica*, var. *rupicola* Fernald, l. c. xvi. 132 (1914). Nfld. and Anticosti to Magdalen Ids. and ne. Me.; L. Huron and L. Superior regions of Ont. and n. Mich. Pistillate only. June, July. PLATES 929 and 930.

22. A. NEODIOICA Greene, Pittonia, iii. 184 (1897).—Variable, with some pronounced varieties

a. Rosette-leaves 1–4 cm. long, 3–17 mm. broad; lower cauline leaves 1–3 cm. long, 1–5 mm. broad; involucres of pistillate heads greenish- or purple-tinged, with scarious tips; corollas 3.2–5 mm. long. . . .*b.*

b. Rosette-leaves gray- or grayish-tomentose above. . . .*c.*

c. Flowering stems flexuous upon elongation, 1–5 dm. high; the 4–14 leaves becoming distant; rosette-leaves obovate, petioled; corymb open.

Outer and middle phyllaries of pistillate involucre obtuse to subacute. . . . . .Var. *typica*.
Outer and middle phyllaries lance- to linear-attenuate.Var. *attenuata*.

c. Flowering stems stiffly erect, 0.5–2.5 dm. high; the 8–14 leaves subapproximate or imbricated; rosette-leaves oblanceolate or narrowly obovate, acutish, cuneate at base; corymb subglomerulate, globose or hemispherical Var. *interjecta*.

b. Rosette-leaves green and glabrous above, 3–13 mm. wide; flowering stem 1.5–5 dm. high. .Var. *chlorophylla*.

a. Rosette-leaves 2–5.5 cm. long, 0.7–2 cm. broad; lower cauline leaves 2–4 cm. long, 3–6 mm. broad, often overlapping; flowering stems stoutish, 1.5–4.5 dm. high; corymb loose; heads very full; involucres (except in shade) reddish, their phyllaries with white petaloid tips; corollas 4.8–6 mm. long. . Var. *grandis*.

Var. TYPICA Fernald, l. c. xxxv. 345 (1933). *A. neodioica* Greene, l. c. Nfld. to Ont., s. to N. S., N. E., inland Va., Ind., Wisc. and Minn. Staminate plants few and rare. May–early July. PLATES 931 and 932.

Var. ATTENUATA Fernald in Proc. Bost. Soc. Nat. Hist. xxviii. 248 (1898). *A. neglecta*, var. *attenuata* (Fernald) Cronquist, l. c. (1945), as to basonym. Similar range. Staminate plant almost unknown. May–Aug. (northw.). PLATE 933.

Var. INTERJECTA Fernald in RHODORA, xxxv. 345 (1933). Gaspé and Rimouski Cos., Que.; n. shore, L. Sup., Ont., to e. Wisc. Staminate plant unknown. Mid-June–mid-July. PLATE 934.

Var. CHLOROPHYLLA Fernald, l. c. xxiii. 296 (1922). Nfld. to Wisc., s. to N. S., N. E. and N. Y. Staminate plant unknown. May–Aug. PLATE 935.

Var. GRANDIS Fernald, l. c. i. 73 (1899) and xxxv. 345 (1933). *A. grandis* (Fernald) House, Bull. N. Y. State Mus. no. 188: 60, 63 (1916), without indication of *specific* characters. N. S. and s. N. B. to s. Que., w. to Mich., s. to Mass. and N. Y. Staminate plant unknown. Late May–July. PLATE 936.

23. A. VIRGINICA Stebbins in RHODORA, xxxvii. 230 (1935). Appalachian Upland, Va., W. Va. and Pa., rarely to w. Vt. Staminate and pistillate plants both abundant. April–June. PLATE 937, FIGS. 1–10.

Var. ARGILLICOLA Stebbins, l. c. 232 (1935). *A. neodioica*, var. *argillicola* (Stebbins) Fernald, l. c. xxxviii. 230 (1936). *A. neglecta*, var. *argillicola* (Stebbins) Cronquist, l. c. (1945). W. Pa., e. W. Va. and w. Va. PLATE 937, FIGS. 11 and 12.

24. A. APRICA Greene, Pittonia, iii. 282 (1898). E. Man. to B. C., s. to w. Minn., Neb., N. M. and n. Mex. Both staminate and pistillate. May–July. PLATES 938 and 939.

25. A. PETALOIDEA Fernald, l. c. i. 73 (1899). *A. neodioica*, var. *petaloidea* Fernald in Proc. Bost. Soc. Nat. Hist. xxviii. 245 (1898). Three geographic vars.

Flowering stems 1–3 (–4) dm. high during anthesis, their leaves at almost regularly decreasing intervals up to the inflorescence; rosette-leaves 1.5–5 cm. long, 0.5–1.7 cm. broad, rounded to acute at summit.
  Phyllaries with whitish petaloid tips; rosette-leaves round-tipped to subacute, up to 1.7 cm. broad....... A. *petaloidea* (typical).
  Phyllaries scarious, lustrous, yellowish, long-attenuate; rosette-leaves acute, up to 1.2 cm. broad.............. Var. *scariosa*.
Flowering stems 2–5 dm. high, nearly or quite without leaves for a distance of 0.7–1.7 dm. below the inflorescence; phyllaries white-tipped; rosette-leaves acute or acutish, mostly 3–6.5 cm. long and up to 2.1 cm. broad............ Var. *subcorymbosa*.

A. PETALOIDEA (typical). Rimouski Co., Que., to Thunder Bay Distr., Ont., s. to s. N. B., N. E., N. Y., mts. of Pa., and W. Va., Mich. and Wisc. Staminate plant very rare. Mid-May–early July. PLATES 940 and 941.

Var. SCARIOSA Fernald in RHODORA, i. 73 (1899). Var. *modesta* E. Nelson in Proc. U. S. Nat. Mus. xxiii. 710 (1901). Local, centr. Me. to Vt. Staminate plant unknown. Late May, early June. PLATE 942.

Var. SUBCORYMBOSA Fernald, l. c. xvi. 133 (1914) and xxxv. 344 (map) and 346 (1933). *A. neglecta,* var. *subcorymbosa* Fernald in Proc. Bost. Soc. Nat. Hist. xxviii. 246 (1898). E. Nfld. and Anticosti, Que., s., especially in coastwise areas, to se. Mass. Staminate plant unknown. June, early July. PLATES 943 and 944.

(*To be continued*)

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLVII

M. L. Fernald

I. KEY TO ANTENNARIA OF THE "MANUAL RANGE"

(*Continued from page 235*)

26. A. Farwellii Greene, Pittonia, iii. 347 (1898); Fernald in Rhodora, xxxviii. 230, t. 433, fig. 3 (1936). Very local, Bruce Pen., Ont., and Keweenaw Co., Mich. Staminate plant unknown. June, early July.

27. A. munda Fernald, l. c. 229, t. 433, figs. 1 and 2 (1936). *A. occidentalis* sensu Robinson & Fernald in Gray, Man. ed. 7, 821, fig. 879 (1908), not Greene. Centr. Me. to Thunder Bay Distr., Ont., s. to Mass., Ct., N. Y., e. Va. (local), W. Va., n. Ind., Wisc. and Minn. Staminate plant very rare. Mid-May–mid-June.

28. A. fallax Greene, Pittonia, iii. 321 (1898); Fernald in Rhodora, i. 74 (1899). *A. arnoglossa*, var. *ambigens* Greene, Pittonia, iii. 320 (1898). *A. Parlinii*, var. *ambigens* (Greene) Fernald in Proc. Bost. Soc. Nat. Hist. xxviii. 244 (1898). *A. ambigens* (Greene) Fernald in Rhodora, i. 150 (1899). *A. plantaginifolia*, var. *ambigens* (Greene) Cronquist, l. c. 183 (1945). Centr. Me. to s. Ont. and Minn., s. to Va., Tenn., Ark. and e. Tex. Staminate plants abundant southw. and westw., rare northeastw. April–July. Plates 945 and 946.

Var. CALOPHYLLA (Greene) Fernald, l. c. xxxviii. 230 (1936). *A. calophylla* Greene, Pittonia, iii. 347 (1898). Ga. to Tex., n. to s. Md., Va., s. Mich., s. Ill. and Mo. PLATES 947 and 948.

29. A. PARLINII Fernald in Gard. and For. x. 287 (1897), in Asa Gray Bull. v. 92, t. 2, figs. 1–5 (1897) and in Proc. Bost. Soc. Nat. Hist. xxviii. 243 (1898). Western N. B. and se. Me. to s. Ont., s. to Ga., O., Ind., Ill. and Ia. Staminate plants freq. southw. and westw., rare northeastw. April–early June. PLATES 949 and 950.

Var. ARNOGLOSSA (Greene) Fernald in Proc. Bost. Soc. Nat. Hist. xxviii. 244 (1898); RHODORA, i. 151 (1899). *A. arnoglossa* Greene, Pittonia, iii. 318 (1898). *A. plantaginifolia*, var. *arnoglossa* (Greene) Cronquist, l. c. (1945). Similar range, s. to N. C., Tenn. and Mo. Late March–early June. PLATE 951.

30. A. BRAINERDII Fernald in RHODORA, i. 153 (1899). W-centr. Me. to Ont., s. to Ct., N. Y., mts. of Va., and n. Mich. Staminate plant unknown. Mid-May–mid-June. PLATES 952 and 953.

31. A. PLANTAGINIFOLIA (L.) Hook. Fl. Bor.-Am. i. 330 (1834), as to basonym only; Greene, Pittonia, iii. 173 (1897). *Gnaphalium plantaginifolium* L. Sp. Pl. 850 (1753), typified by the Plukenet plant but excluding the Gronovian, which belongs to the next species. *G. plantagineum* L. Syst. ed. 12: 545 (1767), with same description, with phrases rearranged, as of his *G. plantaginifolium* (1753), therefore an illegitimate substitute. *G. dioicum*, β. *plantaginifolium* (L.) Michx. Fl. Bor.-Am. ii. 128 (1803) as to basonym and as to plant "corymbo", not as to plant "unifloro; flore manifeste majore". *A. plantaginea* (L.) R. Br. in Trans. Linn. Soc. xii. 123 (1818); Richardson in Append. Frankl. Narr. ed. 2: 758–repr. 30 (1823)—Richardson often erroneously given as author of the combination *A. plantaginifolia*, including later auth., for instance Fernald in Asa Gray Bull. v. 92, t. 2, fig. 6 (1897), the fig. showing the Plukenet TYPE, and in Proc. Bost. Soc. Nat. Hist. xxviii. 242 (1898). *Disynanthus* Raf. in Am. Mo. Mag. ii. 268 (1818), undefined generic name based on the confused *Gnaphalium plantaginifolium* L. *Disynanthus plantagineus* (L.) Raf. ex Jackson in synonymy in Ind. Kew. fasc. ii. 782 (1893), this illegitimate combination based on an illegitimate (substitute) name united with a nonvalid (undefined) generic name for a wholly mixed basic specific concept (great work!). *A. decipiens* Greene, Pittonia, iii. 278 (1898). Sw. Me. to Minn., s. to Ga., Ala. and Mo. Staminate and pistillate plants abundant. April–June. PLATES 954 and 955. Passing into

Var. PETIOLATA (Fernald) Heller, Muhlenbergia, i. 5 (1900). *A. plantaginea*, var. *petiolata* Fernald in Proc. Bost. Soc. Nat. Hist. xxviii. 242 (1898). Sw. Me. to e. N. Y., s., locally, to Va. PLATE 956.

32. A. SOLITARIA Rydb. in Bull. Torr. Bot. Cl. xxiv. 304 (1897). *Gnaphalium plantaginifolium* L. Sp. Pl. 850 (1753) as to description in part and including the Gronovian *Gnaphalium stolonibus reptatricibus longissimis, foliis ovatis, caule capitato* (our PLATE 957). *G. dioicum*, β. *plantaginifolium* (L.) Michx. Fl. Bor. Am. ii. 128 (1803) in part, the plant "caule breviore, unifloro; flore manifeste majore . . . in occidentalibus *Alleghanis* montibus". *A. plantaginifolia*, β. *monocephala* Torr. & Gray, Fl. ii. 431 (1843). *Gnaph. monocephalum* Carpenter ex Torr. & Gray, l. c. in synonymy (1843). *A. monocephala* (Torr. & Gray) Greene, Pittonia, iii. 176 (1897), not DC. (1837). Md. and w. Pa. to Ind., s. to Ga., Ala. and La. Staminate and pistillate plants about equally abundant. April, May. PLATES 957 and 958.

Although *Antennaria solitaria* was not at first specifically separated from the utterly different *A. plantaginifolia*, as typified by Plukenet's plant, it was well known to Clayton and Gronovius, as well as to Linnaeus. Those who are familiar with the plant could scarcely confuse it with anything else. Nevertheless, this was done until Michaux in 1803 commented on it as a variation but without formally separating it. Cronquist, in the most recent discussion of the genus (preceding the present one) concedes that the two species which were elements of the Linnean *Gnaphalium plantaginifolium* are really distinct species, *A. solitaria*, "the single-headed southern plant with certain [unstated] habital peculiarities". He admits just one more species in all our diversified area, *A. neglecta*, which, like *A. solitaria*, has flagelliform stolons. When, in forma *simplex*, *A. neglecta* puts its whole vigor into one exceptionally large head, as in Peck's original material (our PLATE 927) of what avail are the "certain habital peculiarities" without the technical morphological ones, especially when the rosette-leaves of *A. neglecta* are 1.5–6.5 cm. long and up to 1.3 cm. broad (PLATE 925), while those of *A. solitaria* are 2–8 cm. long and, in the smaller specimens, down to only 1.5 cm. broad (PLATE 958, FIG. 2)? The treatment of eastern North American *Antennaria* of two centuries ago was inadequate and confused. The latest student of the genus in our area, although not reuniting it with *Gnaphalium*, has otherwise got back essentially to the pre-Linnean stage. As Mary, Queen of Scots, is reputed to have said when her regal career was coming to its tragic conclusion, "In my end is my beginning".

I was once told, by one whose voluminous errors were too apparent, that I should not "knock" the assertive errors of men younger than myself; that I should expect them not to get many of their facts straight. When, however, a comparative beginner on our eastern flora urges me to see through the press his characterization, as "too dependent on temporary whim", of my species, which have been defined after intensive field- and herbarium-study over a period of a third of a century, it is surely not unreasonable to expect him to show evidence of at least an elementary understanding of the very numerous characters of our eastern species. It must be assumed, apparently, that his very off-hand reduction of one of the few plants which fully satisfies his theoretical requirement (abundance of both sexes) for a species, Stebbins's presumably ancestral *A. virginica* of the ancient Appalachian Upland, and the reduction of or complete ignoring of my 11 described species from Gaspé County, Quebec, westward and southward—it must be assumed that, if he fails to uphold such a theoretically ideal species as *A. virginica*, he would similarly wipe out of consideration the embarrassing scores of species known, locally, from Newfoundland to Greenland and across boreal America and defined by Ostenfeld, Ekman, the Porsilds, Malte, Polunin and, obviously, myself. It is well to be forewarned of their impending doom and to prepare to lie down and meekly to watch them degraded!

In view of the actual situation in *Antennaria* and that in *Hieracium*, Cronquist's warning that "The chaotic condition which has been brought about in some European genera that also show well-developed apomixis, such as *Hieracium*, should give pause to those who have so multiplied our species", is worth a moment's consideration. There seems here to be an assumption that the behavior of apomicts in *Antennaria* and *Hieracium* (perhaps also *Taraxacum*) is comparable. It is, but certainly not identical nor very similar. Those who have lived and explored all their lives in eastern North America are painfully aware of the dominating aggressiveness and rampageous destructiveness, beginning in the late '70's and expanding almost daily in the open season, of the small host of apomicts in *Hieracium* from the very modern flora of Europe, the various species known as King Devil, Devil's Paint-brush and other equally contemptuous names. They also know that, except for occasional crossing of *H. Gronovii* or *H. scabrum* with *H. venosum*, our native *Hieracia* are relatively well-behaved. Similarly the mass of inextricable apomicts known as *Taraxacum officinale* Weber [I was in error when I identified them with *T. palustre* (Sm.) Blytt] are among the most aggressive of all our weeds; but how many of our eastern botanists know the strictly indigenous and morphologically very definite species of our area: *T. phymatocarpum, T. ceratophorum, T. laurentianum. T. dumetorum* or *T. Longii?* Very few, because they are conservative and local species which have to be sought; they do not intrude upon us like the more familiar apomicts of the genus or of *Hieracium.* Now, in *Antennaria* our nonapomictic species, *A. virginica* (PLATE 937), *A. neglecta* (PLATES 924–926), *A. plantaginifolia* (PLATES 954–956) and *A. solitaria* (PLATES 957 and 958), for example, are abundant and as nearly dominating as any members of the genus with us; but, as compared with the apomictic *Pilosella* group of *Hieracium* or the heteromorphic apomicts of *Taraxacum officinale,* they are shy and retiring amateurs. And, whereas the endless apomicts in European *Hieracium* and in the European *Taraxacum officinale* bunch are unrestrainedly aggressive, the unisexual (apomictic) *Antennarias* are local and relatively rare and usually highly selective as to habitat: *A. columnaris,* a species with remarkable individuality and with corollas only 4 mm. long, the achenes 1.2 mm. long, known only on the barrens at the base of Pointe Riche in Newfoundland, there associated with the utterly different *A. Foggii,* unique in having the outer phyllaries agglutinated and thus forming a falsely gamophyllous cup, the corollas 5–5.5 mm. long and the achenes 1.7 mm. long; *A. vexillifera* (PLATE 913), discussed on p. 224, one of the tiniest of species, with 4–6 of the cauline leaves terminated by broad pennant-like scarious appendages 1.5–3 mm. long, known only from an alpine barren in Gaspé and similar barrens in Newfoundland; *A. subviscosa* (PLATES 916 and 917), discussed on p. 225, forming dense carpet-like mats (with crowded trailing branches up to 5 dm. long and heavily covered with marcescent leaves) on the calcareous north-facing cliffs near the lower St. Lawrence from Rimouski Co. to Gaspé Co., Quebec, the upper nodes of the stem and the inflorescence viscid, the cauline leaves with subulate or involute (instead of flat and pennant-like) tips, the viscid pale involucres often pink-tinged. Other chiefly pistillate but sometimes staminate species, like *A. canadensis* (plates 922 and 923), *A. petaloidea* (plates 940–944) and *A. munda*, occur over broader ranges; while species such as *A. Parlinii* (plates 949–951) and *A. fallax* (plates 945 and 946), abundantly bisexual southward or westward but wholly or chiefly pistillate northeastward, are as wide-spread as any. If there is a universal rule for apomicts, *Hieracium*, *Taraxacum* and *Antennaria* do not make it perfectly clear.

Explanation of Plates 912–958

Plate 912. Antennaria eucosma Fernald, all figs. from type-series: figs. 1 and 2, a pistillate and a staminate plant, × 1; fig. 3, pistillate involucre, × 6; fig. 4, a single pistillate flower, × 10; fig. 5, pistillate corollas, × 10; fig. 6, achene, × 10.

Plate 913. A. vexillifera Fernald: fig. 1, pistillate plant, × 1, from type-series; fig. 2, basal rosette, × 5, from Boat Harbor, Straits of Belle Isle, Newfoundland, *Fernald, Wiegand & Long*, no. 29,172; fig. 3, tip of cauline leaf, × 10, from Cook Point, Pistolet Bay, Newfoundland, *Fernald & Gilbert*, no. 29,171; fig. 4, inflorescence, × 2, from no. 29,171; fig. 5, involucre, × 6, from type; figs. 6 and 7, pistillate corollas and achenes, × 10, from Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2085.

Plate 914. A. straminea Fernald: figs. 1 and 2, two plants, × 1, from type-sheet; fig. 3, portion of basal rosette, × 5, from type; fig. 4, tips of two cauline leaves, × 5, from St. John Island, St. John Bay, Newfoundland, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,170; fig. 5, inflorescence, × 2, from no. 29,170; fig. 6, involucre, × 5, from type; figs. 7 and 8, corolla and achenes, × 10, from no. 29,170.

Plate 915. A. Peasei Fernald, all figs. from type: fig. 1, pistillate plant, × 1; fig. 2, basal rosette, × 5; fig. 3, tip of cauline leaf, × 10; fig. 4, inflorescence, × 2.

Plates 916 and 917. A. subviscosa Fernald: Plate 916, small portion of one large plant, × 2/5, trailing down a limestone wall, Bic, Quebec, *Fernald & Collins*, no. 1195, part of type (note marcescent old flowering stems), after photo. by *J. F. Collins*. Plate 917, figs. 1 and 2, two small plants, × 1, from type-series; fig. 3, basal leaves, × 5, from type; fig. 4, tip of cauline leaf, × 10, from type; fig. 5, mature inflorescence, × 2, from Gros Morne, Gaspé Co., Quebec, *Fernald & Weatherby*, no. 2475; fig. 6, involucre, × 6, from type; figs. 7 and 8, corollas, × 10, and achenes, × 10, from Cap Pleureuse, Gaspé Co., Quebec, *Fernald, Weatherby & Stebbins*, no. 2474.

Plate 918. A. albicans Fernald: fig. 1, group of plants, × 1, from type-sheet; fig. 2, basal rosettes, × 5, from type; fig. 3, tip of cauline leaf, × 10, from Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2083; fig. 4, inflorescence, × 2, from no. 2083; fig. 5, pistillate flower, × 10, from type; fig. 6, achenes, × 10, from type.

Plate 919. A. Wiegandii Fernald: fig. 1, plant and basal rosette, × 1, from type-sheet; fig. 2, basal rosette, × 5, from Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2098; fig. 3, inflorescence, × 2, from type; fig. 4, achenes, × 10, from type.

Plate 920. A. spathulata Fernald: fig. 1, two plants, × 1, from Table Mountain, Port-au-Port Bay, Newfoundland, *Fernald & St. John*, no. 10,870; fig. 2, base, to show repent habit, × 1, from Pointe Riche, Newfoundland, *Fernald, Long & Fogg*, no. 2109; fig. 3, portion of rosette-leaf, × 5, from no.

10,870; FIG. 4, inflorescence, × 2, from Pointe Riche, *Fernald & Wiegand*, no. 4143; FIG. 5, portion of involucre, × 5, from no. 10,870; FIG. 6, corollas, × 10, from St. John Island, St. John Bay, Newfoundland, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,183; FIG. 7, achenes, × 10, from no. 29,183.

PLATE 921. A. APPENDICULATA Fernald, all figs. from TYPE: FIGS. 1 and 2, portions of plant, × 1; FIG. 3, upper half of rosette-leaf, × 5; FIG. 4, tip of cauline leaf, × 10; FIG. 5, corymb, × 2; FIG. 6, achenes, × 10.

PLATES 922 and 923. A. CANADENSIS Greene: PLATE 922, FIGS. 1 and 2, pistillate plant, × 1, from Franconia, New Hampshire, June 13, 1897, *Edwin Faxon;* FIG. 3, tip of cauline leaf, × 10, from same collection; FIG. 4, achenes, × 10, from St. Ours, Co. de Richelieu, Quebec, *Rolland-Germain*, no. 43,516. PLATE 923, FIG. 1, staminate plant, × 1, from Ile Perrot, Quebec, *Victorin*, no. 28,256; FIG. 2, basal leaves, × 5, from Manchester, Vermont, June 30, 1898, *Mary A. Day;* FIG. 3, corymb, × 2, from Masardis, Maine, *Fernald*, no. 2363.

PLATES 924–926. A. NEGLECTA Greene: PLATE 924, FIGS. 1 and 2, pistillate ISOTYPE, × 1; FIG. 3, tip of cauline leaf from ISOTYPE; FIG. 4, pistillate inflorescence, × 2, from Menands, Albany Co., New York, May 24, 1916, *House;* FIG. 5, pistillate inflorescence, × 2, from Brookland, D. C., May 2, 1900, *Holm.* PLATE 925, FIGS. 1 and 2, broad-leaved plant, × 1, from Ardsley, Montgomery Co., Pennsylvania, May 17, 1909, *B. Long;* FIG. 3, pistillate inflorescence, × 2, from southeast of Ligonier, Noble Co., Indiana, *Deam*, no. 27,459; FIG. 4, achenes, × 10, from Upland, Grant Co., Indiana, *Deam*, no. 15,779. PLATE 926, FIG. 1, staminate ISOTYPE; FIG. 2, tip of cauline leaf, × 10, from staminate ISOTYPE; FIG. 3, pistillate inflorescence, × 2, from Vaughan, New York, June 1, 1916, *Burnham;* FIG. 4, pistillate corolla, × 10, from no. 15,779.

PLATE 927. A. NEGLECTA, forma SIMPLEX (Peck) Fernald: ISOTYPE, × 1.

PLATE 928. A. CAMPESTRIS Rydb.: FIG. 1, pistillate plant, × 1, from Custer, South Dakota, *Rydberg*, no. 794 (PARATYPE-collection); FIG. 2, staminate plant, × 1, Deadwood, South Dakota, *E. J. Palmer*, no. 37,137; FIG. 3, tip of cauline leaf, × 10, from Charlot Pt., Lake Athabaska, Saskatchewan, *Raup*, no. 6079; FIG. 4, corymb, × 2, from no. 6079; FIG. 5, achenes, × 10, from Charlot Pt., *Raup*, no. 5283.

PLATES 929 and 930. A. RUPICOLA Fernald: PLATE 929, FIG. 1, base of one of TYPE-specimens, × 1; FIG. 2, rosette-leaves, × 5, from TYPE; FIG. 3, tip of cauline leaf, × 10, from TYPE. PLATE 930, FIG. 1, flowering summit of same plant as in plate 929, fig. 1; FIG. 2, corymb, × 2, from TYPE; FIG. 3, receptacle, × 10, from Grand Falls, Newfoundland, *Fernald, Wiegand, Bartram & Darlington*, no. 6344; FIG. 4, achenes, × 10, from same station and same collectors, no. 6343.

PLATES 931 and 932. A. NEODIOICA Greene, var. TYPICA Fernald: PLATE 931, FIGS. 1, 2 and 3, portions of ISOTYPE, × 1; FIG. 4, tip of rosette-leaf, × 5, from northeast of Wenksville, Adams Co., Pennsylvania, *L. F. A. Tanger*, no. 4383; FIG. 5, tip of cauline leaf, × 10, from ISOTYPE; FIG. 6, corymb, × 2, from Mickleton, Gloucester Co., New Jersey, *B. Long*, no. 20,454; FIG. 7, portion of involucre, × 5, from ISOTYPE. PLATE 932, FIGS. 1, 2 and 3, portions of staminate plants, × 1, from Frazer, Chester Co., Pennsylvania, May 7, 1910, *Bartram;* FIG. 4, pistillate corolla, × 10, from ISOTYPE; FIG. 5, achenes, × 10, from ISOTYPE.

PLATE 933. A. NEODIOICA, var. ATTENUATA Fernald: FIGS. 1 and 2, portions of TYPE, × 1; FIG. 3, tip of cauline leaf, × 10, from Orono, Maine, *Fernald*, no. 2356 (PARATYPE); FIG. 4, inflorescence, × 2, from no. 2356; FIG. 5, portion of involucre, × 5, from Sangerville, Maine, July 7, 1897, *Fernald* (PARATYPE).

PLATE 934. A. NEODIOICA, var. INTERJECTA Fernald, all figs. from TYPE: FIG. 1, small plant and base and inflorescence of others, × 1; FIG. 2, tips of rosette-leaves, × 5; FIG. 3, tip of cauline leaf, × 10; FIG. 4, corymb, × 2; FIG. 5, corollas, × 10; FIG. 6, achenes, × 10.

PLATE 935. A. NEODIOICA, var. CHLOROPHYLLA Fernald, all figs. from TYPE: FIGS. 1 and 2, portions of plant, × 1; FIG. 3, tip of rosette-leaf, × 5; FIG. 4, involucre, × 5; FIG. 5, corolla, × 10.

PLATE 936. A. NEODIOICA, var. GRANDIS Fernald: FIGS. 1 and 2, portions of a plant, × 1, from South Ashburnham, Massachusetts, May 30, 1904, *F. F. Forbes;* FIG. 3, two mature corymbs, × 1, from Somesville, Maine, July 1, 1897, *E. L. Rand;* FIG. 4, corollas, and FIG. 5, achenes, from last collection.

PLATE 937, FIGS 1–10. A. VIRGINICA Stebbins: FIGS. 1 and 2, pistillate, and 3 and 4, staminate plants (TYPE) × 1; FIG. 5, rosette-leaf, × 5, from TYPE; FIG. 6, tip of cauline leaf, × 10, from East Furnace, Shenandoah Co., Virginia, *Lena Artz*, no. 4; FIG. 7, involucre, × 5, from Hanging Rock, Hampshire Co., West Virginia, *W. M. Frye*, no. 4 (PARATYPE); FIG. 8, receptacle, × 10, from last no.; FIG. 9, pistillate corollas, × 10, from no. 4; FIG. 10, achenes, × 10, from no. 4.

PLATE 937, FIGS. 11 and 12. A. VIRGINICA, var. ARGILLICOLA Stebbins: FIG. 1, base of TYPE, × 1; FIG. 2, tip of cauline leaf, × 10, from TYPE.

PLATES 938 and 939. A. APRICA Greene: PLATE 938, FIG. 1, pistillate plant and corymbs, × 1, from near Deadwood, South Dakota, *E. J. Palmer*, no. 37,116; FIG. 2, pistillate corymb, × 2, from Perham, Ottertail Co., Minnesota, May 31, 1912, *Z. L. Chandonnet;* FIG. 3, pistillate flower and corolla, × 10, from Mouth of Qu'Appelle River, Manitoba, *Wm. Herriot*, Geol. Surv. Can., no. 72,845; FIG. 4, achenes, × 10, from no. 72,845. PLATE 939, FIG. 1, staminate plant, × 1, from Valentine, Nebraska, June 30, 1891, *J. M. Bates;* FIG. 2, basal rosette, × 5, from same specimen; FIG. 3, upper half of cauline leaf, × 10, from Perham, Minnesota, *Chandonnet;* FIG. 4, pistillate involucre, × 5, from *Herriot*, no. 72,845.

PLATES 940 and 941. A. PETALOIDEA Fernald (typical): PLATE 940, FIGS. 1, 2 and 3, portions of TYPE, × 1; FIG. 4, base of plant, to show repent habit, × 1, from Foxcroft, Maine, *Fernald*, no. 2390; FIG. 5, tip of cauline leaf, × 10, from TYPE; FIG. 6, half of corymb, × 2, from TYPE. PLATE 941, FIG. 1, staminate plant, × 1, from Harwich, Massachusetts, *Fernald*, no. 19,243; FIG. 2, tips of basal rosette, × 5, from Milo, Maine, Sept. 2, 1897, *Fernald;* FIG. 3, pistillate involucre, × 5, from TYPE; FIG. 4, pistillate corolla, × 10, from TYPE.

PLATE 942. A. PETALOIDEA, var. SCARIOSA Fernald: FIGS. 1 and 2, portions of TYPE, × 1; FIG. 3, corymb, × 2, from a TYPE-specimen; FIG. 4, exceptionally lax corymb, × 2, from TYPE-series; FIG. 5, involucre, × 5, from TYPE.

PLATES 943 and 944. A. PETALOIDEA, var. SUBCORYMBOSA Fernald: PLATE 943, FIGS. 1 and 2, portions of TYPE-series, × 1; FIG. 3, tip of cauline leaf, × 10, from TYPE; FIG. 4, involucre, × 5, from TYPE; FIG. 5, pistillate corollas, × 10, from near Charlottetown, Prince Edward Island, *Fernald & St. John*, no. 11,205; FIG. 6, achenes, × 10, from no. 11,205. PLATE 944, FIG. 1, portions of two large inflorescences, FIG. 2, summit of inflorescence at right, × 1, from Cemetery, Jordan Pond Road, Mt. Desert Island, Maine, June 4, 1901, *E. L. Rand.*

PLATES 945 and 946. A. FALLAX Greene: PLATE 945, pistillate plant: FIGS. 1 and 2, base and summit of flowering plant, × 1, from Chestnut Hill, Pennsylvania, May 3, 1889, *Heller;* FIG. 3, corymb, × 1⅞, from same collection; FIG. 4, achenes, × 10, from Ferrisburg, Vermont, *Eggleston*, no. 2645. PLATE 946, FIG. 1, staminate plant, × 1, from Agricultural College, Michigan, May 6, 1898, *C. F. Wheeler;* FIG. 2, involucre of pistillate head, × 6, from Chevy Chase Lake, Maryland, *Maxon & Standley*, no. 291; FIG. 3, pistillate corollas, × 10, from *Eggleston*, no. 2645.

PLATES 947 and 948. A. FALLAX, var. CALOPHYLLA (Greene) Fernald: PLATE 947: pistillate plant: FIGS. 1 and 2, portions of base and summit, × 1, of plant from Cape Girardeau, Missouri, *E. J. Palmer*, no. 39,081; FIG. 3, portion of involucre, × 6, from same no. PLATE 948, FIG. 1, staminate plant, × 1, an ISOTYPE from Cobden, Illinois, June 15, 1898, *E. L. Greene;* FIG. 2, pistillate inflorescence, × 1¾, from *E. J. Palmer*, no. 39,081.

PLATES 949 and 950. A. PARLINII Fernald: PLATE 949, pistillate plant: FIGS. 1 and 2, base and summit, × 1, of one of TYPE-specimens; FIG. 3, summit of flowering stem, to show dark glands, × 10, from Foxcroft, Maine, *Fernald*, no. 2340; FIG. 4, corymb, × 3, from TYPE; FIG. 5, achenes, × 10, from TOPO-

TYPE, June 5, 1897, *Parlin*. PLATE 950, FIGS. 1 and 2, staminate plant, × 1, from TYPE-locality, May 28, 1899, *Parlin;* FIG. 3, portion of pistillate involucre, × 6, from TOPOTYPE; FIG. 4, pistillate corollas, × 10, from TOPOTYPE.

PLATE 951. A. PARLINII, var. ARNOGLOSSA (Greene) Fernald: FIGS. 1 and 2, portion of base and summit, × 1, of ISOTYPE; FIG. 3, involucre, × 6, from ISOTYPE.

PLATES 952 and 953. A. BRAINERDII Fernald: PLATE 952, from ISOTYPE, Barber's Meadow, Addison, Vermont, May 27, 1899: FIGS. 1 and 2, base and summit of plant, × 1; FIG. 3, summit of stem, to show dark glands, × 10; FIG. 4, an inflorescence, × 6; FIG. 5, achenes, × 10. PLATE 953, FIG. 1, portion of base, showing unusually large leaves, × 1, from Mt. Battie, Camden, Maine, July, 1902, *G. G. Kennedy;* FIG. 2, loose pubescence of upper surface of rosette-leaf, × 10, from same specimen; FIG. 3, involucre, × 6, from TYPE; FIG. 4, corollas, × 10, from TYPE.

PLATES 954 and 955. A. PLANTAGINIFOLIA (L.) Hooker: PLATE 954, pistillate plant: FIGS. 1 and 2, base and summit of plant from type-region, × 1, west of Williamsburg, Virginia, *Grimes*, no. 2543; FIG. 3, involucre, × 6, from no. 2543; FIG. 4, corollas, × 10, from no. 2543. PLATE 955, FIG. 1, staminate plant from type-region, × 1, from west of Lake Matoka, James City Co., Virginia, *J. T. Baldwin*, no. 204; FIG. 2, inflorescence, × 6, from *Grimes*, no. 2543; FIG. 3, achenes, × 10, from no. 2543.

PLATE 956. A. PLANTAGINIFOLIA, var. PETIOLATA (Fernald) Heller, all figs. from TYPE-series: FIGS. 1 and 2, small fruiting plant, × 1; FIG. 3, staminate plant, × 1.

PLATES 957 and 958. A. SOLITARIA Rydberg: PLATE 957, FIG. 1, tracing, × 1, of the Gronovian element, of *Gnaphalium plantaginifolium* L., "Gnaphalium stolonibus reptatricibus longissimis, foliis ovatis, caule capitatis. *Gron. virg. 95*", after *B. L. Robinson;* FIG. 2, one of the TYPE-specimens (pistillate), × 1, of *A. plantaginifolia*, *β. monocephala* Torrey & Gray (basis of *A. solitaria*), coll. Louisiana, *Carpenter*. PLATE 958, FIG. 1, average plant (staminate), × 1, from Williamsburg, Virginia, *Fernald, Long & Abbe*, no. 14,241; FIG. 2, very small plant (staminate) × 1, from Chapel Hill, North Carolina, *Pease*, no. 26,998; FIG. 3, achenes, × 10, from north of Medora, Jackson Co., Indiana, *Deam*, no. 24,771.

II. TRANSFERS IN AND ANIMADVERSIONS ON ARTEMISIA

ARTEMISIA GLAUCA Pall., var. **dracunculina** (S. Wats.), comb. nov. *A. dracunculina* S. Wats. in Proc. Am. Acad. xxiii. 279 (1888). *A. Dracunculus* L., subsp. *dracunculina* (S. Wats.) Hall & Clements, Phylogen. Meth. in Taxon. 116 (1923). *A. dracunculoides* Pursh, var. *dracunculina* (S. Wats.) Blake in Journ. Wash. Acad. Sci. xxx. 472 (1940).

I get no satisfaction in trying to separate *Artemisia dracunculoides* Pursh (1814) from *A. glauca* Pallas (1804). At best they seem to be confluent forms of one species, the degree of pubescence or glabrousness and of glaucescence or greenness being most difficult to distinguish. Var. *dracunculina* is more tangible, with its loose inflorescence and nodding or pendulous long-pedicelled heads. In the type the filiform pedicels are 4–8 mm. long (Watson said "2 to 4 lines"), in *Hartman* no. 778, also from

Chihuahua, up to 9 mm., and extreme specimens, such as *J. H. Oyster*, no. 2 from Kansas, and *Bush*, no. 4121 from Greenwood, Missouri (distrib. as *A. mexicana* Willd.), have them (or the filiform minutely bracteate monocephalous branchlets) prolonged to 2–3.5 cm.!

Some botanists, overlooking the fact that the name *Artemisia glauca* Pall. (1804) antedates *A. dracunculoides* Pursh (1814), are using the combination *A. dracunculoides*, var. *glauca* (Pall.) Munz, Man. So. Cal. Bot. 575 and 601 (1935).

A. LUDOVICIANA Nutt., var. **cuneata** (Rydb.), stat. nov. *A. cuneata* Rydb. in N. Am. Fl. xxiv³. 269 (1916).

A. LUDOVICIANA Nutt., var. **Brittonii** (Rydb.), stat. nov. *A. Brittonii* Rydb. in Bull. Torr. Bot. Cl. xxxii. 129 (1905).

A. LUDOVICIANA Nutt., var. **pabularis** (Nelson), comb. nov. *A. rhizomata* Nelson, var. *pabularis* Nelson in Bull. Torr. Bot. Cl. xxvii. 34 (1900). *A. pabularis* (Nelson) Rydb. in Bull. Torr. Bot. Cl. xxxiii. 137 (1906).

A. LUDOVICIANA Nutt., var. **americana** (Bess.), comb. nov. *A. vulgaris* L., var. *americana* Besser in Linnaea, xv. 105 (1841) in part.

A. LUDOVICIANA Nutt., var. **mexicana** (Willd.), comb. nov. *A. mexicana* Willd. ex Spreng. Syst. iii. 490 (1828). *A. indica* Willd., var. *mexicana* (Willd.) Besser in Nouv. Mém. Soc. Nat. Mosc. iii. 56 (1834). *A. vulgaris* L., var. *mexicana* (Willd.) T. & G. Fl. N. Am. ii. 421 (1843). *A. vulgaris*, subsp. *mexicana* (Willd.) Hall & Clements, Phylogen. Meth. Tax. 80 (1923) in part.

I get no intellectual satisfaction from the treatment of *Artemisia* by Hall & Clements. Although published under the sophisticated title "The Phylogenetic Method in Taxonomy", this treatment, it seems to me, does serious injury to sound taxonomy and its natural ally, sound phylogeny. My chief objection is, that fundamental characters in growth-habit, such as one would expect to be given real weight, were ignored or, apparently, not recognized. Under the single blanket-name, *A. vulgaris*, Hall & Clements amassed plants of most diverse habit: species with rounded and deeply dissected leaves with stipule-like appendages at the base, others with comparable leaves but no appendages; species with strictly entire long-attenuate leaves, others with them variously dissected; species with heavy ligneous and non-stoloniferous crowns, others with herbaceous slender rhizomes and prolonged lash-like stolons; plants with densely tufted habit, forming cespitose clumps, others with the stems scattered and arising from the tips of elongate stolons, thus forming loose colonies. It is as if one united as a single species all the members of *Solidago* with the panicle made up of secund branches: calling *S. sempervirens* the maritime fleshy-leaved and, because of its habitat, the large-headed phase; *S. uniligulata* (*neglecta*) a thinner-leaved and, because of its occurrence in eastern acid peat, a smaller-headed phase; *S. missouriensis* a phase developed on the western prairies and, on account of its crowded habitat, sending up only one flowering stem at a time and spreading by prolonged subterranean stolons; and so on through many species. That would be easy and hopelessly superficial; it would be neither sound taxonomy nor phylogeny nor sensible ecology. That Hall, whose work up to the *Artemisia*-period had been sound and free from vagaries and who understood the taxonomic significance of growth-forms when associated with other characters, should suddenly have coöperated in such a confused and unclarifying piece of work is at least amazing.

In attempting to get some workable mean between this treatment and the extreme splitting of Rydberg and to put the many pigeon-holes of undigested material in the Gray Herbarium into such order that it could be readily available I have been handicapped by lack of field-experience with most of the species; but in this case I have temporarily adopted the sophistry of a student of one technical field who, venturing into another with which he was not too familiar, wrote: "It is conceivable that one who is, in a way, an amateur may be more likely to appreciate the more salient features . . . than the specialist".[1] At least the growth-habit, as shown by the few well collected specimens in the collections before[2] me, is highly suggestive of real specific differentiation.

A. VULGARIS L., the Eurasian species much naturalized in the northeastern States, Canada and Newfoundland, forms vase-like clumps arising from a thick but scarcely ligneous forking rhizome, only tardily sending out short stolons. It is tall, with glabrescent stems up to 2 m. high, and its large roundish-ovate to -obovate

[1] Campbell, Douglas Houghton, Outline of Plant Geography, v (1926).

[2] Ninety per cent of so-called specimens in this group are not specimens at all; they are lazily plucked bits, their collectors taking no pains to get the subterranean parts or to show the habit or the lower leaves. That would require work and acuteness.

leaves are green and glabrous or promptly glabrate above, deeply cleft, and bearing at the base of the petiole 4 to 8 obvious leaflet- or stipule-like appendages. It occurs with us as three varieties. Typical *A. vulgaris* has the leaves cleft to midrib into lacerate or cut-toothed lance-acuminate divisions, this plant found from Newfoundland to Ontario, south to Nova Scotia, New England, New Jersey, Pennsylvania, casually to Georgia, Michigan and Wisconsin. Var. *glabra* Ledeb. is similar but with the narrowly lance-acuminate divisions of the primary leaves entire. It is local, from northwestern New England to Ontario, south to Connecticut, Ohio, Michigan and Kansas. Var. *latiloba* Ledeb. has thinner leaves, the principal ones less deeply cleft, the broadly obovate or rhombic terminal divisions and the oblanceolate to oblong lower ones and their few teeth blunt or merely acutish, the panicle but slightly developed. It is local in Quebec and New England. Only one other species of the few in the "Manual range" merged by Hall & Clements with the Old World *A. vulgaris* has stipule-like appendages. This is

A. serrata Nutt., indigenous on bottoms, on prairies or in rich thickets from Wisconsin to North Dakota, south to Illinois, Missouri and Kansas. Hall & Clements treat it as a subspecies of *A. vulgaris*, but its uncleft lance-attenuate sharply fine-serrate primary leaves are only 1–3 cm. broad, their basal appendages small and lance-subulate. I have not seen a base but it is evidently near the next species in which the base has been well collected.

A. Herriotii Rydb., found on plains, dry ridges and gravelly shores from Minnesota to northern Alberta and South Dakota. Rhizome stout, woody, without evident stolons; leaves linear-attenuate, without basal appendages, entire or with few falcate lobes, the larger ones 1–2 dm. long (twice or thrice length of leaves of *A. vulgaris*) and only 0.5–1.5 cm. wide (many times narrower than in *A. vulgaris*). Hall & Clements get rid of this characteristic species of the northern Plains (east of the Rocky Mts.) by pushing it into the "the *douglasiana* form" of their *A. vulgaris*, subsp. *heterophylla*, i. e. *A. Douglasiana* Besser, a big species of the Pacific slope, from southern British Columbia to Lower California, with the rhizome or its branches long and creeping, suggesting thick rope, the "principal leaves oblanceolate or broadly elliptic in outline, somewhat spatulate, . . . 1.5–

5 or 10 cm. wide . . . all . . . tomentulose . . . above" (H. & C.). Naturally, to those who place *A. serrata* and *A. Douglasiana* in the Old World *A. vulgaris*, the Great Plain species, *A. Herriotii*, with strong woody base, narrowly long-attenuate leaves glabrous above, and elongate (instead of campanulate) involucre 4–5 (instead of 3–4) mm. long, could make no appeal. But it looks like a real species and its base is similar to that of

A. LONGIFOLIA Nutt., occurring on dry plains or in alkaline situations from western Ontario and Michigan to the Rocky Mts., a plant with hard woody bases (without stolons) branching into crowns up to 2 cm. thick, the many stems clustered, the very narrow linear-attenuate entire leaves gray-puberulent above, with revolute margins, the principal ones 3–10 cm. long and mostly 2–5 mm. broad, etc.

When we come to *Artemisia ludoviciana* Nutt. the situation seems to be different. This is an aggressive and "weedy" species "varying all over the lot", all over the lot because it is loosely stoloniferous, the long and lash-like stolons enabling it to form loose colonies with more or less circular outline. It is this highly inconstant series which has spread eastward along railroads, roadsides and in litter to Quebec, the Maritime Provinces and the Atlantic States. The growth-habit of its base is very definite; its foliage, whether entire, falcately cleft or merely toothed, hopelessly indefinite. Yet Hall & Clements toss them all into their all-inclusive *A. vulgaris*, not as one subspecies but as three: two of them, their *A. vulgaris*, subspp. *ludoviciana* and *gnaphalodes*, which differ only in that the former has the wool of the upper leaf-surface less permanent than in the latter, each being considered by them as equivalent in value (as subspecies) to true nonstoloniferous Eurasian *A. vulgaris*, the big *A. Douglasiana* of the Pacific Slope, the woody-based and nonstoloniferous more eastern campestrian *A. longifolia*, the campestrian *A. serrata*, and others quite as definite. The attempt, however, in view of the very real character of the rhizome and stolons, to keep *A. gnaphalodes* more than weakly varietally apart from typical *A. ludoviciana* has thus far proved hopeless. In fact, these two are really somewhat intermediate variations in a series which includes plants with upper leaf-surfaces lanate or others, with distinctive ranges, with them bright green and glabrous from the first. In the limited area of Gray's Manual I am recognizing the following, all as varieties of *A. ludoviciana* which stands apart from *A. serrata, Herriotii* and *longifolia* in its loosely colonial habit, the slender cord-like rhizome freely stoloniferous, the stolons slender and elongate, the primary leaves either entire or variously lobed or cleft. Since the abundance as weeds in the East varies, I shall be glad of information regarding additional areas invaded by them.

a. Young leaves tomentose or lanate on upper as well as lower surface....*b*.

b. Pubescence of upper surfaces of primary and often rameal leaves loosening and rather deciduous, the older leaves becoming glabrate and bright green above; leaves entire or some of the lower and median ones with falcate-lobed margins................................*A. ludoviciana* (typical).

b. Pubescence of upper as well as lower surfaces persistent, the upper surface remaining whitish or gray....*c*.

c. Principal leaves lance-linear, lanceolate, oblong or oblanceolate, entire or with marginal falcate teeth or divisions, the blades soft and pliable, heavily tomentose, many times longer than broad....*d*.

d. Leaves flat, mostly straight, ascending or spreading.

Blades lanceolate, acute or attenuate, longer ones 5–10 cm. long, ascending; stem usually simple below or to summit, without or more often with short suppressed axillary branches..........Var. *gnaphalodes*.

Blades oblong, oblong-elliptic or oblong-oblanceolate, blunt or merely acutish, 2.5–7 cm. long, loosely ascending or spreading; stems frequently with loosely spreading or divergent elongate branches....................................Var. *latifolia*.

d. Leaves mostly plicate, widely spreading or recurving, often twisted, the longer ones 2.5–5 cm. long; stem or its erect basal branches with suppressed axillary branchlets....................................Var. *pabularis*.

c. Principal leaves broadly oblong, with few coarse teeth around the summit, firm and thick, rather hard, only two to four times as long as broad; axillary branches short and suppressed............................Var. *Brittonii*.

a. Young leaves glabrous (or only obscurely puberulent) and bright green above from the first, blades linear to lanceolate, entire or with long falcate lobes, they and the lobes attenuate.

Panicle open and leafy, virgate or with virgate branches; involucre globose-hemispherical; stem usually covered with dense continuous felt........................Var. *americana*.

Panicle dense, pyramidal; involucre cylindric or cylindric-ovoid; stem thinly tomentulose to puberulent, often glabrescent....................................Var. *mexicana*.

A. LUDOVICIANA, typical (*A. vulgaris*, subsp. *ludoviciana* (Nutt.) Hall & Clements, in part).—Native of prairies and dry open soils or thin woodland, Michigan to Washington, south to Illinois, Arkansas, Texas and Mexico; spread eastward along railroads, roads, in waste ground, dooryards, grassland, cemeteries, etc., to New England, New York, New Jersey and Virginia.

Var. GNAPHALODES (Nutt.) T. & G. (*A. gnaphalodes* Nutt.; *A. vulgaris*, subsp. *gnaphalodes* (Nutt.) Hall & Clements, in part). —Native of prairies, etc., southern Ontario and Michigan to southern British Columbia, south as in the preceding; naturalized eastward to Quebec, New England, New Jersey and Delaware.

Var. LATIFOLIA (Bess.) T. & G. (*A. Purshiana* Bess., var. *latifolia* Bess.; *A. vulgaris*, subsp. *gnaphalodes*, in part, of Hall & Clements).—Native from Manitoba and Minnesota to southern British Columbia, south to Iowa, Kansas and New Mexico; naturalized eastward to Quebec, New Brunswick and New England.—One of the more marked extremes of the species on account of its short and broad leaves, tendency to divergent branching and relatively loose tomentum. The following are characteristic: QUEBEC: Lac des Chênes, *Rolland*, no. 6121; Notre-Dame-de-la-Dore, Co. Lac-St.-Jean, *Victorin et al.*, no. 30,517; L'Annonciation, Co. Labelle, *Victorin et al.*, no. 384. NEW BRUNSWICK: Fairville, *Fernald*, no. 2268. MAINE: Portland, July 19, 1910, *A. R. Stubbs;* North Berwick, Sept. 1895, *Parlin.* NEW HAMPSHIRE: south of Cold River Station, Walpole, July, 1901, *Blanchard.* MASSACHUSETTS: Newbury, Aug. 7, 1899, *Williams;* Lee, Sept. 3, 1920, *Hoffmann.* MICHIGAN: Keweenaw Co., *Farwell*, no. 427. INDIANA: Kokomo, Aug. 28, 1942, *C. M. Ek.* ILLINOIS: Chicago, *Lansing*, no. 2635. MANITOBA: Cedar Lake, Riding Mountain National Park, *Scamman*, no. 2967. MINNESOTA: Lake Vadnais, *Rosendahl*, no. 5180. IOWA: Estherville, *Wolden*, no. 1264. NORTH DAKOTA: Leeds, Aug. 14, 1900, *Lunell;* Jamestown, *O. A. Stevens*, no. 302. SOUTH DAKOTA: Redfield, *Brenckle*, no. 40-74. KANSAS: Ellis, July 21, 1935, *Bondy.* SASKATCHEWAN: ex Hook. (ISOTYPE). ALBERTA: Rosedale, *Moodie*, no. 1183. MONTANA: Silver Bow, *H. M. Hall*, no. 11,492, in part. WYOMING: Upper Tongue R., Bighorn Mts., July 22, 1900, *J. G. Jack.* NEVADA: Truckee Valley, *W. W. Bailey*, no. 640. BRITISH COLUMBIA: Beavermouth, *C. H. Shaw*, no. 1153.

Var. PABULARIS (Nelson) Fernald, supra. Native from Manitoba and Minnesota to Oregon, south to Iowa, Nebraska and Colorado; adventive eastward to Michigan.—One of the most characteristic varieties on account of its longitudinally folded and recurving or arching leaves. The following are characteristic. MICHIGAN: River Rouge, *Farwell*, no. 4375, in part. MINNESOTA: Brown's Valley, Sept., 1893, *Sheldon;* Muskoda, *Ballard*, no. 3120. IOWA: Iowa Falls, Aug. 1928, *M. E. Peck;* Estherville, *Wolden*, no. 1264a. NORTH DAKOTA: Leeds, Aug. 20, 1900, *Lunell*, as *A. longifolia;* Fargo, Aug. 19, 1901, *Waldron & Manns.* SOUTH DAKOTA: Brookings, Sept. 1894, *Thornber;* Iriquois, Aug. 11, 1894, *Thornber.* NEBRASKA: Kennedy, Oct. 15, 1900, *Bates;* Hazel Creek, *Fred Clements*, no. 2917; Thedford, *Rydberg*, no. 1725. Wyoming: Creston, *Nelson*, no. 4426 (isotype). Colorado: Palmer Lake, Sept. 3, 1919, *H. M. Hall.* Oregon: Upper Klamath Lake, *M. E. Peck*, no. 9523.

Although Hall & Clements call var. *pabularis* merely "A slender competition-form of *A. vulgaris gnaphalodes*" with "Leaves only 2 to 5 mm. wide", it seems to have won its competition and to grow successfully over a vast area.

Var. Brittonii (Rydb.) Fern., supra. A local extreme of Montana to Colorado, etc., casually adventive in Maine: about wool-waste, Sept. 10, 1895, *Parlin.*

Var. americana (Bess.) Fern., supra. Native from Alberta to Texas and northern Mexico; casually adventive in Massachusetts. The following, often confused with var. *mexicana*, are characteristic. Massachusetts: dry sandy field, not scarce, Clam Shell Bluff, Concord, Aug. 11, 1938, *R. J. Eaton.* Tennessee: Nashville, *Gattinger.* Kansas: Poola, *Oyster.* Texas: *Lindheimer*, fasc. iii. no. 442; Weathersford, *Tracy*, no. 8135; Graham, *Reverchon*, no. 3283; Tarrant Co., *Ruth*, no. 320; Briscoe, *Cory*, no. 17,314; Boat Springs, Chisos Mts., *Cory*, no. 7258. British North America: *Richardson.* Alberta: below McKay, Lower Athabasca River, *Raup*, no. 6001. Idaho: Twilight Gulch, *Macbride*, no. 485, as *A. atomifera* Piper. Colorado: Engelmann Cañon, *Clements & Clements*, no. 57; Norwood Hills, *E. P. Walker*, no. 455; Naturita, *Payson*, no. 590. New Mexico: Cloudcroft, *E. D. Schulz*, no. 308. Arizona: Marshall Gulch, *Shreve*, no. 5398; Mule Mts., *Harrison & Kearney*, no. 6238.

Besser's original description of *Artemisia vulgaris*, var. *americana* (as *americanum*) was based primarily on a "specimen Hookerianum e Britt. N. America", the plant with laciniate leaves "supra glabris", ½ inch [1 cm.] wide, with lanceolate laciniae 1½–3 lines wide, the virgate panicle with hemispherical heads. It seems to be the plant here called *A. ludoviciana*, var. *americana*, although Hall & Clements place it in the very striking *A. Tilesii* Ledeb. (their *A. vulgaris*, subsp. *Tilesii*), a plant of eastern Siberia and Pacific America from Alaska to Oregon, etc., with "principal leaves ovate or broadly elliptic in outline, . . . 3–7 cm. wide", etc. I have seen no authentic material and my interpretation may be incorrect; but the general placing of these specimens in var. *mexicana*, simply because the leaves are bright green above and often slenderly dissected, overlooks the important characters of the latter, the densely pyramidal panicle of cylindric-ovoid heads or, as Willdenow's original diagnosis said, "panicula pyramidali subfoliata, floribus ovatis subsessilibus bracteis tomentosis", such a plant as abounds in much of Mexico.

Var. MEXICANA (Willd.) Fern., supra. Mexico and Texas, extending northeastward to barrens and sands of Missouri. The following are typical. MISSOURI: Dodson, *Bush*, no. 7844; Courtney, *Bush*, no. 6509. ARKANSAS: *Engelmann*, ISOTYPE of the 2d plant described by Besser as *A. vulgaris*, var. *americana*. TEXAS: *Lindheimer*, fasc. iii. nos. 442, 443, and 444; Polytechnic, *Ruth*, no. 320; Brown Co., *Cory*, no. 15,855. MEXICO: *Berlandier*, no. 1253; *Bourgeau*, no. 832; *Ghiesbrecht*, no. 155; *Hinton*, no. 1847; *Lyonnet*, no. 435; *Palmer*, nos. 597, 600 and 602; *Parry & Palmer*, nos. 530 and 531; *Pringle*, nos. 290, 7929, 8765, 9848 and 11,481; *Schaffner*, no. 277.

One other species which has spread into the Northeast is the very characteristic *Artemisia Carruthii* Wood (*A. kansana* Britton; included under their *A. vulgaris*, subsp. *Wrightii* (Gray) Hall & Clements), with the somewhat ligneous crown producing abundant prolonged and often leafy-tipped stolons (in some specimens these freely forking and 3 dm. long), the short (1–5 cm. long) elliptic to oblanceolate leaves essentially all pinnately dissected to the midrib into narrowly linear or linear-filiform lobes only 3–10 mm. long and 0.1–1 mm. broad. Native on plains and in dry scrub from western Kansas and Colorado to western Texas, New Mexico and Arizona, this aggressive and vegetatively rapidly reproducing plant has come east. The following eastern specimens are before me. RHODE ISLAND: Pawtucket, October, 1898, *M. L. McCudden*. INDIANA: Miller's, October, 1898, *Umbach*. MISSOURI: Sheffield, *Bush*, nos. 1838 and 3333.

Allied to these and likely to wander eastward (especially since it is here cultivated as SILVER-KING ARTEMISIA) is the characteristic *Artemisia albula* Wooton, of western Texas, New Mexico, Arizona, southern California and northern Mexico. Although this small-leaved and small-headed white or whitish plant was given no recognition by Hall & Clements, except as a reduced "form" of their too inclusive *A. vulgaris*, subsp. *gnaphalodes*, they did see something in it: "but with distinctive habit, very narrow leaves, widely branched inflorescence, and exceptionally small heads, the involucres 3 mm. high". The "distinctive habit" was unexplained, but *A. albula* forms dense or cespitose clumps and, instead of spreading as do *A. ludoviciana* and its many varieties (including *gnaphalodes*) by slender elongate stolons, its basal offshoots, as shown by material from careful collectors like Charles Wright, are assurgent or erect from the subligneous crown and with well developed leaves. This is a "distinctive habit" similar to that of the woody-based *A. Michauxiana* Bess. (*A. discolor*). That it was not noted by Hall & Clements is natural. Of the 54 sheets of it in the Gray Herbarium 38 indicate no attempt to collect the characteristic base, most of them nipped-off bits without even the distinctive leaves of the main stem—the kind of rubbish which some think we must house in our limited space because, forsooth, these snips have numbers!; in such disgraceful witnesses to laziness the diagnostic characters are mostly lacking. These points were strongly emphasized by Dr. Merrill in his foreword to Johnston's most helpful and practical "The Preparation of Botanical Specimens for the Herbarium"[1], a pamphlet which should be carefully studied by all who attempt to make herbarium-specimens.

III. SENECIO CONGESTUS

(Plates 959 and 960)

Senecio congestus (R. Br.) DC., var. **palustris** (L.), stat. nov. *Cineraria palustris* L. Sp. Pl. ed. 2, 1243 (1763). *S. palustris* (L.) Hook. Fl. Bor.-Am. i. 324 (1834), not Velloso (1827). *S. tubicaulis* Mansfeld in Fedde, Rep. Spec. Nov. xlviii. 264 (1940). Plate 959, figs. 3 and 4.

S. congestus, var. **laceratus** (Ledeb.), comb. nov. *S. palustris*, γ. *laceratus* Ledeb. Fl. Ross. ii. 648 (1845), excl. syn.

S. congestus, var. **tonsus,** var. nov. (tab. 960), habitu a var. *palustre* differt corymbo aperto vix lanato-villoso, pedicellis hirtellis sparse villosisque.—Alberta to Wisconsin and Minnesota. The following are characteristic. Alberta: Gov. Hay Camp district, Slave River, about 59° 31′ N., 111° 28′ W., Aug. 4, 1928, *Raup*, no. 3384; Reed's Portage, upper Embarras River, about 58° 28′ N., 111° 32′ W., Aug. 15, 1930, *Raup*, no. 3383. Manitoba: Clear Lake, alt. 2016 ft., Riding Mountain National Park, Aug. 29–Sept. 2, 1941, *Scamman*, no. 2970. Wisconsin: La Chapelle, July 16, 1897, *L. S. Cheney*, no. 7419 (type in Herb.

[1] Johnston, I. M., The Preparation of Botanical Specimens for the Herbarium. Published by the Arnold Arboretum of Harvard University. 1939

Gray.). MINNESOTA: sandy lake-shore, Detroit, June 20, 1909, *H. F. Bergman.*

Unfortunately the name *Senecio palustris* (L.) Hook. (1834) is a later homonym, excluded by *S. palustris* Velloso (1827). When Mansfeld published for it the new binomial *S. tubicaulis* in 1940 he evidently overlooked *S. congestus* (R. Br.) DC. Prodr. vi. 363 (1837), which rests upon *Cineraria congesta* R. Br. in Parry, 1st Voyage, App. 279 (1824), the arctic extreme with the densely congested corymb and the leaves heavily villous-lanate, the plant treated as *S. palustris*, var. *congestus* (R. Br.) Hook. by Hooker, l. c., by Ledebour, l. c., and which in the Synoptical Flora, 1^2. 394 (1884) Gray placed under *S. palustris* (L.) Hook., with the comment: "*C*[*ineraria*] *congesta*, R. Br. in Parry, Voy., Richards., & c., only an arctic and woolly condensed form, var. *congesta*, Hook.".

Typical arctic *Senecio congestus* (PLATE 959, FIGS. 1 and 2, from ISOTYPE) extends south at least to the southeastern coast of Labrador, but more generally across North America it is represented by var. *palustris* (PLATE 959, FIGS 3–4), which I cannot separate from the wide-ranging plant of Eurasia with an open corymb but with copious long villosity or wool on the expanding corymb and more or less permanent dense villi on the pedicels and involucre. This variety extends south with us to the Côte Nord, Quebec, the foot of James Bay, and northern Iowa.

Var. *laceratus*, described from western Alaska, is an extreme with all the leaves lacerate-pinnatifid.

Var. *tonsus* (sheared) has almost or quite lost the long and dense villous-tomentum. Its open corymb has merely hirtellous or short-pilose pedicels or the long villi very few and scattered (PLATE 960).[1]

In PLATE 959, FIG. 1 is an ISOTYPE, × 1, of SENECIO CONGESTUS; FIG. 2, summit of pedicel and base of involucre, × 10, of ISOTYPE. FIGS. 3 and 4, var. PALUSTRIS: FIG. 3, inflorescence, × 1, from Vartofte-Asaka, Sweden, Aug., 1907, *Karl Wigardt;* FIG. 4, summit of pedicel and base of involucre, × 10, from same plant.

PLATE 960. S. CONGESTUS, var. TONSUS: FIG. 1, inflorescence of TYPE, × 1; FIG. 2, summit of pedicel and base of involucre, × 10, from TYPE.

(*To be continued*)

[1] A discoid form of the boreal *Senecio Pseudo-Arnica* Less. is S. PSEUDO-ARNICA Less., forma **Rollandii** (Victorin), stat. nov. *S. Pseudo-Arnica*, var. *Rollandii* Victorin, Mém. Soc. Roy. Canada, sér. 3, xix. 87, t. 4 (1925). *S. Rollandii* (Victorin) Victorin, Contrib. Lab. Bot. Univ. Montréal, no. 13: 26 (1929).

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLVII

M. L. Fernald

(*Continued from page 257*)

IV. NOTES ON EASTERN AMERICAN LUZULA

(Plates 961 and 962)

Luzula sudetica (Willd.) DC., var. **frigida** (Buchenau), comb. nov. *L. campestris* (L.) DC., var. *frigida* Buchenau in Oesterr. Bot. Zeitschr. xlviii. 284 (1898). *L. frigida* (Buchenau) Samuelsson in Lindm. Svensk Fanerogamfl. 161 (1918). Plate 961, figs. 7–9.

I am unable to separate specifically *Luzula campestris*, var. *frigida* or *L. frigida* and *L. sudetica* (figs. 1–6). They have the same aspect and habit, dark perianths, castaneous to blackish capsules, and seeds only 1–1.6 mm. long and tipped by a minute caruncle only 0.1–0.2 mm. long. Whereas true *L. sudetica* has the perianth 2–2.5 mm. long, with the broadly lance-ovate sepals nearly equaled or exceeded by the capsule, var. *frigida* (figs. 7–9), theoretically at least, has the perianth mostly longer, 2.2–3 mm. long, with the narrowly lance-attenuate and slender-tipped sepals clearly overtopping the capsule. The difficulty is that in too many specimens, often under the same number, transitions occur and separation becomes arbitrary. Typical *L. sudetica* extends southward in eastern America to Newfoundland and the Shickshock Mountains in the Gaspé Peninsula, Quebec. I refer the following relatively southern specimens to true L. sudetica:

Newfoundland: shelves and talus of diorite cliffs, Western Head, entrance to Bonne Bay, *Fernald, Long & Fogg*, no. 1512, as *L. campestris*, var. *alpina* Gaudin; meadow near Frenchman's Cove, Bay of Islands, *Mackenzie & Griscom*, no. 10,202, as *Juncoides multiflorum* (Ehrh.) Druce, var.; turfy slopes near the sea, Seal's Nest Island, Bay of Islands, *Fernald, Long & Fogg*, no. 180, as *L. campestris*, var. *frigida*.

The interpretation by Wiegand and me in Rhodora, xv. 42 (1913) of *Luzula campestris* var. *frigida* was a confused one, the plants of southern New Brunswick and eastern Maine being really quite different from the original Labrador material. We were misled by Buchenau's citation of *Robinson & Schrenk*, no.

85, from St. John's, Newfoundland; but a rereading shows that the Robinson & Schrenk plant was not considered by Buchenau as typical: "Ich lernte diese Form [var. *frigida*] zuerst aus Labrador kennen, wo sie mehrfach gesammelt wurde. Sehr ausgeprägt findet sie sich ferner auf . . . Alberta . . . Etwas weniger characteristisch ist die Pflanze von St. Johns auf Neufundland (Robinson und Schrenk, Nr. 85)." The Labrador plant which closely matches Buchenau's description is, as stated, an extreme of *L. sudetica* with more slender and elongate perianth-segments. The southernmost stations of var. *frigida* are along and near the Straits of Belle Isle in

NEWFOUNDLAND: margin of pond back of St. Anthony, *E. C. Abbe*, no. 201; turfy slopes of slaty hills, Little Quirpon, *Fernald, Gilbert & Hotchkiss*, no. 27,809; springy swale and turfy upper border of strand, Anse au Sauvages, Pistolet Bay, *Fernald, Wiegand & Long*, no. 27,810; turfy limestone barrens, Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 27,808; swamp, Flower Cove, July 28, 1920, *M. E. Priest*.

Much of the material heretofore misidentified with *Luzula campestris* var. *frigida*, including the *Robinson & Schrenk* material doubtfully cited by Buchenau, belongs to L. MULTIFLORA (Retz.) Lejeune, var. FUSCONIGRA Čelak., at least *sensu* Samuelsson in Lindman, Svensk Fanerogamfl. 161 (1918). See PLATE 962, FIGS. 4 and 5. Its seed is decidedly not that of *L. sudetica*, but is characteristic of *L. multiflora:* 1.5–2 mm. long, with a round-tipped bulbiform caruncle 0.4–0.7 mm. long. From the common and wide-spread fulvous or paler *L. multiflora* it differs in its relatively narrow leaves, slender, stiff and low (1–4 dm.) stems, dark brown to fuscous sepals (with pale margins) and dark chestnut to blackish capsules. It is northern and relatively local with us. The following specimens have been seen (distributed as *L. campestris*, var. *frigida* unless noted) of what I take to be L. MULTIFLORA var. FUSCONIGRA.

NEWFOUNDLAND: peaty limestone barrens about Flower Cove, Straits of Belle Isle, *Fernald, Long & Dunbar*, no. 26,504; boggy spots on the rocky crests, Twillingate, Notre Dame Bay, *Fernald, Wiegand & Bartram*, no. 5169: dry turf, Old Perlican, Trinity Bay, *G. S. Torrey*, no. 38; dry open turfy slopes of sandstone and arenaceous slate hills back of Carbonear, Conception Bay, *Fernald & Wiegand*, no. 5166 (dwarf, with unusually capitate inflorescences); rocky hills, St. John's, *Robinson & Schrenk*, no.

85, as *L. arcuata* Meyer; by rill on seepy silicious slope of Joan Plains Hill, Bay Bulls, *Fernald, Long & Dunbar*, nos. 26,502 and 26,503, as *L. campestris*, var. *multiflora;* Spreadeagle, June 30, 1893, *Waghorne*, as *L. campestris;* dry field near sea-level, Bay of Islands, *Eames & Godfrey*, no. 5985. QUEBEC: Rivière du Loup, *Pease*, no. 2259, as *L. campestris*, var. *multiflora.* PRINCE EDWARD ISLAND: damp clearing, Morell, *Fernald & St. John*, no. 10,992, as *L. camp.*, var. *mult.* NOVA SCOTIA: wet peaty and rocky ground, Shag Harbor, *Fernald, Bissell & Linder*, no. 20,727, as *L. camp.*, var. *mult.* MAINE: turf, Tenant's Harbor, *Pease*, no. 26,067; Isle au Haut, July 8 and 10, 1920, *N. T. Kidder.* NEW HAMPSHIRE: field, Wolfeboro, *H. E. Sargent.* MASSACHUSETTS: swamp, Nantucket Island, *Bicknell*, no. 260a, unidentified. NEW YORK: low mossy meadow in rather heavy mucky soil, alt. 1840 ft., Parker's (Montague), Lewis Co., *Hotchkiss*, no. 2321; heavy rather dry meadow-soil, alt. 1800 ft., Rector (Montague), Lewis Co., *Hotchkiss*, no. 2323; heavy soil of meadow, alt. 1680 ft., northeast of Mohawk Hill (West Turin), Lewis Co., *Hotchkiss*, no. 2274.

Some material, wrongly distributed as *Luzula campestris*, var. *frigida*, differs at once from *L. multiflora* and its var. *fusconigra* in the very condensed umbel, usually with several sessile or subsessile spikes, with or without stiff rays up to 3.5 cm. long, the pale perianth 3–4 mm. long and greatly exceeding the capsule, the seeds only 1.5–1.7 mm. long and with conically tapering caruncle. This is

L. MULTIFLORA (Retz.) Lejeune, var. **acadiensis** (Fernald), comb. nov. *L. campestris*, var. *acadiensis* Fernald in RHODORA, xix. 38 (1917). Originally described from Prince Edward Island, Nova Scotia, and New Brunswick, var. *acadiensis* is now known from Newfoundland, the Gaspé Peninsula and southeastern Maine, as well. PLATE 962, FIGS. 6–8.

Although often merged with *Luzula campestris* (L.) DC. the common species across North America is abundantly distinct. *L. campestris* is a low plant with scattered tufts of narrow and very silky leaves separated by slender rhizomes and stolons up to 3 cm. long, each tuft with a usually solitary decumbent to ascending flowering stem, bearing 2–6 subglobose spikes, all but the central spike on divergent to recurving rays; the anthers two to five times as long as the filaments. In North America it is apparently native in woods and openings of the Avalon Peninsula of Newfoundland, along with scores of other typical Europeans (*Pedicularis sylvatica, Sieglingia decumbens*, etc., etc.). In 1920 the late C. E. Robbins found it naturalized in a lawn at Wareham, Massachusetts. *L. multiflora* (plate 962, figs. 1–3), on the other hand, is densely cespitose, nonstoloniferous, with numerous erect (up to 9 dm. high) flowering stems, the anthers shorter than to about equaling the filaments.

The only other variety of *Luzula multiflora* in the "Manual range" is var. congesta (Thuill.) Koch, Syn. 734 (1837), based on *Juncus congestus* Thuill. Fl. Env. Paris, ed. 2, ii. 179 (1799). Var. congesta (plate 961, figs. 10–12) is frequent in

Newfoundland: Baccalieu Island, July, 1902, *Sornborger* (misidentified by Fernald & Wiegand as *L. campestris*, var. *comosa*); Whitbourne, *Fernald & Wiegand*, no. 5168 (a lax form with elongate rays, misidentified like the last); Murray's Pond, 1931, *Agnes Ayre;* Trepassey, *Fernald, Long & Dunbar*, no. 26,505 (misidentified as *L. campestris*, var. *frigida*); Port Saunders *Fernald & Wiegand*, no. 3056 (misidentified like the last); Port aux Basques, *Fernald, Long & Dunbar*, no. 26,500.

I am retaining the long familiar name *Luzula multiflora* but as starting with *Juncus multiflorus* Retzius, Fl. Scand. Prodr. ed. 2: 82 (1795), who first properly published it. Ordinarily, as in Index Kewensis, the writings of Ascherson & Graebner and of Buchenau and others, the basic *Juncus multiflorus* is cited, to quote Ascherson & Graebn. Syn. Mitteleur. Fl. ii^2. 523 (1904), as "*Junc. multiflorus* Ehrh. Calam. No. 127 (etwa 1791). Hoffm. Deutschl. Fl. I. 169 (1800)", with *Juncus intermedius* Thuill. Fl. Env. Paris, ed. 2: 178 (1799), *J. liniger* With. Syst. Arr. ed. 4, ii. 343 (1801) and *J. erectus* Pers. Syn. i. 386 (1805) as synonyms. So far as I can find the properly described *Juncus multiflorus* Retzius (1795) has usually come into the picture only as a negative element, for, according to Index Kewensis *J. multiflorus* Retz. " = capensis", i. e. *J. capensis* Thunb. Prod. Pl. Cap. 66 (1794). Just how, to use an American idiom, the original editors of Index Kewensis "got that way," unless a probable *Luzula campestris* got entered as *Juncus capensis*, is not clear. In fact, one soon learns to take the attempted identifications in the original volumes with much more than the conventional grain of salt; for, as in this case, every careful student of the *Juncaceae* or of the flora of The Cape of Good Hope, Ernst Meyer, Buchenau, Baker (in Flora Capensis) and others, have regularly and rightly recognized *Juncus capensis* Thunb. as a true *Juncus*, with long and very slender, linear-subulate, glabrous leaves, naked or scapose flowering stems, and very many muticous seeds about 0.6 mm. long. It is in no wise a *Luzula*, with flat leaves, leafy stems and 3 large carunculate seeds. In describing his *Juncus multiflorus* (1795) Retzius was not accounting for the flora of the Cape of Good Hope! His Florae Scandinaviae Prodromus was, to quote his title-page, an enumeration of the plants of Sweden, Lappland, Finland and Pomerania, as well as of Denmark, Norway, Holstein, Iceland and Greenland, a large enough task without dragging in the Antipodes (especially without any mention of them). Retzius had the usual northern European species of *Juncus* (*J. acutus, conglomeratus, effusus, filiformis, trifidus* and so on to *J. biglumis* and *J. triglumis*), followed by the species which constitute *Luzula: J. vernalis* or *pilosus, J. parviflorus, J. maximus, J. multiflorus* (as new), *J. campestris* and *J. spicatus.* His description was clear:

> 435*. *J. multiflorus*, foliis planis nudis, culmo basi folioso, corymbo subramoso, capitulis multifloris terminalibus axillaribusque. *Juncus* Hall. St. Helv. 1329? *d*) P. sylv.

To those who know *Juncus capensis* the "Foliis planis" and "culmo basi folioso", to say nothing of its Scandinavian occurrence, might have been suggestive! In fact, Buchenau in Das Pflanzenreich correctly cites *J. multiflorus* Retzius as identical with the reputed *J. multiflorus* Ehrh. and graciously notes it as "in Ind. Kew. errore calami = *J. capensis* dicitur"—one of the cases where the pen was mightier than the brain. Furthermore, it is clear that Retzius was not basing his *Juncus multiflorus* (1795) on a reputed *J. multiflorus* Ehrh. (1791–1793[1]). Whether Ehrhart ever published such a species seems open to question. All the bibliographies, Index Kewensis, the citations by Buchenau and others, for instance, take the name back to Ehrhart, the former compendium saying, rather cryptically, under *Juncus*, "*multiflorus*, Ehrh. [Calam.]. 127; ex Hoffm. Fl. Deutschl. i. 169." Hoffm. l. c. (1800), properly publishing *J. multiflorus*, ascribed it

[1] The title-page of Ehrh. Beitr. vi. says 1791 and this date is commonly accepted. Buchenau, however, in Engler, Pflanzenr. iv[36]. 94 (1906) and elsewhere, said "ca. 1791", while von Hayek, Fl. Steierm. i. 106 and elsewhere (1908) gives the unquestioned date 1793. Schneider, too, in his Ill. Handb. Laubholzk., after citing Beitr. vi. consistently as published in 1791, said in his Nachtrag, ii. 886, "Nähreres 1793". If the exact dates of Ehrhart's different volumes have been worked out I shall welcome a reference to the publication.

to "EHRH. *gram. n.* 127", while Buchenau, in Engl. Pflanzenr. iv[36]. 91 (1906), gives the more detailed "*J. multiflorus* Ehrh., Calam., Gram. et Tripet. exsicc. (ca. 1791)." With the aid of Miss Ruth D. Sanderson, Librarian of the Gray Herbarium, I have made a long and fruitless search for any published description by Ehrhart of *J. multiflorus.* Search of Pritzel's Thesaurus and other reliable bibliographies reveals no book by him entitled either "Calam." (the title in brackets given in Index Kewensis), "gram." (the title given by Hoffmann) nor even "Calam., Gram. et Tripet. exsicc.", as cited by Buchenau. In Ehrhart's Beiträge zur Naturkunde, vi. (1791–1793) the 8th article is "Index Calamariarum, Graminum et Tripetaloidearum Linn., quas in usum Botanophilorum collegit et exsiccavit Fridericus Ehrhart, Helveto-Bernas". This, pp. 80–84, consists merely of a list of names, without descriptions, of twelve decades of the Exsiccatae, ending with no. 120 and dated October, 1790. The names of plants of Linnaeus and others of earlier date are of species already published but throughout the list are several new names of Ehrhart, all *nomina nuda* and of no nomenclatural standing until taken up and defined by subsequent authors. To this group of original *nomina nuda* belong nos. 66, *Juncus acutiflorus* Ehrh., 76, *J. obtusiflorus* Ehrh., 85, *J. glaucus* Ehrh. and 86, *J. setifolius* Ehrh.; but there is no number 127, *J. multiflorus*, the twelfth decade ending, naturally, with no. 120. Until it is is shown to be otherwise, we must infer that decades of the exsiccatae following the 12th may have been issued with names on the labels (including specimens numbered 127 and called *J. multiflorus*), but the first description of *J. multiflorus* as of Ehrhart was by Hoffmann in 1800. In the meantime, under that name and without any reference to Ehrhart, Retzius in 1795 described the New Scandinavian species which he thought might be the same as a Swiss plant of Haller. *Juncus multiflorus* Retzius (1795) apparently has the right-of-way.

The error which Buchenau charitably called a slip of the pen, by which Index Kewensis identified *Juncus multiflorus* Retz. (1795) with the South African *J. capensis* Thunb. (1794), at once intrigued some, who promptly altered names without checking the fundamental data. Thus in Bull. Torr. Bot. Cl. xxxii. 610

(1905), Rydberg, accepting unquestioningly the "lapsus calami", published the new combination

Juncoides intermedium (Thuill.) Rydb.

Juncus intermedius Thuill. Fl. Env. Paris, ed. 2, 178. 1799.
Juncus multiflorus Ehrh.; Hoffm. Fl. Deutschl. [i. e. Deutschl. Fl.] ed. 2, **1:** 169. 1800. Not *J. multiflorus* Retz. 1795.

Rydberg added, what seems to be the case, "The name *Juncus multiflorus* dates back as far as 1791, when Ehrhart issued his set of grasses, sedges, etc., but, as far as can be ascertained, it was never published for this plant before 1800, in the revised edition of Hoffmann's Flora". Promptly Professor Aven Nelson, apparently accepting Rydberg's copied statement that *Juncus multiflorus* Retz. is not the same as *J. multiflorus* Ehrh. ex Hoffm., published *Luzula intermedia* (Thuill.) A. Nels. in Coult. & Nels. New Man. Bot. Centr. Rocky Mts. 109 (1909), he evidently not realizing that the identical combination, as a substitute for *Juncus multiflorus*, was published 84 years earlier: *L. intermedia* Spenner, Fl. Friburg. i. 178 (1825), with the synonym "Juncus multiflorus. Hoffm. germ. ed. 2". Incidentally two other species were named *L. intermedia* early enough to find entry in the original Index Kewensis.

In PLATE 961, FIGS. 1–6 are of LUZULA SUDETICA (Willd.) DC.: FIG. 1, inflorescence, × 2, from Varmland Grännark, Sweden, June 17, 1918, *Samuelsson;* FIG. 2, portion of spike, × 8, from same plant; FIG. 3, seed, × 10, from same plant; FIG. 4, inflorescence, × 2, from Seal's Nest Island, Bay of Islands, Newfoundland, *Fernald, Long & Fogg,* no. 180; FIG. 5, portion of spike, × 8, from no. 180: FIG. 6, seed, × 10, from no. 180. FIGS. 7–9, L. SUDETICA, var. FRIGIDA (Buchenau) Fernald: FIG. 7, inflorescence, × 2, from Fullerton, Hudson Bay, lat. 63° 57′, *J. M. Macoun,* no. 79,215; FIG. 8, portion of spike, × 8, from no. 79,215; FIG. 9, seed, × 10, from no. 79,215. FIGS. 10–12, L. MULTIFLORA (Retz.) Lejeune, var. CONGESTA (Thuill.) Koch: FIG. 10, inflorescence, × 2, from Port Saunders, Newfoundland, *Fernald & Wiegand,* no. 3056; FIG. 11, portion of spike, × 8, from no. 3056; FIG. 12, seed, × 10, from no. 3056.

PLATE 962, FIGS. 1–3. L. MULTIFLORA (Retz.) Lejeune: FIG. 1, inflorescence, × 2, from Grindstone Island, Magdalen Islands, Quebec, *Fernald et al.,* no. 7188; FIG. 2, portion of spike, × 8, from no. 7188; FIG. 3, seed, × 10. from no. 7188. FIGS. 4 and 5, L. MULTIFLORA, var. FUSCONIGRA Čelak.: FIG. 4, portion of inflorescence, × 2, from Shag Harbor, Nova Scotia, *Fernald, Bissell, & Linder,* no. 20,727; FIG. 5, seed from no. 20,727. FIGS. 6–8, L. MULTIFLORA, var. ACADIENSIS Fernald: FIG. 6, inflorescence, × 2, from Windsor, Nova Scotia, *Fernald, Bartram & Long,* no. 23,584; FIG. 7, portion of inflorescence, × 8, from TYPE; FIG. 8, seed, × 10, from no. 23,584.

PLATES

Photo. B. G. Schubert.

ANTENNARIA EUCOSMA: FIGS. 1 and 2, pistillate and staminate plants, × 1; FIG. 3, pistillate involucre, × 6; FIG. 4, pistillate flower, × 10; FIG. 5, pistillate corollas, × 10; FIG. 6, achene, × 10.

Photo. B. G. Schubert.

ANTENNARIA VEXILLIFERA: FIG. 1, plant, × 1; FIG. 2, basal rosette, × 5; FIG. 3, tip of cauline leaf, × 10; FIG. 4, inflorescence, × 2; FIG. 5, involucre, × 6; FIG. 6, corollas, × 10; FIG. 7, achenes, × 10.

Photo. B. G. Schubert.

Antennaria straminea: figs. 1 and 2, plants, × 1; fig. 3, portion of basal rosette, × 5; fig. 4, tips of cauline leaves, × 10; fig. 5, inflorescence, × 2; fig. 6, involucre, × 5; fig. 7, corolla, × 10; fig. 8, achenes, × 10.

Photo. B. G. Schubert.

ANTENNARIA PEASEI: FIG. 1, plant, × 1; FIG. 2, basal rosette, × 5; FIG. 3, tip of cauline leaf, × 10; FIG. 4, inflorescence, × 2.

Photo. J. F. Collins.

ANTENNARIA SUBVISCOSA: small portion of large plant, × 2/5, trailing over limestone cliff.

Photo. B. G. Schubert.

Antennaria subviscosa: figs. 1 and 2, small plants, × 1; fig. 3, basal leaves, × 5; fig. 4, tip of cauline leaf, × 10; fig. 5, inflorescence, × 2; fig. 6, involucre, × 6; fig. 7, corollas, × 10; fig. 8, achenes, × 10.

Photo. B. G. Schubert.

ANTENNARIA ALBICANS: FIG. 1, plants, × 1; FIG. 2, basal rosettes, × 5; FIG. 3, tip of cauline leaf, × 10; FIG. 4, inflorescence, × 2; FIG. 5, pistillate flower, × 10; FIG. 6, achenes, × 10.

Photo. B. G. Schubert.

Antennaria Wiegandii: fig. 1, plant and a basal rosette, × 1; fig. 2, basal rosette, × 5; fig. 3, inflorescence, × 2; fig. 4, achenes, × 10.

Photo. B. G. Schubert.

Antennaria spathulata: figs. 1 and 2, plants, × 1; fig. 3, portion of rosette-leaf, × 5; fig. 4, inflorescence, × 2; fig. 5, portion of involucre, × 5; fig. 6, corollas, × 10; fig. 7, achenes, × 10.

Photo. B. G. Schubert.

ANTENNARIA APPENDICULATA: FIGS. 1 and 2, portions of plant, × 1; FIG. 3, summit of basal leaf, × 5; FIG. 4, tip of cauline leaf, × 10; FIG. 5, corymb, × 2; FIG. 6, achenes, × 10.

Photo. B. G. Schubert.

Antennaria canadensis; figs. 1 and 2, pistillate plant, × 1; fig. 3, tip of cauline leaf, × 10; fig. 4, achenes, × 10.

Photo. B. G. Schubert.

ANTENNARIA CANADENSIS: FIG. 1, staminate plant, × 1; FIG. 2, basal leaves, × 5; FIG. 3, pistillate corymb, × 2.

Photo. B. G. Schubert.

Antennaria neglecta: figs. 1 and 2, pistillate plant, × 1; fig. 3, tip of cauline leaf, × 10; figs. 4 and 5, pistillate inflorescences, × 2.

Photo. B. G. Schubert.

ANTENNARIA NEGLECTA: FIGS. 1 and 2, broad-leaved plant, × 1; FIG. 3, mature pistillate inflorescence, × 2; FIG. 4, achenes, × 10.

Photo. B. G. Schubert.

Antennaria neglecta: fig. 1, staminate plant, × 1; fig. 2, tip of cauline leaf, × 2; fig. 3, upper half of mature pistillate raceme, × 2; fig. 4, pistillate corolla, × 10.

Photo. B. G. Schubert.

ANTENNARIA NEGLECTA, forma SIMPLEX: plants, × 1.

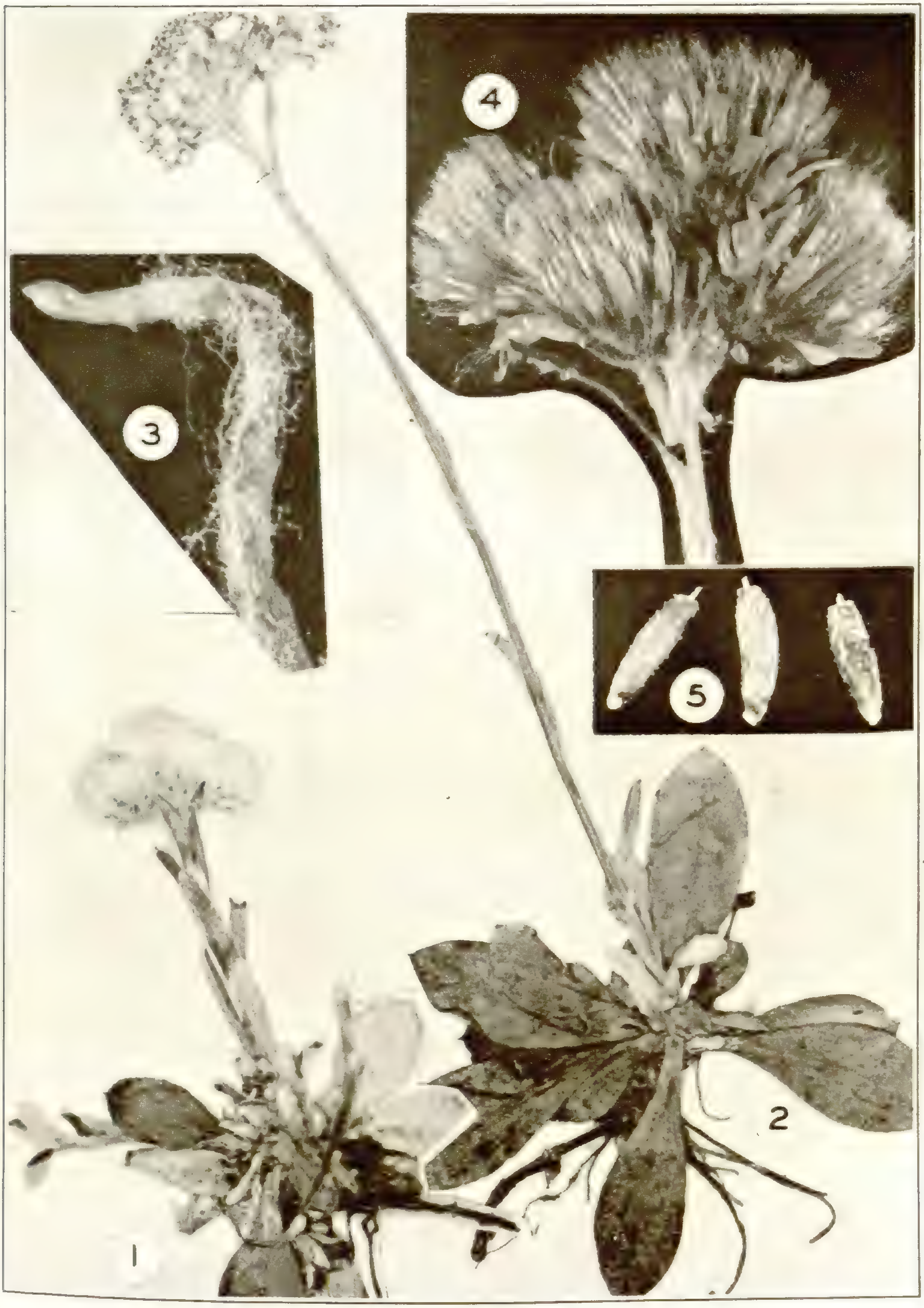

Photo. B. G. Schubert.

Antennaria campestris: fig. 1, pistillate plant, × 1; fig. 2, staminate plant, × 1; fig. 3, tip of cauline leaf, × 10; fig. 4, corymb, × 2; fig. 5, achenes, × 10.

Photo. B. G. Schubert.

ANTENNARIA RUPICOLA: FIG. 1, base of plant, × 1; FIG. 2, rosette-leaves, × 5; FIG. 3, tip of cauline leaf, × 10.

Photo. B. G. Schubert.

ANTENNARIA RUPICOLA: FIG. 1, flowering summit of plant in plate 929, × 1; FIG. 2, corymb, × 2; FIG. 3, receptacle, × 10; FIG. 4, achenes, × 10.

Photo. B. G. Schubert.

ANTENNARIA NEODIOICA, var. TYPICA: FIGS. 1, 2 and 3, portions of ISOTYPE, × 1; FIG. 4, tips of rosette-leaves, × 5; FIG. 5, tip of cauline leaf, × 10; FIG. 6, corymb, × 2; FIG. 7, portion of involucre, × 5; FIG. 8, receptacle, × 10.

Photo. B. G. Schubert.

ANTENNARIA NEODIOICA, var. TYPICA: FIGS. 1, 2 and 3, portions of staminate plants, × 1; FIG. 4, pistillate corolla, × 10; FIG. 5, achenes, × 10.

Photo. B. G. Schubert.

ANTENNARIA NEODIOICA, var. ATTENUATA: FIGS. 1 and 2, portions of plant, × 1; FIG. 3, tip of cauline leaf, × 10; FIG. 4, corymb, × 2; FIG. 5, portion of involucre, × 5.

Photo. B. G. Schubert.

ANTENNARIA NEODIOICA, var. INTERJECTA: FIG. 1, small plant and base and inflorescence of others, × 1; FIG. 2, tips of rosette-leaves, × 5; FIG. 3, tip of cauline leaf, × 10; FIG. 4, corymb, × 2; FIG. 5, corollas, × 10; FIG. 6, achenes, × 10.

Photo. B. G. Schubert.

ANTENNARIA NEODIOICA, var. CHLOROPHYLLA: FIGS. 1 and 2, portions of plant, × 1; FIG. 3, tip of rosette-leaf, × 5; FIG. 4, involucre, × 5; FIG. 5, corolla, × 10.

Photo. B. G. Schubert.

ANTENNARIA NEODIOICA, var. GRANDIS: FIGS. 1 and 2, portions of plant, × 1; FIG. 3, two mature corymbs, × 1; FIG. 4, corollas, × 10; FIG. 5, achenes, × 10.

Photo. B. G. Schubert.

Antennaria virginica: figs. 1 and 2, pistillate plant, × 1; figs. 3 and 4, staminate plant, × 1; fig. 5, rosette-leaf, × 5; fig. 6, tip of cauline leaf, × 10; fig. 7, involucre, × 5; fig. 8, receptacle, × 10; fig. 9, pistillate corollas, × 10; fig. 10, achenes, × 10;
A. virginica, var. argillicola: fig. 11, base of plant, × 1; fig. 12, tip of cauline leaf, × 10.

Photo. B. G. Schubert.

ANTENNARIA APRICA: FIG. 1, pistillate plant and corymb, × 1; FIG. 2, corymb, × 2; FIG. 3, pistillate corollas, × 10; FIG. 4, achenes, × 10.

Photo. B. G. Schubert.

ANTENNARIA APRICA: FIG. 1, staminate plant, × 1; FIG. 2; rosette-leaves, × 5: FIG. 3, tip of cauline leaf, × 10. FIG. 4. involucre. × 5.

Photo. B. G. Schubert.

ANTENNARIA PETALOIDEA (typical): FIGS. 1, 2 and 3, portions of plant, × 1; FIG. 4, base of plant, × 1; FIG. 5, tip of cauline leaf, × 10; FIG. 6, portion of corymb, × 2.

Photo. B. G. Schubert.

Antennaria petaloidea: fig. 1, staminate plant, × 1; fig. 2, tips of rosette-leaves, × 5; fig. 3, involucre, × 5; fig. 4, pistillate corolla, × 10.

Photo. B. G. Schubert.

ANTENNARIA PETALOIDEA, var. SCARIOSA: FIGS. 1 and 2, portions of plant, × 1; FIG. 3, corymb, × 2; FIG. 4, exceptionally lax corymb, × 1; FIG. 5, involucre, × 5.

Photo. B. G. Schubert.

Antennaria petaloidea, var. subcorymbosa: figs. 1 and 2, portions of plant, × 1; fig. 3, tip of cauline leaf, × 10; fig. 4, involucre, × 5; fig. 5, corollas, × 10; fig. 6, achenes, × 10.

Photo. B. G. Schubert.

Antennaria petaloidea, var. subcorymbosa: portions of large inflorescence, × 1; fig. 2, the summit of inflorescence in fig. 1.

Photo. B. G. Schubert.

Antennaria fallax: figs. 1 and 2, base and summit of pistillate plant, × 1; fig. 3, corymb, × 2; fig. 4, achenes, × 10.

Photo. B. G. Schubert.

Antennaria fallax: fig. 1, staminate plant, × 1; fig. 2, pistillate involucre, × 5; fig. 3, pistillate corollas, × 10.

Photo. B. G. Schubert.

ANTENNARIA FALLAX, var. CALOPHYLLA: FIGS. 1 and 2, portions of base and summit of pistillate plant, × 1; FIG. 3, half of involucre, × 5.

Photo. B. G. Schubert.

Antennaria fallax, var. calophylla: fig. 1, staminate plant, × 1; fig. 2, pistillate corymb, × 2.

Photo. B. G. Schubert.

Antennaria Parlinii: figs. 1 and 2, base and summit of plant, × 1; fig. 3, summit of flowering stem, showing glands, × 10; fig. 4, corymb, × 2; fig. 5, achenes, × 10.

Photo. B. G. Schubert.

Antennaria Parlinii: figs. 1 and 2, base and summit of staminate plant, × 1; fig. 3, half a pistillate involucre, × 5; fig. 4, pistillate corollas, × 10.

Photo. B. G. Schubert.

Antennaria Parlinii, var. arnoglossa: figs. 1 and 2, portions of base and summit of plant, × 1; fig. 3, involucre, × 5.

Photo. B. G. Schubert.

ANTENNARIA BRAINERDII: FIGS. 1 and 2, base and summit of plant, × 1; FIG. 3, summit of stem, showing glands, × 10; FIG. 4, corymb, × 2; FIG. 5, achenes, × 10.

Photo. B. G. Schubert.

ANTENNARIA BRAINERDII: FIG. 1, base of large-leaved extreme, $\times$ 1; FIG. 2, upper surface of rosette-leaf, showing long tomentum, $\times$ 10; FIG 3, involucre, $\times$ 5; FIG. 4, corollas, $\times$ 10.

Photo. B. G. Schubert.

ANTENNARIA PLANTAGINIFOLIA: FIGS. 1 and 2, base and summit of pistillate plant, × 1; FIG. 3, involucre, × 5; FIG. 4, corollas, × 10.

Photo. B. G. Schubert.

ANTENNARIA PLANTAGINIFOLIA: FIG. 1, staminate plant, $\times$ 1: FIG. 2, pistillate corymb, $\times$ 2; FIG. 3, achenes, $\times$ 10.

Photo. B. G. Schubert.

Antennaria plantaginifolia, var. petiolata: figs. 1 and 2, small fruiting plant, × 1; fig. 3, staminate plant, × 1.

Photo. B. G. Schubert.

ANTENNARIA SOLITARIA: FIG. 1, tracing by *B. L. Robinson* of the Gronovian plant included by Linnaeus in his *Gnaphalium plantaginifolium*; FIG. 2, one of TYPE-specimens, × 1.

Photo. B. G. Schubert.

Antennaria solitaria: fig. 1, average staminate plant, × 1; fig. 2, small staminate plant, × 1; fig. 3, achenes, × 10.

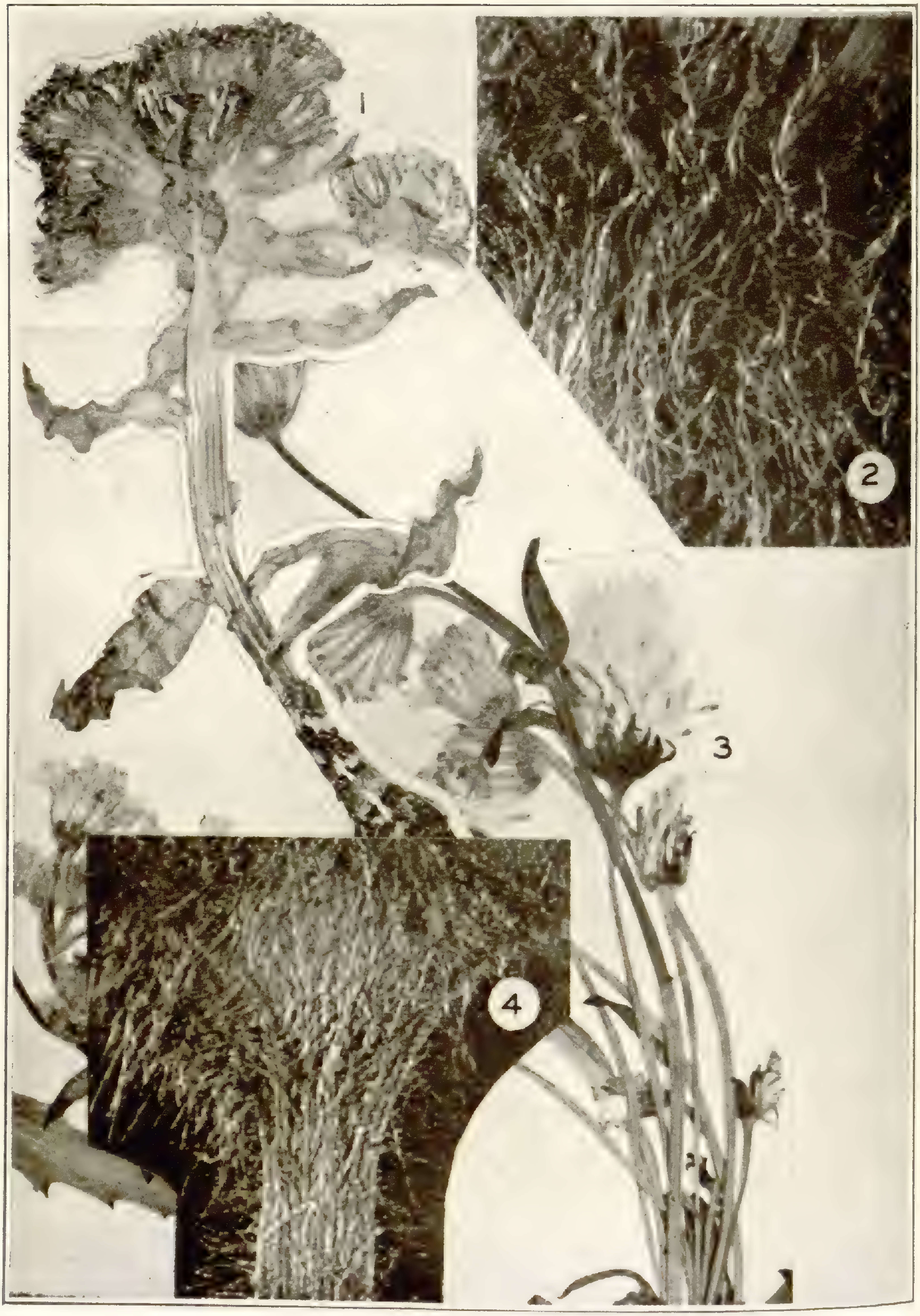

Photo. B. G. Schubert.

SENECIO CONGESTUS: FIG. 1, ISOTYPE, × 1; FIG. 2, summit of pedicel and base of involucre, × 10.
Var. PALUSTRIS: FIG. 3, inflorescence, × 1; FIG. 4, summit of pedicel and base of involucre, × 10.

Photo. B. G. Schubert.

SENECIO CONGESTUS, var. TONSUS: FIG. 1, inflorescence of TYPE, × 1; FIG. 2, summit of pedicel and base of involucre, × 10.

Photo. B. G. Schubert.

LUZULA SUDETICA: FIGS. 1 and 4, inflorescence, × 2; FIGS. 2 and 5, portions of spike, × 8; FIGS. 3 and 6, seed, × 10.

L. SUDETICA, var. FRIGIDA: FIG. 7, inflorescence, × 2; FIG. 8, portion of spike, × 8; FIG. 9, seed, × 10.

L. MULTIFLORA, var. CONGESTA: FIG. 10, inflorescence, × 2; FIG. 11, portion of spike, × 8; FIG. 12, seed, × 10.

Photo. B. G. Schubert.

Luzula multiflora: fig. 1, inflorescence, × 2; fig. 2, portion of spike, × 8; fig. 3, seed, × 10.

L. multiflora, var. fusconigra: fig. 4, portion of inflorescence, × 2, fig. 5, seed, × 10.

L. multiflora, var. acadiensis: fig. 6, inflorescence, × 2; fig. 7, portion of inflorescence, × 8; fig. 8, seed, × 10.

INDEX

New scientific names are printed in full-face type

CONTRIBUTIONS FROM THE GRAY HERBARIUM
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A LIST OF THE VASCULAR PLANTS OF GRAND MANAN, CHARLOTTE COUNTY, NEW BRUNSWICK

C. A. WEATHERBY AND JOHN ADAMS

EVER since Audubon, waiting at Eastport in 1833 for a ship to take him to Labrador, made his excursion to Grand Manan and wrote lyrically of its scenery, the island has been visited from time to time by a long succession of naturalists and has had several competent resident observers. Reports upon its birds, spiders, marine algae, marine invertebrates, mosses, etc., have appeared, but though some dozen taxonomists have made collections on the island, relatively little has been published on its vascular flora. There are scattered records in Fowler's lists of the plants of New Brunswick, in Vroom's list of Charlotte County plants and in the Bulletin of the Natural History Society of New Brunswick; and a list of 261 species, considerably less than half of those now known, was published by H. F. Perkins, assisted by A. M. Covert, in the St. Croix Courier in 1895. But there have been no recent or at all comprehensive studies of the island flora.

The flora of Grand Manan offers none of the surprises and the dramatically broken ranges which characterize that of western Nova Scotia, but there are at least two reasons why a record of it at this time is worth making. In the first place, as in all inhabited areas of New England and the Maritime Provinces, the plant population is already much changed in its composition from its original state by the activities of man and in all probability will continue to change. What we now set down will be, a hundred or even fifty years hence, an historical record of conditions which may then be greatly altered, either toward the sort of flora, consisting largely of hardy and adaptable weeds, which one finds in thickly settled communities or in areas devastated by fire or reckless lumbering, or toward conditions as they were before the white man arrived. The second reason is that the flora of Grand Manan is fairly representative of a natural phytogeographic region. This we shall discuss in more detail, but first some account of the physiography and geology of the island, as they may affect the vegetation, should be given.

Physiography and Geology

Grand Manan is the largest of a group of islands, or miniature archipelago (all of which is included in this flora), situated at the entrance of the Bay of Fundy and belonging politically to the Province of New Brunswick in Canada. The main island is about six miles distant from West Quoddy Head in Maine, the most easterly point in the United States. Lying to the east of Grand Manan, which is a little over fifteen miles in length and approaches seven miles in greatest width, there are nineteen smaller islands of different size. Those attaining a length of one mile or more are: White Head, Ross, Inner Wood, Cheney, Long and Kent Islands. The first two are much larger than the others. White Head Island is about 2.5 miles long and at one point, a ledge of white quartzite, contains the highest elevation reached on the smaller islands, namely, 74 ft. above sea-level. Long Island attains nearly an equal altitude.

Geologically, the group of islands is the emersed portion of an isolated height (monadnock), an upfaulted block which once, when the present Continental Shelf was out of water, rose to a height of perhaps a thousand feet above the Triassic lowland which now forms the floor of the Bay of Fundy. The main island, the axis of which runs in a nearly north and south direction, shows a striking contrast between its eastern and western shores. On the eastern side, the coast-line is greatly indented and in few localities is there a greater elevation than 80 ft. Small beaches of sand are found at Flagg's Cove, Bancroft Point, Grand Harbour, Seal Cove and Deep Cove, and a much better developed one, nearly a mile long, separates Long Pond and Great Pond from the ocean. Small shingle and mud beaches are common. There is a brackish marsh at Whale Cove and a salt marsh of considerable size at Castalia. The human population is restricted almost entirely to the eastern region of the island.

On the western side, from North Head to Southern Head, there is an almost unbroken line of cliffs, varying mostly from 200 to 400 feet in height, the only important breaks in the coast-line being at Money Cove and at Dark Harbour, where there is an inlet about half a mile in length, closed by a bar of shingle.

The western half of the island is a plateau with a relatively gentle slope toward the east. It is cut, almost longitudinally, by two long valleys, one running from near Dark Harbour southeast to Grand Harbour, the other from near the west coast at Little Dark Harbour to Seal Cove. Both are occupied by large brooks. Several smaller streams empty into the sea on the east, some of them through steep-sided ravines; a few, flowing in the opposite direction from the crest, have carved short ravines in the western cliffs, as at Dark Harbour, Money Cove and Little Dark Harbour.

There are barrier-beach ponds, brackish or fresh, on several of the smaller islands and at Whale Cove, Great and Long Ponds on the main island. Depressions on the upland of the main island are occupied by some fifteen small ponds. Two of them have sandy, gravelly, or rocky shores; the others are for the most part surrounded by more or less well-developed sphagnous bog.

The two areas above noted correspond to two main geological formations, bounded by a line drawn from Whale Cove in the north to a point about one mile east of Seal Cove in the south. To the west of this line the rocks are volcanic in origin, basaltic in nature and date from the Triassic period. On the eastern side the formation is partly volcanic, partly sedimentary in nature and dates from Palaeozoic time (Precambrian or Upper Silurian). This series includes all the smaller islands and also Campobello and Deer islands near by and is of the same age as and similar to considerable areas on the north shore of the Bay of Fundy. The nearest counterpart of the basalt seems to be the dyke running from Digby Neck to Cape Blomidon on the northern shore of Nova Scotia.

The physiographic features of the entire group of islands are doubtless correlated with their geological history. The older series of Palaeozoic rocks, having been so much longer exposed to the forces of denudation and erosion, now exhibit a greatly indented coast-line of low elevation, with occasional bluffs where the rock was presumably harder. The smaller islands were doubtless at one time united with the main island, but the sinking of the Continental Shelf and constant erosion by the waves eventually resulted in the development of channels, leaving detached masses of land which are the islands of today. It is still possible during very low tides to travel on foot to Ross Island, Cheney Island and White Head Island in succession, and between any two of them at every low tide. All the small islands lie within the 10-fathom limit.

The rocks of both formations are slightly calcareous and the mineral soils derived from them (and most soils in Grand Manan seem to be so derived) are weakly alkaline. Tests at some fifteen different localities, made in 1927 with a Lamotte soil-testing set, gave uniformly neutral or circumneutral pH values (6+ to 7+). The alkalinity, however, is not enough to inhibit the formation of highly acid upland peat and of sphagnum bogs. Most of the poorly drained depressions on the islands are occupied by such bogs. At Bald Heath (west of Woodward's Cove), at Ingalls Point and on White Head Island are raised bogs quite as well developed, though not as large, as the better known ones of eastern Maine. The alkalinity, however, is sufficient to affect noticeably the composition of the flora, as compared with that of eastern Maine. Blueberries, for instance, though by no means rare, are definitely less common than on the mainland and occur in abundance only on leached soils and in the borders of sphagnum bogs. *Epigaea repens,* not uncommon in Washington County, Maine, is not known at all on Grand Manan. On the other hand, the at least mildly calcicolous *Carex aurea* is one of the common sedges on Grand Manan and rare on the mainland; and the island probably owes to its slightly calcareous soil the presence of such species as *Malaxis monophyllos, Betula pumila* and *Clematis verticillaris.*

Glaciation

The geologist Chalmers in 1890 came to the conclusion that although Grand Manan did not entirely escape the Pleistocene ice, glaciation was light and a large part of the eastern slope was unglaciated. To the layman, the evidence is confusing. Outcrops of basalt on the central plateau show pitted and irregular surfaces not at all smoothed off and striated as are the summits of similar trap dykes in southern New England. There is very little gravel which might be of glacial origin. But there are striae, running much more easterly than those on Campobello and Deer Island, at low elevations along the eastern shore (Chalmers found them at Swallowtail, Deep Cove and at several places between North Head and Grand Harbour); transported boulders have also been reported there. If this were all, one might imagine local glaciation on the lower levels of the ancient monadnock; but there is a rounded granite boulder some eight feet in its longest diameter high up on the central ridge west of Whale Cove.

In any case, glaciation or the lack of it has left no visible imprint on the flora.

Forests

The vegetational aspect of the main island has changed notably even since our first visit in 1926, almost wholly as the result of lumbering. To the former local—and harmless—cutting of young, slender trees for fish-weirs and of others for masts, firewood, etc. has been added extensive getting out of pulp-logs. On our first visit, if one looked west from the main highway between Mark Hill and Southern Head, he would see, beyond the nearby farm-clearings, almost unbroken spruce. Ells, mapping the island in 1904, marked all the western third as "old growth." Now, of this well-established old forest there remain only small areas near Southern Head and on Kent

Island. Its place has been taken by a ragged cover of trees not worth the lumberman's trouble and by new growth, and the rather delicately adapted species of the spruce woods, such as *Epilobium palustre* (typical), *Listera cordata* and other small orchids, are correspondingly reduced in numbers.

The central plateau is still covered with a forest, or the relics of a forest, mainly of red and white spruce, fir, and yellow and white birch on the uplands and of black spruce and tamarack in the sphagnous hollows. White cedar (*Thuja*) is confined to the eastern slope in a strip extending from Whale Cove to near Grand Harbour. Here it formerly produced dense, pure stands; though most of these have been cut, it is still common, though mostly of small size. In general, the forest on the east slope becomes much more varied than that of the upland and the proportion of broad-leaved trees and shrubs, both as to individuals and species, increases markedly. Islands of broad-leaf forest of beech and maple are also to be found in the sheltered ravines of the west coast and at the top of the cliffs there are areas of nearly pure birch. These latter, however, may be partly due to the cutting out of spruce.

Spruce and fir reproduce well after cutting. A nearly bare hillside west of Whale Cove has become, since our first visit, well covered with a young and vigorous forest of these trees. White pine and oak have not been so fortunate. The former once occurred in considerable quantity; it is now represented only by a few scattered, for the most part sickly, individuals. Northern red oak was once present in sufficient quantity to support a barrel-stave factory; we have seen only a very few trees, the largest about two feet in diameter near the base, attended by a few seedlings or suckers. There is one known hemlock on the island.

Present conditions seem to represent a second stage in the development of the flora, which has apparently undergone some radical changes in the course of a century. Abraham Gesner, who, as provincial geologist, visited the island in 1839, reported that "the mountainous district" was then "covered with a fine growth of beech, birch and maple" and that "formerly the lower lands produced an immense growth of pine and spruce but the large timber has been consumed by fire, the great destroyer of American forests." This is almost startlingly different from the present state of things. Accepting Gesner's data as correct, the distribution of woodland species has been reversed, the spruce now prevailingly on the higher, the broad-leaved trees on the lower levels, and questions as to the reason for the reversal arise. It could be inferred that the hardwood forest on the uplands had become established at some period when the climate was warmer and more favorable than at present; that it was able to persist after a climatic change for the worse but, once destroyed by lumbering or otherwise, could not reproduce itself and gave place to the hardier and more adaptable spruce and fir. But this is far from an inevitable conclusion; other causes—for instance, the great fire which, a half-century ago, swept the northern part of the island and must have destroyed much of the then existing leaf-mold—may have been quite as potent, or more so.

Phytogeography and Climate

However changed, the existing vegetation of Grand Manan is not without phytogeographic interest. In an excellent little paper published in 1869, the geologist G. F. Matthew pointed out the presence in southwestern New Brunswick and the adjacent coastal regions of Maine of a small group of boreal species not otherwise to be found so far south except at a considerable altitude. He listed the following which occur on Grand Manan: *Rubus Chamaemorus*, *Solidago thyrsoidea* (*S. macrophylla*), *Senecio Pseudo-Arnica*, *Empetrum nigrum*, *Vaccinium Vitis-idaea* and *Euphrasia officinalis* (*E. americana*, mainly). As "one very obvious cause" of their persistence (for they are presumably to be regarded as relics left behind in the northward march of boreal vegetation in post-glacial time) he mentioned "the abundance of cool sea-fogs in summer time and consequent low temperature and moist atmosphere." Further investigations, those of Kennedy, Fernald and Wiegand, and Knowlton, have served to confirm and extend Matthew's conclusions. No one has yet found a better explanation than his of the presence of these species and others of like range subsequently discovered about the mouth of the Bay of Fundy, and characteristic of the flora of the region.

Matthew gave the mean summer temperature at St. John as 58.1° Fahrenheit and the average number of completely foggy days per month as 5.7. Later observations made from 1905 to 1912 at St. John by D. Leavitt Hutchinson and published in the Bulletin of the Natural History Society of New Brunswick, show Matthew's figures to be essentially correct. The number of foggy days, however, is from six to eleven in July and August. In Grand Manan, according to Pettingill, the mean summer temperature is 50–55° F. on the smaller islands and somewhat higher on the main island, where maximum temperatures of 85° or 90° have been occasionally, but only occasionally, registered. There are few evenings when a fire is not pleasant. There is a definite difference between the north and south ends of the main island, the latter, where fogs are more frequent, being the cooler. This is reflected in the local occurrences of some of the more particular species of plants, such as *Solidago macrophylla* and *Iris setosa* var. *canadensis*, which are confined to the outer islands or the southern extremity of the main island.

On Kent Island, where Bowdoin College maintained a scientific station for some time, the lowest temperature observed during the winter of 1936–37 was 4.5° F. Snowfall is moderate in amount.

The exact limits of the relatively boreal phytogeographic province to which Grand Manan belongs have not been worked out, but, taking political boundaries for convenience, it may be taken to include Washington County, Maine, Charlotte and St. John counties and the southwestern portion of Kings County (roughly, that part west of the 66th meridian) in New Brunswick. It amounts to a sort of floristic island, bounded west and north by the comparatively austral vegetation of the Penobscot Valley and the middle St. John Valley and cut into by the also rather austral valley of the St. Croix.[1] It corresponds, with considerable extension east and west, to Ganong's Passamaquoddy physiographic province, and since the bay of that name lies nearly in its center, we may speak of its vegetation as the Passamaquoddy flora. In giving data as to the local distribution of individual species in the list we have also, for purposes of comparison, included the western counties of Nova Scotia, especially Digby and Annapolis, which also have a cool and foggy summer climate.

The Passamaquoddy vegetation is definitely of the Canadian type. That is, the forest has a large proportion of spruce and fir and the flora in general includes, along with many species of wide and generalized distribution, a noteworthy percentage of species ranging from Newfoundland to Minnesota or Manitoba and south to northern New Jersey and northeastern Pennsylvania. Some of them lack the westward extension to the Great Lakes region; others have a southern arm along the Appalachians; but all have their centers and the greater part of their ranges within the area covered by the Pleistocene glaciers. Of the 513 native species known in Grand Manan, approximately 60% have their northeastern limits in Newfoundland or Labrador. Fifty (about 9%) reach Greenland; 163 (roughly 30%) cross the continent from Greenland or Newfoundland to Alaska or British Columbia. One hundred (about 19%) have the typical Canadian range as defined above. 142 (approximately 26%) are predominantly southern, having their northeastern outposts in the Maritime Provinces and a considerable part of their ranges south of the glaciated regions.

The Passamaquoddy region, then, is noteworthy as a southwestward projection of a Canadian flora, reinforced by a few still more boreal

[1] Vroom lists something like 100 species in Charlotte County not known in Grand Manan, most of them relatively southern in distribution.

species. Because of its small area, Grand Manan has by no means all the Passamaquoddy species; but because of its insular position and the coldness of the water around it,[2] it does harbor a good representation of the species which give the Passamaquoddy area its distinctive floristic tinge. Its phytogeographic interest centers in six small groups of species, as follows.

I. Boreal species, in New England (except northern Maine) chiefly montane, in the sense that they occur principally within Fenneman's White Mountain and Green Mountain physiographic sections, and commonly at relatively high altitudes; their distribution probably controlled by climatic factors.

Cystopteris fragilis (typical)	Empetrum nigrum
Dryopteris spinulosa var. americana	Viola labradorica
Polystichum Braunii	Epilobium palustre (typical)
Scirpus cespitosus var. callosus	Solidago macrophylla
Pyrus decora	Aster foliaceus
Rubus Chamaemorus	Prenanthes trifoliolata var. nana

II. Relatively boreal species, somewhat isolated on Grand Manan, or with one or two stations in the Passamaquoddy area, otherwise not known nearer than the central Penobscot Valley or Aroostook County, Maine, and not primarily upland species in New England, their distribution probably controlled by a preference for calcareous soils. Of these, only *Rhamnus alnifolia* is known from western Nova Scotia.

Carex tenuiflora	Betula pumila
Malaxis monophyllos	Rhamnus alnifolia

III. Halophytes or maritime species, circumboreal or with ranges centering on the Gulf of St. Lawrence, and reaching their southwestern limit in our area or somewhat farther along the coast of Maine. These species are not known on the eastern coast of New Brunswick nor, except *Iris setosa* var. *canadensis*, on the inner part of the Bay of Fundy. They reach our area by way of Prince Edward Island or the Magdalen Islands, Cape Breton, and the outer coast of Nova Scotia—a distribution which suggests that they may have occupied the outer rim of the Continental Shelf which once carried the shore-line some 150 miles south and east of what is now Nova Scotia, and were not able to follow the receding shore when the shelf was submerged except at certain points, mostly those which required the least travel. Possibly they reached Grand Manan and the Maine coast by way of the

[2] Verrill, taking the temperature of the water in the Bay of Fundy, found it coldest near the islands.

rather deep estuaries (now submarine) of the Gulf of Maine, which might have afforded them shore habitats when the Bay of Fundy was still dry land well back from the ocean.

Such conjecture, though intriguing, is not to be taken too seriously. The number of species concerned is too small and the distances too short, for safe generalization. The normal thinning out of species toward the limits of their range and possibly even accidents of collecting,[3] may account for the phenomena here reported. Nevertheless, when the thinning out falls into definite patterns in even a few species, that fact is suggestive and may well be put on record.[4]

Scirpus rufus var. neogaeus	Sagina nodosa (typical)
Carex Mackenziei	Sedum Rosea
Iris setosa var. canadensis	Senecio Pseudo-Arnica

IV. Maritime species, with northeastern limits in Cape Breton or Newfoundland, ranging south to Virginia or the Carolinas, which occur on the eastern coast of New Brunswick, but are not known from the inner Bay of Fundy.

Tillaea aquatica
Euphorbia polygonifolia
Limosella subulata

V. Southern species, not maritime, which are known in Maine from the lower Penobscot Valley or Mt. Desert[5], but not north or east of those points, and reach their eastern limits in Grand Manan or Nova Scotia—a range which suggests a migration-route along the Continental Shelf.

Carex Swanii	Bartonia paniculata
Ceratophyllum echinatum	Utricularia gibba
Cardamine parviflora var. arenicola	Houstonia caerulea

VI. Southern non-maritime species, reaching the upper Penobscot Valley, northeastern Maine, the middle St. John Valley, eastern New Brunswick (except *Carex tincta*), and in one case (*Epilobium strictum*) also Prince Edward Island and Cape Breton. Only *Juncus Dudleyi* reaches the mainland of Nova Scotia and that at a single

[3] This, however, seems unlikely. A collector capable of detecting the tiny and insignificant *Tillaea* in eastern New Brunswick would not be likely to miss the relatively huge *Senecio Pseudo-Arnica* with conspicuously white-woolly foliage and yellow flowers as large as a silver dollar.

[4] Other more common and widely distributed northern littorals, such as *Stellaria humifusa*, *Spergularia canadensis*, *Ranunculus Cymbalaria* and *Lathyrus japonicus*, do reach the coasts both of eastern New Brunswick and the inner Bay of Fundy.

[5] Except *Ceratophyllum echinatum*, which is not known to us between York County, Maine, and Grand Manan.

station. Its range and that of *Clematis verticillaris* may be controlled by soil-preference.

Carex tincta
Juncus Dudleyi
Clematis verticillaris
Epilobium strictum

We have made no attempt to list plant associations. That was to have been done, and we hope may still be done, by Prof. E. W. B. Chase. Those interested in such matters may get some information relating to Grand Manan from Klugh's paper (see the bibliography) and may construct some of the more obvious associations, such as those of peat-bogs, from the habitats given in the present list.

The following species are known in the Passamaquoddy area from Grand Manan only. Those marked with an asterisk occur in western Nova Scotia.

Polystichum Braunii
Botrychium angustisegmentum
*Potamogeton Oakesianus
*Potamogeton Berchtoldi var. tenuissimus
*Scirpus rufus
Carex tenuiflora
*Carex Swanii
Ceratophyllum echinatum
*Tillaea aquatica
*Euphorbia polygonifolia
*Bartonia paniculata
*Teucrium canadense
*Utricularia gibba
*Utricularia purpurea
*Senecio Pseudo-Arnica
*Polygonum punctatum

Previous Collectors and Records

A. E. Verrill, 1859. Verrill, later a distinguished zoölogist and at the time of his visit to Grand Manan a student of Agassiz, went to the islands to collect sea-birds' eggs, for a study of embryos in various stages of development. Being also interested in botany, he collected a few plants, about a dozen species in all. Among them was *Senecio Pseudo-Arnica*, one of the most notable species of the islands. This was its first collection in the area then covered by Gray's Manual; it was duly recorded in the fifth edition of that work in 1867. Three specimens of Verrill's are at Yale University; the others are in Rothrock's herbarium.

J. T. Rothrock, 1861. Rothrock, later a well-known botanical explorer and professor at the University of Pennsylvania, was in 1861 a pupil of Asa Gray. He was well acquainted with Verrill and shared in the working up of some of the latter's botanical collections. He may have been stimulated to visit Grand Manan by Verrill's discovery of the Senecio. The list of species he collected shows that he must have been on the island for some time, probably from early summer to midsummer. His herbarium, including about 130 species from

Grand Manan, is at the Chicago Natural History Museum; a few Grand Manan duplicates are at the Gray Herbarium.

G. U. Hay, 1879–1895. Hay, an amateur botanist, for many years one of the leaders of the Natural History Society of New Brunswick, and a fairly energetic collector, made several visits to Grand Manan. His primary interest there was in marine algae, but he collected a few vascular plants. His specimens are at the New Brunswick Museum, with a few duplicates at the Gray Herbarium and perhaps elsewhere.

J. Vroom, 1880. Vroom was a school-teacher in Maine and later editor of the St. Croix Courier at St. Stephen. He was a keen amateur botanist; as above noted, he published in 1887 a carefully compiled list of the vascular plants of Charlotte County, New Brunswick. He seems to have visited Grand Manan in 1880. So far as we know, he made no very extensive collections anywhere; such specimens of his as we have seen are in the New Brunswick Museum and at the Gray Herbarium.

W. F. Ganong, 1888, 1889 (with Kingo Miyabe). Ganong, professor of botany at Smith College and an indefatigable investigator of almost everything relating to his native New Brunswick, noted several species from Grand Manan in his interleaved copy of Fowler's list, now preserved at the New Brunswick Museum. We have seen no specimens collected by him on the islands, though some at the Gray Herbarium labelled merely "Charlotte County" may have come from them.

J. R. Churchill, 1891. Churchill, for many years judge of one of the municipal courts at Boston, was an ardent amateur botanist. His ambition was to build up an herbarium which should include specimens of all the species in Gray's Manual, all collected by his own hands. In the course of a long life, he came fairly close to achieving this object. He spent parts of July and August on Grand Manan and collected 73 species. The first set of his specimens is at the Missouri Botanical Garden. A very full duplicate set is at the Gray Herbarium and smaller sets may be found in several American herbaria.

H. F. Perkins, about 1894. We have little information about Perkins. He seems to have lived at Grand Harbour for a time; he also resided at Blissville, Sunbury County, New Brunswick. He was a member of the Committee on Botany of the Natural History Society of New Brunswick in 1896. His "Preliminary List of Plants found growing on Grand Manan Island" has already been mentioned. It is a bare enumeration of Latin and English names, arranged under families, practically without data as to habitat or anything else. No grasses or sedges are included. It suffers from numerous misprints, no doubt due to newspaper compositors setting up unfamiliar Latin names from handwritten manuscript. Nevertheless, it is generally accurate and is a document of some importance for the botany of the islands. So far as we know, the only copy of it in existence is in the file of the St. Croix Courier at its office at St. Stephen. We have been courteously permitted to have three type-written copies of it made; these are deposited at the New Brunswick Museum, the Gray Herbarium and the library of the Geological Society at Ottawa.

Two specimens only collected by Perkins are at the New Brunswick Museum, one of them *Senecio Pseudo-Arnica,* which is not in his list.

A. B. KLUGH, 1909. Klugh, professor at Queen's University at Kingston, Ontario, spent the summer of 1909 in field work in Charlotte County. He published in 1912 a study of its plant associations, including several records from Grand Manan. We do not know the present location of his herbarium; some duplicates are at the Gray Herbarium and at the New Brunswick Museum.

Various other visitors have made small collections on Grand Manan, or have kept records of species seen. Prof. W. G. Farlow of Harvard University got a few specimens in 1902. Mr. S. N. F. Sanford of the Boston Society of Natural History collected 28 species in 1913; his specimens are in his private herbarium. Dr. C. B. Graves of New London, Connecticut, made a short visit in 1928 and compiled a list of 74 species which he observed, including a few not before recorded, but got no specimens. Mr. C. H. Knowlton was on the main island and Kent Island for a few days in 1934; his specimens, collected with the first author, are at the Gray Herbarium. Prof. E. W. B. Chase, of Wayne University, Detroit, spent a month in the islands in 1938 and made collections with a view to studying plant associations; her material has never been worked up. We have seen scattered specimens obtained by other collectors; these are noted in the body of the list.

In addition, Miss Marie R. Felix, long a summer resident, for some years kept a card catalogue of species noted by her and her associates. This is not backed by specimens, but contains many authentic and useful records.

Of the above, we have seen at least the critical material from the Rothrock and Verrill collections, such of Klugh's duplicates as are at the Gray Herbarium and the New Brunswick Museum and all of the other collections except Prof. Chase's.

The first-named author and his wife have, in the course of the years from 1926 to 1944, made five visits of two to three weeks' and one of eight weeks' duration. They have covered all of the road-system of the main island, crossed it at three points where there are no roads and visited all but three of the small ponds in the interior. They have also visited most of the outlying islands, in some cases repeatedly. The second author also covered the road-system thoroughly. The first set of the Weatherby collections is at the Gray Herbarium, with duplicates at the Canadian National Museum and the United States National Herbarium, and there are smaller sets at several other institutions: the Adams plants are at the Division of Botany, Central Experimental Farm, Ottawa.

The Map

The accompanying map is reproduced, by permission, from the Anna Buchanan Charles Memorial map of the Islands, prepared by her son, Buchanan Charles, and published under the auspices of the Grand Manan Historical Society. As here reduced, its scale is approximately 2.75 miles to the inch. The heavy outline represents average high-tide level, the light line outside it, low-tide level. The stippled areas between are out of water at low tide. The numbered circles show the location of fish-weirs.

Acknowledgments

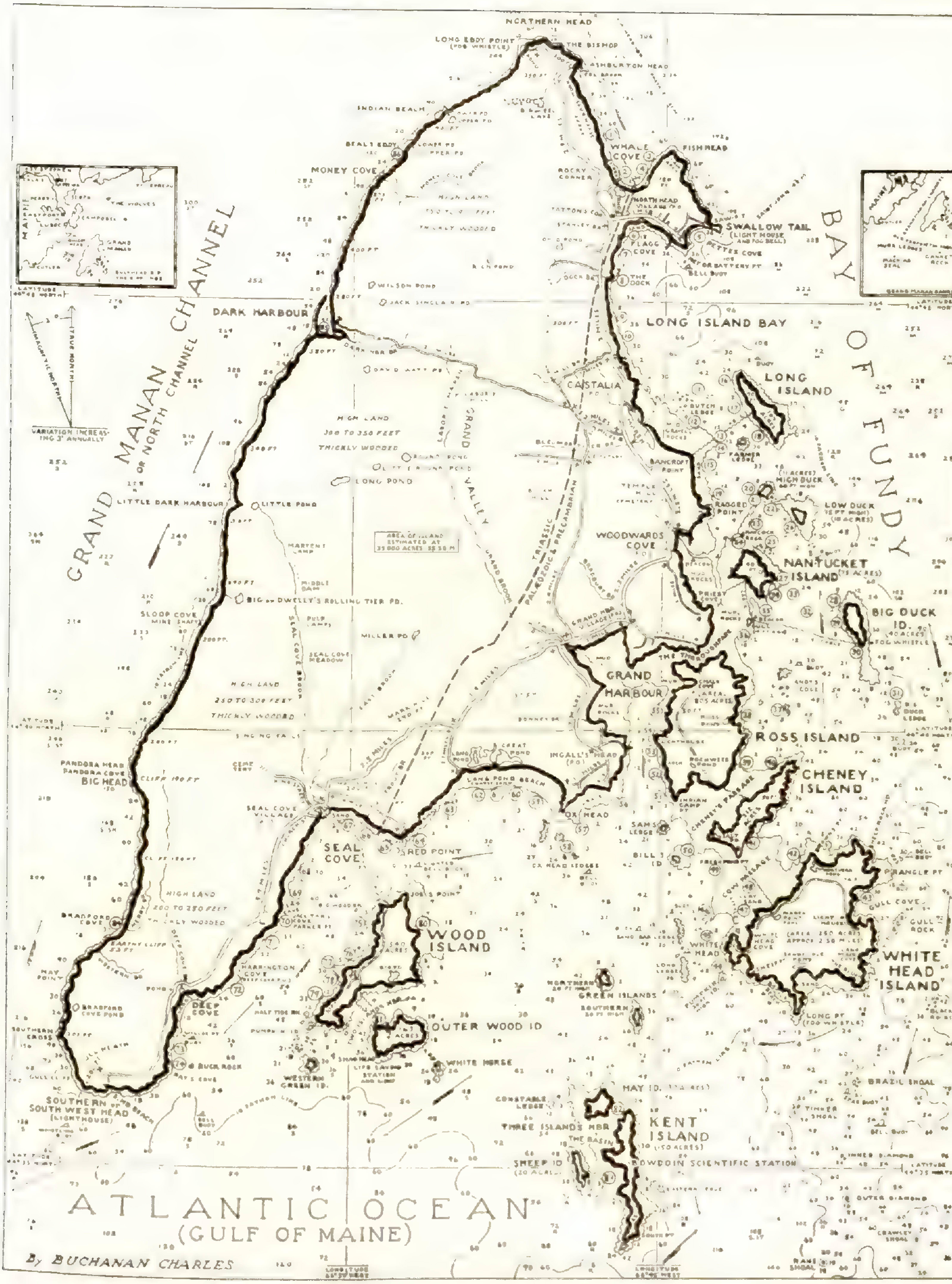
There remains the pleasant task of acknowledging the kindnesses and cordially given assistance we have received from many sources. As anyone must who has to do with the flora of northeastern North America, we have leaned heavily on the work of Prof. M. L. Fernald and in addition are indebted to him for the identification of certain critical specimens. We have had access to the collections of the Canadian National Museum, the Central Experimental Farm and the New Brunswick Provincial Museum; at all three, the staff have aided us in many ways. Dr. Paul C. Standley of the Chicago Natural History Museum has been most generous of time and trouble in supplying information about the Rothrock specimens there. Mr. C. H. Knowlton and Dr. A. E. Roland have helped much in checking geographic ranges. Mr. S. N. F. Sanford has furnished a list of his collections, Mr. S. H. Granville has given us access to the unique volume of the St. Croix Courier containing Perkins' list and, as previously noted, allowed us to make copies from it. Mr. Allan Moses, Prof. Ralph A. Ingalls and Miss Marie R. Felix have been welcome and helpful companions and guides on collecting trips. Mr. Buchanan Charles has kindly permitted us to reproduce his excellent map of the islands. Residents of the island, too many to mention here, have given us useful bits of information; the names of some of them appear in the text of our list. To all, we proffer our hearty thanks.

In compiling the list which follows, we have attempted little original taxonomic investigation, for the most part following the classification now in use at the Gray Herbarium; we have, however, endeavored to keep abreast of contemporary work. We have kept the familiar Engler and Prantl sequence of families and genera, as in current manuals, except in the ferns and grasses, where an order believed to be more in accord with the lines of development in nature and accepted by most specialists in those groups, has been adopted. For species and varieties described or revived since the appearance of the seventh edition of Gray's Manual and for most new names, places of publication are given. Where names used in current manuals have been changed, the manual names are given as synonyms. Accepted names of native species are printed in bold-face type; those of introduced species and of varieties mentioned in the text in small capitals. This, it will be remembered, is the method of Gray's Manual and should be readily followed and understood. In order to save space, headings for families and genera have been omitted. It is expected that this list will be used in connection with current manuals from which any deficiencies in this respect can be easily made up.

Under each species the name of the person who first collected or recorded it on Grand Manan is given, in italics if a specimen of his collecting is extant, in roman if there is only a report. The italicized collector's names amount, of course, to a citation of their specimens; we have also cited our own collections under the more critical species, those of the second author, who did not number his specimens, by name, those of the first-named author and his associates by collection-number.

Varieties are, for the most part, mentioned in notes under their respective species, with a few words of description when they do not appear in current manuals. When, however, a species was originally described from Europe or some other more or less remote region, when its typical element does not occur in our area and the element which does has been separated as a variety, the varietal name is usually given in the heading, though we have not been wholly consistent in this respect. Some especially well marked varieties, often treated as species, are also given separate headings, even though the typical varieties of their species also occur in the Passamaquoddy area.

Only such English names are given as we know or believe to be in actual use in eastern North America. Local names are recorded when we know them; we have made no special effort to collect them. The orthography of compound English names has presented some difficulties. It is far from consistent in current manuals. Where it has been forced into consistency, as in Standardized Plant Names in which



Map of the Grand Manan Group of Islands.

every compound is written as one word, it goes so far beyond accepted usage as to appear merely grotesque. We have endeavored to achieve some degree of consistency and some of consonance with usage (insofar as any articulate usage exists) by following a method suggested by Mr. Donald C. Peattie. The gist of this is that in English names in which the principal element is the name of a definite group of plants, such as oak and rose, and the other element an adjective, or noun in apposition, the two are treated as are the generic and specific elements in a Latin name and written as two words—e. g., red oak, sugar maple. All other names of more than one word are to be treated as compounds and written as one word or hyphenated—e. g., blueberry, wake-robin. In the first class, we have made an exception of "grass." This covers so wide and heterogeneous an aggregate and has been used so much for plants which are, botanically, not grasses at all, that we have preferred to treat it as a generalized term, like "weed" and "wort" and to write names of which it is a part as compounds. We believe that in so doing we approximate existing usage.

Most of the records here given are backed by specimens; some, of particularly well-known and unmistakable species, are not. We have, however, admitted only four species which we have not actually seen and recognized in Grand Manan.

LIST OF SPECIES

Lycopodium lucidulum Michx. Club Moss.

Cool, moist woods: Eel Brook Lake; Third Pond; Little Dark Harbour.

The name "club moss" applies to all but one of the species of Lycopodium which occur on Grand Manan.

Lycopodium annotinum L.

In cool woods and persistent in clearings: frequent. 5771. Var. ACRIFOLIUM Fernald, Rhodora, **17**: 24 (1915), with entire leaves, occurs near Rich Pond. 7307.

Lycopodium clavatum L. "Creeping Jenny" (Bergen); some species, probably this, also called "Foxtail" at St. Andrews.

Rather dry woods and clearings: occasional.

The abundant spores of this and other species have been used, like talcum powder, to prevent chafing.

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

Dryish woods; rather frequent. *Rothrock.*

Lycopodium complanatum L., var. **flabelliforme** Fernald. Ground Pine; Ground Cedar.

Dry wood-margins and clearings: occasional, at least in the northern part of the main island and as far south as Spruce Hill.

Isoëtes Braunii Durieu. Quillwort.

Shallow water of Grand Harbour Brook at crossing of Dark Harbour road. 5626.

Equisetum arvense L. Horsetail.

Various habitats: common. In shade the long-branched forma NEMOROSUM (A. Br.) Klinge. Perkins' list.

For growth-forms of this species see Victorin in Contrib. Lab. Bot. Univ. Montréal, **9**: 21–37; 111–118 (1927).

Equisetum sylvaticum L., var. **pauciramosum** Milde.

Damp, shaded places: common. *Churchill.*

Var. *pauciramosum*, with smooth branches, is the principal American representative of the species. The Grand Manan material belongs with the more luxuriant and freely branched phase distinguished as forma *multiramosum* Fernald and treated as a separate variety by Wherry. See Rhodora, **20**: 129–131 (1918); Amer. Fern Journ. **27**: 58 (1937).

A form bearing small cones on the branches, analogous to the European *E. sylvaticum*, forma *polystachyum* Milde, was collected by *Rothrock* (specimen in Gray Herbarium).

Botrychium multifidum (Gmel.) Rupr. Grape Fern. *B. ternatum* (Thunb.) Sw., var. *rutaefolium* (A. Br.) D. C. Eaton; *B. matricariae* Schrank.

Grassy places in old clearings and wood-roads: occasional. *Perkins* (as *B. lunarioides;* specimen in herb. New Brunswick Museum); 5546. This number was referred by Clausen, Mem. Torrey Bot. Club, **19**: 29 (1938) to *B. multifidum*, var. *silaifolium* (Presl) Broun (*B. ternatum*, var. *intermedium*).

Botrychium dissectum Spreng.

Grassy clearings: near Eel Brook Lake; Money Cove.

Here near its northeastern limit. Not known from Washington County, Maine, though occurring in western Nova Scotia and reported from Hampton, New Brunswick, by W. J. S. Myles in Bull. Nat. Hist. Soc. New Brunswick, **39**: 345 (1911).

Botrychium simplex Hitchcock.

Moist fields and old clearings: Whale Cove; valley of Seal Cove Brook.

The specimens from the former station (7266), with blade high up on the common stalk, are referable to var. LAXIFOLIUM Clausen, Bull. Torrey Bot. Club, **64**: 277, pl. 7 (1937). At the latter station, three plants were seen, one large and with ternately divided blade (forma COMPOSITUM (Lasch) Milde), the others smaller and simpler and referable to typical *B. simplex*. For an account of the grape ferns and adder's-tongues, see Clausen in Mem. Torrey Bot. Club, vol. 19 (1938). Varieties and forms are also treated in Amer. Fern Journ. **25**: 47–51 (1935).

Botrychium matricariaefolium A. Br.

Dry clearing, Indian Beach trail. Perkins.

Botrychium angustisegmentum (Pease & Moore) Fernald. *B. lanceolatum* of manuals in part.

Clearing near Eel Brook Lake.

The nearest known stations are in Annapolis County, Nova Scotia, and at Fredericton, New Brunswick. The species is not known in coastal Maine east of Lincoln County.

For the name, see Fernald in Rhodora, **17**: 87 (1918). Like the original authors, Clausen treats our plant as a subdivision of *B. lanceolatum*.

Ophioglossum vulgatum L., var. **pseudopodum** (Blake) Farwell. Adder's-tongue.

Moist or dry, usually grassy places: Second and Third Ponds; Swamp Road, North Head; southwest of Castalia; valley of Seal Cove Brook. In sphagnum: Mark Hill.

Var. *pseudopodum*, as defined by Fernald in Rhodora, **41**: 494–498 (1939), includes all the adder's-tongue of northeastern North America. Clausen does not recognize it.

Osmunda regalis L., var. **spectabilis** (Willd.) A. Gray. Royal Fern.

Wet places: Eel Brook; Whale Cove swamp; Indian Beach and Money Cove trails; valley of Seal Cove Brook. Perkins.

For the variety, the North American representative of the species, see Rhodora, **32**: 72 (1930).

Osmunda Claytoniana L. Interrupted Fern.

Moist thickets and clearings: occasional. *Rothrock*.

Osmunda cinnamomea L. Cinnamon Fern.

Low woods and clearings: frequent. *Rothrock*.

Woodsia ilvensis (L.) R. Br. Rusty Woodsia.

Exposed ledges: Whale Cove cliffs; near Eel Brook Lake. Perkins.

Cystopteris fragilis (L.) Bernh. Bladder Fern.

Cool or exposed habitats: western cliffs; Eel Brook ravine. *Churchill*; 5527; 5557. Var. Mackayii Lawson occurs on shaded, rocky slopes at Money Cove and Little Dark Harbour. 5600.

C. fragilis (typical) is nearly cosmopolitan, occurring, in one form or another, in all parts of the world except Australia. It is here near its southern limit in coastal North America. In New England (except northern Maine), it is chiefly montane. It is not certainly known from western Nova Scotia. Var. *Mackayii* largely replaces it from Nova Scotia southwestward. See Rhodora, **36**: 373 (1934).

Onoclea sensibilis L. Sensitive Fern.

Wet or moist open or somewhat shaded places: frequent. Perkins. Sensitive to frost, hence the name.

Dryopteris noveboracensis (L.) A. Gray. New York Fern.

Forming dense colonies in moist, chiefly mixed woods, and in clearings: North Head; Indian Beach and Money Cove trails; Castalia; David Watt Pond; Mark Hill.

Dryopteris Thelypteris (L.) A. Gray, var. **pubescens** (Lawson) A. R. Prince. Marsh Fern.

Marshes and wet woods: occasional. Perkins (with doubt).

Typical *D. Thelypteris* is European. For the variety (representative of the species in eastern North America) see Rhodora, **31**: 34 (1929) and Amer. Fern Journ. **26**: 94 (1936).

Dryopteris Phegopteris (L.) C. Chr. Beech Fern. *Phegopteris polypodioides* Fée

Common in old woods and persistent on banks and in clearings. *Rothrock.*

Dryopteris disjuncta (Ledeb.) Morton. Oak Fern. *D. Linnaeana* C. Chr. *Phegopteris Dryopteris* (L.) Fée.

Cold woods and persistent in clearings: frequent. *Rothrock.*

Christensen and other recent authors separate the four preceding species from *Dryopteris* as the genus *Thelypteris.* Others treat them as two genera, *Thelypteris* for the first two species, *Phegopteris* for the last two. Ching erects a separate genus for the oak fern under the name *Gymnocarpium* Newm.; *Currania* Copeland has also been used for it.

Dryopteris marginalis (L.) A. Gray. Shield Fern. Wood Fern.

In considerable quantity in woods at Money Cove; occasional in dry, deciduous woods elsewhere. *Rothrock.*

Dryopteris cristata (L.) A. Gray.

Wet woods: frequent. *Sanford.*

× **Dryopteris Boottii** (Tuckerm.) Underw.

Moist woods: Money Cove trail; trail to Bald Heath. Perkins. Generally regarded as a hybrid of *D. cristata* and *D. spinulosa*, var. *intermedia.*

Dryopteris spinulosa (O. F. Muell.) Watt.

Wet or moist woods: rare. 5704.

Dryopteris spinulosa, var. **americana** (Fisch.) Fernald. *Aspidium spinulosum*, var. *dilatatum*, forma *anadenium* B. L. Robinson.

Abundant and luxuriant in moist, mossy old woods, preferring spruce where not too thick, and persistent, though stunted, in clearings. Once the commonest fern of the islands, now reduced in numbers by the clearing of the woods. *Rothrock*; 5525.

Like *Cystopteris fragilis*, this is a chiefly northern fern, following the Maine coast southwest as far as Boothbay, but in New England (except northern Maine) chiefly montane.

Dryopteris spinulosa, var. **intermedia** (Muhl.) Underw. "Fancy Fern" of florists.

Moist, mossy woods: Money Cove ravine and rather rarely elsewhere. Forms intermediate between this and the preceding variety occur occasionally. For the varieties of *D. spinulosa* (often treated as species), see Amer. Fern Journ. **26**: 65–69 (1936).

Polystichum Braunii (Spenner) Fée, var. **Purshii** Fernald. Holly Fern. Rich, deciduous woods: Money Cove.

Fredericton, New Brunswick (*J. Moser;* specimen in New Brunswick Museum); otherwise not known nearer than Colchester County, Nova Scotia, Restigouche and Victoria Counties, New Brunswick, and Aroostook and Franklin Counties, Maine. One of northern species whose presence near sea-level in this latitude give the Passamaquoddy flora its distinctive character. For the variety (the American plant) see Rhodora, **30**: 30 (1928).

Dennstaedtia punctilobula (Michx.) Moore. Hay-scented Fern. Pasture Fern. *Dicksonia punctilobula* (Michx.) A. Gray.

Dry, open woods and clearings: frequent. Perkins.

Athyrium thelypterioides (Michx.) Desv. Silvery Spleenwort. *A. acrostichoides* (Sw.) Diels (1899), not *A. acrostichoideum* Bory ex Mérat (1836).

Moist thickets: Eel Brook; Indian Beach trail; Stanley Brook; Dark Harbour road. Perkins. The species reaches its northeastward limit in Nova Scotia.

Athyrium angustum (Willd.) Presl. Lady Fern. *Asplenium* and *Athyrium Filix-femina* of manuals in part.

Moist, chiefly deciduous or mixed woods and clearings: frequent. Most of the specimens seen belong to the form distinguished as var. LAURENTIANUM Butters. Here they tend to be rather strongly cespitose, the stipes short and the blades conspicuously narrowed toward the base, thus approximating in appearance true *A. Filix-femina* of Europe (5548, 5549). The woodland phase, var. RUBELLUM (Gilbert) Butters, has been seen at Whale Cove, at Dark Harbour and on Ross Island, and may be expected anywhere in moist, mixed or deciduous woods. For descriptions of the varieties recognized by Butters, see Rhodora, **19**: 191ff. (1917) or Amer. Fern Journ. **26**: 132–133 (1936).

Pteridium aquilinum (L.) Kuhn, var. **latiusculum** (Desv.) Underw. Bracken. *Pteris aquilina* of manuals in part.

Dry ground in open woods and clearings in the more acid soils: frequent. *Rothrock.* For the name, see Tryon in Rhodora, **43**: 13, 41 (1941).

Polypodium virginianum L. Polypody. *P. vulgare* of manuals in part; regarded by Christensen as no more than a variety of that species.

On mossy, shaded rocks: Fish Head; Money Cove; White Head Island. See Rhodora, **24**: 125–142 (1922).

Taxus canadensis Marsh. Ground Hemlock.

Mixed woods: Indian Beach; west of Castalia (Allan Moses).

Pinus Strobus L. White Pine.

Upland or low woods: formerly in considerable quantity (Allan Moses); now reduced by fire and cutting to scattered, at present usually sickly trees. Perkins.

Larix laricina (duRoi) Koch. Tamarack.

Usually in wet, often sphagnous woods: frequent. *Rothrock.*

Picea glauca (Moench) Voss. White Spruce. Cat Spruce. Skunk Spruce. *P. canadensis* (Mill.) BSP.

Upland woods: common; one of the dominant species in the island forest. Perkins.

In thin, pastured woods on Swallowtail occur two trees of a "snake" form, with all branches elongated and with very few branchlets (Ray Gilmore).

P. rubens Sarg. Red Spruce. *P. rubra* (duRoi) Link (1831), not *P. rubra* Dietr. (1824).

One of the common and dominant trees in upland woods.

Picea mariana (Mill.) BSP. Black Spruce.

Wetter and more acid woods and borders of sphagnum bogs: in these habitats common and replacing the red and white spruces. Perkins, as *Abies nigra* and probably including *P. rubens.* Usually the black spruce does not make a symmetrical growth; large trees can be recognized at a distance by their ragged outline.

Abies balsamea (L.) Mill. Balsam Fir.

Upland woods: common and one of the dominant trees. *Rothrock.*

Tsuga canadensis (L.) Carr. Hemlock.

One tree in ravine of Dock Brook (Allan Moses).

Thuja occidentalis L. Arbor-vitae. White Cedar.

Usually in wet woods on the east slope from Whale Cove to near Grand Harbour; formerly in dense, pure stands, now reduced to scattered, but still frequent, small trees. *Rothrock.*

Juniperus communis L., var. **depressa** Pursh. Juniper.

Open banks: common. Hay, as *J. communis*, var. *alpina*, in Bull. Nat. Hist. Soc. New Brunswick, **6**: 82 (1887) and the same year in Vroom's list, with the determination questioned.

Juniperus horizontalis Moench.

Forming dense mats on cliff-summits and dry, stony banks elsewhere: common. *Hay*, 1879 (specimen in New Brunswick Museum).

J. horizontalis occurs in two forms, one with bright-green leaves (5621), the other with the leaves strongly glaucous (5620). There appear to be no other differences. The two forms often grow in adjacent patches contrasting strongly in color.

Typha latifolia L. Cat-tail.

Wet, open places: occasional. Perkins.

Typha angustifolia L.

Border of fresh or slightly brackish barrier-beach pond, Nantucket Island. 7335.

Nova Scotia is the northeastern limit for this species in North America; it has not been reported from New Brunswick.

Sparganium americanum Nutt. Bur Reed.

Shallow water: Eel Brook Lake; Rich Pond; David Watt Pond.

Sparganium chlorocarpum Rydb. *S. diversifolium* of manuals, not Graebn.

Slow-flowing water-course, trail to Bald Heath. 5761. The Grand Manan plant belongs with var. ACAULE (Beeby) Fernald.

Sparganium angustifolium Michx.

Often in relatively deep water: Whistle road; Wilson's Pond; White Head Island. 5746, 6627, 7040.

Sparganium minimum Fries.

Still water of Grand Harbour Brook at crossing of Dark Harbour Road. *Rothrock*; 5627. Not reported from southwestern New Brunswick.

Potamogeton natans L. Pondweed.

In water, often comparatively deep, of ponds: Third Pond. Perkins, with doubt.

Potamogeton Oakesianus Robbins.

Lily Pond (Bradford Cove Pond). 6632.

Though frequent in western Nova Scotia, not known from southwestern New Brunswick, nor in southern Maine east of Mt. Desert.

Potamogeton epihydrus Raf., var. **Nuttallii** (C. & S.) Fernald.

Shallow water of ponds or slow-flowing streams: Eel Brook Lake; Ross Island; Miller Pond; near Mark Hill; Inner Wood Island.

Potamogeton gramineus L. *P. heterophyllus* Schreb.

Shallow water: Eel and Grand Harbour brooks. 6624, 5625, 7310. Not known from Washington County, Maine.

Potamogeton perfoliatus L., var. **bupleuroides** (Fern.) Farwell.

Slow-flowing, perhaps brackish, water of outlet of Great Pond.

Potamogeton Berchtoldi Fieber. *P. pusillus* of manuals, not L.

Great Pond; fragments washed up on shore. 7284. The material seen belongs with var. TENUISSIMUS (Mert. & Koch) Fernald.

Not otherwise known from the Passamaquoddy area, though ranging north to Newfoundland and south to Pennsylvania.

Ruppia maritima L. Ditch-grass.

Brackish pools: Indian Beach; Whale Cove; Castalia; Inner Wood Island. The Grand Manan plant is var. ROSTRATA Agardh.

Zostera marina L. Eel-grass.

Shallow salt water: Dark Harbour; Nantucket Island.

Triglochin maritima L. Arrow-grass.

Saline marshes: common. *Churchill.*

Triglochin palustris L.

Salt marshes: Castalia; Thoroughfare; Ross Island; Inner Wood Island; White Head Island. Perkins.

Bromus ciliatus L. Brome-grass

Overgrown roadside, Back Road. The var. INTONSUS Fernald, Rhodora, **32**: 70 (1930), with pubescent sheaths, occurs on the Money Cove trail.

FESTUCA ELATIOR L. Meadow Fescue.

Grassland: Whale Cove, where doubtfully an escape; Seal Cove. Native of Eurasia.

Festuca rubra L. Fescue.

Open places and upper beaches: common, and very variable. *Rothrock;* 5491. Specimens with stiff, glaucous foliage, from Wood Island (6942) are referable to var. JUNCEA (Hack.) Richter.

FESTUCA CAPILLATA Lam.

Forming dense clumps in old woodroads in dry ground: Whale Cove; Back Road; west of Mark Hill. Native of Europe.

Puccinellia maritima (Huds.) Parl. Goose-grass.

Salt marshes: Castalia. 5538, 5539.

Puccinellia paupercula (Holm) Fern. & Weath., var. **alaskana** (Scribn. & Merr.) Fern. & Weath. Rhodora, **18:** 18 (1916).

Salt marshes: Castalia; Dark Harbour; Thoroughfare; White Head Island. 5503.

Glyceria canadensis (Michx.) Trin. Rattlesnake-grass.

Wet, open or somewhat shaded places: frequent.

Glyceria striata (Lam.) Hitchc. Fowl Meadow-grass. *G. nervata* (Willd.) Trin.

Wet places, both open and shaded: frequent.

Glyceria grandis S. Wats. Reed Meadow-grass.

Wet, open places: frequent. Forming large stands in ditches along the main road south of Woodward's Cove. Forma PALLESCENS Fernald, Rhodora, **23:** 231 (1921), with yellowish spikelets, occurs on Money Cove trail.

Glyceria Fernaldii (Hitchc.) St. John.

Wet place in woods, east of Back Road. We have seen no specimens from southwestern New Brunswick.

POA ANNUA L. Spear-grass.

Weed in moist ground: North Head; Inner Wood Island; Kent Island. Native of Eurasia.

POA COMPRESSA L. Wire-grass.

An occasional weed in dry ground. *Rothrock.* Native of Eurasia.

POA PRATENSIS L. Kentucky Blue-grass.

In various habitats and, as usual, of very various aspect: frequent. Especially noticeable is a phase occurring in subsaline habitats, where it forms a close turf with low culms and reddish-tinged spikelets. 7008. Introduced from Europe and now thoroughly naturalized.

POA TRIVIALIS L. Rough-stalked Meadow-grass.

Wet place by spring, Whale Cove swamp and in ditches in North Head village. Native of Europe.

Poa palustris L. Fowl Meadow-grass.

Moist, open or shaded, ground: frequent or common. *Rothrock.*

Agropyron repens (L.) Beauv. Quack-grass. Quitch-grass.

Upper beaches and dry, open places generally: common. Forma ARISTATUM (Schum.) Holmb., with awned lemmas, occurs on White Head Island.

Agropyron trachycaulum (Link) Steud., var. **majus** (Vasey) Fernald, Rhodora, **35**: 171 (1933). *A. caninum* of manuals in part; *A. pauciflorum* (Schwein.) Hitchc.

On sea-cliffs: Whale Cove.

Elymus arenarius L., var. **villosus** E. Mey. Strand Wheat.

Beaches of sand or fine shingle: usually to be found wherever the upper part of such beaches does not abut on cliffs but forms relatively level areas above tide-level.

Elymus virginicus L. Terrell-grass.

Dark Harbour road (*Adams;* these specimens with lemmas, but not glumes, pubescent); a small colony at top of beach among *Ammophila* and *Agropyron*, Kent Island.

HORDEUM JUBATUM L. Squirrel-tail Grass.

A weed on upper beaches and roadsides: Castalia; Grand Harbour. Here probably adventive.

Deschampsia flexuosa (L.) Trin. Hair-grass.

Dry, open ground: frequent.

Danthonia spicata (L.) Beauv. White Oat-grass.

Dry, open places: frequent. *Sanford.* Var. PINETORUM Piper, with obscurely veined glumes and basal leaves not curled (See Rhodora, **45**: 242), occurs on the shaded bank of a stream under a trap ledge at Deep Cove. 6637. Another form, not yet identified, with open inflorescence, occurs rather frequently in clearings and wood-roads.

Calamagrostis canadensis (Michx.) Beauv. Blue-joint Grass.

Wet, open places: very common.

Ammophila breviligulata Fernald, Rhodora, **22**: 71 (1920). Beach-grass. *A. arenaria* of manuals, not Link.

Sandy beaches: North Head; Castalia; Nantucket Island; Long Pond Beach. In large quantity where it occurs.

Agrostis palustris Huds. Creeping Bent. *A. alba* L., var. *maritima* (Lam.) Koch.

Borders of salt marshes and in wet places elsewhere: common.

AGROSTIS ALBA L. Redtop.

Grassland: common. At least partly introduced as a forage-grass.

AGROSTIS TENUIS Sibth. Rhode Island Bent. *A. alba* var. *vulgaris* (With.) Thurb.

Grass-lands. Native of Europe, thoroughly naturalized.

Agrostis scabra Willd. Hair-grass. *A. hyemalis* of manuals, probably not *Cornucopiae hyemalis* Walt.

Wet or dry open places: frequent.

Agrostis perennans (Walt.) Tuckerm. Upland Bent.

Borders of woods and moist, shaded places generally: frequent. Most Grand Manan plants belong to var. AESTIVALIS Vasey, with pedicels longer than the spikelets and divaricate panicle-branches.

Cinna latifolia (Trev.) Griseb. Wood Reed-grass.

Cool deciduous woods: Money Cove; Little Dark Harbour; Kent Island; Inner Wood Island.

ALOPECURUS GENICULATUS L. Marsh Foxtail.

Shallow fresh-water pools: White Head Island; Inner Wood Island. Abundant in a wet meadow at Woodward's Cove. Naturalized from Europe.

Muhlenbergia uniflora (Muhl.) Fern. Dropseed. *Sporobolus uniflorus* (Muhl.) Scribn. & Merr.

Borders of sphagnum bogs and other wet, mossy places: east of Back Road; Ross Island; east branch of Seal Cove Brook; Red Point; Lily Pond.

Muhlenbergia setosa (Biehler) Trin., var. **cinnoides** (Link) Fern. Rhodora, **45**: 231 (1943). *M. racemosa* of manuals in part.

Open, swampy places: North Head; Castalia; Dark Harbour road. Not known from western Nova Scotia.

Spartina pectinata Link. Cord-grass. *S. Michauxiana* Hitchc.

Wet places, both brackish and fresh: occasional.

Spartina alterniflora Lois.

Salt marshes: Castalia; Thoroughfare; Ross Island.

Spartina patens (Ait.) Muhl.

Forming large colonies in salt marshes: Castalia; Priest Cove.

Hierochloë odorata (L.) Wahlenb. Holy-grass. Sweet-grass.

Borders of salt marshes and open places, chiefly along the shore; probably occasional or frequent.

ANTHOXANTHUM ODORATUM L. Sweet Vernal-grass.

Grass-land and along old cart-roads: occasional or frequent. Native of Europe.

Leersia oryzoides (L.) Sw. Cut-grass.

Swampy thicket: North Head.

Panicum boreale Nash. Panic-grass.

Clearings and roadsides in dry ground: frequent.

Panicum lanuginosum Ell., var. **implicatum** (Scribn.) Fernald.

Dry ground: common

Panicum Tuckermani Fernald, Rhodora, **21**: 112 (1919).

Weed on gravelly, moist roadside: Whistle road near Eel Brook. Here near its eastern limit; we have seen no specimens from western Nova Scotia or elsewhere in New Brunswick.

ECHINOCHLOA CRUS-GALLI (L.) Beauv. Barnyard-grass.

Weed at North Head. Native of Europe.

Dulichium arundinaceum (L.) Britton.

Wet, open places: occasional.

Eleocharis parvula (R. & S.) Link. *Scirpus nanus* Spreng.

Brackish marshes: Great Pond; White Head Island. For the name, see Svenson in Rhodora, **31**: 168 (1929).

Eleocharis obtusa (Willd.) Schultes. Spike Rush.

Muddy margin of pool, southeast of Mark Hill.

Eleocharis palustris (L.) R. & S.

Mucky pond-margins: frequent. *Rothrock*. The Grand Manan plant belongs with var. MAJOR Sonder (var. *vigens* Bailey).

Eleocharis Smallii Britton, Torreya, **3**: 23 (1903).

"Grand Manan, August, 1889, *J. I. Northrop*." Cited by Fernald & Brackett, Rhodora, **31**: 64 (1929); specimen probably at the New York Botanical Garden. We have not seen this species; but colonies passed, in the field, as *E. palustris* var. *major* may belong to it. Not known to us from the mainland of southwestern New Brunswick.[6]

Eleocharis halophila Fern. & Brackett, Rhodora, **37**: 395 (1935).

Borders of salt marshes: frequent. 5501, 5744.

Eleocharis elliptica Kunth. *E. tenuis* of manuals in part.

Pond- and brook-margins and in wet, open places: common. *Rothrock*; 5693.

[6] Northrop, 1861–1891, was a promising young naturalist who met an untimely and horrible death when laboratory alcohol which he was handling became ignited. His one known visit to Grand Manan was primarily for birds, but he may have collected more plants than this single record would indicate. War conditions have prevented a search for other specimens of his.

Scirpus cespitosus L., var. **callosus** Bigelow. See Rhodora, **23**: 24 (1921).

Sphagnum bogs: Bald Heath; Ingalls Head; Ross Island; David Watt Pond; Herring Cove Heath. 5695.

Scirpus hudsonianus (Michx.) Fern.

Wet, open, more or less sphagnous places: Whale Cove; Great Pond. Not known on the Maine coast east of Mt. Desert.

Scirpus subterminalis Torr.

Shallow water of ponds: Eel Brook Lake; Miller Pond.

Scirpus rufus (Huds.) Schrad., var. **neogaeus** Fern. Rhodora, **45**: 287 (1943).

Salt marshes: Castalia; Priest Cove; Ross Island. Here at its southwestern limit; the nearest known stations are on the coast of northeastern New Brunswick, Prince Edward Island, and in Yarmouth County, Nova Scotia.

Scirpus americanus Pers. Sword-grass.

Brackish or fresh marshes: occasional. *Churchill.*

Scirpus validus Vahl, var. **creber** Fernald, Rhodora, **45**: 283 (1943). Bulrush.

Marshes and pond-margins: Eel Brook Lake; Whale Cove; Ross Island; Lily Pond. *Rothrock.* Var. *creber* is the northern element of the species, which was originally described from West Indian specimens. Typical *S. validus* is not known north of Florida.

Scirpus acutus Muhl. *S. occidentalis* (S. Wats.) Chase.

Marshes: Lily Pond. 6629.

Scirpus maritimus L., var. **Fernaldii** (Bickn.) Beetle. See Rhodora, **45**: 288 (1943).

Brackish margins of barrier-beach pond, Whale Cove. 5609, *Adams.* The Grand Manan plant belongs with forma AGONUS Fern., l. c., with flattened achenes. We have seen no specimens from southwestern New Brunswick; however, Fowler's record of *S. fluviatilis* from St. Andrews almost certainly refers to this variety.

Scirpus paludosus A. Nels., var. **atlanticus** Fern. Rhodora, **45**: 291 (1943).

Salt marshes: frequent. *Churchill.* Var. *atlanticus* is the east-coast representative of the species, originally described from alkaline situations in western North America.

Scirpus rubrotinctus Fern.

Open, marshy places: frequent. *Churchill.* Forma CONFERTUS (Fern.) Weath. occurs at Castalia. We have seen no specimens from southwestern New Brunswick, but the species is almost certainly to be found there.

Scirpus atrovirens Willd., var. **georgianus** (Harper) Fern.

Wet roadsides and open places: frequent. *Hay*, 1879 (specimen at New Brunswick Museum).

Scirpus cyperinus (L.) Kunth. Wool-grass.

Marshy, open places: frequent. *Rothrock.* The Grand Manan plant is var. PELIUS Fern. Forma CONDENSATUS (Fern.) Blake occurs at Whale Cove, north of the Thoroughfare, and near Miller Pond.

Scirpus pedicellatus Fern.

Open, marshy places: Back Road south of Dock Brook and probably elsewhere. 7331.

Scirpus atrocinctus Fern.

Open, wet places: frequent. 5722.

Eriophorum spissum Fern. Hare's-tail. *E. callitrix* of Gray's Manual, not Chamisso.

Sphagnum bogs: Ohio Pond; Castalia; Ingalls Head; Little Round Pond; White Head Island; Bradford Cove; Inner Wood Island. *Rothrock.*

Eriophorum tenellum Nutt. Cotton-grass.

Bogs and marshes: Second Pond; Ohio Pond; Ross Island; Ingalls Head; Seal Cove.

Eriophorum angustifolium Roth.

Sphagnum bogs: Bald Heath; Ingalls Head; White Head Island; Little Round Pond; Lily Pond; Inner Wood Island; Kent Island. *Rothrock.*

Eriophorum virginicum L.

Bogs and marshes: frequent. *Rothrock.*

Rhynchospora fusca (L.) Ait. f. Beak Rush.

Sphagnum bogs: Eel Brook Lake; Lily Pond.

Rhynchospora alba (L.) Vahl.

Sphagnum bogs: east of Back Road; Bald Heath; Ingalls Head; Ross Island; David Watt Pond; Little Round Pond; Herring Cove Heath.

Cladium mariscoides (Muhl.) Torr. Twig Rush.

Marshes: Eel Brook Lake; David Watt Pond.

Carex scoparia Schkuhr. Sedge; this name applies to all species of *Carex*.

Moist, grassy places: frequent. *Rothrock.*

Carex projecta Mackenzie. *C. tribuloides* var. *reducta* Bailey.

Moist bank in open woods along Mill Brook west of Castalia. 7264. Here spreading by the rooting at the nodes of old culms of the previous year, prostrate on the ground. We have seen no specimens from points in New Brunswick nearer than Fredericton and Woodstock, but the species probably occurs in the southwestern counties.

Carex Crawfordii Fern.

Moist, open places: common. 5550; *Adams*. Not known in Nova Scotia west of Annapolis and Queens counties.

Carex cumulata (Bailey) Mackenzie.

Along path in dry thicket near the Thoroughfare. 7318. This species, widely distributed in western Nova Scotia, reaches its northeastern limit on Prince Edward Island. We know it elsewhere in New Brunswick only from the eastern counties.

Carex tincta Fern.

Dry old mowing-field, Whale Cove. 7235. We have seen no specimens from western Nova Scotia or southwestern New Brunswick. Fredericton and Woodstock are the nearest stations recorded in that province. The species is, however, found in eastern and northern Maine.

Carex tenera Dewey. *C. straminea* of Gray's Manual, not Willd.

Moist place in overgrown pasture, Whale Cove. 7269. Here near the northeastern limit of the species; we have seen no specimens from Nova Scotia or southwestern New Brunswick.

Carex hormathodes Fern.

Marshes; mostly at the inner edges of salt marshes, but in fresh water: Castalia; Nantucket Island; Thoroughfare; near Mark Hill; White Head Island; Inner Wood Island; Kent Island. *Klugh* in 1909; 5541.

Carex exilis Dewey.

Sphagnum bogs: Ross Island; Ingalls Head; David Watt Pond; Herring Cove Heath; Lily Pond. 5577. It is curious that this species, which occurs in so many of the bogs on Grand Manan, in southwestern New Brunswick and in western Nova Scotia, is not known from the great peat-bogs of eastern Maine.

Carex angustior Mackenzie.

Wet, open or shaded places: common. One of the first species to occupy recent clearings in wet woods. 5522.

Carex cephalantha Bailey.

Brook-margins and wet places in the open or in light shade: occasional. 5696, 6930.

Carex canescens L., var. **disjuncta** Fern.

Wet, open or shaded places: frequent. *Rothrock.*

Carex brunnescens Poir., var. **sphaerostachya** (Dewey) Kükenth. See Rhodora, **28**: 162 (1926).

Wet woods: frequent. 5526, 6536.

Carex tenuiflora Wahlenb.

Open marsh with low-growing vegetation, east end of Long Pond Beach. 7281. A boreal species, recorded from northern New Brunswick by Macoun, not otherwise known to us nearer than three stations in Aroostook and Penobscot counties, Maine.

Carex trisperma Dewey.

Moist, mossy woods; frequent. Var. Billingsii Knight is found in sphagnum bogs: Long Pond; White Head Island; David Watt Pond; Little Round Pond; Herring Cove Heath.

Carex Mackenziei Krecz. *C. norvegica* Willd. (1801), not Retz. (1779).

Brackish marshes: Great Pond; White Head Island. Reported from Whale Cove by Hay in Bull. Nat. Hist. Soc. New Brunswick, **6**: 82 (1887) and from Grand Manan the same year in Vroom's List.

× **Carex pseudohelvola** Kihlm. *C. canescens* var. *disjuncta* × *Mackenziei.*

Brackish marsh, White Head Island. 5662, 5499.

Carex disperma Dewey. *C. tenella* Schkuhr (1801), not Thuill. (1799).

Wet, mossy woods: Castalia; south of Dark Harbour Road; east of Back Road. *Churchill.* Apparently not found in western Nova Scotia.

Carex stipata Muhl.

Wet, open places: frequent. *Rothrock.*

Carex paleacea Wahlenb. *C. maritima* F. Muell. (1777), not Gunn. (1772).

Brackish, open places: occasional. *Churchill.*

Carex crinita Lam., var. **gynandra** (Schwein.) Schwein. & Torr.

Brook-margins and wet or moist shaded places: frequent. *Rothrock.*

Carex nigra (L.) Reichard. *C. Goodenowii* J. Gay.

Brackish marshes: Fish Head trail; White Head Island; Inner Wood Island. 5513, 5582.

Carex Haydeni Dewey. *C. stricta* var. *decora* Bailey.

A single clump in rather wet place at edge of thicket, Whale Cove. 7286. The species is not known from Nova Scotia.

Another species of this group, perhaps *C. stricta*, occurs at Southern Head, but the material at hand is insufficient for certain determination.

Carex aurea Nutt.

Grassy banks and thicket-borders, probably in neutral soil: frequent. Its orange-yellow perigynia make it a striking plant when in fruit. Presumably because of unfavorable soil-conditions, it is rare in eastern Maine and has not been found in extreme western Nova Scotia; it occurs, however, on the trap and limestone formations in southwestern New Brunswick, and on North Mountain in Annapolis County, Nova Scotia (Roland).

Carex pauciflora Lightf.

Sphagnum bogs: south of Woodward's Cove; Ross Island; Ingalls Head; Little Round Pond; Herring Cove Heath; Bradford Cove. Vroom's list.

Carex leptalea Wahlenb.

Wet, mossy woods: frequent.

Carex Buxbaumii Wahlenb. *C. polygama* Schkuhr (1801), not J. F. Gmel. (1791).

Moist, open ground on downs above sea-cliffs, Southern Head. 7296.

Carex Swanii (Fern.) Mackenzie.

Pasture among shrubs, Ross Island. 5780. This species reaches its northeastern limit in western Nova Scotia; except for the Ross Island station, it is not known in New Brunswick, nor in Maine east of Oxford and Knox counties.

Carex gracillima Schwein.

Mixed woods, recent clearings, and fence-rows: Whale Cove; Back Road. Klugh, 1912. Not known in the coastal counties of Maine east of Mt. Desert.

Carex communis Bailey.

Upland woods in the eastern part of the island: occasional. Probably in all adjacent areas, but not seen from southwestern New Brunswick.

Carex novae-angliae Schwein.

Dry woods and shaded banks: occasional or frequent. 5604.

Carex pallescens L., var. **neogaea** Fern. Rhodora, **44**: 306 (1942).

Moist, grassy places: frequent. *Rothrock.*

Carex paupercula Michx.

Sphagnum bogs: Bald Heath; Herring Cove Heath; Ingalls Head; Ross Island; Cheney Island; White Head Island; Inner Wood Island; Kent Island. *Churchill.* The Grand Manan plant belongs with var. IRRIGUA (Wahlenb.) Fern.

Carex limosa L.

Margins and wetter portions of sphagnum bogs: Ingalls Head; Great Pond. Vroom's list. Not known from western Nova Scotia.

Carex leptonervia Fern.

Moist woodlands and clearings: occasional. 7024, 7031, 7240.

Carex conoidea Schkuhr.

Open fields and moist, grassy places, chiefly on the east side of the island; common. *Sanford.*

Carex flava L.

Open, moist ground: Whale Cove; east of Back Road; Dark Harbour; road to Bald Heath; Grand Harbour. *Churchill.*

Carex viridula Michx. *C. Oederi* var. *pumila* of Gray's Manual.

Wet, open places: common. *Rothrock.*

Carex arctata Boott.

Mixed woods: frequent. *Rothrock.*

Carex debilis Michx., var. **Rudgei** Bailey.

Moist, mixed or deciduous woods: occasional.

Carex scabrata Schwein.

Wet places in deep shade: Stanley Brook; ravine of Dock Brook.

Carex lasiocarpa Ehrh., var. **americana** Fern. *C. filiformis* of manuals, not L.

Marshes: Eel Brook Lake; Ohio Pond. *Hay,* 1886.

Carex lacustris Willd. *C. riparia* of manuals, not W. Curtis.

Rothrock; specimen in herb. Chicago Natural History Museum, not otherwise seen by us.

Carex Pseudo-Cyperus L.

Marshes and along streams: occasional. *Churchill.*

Carex lurida Wahlenb.

Wet, open or shaded places: occasional.

Carex intumescens Rudge.

Moist deciduous woods: occasional. The Grand Manan material, or at least the greater part of it, is referable to var. FERNALDII Bailey.

Carex folliculata L.

Moist, open places: Whale Cove. Vroom's list.

Carex vesicaria L.

Rothrock; *Churchill*; not otherwise seen by us. The species is not reported from Nova Scotia.

Carex rostrata Stokes, var. **utriculata** (Boott) Bailey.

Bogs and marshes: frequent. *Rothrock*; 5753, 6625.

Arisaema Stewardsonii Britton. Jack-in-the-pulpit. See Rhodora, **42:** 247ff. (1940).

Wet woods; occasional. Felix' list; 7028, 5678. Not known to us from eastern Maine nor certainly from southwestern New Brunswick, though the *A. triphyllum* of Vroom's list, which he states is common, may be this.

Calla palustris L. Wild Calla.

Wet, mostly shaded, places: occasional or frequent. *Rothrock*.

Acorus Calamus L. Sweet-flag.

Marshes: Whale Cove; Castalia.

Eriocaulon septangulare With. Pipewort.

Shallow water of ponds, especially on sandy bottom: Eel Brook Lake; Second and Third Ponds; Dark Harbour road; David Watt Pond; Little Round Pond. *Rothrock*.

Pontederia cordata L. Pickerelweed. Said to be called "moose-ear" in New Brunswick (Bergen).

Shallow water of Third Pond. Perkins.

Juncus bufonius L. Rush.

Borders of salt marshes, wet roadsides and other wet, open places: common. *Rothrock*.

Juncus Gerardi Loisel.

Salt marshes: frequent.

Juncus tenuis Willd.

Open or shaded places in moist ground: frequent. A collection from Whale Cove (*Adams*) is var. WILLIAMSII Fern. The name *J. tenuis* is here used in the sense of current manuals.

Juncus Dudleyi Wiegand.

Wet, open places, probably in neutral soils: swamp at head of Whale Cove; Castalia; Back Road. Not known from southeastern Maine and recorded from one station only in Nova Scotia—North Mountain, Annapolis County, on the same trap formation as that of Grand Manan.

Juncus balticus Willd., var. **littoralis** Engelm.

Common in salt marshes; also occasionally in fresh-water marshes, as at junction of Back Road with south road from Castalia. *Rothrock*.

Juncus filiformis L.

Wet, sphagnous places: Ingalls Head; White Head Island; Kent Island.

Juncus effusus L.

Wet places in old fields and along streams: frequent. The Grand Manan material belongs to var. SOLUTUS Fern. & Wieg. (5634) and var. COMPACTUS Lej. & Court. (5730). For the varieties, see Rhodora, **12:** 81ff. (1910).

Juncus brevicaudatus (Engelm.) Fern.

Wet, open places and pond-margins: common. A viviparous specimen, probably of this species, was collected at Whale Cove by *Hay* in 1879.

Juncus canadensis J. Gay.

Wet, open places: road to Eel Brook Lake; North Head; Castalia.

Juncus pelocarpus Mey.

Pond-shores and wet places: frequent.

Juncus militaris Bigel.

Shallow water: Eel Brook Lake; Second and Third Ponds; Great Pond. *Churchill;* 5553. We have seen no specimens from elsewhere in New Brunswick.

Juncus articulatus L.

Wet, open places, such as roadside ditches: frequent. Var. OBTUSATUS Engelm. has been collected at Deep Cove (5528) and also by *Churchill*, who gives no definite locality.

Luzula multiflora (Ehrh.) Lej.

Dry banks and open woods: frequent. 5547, 5555, 5734.

ASPARAGUS OFFICINALIS L.

Roadside and thicket: Whale Cove. Native of Europe.

Clintonia borealis (Ait.) Raf. Cow-tongue (Bergen).

Deep woods: occasional. *Rothrock.*

Smilacina racemosa (L.) Desf. False Solomon's-seal.

Dry woods: Dark Harbour trail. Perkins.

Smilacina stellata (L.) Desf.

Dry, open or partly shaded places: occasional. The more common phase of the species on Grand Manan is var. CRASSA Vict. Cont. Bot. Lab. Univ. Montréal, **14:** 16 (1929), with crowded, thick, somewhat clasping, oblong-ovate leaves. This occurs mostly in exposed habitats; typical *S. stellata* is less frequent and more often in sheltered or shady places. Neither is known from Washington County, Maine.

Smilacina trifolia (L.) Desf.

Wet, mossy woods and borders of sphagnum bogs: occasional. *Rothrock.*

Maianthemum canadense Desf. Wild Lily-of-the-valley.

Dry woods: frequent. Perkins.

Streptopus amplexifolius (L.) DC. Twisted-stalk.

Moist woods: Stanley Brook; Money Cove ravine; White Head Island; Kent Island. The Grand Manan plant is var. AMERICANUS Schult. See Fassett in Rhodora, **37:** 97ff. (1935).

Streptopus roseus Michx.

Moist woods: occasional. Perkins. The Grand Manan plant is var. PERSPECTUS Fassett.

Polygonatum pubescens Willd. Solomon's-seal. *P. biflorum* of manuals, not Walt.

Dry woods, in leaf-mold: occasional in the northern half of the main island, but always in small quantity.

Medeola virginiana L. Indian Cucumber-root.

Remnants of old deciduous woods: Money Cove trail; Cedar St.

Trillium erectum L. Wake-robin. Stinking Benjamin (Bergen).

Relic pockets of old deciduous woods: near Eel Brook Lake; along Stanley Brook. Perkins.

Trillium undulatum Willd. Painted Trillium. Benjamin (Bergen).
A single plant seen in moist woods near David Watt Pond. Perkins.

Iris versicolor L. Blue-flag.

Wet woods and marshes: common. *Rothrock.*

Iris setosa Pall., var. **canadensis** Foster.

Exposed places near the sea: Nantucket, Cheney and White Head Islands. Not known to us from southwestern New Brunswick and rare in western Nova Scotia, though on both the outer and inner coasts.

Sisyrinchium angustifolium Mill. Blue-eyed Grass.

Dry, open places: frequent. Perkins, as *S. bermudiana.*

Cypripedium acaule Ait. Moccasin-flower. Lady's-slipper. Nerve-root.

Mossy woods under arbor-vitae, Whale Cove; Money Cove (Felix); dry, open woods along Mill Brook. *Rothrock.* The Money Cove station could not be found again in 1941; at each of the two others, only a single individual was seen. The species is apparently well on the way to extinction on the island.

Habenaria hyperborea (L.) R. Br. Rein Orchis.

Wet woods and moist, open places: Whale Cove; Cedar St. 5616, 6621.

Habenaria dilatata (Pursh) A. Gray.

Moist, open places: swamp at head of Whale Cove; Back Road; Nantucket Island (Ganong, ms. note). *Rothrock.*

Habenaria clavellata (Michx.) Spreng.

Wet, mossy places, open or shaded: Whale Cove; Money Cove trail; Back Road; Woodward's Cove; Lily Pond. *Rothrock.*

Habenaria obtusata (Pursh) Richards.

Old, mossy woods; occasional, or locally common. *Rothrock.*

Habenaria lacera (Michx.) R. Br. Ragged Orchis.

Dry or moist grassy fields and old clearings: Indian Beach trail; Money Cove; trail to Miller Pond; Red Point.

Habenaria psycodes (L.) Sw.

Wet, open place, Dark Harbour road. Perkins; he does not, however, record *H. fimbriata* and his listing may refer to that species.

Habenaria fimbriata (Ait.) R. Br. Purple Fringed Orchis.

Thickets and open woods in moist ground: occasional to locally frequent. Felix. At Red Point this species hybridizes with *H. lacera* and apparently back-crosses, so that a nearly complete series of intermediates between the parent species has been produced. Albinos occur on the Back Road.

Pogonia ophioglossoides (L.) Ker.

Sphagnum bogs: Bald Heath; Ingalls Head; David Watt Pond; Lily Pond. Perkins.

Calopogon pulchellus (Sw.) R. Br. Grass Pink.

Sphagnum bogs; often locally abundant: Bald Heath; Ingalls Head; Ross Island; "very abundant, Grand Harbour" (ms. note by W. F. Ganong). *Rothrock.* The color of the perianth varies from magenta to pale pink.

Arethusa bulbosa L.

Sphagnum bogs: Ross Island; Herring Cove Heath. *Verrill.*

Spiranthes gracilis (Bigel.) Beck. Ladies'-tresses.

Dry, open ground in old fields woodroads, etc.: occasional.

Spiranthes Romanzoffiana Cham

Open, grassy places: frequent and deliciously fragrant. Perkins.

Goodyera repens (L.) R. Br., var. **ophioides** Fern. Rattlesnake Plantain.

Old, undisturbed, mossy woods under evergreens: Money Cove; Kent Island. 5592.

Goodyera tesselata Lodd.

Old, mossy woods: Money Cove; Long Island; Dark Harbour; Bradford's Cove; Southern Head. 5590. A color-form with perianth strongly tinged with pink occurs at Money Cove.

In the Chicago Natural History Museum is a specimen of this species from the herbarium of H. N. Patterson labelled "Grand Menan ex coll. Wm. H. Seaman, Washington, D. C., U. S. A. August". No year or other data are given. We have no other record of this collector.

The name *Epipactis*, applied to this genus in the seventh edition of Gray's Manual, must now, by action of the last Botanical Congress, be employed for *Serapias* of the Manual, as has long been done in Europe.

Listera cordata (L.) R. Br. Twayblade.

Mossy, undisturbed old woods: Long Pond; Long Island; Dark Harbour; Ross Island; White Head Island; Southern Head; Kent Island.

Listera auriculata Wiegand.

In Miss Felix's list is a drawing of a specimen found by Heyward Scudder in the swamp at the head of Whale Cove, once a white-cedar swamp, which appears to represent this species. The plant has not been found again on Grand Manan; it has, however, been collected on Deer Island (*Malte* 723 in 1929) and at South Bay, near St. John (*A. L. Warner* in 1892; New Brunswick Museum). These collections from the Passamaquoddy area make it altogether probable that Miss Felix's record is correct. The species is not otherwise known to us nearer than Temiscouata Co., Quebec, and northern Maine.

Corallorrhiza trifida Chatelain. Coral-root.

Wet, mossy woods: Indian Beach trail; Whale Cove; Cedar St.; Back Road; south of Dark Harbour road. Felix.

Corallorrhiza maculata Raf.

Humus in rather dense spruce or mixed woods: Whale Cove; Stanley Brook. Felix. In all the Grand Manan specimens seen, the whole plant is of a magenta-pink color and therefore referable to forma PUNICEA (Bartlett)[7]. Rafinesque's original description calls for a "yellowish" plant; this would indicate that the yellow forma *flavida* (Peck) Farwell is the typical phase of the species.

[7] C. MACULATA, forma **punicea** (Bartlett), n. comb. *C. maculata* var. *punicea* Bartlett, Rhodora, **24**: 147 (1922).

Malaxis monophyllos L. Adder's-mouth. *Microstylis monophyllos* (L.) Lindley.

Grassy hummocks in wet ground at edge of mowing-field, Henderson's Point. 7280. Not known from the coastal counties of Maine east of the Kennebec.

Malaxis unifolia Michx. *Microstylis unifolia* (Michx.) BSP.

Open, dry ground in old fields: occasional. Felix. A single individual with two leaves was found on the Back Road (7047)—forma BIFOLIA Moxley, Orch. Rev. **35**: 163 (1927).

Liparis Loeselii (L.) Richard. Twayblade.

Open, moist ground, often among grasses: Whale Cove; Cedar St.; Back Road; Castalia; Red Point. *Rothrock.*

Salix lucida Muhl. Shining Willow.

Wet thickets and open swamps: occasional. 7258. Found in fruit, just discharging seeds, at Flagg's Cove on July 5.

Salix pyrifolia Anders. *S. balsamifera* Barratt.

Wet or moist thickets: White Head Island. 5749.

Salix discolor Muhl. Pussy Willow.

Wet thickets: occasional or frequent. *Rothrock*; 5762, 5793.

Salix humilis Marsh.

Dry thickets: Indian Beach trail, and probably elsewhere. Perkins; 7274.

Salix Bebbiana Sarg. *S. rostrata* Richards., not Thuill.

Wet thickets: occasional. 7271. Variable in size and shape of leaves and degree of pubescence; sometimes becoming a small tree.

Populus tremuloides Michx. Aspen.

Dry clearings and roadsides: frequent in cut-over woods, at least in the northern part of the main island. Perkins.

Populus grandidentata Michx.

Old clearings; mostly small trees. Occasional at least in the area from Eel Brook to the woods west of Castalia. Apparently first noted by Dr. Graves.

Populus Tacamahaca Mill. Balsam Poplar. *P. balsamifera* of manuals, not L.

Two small trees, the larger 6 in. in diameter, in second-growth woods near an old house-site on the Back Road south of Dock Brook. Perkins. The species is common as a planted tree.

Myrica Gale L. Sweet Gale.

Wet, open places: common. Perkins.

Myrica pensylvanica Loisel. Bayberry. *M. caroliniensis* of manuals, not Mill.

Dry upland fields: Eel Brook Lake; North Head.

Corylus cornuta Marsh. Beaked Hazel-nut. *C. rostrata* Ait.

Borders of dry woods: ridge west of North Head village; Back Road west of Woodward's Cove. Perkins.

Ostrya virginiana (Mill.) Koch. Hop Hornbeam.

Mixed woods: on east slope of central ridge, west of North Head village; north of Dock Brook (Edward Green). Perkins.

Betula lutea Michx. Yellow Birch.

Common in the drier and more open woods. Often left by lumbermen when upland spruce is cut off and then forming open stands of large trees, as at Little Dark Harbour. Perkins.

Betula populifolia Marsh. Gray Birch.

Dry clearings: frequent.

Betula papyrifera Marsh. Paper, White or Canoe Birch.

Common in the drier and more open woods. *Rothrock.*

Betula pumila L. Swamp Birch.

Border of sphagnum bog, White Head Island. Collected on the Oromocto River, Sunbury County, New Brunswick by *Hay* in 1896; not otherwise known to us in or near the Passamaquoddy area.

Alnus crispa (Ait.) Pursh, var. **mollis** Fern. Green Alder.

Abundant on sea-cliffs and generally in the western and higher parts of the main island. Perkins (as *A. viridis*).

Alnus incana (L.) Moench. Speckled Alder.

Pastures and thickets in the eastern and southern parts of the main island; often locally abundant. *Rothrock.* Only that phase of the species with the leaves glaucous beneath (*A. glauca* Michx. f.) is found on Grand Manan. The English name refers to the conspicuous pale lenticels in the bark.

Fagus grandifolia Ehrh. Beech.

Dry woods: probably occasional throughout the North Head–Grand Harbour lowland area. Perkins. There is a dense, pure stand (perhaps not natural) near the cemetery on the Back Road.

Quercus borealis Michx. f. Red Oak.

A few trees, one with trunk about 2 ft. in diameter and several smaller ones, on the east slope of the ridge west of Castalia. According to Mr.

Allan Moses, the species was once common enough in the northern part of the main island to be cut for timber and to support a barrel-factory. Perkins (as *Q. rubra*).

HUMULUS LUPULUS L. Hop.

Roadside thicket, Back Road south of Dock Brook. Native of Eurasia.

Urtica procera Muhl. Nettle. *U. gracilis* of manuals, not Ait.

Weed in waste places and at top of beaches: Cheney Island; Green Islands; White Head Island; Kent Island. Probably the species recorded as *U. gracilis* in Perkins' list. Not seen from southeastern Maine.

Urtica gracilis Ait. *U. Lyallii* of manuals as to plant of eastern North America, not S. Wats.

Rich, moist deciduous woods: Money Cove; Inner Wood Island. We have seen no specimens from Nova Scotia or Washington County, Maine.

Arceuthobium pusillum Peck. Dwarf Mistletoe.

Parasitic on red and black spruce: between Second and Third Ponds; west of Castalia; Bald Heath; Mark Hill. We have seen no specimens from the mainland of New Brunswick or from Washington County, Maine; but, in view of the abundance of spruce in those areas, it seems hardly possible that the dwarf mistletoe does not occur there.

RUMEX DOMESTICUS Hartm. Dock. *R. Patientia* of manuals in part. See Rechinger in Field Mus. Pub. Bot. **17**: 100 (1937).

Churchill; no definite locality given. Native of Eurasia.

Rumex Brittanica L. Great Water Dock.

Wet places: Whale Cove; Back Road; main road south of Woodward's Cove; White Head Island. Perkins (as *R. orbiculatus*). Not seen from western Nova Scotia.

RUMEX CRISPUS L. Yellow Dock.

An occasional weed: Back Road; White Head Island; Inner Wood Island. Native of Europe. The young leaves make acceptable greens.

Rumex pallidus Bigel.

Sea-beaches: Whale Cove; Ross Island; White Head Island; Inner Wood Island. *Churchill.*

RUMEX ACETOSELLA L. Sheep Sorrel.

An occasional weed. *Rothrock*. Native of Europe.

Polygonum allocarpum Blake, Rhodora, **19**: 234 (1917). Knotweed.

Beaches: Nantucket Island; Long Pond; Kent Island. 6642.

Polygonum aviculare L.

A weed in the settled parts of the island; probably frequent. *Churchill.*

Polygonum scabrum Moench. *P. tomentosum* Schrank.

Damp roadsides: North Head; Thoroughfare; Seal Cove. 6538.

Polygonum amphibium L.

Shallow pools back of barrier-beaches: Whale Cove; Kent Island (Felix, 1928). 5787, 6681. Only the forma HARTWRIGHTII (A. Gray) Blake has been seen from Grand Manan. It is not known from Nova Scotia.

Stanford, in Rhodora, **27**: 157 (1925) separates the American element of this species as *P. natans* (Michx.) Eaton. The distinguishing characters given are, however, so slight that we have preferred the more conservative course. If the separation is to be made, it would seem, unless stronger differentiae can be found, more in accord with the facts as Michaux originally had it—*P. amphibium* var. *natans*.

Polygonum Hydropiper L. Smartweed; Water Pepper.

An occasional weed in moist ground. Perkins.

Polygonum punctatum Ell. Smartweed. *P. acre* HBK.

Borders of barrier-beach and other ponds: Rich Pond; Ross Island; Priest Cove; Long Pond; Nantucket Island; White Head Island; Kent Island. Perkins; 6537, 6663. Not known from Washington County, nor nearer than Fredericton in New Brunswick.

POLYGONUM PERSICARIA L. Lady's-thumb. Said by Mrs. Bergen to be called "heart's-ease" at Eastport and "black heart" at Lubec.

An occasional weed. Perkins. Native of Europe.

Polygonum sagittatum L. Tear-thumb.

Swamps: frequent. *Rothrock.*

POLYGONUM CONVOLVULUS L. Black Bindweed.

An occasional weed: North Head; Ross Island. Native of Europe.

Polygonum cilinode Michx.

A few individuals in an old clearing at Eel Brook Lake. They were of the dwarf, erect state which has been called var. *erectum* Peck.

CHENOPODIUM ALBUM L. Pigweed. Lamb's-quarters.

Apparently not common as a garden weed; seen only at North Head and along Dark Harbour road. Often in considerable quantity on upper beaches, as at the Thoroughfare. Perkins. Native of Europe.

Atriplex patula L., var. **hastata** (L.) A. Gray. Orache.

Upper beaches and generally along shore: frequent. Perkins; 6638.

The very similar *A. glabriuscula* Edmonst. (see Rhodora, **23**: 262 (1921)) has been found in western Nova Scotia (Yarmouth County) and in Washington County and very possibly occurs on Grand Manan, but has not yet been detected there.

Salicornia europaea L. Glasswort. Samphire.

Salt marshes: Castalia; Nantucket Island; Thoroughfare; Priest Cove. Perkins.

Salicornia europaea, var. **pachystachya** (Koch) Fern.

Shingle beach below high tide: Nantucket Island. 7339. With its very fleshy spikes and sprawling habit strikingly different in appearance from typical *S. europaea,* with which it grew, and remaining green after *S. europaea* had turned red. Not otherwise known from New Brunswick, nor from Nova Scotia. Klugh, Contrib. Canadian Biol. 1912: 27, reports it as "common throughout" the St. Croix area. But, since he does not mention typical *S. europaea,* which is common throughout, we suspect that he mistakenly referred all plants seen by him to the variety.

Suaeda maritima (L.) Dumort.

Salt marshes, upper beaches and similar saline habitats: frequent. Perkins; 7315.

S. maritima is glaucous-green and prostrate or decumbent. Another *Suaeda,* not yet identified, with the main axis, at least in young plants, erect, yellow-green and flowering later than *S. maritima,* occurs at the Thoroughfare. 7316.

Salsola Kali L. Saltwort.

Sandy beaches: between Bancroft Point and Woodward's Cove (Felix); Nantucket Island. *Verrill.*

AMARANTHUS RETROFLEXUS L. Pigweed.

Weed in neglected dooryard at Whale Cove. Native of tropical America. Perkins.

Spergularia rubra (L.) J. & C. Presl. Sand Spurrey.

Dry, open ground and crevices of rocks by the sea: North Head; Thoroughfare; Ingalls Head. Felix. Not seen from eastern Maine.

Spergularia marina (L.) Griseb.

Sandy and gravelly margin of salt marsh, Castalia. 7294, 7294a. Occurs here in glabrous and viscid-pubescent forms growing intermixed. Only smooth seeds seen.

Spergularia canadensis (Pers.) Don.

Salt marshes: Castalia; Thoroughfare; Seal Cove. *Churchill;* 5534. The *S. media* of Perkins' list is probably this.

SPERGULA ARVENSIS L. Spurrey.

An occasional weed, sometimes locally abundant: North Head; Whale Cove; Castalia; Back Road; Red Point. *Rothrock.* Native of Europe.

Sagina procumbens L. Pearlwort.

Sea-cliffs and wet banks: occasional. *Rothrock.*

Sagina nodosa (L.) Fenzl.

Crevices and pockets of moist sea-cliffs: near the Whistle; east side of Whale Cove. Vroom's list. Here near its southern limit on the coast. Var. PUBESCENS Mert. & Koch (var. *glandulosa* (Bess.) Aschers.) occurs on shelves of dripping sea-cliffs on the west side of Whale Cove.

Arenaria lateriflora L.

Open, usually somewhat moist, places: occasional. Perkins.

Arenaria peploides L., var. **robusta** Fern.

Forming dense colonies on sand and shingle beaches: Whale Cove; Castalia; Nantucket Island; Priest Cove; White Head Island; Inner Wood Island. *Rothrock.*

Stellaria calycantha (Ledeb.) Bong. *S. borealis* Bigel.

In shingle of upper beaches and along brook- and wood-margins: Castalia; White Head Island; Kent Island; Deep Cove; Southern Head. 5529, 5751, 5789. Our material includes both var. *isophylla* Fern. and var. *floribunda* Fern., Rhodora, **16**: 151 (1914), which here appear to be little, if anything, more than responses to conditions of growth.

Stellaria humifusa Rottb.

Salt marshes: Castalia; Ross Island; White Head Island. 5535. The southwestern limit of the species on the east coast of North America is at Cranberry Island, Maine, near Mt. Desert. We have seen no specimens from Nova Scotia.

STELLARIA GRAMINEA L. Stitchwort.

A common weed in grassy places. Native of Europe.

STELLARIA MEDIA (L.) Cyrill. Chickweed.

A frequent weed in cultivated ground and waste places. Perkins. Native of Eurasia.

CERASTIUM VULGATUM L. Mouse-ear Chickweed.

A frequent weed in waste and cultivated ground. Perkins (as *C. viscosum*). Native of Eurasia.

SILENE NOCTIFLORA L. Catchfly.

Roadside weed: North Head. Felix. Native of Europe.

SILENE CUCUBALUS Wibel. Bladder Campion. Maiden's-tears. *S. latifolia* (Mill.) Britt. & Rendle.

An occasional weed in open places. Felix. Native of Eurasia.

PORTULACA OLERACEA L. Purslane.

A weed in gardens: North Head. Native of Europe.

Ceratophyllum echinatum A. Gray. Hornwort.

Great Pond; fragments washed up on shore. 7285. The species is here at its extreme northeastern limit; it is not otherwise known east or north of southwestern Maine. It is distinguishable from the more common *C. demersum* L. by the very narrow, entire segments of the leaves.

Nuphar variegatum Engelm. Spatter-dock. Cow Lily.

Shallow water: Eel Brook Lake; Ohio Pond; David Watt Pond; east branch of Seal Cove Brook. Perkins (as *N. advena*).

Nymphaea odorata L. Pond Lily.

Moderately deep water of ponds: Third Pond; Rich Pond; David Watt Pond; Miller Pond. Perkins. We have seen no specimens from Washington County, but the species probably occurs there.

Ranunculus trichophyllus Chaix. Water Crowfoot. *R. aquatilis* L. var. *capillaceus* DC.

Shallow, slow-flowing water of small brook: Back Road south of Dock Brook. Perkins' list; 7332. Because of its lightly rugose achenes, the Grand Manan material is best referred to var. CALVESCENS W. B. Drew, Rhodora, **38**: 32 (1936). However, as might be expected in a region where the ranges of typical *R. trichophyllus* and the variety overlap, our specimens are more or less intermediate, combining the smoothish achenes of the latter and the hispid receptacle of the former. We have seen no specimens from western Nova Scotia nor from southwestern New Brunswick; however, Vroom's record of *R. aquatilis* var. *trichophyllus* from St. Stephen very likely refers to our plant, which is frequent in near-by Washington County, where, also, typical *R. trichophyllus* is not known.

Ranunculus Cymbalaria Pursh. Sea-side Crowfoot.

Moist saline or subsaline habitats: frequent. *Churchill.*

RANUNCULUS REPENS L. Creeping Buttercup.

Abundantly naturalized and spreading in moist ground. Perkins; 5585. Native of Europe. The Grand Manan material is all var. VILLOSUS Lamotte, with spreading pubescence.

RANUNCULUS ACRIS L. Buttercup.

A frequent weed in fields. *Rothrock.* Native of Europe.

Thalictrum polygamum Muhl. Meadow Rue. Quicksilver-weed.

Moist, open places: occasional or locally abundant, as in Whale Cove swamp. *Rothrock.* Pistillate flowers often purple-tinged, the staminate white with yellow anthers. Both the typical phase (7312, 7288) and var. HEBECARPUM Fern. (7288a) occur.

Clematis virginiana L. Virgin's-bower.

Roadside thickets: frequent. Perkins.

Clematis verticillaris DC.

Rocky woods at top of Whale Cove cliffs. Felix; 7367. Not known to us from Nova Scotia or southeastern Maine.

Coptis groenlandica (Oeder) Fernald. Gold-thread. *C. trifolia* of manuals in part.

Old woods: occasional. Perkins.

Aquilegia vulgaris L. Columbine.

Escaped from cultivation in woods near the Whistle and freely in fields and even on sea-cliffs at Whale Cove. Dark purple, pale purple and lavender-pink color-forms occur there. Felix. Native of Europe.

Actaea rubra (Ait.) Willd. Red Baneberry.

Deciduous woods: south of the Whistle; Indian Beach; Money Cove; trail from Back Road to Woodward's Cove. Forma neglecta (Gillman) B. L. Robins., with white berries, occurs at Indian Beach (5558).

Actaea alba (L.) Mill. White Baneberry.

Deciduous woods: occasional. *Rothrock.* Forma rubrocarpa Killip with magenta berries, occurs at Money Cove (5598).

Corydalis sempervirens (L.) Pers.

Ledges south of Eel Brook Lake, 1925 (Felix; not seen by us).

Lepidium densiflorum Schrad. Pepper-grass. *L. apetalum* of manuals, not Willd.

A weed at North Head. Native of North America, but here probably introduced.

Capsella bursa-pastoris L. Shepherd's-purse.

A frequent weed. Perkins. Native of Europe.

Bunias orientalis L.

A few tall, branching plants in shade of a pin-cherry thicket at edge of mowing field, Whale Cove. Native of central and eastern Europe and Siberia. A rare weed in North America, so far as we know not previously reported from Canada.

Cakile edentula (Bigel.) Hook. Sea Rocket.

Saline habitats: common. *Rothrock.*

Raphanus Raphanistrum L. Wild Radish.

An occasional weed. Native of Europe.

Sisymbrium officinale (L.) Scop. Hedge Mustard.

Weed on roadsides and in neglected dooryards, North Head. Felix. Native of Europe. The Grand Manan plant, like that of Nova Scotia (see Rhodora, **19**: 265 (1917)), is typical *S. officinale*, with pubescent siliques.

SISYMBRIUM ALTISSIMUM L. Tumble Mustard.

A weed at North Head. Native of Europe.

ERYSIMUM CHEIRANTHOIDES L. Worm-seed Mustard.

Waste ground: Whale Cove, North Head village; Dark Harbour road at City Camp. Felix. Here an introduced weed.

Rorippa islandica (Oeder ex Murr.) Borbás, var. **hispida** (Desf.) Butters & Abbe. Marsh Cress. *Radicula palustris* var. *hispida* (Desf.) B. L. Robins.

Brook-margins and wet, open places: Back Road; Cheney Island; Inner Wood Island. *Nasturtium palustre* of Perkins' list is presumably this.

BARBAREA VULGARIS R. Br. Winter Cress.

Weed along water-runs in old pasture between Long Pond and Red Point. Native of Europe.

Cardamine parviflora L., var. **arenicola** (Britton) O. E. Schulz. Bitter Cress.

In shingle of upper beach, Long Island. 5790. Var. *arenicola* is the American representative of the species, typical *C. parviflora* being European. This and a single station in Washington County constitute its northeastern limit. For the name, see Rhodora, **29**: 192 (1927).

Cardamine pennsylvanica Muhl.

Brook-margins: Dock Brook; trail from Back Road to Woodward's Cove; north of Grand Harbour. 6650, 7237. A good substitute for water cress, but in too small quantity here to be of any importance for this purpose.

Sarracenia purpurea L. Pitcher-plant.

In sphagnum: David Watt Pond; Little Round Pond; Bald Heath; Cheney Island; Grand Harbour (Ganong, ms. note); Ingalls Head; Bradford Cove. Perkins; he calls it "Indian Pitcher." Mrs. Bergen states that it was called "fever-cup" on Grand Manan.

Drosera rotundifolia L. Sundew.

Bogs: common. Perkins. Var. COMOSA Fern. occurs on Ross Island (6662).

Drosera intermedia Hayne. *D. longifolia* of manuals, scarcely of Linnaeus.

In sphagnum: Little Round Pond: Herring Cove Heath; Ross Island; Lily Pond. "North Head, Hay," Bull. Nat. Hist. Soc. N. B. **6**: 80 (1887).

Tillaea aquatica L.

Forming loose mats in mud overlying sand on margin of barrier-beach pond, Cheney Island. 7305. Not otherwise known from southwestern

New Brunswick nor from Maine east of the Penobscot; in Nova Scotia known from a single station in Shelburne County.

SEDUM TRIPHYLLUM (Haw.) S. F. Gray. Live-for-ever. *S. purpureum* Tausch.

Dry, open ground, Back Road. An escape from cultivation; native of Europe.

Sedum Rosea (L.) Scop. Rose-root.

One of the most common and characteristic plants of the sea-cliffs. Verrill; specimen in herb. Yale University.

Except for this species, the cliffs are, in general, disappointing to the botanizer. Because of active frost-erosion, they offer no very enduring habitats; and the rather uncertain footing which they do supply is utilized by such weedy species as yarrow, whiteweed and *Solidago juncea*.

Mitella nuda L. Mitrewort. Bishop's-cap.

Deep woods: Whale Cove (Felix' list); Cedar St.; Ross Island. *Rothrock.*

Ribes hirtellum Michx. Wild Gooseberry. *R. oxyacanthoides* of manuals, not L.

Thickets and old clearings: near Eel Brook Lake; Seal Cove Brook; Bradford Cove trail. *Rothrock.*

Ribes lacustre (Pers.) Poir. Swamp Currant.

Deep, mossy woods: frequent. *Churchill.*

Ribes glandulosum Grauer. Skunk Currant. *R. prostratum* L'Hér.

Deep, mossy woods: frequent. *Rothrock.*

Spiraea latifolia (Ait.) Borkh. Meadow-sweet.

Old fields, thickets and swamps: common. Perkins (as *S. salicifolia*).

Spiraea tomentosa L. Hardhack. Steeple-bush.

Open places: north end of main island; Inner Wood Island. *Rothrock.*

Pyrus melanocarpa (Michx.) Willd. Chokeberry.

Thickets and swamps: near Ohio Pond; Castalia; Back Road; Grand Harbour; Seal Cove. *Rothrock.*

Pyrus americana (Marsh.) DC. Mountain Ash. Rowan-tree.

Dry woods: occasional or frequent. *Rothrock;* 6941, 7043.

Pyrus decora (Sarg.) Hyland. *Pyrus sitchensis* of Gray's Manual, not (Roem.) Piper.

Dry, cut-over woods: Whale Cove; west of Woodward's Cove. 7044.

Amelanchier laevis Wiegand. Sugar Pear. *A. canadensis* of manuals, not (L.) Medic.

Open woods and clearings: occasional or frequent, at least in the northern part of the main island. *Rothrock;* 7232.

Amelanchier canadensis (L.) Medic. *A. oblongifolia* (T. & G.) Roem. Det. by G. N. Jones.

Moist roadside thicket, southwest of Castalia, and probably elsewhere. 7029. By Wiegand's treatment this would probably be referable to *A. intermedia* Spach.

In the absence of flowering material, these two species of *Amelanchier* are by no means easy to determine. They are here separated as follows:

A. laevis: often a small tree; leaves ovate or oblong-ovate, relatively coarsely serrate.

A. canadensis: always a shrub; leaves oblong to elliptic-oblong, finely and shallowly serrate.

Crataegus flabellata (Spach) Kirchn. Hawthorn. Det. by E. J. Palmer.

Fence-rows and old fields: North Head village; main road at Dock Brook. 7292.

Fragaria virginiana Duchesne. Wild Strawberry.

Old fields and open places: frequent. *Rothrock.*

Fragaria vesca L., var. **americana** Porter.

Old fields and open woods: occasional. Felix.

Potentilla norvegica L. Cinquefoil. *P. monspeliensis* L.

Dry, open places: frequent or occasional. Perkins.

Potentilla argentea L. Silvery Cinquefoil.

Thin soil on trap ledges southeast of Eel Brook Lake; pasture, Fish Head (Felix, 1911).

Potentilla palustris (L.) Scop. Marsh Five-finger.

Swamps and marshes: Castalia; back of Long Pond beach; Woodward's Cove; White Head Island. *Churchill.*

Potentilla fruticosa L. Shrubby Cinquefoil.

Old fields and wet thickets: at the south end of the main island and as far north as Castalia; not observed at the north end. *Rothrock.*

Potentilla tridentata Ait. Three-toothed Cinquefoil.

Dry banks, rocky places and even hummocks at the margins of bogs. Rare on the main island: near Eel Brook Lake; above Rocky Corner. Reported from Ross Island (Felix' list, 1914); common on Cheney Island. Perkins.

Potentilla simplex Michx., var. **calvescens** Fern. Rhodora, **33:** 189 (1931).

Weed on dry roadsides: common. Perkins (as *P. canadensis*).

Potentilla Egedii Wormsk., var. **groenlandica** (Tratt.) Polunin. Silverweed. *P. Anserina* of manuals in part.

Saline habitats; occasional to frequent. Perkins' list (as *P. Anserina*).

FILIPENDULA ULMARIA (L.) Maxim. Queen-of-the-meadow.

Escaped from cultivation to fence-rows: Dark Harbour Road. Native of Europe.

Geum aleppicum Jacq., var. **strictum** (Ait.) Fern. Avens.

North-facing hillside, in small clearing, appearing as if introduced: Dark Harbour. 7053.

Geum rivale L. Purple Avens.

Wet, open places: Bancroft Road; Back Road. Perkins.

Rubus idaeus L., var. **canadensis** Richards. Red Raspberry. See Rhodora, **21:** 95–97 (1919).

Clearings and roadsides: common and in good years producing delicious fruit. A pioneer species in recent clearings. Perkins (as *R. strigosus*).

Rubus Chamaemorus L. Cloud-berry. Baked-apple-berry.

Sphagnum bogs: often locally abundant. The fruit is gathered by the island residents. A liking for it raw has to be acquired by most strangers; but it makes very good jam. *Rothrock.*

Rubus pubescens Raf. Dwarf Raspberry. *R. triflorus* Richards. Said by Mrs. Bergen to be called "mulberry" and "dewberry" in New Brunswick.

Wet, mixed woods: common. *Rothrock.*

Rubus hispidus L. Groundberry of Bailey.

Rather dry woods: Dark Harbour road and probably elsewhere. Hay in Bull. Nat. Hist. Soc. N. B. **6**: 79 (1887). 7027. Var. OBOVALIS Fern. occurs in sphagnum under bushes at Little Round Pond (7049).

Rubus pudens Bailey.

Border of dry, old clearing in shade, Back Road. 7017. Known from Maine (Lincoln County) and probably New Brunswick and central Nova Scotia.

Rubus adjacens Fern.

Roadsides, pastures and fields in dry ground, on the east slope of the main island. 5544, 5563, 7009, 7021, 7252. The commonest trailer of the island; known also from the Maritime Provinces, Maine, New Hampshire, Vermont and Massachusetts.

Rubus mananensis Bailey[3].

Luxuriant trailer, supposedly rooting at tip, with dark green lustrous foliage, veins only lightly impressed; primocane axis 4–5 mm. thick, densely covered with reddish-brown setae and gland-tipped hairs; leaves of primocanes 3–5-foliolate, glabrous on upper face, minutely puberulent on ribs and veins underneath, midrib aculeate underneath, margins sharply double-serrate, stipules long-linear; leaflets ovate to elliptic, sometimes somewhat obovate, terminal leaflet broad, usually subcordate at base, abruptly contracted at apex to a narrow point, 5–6 cm. long, about 4 cm. broad, lateral leaflets narrower and often more gradually pointed; petiole setose and glandular-hairy; inflorescence corymbiform, of a half-dozen or fewer flowers on setose or aciculate more or less glandular pedicels, a few solitary flowers in lower axils; fruit globular-oblong, many-seeded, about 1 cm. long, puberulent calyx-lobes caudate-pointed and divaricate.—Allied to *R. alter* Bailey: differs in primocane leaflets much smaller and not overlapping and much more closely serrate, floricane leaflets smaller, much more acute and sharply and finely serrate, setae less stiff and more hair-like, flower and fruit clusters less profuse and fewer-flowered, pedicels less setose and less glandular, calyx-lobes more caudate, fruit smaller and less pulpy, drupelets relatively more numerous.

Clearings: opposite City Camp, Dark Harbour road; near the Thoroughfare. 7025, 7317. Known only from Grand Manan.—Plate II.

Prof. Bailey kindly allows us to publish the above description and illustration of his new species.

Rubus Weatherbyi Bailey.

Margins of thickets in moist or dry ground: Dark Harbour road; west of Bald Heath. 5629, 7241, the former collection the type. So far, known only from Grand Manan.

Rubus canadensis L. High-bush Blackberry.

Moist or dry thickets and clearings; the common high-bush blackberry of the island. 7010, 7014. *R. villosus* of Perkins' list probably refers to this species, or the following, or both.

Rubus allegheniensis Porter.

Forming thickets in dry ground. The common high-bush blackberry of most of New England, here frequent, but less so than the preceding.

[3] **Rubus mananensis** Bailey, spec. nov. Sect. Hispidi. Affinis *R. altero:* differt foliis primocani multo minoribus, non imbricatis, marginibus minutius et acutius serratis, setis minus rigidis, floribus paucioribus, lobis calycis caudatis, fructu minore, drupeolis pluribus. Repens, probabiliter radicans: folia satis viridia, nitida: axis primocani 4–5 mm. crassus, dense rubro-setosus et glandulari-pilosus: folia primocanorum 3–5-foliolata, glabra supra, minute puberulentia in venis subter, margines acute duplo-serrati; foliola ovata vel elliptica, interdum subobovata, foliolum terminale 5–6 cm. longum, 4 cm. latum, abrupte contractum apice, plus vel minus subcordatum basi, foliola lateralia angustiora: petiolus setosus et glandulari-pilosus: inflorescentia corymbiformis; flores 4–6, pedicelli setosi, aliquid aciculati, glandulari-pilosi: fructus globulari-oblongus, circa 1 cm. longus; lobi calycis caudato-acuti.—Clearing, Grand Manan, New Brunswick, July 27, 1941, *Weatherby* 7025, type in Herb. Bailey.

Rubus mananensis Bailey, × ½.

Drawing by Miss Florence Mekeel. At the right, part of a primocane.

This and the six preceding species were determined by L. H. Bailey. It is probable that some of them, although noted and collected only at the stations listed, may be found in suitable habitats anywhere on the main island, particularly in the old cleared land on the east slope. All but the last two are trailers and here do not produce fruit of good quality. Most of the berries worth picking come from the two high-bush species. For descriptions and illustrations (except of *R. mananensis*, here described for the first time), see Bailey, Gentes Herbarum, vol. 5 (1941–43).

Rosa rugosa Thunb.

Forming a dense colony at top of beach, Nantucket Island. An escape from cultivation; native of eastern Asia.

Rosa nitida Willd. Wild Rose.

Wet thickets: frequent. 5578.

Rosa virginiana Mill.

Forming thickets at margin of old field above the cliffs and along roadsides at Whale Cove and frequent elsewhere, at least in the northern part of the main island. Forms with leaves dull above (5701) and shining above (5702) grow intermingled.

The roses of Grand Manan are here somewhat arbitrarily assigned to the above two species on the following basis.

Stems bristly to inflorescence; spines not broad-based, slender and straight; leaflets elliptic-lanceolate, shining; tips of calyx-lobes scarcely dilated, subfiliform . . . . *Rosa nitida.*

Stems bristly in lower part only; spines broad-based, sometimes curved; leaflets elliptic, dull or shining; elongate tips of calyx-lobes conspicuously dilated, sometimes foliose and toothed. *Rosa virginiana.*

These distinctions are by no means wholly satisfactory; too many individuals fail to conform to the specifications. One gets the impression of two strains which, in the restricted area of the island, have interbred until their individuality is nearly lost.

Prunus virginiana L. Choke Cherry.

Thickets in dry ground: frequent. Perkins.

Prunus pensylvanica L. f. Bird Cherry. Pin Cherry.

Clearings: frequent or common. Perkins.

Trifolium pratense L. Red Clover.

Old fields and roadsides: occasional. *Rothrock*. Native of Europe. The Grand Manan plant is the cultivated phase, var. *sativum* (Mill.) Schreb., distinguished chiefly by its greater size. See Rhodora **45**: 331 (1943).

Trifolium repens L. White Clover.

Old fields and waste places: North Head. Perkins. Native of Eurasia.

TRIFOLIUM HYBRIDUM L. Alsike Clover.

Old fields, etc. Perkins. Native of Europe, often cultivated.

TRIFOLIUM AGRARIUM L. Hop Clover.

Reported by Vroom and Perkins; seen by us only in a clearing at Eel Brook Lake. Native of Europe.

TRIFOLIUM PROCUMBENS L. Low Hop Clover.

A frequent roadside weed. Hay in Fowler's list (1880). Native of Europe.

MELILOTUS ALBA Desr. Sweet Clover.

Weed in dry ground: Whale Cove; North Head. Felix. Native of Europe.

VICIA ANGUSTIFOLIA (L.) Reichard. Vetch.

Weed in a field, Whale Cove. Native of Europe.

Vicia Cracca L.

Roadsides and fields: occasional or frequent.

Lathyrus japonicus Willd. Beach Pea. *L. maritimus* Bigel.

Beaches: occasional or frequent. *Rothrock.* Both var. GLABER (Ser.) Fern. and var. PELLITUS Fern. occur, the latter commonly, the former at the Thoroughfare. For the names, see Rhodora, **34:** 177–187 (1932).

Lathyrus palustris L. Vetchling.

Borders of marshes: Long Pond; Cheney Island. *Rothrock.* The Grand Manan plant belongs with var. PILOSUS (Cham.) Ledeb.

LINUM USITATISSIMUM L. Flax.

Roadside, North Head; not persistent. Native of Europe.

Oxalis montana Raf. Wood Sorrel. *O. Acetosella* of manuals, not L.

Old, mossy woods: frequent. *Rothrock.*

Oxalis europaea Jord. Sorrel.

Weed on roadsides and in fields: frequent. Perkins, probably (as *O. stricta*). In spite of its name, the species is a native of North America. Introduced into Europe, it was named by Jordan under the impression that it was indigenous there.

Var. BUSHII (Small) Wiegand, with leaves pubescent on the upper surface and villous stems, occurs at Whale Cove (7236). It is found chiefly in the Mississippi Basin and is rare in eastern North America. We have seen eastern specimens only from Massachusetts.

GERANIUM PRATENSE L. Crane's-bill.

Escaped from cultivation to roadsides: Swallowtail; Castalia village. Native of Europe.

Geranium Robertianum L. Herb-Robert.

Whale Cove cliffs. Felix.

Euphorbia polygonifolia L. Spurge.

Sand beaches: Nantucket Island; Long Pond Beach; White Head Island. 5700, 6676. Not known in Maine east of Knox County, nor on the mainland in southwestern New Brunswick. In Nova Scotia, so far as known to us, on the outer coast only and rare there.

EUPHORBIA CYPARISSIAS L. Cypress Spurge. Napoleon's-crown. Irish Moss (Bergen).

An escape at Whale Cove. Felix. Native of Europe.

Callitriche palustris L. Water Starwort.

Shallow water of ponds and streams: frequent. 5524, 5745.

Empetrum nigrum L. Crowberry.

Open banks, ledges and borders of bogs: frequent to occasional. *Rothrock.*

Rhus typhina L. Staghorn Sumach.

Old fields and clearings: occasional at the north end of the main island. *Hay*, 1879.

Rhus radicans L. Poison Ivy. *R. Toxicodendron* of manuals in part, not L.

Thickets and clearings: fortunately not common and, in contrast with its aggressive behavior farther south, seen only in rather inaccessible places. The Grand Manan plant belongs with var. RYDBERGII (Small) Rehder, which is not climbing and has the leaves approximate at the ends of the branches and the terminal leaflet abruptly acuminate. See Rhodora, **43**: 590 (1941).

Ilex verticillata (L.) A. Gray. Black Alder. Winterberry.

Swampy thickets: Whale Cove; Money Cove trail; Back Road; David Watt Pond. Perkins; 5681. Var. TENUIFOLIA (Torr.) S. Wats. occurs at North Head and probably elsewhere (5792).

Nemopanthus mucronatus (L.) Trel. Mountain Holly.

Moist or wet thickets and borders of bogs: frequent or occasional. Perkins' list.

Acer pensylvanicum L. Striped Maple. Moosewood.

Open woods: frequent. Perkins.

Acer spicatum L. Mountain Maple.

Open woods, especially on hillsides: frequent. Perkins' list.

Acer Saccharum Marsh. Rock Maple. Sugar Maple.

Woods: near Eel Brook; Stanley Brook; Dark Harbour road. Perkins, "very scarce."

There has been much discussion of the name of the sugar maple, and a plausible case has been made out for the conjecture that *A. Saccharum* is no more than a misprint for *A. saccharinum* of Linnaeus and that Marshall did not intend to propose a new name. It seems to us, however, better to accept what Marshall did rather than what we think he meant to do, and to avoid a change in the name generally used in recent manuals. There are changes enough which we have to make.

Acer rubrum L. Red Maple.

Open woods and cut-over land: frequent, mostly small trees. Perkins, "quite common."

Impatiens biflora Walt. Jewelweed. Snapweed.

Moist, shaded or open places: common. Perkins.

Rhamnus alnifolia L'Hér. Buckthorn.

Wet thickets: Whale Cove; Back Road; trail to Miller Pond; Seal Cove. Perkins. Known to us in Nova Scotia only in Cumberland County.

MALVA MOSCHATA L. Musk Mallow.

Escaped from cultivation at North Head village. Native of Europe.

HYPERICUM PERFORATUM L. Saint-John's-wort.

A weed in old fields: common. Perkins. Native of Europe.

Hypericum ellipticum Hook.

Open wet, places: Back Road; Dark Harbour; White Head Island; Seal Cove Brook. Perkins.

Hypericum boreale (Britton) Bicknell.

Pond-margins and wet, open places: North Head; Long Pond marsh; near Mark Hill. Felix; 7328. A collection from a swamp near Grand Harbour has the appearance of a hybrid between *H. boreale* and *H. majus* (6648).

Hypericum majus (A. Gray) Britton.

Open, wet places: North Head; Grand Harbour. 6534. Not known to us from Nova Scotia.

Hypericum canadense L.

Open, wet places: frequent in the lower parts of the main island and on the outlying islands (5692). *Rothrock.* A form with cream-colored petals occurs on Cheney and White Head islands, and is the only form of the species seen on Ross Island (5747, 6665). On the central ridge and in the higher parts of the main island generally, typical *H. canadense* is largely replaced by var. MAGNINSULARE Weath. Rhodora, **30:** 189 (1928), with lemon-yellow, acute and soon reflexed petals (5545, Pl. Exsicc. Gray. 568). So far, the variety is known only from Grand Manan; its distribution and status remain uncertain because of the difficulty of recognizing it in herbarium material.

Hypericum virginicum L. Marsh Saint-John's-wort.

Wet, open places: frequent. Perkins; 7311. Theoretically, the more northern var. *Fraseri* (Spach) Fern. Rhodora, **38:** 434 (1936), with oblong or elliptic, blunt sepals and short styles (1 mm. or less long), which is the prevailing phase of the species on the adjacent Maine coast, should not only occur on Grand Manan, but be the prevailing phase there also. All the material we have examined, however, belongs with typical *H. virginicum.*

Viola cucullata Ait. Violet. "Fighting-cocks"; New Brunswick (Bergen).

Shaded or open wet places: occasional. *Rothrock.* Var. MICROTITIS Brainerd, Rhodora, **15:** 112 (1913), with the auricles of the sepals short (1–2 mm. long) and the upper surface of the leaves sparsely strigose, has been collected in deep shade of a spruce and fir thicket at Deep Cove (7019). So far as length of auricle is concerned, these specimens do not represent the extreme of the variety, which is here at its southeastern limit. Two sheets in the local collection at the New Brunswick Museum, from St. John (*French*) and Rothesay (*A. L. Warner*) are also referable to this variety.

Viola septentrionalis Greene.

Upland woods: common. *Churchill:* 5682, 7239.

Viola fimbriatula Smith.

Dry, open ground: Mill Brook; Back Road; Dark Harbour road.

Viola pallens (Banks) Brainerd. Sweet White Violet.

Wet places in woods and clearings: common. *Rothrock.*

Viola primulifolia L.

Marshy place among *Iris,* Nantucket Island. Heyward Scudder in Felix' list (as *V. lanceolata*); 7341.

Viola incognita Brainerd.

Deep woods: occasional or frequent. 5721. Var. FORBESII Brainerd, Bull. Torrey Bot. Club, **38:** 8 (1911), with leaves glabrous except for scattered hairs on the upper surface, occurs in similar habitats at Third Pond and Pat's Cove. 5767, 6946.

Viola renifolia A. Gray, var. **Brainerdii** (Greene) Fern. Rhodora, **14:** 88 (1912).

Deep, moist woods on the declivity at Indian Beach. 5556. This variety has glabrous foliage. Typical *V. renifolia*, with pubescent leaves, has not been observed in Grand Manan.

Viola labradorica Schrank.

Woods in deep shade: Cliff trail, North Head (Felix' list); Cedar St.; Back Road; Spruce Hill; Mark Hill trail. 5683a. This may be the "V. canina var. sylvestris" of Perkins' list.

Epilobium angustifolium L. Fireweed.

Roadsides and clearings: frequent. *Rothrock.*

Epilobium strictum Muhl. Willow-herb. *E. molle* Torr.

Open swamps: North Head; Castalia; Back Road. 5618. Not seen from western Nova Scotia or the mainland of southwestern New Brunswick.

Epilobium leptophyllum Raf. *E. densum* of recent manuals, not Raf.

Bogs: Mark Hill; Inner Wood Island. Klugh, 1912; 6938, 7038.

Epilobium palustre L.

Old, mossy woods and bogs: Money Cove trail; Third Pond; Long Pond; White Head Island. 5507, 5595. Diminishing in quantity as the old woods are cut off. Var. GRAMMADOPHYLLUM Haussk., with linear-lanceolate or linear leaves tapering to the apex, occurs at North Head (*Churchill*). Var. OLIGANTHUM (Michx.) Fern. (var. *monticola* of Gray's Manual, not Haussk.), with linear, obtuse leaves, is frequent in old woods and bogs.

Epilobium glandulosum Lehm., var. **adenocaulon** (Haussk.) Fern. Rhodora, **20:** 35 (1918).

Wet, open places: frequent and very variable in size and foliage. *Rothrock.*

Oenothera biennis L. Evening Primrose.

Dry, open places: occasional. Perkins.

Oenothera perennis L. Sundrops. *Oe. pumila* L.

Moist, open places: frequent. *Rothrock.*

Circaea alpina L. Enchanter's Nightshade.

Cool, moist woods: common. Perkins.

Myriophyllum tenellum Bigel. Water Milfoil.

On floating mats of vegetable debris: Eel Brook lake; Miller Pond. *Churchill.*

Hippuris vulgaris L. Mare's-tail.

In fresh or brackish water: chiefly on the southern part of the main island and the outlying islands.

Aralia hispida Vent. Bristly Sarsaparilla.

Clearings and rocky places in dry ground: observed at various places in the northern half of the main island and on Ross, White Head and Inner Wood islands. *Rothrock.*

Aralia nudicaulis L. Wild Sarsaparilla.

Dry, open deciduous woods: frequent. *Rothrock.*

Hydrocotyle americana L. Water Pennywort.

Moist, shaded places: occasional. Perkins.

Osmorhiza Claytoni (Michx.) Clarke. Sweet Cicely.

Mixed woods on east slope of central ridge, north of Dock Brook.

Cicuta maculata L. Musquash-root. Beaver-poison.

Swamp near North Head village; Dock Brook at Back Road. Felix. The root is very poisonous.

Cicuta bulbifera L. Water Hemlock.

Swampy margins of Great Pond. Perkins.

CARUM CARUI L. Caraway.

Roadsides and fields: very common at the north end of the main island. Native of Europe.

Ligusticum scothicum L. Lovage.

On sea-cliffs and shingle beaches: frequent. *Rothrock.*

Coelopleurum lucidum (L.) Fern. *C. actaeifolium* (Michx.) Coult. & Rose.

On sea-cliffs and shingle beaches: occasional. Klugh, 1912.

PASTINACA SATIVA L. Parsnip.

A few plants by roadside, Back Road. Native of Europe.

Heracleum lanatum Michx. Cow Parsnip.

Thickets and roadsides: occasional. Felix.

Cornus canadensis L. Bunchberry. "Pigeon-berry"; New Brunswick (Bergen).

Forming large, dense colonies in dry, open wood-margins and clearings: very common. Perkins. Leaves sometimes imperfectly verticillate (forma ELONGATA Peck), or forming two whorls, or one whorl and a pair above. Forma PURPURASCENS (Miyabe & Tatewaki) Hara, with pink bracts, occurs on Ross Island (5778). "Double-flowered" forms, with two or more whorls of white bracts, and forms with two or three heads clustered at the summit of the peduncle occur at North Head.

Cornus stolonifera Michx. Red-osier Dogwood.

Thickets: common. *Churchill.*

Cornus alternifolia L. f. Dogwood.

Open woods and wood-margins: occasional in the northern half of the main island, often becoming tree-like. Perkins.

Chimaphila umbellata (L.) Nutt., var. **cisatlantica** Blake, Rhodora, **19**: 241 (1917). Pipsissewa.

Dry, open woods: North Head; Dark Harbour road.

Moneses uniflora (L.) A. Gray. One-flowered Pyrola.

Dry woods: occasional. *Rothrock.*

Pyrola secunda L. Shinleaf.

Dry woods: Fish Head (Felix); Dark Harbour road; David Watt Pond; Mark Hill trail. *Rothrock.*

Pyrola virens Schweig. *P. chlorantha* Sw.

Dry woods: near Eel Brook Lake. Forma PAUCIFOLIA Fern. Rhodora, **43**: 167 (1941), with few, small leaves or almost leafless, occurs along Money Cove trail. *Sanford.* Only the form is known to us from Washington County.

Pyrola rotundifolia L., var. **americana** (Sweet) Fern.

Dry woods, Money Cove trail. *Rothrock.*

Monotropa uniflora L. Indian-pipe. Ghost-flower.

Deciduous woods: occasional. Perkins.

Monotropa Hypopitys L. Pinesap.

Woods: Indian Beach; Dark Harbour trail; Long Pond; Mark Hill trail; Kent Island. *Rothrock.*

Ledum groenlandicum Oeder. Labrador Tea.

Bogs and sphagnous woods: occasional. Perkins.

Rhododendron canadense (L.) BSP. Rhodora.

Bogs and thickets: occasional. *Rothrock.* Occurs with leaves strongly glaucous (5706) or dull green (forma VIRIDIFOLIUM Fern.; 5707), the two forms, as in the case of *Juniperus horizontalis*, growing side by side. The corolla varies in color from mauve to magenta-pink.

Kalmia angustifolia L. Lamb-kill. Sheep Laurel.

Bogs and clearings: frequent. *Rothrock.*

Kalmia polifolia Wang. Pale Laurel.

Sphagnum bogs: Bald Heath; David Watt Pond; Herring Cove Heath; Ingalls Head bog; Ross Island; White Head Island. Perkins, as *K. glauca.*

Andromeda glaucophylla Link. Bog Rosemary.

Sphagnum bog back of Grand Harbour.

Chamaedaphne calyculata (L.) Moench. Leather-leaf.

Bogs and bog-margins: Priest Cove; Long Pond; White Head Island; Miller Pond; Mark Hill trail; Red Point. Not observed in the northern part of the main island.

Gaultheria procumbens L. Checkerberry. "Ivy-berry"; New Brunswick (Bergen).

Dry, open woods: near Cedar St. (*Oscar T. Locke* and *Margaret Donalda Watt*); Ross Island (Allan Moses). Perkins.

Chiogenes hispidula (L.) T. & G. Creeping Snowberry. Moxie Plum. Capillaire. Teaberry. Maidenhair.

Bogs and sphagnous woods: occasional. *Rothrock.*

Gaylussacia dumosa (Andr.) T. & G., var. **Bigeloviana** Fern. Rhodora, **13**: 99 (1911). Dwarf Huckleberry.

Sphagnum bogs: Bald Heath; David Watt Pond; Little Round Pond; Ingalls Head bog; Priest Cove; Ross Island.

Gaylussacia baccata (Wang.) Koch. Huckleberry.

Borders of heaths and dry thickets: occasional. Perkins.

Vaccinium angustifolium Ait. Blueberry.

The typical narrow-leaved phase, as defined in Gray's Manual, occurs in sphagnous spruce woods on White Head Island (5755). The common low-bush blueberry (*V. pensylvanicum* Lam., not Mill.; *V. angustifolium*, var. *laevifolium* House) is found in considerable quantity in clearings (*Rothrock*), though in no such abundance as in the coastal areas of Maine. The form with glaucous leaves and black berries (*V. Brittonii* Porter; *V. pensylvanicum*, var. *nigrum* of Gray's Manual, not Wood) is occasional (5719). Still another form, with both leaves and berries glaucous, occurs in a clearing near Bald Heath (5760), where the glaucous- and green-leaved phases seem to merge.

Camp, in his recent treatment of the North American blueberries in Brittonia, **5**: 230–237 (1945), recognizes three species in this group: *V. angustifolium*, *V. Lamarckii* Camp (*V. pensylvanicum* Lam., not Mill.), and *V. Brittonii*. *V. angustifolium* is redefined. Instead of a narrow-leaved boreal phase, almost wholly montane as far south as New England, it becomes a wide-ranging species, extending as far south as Virginia, variable in leaf-form, and including the commercial blueberries of Maine and early low-bush berries of New England generally. *V. Brittonii* corresponds to *V. pensylvanicum*, var. *nigrum* of Gray's Manual and would include the fourth form mentioned above. *V. Lamarckii* is a polyploid derivative of *V. angustifolium.*

We have had, of course, no opportunity to try out Camp's classification on the blueberries of Grand Manan, but look forward with pleasure to doing so, since there is in the islands no possibility of complicating hybrids. We can only say that we have observed no particularly large forms which might be referred to *V. Lamarckii.* In view of Dr. Camp's remark that there is still much work to be done on the group, it may not be impertinent to add that the old-fashioned systematist, conscious that the characters of external morphology on which he has relied have proved, in general, really significant, may doubt if a difference in chromosome-number which expresses itself only in a series of over-lapping measurements is, now, of any more taxonomic value than a difference in leaf-form, whatever its possibilities as a basis for future divergent evolution. That is one of the questions which modern cytotaxonomy must answer.

V. Brittonii is described as having a campanulate corolla as against a cylindraceous one in *V. angustifolium.* As a species, it will have to depend on that character. The glaucousness of the leaves is not only unstable in itself, as in numerous other groups such as *Agropyron, Juniperus horizontalis* and rhodora, but quite fails to correlate with lack of glaucousness in the berries. All four possible combinations of green or glaucous leaves and black or glaucous berries occur in nature, not very uncommonly.

Vaccinium myrtilloides Michx. Sour-top Blueberry. *V. canadense* Kalm ex Richardson.

Dry clearings: central ridge on Money Cove trail; Ohio Pond; Back Road; near Bald Heath. Perkins. In this region, the species seems to prefer dry habitats.

Vaccinium Vitis-idaea L., var. **minus** Lodd. Mountain or Rock Cranberry. "Foxberry" of Perkins.

Dry banks and ledges: occasional. *Rothrock.* The berries make very good tart jelly.

Vaccinium Oxycoccos L. Small or Marsh Cranberry.

Bogs and other sphagnous places: occasional. Perkins.

Vaccinium macrocarpon Ait. Cranberry.

Sphagnous places: occasional. Perkins.

Limonium Nashii Small. *L. carolinianum* of manuals, not Walt. Marsh Rosemary.

Salt marshes: Castalia; Ross Island. Perkins, as *Statice Limonium.*

Lysimachia terrestris (L.) BSP. Swamp Loosestrife.

Wet, open places: common. *Rothrock.*

Lysimachia ciliata L. Loosestrife. *Steironema ciliatum* (L.) Raf.

Roadside ditches, Back Road. Known to us in the coastal areas of eastern Maine and in Nova Scotia only at a single station each.

Trientalis borealis Raf. *T. americana* (Pers.) Pursh. Starflower.

Open, deciduous woods: occasional. *Rothrock.*

Glaux maritima L. Sea Milkwort.

Saline habitats: Nantucket Island; Castalia; Dark Harbour; Ross Island; White Head Island. *Churchill*; 5537. Var. OBTUSIFOLIA Fern. occurs on a shingle beach on Nantucket Island.

Fraxinus americana L. White Ash.

Scattered trees in mixed woods in the northern half of the main island. Perkins. Two forms occur, one with glabrous leaf-rachis and nearly entire leaflets, the other with the leaf-rachis pubescent and the leaflets shallowly and coarsely crenate-serrate. The latter is var. JUGLANDIFOLIA (Lam.) Rehd. (cf. Rehder, Man. Cult. Trees and Shrubs, ed. 2, 770 (1940)), probably better treated as a form. Particular attention is here called to it because, on account of its pubescence, it has not infrequently been misidentified as *F. pennsylvanica.*

Fraxinus nigra Marsh. Black Ash.

Wet woods southwest of Castalia. Perkins; 7033.

Bartonia paniculata (Michx.) B. L. Robins.

Sphagnum bog, Ross Island. 6669. This material approaches var. *intermedia* Fern. Rhodora, **23**: 287 (1922). We have seen no specimens of *B. paniculata* from any part of Maine except York County, and none from New Brunswick. Var. *intermedia* is known only from Nova Scotia.

Menyanthes trifoliata L., var. **minor** Michx. Buckbean.

Wet, open places: Money Cove; Castalia; Little Round Pond; back of Long Pond Beach; Inner Wood Island. *Rothrock.*

Nymphoides cordatum (Ell.) Fern. Fairy Lily. *N. lacunosum* of manuals, not *Villarsia lacunosa* Vent.

Shallow water: Eel Brook Lake; Lily Pond. Felix.

Apocynum androsaemifolium L. Dogbane.

Dry thickets and roadsides: occasional.

Convolvulus sepium L. Morning-glory.

Fence-rows and thickets: occasional or locally common. *Rothrock.* Both var. COMMUNIS Tryon, Rhodora, **41**: 419 (1939), with glabrous, hastate leaves (i. e. the basal lobes angled) and var. AMERICANUS Sims (var. *pubescens* of manuals), with pubescent sagittate leaves (i. e. the basal lobes rounded), occur, the latter, so far as observed, mostly near the shore.

Cuscuta Gronovii Willd. Dodder.

Thicket at edge of sphagnum bog near shore, Priest Cove. In Nova Scotia not recorded from the Fundy shore.

Myosotis laxa Lehm. Wild Forget-me-not.

Brook-margin, Deep Cove.

Mertensia maritima (L.) S. F. Gray. Sea Lungwort.

Forming large and conspicuous blue-green patches on sand and shingle beaches: Whale Cove; Castalia; Long Pond Beach; White Head Island; Inner Wood Island. *Verrill.*

ECHIUM VULGARE L. Blue-weed.

Weed near the Whistle and at Whale Cove. Felix. Native of Europe.

Teucrium canadense L. Wood Sage. *T. canadense* var. *littorale* (Bicknell) Fern.

Edge of thicket at top of beach, Ross Island. 6667. Perkins. Not known to us in Maine east of Cumberland County, nor on the mainland in southwestern New Brunswick.

Scutellaria epilobiifolia Hamilt. Skull-cap. *S. galericulata* of manuals, not L.

Wet places: frequent. *Rothrock.* An albino form at Miller Pond (*Miss Felix*).

Prunella vulgaris L. Heal-all.

Open, grassy places: frequent. Perkins. Both the typical phase with oblong leaves and var. LANCEOLATA (Bart.) Fern. Rhodora, **15**: 183 (1913), occur. The latter is native in North America, the former probably an immigrant from Europe.

PHYSOSTEGIA VIRGINIANA (L.) Benth. False Dragon-head.

On the dam of an artificial pond at edge of village, Grand Harbour. Presumably an escape from cultivation. Native of the central United States.

GALEOPSIS TETRAHIT L. Hemp Nettle.

A weed at Whale Cove. *Churchill.* The Grand Manan plant belongs with the small-flowered var. BIFIDA (Boenn.) Lej. & Court. See Rhodora, **12**: 141 (1910).

STACHYS PALUSTRIS L. Hedge Nettle; Woundwort.

Moist, open places: near mouth of Eel Brook; Whale Cove; southwest of Castalia. *Churchill;* 5495. Native of Europe.

Hedeoma pulegioides (L.) Pers. American Pennyroyal.

Clearings and banks in dry ground: occasional. Hay in Bull. Nat. Hist. Soc. N. B. **6**: 81 (1887).

Lycopus uniflorus Michx. Water Horehound.

Open or shaded wet places: common. Felix.

Lycopus americanus Muhl.

Wet places: frequent. Perkins.

Mentha arvensis L. Wild Mint.

Wet, open places; frequent. Perkins. The Grand Manan plant belongs with var. VILLOSA (Benth.) S. R. Stewart (var. *canadensis* (L.) Briq.). Forma GLABRATA (Benth.) S. R. Stewart, with glabrous stems and foliage, occurs in the ravine at Dark Harbour (5636). The dried leaves make a palatable herb tea.

SOLANUM DULCAMARA L. Bittersweet Nightshade.

Moist thickets; occasional. Felix. Native of Europe.

VERBASCUM THAPSUS L. Mullein.

Roadside, Whale Cove. Perkins. Native of Europe.

LINARIA VULGARIS L. Butter-and-eggs.

A roadside weed: North Head; Castalia. Perkins. Native of Europe.

Chelone glabra L. Turtle-head.

Roadside ditches: Cedar St.; Castalia; Back Road. Perkins.

Limosella subulata Ives. Mudwort. *L. aquatica* var. *tenuifolia* or *L. tenuifolia* of manuals, not Wolf.

Forming dense mats in mud overlying sand, strand of barrier-beach pond, Cheney Island. Not known in Maine east of Hancock County.

VERONICA LONGIFOLIA L. Speedwell.

Escaped to roadside, Cedar St. Graves. Native of Europe.

Veronica americana Schwein. Brooklime.

Wet place by a cold run near a spring, upper edge of Whale Cove swamp; by brook in woods near Back Road west of Castalia. *Churchill.* Not known from Washington County.

Veronica officinalis L. Speedwell.

Open, deciduous woods and clearings: occasional. Felix.

Veronica serpyllifolia L.

Grassy places, Whale Cove. *Churchill.*

Melampyrum lineare Desr. Cow Wheat.

Open, mixed woods: Back Road; Ross Island; White Head Island. *Rothrock;* 6671. Var. AMERICANUM (Michx.) Beauverd, with linear-lanceolate to lance-ovate leaves and toothed bracts, occurs near Woodward's Cove. The other collections from Grand Manan are more or less transitional to this variety and perhaps should all be referred to it.

Euphrasia Randii B. L. Robins. Eyebright.

Open, grassy places, especially along the sea-cliffs: occasional. *Churchill;* 5518, 6645. Corolla purplish with yellow eye and darker lines, the entire lobes of the lip nearly equal, the lateral ascending.

Euphrasia americana Wettst.

Open, grassy places: one of the commonest plants of the island. *Churchill;* 5512. Corolla white or somewhat suffused with purple, with dark purple lines and yellow throat; middle lobe of lip longer than the divergent lateral lobes.

ODONTITES RUBRA Gilib.

Rothrock; apparently not found since. A frequent weed along the Maine coast. Native of Europe.

Rhinanthus crista-galli L. Yellow-rattle.

Open, grassy places: frequent or common. *Rothrock.* Both the typical variety, with unspotted stems, golden-yellow corollas, and the teeth of the upper lip whitish (7242, 7256), and var. FALLAX (Wimm. & Grab.) Druce, with black-lineolate stems, lemon-yellow corollas, and gray-purple teeth of the upper lip (7257), occur. The former is the more common in the northern part of the main island; only the variety has been observed in the southern part of the main island and on the outlying islands.

Utricularia geminiscapa Benj. Bladderwort. *U. clandestina* Nutt.

Shallow water at margin of Little Round Pond. Not known on the mainland in southwestern New Brunswick, and from a single station only east or north of Mt. Desert in Maine.

Utricularia vulgaris L.

Pond on White Head Island.

Utricularia gibba L.

On mats of vegetable debris, Miller Pond. Known in western Nova Scotia, where it reaches its northeastern limit, but not on the mainland of New Brunswick nor in Washington County.

Utricularia intermedia Hayne.

Shallow water: Eel Brook Lake; Dark Harbour Brook; Long Pond; Miller Pond; Lily Pond.

Utricularia purpurea Walt.

Fragments washed ashore, Miller Pond. 7233. In western Nova Scotia, but not known from the mainland of New Brunswick nor from Washington County.

Utricularia cornuta Michx.

In wet sphagnum on pond-margins: David Watt Pond; Ross Island; Lily Pond. Perkins. Flowers delightfully fragrant.

Epifagus virginiana (L.) Bart. Beech-drops.

Parasitic on the roots of beeches: north of Eel Brook Lake; Back Road. Felix.

Orobanche uniflora L. Cancer-root.

Thicket south of the Whistle. Graves. *O. uniflora* sens. strict. is not known from Washington County and is here near its northeastern limit. The more northern plant, included in the species in current manuals, has been segregated as *O. terrae-novae* Fern. Rhodora, **28**: 235 (1926), or *O. uniflora* var. *terrae-novae* (Fern.) Achey.

Plantago major L. Plantain.

An occasional weed on roadsides and in waste places, sometimes along old lumber-roads in woods. Perkins. Grand Manan specimens are mostly small and pubescent.

Plantago juncoides Lam., var. **decipiens** (Barn.) Fern. Seaside Plantain.

Sea-cliffs; at Long Pond Beach in sand: common. *Rothrock*; 7276, 7283.

Plantago oliganthos R. & S.

Salt marsh, Castalia. 7301. For descriptions of the two seaside plantains, see Rhodora, **27**: 98 (1925).

Galium Aparine L. Cleavers.

Perkins' list; *Sanford*; not seen by us.

Galium boreale L.

Moist, grassy places: Whale Cove; Castalia. 5736. The Grand Manan plant belongs with var. INTERMEDIUM DC., in which the fruit is covered with short, appressed or incurving hairs. For other varieties of *G. boreale*, see Rhodora, **30**: 106 (1928).

GALIUM MOLLUGO L. Bedstraw.

One large and one small colony in old fields about Whale Cove. Felix. Native of Europe.

Galium palustre L.

Roadside ditches and wet thickets: Back Road; White Head Island. 5741.

Galium trifidum L.

Bogs and open, wet places: Whale Cove; Great Pond; White Head Island. 5697. The specimens from White Head Island, from a brackish marsh, approach var. *halophilum* Fern. & Wieg. (5504).

Galium tinctorium L. *G. Claytoni* Michx.

Moist ground, open or shaded: occasional. 7320.

Galium asprellum Michx. Rough Bedstraw.

Moist thickets: occasional. Perkins.

Galium triflorum Michx. Sweet-scented Bedstraw.

Shaded places in deciduous or mixed woods: frequent. *Rothrock.*

Houstonia caerulea L. Bluets.

We have seen only a single individual in a rocky old field at Flagg's Cove, but the species was collected by Rothrock and is noted in both the Perkins and Felix lists, in the latter from the Back Road. No doubt it is much more common than our one station would indicate.

Diervilla Lonicera Mill. Bush Honeysuckle.

Dry thickets and wood-margins: near Eel Brook Lake (Felix); Whale Cove (Miss Jordan); Dark Harbour road.

Lonicera villosa (Michx.) R. & S. Waterberry.

Wet thickets: occasional. Perkins. Var. CALVESCENS (Fern. & Wieg.) Fern., Rhodora, **27**: 5, 8 (1925), with puberulent young branches, occurs in the shrub-zone bordering a heath on White Head Island (5754); var. TONSA Fern. has been collected at Beech Hill (*Adams*). The berries are edible, resembling blueberries both in appearance and flavor.

Lonicera canadensis Marsh. Fly Honeysuckle.

Mixed woods: occasional, at least in the northern half of the main island. Perkins.

Linnaea borealis L., var. **americana** (Forbes) Rehd. Twin-flower.

Dry, open woods, banks and ledges: occasional. *Rothrock.*

Viburnum trilobum Marsh. High-bush Cranberry. *V. Opulus* L. var. *americanum* Ait.

Thickets and fence-rows: near the Whistle; Willow Farm. Felix. Not known to us from western Nova Scotia.

Viburnum cassinoides L. Withe-rod.

Mixed woods and thickets at the lower levels: frequent. Graves.

Sambucus canadensis L. Elderberry.

Thickets: southwest of Castalia; near the Thoroughfare. Perkins.

Sambucus pubens Michx. Red-berried Elder. *S. racemosa* of manuals, not L.

On talus and in rocky places: occasional. *Rothrock.*

ECHINOCYSTIS LOBATA (Michx.) T. & G. Wild Cucumber.

Often cultivated and occasionally escaped to fence-rows and rubbish-heaps. Native in York and Kings counties, New Brunswick, but not known as an indigenous species on the island.

CAMPANULA RAPUNCULOIDES L. Bell-flower.

Escaped from cultivation near houses at Whale Cove. Native of Europe.

Campanula rotundifolia L. Harebell.

Sea-cliffs and ledges: common. An albino form (forma ALBIFLORA (G. Don) House) occurs on sea-cliffs south of the Whistle.

Lobelia inflata L. Indian Tobacco.

Roadsides and moist, open places: frequent. Perkins.

Lobelia Dortmanna L. Water Lobelia.

Shallow water: Eel Brook Lake; Third Pond; Ohio Pond; Lily Pond. *Rothrock.*

Eupatorium maculatum L. Joe-Pye-weed.

Moist thickets and low grounds: frequent. Perkins, as *E. purpureum;* 6618, 6619. A form with elongate, deeply serrate leaves occurs at North Head (6945).

Eupatorium perfoliatum L. Boneset. Thoroughwort.

Low, open places: occasional. Perkins.

Solidago bicolor L. Silver-rod.

Dry, old fields and uplands: near Eel Brook Lake; Indian Beach.

Solidago macrophylla Pursh. Goldenrod.

Margins of old spruce woods: Bradford Cove; Kent Island. Found only at the southern end of the main island and on the adjacent outlying islands where there are old, undisturbed woods. Not known from western Nova Scotia.

Solidago puberula Nutt.

Dry, open ground at wood-margins and on roadsides: Bancroft Road; Nantucket Island; road to Bald Heath; Dark Harbour road; Inner Wood Island.

Solidago sempervirens L. Seaside Goldenrod.

Upper beaches and margins of salt marshes: frequent. Perkins.

Solidago juncea Ait. Early Goldenrod.

Fields: common; also frequent on sea-cliffs, where it takes kindly to the recent habitats left by frost-erosion. Not known to us from western Nova Scotia.

Solidago uniligulata (DC.) Porter.

In sphagnum bogs and rarely in marshes: Whale Cove; David Watt Pond; Ross Island; Ingalls Head bog; White Head Island; Seal Cove Brook; Inner Wood Island; Lily Pond. *Churchill.*

Solidago rugosa Mill.

Fence-rows and thickets: common. Perkins. Var. VILLOSA (Pursh) Fern. occurs on Ross Island (5777).

Solidago nemoralis Ait.

Old fields and dry, open places: frequent. Felix.

Solidago canadensis L.

Clearings and dry old fields and roadsides: occasional to frequent in the northern half of the main island. Graves.

Solidago gigantea Ait. *S. serotina* var. *gigantea* (Ait.) A. Gray.

Moist places, open or in partial shade: near Eel Brook Lake; Whale Cove (where there are large colonies); Money Cove and Dark Harbour trails; near Ohio Pond; trail from Back Road to Woodward's Cove.

Solidago graminifolia (L.) Salisb.

Moist or dry open places: frequent. Felix. All the Grand Manan material examined belongs with var. NUTTALLII (Greene) Fernald.

Aster macrophyllus L. Aster.

Characteristically dense colonies in wood-margins and along streams: near Eel Brook Lake; Dock Brook ravine. 7244, 7325.

Aster radula Ait.

Borders of thickets: Money Cove trail; Bancroft Farm; Bradford Cove trail.

Aster cordifolius L.

Edge of thicket in dry ground: Whale Cove.

Aster lateriflorus (L.) Britton.

Roadsides and margins of thickets: frequent. 5632, 6615. The Grand Manan plant is the more northern, typical phase of the species, as defined by Wiegand, Rhodora, **30**: 172–177 (1928). An apparent hybrid with *A. novi-belgii* occurs at Castalia (6622).

Aster paniculatus Lam.

Roadside ditch in moist ground, Castalia. 6694. The typical, narrow-leaved plant of Wiegand's treatment, Rhodora, **35**: 28–34 (1933). Perkins' list. The name *A. paniculatus* Lam. is a later homonym and definitely illegitimate, but is here retained because none of the rather numerous possible substitutes can at present be certainly identified.

Aster junceus Ait.

Roadside in moist ground, Ross Island. 5781.

Aster foliaceus Lindl.

Among bushes and on roadsides and margins of marshes: the commonest aster, except *A. acuminatus*, on the east side of the island. *Rothrock.*

It varies considerably in leaf-shape and in the degree of development of the outer phyllaries. The Rothrock specimen has ovate-lanceolate leaves and broad, though rather short, phyllaries. The narrow-leaved phase distinguished as var. SUBLINEARIS Eaton & Griscom, Rhodora, **34**: 14 (1932), was collected by *Churchill.*

Aster novi-belgii L.

Wet, open places: frequent. Graves. The narrow-leaved phase often found in sphagnum, var. ELODES A. Gray, occurs in a dry thicket on Ross Island (6664).

The lines of demarcation separating *A. junceus*, *A. foliaceus* and *A. novi-belgii* are by no means clear. The three species are here separated, unsatisfactorily, on the characters of the involucre. In *A. novi-belgii* the phyllaries are more or less squarrose, the outer ones not greatly dilated or elongate; the branches of the inflorescence commonly bear several reduced leaves or bracts. In *A. foliaceus* the phyllaries are not squarrose and the outer ones are leaf-like and more or less dilated and elongate; the inflorescence has reduced leaves at the points of branching only. *A. junceus* is similar, but the outer phyllaries are not dilated and are no longer than the inner, and the leaves are always linear.

The names *A. novi-belgii* and *A. junceus* are here used in the sense of current manuals. Dr. L. H. Shinners, who has studied this group of asters in two different areas (Wisconsin and Nova Scotia), believes that the name *A. junceus* has been misapplied and perhaps should be abandoned altogether as a nomen ambiguum. He takes up *A. junciformis* Rydb. for our species. From *A. novi-belgii* of the manuals he segregates the more northern element as *A. Rolandii* Shinners. At least some, and probably most of the Grand Manan material would be referable to that species. The specimens here recorded as *A. novi-belgii* var. *elodes*, however, seem to be a narrow-leaved phase, perhaps ecological, of the more southern, typical, *A. novi-belgii*. See Amer. Midland Nat. **26**: 411 (1941) and Rhodora, **45**: 334ff. (1943).

Aster puniceus L.

Moist thickets, Whale Cove. Large plants, 1–1.5 m. tall.

Aster umbellatus Mill.

Moist, open places: common.

Aster acuminatus Michx.

Dry mixed woods and clearings: the commonest aster of the island. Perkins' list.

Aster nemoralis Ait.

In sphagnum: David Watt Pond; Ross Island; Ingalls Head bog; White Head Island; Inner Wood Island; Bradford Cove trail. Vroom's list. Var. MAJOR Peck (var. *Blakei* Porter) occurs in moist ground at Rich Pond, on Ross Island and at Deep Cove (6635); regarded, quite plausibly, by House and Shinners as a hybrid between *A. acuminatus* and *A. nemoralis*. If a hybrid, however, it is an exceptionally common cross, or self-perpetuating.

Erigeron strigosus Muhl. Daisy Fleabane. *E. ramosus* (Walt.) BSP., not Raf.

Wood-roads and clearings: occasional. Perkins; 6617, 6933.

Erigeron canadensis L. Horseweed. Butterweed.

Weed in recent clearing south of the Whistle.

Antennaria canadensis Greene. Pussy-toes.

Dry old fields and open places: frequent. 7230, 7243.

Antennaria neodioica Greene.

Dry old fields and open places: less frequent than the preceding, but much more variable. Wholly typical *A. neodioica* seems not to occur. Of the two collections here referred to it, no. 7262 is a shade-form producing unusually long stolons and with the upper surface of the new leaves nearly glabrous—in this respect approaching var. *chlorophylla* Fern.; and no. 7272 is a large state approaching var. *grandis* Fern. in size and perhaps better referred to it. No. 7263, with relatively large leaves, loose inflorescence and reddish phyllaries with opaque white tips is good var. GRANDIS Fern. No. 7231, small-leaved and with hyaline, translucent phyllary-tips is var. ATTENUATA Fern.

For an account of these varieties, see Rhodora, **35**: 345 (1933). Their local distribution on Grand Manan has not yet been worked out. Var. *attenuata*, however, also common on the adjacent Maine coast, appears to be the common plant of dry fields and banks; var. *grandis* and typical *A. neodioica* seem rather to seek wood-margins in light shade and to be less frequent.

Antennaria petaloidea Fern.

Rothrock; not seen by us.

Anaphalis margaritacea (L.) Benth. & Hook. Pearly Everlasting.

Clearings and roadsides in dry ground: common and often forming dense colonies. Perkins. The Grand Manan plant belongs with var. INTERCEDENS Hara. See Rhodora, **41**: 391 (1939).

Gnaphalium uliginosum L. Low Cudweed.

Moist, open places: occasional. Perkins.

Ambrosia artemisiifolia L. Ragweed.

This hay-fever plant is fortunately not common on the island, though likely to spread if not controlled. It has been observed at North Head, at Castalia, and on Kent Island. The Grand Manan material belongs to the more common phase of the species, var. ELATIOR (L.) Descourtils.

RUDBECKIA HIRTA L. Black-eyed-Susan. Yellow Daisy.

Fields: near Eel Brook Lake; Whale Cove; Back Road. Perkins; 5772. Native of the central United States, here an introduced weed. All Grand Manan specimens seen belong with var. SERICEA (T. V. Moore) Fern. Rhodora, **39**: 457 (1937).

Bidens frondosa L. Beggar-ticks.

A weed in moist ground: occasional or frequent. Perkins.

Bidens cernua L.

Wet, open places: Bancroft Road; Long Pond. Perkins; 6659, 6677. The specimens cited, with very short teeth on the leaf-margins, perhaps should be referred to var. INTEGRA Wiegand. See Rhodora, **24**: 207 (1922)

ACHILLEA MILLEFOLIUM L. Yarrow.

A common weed of waste places; also well established on the sea-cliffs. *Rothrock.*

MATRICARIA MARITIMA L., var. AGRESTIS (Knaf) Wilmott. Wild Chamomile. *M. inodora* of manuals.

An occasional weed. *Verrill.* Native of Europe.

MATRICARIA MATRICARIOIDES (Less.) Porter. Pineapple-weed. *M. suaveolens* (Pursh) Buchenau.

A common weed in moist, open places. Native of western North America. Felix. Gives off a pleasant, pineapple-like odor when crushed.

CHRYSANTHEMUM LEUCANTHEMUM L. Whiteweed. "Bull's-eye"; New Brunswick (Bergen).

An occasional weed and, like yarrow, established on shelves of the sea-cliffs. Perkins; 5485. Native of Europe. The Grand Manan plant is the typical phase of the species, not the var. *pinnatifidum* Lecoq & Lamotte, the common plant southward.

TANACETUM VULGARE L. Tansy.

A weed at North Head. Perkins. Native of Europe. Forma CRISPUM (L.) Fern. occurs in an old clearing near Priest Cove.

COTULA CORONOPIFOLIA L.

Forming a dense, tangled mat in brackish mud about fish-houses, White Head Island. A widely spread species, supposedly native of South Africa; known from only three localities in eastern North America.

TUSSILAGO FARFARA L. Colt's-foot.

Brook-margins and moist ground: near the Whistle; along Dock Brook; Castalia; Back Road; Red Point. Native of Europe.

Petasites palmatus (Ait.) A. Gray. Sweet Colt's-foot.

In spruce woods, Back Road.

Erechtites hieracifolia (L.) Raf. Fireweed.

Recent clearings, particularly in burned-over areas: Rocky Corner; Dock Brook; trail to Miller Pond. The Grand Manan plant belongs with var. INTERMEDIA Fern. Rhodora, **19**: 27 (1917), characterized by broad-based leaves, the upper markedly smaller than the lower.

SENECIO SYLVATICUS L. Groundsel.

Clearings, pastures and upper beaches: a frequent weed. *Churchill.* Native of Europe.

Senecio aureus L. Golden Ragwort.

Openings in wet, mossy woods, trail from Back Road to Woodward's Cove. The Grand Manan plant is, naturally, the more northern element of the species, var. INTERCURSUS Fern. Rhodora, **45**: 499 (1943). Typical *S. aureus*, as defined by Fernald, is not known north of Virginia.

Senecio Robbinsii Oakes. Ragwort.

Wet, open or shaded places: common.

Senecio Pseudo-Arnica Less.

Bill's Island, Grand Harbour—a tiny bit of shingle, rising scarcely 15 ft. above tide-level; Green Islands, *Verrill.* A striking species, here at its extreme southwestern limit, with extraordinarily effective adaptations against loss of water. It is almost as difficult to dry as a cactus.

We have seen no other specimens from New Brunswick. In Gray's Manual, ed. 5, 271 (1867), the species was reported from "Grand Manan island, off Maine" on the basis of Verrill's collection. The phrase "off Maine" is apparently responsible for the record from eastern Maine in the 7th edition of the Manual. We can find no evidence to support this record and suspect that the editors inadvertently interpreted "off Maine" as "in Maine."

ARCTIUM MINUS (Hill) Bernh. Burdock.

A weed at Whale Cove. Graves. Native of Europe.

ECHINOPS SPHAEROCEPHALUS L. Globe Thistle.

Escaped from cultivation to a clearing, Whale Cove. Native of Europe.

CIRSIUM VULGARE (Savi) Airy-Shaw. Bull Thistle. *C. lanceolatum* of manuals, not (L.) Hill.

Waste places: an occasional weed. Perkins. Native of Europe.

Cirsium muticum Michx. Swamp Thistle.

Open woods and clearings: frequent. *Rothrock.*

CIRSIUM ARVENSE (L.) Scop. Canada Thistle.

A frequent and unwelcome weed. Native of Europe. A white-flowered form, forma ALBIFLORUM (Rand & Redfield) R. Hoffm., occurs occasionally.

CENTAUREA CYANUS L. Bachelor's-button. Corn-flower.

Escaped from cultivation at North Head. Native of Europe.

CENTAUREA NIGRA L. Knapweed.

Roadside, North Head. Native of Europe.

CICHORIUM INTYBUS L. Chicory.

An uncommon weed: Whale Cove. Native of Europe.

LEONTODON AUTUMNALIS L. Fall Dandelion.

A common weed. Perkins. Native of Europe. Both the typical phase of the species, with phyllaries merely arachnoid-pubescent, and var. PRATENSIS Koch, with them blackish-pilose, occur, the latter more frequently.

TARAXACUM OFFICINALE Weber. Dandelion.

Roadside weed at North Head and probably elsewhere. Perkins; 7255. Native of Europe.

Taraxacum latilobum DC.

Crevices of sea-cliffs, moist, shaded places in clearings and on roadsides: occasional. 6936, 7247. A native species, very like *T. officinale*, the commonly introduced European dandelion. From it, *T. latilobum* is distinguished almost wholly by its achenes, which are tuberculate nearly or quite to the base; in *T. officinale*, they are muricate or tuberculate only in the upper part. The native species, at least on Grand Manan, is also of a more retiring disposition than the European immigrant, preferring moist and shaded habitats, and is not at all an aggressive weed. For a treatment of the dandelions of eastern North America, see Rhodora, **35**: 319 (1933).

TARAXACUM LAEVIGATUM Willd. Red-seeded Dandelion. *T. erythrospermum* Andrz.

Dry, open or shaded ground in clearings: vicinity of Eel Brook Lake; Back Road; Cheney Island. 7245, 7259. Readily recognized by its finely cut leaves, the horn-like appendages of its phyllaries, and its red achenes. In no. 7259, the achenes are almost without murication. Native of Europe.

SONCHUS ARVENSIS L. Sow Thistle.

Roadsides, about fish-houses and in other waste places: occasional. Graves. Native of Europe.

SONCHUS ASPER (L.) Hill.

A weed at North Head. Perkins. Native of Europe.

Lactuca canadensis L. Wild Lettuce. *L. canadensis* var. *integrifolia* of manuals.

Old fields and pastures: Whale Cove; Dark Harbour road; Back Road. 5631. Var. LONGIFOLIA (Michx.) Farwell (*L. canadensis* of manuals) occurs in a clearing near Back Road. 7045.

Prenanthes trifoliolata (Cass.) Fernald. Wood Lettuce. Gall-of-the-earth.

Open woods: occasional. Perkins, probably, as *Nabalus albus*. Plants of exposed summits of sea-cliffs and ledges near the ocean at Fish Head (5737) and on White Head Island are referable to var. NANA (Bigel.) Fern., though not the extreme of the variety.

Prenanthes altissima L.

Open woods: occasional.

HIERACIUM FLAGELLARE Willd. Mouse-ear Hawkweed. *H. Pilosella* L. var. *viride* Ser.

Roadsides and clearings, Whale Cove. 7253. Native of Europe.

HIERACIUM AURANTIACUM L. Devil's Paint-brush.

Fields at North Head and Grand Harbour. Felix. Native of Europe. A handsome but obnoxious weed, which it is hoped will not take possession of the hay-fields of the island, as it has done in large areas in northern New England.

HIERACIUM FLORIBUNDUM Wimm. & Grab. King-devil.

A too frequent weed in old fields. Native of Europe.

Hieracium scabrum Michx. Hawkweed.

Dry, open ground: Indian Beach trail; road to Bald Heath; Dark Harbour.

Hieracium canadense L.

Dry, open ground, Dark Harbour road. Perkins; 6656. The Grand Manan plant belongs with the more southern phase of the species, var. FASCICULATUM (Pursh) Fern. Rhodora, **45**: 320 (1943). We have seen no specimens from western Nova Scotia.

DOUBTFUL AND UNVERIFIED RECORDS

These records include both such as have appeared in print—chiefly in Perkins' list—and others from the various manuscript lists which we have seen. In no instance have we seen specimens of the species concerned, either in herbaria or in the field. In most cases, this is the only reason why they are placed here rather than in the body of our list. Many in all probability did occur in the islands, either as fugitive weeds or as native species since exterminated or so rare that we have failed to find them again.

But in the absence of specimens there is always the chance of error; it has therefore seemed best to segregate these records from the better assured ones admitted to the list proper.

The name originally given is cited in each case, followed by that now in use, if it is different.

Aspidium acrostichoides (Michx.) Sw. *Polystichum acrostichoides* (Michx.) Schott. Christmas Fern.

Perkins. Probably correct; the species occurs in all adjacent areas.

Pinus resinosa Ait. Red Pine.

Perkins. Very likely correct, though the soils of Grand Manan are not such as the red pine prefers. There is much of it along the St. Croix River below St. Stephen (Vroom listed it as "abundant"), and it occurs in other nearby areas.

Eleocharis ovata (Roth) R. & S.

"Scarce in marshes on Grand Manan and Campobello," Klugh, Contrib. Canadian Biol. 1912: 266. In all probability, this refers to *E. obtusa*, which Klugh does not list. The two are alike in general appearance and without examination of ripe achenes could easily be confused—as for a long time they were by most taxonomists. *E. ovata* is not known from the Passamaquoddy area.

Carex silicea Olney.

"Common [on the rocky coasts of] Grand Manan" Klugh, l. c. 270. Entirely probable. Although we have no definite record from southwestern New Brunswick, *C. silicea* occurs on the outer coast of Nova Scotia and all along the coast of Maine. But we have not detected it on the beaches of Grand Manan.

Luzula pilosa Willd. *L. acuminata* Raf. *L. saltuensis* Fern. Wood Rush.

Perkins. The record could be correct; the species occurs in all adjacent areas. But Perkins does not list the common *L. multiflora* (*L. campestris* of his time); it seems likely that there was some confusion.

Listera convallarioides (Sw.) Torr. Twayblade.

Perkins. Here again the record might be correct; Vroom reports the species from St. Andrews. But it is more probable that Perkins had *L. cordata*, which he does not list.

Salix candida Fluegge. Sage Willow.

Perkins. Probably an error; *S. candida* is not known nearer than northeastern New Brunswick and northern Maine. Perkins may have had some of the more pubescent forms of *S. Bebbiana*.

Comptonia peregrina (L.) Coult. Sweet Fern. *Myrica asplenifolia* L.

"Road to Watt Pond, 1914." Miss Felix's list. Very likely correct; the species has been collected at St. Andrews by Malte and occurs in all adjacent areas.

Betula lenta L. Black Birch.

Perkins. Improbable; Perkins may have had young *B. lutea* and been deceived by the checkerberry flavor which that species also has, though less strongly than *B. lenta.*

Blitum capitatum L. *Chenopodium capitatum* (L.) Aschers. Strawberry Blite.

Possible; may have been a fugitive introduction.

Mollugo verticillata L. Carpet-weed.

"Weed on Swamp Road", Felix. Probably correct. Native of tropical America. Plentiful along the railroad at St. Andrews (Adams).

Agrostemma Githago L. Corn Cockle.

Felix. Probably a fugitive weed. Native of Europe.

Ranunculus Flammula L. Creeping Spearwort.

Perkins. Presumably this refers to what we now call *R. reptans* L. It is very likely to be correct; the species should be sought on pond-shores.

Neslia paniculata (L.) Desv. Ball Mustard.

Graves. Collected at St. Andrews by Malte; a rare weed in New England. May have appeared temporarily on Grand Manan. Native of Europe.

Brassica arvensis (L.) Ktze. *B. Kaber* (DC.) L. C. Wheeler, var. *pinnatifida* (Stokes) Wheeler. Charlock.

Graves. Very likely correct. Native of Eurasia.

Brassica nigra (L.) Koch. Black Mustard.

Hay; Felix. Very likely correct. Native of Eurasia.

Sedum acre L. Stonecrop.

"Church Hill, 1912", Felix. Very likely correct, though perhaps not really an escape.

Ribes floridum L'Hér. *R. americanum* Mill. Wild Black Currant.

Perkins. Very likely correct.

Ribes rubrum L. *R. vulgare* Lam. Red Currant.

Perkins. A probable escape from gardens.

Alchemilla pratensis F. W. Schmidt. Lady's-mantle.

"Roadside weed, Dock Brook Road, 1912". Felix. A common weed in western Nova Scotia, but not known to us in New Brunswick nor eastern Maine. Native of Europe.

Rosa cinnamomea L. Cinnamon Rose.

Graves. Native of Eurasia. We have seen this forming thickets near old houses, but apparently these are merely clones spreading from planted bushes, not truly escaped.

Viola adunca, var. *glabra* Brainerd, Rhodora **15**: 109 (1913). *V. adunca* Smith, forma *glabra* (Brainerd) G. N. Jones, Univ. Washington Pub. Biol. **5**: 194 (1936).

"Grand Manan Island, *J. Vroom*, May 8, 1880." Brainerd, l. c. This record should be correct, but we have not seen the specimen cited, nor any material of the form from the Passamaquoddy area, though typical, pubescent *V. adunca* is not uncommon in Washington County. Possibly Brainerd's plant was the same as that which we treat as *V. labradorica*.

Epilobium coloratum Muhl. Willow-herb.

Perkins. Almost certainly refers to *E. glandulosum* var. *adenocaulon*, not separated in the earlier editions of Gray's Manual, nor in Macoun's Catalogue.

Cornus circinata L'Hér. *C. rugosa* Lam. Dogwood.

Perkins. Possible. Reported from St. Andrews by Vroom, but not known to us from western Nova Scotia nor southeastern Maine.

Convolvulus arvensis L. Bindweed.

Perkins; "Castalia, 1915", Felix. Probably correct, but the species not persistent. Native of Europe.

Lappula echinata Gilib. Stickseed.

"Weed in vegetable garden, Whale Cove". Felix. Collected by Malte at St. Andrews. Native of Europe.

Scutellaria lateriflora L. Mad-dog Skullcap.

Perkins. In all probability correct, though no one else seems to have seen it. It occurs in all adjacent areas.

Nepeta hederacea (L.) Trev. Gill-over-the-ground.

Perkins; Felix. A species which spreads readily from cultivation; records probably correct. Native of Europe.

Mentha viridis L. *M. spicata* L. Spearmint.

Perkins. Quite possible, though not common in adjacent areas. Native of Europe.

Solanum nigrum L. Nightshade.

Perkins. Vroom reports the species from St. Stephen and it has been collected in Washington County.

Datura Stramonium L. Jimson-weed.

"Road to Castalia, 1910". Felix. Reported by Vroom from St. Andrews and St Stephen. Native of tropical America, usually fugitive in the north.

Penstemon Digitalis Sweet. Beard-tongue.

Felix. Malte collected the species at St. Andrews. Native of the central United States.

Symphoricarpos racemosus Michx. *S. albus* L. Snowberry.

Perkins. This presumably refers to the cultivated *S. albus* var. *laevigatus* (Fern.) Blake; typical *S. albus* would be very improbable here. The variety occurs as an escape at several localities in Nova Scotia.

Viburnum Lentago L. Nannyberry.

Perkins. This almost certainly refers to the common *V. cassinoides*, which Perkins did not list.

Solidago uliginosa Nutt.

Perkins. A possible species on Grand Manan, but Perkins probably had *S. uniligulata*, which he does not list.

Antennaria plantaginifolia (L.) Richards. Pussy-toes.

Perkins. In the manuals of Perkins' time, this name was used to cover all the Antennarias of northeastern North America. He may have had any one, or all, of the three species we recognize on Grand Manan. True *A. plantaginifolia* does not get nearer than southwestern Maine, except for a single collection from Mt. Desert.

Gnaphalium polycephalum Michx. *G. obtusifolium* L. Everlasting.

Perkins. Possible, but not very likely. Yet Perkins recorded correctly the species which he might have confused with this.

Bidens connata Muhl. Beggar's-ticks.

Perkins. Possible, but not likely. Perkins may have had some form of the variable *B. cernua*.

Anthemis Cotula L. May-weed.

Perkins. Almost certainly this refers to *Matricaria maritima* (*M. inodora*), which Perkins does not list. The two species look alike; Perkins was not the only one to confuse them.

Senecio vulgaris L. Groundsel.

Perkins, Felix and Graves. This almost certainly refers to the common *S. sylvaticus*, not included in the manuals of Perkins' time and superficially so like *S. vulgaris* as to be readily confused with it.

Artemisia canadensis Michx. Wormwood.

Perkins. Very improbable and not like any species we know from the island. It is hard to guess what Perkins may have had.

Onopordum Acanthium L. Scotch Thistle.

Perkins. A possible escape from cultivation, not unlikely to persist.

Sonchus oleraceus L. Sow Thistle.

Perkins. Perfectly possible, but we have seen only *S. asper* on Grand Manan.

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In addition, more or less general information about Grand Manan may be found in magazine articles by Edward Abbott in Harper's Magazine **56:** 541–556, March, 1878; by William I. Cole in the New England Magazine, n. s. **20:** 387–402, June, 1899; and by Philip C. Curtis in the Canadian Geographical Magazine, Aug., 1939. It should be added that Mr. Cole's local geography is unreliable.

STATISTICAL SUMMARY

	Species	Native Varieties	Forms	Introduced Species
Lycopodiaceae	4	1		
Isoetaceae	1			
Equisetaceae	7		2	
Ophioglossaceae	6	1	1	
Osmundaceae	3			
Polypodiaceae	17	5		
Taxaceae	1			
Pinaceae	10			
Typhaceae	2			
Sparganiaceae	4			
Potamogetonaceae	8			
Juncaginaceae	2			
Gramineae	33	3	2	11
Cyperaceae	77		1	
Araceae	3			
Eriocaulaceae	1			
Pontederiaceae	1			
Juncaceae	13	3		
Liliaceae	11	1		1
Iridaceae	3			
Orchidaceae	22		1	
Salicaceae	8			
Myricaceae	2			
Betulaceae	8			
Fagaceae	2			
Urticaceae	3			
Loranthaceae	1			
Polygonaceae	10			5
Chenopodiaceae	4	1		1
Amaranthaceae				1
Caryophyllaceae	9	2		6
Portulacaceae				1
Ceratophyllaceae	1			
Nymphaeaceae	2			
Ranunculaceae	8	1	2	3
Fumariaceae	1			
Cruciferae	5			8
Sarraceniaceae	1			
Droseraceae	2	1		
Crassulaceae	2			1
Saxifragaceae	4			
Rosaceae	33			11
Leguminosae	3	1		8

STATISTICAL SUMMARY—*Continued*

	Species	Native Varieties	Forms	Introduced Species
Linaceae				1
Oxalidaceae	2	1		
Geraniaceae	1			1
Euphorbiaceae	1			1
Callitrichaceae	1			
Empetraceae	1			
Anacardiaceae	2			
Aquifoliaceae	2	1		
Aceraceae	4			
Balsaminaceae	1			
Rhamnaceae	1			
Malvaceae				1
Hypericaceae	5	1		1
Violaceae	8	1		
Onagraceae	8	2		
Haloragidaceae	2			
Araliaceae	2			
Umbelliferae	7			2
Cornaceae	3		2	
Ericaceae	22	2	2	
Plumbaginaceae	1			
Primulaceae	4	1		
Oleaceae	2	1		
Gentianaceae	3			
Apocynaceae	1			
Convolvulaceae	2	1		
Boraginaceae	2			1
Labiatae	7	1	1	3
Solanaceae				1
Scrophulariaceae	9	2		4
Lentibulariaceae	5			
Orobanchaceae	2			
Plantaginaceae	3			
Rubiaceae	8			1
Caprifoliaceae	8	2		
Cucurbitaceae				1
Campanulaceae	1		1	1
Lobeliaceae	2			
Compositae	48	8		23
	513	44	15	89

In addition, there are one variety and one form among introduced *Compositae*, making the grand total of recognized groups 663. Further exploration may well increase this figure to 700 or more.

Localities Not on the Map

Back Road—the inner road from Grand Harbour to Castalia.

Bald Heath—a large raised bog west of Woodward's Cove.

Cedar St.—the road running west from the main road just north of Castalia.

City Camp—an old lumber camp east of Dark Harbour.

Herring Cove Heath—a large bog in the interior between Little Round Pond and Dark Harbour.

Lily Pond—the same as Bradford Cove Pond of the map.

Second Pond—Little Lake on the map; the small pond just west of Eel Brook Lake.

Spruce Hill—a ridge northeast of Mark Hill.

Third Pond—small pond just above Indian Beach.

Willow Farm—at the end of the east–west road north of Beech Hill.

INDEX

New scientific names are printed in **full-face type.** To save space, compound English names are given but one entry. When they are written as two or more separate words, one of which (usually the last) is the name of a group of plants, they are indexed under the group-name, as the more important and as corresponding to the generic element in a Latin name. Thus, the birches are entered as "Birch, gray . . . ; white . . . ; yellow" under the letter B, and will not be found under gray, white, or yellow. On the other hand, hyphenated English compounds and, of course, those written as one word, are indexed under their first member—"adder's-tongue" under A, "gold-thread" under G. This is essentially the method of standard dictionaries and should cause no difficulty.

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SOME NORTH AMERICAN CORYLACEAE (BETULACEAE)

M. L. Fernald

(Plates 963–989)[1]

I. Notes on Betula in eastern North America

(Plates 963–975)

It has long been evident that the ultraconservative treatment of *Betula*, published by me in 1902, as *Relationships of some American and Old World Birches*[2], can not be accepted, in view of the many characters of aments, their bracts and samaras then not understood. That sophomoric study, based on complete lack of understanding, well illustrates how an over-conservative treatment may be as far afield as are those which split beyond the normal divergencies in Nature. In a recent attempt to set in order the White Birches and the Dwarf Birches as they occur in the Gray's Manual range the names applied to our species and varieties have necessarily changed in several cases. The entire treatment can hardly be given here, but, in order to clarify the situation, the key to our members of Series *Albae* is here given.

a. Bark opaque, chalky- or ashy-white, close, the layers not readily exfoliating; staminate ament usually 1 and, before expanding, pointing stiffly forward; leaves glabrous or merely glutinous on both sides, abruptly ending in prolonged tail-like tips (caudate); fruiting aments 1–2.5 cm. long; their mature bracts nearly horizontally divergent, crowded, 3–4.5 mm. long, uniformly ashy-puberulent on back . . . . 1. *B. populifolia.*

a. Bark lustrous, creamy- or pinkish-white to warm-brown, in maturity often exfoliating or separating into layers; staminate aments 1–few; leaves not prominently caudate-tipped; fruiting aments (except in the dwarf shrubby no. 4) mostly larger; their bracts (except in the introduced no. 2) ascending, glabrous or pilose on back, the lobes ciliate . . . . *b.*

b. Samaras 3.5–6.5 mm. broad, the wings broader than the achene; trees or coarse shrubs.

[1] The cost of preparing and engraving the plates met in part through a grant from the American Philosophical Society.

[2] Contrib. Gray Herb. n. s. xxiii., Am. Journ. Sci., ser. 4. xiv. 167–194, plates v and vi (1902).

c. Leaves glabrous on both sides; young shoots glabrous or merely with resinous warts....*d.*

d. Trees with whitish bark; leaves deltoid-ovate, acuminate from broad base, those of fertile branches 3–10 cm. long; staminate aments 4–10 cm. long; lateral lobes of pistillate bracts divergent, larger than terminal lobe; species of low or intermediate altitudes.

Leaves of fertile branches 3–7 cm. long, their cuneate to truncate bases entire; fruiting aments 2–4 cm. long, their bracts divergent; introduced species...2. *B. pendula.*

Leaves of fertile branches 5–10 cm. long, their rounded bases toothed except near petiole; fruiting aments 2.5–5 cm. long, their bracts ascending; indigenous.........................3. *B. caerulea-grandis.*

d. Shrub with dark close bark; leaves ovate, merely acute to blunt, those of fruiting branches 1.5–4.5 cm. long; staminate aments 1.5–3.5 cm. long; lateral lobes of pistillate bracts ascending, scarcely broader than terminal lobe; subarctic-alpine species..............4. *B. minor.*

c. Leaves pubescent beneath, at least when young, or on veins or in their axils; young vegetative shoots pubescent or puberulent.

Buds lustrous with resin; leaves merely acute, those of fertile branches 3–5 cm. long; mature fertile aments 1.5–3 cm. long; introduced species..................5. *B. alba.*

Buds scarcely resinous; leaves mostly acuminate, those of fertile branches 2.5–10.5 cm. long; mature fertile aments 1.5–6.5 cm. long; indigenous.....6. *B. papyrifera.*

b. Samaras 2–3.5 mm. broad, the wings scarcely to barely as broad as the achene; new sprouts pubescent; leaves elliptic, rhombic-oval or ovate; shrub with close dark bark.......................................7. *B. borealis.*

1. B. populifolia Marsh. Arb. Am. 19 (1785). *B. alba* L., var. *populifolia* (Marsh.) Spach, Ann. Sci. Nat. sér. 2, xv. 187 (1841).—Sterile dry to wet acid soils, Prince Edward Island to Laurentide region of Quebec, west to southern Ontario, south to Delaware, Pennsylvania, upland to Virginia, northern Ohio and northern Indiana.

B. populifolia Marsh., forma **incisifolia,** f. nov., foliis lacerato-incisis, laciniis attenuatis plus minusve incisis.—Massachusetts: old field at border of woods, Auburndale, July 23, 1941, *D. S. Correll* (type in Herb. N. E. Bot. Club). Pennsylvania: along trail just north of highway, below the Pagoda, Mt. Penn, Berks Co., Aug. 14, 1943, a single young individual, *Wherry.* Illustrated as var. *laciniata* Loud. by Correll in Rhodora, xliv. plate 708 opp. p. 236 (1942).

Unfortunately the name *Betula populifolia,* var. *laciniata* (Lodd.) Loud., currently used for this "cut-leaved" form, is not a safe one to take up. The identity is too doubtful since Loudon based it on a *nomen nudum* which had been published by Conrad Loddiges and Sons, Nurserymen, in their 16th Catalogue of Plants, 44 (1836). Loddiges and Sons merely had the name *Betula laciniata* in a list of hardy trees and shrubs cultivated by them. There was no description; consequently when Loudon, Arb. and Frut. Brit. iii. 1707 (1838), published *B. populifolia*, var. *laciniata*, "*B.* laciniata *Lodd.* Cat. ed. 1836, has large, smooth, shining, deeply cut leaves, and appears to us to belong to *B.* (*a.*) populifolia, rather than to *B.* alba", he based his combination on a *nomen nudum*. If he had omitted the citation of Loddiges' identical *nomen* which was further invalidated by the well described *B. laciniata* Ehrh. (1788), the case would be different. At least, if it be maintained that Loudon gave a sufficient diagnosis and thus validated the name, it is not at all certain what he had. It is safer to establish our indigenous form on surer ground.

2. B. PENDULA Roth, Tent. Fl. Germ. i. 405 (1788). *B. alba* L. Sp. Pl. 982 (1753), in part; Koch, Syn. 662 (1837). *B. alba*, β. *pendula* Ait. Hort. Kew. iii. 336 (1789). *B. verrucosa* Ehrh. Beitr. vi. 98 (1791–1793).—Introduced from Europe; spread to roadsides, thickets, open woods, etc., Nova Scotia to Ontario, south to Pennsylvania, Michigan, Wisconsin and Iowa.

Forma DALECARLICA (L. f.) Schneid. Handb. Laubholzk. i. 112 (1904). *B. alba*, β. *dalecarlica* L. f. Suppl. 416 (1781).—Similarly spreading from cultivation.

Those who treat this half of the mixed *Betula alba* L. as typical *B. alba* (for instance Beck von Mannagetta and Wilmott) go back only to Koch (1837) for their cue. Evidently they have overlooked the fact that Roth in 1788 had removed *B. pendula*, thus leaving the other species (*B. pubescens* Ehrh., 1791) to stand as true *B. alba*. See comments under our no. 5.

3. B. CAERULEA-GRANDIS Blanchard, Betula, i. no. 1 (May 7, 1904); Fernald in RHODORA, xxiv. 171 (1922). *B. caerulea* Blanchard, var. *grandis* Blanchard in Vermont Phoenix for May 13, 1904 and Betula, i. no. 2 (May 13, 1904). *B. caerulea*, var. *Blanchardi* Sargent, Man. Trees. N. A. 202, fig. 168A (1905).—Dry woods, Gaspé Peninsula to Montmorency Co., Quebec, south to Nova Scotia, northern New England and eastern New York.

× B. CAERULEA Blanchard, Betula, i. no. 1 (May 7, 1904); Sargent, Man. 201, fig. 168 (1903); Fernald in RHODORA, l. c. 172 (1922)—A hybrid of no. 3 with no. 1, occasional where they are together.

4. B. **minor** (Tuckerm.), stat. nov. *B. papyracea*, var. *minor* Tuckerman in Am. Journ. Sci. xlv. 31 (1843). *B. dahurica*, β. *americana* Regel in DC. Prodr. xvi². 175 (1868). *B. alba*, subsp. *papyrifera*, β. *humilis* Regel, l. c. 166 (1868), in small part only (i. e. *B. papyracea*, var. *minor* Tuckerm., the TYPE of which is also the type of Regel's *B. dahurica*, var. *americana!*) *B. papyrifera*, var. *minor* (Tuckerm.) Wats. & Coult. in Gray, Man. ed. 6, 472 (1889), at least in part. *B. odorata*, var. *tortuosa* sensu[1] Fernald in Rhodora, iii. 173 (1901), not (Ledeb.) Lange. *B. alba*, var. *minor* (Tuckerm.) Fernald in Am. Journ. Sci. ser. 4. xiv. 179 (1902).—Acidic rocky barrens, peats and alpine summits, Labrador Peninsula, south to Newfoundland, Shickshock Mts., Gaspé Peninsula, and Laurentide Mts., Quebec, highest mountains of northern New England and northeastern New York, and shores of James Bay, Ontario. The following are characteristic. Labrador: head of pond, 30 miles west of Nain, Anatolak Bay, *Potter & Brierly*, no. 2614; Anatolak, *C. S. Sewall*, no. 449; Hopedale, Aug., 1935, *Agnes Ayre;* granite hills, Salmon Bight, 53° 27′ N., 55° 47′ W., *A. E. Porsild*, no. 37, as *B. papyrifera*, var. *cordifolia;* Square Island, lat. 52° 49′, Aug. 16, 1882, *J. A. Allen;* large shrubs on upper crests and on gneiss plain, Blanc Sablon, *Fernald & Wiegand*, nos. 3248 and 3249. Newfoundland: shrub 0.5–0.8 m. high, turfy and rocky slopes of Cape Dégrat, Quirpon Island, *Fernald & Long*, no. 28,071, erroneously distributed as *B. microphylla* Bunge; thickets, brooksides and ravines, western side of Quirpon I., *Wiegand, Gilbert & Hotchkiss*, no. 28,076 (as *B. microphylla*); quartzite one half mile south of Deer Pond, Highlands of St. John, *Wiegand, Gilbert & Hotchkiss*, no. 28,078 (as *B. microphylla*); erect, 1 m. or less high, peaty or turfy upper quartzite slopes, alt. 600–650 m., Killdevil, Bonne Bay, *Fernald, Long & Fogg*, no. 1635 (as *B. microphylla*); diorite tableland, alt. about 550 m., northern region of the Blomidon ("Blow-me-down") Mts., Bay of Islands, *Fernald & Wiegand*, no. 4263; diorite tableland, near Franchman's Cove, Bay of Islands, *Griscom*, no. 10,242; about 4 feet high, Riverview Camp, Grand Codroy R., *Pease & Edgerton*, no. 27,113; damp thickets on hill southwest of Tilt Cove, Notre Dame Bay, *Fernald & Wiegand*, no. 5307. Quebec: rocky hillsides, Vieux-Fort, Pontchartrain, Saguenay Co., *St. John*, no. 90,831 (as *B. glandulosa*); tundra, Ile Herbée, Archipel de Vieux-Fort, *St. John*, no. 90,832 (as *B. glandulosa*); sur les gneiss près des chutes, Natashquan, Côte-Nord, *Victorin & Rolland*, no. 28,101 (as *B. microphylla*); Seven Islands, Saguenay Co., *C. B. Robinson*, nos. 864 and 867; plateau dénudé, Botanists' Dome, Montagne de la Table, *Rousseau & Fortier*, no. 31,429; abondant près du sommet, Mt. Lyall, Gaspé Co., *Victorin, Rolland &*

[1] For these more erroneous identifications one is tempted to write "*nonsensu*."

Jacques, no. 33,516 (as *B. microphylla*); parties sèches près des sommets, Mont Sterling, Gaspé Co., *Victorin, Germain & Jacques*, no. 33,481 (as *B. microphylla*); rocky slopes and barrens, alt. 650–1100 m., Mt. Albert, Gaspé Co., *Collins & Fernald*, no. 67; on hornblende schist, alt. 900–1060 m., north slope, Mt. Albert, *Fernald & Collins*, nos. 214 and 529 (as *B. microphylla*); sur les schistes hornblendiques et les paragneiss, Mt. Albert, *Victorin, Brunel, Rolland & Rousseau*, no. 17,598 (as *B. pumila* ?); bare hornblende schist near summit, about 1100 m. alt., Mt. Fortin, Matane Co., *Fernald & Pease*, nos. 25,023 and 25,024 (as *B. microphylla*); Port à Pueis, below Cap à l'Aigle, *J. Macoun*, no. 68,776. MAINE: summit of Mt. Katahdin, Aug., 1847, *Aaron Young*, Bot. Surv. Me., Aug. 25, 1847, *George Thurber*, Aug. 12, 1873, *Scribner*, Aug. 1874, *Scribner* (as *B. glandulosa*), Sept. 1898, *E. D. Merrill* (as *B. glandulosa*); small shrubs, summit of 1st North Peak, Mt. Katahdin, July 14, 1900, *Fernald*. NEW HAMPSHIRE: "In alpinis Mont. Alborum", *Tuckerman* (ISOTYPE); White Mts., 1842, *A. Gray*, this and the preceding the types of *B. dahurica*, var. *americana* Regel; Alpine Garden, Mt. Washington, July 10, 1893, *E. & C. E. Faxon*, June 26, 1898, *E. F. Williams* (as *B. glandulosa*), Aug. 5, 1901, *Robinson*, August 13, 1902, *Pease*, no. 445, July 31, 1926, *Pease*, no. 19,828; Oakes Gulf, Mt. Washington, July 4, 1878, *Faxon* (as *B. glandulosa*), July 8, 1895, *Kennedy*, *Williams;* Oakes Gulf, *Eggleston*, no. 2376 (as *B. odorata*, var. *tortuosa*); 5-mile post on Carriage Road, Mt. Washington, July 27, 1886, *Faxon* (as *B. glandulosa*), *Greenman*, no. 1088 (as *B. glandulosa*), *Pease*, no. 10,532; "Cape Horn", Mt. Washington, June 24, 1898, *Williams*, *Robinson*, no. 955; Lake of the Clouds, Mt. Washington, July 4, 1878, *Faxon* (as *B. glandulosa*), *Pease*, no. 446; near Duck Fall, Low & Burbank Grant, *Pease*, no. 14,160; Nowell's Ridge, Low & Burbank Grant, *Pease*, no. 12,316; Ice Gulch, Randolph, *Pease*, nos. 10,750 ("trees 2 ft. high"), 16,707; upper rocky slopes of Mt. Lafayette, *St. John*, no. 439. NEW YORK: summit of Mt. McIntyre, alt. 4800–5000 ft., *House*, no. 9488. ONTARIO: Hasey Island, Moose River, James Bay, *D. Potter*, no. 804. PLATE 963, FIGS. 1–7.

Betula minor closely simulates the Arctic Eurasian and Greenland shrub, there passing as *B. alba*, var. *tortuosa* (Ledeb.) Schneider or *B. odorata* Bechst., var. *tortuosa* (Ledeb.) Lange or *B. tortuosa* Ledeb. (PLATE 963, FIG. 11). That shrub, however, apparently an arctic extreme of *B. alba*, has the samaras elliptic to obovate (as long as or longer than broad) with wings about equaling the narrow achene. *B. minor*, on the other hand, has the broadly subreniform samaras definitely broader than long, the wings as broad as or broader than the broadly elliptic achene. A great number of specimens (through my original sin) have been misidentified as the Siberian *B. microphylla* Bunge, but that poorly understood species seems to be unlike anything American (see discussion under *B. borealis*). As for its relationship to *B. papyrifera*, *B. minor* has, somewhat naturally, been inferred to be merely a dwarfed alpine or subarctic extreme of the tree of lower altitudes and more favorable climatic conditions. Examination of the two, however, brings out several important characters. In *B. papyrifera* (PLATES 964, 965 and 967–972) the vigorous young shoots are pubescent; in *B. minor* glabrous but often so gummy as to be mistaken for those of *B. glandulosa*. In *B. papyrifera* the expanding leaves are pubescent beneath, the mature ones with traces of pubescence beneath, at least in the axils of the veins. In *B. papyrifera* the bracts of the pistillate aments (except in vars. *macrostachya* and *cordifolia*) have broad and widely divergent lateral lobes; in *B. minor* the lateral and terminal lobes are of about the same breadth and porrect. Although the lateral lobes of *B. papyrifera*, vars. *macrostachya* (PLATE 968) and *cordifolia* (PLATE 970) are porrect, the bracts are much longer than in *B. minor* and the other characters sufficiently different: both with pubescent new shoots and young foliage, var. *macrostachya* with mature fruiting aments 1.3–2 cm. thick, the samaras 5–6 mm. broad; var. *cordifolia* similar but with definitely cordate leaves; *B. minor* glabrous from the first, often gummy, with very short staminate and fruiting aments, the latter at most 9 mm. thick, and samaras averaging 4.6 mm. wide.

5. B. ALBA L. Sp. Pl. 982 (1753), in part; emend. Roth, Tent. Fl. Germ. i. 404 (1788); Schneid. Handb. Laubholzk. i. 116 (1904); Rendle & Britten in Journ. Bot. xlv. 441 (1907). *B. alba, α. vulgaris* Ait. Hort. Kew. iii. 336 (1789). *B. pubescens* Ehrh. Beitr. v. 160 (1790), *nomen only*, vi. 98 (1793—on title page as 1791). *B. tomentosa* Reitter & Abel, Beschr. und Abbild. Deutschl. selt. wild. Holz.-Art. 17, t. 15 (1803).—Introduced from Europe; naturalized on roadsides, in thickets and at borders of woods, Newfoundland to Pennsylvania, west to Michigan.

Although this characteristic European species is passing in this country as *B. pubescens* Ehrh. (1793) it is clear, I think, that we should retain for it the name *B. alba* L. (1753), as emended by Roth (1788) and as taken up by Aiton (his var. *vulgaris*, as opposed to his var. β. *pendula*). Roth properly split the bipartite *B. alba* of Linnaeus in 1788 into what he considered true *B. alba* and the newly segregated *B. pendula*. Except to those who, following the very simple but also very doubtful Germanic practice of rejecting all Linnean names of European species if they included what are now considered two or more species, the case seems quite clear. *B. alba* in the sense of Roth, who first made the split, and of Aiton, who, the next year, split the species into its two primary elements (as varieties) was thus retained by those very keen students of nomenclature, Schneider in Vienna and Rendle & Britten in London.

If we should apply to North American species of Linnaeus the Germanic idea of rejecting all of his names, which were used for two or more specific elements but which Linnaeus supposed to be conspecific and to both of which the original Linnaean name has been frequently applied, the havoc would be amazing and futile. An embarrassingly large number of the American species of Linnaeus, to say nothing of Old World species from the Orient, were hopeless confusions. Nevertheless, we try to typify them by singling out the element most definitely seeming to be what he primarily intended; or we accept the first clear breaking of the mixture into its primary elements. In case of *Betula alba* the bipartite species was clearly separated into its two primary elements by Roth in 1788. Unless someone earlier segregated them under different names, Roth's typification of *B. alba* should stand.

The name *Betula tomentosa* and that of one of its authors, Reitter (or Reiter) have made endless trouble for those who merely compile from others rather than check the original sources. Thus, from the statement in Dippel, Handb. Laubholzk. ii. 174 (1892), a work in which the illustrations (and apparently the bibliography), right or wrong, were copied from others, we find under *B. alba*, subsp. *pubescens* the following bibliography: "Bet. pubescens Ehrh. Beitr. z. Naturk. VI. S. 98. 1793. . . . Bet. tomentosa Reitter u. Abel Abbild. d. 100 wild. deutsch. Holzart. I. 17. 1790." If Dippel's bibliography were correct, the name *B. tomentosa* ("1790") would obviously antedate *B.*

pubescens (1793). This, however, is not the case. It is simply one of the many errors which the incorrect citations of Reitter & Abel have started.

In the first place, the name of the first of the two authors has been so misinterpreted that one wonders if later authors have ever taken the trouble to look up the books. Thus, in Index Kewensis he appears as Retz[ius]. Von Hayek, Fl. Steyerm. i. 105 (1908), swallowed without evident choking the predigested date, 1790, and displaced *B. pubescens* (1793) by *B. tomentosa* "Reith et Abel"; and Schneider, Ill. Handb. Laubholzk. ii. 886 (1912) also said "Reith et Abel". Ascherson & Graebner, Syn. iv. 398, got nearer the facts as to the first author but by omitting a period made the authors and the place of publication erroneously appear as "Reitt u. Abel Abb. 100 wild. Holzart. I. 17 (1790)." Even the very careful Bradley Bibliography called them Reiter & Abel in vol. i. 370, but one looks in vain for them under Reiter in the Index, for there (vol. iv. 716) they are entered only under Reitter.

The author himself (or his editors, collaborators or publishers) was doubtful as to his own name. There were two quite different books by the pair of authors. In the citations by later authors these have been hopelessly confused. These books were

1. Abbildung der Hundert deutschen wilden Holz-Arten, etc. Stuttgart. 1790. With colored plates. The authors given as Reitter und Abel and the first author's name spelled in the dedication very definitely "Reitter". The somewhat altered second edition, with the dedication and much of the introductory matter omitted, the plates uncolored, came out in 1805. Here he appears as "Reiter".
2. Beschreibung und Abbildung der in Deutschland seltener wildwachsenden und einiger bereits naturalisirten Holz-Arten, etc. Stuttgart. 1803. The authors given as Reiter und Abel.

No. 1 alone was caught by Pritzel's Thesaurus. Since no. 2 was evidently unknown to Pritzel it must be very rare. I have, fortunately, been able to consult them both, as well as the 2nd edition of no. 1, at the Arnold Arboretum; and the Librarian, Mrs. Schwarten, kindly refers me to the biography of Johann Daniel Reitter in Hess, Lebensbilder, 287 (1885), the biographer there listing book no. 1, Abbild. Hundert deutsch. wild. Holz-Art., but not no. 2, Beschreib. und Abbild. Deutschl. Holz-Art. Now, when both these works are examined it will be found that in no. 1, Abbild. Hundert deutsch. wild. Holz-Art., there is no

Betula tomentosa. The only true Birch there is on p. 7 (not 17), "XV. *Kupfertafel.* Die *Birke.* Wonnerbaum. Betula alba"; while plate 15 has merely the text "*Betula alba. Die Birke*". Dippel, von Hayek and others who have started *B. tomentosa* there have obviously been mistaken.

In work no. 2, Beschr. und Abbild. 17 (1803) there is a detailed account of *Betula tomentosa*, the "wohlriechende Birke" and t. 15 shows it in color, also as *B. tomentosa.* That, however, was in 1803, not in 1790, so that for those who maintain *B. pubescens* as a species the name *B. tomentosa* offers no competition. The rarity of Reitter & Abel's Beschr. und Abbild. (1803) is further indicated by the absence of a reference to its plate 15 in Index Londinensis. Plate 15 of the Abbildung (1790) is there correctly cited under *B. alba.*

6. B. PAPYRIFERA Marsh. Arb. Am. 19 (1775). *B. papyracea* Ait. Hort. Kew. iii. 337 (1789). *B. alba*, δ. *papyrifera* Spach in Ann. Sci. Nat. Bot. sér. 2, xv. 188 (1841); Regel in Nouv. Mém. Soc. Sci. Nat. Mosc. xiii. 81—repr. Mon. Bet. 23—t. v. fig. 5–16 (1861). *B. alba* sensu Fernald in Am. Journ. Sci. ser. 4, xiv. 169 and 190, in small part (1902).—Highly variable; represented in eastern North America by the following varieties and forms,

a. Leaves merely rounded to tapering at base....*b.*
- *b.* Bracts of pistillate aments 3-lobed; peduncle usually shorter than fruiting ament; the latter 2.5–6.5 cm. long....*c.*
  - *c.* Mature fertile bracts 3.5–7 mm. long, with divergent lateral lobes; samaras 3.5–5 mm. broad....*d.*
    - *d.* Branchlets spreading or ascending, not strongly drooping; leaves of fertile branches broadly ovate, mostly rounded at base; pistillate aments mostly solitary on the spurs....*e.*
      - *e.* Bark of trunks of fruiting trees (or shrubs) creamy- to pinkish-white, very soon exfoliating.
        - Leaves membranaceous to firm, hardly lustrous ..... *B. papyrifera* (typical).
        - Leaves thick and leathery, lustrous above.....Forma *coriacea.*
      - *e.* Bark of fruiting trunks warm-brown, only on oldest bases with smooth outer brown layer exfoliating ..... Var. *commutata.*
    - *d.* Branchlets pendulous; leaves of fertile branches narrowly ovate to ovate-lanceolate, only slightly rounded to gradually tapering to petiole; pistillate aments often in fascicles of 2–4 on the spurs........Var. *pensilis.*
  - *c.* Mature fertile bracts 7–10 mm. long, with ascending lateral lobes; samaras 6–8 mm. broad; leaves ovate, with rounded bases; fruiting aments solitary or paired.
    - Peduncles of fruiting aments 0.5–1.5 cm. long, many times shorter than ament..................Var. *macrostachya.*
    - Peduncles 2–3 cm. long, one half to essentially as long as pendulous ament...........................Forma *longipes.*

b. Bracts unlobed or with merely rudimentary lateral lobes, elliptic-oblong; pistillate aments 1.5–2 cm. long, about equaled by arched-recurving peduncle; leaves rhombic-oval, dentate.......................................Var. *elobata.*

a. Leaves definitely cordate at base; bracts of mature pistillate aments 5–10 mm. long, mostly with ascending lobes; bark of mature trunks warm-brown to creamy- or pinkish-white Var. *cordifolia.*

B. papyrifera, typical.—Woods, especially on slopes, Labrador to Alaska, south to Newfoundland, Nova Scotia, New England, New York, upland of Pennsylvania and West Virginia, northern Ohio, northern Indiana, northern Illinois, northern Iowa, South Dakota, etc. Plate 964.

Forma coriacea Fernald & Wiegand in Rhodora, xxv. 209 (1923)—Dunes of Lake Ontario, New York.

Var. **commutata** (Regel), comb. nov. *B. occidentalis* Hook. Fl. Bor.-Am. ii. 155 (1839) as to specimen from *Scouler* only, not as to other specimens and detailed description; sensu Lyall in Journ. Linn. Soc. vii. 134 (1864); sensu Sargent in Bot. Gaz. xxxi. 237 (1901); not Hook. l. c. as to detailed descr. (1839), nor Nutt. N. A. Syl. i. 23, pl. 7 (1853), nor S. Watson in Bot. King Report—U. S. Geol. Expl. 40th Parallel, v. 323, pl. xxxv (1871), nor Sargent, Sylva, ix. 65, pl. ccccl v (1896), nor S. Wats. Bot. Calif. ii. 79 (1880). *B. alba,* subsp. *occidentalis* (Hook.) Regel, β. *commutata* Regel in Bull. Soc. Nat. Mosc. xxxviii. 401 (1865)—repr. as Bemerk. Gatt. Bet. Aln. 14, pl. 7, figs. 6–10 (1866) and in DC. Prodr. xvi². 166 (1868), as to type from Sumass Prairie, *Lyall. B. papyracea,* var. *occidentalis* sensu Dippel, Handb. Laubholzk. 177 (1892). *B. Lyalliana* Koehne in Mitt. Deutsch. Dendr. Gesellsch. 1899: 53 (1899), *nomen only. B. alba,* forma *occidentalis* sensu Fernald in Am. Journ. Sci. ser. 4, xiv. 173 and 190 (1902), not *B. occidentalis* Hook. basonym. *B. papyracea Lyalliana* Koehne ex Schelle in Beisner, Schelle & Zabel, Handb. Laubh.-Ben. 55 (1903). *B. papyrifera,* var. *Lyalliana* (Koehne) Schneid. Ill. Handb. Laubhk. i. 115 (1904), based on "*B. occidentalis* Lyall, in Jour. Lin. Soc. VII. 134. *1864,* ex parte, non Hook." *B. papyrifera,* var. *occidentalis* sensu Sargent in Journ. Arn. Arb. i. 63 (1919), not *B. occidentalis* Hook. basonym.—Woodlands near the coast, Labrador to northeastern Massachusetts; western North America south to Oregon. Plate 965.

In 1902 I pointed out that the character of permanently close and dark bark, which Sargent (1901) took as the single *specific* character of the tall tree of the Pacific slope, "perhaps the largest of all birch-trees" (Sargent, l. c. 238), breaks down in the West and that in the East trees, otherwise inseparable from *B. papyrifera,* may have the bark permanently quite as dark as in the tree of Puget Sound and the lower Fraser River. Subsequently I have seen forests in Newfoundland and at the tip of the Gaspé Peninsula where the large trunks (up to 9 dm. in diameter) were covered with smooth deep-brown bark. In the oldest trees, however, the dark bark of the base of the trunk (up to 2 or 3 m.) will sometimes exfoliate and there leave perfectly characteristic exfoliating pale bark (PLATE 965, FIGS. 2 and 3) of typical *B. papyrifera.* One of the southernmost stations in the East seems to be on Cape Ann, large brown-barked shrubs loaded with fruit, near granite-quarries back of Bayview, Gloucester, where it was collected in August, 1944, by Miss Elizabeth Johnston. It might be thought that it was long ago recorded from Essex County, for the three specimens cited by Regel of his *B. alba,* subsp. *occidentalis,* β. *commutata* were from "Sumass Prairie (Lyall), Topsfield, Massachusetts (Asa Gray), Oregon (Lyall). The Topsfield specimen, labelled by Regel as above, was distributed by William Oakes as *B. papyracea;* Asa Gray merely sent it on loan to Regel. There is no note regarding the bark of the trunk; apparently Oakes did not see anything unusual in it. The Lyall specimen from Sumass Prairie is the TYPE of var. *commutata.*

Hooker, Nuttall, Torrey, Sereno Watson and many other careful students of the past correctly understood Hooker's rather vivid description of *Betula occidentalis.* Unfortunately, however, Hooker originally complicated matters by first citing a specimen from "Straits of De Fuca. *Dr. Scouler*", although his description was, it seems to me and to several field-botanists who know both trees, based almost entirely on the characteristic shrub or small tree of the Rocky Mountain region, west to the drier slopes of British Columbia, Washington, Oregon and California, the species which Sargent, l. c. 239 (1901) renamed *B. fontinalis.* These two trees are abundantly distinct but I am unable to follow Sargent's reasoning, except that in 1901 he was following the now abundantly discredited principle of neglecting, if it happened to disagree, the description and taking as type the first cited specimen, in this case the Scouler specimen from the Straits of Juan de Fuca. In doing so, however, he saw in Hooker's description more elements of that species than I can find and consequently set off the cordilleran *B. fontinalis.* He stated that the specimens cited by Hooker came from three different trees:

First, *Betula papyrifera* Marsh . . .

Second, the large tree which grows on the lower Fraser river, on the shores and islands of Puget sound, and on Vancouver island (PLATE 965, FIGS. 1 and 4–6). This tree has . . . pubescent branchlets, . . . leaves pubescent on the lower surface, . . . Specimens of this tree, which is perhaps the largest of all birch-trees, were first gathered on the shores of the straits of Fuca by Dr. John Scouler . . . The tree from the straits of Fuca appeared first in the description of *Betula occidentalis which was evidently drawn principally from the specimen of that tree* [italics mine], and must be considered the type of Hooker's species . . .

Third, the half-shrubby dark-barked species . . . which ranges as far south as Colorado, Utah, and northern California. This plant was collected by Nuttall on the Sweetwater . . . and was first described and figured by him as *Betula occidentalis* (*Sylva* **I:** 23. *pl. 7*). Torrey in the Botany of Fremont's Expedition repeats this error. This same species was also described and figured in *King's Rep.* (**5:** 323. *pl. 35*) as *Betula occidentalis* by Watson who repeated his error in the *Botany of California*, and it . . . is described and figured as *Betula occidentalis* in my ninth volume of *The Sylva of North America* . . . our tree, for which I now propose the name of **Betula fontinalis.**

Along with many others I have fallen into the trap and have followed Sargent in calling the cordilleran low tree or coarse shrub *Betula fontinalis*. This course, as already stated, ignores the very definite description given by Hooker:

3. *B. occidentalis;* ramis rufo-fuscis copiose resinoso-verrucosis, foliis late rhombeo-ovatis sublobatis grosse inciso-serratis sub lente appresso-hirsutulis v. nudis subtus pallidioribus epunctatis, nervis paucis remotis, amentis foem. lato-cylindraceis, squamis lobis ovato-oblongis lateralibus decurvo-falcatis intermedio longiore.

HAB. Straits of De Fuca. *Dr. Scouler.* Near springs on the west side of the Rocky Mountains. *Douglas;* and on the east side, from the mountains to Edmonton House. *Drummond.* One specimen is in the collection from the Arctic coast* (?) *Dr. Richardson*—This Birch does not agree with any described species, and it is probably confined to the west coast, and to the immediate vicinity of the Rocky Mountains, forming a low, small brush-wood, 6–10 feet high, and never exceeding a few inches in the diameter of its trunk. Mr. Drummond considered it to be the *B. nigra*, but its bark and leaves are quite different; [Then a statement of characters of *B. nigra*]. The main branches are erect, and somewhat virgate, clothed with a red-brown bark, a little inclining to purple, copiously sprinkled with resinous warts in all the specimens. Petioles ½ to ¾ of an inch long, adult leaves 2–2½ inches, broadly ovato-rhomboid, rather acute than acuminate, of a harsh and dry but not thick texture, slightly lobed at the margin, and inciso-serrate, the serratures coarse and sharp, paler beneath, but never, either in the old or younger state, dotted. Male catkins resembling those of the preceding [*B. papyrifera*], 1–2 inches long.

"* There has probably been some mistake in the station of this."

In the two following paragraphs I have quoted the characters as described by Sargent, Man. 204, 205 and 207 (1905) and by Rydberg, Fl. Rky. Mts. 202–204 (1918) of *B. occidentalis* sensu Sargent (i. e. *B. papyrifera*, var. *commutata*) and *B. fontinalis* Sargent (i. e. *B. occidentalis* Hook.); and after each item Hooker's own description in italics. As Bateson used to say, a judicious advocate leaves the conclusion to flow quietly from the evidence.

B. OCCIDENTALIS sensu Sargent (i. e. B. PAPYRIFERA, var. COMMUTATA). "A tree, 100°–120° high, with a trunk 3°–4° in diameter" (*Sargent*); "tree sometimes 30–40 m. high" (*Rydb.*) HOOKER: "*small brush-wood*, 6–10 *feet high, and never exceeding a few inches in the diameter of its trunk*". The "branches often pendulous on old trees, . . . branchlets more or less glandular and coated with long pale hairs when they first appear, . . . marked by numerous minute pale lenticels and pubescent or puberulous during their first winter and nearly destitute of glands" (*Sargent*); "at first pubescent or puberulent" (*Rydb.*) *Hooker:* "*ramis . . . copiose resinoso-verrucosis*", "*The main branches erect, and somewhat virgate, . . . copiously sprinkled with resinous warts on all the specimens*". Leaves "ovate, acute, . . . covered with dark reddish resinous viscid glands, and villous along the midribs and veins, with long white hairs often also in large persistent tufts in the axils of the primary veins, and at maturity thin and firm in texture, marked by the scars of the fallen glands, . . . 3′–4′ long, . . . their petioles stout, glandular, at first tomentose, ultimately pubescent or puberulous, about ¾′ long" (*Sargent*). HOOKER: "*foliis late rhombeo-ovatis . . . sub lente appresso-hirsutulis v. nudis subtus . . . epunctatis*" . . . "*Petioles* ½ *to* ¾ *of an inch long, adult leaves* 2–2½ *inches, broadly ovato-rhomboid, rather acute than acuminate, of a harsh and dry but not thick texture, . . . paler beneath, but never, either in the old or younger state, dotted*". The "staminate aments . . . becoming 3′–4′ long" (*Sargent*). HOOKER: "*Male catkins . . .* 1–2 *inches long.*"

B. OCCIDENTALIS sensu Nuttall, Torrey, Sereno Watson and Sargent's Sylva (i. e. B. FONTINALIS Sargent): "more commonly shrubby, with many thin spreading stems forming open clusters, 15°-20° high; often much lower, and frequently crowded in almost impenetrable thickets" or more rarely "A tree, occasionally 30°-40° high, with a trunk 12′-18′ in diameter" (*Sargent*); "tree occasionally 10–12 m. high, often growing in clumps and shrub-like" (*Rydb.*). HOOKER: "*forming a low, small brush-wood*, 6–10 *feet high, and never exceeding a few inches in the diameter of its trunk.*" Branchlets "much roughened at first by large lustrous resinous glands persistent until the second season" (*Sargent*); "twigs densely glandular-resiniferous", "not hairy" (Rydb.). HOOKER: "*ramis copiose resinoso-verrucosis*", "*branches . . . copiously sprinkled with resinous warts in all the specimens*". Leaves "broadly ovate, acute" with "abruptly wedge-shaped . . . base, and sometimes slightly laciniately lobed, . . . pilose above, and covered by conspicuous resinous glands when they unfold, at maturity thin and firm, . . . 1′–2′ long, . . . petioles . . . ⅓′–½′ long" (*Sargent*); "leaves broadly ovate, usually less than 4 cm. long" (*Rydb.*). HOOKER: "*foliis late rhombeo-ovatis sublobatis grosse inciso-serratis sub lente appresso-hirsutulis v. nudis subtus . . . epunctatis*", "*petioles* ½ *to* ¾ *of an inch long, adult leaves* 2–2½ *inches, broadly ovato-rhomboid, rather acute than acuminate, of a harsh and dry but not not thick texture, slightly lobed at the margin, . . . never, either in the old or younger state, dotted*". Staminate "aments . . . becoming 2′–2½′ long" (*Sargent*); "staminate aments 5–7 cm. long" (Rydb.). HOOKER: "*Male catkins . . .* 1–2 *inches long*".

When we take into account the facts that plenty of mature branches of *Betula occidentalis* (*fontinalis*) have leaves down to ¾ inch long and petioles down to less than ¼ inch in length, while others (*Koehne*, Herb. Dendrol. no. 105; *L. E. Smith*, no. 759; *Muenscher & Maguire*, no. 15,690; *M. E. Peck*, no. 9468; *F. A. Walpole*, no. 323; *Eggleston*, no. 21,998; *St. John*, no. 7655; show blades 2–2½ inches long, while in an extreme variety they may be up to 7 cm. long, it becomes quite clear that in most of his stated characters Hooker was accurately describing the relatively low and often shrubby species which Nuttall, Torrey, Watson and others understood as *B. occidentalis* and which Sargent, without any concrete diagnosis and without designation of type, called *B. fontinalis*.

Returning to *Betula papyrifera*, var. *commutata*, that name started as *B. alba*, subsp. *occidentalis*, var. β. *commutata* Regel in 1865, Regel defining his subsp. *occidentalis*, var. α. *typica* "trunco humili, foliis inciso-sublobatis dentatisque" (i. e., following Hooker's original description), while his var. *commutata* was defined as follows:

> β *commutata* (tab. 7, fig. 6–10); trunco elato, foliis duplicato-dentatis.—Als B. papyracea und papyrifera im Herbarium Asa Grays und Boissiers.—Wächst in Nord-amerika, Sumass Praierie (Lyall), Topsfield, Massachusets (Asa Gray), Oregon (Lyall).
>
> Von der folgenden Unterart [papyrifera] nur durch die gespreizten oder zurück gekrümmten Seitenlappen der Schuppen des Fruchtzäpfchens verschieden.

All three sheets, including the TYPE from Sumass Prairie are before me. In all evident characters they are quite like the tree of the Pacific slope which Sargent took as *B. occidentalis* and they are all easily matched in details by much eastern *B. papyrifera*. The tree of the Fraser River region, including Sumass Prairie, is with reasonable certainty the dark-barked variety, but the Topsfield specimen of William Oakes (not Asa Gray) is, as already explained (p. 313) evidently from the pale-barked and generally commoner eastern *B. papyrifera*. In Lyall's account of "The Lower Fraser River district, which includes the Sumass and Chilukweyuk prairies and other low grounds to the westward of the Cascade Mountains—a moist region", Lyall, in Journ. Linn. Soc. Lond. vii. 131–135 (1864), enumerated from "The banks of the Lower Fraser River . . . *Abies Douglasii*, . . .

Abies Menziesii, . . . *Abies Mertensiana*, . . . *Thuja gigantea*, . . . *Acer macrophyllum*", etc. and then "*Betula occidentalis*, Hook. (a tree growing to the height of 60 or 70 feet [compare Sargent's "100°–120°", also J. K. Henry's "A small or large tree"] and most common about the borders of the forest)". That material was the basis of var. *commutata*. When Schneider published his *B. papyrifera*, var. *Lyalliana*, citing the Lyall account above quoted and the synonym *B. occidentalis* sensu Sargent, not Hooker, he evidently overlooked the earlier name which had been based on the Lyall collections.[1]

[1] The reinstatement of *Betula occidentalis* Hook. necessitates the following new varietal name.

B. OCCIDENTALIS Hook., var. **fecunda**, nom. nov. *Betula*, 3d. described tree in Piper & Beattie, Fl. Palouse Reg. 55 (1901). *B. Piperi* Britton in Bull. Torr. Bot. Cl. xxxi. 165 (1904), as to description, not as to single collection cited. *B. fontinalis*, var. *Piperi* (Britton) Sargent in Journ. Arn. Arb. i. 65 (1919), in part only. PLATE 966.

In their Flora of the Palouse Region Piper & Beattie, with well-understood hesitation, refrained from assigning guesswork names to the three birches of the area. Instead, they described the three in detail but without names. Their third tree was "B. Graceful tree, 8–15 m. tall, with drooping branches: bark dark bronze . . . branchlets . . . very glandular; leaves ovate, obtuse or acute at the base, . . . shining green above, glandular on both surfaces, 2–4 cm. long . . . : pistillate aments cylindrical: 5 cm. long, .5 cm. thick, often flexuous, mostly in twos, . . . Springy hillsides near Almota."

This description was but slightly, though somewhat, changed by Britton, whose *B. Piperi* was the "tree . . . described by Professor Piper as attaining a height of 15 m. and being slender and graceful, with drooping branches" &c., largely a rewriting of the Piper & Beattie description above quoted. But, most unfortunately, the locality of the "Graceful tree, 8–15 m. tall, with drooping branches", "Springy hillsides near Almota", was not given. Instead, Britton cited only a single station: "Type collected by Professor C. V. Piper, July 9, 1901, nine miles south of Pullman, Washington", with the sad result that Piper himself, accepting for the tree which I am calling *B. papyrifera*, var. *commutata* Sargent's misidentification of it as *B. occidentalis* Hook., was forced to reduce *B. Piperi* to its synonymy. Piper's statement follows: "The name *Betula piperi* was meant by its author to apply to the third unnamed species in the Flora of the Palouse Region, but the specimen actually cited is the eastern Washington form of *B. occidentalis* Hook."—Piper, Fl. Wash., Contrib. U. S. Nat. Herb. xi. 218 (1906).

Var. *fecunda* (PLATE 966) is a remarkably definite variety of the western *Betula occidentalis* (*fontinalis*). In its pendulous branches with the tendency to fascicled and slender aments it is strikingly unlike the shrubby and virgate-branched *B. occidentalis* of Hooker's original description, in which the shorter aments are mostly solitary on the spurs. The latter has been so often illustrated that I am here showing only var. *fecunda*. Piper, puzzled by this beautiful tree, sent, unnamed, 14 sheets (under several numbers) to the Gray Herbarium. These were mostly misidentified by me as the Asiatic *B. microphylla*. Under this misidentification of mine Piper in his Flora of Washington, p. 219, wrote: "The Almota specimens form the basis for the third unnamed species in the Flora of the Palouse Region. This is a tall graceful tree with drooping branches, appearing very different from the ordinary form of *B. microphylla*, and probably distinct from it." As TYPE of var. *fecunda* I am designating *Piper*, no. 1642 in the Gray Herbarium.

Although the leaves of var. *fecunda* were described by Piper as 2–4 cm. long, his material was all rather young. Material from slightly to the southwest, Columbia Co., *St. John, Davison & Scheibe*, no. 6939, has leaves 5–7 cm. long.

Var. **pensilis,** var. nov. (tab. 967), ramulis pendulis; foliis angusto-ovatis vel ovato-lanceolatis basin versus plerumque angustatis vel vix rotundatis; amentis foemineis solitariis vel 2–4-fasciculatis; bracteis 5.5–7 mm. longis, lobis lateralibus rhomboideis vel late oblongis divergentibus. *B. alba* var. *glutinosa* sensu Fernald in Am. Journ. Sci. ser. 4, xiv. 176 (1902), not Trautv.—Locally abundant, Newfoundland to western Quebec, south to Nova Scotia, Maine, Massachusetts and northern New York. Newfoundland: high tableland, Holyrood, Aug. 1, 1931, *Agnes M. Ayre;* Buchan Junction, July 19, 1930, *K. P. Jansson.* Quebec: Rivière du Brick, Anticosti, *Victorin & Rolland*, no. 27,773; thickets and borders of woods near mouth of Marsouin River, Gaspé Co., *Fernald & Pease*, no. 25,017; head of l'Anse aux Bouleaux, Bic, Rimouski Co., July 6–10, 1905, *Williams, Collins & Fernald;* Bic, July 17, 1905, *J. R. Churchill;* east side of Lac Tremblant, Terrebonne Co., July 21, 1922, *Churchill;* near Georgeville, Lake Memphremagog, Aug. 12, 1914, *Churchill.* Nova Scotia: "small tree 10 ft. high, branches drooping", banks of Lahave R., Bridgewater, *J. G. Jack*, no. 3510. Maine: tree by road to Leighton Pond, Pembroke, July 10, 1909, *Fernald* (type in Herb. Gray.); by Wassataquoik River between Roebar's and Dacy Dam, Piscatquis Co., July 17, 1900, *Fernald.* Massachusetts: large tree by Charles River, Newton Lower Falls, July 23, 1912, *Wiegand.* New York: banks of Cascade Lakes, Essex Co., *House*, no. 7640; mountain-side, alt. 1800 ft., near Minerva, Essex Co., *House*, no. 14,887; Stony Island 2, west end of Black Lake, St. Lawrence Co., *Muenscher & Maguire*, no. 2168.

Var. *pensilis* is very striking, not only as a "weeping" birch but on account of the mostly acute-based leaves and the very abundant fruiting aments. In 8 of the sheets before me they are often clustered on the spurs in fascicles of 2–4.

Var. **macrostachya,** var. nov. (tab. 968, fig. 1–3), ramulis divergentibus vix pendulis; foliis ovatis basi rotundatis; amentis foemineis solitariis vel binis, maturis 3.5–5.5 cm. longis 1–2 cm. crassis pedunculatis; pedunculis arcuato-recurvatis 0.5–1.5 cm. longis; bracteis 7–10 mm. longis, lobis lateralibus rhomboideis porrectis vel adscendentibus; samaris 6–8 mm. latis.—Local, northern Newfoundland to Rimouski County, Quebec, south to Nova Scotia and northern Maine. Newfoundland: rich thickets on lower slopes of Ha-Ha Mt., Ha-Ha Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,065; thickets and glades, slopes of Cape Dégrat, Quirpon Island, Straits of Belle Isle, *Fernald & Long*, no. 28,067. Quebec: cold northerly calcareous walls of Grande Coupe, Percé, Gaspé Co., *Fernald & Collins*, no. 1000; bois près de la mer, Bic, Rimouski Co., *Victorin & Rolland*, no. 49,461. Nova Scotia: dry mixed woods, Hectanooga, Digby Co., July 31, 1920, *Long & Linder*, no. 21,007 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). MAINE: in disintegrated volcanic rock, Haystack Mt., Aroostook Co., July 11, 1902, *Williams, Collins & Fernald.*

In its very large aments, bracts and samaras var. *macrostachya* stands midway between typical *Betula papyrifera* and var. *cordifolia.* It is also intermediate in the tendency of its pistillate bracts to have the porrect lateral lobes of the latter, but sometimes nearly or quite horizontal as in the former. Its leaves are like those of typical *B. papyrifera,* without the cordate base so characteristic of var. *cordifolia.* Were it not for this transitional var. *macrostachya,* it would be reasonable to look upon var. *cordifolia* as a fairly distinct species, the status originally given it by Regel.

Var. MACROSTACHYA, forma **longipes,** f. nov. (TAB. 968, FIG. 4), pedunculis 2–3 cm. longis, amentis fructiferis pendulis.—Gaspé Peninsula, QUEBEC: woods, Malbaie, Gaspé Co., *Pease,* no. 6025A, as var. *cordifolia;* mossy meadows and woods at 455 m. (1500 ft.)—915 m. (3000 ft.) in the great basin [Fernald Basin] under the north slope of Mt. Logan, Matane Co., July 22, 1922, *Fernald & Pease,* no. 25,019 (TYPE in Herb. Gray.).

Very striking in its long drooping peduncles often essentially as long as the pendulous aments.

Var. ELOBATA (Fernald) Sargent in Journ. Arn. Arb. i. 63 (1919). *B. alba,* var. *elobata* Fernald in RHODORA, xv. 169 (1913).—Known only from the type-locality in QUEBEC: crevices and talus of serpentine along Ruisseau à la Neige, Mt. Albert, Gaspé Co., *Fernald & Collins,* no. 531. PLATE 969.

It is not improbable that var. *elobata,* when mature fruiting material is secured, may prove to be an endemic species. In its subrhombic and dentate leaves, suggestive of those of *B. nigra* L., and in its very short pendulous pistillate aments with unlobed or only obsoletely lobed bracts, it is very distinct. Unfortunately, the material, collected in an alpine area and only slightly past anthesis in July, does not show mature samaras. The type-colony is near the head of one of the northwestern tributaries of Ruisseau à la Neige, as it abruptly descends the cañon-wall, not far below the serpentine tableland (alt. about 3500 ft.). Under it grow *Polystichum mohrioides,* var. *scopulorum* (D. C. Eaton) Fernald, in its only known area east of local stations in Idaho, while close-at-hand are the type-areas of the endemic or near-endemic *Salix chlorolepis* Fernald, *S. hebecarpa* Fernald, *Arenaria marcescens* Fernald and *Solidago chlorolepis* Fernald, and endemic or disjunct varieties in *Salix*, *Statice* and *Cnicus*. It is important to secure the fruit of *Betula papyrifera*, var. *elobata*.

Var. cordifolia (Regel) Fernald in Rhodora, iii. 173 (1901), by inference only; Rehder, Man. Cult. Trees and Shrubs, 141 (1927). *B. cordifolia* Regel in Nouv. Mém. Soc. Nat. Mosc. xiii. 86—repr. as Mon. Bet. 28, t. 12, figs. 29–36 (1861). *B. alba*, subsp. *papyrifera*, β. *cordifolia* (Regel) Regel in Bull. Soc. Nat. Mosc. xxxiii. 401 (1865)—repr. as Bemerk. Gatt. Bet. Aln. 14 (1866) and in DC. Prodr. xvi². 166 (1868). *B. papyracea*, a *cordifolia* (Regel) Dippel, Handb. Laubholzk. ii. 177 (1892). *B. alba*, var. *cordifolia* (Regel) Fernald in Am. Journ. Sci. ser. 4, xiv. 177 and 190 (1902). *B. papyracea cordifolia* (Regel) Scheele in Beisn., Scheele & Zabel, Handb. Laubh. Benen. 55 (1903). *B. papyrifera*, var. *communis*, f. *cordifolia* (Regel) Schneid. Handb. Laubholzk. i. 115 (1904).—Labrador to Algoma District, Ontario, south to Newfoundland, Nova Scotia, New England (rare southward), northern New York, Michigan, Wisconsin and northern Iowa; high altitudes on Blue Ridge, North Carolina. Plate 970.

In its firm and definitely cordate leaves, its long bracts with mostly porrect lobes and its large samaras *Betula papyrifera*, var. *cordifolia* might merit the specific rank originally given it by Regel; but, as already noted, var. *macrostachya*, with leaves merely rounded and not cordate at base, exactly bridges the gap between it and typical *B. papyrifera*. With its very long bracts with mostly porrect (instead of horizontally divergent) lobes it is certainly a well marked geographic variety, which in the western half of the continent is replaced by var. *subcordata* (Rydb.) Sargent. Rare in southern New England and not known south of the Adirondack region in New York, this is the only variety of *B. papyrifera* known on the high mountains of North Carolina. In discussing its discovery and abundance at 5500–6200 ft. altitude, "in the spruce and balsam forest", "about 550 miles" south of its supposed southern limit (in Massachusetts and Connecticut), Ashe in Rhodora, xx. 63, 64 (1918) quoted various northern botanists, some of whom (Britton and Blanchard) regarded it a good species, others (Sargent and Burns, besides the present writer) recognizing intergradient trees; and be concluded: "The fact that the cordate [-leaved] form alone occurs in North Carolina, and that there its leaf-form is strongly marked and without indication of variation—foliage was examined from more than 100 trees—would at least seem to give it excellent varietal if not specific characterization."

In his original publication of *Betula cordifolia* Regel cited it as in "Novaja Semlaja von Hr. de la Tylaie im Jahre 1826 gesammelte" and compared it with the Asiatic *B. Ermani* Chamisso, arguing for its specific separation since "dass B. Ermani bis jetzt aus Novaja Semlaja noch nicht bekannt ist". Bearing in mind that Novaja Semlaja is the Russian equivalent of Terre-neuve, where Bachelot de la Pylaie (not "Tylaie") spent so many years in botanizing, the intent is obvious. In fact, Regel got the type-locality straightened in his later treatments, where he correctly gave it as "Terra nova (de la Pylaie . . .)."

A small-leaved northwestern variety of *Betula papyrifera*, which may be expected to cross the plains into Minnesota, has leaves in outline resembling those of *B. pendula*. This is

B. papyrifera Marsh., var. **humilis** (Regel) Fernald & Raup, comb. nov. *B. alba*, subsp. *papyrifera*, var. γ *humilis* Regel in DC. Prodr. xvi. 166 (1868), in part (descr. and Bourgeau specimen from Saskatchewan). *B. alaskana* Sargent in Bot. Gaz. xxxi. 236 (1901), not Lesq. (1883). *B. neoalaskana* Sarg. in Journ. Arn. Arb. iii. 206 (1921). *B. papyrifera*, var. *neoalaskana* (Sarg.) Raup, Contrib. Arn. Arb. vi. 152 (1934). Plates 971 and 972.

Betula alba, subsp. *papyrifera*, γ. *humilis* was based primarily on a sheet in the Gray Herbarium, collected by Bourgeau in 1857–8 in Saskatchewan ("Bords de la rivière Castor"). This sheet (our plate 971, figs. 1–4) bears Regel's annotation. Although Regel followed this with citation of Parry and Hall & Harbour specimens, which are of *B. occidentalis* Hook. (*B. fontinalis* Sarg.) and the type of Tuckerman's *B. papyracea*, var. *minor* (*B. minor*) from the White Mts., his description, "folia . . . juniora petiolique saepe pubescentia, . . . subtus ad nervos tantum pilosula. Samararum alae nucula usque triplo latiores", definitely applies to the *Bourgeau* sheet. It can not apply to *B. minor*, for the branchlets and leaves of that more eastern shrub are strictly glabrous and the wings of its samaras are never "nucula usque triplo latiores". Nor could the glabrate branches of Regel's "Ramuli . . . glanduliferi v. juniores pubescentes, dein glabrati" apply to either *B. minor* or *B. occi-*

dentalis, both of which have glabrous branchlets; the "juniores pubescentes, dein glabrati" belongs also to the Bourgeau element. Since this Saskatchewan specimen, clearly labelled by Regel as his *B. alba*, subsp. *papyrifera*, var. *humilis*, agrees with his description in the more diagnostic characters, whereas the Rocky Mountain specimens (*Parry* and *Hall & Harbour*) as well as the White Mountain one (*Tuckerman*) already had legitimate names, we see no way but to take up the name var. *humilis* for the Saskatchewan element primarily described.

There is a second sheet of Bourgeau's Saskatchewan material (1858) in the Gray Herbarium. This one (PLATE 972, FIG. 1) has had a checkered career. In his Bemerkungen über die Gattungen Betula und Alnus, Bull. Soc. Nat. Mosc. xxxviii. 398 (1865)—repr. 11 (1866)—Regel published under the strictly Eurasian *Betula alba*, subsp. *verrucosa*, a var. *resinifera*, based exclusively on a Middendorf specimen from eastern Siberia. In DeCandolle's Prodromus, xvi^2. 164 (1868), however, although otherwise holding his *B. alba*, subsp. *verrucosa* strictly to Eurasia, he cited under var. *resinifera* a single North American specimen: "in America boreali-occidentali ad Saskatchevan (Palliser)". This specimen, *Bourgeau*, 1858, on the Palliser Expedition (Gray Herb.), was originally distributed as *B. papyracea* but it bears Regel's annotation as above. A portion of it is shown in PLATE 972, FIG. 1. The significant point in connection with this second *Bourgeau* (*Palliser*) sheet is that Sargent, describing his *B. alaskana*, selected it as the first specimen to be cited under his new specific name: "Saskatchewan, *E. Bourgeau*, 1858 (in Herb. Gray); near Prince Albert in latitude 53, July 1876, *John Macoun* [our PLATE 971, FIG. 5 and 972, FIGS. 2 and 3]; northwestward, reaching the Alaskan coast", etc. Of this *Bourgeau* specimen Sargent wrote: "The specimen in Herb. Gray collected by Bourgeau in flower on the Saskatchewan was referred by Regel (*Bull. Mosc.* **18**: 398; *DC. Prodr.* **16**^{2}: 164) to his *Betula alba*, subspecies *verrucosa* δ *resinifera*". The fact that, in spite of Sargent's statement, Regel did not mention the Bourgeau specimen in his first publication (Bull. Mosc.) but only in the second (DC. Prodr.) is significant; otherwise it might be involved in the typification of his *B. alba*, subsp. *verrucosa*, var. *resinifera* which, fortunately, was based solely on the Middendorf material.

The name *B. alba*, subsp. *papyrifera*, var. *humilis* has the right-of-way.

7. B. BOREALIS Spach in Ann. Sci. Nat. sér. 2, xv. 196 (1841). *B. pumila*, γ. *borealis* (Spach) Regel in Nouv. Mém. Soc. Nat. Mosc. xiii. 113—repr. Mon. Bet. 55, t. 13, figs. 38 and 39 (1861) and in DC. Prodr. xvi^2. 173 (1868). *B. alba*, var. *carpatica* sensu Fernald in Am. Journ. Sci. ser. 4, xiv. 179 and 190 (1902) in part only, not *B. carpatica* Wald. & Kit. *B. microphylla* sensu Eames and sensu Fernald, as quoted by Eames, in RHODORA, xi. 93 (1909), not Bunge.—Southern Labrador to James Bay, Ungava, south, chiefly on calcareous or magnesian soils to Newfoundland, Anticosti Island and Gaspé Peninsula, Quebec, and very rarely to Cape Breton and to northern Vermont.—Since this characteristic and very definite northeastern species has not been understood during the full century since Spach very clearly described it as "Legit cl. de Lapylaie, in insulâ Terrae-Novae" (this later rendered by Regel "von Herrn de la Tylaie in Novaja Semlaja gesammelt"), it is important to cite and illustrate good material (all, unless noted, distributed erroneously as *B. microphylla* Bunge). LABRADOR: common on many barrens and hillsides, Backway, off Lake Melville, *R. H. Wetmore*, no. 102,930. NEWFOUNDLAND: 1 m. high, peaty limestone barrens, southern half of Burnt Cape, Pistolet Bay, *Fernald & Long*, no. 28,070; cool springy glade, Burnt Cape, *F. & L.*, no. 28,075; limestone barrens on the Highlands northeast of Big Brook, Straits of Belle Isle, *Fernald, Wiegand & Hotchkiss*, no. 28,072; shrubs 1–2 m. high, spruce woods and thickets bordering limestone barrens, Brig Bay, *Fernald, Long & Dunbar*, no. 26,596; spruce woods and thickets, St. Barbe, *F. L. & D.*, no. 26,595; 1–2 m. high, thickets along East Brook, St. Barbe Bay, *Wiegand & Hotchkiss*, no. 28,080; slaty gorge of brook below serpentine barrens above Woody Point, Bonne Bay, *R. H. Kimball*, no. 117; 1–2 ft. high, quartzite gravel and talus, Killdevil, *Fernald, Long & Fogg*, no. 1636; gravelly beach, Middle Birchy Pond, Eastern Drainage of Humber R., *Fernald & Wiegand*, no. 3247 (as *B. alba*, var. *carpatica*); coarse shrub, southerly slopes of dry serpentine ridge, North Arm, Bay of Islands, *Long & Fogg*, nos. 217 and 219; dry thicket on exposed slope at about 1650 ft., Blow-me-down Mt., *Eames & Godfrey*, no. 6033; serpentine and magnesian limestone barrens, northeastern base and slopes of Blomidon ("Blow-me-down") Mts., *Fernald & Wiegand*, nos. 3245 (as *B. alba*, var. *carpatica*) and 3246; large shrubs, dry limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mt., Port-à-Port Bay, *Fernald & Wiegand*, no. 3250 (as *B. alba*, var. *carpatica*), also *Fernald & St. John*, no. 10,827; coarse shrub, thickets on gneiss ledges along Grandy Brook, Distr. of Burgeo and La Poile,

Fernald, Long & Fogg, no. 218; springy and boggy places in river-gravel, Gander R., Glenwood, *Fernald & Wiegand*, no. 5308 (as *B. alba*, var. *carpatica*); gravelly river-bank, Glenwood, *F. & W.*, no. 5309 (as *B. alba*, var. *carpatica*). Quebec: 4 ft. high, rocky crest, Pointe au Maurier, Charnay, Saguenay Co., *St. John*, no. 90,385; granite hills, Mingan, *St. John*, no. 90,384; limestone sea-cliffs, Ile Ste. Généviève, Mingan Ids., *St. John*, no. 90,830; sur les rivages calcaires près du Lac Salé, Ile St.-Charles, Archipel de Mingan, *Victorin & Rolland*, no. 18,881; bordant le sommet de l'escarpement, Ile Nue, Mingan, *V. & R.*, no. 24,728; rivages, Ile à la Chasse, Mingan, *V. & R.*, no. 24,740 (as *B. glandulosa*); wet places, Becscie R., Anticosti, Sept. 7, 1883, *J. Macoun;* le long des platières calcaires, Rivière à la Patate, Anticosti, *Victorin, Rolland & Louis-Marie*, no. 21,726; à une douzaine de milles de l'embouchure, R. Jupiter, Anticosti, *Victorin & Rolland*, no. 24,729; arborescent, sur le bord de la falaise boisée, le long du portage de la ligne, Sand-top, Anticosti, *V. & R.*, no. 27,775; crevices and talus of serpentine, Ruisseau à la Neige, Mt. Albert, Gaspé Co., *Fernald & Collins*, no. 532; large shrub, steep clay banks of Matane R., Matane, *Fernald & Pease*, no. 25,022; Rupert House, James Bay, *D. Potter*, no. 805. Nova Scotia: low thicket in bog on plateau north of Bay St. Lawrence, Victoria Co., *Roland*, no. 41,354 (as *B. pumila*). Vermont: rock-outcrop, shore of Fairfield Pond, alt. 550 ft., Fairfield, Franklin Co., *S. F. Blake*, no. 3105 (as *B. alba*, var. *minor*); summit of Mt. Mansfield, July 2, 1897, *Kennedy, Williams* (as *B. papyrifera*, var. *minor*), July 23, 1901, *T. O. Fuller* (as *B. papyrifera*, var. *minor*). Plate 973.

Betula borealis was very fully and clearly described by Spach, whose description is worth repeating:

> B. borealis Nob.—Legit cl. de Lapylaie, in insulâ Terrae-Novae; forsàn varietas *Betulae excelsae* v. *Betulae albae.*
>
> Arbor? vel frutex? Rami haud resinoso punctati: novelli tomentosi. Folia floralia 6–15 lineas longa, ovato-v. obovato-v. lanceolato-v. oblongo-rhombea, acuta, subaequaliter serrato-dentata, basin versùs integerrima, brevè petiolata: juniora pubescentia; adulta subtùs glaucescentia, sparsè punctulata, reticulata, praeter nervos glabra. Stroboli subpollicares, erecti (?), brevè pedunculati, cylindracei, graciles; rachi gracili, ferè filiformi; squamis tricarpis cuneiformibus, subciliolatis, samaras obtegentibus, trilobis: lobis obtusis, aut subaequalibus, oblongis, nunc parallelis, nunc divergentibus, aut dissimilibus: lateralibus subfalcatis, deflexis, terminali abbreviato, subovato. Samarae ovatae v. suborbiculares, vix lineam latae, angustè alatae, squamis duplò brevioribus. (V. s. sp. in Herb. Mus. Par.)

The densely tomentulose pubescence of vigorous new shoots, usually without glandular atoms, the elliptic to somewhat rhombic or ovate merely acute or acutish leaves more or less pubescent beneath, and the small samaras with the wings scarcely broader than the achene, clearly distinguish it from the other dwarf species of the *Albae* in the Northeast: *B. minor*. There is little to induce one who knows *B. pumila* to place it with that, as was finally done by Regel. The identification with the Siberian *B. microphylla* Bunge was a very crude mistake, quite as unclarifying as my reduction to the latter of the cordilleran North American *B. occidentalis* Hook. (*B. fontinalis* Sargent).[1] *B. microphylla*, as originally described and as represented by Altai material sent by Regel to Gray and perhaps isotypic (PLATE 963, FIGS. 8–10), as well as by more modern specimens, has the small obovate leaves with entire cuneate bases, the summit only coarsely dentate; its branchlets are covered with resinous warts and the wings of its samaras (PLATE 963, FIG. 10) are as originally described by Bunge "semen longitudine et latitudine superantibus." In *B. borealis* the acute or acutish leaves are toothed to base, the branchlets rarely glutinous and the wings of the samara narrow. *B. occidentalis* (*B. fontinalis*), although having broadly winged samaras and very gummy but glabrous branchlets and leaves, has the latter of firmer and heavier texture, more regularly serrulate or doubly serrate margins and usually an ovate outline and lingering pubescence on the upper surface. It does not well match true *B. microphylla* and is quite distinct from the eastern *B. borealis* and *B. minor*, the former with new branchlets heavily pubescent, and the samaras with very narrow wings, the latter glabrous from the first, with more slender fruiting aments and narrower samaras (2.5–5, av. 3.5, mm. broad), whereas the western *B. occidentalis* has the aments thick and the samaras 4–6, av. 5.2, mm. broad.

In *Betula*, ser. *Humiles*, two species need special discussion. The first is only doubtfully a member of this series, a tree of the mountains of western Virginia:

B. **uber** (Ashe), stat. nov. *B. lenta*, var. *uber* Ashe in RHODORA, xx. 64 (1918). PLATE 974, FIGS. 1–5.

It is most difficult to feel that the low tree ("20–25 ft. high", according to Ashe's label) described by Ashe as a small-leaved

[1] See discussion, pp. 313–317.

variety of *Betula lenta* has much, except aromatic bark, to do with that species. *B. lenta* (FIGS. 6 and 7) has cordate-ovate and long-acuminate leaves with fine and sharp serrulation and 10–20 pairs of veins impressed into the upper surface (a typical member of series *Costatae*). *B. uber*, on the other hand, as shown by isotypes at the Gray Herbarium and the Arnold Arboretum, has very short and broadly rounded, often nearly orbicular leaves with few coarse dentations and with only 3–6 pairs of veins not impressed above (characteristics of series *Humiles*). Furthermore, the pistillate aments are more slender than in *B. lenta* and the bracts end in low and broad lobes, those of *B. lenta* more elongate, with the middle lobe prolonged.

In describing his *B. lenta*, var. *uber* Ashe made no note of its size and he stated that the material, in young fruit and foliage, was collected on "Banks of Dickey Creek, Smyth County, Virginia, south of Rye Valley Station, January 14, 1914". The isotype deposited in the Gray Herbarium has Ashe's label, stating that the tree is "20–25 feet high" and that it was collected "At 2800 ft., June [not January], 1914". It is very important to learn much more about *B. uber*,—whether it is shrubby, the range of variation of foliage, the characters of the staminate aments, and its abundance and range.

B. **terrae-novae,** sp. nov. (TAB. 975, FIG. 1–4), planta habitu *B. nanae;* ramis novellis tomentosis; foliis late cuneato-flabelliformibus coriaceis glabris valde reticulatis inciso-dentatis basin versus integerrimis; strobilis sessilibus 0.5–1 cm. longis; strobili squamis integerrimis vel subintegerrimis oblongis vel oblongo-lanceolatis vel oblongo-ovatis arcte adpressis apice subsquarrosis; nuculis ovoideis vel subrotundatis apteris margine incrassato.—*B. Michauxii* Spach in Ann. Sci. Nat. sér. 2, xv. 195 (1841), as to description, not as to Michaux plant, basis of the name. *Apterocaryon Michauxii* (Spach) Opiz in Lotos, v. 258 (1855), in part, not *B. nana* sensu Michx., basis of name. *B. nana*, ε *Michauxii* (Spach) Regel in Nouv. Mém. Soc. Nat. Mosc. xiii. 103—repr. Mon. Bet. 45 (1861), excluding Michaux plant, source of name.—Bogs, tundra and peaty, acidic barrens, Newfoundland and adjacent southeastern Labrador Peninsula. TYPE from diorite tableland, altitude about 550 m., northern region of the Blomidon ("Blow-me-down") Mts., Newfoundland, Aug. 22, 1910, *Fernald & Wiegand*, no. 3271, as *B. nana*, var. *Michauxii* (in Herb. Gray.).

It is unfortunate that the name *Betula Michauxii* had so confused a start. The tiny shrub of Newfoundland, southeastern Labrador and the extreme eastern end of the Côte Nord of Quebec is very distinct from the arctic *B. nana* (FIGS. 5–7) in its tomentose (instead of cinereous-puberulent) branchlets, its more flabelliform, more incised and more strongly reticulate leaves, and above all in simple instead of prominently 3-lobed pistillate bracts and its thick-margined, instead of definitely winged samaras. Spach gave a good description of it in general, but his "Strobili 4–8 pollices [inches] longi" was most unfortunate for any American birch and emphatically for a dwarf with strobiles only 5–10 mm. long! For his *B. Michauxii* Spach set up the new section *Apterocaryon*, which was clearly based on Newfoundland material: "Nuculae apterae, margine incrassato, intus suberoso, cinctae.—Squamae strobilae semper 1-carpae, integerrimae, nuculis duplo angustiores", and this was taken up as the genus *Apterocaryon* (Spach) Opiz. Further to confuse matters Spach started his description of the Newfoundland shrub: "B. MICHAUXII Nob.—*Betula nana* Michx.! Flor. Bor. Amer. (excl. syn.)" and gave the range "America borealis [derived from Michaux] et insula Terrae Novae [La Pylaie material at Paris, presumably]". The name *B. Michauxii* automatically belongs with the Michaux element which came from at least 650 miles farther west ("in sphagnosis, a sinu *Hudsonis* ad lacus *Mistassins*") than the western known limit of *B. terrae-novae.* Furthermore, the description of *B. nana* sensu Michx. Fl. Bor.-Am. 180 (1803), nomenclatural type of *B. Michauxii*, was of something quite different: the shrub "glaberrima" (instead of with tomentose branchlets); "amenti squamis profunde 3-partitis, laciniis oblongis" (instead of entire or merely with obscurely undulate margin); "capsulis orbiculatis, subapteris" (instead of quite apteris). Just what Michaux got we cannot learn at the moment. His description suggests one of the dwarf and glabrous or glabrescent extremes of *B. pumila* L., such as var. *renifolia* Fernald, which abounds on much of the Labrador Peninsula and in Newfoundland and which, in exposed situations, may become a tiny depressed mat with round-obovate to reniform leaves down to 8 mm. long and either pubescent or glabrous. Michaux's plant was, obviously, not at all the characteristic little shrub of the Newfoundland barrens.

The fact that Regel confused *Betula Michauxii*, as a variety, with *B. nana* carries little weight. At the same time he also reduced *B. glandulosa* Michx. to his all-inclusive *B. nana*, as he likewise included the utterly different *B. borealis* Spach (our PLATE 973).

EXPLANATION OF PLATES

PLATE 963, FIGS. 1–7, BETULA MINOR (Tuckerm.) Fernald: FIG. 1, portion of TYPE, × 1; FIG. 2, fruiting branch, × 1, from Oakes Gulf, Mt. Washington, New Hampshire, *Eggleston*, no. 2676; FIG. 3, staminate aments, × 1, from Mt. Washington, New Hampshire, *Greenman*, no. 1087; FIG. 4, lower surface of leaf, × 5, from no. 2676; FIG. 5, branchlet, × 10, from no. 2676; FIG. 6, fruiting bract, × 4, and FIG. 7, samara, × 4, from no. 2676. FIGS. 8–10, B. MICROPHYLLA Bunge: FIG. 8, fruiting branch, × 1, from the Altai of Siberia, probably an ISOTYPE; FIG. 9, fruiting bract, × 4, and FIG. 10, samara, × 4, from same specimen. FIG. 11, B. ALBA L., var. TORTUOSA (Ledeb.) Schneider: samara, × 4, from Kingua Tunugdliarfik, Greenland, Aug. 17, 1888, *Kolderup Rosenvinge.*

PLATE 964, B. PAPYRIFERA Marsh. (typical): FIG. 1, fruiting branch, × 1, from Middlebury, Vermont, July 8, 1908, *E. F. Williams;* FIG. 2, staminate aments, × 1, from Winchester, Massachusetts, May 9, 1897, *E. F. Williams;* FIG. 3, tip of young shoot, × 5, from Lac Ste.-Anne, Gaspé Co., Quebec, *Victorin, Rolland & Jacques*, no. 33,476; FIG. 4, fruiting bract, × 4, and FIG. 5, samara × 4, from Southport, Maine, Aug. 8, 1894, *Fernald.*

PLATE 965, B. PAPYRIFERA, var. COMMUTATA (Regel) Fernald: FIG. 1, portion, × 1, of the *Lyall* specimen from "Cascade Mountains. 49 N. Lat."; FIG. 2, characteristic close bark, × 1, from Percé, Quebec, July, 1905, *Williams, Collins & Fernald;* FIG. 3, outer bark exfoliating, exposing whitish inner bark, × 1, from base of same tree as in fig. 2; FIGS. 4 and 5, fruiting bracts, × 4, from the *Lyall* specimen; FIG. 6, samara, × 4, from the *Lyall* specimen; FIG. 7, fruiting bract, × 4, from Bayview, Gloucester, Massachusetts, Aug., 1944, *Elizabeth Johnston;* FIG. 8, samara, × 4, from the same specimen as fig. 7.

PLATE 966, B. OCCIDENTALIS Hook., var. FECUNDA Fernald: FIG. 1, portion of TYPE, × 1; FIG. 2, younger (flowering) branchlet, × 1, from type-locality, May 11, 1901, *Piper;* FIG. 3, staminate aments, × 1, from type-locality, April 27, 1925, *Constance et al.*, no. 1043.

PLATE 967, B. PAPYRIFERA, var. PENSILIS Fernald: FIG. 1, portion, × 1, of TYPE; FIG. 2, fruiting bract, × 4, and FIG. 3, samara, × 4, from TYPE; FIG. 4, younger branch, × 1, from Bic, Quebec, July, 1905, *Williams, Collins & Fernald.*

PLATE 968, FIGS. 1–3, B. PAPYRIFERA, var. MACROSTACHYA Fernald: FIG. 1, portion. × 1, of TYPE; FIG. 2, fruiting bract, × 4, and FIG. 3, samara, × 4, from TYPE. FIG. 4, forma LONGIPES Fernald: portion, × 1, of TYPE.

PLATE 969, B. PAPYRIFERA, var. ELOBATA (Fernald) Sargent: FIG. 1, portion, × 1, of TYPE; FIG. 2, immature samara embraced by bract, × 4, from TYPE; FIG. 3, young bracts, × 1, from TYPE.

PLATE 970, B. PAPYRIFERA, var. CORDIFOLIA (Regel) Fernald: FIG. 1, portion, × 1, of fruiting branch from Malbaie, Gaspé Co., Quebec, August 20, 1904, *Collins, Fernald & Pease;* FIG. 2, tip of vigorous sprout, × 5, from Roberval, Quebec, July 28, 1892, *G. G. Kennedy;* FIG. 3, fruiting bract, × 4, and FIG. 4, samara, × 4, from same specimen as fig. 1.

PLATES 971 and 972, B. PAPYRIFERA, var. HUMILIS (Regel) Fernald & Raup. PLATE 971: FIG. 1, portion, × 1, of TYPE of *B. alba* L., subsp. *papyrifera* (Marsh.) Regel, var. *humilis* Regel, with Regel's identification; FIG. 2, lower surface of leaf (with scattered trichomes), × 10, from TYPE; FIG. 3, fruiting bract, × 4, and FIG. 4, samara, × 4, from TYPE; FIG. 5, fruiting tip, × 1, of specimen from Prince Albert, Saskatchewan (*Macoun*, no. 12,952[a]), one of the 2 specimens cited by Sargent as his *B. alaskana*. PLATE 972, FIG. 1, portions,

× 1, of the Saskatchewan plant (*Bourgeau*, 1858), the first specimen cited by its author for *B. alaskana* Sargent: FIG. 2, fruiting bract, × 4, and FIG. 3, samara, × 4, of the Prince Albert material, *Macoun*, no. 12,952[a]; FIG. 4, fruiting bract, × 4, and FIG. 5, samara, × 4, from near Fairbanks, Alaska, *Ynez Mexia*, no. 2291.

PLATE 973, B. BOREALIS Spach: FIG. 1, branches, × 1, from Glenwood, Newfoundland, *Fernald & Wiegand*, no. 5308; FIG. 2, fruiting branch, × 1, from Glenwood, *Fernald & Wiegand*, no. 5309; FIG. 3, tip of young branch, × 5, from no. 5309; FIG. 4, fruiting bract, × 4, and FIG. 5, samara, × 4, from base of Blomidon, Bay of Islands, Newfoundland, *Fernald & Wiegand*, no. 3246.

PLATE 974, FIGS. 1–5, B. UBER (Ashe) Fernald: FIG. 1, portion, × 1, of ISOTYPE in Herb. Arnold Arboretum; FIG. 2, upper surface of leaf, × 2, to show venation and toothing, from ISOTYPE; FIG. 3, portion of lower surface of leaf, × 2, from ISOTYPE; FIG. 4, fruiting bract, × 4, and FIG. 5, samara, × 4, from ISOTYPE. FIGS. 6 and 7, B. LENTA L.: FIG. 6, portion of lower surface of leaf, × 1, to show venation and toothing, from Jamaica Plain, Massachusetts, August 25, 1885, *C. E. Faxon;* FIG. 7, fruiting bract, × 4, from same specimen.

PLATE 975, FIGS. 1–4, B. TERRAE-NOVAE Fernald: FIG. 1, portion of TYPE, × 1: FIG. 2, tip of branchlet, × 5, from Goose Pond, upper Humber River, Newfoundland, *Fernald & Wiegand*, no. 3272; FIG. 3, fruiting bracts, × 10, and FIG. 4, nutlet, × 10, from TYPE. FIGS. 5–7, B. NANA L.: FIG. 5, tip of branchlet, × 5, from Velmunden, Norway, July 23, 1909, *Fr. Lange;* FIG. 6, fruiting bract, × 4, and FIG. 7, samara, × 10, from the *Lange* specimen.

(*To be continued*)

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—No. CLIX

M. L. Fernald

II. Eastern North American Representatives of Alnus incana

(Plates 976–989)

In 1906, while he was a student with me, Dr. Harley H. Bartlett joined me in collecting at different stages of development through the season material of the Swamp Alders of northeastern Massachusetts, for it was quite apparent that the variations within this group were not satisfactorily disposed of merely by calling them all simply *Alnus incana* and *A. serrulata* or *rugosa*. With the cooperation of the late Professor J. Franklin Collins in Rhode Island, we assembled many collections but their final identification was interrupted by Bartlett's finishing his studies at Cambridge and the mass of material was stored, with the hope that one of those eclectic students, who specialize on our trees and shrubs, to the exclusion of herbs, would be interested to clarify the situation. More than quarter of a century later, when he was studying with me, Dr. Ernst C. Abbe, working primarily on morphological problems in the *Corylaceae* (*Betulaceae*), made a fresh start on the problem and, although he was obliged to cut short this special work, he had, before he finished, assembled striking evidence that the shrub or small tree, which in North America passes as the Eurasian *A. incana*, really differs from that species in very many important characters. Following up Abbe's unfinished studies, I undertook to conclude the quest and a decade or more ago wrote the introduction to the present paper.

Interrupted by more immediately pressing matters, I likewise failed to bring the study to completion. Now, after these repeated interruptions, I am again endeavoring to set the group in such order as I can establish in it. Fortunately but somewhat unhappily, I am faced by vastly more numerous, though more satisfactorily made, collections to deal with than Bartlett and I had before us 39 years ago, for wherever I have been, in Newfoundland, eastern Canada, New England, New York, Michigan or Virginia, my companions and I have had our eyes open for variations of the Alders. The present paper cannot, therefore, be called a hasty and off-hand study.

The name *Alnus incana* for the common Swamp Alder of the Labrador Peninsula, Newfoundland, eastern Canada and the more northeastern United States (PLATES 977–982) has been so thoroughly established, especially since Edward Tuckerman in 1843 so identified the northern shrub or small tree with leaves glaucous beneath, that to those who are more influenced by long-established usages than by precision its abandonment might seem mere iconoclasm. At the beginning, however, the name belonged strictly to a Eurasian tree and, of course, it must be retained for that variable but morphologically definite species. True *Alnus incana* (L.) Moench (PLATE 976) was so named because of the hoary (incanous) pubescence which so generally characterizes it; ordinarily its leaves are permanently quite gray with soft and velvety pilosity, as are the young branchlets and the axes of the inflorescences. The terminal lobes (FIGS. 5 and 6) of the bracts of the pistillate and fruiting aments (FIGS. 4 and 5) are depressed and slightly recurving or sometimes almost suppressed. This species is found in North America only in cultivation or where introduced from Europe, as formerly on the sandhills near Provincetown, at the tip of Cape Cod, where it was originally planted and was abundant as late as 1919 (*Fernald & Long*, nos. 18,354, 18,355 and 18,360) but where, by 1944, none of it seems to have persisted.[1]

[1] The introduction of European plants for the reclamation of the sand-dunes back of Race Point Life Saving Station near Provincetown is typical of much of the practice in holding or reclaiming loose soils. The natural dunes of Cape Cod are very effectively and automatically reclaimed by the indigenous eastern North American *Ammophila breviligulata* Fernald and *Pinus rigida* (Pitch Pine), while the Alders of the dunes and hollows are endemic Americans. Nevertheless, the reclamation of the dunes of the old province-lands was largely attempted through the planting of imported

The eastern North American shrub or (rarely) small bushy so-called tree (PLATES 977–982) which erroneously passes as *Alnus incana* is not truly incanous. Its new branchlets and the axes of its inflorescences, are, with rare exceptions, glabrous or only very sparsely pilose and very gummy, having, when dry, a crackled or subverrucose surface. The oval or ovate to round-elliptical and usually coarsely undulate or doubly toothed leaves are less pubescent or glabrous beneath or, if strongly pilose, with usually rufescent pubescence. The pale cross-veins (between the strong parallel ribs) are, in mature foliage, coarse and prominent beneath (PLATES 977, FIG. 2, 978, FIG. 2, and 979, FIG. 4), freely confluent and forming a conspicuously scalariform and rugose pattern, the veins in European *A. incana* (PLATE 976, FIG. 2) being very slender and comparatively delicate. In the American species the pistillate aments are usually more numerous than in the European species; and the outer lobes of the summit of each bract of the pistillate cone are suberect or arching and prolonged (PLATES 977, FIG. 3, and 978, FIGS. 3 and 5). That the so-called *A. incana* of North America is really very different from true Eurasian *A. incana* is quite obvious; but for clarity of discussion this American shrub, which for more than a century has erroneously passed with us as Old World *A. incana*, may be temporarily designated SPECIES NO. 1.

All the characters above noted are such as can be seen in a good herbarium. Others of equal significance are not often there displayed. Eurasian *Alnus incana* is a large shrub or, more often, a considerable tree, up to 35 or even to 85 feet high and with single erect trunks up to 3 feet in diameter, the cortex lustrous and whitish-gray. "In . . . Europe . . . in the south . . . sometimes attaining a height of seventy feet; it is the common Alder of Siberia and southeastern Asia [this

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European White Alder, Scotch Pine and Scotch Broom; but the Broom is there now relatively unimportant, the Scotch Pine is secondary to the native Pitch Pine, and the European Alder has not survived. That is as it should be: the climate of the dunes of western Eurasia, with prevailingly western winds off the Atlantic, is so unlike the dry and hot summer conditions at the eastern border of North America, that western European shrubs are too much handicapped. Some years ago I received a call from an American soil-conservator who stated that he was going on a federal government mission to India, to find some Asiatic species which would control erosion in our "dust-bowl". A few days later I had a brief visit from a prominent botanist of India, who had been sent to America by his government to see if in our "dust-bowl" he could secure some plant to control wind-erosion in India. Tra-la-la!

sometimes separated], . . . a stately tree fifty or sixty feet in height, with a trunk often two or three feet in diameter"—Sargent, Silva, ix. 69, in footnote (1896). "Strauch oder bis 10 (25) m hoher Baum. . . . Rinde glatt, glänzend weissgrau"—Hegi, Ill. Fl. Mitt.-Eu. iii. 89, with illustration of the arborescent habit as fig. 483. "Arbre à écorce lisse, d'un gris blanc"—Rouy, Fl. France, xii. 261 (1910); "meist 6 bis etwa 23 m hoch, in der Tracht der *A. glutinosa* ähnlich, aber meist niedriger, mit ziemlich dichter Krone. Stamm glatt mit hellgrauer Rinde"—Ascherson & Graebner, Synop. Mitteleur. Fl. iv. 423 (1911). Certainly the North American shrub or bushy "tree", which for a century or more has passed as *A. incana* (our Species no. 1), does not have sufficiently erect or solitary trunks to rank as a real tree; otherwise it would have been included among the trees in such compendious works as Sargent's *Silva* and his *Manual of the Trees of North America* and in Britton's *North American Trees,* in none of which is it included. If a tree, it should also be in Sudworth's *Check List of the Forest Trees of the United States.* Rightly enough, however, *A. incana* is mentioned by Sudworth only in a footnote as "a shrub", "as it occurs in northeastern North America and United States" (Sudworth, p. 80). In a footnote Sargent, Silva, l. c., refers to it (as *A. incana*) in the following terms: "In North America, where it is the common Alder of swamps and river-banks in the northeastern parts of the continent, forming dense shrubby thickets rarely more than ten or twelve feet high"; while F. A. Michaux, describing it as his *A. glauca* and comparing it with *A. serrulata,* said "c'est-à-dire qu'on en trouve souvent des individus qui ont de 18 à 20 pieds . . . de hauteur, sur environ 3 pouces (12 centim.) de diamètre". And surely the cortex of our northern shrub is never *whitish gray,* the color so consistently stated by Eurasian botanists for their *A. incana.* The thin cortex of ours is a warm purple-black, purple-brown or gray-brown, with conspicuous elongate white lenticels (plate 980, fig. 2). "L'écorce qui couvre le tronc, ainsi que les branches secondaires, est d'une teinte brune très-foncée" (Michx. f. in describing his *A. glauca*); "bark gray brown with lighter horizontal markings" (Mathews, Field Book Am. Trees and Shrubs, 126). "A shrub 8–20 feet high; the stem sometimes 3–4 inches in diameter, with a smooth brown bark"—

Torrey, Fl. N. Y. ii. 202 (1843). In fact, so dark is the bark that, when the younger Michaux published his *Alnus glauca*, with "*foliis subrotundò-ellipticis, duplicatò-serratis, subtùs glaucis*", he gave our shrub of "les États du New-Hampshire, Massachusetts et de Vermont" which has the foliage so "vert pâle et comme bleuâtre, ce qui les fait reconnoître au premier abord", the English name "*BLACK ALDER*"; whereas in Europe *A. incana* is frequently called "WHITE" or "GRAY ALDER". Furthermore, in Europe witches' brooms (*Hexenbesen*) are frequent on *A. incana*, sometimes as many as 100 on a single tree; our dark-barked northeastern shrub, Professor Faull informs me, has never been known to produce them; and Professor Arthur Stanley Pease tells me that his students in Latin, familiar with the shrubbiness of alders in eastern North America, always have a great laugh as they read passages (at least 11 of them) by the Latin poets, telling of ships built of alder! Surely no argument beyond the mere facts and the plates is needed to show that we have been far astray in calling our northern Swamp Alder the same as the Eurasian *A. incana!*

The only other indigenous Swamp Alder of temperate North America, excluding the quite definite autumn-flowering *Alnus maritima* (Marsh.) Muhl., is the generally more southern shrub (PLATE 983–989) with the white lenticels of the bark much smaller than in SPECIES NO. 1 or often very obscure (PLATE 985, FIG. 5); the leaves of a generalized obovate type, mostly subcuneately narrowed (but sometimes more rounded) to base, usually with regularly or subuniformly fine-serrulate margins, with cross-veins beneath (PLATES 984, FIG. 4, 985, FIG. 4, 987, FIG. 4 and 988, FIG. 3) more delicate and less conspicuous, the lower leaf-surfaces fulvous-green to reddish, glabrous, glabrate or reddish-pubescent; the axis of the pistillate inflorescence (PLATES 983, FIGS. 3 and 4, 985, FIG. 3, 986, FIG. 3, 988, FIG. 4, and 989, FIG. 4) commonly with right angles or strongly geniculate bends. The outer terminal lobes of the cone-bract (PLATE 986, FIG. 4) are low and broadly rounded. This shrub, the northern limits of which interlock with the southern outposts of SPECIES NO. 1, long passed correctly as *A. serrulata* (Ait.) Willd.; but, especially since Karl Koch in 1872, Coulter in 1894 and Sargent's Silva (1896), it has recently been incorrectly passing as *A. rugosa* (Du Roi) Sprengel. Since the latter name must be considered in connection with SPECIES NO. 1, it will make for clarity, until the application of the various names is investigated, to designate the more southern shrub as SPECIES NO. 2.

Almost from the start, at least beginning with Willdenow in 1796, the names *rugosa* and *serrulata*, whether under *Betula* or *Alnus*, were hopelessly confused. Regel at last got them clearly separated but, depending chiefly on variable leaf-outline and -pubescence, without noting the striking differences of bark and inflorescences, he maintained them both as variations of one species. With the two eastern American species defined as SPECIES NOS. 1 and 2 and clearly shown in the plates, we may proceed to examine the specific names published for them, somewhat in chronological order, that we may settle their correct application. In so doing I am omitting the several *nomina nuda* of Steudel and others, undefined names which by various authors have been placed in the vague synonymy of one or another of the properly defined ones.

The first of these two American species defined was *Betula Alnus* (*rugosa*) Du Roi, Obs. Bot. p. xxxii (1771). The original diagnosis and discussion of the shrub growing in the botanic garden of Harbke near Brunswick was as follows:

> 5. BETULA ALNUS (*rugosa*) foliis mucronatis acute serratis, subtus venoso-rugosis.
> *Germ.* Nordamerikanische Eller.
> Habitat in America septentrionali.
> Species horti Harbeccensis *foliis* ovatis mucronatis, acutius serratis et angustioribus, quam in B. Alno incana, viridibus glabris, subtus venis albidis rugosis. *Rami* tenues, cortice nigricante. E semine misso culta arbor in horto nondum adhuc floruit.

This was followed by the fuller account in Du Roi's detailed Die Harbkesche wilde Baumzucht, i. 112 (1771):

> 3. BETULA Alnus (rugosa) foliis mucronatis acute serratis, subtus venoso-rugosis.
> The American Alder.
> Aune d'Amerique septentrionale.
> Die Nordamerikanische Eller.
> Sie unterscheidet sich deutlich von den beiden vorigen, und ist hier aus Saamen gezogen, welcher aus Nordamerika geschickt worden ist.

> Die **Blätter** erscheinen schmaler als bei den vorhergehenden, und in den mehresten an vier Zoll Länge und zwei Zoll Breite. Sie sind oval zugespizt, am Rande scharf und fein gezahnt, auf der oberen Fläche hell grün und glatt, und auf der unteren ebenfals hellgrün. Auf der lezteren lauft der Länge nach eine weissgrüne erhabene Ader hin, welche in schrägen Linien nach dem Rande aus etwas feinere Nebenäste Paarweise gegen einander über ausschicket, und aus diesen lezteren kleinen Adern gehet ein Gewebe noch kleinerer Adern heraus, die das Blatt etwas runzlicht bilden.
>
> Die äussere Rinde ist dunkelgrau an alten Zweigen, an iungen aber grün.

Ehrhart, improving on the trinomial nomenclature of Du Roi, redescribed the shrub growing in the Harbke Garden as *Betula rugosa* (Du Roi) Ehrh. Beitr. iii. 21 (1788).

> 6. *Die Haseleller.*
> *Betula rugosa.*
> Betula gemmis elevatis, obtusis; foliis ovatis, acutis, repando-angulatis, serratis, nudis, superne glabris, subtus venoso-rugosis; racemis subtristrobilis, aphyllis.
> Ihr Vaterland ist Nordamerika.
> Die Plantage zu Herrnhausen, die Gärten zu Harbke, Destedt und mehrere haben sie.
> Betula Alnus rugosa. Duroi baumz, v. i, p. 112.

Sprengel, too, in transferring the species to *Alnus*, in Syst. iii. 848 (1826), was equally clear:

> *rugosa** 8. A[lnus] foliis basi rotundata ovato-oblongis acutis duplicato-denticulatis subtus rugulosis, axillis venarum villosis. *Amer. bor.*

but Sprengel made the serious mistake of suggesting identity with the Peruvian *A. acuminata* HBK.

From the original accounts of Du Roi, Ehrhart and Sprengel, then, it is clear that *Alnus rugosa* rests upon material cultivated in Germany and having dark or blackish bark, leaves ovate or oval, acutish, rounded at base, doubly toothed, green and glabrous or glabrescent beneath, a leaf which so resembles that of *Corylus* as to suggest to Ehrhart the name "*Haseleller*" (Hazel-Alder). These descriptions are so vivid for the common extreme of the shrub of northeastern America which has erroneously passed as the European *A. incana*, var. *hypochlora* Call.[1], that it is doubly reassuring to see a photograph (our PLATE 979, FIG. 1) of a speci-

[1] As by Fernald in RHODORA, xxiii. 257 (Feb. 27, 1922).

men distributed by Ehrhart as his *Betula rugosa* and coming from the Harbke Garden. The photograph, for the use of which I am indebted to Professor Alfred Rehder and the Arnold Arboretum, was taken by Professor Rehder at the Botanical Museum at Berlin-Dahlem; and, since the destruction of that invaluable herbarium, it is a most fortunate photograph to have. The foliage shown is young first-year leaves and is closely matched by the leaves on young and vigorous sprouts of our greener-leaved so-called "*A. incana*, var. *hypochlora*". Surely no one, familiar with the obovate and usually cuneate-based leaf of *A. serrulata*, would think of matching the latter with the authentic foliage from the Harbke Garden. Neither would they call our *A. serrulata* "Hazel-Alder". That name is wholly appropriate for our shrub (SPECIES NO. 1) which has been passing as *A. incana*. A characteristic leaf was shown by Regel in his *Monographia Betulacearum* in Nouv. Mém. Soc. Nat. Mosc. xiii. 165, t. xi. fig. 8—repr. as Mon. Bet. 107 (1861)—of the shrub "in den Gärten Europas" and which Regel, with remarkable conservatism, called *A. glutinosa*, lusus *rugosa!* Regel in 1861 stated that the shrub was widely grown in the botanical gardens of Europe and he identified with it the *A. hybrida* of Alexander Braun in Reichenb. Ic. Fl. Germ. xii. 3, t. 630, fig. 1292 (1850), which had been found wild in various parts of Germany and in Bohemia. Such a shrub, from a wild habitat in Wittenberg, was distributed in *Baenitz. Herb. Dendrol.* no. 1214, as *A. rugosa*. This material, unlike the Ehrhart specimen, shows mature fruiting branches with the characteristic cones and the typical foliage of fruiting branches of our greener-leaved "*A. incana*". It is shown in our PLATE 977. Native American specimens, almost like it in every respect, are shown in PLATE 978.

Confusing as it may temporarily prove, there seems to be no escape from taking up for the North American shrub which passes as *Alnus incana*, our SPECIES NO. 1, its earliest name, A. RUGOSA (DuRoi) Spreng.

Chronologically, the names of Humphrey Marshall, Arb. Am. 20 (1785), have to be noted. The first, "BETULA-ALNUS glauca. *Silver-leaved Alder*" of "low marshy ground", had no diagnosis whatever but from its names may be inferred as being the common northern variety of *A. rugosa*, which reaches northeastern

Pennsylvania, a species which had already been described by DuRoi (1771) and which in 1813 F. A. Michaux properly described and illustrated, with no reference to Marshall, as *A. glauca.* Marshall's second species, "BETULA-ALNUS maritima, *Sea-side-Alder*", was sufficiently defined as to give an unquestioned basis for *A. maritima* (Marsh.) Nutt., a clear-cut autumn-flowering species which we are not here discussing. His third had no good description, merely very brief and inconclusive comments. though geographically it was obviously intended for *A. serrulata* (Ait.) Willd., our SPECIES NO. 2. This was

> BETULA-ALNUS rubra. *Common Alder.*
> This grows very common in most parts of Pennsylvania. The leaves are broader than the other kinds and rough or wrinkled. This flowers in the spring, and perfects its seeds in the fall.

From its abundance in Pennsylvania Marshall's species, as said, should be some form of *Alnus serrulata.* The leaves "broader than the other kinds and rough or wrinkled" is inconclusive but there are plenty of broad-leaved variations of *A. serrulata.* Tuckerman interpreted it as unmistakable *A. serrulata* and described *A. rubra* (Marsh.) Tuckerm. in Am. Journ. Sci. xlv. 32 (1843), with leaves obovate and with *Betula serrulata* Ait. and *A. serrulata* (Ait.) Willd. as synonyms, Tuckerman giving the naïvely nationalistic explanation:

> The name of our own botanist should have the priority: his description, though short [he might have said inconclusive], notices the most striking features of the species, and cannot be mistaken. The A. rubra of Bongard [1833], is many years later [than *Betula-Alnus rubra*]. Add to this, that Marshall's name is far more expressive and apt than that of Aiton [1789].

Nevertheless, *Alnus rubra* Bongard (1833), the Pacific North American species, has right of way and under present-day rules no other species can validly bear the same name, even though its name-bringing typonym was earlier. *A. rubra* (Marsh.) Tuckerm. (1843) is fortunately, in view of its vague origin, a later homonym.

The next name, chronologically, was *Betula serrulata* Aiton, Hort. Kew. iii. 338 (1789). Aiton's diagnosis was brief but its characterization of the leaf definite:

serrulata. 11. B. pedunculis ramosis, foliis obovatis acutis; venis et axillis venarum subtus villosis, stipulis ovalibus obtusis.
Notch'd-leaved Alder Tree.
Nat. of Pensylvania.
Cult. 1769, by Peter Collinson, Esq.

That *Betula serrulata* was our SPECIES NO. 2 (especially as shown in PLATE 983) is clear from the *obovate, acute* leaves; but, with wholly vague conceptions of our two species, European authors promptly produced confusion of names, like most botanists who study names to the exclusion of the plants! Thus, Willdenow, in his Berlinische Baumzucht, 45 (1796), took up *Betula serrulata* with Aiton's original diagnosis of 1789 and placed unquestioningly in its synonymy *B. rugosa* Ehrh. (1788), which went back to Du Roi's original publication of 1771. And later, when he made the combination *Alnus serrulata* (Ait.) Willd. Sp. Pl. iv^1. 336 (1805), Willdenow merged with this species, correctly described "foliis obovatis", the above discussed *Betula rugosa* "foliis ovatis . . . repando angulatis". Further augmented by the failure of André Michaux (1803) definitely to distinguish our two species, the mixing of the two, started by Willdenow in 1796, became general and, consequently, has resulted in the recent erroneous and highly uncritical application of the name *A. rugosa* to the abundantly different and usually more southern *A. serrulata.* Michaux's confusion of the two may be stated as follows: in his Flora Boreali-Americana, ii. 181 (1803) he described *Betula rugosa* (American "*incana*") as *B. serrulata* "foliis lato-ovalibus" and then added the

Obs. Folia saepe obovalia, interdum subglanduloso-repanda, basi semper acuta,

the observation referring to the relatively southern *A. serrulata.* Michaux gave the range from "Pensylvania ad Carolinam", the specimen in his Herbarium at Paris, which I examined in 1903, being of the southern species. Somewhat surprisingly, André Michaux, who had explored eastern Canada as far north as Rupert River and west to Lake Ontario and who knew northern New England, gave no intimation in his Flora that there is any Alder of this group north of his "Pensylvania ad Carolinam". Having collected *A. serrulata* in that area, he possibly did not further feel any special interest in the group; at any rate, the only Alder he noted from Canada in his Flora was *Betula crispa* Ait. More probably, however, northern material was lost before the writing of the Flora Boreali-Americana. It is fairly clear that Michaux recognized the northern species as distinct from the southern, for in his Journal—*Journal of André Michaux. 1787–1796. with an Introduction and Notes*, by Charles Sprague Sargent, Proc. Am. Phil. Soc. xxvi. no. 129 (1888)—he noted, among the plants seen on his trip up the Saguenay and across to Lake Mistassini, "Alnus glauca stipulis lanceolatis" (Sargent, l. c. 75, under "Le 15" of August). To be sure, Sargent (l. c.) identified Michaux's *Alnus glauca* as *Betula pumila*, but Michaux knew the difference, for on the 19th of August on "la riv. ditte Mistassin", he specially noted *Betula pumila*.[1]

F. A. Michaux, the son, carried the confusion still further, describing *A. serrulata* "foliis duplicatò-serratis, ovalibus, acutis"[2], stating that it is found in the Northern, Central and Southern States ("on la trouve aussi bien dans les États du Nord que dans ceux de Centre, du Sud et de l'Ouest"), and illustrating the round-based doubly serrate leaf of typical *A. rugosa*, already discussed. With such inauspicious beginnings, it is little to be wondered at that the correct applications of the names *A. rugosa* and *A. serrulata* have been hopelessly confused by those who have relied more upon "the books" than upon the morphological characters of the plants.

The next specific name to consider is *Alnus glauca*. Although the undefined name "BETULA-ALNUS glauca" had been used by Marshall in 1785, that publication was not cited by F. A. Michaux when he described and illustrated his own *Alnus glauca*, Michx. f. Hist. Arb. Forest. Am. Sept. iii. 322, t. 4, fig. 2 (1813). The diagnosis and figure are unequivocal, the former being

[1] Unfortunately, most others of Sargent's identifications of Michaux's plants need correction. For instance, "Sparganium natans", collected on the same trip, was identified by Sargent (p. 75) as *S. minimum*. Michaux's collection, labeled "Hab. in Amnibus à Québec ad Lacus Mistassins", was the type of *S. angustifolium* Michx. Fl. Bor.-Am. ii. 189 (1803), the only species of the genus in the *Flora*. Similarly Michaux's Journal recorded as growing with the *Sparganium* and near the *Alnus* "Alisma subulata", which Sargent identified as "*Alisma Plantago*, L. var. *Americanum*, Gray". But Michaux knew the broad-leaved plant and in his Flora, i. 218, had it as *A. Plantago*. He there included *A. subulata* L. from Florida only, the plant now known as *Sagittaria subulata* (L.) Buchenau. The plant of Canada, which Michaux mistook in the field for *Alisma subulata* L., is the type of *Sagittaria graminea* Michx. Fl. Bor.-Am. ii. 190 (1803).

[2] Michx. f., Hist. Arb. Forest. Am. Sept. iii. 320, fig. 1 (1813).

ALNUS *glauca, foliis subrotundò-ellipticis, duplicatò-serratis, subtus glaucis,*

the species said to be unknown in the South, very rare in the Middle States but abundant in New Hampshire, Vermont and Massachusetts ("Cette espèce d'Aulne qui ne se trouve pas dans les États du Sud, qui est assez rare dans ceux du Milieu, est, au contraire, plus multipliée dans les États du New-Hampshire, Massachusetts et de Vermont"). The description, figure and abundance in northern New England clearly indicate the common shrub of the North with gray or glaucous lower leaf-surfaces (PLATES 980 and 981), which erroneously and almost universally passes as the Old World *A. incana*, the only possible excuse for such an interpretation being the glaucous lower surface of the leaves. This familiar shrub is, of course, one of the extreme and usually most northern variations of *A. rugosa*.

In 1894, the late Dr. Britton collected on Staten Island fruiting material from a "large alder in swampy woods, . . . ; these were at the time referred to *Alnus incana*, though with doubt, inasmuch as the height of the tree seemed much too great for that species, and the large, strongly pointed leaves seemed also to be different from those of any specimens of *incana* that I had seen. The woods in which this tree grew were cut away soon after my collection was made, and, though a search was made in the vicinity for other plants, I was never able to find another specimen".—Britton in Torreya, iv. 124 (1904). Since, however, the late Eugene P. Bicknell subsequently found somewhat similar shrubs on Long Island, the Staten Island specimen was made the type of *Alnus noveboracensis* Britton in Torreya, l. c. (1904) our PLATE 995. It was more fully described and illustrated in Britton, N. Am. Trees, 264, fig. 224 (1908), but in Britton & Brown, Ill. Fl. ed. 2, i. 613 (1913) it was noted after "*A. rugosa*", i. e. *A. serrulata*, with the justifiable comment: "It may be a race of this species". The latter disposition of it seems about right; it is an occasional and rather marked extreme in the broad range of *A. serrulata*, from Maine to Georgia, Tennessee and Louisiana. Unfortunately the type from Staten Island, which I have before me through the courtesy of Dr. Gleason, had been badly pressed, poorly mounted and seriously broken. It is, therefore, not a very good subject for illustration, but in PLATE 985 Dr. Schubert has cannily covered the most broken parts.

Numerous varietal names must be considered but, since they do not disturb the specific epithets which we must apply to our two native species, their discussion will be deferred until the varieties of the two species are defined.

As I understand our spring-flowering native Alders of this group they fall into the two species following.

Cortex of trunks and older branches bearing abundant linear transverse whitish lenticels up to 7 mm. or more long; axis of young or flowering inflorescence arching, without right angles, the pistillate branch or branches (in monoecious inflorescences) then drooping and appearing to be below the staminate ones; leaves ovate, oval, subelliptic or rounded, broadest below or near the middle, with rounded to subcordate bases, oftenest double-serrate or -dentate, often repand-undulate, not at all or only slightly glutinous, the mature blades with the cross-veins beneath prominent and forming ladder-like reticulation between the main lateral veins.......................................1. *A. rugosa.*

Cortex with fewer and shorter orange to gray lenticels or these obsolescent; axis of young inflorescence with 1 or more abruptly geniculate or right-angled bends, the pistillate branches erect or strongly divergent and thus appearing to be above the drooping staminate ones; leaves obovate or obovate-elliptic, broadest above middle, cuneate to but slightly rounded at base, simply serrulate, only exceptionally strongly undulate, the expanding ones glutinous, often aromatic, the mature blades with the lower surface delicately or finely reticulate or with only weak cross-veins........2. *A. serrulata.*

1. A. RUGOSA (Du Roi) Spreng. Syst. iii. 848 (1826).—The following varieties and forms are recognized.

a. Leaves green or fulvous, not glaucous, beneath.

Lower surfaces of leaves glabrous or promptly glabrate, only the principal veins or their axils sometimes permanently pilose....................................Var. *typica.*

Lower surfaces of leaves permanently soft-pilose or subvelutinous (to touch).......................Forma *Emersoniana.*

a. Leaves glaucous or whitened beneath....*b.*

b. Lower surfaces of leaves glabrous or promptly glabrate.

Leaves ovate or oval to rounded-elliptic, with low toothing.................................Var. *americana.*.

Leaves narrowly elliptic to ovate-lanceolate, lacerate or jagged-toothed.............................Forma *tomophylla.*

b. Lower surfaces of leaves densely soft-pilose or subvelutinous (to touch)............................Forma *hypomalaca.*

A. RUGOSA, var. TYPICA H. Winkl. in Engler, Pflanzenr. iv[61]. 119 (1904), as to name of the type. *Betula Alnus* (*rugosa*) Du Roi, Obs. Bot. 31 (1771) and Harkb. Wilde Baumz. i. 112 (1771). *Betula rugosa* (Du Roi) Ehrh. Beitr. iii. 21 (1788). *A. serrulata* sensu Michx. f. Hist. Arb. Forest. Am. Sept. iii. 320, fig. 1 (1813), not Willd. (1805). *A. rugosa* (Du Roi) Spreng. Syst.

iii. 848 (1826); Callier in Mitteil. Deutsche Dendr. Gesellsch. 1918: 114 (1918), in small part only (a bad mixture). *A. latifolia* Desf. Cat. Pl. Hort. Par. ed. 3: 352 (1829), *nomen nudum*, cited in synonymy of the next by Spach (1841). *A. hybrida* A. Br. ex Reichenb. Ic. Fl. Germ. xii. 3, t. 630, fig. 1292 (1850). *A. serrulata*, β. *macrophylla* Spach in Ann. Sci. Nat. sér. 2, xv. 206 (1841). *A. macrophylla* Desf. ex Spach, l. c. in synonymy (1841). *A. autumnalis* Hartig. Naturgesch. Forste, Kulturpfl. 337 (1850). *A. glutinosa*, δ. *serrulata*, lusus c. *rugosa* (Du Roi) Regel in Nouv. Mém. Soc. Nat. Mosc. xiii. 165, t. xi. figs. 8–10—repr. as Mon. Bet. 107 (1861). *A. serrulata* β. *rugosa* (Du Roi) Regel in DC. Prodr. xvi². 188 (1868). *A. glutinosa*, var. *autumnalis* (Hartig) Ktze. Rev. Gen. ii. 638 (1891). *A. incana*, var. *hypochlora* sensu Fernald in RHODORA, xxiii. 257 (Feb. 27, 1922), not Callier (1918).—Low grounds, western Nova Scotia to northern Michigan, south to southern New England, locally to northern and eastern Pennsylvania and northern Indiana. The following, mostly distributed as *A. incana* and selected from more than 300 specimens before me, are characteristic. NOVA SCOTIA: Cedar L., Digby Co., *Fernald & Long*, no. 23,781 (as *A. incana*, var. *hypochlora*); Eel L., Yarmouth Co., *F. & L.*, no. 23,782 (as *A. incana*, var. *hypochlora*). MAINE: Milford, Penobscot Co., *Fernald & Long*, no. 13,474 (as *A. incana*, var. *hypochlora*); Rowe P., Pleasant Ridge, Somerset Co., Sept. 10, 1909, *J. F. Collins;* New Sharon, Franklin Co., July 23, 1904, *Knowlton* (as *A. serrulata*); Whitney P., Oxford, Oxford Co., July 12, 1914, *Weatherby;* Mud P., Greenwood, Oxf. Co., June 12, 1931, *Bill, Eaton, Fernald, Griscom & Hunnewell;* Washington, Knox Co., *J. G. Jack*, no. 3398 (as *A. incana*, var. *hypochlora*); Isle au Haut, Knox Co., Aug. 11, 1918, *Kidder* (as *A. incana*, var. *hypochlora*), *A. F. Hill*, no. 1652; Waterville, Kennebec Co., July 5, 1904, *Knowlton;* Livermore, Androscoggin Co., 1879, *Kate Furbish;* Baldwin, Cumberland Co., *Fernald & Long*, no. 13,476; Limington, York Co., *F. & L.*, no. 13,475; Cape Neddick, York Co., *J. G. Jack*, nos. 3388 and 3392. NEW HAMPSHIRE: Lebanon, Grafton Co., June 12, 1920, *Fernald, Hunnewell and R. W. Blanchard;* Hookset, Merrimac Co., Aug. 2, 1925, *C. F. Batchelder;* Durham, Strafford Co., Sept. 7, 1918, *Knowlton:* Derry, Rockingham Co., Aug. 25, 1917, *C. F. Batchelder;* Nashua, Hillsborough Co., *Robinson*, no. 800; Jaffrey, Cheshire Co., *Robinson*, no. 156. VERMONT: Essex Junction, Chittenden Co., *S. F. Blake*, no. 2218; Middlebury, Addison Co., Sept. 25, 1880, *Brainerd* (as *A. serrulata*); West Rutland, Rutland Co., *Eggleston*, no. 3211; Townshend, Windham Co., June 2, 1912, *L. A. Wheeler;* Manchester, Bennington Co., *M. A. Day*, no. 163. MASSACHUSETTS: Emerson Point, Rockport, Essex Co., *L. B. Smith & R. G. Gates*, no. 1009; West Manchester, Essex Co., June 7, 1913, *F. T.*

Hubbard; Plum Island, Essex Co., *White & St. John*, nos. 528 and 543; Winchester, Middlesex Co., *Fernald & Bartlett*, no. 7; West Cambridge, Mid. Co., *F. & B.*, no. 2; Concord, Mid. Co., July, 1857, *E. S. Hoar;* Boxboro, Mid. Co., *Hubbard & Torrey*, no. 477; West Roxbury, Suffolk Co., April 9 and September 11, 1906, *F. F. Forbes* (as hybrid of *A. incana* and *A. rugosa*); Dorchester, Suf. Co., Sept. 23, 1919, *Kidder*, Brookline, Norfolk Co., March 19, Sept. 9 and Nov. 24, 1902, *F. F. Forbes;* Dedham, Norfolk Co., Sept. 8, 1895, *E. F. Williams;* Hanson, Plymouth Co., *Knobloch, Smith & Stebbins*, no. 2562; North Tisbury, Martha's Vineyard, Dukes Co., Oct. 3, 1912, *Bicknell;* Copaum P., Nantucket, Nant. Co., June 8, 1908, *Bicknell;* Hardwick, Worcester Co., Aug. 9, 1935, *C. F. Batchelder;* Sutton, Worc. Co., *Anderson, Smith & Weatherby*, no. 2446; Montague, Franklin Co., May 11, 1912, *Wheeler & Wiegand;* Chicopee, Hampden Co., *Murdoch & Torrey*, no. T 435; Smith's Ferry, Northampton, Hampden Co., Aug. 10, 1912, *F. F. Forbes;* Proven Mt., Agawam, Hampden Co., May 18, 1913, *Knowlton & White;* North Adams, Berkshire Co., May 14, 1915, *Knowlton;* Lenox, Berks. Co., Aug. 24, 1902, *Hoffmann;* Centre P., Becket, Berks. Co., Sept. 22, 1904, *Hoffmann;* Mount Washington, Berks. Co., Sept. 10, 1915, *Floyd.* RHODE ISLAND: Cumberland, Providence Co., May 30, 1911, *Knowlton;* East Providence, Prov. Co., *J. F. Collins*, no. 15,010. CONNECTICUT: Middlebury, New Haven Co., April 25 and July 16, 1897, *Shepardson;* Oxford, N. H. Co., April 12, 1888 and Sept. 17, 1897, *Harger.* NEW YORK: Black Lake, St. Lawrence Co., *Fernald, Wiegand & Eames*, no. 14,251; Canton, St. L. Co., *Phelps*, no. 373; Sandy Creek Township, Oswego Co., *Fernald, Wiegand & Eames*, nos. 14,249 and 14,250; Spruce P., Black Lake Forest, Orange Co., *Raup*, no. 7589; Taughannock Ravine, Ulysses, Tompkins Co., *Eames & Wiegand*, no. 11,930. PENNSYLVANIA: Kenney's P., e. of West Auburn, Susquehanna Co., *Wahl*, no. 489; 7 miles s. of Moscow, Lackawanna Co., *Randolph & Randolph*, no. 57; Martic Forge, Lancaster Co., Aug. 16, 1914, *J. F. Collins;* Crawford Co., *Dickey*, no. 23. MICHIGAN: Isle Royale, Keweenaw Co., *Cooper*, no. 7; Keweenaw Co. (without stated localities), Oct., 1904, *Farwell* (some as *A. incana*, var. *americana*, some as var. *glauca*); north of St. Ignace, Mackinac Co., *Benner*, no. 6715. INDIANA: south of Tamarack, Porter Co., *Deam*, no. 8064.—Spread from cultivation in Europe. PLATES 977–979.

Var. TYPICA, forma **Emersoniana,** f. nov. (TAB. 979, FIG. 4), foliis subtus piloso-tomentulosis, pilis plus minusve rufescentibus.—*A. incana* sensu Emerson, Trees and Shrubs in Mass. i. 251, with plate (1875), not (L.) Moench.—Differing from typical *A. rugosa* in having a permanently and usually densely pilose-tomentulose lower surface, the pubescence mostly ferruginous.

Of essentially the same range but forming individual and constant large colonies. The following, selected from thrice as many sheets, are characteristic. NOVA SCOTIA (all distrib. as *A. incana*, var. *hypochlora*): Lahave R., Bridgewater, Lunenburg Co., *Fernald & Long*, no. 23,779; Wallace Lake, Italy Cross, Lun. Co., *F. & L.*, no. 23,780; Sloane L., Pleasant Valley, Yarmouth Co., *Fernald, Bissell, Graves, Long & Linder*, no. 21,015. MAINE: Fairfield, Somerset Co., *Fernald & Long*, no. 13,472; Pembroke, Washington Co., *Fernald*, no. 1700; Burnham, Waldo Co., July 24, 1940, *Knowlton;* Nequasset L., Woolwich, Sagadahoc Co., *Fernald & Long*, no. 13,477; Cape Elizabeth, Cumberland Co., *Chamberlain*, no. 682; Limington, York Co., *Fernald & Long*, nos. 13,475, 13,479 and 13,480; Alfred, York Co., *F. & L.*, no. 13,478; Wells, York Co., *F. & L.*, no. 13,467; York Harbor, York Co., Aug., 1892, *Bicknell* (with unpublished new specific name). NEW HAMPSHIRE: Haverhill, Grafton Co., *Fernald*, no. 15,525; Mason, Hillsborough Co., Aug. 20, 1917, *C. F. Batchelder;* Dover, Strafford Co., *Hodgdon*, no. 2567; Hampton Falls, Rockingham Co., Sept. 10, 1916, *C. F. Batchelder;* Derry, Rock. Co., Aug. 15, 1926, *Batchelder;* Hinsdale, Cheshire Co., Aug. 23, 1919, *Batchelder.* VERMONT: Milton, Chittenden Co., July 25, 1927, *Knowlton;* Hartford, Windsor Co., June 12, 1920, *Eaton & St. John;* Wallingford, Rutland Co., May 30, 1907, *Kennedy.* MASSACHUSETTS: Lynnfield, Essex Co., *Fernald & Bartlett*, no. 786; Round Pond, Tewksbury, Middlesex Co., April 14 and Oct. 14, 1906, *M. L. Fernald & H. H. Bartlett*, nos. 14 (TYPE in Herb. Gray.) and 18; Fresh Pond, Cambridge, Mid. Co., 1842 or 43, *Asa Gray* (sheet sent to and identified by Regel as "*Alnus serrulata* Willd., β. *rugosa*"); West Cambridge, *Fernald & Bartlett*, no. 4; West Roxbury, Suffolk Co., March 25, April 5 and May 28, 1904, *F. F. Forbes;* Brookline, Norfolk Co., Oct. 11, 1914, *F. F. Forbes;* Milton, Norf. Co., March 26 and May 26, 1921, *Kidder;* Hanson, Plymouth Co., Aug. 30, 1941, *Knowlton;* Gunning P., Falmouth, Barnstable Co., *Fernald*, no. 578; Dennis P., Yarmouth, Sept. 19, 1913, *Fernald & Long*, as *A. noveboracensis;* Lambert Cove, Martha's Vineyard, Dukes Co., *Bicknell*, no. 3432; Great P., Martha's Vineyard, *Bicknell*, no. 3143 (as *A. noveboracensis*); Nantucket, *Bicknell*, no. 3438; Leominster, Worcester Co., *Fernald & Bean*, no. 14,017; Princeton, Wor. Co., July 22, 1913, *Weatherby;* Barre, Wor. Co., May 14, 1915, *Hunnewell, Macbride & Torrey;* Northfield, Franklin Co., May 11, 1912, *Fernald & Floyd;* Longmeadow, Hampden Co., May 18, 1913, *Hill & St. John;* Chester, Hampd. Co., May 17, 1913, *Weatherby & Bean;* Worthington, Hampshire Co., *B. L. Robinson*, no. 812; Adams, Berkshire Co., *Knowlton & Bean*, no. 15,107. RHODE ISLAND: Newport, N. Co., *Mearns*, no. 603. CONNECTICUT: Woodstock, Windham Co., July 31, 1919, *Weatherby;*

Pomfret, Wind. Co., July 4, 1901, *Driggs;* Franklin, New London Co., Aug. 27 and Nov. 21, 1912, *Woodward;* Sprague, N. L. Co., Sept. 3, 1913, *Woodward;* Tyler P., Goshen, Litchfield Co., *Weatherby*, no. 3350. New York: Bear P., French Mt., Warren Co., June 9, 1920, *Burnham;* Long L., Hamilton Co., *House*, no. 10,172; Mud Pond, Oswego, O. Co., *Fernald, Wiegand & Eames*, no. 14,246. Michigan: Douglas L., Cheboygan Co., *Ehlers*, no. 534. Indiana: Tremont, Porter Co., Sept. 9, 1920, *D. C. Peattie.*

The extreme with soft-pubescent lower leaf-surfaces, *Alnus rugosa,* forma *Emersoniana,* is named for that remarkably accurate and unexcelled student of Massachusetts trees and shrubs, George Barrell Emerson (1797–1881), author of the scholarly Report on the Trees and Shrubs in Massachusetts (2 vols., 1875), a famous and greatly honored educator, an intimate of Jacob Bigelow, adviser of Horace Mann, and one of the three trustees of the Arnold bequest which, as a result of his guidance, became the initial fund of the Arnold Arboretum. Emerson clearly understood and first discriminatingly stated the strong specific differences which separate the northern *Alnus rugosa* and the southern *A. serrulata.* These he accurately illustrated but, like every one of his period and up to the present, he did not get away from the conviction that our dark-barked shrub is identical with the whitish-barked tree of Europe. Although in Trees and Shrubs in Mass. i. 248 he definitely wrote "White Alder of Europe is a very beautiful tree, sometimes rising to the height of seventy feet", on p. 251 he began his very accurate account of "The Speckled Alder. *A. incana,* Willdenow", "easily distinguished by the brilliant, polished, reddish green color of its stem-bark", "speckled with conspicuous light gray dots", "The stem is usually eight or ten feet high and from one to three inches in diameter".

Emerson distinguished three variations of the Speckled Alder: (1) what he considered typical, with "leaves . . . broad oval, rounded or somewhat cordate at base . . . , doubly serrate or denticulate-serrate . . . smooth and conspicuously impressed at the veins and veinlets above; of a soft coriaceous texture; covered with abundant, soft, often ferruginous pubescence beneath, with the veins and veinlets strikingly prominent" (*A. rugosa,* forma *Emersoniana*); (2) *A. glauca* Michx.:

"A striking and very beautiful variety of the speckled alder, called the glaucous alder by the younger Michaux, is distinguished by the pale blue or glaucous color of the lower surface of the leaves. The pubescence is less abundant, but the veins and footstalk are often, as in the common form [i. e. *A. rugosa*, forma *Emersoniana*] of the tree, of a rusty color"; and (3) a series which Emerson considered "intermediate between the common [*A. serrulata*] and the glaucous alder . . . It differs from the common alder in its leaves being always acute and never obovate, and from the speckled, in having its leaves shining and free from down . . . The general aspect of this alder is similar to that of the speckled alder, differing in the greenness of the under surface of the leaves". Emerson's third variety was, apparently, a mixture of typical *A. rugosa* and the extreme of *A. serrulata* with subelliptic and round-based leaves.

Var. **americana** (Regel), comb. nov. *A. incana, β. americana* Regel in Nouv. Mém. Soc. Nat. Mosc. xiii. 155—repr. as Mon. Bet. 97 (1861); H. Winkl. in Engler, Pflanzenr. iv^{61}. 123 (1904). *A. glauca* Michx. f. Hist. Arb. Forest. Am. Sept. iii. 320, t. 4, fig. 2 (1813). *A. incana*, var. *glauca* (Michx. f.) Loudon, Arbor. Brit. iii. 1688 (1838) pro parte, excl. citation of Ait.; Gray, Man. ed. 2: 412 (1856); Callier in Mitteil. Deutsche Dendr. Gesellsch. 1918: 143 (1918)[1], not Ait. Hort. Kew. ed. 2, v. 259 (1813). *A. incana, α. vulgaris* Spach in Ann. Sci. Nat. sér. 2, xi. 206 (1841) in small part only (*A. glauca* Michx. fil), excluding the synonyms "*Alnus incana* auctor", "*Alnus undulata* Pursh" (Pursh correctly giving *A. undulata* Willd. as a synonym of *A. crispa* Ait.) and "Foliis . . obovatis". *A. incana* sensu Tuckerm. in Am. Journ. Sci. xlv. 32 (1843) and most later Am. auth., not (L.) Moench. *A. americana* (Regel) Hort. ex K. Koch, Dendrol. ii^1. 636 (1872).—Generally more northern in range, Labrador to Hudson Bay region and Saskatchewan, south to Newfoundland, Nova Scotia, Maine, New Hampshire, Massachusetts, uplands of Pennsylvania, Maryland and West Virginia, northern Ohio, northern Indiana, Wisconsin and northeastern Iowa. The following, selected from nearly 200 sheets before me, are characteristic. Labrador: Paradise R., Sandwich Bay (lat. 53° 30′, long. 57° 15′), *Harlow Bishop*, no. 275. Newfoundland: Clarenville, July 30, 1938, *Agnes M. Ayre;* Quarry, *Fernald &*

[1] Callier showed the usual Germanic lack of understanding of American geography, citing one specimen from "D a k o t a: New Anglia leg. Blake" and Mrs. Chase's no. 2105 from Dune Park, Indiana, as from "M i c h i g a n: Lake Michigan, Done Park". On a preceding page the strictly northeastern *A. rugosa* was cited from anywhere, including California.

Wiegand, no. 5302; Grand Falls, *F. & W.*, no. 5301; near mouth of Badger Brook, *Robinson & Schrenk*, no. 35; Little Red Indian Lake, *F. & W.*, no. 5300; Goose P., *F. & W.*, no. 3276; Winterhouse Brook, Bonne Bay, *Fernald, Long & Fogg*, no. 1647; Summerside, Bay of Islands, *F. & W.*, no. 3277; Table Mt., Port-à-Port Bay, *Fernald & St. John*, no. 10,828. QUEBEC: Natashquan R., Saguenay Co., July, Aug., 1912, *C. W. Townsend;* Piashtibaie, Sag. Co., *St. John*, no. 90,395; Seven Islands, Sag. Co., *C. B. Robinson*, no. 900; Douglastown, Gaspé Co., Aug. 22, 1904, *Collins, Fernald & Pease;* R. Ste. Anne des Monts, Gaspé Co., *Fernald & Collins*, no. 217; Bonaventure R., Bonav. Co., Aug. 4–8, 1904, *C. F. & P.;* Matane, M. Co., Aug. 5, 1904, *F. F. Forbes;* Bic, Rimouski Co., *Rousseau*, no. 21,457; Cap-à-l'Aigle, Charlevoix Co., *J. Macoun*, no. 68,768; Lac Tremblant, Terrebonne Co., July 23, 1922, *Churchill;* Black Lake, Megantic Co., *Fernald & Jackson*, no. 12,076; Georgeville, Stanstead Co., Aug. 22, 1914, *Churchill;* East Main, E. Coast of James Bay, *D. Potter*, no. 265; Rupert House, E. Coast, *Potter*, no. 260. MAGDALEN ISLANDS: Brion Island, *St. John*, no. 1847; Ile de l'Étang-du-Nord, *Victorin & Rolland*, no. 9418; Grindstone I., *Fernald, Bartram, Long & St. John*, no. 7310. NEW BRUNSWICK: Kent Co., 1870, *Fowler*. NOVA SCOTIA: Pottle's L., North Sydney, Cape Breton Co., *Bissell & Linder*, no. 21,020; Glenbard, near James River Sta., Antigonish Co., *Perry, Wetmore, Hicks & Prince*, no. 10,256; Musquodoboit Harbor, Halifax Co., *Rousseau*, no. 35,263; Deception L., Shelburne Co., *Fernald & Long*, no. 23,777; Clyde River, Shelb. Co., *J. G. Jack*, no. 3454; Butler's L., Gavelton, Yarmouth Co., *Fernald, Long & Linder*, no. 21,021; Lake Annis, Yarm. Co., *Bissell, Pease & Linder*, no. 21,017; Journeay L., Weymouth, Digby Co., *Fernald & Long*, no. 23,778. MAINE: Fort Kent, Aroostook Co., *Fernald*, no. 2446; Masardis, Aroost. Co., *Fernald*, no. 2447; Orono, Penobscot Co., May 30, 1904, *Fernald;* Foxcroft, Piscataquis Co., Aug. 31, 1897, *Fernald;* St. John P., Township iv, Range 17, Somerset Co., *St. John & Nichols*, no. 2272; Dead River, Som. Co., *Fernald & Strong*, no. 409, in part; Chesterville, Franklin Co., Aug. 28, 1904, *E. B. Chamberlain;* Calais, Washington Co., Aug. 24, 1928, *Knowlton;* Roque Bluff, Wash. Co., July 31, 1918, *Knowlton;* Northfield, Wash. Co., Aug. 2, 1941, *Knowlton;* Nicatous L., Twp. 3, Hancock Co., *Fassett*, no. 2378; Seal Harbor, Hanc. Co., July 8, 1889, *Redfield;* Brooklin, Hanc. Co., *A. F. Hill*, no. 1051; Isle au Haut, Knox Co., Aug. 26, 1927, *Kidder;* Monhegan I., Lincoln Co., Aug., 1911, *Kate Furbish;* Brunswick, Cumberland Co., Aug. 26, 1910, *Kate Furbish;* Baldwin, Cumb. Co., *Fernald & Long*, no. 13,470; North Berwick, York Co., Aug. 31, 1894, *Parlin*. NEW HAMPSHIRE: White Mountains, Tuckerman, labeled, "*Alnus incana*, Willd. *A. glauca*, Michx. f. species unica", with reference to Tuckerman's treatment in Am. Jour. Sci. xlv. 32 (1845), this sheet marked by Regel *A. incana* β. *glauca;* Lake Umbagog, Cambridge, Coös Co., *Pease,* no. 18,150; Pittsburg, Coos Co., *Pease,* no. 10,297; summit of Cape Horn, Northumberland Co., Coös Co., *Pease,* no. 16,451; Jackson, Carroll Co., Aug. 1895, *E. W. Hervey;* Bow, Merrimack Co., Sept. 21, 1930, *G. M. Bryant;* Hillsborough, H. Co., Sept. 2, 1921, *C. F. Batchelder;* New Hampton, Belknap Co., Sept. 5, 1904, *F. F. Forbes;* Richmond, Cheshire Co., Aug. 21, 1919, *C. F. Batchelder;* Cheshire Co., *Robinson,* no. 156. VERMONT: Brunswick Springs, Essex Co., *S. N. F. Sanford,* no. 1083; Willoughby, Orleans Co., July, 1898, *Kennedy:* Worcester, Washington Co., Aug. 25, 1875, *Blanchard;* Charlotte, Chittenden Co., April 15 and Sept. 29, 1879, *Pringle;* Hartland, Windsor Co., *J. G. Underwood,* no. 3116. MASSACHUSETTS: Lexington, Middlesex Co., March 23 and May 20, 1931, *L. B. Smith;* Buckland, Franklin Co., April 11 and Aug. 19, 1904, *F. F. Forbes;* Worthington, Hampshire Co., *B. L. Robinson,* no. 507; Pittsfield, Berkshire Co., Aug. 5, 1915, *Churchill.* NEW YORK: Norfolk, St. Lawrence Co., *Phelps,* nos. 1139–1141; Selkirk, Oswego Co., *Fernald, Wiegand & Eames,* no. 14,245; Canadice, Ontario Co., *C. C. Thomas,* no. 3926; Penn Yan, Gates Co., *Sartwell* (Sartwell Herb., Hamilton College, presumable duplicate of the TYPE of *A. incana* β. *americana* Regel); western New York, *Asa Gray,* identified by Regel as *A. incana,* var. *glauca.* PENNSYLVANIA: Little Mud P., e. of Porter's L., Pike Co., *Fogg,* no. 10,767; Pocono Plateau, Monroe Co., July, Aug., 1904, *Harshberger.* MARYLAND: s. of Finzel, Garrett Co., Aug. 15, 1936, *Wherry.* WEST VIRGINIA: at 2500 ft. alt., e. of Gormannia, Grant Co., *Svenson,* no. 4439. ONTARIO: Lake Rosseau, Muskoka Co., *W. F. Wright,* no. 140; Moose River, James Bay, Nipissing Distr., *David Potter,* nos. 262–264; Sand Point, Algoma Distr., *Taylor et al.* no. 842; Batchawana R., Alg. Distr., *Taylor et al.* no. 839; Nipigon, Thunder Bay Distr., *Jennings & Daily,* no. 481. MICHIGAN: Baraga, B. Co., *Fernald & Pease,* no. 3081. OHIO: Hiram, Portage Co., *R. J. Webb,* no. 1377. INDIANA: Chesterton, Porter Co., Aug. 12, 1925, *Churchill.* WISCONSIN: Kewaunee, K. Co., Aug. 2, 1902, *Schuette;* Brodhead, Green Co., *Fassett,* no. 12,931; Dayton, Green Co., *Fassett,* no. 13,990; Brown Co., 1880, *Schuette.* MINNESOTA: Sect. Nw.-Sw. 35, T. 144, R. 36, Clearwater Co., *M. L. Grant,* no. 3368; Cass L., Cass Co., *Pammel,* no. 5; Centre City, Chisago Co., July, 1892, *B. C. Taylor;* Bembridge, *Pammel,* no. 892. IOWA: Postville, Allamakee Co., June, 1914, *Schultz, Pammel & Orr;* Bluffton, Winneshiek Co., March 28 and Sept. 16, 1903, *Shimek;* New Hampton, Chickasaw Co., *Pammel,* no. 475. PLATES 980 and 981.

Var. AMERICANA, forma **tomophylla** (Fernald), comb. nov. *A. incana*, var. *glauca*, f. *tomophylla* Fernald in RHODORA, xvi. 56 (1914). *A. incana*, var. *tomophylla* (erroneously attributed to Fernald) by Rehder, Man. Cult. Trees and Shrubs, 147 (1927).—Local. NEWFOUNDLAND: Norris Arm, *Fernald & Wiegand*, no. 5303 (TYPE). MAINE: Hartford, Oxford Co., Aug., 1892, *Parlin*. PLATE 982, FIG. 4.

Var. AMERICANA, forma **hypomalaca,** f. nov. (TAB. 982, FIG. 1–3), foliis subtus molliter persistenterque piloso-tomentulosis, pilis cinereis.—Local, often abundant, through much of the area of var. *americana*. QUEBEC: Pointe du Lac, St. Maurice Co., Aug. 2, 1923, *Chamberlain & Knowlton*. NEW BRUNSWICK: Shediac Cape, Westmoreland Co., July 3, 1914, *F. T. Hubbard;* Seal Cove Brook, Grand Manan, Charlotte Co., July 24, 1941, *C. A. & Una F. Weatherby*, no. 7015 (TYPE in Herb. Gray.). PRINCE EDWARD ISLAND: St. Charles, Kings Co., *Fernald & St. John*, no. 11,030. NOVA SCOTIA: Central Port Mouton, *Fernald, Bissell, Graves, Long & Linder*, no. 21,019; Meteghan, Digby Co., *Fernald & Long*, no. 21,016; Middleton, Annapolis Co., *Fernald, Pease & Long*, no. 21,018. MAINE: Houlton, Aroostook Co., Aug. 26, 1897, *Fernald;* Patten, Penobscot Co., Aug. 23, 1897, *Fernald;* Milford, *Fernald & Long*, nos. 13,468 and 13,469; Fryeburg, Oxford Co., *C. E. Faxon;* Cutler, Washington Co., July 1, 1902, *Kennedy et al.;* Pembroke, Wash. Co., *Fernald*, no. 1699; Dedham, Hancock Co., *Fernald & Long*, no. 13,465; Deer Isle, Hanc. Co., *A. F. Hill*, no. 2096; Atlantic, Swans Island, Hanc. Co., *Hill*, no. 2281; Rockport, Knox Co., *Rossbach*, no. 1207; Nequasset L., Woolwich, Sagadahoc Co., *Fernald & Long*, no. 13,477; Leeds, Androscoggin Co., July 23, 1913, *Knowlton;* Falmouth, Cumberland Co., *Chamberlain & Bissell*, no. 389; Limington, York Co., *Fernald & Long*, nos. 13,479 and 13,480; Alfred, York Co., *F. & L.*, no. 13,466; Kennebunkport, York Co., Aug. 1929, *C. A. Cheever*. NEW HAMPSHIRE: Mt. Washington, Coös Co., July 16, 1891, *Kennedy:* Randolph, Coös Co., *Pease*, no. 11,179; Shelburne, Coös Co., *Pease*, no. 11,133; Jackson, Carroll Co., July 12, 1883, *C. W. Jenks;* Warren, Grafton Co., July 24, 1908, *E. F. Williams;* Merrimack, Hillsborough Co., Aug. 11, 1917, *C. F. Batchelder;* Rindge, Cheshire Co., May 30, 1912, *F. F. Forbes*. VERMONT: Stowe, Lamoille Co., July 27, 1884, *C. W. Swan*. MASSACHUSETTS: Round Pond, Tewksbury, Middlesex Co., *Fernald & Bartlett*, no. 15; Beaver Brook Reservation, Mid. Co., May 26, 1894, *G. L. Chandler;* Brookline, Norfolk Co., Sept. 25, 1905, *F. F. Forbes;* Needham, Norf. Co., *T. O. Fuller;* Springfield, Hampden Co., June 17, 1913, *Luman Andrews;* Cheshire, Berkshire Co., July, 1912, *E. J. Winslow;* Sheffield, Berks. Co., July 24, 1912, *Hoffmann*. NEW YORK: Axton, Franklin Co., July 10, 1899, *Rowlee, Wiegand & Hastings;* Conklingville, Saratoga Co., *Fogg*, no. 15,161. ONTARIO: Kokoko Bay, Timagami Region, *Edgar & Dorothy M. Anderson*, no. 26,045B; Stokes Bay, Bruce Peninsula, *Krotkov*, no. 8948. INDIANA: Dune Park, Porter Co., *Greenman*, no. 2683.

Alnus rugosa, vars. *typica* and *americana* are not mere forms, the former with green to rufescent lower leaf-surfaces, the latter with them glaucous, gray or cinereous. The latter is decidedly more northern in range. I am indebted to Professor Rehder and Dr. A. C. Smith for the use of a Sartwell sheet from Penn-Yan, New York, lent by the Herbarium of Hamilton College. This is presumably part of the original collection upon which Regel founded his *A. incana*, β. *americana.* The approximately 400 sheets showing foliage in the Gray Herbarium and the herbarium of the New England Botanical Club, when tabulated, give the following proportions (in percentages).

LABRADOR PENINSULA, var. *typica* 0, var. *amer.* 100%; NEWFOUNDLAND, var. *typica* 0, var. *amer.* 100; QUEBEC (south of Lab. Pen.), var. *typica* 0, var. *amer.* 100; NEW BRUNSWICK, var. *typica* 0, var. *amer.* 100; NOVA SCOTIA, var. *typica* 43, var. *amer.* 57; NORTHERN MAINE (northern tier of counties), var. *typica* 59, var. *amer.* 41; SOUTHERN MAINE, var. *typica* 80, var. *amer.* 20; COÖS CO., NEW HAMPSHIRE, var. *typica* 5, var. *amer.* 95; REST OF NEW HAMPSHIRE, var. *typica* 65, var. *amer.* 35; VERMONT, var. *typica*, 62, var. *amer.* 38; MASSACHUSETTS, var. *typica* 89, var. *amer.* 11; RHODE ISLAND, var. *typica* 100, var. *amer.* 0; CONNECTICUT, var. *typica* 100, var. *amer.* 0.

The variations which I treat as forms show no such geographic concentrations; they are scattered throughout the range of the variety under which they are placed.

2. A. SERRULATA (Ait.) Willd. Sp. Pl. iv[1]. 336 (1805).—The following varieties and forms are recognized.

a. Principal leaves definitely obovate, cuneate, or subcuneate to subacute at base; those of vigorous 1st. year's shoots obtuse or acute; those of fertile branches of 2nd. year one third to two thirds as broad as long.
  Lower surfaces of mature leaves glabrous or strongly glabrescent. . . . . Var. *vulgaris*.
  Lower surfaces of mature leaves permanently and densely pilose-tomentulose, plush-like to touch . . . . . . Forma *noveboracensis*.
a. Principal leaves broadly elliptic-obovate to broadly oblong-elliptic or subrotund (though broadest at or above the middle), gradually rounded at base; those of fertile branches of 2nd. year mostly three fifths to nine tenths as broad as long. . . . *b*.
  b. Lower surfaces of mature leaves glabrous or strongly glabrescent.

Leaves gradually rounded to subacute (or more rarely acute) at apex, mostly 6–15 cm. long; staminate aments 3–7 cm. long.......................... Var. *subelliptica*
Leaves broadly retuse or emarginate at apex, mostly 2–5 cm. long; staminate aments 2 cm. long......... Forma *emarginata*.
b. Lower surfaces of mature leaves permanently and densely pilose-tomentulose, plush-like to touch.
Large shrub or small tree; principal leaves 6–12 cm. long; mature cones 1–2 cm. long; staminate aments 3–7 cm. long.................................... Forma *mollescens*.
Dwarf shrub 0.5–1 m. high; principal leaves 2–5 cm. long; mature cones 6–12 mm. long; staminate aments 1.3–1.8 cm. long................................ Forma *nanella*.

A. SERRULATA, var. VULGARIS Spach in Ann. Sci. Nat. sér. 2, Bot. xv. 206 (1841), in part ("Foliis . . . lanceolato-obovatis, v. obovatis, v. oblongo-obovatis, saepius obtusis v. vix acuminatis, basi cuneatis"). *Betula-Alnus rubra* Marsh. Arb. Am. 20 (1785), presumably. *Betula serrulata* Ait. Hort. Kew. iii. 338 (1789); Willd. Berlin. Baumzucht, 45 (1796), at least as to citation of Ait. *A. serrulata* (Ait.) Willd. Sp. Pl. iv[1]. 336 (1805). *A. rubra* (Marsh.) Tuckerm. in Am. Journ. Sci. xlv. 32 (1843), not Bong. (1833). *A. glutinosa*, δ. *serrulata* (Ait.) Regel in Nouv. Mém. Soc. Nat. Mosc. xiii. 164, t. xi. fig. 7—repr. as Mon. Bet. 106, t. xi. fig. 7 (1861), in part, incl. basonym. *A. glutinosa*, δ. *serrulata*, lusus a. *genuina* Regel, l. c. fig. 6 (1861). *A. glutinosa*, δ. *serrulata*, lusus b. *obtusifolia* Regel, l. c. fig. 7 (1861). *A. serrulata*, α. *genuina* Regel in DC. Prodr. xvi[2]. 188 (1868), in part. *A. serrulata*, δ. *obtusifolia* Regel, l. c. (1868). *A. rugosa* sensu K. Koch, Dendrol. ii. 635 (1872); sensu Coulter in Mem. Torr. Bot. Cl. v. 131 (1894); sensu Sargent, Silva, ix. 69 (1896) and subseq. auth.; not Spreng. (1825). *A. rugosa*, var. *serrulata* (Ait.) H. Winkler in Engler, Pflanzenr. iv[61]. 120 (1904). *A. rugosa*, var. *obtusifolia* (Regel) H. Winkler, l. c. (1904). *A. serrulata pumila* Dameker in Mitt. Deutsch. Dendr. Ges. 1909: 326 (1909).—Northern Florida to Louisiana, north to southwestern Nova Scotia, central and southern Maine, southern New Hampshire, central Vermont, New York, West Virginia, Ohio, Indiana, Illinois, Missouri and southeastern Oklahoma. The following, selected from many hundreds of sheets, are characteristic. NOVA SCOTIA: Ponhook L., Queen's Co., *Weatherby*, no. 6955: Cameron L., South Brookfield, Queen's Co., *C. A. & Una F. Weatherby*, no. 7059. MAINE: North P., Norway, Oxford Co., *Pease*, no. 24,100; near Jordan P., Mt. Desert I., Hancock Co., *Stebbins*, no. 235; Bristol, Lincoln Co., *E. B. Chamberlain*, no. 716; South Poland, Androscoggin Co., 1893, *Kate Furbish;* Wilson's Mill, Cumberland, C. Co., *Chamberlain, Morris & Ricker*, no. 852; Limington, York Co., *Fernald & Long*, no. 13,481; Cape Neddick, York Co., *J. G. Jack*, no. 3394. NEW HAMPSHIRE: Wild Goose P., Strafford, S. Co., *Hodgdon & Cham-*

berlain, no. 2886; Nottingham, Rockingham Co., *A. A. Eaton*, no. 435; Danville, Rock. Co., *Pease*, no. 28,210; Manchester, Hillsborough Co., Oct. 2, 1896, *F. W. Batchelder;* Walpole, Cheshire Co., *Fernald*, no. 505; Sandy P., Richmond, Chesh. Co., Sept. 3, 1916, *C. F. Batchelder.* VERMONT: L. St. Catherine, Wells, Rutland Co., *Dodge & Fassett*, no. 822. MASSACHUSETTS: Andover, Essex Co., *Pease*, no. 3432; Ashby, Middlesex Co., May 30, 1914, *Knowlton;* Concord, Mid. Co., April 4 and July 20, 1858, *E. S. Hoar;* Wilmington, Mid. Co., *Fernald & Bartlett*, no. 9; West Roxbury, Suffolk Co., Aug. 9 and Sept. 9, 1904, *F. F. Forbes;* Blue Hills Reserv., Aug. 11, 1895, *E. F. Williams;* Lakeville, Plymouth Co., *Fernald & Long*, no. 9345; Prospect Hill P., Taunton, Bristol Co., *F. C. Seymour*, no. 4460; Brewster, Barnstable Co., *Fernald*, no. 16,684; Provincetown, Barns. Co., *Fernald & Long*, no. 18,356; Chilmark, Martha's Vineyard, Dukes Co., *F. C. Seymour*, no. 1671; Harvard, Worcester Co., Aug. 6, 1916 and April 22, 1917, *F. F. Forbes;* Gill, Franklin Co., May 11, 1912, *St. John & Weatherby;* Ware, Hamshire Co., *Goodale, Potsubay & St. John*, no. 64,660; Stockbridge, Berkshire Co., Aug. 6, 1917, *Hoffmann.* RHODE ISLAND: Lincoln, Providence Co., *St. John*, no. 894: Barrington, Bristol Co., May 20, 1911, *E. J. Winslow;* Warren, Bristol Co., July 25, 1919, *Sanford;* Prudence I., Newport Co., *Sanford*, no. 10,377; Richmond, Washington Co., Aug. 30, 1919, *Fernald & Collins;* Hopkinton, Wash. Co., Sept. 1, 1919, *Fernald, Woodward & Collins.* CONNECTICUT: Woodstock, Windham Co., *Weatherby*, no. 4519; Franklin, New London Co., Oct. 4, 1913, *Woodward;* Tolland, T. Co., *Weatherby*, no. 5330; Tariffville, Hartford Co., May 17, 1913, *Winslow & Hill;* North Guilford, New Haven Co., July 11, 1904, *W. R. Dudley.* NEW YORK: West Fort Ann, Washington Co., Aug. 17, 1913, *Dobbin & Burnham;* Ballston L., Saratoga Co., Aug. 11, 1906, *Burnham;* Sutherland P., Black Lake Forest, Orange Co., *Raup*, no. 7746; Fishers Island, Suffolk Co., *St. John*, no. 2683; Sandy Creek Township, Oswego Co., *Fernald, Wiegand & Eames*, no. 14,248; Ithaca, Tompkins Co., *MacDaniels*, no. 3928. NEW JERSEY: Oradell, Bergen Co., April 16 and Oct. 8, 1905, *Mackenzie;* Denville, Morris Co., Aug. 13, 1905, *Mackenzie;* Vincetown, Burlington Co., *Long*, no. 11,091; Pleasantville, Atlantic Co., *Tidestrom*, no. 11,377; Friendship, Salem Co., *Long*, no. 51,606. PENNSYLVANIA: Scotrun, Monroe Co., Aug., 1906, *B. Long;* Chester Co., *Sharpless*, no. 276; Smithfield Swamp, Lancaster Co., Aug. 30, 1889, *Heller;* Mifflinville, Columbia Co., *Fogg*, no. 14,537; Farrandsville, Clinton Co., *Fogg*, no. 11,516; Fayette Co., *Dickey*, nos. 21 and 205. DELAWARE: Cool Spring, Sussex Co., *Larsen*, no. 459. MARYLAND: Chesapeake City, Cecil Co., *Tidestrom*, no. 11,679; St. Mary's Co., *Tidestrom*, no. 5062. DISTRICT OF COLUMBIA: Brookland, Oct. 15, 1898, *Holm;* Terra Cotta, Aug. 18, 1915, *Holm.* West Virginia: Huttonsville, Randolph Co., *Greenman,* no. 330; Tygart Junction, Barbour Co., *Greenman,* no. 329; between Gilmer and Read, Gilmer Co., *Greenman,* no. 331. Virginia: se. of Alexandria, Fairfax Co., *Wiegand & Manning,* no. 958; ne. of Mechanicsville, Louisa Co., *Adams & Wherry,* no. 2228; Capital Landing Creek, York Co., *Mentzel,* no. 145; Oceana, Princess Anne Co., *Fernald & Long,* nos. 3896 and 3897; eastern shore, Lake Drummond, Norfolk Co., *J. Arthur Harris,* no. C 18,233; Zuni, Isle of Wight Co., *Fernald, Griscom & Long,* no. 6582; south of South Quay, Nansemond Co., *F. & L.,* no. 11,559; south of Franklin, Southampton Co., *F. & L.,* no. 8235; e. of Dan River, Halifax Co., *Fosburg,* no. 15,383; Hollins School, Roanoke Co., *C. E. Wood, Jr.,* no. 5483; "Mts., Virg. 1843", *Asa Gray* (type of var. *obtusifolia* Regel, in Gray Herb.); Bane, Giles Co., *Fogg,* no. 14,714, as *A. crispa;* Peak Creek, Pulaski Co., at 2200 ft. alt., July 16, 1892, *Small.* North Carolina: Snow Hill, Greenė Co., *L. F. & F. R. Randolph,* no. 776; Clinton, Sampson Co., *Godfrey,* no. 5895; Biltmore, Buncombe Co., *Bilt. Herb.* no. 1240^b; at 4000 ft. alt., Pisgah Forest, Transylvania Co., *House,* no. 4041; at 1700 ft. alt., Great Smoky Mts., Swain Co., July, 1891, *Beardslee & Kofoid.* South Carolina: s. of Myrtle Beach, Horry Co., *Weatherby & Griscom,* no. 16,511; Georgetown, G. Co., *Godfrey & Tryon,* no. 988; Santee Canal, *Ravenel* (identified by Regel as his var. *genuina*); Summerville, Dorchester Co., *B. L. Robinson,* no. 114; se. of Elloree, Orangeburg Co., *Godfrey & Tryon,* no. 1503. Georgia: se. of Ludowici, Long Co., *Wiegand & Manning,* no. 962; s. of Cuthbert, Randolph Co., *Harper,* no. 1782. Florida: River Junction, Gadsden Co., *Nash,* no. 2590; Peters Creek, Clay Co., *Small & DeWinkeler,* no. 9706. Indiana: s. of Chestnut Ridge, Jackson Co., *Deam,* no. 13,740. Kentucky: Keyser Creek, Boyd Co., Sept. 25, 1937, *T. N. McCoy;* Tygart's Creek, Carter Co., Oct. 16, 1937, *E. L. Braun;* "Fernbank—ad ripas fluminis Ohio, prope 'North Bend'", *Short.* Tennessee: Rugby, Morgan Co., *Svenson,* no. 4048; Sunbright, alt. 2200 ft., Morgan Co., *Svenson,* no. 4117; n. of Manchester, Coffee Co., *Svenson,* no. 9256; Hollow Rock Jc., Carroll Co., *Svenson,* no. 374. Alabama: n. of Headland, Henry Co., *Wiegand & Manning,* no. 964; Perdido, Baldwin Co., *Blanton,* no. 7087. Illinois: Pope Co., July 31, 1898, *G. P. Clinton.* Missouri: Jefferson Co., July, 1887, *Eggert;* Bismark, St. Francois Co., *E. J. Palmer,* no. 18,065; Monteer, Shannon Co., *Bush,* nos. 204 and 7852. Arkansas: Kensett, White Co., *Demaree,* no. 8658; Siloam Springs, Benton Co., *Demaree,* no. 4626; Washington Co., Aug. 17, 1895, *Blankinship;* Howard Co., *Demaree,* no. 9734; Murfreesboro, Pike Co., *Demaree,* no. 9377; Locksburg, Sevier Co., *Demaree,* no. 9890. Louisiana: New Orleans, 1832, *Drummond;* n. of Kisatchie, Natchitoches Parish, *D. S. & H. B. Correll*, no. 9765. Oklahoma: Page, LeFlore Co., *Stevens*, no. 2619; Valliant, McCurtain Co., *Demaree*, no. 12,022 (appr. var. *subelliptica*). Plates 983 and 984.

Var. vulgaris, forma **noveboracensis** (Britton), stat. nov. *A. noveboracensis* Britton in Torreya, iv. 124 (1904) and N. Am. Trees, 264, fig. 224 (1908). *A. rugosa*, race? Britton in Britt. & Brown, Ill. Fl. ed. 2, i. 613 (1913).—Differing from typical var. *vulgaris* only in the persistent plush-like pubescence of the lower leaf-surfaces.—Scattered through the range, often abundant. Maine: Orono, Penobscot Co., *Fernald & Long*, no. 13,473, as *A. incana*, var. *hypochlora*. Massachusetts: West Roxbury, April 5 and May 18, 1904, *F. F. Forbes*. Rhode Island: Washington P., Kent Co., May 24, 1914, *Thos. Hope*. New York: Grant City, Staten I., Aug. 5, 1894, *Britton* (type of *A. noveboracensis*); Selkirk, Oswego Co., *Fernald, Wiegand & Eames*, no. 14,247. New Jersey: South Amboy, Middlesex Co., *Mackenzie*, no. 1465. Virginia: Blackwater R., Princess Anne Co., *Fernald & Long*, no. 3898; w. of Franklin, Southampton Co., *F. & L.*, no. 6583; se. of Branchville, South. Co., *F. & L.*, no. 10,231; n. of Skipper's, Greensville Co., *F. & L.*, no. 8693. South Carolina: *M. A. Curtis*. Georgia: s. of Athens, Clarke Co., *Duncan & Roland*, no. 3877; Augusta, Richmond Co., *Olney & Metcalf*, no. 91. Kentucky: Harlan Court House, Harlan Co., *Kearney*, no. 7; s. of Albany, Clinton Co., *Smith & Hodgdon*, no. 3992. Tennessee: between Lexington and Natchez Trace Forest, Henderson Co., *Svenson*, no. 10,499. Louisiana: *Hale* (identified by Regel as his *A. serrulata*, var. *genuina*). Plate 985.

Var. **subelliptica,** var. nov. (tab. 986), foliis late elliptico-obovatis vel oblongo-ellipticis vel subrotundo-obovatis basin versus sensim rotundatis, subtus glabris vel glabratis; amentis masculis 3–7 cm. longis; strobilis maturis 1–2 cm. longis.—Georgia, north to southern New Hampshire, Massachusetts and New York. New Hampshire: Wheelwright P., Lee, Strafford Co., *Hodgdon*, no. 2576. Massachusetts: Rockport, Essex Co., *L. B. Smith & R. C. Gates*, nos. 964 and 965; Round P., Tewksbury, Middlesex Co., *Fernald & Bartlett*, no. 17; sandy swamp, Tewksbury, April 14 and October 14, 1906, *Fernald & Bartlett*, no. 16 (type in Herb. Gray.); Winchester, Mid. Co., *F. & B.*, nos. 8, 11 and 13; West Cambridge, Mid. Co., *F. & B.*, no. 3; Fresh Pond, Cambridge, Sept. 29, 1894, *Robinson*, also *F. & B.*, no. 1; Bedford, Mid. Co., Sept. 12, 1903, *Knowlton;* Needham, Norfolk Co., April 20 and July 3, 1883, *T. O. Fuller;* Bellingham, Norf. Co., Sept. 17, 1935, *Ordway & Sanford;* Silver L., Kingston, Plymouth Co., Aug. 30, 1941, *Knowlton;* Wareham, Plym. Co., Sept. 18, 1925, *Knowlton;* Waquoit, Falmouth, Barnstable Co., *R. A. Ware*, no. 336; East Sandwich, Barn. Co., Sept. 16, 1916, *F. F. Forbes;* Seward's P., West Barnstable, Barn. Co., *St. John & White,* no. 924; Great P., Centerville, Barn. Co., June 16, 1895, *E. F. Williams;* Walker P., Brewster, Barn. Co., *Fernald,* no. 16,681; Sheep P., Brewster, *Fernald,* no. 16,683; Cliff P., Brewster, *Fernald & Long,* no. 16,685; Davis P., Greenwich, Hampshire Co., *Pease,* no. 20,353. RHODE ISLAND: Limerock, Lincoln, Providence Co., Oct. 19, 1906, *J. F. Collins;* East Providence, Prov. Co., Oct. 17, 1906, *Collins;* Wash. P., Block Island, Newport Co., *Fernald, Hunnewell & Long,* no. 9344. CONNECTICUT: Coventry, Tolland Co., Aug., 1916, *Weatherby & Smith;* Ladd Fool Bridge, Franklin, New London Co., Aug. 24 and Sept. 6, 1912, *Woodward;* Rainbow, Windsor, Hartford Co., Sept. 20, 1908, *H. S. Clark;* Southington, Hartford Co., *L. Andrews,* no. 182; Oxford, New Haven Co., April 16, 1888 and July 30, 1899, *Harger.* NEW YORK: Long L., Hamilton Co., *House,* no. 13,513; Ashokan, Ulster Co., *Muenscher,* no. 16,104; Glycerine Hollow, Black Lake Forest, Orange Co., *Raup,* nos. 7789 and 7792; Peconic R., Southampton, Suffolk Co., *St. John,* no. 2682: Renwick Flats, Ithaca, Tompkins Co., *MacDaniels,* no. 3927. PENNSYLVANIA: near Kimbles, Pike Co., *Fogg,* no. 10,780; Allegheny Co., *Dickey,* no. 24. VIRGINIA: n. of Keyesville, Charlotte Co., *Fosberg,* no. 15,531; se. of Whitemarsh School, Nansemond Co., *Fernald & Long,* no. 11,558 (transitional); south of South Quay,Nans. Co., *F. & L.,* no. 10,611. NORTH CAROLINA: Parkville, Perquimans Co., *L. F. & F. R. Randolph,* no. 682; Raleigh, Wake Co., *Godfrey,* no. 4957; Hamlet, Richmond Co., *Wiegand & Manning,* no. 960. SOUTH CAROLINA: Pee Dee R. at Mars Bluff, Florence Co., *Wiegand & Manning,* no. 961. GEORGIA: e. se. of Statesboro, Bulloch Co., July 5, 1936, *Wherry.*

Var. SUBELLIPTICA forma **emarginata,** f. nov. (TAB. 987). Frutex ad 1.5 m. alta; foliis subrotundo-obovatis 2–5 cm. longis 1.5–4 cm. latis basin versus rotundatis apice late emarginatis paginis inferioribus glabratis; amentis masculis 2 cm. longis; strobilis maturis 5–10 mm. longis.—CONNECTICUT: open, rather sphagnous, swamp, Rainbow, Windsor, Hartford Co., Sept. 16, 1906 and April 6, 1907, *C. H. Bissell & C. A. Weatherby* (*Weatherby,* no. 2031), TYPE in Herb. Gray.

Var. SUBELLIPTICA, forma **mollescens,** f. nov. (TAB. 988). Frutex altus vel arbor fastigiata ad 8 m. alta; foliis ut in var. *subelliptica* 6–12 cm. longis apice obtusis vel acutis basin versus rotundatis subtus dense persistenterque subvelutinis; strobilis maturis 1–2 cm. longis.—Scattered through the range of the variety. NEW ENGLAND: old specimen from "Nova Anglia", *Oakes,* identified by Regel as his var. *genuina.* MASSACHUSETTS: Plum Island, Essex Co., *St. John,* no. 837; Winchester, Middlesex Co., July, 1907, *Knowlton;* Sharon, Norfolk Co., *S. F. Poole,* no. 3; Barnstable, B. Co., *Fernald & Woodward*, nos. 15,124 and 15,126; Sheep P., Brewster, Barn. Co., *Fernald*, no. 16,682; Seth's P., West Tisbury, Dukes Co., *Fernald & Fogg*, no. 888; Brookfield, Worcester Co., *Hill, St. John & Torrey*, no. T. 261. Connecticut: Thompson, Windham Co., June 11, 1922, *Eaton, Fassett, Jack, Linder & Peattie*. New York: wet hollow, Riverhead, Southampton, Suffolk Co., July 25–Aug. 3, 1920, *St. John*, no. 2681 (type in Herb. Gray.). New Jersey: South Amboy, Middlesex Co., *Mackenzie*, no. 1906. Virginia: Little Neck, Princess Anne Co., *Fernald & Long*, no. 3899. North Carolina: Raleigh, Wake Co., *Godfrey*, no. 4052; Gilson, Scotland Co., *Godfrey*, no. 5073.

Var. *subelliptica*, at the northern border of its range, has often been taken for a hybrid of *Alnus serrulata* (var. *vulgaris*) and *A. rugosa* (var. *typica*) and in outline of leaf it is suggestive of such an origin. It has, however, the characteristic bark, glutinous or gummy quality, branching of inflorescence and venation and serrulation of leaves of *A. serrulata*, not of *A. rugosa*. In southern New England and New York the two species meet, but farther south, from eastern Maryland to Georgia, no representative of the latter species is known.

Var. subelliptica, forma **nanella**, f. nov. (tab. 989), nana, 0.5–1 m. alta; foliis elliptico-obovatis 2–5 cm. longis, subtus subvelutinis; strobilis maturis 6–12 mm. longis.—Virginia: dwarf shrubs with scattered simple stems only 5–8 mm. thick, springy sphagnous and argillaceous bog, Ram-hole Swamp, Seward Forest, near Triplett, Brunswick Co., June 22 and Sept. 13, 1944, *Fernald* (*and Lewis*), no. 14,596 (type in Herb. Gray.); with *Lachnocaulon anceps*, *Sarracenia flava*, etc., bushy sphagnous swamp southeast of Petersburg, at head of Poo Run, Prince George Co., *Fernald & Long*, no. 6167.

Explanation of Plates

Plate 976, Alnus incana (L.) Moench.: fig. 1, leading shoot, with foliage and young aments, × 1, from Breslau, Sept. 20, 1908, *Ziesché;* fig. 2, lower surface of leaf, × 10, from Charlottenbrunn, Silesia, *Baenitz*, no. 1373; fig. 3, inflorescence, × 1, from Möenlycke, April, 1890, *Walter Unlemann*, Fl. Scand.; fig. 4, mature cones, from *Baenitz*, no. 1373; fig. 5, half a cone, × 4, from Wurzburg, *Fl. exsicc. Bavar.*, no. 56; fig. 6, bract, × 10, from Bohemia, July, 1887, *Fopitze;* fig. 7, nutlet, × 10, from same specimen as fig. 6.

Plates 977 and 978, A. rugosa (Du Roi) Spreng., var. typica H. Winkl. Plate 977: fig. 1, fruiting branch, × 1, of shrub spread from cultivation in Europe, from Gehölze an der Lüneburger Eisenbahn nach Motrich, Wittenberge, *Baenitz, Herb. Dendrol.* no. 1214; fig. 2, venation of lower leaf-surface, × 10, from no. 1214; fig. 3, half a cone, × 4, from no. 1214; fig. 4, nutlet, × 10, frrom no. 1214. Plate 978: fig. 1, fruting branch from Narrows Island, Black Lake, New York, *Fernald, Wiegand & Eames*, no. 14,251; fig. 2, venation of lower leaf-surface, × 10, from no 14,251; FIG. 3, portion of cone, × 4, from no. 14,251; FIG. 4, achene, and FIG. 5, bract, × 10, from no. 14,251.

PLATE 979, FIGS. 1–3, A. RUGOSA, var. TYPICA: FIG. 1, terminal leaves of vegetative sprout, × ca. ½, from TOPOTYPE, Harbke Garten, *Ehrhart*, no. 88; FIG. 2, branches of strictly pistillate shrub, × 1, from Townshend, Vermont, June 2, 1912, *L. A. Wheeler;* FIG. 3, inflorescence, × 1, from West Roxbury, Massachusetts, April 9, 1906, *F. F. Forbes.* FIG. 4, forma EMERSONIANA Fernald: lower surface of leaf, × 10, from TYPE.

PLATES 980 and 981, A. RUGOSA, var. AMERICANA (Regel) Fernald. PLATE 980: FIG. 1, fruiting branch, × 1, from Douglastown, Gaspé Co., Quebec, Aug. 22, 1904, *Collins, Fernald & Pease;* FIG. 2, bark, × 1, from Rindge, New Hampshire, Sept. 8, 1917, *C. F. Batchelder;* FIG. 3, group of cones, × 4, from same specimen as fig. 1. PLATE 981: FIG. 1, foliage and young aments of larger-leaved specimen, × 1, from Hillsborough, New Hampshire, Sept. 3, 1921, *C. F. Batchelder;* FIG. 2, inflorescence, × 1, from Buckland, Massachusetts, April 11, 1904, *F. F. Forbes.*

PLATE 982, FIGS. 1–3, A. RUGOSA, var. AMERICANA, forma HYPOMALACA Fernald: FIG. 1, foliage, × 1, of TYPE; FIG. 2, foliage of vigorous sprout, × 1, from Tewksbury, Massachusetts, *Fernald & Bartlett*, no. 15; FIG. 3, lower surface of leaf, × 10, from TYPE. FIG. 4, var. AMERICANA, forma TOMOPHYLLA Fernald; leaf, × 1, from TYPE.

PLATES 983 and 984, A. SERRULATA (Ait.) Willd., var. VULGARIS Spach. PLATE 983, extreme with more acute leaves, "Foliis obovatis acutis", *Aiton:* FIG. 1, foliage of vigorous sprout-shoot, × 1, from Newton, Massachusetts, *Wm. Boott;* FIG. 2, foliage and incipient inflorescence of fertile branch, × 1, from Oceana, Virginia, *Fernald & Long*, no. 3896; FIG. 3, inflorescence, × 1, from Centerville, Massachusetts, April 18, 1897, *E. F. Williams;* FIG. 4, old cones, × 1, from Weymouth, New Jersey, *Long*, no. 25,358; FIG. 5, half a cone, × 4, from Stoneham, Massachusetts, April 16, 1896, *W. P. Rich;* FIG. 6, nutlet, × 10, from *Long*, no. 25,358. PLATE 984, extreme with obtuse leaves; FIG. 1, TYPE, × 1, of var. *obtusifolia* Regel; FIG. 2, narrower leaf (approaching forma *nanella*), × 1, from Richmond, Rhode Island, Aug. 20, 1919, *Fernald & Collins;* FIG. 3, broadest-leaved extreme, approaching var. *subelliptica*, × 1, from Wareham, Massachusetts, Sept. 18, 1928, *C. H. Knowlton;* FIG. 4, venation of lower leaf-surface, × 10, from same leaf as in fig. 2; FIG. 5, young inflorescences of staminate shrub, × 1, from south of South Quay, Virginia, *Fernald & Long*, no. 11,559.

PLATE 985, A. SERRULATA, var. VULGARIS, forma NOVEBORACENSIS (Britton) Fernald: FIG. 1, TYPE, × ½, of *A. noveboracensis* Britton; FIG. 2, tip with incipient inflorescence, × ½, from Selkirk, Oswego Co., New York, *Fernald, Wiegand & Eames*, no. 14,247; FIG. 3, fruiting cones, × 1, from no. 14,247; FIG. 4, lower surface of leaf, × 10, from no. 14,247; FIG. 5, bark, × 1, from Orono, Maine, *Fernald & Long*, no. 13,473.

PLATE 986, A. SERRULATA, var. SUBELLIPTICA Fernald, all figs. from TYPE: FIG. 1, foliage and incipient inflorescence, × 1; FIG. 2, inflorescence, × 1; FIG. 3, fruit, × 1; FIG. 4, bract, × 10; FIG. 5, nutlet, × 10.

PLATE 987, A. SERRULATA, var. SUBELLIPTICA, forma EMARGINATA Fernald, all figs. from TYPE: FIG. 1, fruiting branch, × 1; FIG. 2, largest leaves, × 1; FIG. 3, flowering tip, × 1; FIG. 4, lower surface of leaf, × 10.

PLATE 988, A. SERRULATA, var. SUBELLIPTICA, forma MOLLESCENS Fernald: FIG. 1, leaf and incipient inflorescence, × 1, from TYPE; FIG. 2, old cones, × 1, of TYPE; FIG. 3, lower surface of leaf, × 10, from TYPE; FIG. 4, branch with unusually long cones, × 1, from Little Neck, Virginia, *Fernald & Long*, no. 3899.

PLATE 989, A. SERRULATA, var. SUBELLIPTICA, forma NANELLA Fernald, all figs. from TYPE: FIGS. 1 and 2, fruiting branches, × 1; FIG. 3, lower surface of leaf, × 10; FIG. 4, nutlet, × 10.

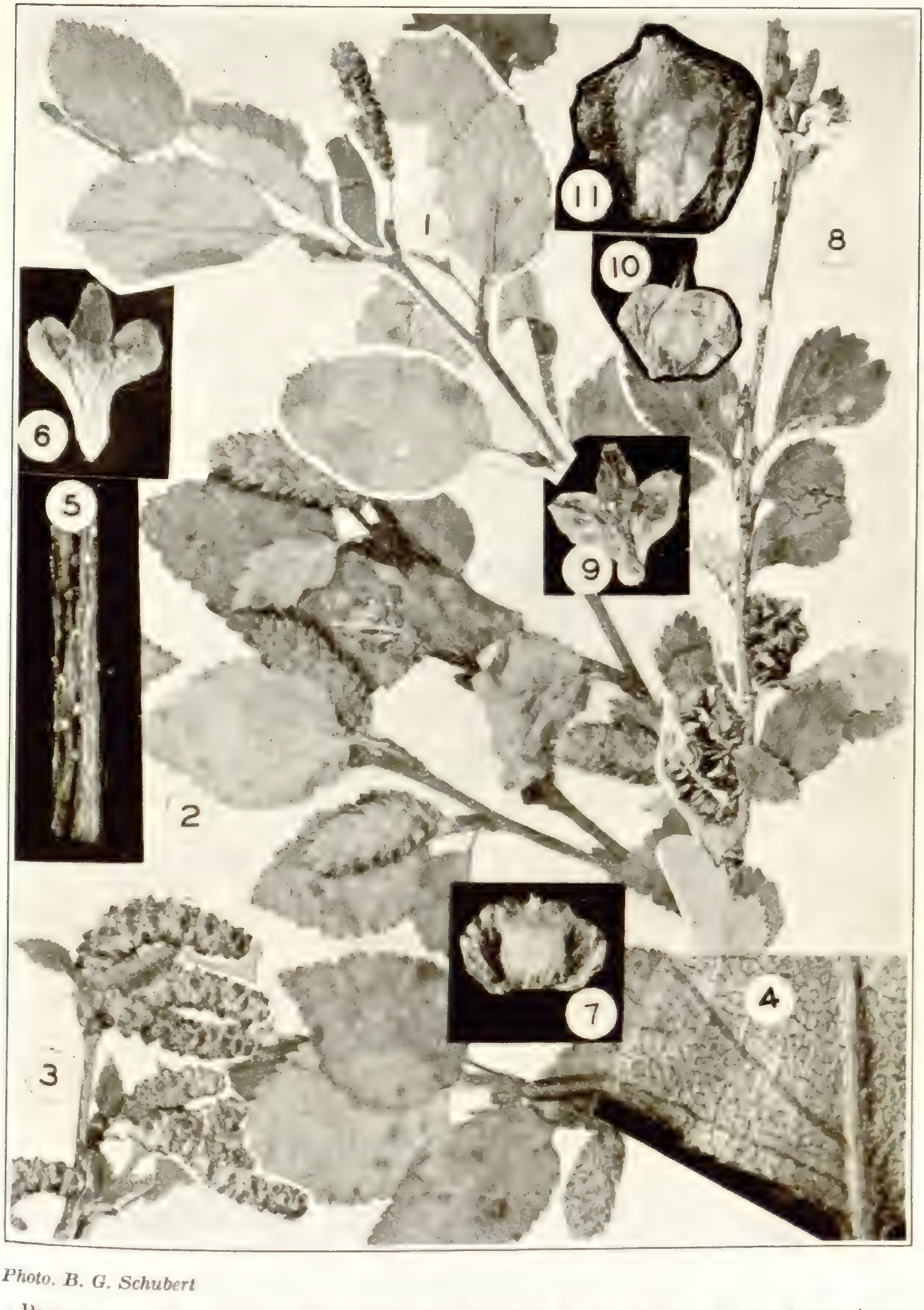

Photo. B. G. Schubert

BETULA MINOR: FIG. 1, portion of TYPE, × 1; FIG. 2, fruiting branch, × 1; FIG 3, staminate aments, × 1; FIG. 4, lower surface of leaf, × 5; FIG. 5, branchlet, × 10; FIG. 6, fruiting bract, × 4; FIG. 7, samara, × 4.

B. MICROPHYLLA: FIG. 8, fruiting branch (probably of ISOTYPE), × 1; FIG. 9, fruiting bract, × 4; FIG. 10, samara, × 4.

B. ALBA, var. TORTUOSA: FIG. 11, samara, × 4.

Photo. B. G. Schubert

BETULA PAPYRIFERA: FIG. 1, fruiting branch, × 1; FIG. 2, staminate aments, × 1; FIG. 3, tip of young shoot, × 5; FIG. 4, fruiting bract, × 4; FIG. 5, samara, × 4.

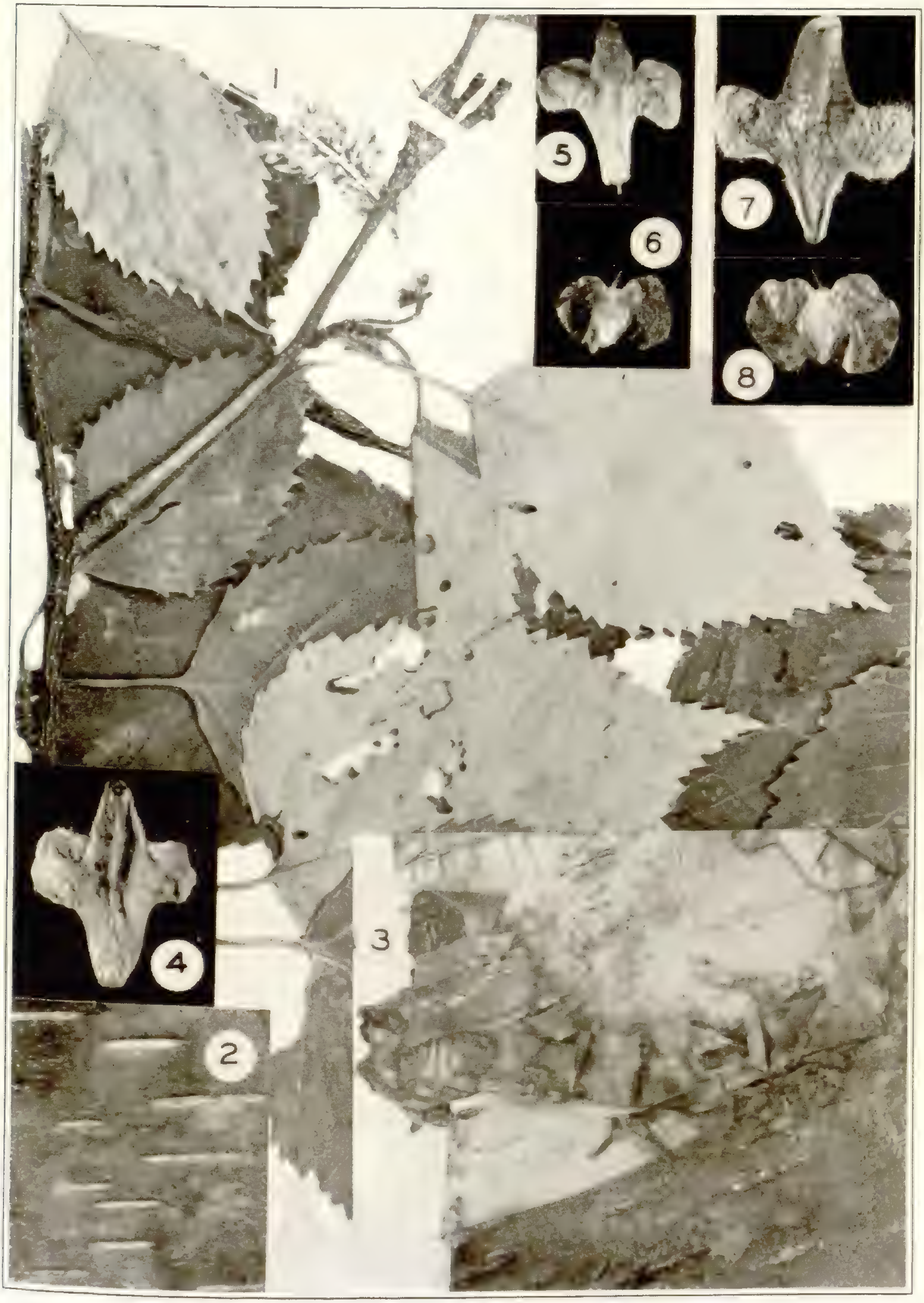

Photo. B. G. Schubert

Betula papyrifera, var. commutata: fig. 1, portion of *Lyall's* specimen, × 1; fig. 2, characteristic close bark, × 1; fig. 3, exfoliating bark from base of old trunk, × 1; figs. 4, 5 and 7, fruiting bracts, × 4; figs. 6 and 8, samaras, × 4.

Photo. B. G. Schubert

BETULA OCCIDENTALIS, var. FECUNDA: FIG. 1, portion of TYPE, × 1; FIG. 2, flowering branchlet, × 1; FIG. 3, staminate aments, × 1.

Photo. B. G. Schubert

BETULA PAPYRIFERA, var. PENSILIS: FIG. 1, portion of TYPE, $\times$ 1; FIG. 2, fruiting bract, $\times$ 4; FIG. 3, samara, $\times$ 4; FIG. 4, branch with younger aments, $\times$ 1.

Photo. B. G. Schubert

Betula papyrifera, var. macrostachya: fig. 1, portion of type, × 1; fig. 2, fruiting bract, × 4; fig. 3, samara, × 4.
Var. macrostachya, forma longipes: fig. 4, portion of type, × 1.

Photo. B. G. Schubert

BETULA PAPYRIFERA, var. ELOBATA: FIG. 1, portion of TYPE, × 1; FIG. 2, immature samara embraced by bract, × 4; FIG. 3, immature bracts, × 4.

Photo. B. G. Schubert

BETULA PAPYRIFERA, var. CORDIFOLIA: FIG. 1, portion of fruiting branch, × 1; FIG. 2, tip of vigorous sprout, × 5; FIG. 3, fruiting bract, × 4; FIG. 4, samara, × 4.

Photo. B. G. Schubert

Betula papyrifera, var. humilis: fig. 1, portion of branch and Regel's label, from type, × 1; fig. 2, lower surface of leaf, × 10; fig. 3, fruiting bract, × 4; fig. 4, samara, × 4; fig. 5, fruiting tip, × 1.

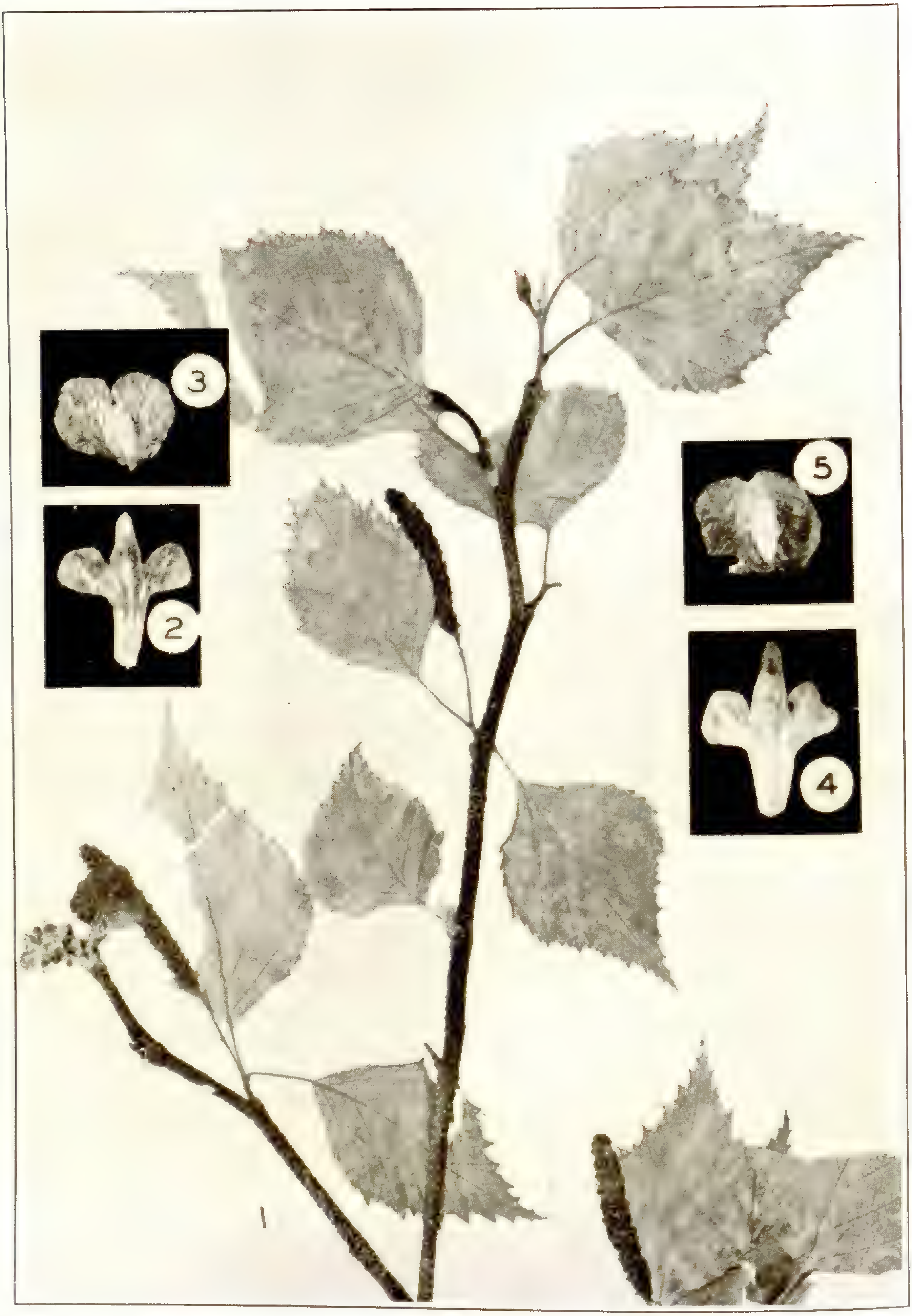

Photo. B. G. Schubert

Betula papyrifera, var. humilis: fig. 1, specimen, × 1, cited by Sargent as his *B alaskana;* figs. 2 and 4, fruiting bracts, × 4: figs. 3 and 5, samaras, × 4.

Photo. B. G. Schubert

Betula borealis: fig. 1, mature branchlets, × 1; fig. 2, immature fruiting branch, × 1; fig. 3, tip of young branch, × 5· fig. 4, fruiting bract, × 4; fig. 5, samara, × 4.

Photo. B. G. Schubert

BETULA UBER: FIG. 1, fruiting branchlets from ISOTYPE, × 1; FIG. 2, upper surface of half a leaf, × 2, showing venation and toothing; FIG. 3, portion of lower surface of leaf, × 2; FIG. 4, fruiting bract, × 4; FIG. 5, samara, × 4.

B. LENTA: FIG. 6, lower surface of half a leaf, × 1, to show venation and toothing; FIG. 7, fruiting bract, × 4.

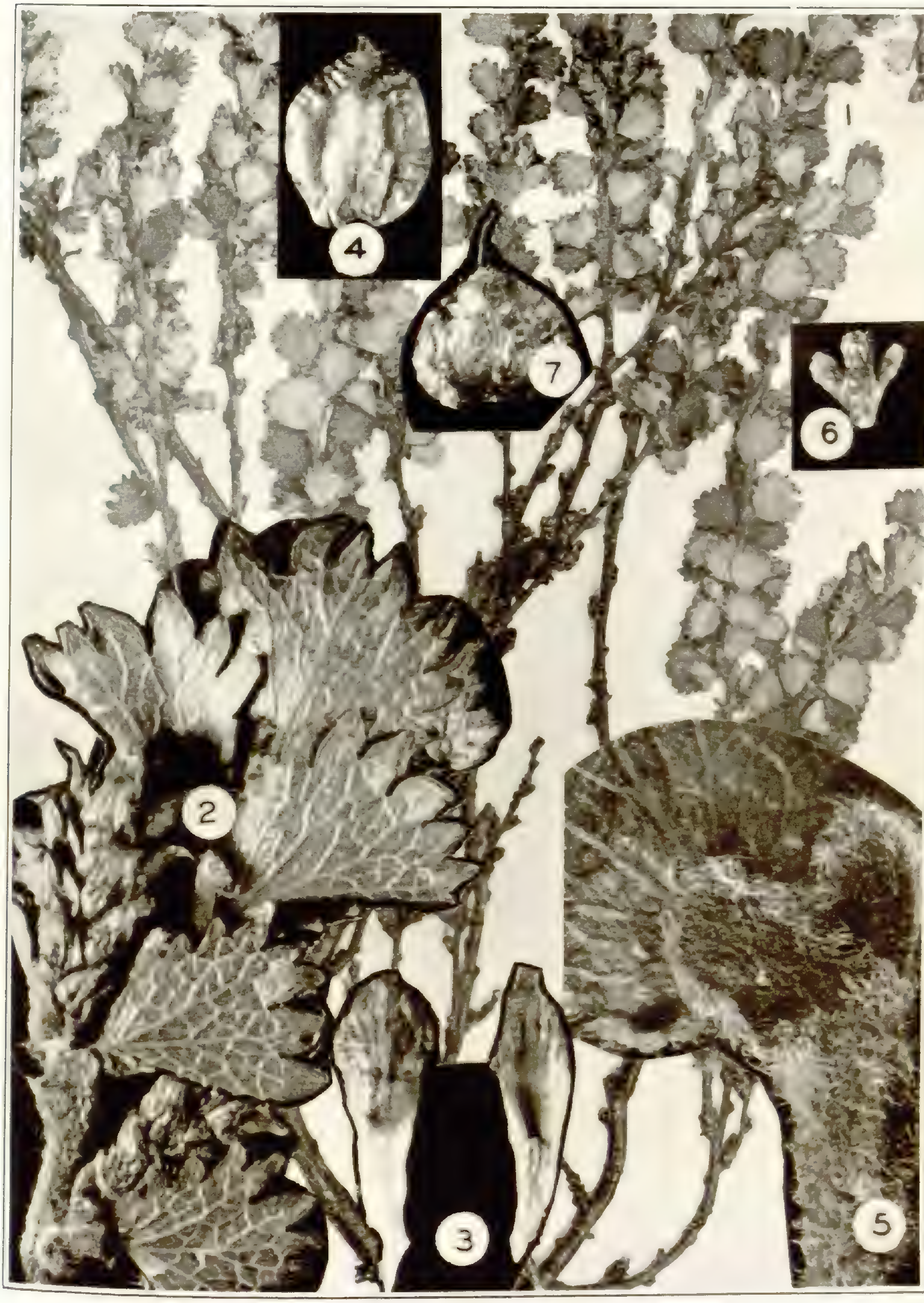

Photo. B. G. Schubert

Betula terrae-novae: fig. 1, portion of type, × 1; fig. 2, tip of fruiting branchlet, × 5; fig. 3, two fruiting bracts, × 10; fig. 4, nutlet, × 10.
B. nana: fig. 5, tip of branchlet, × 5; fig. 6, fruiting bract, × 4; fig. 7, samara, × 10.

Photo. B. G. Schubert

ALNUS INCANA: FIG. 1, shoot with foliage and young aments, × 1; FIG. 2, lower surface of leaf, × 10; FIG. 3, inflorescence, × 1; FIG. 4, mature cones, × 1; FIG. 5, half a cone, × 4; FIG. 6, bract, × 10; FIG. 7, nutlet, × 10.

Photo. B. G. Schubert

Alnus rugosa, var. typica: fig. 1, fruiting branch of the shrub cultivated and naturalized in Germany, derived, presumably, from the original specimen; fig. 2, venation of lower leaf-surface from same collection, × 10; fig. 3, half a cone from same collection, × 4; fig. 4, nutlet, × 10.

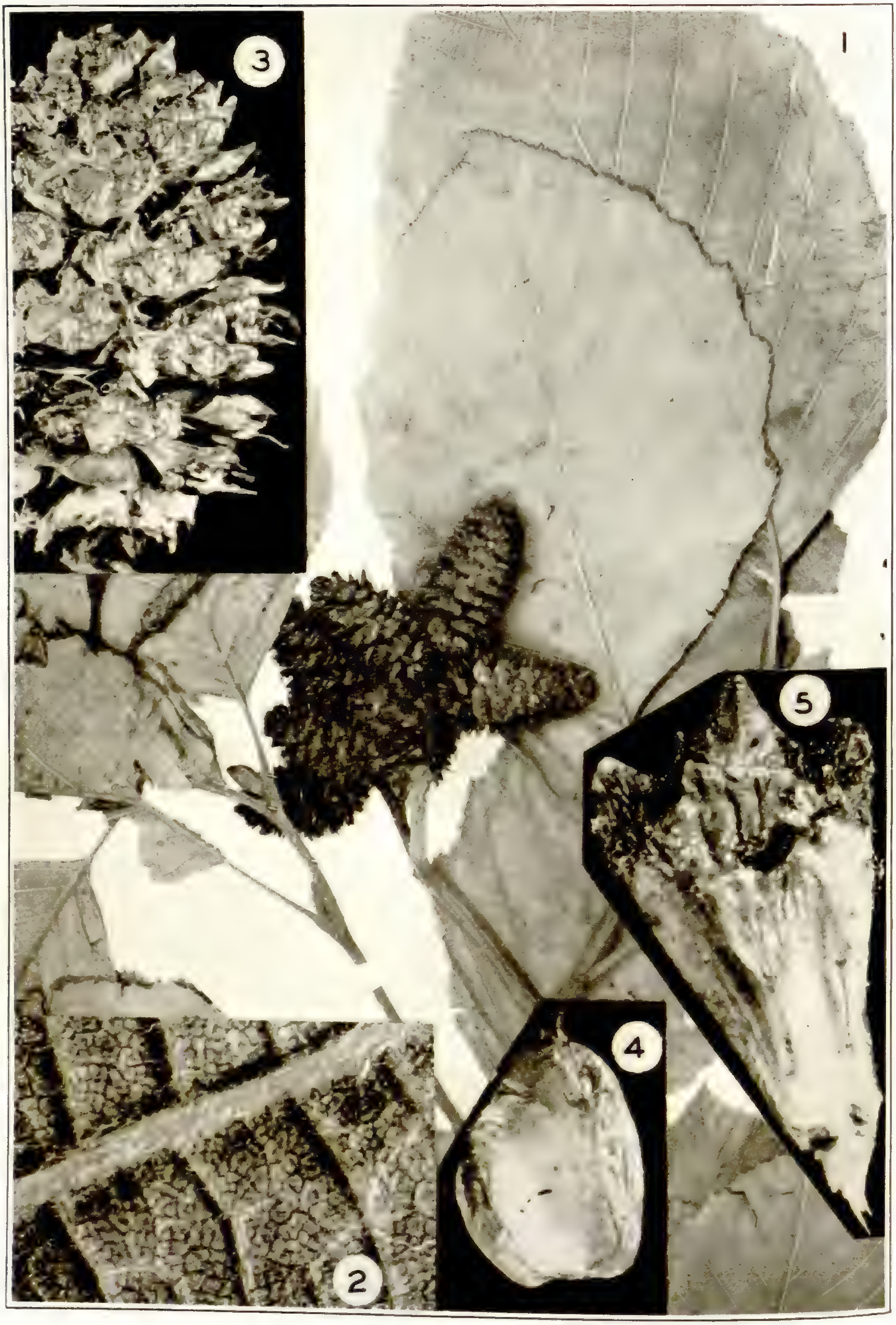

Photo. B. G. Schubert

ALNUS RUGOSA, var. TYPICA, native American shrub: FIG. 1, fruiting branch, × 1; FIG. 2, venation of lower leaf-surface, × 10; FIG. 3, portion of cone, × 4; FIG. 4, achene, × 10; FIG. 5, bract, × 10.

Photo. B. G. Schubert

ALNUS RUGOSA, var. TYPICA: FIG. 1, terminal leaves of vegetative sprout of TOPOTYPE, × ?½, after photo. by Professor *Alfred Rehder;* FIG. 2, branches of strictly pistillate shrub, × 1; FIG. 3, typical inflorescence, × 1.

A. RUGOSA, forma EMERSONIANA: lower surface of leaf of TYPE, × 10.

Photo. B. G. Schubert

ALNUS RUGOSA, var. AMERICANA: FIG. 1, fruiting branch, × 1; FIG. 2, bark, × 1; FIG. 3, cones, × 4.

Photo. B. G. Schubert

ALNUS RUGOSA, var. AMERICANA: FIG. 1, foliage and young aments of large-leaved shrub, × 1; FIG. 2, inflorescence, × 1.

Photo. B. G. Schubert

ALNUS RUGOSA, var. AMERICANA, forma HYPOMALACA: FIG. 1, foliage of TYPE, × 1; FIG. 2, leaf of vigorous sprout, × 1; FIG. 3, lower surface of leaf, × 10.
Var. AMERICANA, forma TOMOPHYLLA: FIG. 4, leaf of TYPE, × 1.

Photo. B. G. Schubert

Alnus serrulata, var. vulgaris, extreme with more acute leaves as in Aiton's type, "foliis obovatis acutis": fig. 1, foliage of vigorous sprout, × 1; fig. 2, fertile branch, × 1; fig. 3, inflorescence, × 1; fig. 4, old cones, × 1; fig. 5, half a cone, × 4; fig. 6, nutlet, × 10.

Photo. B. G. Schubert

ALNUS SERRULATA, var. VULGARIS, extreme with obtuse leaves: FIG. 1, type, × 1, of var. *obtusifolia* Regel; FIG. 2, narrow leaf, × 1; FIG. 3, broad leaf, × 1; FIG. 4, venation of lower leaf-surface, × 10; FIG. 5, inflorescence of staminate shrub, × 1.

Photo. B. G. Schubert

ALNUS SERRULATA, var. VULGARIS, forma NOVEBORACENSIS: FIG. 1, TYPE, × ½; FIG. 2, tip of branchlet with incipient inflorescence, × ½; FIG. 3, fruiting cones, × 1; FIG. 4, lower surface of leaf, × 10; FIG. 5, bark, × 1.

Photo. B. G. Schubert

ALNUS SERRULATA, var. SUBELLIPTICA, all figs. from TYPE: FIG. 1, foliage and incipient inflorescence, × 1; FIG. 2, inflorescence, × 1; FIG. 3, cones, × 1; FIG. 4, fruiting bract, × 10; FIG. 5, nutlet, × 10.

Photo. B. G. Schubert

ALNUS SERRULATA, var. SUBELLIPTICA, forma EMARGINATA, all figs. from TYPE: FIG. 1, fruiting branch, × 1; FIG. 2, largest leaves, × 1; FIG. 3, flowering tip, × 1; FIG. 4, lower surface of leaf, × 10.

Photo. B. G. Schubert

Alnus serrulata, var. subelliptica, forma mollescens, figs. 1–3 from type: fig. 1, leaf and incipient inflorescence, × 1; fig. 2, old cones, × 1; fig. 3, lower surface of leaf, × 10; fig. 4, unusually long cones, × 1.

Photo. B. G. Schubert

ALNUS SERRULATA, var. SUBELLIPTICA, forma NANELLA, all figs. from TYPE: FIGS. 1 and 2, fruiting branches, × 1; FIG. 3, fruiting cones, × 1; FIG. 4, lower surface of leaf, × 10; FIG. 4, nutlet, × 10.

INDEX

New scientific names are printed in full-face type

Reprinted from RHODORA, Vol. 48, Jan.–April, 1946

CONTRIBUTIONS FROM THE GRAY HERBARIUM
OF HARVARD UNIVERSITY

CLX

TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

By M. L. FERNALD

DATES OF ISSUE

Pages 5 to 16, plates 993 and 994 . . . . 5 January, 1946
Pages 27 to 40, plates 995 to 1004 . . . . 6 February, 1946
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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLX

TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

M. L. Fernald

(Plates 993–1020)[1]

I. Some Species in Rafinesque's "Herbarium Rafinesquianum"

(Plates 993 and 994)

Dr. Merrill has asked me about the identities of some of the species published in the rare work of Rafinesque, his Herbarium Rafinesquianum (1833). Unlike too many of the publications of that highly variable and temperamental genius, this little book is carefully written, with logical discussions and with diagnoses of genera and species actually in hand, specimens of which were offered for sale. What a pity that we cannot now buy the series! Here are many well described novelties from many parts of North America, many of which have clear priority over the descriptions of others. For the most part their identification can safely be made only by those intimately familiar with the areas concerned: Texas, Oregon, etc.; but in checking on the region I best know it has been found that several of our long-familiar specific names must lapse, while some in other sections of the world are obviously later homonyms. In the following memoranda only those names about which I feel no doubt are noted; others of them must be considered by specialists on other floras.

Spiranthes lacera (Raf.) Raf. Herb. Raf. 44 (1833). *Neottia lacera* Raf. Fl. Ludovic. 171 (1817), *nomen*, and in Am. Month. Mag. Crit. Rev. ii. 206 (1818) with full description. *Neottia gracilis*, var. β. *secunda* Bigel. Fl. Bost. ed. 2: 322 (1824).

S. montana Raf. Herb. Raf. 45 (1833). *S. ovalis* Lindl. Gen. Sp. Orch. Pl. 466 (1840). *S. cernua*, var. *parviflora* Chapm. Fl. So. U. S., ed. 3: 448 (1897). *Gyrostachys parviflora* (Chapm.) Small, Fl. Se. U. S. 318 (1903). *S. parviflora* (Chapm.) Ames, Orchidaceae, fasc. 1: 137 (1905). *Ibidium ovale* (Lindl.) House

[1] The cost of preparing and engraving the plates met in part through grants from the American Philosophical Society and from the Department of Biology of Harvard University.

in Muhlenbergia, i. 128 (1906). *I. parviflorum* (Chapm.) Jennings in Ann. Carneg. Mus. iii. 485 (1906). *Triorchis ovalis* (Lindl.) Nieuwland in Am. Midl. Nat. iii. 123 (1913). *S. Smallii* Schlechter in Beih. Bot. Centralbl. xxxvii². 358 (1920).

S. TUBEROSA Raf. Herb. Raf. 45 (1833). *S. Beckii* Lindl. Gen. Sp. Orch. Pl. 472 (1840), at least as to descr. *S. simplex* Gray, Man. ed. 5: 506 (1867), not Griseb. *Gyrostachys simplex* (Gray) Ktze. Rev. Gen. ii. 664 (1891). *S. Grayi* Ames in RHODORA, vi. 44 (1904). *Gyrostachys Grayi* (Ames) Britton, Man. ed. 2: 300 (1905). *Ibidium Beckii* (Lindl.) House in Muhlenbergia, i. 128 (1906). *Gyrostachys Beckii* (Lindl.) W. Stone, Pl. So. N. J. 375 (1912). *Triorchis Grayi* (Ames) Nieuwland in Am. Midl. Nat. iii. 123 (1913). *Triorchis Beckii* (Lindl.) House in Am. Midl. Nat. iv. 206 (1920).

Unfortunately, the original description of *Neottia lacera* Raf. in Am. Month. Mag. Crit. Rev. ii. 206 (1818) did not get into Index Kewensis, although the other species, described in the same column of the identical page and directly preceding it, was there entered; and this first specific name of the pair, *Neottia plantaginea* Raf. l. c., was taken up by Torrey as the basis of *Spiranthes plantaginea* (Raf.) Torr. (1843) and, since Torrey had taken it up and it, therefore, got into reputable literature, it has been the nomenclatural basis of binomials by Britton, House and Nieuwland. But *Neottia lacera*, described with it and again in Herbarium Rafinesquianum, has been quite ignored, as have the other eight names under *Spiranthes* in the latter work. Nevertheless *Spiranthes lacera*, based on *Neottia lacera* (1818), was several years earlier than *Neottia gracilis* Bigelow, Fl. Bost. ed. 2: 322 (1824), the nomenclatural basis of *S. gracilis* (Bigelow) Beck, Bot. 333 (1833). Bigelow's original account was as follows:

*NEOTTIA GRACILIS. *Slender Neottia.*

N. foliis radicalibus ovatis; scapo vaginato, floribus spiraliter secundis; labello obovato, crispo.

Leaves radical, ovate; scape sheathing; flowers in a spiral row; lip obovate, curled.

Root fascicled. Leaves radical, on short petioles, ovate, acute, nerved, caducous. Scape erect, slender, eight to twelve inches high with a few sheathing scales or leaf[l]ets. Flowers white in a twisted spike. Bractes closely applied to the germ, ovate, acuminate. Germs obovate. Petals linear, crystalline, parallel, the three upper ones cohering. Lip obovate-spatulate, curled, its base swelling with the lateral petals connected before it. Anther parallel to the style.—In dry, hilly woods.—July.—Perennial.

The leaves falling off frequently cause the plant to appear leafless at the time of flowering.

Variety β. secunda. Spike unilateral, hardly twisted; flowers more slender. Perhaps a different species.—In Conway, New-Hampshire.—July.

Rafinesque's original description in the American Monthly Magazine and Critical Review was

24. *Neottia lacera* Raf. Smooth radical leaves oblong obtuse flat, scapes vaginated, sheaths acute: spike slender, flowers one sided spiral nodding, bracteas longer than the ovary, labellum canaliculated reflexed obtuse laciniated.—Obs. Detected in 1816, in the swampy woods, near Glen's Fall's, Lake George, and the Luzerne mountains, blossoming in July and August, flowers white, scape slender about one foot high, root palmated.

Rafinesque's second account, in his Herbarium Rafinesquianum (1833), was briefer but contained the synonym "N [*i. e. S*]. *gracilis*, Beck, 1833", which nomenclaturally rested on *Neottia gracilis* Bigel. and, incidentally, indicated the priority in 1833 of Beck over Herbarium Rafinesquianum. From this it would be natural to infer that *Spiranthes gracilis* must give way to *S. lacera;* but in this case Rafinesque "builded better than he knew", just as Jacob Bigelow did when he separated as "Perhaps a different species" the more slender-flowered plant of the White Mountains.

Spiranthes gracilis, as generally interpreted, consists of two quite different species: one relatively southern, the true *S. gracilis*, i. e. *Neottia gracilis* Bigelow; the other relatively northern, the *Neottia lacera* Raf. (1818) or *N. gracilis*, var. β. *secunda* Bigelow (1824), the *S. lacera* (Raf.) Raf. (1833). Study of all the material in the Gray Herbarium, the Ames Herbarium, the herbarium of the New England Botanical Club and that of the New York State Museum, which has been kindly placed at my disposal by Dr. House, brings out several striking differences. Some of these are shown in PLATES 993 and 994. They may be briefly stated as follows[1]:

[1] SPIRANTHES LACERA (as *S. gracilis*) is beautifully illustrated in that remarkably accurate study of orchids, by Albert M. Fuller, with photographs by George L. Waite, Studies on the Flora of Wisconsin Part *1:* The Orchids; Orchidaceae—Bull. Pub. Mus. Milwaukee, xiv. no. 1, pl. 36 (1933). This plate well displays *S. lacera.* Although Mr. Fuller conservatively followed long-established usage, he obviously saw two elements in his *S. gracilis*, saying (p. 113): "While the flowers usually occur in spirals on the raceme, plants with distinctly 1-sided (secund) racemes appear to be plentiful in northern Wisconsin". If the Milwaukee Museum has more such careful "Studies" we shall all welcome them.

Spiranthes lacera (plate 993): basal leaves usually present at flowering time, though often wilted, submembranaceous, semi-translucent, the veins and veinlets clearly evident, the veinlets simple or subsimple, forming an obvious loose mesh; spike secund or with 1–few spirals, the flowers distant in few elongate series; sepals and petals narrowly lanceolate to lance-linear, forming a slender tube 1–1.75 (rarely –2.25), averaging 1.4 mm., in diameter, much longer than thick and not strongly ringent; dilated summit of lip drooping, with a broad white border.—Very dry to moist acid open (rarely shaded) soil, Magdalen Islands to Manitoba, south to Nova Scotia, New England, Long Island, more rarely to southeastern Virginia, upland to North Carolina (up to 3300 ft.) and Tennessee, southern Ontario, Michigan, northern Illinois, Wisconsin and Minnesota. Flowering from June 15 to September 11 (average of 135 collections August 5).

S. gracilis (plate 994): basal leaves rarely present at flowering time (though occasionally on non-flowering younger plants), thick, opaque, the veinlets barely visible by strong transmitted light, more branched and forming an obscure but relatively fine mesh; spike strongly spiraling, the approximate flowers in many short secund series; tube of perianth more ringent, the bases of the broader sepals and petals forming a tube 1.5–2.5, averaging 2 mm., thick; white border of summit of lip narrower.—Dry to moist open soil, or in open woods and thickets, Florida to Texas, north to southwestern Maine, southeastern New Hampshire, central Vermont, southeastern, central and western New York, Ohio, Indiana, Illinois, Missouri and Oklahoma. Flowering late July to October (average of 110 collections September 2).

All material seen from Quebec, New Brunswick, Nova Scotia, northern and central Maine and New Hampshire, northern Vermont, northeastern New York, Ontario, Michigan, Wisconsin, Minnesota and Manitoba belongs to *S. lacera.* In eastern New York that plant abounds northward, being the only one of the two species found in the Adirondack region and near Lake George, from Clinton and St. Lawrence Counties to Saratoga, Fulton and Oneida Counties, while in Cattaraugus County to the west it occurs at an altitude of 2000 feet. It is the plant of shores and slopes near Lake George (our fig. 2) and is clearly the plant described by Rafinesque from there.

Spiranthes gracilis, of wide southern range, spreads northward at low altitudes to Cumberland County, Maine, Strafford and Hillsboro Counties, New Hampshire, southeastern Addison County, Vermont, and in eastern New York from Long Island northward to Albany County. In southern New England and southern and central New York both species occur. It is, therefore, specially illuminating to note the collector's data when they have placed them both on one sheet or under the same label. Thus, the late Charles W. Jenks, getting them both in Bedford, Massachusetts, and calling them both *S. gracilis*, noted them on his label and sheet as *a*, *b* and *c; a* being flowering *S. lacera* collected July 26, *b* fruiting material of the same collected August 24, and *c* young flowering material (the upper half of the spike in bud) of *S. gracilis* collected August 25. Another sheet from Massachusetts, from the herbarium of H. M. Ballou, has the two under one label, the slender-flowered *S. lacera* dated July 18, the flowering *S. gracilis* marked "Aug.". One other mixed sheet brings out the difference in flowering period. This is one of the late R. W. Woodward's beautiful sheets from Franklin, Connecticut, the label bearing the notes: "plants with basal leaves July 14", these being *S. lacera* in anthesis; "plants without basal leaves Aug. 11", these being *S. gracilis*, so young that the recurving budded tips have not straightened up.

Not only did Jacob Bigelow think that *Spiranthes lacera* (his *Neottia gracilis*, var. β. *secunda*) was "perhaps a different species"; Asa Gray, having material of it, probably from northern New York, was puzzled by it. His specimen resided for nearly a century in the Gray Herbarium, unnoticed in a pocket, pasted on a sheet of typical *S. gracilis*, but with a folded manuscript discussing its details and a significant "(?)" after the unsatisfactory name. Furthermore, I find that in both the Gray Herbarium and that of the New England Botanical Club a specialist on the *Orchidaceae* has recently separated out strikingly characteristic sheets of *S. lacera* and has annotated them as the very different *S. Beckii;* at least they did not seem to him to be *S. gracilis!*

There can be hardly a doubt of the identity of *Spiranthes montana* Raf. with the beautifully distinct *S. ovalis* Lindl. Rafinesque's description was brief but clear:

> 8. Sp. *montana*, Raf. Caule basi folioso, fol. radic. obl. cuneatis-obtusis, caulinis lanc obt. spicis obl. dense spir. bract. obt. acum. fl. mediocris, labellum obl. obt. erosum.—Cumberland mts. pedal. disc. 1823.

This species (as *S. ovalis*) has been collected by my companions and me several times in Virginia. Its cuneate-oblong or oblanceate, obtuse or acutish lower leaves, its well developed cauline leaf or leaves and the thick and short spike, tapering when young but rounded at summit at maturity, are characteristic, as is the lip. Although local, the species is scattered in rich, preferably calcareous woods from Virginia across the Cumberland Mts. and Plateau of Kentucky to bluffs of southern Indiana and to Missouri, south to northern Florida, Alabama, Mississippi, Louisiana and eastern Texas. Dr. E. Lucy Braun records it from three counties of Kentucky in the Cumberland area and specimens from the Cumberland Mts. of Tennessee are well known.

As to the identity of *Spiranthes tuberosa* Raf. and the white-lipped *S. Beckii* Lindl. there is certainly no doubt. Here is the original diagnosis:

> 10. Sp. *tuberosa*, Raf. rad. tuberosa monorchis, caule filif. aphyllo, vaginis setaceis, spic. gracilis vix spiralis secunda, bract. brevis acutis, fl. parvis, labellum cuneato acuto.—Disc. by M. Durand in New Jersey, pedal.

This, with "rad. tuberosa monorchis", etc., is surely the characteristic species with a single tuberoid, described by Gray as *S. simplex:* "Root a *solitary oblong or spindle-shaped tuber;* no leaves at flowering time; scape 5′–9′ high, bearing a small narrow (rarely 1-sided) spike of *very short flowers* (perianth 1″–1½″ long) . . . —E. Mass. (Nantucket, *Dr. Robbins*), New Jersey (*C. F. Austin, &c.*) and Delaware, *Wm. M. Canby*".

HABENARIA MARITIMA Raf., Herb. Raf. 74 (1833) antedates by nearly 60 years the Californian *H. maritima* Greene, Pittonia, ii. 298 (1892), basis of *Piperia maritima* (Greene) Rydb. in Bull. Torr. Bot. Cl. xxviii. 641 (1901).

With only limited understanding of the Californian endemics I refrain from renaming the latter. By Ames it is treated as *H. elegans* (Lindl.) Bolander, var. *maritima* (Greene) Ames, Orchidaceae, iv. 113 (1910). It is noteworthy, however, that both Jepson and Abrams, with intimate field-acquaintance of both, maintain them as distinct.

Rafinesque's *Habenaria maritima* was obviously one of the numerous fluctuations of *H. clavellata* (Michx.) Spreng. (1826), which was based on *Orchis clavellata* Michx. Fl. Bor.-Am. ii. 155, (1803) from Carolina and which, in spite of the slightly 3-lobed tip of the lip was described by Michaux "cornu longitudine ovarii, clavato; labello ovali, integro". Rafinesque's description was quite as definite:

> 4 *Habenaria maritima,* Raf. Caule angulato, folia unica longa cuneata lanc. ceteris subulatis, Spica brevis paucifl. 5–8 fl. bract. lanc. ovar. eq. calcar recurvo clavato labello oblongo truncato.—On the Sea Islands of New Jersey in swamps, semipedal, flowers small greenish white.

Those who consider *Habenaria maritima* Greene a good species need a name for it.

Calipogon parviflorum Raf. Atl. Journ. i. 148 (1832).

Several years earlier than *Calopogon parviflorus* Lindl. Gen. Sp. Orch. Pl. 424 (1840), that species considered identical with *Ophrys barbata* Walt. Fl. Carol. 221 (1788), the basis of Calopogon barbatus (Walt.) Ames, Orchidaceae, ii. 227 (1908). Rafinesque's plant was evidently of this species, as indicated by his "stem one leaved 3–5 flore", for *C. barbatus* has 1–7 flowers, its var. *multiflorus* (Lindl.) Correll in Bot. Mus. Lfts. vii. 71 (1940), based on *C. multiflorus* Lindl. l. c. 425 (1840), having more. The only other species to consider for Rafinesque's species of "Fl. and Louis", with "3–5 . . . flowers spicate, minute, bracts subulate, labellum undulate", is *C. pallidus* Chapm. (1860). Originally described "Scape 10–20-flowered", that species, at the northern limit of its range, in southeastern Virginia and North Carolina, may, in the smaller specimens, have as few as 3–6 flowers. Until authentic material of Rafinesque's species is found, it is wisest to let *C. pallidus* stand; his specific epithet, however, clearly antedates that of Lindley.

Goodyera oblongifolia Raf. Herb. Raf. 76 (1833). *Spiranthes decipiens* Hook. Fl. Bor.-Am. ii. 203, t. 204 (1839). *G. Menziesii* Lindl. Gen. Sp. Orch. Pl. 492 (1840). *Orchioides decipiens* and *O. Menziesii* Ktze. Rev. Gen. ii. 675 (1891). *Peramium Menziesii* (Lindl.) Morong in Mem. Torr. Bot. Cl. v. 124 (1894). *Peramium decipiens* (Hook.) Piper in Contrib. U. S. Nat. Herb. xi. 208 (1906). *G. decipiens* (Hook.) F. T. Hubbard in Standardized Pl. Names, 328 (1923).

Rafinesque's description of *Goodyera oblongifolia* from the mountains of Oregon seems unequivocal:

> 10 *Goodyera seu Tussaca oblongifolia,* Raf. Fol. radic petiol oblongis ovatis acutis 5 nervis non reticulatis, subtus glaucis, caule gracile vaginato, spica laxiflora, fl. remotis hirsutis, bract. lanc. acut. ovar. eq. ovarium tereto.—Oregon mts. subpedal, fl. white small.

Hooker said "Scape 8 inches to a foot high"; Lindley's description of *Goodyera Menziesii,* "Hab. in *Americae septentrionalis* orâ occidentali, *Menzies, Douglas*", began:

> "G. subacaulis, foliis oblongis venosis unicoloribus petiolis longioribus, spicâ laxâ . . . , bracteis ovario aequalibus".

There is little difference (except in finish) between this account of the habit of *G. Menziesii* and Rafinesque's definition of the earlier *G. oblongifolia*.

CORALLORHIZA MONTANA Raf., Herb. Raf. 75 (1833), should be added to the synonymy of *C. odontorhiza* (Willd.) Nutt. (1818), which was *Cymbidium odontorhizon* Willd. (1805). Rafinesque's species from the "Wasioto mts, and hills, autumnal" had the "labello involuto truncato . . . , capsulis pendulis globosis, . . . flowers small yellowish, with red spots on the lip". The small flowers, pendulous, globose capsule and autumnal flowering seem to settle the identity.

DENTARIA GRANDIFLORA Raf. Herb. Raf. 47 (1833). *D. macrocarpa* Nutt. ex Torr. & Gray, Fl. i. 88 (1838). *Cardamine pulcherrima* Greene in Erythea, i. 148 (1893). *D. macrocarpa*, var. *pulcherrima* (Greene) Robinson in Gray, Syn. Fl. i^1. 154 (1895). *D. tenella* Pursh, var. *pulcherrima* (Greene) Detling in Am. Journ. Bot. xxiii. 273 (1936).

Rafinesque's description was clearly of the largest-flowered extreme which Greene later described as *Cardamine pulcherrima*. Rafinesque's account of his plant from Oregon follows:

2. *Dentaria grandiflora*, Raf, Caule flexuoso apice diphyllo, fol. oppos. petiolis alatis, trifoliatis, foliolis sessilib. ovato-lanceol, ineq. serratis, racemo brevis umbellato grandifloro.—Pedal. fl. incarnate one inch long. petals entire equal to stam.

SANGUISORBA STIPULATA Raf., Herb. Raf. 47 (1833). *S. canadensis* L. β. *latifolia* Hook. Fl. Bor.-Am. i. 198 (1834). *S. sitchensis* C. A. Meyer, Fl. Ochot. 34 (1856). *Poterium sitchense* (C. A. Meyer) S. Watson, Bibl. Index, i. 303 (1878). *S. latifolia* (Hook.) Coville in Contrib. U. S. Nat. Herb. iii. 339 (1896).

Unfortunately the long-familiar name *Sanguisorba sitchensis* for the northwestern species must lapse. Rafinesque's description of his plant from Oregon was clear:

3. *Sanguisorba stipulata*, Raf. Caule apice panicul. angul. nudo, fol. amplis, foliolis stipulatis petiolatis alternis, cordatis ovatis grandident. spicis parvis obl. bract. ovatis acum.—Foliolis twice as large as in *S. officinalis*, 3 inches long.

Compare the description by Abrams of *Sanguisorba sitchensis:*

" . . . stipules rounded, coarsely toothed; leaflets oblong-ovate, 2–7 cm. long, rounded at the apex, cordate at the base, coarsely serrate, petiolulate", etc.

Explanation of Plates 993 and 994

Plate 993, Spiranthes lacera (Raf.) Raf.: fig. 1, two plants, × 1, from Randolph, Coös County, New Hampshire, *Pease*, no. 31,500; fig. 2, spike, × 1, from the type-region, Northwest Bay, Lake George, Warren County, New York, *House*, no. 30,076; fig. 3, profile of portion of spike, × 6, from no. 31,500; fig. 4, face-view, × 6, of portion of spike, from no. 31,500; fig. 5, lip, × 10, from no. 31,500; fig. 6, venation of basal leaf, × 10, by transmitted light, from Willoughby, Vermont, September 4, 1896, *G. G. Kennedy*.

Plate 994, S. gracilis (Bigelow) Beck: fig. 1, spike, × 1, from Wellesley, Massachusetts, August 17, 1945, *F. W. Hunnewell;* fig. 2, portion of spike, × 6, from same collection; fig. 3, face-view of portion of spike, × 6, from Winchester, Massachusetts, August 16, 1945, *Ernest Rouleau;* fig. 4, lip, × 10, from last specimen; fig. 5, venation of dried-out old basal leaf, × 10, by transmitted light, from East Hartford, Connecticut, *Weatherby*, no. 1434.

II. Difficulties in North American Salix

(Plates 995–1006)

1. Muhlenberg's Nordamerikanischen Weiden antedated by Michaux.—The first decade of the 19th century and the two decades immediately preceding it were of the greatest significance in making known the more generalized flora of eastern North America. Not appreciating the ultimate significance of the exact date of issue (like too many editors of so-called learned societies today), editors brought out scattered or independent papers under a blanketing title-page with one arbitrary date for the whole series. Something has been done to clarify the dates of actual publication of numerous debatable works and much more remains to be done, especially since the over-nice susceptibilities of librarians and book-binders have long led to the discarding of or the shifting of the positions of the original covers (and, of course, the trimming off of all carefully made marginal memoranda). In the intricate genus *Salix* one paper has been outstanding as containing the original descriptions and drawings of leaves of the commoner species of the eastern United States. This is the brief article entitled *Uber die Nordamerikanischen Weiden von Hrn. Pred.* Mühlenberg *mit Anmerkungen des Hrn. Prof.* Willdenow, which was article no. XIV (pp. 233–242, tab. VI) in Der Gesellschaft Naturforschender Freunde zu Berlin Neue Schriften, iv, with the general title-page dated 1803.

Since Michaux, in his Flora Boreali-Americana, ii. 225, 226 (1803), also published as new five species of *Salix* from Canada and the eastern United States the exact dates of issue of the two nearly contemporaneous treatments have to be settled. To be sure, it has long, following Willdenow who had an editorial finger in the Muhlenberg paper, been assumed to need no investigation. In fact, so dominating was the influence of Willdenow and his remarkable and compendious Species Plantarum that the dictum emanating from those sources has rarely been challenged. Thus, the Muhlenberg treatment of American willows was reprinted by Konig and Sims in their Annals of Botany, ii. 62–69, pl. 5 (1805)[1] with the title: *On North American Willows, by the Rev. Mr.* MUHLENBERG, *with Notes of Professor* WILLDENOW. Furthermore, although Sims had been regularly citing Michaux, Flor. Bor.-Am. in his articles in Curtis's Botanical Magazine, beginning on December 1, 1803, so that it appears that he knew that remarkable work, he and Konig in 1805 contrived to overlook the five species of *Salix* published by Michaux, for, as an explanation of their reprinting of the Muhlenberg paper they wrote: "of all the species of these regions, we know but one through Mr. von Wangenheim [*S. conifera*, an abnormal plant] and another through Mr. Aiton [*S. tristis*]." Nevertheless, the five species of Michaux can hardly be waved aside; surely not if the sketchy accounts by Marshall are satisfactory for the establishment of three of our species!

My attention was drawn to this technical matter through noting, while studying Schneider's various papers on American willows, that in Journ. Arn. Arb. ii. 189 (1921) Schneider, without a word of explanation, reduced outright to *S. cordata* Muhlenberg (our PLATES 995 and 996) the utterly different *S. cordata* Michx. (our PLATES 997–1000); and, furthermore, that in vol. i. 158 (1920) he had reduced to *S. adenophylla* Hook. (our PLATE 997) the amazingly different *S. syrticola* Fernald (our PLATES 1001 and 1002). I was naturally surprised at what has been called "this Schneid. treatment" of these species, for I had studied Michaux's willows as well as Hooker's type of *S. adenophylla* (PLATE 997) and I knew that *S. cordata* Michx. has quite different aments from those of *S. cordata* Muhl.; in fact, that it is the best kind of *S. adenophylla!* And I also knew the several fundamental characters which distinguish *S. syrticola* from the others. It is,

[1] The title-page says 1806, but the late Mr. James Britten pointed out in Journ. Bot. xl. 419 (1902) that the pages including the Muhlenberg reprint were issued "1 June, 1805."

consequently, evident that the application of Schneider's apology should be extended quite to the Atlantic coast, for he gave it too occidental a bearing when he wrote, "As to the [§] *Cordatae*, I am not yet well enough acquainted with some of the western forms of this group to be able to draw a sharp line between them and the [§] *Adenophyllae*" (Journ. Arn. Arb. i. 148 (1920)).

Returning to the question of dates, Dr. Schubert, in Rhodora, xliv. 149 (1942), has clearly shown that Michaux's Flora Boreali-Americana was on sale in March, 1803. It was very soon being cited: for instance, Sims in Curtis's Botanical Magazine, xix, under plates 703, etc.; plate 703, of *Iris virginica* (with definite citation of "*Michaux* Flor. Bor.-Amer. 1. 22"), being engraved in time for publication on December 1, 1803. Nearer home, in Paris, in the 780-page (therefore not written in a day) vol. vi. (1804) of Lamarck's Encyclopédie Méthodique, Poiret added at the end of his treatment of *Salix* the note (p. 661): "Michaux, dans sa *Flore de l'Amérique septentrionale*, cite les espèces suivantes", followed by transcripts from Michaux and more detailed descriptions by Poiret. The actual placing on sale of Michaux's *Flora* in March, 1803, can hardly be questioned.

As to the Muhlenberg paper on *Nordamerikanischen Weiden* I have again asked the aid of Dr. Schubert. The following items are most important. The Vorrede of vol. iv. of Der Gesellschaft Naturforschender Freunde zu Berlin Neue Schriften, with the title-page dated 1803, certainly was prepared before the volume was actually published. This Foreword bears the definite date "Berlin, den 3ten Mai 1803", two months after Michaux's *Flora* was on sale. This concerns vol. iv. of the Neue Schriften.

In the Göttingische gelehrte Anzeigen, Bd. iii for 1803, p. 1493, issued "den 17. Sept. 1803", vol. iii of the Neue Schriften was reviewed; but it was not until Bd. i for 1804 of Gött. Anz. p. 255 ("16. Febr. 1804") that the first notice of Neue Schriften, iv appeared, while Muhlenberg's paper on Nordamerikanischen Weiden and succeeding papers in vol. iv were not reviewed until the issue of May 12, 1804. Another line of evidence is found in the dates of sending or receiving the manuscripts of articles published in vol. iv of Neue Schriften. The manuscript of article no. VI, by Domeier, was sent from "London, in December 1802" (p. 110); article no. XVIII, by Karsten, was dated "am

15ten Marz 1803" (p. 328); article XXIII was submitted by Trommsdorf from "Erfurt, im Febuar 1803" (p. 391); while article XXIV, by Bode, was submitted from "Berlin, den 26sten April 1803" (p. 394). These dates are consistent with the interpretation derived from the first notice of vol. iv in the Göttingische gelehrte Anzeigen, "16. Febr. 1804". It is clear, then, that Michaux's Flora Boreali-Americana was on sale in March, 1803, but that Muhlenberg's paper on American Willows could not have been issued prior to the date of the foreword, May 3, 1803, and was probably not available until late in 1803 or early 1804.

Fortunately, in 1903 I made a detailed study of Michaux's Herbarium in Paris and made notes on or photographs of all types which were within my limited understanding. These have subsequently been supplemented by some hundreds of sharply clear photographs taken under the supervision of Metman by the photographer for the Muséum National d'Histoire Naturelle, Cintract, so that a fair proportion of Michaux's species are understood. Unhappily, however, in case of *Salix* only my memoranda and some very vague photographs of 1903 are available. These notes, nevertheless, were explicit, except for the one southern species which I then did not know.

(*To be continued*)

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLX

TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

M. L. Fernald

(Continued from page 16)

1. Salix eriocephala Michx. Fl. Bor.-Am. ii. 225 (1803) is represented by a good branch (except for broken leaf-tips) of the foliage "oblongo-ovalibus, basi subretusis, serrulatis", which my note of 1903 described "foliage of oblong-leaved *cordata*", and a flowering branch which clearly gave the name to the species, "S. diandra: ramulis minutim tomentosis: . . . amentis ovalibus, confertim villosissimis", "*Hab.* in regione Illinoensi", my note on it being "flowering branch near *discolor*". The type is material of the tomentulose-branched *S. missouriensis* Bebb in Garden and Forest, viii. 379 (1895). It has been erroneously placed with *S. discolor* as *S. discolor* Muhl., var. *eriocephala* (Michx.) Anderss. in DC. Prodr. xvi^{2}. 225 (1868), the very large precocious aments and long (up to 1 cm.) capsules having deceived those who did not consider its other characters, into thinking it *S. discolor*. Michaux's "foliis oblongo-ovalibus, basi subretusis" is not good for *S. discolor* which becomes relatively local in southern Illinois and adjacent eastern Missouri. Michaux collected his *S. eriocephala* "in regione Illinoensi". That meant southernmost Illinois, for Michaux went down the Ohio, camped at the mouth of the Wabash and then proceeded to the Mississippi near the mouth of the Ohio. Here *S. missouriensis* abounds ("Plants of the Lower Wabash Valley", *Robt. Ridgeway*, no. 1580), Ball explicitly referring to it "in Illinois along the Ohio River near its

junction with the Mississippi" (Ball in Deam, Shrubs Ind. 52), just the region where Michaux got his *S. eriocephala*. The very weak photograph which I got of the foliage of Michaux's type might almost as well have been taken from *Ridgway*, no. 1580 from the Lower Wabash, from Glatfelter's material from Crève Coeur, St. Louis Co., Missouri, or from *Ball & Over*, nos. 2233, 2235 and 2246 from South Dakota—these all characteristic broad-leaved representatives of *S. missouriensis*.

2. S. CORDATA Michx. l. c. (1803). This, although omitted from Index Kewensis, has nothing to do with the later published and generally more southern *S. cordata* Muhl. It was from Lake St. John, the entire treatment being

> CORDATA. S. ramulis foliisque villosis: foliis cordato-ovalibus, acuminatis, argute serrulatis; stipulis foliaceis, maximis.
> *HAB*. in Canada, ad lacum *S. Joannis*.

The shrub was very familiar to me when I studied Michaux's type, for only three years earlier I had been collecting it along the Aroostook River in northern Maine, hence my memorandum: "The most extreme broad-leaved pubescent form of the Aroostook R., once taken by me for *S. adenophylla* [with absolute correctness as it proves]." See later discussion.

3. S. INCANA Michx. l. c. (1803), not Schrank (1789). My memorandum accords with the long-held identification: "The true *candida* with flocculent pubescence. The spec. labelled 'Lac Mistassins et Riv. des Goelands'."

4. S. LONGIROSTRIS Michx. l. c. 226 (1803). My note says merely "One of the *tristis* forms". It is generally treated as *S. tristis* Ait. (1789).

5. S. CAROLINIANA Michx. l. c. (1803). Although *S. caroliniana* is commonly placed in the unquestioned synonymy of *S. nigra* Marsh., with which, in 1903, I was very familiar, I did not recognize the Michaux material of his *S. caroliniana*. Michaux identified it with the "*S. pentandra?*" of Walt. Fl. Carol. 243 (1788), which had "foliis glabris serratis nitidis lanceolatis" and which, if it at all resembled the Eurasian *S. pentandra* L., could not have looked very much like *S. nigra* Marsh., with, to quote Deam's Flora of Indiana, "leaves linear-lanceolate". Michaux's *S. caroliniana* was described as follows:

CAROLINIANA. S. foliis lanceolatis, subtiliter arguteque serrulatis, subsessilibus: staminibus 4–6: amenti foeminei squamis oblongis, minutissime partimque lanuginosis; ovariis oblongis, glabris.

S. pentandra ? WALT.

OBS. Affinis *S. triandrae.*

HAB. in Carolina et Georgia.

In studying the American willows Schneider had before him the vast accumulations in all the larger American herbaria and it is significant that, with all these collections before him, he was unable to find any typical *S. nigra* from much of North and South Carolina and Georgia: "A very well-known eastern species the range of which seems to extend along the Atlantic coast from southern New Brunswick to northern North Carolina, and westward through northwestern South Carolina and northern Georgia (from where I have not yet seen typical material) to central and eastern Alabama . . . , southern Arkansas", etc. (Schneid. in Journ. Arn. Arb. i. 6 (1919)). In *S. nigra*, according to Sargent, Silva, ix. 104, "The stamens vary from three to five in number"; similarly, Andersson, the most accurate student ever to work on *Salix*, said in DC. Prodr. xvi². 200 (1868) "masc. 3–5-andris". Michaux's "4–6" slightly exceeds this and his "amenti foeminei squamis . . . partimque lanuginosis" is not too well described by Sargent's "scales . . . coated on the inner surface with pale hairs" nor by Andersson's "squamis in amentis . . . foemineis . . . glabriusculis vel basi et margine villosis".

In view of the great rarity in or absence from much of the area of "Carolina et Georgia" of *Salix nigra* and, likewise in view of Michaux's "*OBS.* Affinis *S. triandrae*", it would seem the obvious procedure to look for some common species of Carolina and Georgia which looks like the Eurasian *S. triandra* L. and which has 4 to 6 stamens, and the scales of the pistillate aments woolly at base. This is obviously *S. longipes* Shuttlew. ex Anders. (1868) and especially *S. Wardi* Bebb (1895), which Schneider treats as *S. longipes*, var. *Wardi* (Bebb.) Schneid. Typical *S. longipes* was recorded by Schneider in Journ. Arn. Arb. i. 25 et seq., "from Cuba to northern Florida . . . and from . . . adjacent southeastern Georgia . . . , South Carolina . . . , . . . eastern North Carolina . . . and in the southeastern corner of Virginia", the barely or hardly separable var. *Wardi* extending to the District of Columbia "where it apparently reaches the most northern point of its distribution". One can hardly look at characteristic specimens of *S. triandra* without seeing marked resemblance in outline and breadth of leaves to those of *S. longipes* (including *S. Wardi*), but he would scarcely think of the more linear- and narrower-leaved *S. nigra*. Although Schneider in various papers talked around the subject, I fail to find him getting down to a concrete statement of the characters of *S. longipes* (and *Wardi*). Sargent's full description in his Silva, l. c. 107, of *S. Wardi* emphasizes "leaves lanceolate to ovate-lanceolate . . . or . . . linear-lanceolate . . . stamens . . . three to six", while *S. longipes* (as *S. occidentalis* Koch (1828), not Walt. (1788)) was defined with "leaves . . . lanceolate, . . . scales . . . oblong-obovate . . . and villous on the back . . . stamens five or six". Similarly, Ball, in his detailed description of *S. longipes* (including *Wardi*) in Deam's Shrubs of Indiana, 44, says "leaf-blades narrowly lanceolate to lanceolate, . . . scale oblanceolate or obovate, villous, . . . stamens 5–8". Assembling these modern statements and comparing with Michaux's we get for *S. longipes* (including *S. occidentalis* sensu Sargent and *S. Wardi*): leaves lanceolate (narrowly or broadly); scales of ament oblong-obovate or oblanceolate, villous on the back; stamens 3–8. Michaux said: leaves lanceolate; scales minutely and partly woolly; stamens 4–6; furthermore his *S. caroliniana* came from Carolina and Georgia, where *S. longipes* abounds and where *S. nigra* is rare or local.

Two more points. Quite unfamiliar with *Salix longipes* (*Wardi*) in 1903, I entered only a query against Michaux's *S. caroliniana*. This was "Form of *S. cordata?*". That was only an off-hand suggestion, but Bebb, who set up the species, *S. Wardi*, in Gard. and For. viii. 363 (1895), had originally published it as *S. nigra*, var. *Wardi* in Ward, Guide to Flora of Washington, 114 (1881). He then (1881) spoke of a form of the latter which "might be easily mistaken (in the absence of aments) for an extravagant growth of *S. cordata*". Again, in 1895, he wrote: "The statement made when this Willow was first described that in some of its forms the leaves alone, with their ample stipules, might easily be mistaken for *S. cordata*, finds striking exemplification in Professor Short's specimen in the Gray Herbarium, which two no less competent salicologists than Mr. Carey[1] and Professor Andersson have mistaken for 'S. cordata angustata'. Indeed it is apparent from the description that this identical specimen served as the type of S. cordata angustata, 1° forma discolor, Andersson (DC., Prod. xvi². 252)." When the foliage of Michaux's type of *S. caroliniana* reminded my then quite inexperienced eye of that of *S. cordata* (surely not of *S. nigra*) I was in distinguished company, for it is an honor to approach the class with the discerning John Carey, the highest of honors to get near the limited group of most cautious salicologists with Nils Johan Andersson!

Schneider states with seeming finality regarding *Salix caroliniana* that "unfortunately no type specimen seems to exist in Michaux's herbarium at Paris"—Journ. Arn. Arb. iii. 64 (1921). But, from what I have already noted, it is evident that Schneider did not at all understand the types at Paris of Michaux's *S. eriocephala* and *S. cordata* and probably never studied them. These types and that of *S. caroliniana* were all there in 1903, when I studied and photographed some of them; of course, since the invasion of Paris by Hitler's ravaging hordes they may now be missing; but shortly before the "*blitzkrieg*" in which Paris was invaded at the opening of the recent war the TYPE was there, for Cintract took the photograph of it which is before me. This photograph shows the relatively broad young leaves paler beneath than above and the toothing of *Salix longipes*, not of *S. nigra*. I am satisfied that S. CAROLINIANA Michaux. (1803) is *S. longipes* Shuttlew. (1858), i. e. *S. Wardi* (Bebb) Bebb (1895).

S. CORDATA Michx. Fl. Bor.-Am. ii. 225 (early 1803); Poiret in Lam. Encycl. Méth. vi. 661 (1804); not Muhl. in Ges. Naturf. Freunde Neue Schr. iv. 236, t. 6, fig. 3 (late 1803 or early 1804). *S. adenophylla* Hook. Fl. Bor.-Am. ii. 146 (1839); Schneid. in Journ. Arn. Arb. i. 158 (1920) in part (excl. *S. syrticola*); St. John, Vict. Mem. Mus. Mem. **125:** 79 (1922); Raup in Sargentia, iv.

[1] In his Salices Amer. no. 22, Joseph Barratt had *Salix longipes* under a *nomen nudum* (in Index Kewensis and also cited by Schneider, so that I am not here publishing a useless name), with the following explanation: "22. *Salix Pitcheriana** Barratt, MSS. Hab. Arkansas.—Dr. Pitcher. Sea Islands of Georgia. This undescribed species is allied to *S. nigra*. I possess specimens which have been obligingly communicated by John Carey, Esq. of New York", etc. John Carey was not properly edified. On one of his labels of Georgia material he wrote: "I always supposed this to be S. nigra of Lin [who had no such species]: (no doubt it is of Ell.) but Dr. Barratt who calls himself the great authority for our willows names it a new species". "Authorities" beware!

111 (1943).—Southeastern Labrador Peninsula to James Bay, Ontario, south to Newfoundland, Nova Scotia, northern Maine, eastern Cape Cod, northern New York, Simcoe and Bruce Cos., Ontario, and northern Michigan. Plates 997–1000.

Salix cordata Michx. has been wrongly guessed, ever since Willdenow, to be identical with the later *S. cordata* Muhl. (see pp. 14 and 28 and plates 995 and 996). In his Species Plantarum, iv^2. 666 (1806), Willdenow took up the later *S. cordata* Muhl., expanding Muhlenberg's original description to read "*ramis glabris viridibus.* Folia *tripollicaria oblongo-lanceolata acuminata basi cordata, margine argute serrata, serraturis cartilagineis, utrinque glabra*", etc.; and at the same time he maintained *S. rigida* Muhl. as a distinct species, although others have not been able to do so. *S. rigida* was thought to be distinguished by "*ramis viridibus superne purpurascentibus, junioribus pubescentibus.* Folia *tripollicaria rigida oblongo-lanceolata acuminata basi subcordata, margine argute serrata, serratura infime elongata apice glandulosa*" etc., not very convincing differences, especially when Muhlenberg's original figures (our plate 995, fig. 1 and 996, fig. 1) are compared. However, in *S. rigida,* with glabrous oblong-lanceolate subcordate leaves, Willdenow doubtfully included "S. (*cordata*) ramulis foliisque villosis, foliis cordato-ovalibus acuminatis argute serrulatis, stipulis foliaceis maximis. *Mich. amer.* 225?". There he had a really different species, which has positively cordate and narrowly oval or ovate leaves densely villous when young, and often to maturity, and coming originally from Lake St. John, which is more than 600 miles north of Muhlenberg's region (Lancaster County, Pennsylvania) and with a Hudsonian or Hudsonio-Canadian (instead of Alleghenian-Carolinian) flora. As stated on a previous page (28) the type of *S. cordata* Michx. from Lake St. John is surely of the northern species with densely pubescent branchlets and young foliage, which is common from southeastern Labrador Peninsula to James Bay, a species (plates 997–1000) of which many sheets from Lake St. John are before me. In its smallest-leaved developments it is quite identical with the type of *S. adenophylla* Hook. (plate 997, figs. 1 and 2) from "Labrador. *Dr. Morrison*", the latter region being presumably the Côte Nord of the eastern part of Saguenay County, Quebec, which in Hooker's (and Morrison's) time was included in "Labrador". At least the type of *S. adeno-*

phylla could perfectly well have come from the Natashquan River, the old "American Harbour," for Natashquan material (PLATE 997, FIGS. 3 and 4) is very like it. The photograph of Hooker's type of *S. adenophylla* was sent to the late Professor Sargent and is preserved, along with some leaves and portions of an ament at the Arnold Arboretum. In its details it is quite like specimens from Newfoundland, the Côte Nord, Lake St. John, Aroostook River, Maine, James Bay and elsewhere in the range of Michaux's species; and the photograph and fragments exactly agree with Hooker's detailed account of his *S. adenophylla:*

8. *S. adenophylla;* ramis brevibus subrobustis lanatis, foliis ovatis basi cordatis acutis subcoriaceis fere omnino sessilibus reticulatim venosis argute serratis serraturis elongatis glanduliferis lana sericea dense obsitis demum aetate nudiusculis, stipulis ovato-cordatis grosse glanduloso-serratis, amentis foemineis elongatis pedunculatis, capsulis ovatis acuminatis glaberrimis, stylo elongato, stigmatis lobis fissis.

HAB. Labrador. *Dr. Morrison.*—I know no species like this, well marked as it is by the copious long narrow serratures to the leaves tipped with a gland, so that the leaf looks as if it were fringed with pedicellated glands. These leaves are an inch or more long, clothed, even when fully grown, with long silky tomentum on both sides, but which is deciduous on the oldest leaves . . .

Although the teeth on young and just expanding leaves of *Salix cordata* Michx. (and *S. adenophylla*) may be prolonged and gland-tipped, they are often lower, blunter and less evidently ending in glands, in such specimens the toothing approaching that of *S. rigida* Muhl. (*S. cordata* Muhl.). Furthermore, the narrowest-leaved *S. cordata* resembles the broadest-leaved *S. rigida* but the blades are more generally cordate in the former than in the latter. Measurements of all mature foliage in the Gray Herbarium gives the following results, to which I add the far more significant characters of the aments.

S. CORDATA: leaves broadly oblong-lanceolate to ovate, mostly strongly cordate, the mature ones 3–13 (av. 6.5) cm. long and 2–5.5 (av. 3.5) cm. broad; staminate aments terminating leafy axillary branchlets, the leaves well developed at anthesis, the bracts with whitish beard; pistillate aments dense, in anthesis with appressed-ascending ovaries, in fruit with the capsules crowded on very short pedicels shorter than to barely exceeding the bracts.

S. RIGIDA: leaves oblong-lanceolate, subcordate, rounded or tapering or attenuate at base, the mature blades one eighth to one third as broad as long, 4.5–15 cm. long, 0.9–4.5 cm. broad; staminate aments subtended by short bracts barely expanded at anthesis; pistillate aments in anthesis with widely (often horizontally) divergent ovaries, in fruit with the widely divergent capsules on pedicels as long as to much longer than their subtending bracts.

Typical *Salix cordata* Michx. has heavily villous branchlets and young leaves, the pubescence inclined to persist on the mature foliage. In the eastern part of its range it is represented in many areas (along certain rivers, etc.) by a glabrous or glabrescent extreme, which has the aments, stamens, short pedicels and cordate leaf of the typical extreme of the species, but with the teeth less often prolonged and gland-tipped than in that shrub. With leaf-outline and aments of *S. cordata* and occurring only in Newfoundland, eastern Canada and northern Maine, mostly north of *S. rigida*, it seems to be an extreme of the northern species. This is

S. cordata Michx., var. **abrasa**, var. nov., ramulis petiolisque glabris vel glabratis; foliis costa excepta glabris vel glabratis.—Newfoundland and Gaspé Peninsula, Quebec, to Nova Scotia and northern Maine. The following are characteristic. Newfoundland: Birchy Pond Stream, *Fernald & Wiegand*, no. 3149; Harry's River (or Brook), *Fernald & Wiegand*, no. 3150; Force-le-Plain, Harry's Brook, *R. B. Kennedy*, nos. 305 and 387; Riverview Camp, Grand Codroy River, *Pease & Edgerton*, no. 27,120. Quebec: R. Ste. Anne des Monts, Gaspé Co., July 14–17, 1906, *Fernald & Collins*, nos. 484 (type in Herb. Gray.), 485 and 486; R. Petite Cascapedia, Bonaventure Co., *Victorin, Rolland & Jacques*, no. 33,845; Bonaventure R., Bonaventure Co., Aug. 4–8, 1904, *Collins, Fernald & Pease* (*Pease*, nos. 5831 and 5897); junction of Restigouche and Matapedia Rivers between Quebec and New Brunswick, *Rousseau & Boivin*, nos. 32,037 and 32,082; Grande-Décharge, Lac St.-Jean, *Victorin, Rolland & Meilleur*, no. 45,872. New Brunswick: Tom's Island, Restigouche R., July 30, 1896, *G. U. Hay;* lower Tobique River, Oct., 1945, *G. D. Chamberlain.* Nova Scotia: Salt Springs, Pictou Co., *Perry, Wetmore, Hicks & Prince*, no. 10,134; Truro, Colchester Co., *J. G. Jack*, no. 3633; Wellington, Shubenacadie Grand Lake, Halifax Co., *Fernald, Bartram & Long*, no. 23,739 (transitional); Landsdown, Digby Co., *J. G. Jack*, no. 3704. Maine: Fort Kent, Aroostook Co., *Fernald*, nos. 2473–2475; *Pease*, no. 2578.

Schneider, who considered *Salix cordata* Muhl. and *S. cordata* Michx. identical and who put them both into § *Cordatae*, treated *S. adenophylla* Hook. (which is really very small-leaved *S. cordata* Michx.) as the type of a separate § *Adenophyllae.* He was unable to distinguish from the latter northern species the very different shrub of sands about Lake Michigan, *S. syrticola* Fernald in Rhodora, ix. 225 (1907), (our plates 1001 and 1002), Schneider saying "Unfortunately Fernald did not see Hooker's type of which I have before me an excellent photograph and some fragments from the Kew Herbarium . . . When he proposed his new species he did not know of the specimens collected by Macoun, Ross and Spreadborough in the James Bay region. They connect the original habitat of (probably southern) Labrador and that of *S. syrticola.* The only difference between the forms of James Bay and those of the Great Lakes, so far as I can judge, is in the length of the styles, which measure about 1.5 mm. in typical *S. adenophylla*, while they rarely are longer than 1 mm. in *S. syrticola*"—Schneid. in Journ. Arn. Arb. i. 158, 159 (1920).

Now it so happens that, in 1903 (again in 1930) the author of *Salix syrticola* had closely studied Hooker's type of *S. adenophylla* and he has many times studied colonies of *S. adenophylla* in Newfoundland, Quebec and northern Maine. The type, from the northeastern and rather inhospitable limit of the specific range, was unusually small-leaved and heavily pubescent, but the characters of this species (as the earlier *S. cordata* Michx.) are shown in PLATES 997–1000. Whether *S. syrticola* is fully distinct from *S. cordata* it is too soon to assert with finality. In general the two are very different in many characters, but in northern Michigan and about the Lake Huron shores of Ontario some shrubs indicate possible transitions which are no more tangible than the "mongrels" into which other species of *Salix* regularly "spawn" (to quote Bailey's picturesque phrase) when they meet and cross. Until very recently we did not know good staminate aments and the plans to secure them last June from the type-region of the northern shrub, Lake St. John, or from northern Maine were thwarted by the erratic weather, when abnormally late frosts after an abnormally early opening of spring blighted the flowers or fruits as well as vegetative tips of many species occurring from eastern Canada to the Southeastern States. Most fortunately, however, in late June and early July, Fathers Dutilly and Lepage secured beautiful freshly flowering staminate, as well as pistillate, material near James Bay. This differs at once from *S. syrticola* in many characters. As to the staminate aments, they are borne at the tips of well developed leafy branchlets, the bracteal leaves very much more developed than are those of *S. syrticola* during anthesis, and the beard of the bracts is much whiter than the fuscous beard in *S. syrticola.*

These characters of the staminate aments, accompanied by parallel ones in the pistillate, and by different outline, toothing and reticulation of leaves, different toothing of stipules, etc., lead to the following statement of contrasts.

S. cordata: Leaves broadly lance-oblong to oblong-ovate, long-acuminate, gradually tapering from below or near the middle, the mature ones 3–13 cm. long; each margin with 25–90 (av. 55) forward-arching at first often gland-tipped but soon glandless mostly simple teeth; the mature petiole (2–) 5–35 (av. 13) mm. long; the mature lower surface with secondary veins slender and relatively low: mature and larger stipules with 0–22 (av. 14) gland-tipped or mostly glandless teeth on the longer margin; staminate aments on leafy branchlets, the leaves well-grown at anthesis; the blackish to brown bracts with white beard: pistillate aments in maturity 2–6 cm. long; bracts narrowly obovate, fuscous or brown, their bright white beard only slightly longer; ovaries in anthesis appressed-ascending, in fruit more spreading, on pedicels shorter than bracts. Plates 997–1000.

S. syrticola: Leaves oblong-ovate, acute or abruptly short-acuminate from well above the middle, the mature ones 3.5–9.5 cm. long; each margin with 81–137 (av. 105) horizontally or subhorizontally divergent and permanently gland-tipped prolonged often compound teeth; the mature petiole 2–10 (–15) (av. 6.3) mm. long, thicker than in the preceding; mature lower surface with secondary veins coarse and rather prominent: mature and larger stipules with 24–40 (av. 32) mostly gland-tipped and straight teeth on the longer margin: staminate aments in full anthesis subtended by leaves only about one-fourth grown; the oblong pale brown bracts with ashy-white to fuscous beard: pistillate aments in maturity 6–8 cm. long; flowers soon divergent, the mature capsules on pedicels nearly as long as to longer than blade of the oblong pale brown bract, the beard of the latter very long, ashy; style 0.7–1.5 mm. long. Plates 1001 and 1002.

With such an abundance of distinctive characters, I find myself incapable of following Schneider in treating *S. cordata* (*S. adenophylla*) and *S. syrticola* as absolutely the same. Schneider states that the "styles . . . measure about 1.5 mm. in typical *S. adenophylla* [i. e. *cordata*], while they rarely are longer than 1 mm. in *S. syrticola*" (Schneider, Journ. Arn. Arb. i. 159). Rather naturally, however, my measurements of the style of *S. syrticola* accurately coincide with those of Ball in Deam's Shrubs of Indiana, 0.7–1.5 mm. I am not, as already emphasized, convinced that *S. cordata* (*S. adenophylla*) and *S. syrticola* are conspecific, although, as also noted above, at the northern border of the range of the latter some transitional specimens may possibly occur. So they do at the border-lines or coincident ranges of many willows. That is one of the reasons the willows are difficult; they *will* cross.

Incidentally, *Salix syrticola* has its greatest development on the dunes of Lake Michigan, especially toward the southern end of the Lake, a region famous for the isolation there of prevailingly southern, rather than northern species. Although the dunes support *Pinus Banksiana* and a few other common Hudsonian and Canadian species, they are famous largely on account of the remarkable assemblage of far-isolated southern or southeastern species. These include *Aristida tuberculosa*, "Massachusetts to Georgia and Mississippi; around the southern end of Lake Michigan and in . . . Wisconsin, Indiana, Illinois", etc. (*Hitchcock*); *Panicum auburne*, "Massachusetts to northern Florida and Louisiana; Arkansas; Indiana, near Lake Michigan" (*Hitchcock*); *Eleocharis geniculata* (*E. caribaea*), Florida to Texas and southern California, north near coast to North Carolina, sands of Great Lakes, southern Ontario to Michigan and northwestern Indiana; *E. melanocarpa*, localized in northern Florida and Georgia, southeastern Virginia, southern New Jersey to southeastern Massachusetts, eastern Texas, and dunes of Lake Michigan; *Psilocarya nitens*, occurring from eastern Texas to Florida, thence north to southeastern North Carolina, otherwise highly localized in Sussex County, Virginia, Cape May region, New Jersey, Suffolk County, Long Island, Plymouth County, Massachusetts, and dunes of Lake Michigan; and so on to *Stachys hyssopifolia*, a very characteristic species occurring from southern New England and southeastern New York to South Carolina and isolated in southern Michigan and northwestern Indiana; or *Lycopus amplectens* Raf. (*L. sessilifolius* Gray), one of the most definite of species, occurring from Mississippi to Florida, thence to North Carolina, from southern New Jersey to southeastern Massachusetts, and among the dunes of Lake Michigan. In view of this striking southern, rather than prevailingly Hudsonian, relationship of the flora of the dunes of Lake Michigan, it is wise to hesitate before too positively asserting that *S. syrticola* of the dunes of Lake Michigan is, in spite of its many distinctive characters, identical with the shrub which prevails in the Hudsonio-Canadian area from Hudson Bay to southern Labrador and Newfoundland. Primarily upon *S. syrticola* which he misidentified with *S. adenophylla*, Schneider set up his § *Adenophyllae*, although, as quoted by me on p. 15, he admitted that he was perplexed "to draw a sharp line between [§ *Cordatae*] . . . and the [§] *Adenophyllae*". If *S. cordata* Michx. and *S. cordata* Muhl. are, as Schneider incorrectly says, identical, though clearly of the same section, and if, as it seems to me, *S. adenophylla* is the same as *S. cordata* Michx. (not Muhl.), then § *Adenophyllae* Schneid. has a very slim basis for separation from § *Cordatae*.

The automatic abandonment of the later name, *Salix cordata* Muhl., not Michx., necessitates the following transfers:

S. rigida Muhl., forma **mollis** (Palmer & Steyerm.), comb. nov. *S. cordata* Muhl., forma *mollis* Palmer & Steyerm. in Ann. Mo. Bot. Gard. xxv. 770 (1938).

S. rigida Muhl., var. **angustata** (Pursh), comb. nov. *S. angustata* Pursh, Fl. Am. Sept. ii. 613 (1814). *S. cordata* Muhl., β. *angustata* (Pursh) Anderss. in DC. Prodr. xvi². 252 (1868).

Typical *Salix rigida* Muhl. has the leaves broadly rounded to subcordate or slightly cordate at base, one sixth to one third as broad as long, the mature blades 1.5–4.5 (av. 2.75) cm. broad. In var. *angustata* the blades taper to base or are very gradually rounded, one eighth to one fourth as broad as long, the mature ones 0.9–2.2 (av. 1.5) cm. broad.

2. Additional Names and Transfers in Salix—

× S. **Jesupi.** *S. pameachiana* sensu Anders. in K. Svensk. Vet.-Akad. Handl. vi. 48 (1867), not Barratt (1840). *S. alba*, var. *pameachiana* Anders. in DC. Prodr. xvi.² 212 (1868), not *S. pameachiana* Barratt, basonym. *S. alba* × *lucida* Bebb in Gard. and For. viii. 423, 424, fig. 57 (1895).

Named for its discoverer, Henry Griswold Jesup (1826–1903). *Salix pameachiana* Barratt, Salices Amer. (1840) "growing about the Pameacha stream in this town [Middletown, Connecticut]" and, therefore, not a personal name as assumed by Andersson and by Schneider, who regularly used a capital initial, was said by Barratt to be "the intermediate of S. vitellina and the former [*S. decipiens* or *fragilis*]". Carey in Gray, Man. 428 (1848) treated it as *S. alba*, var. *vitellina* × *S. fragilis*. It has nothing to do with the very striking × *S. Jesupi*.

S. interior Rowlee, var. **exterior,** var. nov., foliis plus minusve persistenter sericeis breviter subacutis oblongo-lanceolatis dentibus suppressis, lamina 2–7 cm. longa ad 1.5 cm. lata.—Beaches of Aroostook River, Maine: Caribou, July 18, 1902, *Williams, Collins & Fernald* (type in Herb. Gray.; isotype in Herb. N. E. Bot. Cl.); Fort Fairfield, June 28, 1931, *Fernald & Weatherby*, no. 2432. Pennsylvania: banks of Susquehanna River, above McCall's Ferry, York Co., Sept. 13, 1864, *T. C. Porter* (Herb. Phil. Acad.; fragments and tracing in Gray Herb.).

In its very short and broad leaves with suppressed teeth quite distinct from narrower-leaved typical *Salix interior*, in which the usually divergent teeth are prominent. *S. interior*, named for its extensive inland development, or its forma *Wheeleri* (Rowlee) Rouleau, extends from Alaska to Oklahoma and Arkansas, and eastward in the North to the St. Lawrence River in Quebec and the Connecticut in western New England, with a slight but isolated occurrence along the St. John in New Brunswick and the lower Restigouche in Quebec. Var. *exterior* is close to the easternmost edge of the specific range. Although the name *S. longifolia* Muhl. (1803) is still much used, it was clearly antedated by the wholly different *S. longifolia* Lam. (1778).

S. RETICULATA L., var. **semicalva,** var. nov. (TAB. 1003, FIG. 2–4 et TAB. 1004, FIG. 2–4), squamis masculis flavescentibus dorso glabris vel glabratis; antheris flavescentibus; squamis foemineis flavescentibus vel fulvis; capsulis sparse breviterque pilosis.—Limestone barrens and gravels, northern and northwestern NEWFOUNDLAND: Quirpon Island, *Wiegand, Gilbert & Hotchkiss*, no. 27,939; Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 27,936; Anse aux Sauvages, Pistolet Bay, *Fernald, Wiegand & Long*, no. 27,940; Sandy (or Poverty) Cove, Straits of Belle Isle, *Fernald, Long & Dunbar*, no. 26,586; between Nameless Cove and Mistaken Cove, Straits of Belle Isle, *Wiegand, Pease, Long & Hotchkiss*, no. 27,935; Flower Cove, July 17, 1920, *Mary E. Priest;* Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 26,585; south of Flower Cove, *Wiegand, Pease, Long & Hotchkiss*, no. 27,934; Brig Bay, *Fernald, Long & Dunbar*, no. 26,587; St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, nos. 27,937 and 27,938; Ingornachoix Bay, *Fernald & Wiegand*, no. 301; Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, nos. 1578 (TYPE in Herb. Gray., July 20, 1929)—1580; Pointe Riche, *Fernald, Long & Fogg*, no. 1581.

The two collections (*Woodworth*, no. 143, and *Abbe & Odell*, no. 210), from the Torngat region of northern Labrador, have the pale bracts and the minutely puberulent ovaries of var. *semicalva*. I have seen no staminate material from that area.

Typical arctic-alpine *Salix reticulata* (PLATE 1003, FIG. 1 and 1004, FIG. 1) has the bracts of the pistillate aments dark (deep purplish to blackish), those of the staminate aments heavily villous at base on the back (as well as on the inner surface), the anthers dark (Schneider in Journ. Arn. Arb. iii. 92 (1921), in his key saying "Antherae violaceae" for *S. reticulata* as opposed to

"Antherae flavae" for *S. vestita*), the ovaries and capsules heavily white-tomentulose. The arctic shrub (especially in Eurasia) may often have silky pubescence on the young leaves, this persisting near the base of the leaf on the back; and in European (typical) specimens the peduncle is usually villous. The Newfoundland representative of the species is glabrous from the first or with the young peduncles only sparsely pilose. Its aments have yellowish-brown to fulvous bracts, these in the staminate aments only weakly pilose or promptly glabrescent, the anthers pale or yellow, while the pubescence of the capsules is so short and fine that the purplish color of the capsule is scarcely obscured.

(*To be continued*)

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLX

TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

M. L. FERNALD

(*Continued from page 40*)

In fact, *Salix* § *Reticulatae* has strongly diverged in Newfoundland and the adjacent Labrador Peninsula from orthodox characters of the section, Schneider in Bot. Gaz. lxvii. 44 (1919) finding "the characters of the RETICULATAE . . . further changed by the inclusion of *S. leiolepis* [endemic in western Newfoundland] with glabrous ovaries". *S. leiolepis* (PLATE 1005), with habit of very coarse-stemmed *S. reticulata* but with strictly glabrous bracts and ovaries, is endemic, so far as known, on Table Mt., Port-au-Port Bay, 150 miles south of the southern known limit of *S. reticulata* var. *semicalva*. In the same general area with the embarrassing *S. leiolepis* the coarse and usually upright *S. vestita* is highly complex. Furthermore, this very definite coarse species of the *Reticulatae*, with very short petioles, the coriaceous leaf-blades usually heavily clothed beneath with dense and lustrous silky white hairs, and with staminate aments 1–1.5 cm. long, has diverged on Eskimo Island, west of the Straits of Belle Isle, and locally on walls of the Shickshock Mts. of the Gaspé Peninsula, as *S. vestita*, var. *psilophylla* Fernald & St. John in Vict. Mem. Mus. Mem. **126:** 44 (1922), with the membranaceous leaves glabrescent beneath, the staminate aments 1.7–2.5 cm. long. Again, along the Straits of Belle Isle the *Reticulatae* have thrown off another endemic, *S. jejuna* Fernald in RHODORA, xxviii. 177 (1926), this tiny shrub (PLATE 1006) differing from *S. reticulata* in its very short (instead of long) petioles and short- (instead of long-) peduncled fruiting aments, and in the very long ascending villi of the papillate capsule, and from the Newfoundland *S. reticulata*, var. *semicalva* still further in its fuscous or dark purple very pubescent bracts. Furthermore, this unique little species of northernmost Newfoundland may flower twice in the same summer. In June or early July the fruits are ripe but one of the original collections, of July 16, had already fruited, while the new, vigorous shoots were already producing new flowering aments, without waiting for the next summer. Since neither of the endemic Newfoundland species of § *Reticulatæ* have been illustrated, I am showing them in PLATES 1005 and 1006.

S. VESTITA Pursh, forma **mensalis,** f. nov., trunco prostrato; foliis 1–1.6 cm. longis; amentis fructiferis 5–6 mm. longis.—NEWFOUNDLAND: mossy knolls on the limestone tableland, alt. 200–300 m., Table Mountain, Port-au-Port Bay, June 16 and 17, 1914, *Fernald & St. John*, no. 10,824, specimens distributed under an identical but unpublished varietal name.

Forming dense prostrate mats 1.5 dm. broad, with tiny leaves only 1–1.6 cm. long, and fruiting aments 5–6 mm. long; in strong contrast with the erect or ascending typical *Salix vestita* (up to 1 m. high) which has leaves 1.5–7 cm. long, the fruiting aments 0.6–1.5 cm. long.

The section *Reticulatae* Fries is unique among the diandrous *Salices*. In the tremendously extensive series of sections of diandrous willows with persistent bracts the aments or their supporting branchlets are axillary, terminal or subterminal, and the flowers are subtended by 1 or 2 slender to stout simple glands or nectaries. In the round-, roundish- or obovate- and reticulate-leaved § *Reticulatae* the peduncled aments are falsely terminal, borne just below the tip of the branchlet and on the side of the stem opposite the terminal leaf; and the glands of both staminate and pistillate flowers often form a false disk (as in *Populus*) with the margin lobed. Thus making a transition in its gland and in several other characters to *Populus*, the section was set up by A. Kerner in 1860 as a genus, *Chamitea*. Of this differentiation the late Professor C. E. Moss wrote in his Cambridge British Flora, ii. 25 (1914):

"*S. reticulata* possesses so many remarkable characters, showing it to be, in spite of the great difference in habit, intermediate in several respects between *Populus* and species of *Salix* in general, that there is little wonder that Kerner . . . suggested it should be placed in a new genus. However, the remarkable characters possessed by *S. reticulata* are so distributed among the other more primitive species of *Salix* that its generic separation from them cannot be maintained; and indeed Kerner himself at a later date accepted this view. The characters by which *S. reticulata* recalls *Populus* are the suckering habit, the long petioles, the broad laminae, and the perianthoid nature of the nectary. In its androecium, however, it has become a thorough *Salix*, more so even than *S. pentandra*, which has rather broad laminae, a double nectary, and, as a rule, 5 stamens at least. It seems to us that *S. pentandra* and *S. reticulata* diverged long ago from a primitive Salicalian stock, that each has retained a few of the *Populus*-like characters which this ancestral hypothetical group possessed, and that each of these species or their ancient allies have given rise to the other species of *Salix*, some of which . . . exhibit interesting features of convergent development."

The very primitive § *Reticulatae* consists of only a few localized species: (1) *S. reticulata* of arctic-alpine range on calcareous soils, extending south to the higher mountains of Eurasia and in America in very local areas to northwestern Newfoundland (as var. *semicalva*), shores of Hudson Bay and southern Alaska and the Aleutian Islands; (2) *S. vestita* Pursh, with localized varieties, of the Labrador Peninsula, Newfoundland, Anticosti and Gaspé, west side of Hudson Bay, Cordilleran region of southern Alberta and British Columbia to northern Montana and eastern Oregon; (3) *S. leiolepis* and (4) *S. jejuna*, Newfoundland endemics; (5) *S. nivalis* Hook. of alpine regions of the Rocky Mts.—evidently a primitive section, consisting only of a few disjoined relicts.

The pentandrous willows, on the other hand, such as those of §§ *Nigrae*, *Pentandrae* and *Bonplandianae*, are relatively southern (some even tropical) and their species, *S. nigra* Marsh., *Humboldtiana* Willd., *lucida* Muhl., *Bonplandiana* Kunth, etc., have broadly continuous ranges. Although presumably, as Moss pointed out, of as great antiquity as § *Reticulatae*, both series showing primitive characters, the pentandrous and chiefly more austral willows show no more evidence of relict-endemism than do the relatively modern diandrous species, such as *S. rigida* Muhl., *S. humilis* Marsh., *S. discolor* Muhl. or *S. Bebbiana* Sargent. § *Reticulatae*, however, has remained somewhat static and relict-endemism is one of its striking peculiarities. In view of its concentration in northern and western Newfoundland and its association there with hundreds of other relict-species of both plants and animals, those who believe the present distribution of nonaggressive plants and animals of as great or greater significance as the remote occurrence of chance fossils, find themselves unable to subscribe to the insistence of certain geologists and others, that life on Newfoundland and in adjacent areas was wholly obliterated by Wisconsin ice. It would be most difficult to demonstrate that in that area the relatively modern sections of diandrous *Salix* have in a few thousand years given rise to localized shrubs with more primitive floral characters.

Salix, § **Uva-ursi,** sect. nov., a § *Herbaceae* Borrer differt trunco valde ligneo vix subterraneo, ramulis valde foliosis; foliis firmis nec rotundatis nec valde reticulatis subtus albidis; amentis multifloris; bracteis valde sericeis; stamine plerumque 1. Type *S. Uva-ursi* Pursh.

It is most difficult to see any close relationship of the eastern boreal American *Salix Uva-ursi* and the circumpolar *S. herbacea* L. The latter has its trunks and main branches subterranean, stoloniferous and rooting at the nodes, only the short ascending filiform branchlets above ground, these bearing 2–4 reticulate rounded slender-petioled leaves which are green on both sides, and subterminal 2–8-flowered tiny aments, with nearly glabrous bracts, and the staminate flowers with 2 stamens. *S. Uva-ursi* is a strongly ligneous prostrate shrub, forming extensive superficial and very leafy carpets; the firm leaves not rounded, whitened beneath and not conspicuously reticulate, also short-petioled; the many-flowered aments with long-silky bracts; the stamen solitary (rarely 2).

S. arctica Pallas, var. **antiplasta** (Schneider), comb. nov. *S. anglorum* Cham., var. *antiplasta* Schneider in Bot. Gaz. lxvi. 134 (1918).

Salix, § **Argyrocarpae,** sect. nov. Frutex 0.2–1.7 m. altus; foliis subtus micaceo-sericeis; stipulis minutis fugaceis; amentis fructiferis laxis; capsulis micaceo-sericeis; pedicellis elongatis glandulas duas 3–4-plo superantibus; staminibus 2. Type *S. argyrocarpa* Anders.

The boreal and alpine *Salix argyrocarpa* of northeastern America, like its associate, *S. Uva-ursi,* stands so far apart from other willows that it deserves a place in the system of Sections.

Andersson, Bebb and Schneider have tried to place it in some section and the latter close student of the genus finally left it unanchored.

S. GLAUCOPHYLLOIDES Fernald, forma **lasioclada,** f. nov., ramulis persistenter griseo-velutinis. TYPE from Robinson's Brook, southwestern Newfoundland, August 10, 1930, *Rachel B. Kennedy*, no. 470, in Herb. Gray; flowering material from the same shrub, coll. June 7, 1930, no. 254.

Differing from the glabrous- and lustrous-branched typical *S. glaucophylloides* in its densely gray-velvety branchlets. Found through much of the range of typical *S. glaucophylloides.*

S. GLAUCOPHYLLOIDES Fernald, var. **albovestita** (C. R. Ball), comb. nov. *S. glaucophylla* Bebb, var. *albovestita* C. R. Ball in Journ. Wash. Acad. Sci. xxix. 492 (1939).

Unfortunately the name *Salix glaucophylla* Bebb (1881) is antedated by the same name for quite different species by Besser (1822) and by Andersson (1851). Typical *S. glaucophylloides,* occurring on gravelly shores in calcareous areas from Newfoundland to northern Ontario, south to the Gaspé Peninsula, northern New Brunswick and northern Maine, is a coarse shrub or small tree up to 5 m. high, its oblong to lanceolate or ovate leaves glaucous beneath and lustrous above, these about half-grown at anthesis, the aments subtended by 3–5 leaves. Its pistillate aments are dense, in maturity 2–6 cm. long, the capsules on pedicels only 1–1.5 mm. long. Var. *glaucophylla* (Bebb) Schneider, localized about the Great Lakes, is a low shrub (1–2.5 m. high), its aments expanding before the leaves are well grown, the pistillate aments lax and subremotely flowered, becoming 6–10 cm. long, with fruiting pedicels 2–4 mm. long. Var. *albovestita* is similar to the latter and found on dunes of the Great Lakes from New York and southern Ontario to Michigan. Its branchlets are densely pubescent and the young (sometimes the old) leaves are clothed with dense white pubescence.

S. HUMILIS Marsh., var. **hyporhysa,** var. nov. Frutex 1–3 m. altus; ramulis fertilibus 2–5 mm. crassis; foliis glabratis vel subtus sparse puberulis, subtus valde rugoso-reticulatis, lamina matura 0.7–2 (–3) cm. lata; amentis masculis 1–3 cm. longis 1–2.3 cm. crassis; amentis fructiferis 2–8 cm. longis.—*S. humilis,* var. *rigidiuscula* sensu Rob. & Fern. in Gray, Man. ed. 7: 362 (1908) not the basic *S. humilis,* var. *longifolia,* f. *rigidiuscula* Anders. (1897).—The commoner variety southward, from Florida to eastern Texas, north on or near the coastal plain to eastern Connecticut, Long Island, New Jersey and eastern Pennsylvania, and inland to West Virginia, Ohio, southern Michigan, southern Wisconsin, Iowa and Oklahoma. TYPE from NEW JERSEY: open thickets bordering brackish marshes, Manahawkin, Ocean Co., July 23, 1923, *Bayard Long*, no. 28,011 (in Herb. Gray.).

S. HUMILIS, var. **microphylla** (Anders.), comb. nov. *S. tristis* Ait. Hort. Kew. iii. 393 (1789). *S. tristis microphylla* Anders. in Öfv. Svensk. Vet.-Akad. Frösh. xv. 126 (1858). *S. humilis*, var. *tristis* (Ait.) Griggs in Proc. Ohio Acad. Sci. iv. 301, t. x (1905).

S. HUMILIS, var. MICROPHYLLA, forma **tortifolia,** f. nov., foliis valde spiraliter tortis.—MASSACHUSETTS: Plymouth, *Wm. Oakes*, with manuscript label bearing an unpublished varietal name (TYPE in Herb. Gray.); dry hill, Plymouth, Sept. 22, 1853, *Wm. Boott;* another sheet, with copied (not original) label, "Ipswich, Masaschusetts ex herb. William Oakes", with typical flat-leaved and twisted-leaved branches mixed.

Oakes's material was evidently collected prior to 1848. The type-sheet has above his label the stamped memorandum "Manual, 1847". Gray's Manual 425 (1848) has under *S. tristis* the note "A variety occurs with very small and rigid contorted leaves."

S. HUMILIS, var. MICROPHYLLA, forma **curtifolia** (Fernald), comb. nov. *S. tristis*, forma *curtifolia* Fernald in RHODORA, xxxvi. 195 (1934).

S. HUMILIS, var. MICROPHYLLA, forma **festiva** (Fernald), comb. nov. *S. tristis*, forma *festiva* Fernald in RHODORA, l. c. (1934).

S. GRACILIS Anders., var. **textoris,** var. nov., capsulis ad 9 mm. longis; foliis maturis glabratis 4–10 cm. longis ad 2 cm. latis evidenter serrato-dentatis, dentibus apice glanduliferis. (*S. petiolaris* sensu Pursh and later American authors, not J. E. Smith)—Southern Quebec to Manitoba, south to New Brunswick, New England, northern New Jersey, northeastern and central Pennsylvania, Ohio, Indiana, Illinois, northern Iowa and Nebraska. TYPE: MASSACHUSETTS: border of boggy meadow near Concord River, Bedford, May 11 and June 30, 1930, *Fernald, Weatherby & Anderson* in Pl. Exsicc. Gray. no. 447 (in Herb. Gray.; ISOTYPES in many herbaria).

Typical *Salix gracilis* is smaller and generally more northern, occurring from Quebec to Alberta, south to northern Massachusetts, western Connecticut (local), northern New York, northern Michigan, northern Wisconsin and Minnesota. It is *S. petiolaris*, vars. *rosmarinoides* (Anders.) Schneid., and *angustifolia*

Anders., characterized by capsules only 5–7 mm. long and leaves entire or only obscurely denticulate, the mature ones 2.5–7 cm. long and 3–11 mm. broad.

Var. *textoris* (of the basket-maker) is so named because of the memoranda by Joseph Barratt (Salic. Amer.) and others, Barratt (1840) stating that "Mr. Hopkins, an experienced basket-maker . . . assures me that the green osier . . . furnishes the best twigs of any Willow he knows . . . The twigs are hard, tough, and elastic, and twist well for handles . . . It furnishes long, smooth twigs with small buds; the twigs are less tapering than is usual, which enhances their value to the basket-maker."

It seems extraordinary that the identity of our low shrub, *Salix gracilis,* should, for more than a century and a quarter, have been confused by all students of *Salix* with the British tree, *S. petiolaris* J. E. Smith, Trans. Linn. Soc. vi. 122 (1802), Engl. Bot. xvi. t. 1147 (1803) and Fl. Brit. iii. 1048 (1804), etc. Our *S. gracilis* is a slender shrub with erect green to olive-brown tenuous and flexible branches 1–3 m. high; aments with narrow (linear-lanceolate to narrowly oblanceolate or spatulate) yellowish or pale brown bracts; leaves linear or narrowly lanceolate, entire to short-serrate-dentate, and 2.5–10 cm. (1–4 inches) long by 3–20 mm. (⅛–¾ inch) wide, with stipules usually quite wanting, very rarely present on the sprouts but then minute and caducous. *S. petiolaris,* at first known from meagre material sent by Dickson from Scotland, was soon better known and the treatment by Forbes, Salict. Woburn. 45, t. 23 (1829), gave a good account of it: "A bushy tree, with slender, spreading [not strongly ascending] purplish, or dark-brown [not green or olivaceous] *branches. Leaves* about 4 inches long, and nearly 1 broad [in *S. gracilis* 1–4 inches long, ⅛–¾ inch broad]. *Stipules* lanceolate, serrated [in *S. gracilis* wanting] . . . *Scales* rounded, notched [in *S. gracilis* elongate, entire, and yellowish; Smith's original diagnosis said "black, hairy, obovate, often notched"]. . . . *Stalk* of the germen as long as the adjoining scale", though in the plate shown as shorter [in *S. gracilis* much longer]. Forbes's beautiful plate would scarcely be taken as made from our slender and upright shrub; and European specimens, distributed as *S. petiolaris,* show a dense, curling, soft pubescence on the leaves and young branchlets, whereas the pubescence of young leaves (rarely if ever occurring on the branchlets) of *S. gracilis* is minute, silky and closely appressed. Although Schneider talked all around the subject in Journ. Arn. Arb. ii. 16–24 (1920), there is no indication in his discussion that he actually compared our species with true *S. petiolaris*. The latter name seems to have been wholly misapplied to our material.

Explanation of Plates 995–1006

Plates 995 and 996, Salix rigida Muhl. (*S. cordata* Muhl.). Plate 995: fig. 1, leaf of type of *S. rigida*, × 1, after *Muhlenberg;* fig. 2, fruiting branch, × 1, from Hinsdale, New Hampshire, May 15, 1919, *C. F. Batchelder;* fig. 3, portion of young pistillate ament, showing characteristically divergent flowers, × 5, from Lebanon, New Hampshire, May 4, 1884, *G. G. Kennedy;* fig. 4, fruiting ament, to show small basal bracts, × 4/5, from Buckland, Massachusetts, May 21, 1906, *F. F. Forbes;* fig. 5, portion of latter ament, to show elongate pedicels, × 5. Plate 996: fig. 1, leaf of *S. cordata* Muhl., × 1, after *Muhlenberg;* fig. 2, staminate flowering branch, × 1, from Shelburne, New Hampshire, May 21, 1920, *Walter Deane;* fig. 3, pistillate flowering branch, × 1, from Lebanon, New Hampshire, May 4, 1889, *Kennedy;* fig. 4, portion of half-mature pistillate ament, showing long pedicels, × 5, from Hinsdale, New Hampshire, May 15, 1919, *C. F. Batchelder.*

Plates 997–1000, S. cordata Michaux (*S. adenophylla* Hook.). Plate 997: fig. 1, type of *S. adenophylla*, × ca. 1/2; fig. 2, margin of leaf of type of *S. adenophylla*, showing porrect gland-tipped teeth, × 10; fig. 3, tip of leafy branch, × 4/5, from Natashquan River, Saguenay County ("Labrador"), Quebec, July, Aug., 1912, *C. W. Townsend;* fig. 4, fruiting ament, with foliaceous bracts, × 4/5, from *Townsend* specimen. Plate 998, figs. 1, 2, 3 and 6, from specimens from Michaux's type-region, Lake St. John, Quebec: fig. 1, leafy tip, × 4/5, from Vauvert, Lake St. John, *Victorin*, no. 16,362, as *S. adenophylla;* fig. 2, tip of leafy shoot, × 4/5, from Roberval, Lake St. John, July 23, 1895, as *S. adenophylla, J. G. Jack;* fig. 3, stipules and leaf-bases, × 5, from no. 16,362; fig. 4, stipule and leaf-base, × 5, from Rivière Petite Cascapedia, Gaspé Pen., Quebec, *Victorin, Rolland & Jacques*, no. 33,846; fig. 5, leaf-margin, × 10, from Fort Fairfield, Maine, Sept. 19, 1900, *Fernald*, as *S. adenophylla;* fig. 6, leaf-margin, × 10, from no. 16, 362; fig. 7, staminate ament, × 4/5, from Moosonee, mouth of Moose River, James Bay, Ontario, *Dutilly & Lepage*, no. 14,002. Plate 999: fig. 1, staminate flowering branch, × 4/5, from Moosonee, mouth of Moose River, James Bay, Ontario, *Dutilly & Lepage*, no. 14,002; fig. 2, pistillate flowering tip, × 4/5, from Rupert House, Ungava, *Dutilly & Lepage*, no. 14,032; fig. 3, fruiting ament, × 4/5, from no. 14,032; fig. 4, portion of unexpanded staminate ament, showing blackish bracts, × 10, from no. 14,002; fig. 5, portion of expanded staminate ament, × 10, from no. 14,002. Plate 1000: fig. 1, fruiting branch, × 1, from Wellington, Ontario, June 3, 1902, *James Fowler*, as *S. adenophylla;* fig. 2, lower surface of mature glabrate leaf, showing delicate venation, × 10, from Michaux's type-region, Ile-aux-Couleuvres, Lake St. John, Quebec, *Victorin*, no. 16,371; fig. 3, portion of immature pistillate ament, to show short pedicels, × 10, from Rupert House, *Dutilly & Lepage*, no. 14,032.

Plates 1001 and 1002, S. syrticola Fernald. Plate 1001, both figs., from type, Lake Michigan, near Chicago, *Bebb*, Herb. Sal. no. 2, as *S. adenophylla:* fig. 1, pistillate, and fig. 2, staminate branch, × 4/5. Plate 1002: fig. 1, portion of stipule, petiole and leaf-base, × 5, from Saugutuk, Michigan, August 15, 1896, *C. F. Wheeler;* fig. 2, petiole and leaf-base, × 5, from Dune Park, Indiana, *Umbach*, no. 95; fig. 3, portion of stipule, × 5, from no. 95; fig. 4, lower surface of mature leaf, showing venation, × 10, from New

Buffalo, Michigan, *Lansing*, no. 3265; FIG. 5, portion of flowering pistillate ament, × 5, from TYPE; FIG. 6, portion of staminate ament, × 5, from TYPE.

PLATES 1003 and 1004, S. RETICULATA L. and var. SEMICALVA Fernald. PLATE 1003: FIG. 1, portion of staminate ament, showing villous-based and blackish bracts, × 10, of typical S. RETICULATA from Dovre, Norway, *W. Boeik* (?). FIGS. 2–4, var. SEMICALVA: FIG. 2, portion of TYPE, × 4/5; FIG. 3, staminate ament and lower surface of leaf, × 3, from TYPE; FIG. 4, portion of staminate ament, showing pale and glabrous bracts, × 10, from TYPE. PLATE 1004, FIG. 1, portion, × 10, of fruiting ament of the typical S. RETICULATA from Torne Lappmark, July 19, 1927, *Samuelsson & Zander*. FIGS. 2–4, var. SEMICALVA, all from Gargamelle Cove, Ingornachoix Bay, Newfoundland, *Fernald, Long & Fogg*, no. 1580: FIG. 2, fruiting plant, × 4/5; FIG. 3, fruiting ament, × 5; FIG. 4, portion of latter, to show pale glabrous bracts and sparsely pubescent capsules, × 10.

PLATE 1005, S. LEIOLEPIS Fernald, all figs., from TYPE: FIG. 1, portion of plant, × 1; FIG. 2, branchlet and portions of leaves, × 5; FIG. 3, portion of ament, to show glabrous bracts and capsules, × 10.

PLATE 1006, S. JEJUNA Fernald: FIG. 1, two portions of type, × 1; FIG. 2, a denser plant, × 1, from Four-Mile Cove, Straits of Belle Isle, Newfoundland, *Fernald, Wiegand & Long*, no. 27,949; FIG. 3, branch, × 1, showing 2nd flowering in midsummer, from east of Big Brook, Straits of Belle Isle, Newfoundland, July 16, 1925, *Fernald, Wiegand & Hotchkiss*, no. 27,986; FIG. 4, expanding bud and stipule, × 10, from no. 27,986; FIG. 5, fruiting ament and leaf, × 5, from no. 27,949; FIG. 6, portion of same ament, showing villous bracts and capsules, × 10.

III. NOMENCLATURAL TRANSFERS IN POLYGONUM

POLYGONUM AMPHIBIUM L., var. STIPULACEUM Coleman, forma **hirtuosum** (Farwell), comb. nov. *P. amphibium*, var. *marginatum*, forma *hirtuosum* Farwell in Papers Mich. Acad. Sci. i. 93 (1923).

P. AMPHIBIUM, var. STIPULACEUM, forma **simile,** f. nov., terrestre vel subterrestre, ramis adscendentibus glabris vel minute pubescentibus; ochreis cylindricis; foliis lanceolatis, breviter petiolatis. TYPE from moist open meadow, Lisbon, New York, June 25, 1916, *O. P. Phelps*, no. 1551 (in Herb. Gray).

P. AMPHIBIUM, var. STIPULACEUM, forma **fluitans** (Eaton), stat. nov. *P. amphibium*, var. *α. natans* Michx. Fl. Bor.-Am. i. 240 (1803), not Moench, Enum. Pl. Hass. 189 (1777). *P. natans* (Michx.) Eaton, Man. ed. 3: 400 (1822). *P. amphibium*, var. *aquaticum* Torr. Fl. No. Mid. U. S. i. 404 (1824), not Leysser, Fl. Hals. ed. alt. 95 (1783). *P. fluitans* Eaton, Man. ed. 6: 274 (1833). *Persicaria fluitans* (Eaton) Greene, Lfts. i. 26 (1904).

In RHODORA, xxvii. 125–130, 146–152 and 156–166 (1925) Stanford discussed very clearly the heteromorphic series which at various times and by various authors has been treated as *Polygonum amphibium* L., his conclusions including, among other points, the segregation of the aquatic plant with thick and relatively short spikes and glabrous peduncles as a strictly North

American species, *P. natans* (Michx.) Eaton, with terrestrial phases. His main arguments for separating these from the Eurasian *P. amphibium* were the facts that in America the terrestrial form often has the summit of the ochrea flaring into a horizontally divergent foliaceous and bristly-ciliate flange, which does not occur in the Old World; that the terrestrial forms of the American plant have a less harsh leaf-margin; that the floating leaves of the American plant are more elliptic or elliptic-oval than in that of the Old World; that in true *P. amphibium* "the lateral veins of mature leaves [are] nearly straight and meeting the mid-vein nearly at right angles", whereas in the American *P. natans* they are more curved and meet "the midvein at an angle of about 60°" (*Stanford*, pp. 157, 158); and the ochreolae of *P. natans* are narrower and more tapering than in true *P. amphibium.* Other differences, measurements of achenes, calyx, etc., break down in the two series and the angle by which the veins join the midrib proves to vary too much in both series. So far as I can make out the really significant differences are the more lance-oblong or narrowly trowel-shaped leaf in *P. amphibium*, the harsher and shorter pubescence of the terrestrial foliage, the broader ochreolae and the more slender and often more elongated spike of the Eurasian series, with a tendency to longer peduncles. These are all relative characters, whereas the flowers and achenes are so similar that I am forced back to the long-established uniting of the two series as a single circumboreal species, *P. amphibium* L.

The North American variety cannot take the first varietal name given it, *P. amphibium*, var. *α. natans* Michx. (1803), nomenclatural basis of *P. natans* (Michx.) Eaton (1822), for there was already a var. *natans* Moench (1777) for the floating-leaved European plant. The next varietal name for our plant, *P. amphibium*, var. *aquaticum* Torr. (1824) likewise duplicated an identical name given the aquatic European plant in 1783. Singularly enough, the first available varietal name for the American series seems to be one applied to the most distinctively American phase of the species, var. *stipulaceum* Coleman, Cat. Fl. Pl. S. Pen. Mich. 32 (1874). Since Coleman's work is a relatively scarce one I here give his account: Under *P. amphibium* he had the conventional var. *aquaticum*, ascribed to

Linnaeus, with *P. fluitans* Eaton as a synonym, and var. *terrestre* Willd. Then came

> Var. stipulaceum, with leaves and flowers like *P. amphibium;* the leaves, possibly a little narrower, and with salver form stipules, like *P. orientale*, found growing in sandy soil near Gd. Rapids.

That was a clear description of the distinctively North American terrestrial plant which had been described as *P. Hartwrightii* Gray in Proc. Am. Acad. viii. 294 (1870), the plant subsequently called *P. amphibium*, var. *Hartwrightii* (Gray) Bissell in Rhodora, iv. 104 (1902) and *P. natans* (Michx.) Eaton, forma *Hartwrightii* (Gray) Stanford in Rhodora, xxvii. 160 (1925). As the first valid varietal name, var. *stipulaceum* has to be taken up to include the many vegetative American forms. This might seem to those who think of the American plant as the aquatic phase with oblong long-petioled floating leaves, which, becoming stranded, will change rapidly to the terrestrial phases, like putting the cart before the horse. The floating transmutation, however, is the exceptional one. Over much of the area, where lakes and ponds are scattered, the terrestrial var. *stipulaceum* occupies thousands and thousands of square miles of swamp, meadow and swale, where it makes vast carpets and never gets the opportunity to stretch into permanently standing water. To those who know such extensive areas var. *stipulaceum* seems the normal development of the species.

As to var. *stipulaceum*, forma *simile*, that plant of swale, meadow and shore, although simulating the Old World *P. amphibium*, forma *terrestre* (Leers) Blake in Rhodora, xv. 164 (1913) and Moss, Camb. Brit. Fl. ii. 115 (1914), which was based nomenclaturally on *P. amphibium*, var. *terrestre* Leers (1775), is really a parallel form of var. *stipulaceum* without the foliaceous flanges.

It is in some ways fortunate that the name *P. fluitans* Eaton is available as a nomenclatural basis for the formal name of the common lacustrine extreme of the species in America, the *P. natans* (Michx.) Eaton, forma *genuinum* Stanford in Rhodora, xxvii. 158 (1925), for, since the varietal names given this extreme by earlier authors were later homonyms, we should be faced by a large handful of Greene's so-called species and might have to transfer to the formal category for the common aquatic plant, growing from Labrador to Alaska and south into the Northeastern, Central and Western States, one of several inappropriate binomials, such as *Persicaria purpurata* Greene, *P. mesochora* Greene or *P. oregana* Greene.

Amos Eaton started off his *Polygonum fluitans* (1833) in a somewhat contradictory manner. In 1822 he had published *P.* "*natans* (floating knotweed)" from "Whiting's pond, 5 miles south of New Lebanon springs", saying definitely "It is the P. amphibium. Var. natans of Mx". In 1833, however, he changed his mind, renaming the plant of Whiting's Pond *P.* "*fluitans*, Ea. . . swimming knotweed" and saying "Finding this to be a new one, not var. *natans* of Mx. I give it a new name." There is nothing about the lacustrine plant of western Massachusetts and adjacent eastern New York (TYPE-region) to separate it from Michaux's *P. amphibium*, var. *natans* from Lake St. John, Quebec, as shown by the photograph of it before me. And even Greene, who saw many species where others see only one, admitted the probable identity, saying in his typically sophisticated and plausible style, under his *Persicaria fluitans* (*Polygonum fluitans* Eaton):

"Amos Eaton as early as 1840 [*i. e.* 1833] gave the name *P. fluitans* to what, from the description as well as the locality, we must conclude to have been that here described anew. I do not know where that St. John's Lake is which Michaux cites as the habitat of his var. *natans;* but I suspect it to be some northern lake now known by another name, and lying within the habitat of *P. fluitans*, in which case that may be an older, though a merely varietal designation which would in my view be of no consequence."

Since Michaux's *Polygonum amphibium*, var. *natans* was the nomenclatural basis of *P. natans* (Michaux) Eaton (1822), the plant later (1833) becoming *P. fluitans* Eaton, Greene's dismissal of the name *natans* as "merely a varietal designation" showed woeful lack of knowledge of the literature for a self-styled historian. So did his ignorance of "Where that St. John's Lake is which Michaux cites", for the big Lake St. John, lying at the head of the Saguenay, in the Districts of Lake St. John and Chicoutimi, was on the old route of early explorers from the lower St. Lawrence to Hudson Bay, was much mentioned by

Michaux in his journals of exploration and was repeatedly cited as the type-locality of plants described by him, and it is shown (and named), almost north from the city of Quebec, as a roundish blue spot on all maps of Canada, or even of North America, which I find in recent atlases. Nevertheless some botanists express admiration of Greene and his methods.

P. ARIFOLIUM L., var. **pubescens** (Keller), comb. nov. *P. sagittatum*, var. *pubescens* Keller in Bull. Soc. Roy. Bot. Belg. xxx^2. 45 (1891). *P. arifolium*, var. *lentiforme* Fernald & Griscom in RHODORA, xxxvii. 167 (1935).

It is too bad to be forced to abandon a diagnostically descriptive name, var. *lentiforme* (from the lenticular achene), for a nondistinctive one, since both typical southeastern *Polygonum arifolium* and the northern var. *pubescens* (or *lentiforme*) are pubescent, the former much more so than the latter.

When Dr. Robert Keller described the northern variety as a pubescent variety of *P. sagittatum*, in a paper entitled *Remarques sur quelques espèces du genre Polygonum de l'Herbier de Jardin Botanique de l'État à Bruxelles*, he unwittingly indicated the weakness of that famous herbarium in representative North American material and, incidentally, unfamiliarity with the standard floras and manuals of eastern North America, in which the Linnean *P. arifolium* (1753) was described with the pubescent, large, long-acuminate leaves and the hispid-glandular axis of the inflorescence which set off Keller's *P. sagittatum*, var. *pubescens* (a single specimen from Troy, New York) as "une variété bien caractérisée" of his true *P. sagittatum*, defined "*foliis sagittato-lanceolatis nudis vel margine setulis ciliolatis subtus nervo inermi vel plus minusve aculeolato*"; var. *pubescens* "foliis sagittatis late ellipticis, longe acuminatis, . . . subtus in nervo medio nervisque secundariis aculeolatis, foliis infra densius pubescentibus pilis stellatis supra parce pubescentibus pilis simplicibus adpressis pilisque stellatis".

As early as 1788 Walter described *P. arifolium* "foliis hastatis pilosis magnis"; Elliott (1817) knew its stem "towards the summit with capitate hair and a stellated pubescence. *Leaves* on long petioles, hastate, with the auricles acute, pubescent"; Torrey (1824) knew its "*Leaves* on long aculeate petioles . . . acuminate, with short scattered hairs on the upper surface, minutely papillose beneath" and to these characters he added in Fl. N. Y. (1843) "peduncles glandularly hispid". Even if Keller did not know these and the more detailed American treatments of succeeding years he might have found Meisner in his Monograph (1826) defining *P. arifolium* "foliis hastatis acuminatis, utrinque adpresse pilosis", these characters repeated in Meisner's treatment in DeCandolle's Prodromus (1856), with the other distinctive character of Keller's *P. sagittatum*, var. *pubescens*, "pedunculis subglanduloso-hispidulis". Had Keller looked further he would doubtless have found that the flowers of the latter have 6 stamens and bifid style (the achene, consequently, biconvex), whereas his true *P. sagittatum* would have shown him 8 stamens and a trifid style (consequently a trigonous achene).

Since the type and only specimen cited by Keller came from Troy, New York, it is obviously of the less pubescent northern plant which Griscom and I described as *P. arifolium*, var. *lentiforme*, we not imagining anyone in these days referring members of that long and generally understood species to the very different *P. sagittatum*. Even the most inexperienced of our "lumpers" would hardly argue for the specific uniting of *P. sagittatum* and *P. arifolium*, provided, of course, that he knew the plants and their morphological characters.

P. cilinode Michx., forma **erectum** (Peck), stat. nov. Var. *erectum* Peck, N. Y. State Mus. Rep. xlvi. 129—repr. 49 (1893). Var. *breve* Peck, Bull. N. Y. State Mus. vi. 120 (1899).

The low and upright plants ending in panicles and without twining tips, comparable with bush-beans, as contrasted with twiners.

IV. Novelties in our Flora

(Plates 1007–1020)

Carex crinita Lam., var. **brevicrinis,** var. nov., a var. typica recedit spicis foemineis 4–10 (plerumque 6–7) cm. longis densifloris omnino foemineis vel ad apicem masculis; squamis imis perigyneis aequantibus ad duplo longioribus, squamis superioribus perigyneis vix aequantibus ad paulum longioribus; perigyneis valde inflatis 3–4 mm. longis 2–3 mm. latis.—North Carolina to eastern Texas, north to southern New England, Kentucky and Missouri. The following are characteristic. Massachusetts: edge of cedar swamp, southwest of Beachwood, Cohasset, July 22, 1938, *Griscom & Svenson* (as *C. Mitchelliana*); maple swamp, Spring Hill, Harwich, July 30, 1919, *Fernald & Long*, no. 18,127 (as *C. Mitchelliana*). RHODE ISLAND: Providence, May, 1845, *Thurber*. CONNECTICUT: Bridgeport, June 8, 1910, *H. S. Clark;* New Fairfield, July 19 and 20, 1912, *Blewitt*. DISTRICT OF COLUMBIA: May 30, 1899, *Steele;* May 22, 1890, *Steele* (as var. *gynandra*). VIRGINIA: sphagnum swamp, 1½ miles northwest of Williamsburg, June 12, 1921, *Grimes*, no. 3693; Powhatan Swamp, ½ mile southwest of Five Forks, James City Co., June 20, 1922, *L. F. & F. R. Randolph;* sphagnous boggy margin of spring-fed pond, Century House, northeast of Burgess, Dinwiddie Co., July 23, 1938, *Fernald & Long*, no. 8614; wooded alluvial bottomland of Rowanta Creek, near Rowanta, Dinwiddie Co., June 8, 1938, *Fernald & Long*, no. 8413 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); inundated swamp along Quarrel Creek, "Chamblis bigwoods", Seward Forest, near Triplett, Brunswick Co., May 10, 1945, *Fernald*, no. 14,795. NORTH CAROLINA: swamp, edge of Newbridge Creek, 2 miles from Currituck Sound, Currituck Co., July 1, 1922, *Randolph & Randolph;* marsh, Lake Raleigh, Wake Co., May 11, 1937, *Godfrey;* low field, 7 miles northwest of Chapel Hill, June 28, 1927, *Wiegand & Manning*, no. 414. KENTUCKY: without stated locality, *Short* (as *C. Pseudo-Cyperus*, this corrected by Dewey). TENNESSEE: low, wet grounds, Wolf Creek, August 15, 1900, *Ruth*, no. 497. MISSOURI: rare in low ground, Courtney, May 25, 1902, *Bush*, no. 1714. LOUISIANA: western section, *Hale*. TEXAS: without stated locality, *Wright*.

Carex crinita, var. *brevicrinis* has puzzled its collectors. Some of the northern collections were placed with the then recently redefined *C. Mitchelliana* M. A. Curtis[1], because they would not go satisfactorily into typical *C. crinita*, in which the pistillate spikes only rarely have staminate tips, the long awns of the lower scales are two to three or four times as long as and the upper awns definitely longer than the relatively small perigynia (2–3-rarely 3.5 mm. long and 1–2 mm. broad). Var. *brevicrinis* most often has the pistillate spikes with a staminate tip (as frequently in var. *gynandra* (Schwein.) Schwein. & Torr.), its lower scales are rarely twice as long and the upper ones shorter than to barely longer than the large and strongly inflated, mostly obovate perigynia, these 3–4 mm. long and 2–3 mm. broad.

Although superficially suggesting var. *gynandra*, the usually more southern or coastwise var. *brevicrinis* differs at once in its

[1] See Weatherby in RHODORA, xxv. 17–20 (1923).

smooth lower leaf-sheaths (those of var. *gynandra* being harsh), in its relatively longer lower foliaceous bract, in its relatively shorter scales and in its more strongly inflated and crumpled perigynia. In the relatively northern and upland var. *gynandra* the lowest foliaceous bract ranges from 1.2–4 (av. 2.5) dm. long, this averaging twice the length of the axis of the inflorescence. In var. *brevicrinis,* on the other hand, the lowest bract is from (2.5–) 3–4 (av. 3.6) dm. long, this averaging three and a third times the length of the axis of the inflorescence.

Although *Carex crinita,* var. *brevicrinis* has been mistaken for *C. Mitchelliana,* it is really very different. *C. Mitchelliana* has the leaves and lower foliaceous bract only 2.5–9 mm. broad (in var. *brevicrinis* thinner and darker, 6–12 mm. broad) the lower bract 0.8–3 (av. 1.8) dm. long; the tight or scarcely inflated and definitely nerved granular-papillate ovate to ovate-lanceolate perigynia 2.5–3.5 mm. long and only 1.4–2 mm. broad.

Xyris (§ Brevifoliae) **Bayardi,** sp. nov. (tab. 1007). Planta annua vel biennis; foliis pallide viridibus lanceolato- vel lineari-ensiformibus 1.5–4 cm. longis ad 4 mm. latis, plus minusve curvatis, membranaceis, margine albido minute denticulato, apice subacuto breviter curvato; scapis filiformibus 1–3 dm. altis glabris; vaginis basilaribus scapi perbrevibus brunneis; spicis paucifloris ellipsoideo-ovoideis acutis vel subacutis 5–6 mm. longis 3–4.2 mm. crassis; bracteis intermediis elliptico-ovalibus brunneis margine albido-hyalinis, area dorsali viridi distincta; sepalis lateralibus liberis curvatis oblique lineari-lanceolatis 3–3.5 mm. longis 0.3–0.5 mm. latis, ala carinali angustissima in parte tertia superiore minute denticulatis; seminibus ellipsoideo-fusiformibus 0.45–0.5 mm. longis 0.2–0.24 mm. latis, pallide stramineis apicibus brunneis.—Sussex County, Virginia: wet sandy and peaty shore of Airfield Millpond, southwest of Wakefield, September 11, 1945, *Fernald & Long,* no. 14,922 (type in Herb. Gray; isotype in Herb. Phil. Acad.).

Xyris Bayardi (for one of its discoverers, Bayard Long) is the northernmost member of *Xyris* § *Brevifoliae,* only three other members of this chiefly tropical section, mostly annuals and biennials, being known in the United States. From all three *X. Bayardi* is abundantly distinct. The basic *X. brevifolia* Michaux, Fl. Bor.-Am. i. 23 (1803), shown in our pl. 1008, figs. 1–4, described from the low country of Georgia, is rare except in Florida. Its firm leaves (figs. 1 and 2) are very narrowly linear

(1–2 mm. wide), arching to long attenuate tips, firm and glabrous-margined; whereas the very thin and membranaceous leaves of *X. Bayardi* are broader (up to 4 mm. broad), with short and barely acutish tips, the white margin minutely denticulate. The sheaths at the base of the scape in *X. Bayardi* are so short as scarcely to be seen, while in *X. brevifolia* (FIG. 1) they are prolonged and commonly much overtopping the basal foliage. The fruiting spike of *X. Bayardi* is ellipsoid and acute or acutish and only 3–4.2 mm. thick; whereas *X. brevifolia* (FIG. 3, × 1, from the Michaux TYPE) has the mature spikes oblate or depressed-globose and broad-tipped, finally 6–8 mm. thick. The very narrow (0.3–0.5 mm.) lateral sepals of *X. Bayardi* are minutely denticulate only toward the summit of the keel; the broader (0.6 mm.) sepals of *X. brevifolia*, to quote Malme in the North American Flora, have the "keel ciliate-scabrid from near the base to the apex". At its type-station (the only one yet known) *X. Bayardi* was mature, but with lingering marcescent corollas, on September 11th. Whether it begins flowering before summer we do not yet know. It is significant, however, that most of the material of *X. brevifolia*, whether in flower or in fruit, from Florida was collected in March, April and May, only exceptionally up to midsummer.

A second annual species, occurring from Florida to Mississippi, is *Xyris flabelliformis* Chapman, Fl. So. U. S. 499 (1860), our PL. 1008, FIGS. 5–7. *X. Bayardi* has flabelliform clusters of basal leaves as in Chapman's species, but they are thinner, paler, broader and blunter than in *X. flabelliformis*, and with minutely denticulate, instead of entire margins. Furthermore, the basal sheaths of *X. flabelliformis* run up the scape (FIG. 5), while in *X. Bayardi* they are almost hidden. The spike of *X. Bayardi* might be taken for that of *X. flabelliformis* (FIG. 7) but its bracts are broader, more appressed and more rounded at tip. *X. Bayardi* can hardly be forced into *X. flabelliformis*.

The only other species of § *Brevifoliae* described from north of the Tropics is *X. Drummondii* Malme from Alabama, described as a perennial with smooth leaves, sheaths extending up the scape, and lateral sepals 0.8 (in *X. Bayardi* 0.3–0.5) mm. broad and ciliate-scabrous on the keel. I have seen no material but it can hardly be made to include *X. Bayardi*.

It was only by the rarest of good luck that *Xyris Bayardi* was discovered. Mr. Long's and my discovery that in Sussex and Southampton Counties, Virginia, there are at least two large ponds (Airfield in Sussex, Whitefield in Southampton) which we had not previously known and which, during a dry season, have broad sandy and peaty beaches, was recounted in Rhodora, xlv. 372 and 373 (1943). We discovered these ponds with their broad beaches (then "perhaps 50 feet wide up to the bushes") in early July, 1942. Then gasoline-rationing cut us off from working them. Two futile attempts (after heavy rains) were made by me to explore them later (see Rhodora, l. c. 381 and xlvii. 103–105), so that the end of gasoline-rationing was the signal for Long and me to hurry to our headquarters at Waverly and to try, in September last, for the pond-shores. Again alas! An abnormally rainy summer had completely overflowed Whitefield Pond, Brittle's showed no beach, but on September 11th and 12th a very narrow rim, still wet from drowning, was visible at Airfield, this very soon obliterated by more rain. Luckily we got there in time for preliminary exploration of the little emersed belt of shore. Here had been the only known station for *Rhynchospora filifolia* between southeastern North Carolina and Cape May, New Jersey; that and other species collected in early summer indicated an unusual pond-shore for eastern Virginia. The southern shore of Airfield is the best we saw, the northern being more uniformly pretty swaley, with *Panicum verrucosum, Cephalanthus occidentalis, Xyris caroliniana, X. ambigua* Beyrich (in all sizes) and other aggressive plants crowding out all others. Immediately we got *Sabatia difformis* (L.) Druce, the first from between North Carolina and eastern Maryland. Then *Eriocaulon decangulare,* very local in Virginia. *Psilocarya nitens,* previously unknown between southeastern North Carolina and Cape May was locally abundant; and we were (and still are) utterly baffled by the members of the alliance of *Hypericum canadense.* I had thought that I had this series under control, but its behavior on the peaty shore of Airfield Pond is seriously disturbing the latest treatments. I may stave off the evil day until another season of observation. And here, nestled among the coarser vegetation, were the whitish-green fan-like tufts of a tiny annual *Xyris:* the newly described *X. Bayardi.* We saw it in only one small area, a few rods wide, but further exploration another season, when the water is much lower, will, we hope, reveal it in quantity. Airfield Pond still needs a season of intensive botanizing!

Pedicularis canadensis L., var. **Dobbsii,** var. nov. (tab. 1010 et 1009, fig. 2 et 3), vix cespitosa, caudicibus lateralibus horizontaliter divergentibus elongatis plus minusve repentibus.—New York to Minnesota, south to northern Florida, Alabama, Louisiana and eastern Texas. The following are characteristic. New York: along Babcock Trail near Jim Pond, Black Rock Forest, Orange Co., *Raup*, no. 7215; Taughannock Ravine and vicinity, Ulysses, *F. P. Metcalf*, no. 7148. New Jersey: Columbus, Burlington Co., May 11, 1921, *H. B. Meredith*. West Virginia: along East Fork of Greenbrier River, Pocahontas Co., *Greenman*, no. 252. North Carolina: Highlands, May 27, 1901, *E. E. Magee*. Florida: without statement of locality, *Chapman*. Ontario: Tobermory, Bruce Co., *Krotkov*, no. 7771. Michigan: Carp Creek, Cheboygan Co., *Ehlers*, no. 392. Indiana: Jackson Tp., Wells Co., May 11, 1908, *Deam*. Tennessee: oak barrens, 7 miles east of Crossville, Cumberland Co., May 13, 1933, *C. A. & Una F. Weatherby*, no. 6254 (type, in Herb. Gray); Jackson, *Bain*, no. 442. Alabama: about 3 miles north-northeast of Marion, Perry Co., *Harper*, no. 3702. Wisconsin: Preble, Brown Co., May 19, 1887, *J. H. Schuette*. Illinois: Mt. Morris, May 20, 1909, *Sherff;* about ½ mile east of western boundary of Henry County and ¼ mile south of U. S. Route 6, July 1, 1945, *Raymond J. Dobbs*. Minnesota: Clearwater Co., *M. L. Grant*, no. 2702; Spring Grove, *Rosendahl*, no. 276. Iowa: Homestead, Iowa Co., May 11, 1925, *Shimek*. Arkansas: Little Rock, *Demaree*, no. 18,795. Louisiana: Perkins, Calcasieu Parish, *Pennell*, no. 10,212. Kansas: Leavenworth Co., *Hitchcock*, no. 788. Oklahoma: Arkansas National Forest, Sebastian Co., *E. J. Palmer*, no. 39,309. Texas: Camp Fannin, 8 miles northeast of Tyler, Smith Co., *H. E. Moore, Jr.*, no. 673.

Var. *Dobbsii*, which was called to my attention by Mr. Raymond Joseph Dobbs of Geneseo, Illinois, keen student of the flora of Henry County, is a striking departure in habit from the densely cespitose typical *Pedicularis canadensis* (plate 1009, fig. 1). At the northeastern corner of the range of *P. canadensis*, whence, undoubtedly, came Kalm's material which was described by Linnaeus, the densely crowded crowns are erect or strongly ascending (plate 1009, fig. 1) and the large series before me from southern Quebec and New England shows no appreciable tendency to the lax to stoloniferous habit of var. *Dobbsii*. The densely cespitose extreme also extends westward and southward essentially to the limits of the specific range, except for the more western var. *fluviatilis* (Heller) Macbride, and it is general in the large New England series before me; it is evidently the only variety occurring in this area. Whether var. *Dobbsii* has a different habitat and whether it more generally has fusiform roots (as in the type) are matters for close field-observation. Such fusiform roots are apparently rare in typical *P. canadensis*—perhaps only seemingly so through careless collecting.

Utricularia juncea Vahl, forma **virgatula** (Barnhart), stat. nov. *U. virgatula* Barnhart in Bull. Torr. Bot. Cl. xxxiv. 580 (1908). *Stomoisia virgatula* (Barnhart) Barnhart in Britton & Brown, Ill. Fl. ed. 2, iii. 232, fig. 3875 (1913).

Ever since I first began collecting with him in Virginia Mr. Bayard Long has insisted that *Utricularia juncea* and *U. virgatula* are phases of one species, comparable with *U. subulata* L. and its forma *cleistogama* (Gray) Fernald in Rhodora, xxiii. 291 (1922). Although we usually find *U. virgatula* growing with *U. juncea* I have been reluctant to merge them; but on the shore of Airfield Millpond in Sussex County, Virginia, we found in September last such perfect intergradation in all the large areas of the plants between large-flowered *U. juncea* and small-flowered *U. virgatula*, that I give up. Only by arbitrary sorting and very arbitrary exclusion of many intermediates can two piles of similar specimens be made. By this doubtful process some of our earlier collections have been forced apart. It is significant, therefore, that many numbers in the Gray Herbarium show that their collectors did not mechanically sort them into two or three piles: *J. A. Allen* from Atsion, New Jersey, Aug. 16, 1879, with smallest and transitional corollas; *Commons*, Laurel, Delaware, Aug. 19, 1880, both large and smallest corollas; *R. R. Tatnall*, no. 2759 from Kent Co., Delaware, large and intermediate corollas, the latter *U. juncea*, forma *minima* Blake in Contrib. Gray Herb. no. lii. 89 (1917); *Heller*, no. 1222 from Princess Anne Co., Virginia, both typical *U. juncea* and forma *virgatula;* and so on to Mississippi. The experience at Airfield Millpond finally convinced me.

Chrysopsis mariana (L.) Ell., forma **efulgens,** f. nov. ligulis nullis.—Sussex County, Virginia: dry pine woods, State Game Sanctuary, northwest of Newville, Sept. 13, 1945, *Fernald & Long*, no. 14,996 (type in Herb. Gray., isotype in Herb. Phil. Acad.); dry pineland 3–4 miles west of Waverly, Sept. 16, 1945, *Fernald & Long*, no. 14,997.

(*To be continued*)

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLX

TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

M. L. Fernald

(*Continued from page 60*)

× Solidago (§ Euthamia) **hirtipes,** hybr. nov. (? *S. graminifolia* (L.) Salisb., var. *Nuttallii* (Greene) Fernald × *S. microcephala* (Greene) Bush). Tab. 1011. Planta robusta ad 1.5 m. alta; foliis lineari-lanceolatis divergentibus 3–5-nerviis utrinque scabro-puberulis, in axillis plus minusve fasciculatis; foliis primariis 4–6 mm. latis; corymbo ad 4.5 dm. lato ramis valde adscendentibus, ramulis ultimis densissime griseo-hirtellis; capitulis glomerulatis vel solitariis pedicellatisque; involucro glutinoso pallido cylindrico (sicco cylindrico-turbinato) 3–4 mm. longo; phyllariis pallide stramineis apice adpresso viride.—Sussex Co., Virginia: roadside thicket about 1½ miles north of Waverly, Sept. 13, 1945, *Fernald & Long*, no. 15,015 (type in Herb. Gray; isotype in Herb. Phil. Acad.).

× *Solidago hirtipes* is a very puzzling plant, which may prove to be a fully established species. In its very broad and flat-topped corymb (with inclination to form "stories" at different heights) and in its very slender heads it at once suggests the common southern *S. microcephala* (plate 1012, figs. 4–6); but that characteristic species has the very narrow and often longitudinally folded primary leaves only 1–2 mm. broad, 1-nerved (only rarely with any trace of lateral nerves), and subtending abundant suppressed axillary branches. Its sparsely hirtellous pedicels are mostly 1-headed; while its very narrow leaves are as gray-puberulent as in × *S. hirtipes*. In its great stature, broad

3–5-nerved leaves and strong tendency to glomerulate heads the new plant is as near *S. graminifolia*, var. *Nuttallii*. In that plant (PLATE 1012, FIGS. 1–3), however, the suppressed axillary branches are few or wanting, the leaves less puberulent, the pubescence of the lower side usually confined to the ribs, the corymb with convex-topped secondary corymbs, the branchlets and pedicels as hirtellous as in × *S. hirtipes* (or even more so) but ending in densely crowded glomerules of broader and more subcampanulate heads.

I am looking upon × *S. hirtipes* as probably derived from *S. microcephala* and *S. graminifolia*, var. *Nuttallii*, though further experience may show it to be wholly separable from them. The type-colony is likely to spread; as it is, we took only selected small plants of it.

XANTHIUM **Chasei**, sp. nov. (TAB. 1013, FIG. 1, et 1014). Planta a *X. strumario* differt petiolis scabro-hispidis foliorum laminis crassis supra scabris; fructi corpore glabro vel minute puncticulato lucido olivaceo ellipsoideo-ovoideo vel subgloboso 1.3–1.6 cm. longo 6–9 mm. crasso, rostris basin versus crassis glanduloso-puberulisque porrectis vel suberectis remotis rectis 4–5 mm. longis vel ad apicem exigue excurvatis vel incurvatis, exteriore facie 100–200 aculeis approximatis armato, aculeis anguste subulatis rectis vel superne curvatis glabriusculis vel basin versus glandulosis 2–3.5 mm. longis.—ILLINOIS: bottomlands of Illinois River near Peoria, Oct. 1, 1919, *Virginius H. Chase*, no. 3398, as *X. globosum* Shull (Herb. Chase., Herb. Gray.); Sept. 12, 1920, *Chase*, no. 3474, as *X. globosum* (Herb. Chase., Herb. Gray.); Sept. 15, 1945, *Chase*, no. 8205 (TYPE in Herb. Gray.; ISOTYPE in Herb. Chase.).

Although originally identified as *Xanthium globosum*, a natural identification since there was then no good material readily available of Shull's species, *X. Chasei*, named for its discoverer, VIRGINIUS HEBER CHASE, differs at once from that species (our PL. 1015, FIGS. 1 and 2) in several characters which appear in all the specimens before me. In *X. globosum* the leaves are thinnish to membranaceous and the ripe bur is light brown, with the body only 0.9–1.1 cm. long and 4.5–7 mm. thick, while the 50–80 prickles visible on one face are remote and 4–6 mm. long. This species is widespread from Illinois and Kentucky to Kansas and is represented in Mr. Chase's series by fine specimens from the bottomlands near East Peoria, his nos. 8206 and 8207. *X.*

Chasei differs in its thick and more scabrous foliage and especially in its burs. These are olivaceous or greenish brown, the body 1.3–1.6 cm. long and 6–9 mm. thick, with 100–200 prickles visible on one face, these rather crowded and only 2–3.5 mm. long. So far as the abundant material shows, the fruit of *X. Chasei* scarcely overlaps in any point the distinctive characters of *X. globosum.*

In its very short prickles *Xanthium Chasei* might suggest the European *X. strumarium* L. (our PL. 1013, FIGS. 2 and 3), a species with us only casually adventive[1] but apparently not naturalized near the port of Boston; but the two differ in many points and the natural habitat of *X. Chasei* is not ballast and rubbish about eastern seaports. In *X. strumarium* the petioles are minutely soft-pilose and the leaf-blades submembranaceous and barely scabridulous above; whereas the petioles of *X. Chasei* (on bottomlands where many plants tend toward glabrescence and thin leaves) are harshly scabrous, as is the upper surface of the thick leaf-blade. In *X. strumarium* the mature burs are closely and finely pilose, with the body only 5–7 mm. thick, the beaks only 1–2 mm. long, while the 15–50 slender prickles visible on each face have broad interspaces separating their bases. In *X. Chasei*, on the other hand, the mature burs are 6–9 mm. thick, glabrous (except for glandular punctation), the beaks 4–5 mm. long, the 100–200 bulbous-based prickles visible on one face crowded.

There is no chance that *Xanthium Chasei* has anything to do with the large-fruited series with strongly villous burs: *X. italicum* Moretti with fulvous burs villous-hirsute, the body 1.3–1.8 cm. long and 6–8 mm. thick, the subulate basally long-hirsute beaks 5–7 mm. long, the divergently long-villous prickles mostly 4–7 mm. long (see PL. 1015, FIGS. 3 and 4); *X. oviforme* Wallr. with

[1] In the Gray Herbarium there are 3 sheets of *Xanthium strumarium* from the United States: (1) a fragment of doubtful origin in a series of plants said to have been collected by the late Stephen P. Sharples in Chester County, Pennsylvania, from 1858–1864; (2) branches from a single tall plant, found by the writer on October 20, 1912 (with fresh anthers), in rubbish back of Crescent Beach, Revere, Massachusetts; (3) portion of a single individual found on October 1, 1927, by S. F. Blake (*Blake*, no. 10,549) on a sandy beach at Hull, Massachusetts. In early November, 1945, Dr. Bernice G. Schubert and I followed the beach from south of Crescent Beach to well north of that area but no *Xanthium strumarium* could be found. Similarly, the sandy and gravelly beaches in Hull, like those in Revere, yielded only *X. echinatum, italicum* and *chinense.*

the body of the fulvous bur 2–2.5 cm. long and 1.2–2 cm. thick, the stoutish beaks 7–10 mm. long, and the densely crowded prickles 7–10 mm. long; and other species. Nor can it be forced into the very definite *X. inflexum* Mackenzie & Bush (our PL. 1015, FIGS. 5 and 6), which occurs on bottomlands and prairie of Illinois, Missouri, Kansas and Arkansas, for *X. inflexum* has the glabrous to hirtellous body of the bur 1.3–2 cm. long and 6–8 mm. thick, the strongly inflexed to overlapping or crossing beaks 5–7 mm. long, and the prickles 4.5–10 mm. long.

The glabrous or glabrescent burs of *Xanthium Chasei* might, to some minds, mean that it is *X. chinense* Mill. or *X. curvescens* Millspaugh & Sherff. The widely dispersed *X. chinense* (our PL. 1015, FIGS. 7 and 8), however, has the fewer reddish-tinged prickles very remote at base and 4–7 mm. long, the more inflexed or hamate beaks up to 7 mm. long. As to *X. curvescens* (our PL. 1016, FIGS. 1–4), described from the shores of Lake Champlain, that doubtful species, illustrated with the original description in Field, Mus. Pub., Bot. Ser. iv., no. 2, pl. xi, the burs shown in pl. viii, figs. 28–29 (1919), has the body of the fruit only 3.5–5 mm. thick, with only 30–50 stout and upwardly curving prickles visible on each face. It thus has characters strongly suggestive of the Old World *X. orientale* L. (PL. 1017). In fact, very typical *X. orientale* (our PL. 1017, FIGS. 5–8) is an abundant weed about Montreal, thence up the Richelieu Valley to the shores of Lake Champlain (perhaps better stated in reverse order), and the most slender Old World fruits (our FIG. 3) closely match those of *X. curvescens* (PL. 1016, FIGS. 1–4) and even of *X. leptocarpum* Millspaugh & Sherff. (our PL. 1016, FIGS. 5 and 6). In fact, when they published *X. curvescens* and *X. leptocarpum* the authors of those names saw their resemblance to *X. orientale*, saying

> Because of its strongly bent prickles and beaks, we were disposed at first to regard this species as a form of the European X. orientale L. But in the many fruiting specimens of X. orientale examined from Europe, we have found the fruiting involucres to be not only considerably larger, but brownish rather than reddish, also much more pubescent and the prickles nearly always more numerous. In its narrow, reddish, remotely aculeate fruits, this species suggests the next, X. leptocarpum, the type of which was collected likewise in western Vermont, about three years earlier. Indeed, as a species, it seems to lie just half-way between X. orientale and X. leptocarpum, and for a time we suspected it of being a hybrid between these two species. But the apparent absence of true X. orientale from all of North America would seem to make an assumption to this

effect purely gratuitous. Nor do we feel inclined to regard our plant as an anomalous race or variety of X. leptocarpum, since the arcuate character of its prickles is a character that holds with a high degree of uniformity throughout the specimens of the corresponding X. orientale of Europe.

Had they realized the establishment of *X. orientale* from the shores of Lake Champlain to the streets, waste lots and wharves of Montreal, their first impression might have prevailed. At any rate, *X. Chasei* has nothing to do with *X. orientale*, and the doubtfully separable *X. curvescens* and *X. leptocarpum*.

If only its short beaks and prickles were taken into account and all other characters ignored or overlooked (a tendency too apparent in some recent so-called studies of *Xanthium*), *Xanthium Chasei* might superficially be placed with *X. echinatum* Murr. and *X. varians* Greene, for in all three of these species the beaks are unusually short and stout and the prickles short. There, however, the resemblance ends. Both *X. echinatum* (our PL. 1018) and *X. varians* (PL. 1019) have the olive-shaped drab to pale brown mature bur densely long-hirsute, the stout beaks 3–6 mm. long and with very stout hispid bases 2–3 mm. thick, the remote prickles mostly hamate, hirsute-villous below the middle and 3.5–5 mm. long. By recent authors the inland *X. varians* has not been distinguished from the coastal *X. echinatum;* but the two are well distinguished both by characters of leaf and bur and by their strikingly different habitats, *X. echinatum* confined to sea-beaches, dune-hollows and borders of saline marshes along the coast from southern Maine to Virginia; *X. varians* occurring inland, on shores and damp prairie, from western Quebec to northern Alberta, south to northern New York (St. Lawrence drainage), Iowa, South Dakota, Saskatchewan and Oregon. In the halophytic *X. echinatum* the young stem is whitened above with harsh and short hispidity, the later full-grown leaves are broadly cordate or subcordate-ovate, unlobed or very shallowly lobed, with undulations mostly longer than deep (FIGS. 1 and 2), and the beaks of the fruit (FIGS. 3–6) tend soon to inflex and finally to become approximate or with their tips crossing, like the bill of a crossbill. The inland *X. varians* (PL. 1019), on the other hand, has the greener stem with sparse pubescence, the larger leaves more often rhombic or cuneate-based, their margins subacutely dentate with teeth nearly or quite as high as broad, and the erect or nearly erect beaks straight or nearly so (FIGS. 2 and 3). Only by the most superficial treatment could *X. Chasei* be crowded into either of these apparently different species or geographic varieties for its bur is essentially glabrous and lustrous, olivaceous, and with crowded nearly glabrous prickles only 2–3.5 mm. long.[1]

I realize that in his somewhat novel (and we hope, immature) concept Cronquist, following the cue of Wiegand, who saw more hybrids than pure strains in several variable groups, has intimated in RHODORA, xlvii. 403 (1945) that most if not all our species of *Xanthium* are variations of one species, the European *X. strumarium*, for he finds that "The determination of species of *Xanthium* has become a formidable task, undertaken by many botanists only when it becomes unavoidable, and then with serious misgivings", exactly the situation with *Carex*, *Potamogeton*, *Festuca* and many other groups with inconspicuous flowers, which are regularly dodged by those who want to work only on pretty flowers. Nevertheless, there are scores of very real species in these genera and they have been clearly recognized by some of the most thorough and wise students of plants, for we bow with profound respect to such sound students of *Carex*, for example, as Willdenow, Schkuhr, Schweinitz, Torrey, Dewey, Francis Boott, William Boott, Tuckerman and many others, although the casual botanizer lets the genus alone. Similarly, that the study of *Xanthium* bristles with difficulties none will gainsay; but, paradoxically, the harder the points in this genus the easier

[1] It seems hardly necessary, in orienting *Xanthium Chasei*, to illustrate three species found in the eastern United States, with which it could not be confused. The bur of *X. pensylvanicum* Wallr. is very similar to that of *X. chinense* but, whereas the body of the latter is glabrous or merely glandular-punctate and lustrous, that of *X. pensylvanicum* is short-pilose with pale pubescence, and the 200 or more prickles visible on one face are mostly glandular-hispid below the middle, the bases of the prickles about as broad as the interspaces. In *X. chinense* the interspaces are broader than the nearly or quite smooth bases of the fewer prickles (100–150 visible on one face). *X. pensylvanicum* thus stands between *X. chinense* and *X. italicum*. *X. speciosum* Kearney has a bur (including beaks and prickles) 3–4 cm. long and 2–3 cm. thick, the almost filiform-setose prickles 7–9 mm. long and so crowded as to have their bases practically hidden, the beaks 6–11 mm. long. *X. Wootoni* Cockerell could be confused only with *X. orientale*, but it differs in its fewer heavily glandular and straightish prickles and in having the porrect (instead of strongly incurving) beaks more distant from the upper prickles. The burs of all four of the species are beautifully illustrated by Millspaugh & Sherff or by Widder.

the identifications, for, whereas young and relatively tender flowering plants and even those with well-grown but immature fruit are most difficult to distinguish (being annuals of very similar habit and foliage), the fully mature and very hard burs alone are sufficient for identification. The somewhat discouraged verdict of Wiegand, which Cronquist accepts in lieu of working out the characters, is not final: "It is probably wise to treat all North American Xanthiums as one species except *X. spinosum* L. and possibly *X. strumarium* L. and *X. echinatum* Murr. *X. strumarium*, however, is scarcely distinct, and with more study may also be included. *X. echinatum* may be a real species, as it has a distinct coastal range and seems to behave as though genetically distinct". Cronquist is "in complete agreement with Wiegand's observations, except that *X. strumarium* sens. strict., seems no more than varietally distinct from our plants, and that I am quite unable to see any sort of taxonomic unit in *X. echinatum*."

Inability to see what others clearly see is not a sin; neither does it necessarily clarify a question. To those who have some understanding of the characters in the genus, Wiegand's recognition of *X. echinatum* will appeal. Several close students have devoted themselves to the difficult and often thankless task of working out the characters of *Xanthium:* (1) Wallroth, *Monographischer Versuch über die Gewächs-Gattung Xanthium*, Wallr. Beitr. i. 219–244 (1844), Wallroth recognizing 21 species, 7 of them North American;[1] (2) Millspaugh & Sherff, *Revision of the North American Species of Xanthium*, Field Mus. Pub., Bot. Ser. iv. no. 2 (1918), with very fine illustrations of the burs, this very detailed study also recognizing 21 species but all of them found in North America, the authors having gone to great pains to identify the types of earlier-described species; (3) Widder, *Die Arten der Gattung Xanthium* in Fedde, Repert. Beih. xx. (1923), a very conservative and careful study with clear illustrations of the fruits, the original text completed before the publication of the monograph of Millspaugh & Sherff, but that study summarized in the Nachtrag. Widder maintained most of the species

[1] That Wallroth was not a visionary, as one might infer from those who can see nothing in his species of *Xanthium*, is apparent from his great monograph of *Agrimonia*, published also in his Beiträge, for his four new North American species, *A. gryposepala*, *rostellata*, *microcarpa* and *pubescens*, are all maintained by those who have closely studied the genus.

recognized by Wallroth and by Millspaugh & Sherff. If, as we have recently been told, all of them, except *X. spinosum*, are modifications of a single species, which in its typical form has scarcely gained a foothold (and that near a large Atlantic port) in America, it is amazing that not one of the really careful students of the genus should have suspected the species to be of such instability.

Besides the three great monographs of *Xanthium*, there have been many significant but briefer studies, these noted by Millspaugh & Sherff and by Widder. From our viewpoint as significant as any is that of the physiologist, Professor Charles A. Shull, *Physiological Isolation of Types in the Genus Xanthium*, in Bot. Gaz. lix.[1] 474–483, with 7 blocks of figs. (1915). Desiring material for physiological study, Shull went to an old field near Lawrence, Kansas, where plants of *Xanthium* with 3 quite different types of bur abounded. "It was thought that the various forms were possibly the result of promiscuous crossing of varieties or elementary species, and that a year or two of guarded pollination would be necessary to purify the strains." Shull took essentially uniform burs from a single plant each of the three extremes, what he eventually described as a true species, his *X. globosum*, the wide-ranging *X. pensylvanicum* and *X. canadense* (now known by the earlier name *X. chinense*). Successive generations from these fruits in carefully checked plots proceeded to come true and not to show any Mendelian segregation. "This result was wholly unexpected, as it was believed that hybridization could hardly have been avoided in nature". Shull recognized not only the differences in burs but those of cotyledons even, as well as of pigmentation of the stems and prickles and shape of the seeds and color of their coats; and, having started out a skeptic, with the popular preconception that the differences of burs and other characters he saw were the result of "promiscuous crossing", he frankly concluded his experimental study by defining a new species, and on his last page he unblushingly predicted that "There are probably a number of new species of *Xanthium* still undescribed in America". *X. Chasei* is one of them.

[1] Through the perverse fatality which dogs editorial movements the signature of the Gazette on which Shull's paper begins bears the note "Botanical Gazette, vol. 69]"

On the Illinois bottomlands near Peoria *Xanthium Chasei* has remained constant, just as *X. echinatum* does along the coastal sands or as does the distinctive *X. speciosum* Kearney, brought unintentionally in western fleeces to New England woolen-mills, whence it has washed down-river and made constant and consistent colonies far from their native haunts.

Cronquist's last paragraph on *Xanthium* reads:

> Although both species [all-inclusive *X. strumarium*, involving all American members of DeCandolle's § *Euxanthium*, and *X. spinosum*, the single species recognized by him in § *Acanthoxanthium* DC.] of *Xanthium* have now become cosmopolitan weeds, and *X. strumarium* was well established in Europe four hundred years ago . . . , it seems probable that they originated in the new world. Except for a few species of *Ambrosia*, the subtribe *Ambrosinae* is otherwise exclusively American.

That statement implies that the several endemics in *Xanthium* § *Euxanthium* which are known only in the Old World, such unique plants as *X. inaequilaterum* of DeCandolle (who was no "splitter"), found from Java and Borneo to Japan and the coast of southeastern China, or as *X. indicum* Konig (*X. Roxburghii* Wallr.) of tropical and subtropical India, Sumatra and Java,—the implication is that such endemic species of the Old World originated in America, but entirely quit the New World in favor of the Old. This interpretation is again illustrated by *X. spinosum*, often assumed to be indigenous (as perhaps it is) in South America, but certainly not in eastern North America, where it is a weed of relatively recent introduction. Linnaeus described it "*Habitat in* Lusitania" and Widder, whose citations of South American and North American specimens occupy less than 1 page, gives up 6 pages to citations of European and African specimens. Whether this semicosmopolitan weed is native in South America I cannot say, but the learned Charles Pickering wrote in his Chronological History of Plants, 976 (1879): "Transported to North America as late perhaps as 1814 (as may be inferred from the silence of Walter, Michaux, and Pursh), was found by Nuttall in 1818 near dwellings from Savannah to Washington, and not foreseeing that it would become troublesome, was introduced by him as he informed me into the environs of Philadelphia; . . . In the Southern Hemisphere, by European colonists also, was probably carried across the Andes into Chili (Beechey voy. 57, and A. Dec.)", Hooker & Arnott, in their Botany of Captain Beechy's Voyage, recording it from Valparaiso, surely not an undisturbed locality. Finally, in regard to the nativity of *X. spinosum*, the article, *Xanthium spinosum in Neolithic deposits in Bulgaria*, by W. B. Turrill in Kew Bull. for 1923: 190 (1923) is significant:

Xanthium spinosum is one of the commonest ruderal plants of Central Europe and the Mediterranean region. It has generally been considered by recent writers to be a native of South America. The strong arguments in favour of this view will be found summarized by Thellung in his Flore adventice de Montpellier . . . . Another opinion, which was current among earlier botanists, that *Xanthium spinosum* was native in South Russia, was rejected by Ascherson . . . . It may also be noted that according to L. Simonkai and Karl Flatt . . . both A. Florentin and also C. Spegazzini have collected fossil fruits ('false-fruits') of *X. spinosum* from the Pliocene beds in the Tertiary formation of the Pampas.

"During a visit to Bulgaria last summer Dr. N. Stoianoff of Sofia University gave me some semi-fossilized fruits which careful comparison at Kew has shown to be those of *Xanthium spinosum*. These were obtained during excavations in prehistoric deposits . . . east of Sofia, . . . The deposits are of Neolithic age . . .

"Whatever may be the real history of *Xanthium spinosum* in the Old World this discovery would seem to indicate that the species existed in South Europe long before the dates (1700–1750) accepted by Thellung for its first introduction and establishment.

Surely Neolithic Bulgarians did not come to America to get it. *Xanthium*, like *Ambrosia*, obviously has species native to the Old World as well as to the New. Wallroth thought that he saw characters to separate American material from typical European *X. spinosum*. And, although Cronquist would reduce all *Xanthium* to the two species (*i. e.* the two sections of DeCandolle and others), the European *X. strumarium* L. and *X. spinosum* L., it is most difficult to believe that the very distinct and characteristic *X. ambrosioides* Hooker & Arnott, the Argentinian procumbent plant with bipinnate blunt-lobed leaves, a species which has to be taken into account by those who watch the waste lots of New England, can possibly be forced into *X. spinosum*. Hooker & Arnott were ultraconservative, yet they saw what is a really good species in *X. ambrosioides;* so did Widder; so do others.

HELIANTHUS ATRORUBENS L., var. **alsodes,** var. nov. (TAB. 1020), foliis imis longe petiolatis anguste ovatis vel late lanceolatis acutis vel subacutis plerumque serratis vel serrato-dentatis; foliis supernis anguste ovatis vel lanceolatis.—Dry open woods, thickets and clearings, Virginia, North Carolina and upland of southeastern Kentucky and eastern Tennessee. VIRGINIA: dry land about 3 miles north of Williamsburg, James City Co., *R. W. Menzel*, no. 289; dry open thickets, Virginia Beach, Princess Anne Co., Sept. 10, 1935, *Fernald, Long & Fogg*, no. 5127 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); rich woods and bushy clearing north of Double Bridge, southwest of Jarratt, Sussex Co., *Fernald & Long*, no. 11,474; Bedford Co., Oct. 15, 1871, "leafy-stemmed form", *A. H. Curtiss;* "Mts., Carol. & Virginia", *Asa Gray*. NORTH CAROLINA: sand-ridge at Atlantic, Cartaret Co., *Godfrey*, no. 6447; pineland near Goldsboro, Wayne Co., *Godfrey*, no. 6576; sand-ridge near Roseboro, Sampson Co., *Godfrey*, no. 5699; sand-ridge at Carolina Beach, New Hanover Co., *Godfrey*, no. 6368; pine woodland, Raleigh, *Godfrey*, no. 6601; thicket, Raleigh, *Godfrey*, no. 6892; dry thicket, north of Spruce Pine, Mitchell Co., *Wiegand & Manning*, no. 3378; dry open woods, Biltmore, Buncombe Co., *Bilt. Herb.*, no. 499^a; rich wooded mountain side near Asheville, *A. H. Curtiss*, no. 6526; open woods, Henderson Co., Aug. 24, 1881, *J. D. Smith* (as *Rudbeckia fulgida*); open woodlands, Highlands, *Bilt. Herb.*, no. 499^c. KENTUCKY: roadsides and fields east of Cumberland Falls, Whitley Co., *McFarland*, no. 59. TENNESSEE: gravelly oak-pine woods, Jamestown, Fentress Co., *Svenson*, no. 4100.

Helianthus atrorubens consists of the two rather marked varieties: var. *normalis* Kuntze, Rev. Gen. i. 343 (1891), and the narrower-leaved plant here described as var. *alsodes*. The species started with the detailed description and life-size plate of *Corona solis minor, disco atro-rubente* of Dillenius, Hort. Elth. 111, t. xciv (1732) and the *Helianthus foliis ovatis crenatis* of Gronovius, both cited without further description by Linnaeus, who obviously took his epithet from Dillenius (whose plant was from Carolina) but gave the "Habitat in Virginia". There was no specimen of the species in the Linnean Herbarium at the time of writing *Species Plantarum;* and the Gronovian description of the Clayton specimen, with "folia asperata paucis auritis, ex adverso binis auriculatis", suggests the Dillenian plate, in which there are tiny leaves ("auricles") at the bases of some large primary leaves. Such tiny undeveloped axillary branchlets occasionally occur in the plant with ovate or oval bluntish leaves (var. *normalis*) but I have not seen them in var. *alsodes*. The Dillenian plate (which may stand as TYPE of the species) is of the characteristic plant found from Florida to Louisiana, north to Virginia and Tennessee, with the basal leaves ovate or oval and crenate to dentate, these and the lower cauline with blades one half to four fifths as broad as long and blunt or merely subacute, their bases abruptly contracted to the winged petiole, the sessile or subsessile median cauline leaves ovate or oval. In this plant the middle phyllaries are broadly rounded at summit or abruptly short-acuminate.[1] Var. *alsodes*, although found in the northeastern third of the specific range, has the lower long-petioled leaves usually more gradually tapering from petiole to blade, and the most often serrate or serrate-dentate blade is acute or acutish, two to five times as long as broad; the lowest sessile cauline blades lanceolate or narrowly ovate. In var. *alsodes* the middle phyllaries (fig. 3) are usually less broadly rounded at summit.

It is barely possible that *Helianthus atrorubens*, var. *alsodes* is the plant described as *H. sparsifolius* Ell. Sk. ii. 415 (1823) from the "western districts of Georgia", as contrasted with his *H. atrorubens* apparently common in his own region of southeastern South Carolina. Elliott's "leaves ovate, acute, coarsely toothed" is good, but "abruptly contracted into a petiole" not so good; furthermore, since he defined *H. atrorubens* as having "leaves spathulate", it would be unwise, his specimens of *H. sparsifolius* not being preserved at Charleston, to take up the name for var. *alsodes*. From the citation by E. E. Watson in Papers Mich. Acad. ix. 343 (1920), in the synonymy of *H. atrorubens*, of *H. gracilis* Bertoloni one might infer that Bertoloni had our plant. It is noteworthy, however, that Watson omitted the citation of Bertoloni's plate, which he evidently had not seen. *H. gracilis* Bertoloni, Misc. Bot. vii. 41, t. vi, fig. 1 (1868), shown life-size, is a monocephalous plant with lower entire leaves barely petioled, extending gradually as linear-lanceolate blades to the single peduncular summit of the stem, the phyllaries linear or lanceolate

[1] The following are characteristic specimens of var. normalis. Virginia: west of Mt. Hope Church, Southampton Co., *Fernald & Long*, no. 11,472; northwest of Round Gut, southwest of Franklin, Southampton Co., *F. & L.*, no. 11,473. North Carolina: west of Jacksonville, Onslow Co., *Godfrey*, no. 6461; Winston-Salem, Forsyth Co., *Godfrey*, no. 6103; Biltmore, Buncombe Co., *Bilt. Herb.*, no. 499[a]; South of Tuxedo, Henderson Co., *Wiegand & Manning*, no. 3377; Highlands, Aug. 2, 1902, *Magee;* Joy, Burke Co., *Hunnewell*, no. 12,981. South Carolina: Eutawville, *Eggleston*, no. 4997; Marietta, Greenville Co., *Wiegand & Manning*, no. 3376. Georgia: Middle Ga., 1846, *Porter*. Tennessee: Chilhowee Mt., *A. H. Curtiss*, no. 1439. Louisiana: without stated locality, *Drummond*.

It is not improbable that var. *normalis* tends to grow in damper soil than var. *alsodes*. Of the 16 sheets before me of var. *alsodes*, of which *habitat* is given, all are from dry situations. Of the 13 of var. *normalis* with habitat noted 2 are from savannas, 1 from pine-barren bog.

("squamis linearibus", also "lanceolatis"). It surely has nothing to do with *H. atrorubens.* In fact Bertoloni knew that, specially saying "Ab *Heliantho atrorubente* L. diversus". His plate suggests *H. heterophyllus* Nutt.

Another and really quite different species, *Helianthus silphioides,* is included by Watson under his aggregate *H. atrorubens,* a somewhat unexpected attitude, in view of the many minor variants in other series recognized by him as "new species", minor variants which forced the obliging but always cautious Dr. C. C. Deam to write in his *Flora of Indiana,* "I at first attempted to construct a key to our species using Watson's determinations", and to state in conclusion: "I have excluded 15 species that have been reported for the state". Surely *H. silphioides* Nutt. in Trans. Am. Phil. Soc. vii. 366 (1841), found from "the plains of Arkansa" and southeastern Missouri up the Mississippi drainage to southwestern Indiana, thence south to Alabama and Louisiana, later described from along the Mississippi in Kentucky as *H. kentuckiensis* McFarland & Anderson in Am. Mid. Nat. ix. 139, t. 10, (1924),—surely this very distinct plant cannot be satisfactorily referred to the more eastern *H. atrorubens,* as is done by Watson. In fact, Nuttall specially noted after the detailed description of *H. silphioides,* "Allied to *H. atrorubens* but" etc., just as Bertoloni had done after his description of the equally distinct *H. gracilis.* It almost appears as if both mentions of *H. atrorubens* had been mistaken as identifications with it.

To be sure, Dr. W. A. Anderson, coauthor of *H. kentuckiensis,* subsequently pointed out[1] that *H. kentuckiensis* is certainly identical with *H. silphioides* Nutt., as well as with the type of *H. atrorubens,* var. *pubescens* Kuntze, l. c. At that time Anderson considered the tall and very leafy plant, with slenderly short-petioled cuneate- or truncate- to cordate-based leaves running high and nearly uniformly up the stem, the pubescence of stem and roundish leaves short and close, as a Mississippi Valley extreme of *H. atrorubens* of "the Atlantic coastal plain, and . . . the mountains of North Carolina, Tennessee and Georgia", the latter with the stem hispid to villous below (our FIG. 2), the leaves "*ovate to oblong-lanceolate, . . . tapering or abruptly contracted into a winged petiole*", the "lower surfaces of the leaves

[1] W. A. Anderson in RHODORA, xxxiv. 1–4 (1932).

smoothish, with long hairs on veins and petiole". Anderson further noted that "Before publishing *Helianthus kentuckiensis* as a new species, Dr. McFarland and the writer sent a specimen to Mr. E. E. Watson who was then preparing a monograph of the genus. It was at his suggestion that the plant was described as a new species. Later, when his monograph appeared, Watson disposed of *H. kentuckiensis* as 'not a *Helianthus*'."

The photograph of the type of *Helianthus silphioides*, taken by Dr. S. F. Blake at the British Museum, and the original plate of *H. kentuckiensis* might have come from the same material, and, after studying the type of Otto Kuntze's *H. atrorubens*, var. *pubescens* (the "varietal name . . . not a happy one") from Cairo, Illinois, Anderson found it quite like the others. Dr. Anderson sent a root from the type-colony of *H. kentuckiensis* to the Harvard Botanic Garden, the crown then carrying a number of stems. That original plant, increasing by many deep-seated subterranean stoloniform roots and, as Mr. Francis Lazenby, the Superintendent, informs me, not here coming from the regularly scattered achenes, is now a clone or colonial plant of about 50 tall uniformly leafy fertile stems. Such a root-system, with the many elongate and stoloniform deep roots ending in vegetative buds and completely covering an herbarium-sheet is wonderfully displayed by a plant, mounted on three sheets, sent to the Gray Herbarium by Mr. *Ralph M. Kriebel* from a colony covering about 100 yards in Lawrence County, Indiana (*Kriebel*, no. 3965), tentatively placed with *H. scaberrimus*. Although the Kriebel plant has the leaves less rounded at base than in most typical *H. silphioides*, it is well matched by the foliage of the upper half of the stem of *Demaree*, no. 16,543 from Arkansas, as well as that of Buckley's material from Alabama. Its involucres, flowers and achenes are those of *H. silphioides*. How unlike the habit of *H. atrorubens!* The latter, with which I have become very familiar in the field, has a simple, short, horizontal or ascending premorse rhizome which rarely attains a length of 4 cm. It does not form clones, but the plants regularly have a single flowering stem, arising from the axil just beyond the remnants of the stem of the preceding year. Most of its leaves are borne from near the base of the tall stem, these on very long upwardly winged petioles. Far separated from these subbasal leaves there is usually a pair of smaller but petioled leaves, borne one sixth to one fourth the way up the stem; then far above them a few much smaller and eventually merely bracteiform leaves up the almost scapose upper two thirds of the stem. With such differences of subterranean habit, pubescence, shape and distribution of leaves and geographic isolation, *H. silphioides* and *H. atrorubens* seem to me as distinct as any two species of *Helianthus*.

Helianthus laetiflorus Pers., var. **rigidus** (Cass.), stat. nov. *Harpalium rigidum* Cass. Dict. Sci. Nat. xx. 200 (1814). *Helianthus scaberrimus* Ell. Sk. ii. 423 (1823). *Helianthus rigidus* (Cass.) Desf. Cat. Hort. Par. ed. 3: 184 (1829).

H. laetiflorus, var. **subrhomboideus** (Rydb.), comb. nov. *H. subrhomboideus* Rydb. in Mem. N. Y. Bot. Gard. i. 419 (1900). *H. scaberrimus*, var. *subrhomboideus* (Rydb.) Farwell in Am. Midl. Nat. viii. 278 (1923).

When Deam defined *Helianthus rigidus*, forma *flavus* he "started something". Up to that time the very obvious division of *Helianthus* into a series with lobes of the disk-corollas purple, as opposed to those with corolla-lobes yellow, had been almost unchallenged, although it was well known that the commonly cultivated *H. annuus* may have "sports" with yellow, instead of the more frequent dark purple disk. As early as 1789 Lamarck, in his Dict. iii. 86, got confused and described as the quite different *H. atrorubens* L., a species then cultivated in the Jardin du Roi in Paris, a very scabrous plant with spatulate-oval harshly scabrous acuminate and triple-nerved leaves which tapered to short petioles; heads very showy, resembling those of *Rudbeckia* "mais qui sont plus grandes & ont plus d'éclat", these on long scabrous peduncles; the phyllaries erect and lanceolate; the disk "d'un jaune foncé". So obviously not the Linnean *H. atrorubens*, the plant of Lamarck was redefined by Persoon as *H. laetiflorus* Pers. Synop. ii. 476 (1807). *H. laetiflorus*, passed on to other large European gardens, was several times well illustrated and is well known as a native or as a garden-escape through much of eastern North America. When he discussed it in the Synoptical Flora Asa Gray, still clinging to the primary divisions, "Disk . . . dark purple or brownish" as opposed to "Disk yellow", placed *H. laetiflorus* immediately after *H. rigidus* but as the first species with "Disk yellow", and defined it "Resembling tall forms of the preceding, similarly scabrous or hispid", etc., the plant recognized from "Indiana, Illinois, Wisconsin". When Deam said, under "Excluded Species", of *H. laetiflorus* "I am excluding the species from our flora and referring specimens so named to the yellow flowered form of *Helianthus rigidus* (Cass.) Desf.", he was right as to the identity but, unfortunately, he overlooked the fact that the specific epithet *laetiflorus* started in 1807, while *H. rigidus* was based on a name which was first published in 1814.

I am treating *Helianthus rigidus* as a variety rather than a color-form. In general it has thicker leaves than typical *H. laetiflorus* and its natural range is more western. Similarly, although Deam and, before him, E. E. Watson, got nothing out of *H. subrhomboideus*, which admittedly passes into western phases of *H. laetiflorus*, var. *rigidus*, it stands apart on several characters.

Var. *rigidus* has a very scabrous stem 0.7–2.5 dm. high; var. *subrhomboideus* a slender and less scabrous (especially above) stem 0.15–1.2 m. high. Var. *rigidus* has 7–15 leafy nodes, the lance-oblong to lance-ovate leaves acuminate to long tips, the longer blades up to 3 dm. long; but var. *subrhomboideus* has only 6–9 nodes, the leaves subrhombic and barely acute to bluntish, the larger ones only 0.5–1.5 dm. long. In var. *rigidus* the phyllaries are lanceolate to narrowly ovate; in var. *subrhomboideus* more oblong or oblong-oval. Although westward it merges into typical var. *rigidus*, it has come east to Quebec and New England, chiefly via transcontinental railways, from plains of the West. Here it is very pure and shows little or none of the transition to var. *rigidus* which occurs farther west.

Explanations of Plates 1007–1020

Plate 1007, Xyris Bayardi Fernald, all figs., from type: fig. 1, four plants, × 1; fig. 2, two spikes, × 5; fig. 3, tip of basal leaf, × 10; figs. 4 and 5, lateral sepals, × 10; fig. 6, seeds, × 10.

Plate 1008, X. brevifolia Michaux and X. flabelliformis Chapman. Figs. 1–4, X. brevifolia: fig. 1, bases of plants, × 1, from the general type-region, between Guyton and Ogeechee Rivers, Effingham Co., Georgia, *Harper*, no. 920; fig. 2, basal leaf, × 10, from no. 920; fig. 3, group of spikes, × 1, from the type of Michaux, after photo. by *Cintract;* fig. 4, spike, × 5, from no. 920. Figs. 5–7, X. flabelliformis, all figs. from isotype: fig. 5, base of plant, × 1; fig. 6, tip of basal leaf, × 10; fig. 7, spike, × 5.

Plate 1009, fig. 1, Pedicularis canadensis L.: characteristic plant, × ⅔, from Brooklin, Maine, *A. F. Hill*, no. 1419. Figs. 2 and 3, var. Dobbsii Fernald: fig. 2, characteristic base of plant, × ¾, from Spring Grove, Minnesota, *Rosendahl*, no. 276; fig. 3, flowering raceme, × 1, from no. 276.

Plate 1010, P. canadensis, var. Dobbsii, both from type: fig. 1, base of plant, × ⅔; fig. 2, fruiting raceme, × 1.

PLATE 1011, × SOLIDAGO HIRTIPES Fernald, all figs. from TYPE: FIG. 1, portion of plant, × 1/3; FIG. 2, pedicelled heads, × 5; FIG. 3, pedicels, × 10; FIG. 4, upper, and FIG. 5, lower surface of leaf, × 10.

PLATE 1012, S. GRAMINIFOLIA (L.) Salisb., var. NUTTALLII (Greene) Fernald and S. MICROCEPHALA (Greene) Bush. FIGS. 1–3, S. GRAMINIFOLIA, var. NUTTALLII, all from near Alexandria, Virginia, *Blake*, no. 8697: FIG. 1, glomerules, × 5; FIG. 2, branchlet and pedicel, × 10; FIG. 3, lower surface of leaf, × 10. FIGS. 4, 5 and 6, S. MICROCEPHALA, all from the type-region, Sumter Co., Georgia, *Harper*, no. 636: FIG. 4, pedicelled heads, × 5; FIG. 5, branchlet and pedicels, × 10; FIG. 6, upper surface of leaf, × 10.

PLATE 1013, XANTHIUM CHASEI Fernald and X. STRUMARIUM L. FIG. 1, X. CHASEI, TYPE, × 3/7. FIGS. 2 and 3, X. STRUMARIUM: FIG. 2, bur, × 2, from Bavaria, *Killermann*, in Herb. Exsic. Bavar., no. 1226; FIG. 3, same bur, × 5.

PLATE 1014, X. CHASEI Fernald: FIG. 1, portion of TYPE, × 1; FIG. 2, bur, × 2, from TYPE; FIG. 3, portion of bur, to show beaks and bulbous-based prickles, × 5, from TYPE; FIG. 4, bur, × 2, from *V. H. Chase*, no. 3474; FIG. 5, summit of bur, × 5, from no. 3474.

PLATE 1015, burs, × 2, and beaks, × 5, of X. GLOBOSUM Shull, X. ITALICUM Moretti, X. INFLEXUM Mackenzie & Bush and X. CHINENSE Miller. FIGS. 1 and 2, X. GLOBOSUM, from plant raised by Sherff from seed of TYPE. FIGS. 3 and 4, X. ITALICUM, from Venetia, *Béguinot* in Fl. Italica Exsicc., no. 2774. FIGS. 5 and 6, X. INFLEXUM, from Courtney, Missouri, *Bush*, no. 1806. FIGS. 7 and 8, X. CHINENSE, from Ogdensburg, New York, *Phelps*, no. 1215.

PLATE 1016, burs of X. CURVESCENS Millspaugh & Sherff and X. LEPTOCARPUM Millspaugh & Sherff, smaller figs. × 2, larger, × 5. FIGS. 1–4, X. CURVESCENS: FIGS. 1 and 2, from TYPE; FIGS. 3 and 4, from Burlington, Vermont, Sept. 8, 1918, *N. F. Flynn* (identification by *Sherff*). FIGS. 5 and 6, X. LEPTOCARPUM, from TYPE.

PLATE 1017, burs of X. ORIENTALE L., figs. 1, 3, 5 and 7, × 2, others × 5; FIGS. 1 and 2, from Austria, *Fritsch* in Fl. Exsic. Austro-Hung., no. 3068; FIGS. 3 and 4 (2 burs), from France (as *X. macrocarpum* DC.), ex Herb. Cosson-Germain; FIGS. 5 and 6, from Richelieu River, St. Hilaire, Quebec, *Pease*, no. 12,955; FIGS. 7 and 8, from LaTortue, Quebec, *Victorin*, no. 21,254.

PLATE 1018, X. ECHINATUM Murray: FIG. 1, fruiting branch, × 1, from Revere, Massachusetts, Sept. 17, 1882, *Herbert A. Young;* FIG. 2, margin of large leaf, × 1, from Marshfield, Massachusetts, August 28, 1898, *C. H. Morss;* FIG. 3, bur, with arching beaks, × 2, from Tisbury, Massachusetts, *F. C. Seymour*, no. 2029; FIG. 4, summit of bur, × 5, from no. 2029; FIG. 5, bur, with tightly crossing beaks, × 2, from Newcastle, New Hampshire, Sept. 19, 1901, *E. F. Williams;* FIG. 6, summit, × 5, of same bur as in fig. 5.

PLATE 1019, X. VARIANS Greene: FIG. 1, portion of ISOTYPE, × 1; FIG. 2, bur, × 2, from The Dalles, Oregon, *Suksdorf*, no. 193; FIG. 3, summit of bur, × 5, from no. 193.

PLATE 1020, HELIANTHUS ATRORUBENS L., var. ALSODES Fernald, all figs. from TYPE: FIG. 1, plant, × 3/8; FIG. 2, pubescence of base and petioles, × 2; FIG. 3, involucre, × 2.

PLATES

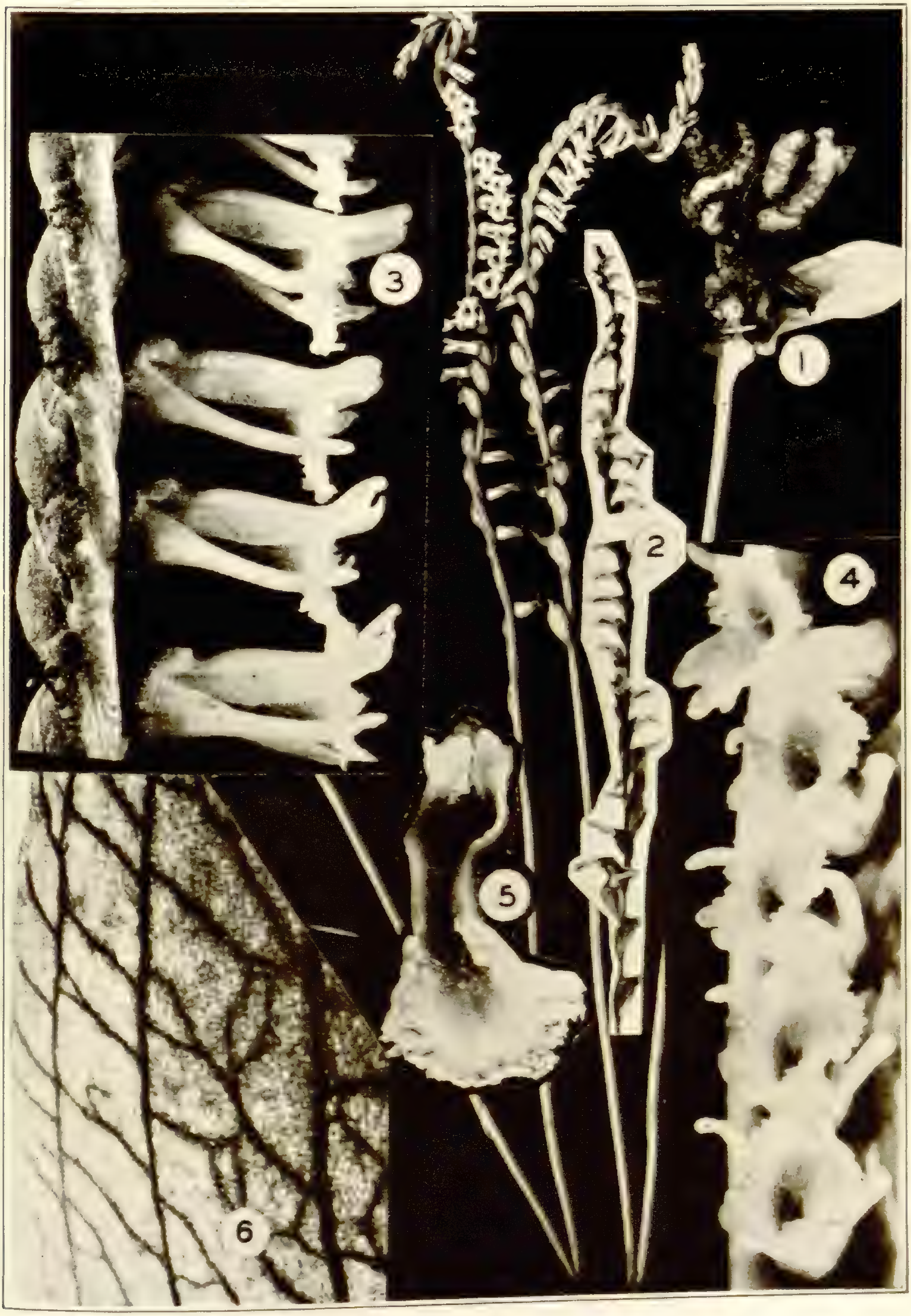

Photo. B. G. Schubert

SPIRANTHES LACERA: FIG. 1. two plants, × 1, from type-region of *S. gracilis*, var. *secunda*: FIG. 2, two spikes, × 1, from type-region of species; FIG. 3, profile, × 6, of portion of spike; FIG. 4, face-view, × 6, of same flowers; FIG. 5, lip, × 10; FIG. 6, venation of basal leaf, × 10, by transmitted light.

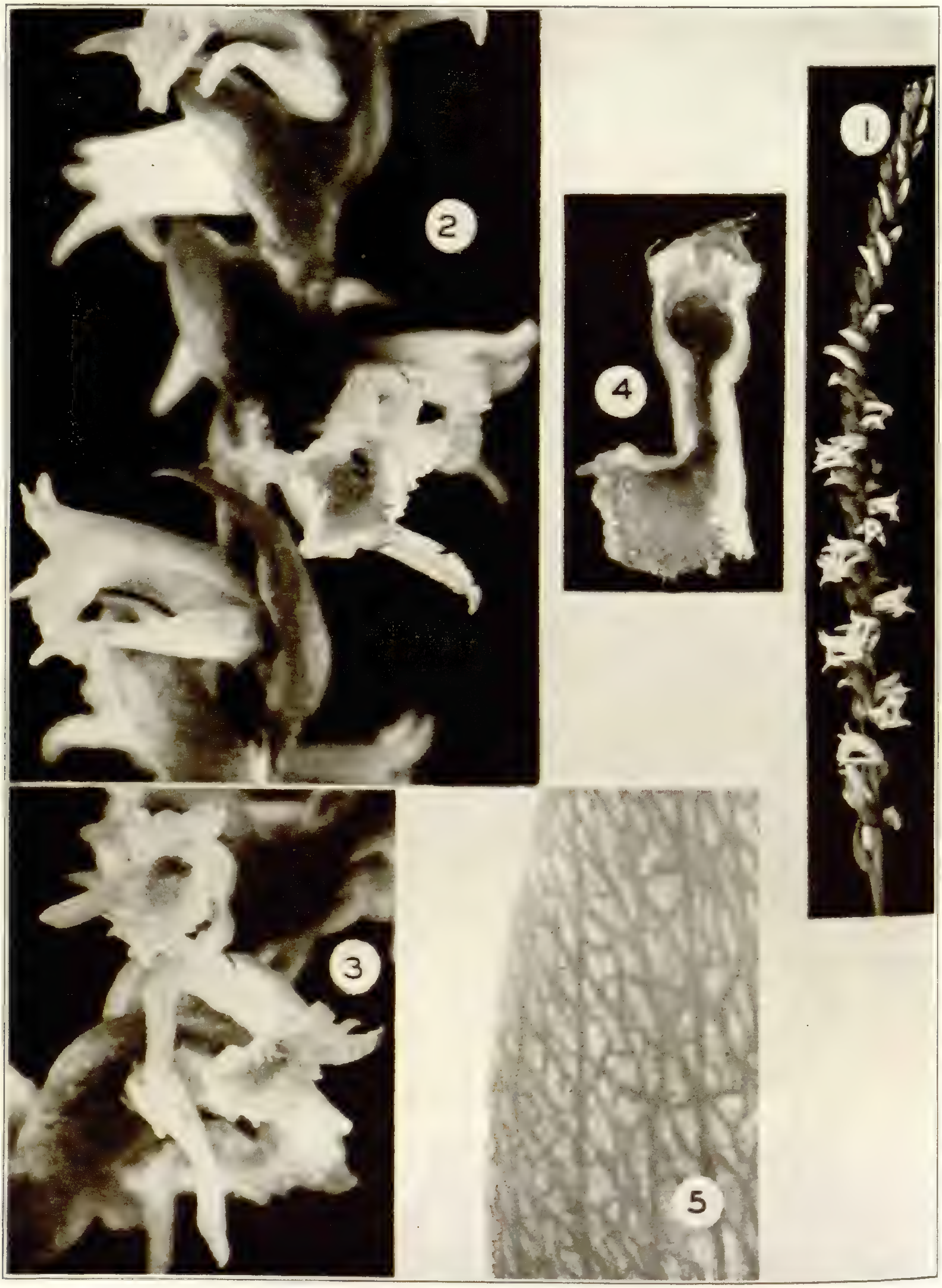

Photo. B. G. Schubert

SPIRANTHES GRACILIS: FIG. 1, spike, × 1, from type-region; FIG. 2, profile, × 6, of flowers, and FIG. 3, face-view, × 6, of flowers; FIG. 4, lip, × 10; FIG. 5, venation of basal leaf, × 10, by transmitted light.

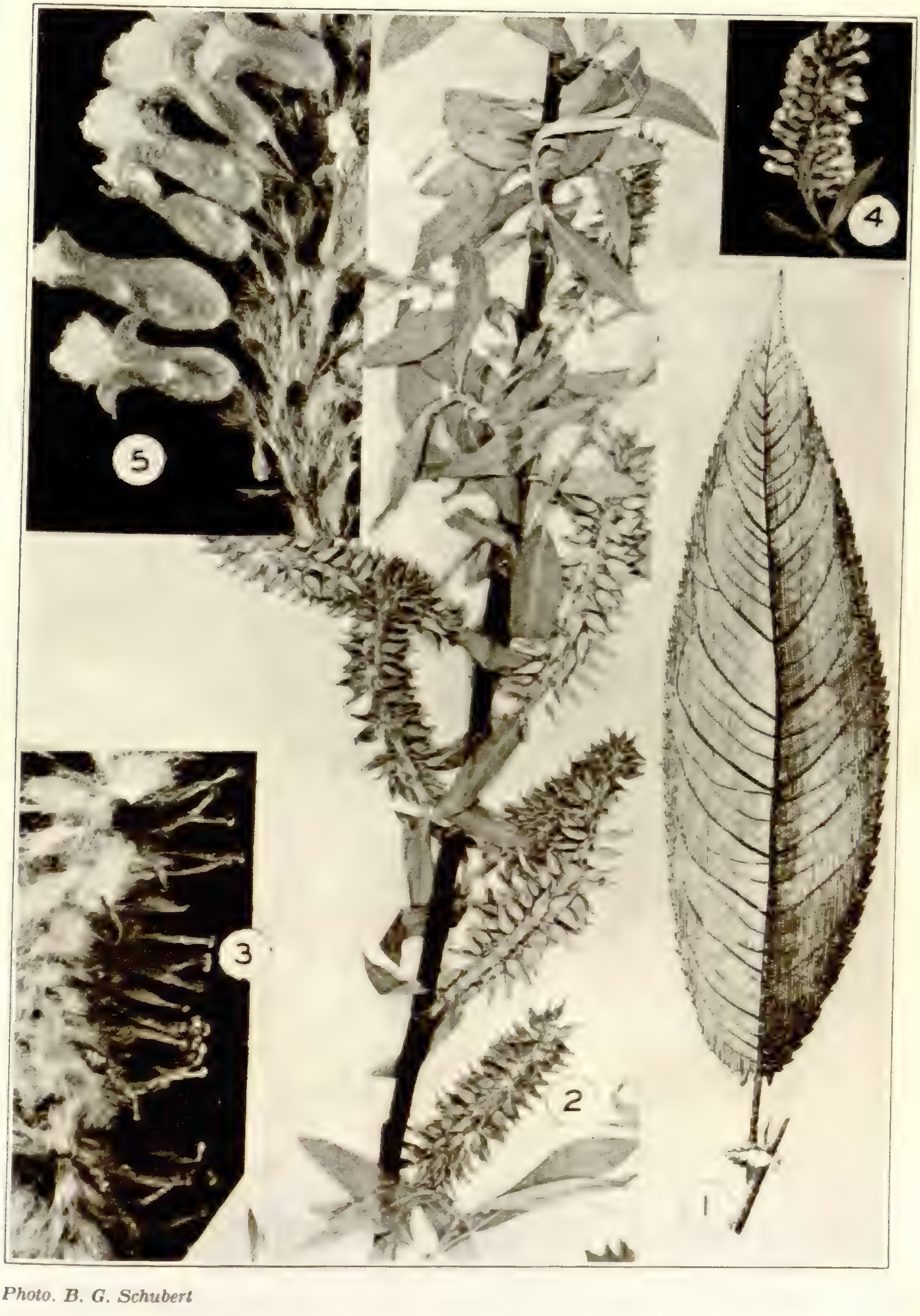

Photo. B. G. Schubert

SALIX RIGIDA: FIG. 1, leaf of TYPE, × 1, after *Muhlenberg;* FIG. 2, fruiting branch, × 1; FIG. 3, portion of young pistillate ament, × 5; FIG. 4, fruiting ament, × $\frac{4}{5}$; FIG. 5, portion of fruiting ament, × 5.

Photo. B. G. Schubert

Salix rigida (*S. cordata* Muhl.): fig. 1, leaf of type of *S. cordata* Muhl., × 1, after *Muhlenberg;* figs. 2 and 3, staminate and pistillate flowering branches, × 1; fig. 4, portion of fruiting ament, × 5.

Photo. B. G. Schubert

SALIX CORDATA Michaux (*S. adenophylla* Hook.): FIG. 1, type of *S. adenophylla*, × ca. $\frac{1}{2}$; FIG. 2, margin of leaf of type of *S. adenophylla*, × 10; FIGS. 3 and 4, leafy tip and fruiting ament, × $\frac{4}{5}$, from probable type-region of *S. adenophylla*.

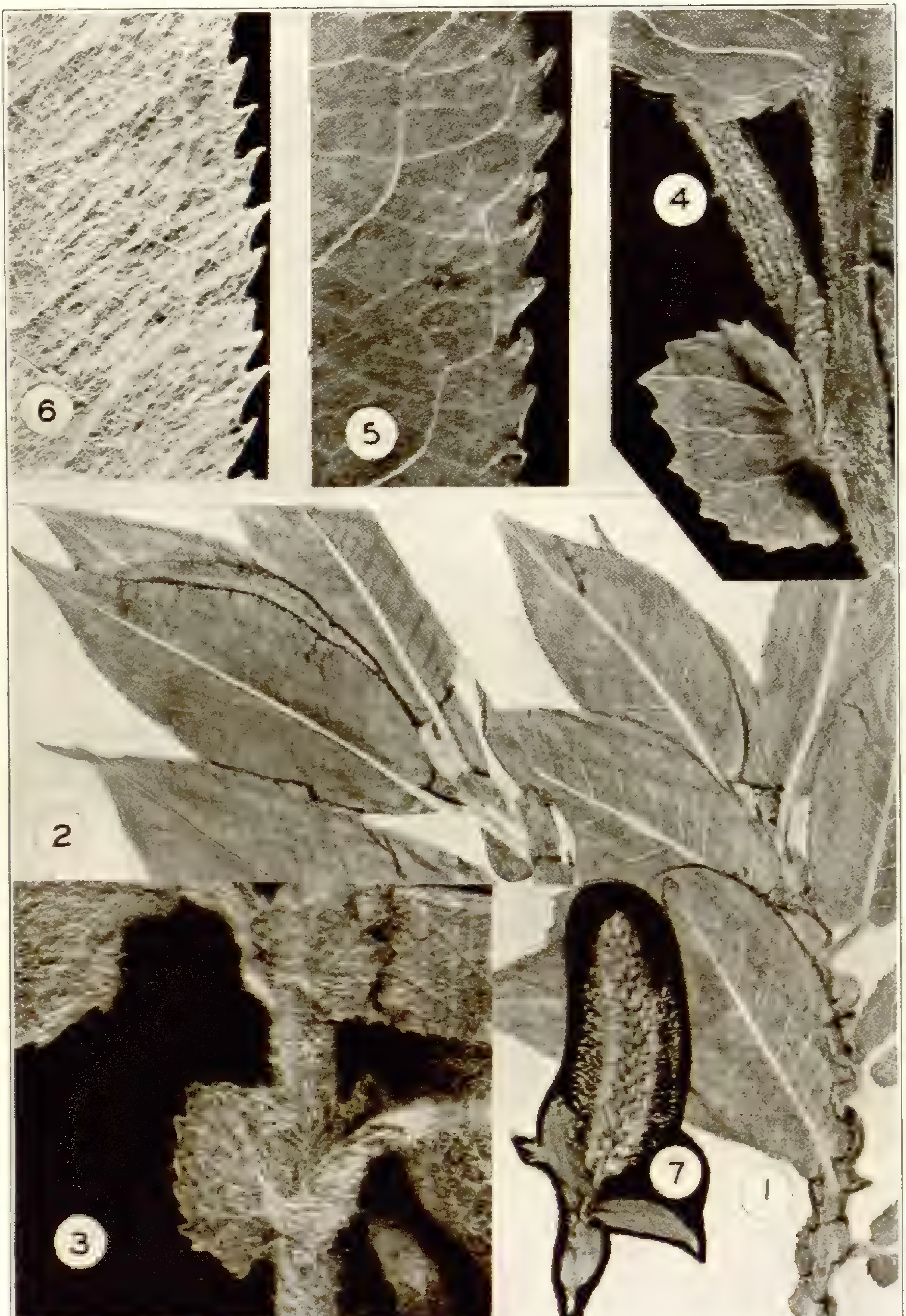

Photo. B. G. Schubert

SALIX CORDATA Michaux. FIGS. 1, 2, 3 and 6 from Michaux's TYPE-REGION: FIGS. 1 and 2, leafy tips, × 4/5; FIGS. 3 and 4, stipules and leaf-bases, × 5; FIGS. 5 and 6, leaf-margins, × 10; FIG. 7, staminate ament, × 4/5.

Photo. B. G. Schubert

SALIX CORDATA Michaux: FIG. 1, staminate flowering branch, × 4/5; FIG. 2, pistillate flowering tip, × 4/5; FIG. 3, fruiting ament, × 4/5; FIG. 4, portion of young, and FIG. 5, portion of flowering staminate ament, showing blackish bracts, × 10.

Photo. B. G. Schubert

Salix cordata Michaux: fig. 1, fruiting branch, × 1; fig. 2, lower surface of mature leaf, showing delicate venation, × 10; fig. 3, portion of fruiting ament, showing short pedicels, × 10.

Photo. B. G. Schubert

SALIX SYRTICOLA: FIG. 1, pistillate, and FIG. 2. staminate branch, × 4/5, from TYPE.

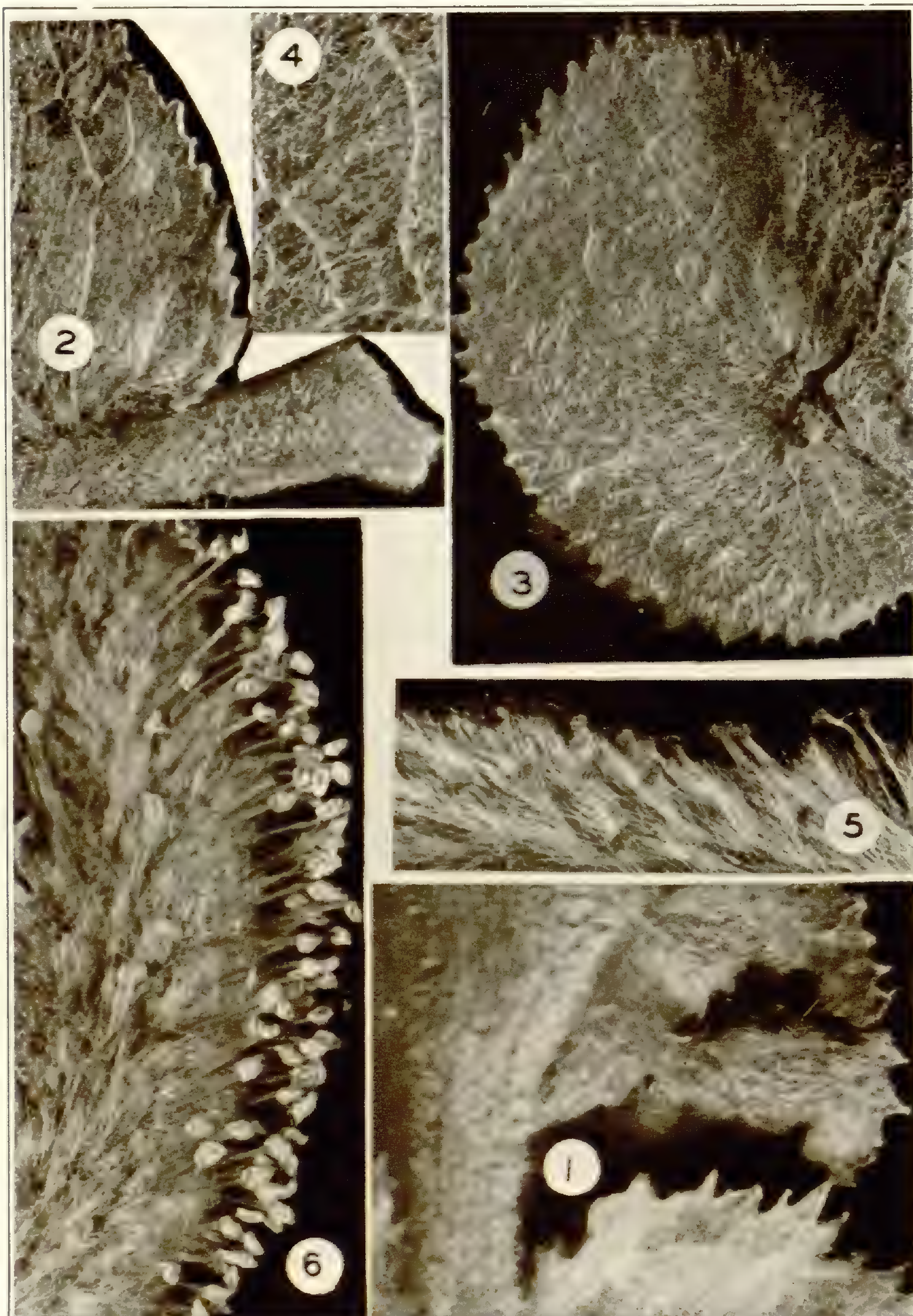

Photo B. G. Schubert

SALIX SYRTICOLA: FIG. 1, portion of stipule, petiole and leaf-base, × 5; FIG. 2, petiole and leaf-base, × 5; FIG. 3, portion of stipule, × 5; FIG. 4, venation of lower leaf-surface, × 10; FIG. 5, portion of flowering pistillate ament, × 5; FIG. 6, portion of staminate ament, showing pale bracts, × 5, from TYPE.

Photo. B. G. Schubert

SALIX RETICULATA: FIG. 1, portion of staminate ament, × 10.
S. RETICULATA, var. SEMICALVA: FIG. 2, portion of TYPE, × 4/5; FIG. 3, staminate ament and lower surface of leaf, × 3, from TYPE; FIG. 4, portion of staminate ament, × 10, from TYPE.

Photo. B. G. Schubert

Salix reticulata: fig. 1, portion of fruiting ament, × 10.
S. reticulata, var. semicalva: fig. 2, fruiting plant, × ⅘; fig. 3, fruiting ament, × 5; fig. 4, portion of fruiting ament, × 10.

Photo. B. G. Schubert

Salix leiolepis, all figs. from type: fig. 1, portion of shrub, × 1; fig. 2, branchlet and portions of leaves, × 5; fig. 3, portion of fruiting ament, showing glabrous bracts and capsules, × 10.

Photo. B. G. Schubert

SALIX JEJUNA: FIG. 1, two portions of TYPE, × 1; FIG. 2, a small dense shrub, × 1; FIG. 3, branch, × 1, showing 2nd flowering in midsummer; FIG. 4, expanding bud and stipule (left), × 10; FIG. 5, fruiting ament and leaf, × 5; FIG. 6, portion of fruiting ament, showing villous bracts and capsules, × 10.

Photo. B. G. Schubert

Xyris Bayardi, all figs. from type: fig. 1, four plants, × 1; fig. 2, two spikes, × 5; fig. 3, leaf-tip, × 10; figs. 4 and 5, lateral sepals, × 10; fig. 6, four seeds, × 10.

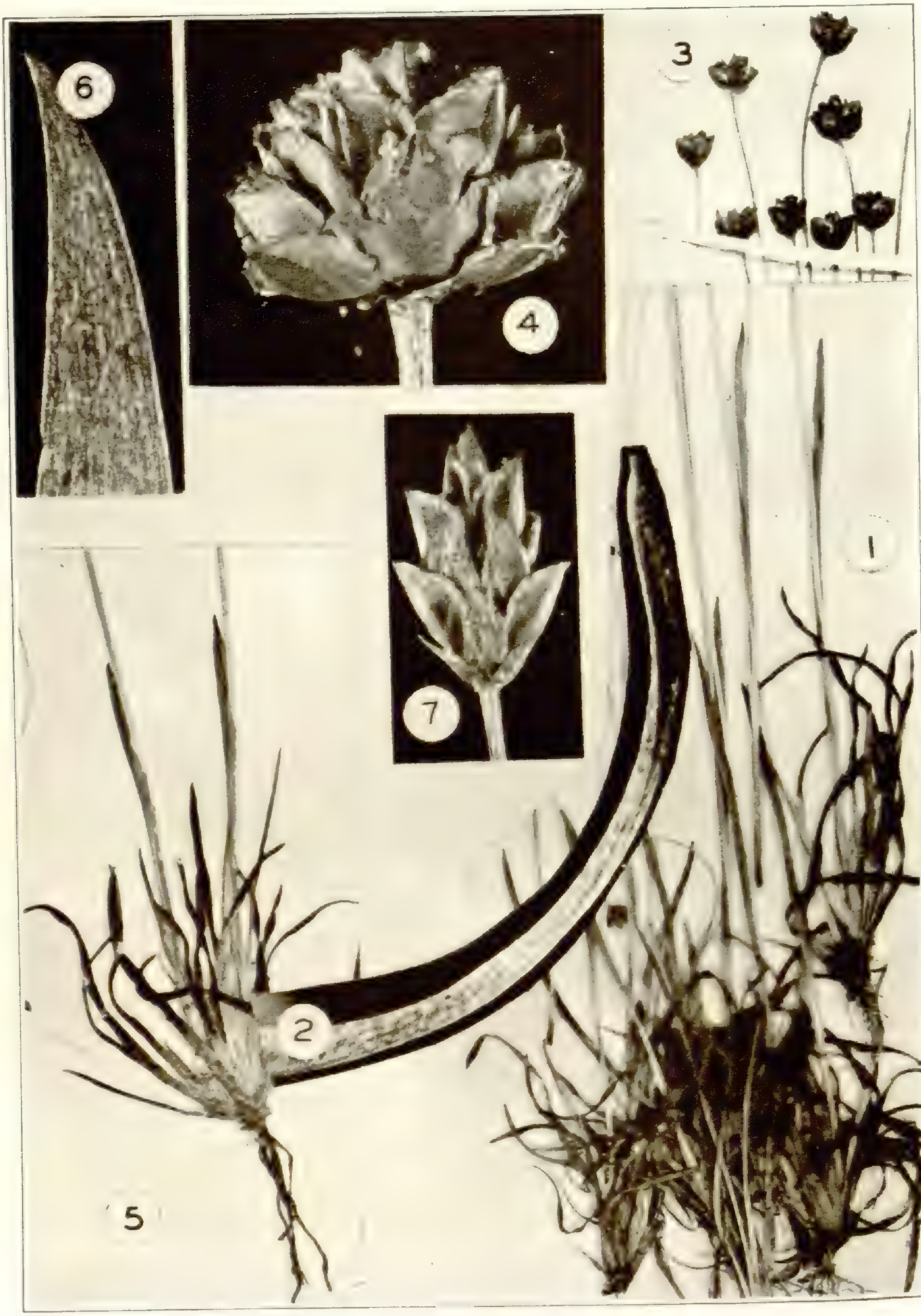

Photo. B. G. Schubert

XYRIS BREVIFOLIA: FIG. 1, bases of plants, × 1, from TYPE-REGION; FIG. 2, basal leaf, × 10: FIG. 3, group of spikes, × 1, from Michaux's TYPE, after photo. by *Cintract;* FIG. 4, spike, × 5.

X. FLABELLIFORMIS, all figs. from ISOTYPE: FIG. 5, base of plant, × 1; FIG. 6, tip of leaf, × 10; FIG. 7, spike, × 5.

Photo. B. G. Schubert

Pedicularis canadensis: fig. 1, plant, × ⅔.
P. canadensis, var. Dobbsii: fig. 2, characteristic base, × ¾; fig. 3, flowering raceme, × 1.

Photo. B. G. Schubert

PEDICULARIS CANADENSIS, var. DOBBSII, both figs. from TYPE: FIG. 1, base of plant, showing fusiform roots (center), × ⅔; FIG. 2, fruiting raceme, × 1.

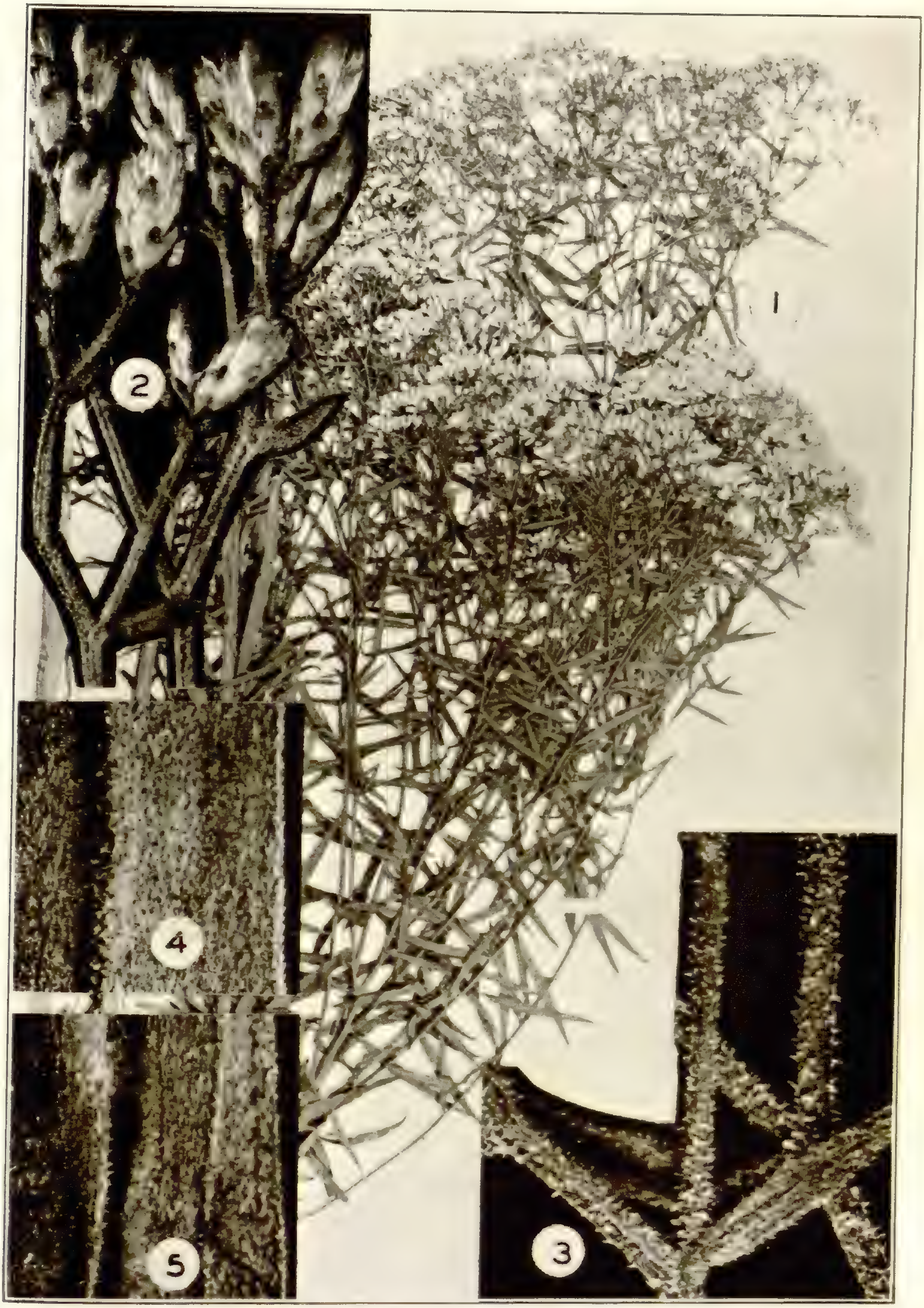

Photo B. G. Schubert

× SOLIDAGO HIRTIPES, all figs. from TYPE: FIG. 1, portion of plant, × ½; FIG. 2, pedicelled heads, × 5; FIG. 3, pedicels, × 10; FIG. 4, upper, and FIG. 5, lower surface of leaf, × 10.

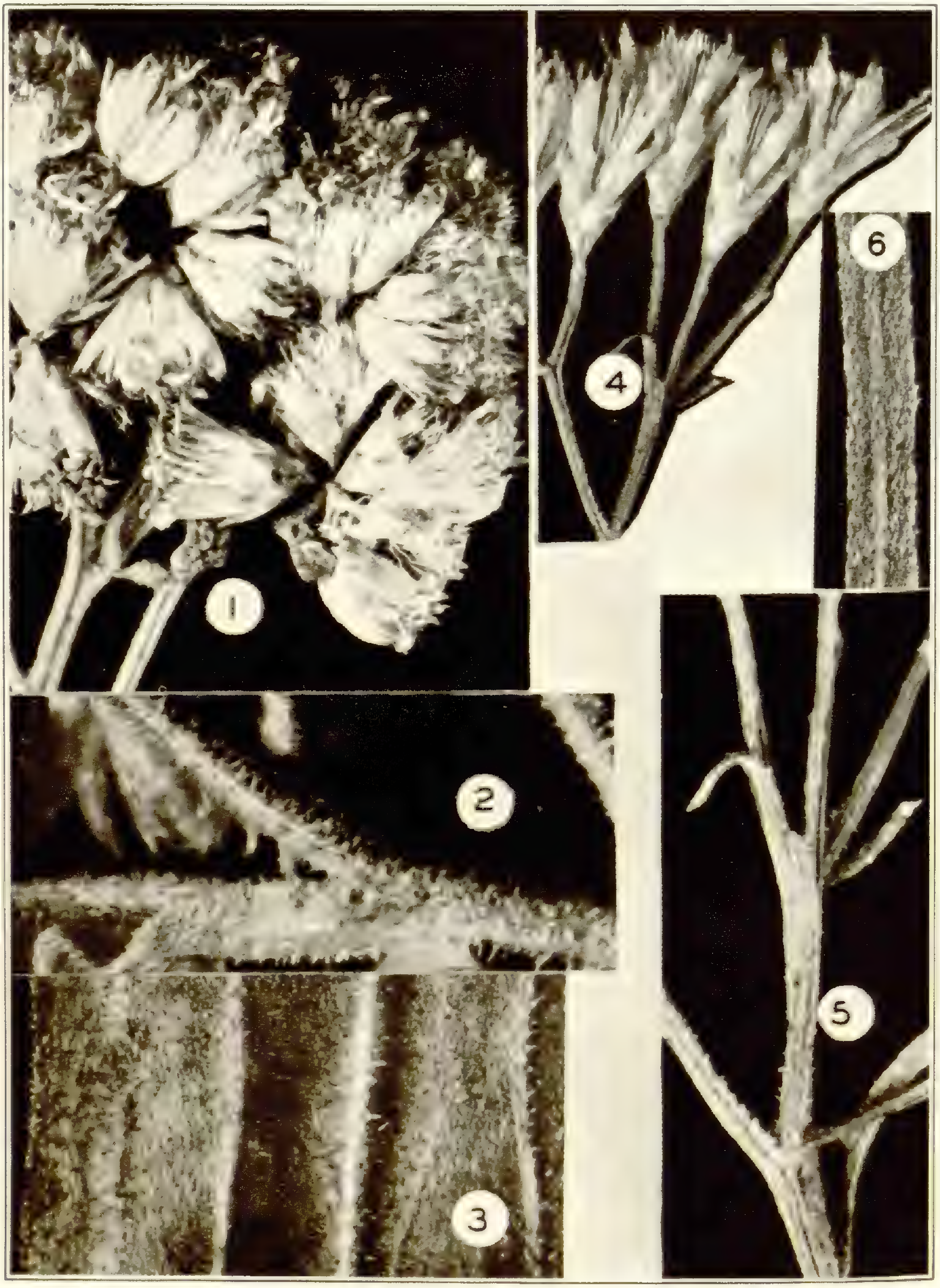

Photo B. G. Schubert

SOLIDAGO GRAMINIFOLIA, var. NUTTALLII: FIG. 1, glomerules, × 5; FIG. 2, branchlet and pedicel, × 10; FIG. 3, lower surface of leaf, × 10.
S. MICROCEPHALA from TYPE-REGION: FIG. 4, pedicelled heads, × 5; FIG. 5, branchlet and pedicels, × 10; FIG. 6, upper surface of leaf, × 10.

Photo B. G. Schubert

Xanthium Chasei: fig. 1, type, × 3/7.
X. strumarium: fig. 2, bur, × 2; fig. 3, bur, × 5.

Photo B. G. Schubert

XANTHIUM CHASEI, FIGS. 1, 2 and 3 from TYPE: FIG. 1, portion of plant, × 1; FIG. 2, bur, × 2; FIG. 3, portion of bur to show beaks and bulbous-based prickles, × 5; FIG. 4, bur, × 2, and FIG. 5, its summit, × 5.

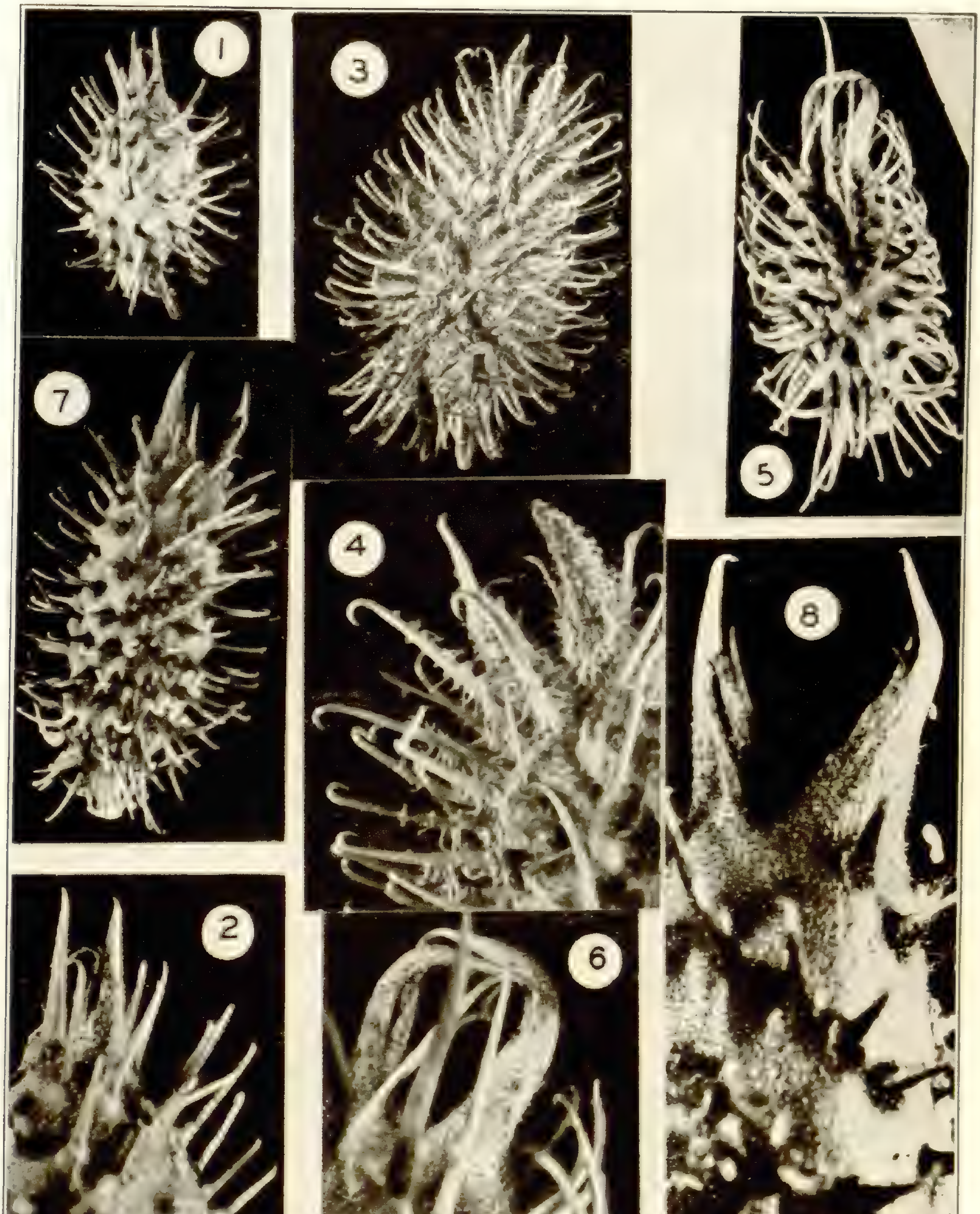

Photo B. G. Schubert

Xanthium, burs, × 2, beaks, × 5; figs. 1 and 2, X. globosum, from plant raised from seed of type; figs. 3 and 4, X. italicum; figs. 5 and 6, X. inflexum; figs. 7 and 8, X. chinense.

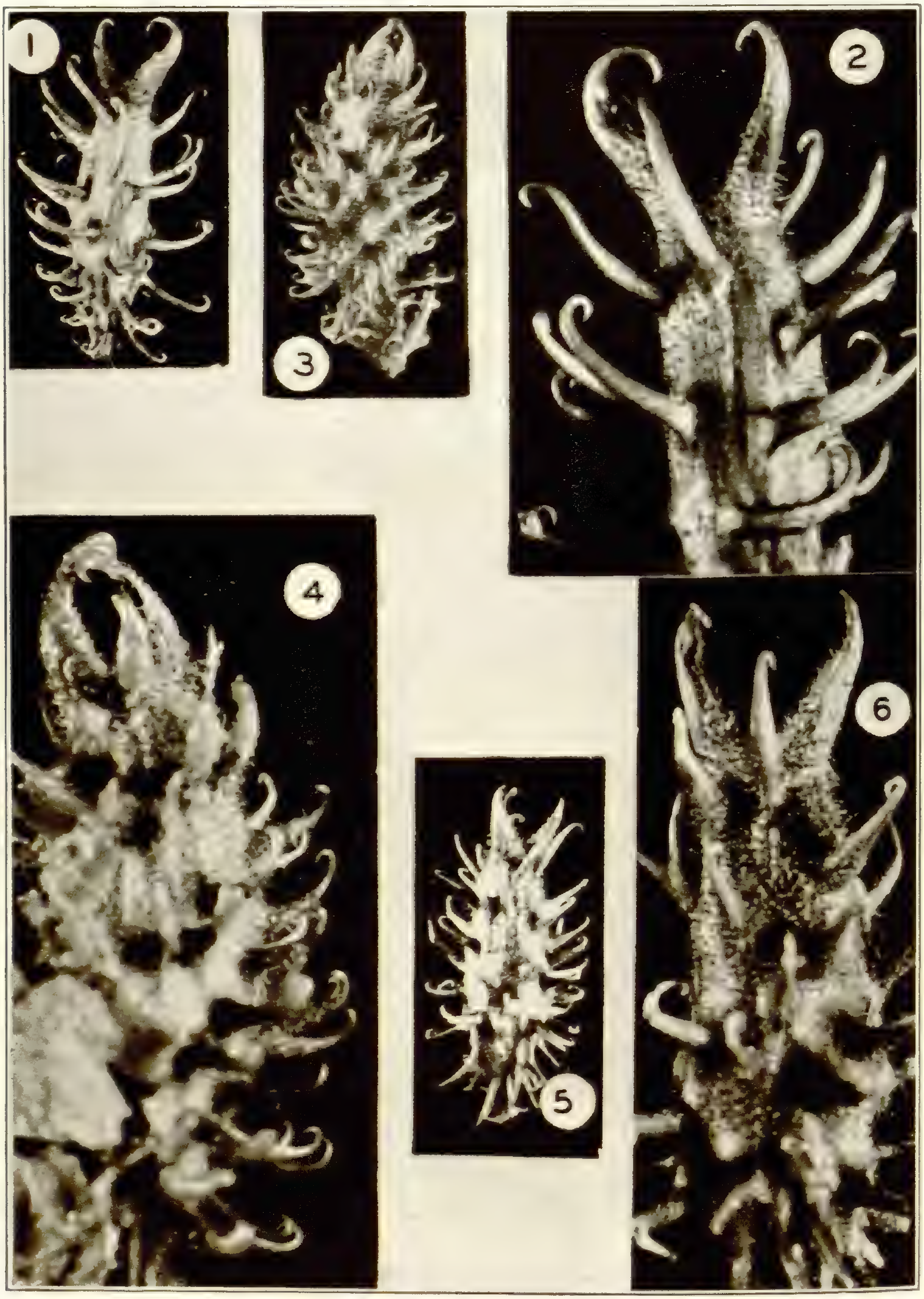

Photo B. G. Schubert

XANTHIUM, entire burs × 2, enlargements × 5: FIGS. 1–4, X. CURVESCENS, FIGS. 1 and 2 from TYPE; FIGS. 5 and 6 from TYPE of X. LEPTOCARPUM.

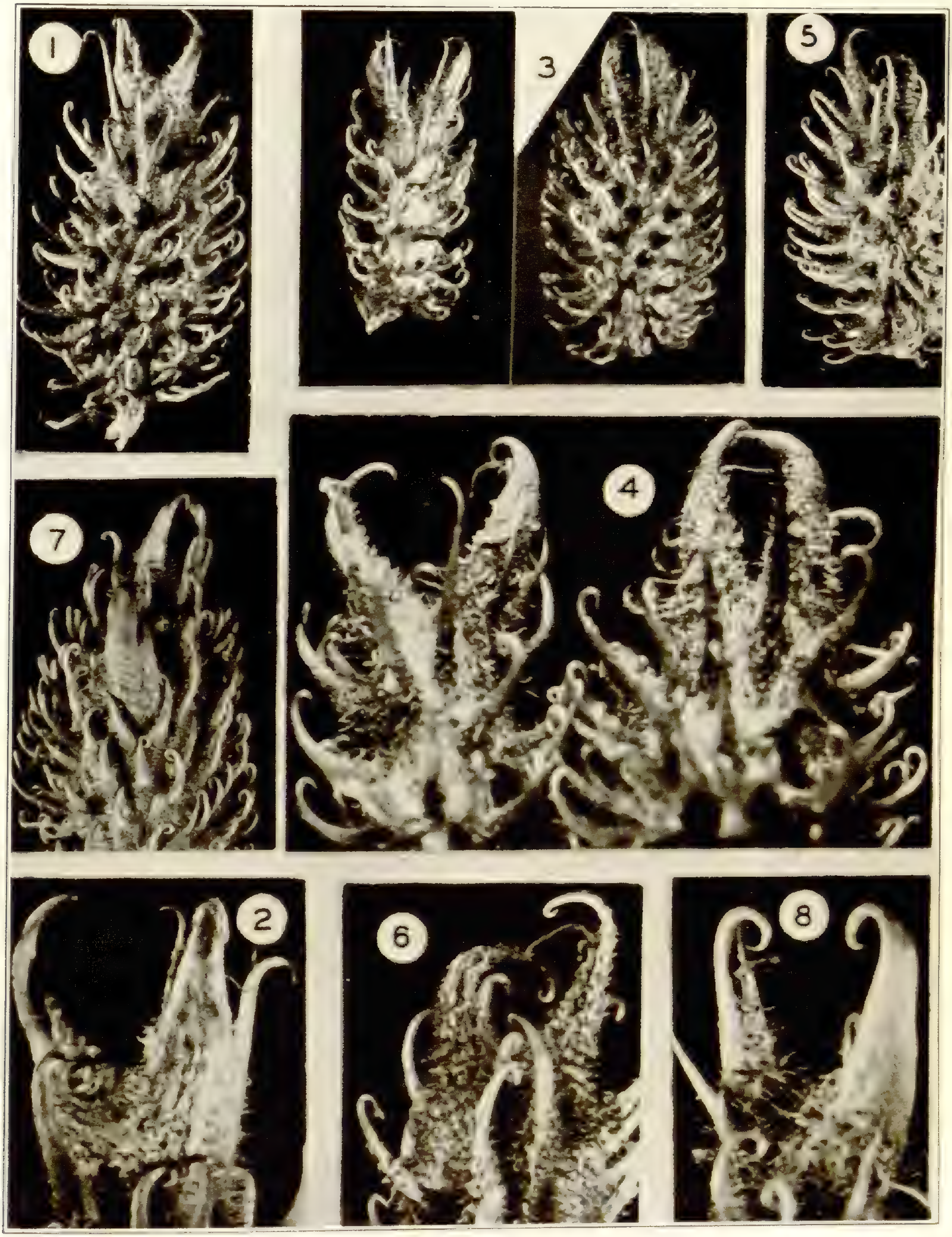

Photo B. G. Schubert

Xanthium orientale: figs. 1, 3, 5 and 7 burs, × 2; figs. 2, 4, 6 and 8 beaks, × 5; figs. 1–4 from European plants, figs. 5–8 from plants adventive in America.

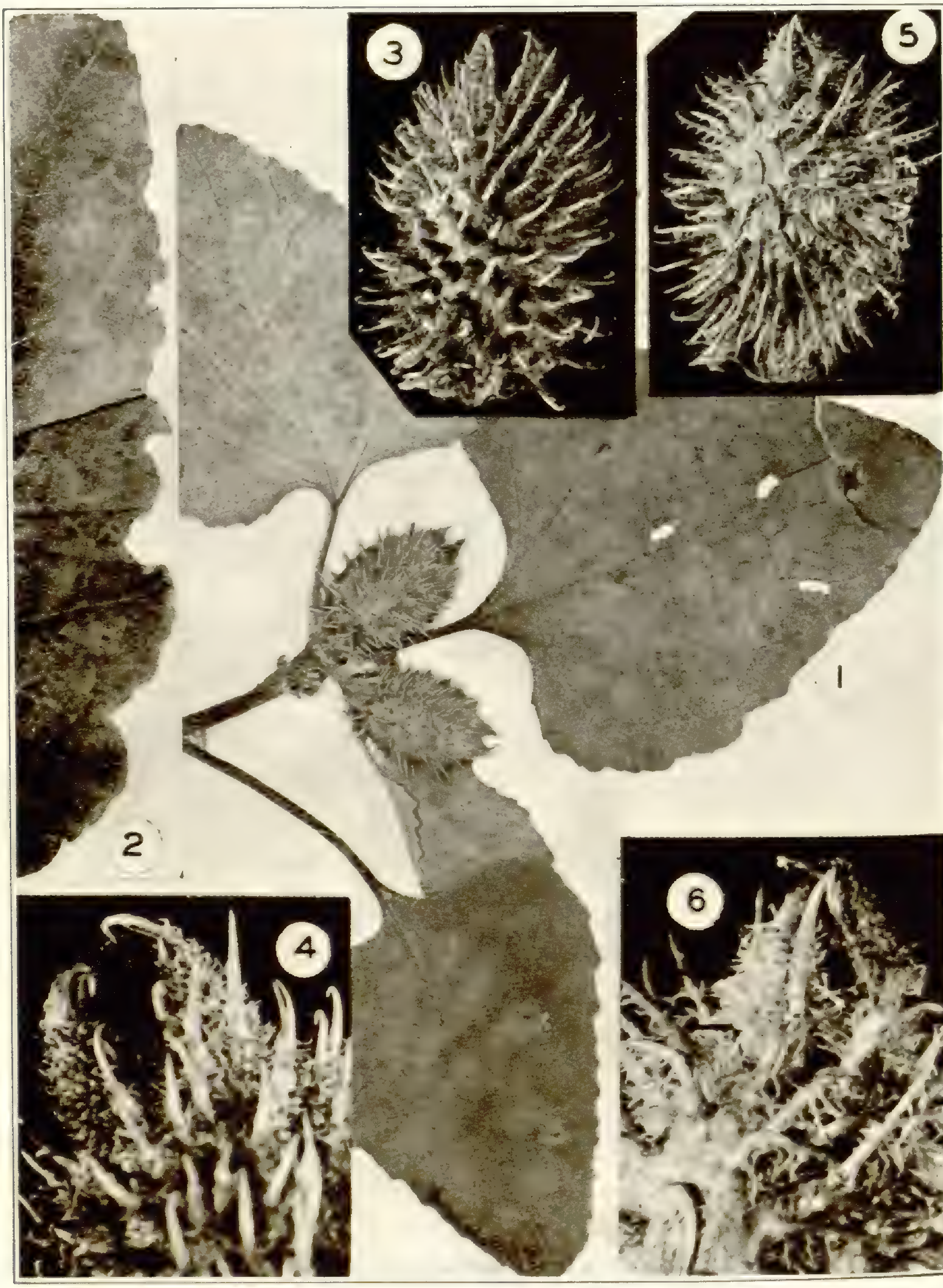

Photo B. G. Schubert

Xanthium echinatum: fig. 1, fruiting branch, × 1; fig. 2, margin of large leaf, × 1; figs. 3 and 5, burs, × 2; figs. 4 and 6, beaks, × 5.

Photo B. G. Schubert

Xanthium varians: fig. 1, portion of isotype, × 1; fig. 2, bur, × 2; fig. 3, summit of bur to show beaks, × 5.

Photo B. G. Schubert

HELIANTHUS ATRORUBENS, var. ALSODES, all figs. from TYPE: FIG. 1, plant, × 3/8; FIG. 2, pubescence of base and petioles, × 2; FIG. 3, involucre, × 2.

INDEX

New scientific names are printed in full-face type

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY

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1.—STUDIES IN THE FLORA OF BOLIVIA,—I.

Iridaceae, Part 1.

By Robert C. Foster

During the past two years, preliminary work on a proposed Flora of Bolivia has been carried on, this work consisting chiefly of a search through botanical literature for species described from Bolivian types, or other species reported to occur in Bolivia. It became clear, early in the making of this catalogue, that material was accumulating, and would continue to accumulate in increasing amounts, which could not properly be included in the Flora, as that work is now planned. To deal with this material, the present series of studies is initiated. It will contain descriptions of new species, nomenclatural notes, and preliminary treatments of special groups, treatments with more detailed descriptions, fuller synonymy, and more ample comment than will be possible in the final work.

In view of my special interest in *Iridaceae*, it is hardly surprising that this first paper should be a treatment of the Bolivian members of that family. For the most part, it is based on the collections of the Gray Herbarium, although some material has been seen from the United States National Herbarium (US), the New York Botanical Garden (NY), the Chicago Natural History Museum (F), and the Missouri Botanical Garden (MBG). I am indebted to the administrative officers of these herbaria for their kindness in lending this material to me.

Key to the Genera

a. Rootstock neither a bulb nor a corm.
  b. Perianth-tube absent, the tepals basally connate.
    c. Tepals dimorphic, the outer series sepaloid, shorter than the inner..1. *Libertia*
    c. Tepals subequal or the outer series longer than the inner, not sepaloid.
      d. Filaments more or less free; flowers short-pedicellate; capsules not exserted on long pedicels; rhizome coarse....................................2. *Orthrosanthus*
      d. Filaments connate or partly free; flowers long-pedicellate; capsules usually well-exserted; rhizome short or nearly absent...........................3. *Sisyrinchium*
  b. Perianth-tube present, long.........................4. *Phaiophleps*

a. Rootstock a bulb or corm.
  e. Stigmatic areas apical, or laterally descending from the apex, but not transverse; style-crests absent.
    f. Perianth-tube absent, but the tepals basally connate.
      g. Style-arms entire.
        h. Style-arms narrowly linear-subulate or -canaliculate.
          i. Leaves very narrow, not plicate; spathes 1-flowered; bulb-tunics castaneous or blackish-brown, thin.......5. *Calydorea*
          i. Leaves broad, plicate; spathes several-flowered; bulb-tunics purple or purple-brown, thick.....6. *Eleutherine*
        h. Style-arms not narrowly linear-subulate.
          j. Inner tepals connivent; style cylindric, style-arms elliptic, much longer than broad.......7. *Cipura*
          j. Inner tepals not connivent; style more or less trumpet-shaped, style-arms shorter than the style, cuneate-reniform, not longer than broad......8. *Sphenostigma*
      g. Style-arms bifid.
        k. Flower blue or blue-purple, inner tepals much shorter than the outer; style-arms briefly bifid.....9. *Alophia*
        k. Flower yellow, tepals subequal; style-arms deeply bifid.......10. *Tigridia*
    f. Perianth-tube present.......11. *Cardenanthus*
  e. Stigmas transverse; style-crests present.
    l. Inner tepals much reduced; anthers free from style-arms; style-arms bifid below the stigmas.......12. *Mastigostyla*
    l. Inner tepals less reduced; anthers apically adherent to the style-arms; style-arms not bifid below the stigmas......13. *Cypella*

1. LIBERTIA Spreng.

LIBERTIA **boliviana,** spec. nov. Rhizoma gracile, breve, basibus foliorum vetustorum vix vestita. Folia basalia numerosa, flabellata, linearia, longe attenuata, rigida, glabra, nervo primario marginibusque incrassatis, marginibus scabridulis, ad 15 cm. longa et 4 mm. lata; folia caulina pauca (1–3), reducta. Caulis ramosus, teres, glaber, ad 20 cm. altus. Spathae terminales, ad 1.5 cm. longae, inaequales, interior brevior, 1–3-fl.; pedicelli filiformes, ad anthesin bene exserti, ad 1.5 cm. longi. Perianthii tubus obsoletus; tepala exteriora sepaloidea, oblonga, apice obtusa, subcucullata, penicillata, 3 mm. longa, 1.25 mm. lata, viridescentia; tepala interiora alba (?), ovato-obovata, obtusa, 4.5 mm. longa, 3 mm. lata, lamina in parte superiore crenulato-undulata. Stamina cum styli ramis alterna; filamenta libera, 2 mm. longa; antherae ca. 1 mm. longae, ovoideae vel ovato-ovoideae. Stylus 1 mm. longus; styli rami 2 mm. longi, subulati. Capsula immatura globosa, trisulcata, glabra; semina non visa. LA PAZ: NOR YUNGAS: Unduavi, 3200 m. alt., November, 1910, *Buchtien*, no. 701 (TYPE, G), distributed as *Sisyrinchium* sp.

Until 1939, the genus *Libertia* was thought to occur in Australia, New Zealand, New Guinea, and on the west coast of South

America, the several species on that continent being confined to Chile. In that year, *L. colombiana* R. C. Foster was described from two collections made by Dr. F. W. Pennell, in Colombia. The description of the present species again increases the range of the genus in South America, for it is, so far as known to me, the first record of its occurrence in Bolivia.

L. boliviana superficially resembles *L. tricocca* Phil. and *L. colombiana*, but differs in its smaller, fewer flowers, and in having the stamen-filaments free to the base, instead of being united for much of their length.

2. ORTHROSANTHUS Sweet

Orthrosanthus nigrorhynchus Rusby. Coarse perennial tufted herb, with a short coarse rhizome. Basal leaves several to many, firm-textured, finely ribbed, linear, acute, to 45 cm. long, 5 mm. wide, the ribs puberulent and the thickened margins densely scabridulous-puberulent; cauline leaves several, the lowermost resembling the basal leaves, the uppermost much reduced. Stem terete, firm, puberulent, simple, or rarely branched in the inflorescence, to 5–6 dm. tall. Inflorescence racemose-paniculate, each pedunculate flower-cluster subtended by a spathiform bract (or reduced cauline leaf), these mostly exceeding the flowers. Spathes subequal, or the outer shorter, to 2 cm. long, finely ribbed, somewhat brown-membranous at the apex, 1-flowered (rarely 2-flowered ?). Ovary oblong-elliptic, glabrous, to 1 cm. long, sessile, or nearly so. Flowers white, about 3 cm. in diameter, rotate, the tepals slightly connate at the base, but a true perianth-tube absent; tepals subequal, about 1.5 cm. long, 6 mm. wide, obovate, rounded at the apex and abruptly short-mucronate. Stamens alternate with the style-arms; filaments united at the base, but mostly free, ca. 3 mm. long; anthers linear, 5 mm. long. Style short, about as long as the united portion of the filaments; style-arms entire, conduplicate, becoming wider in the upper portion, much shorter than the anthers, about 3 mm. long. Capsule oblong-ellipsoid, to 2 cm. long, sessile in the spathes or nearly so, not strongly exserted from the spathes, angled; seeds numerous.—Mem. Torr. Bot. Club, vi (1). 126 (1896). *Orthrosanthus tunariensis* O. Ktze. Rev. Gen. Pl. iii (2). 309 (1898). *O. Ocisapunga* Ruiz ex Diels in Engl. & Prantl, Nat. Pflanzenfam. (rev. ed) xva. 478 (1930), but not *Sisyrinchium Occissapungum* Ruiz ex Klatt in Linnaea, xxxi. 379 (1861–62). *O. chimboracensis* sensu Rusby, non (HBK.) Baker, in Bull. Torr. Bot. Club, xxix. 224 (1901). This species is apparently confined to Bolivia and Peru. LA PAZ: Larecaja: near

Sorata, between El Choro and Pampa de Chiliata, in grassy places, 3200–3400 m. alt., May, *Mandon*, no. 1209 (G); Sorata, ca. 3300 m. alt., February, 1886, *Rusby*, no. 700 (G). COCHABAMBA: near Cochabamba, 1891, *Bang*, no. 1074 (isotype, G); CHAPARE: Cumbre de Colomi, 3800 m. alt., March, 1941, *Cárdenas*, no. 2217 (US).

Although Kuntze's material of *O. tunariensis* has not been seen, it seems quite safe to place that name in synonymy, for he described it briefly (l. c.) as follows: "Ab simili O. chimborazensi differt floribus albis foliis angustioribus. Bolivia: im Tunarigebirge 3600 m hoch stellenweise häufig."

I am unable to differentiate the plant of Bolivia and Peru, briefly described by Diels, l. c., as *O. Ocisapunga* Ruiz, and the Bolivian *O. nigrorhynchus*. It is worth noting that the binomial given by Diels and the binomial *Sisyrinchium Occissapungum* Ruiz ex Klatt apply to different plants. Although Klatt cited a Ruiz collection from Peru, he also cited two Mexican collections. From his description, it is clear that he was redescribing *O. chimboracensis* (HBK.) Baker, which differs from *O. nigrorhynchus* in its blue flowers, anthers longer than the filaments, the spathes 2–3-flowered, and the whole plant generally taller and stouter. No Bolivian material of *O. chimboracensis* has yet been seen by me, although it may occur in that country. Baker, Handbk, Irid. 119 (1892), attributed it to Bolivia, but this was probably on the basis of *Mandon*, no. 1209, which he mentioned as a "high alpine variety."

3. SISYRINCHIUM L.

A tentative treatment of the Bolivian species of this genus was prepared, but it is so unsatisfactory in a number of respects that it seems undesirable to present it here. A number of the approximately sixteen species can satisfactorily be treated with the material now in hand, but the uncertainty as to what binomials should be applied to a few species, and the extremely poor and scanty material of one or two others, make it necessary to postpone the treatment of this genus until more material can be studied. It will be presented as Part 2 of the present study.

4. PHAIOPHLEPS Raf.

PHAIOPHLEPS ACAULIS (Klatt) R. C. Foster. Densely caespitose, nearly acaulescent, rhizomatous perennials, the rhizome short, with long, coarsely fibrous roots. Leaves several, crowded, clothed at the base by the fibrous remains of old leaves, linear, acute, glabrous, to 6 cm. long, 1 mm. wide. Stem almost absent, the spathe-clusters appearing sessile in the leaf-bases, one to several spathe-clusters in a clump. Spathes subequal, rigid, to 2 cm. long, 1-flowered, the pedicels short. Perianth-tube narrow, enlarging near the apex, to 1.5 cm. long; tepals elliptic-oblong, to 7–8 mm. long, 2 mm. wide. Stamens alternate with the style-arms; filaments united for 7 mm., then free for 4 mm.; anthers oblong, versatile, 2 mm. long. Style as long as the column of filaments; style-arms linear-subulate, entire, ca. 3 mm. long. Capsule oblong-ellipsoid, about 5 mm. long; seeds numerous, very small, angular.—CONTRIB. GRAY HERB. cxxvii. 43 (1939). *Sisyrinchium acaule* Klatt in Linnaea, xxxiv. 736 (1865–66). *Solenomelus acaulis* (Klatt) Baker in Journ. Linn. Soc. Bot. xvi. 121 (1877). *Symphyostemon acaule* (Klatt) Benth. ex Baker, Handbk. Irid. 138 (1892). Apparently endemic in Bolivia. LA PAZ: LARECAJA: near Combaya and Mt. Chimburú, in grassy places, 4000–4200 m. alt., October, 1858–January, 1859, *Mandon*, no. 1212 (isotype, G).

This curious and insignificant plant is not likely to be mistaken for any other, except possibly for a very dwarf *Sisyrinchium*, from which it is immediately distinguished by its perianth-tube, or for a *Cardenanthus*, from which genus it can readily be separated by its rhizome and entire style-arms.

5. CALYDOREA Herb.

CALYDOREA APPROXIMATA R. C. Foster. Corm ovoid, to 1.5 cm. high, ca. 1 cm. in diameter, the membranous brown tunics somewhat prolonged upwards in a short collar around the base of the stem. Basal leaves 2–4, linear, acute, glabrous, 3.5–14 cm. long, 0.4–1 mm. wide (usually less than 1 mm.); cauline leaf immediately subtending the spathes, the shortly spathiform base clasping the bases of the true spathes, 4–7.5 cm. long, the erect or slightly divergent linear-attenuate blade 0.5–1 mm. wide. Stem simple, filiform, glabrous, 5–10 cm. long, the inflorescence a pair of 1-flowered spathes. Spathes quite unequal, the outer shorter (to 8 mm. less), the inner spathes 1.4–2 cm. long, both herbaceous, acute; pedicels filiform, shorter than the spathes at anthesis. Ovary 3–4 mm. long, oblong, glabrous. Tepals somewhat unequal, the outer series to 1.5 cm. long, 4 mm. wide, the inner series to 1 cm. long, 2–2.5 mm. wide, both series somewhat obovate, obtuse, probably blue, lighter in color toward the base (at least *in sicco*). Stamens alternate with the style-arms; filaments 2.5 mm. long; anthers 2.5–3 mm. long, becoming spirally twisted with age. Style 2.5 mm. long; style-arms 2–2.5 mm. long, entire. Capsule and seeds not seen.—CONTRIB. GRAY HERB. clv. 46 (1945). TARIJA: Toldos, near Bermejo, 1850 m. alt., Dec. 5, 1903, *Fiebrig*, no. 2344 (TYPE, G).

Two other species, *C. azurea* Klatt and *C. campestris* Klatt, have been recorded by Herzog, in Mededeel. Rijks Herbar. Leiden, xl. 39 (1921), as occurring in the Department of Santa Cruz, near Samaipata and Santa Cruz de la Sierra, respectively. No Bolivian material has been seen by me as yet.

6. ELEUTHERINE Herb.

ELEUTHERINE BULBOSA (Mill.) Urban. Plants to 0.5 m. tall, the bulbs rather large, with thick, firm, red- or purple-brown tunics. Basal leaves few, linear, plicate, glabrous, to 45 cm. long, 6 mm. wide, apically long-attenuate. Stem simple, terete, glabrous, the terminal inflorescence appearing lateral in the axil of the apical cauline leaf, which exceeds it; inflorescence of several more or less pedunculate flower-clusters. Spathes several- to many-flowered, to 2 cm. long, herbaceous, the inner spathes more or less hyaline; pedicels not exserted at anthesis. Flowers white (or bluish-white), to 3.5 cm. in diameter, fugacious; perianth-tube absent, the tepals slightly connate at the base, spreading; tepals subequal, about 1.5 cm. long, obovate, obtuse. Stamens alternate with the style-arms; filaments free, 1.5–2 mm. long; anthers linear, 3–4 mm. long. Style about 2 mm. long; style-arms entire, linear-subulate, about 3–4 mm. long, shorter than or equal to the anther-apex. Capsule subglobose to oblong, exserted from the spathes, 6–20 mm. long; seeds numerous, irregularly angled, dark brown.—In Fedde, Repert. Spec. Nov. xv. 305 (1918). *Sisyrinchium bulbosum* Mill. Dict. (ed. 8) no. 3 (1768). *Ixia americana* Aubl. Pl. Guian. i. 33 (1775). *Moraea plicata* Swartz, Fl. Ind. Occ. i. 82 (1797). *Marica plicata* (Sw.) Ker in Bot. Mag. xviii. t. 655 (1803). *Eleutherine plicata* (Sw.) Herb. in Bot. Reg. xxix. sub t. 57 (1843). *Cipura plicata* (Sw.) Griseb. Fl. Brit. W. Ind. 589 (1864). *Galatea plicata* (Sw.) [incorrectly ascribed to Salisb. by] Baker in Journ. Linn. Soc. Bot. xvi. 101 (1877), *in synon*. *Galatea vespertina* Salisb. in Trans. Hort. Soc. Lond. i. 310 (1812), *nomen illegitimum*. Widespread, from Mexico through the West Indies to Venezuela, the Guianas, Brazil, Argentina, and Bolivia. SANTA CRUZ: SARA: pampas, monte y barbechos, Buenavista, 450 m. alt., Oct. 6, 1924, *Steinbach*, no. 6569 (G). Reported by Fries, in Arkiv f. Bot. viii (no. 8). 27 (1909), from TARIJA: O'CONNOR: Narvaez [as Narvais], in campo graminoso, *Fries*, no. 1293.

7. CIPURA Aubl.

CIPURA PALUDOSA Aubl. Small bulbous plants, the bulbs small, ovoid, 1.5 cm. high, the tunics thin, dark brown, membranous. Basal leaves 1–3, to 22 cm. long, 4 mm. wide, linear, glabrous, plicate. Stem simple, terete, glabrous, 5–15 cm. tall, with an apical cauline leaf immediately subtending the inflorescence and much exceeding it, to 19 cm. long, 5 mm. wide; inflorescence terminal but appearing pseudo-lateral. Spathes unequal, the outer to 2 cm. long, the inner to 3.5 cm. long, 2–3-flowered, the pedicels not exserted at anthesis. Flowers pale blue or white, fugacious, the tepals basally connate, but a true perianth-tube absent; tepals markedly unequal, the outer tepals spreading, 2.3 cm. long, 1 cm. wide, obovate-cuneate, obtuse; inner tepals much shorter and narrower, connivent, with the apex slightly recurved outward. Stamens alternate with the style-arms; filaments free, to 2.5 mm. long; anthers linear, to 2.5–3 mm. long. Style slender, ca. 2.5 mm. long; style-arms entire, narrowly elliptic, somewhat petaloid, 2.5–3 mm. long. Capsule more or less oblong, 1.5 cm. long, exserted; seeds numerous, brown, irregularly angled.—Pl. Guian. i. 38, t. 13 (1775). *Marica paludosa* (Aubl.) Ker in Bot. Mag. xviii. t. 646 (1803). *Cipura major* Rusby in Bull. N. Y. Bot. Gard. vi. 493 (1910). A widespread and very variable species, ranging from Mexico and the West Indies to Venezuela, Colombia, the Guianas, Brazil, Uruguay, Paraguay, Peru, and Bolivia. LA PAZ: CAUPOLICÁN: Ixiamas, ca. 235 m. alt., Dec. 20, 1921, *O. E. White* (Mulford Exped.), no. 2307 (G), distributed as *Cipura major* Rusby; Tumupasa, 600 m. alt., Dec. 16, 1901, *R. S. Williams*, no. 546 (type of *C. major*,* NY). SANTA CRUZ: SARA: Rio Yapacani (near Buenavista), 400 m. alt., June, 1892, *O. Kuntze* (*fide* Kuntze, Rev. Gen. Pl. iii (2). 308); campos humidos, Buenavista, 500 m. alt., Mar. 25, 1921, *Steinbach*, no. 5452 (G), 450 m. alt., Mar. 8, 1925, *Steinbach*, no. 6944 (G).

At present, I am unable to find any clear lines of segregation in this highly variable species, and consequently *C. major* Rusby has been placed in synonymy.

8. SPHENOSTIGMA Baker

Bulbous, perennial, caulescent herbs. Basal leaves few, linear or lance-linear, plicate; cauline leaves few, similar to the basal

* Not seen

leaves, or the upper ones reduced. Stem simple or branched. Spathes herbaceous, terminal, 1-several-flowered, the filiform pedicels equalling or a little shorter than the spathes. Ovary oblong-clavate, glabrous. The two series of tepals subequal or very dissimilar in size and shape, spreading, connate at the base, but a true perianth-tube absent. Stamens alternate with the style-arms, the filaments free or united, the anthers linear, with a narrow connective. Style becoming trifid, the arms entire, the stigmatic areas apical. Capsule oblong; seeds numerous, irregularly angled, dark brown.

KEY

a. Filaments to 6 mm. long, united; inner tepals nearly as long as the outer, broadly cuneate-spatulate, briefly mucronate; style-arms with linear-falcate spreading lateral appendages..1. *S. boliviense*

a. Filaments 3 mm. long, free; inner tepals less than half as long as the outer, narrowly cuneate, long-apiculate; style-arms not laterally appendaged.

b. Upper cauline leaves not reduced, not bulbilliferous in the axils..2. *S. Mandoni*

b. Upper cauline leaves reduced, bulbilliferous in the axils...2a. *S. Mandoni* var. *bulbilliferum*

1. SPHENOSTIGMA BOLIVIENSE Baker. Bulb ovoid, 2 cm. high, 1.5 cm. wide. Basal leaves 1–2, to 30 cm. long, 8 mm. wide, linear, attenuate, acute, glabrous, plicate; cauline leaves 1–2, to 25 cm. long, exceeding the inflorescence, to 1.7 cm. wide, plicate, glabrous. Stem simple or 1-branched, terete, glabrous, 12–30 cm. high. Spathes subequal, or the outer slightly shorter, 2–2.5 cm. long, acute, subventricose, 3–4-flowered, the pedicels slightly shorter than the spathes at anthesis, later elongating slightly. Ovary oblong-clavate, glabrous, to 6–7 mm. long. Flowers bright blue (*fide* Baker), lighter in the center; outer tepals to 1.5 cm. long, nearly 1 cm. wide, ovate-obovate, obtuse, the inner tepals nearly as long, to 6–7 mm. wide, cuneate-spatulate, obtuse or slightly retuse, briefly mucronate. Filaments united, to 6 mm. long; anthers to 2 mm. long. Style as long as the column; style-arms and stigmas flattened-reniform, with linear-falcate lateral appendages, about 2.5 mm. wide, broader than long, not equalling the anther-apex. Capsule oblong-clavate, to 1.5 cm. long; mature seeds not seen.—Handbk. Irid. 107 (1892). Apparently endemic in Bolivia. LA PAZ: LARECAJA: near Sorata, between Munaypata and Lucmapampa, Jan.–Mar. 1858, *Mandon*, no. 1225 (TYPE, not seen; isotypes, G, NY).

2. S. **Mandoni** (Rusby), comb. nov. Bulbs ovoid, to 3 cm. high. Basal leaves few, exceeding the stem, to 1 cm. wide, linear, acute, plicate, scabridulous on the nerves and margins; cauline leaves 1–2, not reduced, the upper one inserted 10–15 cm.

below the inflorescence. Stem to 1 m. high, terete, glabrous, simple or branched in the axils of the cauline leaves. Spathes to 4 cm. long, subequal, 4–5-flowered, the pedicels as long as the spathes at anthesis. Flowers blue, to 6 cm. in diameter, the tepals very unequal; outer tepals to 3 cm. long, ca. 1.8 cm. wide, broadly cuneate-spatulate, more or less obtuse at the apex; inner tepals to 8 mm. long, ca. 2 mm. wide, narrowly cuneate, long-apiculate, the apiculus 2 mm. long. Filaments free, 3 mm. long; anthers 3 mm. long. Style about 6 mm. long; style-arms and stigmas exceeding the anthers, not appendaged laterally, cuneate-reniform, about 2 mm. wide. Capsule oblong, to 3.5 cm. long; seeds 2 mm. long.—*Cypella Mandoni* Rusby in Mem. Torr. Bot. Club, vi (1). 125 (1896). COCHABAMBA: near Cochabamba, 1891, *Bang*, no. 1077 in part (TYPE, NY; isotypes, US no. 933787 in part, US no. 207100 in part, G in part, MBG in part); *Bang*, no. 1157 (NY, US, MBG), in fruit.

Dissection of the type of *Cypella Mandoni* showed that there had been a misapprehension as to the genus in which this very distinct species belongs. With apical stigmatic areas, and the stamens alternate with the cuneate-reniform style-arms, it clearly belongs in *Sphenostigma*, and the transfer is made here. Study of other sheets of the type-number disclosed that there is a mixture present. Some of the specimens agree well with the type-sheet (which does not contain a mixture), but others show plants of a slighter aspect, with the upper cauline leaves reduced and bulbilliferous. These plants are here distinguished as the following variety.

2a. S. MANDONI var. **bulbilliferum,** var. nov. Folium basale unicum, 20–35 cm. longum, 1–4 mm. latum, lineare, nervis marginibusque sparse scabridulis; folia caulina 2–4, infimum productum, ad 22 cm. longum et 2–5 mm. latum, superiora reducta, spathiformia, axillibus bulbilliferis. Caulis simplex vel ramosus, teres, glaber, ad 35 cm. longus. Spathae ad 3 cm. longae, exterior quam interiorem brevior, acutae, 1–3-fl.; pedicelli spathas aequantes. Ovarium ca. 4 mm. longum. Flores caerulei; tepala exteriora ad 2.5 cm. longa, 1.8 cm. lata, cuneato-spathulata, obtusa, tepala interiora ad 8 mm. longa, ca. 1.8 mm. lata, anguste cuneata, longe apiculata, apiculus ca. 2 mm. longus. Filamenta libera, 3 mm. longa; antherae lineares, 3 mm. longae. Stylus ca. 6 mm. longus; styli rami antheras excedentes, cuneato-reniformes, exappendiculati, ca. 2 mm. lati. Capsula seminaque non visa. LA PAZ: LARECAJA: near Sorata, Cerro del Iminapi, 2650 m. alt., Feb. 1858, *Mandon*, no. 1226 in part (TYPE, G;

isotypes, NY, US). COCHABAMBA: near Cochabamba, 1891, *Bang*, no. 1077 in part (G in part, US no. 207100 in part, US no. 933787 in part, MBG in part).

The type-number, *Mandon*, no. 1226, is apparently a mixture, for this number is the type-number of *Tigridia bracteolata* (Klatt) Macbr. Klatt's original description stressed the facts that the filaments were united in a column and that the style-arms were bifid, neither point being true of any material on the three sheets of this number seen by me. These are clearly and unmistakably *Sphenostigma*. Unfortunately, none of the material seen is in really good condition. It is possible that better material will show that the plant deserves specific rank, but, for the time being, it seems preferable to leave it in its present status.

9. ALOPHIA Herb.

Alophia tigridioides Hicken. Bulb ovoid, to 3 cm. high. Basal leaves several, to 30 cm. long (usually shorter), 3–6 mm. wide, linear, attenuate, acute, plicate, glabrous; cauline leaves 1–2, usually reduced, spathiform. Stem sometimes simple, usually branched, 7–25 cm. long, the inflorescences terminal. Spathes unequal, the outer shorter, to 5 cm. long, 2-flowered, the pedicels as long as the inner spathe at anthesis. Ovary oblong-ellipsoid, glabrous, ca. 8 mm. long. Flower blue or bluish-purple; outer tepals spreading, to 3 cm. long and 1 cm. wide, obovate, rounded at the apex and briefly mucronate; inner tepals narrowly ovate-lanceolate, acute, to 1 cm. long and 3 mm. wide, probably more erect than the outer tepals. Stamens opposite the style-arms; filaments united, the column 5 mm. long; anthers 7–8 mm. long, linear, coiling spirally downward with age. Style as long as the column; style-arms to 4 mm. long, bifid for 2 mm., the halves divergent. Capsule oblong-ellipsoid, to 1.8 cm. long; seeds numerous, brown, ca. 1 mm. in diameter.—Darwiniana, i. 116 (1924). Frequent in northwestern and central Argentina, and now recorded from southern Bolivia. TARIJA: Avilés: Camacho, 2500 m. alt., Dec. 15, 1903, *Fiebrig*, no. 2579 (G); this was distributed as *Calydorea speciosa* Herb.

Current studies on the genus *Tigridia* and its allies indicate that there may be a reduction in the number of species recognized in *Alophia*, but for the time being, at least, the binomial *A. tigridioides* is retained.

10. TIGRIDIA JUSS.

Tigridia bracteolata (Klatt) Macbride in Candollea, v. 348 (1934). *Beatonia bracteolata* Klatt in Linnaea, xxxiv. 733 (1865–66). *Nemastylis bracteolata* (Klatt) Baker, Handbk. Irid. 114 (1892). This is the only Bolivian member of the genus known to me at present, but, unfortunately, no material of it has been available. As was pointed out in an earlier part of this paper, the type-number, *Mandon*, no. 1226, is a mixture, the three examples of it which have been seen by me belonging in the genus *Sphenostigma*. Macbride, l. c., saw yet another example at Geneva and, on the basis of this specimen and the description, made the transfer to *Tigridia*. The type-number was collected near Sorata, Cerro del Iminapi, at 2650–2800 m. alt., in February and March. For the benefit of collectors in that area who might chance to find it, a description, based on Klatt's original description, follows:

Bulb oblong-globose. Basal leaf ensiform, plicate, long-acuminate, 2–5 mm. wide, shorter than the nine-inch stem; cauline leaves several, reduced. Stem terete, glabrous, simple or branched. Spathes unequal, about 2.5 cm. long, 2–3-flowered. Flowers yellow, the tepals subequal, ovate, acuminate. Filaments united in a column. Style as long as the column; style-arms bifid, the lobes subulate.

The mention of reduced cauline leaves suggests that this detail may have been drawn from the *Sphenostigma*-element in the type-number.

11. CARDENANTHUS R. C. Foster

Plants small, bulbous, subacaulescent. Leaves few, narrowly linear. Inflorescence subsessile, the spathes terminal, flowers shortly pedicellate. Flowers basally infundibuliform, a true perianth-tube present, the tepals markedly unequal in size and shape, the outer series oblanceolate-spatulate, the inner series much reduced, narrowly linear-subulate or linear-oblanceolate. Stamens opposite the style-arms; filaments united in a column, inserted at the apex af the perianth-tube; anthers sessile or subsessile on the column. Style filiform, three-branched above, the branches bifid, canaliculate, apically stigmatose. Capsule oblong-ellipsoid; seeds small, numerous.

KEY

a. Inner tepals glandular at base of claw; perianth-tube 4 mm. long.
  b. Inner tepals oblanceolate, 1 mm. wide; style-arms 2 mm. long, bifid for 1 mm. . . . . .1. *C. orurensis*
  b. Inner tepals linear, less than 0.5 mm. wide; style-arms 3.5 mm. long, bifid for ca. 2 mm. . . . . .2. *C. boliviensis*
a. Inner tepals not glandular; perianth-tube not over 2 mm. long. 3. *C. tunariensis*

1. CARDENANTHUS **orurensis,** spec. nov. Planta subacaulescens. Bulbus ovoideus, 2–2.5 cm. altus, 1–2 cm. diam. Folia basalia 1–2, valde reducta, 2–4 cm. longa; folia caulina 2, spathas subtendentia, inferius 13–15 cm. longum, 1.5–2 mm. latum, lineare, acutum, glabrum, nervatum, superius 3.5–5 cm. longum, 1 mm. latum. Spatha exterior ad 2 cm. longa, herbacea vel submembranacea, acuta, spatha interior ad 2.4 cm. longa, apice truncata, 1- (raro 2-) fl.; flores pedicellati, pedicelli ad 6 mm. longi. Ovarium oblongum, glabrum, 5–7 mm. longum. Flores purpurei vel caeruleo-purpurei; perianthii-tubus 4 mm. longus; tepala exteriora ad 1.2 cm. longa, 6 mm. lata, breve unguiculata, obovata, apice subobtusa; tepala interiora ad 4–4.5 mm. longa, 1 mm. lata, anguste elliptica vel oblanceolata, acuta, basi glanduloso-tumescentia. Staminum columna 5 mm. longa; antherae lineares, 3 mm. longae. Stylus columnam longitudine aequans; styli rami 2 mm. longi, bifidi 1 mm. Capsula seminaque non visa. ORURO: CERCADO: Hacienda Huancaroma, near Eucaliptus, 3800 m. alt., Feb. 19–27, 1934, *Hammarlund*, no. 94 (TYPE, NY).

At first, the seven plants on the type-sheet appeared to be *C. boliviensis,* but dissection gave evidence of differences. Not only are the spathes almost always 1-flowered, instead of 2–3-flowered, but the inner tepals are broader and elliptic or oblanceolate, rather than narrowly linear, while the anthers and style-arms are shorter. It is possible that a fruiting specimen, from which the details of capsule and seeds were taken for the generic characterization, belongs here rather than with *C. boliviensis:* POTOSÍ: Uyuni, 3700 m. alt., Mar. 25, 1921, *Asplund*, no. 6362 (US).

2. C. BOLIVIENSIS R. C. Foster. Plant acaulescent (with a 2–4 cm. subterranean stem), the bulb ovoid, 2 cm. high, 1 cm. wide. Basal leaves none; cauline leaves 2, subtending the spathes, the lower to 9 cm. long, 1 mm. wide, the upper to 4 cm. long, 1 mm. wide, linear, acute, glabrous. Spathes herbaceous, the outer to 1.5–2 cm. long, acute, the inner 2–2.5 cm. long, ob-

tuse, retuse, 2–3-flowered, the flowers nearly sessile in the spathes. Ovary ca. 3 mm. long, ellipsoid, glabrous. Flowers blue; perianth-tube to 4 mm. long; outer tepals to 1.4 cm. long, 4–5 mm. wide, ovate, acuminate to the rather blunt apex; inner tepals to 5 mm. long, linear, the base glandular-tumescent, the enlarged portion 0.75 mm. long, the blade about 0.33 mm. wide, not acuminate. Staminal column 5 mm. long; anthers 5 mm. long. Style about 8–9 mm. long; style-arms 3.5 mm. long, bifid over half their length, the stigmatic area ciliate. Capsule and seeds unknown.—CONTRIB. GRAY HERB. clv. 4 (1945). POTOSÍ: Potosí, 4000 m. alt., January, 1932, *Cárdenas*, no. 124 (TYPE, G).

3. C. TUNARIENSIS R. C. Foster. Plant nearly acaulescent, the bulb ovoid, to 2 cm. high, ca. 1 cm. wide. Basal leaf 7–12 cm. long, 1 mm. wide; cauline leaf subtending the spathes, 4–8 cm. long, 1 mm. wide, glabrous, acute. Spathes herbaceous, the outer to 3 cm. long, acute, acuminate, the inner 1.7–2.6 cm. long, subobtuse, 2-flowered, the pedicels to 1.3 cm. long. Ovary ellipsoid, glabrous, 4 mm. long. Flower blue or purple; perianth-tube to 2 mm. long; outer tepals to 1 cm. long, 4 mm. wide, oblanceolate; inner tepals to 3.5 mm. long, 1 mm. wide at the base, narrowly lance-deltoid, acute, acuminate, eglandular. Staminal column 5 mm. long; anthers 3–3.5 mm. long, nearly sessile on the column, the apex tufted-apiculate. Style as long as the column; style-arms 1.5 mm. long, bifid almost to the base. —CONTRIB. GRAY HERB. clv. 5 (1945). *Nemastylis nana* sensu Rusby (non S. Watson) in Mem. Torr. Bot. Club, vi (1). 125 (1896), as to *Bang*, no. 1042, but not *Mandon*, no. 1224. COCHABAMBA: near snow-line, Mt. Tunari, 1891, *Bang*, no. 1094 (TYPE, G; US, MBG).

12. MASTIGOSTYLA Johnston

Bulbous, caulescent or nearly acaulescent perennial herbs. Basal leaves few (1–2), linear, plicate, glabrous; cauline leaves 1–2. Stem simple or branched. Spathes herbaceous, rather firm in texture, usually subequal, or the outer slightly shorter, 1–4-flowered, the slender pedicels usually not exserted at anthesis. Flowers infundibuliform at the base, with a brief (2 mm.), rudimentary perianth-tube, the two series of tepals markedly dissimilar in size and shape, the outer series the larger. Stamen-filaments united in a column, the anthers nearly or quite sessile on the column, the stamens opposite the style-arms. Style as long as the column; style-arms bifid below the transverse stigmas, the crests more or less petaloid. Mature capsule and seeds not known for the Bolivian species.

KEY

Outer tepals not over 2 cm. long and 5 mm. wide; staminal column 6 mm. long.................................1. *M. brevicaulis*
Outer tepals 3 cm. long, about 1.5 cm. wide; staminal column 8–12 mm. long, the filaments free for 1–2 mm. at the top..2. *M. Cardenasii*

1. MASTIGOSTYLA **brevicaulis** (Baker), comb. nov. Bulb ovoid, to 2.5 cm. high, ca. 1 cm. in diameter, the tunics brown, membranous. Basal leaves 1–2, 20–30 cm. long, 3–4 mm. wide, linear, plicate, acute, glabrous; cauline leaves 1–2, 8–30 cm. long, 2–4 mm. wide, the uppermost usually subtending the spathes. Stem simple (or 1-branched, *fide* Baker), terete, glabrous. Spathes herbaceous, subequal, to 3 cm. long, the outer acute, 1–3-flowered, the pedicels usually not exserted at anthesis. Ovary glabrous, ellipsoid-turbinate, to 5 mm. long. Flower blue, the outer tepals long-unguiculate, oblanceolate, acutish, to 1.8 cm. long and ca. 5 mm. wide; inner tepals linear or lance-linear, acute, apparently glandular-tumescent at the base, 7 mm. long, 0.75–1 mm. wide. Staminal column 6 mm. long; anthers 4 mm. long, deeply and narrowly retuse at the apex. Style 7 mm. long; style-arms and -crests 3 mm. long, bifid for 2 mm., the crests short, petaloid, not flagellar. Immature capsule turbinate, about 8 mm. long; seeds not seen.—*Nemastylis brevicaulis* Baker, Handbk. Irid. 113 (1892). LA PAZ: LARECAJA: near Sorata, Ullontiji, 2700 m. alt., Jan.–Apr. 1859, *Mandon*, no. 1224 in part (isotype, NY); MURILLO: near La Paz, 3800 m. alt., Jan. 14, 1907, *Buchtien*, no. 819 (US).

The type-number of *Nemastylis brevicaulis* Baker, *Mandon*, no. 1224, appears to have been a mixture, for the sheet of this number in the Gray Herbarium is a *Cypella*. In his original description, Baker stated that the filament-column was shorter than the anthers, but this is not true of the specimens cited here. The Gray Herbarium sheet of the Mandon collection has filaments shorter than the anthers, but the filaments are free. Possibly the type-sheet itself is a mixture, but since, with this one exception, the points of the description might all have been drawn from the *Mastigostyla* element, I am limiting Baker's name to this, rather than to the *Cypella* element. Additional justification for this action is found in the fact that Baker considered the species to be a *Nemastylis*, and it is rather improbable that he could have done so were the type-sheet actually a *Cypella*.

2. M. CARDENASII R. C. Foster. Bulb ovoid, 2–2.5 cm. high, 1.5 cm. wide, the tunics dark brown, membranous, prolonged upward in a collar around the base of the stem. Basal leaves 1–2,

to 15 cm. long, 1.5 mm. wide; cauline leaf 1 or none, subtending a branch, the base spathiformly clasping the stem, similar to the basal leaves, equalling or exceeding the inflorescence. Stem simple or branched near the base, 5–10 cm. long, terete, glabrous. Spathes herbaceous, firm, to 4.5 cm. long, the outer with the margins basally united for 6–7 mm., acuminate, acute, the inner spathes equal to or longer than the outer, with broad hyaline margins, acute, 2–4-flowered, the filiform pedicels shorter than the spathes. Ovary ellipsoid-obovoid, glabrous, about 8 mm. long. Flowers dark blue, with darker spots (*fide* Cárdenas), the outer tepals long-unguiculate, obovate-spatulate, obtuse, to 3 cm. long and 1.5 cm. wide; inner tepals 5 mm. long, 1 mm. wide, narrowly elliptic-lanceolate, acute. Staminal column to 1.2 cm. long, the filaments then free for 1–2 mm.; anthers linear, 6 mm. long. Style about as long as the column; style-arms and -crests 1 cm. long, bifid for 5 mm., the stigmatic projections large, about 1.5 mm. long, the crests petaloid, about 2 mm. long. Immature capsule obovoid-ellipsoid, to 1 cm. long; seeds not seen.—Contrib. Gray Herb. clv. 23 (1945). COCHABAMBA: Huayrapata, near Anzaldo, 3900 m. alt., April, 1944, *Cárdenas*, no. 2491 (US).

The collector has noted on the label that the plants were from 10–30 cm. high, growing in an open sandy loam.

13. CYPELLA Herb.

Bulbous, perennial, caulescent herbs, the bulbs ovoid to subglobose. Basal leaves linear to lance-linear or lanceolate, plicate; cauline leaves similar to the basal leaves or reduced. Stem simple or branched, the inflorescence terminal. Spathes herbaceous, the filiform pedicels equalling the spathes at anthesis. Flowers fugacious, more or less open-crateriform, the two series of tepals dissimilar in size and shape. Stamens opposite the style-arms, the filaments free or nearly so, the anthers apically adherent to the style-arms below the stigmas. Style becoming trifid, or the arms nearly obsolete, the transverse stigmas at the base of two more or less petaloid style-crests. Capsule oblong or subglobose, slightly exserted; seeds numerous, somewhat flattened, brown.

Key

Flowers small, blue or blue-purple, the inner tepals not pubescent; style-arms long, slender, the crests nearly lance-linear. . . 1. *C. linearis*

Flowers large, yellow, dotted or lined with purple, the inner tepals panduriform, with a large yellow and purple pubescent patch between the claw and the blade; style-arms obsolete, the crests large, petaloid. . . . . 2. *C. peruviana*

1. Cypella linearis (HBK.) Baker. Bulb small, ovoid to subglobose, to 1.5 cm. high. Basal leaves several (2–6), to 20 cm. long, 1–2 mm. wide, linear, acute; cauline leaf at or above the middle of the stem. Stem 5–25 cm. long, terete, glabrous, simple or 1–4-branched in the axil of the cauline leaf, the branches more or less fasciculate. Spathes to 3 cm. long, the outer shorter than the inner, 1–2-flowered. Outer tepals narrowly obovate to oblanceolate, to 1.8 cm. long, ca. 3–4 mm. wide, obtuse at the apex, the blade with a central yellow mark (*fide* Steinbach); inner tepals shorter, long-clawed, the blade suborbicular. Filaments free, 3 mm. long; anthers 2–3 mm. long. Style filiform, 2 mm. long; style-arms ca. 5 mm. long, style-crests narrowly lance-linear to linear-filiform. Capsule subglobose, 5 mm. long, exserted slightly from the spathes; mature seeds not seen.—Handbk. Irid. 65 (1892). *Moraea linearis* HBK. Nov. Gen. & Spec. i. 321 (1816). *Marica linearis* (HBK.) Ker, Irid. Gen. 24 (1827). *Alophia linearis* (HBK.) Klatt in Linnaea, xxxi. 558 (1861–62). *Larentia linearis* (HBK.) Klatt, Ergänz. 28 (1882). *Sphenostigma lineare* (HBK.) Benth. & Hook. f. Gen. Pl. iii. 695 (1883). Widespread in South America, from Colombia, Venezuela and the Guianas through Brazil and Bolivia. SANTA CRUZ: Sara: near Buenavista, March and September, 450–500 m. alt., *Steinbach*, no. 5451 (G), no. 6466 (G), no. 7018 (G).

2. C. peruviana Baker. Bulb ovoid, to 4 cm. high. Leaves 2–3, basal or superposed, to 6 dm. long and 1.8 cm. wide, lanceolate to lance-linear, glabrous, plicate, acute; cauline leaves 1–2, the upper reduced. Stem simple or branched, 10–65 cm. long, terete, glabrous. Spathes to 4 cm. long, subequal or the outer a little shorter, subventricose, 2–5-flowered. Flowers yellow, dotted or lined with red-brown or red-purple, the outer tepals spreading, to 3 cm. long, 1.5–2 cm. wide, broadly obovate-cuneate; inner tepals shorter, panduriform, the claw long, the cuneate to suborbicular blade reflexed outward, with a large patch of yellow, purple, and white hairs between the blade and the claw. Filaments free, 5 mm. long; anthers linear, 7 mm. long. Style ca. 1 cm. long, the style-arms nearly or quite obsolete; style-crests petaloid, about 4 mm. long. Capsule oblong, about 2 cm. long; mature seeds not seen.—Bot. Mag. cii. t. 6213 (1876); Handbk. Irid. 65 (1892). *Hesperoxiphion peruvianum* (Baker) Baker in Journ. Linn. Soc. Bot. xvi. 127 (1877). Bolivia and Peru. LA PAZ: Larecaja: near Sorata, between Munaypata and río Challasuyo, 2650 m. alt., March–May, *Mandon*, no. 1223 (G); Ullontiji, Cerro del Iminapi, 2650–2750 m. alt., Jan.–Apr., *Mandon*, no. 1224 in part (G); Sorata, May, 1892, *Bang*, no. 1318 (G, NY, US, MBG).

There is some question in my mind as to whether the Bolivian material is truly conspecific with the Peruvian material. The specimens seen, however, are not well enough preserved to answer this question.

2.—THE *HEDYSARUM* OF SESSÉ AND MOCIÑO

By Bernice G. Schubert

(Plates I & II)

In 1941 I listed[1] a few identifications of the material described as various species of *Hedysarum* by Sessé and Mociño in their Plantae Novae Hispaniae (1893) and in the Flora Mexicana (1895); the identifications were all of species treated in detail by me earlier in that paper. In the *Begonia* material of the same collection, which I studied with Dr. Lyman B. Smith,[2] the specimens were all members of the genus *Begonia;* in the *Hedysarum* collection, however, at least four genera besides *Desmodium* are included and there is no true *Hedysarum* in the modern sense. Of the nineteen species listed by Sessé and Mociño, material for eight is unknown; these are: *H. biarticulatum,*[3] *H. diphyllum, H. grandiflorum, H. linifolium, H. nicaraguense, H. procumbens, H. reniforme* and *H. scandens;* six other species represent ten species of *Desmodium* and five species represent four other genera. In the Flora Mexicana, two species are called *H. volubile;* these belong to two different genera.

In the Plantae Novae Hispaniae (ed. 1), twelve species were treated. The second edition was the same, with only changes in spelling and pagination. In the Flora Mexicana, nine different species were considered, and two, *H. scandens* and *H. prismaticum* were treated again.

It is clear from the names published by Sessé & Mociño and from those on the original labels that they were familiar with the current literature of the period, because the epithets used by them were often similar to or synonyms of the names of other authors;

[1] B. G. Schubert in Contrib. Gray Herb. cxxxv. 112, 113 (1941).

[2] L. B. Smith & B. G. Schubert in Contrib. Gray Herb. cliv. 27–31 (1945).

[3] Presumably plate 270 of the Calques des Dessins of Mociño and Sessé is based on material of this species which DeCandolle treated as *D. infractum* (see below).

however, essentially no effort was made to cite the original authorities or their works.

In the following list, including species of both works, the first volume in which each was treated will be indicated as well as the botanical equivalent.

Hedysarum acayucense (Fl. Mex. 171) = Aeschynomene cf. americana L.

Hedysarum arborescens (Fl. Mex. 170) = Ae. amorphoides (Wats.) Rose.

Hedysarum biarticulatum (Fl. Mex. 171) = Desmodium infractum DC.

Hedysarum diphyllum (Pl. Nov. Hisp. 122; ed. 2: 114) = ? (material unknown).

Hedysarum frutescens (Pl. Nov. Hisp. 123; ed. 2: 114) = Desmodium adscendens (Sw.) DC., D. Conzattii Greenm., D. canum (Gmel.) Schinz & Thellung, D. Grahami Gray., D. Ghiesbreghtii Hemsl.

Hedysarum grandiflorum (Pl. Nov. Hisp. 123; ed. 2: 115) = ? (material unknown).

Hedysarum linifolium (Pl. Nov. Hisp. 122; ed. 2: 114) = ? (material unknown).

Hedysarum longifolium (Fl. Mex. 171) = Desmodium Hartwegianum Hemsl., var. typicum.

Hedysarum marilandicum (Pl. Nov. Hisp. 122; ed. 2: 114) = D. orbiculare Schlecht.

Hedysarum mexicanum (Pl. Nov. Hisp. 123; ed. 2: 115) = D. angustifolium (HBK.) DC., var. typicum.

Hedysarum nicaraguense (Fl. Mex. 171) = ? (material unknown).

Hedysarum prismaticum (Pl. Nov. Hisp. 124; ed. 2: 115; Fl. Mex. 171) = Pachecoa prismatica (Sessé & Mociño) Standley & Schubert.

Hedysarum procumbens (Pl. Nov. Hisp. 123; ed. 2: 115) = ? (material unknown).

Hedysarum quinqueangulatum (Pl. Nov. Hisp. 123; ed. 2, 115) = Desmodium Painteri (Rose & Standl.) Standley, D. Pringlei Watson.

Hedysarum reniforme (Fl. Mex. 171) = ? (material unknown).

Hedysarum repens (Fl. Mex. 172) = Desmodium triflorum (L.) DC.

Hedysarum retroflexum (Pl. Nov. Hisp. 122; ed. 2: 114) = Desmodium sp. (material incomplete).

Hedysarum scandens (Pl. Nov. Hisp. 124; ed. 2: 115; Fl. Mex. 171) = ? (material unknown).

Hedysarum viridiflorum (Pl. Nov. Hisp. 123; ed. 2: 115) = Desmodium Hartwegianum Hemsl., var. amans (Wats.) Schubert.

Hedysarum volubile (I) (Fl. Mex. 170) = Galactia cf. striata complex.

Hedysarum volubile (II) (Fl. Mex. 170) = Rhynchosia cf. reticulata (Sw.) DC.

Identifications of the specimens, cited by number, and brief notes follow:

DESMODIUM cf. ADHAESIVUM Schlecht. in Linnaea, xii. 314 (1838). Numbers 1953 and 1975 probably belong here but the material is over-ripe and incomplete.

D. ADSCENDENS (Sw.) DC., Prod. ii. 332 (1825). Number 2000, in very small part (Mad), and 2001 (Mad) belong here.

D. ANGUSTIFOLIUM (HBK.) DC., var. TYPICUM Schubert in CONTRIB. GRAY HERB. cxxix. 27, pl. 2, fig. C1–8 (1940). Number 2002 (CM) belongs here. This is the *Hedysarum mexicanum* of Pl. Nov. Hisp. p. 123. The specimen is not in fruit but there is no doubt of its identity.

D. BATOCAULON Gray in Smithson. Contrib. to Knowledge, iii. art. v. 53 (1852) (Pl. Wright. i. 53). Number 1961 (CM; Mad, part of 2 sheets). This material was thought by the collectors to be previously undescribed, and annotated with a name they did not publish.

D. CANUM (Gmel.) Schinz & Thellung in Mem. Soc. Neuchât. Sci. Nat. v. 371 (1913). Numbers 1987 and 1999 (Mad) are referred to this species. The original label on 1987 bears a name not published by the authors, and that on 1999 the number "1412" and the name *Hedysarum frutescens.*

D. CARIPENSE (HBK.) G. Don, Gen. Syst. ii. 292 (1832). *D. orizabanum* Hemsl. Diagn. Pl. Nov. pt. 3. 45 (1880). Number 1988 is a small portion of stem with two leaves and the fruiting inflorescence. The original label bears a name not published for the species.

D. CONZATTII Greenman in Field Mus. Pub. Bot. ii. 331 (1912). Numbers 1997 (Mad, in part) and 1998 labeled *Hedysarum* *frutescens* are fruiting specimens of *D. Conzattii*. The sheet of 1997 is mixed, part of the material being *D. Grahami* Gray which is taken up next.

D. Grahami Gray in Smithson. Contrib. to Knowledge, iii. art. v. 48 (1853) (Pl. Wright. ii. 48). Numbers 1961 (Mad, 2 mixed, 1 unmixed), 1968 (Mad, in small part), 1970 (Mad), 1997 (Mad, in part), 2000 (Mad, in small part), 2001 (CM, Mad) and 3699 (Mad) all are referred here. Sheet no. 2000 (Mad) had three species represented on it and its original label has the name *Hedysarum frutescens*. Number 3699 is labeled "Phaseolus?".

D. Ghiesbreghtii Hemsl. in Biol. Cent.-Am. Bot. i. 279 (1880). See Schubert in Contrib. Gray Herb. cxxxv. 113 (1941). Number 2000 (Mad), already noted under *D. adscendens* and *D. Grahami*, must be listed here too. This number was also cited in my earlier paper on the collection, under *D. Ghiesbreghtii*.

D. Hartwegianum Hemsl., var. amans (Wats.) Schubert in Contrib. Gray Herb. cxxxv. 93, pl. 2, figs. 19–27 (1941); see also op. cit. 112, 113. Numbers 1950, 1951, 1952 and 2007, all discussed in my earlier paper, belong here.

D. Hartwegianum Hemsl., var. typicum Schubert, op. cit. 91 and 113, pl. 2, figs. 10–18. Number 1967 was discussed in the earlier paper; number 1991, not noted then, also bears the name *Hedysarum longifolium* on the original label and should be placed here.

D. infractum DC., Prod. ii. 330 (1825). See Blake in Bot. Gaz. lxxviii. 280 (1924). Number 2005, though not in mature fruit, is clearly representative of this species. *Hedysarum biarticulatum* Sessé & Mociño is listed by DeCandolle as a synonym of *D. infractum*, and is one of the two species of *Desmodium* represented by illustrations in Mociño & Sessé, Calques de Dessins, t. 270[1].

D. molliculum (HBK.) DC., Prod. ii. 331 (1825). Numbers 1958 and 1968 (CM; Mad, in large part) belong here. The name on the original label of no. 1958 was not published later by the authors.

[1] The other species represented by an illustration is *D. stipulaceum* DC., which Schindler in Fedde, Rep. Spec. Nov. Beih. Bd. xlix². 300 (1928), treats as a synonym of *Meibomia purpurea* (= *D. tortuosum* (Sw.) DC.), a disposition of the name which seems to me proper.

D. NEO-MEXICANUM Gray in Smithson. Contrib. to Knowledge, iii. art. v. 53 (1852) (Pl. Wright. i. 53). Numbers 1983, 1986 and 2008 belong here. Each of the original labels has a different name, none of which was ever used in a publication by Sessé & Mociño. There is no question about the identity of the plants, however.

D. NICARAGUENSE Oerst. ex Benth. & Oerst. in Kjoeb. Vidensk. Meddel. for 1853. 16 (1854). This material, numbered 1965 and labeled simply "Hedysarum?", is immature but characteristic. There is nothing to indicate that this is what *H. nicaraguense* Sessé & Mociño was based on.

D. ORBICULARE Schlecht. in Linnaea, xii. 311 (1838). Number 1995, representative of this species, is the material treated in Pl. Nov. Hisp. 122 as *H. marilandicum*, a Linnean species.

D. PAINTERI (Rose & Standl.) Standley in Field Mus. Pub. Bot. iv. 214 (1929). Numbers 2004 and 2006 (Mad, in small part) belong here. The material is in young flower, but characteristic. These specimens form part of the basis of the description of *Hedysarum quinqueangulatum* (Pl. Nov. Hisp. 123), those representing *D. Pringlei* form the rest. The description is clearly based on both elements and if the name were used for either it would be a source of great confusion. *D. Pringlei*, moreover, was published one year earlier than *H. quinqueangulatum*. I am therefore, considering *H. quinqueangulatum* a *nomen confusum*.

D. PLICATUM Schlecht. & Cham. in Linnaea, v. 585 (1830). Number 1955 represents this species.

D. POLYSTACHYUM Schlecht. in Linnaea, xii. 321 (1838). *D. plectocarpum* Hemsl. Number 1956 in flower and fruit is characteristic material of this species. The original label bears the specific epithet of the preceding species in this list.

D. PRINGLEI Watson in Proc. Am. Acad. xxiii. 271 (1888). Number 2006, with the exception of a very small part (Mad), is this species (CM, 2 sheets; Mad, 4 sheets) of which there is fine flowering material and some very young fruit. This material together with that cited under *D. Painteri* formed the basis of *Hedysarum quinqueangulatum* as stated above.

D. PSILOPHYLLUM Schlecht. in Linnaea, xii. 310 (1838). *D. Wrightii* Gray in Bost. Journ. Nat. Hist. vi. 177 (1850). Numbers 1981 and 1982 are good fruiting specimens of *D. psilophyllum.* Both numbers have annotations on the original labels assigning them with doubt to Old World species. Number 1981 also has the number "1418" on its original label.

D. Purpusii Brandegee in Univ. Calif. Publ. Bot. vi. 53 (1914). *D. lunatum* Brandegee (1908) non Huber (1906). Number 1979, fruiting material annotated with an unpublished name, represents this species of the section *Nephromeria.*

D. triflorum (L.) DC., Prod. ii. 334 (1825). Number 1960 (CM) annotated as *Hedysarum repens* is representative of this species.

The remainder of the list includes the specimens which represent other genera than *Desmodium.*

Aeschynomene cf. americana L. Sp. Pl. 713 (1753). This material, number 1990 (Mad), was the basis of *Hedysarum acayucense* (Fl. Mex. 171). The specimen is fragmentary and the fruit poorly developed. The original label bears the number "1402" and the suggestion "An Aeschinomene".

Ae. amorphoides (Wats.) Rose in Proc. Am. Acad. xxix. 315 (1894). Number 2009, the basis for *Hedysarum arborescens* (Fl. Mex. 170), also bears on the original label another name, not published by the authors.

Clitoria mexicana Link, Enum. Hort. Berol. ii. 234 (1822). This species is represented by number 3629 (Mad), which has on its original label a name in the genus *Lotus.*

Galactia prob. G. striata (Jacq.) Urb. Symb. Ant. ii. 320 (1900), vel aff. Number 1962 (Mad), a flowering specimen labeled with a name not published by Sessé & Mociño, is certainly close to *G. striata.*

Number 1963, the original label also numbered "1422," is the first of the two species described as *Hedysarum volubile* in Fl. Mex. 170. The material is in a late flowering stage and although its affinity is clear its exact specific determination is doubtful.

G. cf. multiflora Robinson in Proc. Am. Acad. xxix. 315 (1894). Number 1977 is another collection annotated with a name which the authors did not use later. The material is flowering, but in all probability referable here.

Pachecoa **prismatica** (Sessé & Mociño) Standley & Schubert, comb. nov. *Hedysarum prismaticum* Sessé & Mociño, Pl. Nov.

PACHECOA PRISMATICA: FIG. 1, flowering branch and original label, × ⅔, from TYPE; FIGS. 2 and 4, a COTYPE of *P. guatemalensis*, FIG. 2, portions of plant, × ⅔, FIG. 4, flower, × 4; FIGS. 3 and 5, TYPE of *P. guatemalensis*, FIG. 3, flower, × 4, FIG. 5, fruit, × 4.

PACHECOA PRISMATICA: TYPE of *P. guatemalensis.*

Hisp. 124 (1889); ed. 2: 115 (1893); Fl. Mex. 171 (1895). *Pachecoa guatemalensis* Standley & Steyermark in Field Mus. Pub. Bot. xxiii. 12, 13 (1943). Number 1985 (Mad), labeled *Hedysarum prismaticum* and clearly described by Sessé & Mociño, is a fragmentary specimen with three flowers and a detached piece of fruit. After working on this specimen at intervals over a long period of time I was forced to the conclusion that it probably represented an undescribed genus. As a final precaution I consulted Dr. Paul C. Standley of the Chicago Museum, who wrote in reply that the "plant is a new genus—but not too new"! *Pachecoa guatemalensis* was based on two Guatemalan collections from the Department of Jutiapa (vicinity of Jutiapa, *Standley*, no. 75307 (TYPE, CM), *Standley*, no. 75032) and a collection of *Liebmann* from an uncertain locality in Mexico. *Sessé & Mociño et al.*, no. 1985 was said by the authors to have come from Coahuayana (in Michoacan); the specimen differs somewhat from the other Mexican and the Guatemalan collections in (1) its leaflets which are more nearly obovate, only slightly setose, and very short mucronate, (2) its calyx which does not have setose-ciliate teeth, and (3) its anthers which are about as broad as long. The immature and fragmentary condition of the specimen, however, does not justify maintaining it as distinct from *P. guatemalensis*, and since it was described first, its specific epithet must be taken up for *P. guatemalensis* Standl. & Steyerm., as suggested by Dr. Standley. (Pls. I & II).

RHYNCHOSIA LONGERACEMOSA Mart. & Gal. in Bull. Acad. Brux. x^2. 198 (1843). Numbers 1959 and 1972 (also numbered "1403"), annotated with two names not published by the collectors, seem clearly to be referable to this species. Number 1959 has some good fruit and number 1972 some very young fruit.

R. cf. RETICULATA (Sw.) DC., Prod. ii. 385 (1825). Number 1976, annotated with a name not later used by the authors and also with the epithet "volubilis" represents the second *Hedysarum volubile* of Fl. Mex. (ed. 2: 170). The material bears some young fruit.

SESBANIA SERICEA (Willd.) DC., Prod. ii. 266 (1825). Number 1989 is a fragmentary representative of this species.

EXPLANATION OF PLATES I and II

PLATE I. PACHECOA PRISMATICA (Sessé & Mociño) Standley & Schubert: FIG. 1 and small label to right, TYPE and original label, × ⅔, of *Hedysarum prismaticum* Sessé & Mociño (Mad); FIG. 2 and two small figures to left, portions of *Liebmann* collection, × ⅔, (COTYPE of *P. guatemalensis*, CM); FIG. 3, young flower, × 4, from *Standley*, no. 75,307 (TYPE of *P. guatemalensis*, CM); FIG. 4, mature flower, × 4, from *Liebmann;* FIG. 5, somewhat immature fruit, × 4, from *Standley*, no. 75,307.

PLATE II. TYPE of *Pachecoa guatemalensis* Standley & Steyermark, × ⅔, *Standley*, no. 75,307 (CM).

3.—STUDIES IN THE *BEGONIACEAE*,—II.

By

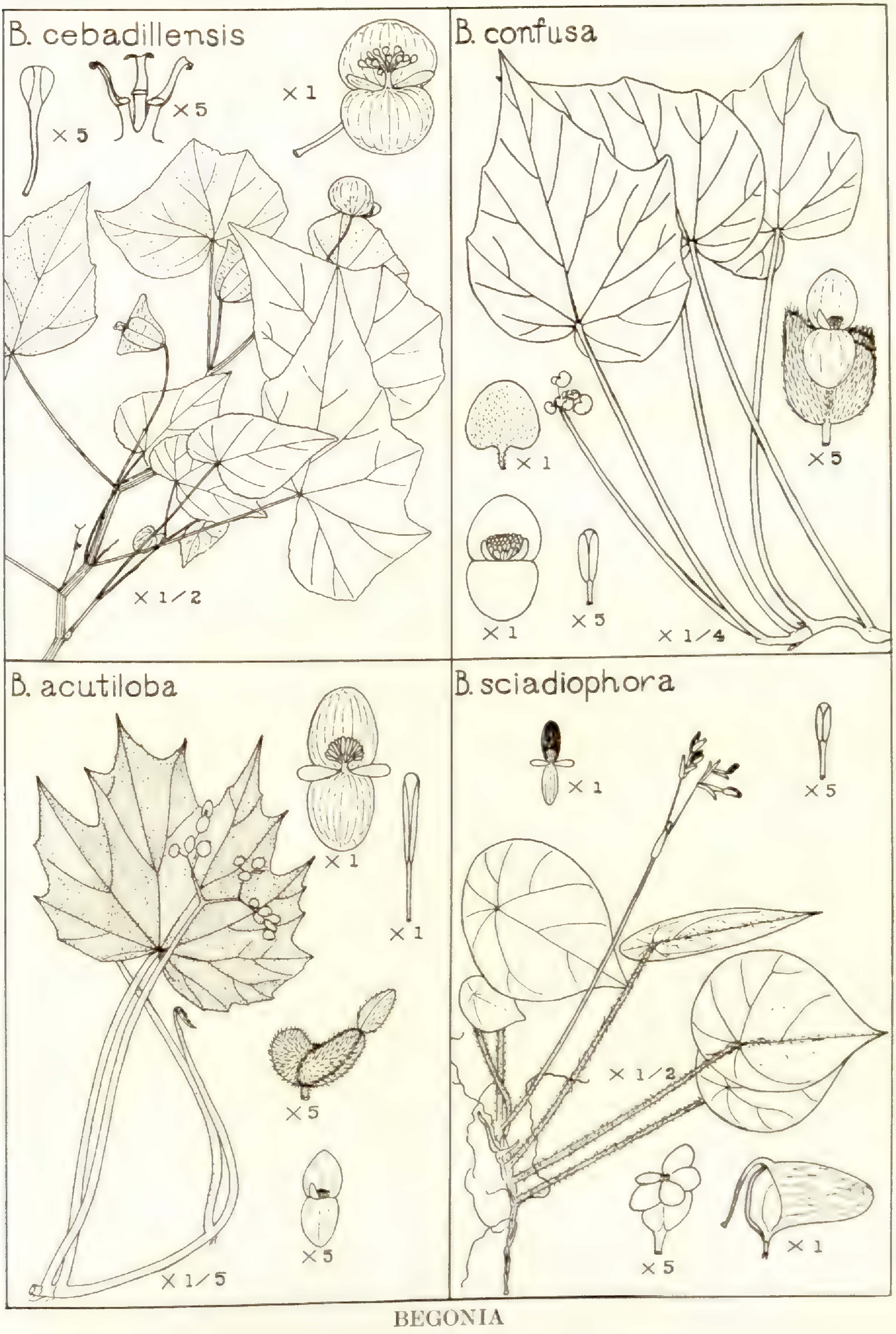
LYMAN B. SMITH & BERNICE G. SCHUBERT[1]

(Plate III)

In studying the Guatemalan species of *Begonia*, the four treated and illustrated here seemed especially worthy of note. Three of the species are described as new, the fourth, described almost a century ago from Mexico, has been but little collected and only recently found in Guatemala. The large collections made in Guatemala in recent years by Drs. Standley and Steyermark of the Chicago Museum have produced some extremely interesting additions to the previously known species of *Begonia* and it is hoped that continued collecting will help to clarify further the complexities of the genus.

BEGONIA **cebadillensis** Houghton ex Smith & Schubert, spec. nov., herbacea, caulescens, erecta, stipulis deciduis, lanceolatis, acuminatis, ciliato-laceratis, 2 mm. longis, petiolis gracilibus, ad 7 cm. longis, foliorum laminis transversis, subellipticis, acuminatis, undulato-sublobatis, basi late leviterque cordatis, ad 4 cm. longis et 9 latis, dentatis, utrinque sparse puberulis, pedunculis axillaribus, quam foliis multo brevioribus, inflorescentiis uni- vel paucifloris, bracteis deciduis, stipulis similibus, pedicellis 6–23 mm. longis, sparse glandulosis, tepalis masculinis 4, integris, roseis (! Calderón), exterioribus ample reniformibus, ad 10 mm. longis, stamina subduplo superantibus, interioribus anguste ellipticis, stamina subaequantibus, staminibus multis in columna brevi insertis, antheris obovoideis, quam filamentis multo brevioribus, tepalis femineis ignotis, stylis persistentibus, articulatis, apice breviter bilobatis, placentis bilamellatis utrinque ovuliferis,

[1] See: Smith & Schubert in CONTRIB. GRAY HERB. cliv. 23–31 (1945).


B. cebadillensis
× 5
× 5
× 1
× 1/2
B. confusa
× 1
× 5
× 1
× 5
× 1/4
B. acutiloba
× 1
× 1
× 5
× 5
× 1/5
B. sciadiophora
× 1
× 5
× 1/2
× 5
× 1

BEGONIA

capsula oblongo-ellipsoidea, inaequaliter 3-alata, ad 2 cm. longa, alis triangularibus.—TAB. III.—*B. cebadillensis* Houghton in Standley & Calderón, Lista Prelim. Pl. Salvador, 156 (1925), *nomen.*

SALVADOR: SAN VICENTE: La Cebadilla, Canton of San Francisco, 1922, *Calderón 1216* (G, TYPE).

GUATEMALA: SANTA ROSA: hills east of Cuilapa, along the stream supplying the city water, alt. 900–950 m., November 24, 1940, *Standley, 78204* (CM, G, COTYPES).

Its articulated styles distinguish *B. cebadillensis* from species approaching it in other characters; it is difficult to determine the exact relationship without pistillate flowers but its affinity seems to be with *B. gracilis* and its relatives. The lack of axillary bulblets and the entire staminate tepals together with the unique styles combine to produce a distinctive character for this species.

BEGONIA (§ MAGNUSIA) **confusa** Smith & Schubert, spec. nov., herbacea; rhizomate gracili, prostrato, rubro, glabro, internodiis 1–9 cm. longis; stipulis deciduis, oblongo-lanceolatis, integris, 23 mm. longis, pilosis; petiolis erectis, 16–23 cm. longis, sparse pilosis; foliis rectis, asymmetricis, late ovatis, acuminatis, 1–3-lobatis, basi cordatis, ad 18 cm. longis, integris vel sparse denticulatis, utrinque sparse puberulis, subtus ad nervos densiore; pedunculis juvenilibus quam foliis multo brevioribus; cymis paucifloris, regularibus, juvenilibus densis; bracteis deciduis, ellipticis, integris, membranaceis, infimis 12 mm. longis; pedicellis ca. 10 mm. longis; tepalis masculinis 4, integris, exterioribus late ovatis, obtusis, rubro-puberulentis, 12 mm. longis, interioribus ellipticis, multo minoribus; staminibus multis, antheris oblongis, quam filamentis longioribus, connectivo producto, obtuso; floribus femineis verisimiliter ebracteolatis, perjuvenilibus solum cognitis; tepalis femineis 3, exterioribus late ovatis, carnosis, rubro-puberulentis, interiori minori, elliptico, glabro; stylis 3, bifidis; ovario inaequaliter trialato, pubescenti, alis ascendentibus.—TAB. III.

GUATEMALA: HUEHUETENANGO: creeping on rocks, Cerro Chiblac, between Finca San Rafael and Ixcan, Sierra de los Cuchumatanes, alt. 1200–2000 m., July 22, 1942, *Steyermark, 49185* (CM, TYPE; G, ISOTYPE).

Lacking mature fruit it is difficult to judge the affinities of *Begonia confusa.* Its habit is much like that of *B. ludicra,* but the leaves are nearly or quite straight and the tepals are covered with dark red trichomes.

Begonia (§ Begoniastrum) **sciadiophora** Smith & Schubert, spec. nov., herbacea; rhizomate gracili, ramoso, dense rufo-hirsuto, internodiis distinctis, ad 3 cm. longis; stipulis lanceolatis, acuminatis et apice seta longa molli auctis, ad 12 mm. longis, membranaceis, ferrugineis, subglabris; petiolis gracillimis, erectis, 4–14 cm. longis, dense rufo-hirsutis; foliis peltatis, 7-nerviis, late ovatis, abrupte acuminatis, basi late rotundatis, 5–6.5 cm. longis, 4–5 cm. latis, integris, nullo modo lobatis, supra glabris, subtus praecipue ad nervos hirsutis; pedunculis folia subaequantibus, sparse hirsutis; inflorescentia laxe cymosa, pauciflora, sparse hirsuta; bracteis plus minusve persistentibus, lanceolatis, integris, membranaceis, brunneis, infimis 10 mm. longis, pedicellis 6–8 mm. longis; tepalis masculinis 4, integris, obtusis, exterioribus anguste ellipticis, 5.5 mm. longis, uno rubro, altero albo, interioribus 3 mm. longis, albis; staminibus paucis, antheris oblongis, filamenta subaequantibus; flos femineo unico perjuvenile solum cognito; tepalis femineis 5, inaequalibus, ellipticis, obtusis, integris; ovario 3-loculato, placentis bilamellatis; capsula unica solum cognita, subellipsoidea, trialata, ala maxima ovata, obtusa, 14 mm. longa, 9 mm. lata, alteris anguste lunatis.—Tab. III.

GUATEMALA: Alta Verapaz: common in dense wet limestone forest near Chirriacté on the Petén highway, alt. ca. 900 m., April 9, 1941, *Standley 91967* (CM, type; phot. G); *91953* (CM, cotype).

Except for a somewhat denser indument *Begonia sciadiophora* is almost identical in habit with *B. Calderonii* Standl., yet its five pistillate and four staminate tepals place it in a different section, *B. Calderonii* (*B. falcata* Smith & Schubert) having only two staminate and two pistillate tepals.

Begonia acutiloba Liebm. emend. Smith & Schubert. Pedicellis 1–2 cm. longis, rufo-pubescentibus; tepalis femineis 3 (perjuvenilibus solum cognitis), integris, exterioribus ovatis, interiori minori; stylis 3, bifidis; capsula deflexa ellipsoidea, inaequaliter trialata, ala maxima subbasali, oblonga, obtusa.—Tab. III.—Liebm. Vid. Medd. Kjoebenhavn, for 1852: 14 (1853).

MEXICO: Oaxaca: growing in the damp mountain-forest near S. Jago Amatlan, July, *Liebmann* (type-collection Berlin; phot. G (CM 20869)).

GUATEMALA: Huehuetenango: forested slopes, Cerro Chiblac, between Ixcan and Finca San Rafael, Sierra de los Cuchumatanes, alt. 1800–2000 m., *Steyermark, 49379* (CM; phot. G).

Since *Begonia acutiloba* was first described from staminate material we have here described the only pistillate collection we have seen (*Steyermark*) in an effort to elucidate the species.

Begonia acutiloba seems to be closely related to *B. ludicra* and *B. Popenoei;* it differs from both in its extremely early deciduous stipules; from *B. ludicra* it differs at first glance in its very broad leaves with numerous sharp lobes. It also differs in having the tepals of its flowers pubescent on the outer surface, at least when young, as well as the ovary, whereas the comparable structures in *B. ludicra* seem to be glabrous from the first. From *B. Popenoei* it varies further in having its leaves always deeply lobed.

4.—STUDIES IN THE *BROMELIACEAE*—XIV

By Lyman B. Smith

(Plate IV)

Brocchinia Tatei, spec. nov., sine dubia grandis; laminis foliorum ligulatis, rotundatis apiculatisque, ultra 10 cm. latis, planis, integris, haud reticulatis; inflorescentia minimo ample 3-pinnata, minute denseque ferrugineo-stellata, axibus rectis; bracteis florigeris ex ovato longe acuminatis, ovaria subaequantibus, 3–4 mm. longis, tenuibus; pedicellis brevibus sed distinctis; sepalis petalisque subaequalibus, ellipticis, 3.5 mm. longis; sepalis sparse lepidotis; petalis nullo modo unguiculatis, albis (! Tate); staminibus liberis, quam petalis paulo brevioribus; ovario tereti, omnino infero. Tab. IV, fig. 1.

VENEZUELA: Bolívar: burned-over areas at Rondon Camp (erroneously labeled as in British Guiana, cf. W. H. Phelps in Bol. Soc. Venez. Cienc. Nat. v. 57, fig. 2 (1938)), Mount Roraima, alt. 2070 m., Dec. 4, 1927, *G. H. H. Tate 514* (NY, type; phot. G). Presumably the same, although it is an ampler specimen, showing a more richly branched inflorescence: Cerro Guaiquinima, Alto Rio Paragua, alt. 500 m., Aug. 27, 1943, *F. Cardona 888* (US; phot. G).

Apparently this is the common large *Brocchinia* noted by im Thurn[1] on the first complete ascent of Mount Roraima in 1884, where he said it grew only above 5500 feet. He and subsequent explorers took it for granted that it was a somewhat reduced form of *B. micrantha* of the Kaieteur Savanna, and thus one of the most characteristic species of Roraima was neglected in favor of rarer items until Dr. Tate finally collected it in 1927.

Judging from the necessarily fragmentary herbarium material, I placed it with *B. reducta* because of the form of the petals and

[1] Trans. Linn. Soc. ser. 2, ii. 256, 269 (1887).

the completely inferior ovary. Dr. Tate, from his experience with both species in the field, knew that it could not be *B. reducta* on account of its entirely different habit. As the appended key shows, *B. Tatei* is phylogenetically allied with *B. reducta* by its more technical characters, but has the habit of *B. micrantha* and *B. paniculata*.

I take pleasure in dedicating this dominant species of Mount Roraima to Dr. G. H. H. Tate of the American Museum of Natural History, not only because he is responsible for bringing it to light, but, in the larger sense, for all he has done in exploring the mountain system of which Roraima is but a small part.

The following key summarizes the relationships of the species of *Brocchinia* so far known:

1. Ovary only one-third inferior; leaves and scape-bracts serrate. Cerro de Circasia, Vaupés, Colombia.......... 1. *B. serrata*.
1. Ovary wholly or almost wholly inferior; leaves and scape-bracts entire.
    2. Leaf-blades narrowly triangular, acuminate.
        3. Capsule sharply trigonous, its slender pedicel usually exceeding the floral bract; branches of the inflorescence elongate, lax; flowers erect. Esmeralda, Venezuela. 2. *B. prismatica*.
        3. Capsule subterete, subsessile; branches of the inflorescence short and dense; flowers divergent. Auyantepui, Venezuela.......... 3. *B. acuminata*.
    2. Leaf-blades ligulate, rounded and apiculate.
        4. Petals much longer than broad, not at all unguiculate; filaments free; ovary wholly inferior.
            5. Inflorescence excurrent with the main axis and also the primary lateral axes straight; at least the upper part of the leaf-blade evenly nerved without any reticulation. Roraima to Cerro Guaiquinima, Venezuela... 4. *B. Tatei*.
            5. Inflorescence subdeliquescent with geniculate axes; leaf-blades septate-reticulate throughout.
                6. Scape ca. 3 mm. thick, its bracts small, remote; leaves few, erect. Kaieteur, British Guiana, to Duida, Venezuela.......... 5. *B. reducta*.
                6. Scape much stouter; leaves many, spreading. Roraima, Venezuela.......... 6. *B. hechtioides*.
        4. Petals about as broad as long, suborbicular, distinctly unguiculate; filaments of the second series connate with the petals; ovary in small part superior.
            7. Inflorescence (including the ovaries) glabrous. Kaieteur, British Guiana.......... 7. *B. micrantha*.
            7. Inflorescence (including the ovaries) lepidote. Araracoara, Colombia.......... 8. *B. paniculata*.

Brocchinia and the allied genus, *Navia*, are characteristic of the geologically ancient sandstone formations which form a very discontinuous arc of flat-topped mountains around the northern rim of the Amazon Basin, from southeastern Colombia to central British Guiana and, in the case of *Navia*, to Surinam, where Maguire[1] has noted its occurrence on Tafelberg. Dr. Leon Croizat has kindly brought to my attention a third example, *Cephalocarpus*[2] of the *Cyperaceae*. Dr. H. A. Gleason has suggested a number of families and genera on which I hope to report when I can check them in detail.

Since its exploration by Tate[3] in 1928–9, the geologic and floristic relationship of Duida to Roraima has been recognized, and subsequent collecting in intervening territory at Auyantepui[4] and Cerro Guaiquinima has added further confirmation. On the other hand, the relationship of the Duida-Roraima segment of the arc with southeastern Colombia appears to have been overlooked because of the wide gap made by the basin of the Orinoco, although Chapman[5] has noted the strong Andean element in the birds of Roraima and Duida. In this regard, Schultes'[6] account of the geology and flora of these flat-topped mountains in southeastern Colombia makes interesting and, I believe, significant comparison with the accounts of Duida, Roraima and Tafelberg.

The areas involved have been explored so little that it is hardly safe to draw conclusions, but certain facts seem worth noting for further investigation. First, *Brocchinia*, *Navia* and *Cephalocarpus* are found on an arc from southeastern Colombia to the Guianas (fig. 1), but not elsewhere. The least involved reasoning would be to assume that they migrated from one end of the arc to the other. Second, the closest relationships of *Brocchinia* and *Navia* are with Andean genera, and the most primitive species of *Brocchinia*, judging from the position of the ovary, is in Colombia. This situation would argue that movement on the arc was from the Andean region eastward. Finally, most of the species are narrow endemics, indicating that the movement was relatively ancient.

[1] Geographical Review, xxxv. 574, fig. 11 (1945).
[2] C. L. Gilly in Bull. Torr. Bot. Club, lxix. 290 (1942).
[3] H. A. Gleason et al. in Bull. Torr. Bot. Club, lviii. 277 (1931).
[4] G. H. H. Tate in Bol. Soc. Venez. Cienc. Nat. v. 96 (1939).
[5] Geographical Review, xxi. 363 (1931).
[6] Caldasia, iii. 124 (1944).

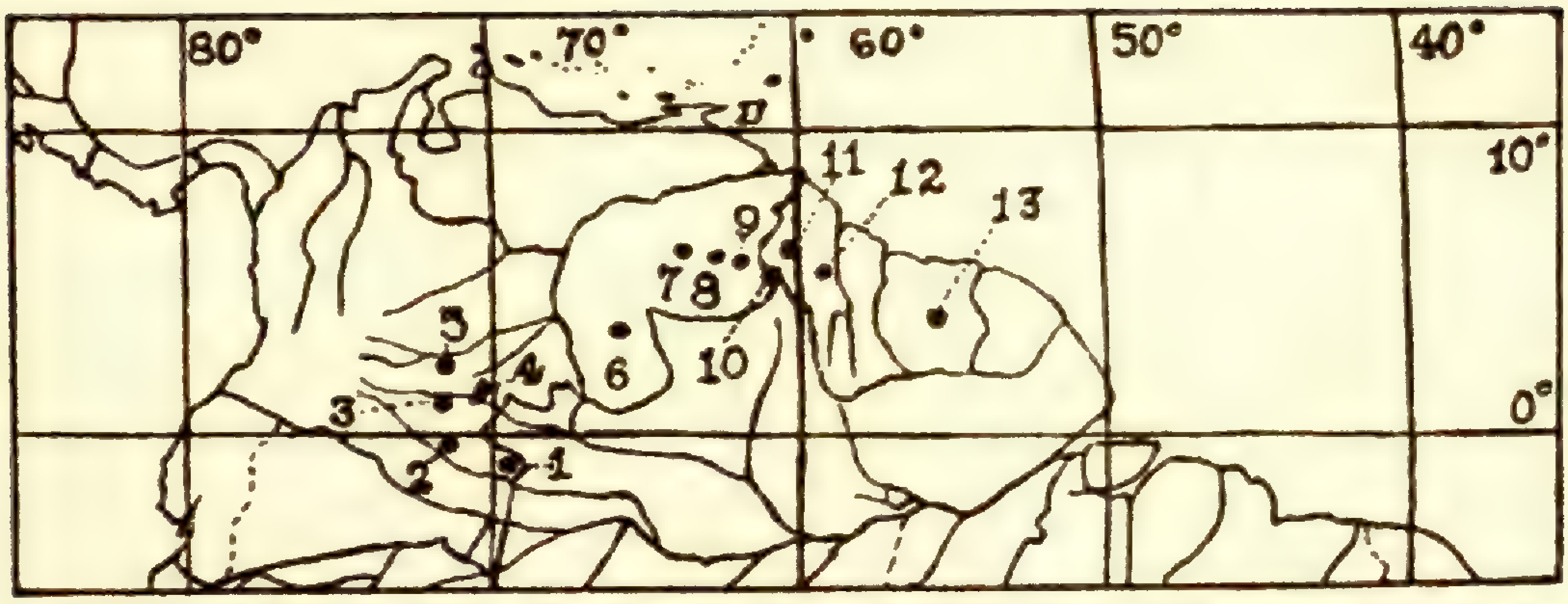


Fig. 1. COLOMBIA: Station 1: Cerro de Cupaty, Amazonas; 2: Araracoara, Amazonas; 3: Mt. Chiribiquete, Cerro del Castillo and Mt. Campana, Vaupés; 4: Cerro de Circasia, Vaupés; 5: Rio Guaviare, Vaupés; VENEZUELA: 6: Mt. Duida, Amazonas; 7: Guaiquinima, Bolívar; 8: Auyantepui, Bolívar; 9: Ptari-tepui (J. A. Steyermark exped. ined.), Bolívar; 10: Mt. Roraima, Bolívar, and BRITISH GUIANA: Marima; 11: Macreba Falls, Kurutung River; 12: Kaieteur; SURINAM: 13: Tafelberg.

Brocchinia: stations 2, 4, 6–10, 12. *Navia:* 1, 3, 5, 6, 10–13. *Cephalocarpus:* 1, 6, 8, 10.

Hechtia melanocarpa, spec. nov., planta feminea solum cognita, florifera 2.2 m. alta; foliis multis rosulatis, 1.1 m. longis, vaginis suborbicularibus, ca. 8 cm. longis, albido-furfuraceis, laminis lineari-triangularibus, longe acuminatis, pungentibus, basi 5 cm. latis, viridibus, supra glabris, subtus lineatim adpresse pallido-lepidotis, spinis hamatis rubris 5–6 mm. longis laxe armatis; scapo in rosula centrali (! Foster), basi ca. 2 cm. diametro, dissite albido-flocculoso, mox glabro, scapi bracteis infimis subfoliaceis cum laminis fulgide rubris, supremis anguste ovatis, integris, internodia paulo superantibus sed scapum haud occultantibus; inflorescentia laxe bipinnatim paniculata, ad 7 dm. longa, mox glabra; bracteis primariis anguste ovatis, acuminatis, quam ramis axillaribus multo brevioribus; ramis lateralibus divergentibus, ad 9 cm. longis, subdense florigeris; rhachi crassa; bracteis florigeris ovatis, acutis, 5 mm. longis, pedicellos paulo superantibus, denticulatis, apice hyalinis; floribus divergentibus; pedicellis robustis; sepalis ovatis, obtusis, 4 mm. longis; petalis anguste triangularibus, 7 mm. longis; filamentis adsunt; stylo subnullo; capsula anguste ovoidea, acuta, 14 mm. longa, acute triangulata, atra, glabra. Tab. IV, fig. 8, 9.

MEXICO: Guerrero: Canyon de los Zapolotes, June 1935, cultivated and flowered in 1945, *M. B. Foster 1258* (G, type).

Apparently, *Hechtia melanocarpa* is most nearly related to *H. subalata*, but it differs in its large non-repand leaves, divergent branches, subterete rhachis and large almost black capsules.

Fig. 1, BROCCHINIA TATEI L. B. Sm.; 2–3, PITCAIRNIA JUNCOIDES L. B. Sm.; 4, P. LEPROSA L. B. Sm.; 5, P. MILITARIS L. B. Sm.; 6, P. SORDIDA L. B. Sm.; 7, P. TILLANDSIOIDES L. B. Sm.; 8–9, HECHTIA MELANOCARPA L. B. Sm.

Pitcairnia juncoides, spec. nov., ad 45 cm. alta; caule verisimiliter subterraneo, brevi; foliis homomorphis, fasciculatis, ad 34 cm. longis, integerrimis, vaginis ovatis, parvis, glabris, laminis linearibus, involuto-subulatis, basi ca. 7 mm. latis, subpungentibus, supra vel intus dense adpresseque albo-lepidotis, subtus perobscure punctulato-lepidotis; scapo erecto, gracili, glabro; inflorescentia simplicissima, laxe pauciflora, glabra; bracteis florigeris ovatis, haud 4 mm. longis; floribus subpatentibus, rubris; pedicellis gracilibus, 2 cm. longis; sepalis elliptico-oblongis, obtusis, 14 mm. longis, ecarinatis, nervatis; petalis nudis, linearibus, obtusis, 32 mm. longis, stamina superantibus; ovario 3/5 supero; ovulis alatis. Tab. IV, fig. 2, 3.

VENEZUELA: AMAZONAS: San Antonio, Upper Orinoco, Feb. 1931, *E. G. Holt & E. R. Blake 696* (US, COTYPE); clearings in the savannas, San Antonio, alt. 121 m., April 27, 1942, *L. Williams 15048* (US, TYPE; phot. G).

Without mature fruit, it is difficult to guess the exact relationship of *Pitcairnia juncoides.* If the fruit is indehiscent, the species should be placed near *P. aphelandriflora* and *P. punicea,* but if it is dehiscent it keys down to the vicinity of *P. straminea* in the *Pflanzenreich,* where it seems out of place. In any event. *P. juncoides* is easily distinguishable by its peculiar habit alone,

Pitcairnia leprosa, spec. nov., verisimiliter acaulis sed basi ignota, florifera ultra 55 cm. alta; foliis disjunctis (? vel scapi vaginis infimis) solum cognitis, linearibus, acuminatis, basi paulo angustatis, ad 46 cm. longis, 9 mm. latis, integris, supra glabris, subtus dense floccosis; scapo recto, 6 mm. diametro, albido-floccoso; scapi bracteis erectis, ovatis, inermibus, inferioribus dense imbricatis, laminis magnis, foliaceis auctis, superioribus parvis, internodiis paulo superantibus et scapum haud obtegentibus; inflorescentia simplicissima, laxa, 15 cm. longa, lepidibus stellatis albidis vel sordidis dense vestita; bracteis florigeris erectis, e late ovato acutis, pedicellos subaequantibus; floribus secunde patentibus; pedicellis gracilibus, ad 2 cm. longis; sepalis ellipticis, acutis, 3 cm. longis, haud carinatis, valde nervatis; petalis ultra 9 cm. longis, verisimiliter albis, late acutis, basi nudis, apice sparsissime floccosis; staminibus inclusis; ovario 3/5 supero; ovulis caudatis. Tab. IV, fig. 4.

MEXICO: GUERRERO: cliff, Vallecitos, Montes de Oca District, July 2, 1937, *Hinton et al. 10552* (G, TYPE; NY, US).

Like *Pitcairnia Hintoniana, P. leprosa* has large petals that are floccose-lepidote at apex, but, unlike that species, it has a densely lepidote inflorescence and unarmed scape-bracts.

Pitcairnia militaris, spec. nov., acaulis, florifera fere 3 dm. alta; foliis multis, bulbose rosulatis; vaginis suborbicularibus, 2–3 cm. longis, atro-castaneis, glabris lucidisque; laminis dimorphis, alteris persistentibus, ad spinas brunneas aculeatas reductis, alteris linea recta transverse deciduis, sub lineam serratis, supra lineam ignotis; scapo erecto, 3 mm. diametro, dense albido-lanato; scapi bracteis erectis, dense imbricatis, lanceolatis vel ovatis, albido-lanatis, inferioribus laminis longis spiniformibus aculeatis auctis; inflorescentia simplicissima, subdense racemosa, 9 cm. longa, albido-lanata, haud secunde florigera; bracteis florigeris suberectis, lanceolatis, acuminatis, pedicellos bene superantibus; floribus suberectis; pedicellis ad 10 mm. longis; sepalis anguste oblongis, ad 20 mm. longis, alato-cristatis, apice late acutis vel rotundatis; petalis linearibus, 5 cm. longis, rubris, nudis; ovario 2/3 supero; ovulis caudatis. Tab. IV, fig. 5.

MEXICO: GUERRERO: cliff, I. R. F. del Oro, Trincheras-Vinatita, Mina District, northwest of Lat. 18° N., Long. 101° W., May 2, 1937, *Hinton et al. 10127* (G, TYPE).

In my key in the North American Flora, *Pitcairnia militaris* would come next to *P. Karwinskyana* from which it differs in its broad-pointed sepals, lanate inflorescence and spiny-laminate scape-bracts.

Pitcairnia sordida, spec. nov., acaulis, florifera 35–38 cm. alta, stolonibus procreans; foliis multis, bulbose rosulatis; vaginis latis, ca. 25 mm. longis, atro-castaneis, glabris; laminis dimorphis, alteris persistentibus, ad spinas brunneas aculeatas reductis, alteris linea recta transverse deciduis, sub lineam serratis, supra lineam ignotis; scapo erecto, 4–5 mm. diametro, sordide flocculoso; scapi bracteis erectis, dense imbricatis, lanceolatis, longe subulato-acuminatis, sordide flocculosis, inferioribus ad apicem versus laxe spinoso-serrulatis, superioribus omnino inermibus; inflorescentia simplicissima, dense racemosa, 14–15 cm. longa, haud secunde florigera, petalis exceptis sordide flocculosa; bracteis florigeris suberectis vel divergentibus, lanceolatis, acuminatis, inferioribus sepala superantibus; pedicellis gracilibus, ad 7 mm. longis; sepalis lanceolatis, acuminatis, 24 mm. longis, ecarinatis; petalis linearibus, 5 cm. longis, rubris, nudis; ovario 2/3 supero; ovulis caudatis. Tab. IV, fig. 6.

MEXICO: GUERRERO: on boulder in oak and pine forest, Toro Muerto, Mina District, alt. 2250 m., May 5, 1939, *Hinton et al. 14248* (G, TYPE).

From the nearly related *Pitcairnia monticola, P. sordida* differs in its green bracts and dense persistently sordid-flocculose inflorescence.

Pitcairnia tillandsioides, spec. nov., acaulis, florifera 12–20 cm. alta; foliis paucis, subbulbose rosulatis, verisimiliter homomorphis; vaginis late ovatis, ca. 15 mm. longis, atrocastaneis, glabris; laminis linea recta transverse deciduis, subtus lineam inconspicue spinoso-serratis, supra lineam lineari-lanceolatis, acuminatis, basi paulo angustatis, ad 13 cm. longis, 8 mm. latis, inermibus, planis, viridibus, parcissime floccosis vel glabris; scapo erecto, gracillimo, glabro; scapi bracteis erectis, lanceolatis, acuminatis, quam internodiis brevioribus vel longioribus sed rhachin haud obtegentibus; inflorescentia simplicissima, laxe pauciflora, glabra vel subglabra; bracteis florigeris eis scapi similibus, pedicellos superantibus; pedicellis gracilibus, floribus suberectis, eis *Tillandsiae* simulantibus; sepalis lanceolatis, acuminatis, 16–18 mm. longis, ad 8 mm. latis, parcissime floccosis, posticis subalatis; petalis regulariter dispositis, nullo modo zygomorphis, ad 4 cm. longis, rubris, nudis, laminis ellipticis, late acutis, apice reflexis; staminibus inclusis; ovario 2/3 supero; ovulis caudatis. Tab. IV, fig. 7.

MEXICO: Guerrero: cliff in oak forest, Los Barrales-Yesceros, Mina District, alt. 1775 m., July 5, 1939, *Hinton et al. 14398* (G, type).

Although *Pitcarnia tillandsioides* keys to the vicinity of *P. Karwinskyana* and *P. ringens*, its perfectly regular petals, like those of a *Tillandsia,* would indicate that it was not very closely related to them.

Explanation of Plate IV

Fig. 1. Brocchinia Tatei L. B. Smith (*Tate 514*), floral bract and flower × 2.
2. Pitcairnia juncoides L. B. Smith (*L. Williams 15048*), habit × ½.
3. Same, sepal × 1.
4. Pitcairnia leprosa L. B. Smith (*Hinton et al. 10552*), floral bract and flower × 1.
5. Pitcairnia militaris L. B. Smith (*Hinton et al. 10127*), floral bract and flower × 1.
6. Pitcairnia sordida L. B. Smith (*Hinton et al. 14248*), floral bract and flower × 1.
7. Pitcairnia tillandsioides L. B. Smith (*Hinton et al. 14398*), habit × 1.
8. Hechtia melanocarpa L. B. Smith (*Foster 1258*), habit × 1/20.
9. Same, floral bract and mature pistillate flower × 1.

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New scientific names are printed in full-face type

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IDENTIFICATIONS AND REIDENTIFICATIONS OF NORTH AMERICAN PLANTS

M. L. Fernald

(Plates 1031–1050)[1]

During a somewhat searching study of different groups in the flora of eastern North America it is found imperative, if we are properly to identify our plants, to study the original descriptions and their citations and, when possible, to see the types or good photographs of the types. Otherwise, as in too many cases, we make wrong guesses and encumber taxonomy with erroneous and quite misleading names. In some of the present series of studies attempts have been made to place the names of the plants studied on a surer basis than heretofore.

The Identity of Quercus laurifolia (plates 1031–1036). *Quercus laurifolia* Michx. Hist. Chênes Am. Sept. tt. xvii. and xviii (1801), has so long been misinterpreted, at least since Elliott in 1824, that it becomes necessary to study in some detail the original material of Michaux and the two species which have figured in the misinterpretation of his clearly defined and beautifully illustrated species.

[1] The cost of preparing and engraving the plates met in part through grants from the American Philosophical Society and from the Department of Biology of Harvard University.

The two principal elements involved in the problem are (1) *Q. hemisphaerica* Bartram as validated by Willd. Sp. Pl. iv[1]. 443 (1805), the southern tree (our PLATES 1035 and 1036) with full hemispherical or subspherical head; the coriaceous, dense and opaque, evergreen or only tardily deciduous (at least overwintering) leaves, with foliage of the fruiting branches oblong-lanceolate or -oblanceolate to narrowly elliptic or oblong, quite glabrous on both lustrous surfaces, cuneate at base, either acute or obtuse, 3–10 cm. long and 1–3 cm. broad, very short-petioled; leaves of vigorous vegetative sprouts often sinuate-dentate or -serrate; cup shallowly saucer-shaped, 1–1.5 cm. broad and 3–5 mm. high, with strongly flattened-rounded base; the nut 0.8–1.5 cm. long; the tree occurring on the outer coastal plain from Florida to eastern Texas, north to southeastern Virginia; and (2) the tree with longer, broader and thinner leaves membranaceous and showing, by transmitted light, a clear and intricate reticulation, the glabrate lower surface often with tufts of pubescence in the axils of the lateral veins; the cup deeply saucer-shaped, shallowly cup-shaped or turbinate, 1.5–2 cm. broad and 7–10 mm. high; this being the species described in detail by Sargent as his *Q. rhombica* Sargent in Bot. Gaz. lxv. 430 (May 15, 1918), our PLATES 1031 to 1033, with "Leaves rhombic, rarely oblong-obovate to lanceolate, acute or rounded . . . at apex, cuneate at base, . . . at maturity thin, . . . 9–12 cm. long and 3.5–5 cm. wide, with . . . slender primary forked veins; . . . falling gradually in early winter; . . . cup saucer-shaped to cup-shaped . . . From *Q. laurifolia* it differs in the shape of its thinner leaves . . . and in its larger fruit with much deeper cups". As a variety Sargent described material from a single tree, his var. *obovatifolia* (our PLATE 1034) which differed "in the obovate leaves at the ends of the branches, rounded or slightly 3-lobed or undulate at the broad apex".

On a succeeding page (432) Sargent discussed what he took to be true *Quercus laurifolia* Michx., with "leaves, which are thicker than those of *Q. Phellos* L., are dark green, very lustrous, and glabrous . . . usually not more than 7–8 cm. in length;" and (p. 433) saying "The laurel oak is not evergreen. Late in the winter the leaves begin gradually to turn yellow and then brown, and when the buds begin to swell at the appearance of spring drop almost simultaneously". Later, in his Man. Trees N. Am. ed. 2: 261 (1922) the "much deeper cup" "saucer-shaped or cup-shaped" of *Q. rhombica* became merely "a saucer-shaped cup", although the artist saw it and represented it (our PLATE 1031, FIG. 3) as definitely turbinate and half as high as broad. In this edition of Sargent's Manual the earlier and inclusive description of *Q. laurifolia* was not sufficiently altered to bring out all the contrasts between the two species as conceived by Sargent, for the "thicker" leaves were here described as "at maturity thin", although the cup of the species with narrow coriaceous and over-wintering leaves was correctly illustrated and described as "a thin saucer-shaped cup".

In his original discussion of *Quercus laurifolia* in his sense (i. e. *Q. hemisphaerica*), with leaves "usually not more than 7–8 cm. long" and, as stated in his Manual, "¾′ [*i. e.* 1.8 cm.] wide", Sargent commented on the plates which Michaux published with the original description of *Q. laurifolia:* "On the branches figured by MICHAUX the leaves are generally elliptic but sometimes slightly broadest above the middle, acuminate at the ends [in Michaux's var. *hybrida* (our PLATE 1031, FIG. 4) "obovate and rounded at apex"], and 6–12.5 cm. in length". Furthermore, Michaux's plate (our PLATE 1031, FIGS. 1 and 2) showed, in case of typical *Q. laurifolia*, a fruiting branch with leaves mostly 2–4 cm. broad, and a photograph in the Gray Herbarium of his type of the typical form shows very thin and translucent foliage (PLATE 1033, FIG. 1), the intricate reticulate venation too strongly suggesting that shown by transmitted light in leaves of the type of *Q. rhombica* (PLATE 1033, FIG. 3). Instead of being unusual the leaves shown by Michaux of his original *Q. laurifolia* and its var. *hybrida* seem to me inseparable from those of thoroughly characteristic *Q. rhombica*, originally described with leaves "9–12 cm. long and 3.5–5 cm. wide, with stout conspicuously yellow midribs and slender primary forked veins"; and the type of the acute-leaved form (var. *acuta* Willd.) preserved at Paris could easily have come from material of the tree illustrated by Michaux. Still further, Michaux described the "cupule un peu turbinée" and illustrated it (our PLATE 1031, FIG. 2) as pretty definitely so, just as in his Manual (our FIG. 3) Sargent had so illustrated the cup of *Q. rhombica*.

It is most difficult for me to believe that, when Michaux described and illustrated as his new *Quercus laurifolia*, with evidently thinnish leaves (the type showing intricate venation even in the photograph) on a fruiting branch, the blades up to 12.5 cm. long and 2–4 cm. broad, many of them in outline (as well as size) quite like those of *Q. rhombica*, the cup definitely turbinate and shown as half as high as broad, the tree with these characters having the thin leaves often with tufts of hair persisting beneath in the axils of the veins,—it is most difficult to follow Sargent in believing that Michaux was wholly mistaken and really intended to describe a tree with much shorter and narrower, dense, coriaceous, overwintering, glabrous leaves and "thin saucer-shaped" cups. I see no way but to treat *Q. rhombica* as typical *Q. laurifolia*.

One week before the publication of *Quercus rhombica*, Ashe picked up the *Q. laurifolia* β. *obtusa* of Willdenow, Sp. iv[1]. 428 (1805), a substitute preferred by Willdenow for *Q. laurifolia hybrida* Michx., and made the specific combination *Q. obtusa* (Willd.) Ashe in Torreya, xviii. 72 (May 8, 1918), thus antedating *Q. rhombica* of May 15, 1918. Ashe, like Sargent and others, took as *Q. laurifolia* the species which Willdenow had properly defined in 1805 as *Q. hemisphaerica*, for Ashe said of his *Q. obtusa:* "This tree is undoubtedly closely related to *Q. laurifolia* as generally understood, but it can be readily separated from it by the leaves of vigorous shoots, which in *Q. laurifolia* are irregularly toothed, while in *Q. obtusa* the margins are entire. The cup also has a very pointed base, while the base of the cup in *Q. laurifolia* is flat." Had Ashe looked at Michaux's plate of the original *Q. laurifolia* (our PLATE 1031, FIGS. 1 and 2) he would have seen quite entire leaves and a cup with "a very pointed base", not at all "flat". He could also have seen that Michaux's diagnosis clearly said "Cupula subturbinata".

Somewhat later, Ashe, realizing that *Quercus rhombica* of May 15 was *Q. obtusa* of May 8, published a note in RHODORA, xxiv. 78 (1922), making the reduction, still apparently not knowing that *Q. obtusa* and *Q. rhombica* were phases of true *Q. laurifolia*. He then picked up Sargent's very unsatisfactory *Q. rhombica*, var. *obovatifolia* and made the combination *Q. obtusa obovatifolia* (Sarg.) Ashe, this variety, according to him, differing "only in its spatulate leaves with rounded apices." Sargent had said "obovate leaves at the ends of the branches, rounded or slightly 3-lobed or undulate at the broad apex", his type (our PLATE 1034) and only cited material being from "A single tree" from Beaumont, Texas, *E. J. Palmer*, no. 12747; Sargent accidentally omitting the last figure and adding: "The terminal leaves of this variety, . . . show a relationship with *Q. nigra* L.". They certainly do.

The more significant bibliography of *Q. laurifolia* is as follows:

Q. LAURIFOLIA Michx. Hist. Chênes Am. Sept. t. xvii (1801) and Fl. Bor.-Am. ii. 197 (1803). *Q. laurifolia hybrida* Michx. Hist. Chênes Am. Sept. t. xviii (1801). *Q. laurifolia* α. *acuta* and β. *obtusa* Willd. Sp. Pl. iv¹. 428 (1805). *Q. laurina* Raf. Alsog. Am. 27 (1838), not Humb. & Bonpl. (1809). *Q. laurifolia* β. *obtusa* Pursh, Fl. Am. Sept. ii. 627 (1814). *Q. Phellos*, var. *laurifolia* (Michx.) Chapm. Fl. So. U. S. 420 (1860). *Q. aquatica* β. *laurifolia* (Michx.) A. DC. in DC. Prodr. xvi². 68 (1864), in part. *Q. hybrida* (Michx.) Ashe in Proc. Soc. Am. For. xl. 88 (1916), not (Chapm.) Small (1903). *Q. obtusa* (Willd.) Ashe in Torreya, xviii. 72 (May 8, 1918). *Q. rhombica* Sargent in Bot. Gaz. lxv. 430 (May 15, 1918).—Florida to eastern Texas, north on coastal plain to Cape May, New Jersey.

My reason for including as separate names in the above synonymy both *Quercus laurifolia* β. *obtusa* Willd. (1805) and *Q. laurifolia* β. *obtusa* Pursh (1814) is, that Pursh did not cite Willdenow as the author of his variety. From the start this name has been the source of bibliographic or nomenclatural errors which make one blush for the performances of taxonomists of renown. In his Report on Forests of North America, 152 (1884) Sargent gave in his synonymy of *Q. laurifolia* "*Q. obtusa* Pursh, Fl. Am. Sept. ii. 627". This unintentional new binomial, which Pursh had not made, promptly appeared, correctly in this instance, in *Index Kewensis* under *Quercus* as "*obtusa*, Sargent . . . in syn".; and "*Quercus obtusa* Pursh" appears, as if made by Pursh, in Sudworth's Nomenclature of the Arborescent Flora of the United States (1897), in Trelease's writings and elsewhere, where some sort of verification might have been expected. Since the original *Q. laurifolia* var. *hybrida* Michx. (1801) was the sole basis of *Q. laurifolia* β. *obtusa* Willdenow (1805), the intricate and not very intelligent confusion of the two names must, unhappily, be investigated.

In Small, Fl. Se. U. S. 350 (1903), something quite different and based on *Quercus aquatica* Walt., var. *hybrida* Chapman, Fl. So. U. S. 421 (1860), this having nothing to do with *Q. laurifolia*, var. *hybrida* of Michaux, appeared as *Q. hybrida* (Chapm.) Small, although Small, with his customary "lack of time", left others to hunt up the place of publication of the basonym. Now *Q. aquatica* of Chapman's time was what has proved to be *Q. nigra* L. (1753) and his var. *hybrida* was evidently a form of it, with "leaves oblong or wedge-oblong, entire, emarginate, or 3-lobed at the summit", etc., surely having nothing to do with *Q. laurifolia hybrida* Michx. (our PLATE 1031, FIG. 4). Nevertheless, having subsequently decided that his *Q. hybrida* (Chapm.) Small was not worth maintaining, Small dropped it; but, under the already much discussed and nonexistent *Q.* "*obtusa* (Willd.) Pursh", he gave a single synonym, "*Q. hybrida* (Michx.) Small", Man. Se. U. S. 428 (1933), thus making still another useless binomial, this one invalid because published in synonymy! But when he published his *Q. hybrida* (Chapm.) Small in 1903, the author was not retarded because of the identical binomial (*Q. hybrida*) already published four times before, by Brotero in 1804, by Bechstein in 1843, by Hampton in 1886 and by Houba in 1887. As described by Chapman the basic name seems to have belonged to a tree very unlike the latter; but, as illustrated by Britton & Shafer, N. Am. Trees, fig. 254 (1908), its leaves and their venation are those of *Q. laurifolia*, the cup that of *Q. hemisphaerica*. Probably *Q. hybrida* (Chapm.) Small was an appropriate name.

In his monumental Histoire des Chênes de l'Amérique Septentrionale (1801) Michaux showed as *Quercus aquatica* the species now known to be *Q. nigra* L. in plates xix–xxi. Plate xx showed several different leaves, not all of them belonging to *Q. nigra* (*aquatica*) as now understood. Fig. 2 (our PLATE 1035, FIG. 1), especially, was a vigorous young shoot of an unnamed variety with the narrow leaves cut as in those of sprouts of *Q. hemisphaerica*. In a special paragraph at the end of his discussion of *Q. aquatica* Michaux commented on such foliage, saying:

> On trouve sur les dunes sablonneuses en Géorgie et en Floride, une variété de cet arbre à feuilles étroites, dentées irrégulièrement, et qui conserve ses feuilles pendant tout l'hiver. C'est probablement cette variété que BARTRAM a nommée QUERCUS *dentata* (*narrow leaved winter*

green oak), et dans un autre endroit, QUERCUS *dentata s. hemisphoerica.* On doit la rapporter à notre Chêne aquatique. *Voyez* BARTRAM *Travels, p.* 14, 28 *et* 320.

Referring to Bartram, p. 14, one finds an account of "Our turkey of America" and nothing about any oak; but on p. 24 (probably intended by Michaux) there is a list of the trees and shrubs "growing on the banks of this sequestered river" which includes the undefined name *Q. dentata.* Page 28 yields, as growing near Savannah, "5. Q. dentata", which in a footnote is explained as "5. Narrow-leaved Wintergreen Oak"; and on p. 320 a long list includes "Quer. dentata, s. hemispherica". The last entry, *Quercus dentata* or *hemispherica,* makes the names alternative and therefore illegitimate, even if they had been accompanied by diagnoses, which they lacked. *Index Kewensis* solved the identity of these two alternative names by stating that one " = aquatica", the other " = nigra". This is one way out of the problem. The usually very cautious Stephen Elliott included in his Sk. Bot. S. C. and Ga. ii. 596 (1824), under *Q. laurifolia* the tree which Willdenow had properly validated as *Q. hemisphaerica,* with "Leaves nearly perennial, sessile, oblong-lanceolate, nearly acute, tapering at base, entire, glabrous on both surfaces"; and he cited in the synonymy *Q. hemispherica* Bartram, and in addition to Michaux's two plates of true *Q. laurifolia* "perhaps also t. 20. f. 2". His more detailed account of the tree with "a large handsome hemispherical head" with leaves "very glabrous on both surfaces . . . , those of the young plant toothed and irregularly sinuate. . . . *Cup* shallow, nearly sessile", was of *Q. hemisphaerica,* rather than of Michaux's *Q. laurifolia.* It is probable that Elliott's misidentification in 1824 set the standard by which later authors have misidentified *Q. laurifolia* of Michaux. Elliott's further remarks are illuminating:

> The figure in Mich. Querc. t. 20. f. 2. exactly resembles the young plants of this species. And as this oak, though growing in dry soils, is more known by the name of "Water Oak," than by any other appellation, it is not impossible that Michaux may have been misled by its popular denomination to insert a figure of it among the real Water Oaks.
>
> I have always considered this as the real Q. Hemisphaerica of Bartram. It certainly is the species to which his [*i. e.* Willdenow's] description most appropriately applies.
>
> Grows in rich sandy soils along the margin of swamps, appearing to take the place of the live oak as you leave the margin of the ocean, but growing also with the live oak on the sea-islands.

I realize that by *Index Kewensis* and by Sargent, Silva, viii. 165 (1895) *Q. hemisphaerica* is reduced, without a word of explanation, to *Q. nigra* L. To be sure, Trelease in his American Oaks, Mem. Nat. Acad. Sci. xx. 160 (1924), speaking of Willdenow's herbarium, said "forms occur as representatives of *Q. hemisphaerica* as he meant to use that name", but that these are the heterophyllous sprouts of several species. Willdenow may have had mixed material (and probably did, just as did Linnaeus for many species) but his diagnosis, "Q. foliis perennantibus oblongo-lanceolatis indivisis trilobis sinuatisque lobis mucronatis utrinque glabris. W.", and his basing of the species on Michaux's interpretation above quoted and Michaux's t. 20, fig. 2, leave no doubt as to what he primarily meant. Trelease's suggestion that *Q. hemisphaerica* might have been sprouts of *Q. nigra* or of *Q. Phellos* does not dispose of Willdenow's definite "foliis perennantibus" nor of the Michaux figure, for both *Q. nigra* and *Q. Phellos* have promptly deciduous leaves.

Sargent and, after him, Trelease, also cite in the synonymy of *Quercus nigra* "*Quercus hemisphaerica*, var. *nana*, Nuttall, Gen. ii. 214 (1818)", although Nuttall had no such variety under *Q. hemisphaerica*. Instead, this is what he said: "11. *hemispherica*, Bartram. Willd. also *Q. aquatica*, Willd. β. *nana*, *Q. nana*, Willd.". Willdenow having published as a species *Q. nana*, Nuttall's *Q. aquatica*, var. *nana* was a new combination (but not under *Q. hemisphaerica*). If we do not take up *Q. hemisphaerica* Bartram ex Willd. for the evergreen or partly evergreen species of the outer Coastal Plain of the South, we must coin a new name. Whoever does that will have some difficulty in demonstrating that André Michaux in 1801, Willdenow in 1805 and Elliott in 1824 were all wrong. There has been trouble enough; no good can come from making more. One whole precious week has been lost in working out these unedifying details. That is enough.

Professor W. C. Coker in Journ. Elisha Mitchell Sci. Soc. xxxii. plates 2–4 (1916) shows some beautiful illustrations of *Quercus hemisphaerica* (as the traditional "*laurifolia*"). The name *hemisphaerica*, when applied to these photographs, seems not to need the restrictive first two syllables. In the trade this tree has become known as "Darlington Oak", because of its early introduction as an evergreen ornamental to the streets of

Darlington, South Carolina. Professor Coker's account of the persistence of the foliage of "one of the handsomest and most ornamental oaks to be found in any country" should be repeated:

> One of the most remarkable qualities of the Laurel Oak is its habit of holding its leaves through the entire year throughout most of its range. Towards its northern limit and when planted outside of the coastal plain this habit is modified to a varying degree, depending on the climate. In the low country of South Carolina and along the gulf to New Orleans the tree is nearly or completely evergreen, but at Darlington and Hartsville, S. C., the leaves fall slowly through the winter, usually beginning at the tips of the branches and proceeding inwards, so that by February or March only the center remains decidedly green, with scattered green leaves in the peripheral parts.—Coker, l. c. 40.

Back to Carex rostrata.—In Rhodora, xliv. 324–331, plates 715 and 716 (1942) I felt it necessary, in following strict priority, to abandon the long-familiar name *Carex rostrata* Stokes (1787) for the earlier *C. inflata* Hudson (1762 in part, emend. 1778). This most unfortunate change of name for one of the most common and generally known *Carices* of cool-temperate regions around the northern hemisphere was induced by the decision of the late A. B. Rendle and James Britten in 1907, that the change was unavoidable. The decision of these usually quite accurate gentlemen, neither of whom understood *Carex*, was further argued and accepted by those most careful students of nomenclature, Schinz & Thellung (1908) and Mansfeld (1938), as well as the less cautious Druce and many others in Europe. There seemed no escape from *C. inflata.*

Now, however, the most accurate of recent British students of *Carex*, Mr. E. Nelmes of Kew, has given a very detailed analysis of Hudson's *C. inflata* in Journ. Bot. lxxx. 109–112 (1942), Hudson's original *C. inflata* of 1762 having been a sad mixture, clarified by his redefinition of it as a single specific element in 1778. Approaching the problem with full understanding of British *Carices*, Nelmes considers every possibility and, most happily, concludes: "From the available evidence it seems to me that *Carex inflata* Huds., *Fl. Angl.*, ed. 1, cannot be identified with any one species: it may be *C. vesicaria* L., or, less likely, *C. rostrata* Stokes, or, least likely, *C. laevigata* Sm.; but it is most likely to represent a mixture. *Carex inflata* Huds., *Fl. Angl.*, ed.

2, is almost certainly *C. laevigata* Sm.". Everyone who knows *Carex* will give a sigh of relief. The four varieties recognized by me and illustrated in 1942 should now be called

Carex rostrata Stokes in Withering, Brit. Pl. ed. 2, ii. 1059 (1787). *C. ampullacea* Gooden. in Trans. Linn. Soc. ii. 207 (1794). *C. inflata* sensu Rendle & Britten in Journ. Bot. xlv. 444 (1907), not Hudson, Fl. Angl. 354 (1762), emend. ed. 2: 412 (1778).

Var. **anticostensis** (Fernald), comb. nov. *C. inflata*, var. *anticostensis* Fernald in Rhodora, xliv. 329, pl. 715, figs. 5 and 6 (1942).

Var. utriculata (Boott) Bailey in Proc. Am. Acad. xxii. 67 (1886). *C. utriculata* Boott in Hook. Fl. Bor.-Am. ii. 221 (1839). *C. utriculata*, var. *minor* Boott, l. c. (1839); and many other synonyms cited by me in Rhodora, xlvi. 330 (1942), these including *C. inflata*, var. *utriculata* (Boott) Druce in Bot. Soc. & Exchange Club Brit. Isl. Rep. ix. 141 (1930).

Var. ambigens Fernald in Rhodora, iii. 51 (1901). *C. inflata*, var. *ambigens* (Fernald) Fernald l. c. xliv. 330, pl. 715, figs. 7 and 8 (1942).

Lemna valdiviana, not L. cyclostasa.—Although in his *Revision of the North American Lemnaceae*, printed in advance, Nov. 1, 1897, from the Ninth Ann. Rep. Mo. Bot. Gard. (1898), Dr. C. H. Thompson took up the name *Lemna cyclostasa* for one of the most distinct members of the genus, the authors of Gray, Man. ed. 7 (1908), rejected that name in favor of the validly published *L. valdiviana* Philippi (1864). Had Thompson refrained from precipitate haste to get out his Revision "in Advance" and verified his bibliography it would have been well; for, even now, some authors of volumes on aquatics, in spite of the correction made in ed. 7 of the Manual, still use the name *L. cyclostasa*. Thompson's bibliography was as follows:

Lemna cyclostasa (Ell.) Chev. Fl. Par. **2:** 256. 1827. Schleid. Linnaea. **13:** 390. 1839. *Lemna minor* var.? *Cyclostasa* Elliott, Bot. S. Carol. and Ga. **2:** 518. 1824. *L. Valdiviana* Ph. Linnaea. **33:** 239. 1864. *L. Torreyi* Aust. in Gray, Man. Bot. 479. 1867. [5th ed.]. *L. abbreviata* Hglm. Engler's bot. Jahrb. **21**^{3}**:** 298. Jan. 1895.

Had Thompson been less content with the lax and unverified type of bibliography which characterizes so much of the work of his sponsor, Trelease, he would have searched in vain in Chevalier's Flore générale des Environs de Paris for any mention whatever of *L. cyclostasa,* a species unknown in Europe. Chevalier had the regular European *L. trisulca, polyrrhiza, arhiza, minor* and *gibba* but not *L. cyclostasa* of tropical and warm-temperate America. Had he looked at Schleiden's Monograph of Lemnaceae in Linnaea, xiii. 390 (1839) he would have found under *L. minor* the synonym "L. cyclostasa Elliot". Elliott had no such species but he did describe *L. minor,* var. *? cyclostasa;* Schleiden incorrectly attributed the binomial to him but, since the binomial was published in synonymy, it is invalid. Presumably Thompson copied his references directly from *Index Kewensis,* which gives "cyclostasa, Ell. ex Chev. Fl. Par. ii. 256; Schleid, in Linnaea, viii. (1839) 390 = minor". But everyone with much experience knows that the earlier volumes of *Index Kewensis* must be taken as very untrustworthy guides. If anyone can find *L. cyclostasa* in Chevalier, he will make a clarifying discovery; but the reduction by *Index Kewensis* of the species to *L. minor* shows equal lack of understanding. As to Thompson's reference to *L. abbreviata* Hegelm., consultation of his *Systematische Übersicht der Lemnaceen* in Engler's Jahrb. (1895) immediately shows that Hegelmaier was not treating it as a species. Unfortunately, Hegelmaier adopted a misleading method of designating his varieties, by enclosing the specific name and "var." in parentheses, just as in this country there are always some nonconformists, who refuse to follow conventional practices. Hegelmaier gave numbers to all recognized species, "8. **Lemna angolensis** Welw.", "9. **Lemna valdiviana** Philippi", "10. **Lemna minima** Phil.", but under, 9. *L. valdiviana,* he had, without numbers "**Lemna** (**valdiviana** var.) **abbreviata**" and "**Lemna** (**valdiviana** var.?) **platyclados**". *L. valdiviana,* var. *abbreviata* was not intended as a species.

It has seemed important to dissect this case, in view of the faith trustingly reposed in "the books" by those who follow the uncritical American principle of accepting anything they see in print—a method not creditable when extended, as it so regularly is, into scientific bibliography. Lemna valdiviana Philippi has right-of-way until it is demonstrated that it is antedated by a validly published binomial.

Stenanthium in the Eastern United States (Plates 1037–1041).—

Stenanthium gramineum (Ker) Morong, var. **robustum** (S. Watson), stat. nov. *S. robustum* S. Watson in Proc. Am. Acad. xiv. 278 (1879). Plates 1039 and 1040.

S. gramineum, var. **micranthum,** var. nov. (tab. 1041), caule 0.25–1 m. alto, basin versus 1.5–5 mm. diametro; foliis subrigidis corrugatis 0.4–1 cm. latis; perianthiis 3–4.5 (–5) mm. longis.—Upland woods, western Virginia and eastern Tennessee to northwestern Florida and Alabama. Type from open woods, Caesar's Head, South Carolina, July 28, 1881, *John Donnell Smith* (Herb. Gray.).

The so-called specific distinctions between *Stenanthium gramineum* and *S. robustum* have proved to be very evasive, Britton in Britton & Brown, Ill. Fl. ed. 2: i. 489 (1913) giving seemingly good differences, his key reading:

"Leaves 2″–3″ wide; capsule reflexed . . . . 1. *S. gramineum.*
Leaves 3″–10″ wide; capsule erect . . . . 2. *S. robustum.*"

In the illustrations, however, these characters are not very definitely shown, the figures showing flowering pedicels spreading in both and no contrast in flowers or fruit, while the comment under *S. robustum* implies lack of full conviction: "Apparently distinct from the preceding species, though closely related". Small, Man. 277 (1933), gives a key which *looks* good:

"Perianth white: capsule deflexed, about 8 mm. long. . . . . 1. *S. gramineum.*
Perianth green: capsule erect, fully 10 mm. long . . . . 2. *S. robustum.*"

In both cases the ranges are given as very extensive, *S. robustum* said by Small to grow in "Acid swamps, various provinces, S[outhern] S[tates] to Ark., Ohio, and Pa.".

When, however, the material of the *Stenanthium* of the eastern United States is even casually studied the keys are found not to unlock the door. The type of *S. gramineum* is *Helonias graminea* Ker in Curtis's Bot. Mag. xxxix. t. 1599 (Nov. 1, 1813), Ker there describing the "*flowers* small, . . . white, suffused with purple on the outside", and very many specimens, otherwise quite like Ker's plate, have the perianth green or bronze to purplish, as well as whitish. Furthermore, Watson's original description of *S. robustum* clearly said "perianth-segments 3 or 4 lines long, white or green". As to the "erect" capsules of the latter, as opposed to "capsule deflexed" in the former, it is not reassuring to one's confidence in the character, to examine a series of *S. robustum* and then one of the usually smaller-flowered *S. gramineum.* Watson seems to have picked out to constitute his *S. robustum* stout and broad-leaved specimens with flowers the largest in the series, these largest plants having "been originally included in the last", the "last" being the more slender and narrower-leaved plants with perianth "2 or 3 lines long" and called by Watson "S. ANGUSTIFOLIUM, Gray", based on *Veratrum angustifolium* Pursh. Pursh had the plant which, shortly before, had been described by Ker as *Helonias graminea,* Pursh not realizing that this plant was later to be distinguished by Small on account of its "Perianth white", for Pursh brazenly wrote "Flowers greenish yellow". Pursh's species came from "high mountains of Virginia and Carolina" and a specimen (with an unpublished name) collected by him and bearing his label "Veratrum [unpublished trivial name somewhat equivalent to *angustifolium*], P. Salt pond mountain", is in his herbarium at the Academy of Natural Sciences of Philadelphia. This, with perianths obviously herbaceous (not white and petaloid), and about 6 mm. long, which may pass as presumably the type, has the capsules nearly erect, not at all "deflexed". Similarly, plants which have the medium-sized perianth and firm narrow leaves of true *S. gramineum* may have the capsules as erect as in theoretically ideal *S. robustum* (PLATE 1039, FIG. 3). Such specimens of *S. gramineum* are shown in PLATE 1037, FIG. 3, from Pisgah Forest, North Carolina, *House,* no. 4040. Others, with the pedicels no more erect than in some Pennsylvanian specimens of *S. robustum* (PLATE 1040, FIG. 3, from New Texas, Lancaster County). Such fruiting racemes are shown in PLATE 1038, this specimen from Springfield, Ohio.

Most unfortunately Watson designated no type for his *Stenanthium robustum* and, still more unfortunately, he left others to find out just what he intended by his species of "Pennsylvania to Ohio, Tennessee and South Carolina." A single sheet only bears his inscription "S. robustum, n. sp." in a delicate pencil-notation easily overlooked. This, PLATE 1039, FIGS. 1 and 2, was from Sligo Furnace, Clarion Co., Pennsylvania, Aug. 1859, *J. R. Lowrie* (distributed by Porter) and must stand as the

TYPE. As will be seen from the photograph, the capsules on the lateral racemes are on almost as divergent pedicels as those of *S. gramineum* (PLATE 1038, FIG. 3). I get little satisfaction out of "Perianth green: capsule erect" as opposed to "Perianth white: capsule deflexed".

Taking the one sheet which Watson marked *S. robustum* as the type, the stout and very leafy stem and the broad leaves, accompanied by perianths 8 or 9 mm. long, set the standard; and it at once becomes apparent that such plants, with bases of stem up to 1.5 cm. thick (as opposed to a maximum of 1 cm.), with larger leaves 1–3 cm. broad (as opposed to 4–15 mm.) have the very smooth and translucent leaves thin or membranaceous and with the very many (up to 61) nerves immersed in the tissue (PLATE 1039, FIGS. 2 and 4, PLATE 1040, FIG. 2). In the usually more southern *S. gramineum* and var. *micranthum*, on the other hand, the firm or coriaceous and mostly narrow leaves have prominent elevated ribs, these giving the upper leaf-surface a closely furrowed or corrugated appearance when dry (PLATE 1037, FIG. 2, PLATE 1038, FIGS. 2 and 6, and PLATE 1041, FIG. 2)[1]. Occasionally plants with all other characters of typical *S. gramineum* (PLATE 1038, FIG. 3) will diverge in foliage, showing thin but narrow leaves (FIG. 4) too strongly approaching those of *S. robustum*. The failure of this last character, so hopefully worked out, leaves nothing absolute to separate the larger-flowered *S. gramineum* and the smaller-flowered *S. robustum* as species.

Turning in the other direction, we find along the mountains from western Virginia and eastern Tennessee southward a series of slender-stemmed and narrow-leaved plants with flowers strikingly smaller than in typical *S. gramineum*. The perianths are either herbaceous or petaloid in texture, sometimes greenish or purplish, sometimes white, and the sepals and petals vary from lance-attenuate to linear-oblong and bluntish. The inflorescence is strongly suggestive of smaller panicles of typical *S. gramineum*. This plant evidently passes through its larger-flowered individuals into the smaller-flowered extreme of *S. gramineum*. I am calling it var. *micranthum* (PLATE 1041).

[1] These differences stand out sharply, without aid of a hand-lens, through the reading-glasses prescribed after the removal of a cataract. The late K. K. Mackenzie boasted of his "microscopic vision". It is hoped the the present writer will not see what others can not visualize!

Thus, from the coarse and relatively northern *S. gramineum*, var. *robustum* through the commoner and much wider-ranging true *S. gramineum*, thence on to the tiniest of the series, the southern var. *micranthum*, we have a confluent series, the two most extreme variations with distinctive areas of development. I see no way but to treat them as three geographic varieties. The material in the Gray Herbarium alone suggested three probable species. The large representation in the United States National Herbarium, the herbarium of the Academy of Natural Sciences of Philadelphia, and that of the New York Botanical Garden, for the use of which I am greatly indebted to Drs. Maxon, Pennell and Seaver, respectively, have destroyed all my illusions! As the best I can now do I propose the following definition of the three varieties.

a. Stem (dry) 4–10 mm. thick at lowest exposed internode; leaves rather crowded below, rapidly diminishing below panicle, firm to coriaceous, mostly opaque, the larger ones 4–15 mm. wide, their prominently raised ribs producing a corrugated surface; panicle lax, the branches distant, the flowers mostly subremote along the often flexuous branches; perianth 3–8 (–10) mm. long; capsules ovoid-urceolate, 6–9 mm. long, on spreading to reflexed pedicels; seeds 5–5.5 mm. long.
Stem 0.5–1.9 cm. high, 4–10 mm. thick at base; perianth 5–10 mm. long.......................*S. gramineum* var. *typicum*.
Stem 0.25–1 m. high, 1.5–5 mm. thick at base; perianth 3–4.5 (–5) mm. long..........................Var. *micranthum*.
a. Stem (dry) 7–15 mm. thick at lowest exposed internode, up to 1.8 m. high; leaves crowded and numerous nearly up to panicle, thin and membranaceous, translucent, the larger ones 1–3 cm. wide, their ribs mostly immersed in the tissue; panicle usually dense, with flowers crowded along the stiffly ascending branches; perianth 5–10 mm. long; capsules oblong-subcylindric, 9–10 mm. long, crowded and ascending to horizontally spreading; seeds 5–8 mm. long..................................Var. *robustum*.

S. GRAMINEUM (Ker) Morong, var. **typicum.** *S. gramineum* (Ker) Morong in Mem. Torr. Bot. Cl. v. 110 (1894). *Helonias graminea* Ker (Gawler) in Curtis's Bot. Mag. xxxix. t. 1599 (Nov. 1, 1813). *Veratrum angustifolium* Pursh, Fl. Am. Sept. i. 242 (1814). *Xerophyllum gramineum* (Ker) Nutt. Gen. i. 236 (1818). *Veratrum* (subgen. *Stenanthium*) *angustifolium* (Pursh) Gray in Ann. Lyc. N. Y. iv. 120 (1837). *S. angustifolium* (Pursh) Kunth, Enum. iv. 190 (1843). *S. angustifolium*, **S. gramineum* (Ker) Kunth, l. c. (1843).—Rich woods, thickets and borders of bottoms, northwestern Pennsylvania to Illinois and Missouri, south to southeastern Virginia, upland to northwestern

Florida and Alabama, and to Louisiana and eastern Texas. Plates 1037 and 1038.

Var. micranthum Fernald, supra.—Upland woods, western Virginia and eastern Tennessee to northwestern Florida and Alabama. Plate 1041.

Var. robustum (S. Watson) Fernald, supra. *S. robustum* S. Watson in Proc. Am. Acad. iv. 278 (1879).—Southeastern Pennsylvania, Maryland and District of Columbia to Indiana. Plates 1039 and 1040.

The Identity of Sisyrinchium angustifolium (Plates 1042–1044).—In 1865, in the 4th edition of his Manual, Asa Gray recognized one species of *Sisyrinchium* in eastern North America, the all-inclusive *S. Bermudiana* L., with two varieties: var. *anceps* (*S. anceps* Cav.) with "broadly winged scape" and var. *mucronatum* (*S. mucronatum* Michx.) "with slender and narrowly winged scape". By the 6th edition of the Manual Watson (and Coulter), conscious that the continental North American plants are not the restricted *S. Bermudiana* of Bermuda, recognized two species: *S. angustifolium* Mill., with "Scape . . . *simple, the spathe solitary* and terminal", and *S. anceps* Cav. with "Scape . . . usually branching and bearing 2 or more peduncled spathes". Then came Bicknell's amazing revelation that in temperate North America there are very many morphologically and geographically segregated species, although Bicknell went much farther in his splitting than others have been able to follow. Nevertheless, in Atlantic North America Bicknell clearly differentiated at least a score of species which all careful students must recognize. So absorbed, however, was Bicknell in his newly discovered small world that he did not carefully trace to their sources some of the earlier-named plants.

One of his earliest papers, his *Studies in Sisyrinchium—III: S. angustifolium and some related Species new and old,* in Bull. Torr. Bot. Cl. xxvi. 335–349 (1899), started with the basic assumption that the identity of the first segregate from the Linnean all-inclusive *S. Bermudiana* was settled. His *S. "angustifolium* Mill.", with three synonyms (besides *S. Bermudiana* L. in part), *S. gramineum* Lam. (1783), *S. anceps* Cav. (1788) and *S. montanum* Greene (1899), was described as "stiff and erect . . . Leaves . . . 1.5–2.5 mm. wide (1–3.5 mm.) . . . : stems simple and leafless, or occasionally bearing a single leaf subtending 1 or 2 branches . . . , 1–2 mm. or even 3 mm. wide, wing-margined . . . : spathes erect, green or sometimes purplish-tinged; outer bract 2–6 cm. long, surpassing the inner one 1.5–4 cm., rarely less than twice its length, . . . clasping for 2–6 mm. at base . . . ; interior scales silvery white, narrow, usually about half the length of the inner bract: flowers 1–8, violet-blue; perianth 10–12 mm. long; . . . pedicels erect or nearly so, 17–25 mm. long, shorter or slightly longer than the inner bract: capsules 4–6 mm. high, . . . pale, but often clouded with brownish-purple".

Then Bicknell continued: "This species is far more widely distributed than any other one of its genus, ranging from Newfoundland and New Jersey to Saskatchewan and Montana and southward along the eastern mountains to Virginia [only Mountain Lake, 4000 ft. alt. cited] and in the west to southern Colorado". In his introductory paragraph Bicknell had said: "The common Blue-eyed Grass of the eastern states, *Sisyrinchium angustifolium* Miller, may be taken as representative of a section of the genus *Sisyrinchium*, embracing those species having simple leafless stems with terminal spathes . . . the simple-stemmed species are, as a group, of more northern and alpine distribution than those which develop pedunculate spathes from one or more leaf-bearing nodes, while, on the other hand, the species having a definitely compound system of branching are all distinctive southern".

Thus was set up for all of us, who have found it easier to follow the course of least resistance, a standard misconception of what Miller was supposed to have meant by *Sisyrinchium angustifolium*, what Lamarck had as *S. gramineum* and Cavanilles as *S. anceps*, although Miller and Cavanilles had described or shown the spathes as peduncled and all had cited or illustrated plants with peduncles, and with pedicels far from "erect or nearly so, . . . shorter or slightly longer than the inner bract" of Bicknell's *S. "angustifolium"*.

Starting with *Sisyrinchium angustifolium* Miller, Gard. Dict. ed. 8, sp. no. 2 (1768), we get a brief account of a plant cultivated in England, *with peduncles* and small pale blue flowers:

> 2. Sisyrinchium (*Angustifolia*) foliis lineari-gladiolatis pedunculis longioribus [than in the preceding *S. Bermudiana*]. *Sisyrinchium with linear sword-shaped leaves, and longer foot-stalks to the flower* [longer than in true *S. Bermudiana*]. Bermudiana graminea, flore minore caeruleo.

Hort. Elth. 49. *Grass-leaved Bermudiana with a smaller blue flower.*

. . . .

The second sort grows naturally in Virginia; this hath a perennial fibrous root, from which arise many very narrow spear-shaped leaves about three inches long, and scarce an eighth part of an inch broad, of a light green colour, and entire. The stalks rise about three inches high; they are very slender, compressed and bordered like those of the first [*S. Bermudiana*], and have short, narrow, sword-shaped leaves, whose base embrace them; they are terminated by two small pale blue flowers, inclosed in a two-leaved sheath, standing upon longer foot-stalks than those of the other.

The identification by Miller of his *Sisyrinchium angustifolium* with long peduncles and small pale blue flowers on "longer" foot-stalks, with the plant described and illustrated by Dillenius as cultivated in the English gardens in 1732, has real significance, although Bicknell did not note it, just as he apparently did not even read Miller's description in Gard. Dict. ed. 8 (1768), the first place of publication of the binomial *S. angustifolium.* Instead, Bicknell started *S. angustifolium* from the polynomial ed. 7 (1759), where neither the name nor the adjective *angustifolium* is found. Here is what Miller gave in 1759:

2. Sisyrinchium *foliis lineari-gladiolatis, pedunculis longioribus. Sisyrinchium* with linear Sword-shaped Leaves, and longer Foot Stalks to the Flower. This is the *Bermudiana graminea, flore minore caeruleo. Hort. Elth.* 49. Grass-leaved *Bermudiana* with a smaller blue Flower.

This nonbinomial account, which alone was cited by Bicknell, was followed by the same statement as in ed. 8, that the plant "grows naturally in *Virginia*", etc.

Now, if we turn to the basic treatment by Dillenius, in his Hortus Elthamensis, 49, t. XLI, fig. 49 (1732) we find his *Bermudiana graminea, flore minore caeruleo* described, not merely as "three inches high", as evidently misquoted by Miller, but up to a foot high: "Planta est palmaris, dodrantalis & pedalis"; the leaves full green ("folia . . . saturanter viridia"); the stem 2-forked ("Caulis . . . in summitate bifariam dividatur"). The plate shows as fig. 48 a plant of true *Sisyrinchium Bermudiana,* with erect and but slightly exserted pedicels, as described by Bicknell for *S. angustifolium* sensu Bickn., not Mill.; and as fig. 49 (our plate 1042, fig. 1) *Bermudiana graminea, flore minore caeruleo,* two plants, the taller 1.6 dm. high and with forked scape, the other with simple scape. Both show narrow sepals and petals

5–10 mm. long and, most important of all, slender fruiting pedicels reflexed or recurving from the spathes, quite as in *S. graminoides* Bicknell, Bull. Torr. Bot. Cl. xxiii. 133, pl. 263 (1896), for Bicknell's plate (our PLATE 1043, FIGS. 1 and 2) shows bifurcate and simple stems from the same base, quite as did that of Dillenius, and 2–4 arched to recurving elongate pedicels, while his description of his *S. graminoides* contains the following items: plant 6 inches to 2 feet high (up to a foot acc. to Dillenius), green or somewhat glaucous (full green acc. to Dillenius); leaves and stem "mostly 1½‴–2‴ wide" (Dillenius showed them approximately the same, 3–4 mm.); "Stem dividing . . . into two . . . branches. Not infrequently simple and leafless scapes rise among the normally branched ones, simulating the stem of *S. angustifolium*" (Dillenius said "Caulis . . . in summitate bifariam dividatur" but, like Bicknell, showed also a simple stem); "Capsules . . . disposed to be spreading or even recurved on slender pedicels" (Dillenius showed them definitely so), not erect or nearly so as shown in *S. angustifolium* sensu Bicknell (our PLATE 1043, FIG. 3), not Miller.

It is fortunate that Dillenius gave a good illustration of *Sisyrinchium graminoides* Bicknell (as *Bermudiana, flore minore caeruleo*), for in his discussion Dillenius refers to it, as a "figura . . . vitiosa exhibita", the *Sisyrinchium caeruleum parvum gladiato caule Virginianum* of Plukenet, Phyt. t. lxi. fig. 1 (our PLATE 1042, FIG. 3), for the latter figure, although "vitiosa" for the Dillenian species, was a good one of the common Virginian *S. mucronatum* Michx.!, the type of which I studied in 1903 and which is definitely the plant we now know under that name.

Next among the older species included by Bicknell in his usually simple- and winged-stemmed and relatively northern *Sisyrinchium "angustifolium"*, with erect or nearly erect short pedicels is *S. gramineum* Lam. Encycl. i. 408 (1783). Lamarck gave a clear description of a Virginian plant which can hardly be waved aside, as one might be tempted to do, and he also gave as synonyms the conventional *S. Bermudiana* var. α L., which included at least the Dillenian plant, already discussed, and the Plukenet illustration (our PLATE 1042, FIG. 3) of a Virginian plant, which is evidently *S. mucronatum* Michx. (1803). That Lamarck in 1783 had before him a really new species is possible, from his description. That it was the plant of Plukenet's t. 61, fig. 1 is seemingly apparent and that it was the characteristic plant, common at least in eastern Virginia, which in 1803 Michaux described from Pennsylvania as *S. mucronatum* seems possible from Lamarck's very clear description:

1. Bermudienne graminée, *Sisyrinchium gramineum. Sisyrinchium caule simplici alato, spathis inaequalissimis flores superantibus.* N. *Sisyrinchium angustifolium.* Mill. Dict. n°. 2. *Sisyrinchium caeruleum parvum, gladiato caule, Virginianum.* Pluk. Alm. 348. t. 61. f. I. *Bermudiana graminea, flore minore caeruleo.* Dill. Elth. 49. t. 41. f. 49. *Sisyrinchium Bermudiana.* Lin. var. *a.*

Les feuilles de cette plante sont très-étroites, linéaires, graminées, lisses ou sans nervures bien remarquables, & s'engaînent à leur base par le côté, comme celles des Iris: les tiges sont presque filiformes, simples pour l'ordinaire, comprimées, bordées dans leur longueur de deux petites aîles ou membranes courantes, & hautes de six ou sept pouces. Chaque tige est terminée par deux écailles spathacées, fort inégales, l'extérieure étant une fois plus longue que l'autre, & dépassant toujours les fleurs, qui sont petites, bleuâtres, & communément au nombre de deux. Cette plante croît naturellement dans la Virginie; on la cultive au Jardin du Roi. ♃. (*v. v.*)

In Virginia the only species of *Sisyrinchium* known with consistently unforking stems are *S. "angustifolium"* sensu Bicknell, already somewhat discussed, and in Virginia definitely montane; *S. mucronatum* Michx., frequent; and the southern and capillary-leaved *S. capillare* Bicknell, a very rare and very distinct species with paired sessile spathes, of flat pineland or bog of the Coastal Plain, only twice found in the southeasternmost counties. That *S. gramineum* of Lamarck could have been *S. mucronatum* is evident from the slender ("almost filiform") stems bordered by 2 little wings; whereas, if it were *S. "angustifolium"* sensu Bicknell, which is less likely to have reached the Jardin du Roi from Virginia, we should expect less emphasis on the slenderness. Whether Lamarck had either of these becomes, perhaps fortunately, unimportant, since he cited as an unquestioned synonym *S. angustifolium* Mill. Dict. no. 2. By the International Rules Lamarck's *S. gramineum* is, therefore, illegitimate because (Art. 60[1]) "there was a valid name for the group to which it was applied, with its particular circumscription, position and rank". Thus the identity of the plant actually described by Lamarck becomes an academic question only. S. mucronatum Michx., published without entangling bibliography, stands.

Returning to Bicknell's enumeration of supposed synonyms of his *S. "angustifolium"* we next come to *S. anceps* Cav. Diss. vi. 345, t. cxc, fig. 2 (1788), and we almost repeat the story. This plant (our PLATE 1042, FIG. 2), "*Habitat in Virginia*", described "Caule simplici ancipite saepius aphyllo", was shown as either simple or with a fork at the axil of the cauline leaf, just as in the Dillenian plate of *S. angustifolium* and in Bicknell's plate (our PLATE 1043, FIGS 1 and 2) of his *S. graminoides*, while the long-exserted pedicels are too suggestive of Bicknell's illustration of his *S. graminoides*. Here, then, is the same old plant of European gardens, *S. angustifolium* Mill. (not sensu Bicknell) and, to cap the climax, Cavanilles calmly gave as the same as his reputedly new *S. anceps* the following synonyms: *S. Bermudiana* var. α L.; *S. gramineum* Lam.; *S. angustifolium* Mill., the pre-Linnean *S. caeruleum parvum, gladiato caule, virginianum* of Plukenet, Alm. 348, t. 61, fig. 1, and the much discussed *Bermudiana graminea, flore minore coeruleo* of Dillenius. Then, for full measure, Cavanilles added a new synonym: "S. Minus. R. H. P. [Roy. Hort. Paris, *i. e.* Jardin du Roi, whence Lamarck got his material of *S. gramineum*]". Thus, *S. anceps* started off with all the previously published names for the North American plants encumbering it; and by the same Rule which invalidates the name *S. gramineum* Lam. the name *S. anceps* is also illegitimate.

The last name cited by Bicknell as synonymous with his *Sisyrinchium "angustifolium"* is *S. montanum* Greene, Pittonia, iv. 33 (1899), described from the mountains of Colorado. Here, at last, is a resting-place for the commonest and most widespread species of the genus in Canada and the Northern States, but, even so, the common plant of the East and Northeast cannot really rest. Most of the Northeastern plants have the leaves and stem full green, the green or purple-suffused capsules becoming dull brown or greenish-purple, when ripe changing to almost blackish (PLATE 1044, FIG. 3). Greene's *S. montanum*, an ISOTYPE shown in our PLATE 1044, FIGS. 1 and 2, is pale or whitish-green, with the capsules whitish-brown or pale-stramineous. In the East it occurs along the limy valleys of the Gaspé Peninsula and Anticosti; it is also in western New York, along the Ottawa River, on the limestone of Bruce Peninsula and in northern Michigan and Minnesota. So far as I can find there is no published name for the common deeper green and darker-fruited and not prevailingly calcicolous eastern plant.

To summarize, the species of Sisyrinchium here specially discussed are

Sisyrinchium angustifolium Mill. Dict. ed. 8, 2 (1768), based largely, if not wholly on *Bermudiana graminea, flore minore caeruleo* Dill. Hort. Elth. 49, t. XLI, fig. 49 (1732). *S. Bermudiana* L. Sp. Pl. 954 (1753) at least as to citation of Dillenius. *S. foliis lineari-gladiolatis, pedunculis longioribus* Mill. Gard. Dict. ed. 7, no. 2 (1759). *S. gramineum* Lam. Encycl. i. 408 (1783) in part. *S. anceps* Cav. Diss. vi. 345, t. cxc, fig. 2 (1788). *Ferraria pulchella* Salisb. Prodr. 42 (1796), in part, as based on *S. anceps* Cav. (illegitimate substitute). *S. graminoides* Bicknell in Bull. Torr. Bot. Cl. xxiii. 133, plate 263 (1896). Our plates 1042, figs. 1 and 2, and 1043, figs. 1 and 2.

S. montanum Greene, Pittonia, iv. 33 (1899). Plate 1044, figs. 1 and 2. *S. angustifolium* sensu Bicknell in Bull. Torr. Bot. Cl. xxvi. 336 (1899), in part only. *S. septentrionale* Bicknell in Bull. Torr. Bot. Cl. xxvi. 452 (1899), the slenderest extreme.—Plant pale green, not much if at all darkened in drying; capsules whitish-brown or pale-stramineous, not becoming blackish in age.—Calcareous and other mountains and river-gravels and openings, western Newfoundland to Mackenzie and northern British Columbia, south to Anticosti Island and Gaspé Peninsula, Quebec, southern Ontario, western New York, Michigan, northern Indiana, northern Illinois, Iowa, Nebraska, Colorado, Utah and southern British Columbia. All material I have seen from Michigan and Manitoba northwestward and westward belongs here. Characteristic eastern specimens (selected from a larger series) are: Newfoundland: dry limy barrens, upper slopes and tablelands, alt. 200–300 m., Table Mountain, Port-au-Port Bay, *Fernald & Wiegand*, no. 4252, *Fernald & St. John*, no. 10,814 (both as *S. septentrionale*). Quebec: Anticosti I., graviers calcaires, many colls., from *Victorin & Rolland-Germain* (some of them with *Louis-Marie*): no. 20,333 (Rivière Vaureal), 20,334 (R. au Saumon), 20,335 (R. à la Patate), 24,233 (R. Jupiter), 24,234 and 27,108 (Pointe Sud-Ouest), 27,109 (R. Chicotte), 27,110 (R. Dauphine), 27,111 (R. Natiskotek), 27,112 (R. McKane), 27,113 (R. du Brick); alluvium, banks of Grand River, Gaspé Co., June 30–July 3, 1904, *Fernald;* alluvial thicket between the Forks and Brulé Brook, Little Cascapedia River, Bonaventure Co., July 29 and 30, 1904, *Collins, Fernald & Pease* (*Pease*, no. 4971); alluvium of Little Cascapedia R., *Collins & Fernald*, no. 56; Rivière Petite Cascapedia, *Victorin, Rolland & Jacques*, no. 33,781; alluvium, Grand Cascapedia River, July 12–15, 1905, *Williams, Collins & Fernald;* alluvium of Bonaventure River, Bonaventure Co., Aug. 5, 6 and 8, 1904, *Collins, Fernald & Pease* (*Pease*, no. 5780); gravelly beach, Carleton Point, Carleton, July 21, 1904, *Collins & Fernald;* dry calcareous sand back of beach, Tracadigash Point, Carleton, *Fernald & Weatherby*, no. 2426; sur le barachois, Carleton, *Victorin, Rolland & Jacques*, no. 33,576; Chicoutimi, Saguenay River, Aug. 3, 1892, *Kennedy*. NEW YORK: low field 2½ miles northwest of Waterloo, Seneca Co., *Wiegand, Eames & Randolph*, no. 11,801; low meadow, Victor, Ontario Co., *House*, no. 17,489. ONTARIO: east of Davis Swamp, Ottawa, *J. Macoun*, no. 86,675; Casselman, *J. Macoun*, no. 4387, crevices and talus of hornblendic cliffs and ledges, Cloche Peninsula, Manitoulin Distr., *Fernald & Pease*, no. 3244; dry limestone flats, Cloche Peninsula, *Fassett*, no. 14,570; Hay Bay, Tobemory, Bruce Peninsula, *Krotkov*, no. 7281; open glade, Jack Fish, Thunder Bay Distr., *Pease & Bean*, no. 23,547; Sleeping Giant, Thunder Bay Distr., *Taylor, Losee & Bannan*, no. 915.

S. MONTANUM, var. **crebrum,** var. nov. (TAB. 1044, FIG. 3) foliis saturante viridibus; capsulis viridibus vel purpurascentibus deinde plus minusve atrobrunneis.—Foliage and stem deep green, drying dark or blackish; capsules green or purple-tinged, in age fuscous-brown or blackish.—Southwestern Greenland; Newfoundland to Ontario, south to Nova Scotia, New England and Pennsylvania, and mts. to western Virginia (according to Bicknell). TYPE from Clark's Point, Southwest Harbor, Maine, August 17, 1890, *Edward L. Rand* (in Herb. Gray.).

In addition to the type the following, from twenty times as many sheets, are cited as characteristic. GREENLAND: Nünatàrssüak, 65° 25′ N., 49° 50′ W., August, 1932, *J. Iversen*. NEWFOUNDLAND: by rill on steep siliceous slope of Joan Plains Hill, Bay Bulls, *Fernald, Long & Dunbar*, no. 26,528; dry soil in fields, near Topsail, Conception Bay, *Howe & Lang*, no. 1219; Glenwood, *Fernald & Wiegand*, nos. 5196 and 5198; dry burned crests north and east of Tilt Cove, *F. & W.*, no. 5199; Grand Falls, *F. & W.*, no. 5195; Port Saunders, *F. & W.*, no. 3094; Cow Head, *F. & W.*, no. 3091; river-gravel, mouth of McKenzie River, Bonne Bay, *Fernald, Long & Fogg*, no. 1531; Lark Harbor, *F. L. & F.*, no. 188. QUEBEC: Natashquan, *St. John*, no. 90,327, *Victorin & Rolland*, no. 28,543; Cap de l'Est, Anticosti, *Victorin & Rolland*, no. 27,105; graviers de platières, Rivière la Loutre, *Victorin & Rolland*, no. 24,235; La Madeleine, Gaspé Co., *Rousseau*, no. 31,099; Mont-Saint-Pierre, Gaspé Co., *Victorin, Rolland & Jacques*, no. 33,229; peaty headland, Cap au Renard, Gaspé Co., *Fernald & Pease*, no. 24,968; Isle-aux-Courdes, *Victorin*, no. 4192; Lac St.-Jean, *Victorin*, no. 15,957; Ile-aux-Basques, Co. de Temiscouata, *Victorin, Rolland & Jacques*, no.

33,042; sable, nord de Mont-Laurier, Senneterre, *Victorin, Rolland & Dominique*, no. 204. Magdalen Islands: dry sandy field, Wolf Island (Pointe du Loup), *Fernald, Bartram & Long*, no. 7214. Prince Edward Island: dry clearings, Alberton, *Fernald & St. John*, no. 7213. New Brunswick: dry gravel-pavement, Belledune Point, *Fernald & Pease*, no. 24,969; sandy shore, Bathurst, *S. F. Blake*, no. 5387; damp place in field, Deep Cove, Grand Manan, *C. A. & Una F. Weatherby*, no. 5530. Nova Scotia: Barrasois River, Cape Breton, *G. E. Nichols*, no. 611; gravelly beach, Guysborough, *Rousseau*, no. 35,352; gravelly beach of Third Lake, Windsor Junction, *Fernald & Long*, no. 20,806; seepy banks and moist fields, Yarmouth, *Bissell, Pease, Long & Linder*, no. 20,793. Maine: dry fields, Blaine, *Fernald*, no. 2493; Peaked Mt., Clifton, Aug. 22, 1897, *Fernald;* roadside, Newry, *Pease*, no. 28,376; dry pasture, Roque Bluffs, Aug. 1, 1911, *C. H. Knowlton;* boggy meadow, Harriman Point, Brooklin, *A. F. Hill*, no. 1347; old orchard, Lincolnville, *G. B. Rossbach*, no. 148; Blackstrap Hill, Falmouth, *Bissell & Chamberlain*, no. 373; York Harbor, Aug. 25, 1896, *Bicknell*. New Hampshire: dry pasture, Martin Location, Coös Co., *Pease*, no. 14,251; Durham, *Hodgdon*, no. 4000; Hookset, June 7, 1921, *C. F. Batchelder*. Vermont: field, Concord, Essex Co., *Pease*, no. 28,576; Wells River, *Pease*, no. 29,462; sand plain, Swanton, *S. F. Blake*, no. 3153; Manchester, *M. A. Day*, no. 171. Massachusetts: Essex, June 13, 1896, *E. F. Williams;* Groton, *Harris & Smith*, no. 2678; Boxborough, *Hubbard & Torrey*, no. T521; wet field, Stoughton, June 2, 1909, *Kennedy;* Plymouth, *Fernald & Hunnewell*, no. 15,083; dry sandy oak barrens, Harwich, *Fernald*, no. 16,601; South Ashburnham, *F. F. Forbes*, no. 1085; dry gravelly bank, Ashfield, June 19, 1921, *Churchill et al.;* dry open soil, Middlefield, *Fernald & Long*, no. 9262. Rhode Island: Cumberland, May 30, 1911, *R. A. Ware;* Middletown, May 30, 1908, *E. F. Williams;* Block Island, June 16, 1917, *R. P. Marshall*. Connecticut: dry field, Franklin, May 31, 1906, *Woodward;* moist field, South Britain, *Blewitt*, no. 624; wet meadow, Waterbury, *Blewitt*, no. 567; dry hill, Southington, *L. Andrews*, no. 489; Oxford, June 8, 1902, *Harger;* meadows, Stratford, June 5, 1898, *Eames*. New York: moist open field, Madrid, *Phelps*, no. 340; Canton, *Phelps*, no. 108; Fort Ann, July 15, 1917, *Burnham;* Oneida Castle, *Maxon*, no. 152; Caroline, *Eames & MacDaniels*, no. 3801; Dryden, *F. P. Metcalf*, no. 2025. Pennsylvania: wooded roadside, Muncy Valley, Sullivan Co., *Fosberg*, no. 15,036; grass-flat in open woods, Leroy, Bradford Co., June 21, 1941, *W. F. Westerfeld*. Ontario: dry clearing, Temagami Forest, *W. R. Watson*, no. 6701; open field, Central Island, Toronto, June 18, 1936, *R. J. Eaton;* crevices of sandstone, Corbeil Point, Algoma Distr., *T. M. C. Taylor et al.*, no. 705.

SOME ORCHIDS OF THE MANUAL RANGE (PLATES 1045–1048).—

HABENARIA CLAVELLATA (Michx.) Spreng., var. **ophioglossoides,** var. nov. (TAB. 1046), a var. typica recedit folio infimo sessile, vix basi prolongato, ovale vel oblongo vel late oblanceolato 1–4 cm. lato, 3–17 cm. longo, longitudine bis vel etiam sexies majore quam latitudine.—Newfoundland and Côte Nord, Que., to western Ontario, south to Nova Scotia, New England, New Jersey, Michigan and northern Wisconsin. TYPE from NOVA SCOTIA: boggy clearing near Porcupine Lake, Arcadia, Yarmouth Co., Sept. 2, 1920, *Fernald & Long*, no. 20,839 (in Herb. Gray.; isotype in Herb. Phil. Acad.).

Typical *Habenaria clavellata* was based on *Orchis clavellata* Michx. Fl. Bor.-Am. ii. 155 (1803) from Carolina. As shown by the Michaux TYPE (our PLATE 1045, FIG. 1), which, unfortunately, has the tip of the backward-folded leaf covered by the label, he had the characteristic Carolinian and broadly southern plant with the relatively narrow leaf tapering to a subpetiolar base, a full-length leaf from North Carolina shown as FIG. 3. Typical *H. clavellata* has the single large leaf narrowly oblong, oblanceolate or spatulate, gradually tapering to a rather definite petiolar base, the leaf varying from 5.5 to 23 cm. long and 0.7–2.7 cm. broad (one twelfth to one fifth as broad as long). All material in the Gray Herbarium from Florida westward to Louisiana and northward to Virginia and Tennessee is typical *H. clavellata*, while this extreme of the species pushes locally northward into the southern area of var. *ophioglossoides*.

The latter, var. *ophioglossoides*, has oval, oblong or broadly oblanceolate leaves rounded to tapering to an essentially sessile (not subpetiolar) base, the blade 3–17 cm. long and 1–4 cm. broad (one sixth to one half as broad as long). It is, as a series,

CORRECTION

Contribution from Gray Herbarium, no. CLXII.

Through an error in reprinting, 10 lines at the bottom of p. 161 were omitted. The portion of the paragraph on p. 161 is here reprinted and may be attached to the page.

more northern than typical *H. clavellata*, its dominance in the North indicated in the following check of specimens in the Gray Herbarium and that of the New England Botanical Club: from NEWFOUNDLAND, typical *H. clavellata* 0, var. *ophioglossoides*, 21; QUEBEC, typical *clav.* 0, var. *oph.* 8; PRINCE EDWARD ISLAND, typical *clav.* 0, var. *oph.* 4; NEW BRUNSWICK, typical *clav.* 0, transition 1, var. *oph.* 7; NOVA SCOTIA, typical *clav.* 0, transition 1, var. *oph.* 23; MAINE, typical *clav.* 0, transition 6, var. *oph.* 75; NEW HAMPSHIRE, typical *clav.* and transition 8, var. *oph.* 42; VERMONT, typical *clav.* and transition 1, var. *oph.* 12; MASSAchusetts, typical *clav.* and transition 41, var. *oph.* 17; Rhode Island, typical *clav.* 7, var. *oph.* 1; Connecticut, typical *clav.* 6, var. *oph.* 0; New York, typical *clav.* 8, var. *oph.* 5; Ontario, typical *clav.* 0, var. *oph.* 6; Michigan, typical *clav.* 0, var. *oph.* 6. Too little material is at hand from New Jersey, Pennsylvania and Ohio to Minnesota and Iowa to indicate the relative frequency of the two in those states; but the strong development southward of typical *H. clavellata* and northeastward of var. *ophioglossoides* is clear.

From the citation in Ames, Enum. Orchids U. S. and Canada, 44 (1924) one would infer that, in publishing the basic *Orchis clavellata*, Michaux assigned it earlier synonyms which might render his later name (of 1803) untenable. The first citation in the Enumeration, under synonymy of *H. clavellata* reads: "Orchis clavellata *Michaux,* Flora Boreali-americana, vol. 2, p. 155 (1803), exclude synonymy in part." Reference to Michaux's treatment shows, however, merely the description of the new species, with "*Hab.* in Carolina."[1] As originally published *Orchis clavellata* had no synonymy, so that the validity of the name is unblemished.

Orchis tridentata Muhl. ex Willd. Sp. Pl. iv. 41 (1805) from Pennsylvania, with "Folia *caulina tria, infimum lanceolato-ensiforme dodrantale*" must be the typical relatively southern *Habenaria clavellata,* for the very narrow leaf "nine inches long" can apply only to that, and the material from Lancaster County before me is of typical *H. clavellata.*

(*To be continued*)

[1] Michaux's Flora Boreali-Americana was based on his own collections made during many years of pioneer botanical exploration in eastern North America, just as the Flora Virginica of Gronovius was based on collections made in Virginia by John Clayton, the latter book prepared with the collaboration of the young Linnaeus who, later, based many binomials on the Clayton plants described by Gronovius. This is common knowledge, clearly stated in the two pioneer books. It is, therefore, a bit startling to read in the North American Flora, xxviiiB², in the treatment of the *Umbelliferae*, items like the following: *Ptilimnium capillaceum* (Michx.) Raf., resting on *Ammi capillaceum* Michx. Fl. Bor.-Am., with "Type locality: 'In campestribus Carolinae', collector unknown"; or *Thaspium trifoliatum* (L.) Gray, resting on *Thaspia trifoliata* L., from *Clayton*, with Linnaeus citing "*Gron. virg.* 31", said to have its type from "'Virginia', collector unknown". Surely, the editors could have found out. Such entries are similar to the enumerations of states from which species are known, with the state from which the type came omitted.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLXII.

IDENTIFICATIONS AND REIDENTIFICATIONS OF NORTH AMERICAN PLANTS

M. L. Fernald

(*Continued from page 162*)

Habenaria psycodes (L.) Spreng., forma **varians** (Bryan), stat. nov. Var. *varians* Bryan in Ann. Mo. Bot. Gard. iv. 37, pl. 5, fig. B (1917).

H. fimbriata (Ait.) R. Br., forma **mentotonsa,** f. nov., labelli lobo terminali cuneato integro vel apice breviter eroso-dentato; petalis integris.—Maine: meadow, Hamilton Cove, Lubec, Washington County, August 2, 1909, *Fernald*, nos. 1662d (type in Herb. Gray.), 1662e and 1662g.

Quite like typical *Habenaria fimbriata* but with entire petals and narrowly cuneate entire or obscurely short-dentate or erose terminal division of the lip. Entire petals are frequent in both *H. fimbriata* and the smaller-flowered *H. psycodes*, and the lip of *H. psycodes*, forma *ecalcarata* (Bryan) Dole is entire. At Hamilton Cove *H. fimbriata*, forma *mentotonsa* (with shaved chin) is relatively common, mixed with typical *H. fimbriata*, but I cannot follow Correll who, in Bot. Mus. Lfls. Harv. Univ. vii. 65 (1938), calls this plant the characteristic slender-racemed one with greenish-white or rose-tinted flowers, the hybrid of *H. lacera* (Michx.) Lodd. and *H. psycodes*, the always scanty and relatively insignificant plant known as × *H. Andrewsii* Marcus White ex Niles, Bog-Trotting for Orchids, 258 with plate (1904).

Correll's vast aggregation of relatively typical *Habenaria psycodes*, *H. fimbriata* and *H. lacera*, var. *terrae-novae* Fern. in Rhodora, xxviii. 21 (1926) under the unsatisfactorily blanketing name × *H. Andrewsii* can appeal to no field-botanist who for decades has known the various elements involved. Much Newfoundland *H. lacera*, var. *terrae-novae* is included under his remodeled × *H. Andrewsii*, although no true *H. lacera* is found in Newfoundland, where its smaller-flowered var. *terrae-novae* occurs by thousands on boggy barrens, tundra and treeless alpine areas, almost always apart from *H. psycodes* of richer, often alluvial, thickets and meadows. On Sable Island, 100 miles out-to-sea off

Canso, Nova Scotia, the only Fringed-orchid is *H. lacera*, var. *terrae-novae*.

Very similarly, although *Habenaria fimbriata*, forma *mentotonsa* occurs in eastern Washington County, Maine, it is significant that in the many pigeonholes of Fringed-orchids in the Herbarium of the New England Botanical Club I can find neither *H. lacera* nor *H. psycodes* (parents of true × *H. Andrewsii*) from that county. Both seem to stop their eastern extension in coastwise Maine in Hancock County, 70–90 miles to the southwest of Cutler.

Similarly, nine tenths of the specimens in the Gray Herbarium and that of the New England Botanical Club which have been annotated (some of them cited) as × *Habenaria Andrewsii* are characteristic *H. fimbriata* (including the TYPE of *H. fimbriata*, forma *albiflora* Rand & Redfield) or *H. psycodes*. × *H. Andrewsii*, as well as Fleur-de-lis, Blackberry blossoms, Yellow Clintonia, Indian Pipes, "white, innocent twigs of apple" and other non-orchidaceous plants, was illustrated in Bog-Trotting for Orchids. The life-size photograph shows racemes 2–2.5 cm. thick; and the description calls for "Labellum about ⅓–½ inch [8–12.5 mm.] broad". In his very detailed account of *H. psycodes* × *lacera*, Andrews, in RHODORA, iii. 246 (1901), said: "Lower leaves as in *H. lacera* . . . , width to 3 cm. . . . Average width of lip about 12 mm. . . . cleft as in *H. lacera* . . . Glands of pollen-masses . . . elliptical or slightly kidney-shaped", and, on p. 247, "All in all the characteristics of the hybrid seem to show a stronger influence of *H. lacera*". The distinctive characters of *H. lacera* and of *H. fimbriata*, besides color and dissection of lip, include the following. H. LACERA: largest lower leaves 1–3.5 cm. broad; raceme 2–6 cm. thick; perianth 5–6 mm. long; lip 1–1.5 cm. long and broad, its terminal division cuneate into a very slender claw; glands of anther oblong-linear. H. FIMBRIATA: largest lower leaves 2.5–9 cm. broad; raceme 5–9 cm. in diameter; perianth 9–12 mm. long; lip 1.5–2 cm. long, 1.8–3 cm. broad, its dilated terminal division short-stalked or subsessile; glands suborbicular. In all except the narrow and fringeless terminal division of its lip *H. fimbriata*, forma *mentotonsa* is very characteristic *H. fimbriata*, growing, as said, far from *H. lacera* or *H. psycodes*. In view of these many considerations it is tolerably certain that the great group of amateur and professional botanists who have assembled the large representation of *H. lacera, psycodes* and *fimbriata* in the herbarium of the New England Botanical Club and in the Gray Herbarium, for the most part with correct identifications, have not all been wrong.

Cleistes divaricata (L.) Ames, var. **bifaria,** var. nov. (tab. 1048), var. typica recedit planta plerumque 1.5–5 dm. alta pedunculo 0.3–1.6 dm. longo; sepalis longioribus 3–4.5 cm. longis; petalis 2–3 cm. longis, 5–10 mm. latis.—Upland woods, mountain-crests and slopes, Cumberland Plateau and Mountains of Kentucky and Tennessee and Blue Ridge of western North and South Carolina, coming out to peats and pine barrens of the Coastal Plain from eastern North Carolina to Florida, thence to Louisiana. Map 2.[1] Type from summit of Table-rock Mountain, Burke Co., North Carolina, July 2, 1891, *Small & Heller*, no. 285 (Gray Herb., isotypes in several other herbaria).[2]

Arethusa divaricata L. Sp. Pl. 951 (1753), typonym of *Cleistes divaricata* (L.) Ames, Orchidaceae, vii. 21, pl. 108 (1922), was based on *Serapias radicibus palmato-fibrosis, caule unifloro* of Gronovius from Virginia (photograph before me) and upon Catesby's plate 58 of his *Helleborine Lilii folio caulem ambiente*, etc., represented as having an extraordinarily large flower (with sepals 6.4–7.3 cm. long, petals 6–7 cm. long and lip 7 cm. long). The Clayton material, shrunken by drying, is more modest, its dried and distorted sepals up to 4.2 cm. long, petals to 3.6 cm. and lip slightly over 4 cm. long. The Clayton material represents a small-flowered extreme of the plant which locally follows the Coastal Plain from southern New Jersey to northern Florida (map 1). The Catesby drawing is presumably exaggerated in size. I have had through the courtesy of the Curators the advantage of studying, besides that in the Gray Herbarium and the Ames Herbarium, all the material at the United States National Herbarium, the New York Botanical Garden, the Academy of Natural Sciences of Philadelphia and the Brooklyn Botanic Garden. These collections show that there are two

[1] Since the map was engraved, specimens from additional stations in the Cumberland Mountains of Tennessee have been sent me for study by Professor Jesse M. Shaver of George Peabody College for Teachers, at Nashville. They add three dots for Tennessee.

[2] One Florida specimen of 1888, bearing the intriguing data, "wedding trip", has not been entered on the map; neither have I selected it as the type of var. *bifaria* (*in two parts* or *on two sides*).

MAP 1, Range of typical CLEISTES DIVARICATA; MAP 2, of var. BIFARIA.

rather strongly defined varieties passing as *Cleistes divaricata.* The plant which is confined to the Coastal Plain, northward to southern New Jersey but in the South not found west of northern Florida, seems to be true *C. divaricata.* This plant (our PLATE 1047) in its best development is usually 4 or 5 dm. high, the whole series ranging from 2.2–7.2 (av. 4.5) dm. high, while the peduncle (between the base of the median leaf and the floral bract is 0.9–2 (av. 1.5) dm. long. The median leaf ranges from 6.5–15 (av. 10) cm. long; the lateral sepals 4–7 cm. long; petals 3.5–5 (by Catesby shown up to 7) cm. long and 8–14 mm. broad; the ovary and stipe during anthesis 2.5–4.5 (av. 3.25) cm. long.

Throughout much of the Southeast, from Florida to eastern North Carolina, west to Louisiana, chiefly on the Coastal Plain, and inland on the Blue Ridge (up to open summits) to North Carolina and on the Cumberland Plateau and Mountains of Tennessee and Kentucky, the plant is generally smaller in most parts, var. *bifaria* (from its two areas of development). In var. *bifaria* (PLATE 1048) the stem is rarely 6.5 dm. high, usually ranging from 1.5–5 dm., with the peduncle 0.3–1.6 (av. 1) dm. long and the median leaf 3.5–13 (av. 7.6) cm. long. Its flower is conspicuously smaller, though sometimes approaching that of var. *typica*, with longer sepals 3–4.5 cm. long, petals only 2–3 cm. long and 5–10 mm. wide, and ovary and stipe during anthesis 1.2–3.5 (av. 2.6) cm. long.

Occurring on the ancient Cumberland Mountains and Plateau and along the ancient Blue Ridge, var. *bifaria* seems to be the biological type of the species, which, on withdrawal of the Cretaceous and then the Tertiary seas from the country to the east and south, largely moved out to the Coastal Plain. There, in new environment, it has given rise to the larger-flowered extreme (nomenclatural type of the species) which has followed locally northward to southern New Jersey.

As indicating the confusion heretofore of typical *Cleistes divaricata* of the Atlantic Coastal Plain and var. *bifaria* of the southern Atlantic and the Gulf Coastal Plain, as well as the mountains, there is a sheet in the Britton Herbarium, originally in the herbarium of the late Professor Lewis R. Gibbes of the College of Charleston, South Carolina, labeled in the hand of Dr. John K. Small as from "Flat Rock, S. C.". This original label, which, like all original labels, would never be altered or written upon by those who fully respect original documents, was unfortunately altered by a later botanist, who knew the Carolina Mountains, to "N. C." instead of the original S. C., and the original label further desecrated by the misinformative addition "Henderson Co., N. C.". The specimen is of typical Atlantic Coastal Plain *C. divaricata*, which is apparently unknown in Henderson County or elsewhere on the Blue Ridge or on the Cumberland Plateau or Mountains. In view of the fact that Gibbes lived at Charleston and that there is another sheet of material with his original handwriting on the labels (one "Summerville, 20 May, 1859", the other "Flat Rock, 12 June, 1858. L. R. G.") it would seem that the specimen with unjustifiably altered label came from Flat Rock on Flat Rock Creek, which drains into Wateree River, a tributary of Santee River, in Kershaw County, on the Coastal Plain of South Carolina, north of Camden and northwest of Sumter and Charleston.

Calopogon pulchellus (Salisb.) R. Br., var. **latifolius** (St. John), stat. nov. Forma *latifolius* St. John in Proc. Bost. Soc. Nat. Hist. xxxvi. 69, pl. 1, fig. 4 (1921). *Limodorum tuberosum*, f. *latifolium* (St. John) House in Bull. N. Y. State Mus. no. 243–244: 51 (1923), as to name only. *Cathea pulchella*, f. *latifolia* (St. John) House, l. c. no. 254: 244 (1924), as to name only.

The original material is much more than a broad-leaved extreme of *Calopogon pulchellus*, a species which, even in the same area, may have the leaf varying from narrowly linear and only 2–4 mm. wide up to lanceolate or lance-oblong and up to 2 cm. wide, while very extreme and gigantic plants (up to 9.75 dm. high), may have the leaf up to 3–5 cm. broad. In this typical *C. pulchellus*, either very narrow- or very broad-leaved, the leaf is usually solitary and much shorter than the elongate scape. The type of var. *latifolius* has the leaves often paired and broadly lance-oblong to narrowly oblong-ovate, only twice to six times as long as broad and greatly overtopping the very short scape, while its heavily dark-coated tuber is much larger (2 cm. thick) than in any typical *C. pulchellus* I have ever seen. The type is past flowering, but other material, also from Sable Island, is flowering. This is narrower-leaved and has either paired or single leaves, although its scape is much shorter than to barely overtopping the leaf or leaves; furthermore, some material from the Magdalen Islands is stongly transitional to var. *latifolius*. This plant of Sable Island and, less typically, of the Magdalen Islands is not the Newfoundland *Limodorum tuberosum*, var. *nanum* Nieuwland in Am. Midl. Nat. iii. 130 (1913). The latter is merely typical *Calopogon pulchellus* at its bleak northern limit, 0.7–2 dm. high, with scape much overtopping the leaf, the raceme reduced to 1–4 flowers, merely the smallest extreme of the species, just as plants of southeastern Virginia 6–9.75 dm. (pretty close to 1 m.) high, with the leaf 3–5 cm. broad and the 10–20 flowers 4–4.5 cm. broad, are the largest. The paired and short leaves and the large tuber of the type of var. *latifolius* give the plant (past flowering), as shown in St. John's figure, the aspect of *Liparis!*

Spiranthes tuberosa Raf., var. **Grayi** (Ames), comb. nov. *S. Grayi* Ames in Rhodora, vi. 44 (1904). *S. simplex* Gray, Man. ed. 5: 506 (1867), not Griseb. Fl. Brit. W. Ind. 641 (1864).

As noted by me in Rhodora, xlviii. 6 and 10 (1946), the name *Spiranthes tuberosa* Raf., Herb. Raf. 45 (1833) antedates by seven years the name *S. Beckii* Lindley (1840), the latter name currently used for the very slender and tiny-flowered plant which Ames correctly, except for the overlooked *S. tuberosa*, named *S. Grayi* in 1904. It is fortunate, at least, to be able to dismiss the name *S. Beckii*, for Lindley made a sad mess of his original publication of it in his Genera and Species of Orchidaceous Plants, 472 (Sept. 1840). There, in the fashion of many British botanists of his day (and too often of the present day), he chose the British use of the name *S. gracilis*, rather than the earliest use of it. Consequently, he took up *S. gracilis*, as of Hook. (we now would say *sensu* Hook.), Fl. Bor.-Am. ii. 202, t. 203 (1839), with the synonymy copied directly from Hooker. Hooker mis-cited the combination as starting in Bigelow, Fl. Bost. ed. 2: 322 (1824), Bigelow having called it *Neottia gracilis*. Hooker cited his *S. gracilis* (Bigel.) Hook. as having the "Hab. Canada; and Lake Huron (*Dr. Todd*) to Fort Franklin, on the Mackenzie River. *Dr. Richardson. Drummond*" and his plate beautifully showed the Canadian *S. lacera* (Raf.) Raf., l. c. 44 (1833), discussed and illustrated by me in Rhodora, l. c. 5–9, pl. 993 (1946). Lindley, maintaining *S. gracilis* sensu Hooker (1839), assumed that Drummond, who actually explored northward to northern Canada, had collected it much farther south, consequently he interpreted the Drummond citation given by Hooker as meaning "Louisiana", then for good measure he added "etiam in Bahamis"! *S. gracilis* (Bigelow) Beck, Bot. 333 (1833) and *S. gracilis* (Bigelow) [sensu] Hooker (1839), although two different species so far as the plants are concerned, both go back nomenclaturally to the same type.

Having thus temporarily saved the name *Spiranthes gracilis* sensu Hooker (1839), Lindley's next problem was to dispose of the earlier *S. gracilis* (Bigelow) Beck (1833). That was quickly accomplished by renaming the latter *S. Beckii* Lindl. l. c. (1840), with the additional synonyms *Neottia tortilis* [sensu] Elliott (1822) [not Swartz (1800)], and *Limodorum praecox* Walt. (1788) basis of *S. praecox* (Walt.) S. Watson (1890). Nomenclaturally alone the name *S. Beckii* Lindl. is doubly illegitimate. If it was, as he said, the same as the earlier *S. gracilis* (Bigelow) Beck he should have used the latter name for it; if, however, it was also the same as *Limodorum praecox* Walt. (1788) Lindley should have retained this specific name. Taxonomically, furthermore, *S. Beckii* Lindl. was as hopeless a muddle as could be imagined, for it was concocted from elements of several different species. *Limodorum praecox* Walt., originally described with fibrous roots and ensiform leaves ("radicibus fibrosis, foliis ensiformibus") etc., is a plant with long and mostly linear firm leaves extending up the stem, the relatively coarse spike with heavily pubescent rachis, bracts and ovaries, the perianth 4–6 mm. long, etc., the perianth of *S. tuberosa* being only 2–3 mm. long. Nevertheless, Lindley described his *S. Beckii* as "perfectly glabrous. The flowers are very minute . . . S. glaberrima, foliis omnibus radicalibus anguste ovalibus" etc. If, furthermore, it were *N. tortilis* sensu Elliott, it would be very difficult to reconcile Lindley's description with Elliott's "foliis radicalibus linearibus . . . *Stem* pubescent towards the summit. *Leaves* . . . of the root linear lanceolate, nine to ten inches long . . . Bracteal leaves pubescent" etc. In view of the vertical, finger-like, usually solitary tuber of *S. tuberosa* ("*S. Beckii*" of most recent authors) it is illuminating that Lindley knew nothing of this character nor did those authors with whose descriptions he associated his name. Furthermore, since his *S. Beckii* was "perfectly glabrous" as is *S. tuberosa*, it is significant that Lindley said in his Latin diagnosis "ovario puberulo", a character belonging to *S. praecox*. The "lip [with] . . . a remarkably lax cellular texture" applies to *S. tuberosa*, but the description and cited synonyms otherwise are so confused that it is certainly fortunate that the name given by Lindley is illegitimate.[1]

Spiranthes tuberosa consists of two strongly marked geo-

[1] Hooker, under his *Spiranthes gracilis* (i. e. *S. lacera*), a plant with glabrous inflorescence, and which Hooker correctly described "foliis radicalibus ovatis petiolatis", cited as synonyms the much earlier *Ophrys aestivalis* Michx. Fl. Bor.-Am. ii. 157 (1803) and *Neottia tortilis* Pursh, Fl. Am. Sept. ii. 589 (1814), "(*non Sw.*)". Lindley, under *Spiranthes gracilis*, cited the same synonyms. Evidently neither he nor Hooker studied very closely the Michaux description [and specimens] nor the description by Pursh; otherwise they would not have cited them under the wholly glabrous *S. gracilis*, with leaves all basal and ovate, for Michaux definitely described his *Ophrys aestivalis:* "O. scapo folioso: foliis glabris, lanceolatis, acutissimis; spica pubescente, spirali" etc. and he suspected that it might be the *Limodorum praecox* of Walter, *O. aestivalis* occurring "a Pensylvania ad Carolinam". The type of *Ophrys aestivalis*, a species which I do not find accounted for in recent American literature, as shown in one of Cintract's photographs before me, consists of two full plants, with linear-lanceolate leaves extending up the stem, the longer blades about 2 dm. long, the slightly spiraling to secund spike with perianths 6 mm. long. Mounted with these two plants is a broken-off spike of *Spiranthes cernua*, which obviously was an inadvertent addition made by the mounter. *Ophrys aestivalis* Michx. (1803) is *Spiranthes vernalis* Engelm. & Gray (1845). Most fortunately, we do not have to displace the latter name, for there is an Old World *Spiranthes aestivalis* Richard (1818).

As to Pursh's misidentification of *Neottia tortilis*, we need not here go into details, except to note that Pursh included under it *Ophrys aestivalis* Michx., gave the same range as the latter, and described the leaves as *linear*. Enough said!

graphic variations. Essentially all the material in the Gray Herbarium and that of the New England Botanical Club from New England, forty-five collections, has a relatively close spike with closely spiralling and often crowded and overlapping flowers, as in the type of *S. simplex* Gray, not Grisebach. This plant varies from 0.7–3 dm. (farther south to 4.5 dm.) in height, and its vertical tuber is thick and finger-like, usually solitary. This, as said, is the plant described by Gray as *S. simplex* and correctly renamed by Ames *S. Grayi*. All the material in the Gray Herbarium from the southernmost states, from Florida to eastern Texas, north to South Carolina, has the spike strongly secund, without or with few spiral twists in the rachis and the relatively few flowers distant and not overlapping. From North Carolina to New Jersey both variations, with some transitions, occur, the plant often reaching a height of 5.25 dm., while its roots are usually more slender and not infrequently 2 or even 3. This is true *S. tuberosa* Raf. which was described with "spic. gracilis vix spiralis secunda . . . pedal."

Dr. Schubert has made dissections of flowers from several specimens of each extreme and, while each series shows some variation in the degree of toothing and shape of the lip, there appears to be nothing constant except the relatively dense and strongly spiralling spike and usually thicker tuber to separate var. *Grayi* from the usually more southern typical *S. tuberosa*.

Gray's *Spiranthes simplex*, type of *S. Grayi* and of *S. tuberosa*, var. *Grayi*, had "scape . . . bearing a small narrow (rarely 1-sided) spike of *very short flowers* (perianth 1″–1½″ long)". It came from "E. Mass. (Nantucket, *Dr. Robbins*), New Jersey (*C. F. Austin*, &c.), and Delaware, *Wm. M. Canby*." Gray's original sheet contains the Nantucket material from *Robbins*, which is the dense-spiked *S. tuberosa*, var. *Grayi;* a series of six quite similar plants collected by himself ("&c.") in the pine barrens of New Jersey (the *Austin* material evidently not retained by him), and three characteristic plants (one of them misplaced by the mounter) with the "rarely 1-sided" spike from *Canby*, but marked as from "Salisbury, Maryland" (not "Delaware"), this *Canby* material being of typical *S. tuberosa*.

Corallorhiza, not Corallorrhiza.—From the first edition of Gray's Manual (1848) through the 6th edition (1890) the saprophytic woodland Coral-roots were rightly called *Corallorhiza*, although the genus was ascribed to Haller, whose definition of it was prior to 1753, in his Enum. Meth. Stirp. Helvet. i. 278 (1742), Haller, who went back to Ruppius, then spelling the generic name *Corallorhiza*. In the 7th edition of Gray's Manual (the *Orchidaceae* revised by Professor Oakes Ames) Haller was bracketed as the author prior to 1753, the post-Linnean author given as Robert Brown; and the spelling was changed to *Corallorrhiza*. Although Robert Brown was there and in the later compendium of Ames, his Enum. Orch. U. S. and Can. 21 (1924), made the first post-Linnean author of the genus, Brown himself had cited the genus as starting after 1753 in Haller's Hist. Stirp. Helvet. ii. 159 (1768). That was correct, so far as it went, and Haller in 1768 had adopted the better Greek spelling, *Corallorrhiza*. Brown gave the common circumboreal species the specific name *C. innata* R. Br. in Ait. Hort. Kew. ed. 2, v. 209 (1813).

In Gray's Manual, ed. 7, and in his Enumeration of 1924 Ames took up for the original species of the genus, the latter said by him to date from 1813, a binomial dating from 53 years prior to Brown's publication, a case of putting prophecy before history which has puzzled many students, for the genus *Corallorhiza* and its species *C. trifida* were both clearly and very adequately published in Chatelain's Specimen inaugurale de Corallorhiza in 1760, the genus clearly diagnosed on p. 6, the species on p. 8. Here, so far as I can find, is the initial date (after 1753) for both Corallorhiza and its original species, *C. trifida*, which was based on *Ophrys Corallorhiza* L. (1753). We thus get rid of the situation wherein a binomial seems to have been published 53 years earlier than the genus under which it was placed; but, at the same time, we can return to the long-familiar spelling of the generic name, since, by the International Rules of Nomenclature, the original spelling (in this case of Haller in 1742 as well as of Chatelain in 1760) must stand[1]. The correction of the first post-

[1] Since the above was written the similar decision of Rendle and Britten in Journ. Bot. xlv. 442 (1907) has come to my attention: "This genus was established by J. J. Chatelain 'Specimen inaugurale de Corallorhiza' 1760. He names the species C. trifida, which must stand, as the Linnean trivial *Corallorhiza* (under *Ophrys*) is inadmissable".

Linnean author of the genus (but incorrectly as *Corallorrhiza*) was made in Britton & Brown, Ill. Fl. ed. 2, i. 574 (1913) but, singularly enough, in a work seeming to be authoritative, Schlechter's Monographie der Gattungen und Arten in Keller & Schlechter, Monographie und Iconographie der Orchideen Europas und des Mittelmeergebietes, Fedde, Rep. Spec. Nov. Sonderbeiheft A, Lief. 9–10, 302, 303 (1928), the anomaly again appears: the genus *Corallorhiza* here started from Robert Brown in 1813, but its single European species given as "1. C. **trifida** Chatel., Spec. inaug. Corall. (1760), p. 8"!

In current works on the flora of the northeastern United States the lip of *Corallorhiza trifida* is described as "white, not spotted" (Gray's Man. ed. 7), "lip unspotted" (Wiegand & Eames, Fl. Cayuga Lake Basin), "lip usually pure white" (A. M. Fuller, Studies on the Fl. Wisc. Part I: The Orchids), etc.; though rarely in America it is described, as by Morris & Eames (Our Wild Orchids), as "almost as often spotted as unspotted". Their discussion, however, shows that no distinction was being made between plants of North America and those of northern Eurasia and that they included Canada to the Arctic. In view of the usual lack of red or purple mottling of the lip in the United States and southernmost Canada it is worth noting that Chatelain, in his original account of European *C. trifida*, said "labellum . . . album, punctis coccineis notatum", while Schlechter, l. c., describing the European plant, says "die Petalen zuweilen rotpunktiert, Lippe weiss rotpunktiert".

In 1916, Cockerell in Torreya, xvi. 231, getting in Colorado the common plant of the United States, with "lip whitish", described it as *Corallorhiza Corallorhiza coloradensis* n. subsp., he then separating it because the true European plant, as shown by the enlarged figures of flowers published by H. Müller, has the throat "dotted with dark pigment". Almost a century earlier, however, Thomas Nuttall clearly understood the situation when he monographed our species in his *Remarks on the Species of Corallorhiza, indigenous in the United States* in Journ. Acad. Nat. Sci. Phila. iii. 135–139, with plate (1823). Nuttall there defined his new *C. "verna* . . . petalis omnibus lineari-lanceolatis patentibus, labello oblongo immaculato basi bidentato apice recurvo ovato calcare obsoleto innata . . . whole plant except the lip, of a yellowish-green colour . . . Lip nearly white, without spots", etc. This species, *C. innata* in the sense of Muhlenberg, Amos Eaton and Nuttall's Genera, was based primarily on material from New England and in his "OBSERVATION" Nuttall wrote: "Mr. Eaton justly remarks the discrepancy of this plant with the species which I had erroneously considered the *Corallorhiza innata* of Europe"; but, pursued by the fatality which so often confuses those who attempt clarification, Nuttall proceeded in his discussion to ascribe to his new eastern American *C. verna* (which he had just correctly defined as "whole plant except the lip, of a yellowish-green colour . . . three outer petals lanceolate-linear spreading; the two inner . . . [of] nearly the same figure and colour. Lip nearly white, without spots, . . . the point ovate") the distinctive characters of European *C. innata!* These were given (with obvious lapse or omission of a phrase) in his observation where he said of his new species: "It differs also from the European . . . principally in the oblong ovate form and whiteness of the inner lateral petals [characters of the *European*], also by the lip which is obtuse and spotted [the spots belonging to the *European*], and in the connivence of the two upper and outer petals with the inner [as shown in detailed figures of the *European*]".

Only by those who see no difference between the Eurasian and the more boreal North American plant, with connivent sepals forming a hood, blunt oblong white petals and round-tipped spotted lip, and the temperate American plant with lanceolate sepals, linear-lanceolate yellow-green petals, lip abruptly tipped and unspotted, Nuttall's confusion of the two in his "OBSERVATION" will be applauded. By those who have carefully compared the two series it will be recognized that in the main the temperate North American plant with "Lip white, unspotted", is well separated from the Eurasian and Hudsonian North American *C. trifida*.

In 1926, reporting on explorations in northern Newfoundland of a party of New England and more southern botanists who were all familiar with the narrow-petalled plant with unspotted lip, I recorded from near the Straits of Belle Isle (a Hudsonian to Subarctic area) a plant which differed from what we had been considering to be true *Corallorhiza trifida*. "The plant which was troubling us had more purple; . . . the sepals purple or brown; the lip larger and with long rows of purple dots below the marginal notches", etc.—Fernald in Rhodora, xxviii. 93 (1926). This plant was then identified with the original description and beautiful colored plate of the northern European *C. ericetorum* Drejer, a plant which is now generally considered an unimportant (small) phase of true *C. trifida*. Now, with the generous aid of Dr. Schubert in making dissections, it appears that the more northern plants in North America are true *C. trifida*, occurring from southern Greenland to Alaska (thence to northern Eurasia), south in tundra, peat, moss and peaty thickets or woods to northern Newfoundland, the Côte Nord of Quebec, shores of Hudson Bay, northern Ontario, and along the mountains to Wyoming and Oregon.

Meeting the southern limit of true *Corallorhiza trifida* in North America and sometimes overlapping it is the northernmost series of *C. verna* Nutt. Perfectly definite southward, the latter seems northward to show transitions, whether through crossing or otherwise, and its treatment as a relatively southern variety of the more boreal and typical *C. trifida* seems justified. It thus becomes

Corallorhiza trifida Chatelain, var. **verna** (Nutt.), comb. nov. *C. verna* Nutt. in Journ. Acad. Nat. Sci. Phila. iii. 134 (1823). *C. odontorhiza* (Willd.) Nutt., β. *verna* (Nutt.) Wood, Class-Bk. ed. 2: 531 (1847). *C. innata* R. Br., var. *virescens* Farr in Contrib. Bot. Lab. Univ. Pa. ii. 425 (1904). *C. Corallorhiza*, ssp. *coloradensis* Cockerell in Torreya, xvi. 231 (1916). *C. trifida*, var. *virescens* (Farr) Farwell in Papers Mich. Acad. Sci. xvi. pt. 1: 9 (1941).—Details of flower well shown by A. M. Fuller, Bull. Pub. Mus. Milwaukee, xiv. no. 1, pl. 51 (as *C. trifida*) (1933).—Dry to moist woods, sometimes in bogs, Newfoundland to British Columbia, south to Nova Scotia, New England, New Jersey, Pennsylvania, mountains to Georgia and Tennessee, Ohio, northern Indiana, Wisconsin, Missouri, South Dakota, Colorado and Oregon.

Details of flowers of typical *Corallorhiza trifida* are shown in many European works. A few specially accurate illustrations are the following: Reichenb. f., Ic. Fl. Germ. xiii–xiv. pl. 490 (1851); H. Müller, Alpenbl. 77, fig. 21 (1881); Knuth, Handb. Blütenbiol. ii. pt. 2: 456 (1899); Correvon, Album Orchid. pl. 9 (1899); Lindman, Svensk. Fanerogamfl. fig. 125, no. 6 (1918).

The largest-flowered species of *Corallorhiza* in temperate North America, *C. striata* Lindl., has a remarkably disrupted range: the Gaspé Peninsula; southwestern Quebec to western Ontario, south to northwestern New York and southern Ontario, Michigan, northern Wisconsin and northeastern Minnesota; southern Alberta and southern British Columbia, with tongues down the mountains to northwestern Wyoming, eastern Idaho and California; in the East preferring calcareous woodlands and growing chiefly at the bases of *Thuja occidentalis.* Throughout this broad range the plant (scape, sheaths and perianths) is of a warm madder-purple, with the sepals and 2 upper petals conspicuously 3 (or 2)-striate with deep purple. At the easternmost limit of the range the stem, sheaths and perianth are yellow- or orange-brown, comparable with color-forms in *C. maculata* Raf.[1] and *C. odontorhiza* (Willd.) Nutt. This plant may be called

C. STRIATA Lindl., forma **fulva,** forma nov., scapo vaginis perianthiisque fulvis. TYPE: arbor-vitae woods, cold walls of Percé Mt., Percé, Gaspé Co., Quebec, July 25, 1905, *Williams, Collins & Fernald* (Herb. Gray.).

[1] When, in RHODORA, xxiv. 145–148 (1922), Bartlett defined (as varieties) the color-forms of *Corallorhiza maculata* Raf. in Am. Mo. Mag. ii. 119 (1817), he considered the yellow plants as relatively rare, while his purplish var. *punicea* is relatively common. He then concluded: "The deeply purple-stemmed var. *punicea* might with some reason be viewed as the biological type of the species, and therefore chosen, in the absence of a type specimen, as the nomenclatorial type as well". Bartlett and those who have followed him, but treating the color-forms as formae, apparently overlooked Rafinesque's statement that in the original *C. maculata* "the whole plant is yellowish".

(*To be continued*)

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLXII.

IDENTIFICATIONS AND REIDENTIFICATIONS OF NORTH AMERICAN PLANTS

M. L. Fernald

(Continued from page 197)

Corydalis **Halei** (Small), Fernald & Schubert, comb. nov. *Capnoides Halei* Small in Bull. Torr. Bot. Cl. xxv. 137 (1898). *Corydalis aurea*, var. *australis* Chapm. Fl. So. U. S. ed. 2: 604 (1883). *Corydalis micrantha*, var. *diffusa* Fedde, Repert. Nov. Spec. x. 380 (1912).

Corydalis Halei seems to be a very distinct species of the southeastern Atlantic Coastal Plain and the Gulf Coastal Plain, extending inland, in sandy soil, to southeastern Missouri. Chapman well described it as *C. aurea* Willd., var. *australis* but the crested keel of the outer petals, as well as its tendency to produce cleistogamous inflorescences, place the species nearer *C. micrantha* (Engelm.) Gray. In fact, Dr. Gray united it with *C. micrantha* in the Synoptical Flora, i^1. 98 (1895). *C. micrantha*, however, is an inland plant, found from Illinois to Nebraska, south to Tennessee, Arkansas, Oklahoma and Texas, with abundant and well developed foliage on the loosely ascending branches, the leafy summits mostly overtopping the longer terminal racemes. The latter are rather closely 3–12-flowered, and when fully expanded (in fruit) only 1.5–6 cm. long, with the lower and longer internodes 2–10 (–12) mm. long; its erect or strongly ascending fruiting pedicels are 0.5–3 mm. long, the thick-cylindric capsule scarcely torulose and 6–15 mm. long. *C. Halei*, on the other hand, is stiffly ascending, with leaves rapidly reduced upward, so that its terminal racemes overtop the foliage. The racemes quickly elongate to 0.5–2 dm., the 4–20 flowers and capsules all becoming remote, with the lower internodes of the rachis 1.5–2.5 cm. long. Its capsules, on pedicels 2–5 mm. long, are slender, torulose and 1.5–2.5 cm. long, often outwardly arching. An isotype of *C. micrantha*, var. *pachysiliquosa* Fedde, l. c., is a close match for an isotype of typical *C. micrantha*.

Arabis perstellata E. L. Braun, var. **Shortii,** nom. nov. *Sisymbrium dentatum* Torr. in Short, 3rd Suppl. Cat. Pl. Kentucky, 338 (1833), not Allioni (1785). *A. dentata* (Torr.) Torr. & Gray, Fl. N. Am. i. 80 (1838), not de Clairville (1811)[1]. *Shortia dentata* Raf. Aut. Bot. 17 (1840), at least as to "Sisymbr. do Tor. et Arabis!" *Iodanthus dentatus* (Torr.) Greene, Pittonia, iii. 254 (1897).

A. perstellata, var. **phalacrocarpa** (M. Hopkins), comb. nov. *A. dentata,* var. *phalacrocarpa* M. Hopkins in Rhodora, xxxix. 169 (1937).

Several acute botanists have called my attention to the fact that the name *Arabis dentata* (Torr.) Torr. & Gray (1838) is a later homonym, invalidated by de Clairville's *A. dentata* of 1811. I, naturally, passed the matter on to Dr. Milton Hopkins, before he became discouraged with the financial outlook for the university botanist and took to another and, we hope, more remunerative profession. Dr. Hopkins agreed with me that the very distinct and localized *A. perstellata* E. L. Braun in Rhodora, xlii. 47 (1940), while differing from typical and wide-ranging *A. dentata,* must be considered an extreme variety of the same series, many of the characters showing transitions in a large series of specimens. While it is anomalous that the plant of broad range should be treated as a geographic variety of a very local one, there seems to be no other specific name available. The usual source of many names which might be picked up, Rafinesque, seems to have been satisfied to retain the trivial name for his *Shortia dentata.* It would now be helpful if he had employed another.

Asclepias viridiflora Raf., var. **linearis** (Gray), comb. nov. *Acerates viridiflora* (Raf.) Eaton, var. *linearis* Gray, Syn. Fl. ii[1]. 99 (1878).

[1] Joseph Philippe de Clairville (1742–1830) was one of the most modest and self-effacing taxonomists I have ever encountered. His *Manuel d'Herborisation en Suisse et en Valais* (1811) was "Par l'Auteur de l'Entomologie helvétique", without indication of his name; while the 26-page Preface was unsigned—merely "21. Fevrier 1811". How unlike the modern counterparts of the visionary Bombastus Paracelsus who imagine that they are helping by publishing such combinations as *Phyton euphyton* Bombastus Superbus, ssp. *euphyton* (Bombastus Superbus) Bombastus Superbus, comb. nov., var. *euphyton* (Bombastus Superbus) Bombastus Superbus, comb. nov.,—based on *Phyton euphyton* Bombastus Superbus in Journ. Erudit. clv. 00.000 (194?). So far as I can find no genus was ever dedicated to *Bombastus Paracelsus.* Clairvillea was defined by DeCandolle with the dignified dedication: "Dixi in memoriam cl. de Clairville Galli botanici et entomologici de historiâ naturali Helveticâ benê meriti", DC. Prodr. v. 636 (1836).

Since the characters supposed to separate *Acerates* from *Asclepias* so definitely break down the preceding combination is needed. Whereas typical *Asclepias viridiflora* and its var. *lanceolata* (Ives) Torr. extend eastward to the Atlantic States, var. *linearis* is an inland extreme, from western Ontario and Manitoba south to Louisiana, Oklahoma and New Mexico.

TRIODANIS VERSUS SPECULARIA (PLATES 1049 and 1050).—Under the title *The Genus Triodanis Rafinesque, and its Relationships to Specularia and Campanula* Dr. Rogers McVaugh[1] has discussed in detail what he considers the strongest characters separating *Specularia* Heist. and *Triodanis* Raf. from *Heterocodon* Nutt. and *Campanula* L. Since the three species already recognized in the "Manual range" as belonging in *Specularia* (and some new ones which occur in Missouri) are all treated as belonging to *Triodanis*, I have found it necessary to study with some care the characters relied upon as separating the American and Eurasian *Triodanis* from the chiefly Eurasian and North African *Specularia*. McVaugh's statement of the strongest characters (as contrasted with those of the other two genera, which need not here be considered) are as follows:

> *Specularia* Heist. ex Fabr. Plants annual, branching above the middle; the flowers nearly sessile, clustered near the tips of the branches or corymbosely aggregated at the summit of the plant; flowers all open, or some imperfectly developed but open and not vestigial; corollas divided well below the middle, more or less rotate [this in contrast with *Heterocodon*]; filaments gradually widened to base, glabrous; capsules much elongate, linear, contracted at apex beneath the calyx-lobes, dehiscent at apex. Two species, western and southern Europe.
>
> *Triodanis* Raf. Plants annual, the branches, if any, from base or middle of the plant; flowers axillary, sessile or essentially so, the inflorescence spiciform; flowers from the lower nodes normally cleistogamous, with the corolla and androecium vestigial; some of the upper flowers or at least the terminal one usually open (all corollas sometimes open in *T. coloradoensis*), with expanded corollas divided below the middle [this, likewise, in contrast with the American *Heterocodon*]; filaments abruptly dilated and ciliate at base; capsule ovoid or clavate to linear or subulate, usually not abruptly contracted at apex, opening at the apex or (in *T. perfoliata*) at the middle or a little above it. Eight species, one chiefly Mediterranean, the others American.

If these are, indeed, distinct genera, separated on constant morphological characters, in the sense of genera of Eichler,

[1] McVaugh in Wrightia, i. 13–53 (1945).

DeCandolle, Bentham & Hooker and Engler & Prantl, we should hardly expect so many qualifying expressions or exceptions in the statement of differential generic characters, especially when, in the detailed accounts of species so many additional exceptions to the generic definition are stated. Taking up the reputed GENERIC differences in order, we, without monographic knowledge of details, note the following items.

1. "Plants annual, branching above the middle" in *Specularia*, as opposed to "branches, if any, from base or middle of the plant" in the reputed genus *Triodanis*. If Rafinesque had made such a distinction we should not be surprised; but, noting in passing, that small plants of European, southwestern Asiatic and North African[1] (not merely of "western and southern Europe") *Specularia Speculum-Veneris* (L.) Tanfani[2] (*S. speculum* A. DC.), the type of the genus *Specularia*, may be quite simple, we come to the very evident fact that of 59 individuals in the Gray Herbarium, these mostly validated by McVaugh, 29 *branch from the very base* (PLATE 1049, FIG. 1) or just above it. Similarly, the second species allowed by McVaugh to stay in *Specularia*, which he distinguished generically by "branching above the middle", the southern European (also North African—"a Barbariâ (Desf.)", A. DC. l. c. 349) *S. hybrida* (L.) A. DC., shows in the Gray Herbarium 40 individuals with strictly or primarily basal branching (PLATE 1049, FIG. 3) and 25 quite simple, but only 3 branching definitely near (not "above") the middle. When, furthermore, we note that in the first species taken up by Mc Vaugh (l. c. 25) as generically distinct from Old World *Specularia* (because, as to branching at least, *Specularia* has the "branching above the middle", whereas *Triodanis* has "the branches, if any, from base or middle" (not "above the middle")—when we note McVaugh's detailed description of his *Triodanis coloradoensis* (Buckl.) McVaugh (our PLATE 1050, FIG. 1) as "with branches . . . from the nodes just above the middle of the plant (usually

[1] "Syriâ . . . et Barbariâ"—A. DC. Mon. Camp. 347 (1830); "Palestinae (Boiss!) Aegypti . . . (Bal!) . . . Berythum Syriae . . . Africa borealis"—Boissier, Fl. Orient. iii. 959 (1875).

[2] Although the combination *Specularia Speculum-Veneris* appears in Index Kewensis, Suppl. 1 (1902) as made by Caruel in Parlatore, Fl. Ital. viii. 139 (1888), a check on the cover-page of vol. viii reveals the pertinent statement: "CAMPANULACEE. JASMINACEE. OLEACEE. PER ENRICO TANFANI," this author also cited at the beginning of the *Campaniflore*, p. 15.

not with basal branches)", it almost seems as if we were reading the contradictory writings of the author of *Triodanis*. The branching, as most taxonomists would suspect in annual weedy plants, is not a constant or even nearly constant GENERIC character.

2. Flowers "nearly sessile, clustered near the tips of the branches or corymbosely aggregated" in *Specularia;* "axillary, sessile or essentially so, the inflorescence spiciform" in *Triodanis*. The first point, whether the flowers are sessile or nearly so is not a generic difference and was put in, apparently, to contrast with the peduncles of *Heterocodon;* but when one views the inflorescence of the basic *Specularia Speculum-Veneris* (our PLATE 1049, FIG. 2) and one of a species of the supposedly different genus *Triodanis, T. coloradoensis* (PLATE 1050, FIG. 2), both figures from specimens validated by McVaugh, and when he notes that Boissier, one of the truly great taxonomists, who clearly understood the Old World species, described *S. Speculum* δ. *racemosa* with "Inflorescentia . . . ut in *Sp. falcatâ* racemosa" (Boiss. l. c. 959), he stops to take a long breath. If *Specularia falcata* (Ten.) A. DC. is not a *Specularia* because its flowers are not "corymbosely arranged" as they are said to be in real *Specularia,* what about *S. Speculum*, var. *racemosa* which has the flowers racemose? And what about *Triodanis coloradoensis,* in which the flowers may be "corymbosely aggregated"? As a strong GENERIC difference this does not seem quite clear.

3. In *Specularia* "flowers all open, or some imperfectly developed but open and not vestigial"; in *Triodanis* "flowers from the lower nodes normally cleistogamous, with the corolla and androecium vestigial". This distinctive character of *Triodanis,* however, is at once weakened farther on in the same paragraph by the statement that "all corollas [are] sometimes open in *T. coloradoensis,*" this fact again stated in the full description of the quite unconventional Texan *T. coloradoensis:* "flowers . . . all . . . prevailingly fertile and open". Cleistogamy is a common trait of some species or sections of genera or in some strains within species. In *Utricularia* it sometimes occurs in some plants and with every transition from truly cleistogamous flowers through intermediates to those with large and showy expanding corollas. In one large and perplexing American subgenus of

Panicum the later and reduced panicles of apparently cleistogamous spikelets are diagnostic, yet no sound student of the grasses has suggested setting up *Panicum*, subg. *Dicanthelium* as a true genus. In *Viola* certain sections exhibit abundant cleistogamy, certain others not; yet, even to Rafinesque, Greene, Rydberg and Small they were all *Viola*. Late in the season *Danthonia* produces within and at the bases of the old sheaths specifically distinctive cleistogamous flowers, but if one species somewhere should not do so, we should hardly treat it, on that character alone, as another genus. Innumerable showy-flowered herbs, annual, biennial or perennial, will, under certain conditions, produce insignificant cleistogamous flowers. Yet, so far as I have seen, most of these cleistogamous individuals (except in case of *Utricularia*) have not been sorted out as separate genera. If *Triodanis coloradoensis* would obligingly stop its misbehavior, the case for a genus separate from *Specularia* would be less weak; and the case would gain a little strength if the Old World *S. hybrida* (left by McVaugh in *Specularia*) would stop producing "flowers . . . considerably reduced in size and apparently . . . a step in the direction of truly cleistogamous flowers" (McVaugh, p. 19). A little more and the step may prove fatal.

4. The characters, corolla divided "well below the middle" and "below the middle", were obviously put in as a contrast with the really different corolla of *Heterocodon*. This section needs no further discussion.

5. In *Specularia* "filaments gradually widened to base, glabrous"; in *Triodanis* "filaments abruptly dilated and ciliate at base". However, in three of the eight species of *Triodanis* McVaugh allows that the filaments may gradually widen to base: *T. biflora* (R. & S.) Greene conceded to have "Filaments . . . , the proximal half gradually or abruptly expanded; and *T. texana* McVaugh and *T. Holzingeri* McVaugh with filaments similarly described. That leaves (unchecked by me) filaments "glabrous" as opposed to "ciliate at base". In *Campanula* the filaments are either abruptly dilated or gradually dilated at the ciliate or glabrous base.

6. In *Specularia* "capsule much elongate, linear, contracted at apex beneath the calyx-lobes, dehiscent at apex"; in *Triodanis* "ovoid or clavate to linear or subulate, usually not contracted at

apex, opening at the apex or (in *T. perfoliata*) at the middle or a little above it". The apical opening is at once dismissed as occurring in both *Specularia* and *Triodanis,* though another character was overlooked in the latter, for in his key to the species of *Triodanis* emphasis is placed on "Capsule opening from base toward apex" in *T. falcata* (Ten.) McVaugh. Furthermore, since Alphonse DeCandolle in his classic Monographie des Campanulées (1830) described (p. 348) the capsule of *Specularia Speculum-Veneris* as either "cylindrica, medio inflata, basi et apice angustata" or "non propriè cylindricâ, sed subfusiformi, utrinquè angustatâ", while Boissier (l. c. 959) defined *S. Speculum,* β. *libanensis* A. DC. with "capsulae abbreviatae interdum oblongae", the definition of the genus *Specularia* as having the capsule "linear" (a measurement of flat surfaces, not solids) is not convincing, especially since *Triodanis* is allowed "linear or subulate" capsules. Nor is the tip of the capsule a strong generic character: "contracted at apex" in *Specularia,* "usually not contracted at apex" in *Triodanis.* For, as already quoted from Alphonse DeCandolle, the type-species of *Specularia* may have "capsulâ . . . utrinquè angustatâ", although his *S. hybrida* (which McVaugh leaves in *Specularia*) has "Capsula prismatica, basi apiceque abruptè constricta". Similar contrasts occur in American species of so-called *Triodanis:* for instance McVaugh's description of *T. coloradoensis* (embarrassing species, always getting in the way!) contains "Capsule . . . oblong-linear or clavate [as also that of *T. falcata* (Ten.) McVaugh] usually abruptly narrowed distally"; and they are "truncate" in *T. Holzingeri* McVaugh.

From this recapitulation of the stated characters supposed to separate a genus, *Triodanis* Raf., from *Specularia* it must be apparent that the so-called generic characters set up in support of such a segregation fail at altogether too many points. I find myself following Endlicher, Alphonse DeCandolle, Boissier, Bentham & Hooker and Schönland (in Engler & Prantl) in keeping *Triodanis* in *Specularia.* I cannot follow Rafinesque, Greene and McVaugh in considering it a clearly distinct genus. As my friend Pease remarks, "Too much present-day writing is quantitative rather than qualitative."

Although as a genus *Triodanis* seems to me very weak, the species defined under it seem to me very strong. It becomes necessary, therefore, to transfer three of them to *Specularia.* I dislike so to do, for it would have been much more satisfactory if the author who clearly worked them out had himself placed them in *Specularia.*

SPECULARIA **lamprosperma** (McVaugh), comb. nov. *Triodanis lamprosperma* McVaugh in Wrightia, i. 42 (1945).

S. **texana** (McVaugh), comb. nov. *Triodanis texana* Mc Vaugh, l. c. 43 (1945).

S. **Holzingeri** (McVaugh), comb. nov. *Triodanis Holzingeri* McVaugh, l. c. 45 (1945).

EXPLANATION OF PLATES 1031–1050

PLATE 1031, QUERCUS LAURIFOLIA Michx.: FIGS. 1 and 2, foliage and fruit, × 1, from Michaux's original plate; FIG. 3, fruit of *Q. rhombica* Sargent, from Sarg. Man. ed. 2, fig. 239; FIG. 4, leaf, × 1, from Michaux's original plate of Q. LAURIFOLIA, var. HYBRIDA, basonym of *Q. obtusa* (Willd.) Ashe.

PLATE 1032, QUERCUS LAURIFOLIA Michx.: FIGS. 1 and 2, fruiting branch and terminal leaves from Windman's Mill, south of Sunbeam, Southampton Co., Virginia, *Fernald & Long,* no. 11,323; FIG. 3, leaves of fruiting branch, originally and correctly identified as *Q. laurifolia,* later cited as a PARATYPE of *Q. rhombica* Sargent, and later identified as *Q. obtusa* (Willd.) Ashe, from Monroe, Ouachita Parish, Louisiana, *E. J. Palmer,* no. 8934.

PLATE 1033, QUERCUS LAURIFOLIA Michx.: FIG. 1, venation of lower leaf-surface, × 3, of Michaux's type, from photograph by *Cintract;* FIG. 2, foliage of type of *Q. rhombica* Sargent; FIG. 3, venation, × 3 (by transmitted light) of lower leaf-surface of type of *Q. rhombica.*

PLATE 1034, QUERCUS LAURIFOLIA Michx.?: portions of TYPE, × 1, of *Q. rhombica,* var. *obovatifolia* Sargent or *Q. obtusa* (Willd.) Ashe, var. *obovatifolia* (Sarg.) Ashe.

PLATE 1035, QUERCUS HEMISPHAERICA Bartram ex Willd., both figs. × 1: FIG. 1, *Q. aquatica,* var. from Michx. Hist. Chênes Am. Sept. t. 20, fig. 2, cited by Willdenow; FIG. 2, toothed leaves of young tree, from Gainesville, Florida, *Harbison,* no. 35 in Herb. Arn. Arb. as *Q. laurifolia.*

PLATE 1036, QUERCUS HEMISPHAERICA Bartram ex Willd., both figs. × 1: FIG. 1, fruiting branch, from Mayfield, Georgia, 1916, in Herb. Arn. Arb. as *Q. laurifolia;* FIG. 2, cups and acorn from vicinity of Eustis, Lake County, Florida, *Nash,* no. 1663, as *Q. Phellos,* in Herb. Arn. Arb. as *Q. laurifolia.*

PLATE 1037, STENANTHIUM GRAMINEUM (Ker) Morong: FIG. 1, portion of flowering plant, × 1, from Hendersonville, Henderson County, North Carolina, *Biltmore Herb.,* no. 5616[c]; FIG. 2, portion of leaf, × 2, from no. 5616[c]; FIG. 3, portion of fruiting plant, × 1, from "Pink Beds", 3500 feet alt., Pisgah Forest, North Carolina, *House,* no. 4040.

PLATE 1038, STENANTHIUM GRAMINEUM (Ker) Morong: FIG. 1, portion of inflorescence from near Merrifield, Virginia, *Allard,* no. 3234; FIG. 2, portion of leaf, × 2, from no 3234; FIG. 3, portion of fruiting inflorescence, × 1, from Pisgah Mountain, Buncombe County, North Carolina, *Biltmore Herb.,* no. 3501[b]; FIG. 4, portion of leaf, × 2, from no. 3501[b]; FIG. 5, portion of terminal fruiting raceme, × 1, from Springfield, Ohio, no. 11839, collector not stated; FIG. 6, portion of leaf, × 2, from same plant as FIG. 5.

PLATE 1039, STENANTHIUM GRAMINEUM, var. ROBUSTUM (S. Watson) Fernald: FIG. 1, portion of TYPE of *S. robustum* S. Watson, × 1, from Sligo Furnace, Clarion County, Pennsylvania, August, 1859, *J. R. Lowrie;* FIG. 2, portion of leaf, × 2, from TYPE; FIG. 3, portion of terminal fruiting raceme, × 1, from Pleasant Grove, Pennsylvania, August 22, 1889, *Small;* FIG. 4, portion of leaf, × 2, from Pleasant Grove.

PLATE 1040, STENANTHIUM GRAMINEUM, var. ROBUSTUM (S. Watson) Fernald: FIG. 1, portion of inflorescence, × 1, from Beaver, Pennsylvania, *J. F. Mansfield;* FIG. 2, portion of leaf, × 2, from the *Mansfield* specimen; FIG. 3, summit of inflorescence, × 1, from New Texas, Lancaster County, Pennsylvania, Aug. 12, 1863, *Porter;* FIG. 4, terminal flowering raceme, × 1, from Armstrong County, Pennsylvania, 1868, *S. W. Knipe.*

PLATE 1041, STENANTHIUM GRAMINEUM, var. MICRANTHUM Fernald: FIG. 1, inflorescence, × 1, of TYPE, from Caesar's Head, South Carolina, July 28, 1881, *John Donnell Smith;* FIG. 2, portion of leaf, × 2, from TYPE; FIG. 3, portion of fruiting plant, × 1, from "Mts. Carol.", 1845, *Asa Gray.*

PLATE 1042, SISYRINCHIUM ANGUSTIFOLIUM Mill. and S. MUCRONATUM Michx. FIGS. 1 and 2, S. ANGUSTIFOLIUM: FIG. 1, *Bermudiana graminea, flore minore caeruleo* Dillenius, Hort. Elth. t. XLI, fig. 49, × 1, basis of *S. angustifolium;* FIG. 2, *S. anceps* Cavanilles, × 1. FIG. 3, S. MUCRONATUM Michx.: figure of *Sisyrinchium caeruleum parvum, gladiato caule, Virginianum* of Plukenet, Alm. 348, t. 41, fig. I, × 1, cited by Lamarck under his *S. gramineum.*

PLATE 1043, SISYRINCHIUM ANGUSTIFOLIUM Mill. and S. MONTANUM Greene, var. CREBRUM Fernald. FIGS. 1 and 2, S. ANGUSTIFOLIUM: portions of Bicknell's illustration of *S. graminoides* Bicknell, slightly reduced from Bull. Torr. Bot. Cl. xxiii, plate 263 (1896). FIG. 3, S. MONTANUM, var. CREBRUM: reduced from Bicknell's plate of *S. angustifolium* sensu Bicknell, not Miller, in Bull. Torr. Bot. Cl. xxiii. pl. 265 (1896).

PLATE 1044, SISYRINCHIUM MONTANUM Greene and var. CREBRUM Fernald, both × 1, FIGS. 1 and 2: portions of ISOTYPE of S. MONTANUM, from Mancos, Colorado, *Baker, Earle & Tracy,* no. 113. FIG. 3, var. CREBRUM: portions of TYPE.

PLATE 1045, HABENARIA CLAVELLATA (Michx.) Spreng.: FIGS. 1 and 2, TYPE of *Orchis clavellata,* × 1, after *Cintract* (note leaf—partly covered by label—with tip folded back); FIG. 3, leaf, × 1, from Blowing Rock, North Carolina, *B. L. Robinson,* no. 143; FIG. 4, leaf, × 1, from Dedham, Massachusetts, July, 1875, *E. H. Hitchings;* FIG. 5, leaf, × 1, from Southington, Connecticut, *L. Andrews,* no. 325; FIG. 6, leaf, × 1, from Southampton, Long Island, *St. John,* no. 2655.

PLATE 1046, H. CLAVELLATA, var. OPHIOGLOSSOIDES Fernald: FIGS. 1 and 2, portions of TYPE, × 1; FIG. 3, leaf, × 1, from Tignish, Prince Edward Island, *Fernald, Long & St. John,* no. 7228; FIG. 4, leaf, × 1, from Glenwood, Newfoundland, *Fernald & Wiegand,* no. 5208; FIG. 5, leaf, × 1, from Coffin Island, Magdalen Islands, *Fernald, Long & St. John,* no. 7229; FIG. 6, leaf, × 1, from Trepassey, Newfoundland, *Fernald, Long & Dunbar,* no. 26,534.

PLATE 1047, CLEISTES DIVARICATA (L.) Ames, all figs. × 1: FIGS. 1 and 2, median leaf and flower from southeast of Petersburg, Virginia (general type-region), *Fernald, Long & Smart,* no. 5742; FIG. 3, flower from Bennett, Cape May Co., New Jersey, June 20, 1909, *Witmer Stone, "in presence of S. S. Van Pelt, B. Long, O. H. Brown & Dr. J. W. Eckfeldt".*

PLATE 1048, CLEISTES DIVARICATA, var. BIFARIA Fernald, all figs. × 1: FIG. 1, upper half of plant, from the TYPE-SERIES, summit of Table-rock Mountain, Burke Co., North Carolina, *Small & Heller,* no. 285; FIG. 2, flower from Jacksonville, Onslow Co., North Carolina, *Moldenke,* no. 1246; FIG. 3, flower from back of Gatlinburg, Sevier Co., Tennessee, *A. N. Leeds,* no. 1139; FIG. 4, flower from Apalachicola, Florida, *B. F. Saurman;* FIG. 5, flower from Spring Hill, Alabama, *E. W. Graves,* no. 853; FIG. 6, flower from near Jacksonville, Florida, *A. H. Curtiss,* no. 4729.

PLATE 1049. FIGS. 1 and 2, SPECULARIA SPECULUM-VENERIS (L.) Tanfani: FIG. 1, lower half of plant, × 1, with characteristic basal branching (not merely

"branching above the middle"), from France, June, 1890, *S. E. Lassinome* (identification validated by *McVaugh*); FIG. 2, flowering summit, × 1, of same specimen. FIG. 3, SPECULARIA HYBRIDA (L.) A. DC.: portion of plant, × 1, to show characteristic basal branching (not merely "branching above the middle"), from Etruria, *Fiori* in Fiori & Béguinot, Fl. Ital. Exsicc., no. 1962bis (identification validated by *McVaugh*).

PLATE 1050. SPECULARIA COLORADOENSIS Buckl. = *Triodanis coloradoensis* (Buckl.) McVaugh, from specimens validated by McVaugh: FIG. 1, median third of plant, × 1, showing branching "above the middle" (not "branches, if any, from base or middle") and fruits "corymbiform aggregated" (not with "inflorescence spiciform") from New Mexico, *Chas. Wright*, no. 1432; FIG. 2, flowering inflorescence, × 1 (cf. PLATE 1049, FIG. 2) from plant raised by Asa Gray from Wright's seed.

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New scientific names are printed in full-face type

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QUERCUS LAURIFOLIA Michx.: FIGS. 1 and 2, foliage and fruit, × 1, after *Michaux;* FIG. 3, fruit of *Q. rhombica* Sargent, after *Sargent;* FIG. 4, leaf, × 1, of *Q. laurifolia*, var. *hybrida* Michx. or var. *obtusa* Willd., after *Michaux*.

Photo B. G. Schubert

QUERCUS LAURIFOLIA Michx.: FIGS. 1 and 2, fruiting branch and terminal leaves, × 1, from Virginia; FIG. 3, leaves, × 1, of PARATYPE of *Q. rhombica* Sargent.

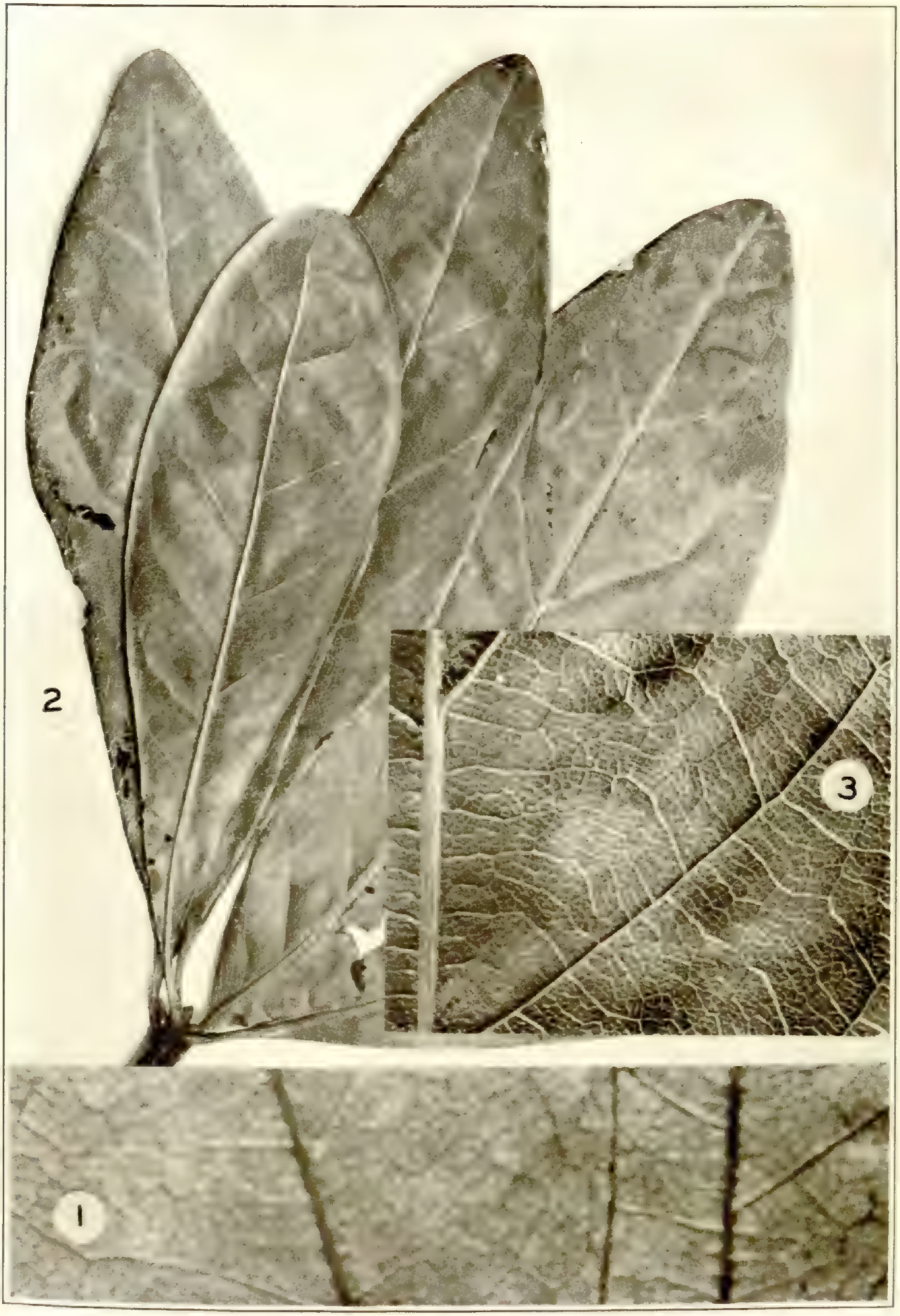

Photo B. G. Schubert

QUERCUS LAURIFOLIA Michx.: FIG. 1, venation of lower leaf-surface, × 3, from photograph of the TYPE by *Cintract;* FIG. 2, foliage, × 1, of type of *Q. rhombica* Sargent; FIG. 3, venation of lower surface of leaf of the latter, × 3.

Photo B. G. Schubert

QUERCUS LAURIFOLIA: portions, × 1, of type of *Q. rhombica*, var. *obovatifolia* Sargent.

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QUERCUS HEMISPHAERICA Bartram ex Willd., both figs. × 1: FIG. 1, the original figure of Michaux, cited by Willdenow; FIG. 2, leaves of young tree of *Q. laurifolia* sensu most authors, not Michaux, from Florida

Photo B. G. Schubert

QUERCUS HEMISPHAERICA, both figs. × 1: FIG. 1, fruiting branch from Georgia of *Q. laurifolia* sensu most authors, not Michx.; FIG. 2, cups and acorn from Florida.

Photo B. G. Schubert

Stenanthium gramineum, var. typicum: fig. 1, portion of flowering plant, × 1; fig. 2, portion of leaf, × 2; fig. 3, portion of fruiting plant, × 1.

Photo B. G. Schubert

STENANTHIUM GRAMINEUM, var. TYPICUM: FIG. 1, portion of inflorescence, × 1; FIG. 2, portion of leaf, × 2; FIG. 3, portion of fruiting panicle, × 1; FIG. 4, portion of leaf, × 2; FIG. 5, terminal fruiting raceme, × 1; FIG. 6, portion of leaf, × 2.

Photo B. G. Schubert

Stenanthium gramineum, var. robustum: fig. 1, portion, × 1, of type of *S. robustum* S. Watson; fig. 2, portion of leaf, × 2, from type; fig. 3, portion of terminal fruiting raceme, × 1; fig. 4, portion of leaf, × 2.

Photo B. G. Schubert

Stenanthium gramineum, var. robustum: fig. 1, portion of inflorescence, × 1; fig. 2, portion of leaf, × 2; fig. 3, summit of inflorescence, × 1; fig. 4, terminal flowering raceme, × 1.

Photo B. G. Schubert

STENANTHIUM GRAMINEUM, var. MICRANTHUM: FIG. 1, inflorescence, × 1, of TYPE; FIG. 2, portion of leaf, × 2; FIG. 3, portion of fruiting plant, × 1.

Sisyrinchium angustifolium Mill.: fig. 1, type, i. e. *Bermudiana gramineo, flore minore caeruleo* Dillenius, t. xli. fig. 49, × 1, after *Dillenius;* fig. 2, *S. anceps* Cav., × 1, after *Cavanilles.*

S. mucronatum Michx.: fig. 3, *Sisyrinchium caeruleum parvum, gladiato caule, Virginianum,* after *Plukenet,* cited by Lamarck under *S. gramineum* Lam., in part, not Mill.

Photo B. G. Schubert

SISYRINCHIUM ANGUSTIFOLIUM Mill.: FIGS. 1 and 2, portions of Bicknell's illustrations of *S. graminoides* Bicknell.

S. MONTANUM, var. CREBRUM: FIG. 3. reduced from Bicknell's illustration of *S. angustifolium* sensu Bicknell, not Mill.

Photo B. G. Schubert

SISYRINCHIUM MONTANUM Greene: FIG. 1, portion, × 1, of ISOTYPE.
S. MONTANUM, var. CREBRUM Fernald: FIG. 2, fruiting portions, × 1, of TYPE.

Photo B. G. Schubert

HABENARIA CLAVELLATA: FIGS. 1 and 2, TYPE of *Orchis clavellata* Michx., × 1, after *Cintract;* FIGS. 3–6, leaves × 1, from various localities.

Photo B. G. Schubert

HABENARIA CLAVELLATA, var. OPHIOGLOSSOIDES: FIGS. 1 and 2, portions of TYPE, × 1; FIGS. 3–6, leaves, × 1, from various localities.

Photo B. G. Schubert

CLEISTES DIVARICATA, all figs. × 1: FIGS. 1 and 2, median leaf and flower from eastern Virginia (type-region); FIG. 3, flower from southern New Jersey.

Photo B. G. Schubert

CLEISTES DIVARICATA, var. BIFARIA, all figs. × 1: FIG. 1, upper half of plant from TYPE-series; FIGS. 2–6, flowers from various localities.

Photo B. G. Schubert

Specularia Speculum-Veneris, both figs. × 1: fig. 1, lower half of plant, showing basal branching, and fig. 2, inflorescence, both from France.
S. hybrida: fig. 3, base, to show basal branching, from Italy.

Photo B. G. Schubert

SPECULARIA COLORADOENSIS (= *Triodanis coloradoensis*), both figs. × 1: FIG. 1, median third of plant, showing branching "above the middle" and fruits "corymbiform aggregated"; FIG. 2, flowering inflorescence.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM
OF HARVARD UNIVERSITY

CLXIII

ADDITIONS TO AND SUBTRACTIONS FROM THE FLORA OF VIRGINIA

By M. L. FERNALD

DATES OF ISSUE

Pages 85 to 115 and plate 1056	3 April, 1947
Pages 121 to 142 and plates 1057 to 1063	6 May, 1947
Pages 145 to 159 and plates 1064 to 1077	10 June, 1947
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ADDITIONS TO AND SUBTRACTIONS FROM THE FLORA OF VIRGINIA

M. L. Fernald

(Plates 1056–1085)

Part I. Three short Trips to Southeastern Virginia

As soon as gasoline became available in 1945 Mr. Bayard Long and I returned to our center at Waverly, Virginia, anxious to do some autumnal exploring of the ponds of Sussex and Southampton Counties which we had seen together only in the early summer of 1943 and then at the last moments of a trip which had to be our last one for more than two years. Many species, accredited to southeastern Virginia for a century to a century and a half but without known vouchers, were on our minds; and we were determined, now that we had found some ponds with broad sandy or peaty beaches and extensive swales (only a few miles from the Southampton headquarters of Frederick Pursh, at Dr. Edwin Gray's near Sebrell), to gather them where presumably Pursh had found them, for some, though not all, of the unverified records started with Pursh in 1814, a few going farther back and a few starting with Torrey & Gray or with early editions of Gray's Manual. We had for years hunted in vain in moist pine-barrens or damp peaty or sandy pockets for *Bartonia verna*[1], which Pursh had recorded from "mossy swamps: Virginia to Georgia";

[1] As in preceding papers of this Virginia series, authors of names which are in Gray's Manual, ed. 7, are omitted.

and records of other plants of sands or sandy barrens, like *Syngonanthus flavidulus* and *Kalmia hirsuta,* still haunted us. These, however, were spring- or early summer-flowering species. We had now set our hearts on at last retrieving from the peaty pond-margins such obvious desiderata as *Mayaca Aubleti* and *Balduina uniflora,* the latter described by Nuttall in 1818 from "open grassy swamps from the maritime parts of Virginia to Florida". The *Balduina,* of course, might be back in the savanna-like swales which at least one member of the party had hopefully visualized as there, if anywhere, associated with other Virginian "spooks" like *Dichromena latifolia, Juncus polycephalus, Oxypolis filiformis* and *Baccharis glomeruliflora.* And we hoped at last to find Pursh's own station (supported by a specimen at the Philadelphia Academy) for *Litsea,* to say nothing of the always evasive but magnificent evergreen tree, *Gordonia.* These and other reputed Virginians were on our minds, as they had been for several years, and, now that we actually knew of appropriate pond-margins near where Pursh had resided, we were buoyant with hope.

But, alas, excessive rains of late summer had flooded the ponds; the shores of most of them were completely drowned. Only a very narrow and soaking-wet margin of a few feet (instead of 50–100 or more) showed, where the water had receded at Airfield Pond. Following the northeastern margin, which we had slightly explored in early July of 1943, we found nothing new. The bushy swale at the head of the first cove was a typical *Cephalanthus*-swamp, with herbaceous vegetation of the commonest and most aggressive species, such as *Rhynchospora glomerata* or *Xyris caroliniana* and *X. ambigua* Beyrich. If any rarity ever occurred there it would have been crowded out by *Cephalanthus* and its jostling associates. So, going to the southern shore of the pond, we climbed over the inevitable fenced-in hog-wallow, to follow the little belt of exposed shore. Immediately the excitement began. Standing up out of the continuous carpet of *Drosera capillaris* Poir. we promptly saw the beautifully distinct but relatively common *Gentiana Catesbaei* Walt. (see PLATES 1078 and 1079). Growing with it was the white (when dry saffron)-flowered *Sabatia difformis* (L.) Druce, a characteristic species new to Virginia. In 1943, on the northeastern shore of

Airfield we had found only a single small colony of *Rhynchospora filifolia* Torr. at the first station between southeastern North Carolina and those famous havens of isolated southern plants, Sussex County, Delaware, and Cape May, New Jersey. Here, on the southern shore, it was dominant. Associated with it was *Eriocaulon decangulare*, a very local species in Virginia but here abundant; and *Hypericum,* § *Brathys* threw us into despair. Almost everywhere was typical *H. canadense* of all sizes up to 6 dm. high, while more or less alternating and broader-leaved plants with few or aborted fruits, the plants reaching a height of 7.5 dm., abounded. Although broader-leaved, this could not be the northern *H. majus.* It goes into the heteromorphic series called *H. dissimulatum* Bicknell (surely well named), that half-sterile bunch which northward seems like polymorphous progeny of *H. canadense* crossed with either *H. boreale* or *H. mutilum.* Here *H. boreale* was out of the question and, although *H. mutilum* is in the neighborhood, we did not specially note it at Airfield Pond. The plant there which most interested us, however, was a tiny little leaning or half-reclining *Hypericum* with short-petioled obovate to oblanceolate leaves, a slender plant which an hour or so earlier we had been puzzling over in a pocket of deep *Sphagnum* a little farther north. This weak and slender plant, strongly suggesting attenuated *Galium trifidum* or *G. tinctorium*, occupied a few mossy carpets quite by itself. It is later described, and illustrated in PLATE 1076.

Near the mossy and peaty pockets of the new *Hypericum* was *Scleria Muhlenbergii* Steud.[1], a nice species but a bit disappointing, for we hoped, in this habitat, so like many pond-shores of the Carolinas, southern New Jersey, Long Island and southeastern Massachusetts, to get its close relative, *S. reticularis*, which occurs from Florida to southeastern South Carolina, thence seeming to "jump" to Delaware but occurring rather generally from there to eastern Massachusetts. We hunted for other species which occur in Georgia or South or North Carolina but are unknown between there and Delaware or southern New Jersey, but mostly in vain. In a few mossy pockets, however, one of them suddenly appeared, *Psilocarya nitens*, a very neat species, heretofore unknown from between the famous Wilmington region of south-

[1] See Fernald in RHODORA, xlv. 296, 297 (1943).

eastern North Carolina and Cape May, New Jersey but local about ponds of Long Island, with an isolated northeastern outlier on a single pond in Plymouth, Massachusetts, and, like several other Coastal Plain species, an isolated colony in northwestern Indiana. That was the sort of plant we were looking for but we were unprepared for the next discovery. Very near the *Psilocarya,* in semi-open peaty and sandy spots, there was a tiny *Xyris,* making little whitish-green tufts only 2 or 3 cm. across. Its filiform scapes suggested *X. Curtissii* Malme, but instead of being a cespitose blue-green perennial with many scapes, as is the latter species, the little plant of Airfield Pond was an annual, with mostly solitary scapes and different sepals and seeds. It proves to be the most northern member of the chiefly tropical *Xyris,* § *Brevifoliae.* I have already described and illustrated *X. Bayardi* in Rhodora, xlviii. 56, plate 1007 (1946). The insignificant belt of sand and peat exposed at the margin of Airfield Pond was really very significant and had well justified our faith in the locality, but *Mayaca, Balduina, Dichromena latifolia, Oxypolis filiformis* and the other reputed Virginians still remained on the doubtful list. For a moment I thought I saw *Mayaca* but only for a moment. The wet peat was carpeted right down to the water with very loosely leafy and prolonged, flexuous, creeping and writhing stems of the most diffuse extreme of *Lycopodium inundatum,* var. *Bigelovii* Tuckerm.[1] These sterile and lax strands up to 4 dm. long and with leaves up to 1 cm. long so closely resemble the long creeping stems of *Mayaca fluviatilis* Aublet, which comes north into southeastern North Carolina, that, at a distance of a few feet, herbarium sheets of the two are indistinguishable. As I suggest in Part II, it is a temptation to imagine that Pursh's record of *Mayaca* from Virginia could easily have been based on such loose-growing sterile plants of the *Lycopodium.*

More rain quickly drowned the temporary narrow beach of Airfield, and every pond we visited was quite without exposed shore. So we soon started out on days of mere exploration, making our way to several ponds, that we might sometime, when the water is low, know which to revisit. There are a full one hundred of them on the Coastal Plain of southeastern Virginia

[1] See Rhodora, xlviii. 136 (1946).

and it was important to learn how to reach them. One which lies to the north of Airfield Pond, but which is at the head of a branch flowing into Brittle's, seemed worth finding. When we showed the contour-sheet to some colored boys they said: "Oh, that's Jenkins Pond." Driving along the road we were puzzled as to which farm-road to take; so, seeing a farmer at work, we asked how to reach Jenkins Pond, receiving the prompt reply: "Never heard of it. There's a pond back of my barn which might interest you. Just drive up to the house and leave your car. My name is Jenkins." We have called this promising pond "Jenkins Pond." We remembered a tempting piece of *Sphagnum*-carpeted woods not far from Brittle's Pond where, in July of 1943, we had seen interesting plants. At this season the most interesting discovery was the *Galium*-like *Hypericum* already discussed; and, since such spring-fed sphagnous woods often contain the primitive and rare *Carex Collinsii* Nutt., we watched for it, although June would have been the proper season. There it was, mixed with the long misinterpreted *Agrostis altissima* (Walt.) Tuckerm., which I shall discuss in Part II. At the margin of these woods we established a new eastern limit for *Lobelia georgiana* McVaugh (*L. glandulifera* (Gray) Small). Nearby, the drier woods yielded a very handsome and quite distinctive *Desmodium*, one of Dr. Schubert's species, the name not yet published by her. A mile or so north of Waverly, along a wood-road near a now drained pond, we were delighted to find a good colony of the recently described *Eupatorium cordigerum* Fern. in Rhodora, xlvii. 192, plate 908 (1945); and near it was a great clump of a puzzling *Solidago*. This has been described and illustrated as × *S. hirtipes* Fern. in Rhodora, xlviii. 65, plate 1011 (1946).

The ponds being over-full and their shores inaccessible, the obvious thing to do was to explore the fresh reed-marshes along the tidal rivers. Fortunately our friend Calvin Horne had his outboard-motor still mounted on a trailer after a vacation on the lower James; so with him or his substitute we returned to the usually productive reed-marshes of the lower Northwest River in southern Norfolk County and similar marshes of Blackwater Creek in southern Princess Anne County. These very extensive reed-marshes, with coarse grasses, sedges, *Typha*, and tall *Com-*

positae high above one's head, these interspersed with the incomparably tough and stabbing "Blaspheme-vine", *Smilax laurifolia,* or with tall masses of Sawgrass, *Cladium jamaicense,* with its hard and elongate leaves fringed by coarse saw-teeth, are not the places for picnics or for the mere seeker for pretty flowers. Finding a possible landing-spot, one wallows and tumbles into the back of the marsh through almost impassible barriers and when nearly exhausted makes his way back to the boat. Three or four such landings in a day were all we two oldish but somewhat experienced botanists could stand. In view of the facts that almost every landing (perhaps a fourth of a mile apart) often yields something else and that about a quarter of Princess Anne County consists of such marshes (with Norfolk County a good second) the future work for a new generation is impressive. At one point or another these fresh marshes or their borders and pools are occupied by such local species, then known from only one station in Virginia, as *Phalaris caroliniana* Walt., *Scirpus etuberculatus, Eleocharis radicans* (Poir.) Kunth, *Lilaeopsis carolinensis* C. & R., *Pluchea purpurascens* (Sw.) DC., *Aster Elliottii* T. & G., etc., etc.; while only 2 or 3 stations are known for many others: *Juncus megacephalus, Dichromena colorata, Ludwigia alata, Verbena scabra* Vahl, etc., etc. So we attempted to do our bit, but these two areas, not far from the bridges, had been well searched before, Northwest an old collecting-ground of Heller, Kearney and ourselves, and Blackwater Bridge much visited also. *Ludwigia alata* was added to the specialities of Northwest and the almost smooth estuarine *Polygonum sagittatum* var. *gracilentum* Fern., mingling with true plump-fruited *P. arifolium,* which seems to specialize on estuaries, was extended south from the marshes of the Chickahominy. *Aster Elliottii* was found to be rather general on the marshes; and at the type-locality, Northwest, of *Lobelia elongata* Small we found some overgrown plants with branching inflorescences. But we soon became absorbed with *Spartina cynosuroides,* for it suddenly struck us that the loosely racemose inflorescences with definitely peduncled spikes, which abounded in these marshes, belonged to a very different plant from the one on real salt-marsh, in which the inflorescence is denser and with many more closely crowded and appressed spikes. We resolved to get real rhizomes and stolons, for most herbaria lack them. If others have attempted that feat they will know that it may take an hour of hard pickaxing to extract complete rhizomes and stolons from the dense and slimy substratum. After one was secured for me there must be one for Long; then a few duplicates! This plant of fresh to merely brackish tidal marshes was again dug on similar reed-marshes of Gray's Creek, well up the James above salt water. This subject will be further analyzed in Part II.

In June of 1946 Long, unfortunately, was unable to join Dr. H. Emery Moore, Jr., and me for a trip, June 3–15, but perhaps he was really fortunate in avoiding possible infection. When we left Cambridge Moore was feeling "miserable" and, as we proceeded, it was evident that he was urging himself to drive; eventually weakened and nearly prostrated by intestinal 'flu. Nevertheless, he hung on gamely until the doctor interfered, ordered him to bed and prescribed a starvation-diet. Naturally the first duty was to get at the ponds. It had rained heavily through May and we were told that the pond-shores were flooded. Consequently, when we first spied Airfield, I thought we had taken the wrong road. There wasn't any pond there, merely a great shallow and peaty basin more than a mile long, with scattered small pools. But it was Airfield, after the breaking of the dam in winter. The bottom, as far out as we cared to walk, was a solid turf of the usually perennial *Eleocharis obtusa*, var. *ellipsoidalis* Fern. in fruit, a perennial which had sprung up and was heavily fruiting in a few months! The usual array of *Rhynchospora, Carex, Panicum* and other shore-plants luxuriated, but the upper margin of the pond showed nothing new. The dam of Whitefield Pond, southwest of Corinth Church, had, unhappily for us, stayed damnably intact and the heavy rains had been thoroughly impounded, so that botanizing became deep wading (up to our waists). Immediately we were challenged by the great variation in the fruit of the Water-Ash, *Fraxinus caroliniana*. Some shrubs had the fruit purplish, others pale or yellowish, some had the young shoots and the lower leaf-surfaces glabrous, others softly velvety or pilose; but those variations were merely formal. More significant was the shape of the fruit, rhombic, ellipsoid or oblanceolate, broadly rounded at summit or attenuate, flat, spoon-shaped or 3-angled. From that first day throughout the trip this baffling series held our attention. Whether it will be sufficiently studied for further consideration in this paper is doubtful, since it is necessary to get further data on some old types within the genus. Very soon we got into a great clump of high-doming blackberry, gigantic shrubs with only a few prickles but with intricately forking and flexible branchlets 2 m. long and arching over to the ground. This was a stranger which will be described and illustrated (PLATES 1067–1069) in Part II; but it merely started us on the inevitable series of novel *Rubi*. At one point *Itea virginica* did not look natural. In fact, I thought we had extended northward the range of *Fothergilla parvifolia* Kearney, the little compact inflorescences were so strikingly suggestive of *Fothergilla*. The clump is, however, the type of *Itea virginica*, forma *abbreviata* Fern. in RHODORA, xliv. 22 (1947). Only at one point, close to the dam, was there evident a bit of exposed beach; but that was definitely worth while, for there, tangled with the now very familiar but locally endemic *Eryngium prostratum*, var. *disjunctum* Fern. in RHODORA, xlvii. 163, plates 897 and 898 (1945), was a neat little colony of *Ludwigia brevipes* (Long) Eames, a species we had known only from damp sands nearer the outer coast, the most inland station known having been at the Cat Ponds in eastern Isle of Wight County. These few specialities, added to *Polygonum hydropiperoides*, var. *euronotorum* Fern. in RHODORA, l. c. 137, plate 884 (1945), all on a few rods of shore, certainly mean that some dry summer Whitefield Pond is going to give us some more surprises.

Having an errand which required driving to Petersburg, we started northwestward from Waverly, but when we reached the very wet (then almost pond-like) depression in the pinelands only 3 or 4 miles from Waverly we stopped to get any lingering flowers of *Iris prismatica* which abounds there. While we were gathering these last flowering specimens I was impressed by the trailing dewberry which occupied the wet hollow. This was not the right habitat for ordinary xerophytic and glabrous-leaved *Rubus flagellaris*, and examination showed that this swamp-plant had the leaves soft-pubescent beneath. It was, obviously, not that species. Subsequently, in September, Long and I got supplementary material and then found it occupying a similar wet and swaley habitat several miles away. Differing from *R. flagellaris* in several additional characters, this trailer of wet pineland will be described in Part II and shown in PLATES 1064–1066. In this boggy hollow, the home of *Aletris aurea, Tofieldia racemosa, Zigadenus glaberrimus* and *Carex Barrattii* Schwein. & Torr., the low and narrow-leaved *Viburnum nudum*, var. *angustifolium* Torr. & Gray was abundant in its almost extreme development, flowering but only 3 or 4 feet high, although later on we found it fully mature and only 1½ feet high.

At New Bohemia we varied the route by leaving the 4-lane turnpike and taking a cross-road toward the Jerusalem Plank Road, in order to pass through unspoiled woodland and clearings; but we got only a short distance when we halted for an abundant goldenrod, in full bloom in the first week of June (obviously having begun flowering late in May). Immediately thinking of *Solidago verna* M. A. Curtis, which flowers in southeastern North Carolina from earliest May to early June, we set to work on the large colony. It obviously was not *S. verna* but was so like the midsummer and autumnal *S. juncea* of northern, inland, and (southward) upland range as to baffle us. It proves to be a vernal-flowering Coastal Plain extreme of *S. juncea*, differing from it in smaller involucres with vividly green (instead of yellowish) phyllaries and shorter ligules, disk-corollas, pappus and achenes. This fine new goldenrod, to be described in Part II, ended the morning's collecting. Later in the day, trailing old specialties, we brought up at the little sphagnous bog near Dahlia, the home of so many rarities. For purely sentimental reasons I make it a point to look in there occasionally, although we now find nothing new. In fact, the encroachment by the farmer, whose plowed acreage, ditching and hogs continue to invade the bog, is bound to destroy some of the specialities. Not so one of them, which a few years ago was represented by only a few small plants. Repeated and chronically southern burning off of the bog has stimulated *Zigadenus densus* (Desr.) Fern. at its only known Virginia station, so that the greatly increased colony now bears inflorescences four times the recorded size, some of them branching and paniculate, instead of simply racemose!

While stationed at Norfolk during the war, Mr. Leslie Hubricht of Detroit had written me of some of his botanical finds and on returning to Detroit he sent me specifications of the three most natural and undisturbed spots he had found in his occasional botanizing trips. These were all near Suffolk. One of them had been familiar to Long and me, the type-region of *Malaxis Bayardi* Fern. in Rhodora, xxxviii. 402, fig. 1 and pl. 446, figs. 1 and 2 (1936); the others were unknown to us. So one day Moore and I started out to look into them. The first, a tiny bit of sphagnous bog west of Kilby, along the Norfolk and Western Railway, was quickly found, recognized from the path on the railroad-embankment by the upstanding yellowish trumpets of *Sarracenia flava*, always a good indicator. In early June such bogs are only beginning to show their real treasures but even then the richness of the spot in localized plants was apparent. *Scleria minor* (Britt.) Stone, a denizen of sphagnous bogs, was there, again a good indicator, and the thick corm-like bases and foliage nearby indicated *Aster gracilis*. Here, too, was *Scutellaria integrifolia*, var. *hispida* Benth., at its third known station so far north. Best of all, at the western border of the bog we walked into the second Virginian station for the very rare southern *Sisyrinchium capillare* Bicknell, already in mature and opening fruit. These were only mild suggestions of what the September visit would yield.

The borders of the Great Dismal Swamp, traversed by trunk-roads, always yield surprises. So, passing Suffolk, en route to the tidal marshes of Northwest River, we had passed Magnolia when, curious about the very large *Anthoxanthum odoratum* (up to 1 m. high and with interrupted inflorescences nearly 1.5 dm. long), which deliciously scented the roadside atmosphere, I got out to investigate. The grass was interesting enough, forma *giganteum* P. Junge, which I had never seen. But, before returning to the car, I became puzzled by the water-lily which filled the seemingly shallow but, when entered, pretty deep peat-bottomed pools. The flowers were all wrong; standing erect some inches above the floating leaves, both sepals and petals narrowly lance-attenuate, the sepals reflexed and pointing down to the water. This was quite new to our experience, so Moore, although feeling pretty groggy, wanted to take a kodachrome-picture of it with the old man as a scale. In labeling this photograph he displayed his emotions at the time, for he called it "Water-nymphs in the G. D. Swamp" (plate 1061). The plant is so distinct that it will be described and illustrated (plates 1061–1063) in Part II.

Not far from Magnolia there was a trailing *Rubus* which I had never met, merely *R. celer* Bailey, its range extended southward from Arlington and Fairfax Counties. But the next two *Rubi* represented not merely range-extensions. In the very wet and perpetually inundated margin of the Great Dismal Swamp, near Wallaceton, there was a strange relative of *R. cuneifolius*, which is xerophytic. This shrub, in the wettest of habitats, looked unfamiliar. It proves to be a novelty, described and figured (PLATES 1070 and 1071) in Part II, its nearest ally apparently being *R. Humei* Bailey of Florida, said by its author to be "the only paludose species" of the section. Desiring to get really good rhizomes of *Dryopteris celsa*, which had been much on my mind since I suddenly found myself condemned to "do" the ferns for the Manual, we proceeded to the cypress-swamp along Northwest River northeast of Wallaceton to get them. There, in the shade of *Taxodium*, another and very "different" *Rubus* blocked our path. So definitely not of the ordinary run and occupying so distinctive a habitat, it had to be collected. In September, when Clement was with Long and me, we found it characteristic of other cypress-swamps up to 50 miles away. It has a real range and definite habitat; so I am forced to describe and illustrate it (PLATES 1072–1074) in Part II. The reed-marshes at Northwest and at Blackwater failed to yield any real novelties, though at Northwest the marsh had *Carex Mitchelliana* M. A. Curtis of fresh habitats mingling its roots with those of the usually extreme halophyte, *Scirpus Olneyi!* Southeast of Blackwater, at Pellitory Point along Back Bay, almost in North Carolina, *Carex hormathodes* abounded, its previous southern limit in the tidal marshes of the James. It may now be looked for on Currituck Sound in North Carolina.

In September of 1946 (5th to 18th) my student, Ian D. Clement, drove Long and me to Virginia, our new headquarters being in a very comfortable cabin at the Virginia Diner in Wakefield. Airfield Pond had pretty well filled after the repairing of its dam and we got nothing not seen the year before, although several species, *Sabatia difformis* and some others, were more abundant, while the draining of the pond seemed to have put a temporary check upon others. Whitefield Pond was still overflowing but we got better material of some of the June specialities at the only bit of beach exposed, and began the collecting of *Eleocharis vivipara* Link, a southern species heretofore known in the state only from near Cape Henry but from our first day to the last now repeatedly appearing about the ponds from Southampton to Princess Anne.

One of the localities indicated to us by Mr. Hubricht as almost unique in southeastern Virginia, in being rich woods with the deep carpet of leafmold undisturbed (instead of scraped down to the underlying clay or sand for use on the truck-farms) was near a most unpromising tangle of railroads, sidings, abandoned roads and dumps just to the east of Suffolk. We looked askance at the abandoned dirt-road he indicated on his map but, after trying others, came back to it and in one minute were at the margin of a fine piece of oak-hickory woods, bordered on one side by a dump of broken glass and rubbish, on another by an old field, on a third by a railroad. Starting in at the upper edge of the woods we promptly came to a small branch bordered by the rare *Chelone obliqua;* then the largest colony we had ever imagined, mostly in fruit, of *Hexalectris,* which always means good soil; then *Sanicula Smallii* Bicknell at a new eastern limit. With them were other good things but we were most interested in a strange *Desmodium,* one we did not remember having seen and which Dr. Schubert (at the moment of this writing studying and photographing at Geneva the types of the *Desmodia* described in De Candolle's Prodromus) assures us is undescribed. Trying to get rooting specimens, we followed the horizontal roots by cutting away hickory- and oak-roots and eventually landed complete roots. The fruiting stem arose from a sweet-potato-like enlargement which terminated a long filiform root, fringed with tubercle-bearing rootlets, and itself terminated by a slender "sweet-potato". We had started something! Coming up from the woods to a fallen log we quickly disposed of lunch and then rested for an hour or two by digging out root-systems of *Desmodium viridiflorum, paniculatum* and *nudiflorum,* each very distinctive. The die was cast; there was no turning back. Every species of *Desmodium* we came to after that must be dug. *D. lineatum* of dry pineland had a stout tap-root descending vertically through a mesh of oak- and pine-roots, so that it was necessary to cut out a broad pit a foot and a half deep and even then to miss the tip.

Then a second one must be dug, that both Long and I might each have one. *D. pauciflorum* of rich woodland loam has filiform, horizontal roots ending in tubers resembling small peanuts. In fact, if one really wants to distinguish the species of *Desmodium* he should know the roots! One plant can be dug, on the average, in half-an-hour to an hour. I am not making a key to the species wholly dependent on the roots. There are many which we do not yet know. It is going to be interesting, for instance, to see what sphagnicolous *D. tenuifolium* T. & G. has for roots. Dr. Schubert, furthermore, is in the midst of a monograph of the genus in North America. She has been working with bracts, calyx, articles (segments of loment), leaves and such superficial characters. We are merely trying to do our little part by helping her get at the root of her problem!

Clement, absorbed in the intricacies of *Sida*, was anxious to see the type-colony of *S. inflexa* Fern. in RHODORA, xlii. 463, pl. 638 and 639, figs. 1–3 (1940). In his studies he has been able to show me that I had mixed two species and that *S. inflexa* is indeed an endemic species of southeastern Virginia only. The type-region is the woods along Three Creek, perhaps 2 miles above Carey Bridge over the Nottoway. The banks and very rich woods along the western side of the Nottoway there have been very productive. There has been the only actually known station for the rare and evasive true *Sphenopholis pallens*, discussed in RHODORA, l. c. 356 and 357 and again in vol. xliii. 494 and 534 (1941); and growing near it was the relatively rare *Aconitum uncinatum*, var. *acutidens* Fern. in RHODORA, xliv. 398, pl. 720, figs. 2–4 (1942). Nearby grow *Tetragonotheca helianthoides* and true southern *Polygala polygama* at one of the two known stations in Virginia, as well as numerous other rarities. As soon as we turned into the wood-road above Carey Bridge we were disheartened. The country thereabouts was being improved! Everywhere the woods were torn up and heavy bulldozers and other instruments of so-called improvement had dug away or heaped in great mounds the whole substratum nearly up to the crossing of Three Creek. The only station for *Sphenopholis pallens* was covered by many feet of earth and the preparation for a new approach to a presumably new bridge had obliterated the *Aconitum* and many more mere plants. Who cares? Fearing that *Tetragonotheca*, the *Sida* and their local associates were also gone, we were relieved to find that these, at least, were still spared, but we do not know what may have been happening since. *Sida inflexa* was in fine form, much better than we had heretofore known it. We were thankful for that little bit.

At last (on the 8th) we got to the little bog about half-a-mile west of Kilby. Immediately the shouting began. While I was collecting one speciality or showing it to Clement, Long was calling to me to come and see what he had found. In fact, this small pocket was a regular *rhynchosporicetum*, with half the species of Virginia jostling one another, all the common species and some less common, like *R. debilis* Gale in Rhodora, xlvi. 194, pl. 826, figs. 5A and 5B (1944), *R. rariflora* (Michx.) Ell., and *R. chalarocephala* Fern. & Gale in Rhodora, xlii. 426, figs. 1 and 2 (1940); and here I began to be worried by *R. perplexa* Britton, for the spikelets were so much more crowded and so much larger than in the Florida type. From now on we collected it and in Part II, I shall discuss and illustrate it (plate 1060). The great show, however, was not from *Rhynchospora*. All over the bog the roseate inflorescences were abundantly supplied by the stiff spikes of *Liatris spicata*, var. *resinosa* (Nutt.) Gaiser in Rhodora, xlviii. 216 (1946), described by Nuttall from "the Pine forests of North and South Carolina", its viscid, dark purple involucres strongly contrasting with the rose-pink flowers; and the broad corymbs of *Carphephorus tomentosus* (Michx.) Torr., var. *Walteri* (Ell.) Fern. in Rhodora, xlii. 481 (1940), which had been known in Virginia only in dry pine-barrens farther inland. Earlier in the morning the rose-color would have been increased by the petals of *Rhexia mariana*, var. *purpurea* Michx. (*R. Nashii* Small) and *R. ciliosa*, both of which drop their petals too promptly for any but very early risers. Yellow was supplied by the panicles of the southern (Texas to Georgia, north to southeastern Virginia) *Solidago nemoralis*, var. *Haleana* Fern., l. c. xxxviii. 227, pl. 431, figs. 1 and 2 (1936) and by a perfectly glabrous extreme, such as we had previously found on the bog near Tom Hunter's at the southwest corner of the county, of the usually densely pilose- or villous-stemmed *S. fistulosa* (*S. pilosa* Walt., *S. villosa* Ell.), an extreme to be more formally defined in Part II. More brilliantly yellowing the upper border of the bog were the earliest expanding heads of *Coreopsis oniscicarpa* Fern. in Rhodora xl. 472, pl. 533 and 534 (1938). Mingled with these but making less display were such nice plants of bogs or wet pine-barrens of the South as *Ctenium aromaticum*, true *Xyris flexuosa* (*arenicola* Small), *Aletris aurea*, *Paspalum praecox* Walt., var. *Curtisianum* (Steud.) Vasey, *Hypoxis micrantha* Pollard, *Desmodium tenuifolium*, *Hypericum setosum* L., *Ludwigia hirtella* and *pilosa* Walt., and *Gentiana Porphyrio* (in bud). Such a congregation of the elect certainly indicated what must have been the boggy spots when Banister or Clayton first knew southeastern Virginia, these tiny remnants of unaltered country now excessively rare. But that was not all; the good things enumerated are merely the background of the picture. Crawling on hands and knees we began to unravel the tangle; a strange little grass, suggesting *Paspalum setaceum* but with essentially glabrous foliage, to be described and illustrated in Part II (plate 1057); an overripe but strange *Ludwigia* which could only be the southern *L. virgata* Michx., the first known in Virginia; a *Crotalaria* quite new to us and growing in *Sphagnum*, not in dry sand, a novelty to be described later and illustrated in plate 1075; and almost mixed with it an utterly strange *Panicum* with sheaths and leaves gummy with black wart-like atoms, an apparently new species (plate 1059). When we quit near twilight we were not at all certain that we had crawled over and thoroughly investigated every square yard of the bog, but we were temporarily satisfied and, after reporting general results to our friendly hosts at Wakefield, were regularly asked at the end of each day if we had "hit the jack-pot" again.

We certainly did not again approach that day's record but another day, when we had gone hopefully to points farther north, to be somewhat disappointed, we returned to the area. On the northern side of the railroad there was a smaller piece of the bog which we had barely touched, and, reasoning that other such spots might be farther west along the unspoiled right-of-way, we tried out our theory. Less than a mile farther west there was, indeed, a small duplicate of the first bog, with many of the same specialties and with *Lachnocaulon anceps* so atypical in aspect as to raise our hopes. Best of all, here was a dwarf *Scutellaria* which proves to be *S. integrifolia*, var. *multiglandulosa* Kearney (*S. multiglandulosa* Epling), the first from north of Georgia. In the smaller portion of the first bog some of the now familiar species had greatly developed their inflorescences in only four days and there *Lyonia ligustrina* was reduced to its lowest stature, fruiting and evidently fully developed though only 1.5–2 dm. high (see PLATE 1077). Other surprises of this and near-by areas may be held over for Part II for they would seem trivial after a boggy area which had yielded 6 plants new to science, with 2 others new to Virginia and 17 others which had been known from only 1–3 stations.

Reasoning that the various shallow and fresh ponds back of or among the dunes along the coast would have available shores at low tide and remembering many specialties of such habitats found during our earliest Virginian work, when we had a center at Virginia Beach, we decided to try them. Proceeding to Little Creek in northwestern Princess Anne, we found much of the area under military or naval restrictions; so, since all ponds were, for the moment, alike to us, we bypassed, without seeing it, Bradford Lake, a full mile long, and headed for Lake Joyce, even longer and situated south and east of Chesapeake Beach. But, driving out from the turnpike, we promptly came to a tiny nameless pond less than a quarter of a mile long and went to work. It was well on in the afternoon when we stopped to eat lunch and approaching twilight when we quit. Big Lake Joyce and Bradford Lake and smaller Chub Lake with its half-mile of bordering marshy flat, all easily accessible from Chesapeake Beach, are still unknown to us. The little pond was bordered by a turf of *Eleocharis*, *Juncus*, *Cladium mariscoides* and other such plants. *Eleocharis olivacea* and the now very familiar *E. vivipara* alternated or commingled, and growing by itself there was another, the tropical American *E. flavescens* (Poir.) Urban, heretofore known in the Manual-range only from Virginia Beach and at Cape May, New Jersey. We trampled on the continuous carpets of the usually very local *Ludwigia brevipes* as if it were a mere carpet-weed; but, kneeling down to collect some good strands of it, we stopped abruptly. The *Hypericum* was surely the northern *H. boreale*, heretofore unknown so far south except in the mountains. And the *Galium*, closely resembling *G. tinctorium* (*Claytoni*) puzzled us on account of its large fruit and very long pedicels, merely *G. tinctorium*, var. *floridanum* Wiegand, its range extended north from Florida and here mingling with *Hypericum* *boreale* at its southern limit. That was pretty good, but we must look over the dune-hollows. Of course the regular plants were there: *Triplasis purpurea* more than a meter high; *Oenothera humifusa, Galium hispidulum, Lechea maritima*, var. *virginica* Hodgdon in RHODORA, xl. 109, pl. 490, fig. 9 (1938), *Diodia teres*, var. *hystricina* Fern. & Griscom in RHODORA, xxxix. 307, pl. 469, fig. 4 (1937). Here also was *Cassia nictitans*, var. *hebecarpa* Fern. l. c. xxxviii. 423, pl. 448, figs. 1–3 (1936), heretofore known in Virginia only from the sands of Northampton County. But we were especially pleased with the *Eupatorium* which abounded in the hollows. Off-hand one might pass it for *E. leucolepis* but its very thick and thumb-like tuberous roots are all wrong for the latter species. It proves to be the southeastern *E. recurvans* Small, which we had previously seen only about the Great Dismal Swamp. Starting toward Wakefield at the end of a full day, we were driving as rapidly as allowed on the broad turnpike when Long, famous for such last-moment stunts, shouted "Stop". There, in a cultivated field, was a dominating and very tall weed strange to us. It proves to be the oriental *Echinochloa stagnina* (Retz.) Beauv., apparently not previously known as naturalized in America.

Just one more locality may here be noted. Early in the summer of 1937 Long and I had found very interesting and localized plants on the sandy and peaty beach of Darden's (or Predler's) Pond, north of Courtland, but we had never been there since. We wanted to see what the autumn would show. The shore which we had formerly explored proved to have been thoroughly punched by hoofs, so, climbing across the dam, which we were sure the hogs could not do, we came to an unspoiled sand-bordered beach full of local plants. Until mid-afternoon, when empty stomachs urged us back to the car, we were studying and collecting the usual intricate series in *Eleocharis* and other technical groups, but we did not have to puzzle over the very definite *E. tricostata* at the third Virginian station, nor *Scutellaria integrifolia*, var. *multiglandulosa*, which we had been getting on the bog near Kilby. *Juncus canadensis*, var. *euroauster* Fern. in RHODORA, xlvii. 127, pl. 881, figs. 1–3 (1945) was in fine fruit, and we again wondered at the relative bigness and crowding of the spikelets of the Virginian representative of *Rhynchospora perplexa*. When we came to a diving-board, ranks of seats in the woods, summer-cottages and evident meeting-places we turned back but another day returned to follow the beach toward the north. The little settlement proved to be a gathering-place for Boy Scouts of the state, presented and maintained by the liberal former Governor Darden. Stating our errand to the warden, we proceeded to follow up other nice plants, only three of which will here be noted. Among the ordinary broad-leaved *Cephalanthus occidentalis* of boggy thickets there were clumps with very narrow "willowy" leaves, this extreme form to be accounted for in Part II. We had been having a repetition of Moore's and my experience with *Fraxinus caroliniana*, which here showed uncanny variation in its fruit, but the tree which really delighted us was a large evergreen or semi-evergreen oak with great rounded and dense crown and drooping fruiting branchlets, which was scattered back of the beach through the woods. This was clearly the Darlington Oak, *Quercus hemisphaerica* Bartr. ex Willd., discussed and illustrated by me in Rhodora, xlviii. 137 et seq., pl. 1035 and 1036 (1946). Our previous collections had been from small trees in the gum-swamp along West Neck Creek west of Pungo in Princess Anne. Here at Darden Pond the trees are very handsome and fully grown. Returning to the car, we stopped to investigate a strange-looking *Physalis* in the sandy woods. It was not merely strange-looking; it was really so strange that it will be discussed and illustrated (plates 1080 and 1081, figs. 4 and 5) in Part II.

Thus we have again demonstrated that, in spite of almost complete clearing, settling and cultivating of many areas of southeastern Virginia, there is plenty yet to do for the botanist who knows what to avoid as ordinary, what to collect as unusual. Almost every wholly natural and unmolested spot has its isolated specialties. The great problem is to locate these spots, often so small in area as to be insignificant on a map or an aerial photograph. Only by learning the more conspicuous "indicators" and promptly following up their indications (before the plow or bulldozer gets there) can we find the last remnants of what originally must have been the most varied and numerically the largest indigenous flora in the Manual-area. Many species, found by early botanists, are apparently gone but many others, not seen by them, still linger. These we want to know about before Man has destroyed them.

Part II. Range-extensions, Range-abbreviations, Technical Notes and Descriptions

In Part II, as in previous papers of this Virginia series, I have assembled in taxonomic sequence and often with fuller discussion the principal records of range-extensions and descriptions of novelties which are noted in the diffuse narrative, as well as others not there noted. Several revisions of groups, growing partly out of the Virginia work, are noted, and, in order to assemble the Virginian specialties, several species and varieties already published elsewhere are here drawn in and in many cases indicated as additions to the flora of the state, the original collections justifying their being noted here. Several others, the status of which in Virginia has long been questionable, are also discussed, an attempt having been made to trace the sources of such records. Most of the plates, some of them of highly inartistic subjects, were prepared with her accustomed skill by Dr. Bernice G. Schubert before her departure to Europe to study and photograph hundreds of types. Most unfortunately I must humbly apologize to her for failing completely to remove some films of the almost (but not quite) transparent adhesive over numbers or other points in a few plates, these having been left with me to clean finally before they went to the engraver. Five plates, more recently made, are the work of my student, Ian D. Clement, our companion on the last September trip. The cost of the engravers' blocks has been met through an appropriation for personal research from the Department of Biology of Harvard University. For meeting the expense of their reproduction I am again indebted to my always alert companion on many botanical explorations for more than thirty years, Mr. Bayard Long. Plants thought to have been previously (except in the cases above noted) unrecorded from Virginia are indicated by an asterisk (*).

*Dryopteris Thelypteris (L.) Gray, var. pubescens (Lawson) A. R. Prince, forma suaveolens (Clute) A. R. Prince. Princess Anne County: fresh tidal reed-marsh along Blackwater Creek ("River" of contour sheet), below Blackwater, *Fernald & Long*, no. 14,870.

Very tall (up to 1.05 m.) and, in September at least, scenting the marsh with a strong coumarin-odor, suggestive of "Hay-scented Fern". The odor not evident in the specimens after the lapse of a year.

D. Goldiana (Hook.) Gray. Surry County: lower slopes of rich calcareous wooded gullies along James River, Claremont Wharf, *Fernald & Long*, no. 8006, *Smith & Hodgdon* in Pl. Exsicc. Gray., no. 1003; rich wooded gullies along James River, below Sunken Meadow Beach, *F. & L.*, no. 8007; very abundant in rich deciduous woods 1½ miles east of Blizzard's Corner, *F. & L.*, no. 9235.

Through my failure to understand the rather definite characters which separate *Dryopteris celsa* (W. Palmer) Small, of inundated acid swamps, cypress-swamps, cypress-knees and -logs and wet woods of the southeastern Coastal Plain, from the really different *D. Goldiana* of rich (mostly calcareous) woods, chiefly northward and inland, the numbers above cited were erroneously distributed or reported as *D. celsa*. Briefly stated, the distinctions which I propose to publish in the Manual (if the rights to copyright are not endangered by someone else copying this item and himself copyrighting it first—such things happen) between *D. celsa*, *D. cristata* (L.) Gray, var. *Clintoniana* (D. C. Eaton) Underw., *D. Filix-mas* (L.) Schott (which comes down nearly to meet *D. Goldiana* in the North) and *D. Goldiana*, follow.

a. Lowest pinnae of fertile fronds with 10–22 pairs of definite pinnules (excluding terminal teeth or small lobes); blades lanceolate to lance-oblong, the fertile ones one fifth to half as broad as long; basal scales of stipe pale brown to fuscous, thin and scarious....*b*.

  b. Lowest pinnae obviously shorter than median ones; scales of stipe pale brown to cinnamon.

    Basal scales of stipe ovate to ovate-lanceolate, 1–2 cm. long; lowest pinnae deltoid-ovate, the others broadly lanceolate; plant of swamp or wet woods, north to southern Canada.................... *D. cristata*, var. *Clintoniana*.

    Basal scales of stipe lance-linear and long-attenuate, 1.5–3 cm. long, mixed with shorter setiform ones; lowest pinnae lance-ovate or lanceolate, the others lance-linear; boreal upland plant.................. *D. Filix-mas*.

  b. Lowest pinnae nearly or quite as long as and like the median ones, all lanceolate; basal scales of stipe brown to fuscous, lance-attenuate to oblong-ovate, 0.7–1.5 cm. long; southeastern paludal species.............................. *D. celsa*.

a. Lowest pinnae of fertile frond with (15–) 20–31 pairs of definite pinnules; blades ovate to ovate-oblong, one half to five sixths as broad as long; basal scales of stipe firm, castaneous to blackish, lustrous; plant of rich temperate woodland.... *D. Goldiana*.

Dryopteris Goldiana in the calcareous ravines of the lower

James thus takes its place with other upland and inland calcicolous species of the same region.

*Lycopodium complanatum L., var. flabelliforme Fernald, forma **brachypodum,** f. nov., a forma typica recedit pedunculo 0.5–1.5 cm. longo.—Sussex County, Virginia: forming a broad carpet on the sandy wooded terrace of Nottoway River, 3 miles north-northwest of Bethel Church, September 9, 1946, *Fernald, Long & Clement*, no. 15,171.

Forma *brachypodum*, which forms a large mat where we found it, was only sparsely fruiting. It strongly contrasts with the usual and typical var. *flabelliforme* in having the common peduncle so short as to appear, without close examination, to be wanting, the peduncle in var. *flabelliforme* usually being very evident, 3–11 cm. long.

Potamogeton diversifolius Raf. When I treated this species in Mem. Am. Acad. xvii, pt. 1, 105–108 (1932) I had seen it from only one station in southeastern Virginia, that in Princess Anne County. It proves to be generally distributed from Northampton and Princess Anne Counties inland to Henrico, Dinwiddie and Greensville Counties.

Najas in the Virginian Estuaries.—In Rhodora, xliii. 527 (1941) I wrote, in discussing some of the estuarine plants of southeastern Virginia: "As if it were not enough, for an estuary already 'worked out', *Najas* at low tide began to upset our calculations. The material secured belongs to three species. Before they can be satisfactorily settled additional collections, especially at a later season, must be secured." More material has been collected but I find myself still puzzled as to exact identities. I have tentatively placed them in the three generally recognized eastern species, but close study by one more familiar with the technical characters is likely to lead to readjustment.

*?Najas flexilis (Willd.) Rostk. Plants temporarily so identified are from two river-systems. King William County: fresh tidal margin of Mattaponi River, northwest of King William Courthouse, *Fernald & Long*, no. 12,520. New Kent County: fresh tidal marsh by Chickahominy River at "Shady Rest", southeast of Windsor Shades (Boulevard Post Office), *Fernald & Long*, no. 12,523. Charles City County: fresh tidal margin of Chickahominy River, near Cypress Bank Landing, *F. & L.*, no. 13,214.

On a sheet of no. 12,520 Dr. R. T. Clausen has noted departures from typical *Najas flexilis* in length of style, slenderness of fruits, etc. To these should be added fleshier and firmer leaves. I leave the problem to Clausen, who has done clarifying work on the genus.

N. guadalupensis (Spreng.) Morong. To the published records add the following. King William County: fresh tidal shore of Mattaponi River at Horse Landing, near King William Courthouse, *Fernald & Long*, no. 11,510; similar habitat northwest of King William Courthouse, no. 12,522. Princess Anne County: shallow pools in brackish to fresh marsh along Back Bay east of Creeds, *Fernald & Long*, no. 10,871; shallow pool in brackish to fresh marsh along Back Bay, at eastern margin of Long Island, *F. & L.*, no. 10,478; fresh to brackish water over sandy bottom, Back Bay, Long Island (extreme depth of water about 4 feet), *F. & L.*, no. 10,872.

?N. gracillima (A. Br.) Morong. King William County: fresh tidal margin of Mattaponi River, northwest of King William Courthouse, *Fernald & Long*, no. 12,521. New Kent County: fresh tidal marsh by Chickahominy River, Walker, *F. & L.*, no. 13,511; fresh tidal marsh by Lacy Creek, west of Walker, *F. & L.*, no. 13,510. Charles City County: fresh tidal margin of Chickahominy River near Cypress Bank Landing, *F. & L.*, no. 13,213, and at Graves Landing, north of Holdcroft, no. 13,512.

The material from tidal flats in eastern Virginia and from along the Delaware seems to differ from true *N. gracillima* of fresh sandy or peaty pools in different texture and, perhaps, shoulders of the stipular sheaths. Again I commend the problem to Dr. Clausen.

*Sagittaria **planipes**, sp. nov. (tab. 1056, fig. 1–6), a *S. latifolia* differt bracteis planis nec cucullatis vel navicularibus; pedicellis compressis planis; antheris ovatis 1–1.3 mm. longis.—Norfolk County, Virginia: deep peat and mud, southeastern shore of Lake Drummond, Great Dismal Swamp, west of Wallaceton, September 15, 1941, *Fernald & Long*, no. 13,517 (type in Herb. Gray.).

Sagittaria planipes superficially suggests *S. latifolia* Willd., var. *obtusa* (Muhl.) Wiegand, having very similar leaves and achenes. Its flowering tufts, however, terminate very long and deeply buried slender caudices without evident bulbous enlargement. The bracts subtending the pedicels are flat (fig. 2), instead of cucullate or boat-shaped (fig. 7); the pedicels strongly flattened (FIGS. 3 and 4), instead of terete, very strongly ascending, the lower ones in maturity 2–5 cm. long, the pedicels of *S. latifolia* and var. *obtusa* usually more spreading or spreading-ascending, terete, and the lower ones rarely so prolonged. The anthers of *S. planipes* (FIG. 5) are ovate or ovate-quadrate and only 1–1.3 mm. long, the nearly linear anthers (FIG. 8) of *S. latifolia*, var. *obtusa* being 1.5–2.3 mm. long. Differing in its bracts, pedicels and anthers, *S. planipes* is apparently a distinct species, although further material may prove it to be a strong variety of *S. latifolia*.

The collection consists of one fairly respectable specimen (FIG. 1) and a second badly eaten individual, not the kind of representation of a plant the collectors aim to secure. The material was got under rather strenuous conditions which I described in RHODORA, xliv. 365 (1942):

> Lake Drummond was so phenomenally low that it had been difficult to navigate, on account of drowned cypress-knees, and it was, consequently, necessary to anchor hundreds of yards from the thicket and to wade, often slipping on submerged logs, to shore. At one point on the southeastern side, where we saw a vivid green carpet of low vegetation, Long and I struggled ashore, guiding ourselves by means of oars as sounding-rods and sinking each step well above our knees into the plastic clay of the bottom. Even after we got to the green carpet the clay, above low-water level, was so pasty and deep that we wallowed and tumbled with great ease but kept enough poise and breath to collect only with extreme difficulty. Pulling and grabbing as best we could we brought to the boat a miscellany of specimens and, after it was too late, we discovered that the *Sagittaria* of this deep mud had peculiar bracts and strongly compressed pedicels; furthermore it evidently has prolonged subterranean rhizomes. The material is rather inadequate and we needed more conclusive specimens. Unfortunately, however, when, in October, we tried to get to Lake Drummond for it, the Feeder was closed to navigation on account of repairs going on. The *Sagittaria* is one of many problems left for the future.

The war-years making Lake Drummond inaccessible to us, I now venture to describe the strange *Sagittaria*, hoping another season to secure fuller and better material.

THE IDENTITY OF THE LINNAEAN ALISMA CORDIFOLIA.—

ECHINODORUS CORDIFOLIUS (L.) Griseb. in Goett. Abh. vii. 257—repr. 109 (1857), at least as to basonym, *Alisma cordifolia* L. Sp. Pl. 343 (1753). *Sagittaria radicans* Nutt. in Trans. Am. Phil. Soc. v. 159 (1837). *E. radicans* (Nutt.) Engelm. in Gray, Man. 460 (1848) and ed. 2: 438 (1856).

It is astounding that the species, *Echinodorus cordifolius,* based directly on *Alsima cordifolia* L. Sp. Pl. (1753) "*Habitat in* Virginia" and with Morison's very characteristic figure cited by Linnaeus "Sagittaria virginiana, obtusiore lato folio, floribus albis. *Moris.* hist. 3. *p.* 618. *s.* 15. *t.* 4. *f.* 6"., should have been generally treated as a South American species unlike that of Virginia, or, more recently, as being the much smaller *E. rostratus* (Nutt.) Engelm., the latter based on the small and erect *Alisma rostrata* Nutt., l. c. of the Mississippi drainage, thence westward and southwestward. The plant of southeastern Virginia, along the James, Blackwater and Nottoway Rivers, is exactly *E. radicans,* that species extending up the Coastal Plain from Florida, across eastern South and North Carolina. Morison's figure of his *Sagittaria virginiana* is quite characteristic and the type in the Linnaean Herbarium shows portions of two inflorescences, one just out of anthesis, the other in fruit, either of which could have come from the bottomlands of the James or the Nottoway. The microfilm of the type and the enlargement of it in the file at the Arnold Arboretum is unquestionable. It is no longer right to follow those authors who insist that the plant of Virginia really came from South America or is *E. rostratus* of the Mississippi drainage and westward. When Nuttall described the latter, as *Alisma rostrata,* he said "Nearly allied, apparently, to A. cordifolia of South America". "How do they get that way?" The original account by Linnaeus was, seemingly, of no importance.[1]

*Dactylis glomerata L., var. detonsa Fries. Norfolk County: very abundant on roadsides and in damp old clearings and thickets, north of Wallaceton, *Fernald & Moore,* no. 15,030.
*D. glomerata L., var. multiflora G. Beck. Greensville County: soft shoulder of road north of Skipper's, *Fernald,* no. 14,773.

Triplasis purpurea (Walt.) Chapm. In Gray's Manual, ed. 7, Hitchock states the height or length of the culms as 3–8 dm.,

[1] With the name *Echinodorus cordifolius* returned to the species described by Linnaeus, the following transfer becomes necessary:

E. rostratus (Nutt.) Engelm., forma **lanceolatus** (Engelm.), comb. nov. *E. rostratus,* var. *lanceolatus* Engelm. ex. Wats. & Coult. in Gray, Man. ed. 6: 556 (1891). *E. cordifolius,* var. *lanceolatus* (Engelm.) Mackenz. & Bush, Man. Fl. Jackson Co., Mo. 10 (1902). *E. cordifolius,* forma *lanceolatus* (Engelm.) Fernald in Rhodora, xxxviii. 73 (1936).

in his Manual of Grasses as "30 to 75 cm.". On the coast of New England the culms may stop at a height of 1 dm.; among the dunes of Chesapeake Beach, Princess Anne County, Virginia (*Fernald, Long & Clement*, no. 15,174), they reach a height of 1.2 m. See p. 101.

AGROSTIS SCABRA Willd. ISLE OF WIGHT COUNTY: large stools in a moist sandy and peaty clearing south of Lee's Mill, *Fernald & Moore*, no. 15,032.

Our first evidence of the relatively northern *Agrostis scabra* in a region where the much smaller and earlier *A. hyemalis* (Walt.) BSP. abounds. See Fernald in RHODORA, xxxv. 207, 208, pl. 246 (1933).

THE IDENTITY OF CORNUCOPIAE ALTISSIMA.—

AGROSTIS ALTISSIMA (Walt.) Tuckerm. in Am. Journ. Sci. xlv. 44 (1843), excl. var. *Cornucopiae altissima* Walt. Fl. Carol. 74 (1788). *Trichodium elatum* Pursh, Fl. Am. Sept. i. 61 (1814). *A. elata* (Pursh) Trin. Mém. Acad. St. Pétersb. ser. VI. Sci. Nat. iv. 317—repr. 71 (1841). *Trichodium altissimum* (Walt.) Michx. ex Wood, Class-bk. ed. 2: 599 (1847). *A. perennans elata* (Pursh) Hitchc. U. S. Dept. Agr., Bur. Pl. Indus. Bull. no. 68: 50, pl. xxxiii. (1905). *A. hyemalis*, var. *elata* (Pursh) Fernald in RHODORA, xxiii. 229 (1921). *A. perennans*, var. *elata* (Pursh) Hitchc. Man. Grasses U. S. 340, 784 (1935).

Since Pursh's original account of his *Trichodium elatum* cited as pure synonyms the earlier *Cornucopiae altissima* Walt. (Pursh liking another name which had the same meaning) and *Agrostis dispar* Michx., the name *Trichodium elatum* was illegitimate on two counts, for Pursh failed to take up either of the earlier names of plants which he considered identical with his. Hitchcock, in U. S. Dept. Agr., Bur. Pl. Indus. Bull. no. 68: 50 (1905), quoting Walter's brief diagnosis, "culmo erecto, duro; panicula coarctata; flor. magnis [as compared with those of *C. perennans* immediately preceding]", wrote as follows:

> "This description is scarcely sufficient to identify the species, which is not represented in Walter's herbarium. The plant which I have referred to *A. elata* is quite rare and there are few specimens from the Carolinas, the region covered by Walter's Flora, and it certainly is not common. There does not seem sufficient evidence for taking up Walter's name, nor is it likely to be any better known in the future. The name is inserted here [among synonyms] because later authors have assumed that this was *Trichodium elatum* Pursh. It is more likely to have been *Agrostis alba* L."

Of that more below. Of *Trichodium elatum* Hitchcock wrote: "The type specimen, or at least one collected by Pursh, is in the herbarium at Kew"; while regarding *Agrostis elata* (Pursh) Trin., which Trinius had based nomenclaturally directly on "*Trichodium elatum Pursh* Fl. Amer. I, p. 61", Hitchcock (by some thought to understand the principles of plant-nomenclature) said "The type specimen is in the Trinius herbarium at St. Petersburg. There are two plants mounted on the sheet, one from pine barrens of New Jersey, collected by Doctor Torrey and sent by Greville, 1835. The other, also from New Jersey ('Nov. Caesar.'), sent by Doctor Gray, 1835. The second would be the type as it is the one first mentioned by Trinius . . . Both specimens agree with Pursh's type. It may be best to consider this primarily a change of name [it certainly was a transfer from one generic name to another!], in which case the type is Pursh's plant." Obviously, it would seem, when Trinius cited the Pursh name as the nomenclatural basis of *Agrostis elata* he did not change the type!

Now as to *Agrostis altissima* (Walt.) Tuckerm. Tuckerman based his specific epithet on that of Walter, although he, like Pursh and others, added to the synonymy *Agrostis dispar* Michx., which Hitchcock has said was merely *A. alba* L. Furthermore, Tuckerman, citing Carolina and New Jersey specimens, gave a clear description of the Coastal Plain species with "culmis erectis duris rigidis crassiusculis, foliis . . . scaberrimis . . . , panicula coarctata ramis verticillatis erectis rigidiusculis scabris summitatibus dense floridis, glumis magnis", etc., this description ampler but containing the points given by Walter, "culmo erecto, duro; panicula coarctata; flor. magnis", a diagnosis of which Tuckerman wrote: "The description of Walter can hardly be improved as respects the prominent features of this very distinct species", although Hitchcock, never having handled fresh material (as shown by his citation of specimens) found it "scarcely sufficient to identify the species". Having many times collected and studied in the field both of Walter's species, *Cornucopiae perennans* and *C. altissima,* I concur in Tuckerman's characterization of the brief but clear diagnosis.

It should be noted that, on his page 74, Walter had two new species: first *Cornucopiae perennans,* "culmis subdecumbentibus;

foliis latioribus; panicula longa diffusa, ramis trichotomis verticillatis". He added further notes, of which certain ones are significant, for instance his "Gramen undique laeve, . . . in hyeme vigens, radicibus geniculisque se cito propagans". Then followed *C. altissima*, with erect, hard culms, crowded panicle but large spikelets. Now, when one compares the two species, *Agrostis perennans* and *A. altissima* (*A. elata*), as they abound in southeastern Virginia (to say nothing of the Carolinas, except that there is an old sheet of Ravenel's from "damp pineland", Santee Canal, September, in the Gray Herbarium—this from close to Walter's home, Walter's classical volume with the preface signed from "Ripas Fluvii Santee, 30 Dec. 1787")—when the two are compared it is notable that the latter, a plant of bogs, wet pinelands and clearings or margins of pools, is upright, with hard and stiff culms, usually without any new green basal offshoots in late autumn, the cauline leaves 5–10, with overlapping scabrous sheaths and stiff, erect narrowly linear to involute harsh blades 0.6–2 dm. long, their ligules 4–5 mm. long; the narrowly ovoid to lanceolate panicle with few ascending and strongly scabrous branches forking above the middle into appressed, short floriferous branchlets; spikelets purplish or bronze, 2.5–3.8 mm. long, with slightly unequal lance-attenuate glumes, the lemma 2.3–3 mm. long.

On the other hand, *Agrostis perennans* of woods, thickets and clearings (not of bogs and wet pineland) has softer culms and, as Walter clearly stated, sends out in autumn green, overwintering basal leafy tufts. Its 3–7 loosely ascending to divergent cauline leaves are flexible, flat and only slightly scabrous or smooth ("Gramen undique laeve"—*Walter*), their ligules 2.5–5 mm. long; the loosely ascending to wide-spreading branches of the panicle smooth or barely scabrous; the usually green spikelets 2–(rarely) 3 mm. long, the lemma 1.5–2 mm. long. These differences in the spikelets were clearly seen by "The artist", unnamed by the author of the text but from the signature "*A. C.*" on the plates fortunately apparent, in Hitchc. l. c. plates xxxi–xxxiii, but their significance seems not to have been appreciated. The plates are, indeed, very fine and fully justify Hitchcock's characterization (p. 14): "The artist has faithfully reproduced all the technical details of the spikelets". Since she clearly showed the spikelets of *A. perennans*, var. *elata* as 3.8 mm. long, it is too bad that this accurate measurement was not recorded in the text (or in the later Manual of Grasses), where the maximum length for the inclusive species is given as 3 mm.

Further indicating Hitchcock's failure to understand *Agrostis altissima* (*A. elata*) are the facts that, in the synonymy of his misunderstood *A. perennans*, var. *elata*, Hitchcock (Man. of Grasses U. S. 784, 785 (1935)) places *A. perennans* forma *chaetophora* Fernald in Rhodora, xxxv. 317 (1933), the type from Huntingdon (not "Huntington"—*Hitchc.*) County, Pennsylvania, 150 miles inland from the Pine Barrens of New Jersey where *A. perennans*, var. *elata* (i. e. *A. altissima*) really occurs, Huntingdon County being among the Allegheny Mountains and the type being perfectly ordinary *A. perennans* but with awned lemmas; and *A. perennans*, var. *aestivalis*, forma *atherophora* Fernald, l. c., the type from Co. Terrebonne, Quebec (not simply "Terrebonne, Quebec"—*Hitchc.*, the locality in Co. Terrebonne being Lac Tremblant), 325 miles north of the northern limit of Hitchcock's *A. perennans*, var. *elata* on the Coastal Plain of southeastern Massachusetts, forma *atherophora* being characteristic *A. perennans* var. *aestivalis* with 4 remote smoothish and flat cauline leaves, very diffuse panicle and spikelets 2 mm. long but with the lemma awned. Its collector had originally called it *A. canina*, a natural error since he used Gray's *Manual*, in which Hitchcock's key read as follows:

"Lemma awnless.................................4. *A. perennans*.
Lemma awned.
Spikelets 2 mm. long.............................5. *A. canina*.
Spikelets 3 mm. long.............................6. *A. borealis*."

Nevertheless, in his Manual, Hitchcock did not place either *A. canina* or *A. borealis* in the synonymy of his vaguely understood *A. perennans*, although forms of them both (usually with awns) are well known with awnless lemmas. The same inconstant "Lemma awned" as opposed to "Lemma awnless" is there repeated by the author of a detailed monograph of the genus in North America![1]

The upshot of this discussion is, that, since the secondarily

[1] Another awned form is

Agrostis alba L., forma **aristata** (Fernald), comb. nov. *A. stolonifera*, forma *aristata* Fernald in Rhodora, xxxv. 317 (1933).

basic name *Trichodium elatum* Pursh was illegitimate, it might be necessary further to confuse matters by giving it a new and legitimate name. Since, however, the original basic *Cornucopiae altissima*, briefly defined by Walter to contrast with his preceding *C. hyemalis* and *C. perennans*, was assigned characters, "culmo erecto, duro; panicula coarctata; flor. magnis", in contrast with those of the other two, Walter's characterization was, as Tuckerman found it, almost vividly accurate. I see no reason, from rather close familiarity with such a Coastal Plain species, why we should not maintain for it the name *Agrostis altissima* (Walt.) Tuckerm. If it be true that no specimen (type) of Walter's own collection now exists, then, since Pursh merely renamed and redescribed it under a substitute name, we may accept as the lectotype the Pursh specimen preserved at Kew.

The two Varieties of Spartina cynosuroides.—In coastwise Virginia as well as northward and southward *Spartina cynosuroides* (L.) Roth occurs as two usually well defined ecological varieties. One, typical *S. cynosuroides*, is primarily a plant of fresh to but slightly brackish tidal estuaries, the other, which was described by Michaux as *Trachynotia polystachya*, is confined to saline shores and salt marshes. The two are distinguished as follows:

S. cynosuroides (L.) Roth, Catal. Bot. iii. 10 (1806). *Dactylis cynosuroides* L. Sp. Pl. 71 (1753), clearly described "*Spicae sex s. plurimae, secundae, divergentes*", the type (photograph before me) from Gronovius (*Clayton*, no. 577). The plant, with 6 or more divergent spikes is, in light of more adequate material, characterized by its inflorescence of 6–50 spikes in an open raceme, these subdistant or distant, often definitely peduncled. It follows mostly fresh tidal shores northward to Connecticut. In southeastern Virginia it extends up-river far above the areas of salt marsh, up the James at least to Gray's Creek in Surry County. See p. 90.

Var. polystachya (Michx.) Beal, Grasses N. Am. ii. 398 (1896). *Trachynotia polystachya* Michx. Fl. Bor.-Am. i. 64 (1803), described with "spicis numerosis inordinatis, passim subaggregatis . . . in inundatis maritimis, a Nova Anglia ad Floridam". This Beal took to be the strictly maritime plant which is characterized by the dense or soon dense inflorescence with the 30–100 or more appressed-ascending or erectish spikes only short-peduncled to subsessile. It extends northward in saline marshes to Cape Cod. We have not seen it on the estuaries of Virginia. Mr. Long informs me that in New Jersey, Delaware and eastern Pennsylvania the two varieties are similarly selective of habitat.

Spartina patens (Ait.) Muhl., var. **monogyna** (M. A. Curtis), comb. nov. *Limnetis juncea*, var. *monogyna* M. A. Curtis in Bost. Journ. Nat. Hist. i. 136 (1835). *Trachynotia juncea* Michx. Fl. Bor.-Am. i. 64 (1803). *Limnetis juncea* (Michx.) L. C. Richard in Pers. Synop. i. 72 (1805). *S. juncea* (Michx.) Willd. Enum. 81 (1809). *S. patens*, var. *juncea* (Michx.) Hitchc. in Rhodora, viii. 210 (1906).

Spartina patens, based on *Dactylis patens* Ait. (1789), has two wide-ranging varieties, each extending many hundreds of miles beyond the limits of the other; but from southern New Hampshire to Virginia with ranges, but very rarely habitats, overlapping. The northern variety, true *S. patens*, follows saline or brackish marshes and inundated shores from Newfoundland around the Gulf of St. Lawrence and up the River St. Lawrence to the limit of saline marshes, thence southward around the coast to marshes of Lynnhaven Bay in northern Princess Anne County, Virginia, with inland areas in western New York and southeastern Michigan; its northern limit more than 600 miles beyond the northern limit of the next. Var. *monogyna* (*S. patens*, var. *juncea*) is on saline shores or, more often, on coastal sands from southern New Hampshire to Florida, thence to Texas, its southwestern limit, following the coast, more than 2000 miles beyond the southern limit of typical *S. patens*. The two are not only geographically largely separated; morphologically they are strikingly different. Their distinctive characters are noted below:

Typical S. patens: rhizomes 1–3 mm. thick; culms 1–2.5 mm. thick at base, 1.5–8 dm. high or long; new green cauline leaves of the season usually 4 (2–5), the blade of the 2nd from the summit averaging 1 (0.5–2) dm. long; spikes 1–4, mostly purple; spikelets 9–13 mm. long, loosely imbricated, straightish, ascending, with suberect free tips; 2nd glume acuminate.

Var. monogyna (var. *juncea* (Michx.) Hitchc.): mostly coarser; rhizomes 2–6 mm. thick; culms 1–6 mm. thick at base, 0.2–1.5 m. high; new green cauline leaves averaging 6 (5–9), the 2nd from summit averaging 2 (1–5) dm. long; spikes 2–9, purplish to stramineous; spikelets 7–10 mm. long, tightly imbricated and strongly arching, with appressed tips; 2nd glume often merely acute or even blunt.

Although in his Manual of Grasses of the United States Hitchcock merged the two rather striking and geographically only slightly overlapping varieties (as he did numerous others which are well defined), in his treatment in Gray, Manual, ed. 7, in deference to some who clearly saw the distinctions, he had kept them apart.[1]

M. A. Curtis, evidently taking *Limnetis juncea* to be true *S. patens*, described his new variety as follows:

> "*Limnètis júncea*, var. *monógyna*. Stem about 3 feet high; Leaves 8–12 inches long; Spikes 3–6, about their length distant from each other; Style 2-cleft like L. cynosuróides. In every other particular agreeing exactly with L. júncea. Grows abundantly on the sandy beach at the mouth of Cape Fear river. L. júncea has not been found there."

The ISOTYPE of Curtis's variety in the Gray Herbarium, the label written by Curtis, is quite typical *Trachynotia juncea* Michx., concerning the identity of which I noted, when studying Michaux's type in 1903, "The sand-dune plant of Martha's Vineyard". Curtis wrote beneath his new name "*S. juncea*, Ell.!", thus indicating, as suggested above, that he thought that true (not Elliott's) *Spartina juncea* was the smaller *S. patens* which "has not been found there [at mouth of Cape Fear River]". The Curtis type or isotype is closely matched by such characteristic specimens as the following: sea-beaches, Cape May, New Jersey, August, 1872, *Canby; Fernald & Griscom*, no. 2711, *Fernald, Long & Fogg*, nos. 4793 and 5214, and *Fernald & Long*, no. 11,235, all from sandy coast or dunes of Virginia; *Ruth*, no. 537 from Fort Marion, North Carolina; *Biltmore Herb.*, no. 3516[a] from sands of Smith's Island, North Carolina; *Godfrey*, no. 4651 from Carolina Beach, North Carolina; *Godfrey & Tryon*, no. 324 from dune-hollow, Pawley's Island, South Carolina; *Harper*, no. 1545 from drifting sands of Cumberland Island, Georgia.

(*To be continued*)

[1] While preparing the treatment of *Gramineae* for Gray, Man. ed. 7, Professor Hitchcock received a suggestion from one of the editors of that edition, that the wide-ranging species of the United States differed in many characters from the more northern and Eurasian *Glyceria fluitans*, with which it had been confused. Consequently he published as his new discovery *G. septentrionalis* Hitchcock in RHODORA, viii. 211 (1906), without noting the most important differential characters. While preparing the Manual of Grasses of the United States its author wrote to the botanist who had pointed out to him the distinctions of *G. septentrionalis*, asking how his own species differed from that of Linnaeus. In case of the smaller northern *Spartina patens* and its coarser and usually more southern variety the distinctions were apparently similarly lost.

ADDITIONS TO AND SUBTRACTIONS FROM THE FLORA OF VIRGINIA

M. L. FERNALD

(*Continued from page 115*)

CTENIUM AROMATICUM (Walt.) Wood. To the very local stations in Virginia add one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,177.

Ordinarily *Ctenium aromaticum* fully justifies its name, the bruised bases emitting a delightful pungent fragrance suggestive of lemon. The clumps at the new station could not be induced to give off more than an uninteresting grassy odor. See p. 99.

*ANTHOXANTHUM ODORATUM L., forma GIGANTEUM P. Junge. Abundant on roadsides of Nansemond and southwestern Norfolk Counties. NANSEMOND COUNTY: east of Magnolia, *Fernald & Moore*, no. 15,033.

The largest extreme of the species: the culms 0.6–1 m. high; panicle 7–14 cm. long, often interrupted; spikelets 1–1.2 cm. long. See p. 99.

PASPALUM PRAECOX Walt., var. CURTISIANUM (Steud.) Vasey (*P. lentiferum* Lam.). To the two local stations, one in eastern Sussex, one in southern Greensville, add a more extensive one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, nos. 15,192 and 15,193. See p. 99.

*PASPALUM SETACEUM Michx., var. **calvescens,** var. nov. (TAB. 1057), foliis angusto linearibus 1.5–3.5 mm. latis erectis valde elongatis glabris vel sparsissime strigosis.—Nansemond County, VIRGINIA: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, September 8 and 12, 1946, *Fernald, Long & Clement*, no. 15,191 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.).

A second and more extensive colony was noted in another bog (Magnolia swamp) nearly a mile farther west. In the confusion caused by the rapid discovery of several notable plants the present writer laid down and forgot the series collected from this bog. Var. *calvescens* is habitally quite like the stricter states of *Paspalum setaceum* (details in PLATE 1058, FIGS. 1–3) but, whereas the leaves of true *P. setaceum* are densely appressed- or strigose-villous, those of var. *calvescens* are essentially glabrous, with only few remote and short trichomes. The slight difference in the shape and breadth of the spikelets is well within the range of variation in the species. In its essentially glabrous foliage var. *calvescens* might be mistaken for *P. setaceum*, var. *longepedunculatum* (Le Conte) Wood (*P. longepedunculatum* Le Conte), but that extreme variety has shorter and broader leaves confined chiefly to the base of the plant and inclined to be loosely divergent (PLATE 1058, FIG. 4). Typical *P. setaceum* prefers dry siliceous habitats; var. *calvescens* grows in wet *Sphagnum* or peat. See p. 99.

*PANICUM (sub-§ LANUGINOSA) **glutinoscabrum,** sp. nov. (TAB. 1059), planta cespitosa 7–9 dm. alta; culmis firmis erectis basin versus 1.5–2 mm. diametro, internodiis 5 elongatis scabro-puberulentibus, pilis minutis cinereis cum verrucis viscidis vel glutinosis adspersis; nodis villoso-barbatis; foliis caulinis primariis lanceolatis ad 7 cm. longis 7–8 mm. latis attenuatis utrinque breviter pilosis, pilis cum verrucis viscidis adspersis; vaginis papillato-verrucosis, glutinosis, breviter pilosis; ligulis 4–5 mm. longis aciculiformibus; paniculis primariis valde exsertis ovoideis 6–9 cm. longis 6–7 cm. diametro, rhachi minutissime puberulo, ramis adscendentibus; statu autumnali suberecto breviter ramoso, ramis adscendentibus 1–6 mm. longis, valde foliosis paniculis terminalibus ad 2 cm. longis; spiculis ellipsoideis subacutis 1.7–1.8 mm. longis 0.7–0.8 mm. crassis breviter hispidulis; gluma inferiore deltoideo-ovata subacuta 0.6–0.7 mm. longa, superiore lemmateque sterili aequilongis, fructum lucidum subaequantibus.—Nansemond County, VIRGINIA: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, September 8 and 12, 1946, *Fernald, Long & Clement*, no. 15,186 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.).

Panicum glutinoscabrum is a perplexing plant to orient. In the general characters of inflorescence and relatively few primary nodes and autumnal axillary branches it seems to belong to sub-§ *Lanuginosa*, but its very glutinous or viscid quality is apparently unique. The blackish wart-like secreting glands which abound, especially on the sheaths and leaf-blades, are a striking character, the sheaths and internodes of the culm being scabridulous. See p. 99.

*ECHINOCHLOA STAGNINA (Retz.) Beauv. PRINCESS ANNE COUNTY: erect weed, very abundant in a cultivated field west of Chesapeake Beach, *Fernald, Long & Clement*, no. 15,182.

Echinochloa stagnina is a characteristic oriental species (southern Asia, Malayan Islands and Africa) with very tall, erect stems, erect leaves, hairy ligule and relatively slender stiffish panicles, not generally (if at all) recognized as naturalized in North America. At the station in Princess Anne County the very tall (about 1.5 m.) plants were superabundant as a weed and greatly overtopped the intended crop. Like so many invaders from Asia it will doubtless rapidly spread.

The binomials, *Echinochloa crusgalli* (L.) Beauv., *E. echinata* (Willd.) Beauv., *E. stagnina* (Retz.) Beauv. and four others, are regularly ascribed by Index Kewensis to Beauv. Agrost. 53 (1812) but it is quite certain that Palisot de Beauvois did not there make the combinations; he did not even give the authors or the bibliographic citations for the reputed basonyms. On p. 53 he defined the new genus *Echinochloa* and listed as *Panicum* its "Spec. Panicum *crusgalli, cruscorvi, echinatum, lanceolatum, setigerum, setosum, stagm*[*n*]*inum*, etc.". The combinations were not there made but in the Index, p. 161, they are all listed under *Echinochloa*, although two of them are entered with doubt: *E.* "setigera?" and *E.* "stagnina?". Obviously page 161 should be added to the usual reference, and we should strengthen the bibliographic reference for *E. crusgalli* by adding t. xi. fig. ii, for the detailed figures are definitely cited in Explic. Planches et Figs., 8, as of "Echinochloa *crus-galli*" (the hyphen here inserted, though not used by Linnaeus). If the wavering inclusion of *Panicum stagninum* Retz. be considered as not validating the combination *E. stagnina*, then the specialists on the *Gramineae* and upon bibliography have a little problem in deciding who first validated the combination. I leave it to them! See p. 101.

*E. pungens (Poir.) Rydb., var. ludoviciana (Wieg.) Fern. & Grisc. Nansemond County: wet peaty and sandy shore of Exchange Pond, southwest of Everett's Bridge, *Fernald, Long & Clement*, no. 15,181.

A striking dense-panicled extreme with awnless spikelets, heretofore known in the Mississippi and Gulf drainage, northeastward to western Pennsylvania. In its occurrence on the Coastal Plain joining a large series of similarly disjunct plants.

Andropogon scoparius Michx., var. littoralis (Nash) Hitchc. To the previously recorded stations add another in

Princess Anne County: border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,198.

A. Elliottii Chapm., var. gracilior Hack. To the relatively few recorded stations add another in Nansemond County: sphagnous and peaty bog (Magnolia swamp) by Norfolk and Western Railway, 1–1½ miles west of Kilby, *Fernald, Long & Clement*, no. 15,195.

Cyperus rivularis Kunth, forma elutus (Clarke) Kükenth. Add a station in Nansemond County: fresh tidal shore of Western Branch, below Everett's Bridge, *Fernald, Long & Clement*, no. 15,201.

Eleocharis flavescens (Poir.) Urban. Princess Anne County: tiny tussocks abundant at border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,207. Identification confirmed by Dr. Svenson, who, in Rhodora, xli. 47 (1939), had cited two early collections from Virginia Beach. See p. 100.

E. vivipara Link. To the single station (Lake Joyce) recorded, under the synonym *E. prolifera* Torr., in Rhodora, xxxviii. 359 (1936), add the following. Princess Anne County: forming continuous turf at border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,212. Southampton County: wet peaty margin of Whitefield's Millpond, southwest of Corinth, *F. L. & C.*, no. 15,210; upper border of sandy and peaty shore of Darden's Pond, north of Courtland, *F. L. & C.*, nos. 15,211 and 15,213.

Plants (such as no. 15,211) with umbels of 2–several peduncled spikelets are singularly suggestive of *Fimbristylis* and *Bulbostylis*. See pp. 96 and 100.

E. tricostata Torr. To the two highly localized stations already known in eastern Virginia add one in Southampton County: upper border of sandy and peaty shore of Darden's Pond, north of Courtland, *F. L. & C.*, no. 15,214, See p. 101.

Is Dichromena latifolia in Virginia?—So far as I can determine *Dichromena latifolia* Baldwin was first recorded as perhaps occurring in Virginia in Gray, Man. ed. 5: 567 (1867) but as from "S. Virginia? and southward". In the 6th and 7th editions the mark of interrogation was dropped, although I am unable to find any evidence in the material which Gray had before him of its coming north of eastern North Carolina. Any evidence of it in the state will be welcomed. See pp. 86 and 88.

Psilocarya scirpoides Torr., var. Grimesii Fernald & Griscom. To the few known stations, in Princess Anne, Norfolk and Nansemond, add one farther inland, in SOUTHAMPTON COUNTY: upper border of sandy and peaty shore of Darden's Pond, north of Courtland, *Fernald, Long & Clement*, no. 15,206.

*P. NITENS (Vahl) Wood. SUSSEX COUNTY: sandy and peaty shore of Airfield Millpond, southwest of Wakefield, *Fernald & Long*, nos. 14,898 and 14,899. The first from between southeastern North Carolina and Cape May, New Jersey, already recorded in RHODORA, xlviii. 58 (1946). See p. 87.

RHYNCHOSPORA CHALAROCEPHALA Fernald & Gale. To the two recorded stations in the state (one in Isle of Wight, one in Norfolk) add one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,227. See p. 98.

R. DEBILIS Gale. To the several stations (in Princess Anne, Isle of Wight, Sussex, Southampton, Dinwiddie, Prince George and Chesterfield) cited in the original publication add two in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,226; similar habitat, 1–1½ miles west of Kilby, no. 15,218. See p. 98.

R. RARIFLORA (Michx.) Ell. To the scattered stations from Princess Anne to Amelia, Dinwiddie and Greensville add one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,225. See p. 98.

R. PERPLEXA Britton, var. **virginiana**, var. nov. (TAB. 1060, FIG. 5–8), planta a var. typica differt culmis foliisque plerumque crassioribus; spiculis 2.5–3 mm. longis sessilibus vel subsessilibus congestis; tuberculo depresso late rotundato.—Southeastern VIRGINIA. Dinwiddie County: wet argillaceous depressions south of Petersburg, July 14, 1938, *Fernald & Long*, no. 8603; flat pineland, Collier's Yard, 3–4 miles southwest of Petersburg, August 17, 1939, *Fernald & Long*, no. 10,981; same station, August 17, 1939, *Smith & Hodgdon* in Pl. Exsicc. Gray., no. 924; depression in argillaceous woods west of Winfield's Mill, October 13, 1941, *Fernald & Long*, no. 13,903. Sussex County: wet peaty depression in pineland 3 to 4 miles northwest of Waverly, June 12, 1938, *Fernald & Long*, no. 8115; upper border of sandy beach, Airfield Millpond, southwest of Wakefield, July 6, 1942, *Fernald & Long*, nos. 14,297 and 14,298. Southampton County: upper border of sandy and peaty shore of Darden's Pond, north of Courtland, September 15 and 16, 1946, *Fernald, Long & Clement*, no. 15,231 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). Greensville County: pond-hole in pine and oak woods near Three Creek, north of Emporia, September 19, 1938, *Fernald & Long*, no. 9282. Surry County: exsiccated argillaceous pond-hole in woods, about 1 mile south of Mercy Seat Church, August 23, 1938, *Fernald & Long*, no. 8989.

Typical *Rhynchospora perplexa* (our PLATE 1060, FIGS. 1–4) has, as Dr. Gale described and illustrated it, in RHODORA, xlvi. 270, plate 832, fig. 3B (1944), the "tubercle broadly deltoid", the straight sides sloping to a definite terminal angle. This is the characteristic tubercle of the type-series from Chapman (our FIG. 2) and in essentially all material from south of Virginia, only a very exceptional individual (as in the central one of FIG. 3 and the right-hand ones of FIG. 4) showing a slightly round-topped tubercle. In all the Virginian material the tubercle is more depressed and broadly rounded above and the sessile or subsessile spikelets are 2.5–3 mm. long, the often less crowded or definitely pedicelled spikelets of the more southern typical *R. perplexa* being only 2–2.5 mm. long. In general, furthermore, the Virginian series shows rather stouter culms and broader channeled leaves, although this tendency is not specially significant. The depressed and round-topped skullcap-like tubercle and the larger and more nearly sessile spikelets sufficiently mark the Virginian series as a relatively northern variety, which is apparently isolated by 150 miles from the northern limit of typical *R. perplexa*. With the material in most of the larger herbaria before her and the rich collections from North Carolina in the herbarium of the University of North Carolina and the very full North Carolina series assembled by Godfrey, Dr. Gale could cite only one collection from the state, that from Columbus County[1] in the southeastern corner of the state, fully 150 miles south of the Virginian area. See pp. 98 and 101.

CLADIUM MARISCOIDES (Muhl.) Torr. To the previously known eastern Virginian stations (along North Landing and Northwest Rivers) add another in PRINCESS ANNE COUNTY: border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,233. See p. 100.

SCLERIA MINOR (Britton) Stone. To the few recorded stations, from farther inland, add one in NANSEMOND COUNTY: sphagnous and peaty bog south of Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald & Moore*, no. 15,050. See p. 94.

*CAREX MESOCHOREA Mackenz. SURRY COUNTY: rich low woods west of Claremont, *Fernald & Moore*, no. 15,056.

[1] A glance at the map suggests caution about rushing unprepared into Columbus County for botanizing; at least, the names of two of the villages, Bughill and Redbug, were not bestowed as inducements to tourists.

Not recorded by Mackenzie, in N. Am. Fl., from Virginia. Possibly already known in the state.

C. DECOMPOSITA Muhl. To the scattered stations, all in cypress-swamps, already recorded in James City, Isle of Wight and Southampton add one in SUSSEX COUNTY: on stumps of *Taxodium*, Niblett's Millpond, southwest of Newville, *Fernald & Long*, no. 14,912.

C. HORMATHODES Fernald. To the few known Virginian stations, along the lower James River, add one not far from the North Carolina boundary in PRINCESS ANNE COUNTY: borders of shallow pools in brackish to fresh marsh along Back Bay, Pellitory Point, east of Munden, *Fernald & Moore*, no. 15,053. Less than 5 miles from North Carolina. See p. 95.

C. RENIFORMIS (Bailey) Small. To the single known Virginian station in western Southampton add another in eastern SOUTHAMPTON COUNTY: dry sand of open alluvial flat by Blackwater River, southeast of Unity, *Fernald & Moore*, no. 15,055.

*C. CRINITA Lam., var. BREVICRINIS Fernald in RHODORA, xlviii. 54 (1946). Type from near Rowanta, Dinwiddie County. Many stations in James City, Sussex, Dinwiddie and Brunswick Counties.

C. MITCHELLIANA M. A. Curtis. To the few recorded stations add one in NORFOLK COUNTY: mixed with *Scirpus Olneyi* in fresh tidal reed-marsh along Northwest River below Northwest, *Fernald & Moore*, no. 15,058. See p. 95.

C. DEBILIS Michx., var. RUDGEI Bailey. To the few recorded stations add one in SURRY COUNTY: low rich woods west of Claremont, *Fernald & Moore*, no. 15,061.

*LEMNA VALDIVIANA Philippi, var. ABBREVIATA Hegelm. NORFOLK COUNTY: in a spring at sandy and peaty margin of Lake Drummond, near Jericho Ditch, Great Dismal Swamp, west of Wallaceton, *Fernald & Long*, no. 13,575.

A striking and very extreme variety of the common *L. valdiviana*, its transclucent and veinless fronds broadly elliptic or oval, instead of much narrower. The first in the Gray Herbarium from north of Florida. Hegelmaier described it from tropical South America and Mexico, extending north to Florida and California.

ERIOCAULON DECANGULARE L. To the two recorded stations (in Norfolk and Prince George) add a very extensive one in SUSSEX COUNTY: wet sandy and peaty shore of Airfield Millpond, southwest of Wakefield, *Fernald & Long*, nos. 14,923 and 14,924. See p. 87.

E. Parkeri Robinson. Add a station in Nansemond County: fresh tidal shore of Western Branch, below Everett's Bridge, *Fernald, Long & Clement*, no. 15,238.

Lachnocaulon anceps (Walt.) Morong. Local range extended eastward in Nansemond County: sphagnous and peaty bog (Magnolia swamp) by Norfolk and Western Railway, 1–1½ miles west of Kilby, *Fernald, Long & Clement*, no. 15,239. See p. 99.

Exit Syngonanthus flavidulus.—*Syngonanthus flavidulus* (Michx.) Ruhland stands in our manuals as a Virginian. Nevertheless, the failure during several seasons to find it in the proper habitat, white sands of pine-barren in spring or early summer, has naturally raised doubt as to the record. The species started as *Eriocaulon flavidulum* Michaux, Fl. Bor.-Am. ii. 166 (1803) "Hab. in Carolina." The type-sheet, of which a photograph is before me, bears no record of locality and "Carolina" may have been assumed by L. C. Richard after Michaux's death. At least, Elliott, Sketch Bot. S. C. and Ga. ii. 567 (1824), could do no more than say "In Carolina. Mich. Pursh. I have not met with this species in the low country of Carolina". No Virginian material of it exists in the principal herbaria of the country and the only Carolina specimen in the Gray Herbarium is one without original label, said to have come from Charleston, South Carolina. Certainly Godfrey, in his extensive collecting for the Gray Herbarium in eastern North Carolina, and Godfrey and Tryon, vigorously collecting in eastern South Carolina, did not secure it. In eastern Georgia and in Florida it becomes common in dry to wet sands.

There is, however, little doubt that more than a century ago M. A. Curtis got it in southeastern North Carolina. His *Enumeration of Plants growing spontaneously around Wilmington, North Carolina*, had it entered with doubt, but his "Remark" seems conclusive: "(39) *Eriocáulon flavídulum?* Stem pubescent, 5 grooved; Leaves short, 1–2 inches long; Scales of the involucrum oblong oval, obtuse, lucid. This appears to be Michaux's plant, but I am not certain that it is Elliott's."

Seeking the source of the more northern records, one automatically turns to Pursh, the author of many errors. There is the clue. Pursh, Fl. Am. Sept. i. 92 (1814), obviously rewrote the original Michaux description of *Eriocaulon flavidulum*, changing

Michaux's "culmis . . . 5-striatis" to "scapis . . . subseptem-striatis" and describing the narrowly oblong involucral bracts of Michaux's plant as "squamis involucri suborbiculatis". These alterations at once indicate that Pursh did not have the Michaux species at all; and Pursh's statement of habitat and range clearly show that his 7-striate scape and suborbicular bracts were those of *Eriocaulon Parkeri* Robinson. Here were Pursh's words: "On the banks of rivers, below high-water mark: Pensylvania to Carolina. ⊙. July. *v. v.* From one to two inches high." *E. Parkeri,* found on tidal mud of the Delaware River (well known to Pursh), is in such habitats southward nearly to the North Carolina line but, doubtless, the "Carolina" of Pursh's range was merely borrowed from Michaux. Furthermore, *Syngonanthus flavidulus*, flowering in April and May ("Spr."—*Small*) is very strikingly perennial, with hard or subligneous base; *Eriocaulon Parkeri* is a soft-based plant, strongly simulating an annual, and on the lower Delaware it begins flowering in July. Pursh's "⊙. July" was obviously based upon it. When Elliott stated that *Eriocaulon flavidulum* had not been met by him, he added the misleading "Grows in inundated soils. Pursh." Others continued the confusion, though gradually reducing the northern limit to "Va." or "Va.?"; but Ruhland, in publishing the combination in Engler, Pflanzenr. iv^{30}, 256 (1903) wisely omitted the Pursh reference and restricted *Syngonanthus flavidulus* to "Carolina, Georgia, Florida", although he could have added Alabama. We may safely drop it from the Virginian list. See p. 86.

*Xyris Bayardi Fernald in Rhodora, xlviii. 56, plate 1007 (1946). Sussex County: wet sandy and peaty shore of Airfield Millpond, southwest of Wakefield, *Fernald & Long*, no. 14,922.

A remarkable little annual, the most northern member of the chiefly tropical *Xyris* § *Brevifoliae.* A small area covered by it in 1945, but the breaking of the dam had drained the pond in early 1946 and no evidence of the tiny *Xyris* and of several other species seen in 1945 could be found in 1946, while plants which were scarce in 1945 had increased to relative abundance in 1946. Another and more favorable year will doubtless bring it back, since the seeds must have been well dispersed. See p. 88.

X. flexuosa Muhl. (*X. arenicola* Small). Local range extended farther east in Nansemond County: large stools in sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,237. See p. 99.

Is Mayaca in the "Manual Range"?—Michaux, Fl. Bor.-Am. i. 26 (1803), described *Mayaca Aubleti* "a Carolina ad Floridam." A few years later Pursh, without mentioning Michaux, cited in his Fl. Am. Sept. i. 32 (1814) *Syena fluviatilis* (Aublet) Willd., based on *Mayaca fluviatilis* Aubl., as growing "In small rivulets of Virginia and Carolina." Later works have credited *M. Aubleti* to both Virginia and Ohio. Both species extend northward into the Coastal Plain of North Carolina: *M. Aubleti* at least to Cumberland County; *M. fluviatilis* to Scotland County. Either of them might be expected, along with other plants of similar range, in southeastern Virginia; but intensive watching of all rills and small branches as well as inundated pond-margins has thus far failed to reveal them. In view of Pursh's well known lack of precision the question naturally arises, whether he may not have seen one of the serpentine and flaccid inundated states of *Lycopodicum inundatum* L., var. *Bigelovii* Tuckerm.[1] such as abound on inundated shores near where Pursh is known to have resided in Southampton County, Virginia, and which so strongly simulate *Mayaca fluviatilis* as to raise the hopes of searchers for the latter. I am aware that in his Aquatic Plants of the United States, 191, map 202 (1944), Muenscher indicates the occurrence of *M. Aubleti* in Virginia and Ohio (on the bases of traditional records) and also in Pennsylvania. Inquiry brings from Dr. Muenscher the statement that he has seen no material from north of the Carolinas. It now becomes important to know if there are actual specimens of either species of *Mayaca* from north of North Carolina. See pp. 86 and 88.

*Juncus scirpoides Lam., var. meridionalis Buchenau. Though known for several years, apparently not definitely recorded as Virginian. Northampton County: moist dune-hollows, Savage Neck, *Fernald, Long & Fogg*, nos. 5263 and 5264. James City County: wet bottomland about 5 miles west of Toano, *Menzel*, no. 80. Princess Anne County: wet peaty depressions in sandy pineland, the Desert, Cape Henry, *Fernald & Long*, no. 3842. Nansemond County: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,240. Amelia County: argillaceous bog about 1 mile north of Winterham, *Fernald & Long*, no. 9018.

Juncus polycephalus not known from Virginia.—Apparently the record of *J. polycephalus* Michx. from Virginia rests

[1] See Fernald in Rhodora, xlvi. 134–136 (1946).

only upon a suggestion made by Engelmann in Gray, Man., ed. 5: 543 (1867). There, Engelmann, considering *J. polycephalus* and some others varieties of an all-inclusive *J. scirpoides* Lam., said under *J. scirpoides* var. *polycephalus* (Michx.) Engelm., l. c. "From North Carolina southward; and may be looked for in Southern Virginia". In the 6th edition of the Manual (by Sereno Watson, whose field-experience had been west of the Rocky Mountains, and by Coulter, who had early done some exploring in the Rocky Mountains) the tentative phrase was omitted and the range given as "S. Va. to Fla., west to Mo. and Tex."; and the extension northward to southern Virginia was trustingly retained in the 7th edition. In 1895, however, Coville, in his detailed study of the section, Bull. Torr. Bot. Cl. xxii. 302–305, showed that the *J. polycephalus* of most authors was at least two species: *J. polycephalus* (true), extending north only into North Carolina; *J. validus* Coville, the plant of Arkansas (and Missouri). Since, however, true *J. polycephalus* comes north to Tyrrell County on the southern side of Albemarle Sound in northeastern North Carolina (10 miles north of Fairfield, *Godfrey*, no. 4337), only 45 miles south of the tidal marshes and savannas of Northwest and North Landing Rivers and of Back Bay (northern extensions of Albemarle Sound), Engelmann's surmise may yet be justified. "Here's hoping". [1]

Juncus polycephalus was reported from various stations on the coast of Worcester Co., Maryland by Rev. Paul J. Redmond in his Flora of Worcester County Maryland, Contrib. Biol. Lab. Cath. Univ. Am. no. 11: 74 (1932). Dr. Hugh O'Neill writes me, however, that the material deposited at the Catholic University was destroyed by fire and there is serious doubt of the identification. He personally knows the region and has never seen *J. polycephalus* there.

J. CANADENSIS J. Gay, forma CONGLOBATUS Fernald. To the single Virginian station cited (in Brunswick County) add one in

[1] Generally *Juncus polycephalus* has simple globose heads of flowers. In Scotland County, North Carolina there occurs a plant like it in every way except that its heads are strongly lobulate, each head consisting of 2–5 subellipsoid and elongate crowded spikes. Since the parallel variation in *J. scirpoides* Lam. (var. *meridionalis* Buchenau) occurs as uniform colonies, not as sporadic individuals, the similar variation in *J. polycephalus* is presumably a variety rather than a form. I am calling it

JUNCUS POLYCEPHALUS Michx., var. **schizocephalus**, var. nov., a var. typica recedit capitibus lobulatis lobis elongatis.—NORTH CAROLINA: shallow stream, 15 miles north of Laurinburg, July 14, 1938, *Godfrey*, no. 5050 (TYPE in Herb. Gray.).

Princess Anne County: border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,242.

J. canadensis, var. euroauster Fernald. To the stations (in Princess Anne, Norfolk, Sussex, Henrico and Greensville) originally cited add one in Southampton County: upper border of sandy and peaty shore of Darden's Pond, north of Courtland, *Fernald, Long & Clement*, no. 15,241. See p. 101.

Zigadenus densus (Desr.) Fernald in Rhodora, xlii. 245 (1940).

As noted on p. 93 the very few and small plants of a few years ago, at the only known Virginia station, the little sphagnous bog northwest of Dahlia in Greensville County, have been stimulated by burning-off of the bog. The plants in June, 1946, numbered 25. Although the herbarium-specimens from farther south justify Small's measurement of the "raceme cylindric, 5–10 cm. long, about ½ as thick" (as *Tracyanthus angustifolius* (Michx.) Small), the larger stimulated plants had the simple or basally branching racemes up to 4 dm. long and 5 cm. thick, the plants reaching a height of 1.65 m., instead of stopping at Small's maximum of 1 m. (10 dm.).

*Stenanthium gramineum (Ker) Morong, var. micranthum Fernald in Rhodora, xlviii. 148, plate 1041 (1946). Occurring from western Virginia along the mountains to northwestern Florida and Alabama. I have seen Virginia material from Augusta County: at 540 m. alt., ridge of Little North Mountain, vicinity of Stribling Springs, *Steele*, no. 49.

Allium vineale L. occurs as three often well defined forms. Typical *A. vineale* has the umbel of numerous bulbs mixed with flowers; forma *capsuliferum* (Koch) Asch. & Graebn. is nearly or quite without the bulbs but has very many fertile flowers; forma *compactum* (Thuill.) Asch. & Graebn. has the umbel wholly of bulbs. All three occur in eastern Virginia (unfortunately). Besides typical *A. vineale* I have before me

*Allium vineale L., forma capsuliferum (Koch) Asch. & Graebn. Elizabeth City County: Hampton, *A. B. Seymour*, no. 19. James City County: Williamsburg, *Grimes*, no. 3787. Brunswick County: bottomland of Pope Creek, southeast of Ebony, *Fernald*, no. 14,591. Mecklenburg County: old field, north of Clarksville, *F. R. Fosberg*, no. 15,461.

*A. vineale L., forma compactum (Thuill.) Asch. & Graebn. Norfolk County: "Western Branch, Julio 1840", *F. Rugel*.

Lilium Michauxii Poir. To the few and scattered stations on the Coastal Plain of Virginia add the following. Prince George County: several large plants in argillaceous and boggy depression north of Gary Church, *Fernald & Moore*, no. 15,072. Dinwiddie County: small and single-fruited plants in flat pineland slightly south of Petersburg, *Fernald, Long & Clement*, no. 15,245. Sussex County: a single large plant at foot of roadside fill bordering a swampy depression in sandy pinelands 3 to 4 miles northwest of Waverly, *Fernald, Long & Clement*, no. 15,245—perhaps travelling by car; if so, preferable to most adventives.

Hypoxis micrantha Pollard. To the very few Virginian stations add another in Nansemond County: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,248. See p. 99.

Iris prismatica Pursh, var. **austrina,** var. nov., foliis surculorum 5–9 mm. latis valde sulcato-costatis, valvis spathae firmis subcoriaceis brunneis vel viridescentibus, flore 8–10 cm. lato, tubo perianthii 5–6 mm. longo, sepalis spathulato-obovatis lamina cuneata, seminibus 4–6 mm. longis.—Acid swamps, wet barrens and shallow pools, mountains of Tennessee and North Carolina to Georgia, east to the Piedmont and Coastal Plain of southeastern Virginia and North Carolina. Virginia: wet depression in pineland 3 to 4 miles northwest of Waverly, July 26, 1936, *Fernald & Long*, no. 6170, June 7, 1946, *Fernald & Moore*, no. 15,074 (type in Herb. Gray, isotype in Herb. Phil. Acad.), September 9 and 11, 1946, *Fernald, Long & Clement*, no. 15,250; wet ground along railroad, Ashland, May 26, 1932, *H. B. Meredith;* Richmond, May, 1838, collector not stated, May 10, 1894, *J. R. Churchill;* low, wet open woods and marshes, Westwood Golf Course, near Richmond, 1931, *C. Thompson;* exsiccated argillaceous swale, Libbie Avenue, Westhampton, June 21, 1936, *Fernald, Long & Smart*, no. 5735. North Carolina: moist, acid, sandy soil, between Bunn and Wake Forest, Franklin County, May 27, 1937, *Blomquist*, no. 9257; wet meadows near Hendersonville, Henderson County, May 26, 1898, *Biltmore Herb.* no. 2596[a]. Georgia: Butler, Taylor County, August, 1877, *H. M. Niesler*. Tennessee: abundant in grassy swamp, oak barrens, alt. 1100 ft., Tullahoma, Coffee County, August 24, 1930, *Svenson*, no. 4269; flowering specimen raised from seed of latter, grown at Brooklyn Botanic Garden, June 6, 1933, *M. Putz;* wet barrens along road between Tullahoma and Manchester, May 18, 1937, *Svenson*, no. 10,259.

Typical *Iris prismatica*, described by Pursh from New Jersey, occurs most often on brackish to saline (sometimes fresh) marshes, sands, shores or meadows along the coast from northeastern Maryland and Delaware to southern Maine, with a few stations inland to 30 miles from salt water and an isolated area on salt marshes of eastern Cape Breton, 600 miles northeast of its northeastern limit in New England. The distinctive characters which separate the southeastern and inland var. *austrina* of fresh acid marshland are summarized below:

I. PRISMATICA: leaves terminating new stolons 2–5 mm. wide, shallowly or obscurely corrugated; valves of spathe pale brown, wholly or partly scario-membranaceous, the outer one rarely foliaceous; flower 5–7 cm. broad, with perianth-tube about 3 mm. long; blade of sepal ovate or obovate to roundish, 1.3–2 cm. broad, rather abruptly contracted to the broad claw; faces of capsule 6–14 (av. 9.6) mm. broad; seeds 3–4 mm. long.

Var. AUSTRINA: leaves terminating new stolons 5–9 mm. wide, deeply corrugate-sulcate; valves of spathe firm or subcoriaceous, either brown, or green and foliaceous; flower 8–10 cm. broad, with perianth-tube 5–6 mm. long; sepals spatulate-obovate, 1.2–1.7 cm. broad, the blade gradually tapering into the slender-based claw; faces of capsule 10–14 (av. 12.5) mm. broad; seeds 4–6 mm. long.

It is probable that *Iris prismatica*, var. *austrina* is the phylogenetic progenitor of the more northern and semi-halophytic *I. prismatica;* var. *austrina*, spreading out from the ancient Appalachian Upland to the younger Coastal Plain and there giving rise to the more northern and coastwise smaller plant which, in its extreme isolation on Cape Breton, suggests a northern migration along the now submerged continental shelf, such as we find in many plants which are isolated from the South in various parts of Nova Scotia.

SISYRINCHIUM CAPILLARE Bicknell. To the single recorded Virginia station (in Sussex County) add an extensive one in NANSEMOND COUNTY: sphagnous and peaty bog south of Norfolk and Western Railway, about ½ mile west of the brickyard, Kilby, *Fernald & Moore*, no. 15,075.

In fully ripe (or over-ripe) fruit on June 8, the stiff and wiry, very slender scapes inclined to spiral and with a bronzy or metallic luster. See p. 94.

*CANNA INDICA L. PRINCESS ANNE COUNTY: two slender purplish plants naturalized at border of swampy woods near Pungo, *Fernald & Long*, no. 10,596.

THE IDENTITY OF ISOTRIA MEDEOLOIDES.—*Isotria medeoloides* (Pursh) Raf. Fl. Tellur. iv. 47 (1838) rests on *Arethusa medeoloides* Pursh, Fl. Am. Sept. ii. 591 (1814). Under *Arethusa* Pursh's no. 5 was *A. verticillata* Willd. (i. e. Muhl. ex Willd.) with the description copied largely from Willdenow's original, "petalis tribus exterioribus longissimis linearibus" but adding "interioribus lanceolatis", the "flowers . . . of a dull purple mixed with yellow". This was a perfectly good characterization of *Isotria verticillata* (Muhl.) Raf., which Morris & Eames, Our Wild Orchids, 221 (1929), describing from fresh material, assign "Sepals . . . brownish above, linear, spreading and recurved, 2 in. long . . . Petals: yellow-green, nearly 1 in. long, lanceolate", the flowers "on long pedicels (½–1¾ in. long)". Beautiful drawings of the flower, with its very long sepals and long peduncle, and of the long-peduncled fruit will be found in Mrs. Ames's plates 105 and 106 in Ames, Orchidaceae, vii. (1922). They are, of course, shown in very many other illustrations.

Immediately following *Arethusa verticillata*, Pursh described his new species, *A. medeoloides:*

> 6. A. foliis verticillatis oblongis acuminatis, caule unifloro, flore subsessili, petalis tribus exterioribus linearibus, interioribus brevioribus oblongis obtusis, labello petalis consimile. *medeoloides*
> In shady woods on the Blue-mountains. *Vanvleck.* ♃. July. *v. s. in Herb. Vanvleck.* Resembles the preceding in general habit.

The subsessile (instead of long-stalked) flower is altogether too suggestive of the "*peduncle much shorter than the ovary and pod*" of the original description of *Pogonia affinis* Austin in Gray, Man. ed. 5: 507 (1868), Austin having supplied Gray with the contrasts, so that the description, immediately preceding, of *Pogonia verticillata* (Muhl.) Nutt. contained the supplementary note: "Stalk of pod about 1½′ long, more than half the length of the leaves". Mrs. Ames's accurate drawings in Ames, l. c., plate 107, of *Isotria affinis* (Austin) Rydberg definitely show the "flore subsessili" of Pursh's account, as do the fine photographs (plates 70 and 71) of Morris & Eames; while Pursh's "petalis . . . interioribus brevibus oblongis obtusis" are well shown in Mrs. Ames's figs. 1, 2 and 5.

Pogonia affinis was found by Austin in "Southern New York and Northern New Jersey", the specimen sent to Gray coming from Closter, New Jersey. In 1889, Cat. Pl. N. J. 233, Britton listed it from stations in Bergen and Mercer Counties. House cites it for Rockland and Washington Counties (to which stations on Long Island could be added) in New York, and Porter listed three counties for it in eastern Pennsylvania, including Monroe, at the Delaware Water Gap, where the Delaware River cuts through the Kittatinny or Blue Mountains. Pursh's *Arethusa medeoloides* was from the "Blue-mountains", collected by Vanvleck. The Blue Mountains of Vanvleck's region were what are now known as the Kittatinny Mountains of southeastern mainland New York, northwestern New Jersey and eastern Pennsylvania (Lippincott's Gazetteer), just the region where *Pogonia affinis* has been collected. I can not bring myself to discard *Isotria medeoloides* as a pure synonym of *I. verticillata*, as I find it treated by recent students of the orchids. Whatever his inaccuracies and irregularities certainly were, Pursh did not, like Rafinesque and some others, often describe the same species twice on the same page. I am replacing the later name, *Isotria affinis* (Austin) Rydberg, by the much earlier I. MEDEOLOIDES (Pursh) Raf. A number of Virginia stations in JAMES CITY COUNTY.

*SPIRANTHES TUBEROSA Raf., var. GRAYI (Ames) Fernald in RHODORA, xlviii. 189 (1946). HENRICO COUNTY: dry rocky woods, campus of University of Richmond, September 21, 1934, *Alice Ryland.*

As pointed out by me, in RHODORA, l. c. 6 and 10 (1946), the plant which has erroneously passed as *Spiranthes Beckii* Lindl. (1840) must be called *S. tuberosa* Raf. (1833). Somewhat later, pp. 189–192, it was shown that typical *S. tuberosa*, common in eastern Virginia and southward, has a 1-sided or essentially secund spike, its flowers rather distant and not very strongly overlapping. In New England, south rarely to Virginia, var. *Grayi* occurs, the spike definitely spiraling, its numerous close spirals with crowded flowers.

*S. LACERA Raf. PRINCESS ANNE COUNTY: clay ditches bordering pine woods, Virginia Beach, *Fernald & Long*, no. 3873; sandy pineland, Cape Henry, *Fernald, Griscom & Long*, no. 4618; both distributed as *S. gracilis*.

For detailed discussion and illustration see Fernald in RHODORA, xlviii. 5 and 6–9, plate 993 (1946).

LIPARIS LILIFOLIA, not L. LILIIFOLIA.—The plant which regularly passes as *Liparis liliifolia* and as of "(L.)" Richard ex Lindl. in Bot. Reg. xi. sub pl. 882 (1825) started in L. Sp. Pl. 946 (1753) as *Ophrys lilifolia.* The name was not from *Lilium*, as often inferred and which would be almost absurd as applied to our small scapose plant with two or three basal leaves, but apparently from *Lilia*, the name of a class of plants chiefly with one to few basal leaves set up by Gmelin in 1747 for such genera as *Convallaria*, *Hemerocallis*, *Erythronium*, etc. Had Linnaeus followed the pattern for most such names he would have used the connective *ae* but in this case he definitely did not do so. His *Ophrys lilifolia* was from "Virginiae, Canadae, Sueciae", the type being a Virginian specimen from Clayton, who discovered the species on May 26, 1741 ("Die 26. Maji Anni 1741 florentem inveni"—Clayton in Gron. Fl. Virg. pars 2: 185 (1743)), an item such as one rarely finds in this early work. Linnaeus clinched the Virginian plant as his type through his description: "*Planta* virginica *sexies major nostrate* [*Sueciae*], *at structura eadem, notabilis flore: petalis exterioribus linearibus.*" Through three editions of Species Plantarum (ed. 3 in 1764) and through many editions of his Systema, Linnaeus consistently had *Ophrys lilifolia*, although in late editions he frequently altered the spellings used for names in his first editions. In Syst. Nat. ed. 12, ii. 592 (1767), it got printed, doubtless through a *lapsus calami*, as *O. linifolia.*

Index Kewensis has under *Ophrys* "*lilifolia*, Linn. Sp. Pl. 946 = Liparis liliifolia", the original spelling not being maintained under *Liparis.* The first transfer of *Ophris lilifolia* to another genus seems to have been as *Malaxis liliifolia* Swartz in Vet. Akad. Nya Handl. Stockh. xxi. 235 (1800), this starting the spelling with the double *ii*, as if the name came from *Lilium.* After that authors varied, some using correctly the original form but being cited by the less careful as doing just the opposite! Thus, although Robert Brown in Ait. f. Hort. Kew. ed. 2, v. 208 (1813) had it correctly as *Malaxis lilifolia*, when the plant was put into *Liparis* as *L. liliifolia* Richard ex Lindl. l. c., Lindley cited as synonyms, not the Linnaean reference at all but "Ophrys liliifolia, *Bot. rep.*" and "Malaxis liliifolia. *Br. in Ait. Kew. ed. 2.*" Nevertheless, Andrews, Bot. Repos. i. pl. LXV (1797), had it, with absolute correctness, as *O. lilifolia* and Robert Brown, following the original spelling, had *Malaxis lilifolia.* The change of spelling, started apparently by Swartz, continued by Willdenow and repeatedly carried on by Lindley and his trusting followers, has been regularly accepted by more recent students of the orchids, who have found that course much easier than the time-consuming and exacting tracing of the name to its source.

Hexalectris spicata (Walt.) Barnh. Local range extended eastward into Nansemond County: rich sandy and loamy oak and hickory woods just east of Suffolk, *Fernald, Long & Clement,* no. 15,251, the plants well fruiting. Station indicated to us by Mr. Leslie Hubricht. See p. 96.

*Carya ovalis (Wangh.) Sarg., var. hirsuta (Ashe) Sarg. Southampton County: wooded alluvial bottomland of Meherrin River, near Haley's Bridge, *Fernald & Long,* no. 8232. Large trees with flakey and shallowly furrowed bark. Extension from North Carolina.

*Alnus serrulata (Ait.) Willd., forma noveboracensis (Britton) Fernald in Rhodora, xlvii. 358, plate 985 (1945). Specimens cited from Princess Anne, Southampton, and Greensville Counties.

*A. serrulata, var. subelliptica Fernald, l. c. plate 986 (1945). Specimens cited from Nansemond and Charlotte Counties.

*A. serrulata, var. subelliptica, forma mollescens Fernald, l. c. 359, plate 988 (1945). Specimen cited from Princess Anne County.

*A. serrulata, var. subelliptica, forma nanella Fernald, l. c. 360, plate 989 (1945). Specimens cited from Brunswick (type) and Prince George Counties.

Quercus alba L. occurs in three pronounced forms (by Sargent treated as varieties). Typical *Q. alba* has the leaves with median portion of the blade only 0.5–2.5 cm. broad, the longer of the 4–10 narrowly oblong entire to slightly lobulate or apically cut lobes 2.5–8 cm. long and 0.8–2 (rarely –3) cm. broad. Forma *latiloba* (Sarg.) Palmer & Steyerm. (var. *latiloba* Sarg.) has the blades usually cleft less than half-way to the midrib, the round-tipped broadly oblong lobes 1.5–4 cm. broad. Forma *repanda* (Michx.) Trel. (var. *repanda* Michx.) has a shallowly sinuate margin, the rounded lobes as broad as long. They all occur in Virginia. The following specimens from the Coastal Plain or near it are characteristic.

Quercus alba L. (typical, i. e. *Q. alba pinnatifida* Michx. f.), the type from Virginia. Norfolk County: Norfolk, *Rugel.* Southampton County: south of Berlin, *Fernald & Long.* no. 7409; near Nottoway River, Carey Bridge, *F. & L.*, no. 10,016. Dinwiddie County: northeast of Burgess, *F. & L.*, no. 8236.

*Q. alba, forma latiloba (Sarg.) Palm. & Steyerm. Henrico County: Chickahominy Swamp, 6 miles north of Richmond, *L. F. Randolph & P. Merriman*, no. 255.

*Q. alba, forma repanda (Michx.) Trel. Sussex County: by Nottoway River, southwest of Lamb's, *Fernald & Long*, no. 12,998.

*× Q. Beadlei Trel. (*Q. alba × Michauxii*). Princess Anne County: large tree, south of Seatack, *Fernald & Long*, no. 3902, distributed as *Q. Prinus*. Present identification by E. J. Palmer.

*Q. virginiana Mill., var. maritima (Chapm.) Sargent. Princess Anne County: sandy pineland, Cape Henry, *Fernald & Griscom*, no. 4383; sand-dunes, Cape Henry, *Fernald, Long & Fogg*, no. 4864.

Typical *Quercus virginiana*, either as a tall tree or a shrub, has inconspicuous veins, Var. *maritima*, a shrub or low tree, has the veins deeply impressed into the upper surface of the leaf and prominent and inclined to be obviously reticulated beneath.

Quercus velutina Lam., as shown by me in Journ, Arn. Arb. xxvii. 386 et seq. (1946), was based on an unusual (perhaps juvenile) extreme with obovate and only very shallowly lobulate leaves. I have not seen it from Virginia. In Virginia three strongly marked forms occur: forma *macrophylla* (Dippel) Trel., with the blades cut less than half-way to the midrib and with broadly oblong, toothed lobes many times broader than the slender sinuses; forma *dilaniata* Trel., with the blade having round-based sinuses extending half-way to three fourths to the midrib, and the oblong terminally toothed lobes often narrower than the broader sinuses; and forma *pagodaeformis* Trel., with the long blade with deep and very broad round-based sinuses and the long, mostly acuminate lobes subentire or only slightly toothed. Representative Virginian specimens are here noted.

*Q. velutina Lam., forma macrophylla (Dippel) Trel. Fauquier County: Bull Run Mountains, *Allard*, nos. 9328 and 9741. Giles County; Beanfield Mt., alt. 3350 feet, west of Mountain Lake P. O., *Fogg*, no. 12,894.

Q. velutina, forma dilaniata Trel. The commonest form, generally passing as true *Q. velutina*. Fauquier County: Bull Run Mountains, *Allard*, nos. 1685 and 2601. Shenandoah

County: Massanutten Range, *Allard*, no. 5578. Lee County: Cumberland Gap, July 27, 1892, *Small*. Henrico County: campus of University of Richmond, *M. M. Ryland*.

*Q. velutina, forma pagodaeformis Trel. Bedford County: October, 1871, *A. H. Curtiss*.

*× Q. garlandensis E. J. Palmer (*Q. falcata* × *Q. nigra*). Princess Anne County: large tree near landing, Ragged Island, *Fernald & Long*, no. 12,323, erroneously distributed as × *Q. ludoviciana* (see next entry). Identification by Mr. Palmer.

× Q. ludoviciana Sargent (*Q. falcata* × *Phellos*). This hybrid, erroneously reported on the basis of the preceding no., retains its place in the Virginian flora through another collection. Princess Anne County: dry woods and thickets, Lynnhaven, *Fernald & Long*, no. 3901, erroneously identified as *Q. imbricaria*. Identification corrected by Mr. Palmer.

*× Q. Rudkini Britton (*Q. marilandica* × *Phellos*). James City County: 1½ miles northwest of Williamsburg, *Grimes*, no. 3186.

Q. hemisphaerica Bartr. ex Willd. See Fernald in Rhodora, xlviii. 142–145, plates 1035 and 1036 (1946). *Q. laurifolia* sensu many auth., not Michx. The following specimens of this semi-evergreen species are before me from Virginia. Princess Anne County: swamp, West Neck Creek, west of Pungo, *L. F. and Fannie R. Randolph*, no. 518, as *Q. Phellos;* border of gum swamp west of Pungo, *Fernald & Long*, no. 4861, as *Q. Phellos*, var. *laurifolia*. Southampton County: many fine, fruiting, large trees with drooping branchlets, sandy woods near Darden's Pond, north of Courtland, *Fernald, Long & Clement*, no. 15,254. See p. 102.

*Rumex Acetosella L., var. pyrenaeus (Pourr.) Timbal-Lagrave. Dinwiddie County: roadsides and waste places, Petersburg, *Fernald & Long*, no. 11,561.

Var. *pyrenaeus* is the coarsest variety of the ubiquitous weedy species, up to 7 dm. high; its basal hastate leaves with terminal lobe obovate or elliptic, usually rounded or blunt at apex and up to 3 cm. broad.

*Polygonum aviculare L., var. vegetum Ledeb. James City County: cultivated ground, Williamsburg, *Grimes*, no. 3916. Sussex County: clearings, borders of dry woods and roadsides east of Stony Creek, *Fernald & Long*, no. 8248. Southampton County: roadsides and dry fields, Franklin, *F. & L.*, no. 9915.

Presumably of general occurrence as a weed.

*P. Persicaria L., var. angustifolium Beckhaus. Dinwiddie County: cinders of freight yard of Norfolk and Western Railway, Petersburg, *Fernald & Long*, no. 10,630.

The narrowest-leaved extreme of the species, with lance-linear leaves only 3–5 mm. wide, strigose on both faces; bristle-like cilia of ocreae half as long as the strigose sheath.

*P. PERSICARIA, var. RUDERALE (Salisb.) Meisn. ARLINGTON COUNTY: abundant near greenhouses, Arlington Farm, *Allard*, no. 3887, distrib. as *P. mite.*

A prostrate or matted extreme, with oblong- or narrowly rhombic-lanceolate blunt to acutish (scarcely acuminate) often scabrous leaves, the primary ones only 2–5 cm. long; ochreae short-ciliate; spikes short-cylindric to subglobose, 0.5–1.5 cm. long, short-peduncled to sessile.

P. SAGITTATUM L., var. GRACILENTUM Fern. Range extended south from tidal marshes of the Chickahominy to the tidal reed-marshes of southeastern Virginia (almost in North Carolina). PRINCESS ANNE COUNTY: along Blackwater Creek, below Blackwater, *Fernald & Long*, no. 14,935. NORFOLK COUNTY: along Northwest River below Northwest, *F. & L.*, no. 14,934. See p. 90.

*NYMPHAEA ODORATA Ait., var. **stenopetala,** var. nov. (TAB. 1061–1063), a var. typica recedit pedunculo vix flexuoso flore super aquam elevato; sepalis petalisque lanceolato-acuminatis 0.8–1.5 cm. latis, sepalis reflexis.—Nansemond County, VIRGINIA: canal at northern border of Great Dismal Swamp, east of Magnolia, June 10, 1946, *Fernald & Moore*, no. 15,086 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.)

Typical *Nymphaea odorata* (including var. *minor* Sims) has the peduncle, to quote Conard's account, "usually slender and weak", the flowers resting directly on the water, although Conard cites one collection from shallow water in which "the peduncles may be rigid and bear the flowers 15 cm. above the water (Sugar Hollwo Pond, Danbury, Conn.)". The sepals of typical *N. odorata* are described by him as "ovate to lance-ovate, rounded at summit . . . Outside green, more or less shaded with reddish-brown or red". The outer petals are similarly "ovate to elliptic-lanceolate, apex obtuse or rounded"; and for his typical *N. odorata* he gives the sepals a breadth of 2.1–2.5 cm., the petals of 1.75–2.2 cm., although the smallest extreme (var. *minor*) may have sepals down to 1.04 cm. broad, this dwarf form having a weak peduncle "only half supporting the flower even when the plant has no water around it". The much larger *N. odorata*, var. *gigantea* Tricker, with petals "ovate or obovate, broadly rounded at apex" has the sepals 2.4–3.6 cm. broad, the outer petals 2–2.8 cm. broad.

Var. *stenopetala* is very striking, its leaves floating, deep purple beneath and veined (PLATE 1062, FIG. 1) as in typical *N. odorata*, but the flowers stand well above them, on stiff erect peduncles (PLATES 1061 and 1062, FIG. 2). The narrow (lance-acuminate) sepals, with drab- or fuscous-green backs, are strongly reflexed in anthesis, pointing down toward the water, and the lance-acuminate narrow petals are quite unlike those of typical *N. odorata* and of var. *gigantea*. In mid-September, after weeks of relatively dry weather, var. *stenopetala* was nearly all shrivelled and not to be seen. Only a few small pools exhibited it and in these Mr. Long and I could find no fruits. The plant is presumably widely distributed in the Great Dismal Swamp, See p. 94.

*ITEA VIRGINICA L., forma ABBREVIATA Fern. in RHODORA, xlix. 22 (1947). SOUTHAMPTON COUNTY: peaty and sandy shore of Whitefield's Millpond, southwest of Corinth, *Fernald & Moore*, no. 15,094.

In September, when Mr. Long and I visited the spot we found that the shrub, along with all its associates near the dam, had been cut off. We shall have to wait for fruiting material until another year.

(To be continued.)

ADDITIONS TO AND SUBTRACTIONS FROM THE FLORA OF VIRGINIA

M. L. Fernald

(*Continued from page 142*)

Rubus celer Bailey. Range extended south from Arlington and Fairfax Counties to Nansemond County: border of ditch, northern border of Great Dismal Swamp, east of Magnolia, *Fernald & Moore*, no. 15,098. See p. 95.

*R. (§ Flagellares) **hypolasius,** sp. nov. (tab. 1064–1066), a *R. flagellare* differt primocannae aculeis rectis horizontaliter divergentibus 4–6 mm. longis; primocannae foliis subtus molliter pilosis supra sparse pilosis; floricannae foliis subtus pilosis; pedicellis pilosis, pilis patentibus, longioribus 1–4 cm. longis.—Sussex County, Virginia: wet swampy depression in pineland 3 to 4 miles northwest of Waverly, June 7, 1946, *Fernald & Moore,* no. 15,102 (type in Herb. Gray.; isotype in Herb. Phil. Acad.), *Fernald, Long & Clement,* September 9, 1946, no. 15,266 and Sept. 11, no. 15267; peaty swales and open bushy or wooded swamp 3½ to 4 miles northwest of Homeville, September 11, 1946, *Fernald, Long & Clement,* no. 15,267.

Rubus flagellaris Willd. of dry open habitats has the usually hooked prickles 2–4 mm. long, the leaves glabrous or essentially so, except for occasional sparse pubescence on the midrib beneath; the pedicels glabrous, 4–12 cm. long and elevating the flowers and fruits well above the bracteal leaves. *R. hypolasius* of swampy pineland and wet thicket has longer and straighter prickles on the primocanes; the lower surfaces of both primocane- and floricane-leaves soft to the touch with pilosity; the short pedicels pilose and not standing evidently above the leafy bracts. Found by us in similar swampy habitats several miles apart, it evidently has a good area of development.

In its relatively short pedicels *Rubus hypolasius* somewhat suggests *R. celer* Bailey, Gent. Herb. v. 281, fig. 117 (1943), but that species is more slender, with very short and hooked prickles, glabrous foliage and much narrower primocane-leaflets. I can place it with none of the species of § *Flagellares* described and beautifully illustrated by Bailey. See p. 92.

*R. (§ THOLIFORMES) **subinnoxius,** sp. nov. (TAB. 1067–1069), valde arcuans cannis tholos 2 m. altos formantibus, cannis vel ramis pendulis ad 2 m. longis apicibus prostratis plus minusve radicantibus; primocannis simplicibus vel deinde ramosis, arcuatis angulato-subteretibus glabris inermibus vel remote aculeatis; aculeis oblique deltoideo-subulatis unguiculatis 2–5 mm. longis basi 2–4 mm. lato; primocannae foliis imis ternatis mediis superioribusque quinatis submembranaceis supra strigoso-villosis subtus molliter piloso-tomentulosis; petiolo inarmato vel remote unguiculato-armato; foliolis ovatis vel ellipticis duplicato-serratis, foliolo terminali 8–9 cm. longo 4.5–6 cm. lato abrupte longeque acuminato basi cordato, petiolulo tomentoso 2.5–3 cm. longo, foliolis mediis ellipticis vel elliptico-oblongis acuminatis subsessilibus basi sensim rotundatis; floricannis intricate ramosis ramis arcuato-pendulis; floricannae foliis ternatis, foliolis anguste ellipticis vel anguste cuneato-obovatis acutis vel acuminatis dentato-serratis supra strigosis subtus piloso-tomentosis, foliolo terminali 2–5 cm. longo; inflorescentiis perbrevibus corymbiformibus foliosis, 1–4-floris, bracteis trifoliolatis quam pedicellis longioribus; pedicellis dense pilosis plerumque inarmatis 0.5–2 cm. longis; calycis pilosis inarmatis segmentis deinde reflexis; fructibus ad 1.5 cm. diametro.—Southampton County, VIRGINIA: thicket bordering Whitefield Millpond, southwest of Corinth, June 5, 1946, *Fernald & Moore*, no. 15,103 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.).

In its very prolonged and eventually tip-rooting branchlets, its few-flowered corymbs and the very small leafy bracts *Rubus subinnoxius* at once suggests *R. Akermani* Fernald in RHODORA, xlvii. 152, plates 890 and 891 (1945). That characteristic doming shrub of Brunswick and Greensville Counties, Virginia, however, has the fertile branches and branchlets much more stiffly spreading, the very firm primocane-leaves all 3-foliolate and with much shorter pubescence on the upper surface, the bracteal leaves very firm and stiff, with mostly obtuse leaflets. *R. subinnoxius*, with long and flexuous recurving primocane-branches and -branchlets, has membranaceous leaves, those of the primocanes mostly 5-foliolate and with remarkably long appressed villi on the upper surface, those of the floricanes (especially the bracteal ones) acute to acuminate. See p. 92.

*R. (§ Cuneifolii) **uliginosus,** sp. nov. (tab. 1070 et 1071), a *R. Humei* differt primocannae aculeis 5–9 mm. longis; primocannae foliis foliolis mediis subsessilibus vel breviter petiolulatis. —Norfolk County, Virginia: damp old clearing, eastern side of Great Dismal Swamp, north of Wallaceton, June 10, 1946, *Fernald & Moore*, no. 15,101 (type in Herb. Gray.; isotype in Herb. Phil. Acad.).

Rubus uliginosus is the only member of § *Cuneifolii* known in Virginia with terminal leaflet of the primocane-leaves elliptic. The others have this leaflet broadened toward the summit (obovate) or toward the base (ovate). It is unusual in growing in decidedly swampy ground, the others rarely, if ever, getting their bases immersed. It is very close to *R. Humei* Bailey, Gent. Herb. v. 457, fig. 208 (1943), the outline of the leaflet seeming identical; but in *R. Humei* the upper or intermediate paired leaflets are on long petiolules, in *R. uliginosus* nearly sessile. Furthermore, the prickles on the primocane of the latter are almost twice as long. *R. Humei* is "the biggest of the Cuneifolii, attaining a height of 10 feet"; *R. uliginosus* is content to stop at 2 or 3 feet. Bailey speaks of *R. Humei* as "the only paludose species" of the section. Certainly the commonly inundated low areas of the Great Dismal Swamp, where *R. uliginosus* grows, are "paludose" enough! See p. 95.

*R. suus Bailey. Range extended from the mountains of North Carolina to the Coastal Plain of Virginia. Isle of Wight County: dry sandy woods near Pope Swamp, northeast of Zuni, *Fernald & Long*, no. 14,342, the specimens closely matching Bailey's description and illustration in Gent. Herb. v. 634, fig. 281 (1945).

*R. immanis Ashe. Range extended from the mountains of North Carolina and Tennessee to the Coastal Plain of Virginia. Sussex County: disturbed soil, bottomland woods along Nottoway River west of Homeville, *Fernald & Long*, no. 14,343—plants high-arching, 10 ft. high, with superior fruit. A close match for the description and figure in Bailey, Gent. Herb. v. 683, fig. 307 (1945).

*R. (§ Arguti) **cupressorum,** sp. nov. (tab. 1072–1074), a *R. vixarguto* differt primocannae foliis foliolis abrupte longeque acuminatis, supra strigoso-villosis subtus minute pilosis venis villoso-strigosis; floricannae foliis supra glabris subtus ad venas strigoso-villosis; pedicellis minute pilosis inarmatis.—Cypress swamps of southeastern VIRGINIA: wooded river-swamp along Northwest River, northeast of Wallaceton, Norfolk County, June 10, 1946, *Fernald & Moore*, no. 15,100 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); cypress-swamp on Flag Run, southwest of Story, Southampton County, September 15, 1946, *Fernald, Long & Clement*, no. 15,263; siliceous and argillaceous alluvium bordering cypress-swamp, Nottoway River above Cypress Bridge, *Fernald, Long & Clement*, no. 15,268.

At the type-station, margin of cypress-swamp along Northwest River, *Rubus cupressorum* forms a very tangled thicket 2 m. high, the branches of the floricanes intricately forking and widely arching but with no tendency to tip-rooting. The primocanes also incline to branch. At the other two stations, cypress-swamps about 50 miles farther inland, the fruiting period was long past but the primocanes were much branched. On first inspection *R. cupressorum* might be mistaken for *R. vixargutus* Bailey, Gent. Herb. v. 622, fig. 275 (1945) but the leaflets of the primocanes are abruptly long-acuminate instead of gradually subacuminate; their upper surfaces are strigose-villous instead of "glabrous on upper face". The leafy bracts of the racemes in *R. vixargutus* are described by Bailey as having "strongly obovate or oblanceolate shapes in floral leaflets some of which may be obtuse"; and he describes in Latin the "pedicelli inermes", in English "unarmed pedicels". The upper (flowering) branchlet in his illustration meets these requirements but the lower fruiting branchlet is shown with the leaflets ovate, long-acuminate and jagged-toothed, the pedicels all strongly armed with prickles! The author and the artist, whose drawings seem remarkably accurate, appear not wholly to agree. I am not so situated as to decide what are the real characters. The striking difference in the primocane-foliage and the occurrence of this shrub in cypress-swamps of the Coastal Plain indicates that *R. cupressorum* is not *R. vixargutus* of wooded areas on Lookout Mountain, Tennessee. See p. 95.

Rubus cupressorum might by some be pushed into *R. jugosus* Bailey, l. c. 629, fig. 278 (1945) of the mountains of southwestern Virginia, but that species has the primocane-leaflets more oblong, with nearly parallel straight margins and densely pubescent beneath and the inflorescence more cymiform.

Cassia nictitans L., var. hebecarpa Fernald. To the type-station in Northampton County add one in Princess Anne County: hollows in sand dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,271. See p. 101.

*Crotalaria Purshii DC., var. **bracteolifera,** var. nov. (tab. 1075, fig. 2 et 3), caule ramosissimo; foliis linearibus vel anguste lineari-lanceolatis; pedunculis longioribus 7–14-bracteoliferis.—Virginia: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, Nansemond County, September 8 and 12, 1946, *Fernald, Long & Clement*, no. 15,273 (type in Herb. Gray.; isotype in Herb. Phil. Acad.). North Carolina: savanna 5 miles east of Fayetteville, Cumberland County, June 11, 1938, *Godfrey*, no. 4552; savanna at Chocowinty, Beaufort County, July 20, 1938, *Godfrey*, no. 4505. South Carolina: grass-sedge bog or savanna, 7 miles east of Andrews, Georgetown County, June 27, 1939, *Godfrey & Tryon*, no. 148; mucky open thicket, 2 miles north of Lake City, Florence County, July 9, 1927, *Wiegand & Manning*, no. 1500. Georgia: dry sandy pine-barrens, ½ mile northeast of Townsend, McIntosh County, July 23, 1927, *Wiegand & Manning*, no. 1504.

Typical *Crotalaria Purshii*, based on *C. laevigata* Pursh, not Lamarck, of "pine-woods of Virginia and Carolina", was described "simplex foliis lanceolato-oblongis, . . . racemis oppositifoliis subtrifloris". That was a good characterization of the typical plant of dry sandy pineland or oak-barrens in southeastern Virginia and Carolina (portions shown in our fig. 1), with mostly simple stems, the lower and median leaves lance-oblong and 6–15 mm. wide, the upper ones narrower, the longer peduncles with 2–6 flowers or bracts borne from near or well above the middle to the tip. Var. *bracteolifera*, chiefly of bogs and savannas, has the branches freely once or twice forking, making somewhat intricate bushy-looking plants, the leaves linear or narrowly linear-lanceolate, the broader ones 2–7 mm. wide but the great majority up to only 2–5 mm. Its longer peduncles bear 7–14 flowers or bracts, though the shorter ones have fewer bracts, and the bracts extend well down the axis, often nearly to its base. The branching habit, narrow leaves and numerous bracts mark an extreme of the species which is conspicuously unlike typical *C. Purshii*, but several collections, especially from Florida and the Carolinas, seem quite transitional. I can, therefore, not treat the plant of bog or savanna as a species. See p. 99.

C. spectabilis Roth. Southampton County: very tall and handsome along a roadside fencerow west of Franklin, *Fernald, Long & Clement*, no. 15,272.

Stylosanthes riparia Kearney. On the beaten gravelly foot-path along the Norfolk and Western Railway, west of Kilby, this usually small but often depressed species, responding apparently to the constant trampling through many years, has put out new vigorous sprouts until it now forms intricate and highly floriferous carpets toward a meter across! S. biflora (L.) BSP., var. hispidissima (Michx.) Pollard & Ball, similarly trampled on, has there made broad but less extensive mats. Small bits from such giant individuals more than fill herbarium-sheets. Such plants in full bloom are wonderfully attractive and suggest possibilities for rock-gardeners.

*Vicia sativa L., var. linearis Lange. Norfolk County: fallow field near Yadkin, *Fernald, Long & Abbe*, no. 14,183.

The extreme with leaflets of all but the basal leaves linear and emarginate or apiculate. Not much collected in America.

Pueraria Thunbergiana (Sieb. & Zucc.) Benth. A few years ago we looked upon the Kudzu-vine as a beautiful strong-growing climber with deliciously fragrant deep purple flowers and a rarity in the wild in the latitude of Virginia. Now it is becoming one of the commonest high-climbers along roadsides and borders of woods. At the rate it is increasing and enmeshing shrubs and trees up to 40 ft. high it may soon be a competitor of Japanese Honeysuckle.

Euphorbia humistrata Engelm. To the two stations recorded in Henrico County add one in similar habitat in Nansemond County: dry sandy and gravelly railroad embankment west of Kilby, *Fernald, Long & Clement*, no. 15,299.

*Vitis vinifera L. Henrico County: waste places and railroad-ballast, near Chesapeake and Ohio Railroad, Richmond, *Fernald & Long*, no. 12,404.

Obviously derived from seeds of "Tokay," "Malaga" or other such grapes thrown from car-windows; now forming dense thickets.

*V. araneosa Le Conte (*V. rufotomentosa* Small). Surry County: dry woods north of Surry Courthouse, *Fernald & Long*, no. 13,076.

Quite like the type of *Vitis araneosa* Le Conte (1853), preserved at the Academy of Natural Sciences of Philadelphia and studied by me in 1939—See Fernald in RHODORA, xli. 434 (1939). Closely matched also by an isotype of *V. rufotomentosa* Small, which is quite like the Le Conte type. Although Le Conte's material was from Athens, Georgia, and Small says "Florida to Louisiana" and Bailey, Gent. Herb. iii. 292 (1934) knew it "positively only from northern and peninsular Florida", the Le Conte type from Athens, Georgia, and Small's type from Lake County, Florida, are closely matched in the Gray Herbarium by material from Augusta, Georgia, *S. T. Olney and J. Metcalf*, nos. 213 and 214, identified by Bailey as *V. aestivalis;* and by an old specimen from South Carolina from *M. A. Curtis*. Even so, Surry County, Virginia, is a good extension northward. Whether it is a true species must yet be determined.

DOES GORDONIA GROW IN VIRGINIA?—One of the handsomest evergreen trees or shrubs of our southern Coastal Plain is the Loblolly Bay or Tan Bay, *Gordonia Lasianthus* (L.) Ellis.[1] An evergreen with large white flowers on long peduncles, it shares the beauty and distinction of *Stewartia* and other members of the *Theaceae;* and for more than a century and a quarter it has been credited with extending northward into Virginia. Constant watching for it in recent years has failed to reveal it. Kearney, in his very adequate Report on a Botanical Survey of the Great Dismal Swamp Region (Contrib. U. S. Nat. Herb. v. no. 6 (1901)), covering the area from the northern side of Albemarle Sound, in northeastern North Carolina, to the southern side of Chesapeake Bay, did not record it, although he did not see its handsomer cousin, *Stewartia Malachodendron*, which has subsequently been found in the Great Dismal Swamp as well as farther east in his area. Of course, the failure of Kearney and of his successors in exploring the region to locate any *Gordonia* is negative evidence but it is significant that, so far as I can learn,

[1] Although the binomial *Gordonia Lasianthus* is accredited to Linnaeus ("Linn. Mant. ii. 570") in Index Kewensis, while the genus is properly ascribed to "Ellis, in Phil. Trans. lx. (1770) 518, t. 11", it certainly was Ellis's binomial. After his very full account of the characters of the genus Ellis gave a very detailed plate of "Gordonia Lasianthus. *Vulgo* Loblolly Bay" and the explanation of his plate is of "*Gordonia Lasianthus*". In Mantissa Altera in 1771 Linnaeus had *Gordonia* without a word of description or a reference to John Ellis, the Linnaean *Gordonia* thus being a mere nomen. The binomial *G. Lasianthus*, resting on *Hypericum Lasianthus* L. (1753), had a proper basis under an undefined generic name, but Ellis's earlier and identical binomial has right-of-way

there is no material in any of our representative herbaria from a Virginian station.[1]

Gordonia Lasianthus was first described and illustrated by Plukenet in his Amaltheum Botanicum, 7, t. 352, fig. 3 (1697) as "Alcea *Floridana* quinquecapsularis, Laurinis foliis, leviter crenatis . . . **Rosebay**". In 1731 Catesby, Nat. Hist. Carol. Fla. i. 44, t. 44, had a beautiful plate of it under Plukenet's descriptive phrase as "Loblolly Tree"[2], stating that "it grows in *Carolina;* but not in any of the more Northern Colonies." In his Travels through North & South Carolina, Georgia, East and West Florida (1791) John Bartram went into ecstasies (pp. 161, 162) over "The tall aspiring Gordonia lasianthus . . . in all its splendour, is every way deserving of our admiration . . . it is sixty, eighty or an hundred feet high"; but that was not in Virginia! Dr. Francis Harper, in his masterly study of Bartram's Diary of a Journey through the Carolinas, Georgia and Florida from July 1, 1765 to April 10, 1766,[3] repeatedly refers to Bartram's records of *Gordonia* as "Red Bay": "Alcea (or 'Alcea florideana' or 'Alcea floridana') . . . red bay or loblolly bay (*Gordonia lasianthus*)", *Harper*, p. 79; "probably red bay (*Gordonia lasianthus*)", p. 81; "Bay, red: in this case probably red or loblolly bay (*Gordonia lasianthus*)—not *Persea borbonia*", p. 82, etc. In other words, the name Red Bay was used interchangeably for *Gordonia* and for *Persea.*

Linnaeus, Sp. Pl. ii. 783 (1753), citing the Plukenet account and that of Catesby, already referred to (as well as a reference to Amman and his own Hort. Cliff.), placed the species in *Hypericum.* Then John Ellis, taking up the pre-Linnaean *Gordonia,* redefined it as *Gordonia,* but neither of them indicated it from north of Carolina.

[1] When, in Claytonia, ii, 36 and 37 (1936), I enumerated 29 species which had been standing as Virginian without wholly clear title, I had written "it would be reassuring to see authentic material of *Gordonia Lasianthus* from indigenous Virginian trees". Unfortunately, however, the mimeographed issue of the journal, of which I saw no proof, stated that "it was reassuring" etc. I wish that such wishful thinking were true!

[2] "Loblolly, a loutish or foolish person, nautically loblolly-boy or surgeon's assistant, is a nautical name . . . It was early used in the West Indies as a plant name, and appears in Plukenet's *Almagestum Botanicum* . . . in 1696, where this phrase occurs on page 38: 'Arbor Indica baccifera Verbasci foliis lanuginosa, Loblolly Barbadensibus dicta'. Plukenet's plant is *Cordia macrophylla,* Mill., which thus appears to be the first tree to which the name Loblolly was applied in print".—Sargent, Silva, i. 42 (1890).

[3] Trans. Am. Phil. Soc. n. s. xxxiii. pts. i (1942) and ii (1943).

It is also significant that Michaux, who travelled and collected in southeastern Virginia and who had an eye particularly for trees, did not see *Gordonia* there, he giving in his Fl. Bor.-Am. ii. 43 (1803) the "*Hab.* in maritimis Carolinae et Floridae", while his son, F. A. Michaux (Hist. Arb. Forest. Am. Sept.) could not bring it up to Virginia. The first and apparently the basic record for Virginia seems to be that of Pursh, Fl. Am. Sept. ii. 451 (1814), Pursh stating its range as "In cedar-swamps, near the sea-coast: Virginia to Florida". All subsequent students of our flora have accepted Pursh's record as authentic; but where in Virginia is that tree up to 100 feet high, the "splendour" of which in "every way deserves of our admiration"? If it is there, surely someone should have seen it.

Frederick Pursh, at the very opening of the 19th century, collected in southeastern Virginia, making his headquarters, apparently, in Southampton County, somewhere near Sebrell, at least north of Jerusalem (now Courtland). In the portion of his herbarium preserved at the Academy of Natural Sciences of Philadelphia there is nothing from the Great Dismal Swamp, evidence that Pursh did not penetrate that vast and rather formidable area, the one extensive tract in which "cedar-swamps" have occurred in Virginia. There the southern Cedar, *Chamaecyparis* (locally known as "Juniper") once prevailed and even in his report in 1901 Kearney was able to state that it was "Abundant in parts of the Dismal Swamp . . . Locally known as 'juniper'". Today it is mostly small remnants or very young colonies. *Persea*, "Popularly confused with *Magnolia virginiana*, under the name of 'bay'" (Kearney, p. 526), is more commonly called "Red Bay" and is found pretty generally there, at the western side of Lake Drummond forming a pure forest within a short distance of a juvenile "cedar-swamp". In view of the abundance of *Persea* (Red Bay) in this greatest of all Virginian "cedar-swamps" and in view of the early name "Red Bay" also for *Gordonia*, it seems not unreasonable to surmise that Pursh's record of *Gordonia* from "cedar-swamps . . . Virginia" may have started from reports of Red Bay in this extensive area where cedar-swamps once prevailed.

Pursh, who was a notorious dipsomaniac, made many records which cannot be substantiated, like his *Dryas tenella* "On the white hills of New Hampshire", the specimen *"in Herb. Banks"*, being really from Newfoundland. Or again, Pursh, who had been on the lower St. Lawrence, where it abounds on brackish shores, gave a good description, as *Swertia pusilla*, of the little annual now known as *Lomatogonium rotatum* (L.) Fries, said by Pursh to grow "On alpine regions of the White-hills of New Hampshire . . . June . . . In the Banksian Museum are specimens from Labrador, in every respect agreeing with the New Hampshire plant". The plant in the Banksian Herbarium is characteristic *Lomatogonium rotatum* (*Pleurogyne rotata*), which follows subsaline or brackish shores up the St. Lawrence to regions known to Pursh, and down the coast, locally, to eastern Maine. An army of keen enthusiasts has sought vainly for it in the nonsaline White Mountains in "June". On the brackish shores of the lower St. Lawrence it flowers from July to September. At the nearest known station to the White Mts., "brackish shores" at Schoodic Point, Hancock County, Maine (*Stebbins*, no. 451), it was beginning to flower on August 28, 1908. It is feared that in this case, as well as that of the Dryas (and some others) Pursh worked on his specimens while "under the influence". At any rate, until someone brings forward real evidence of *Gordonia* being in Virginia I am content to think that Pursh made another mistake.

HYPERICUM SETOSUM L. To the relatively few recorded stations add another in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,308. See p. 99.

H. BOREALE (Britton) Bicknell. To the stations in the mountains of western Virginia add one on the coast, in PRINCESS ANNE COUNTY: wet peaty border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,304. See p. 100.

*HYPERICUM CANADENSE L., var. **galiiforme,** var. nov. (TAB. 1076), caule pergracile reclinato vel adscendento 0.8–3 dm. longo simplice vel sparse ramoso; foliis anguste obovatis vel oblanceolatis petiolatis; laminis primariis 5–15 mm. longis 2–4 mm. latis; inflorescentia laxe brachiata; sepalis 1.5–2 mm. longis; capsula ovoidea apice rotundata 3–3.5 mm. longa.—Sussex County, VIRGINIA: sandy and peaty shore of Airfield Millpond, southwest of Wakefield, September 11 and 12, 1945, *Fernald & Long*, nos. 14,962 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.) and 14,964; sphagnous wooded swamp southwest of

Brittle's Millpond, west of Wakefield, September 11, 1945, *Fernald & Long*, no. 15,954.

Hypericum canadense, var. *galiiforme*, especially when reclining and weakly branching among the natural covers of sphagnous pockets, so strikingly suggests a weak *Galium* of the *G. trifidum* series as to be deceptive; in more open spots (our no. 14,964) it is as strongly ascending as typical *H. canadense.* In the latter wide-ranging and highly variable plant the median and upper cauline leaves are linear to linear-oblanceolate, sessile or nearly so; the sepals 2.5–4.5 mm. long; the finally conic to lanceolate and acuminate-tapering capsules 4–6.5 mm. long. Var. *galiiforme* is weak, reclining when in deep *Sphagnum*, its very short and broad leaves varying from narrowly obovate to oblanceolate, petioled, and only 5–15 mm. long. The very lax and open cyme bears flowers and fruits smaller than in typical *H. canadense:* sepals only 1.5–2 (instead of 2.5–4.5) mm. long and roundish-tipped capsule only 3–3.5 (instead of 4–6.5) mm. long. The most dwarf extremes of *H. canadense* (from Newfoundland and the Labrador Peninsula) have fruits and foliage nearly as short as in var. *galiiforme* but their leaves are those of true *H. canadense.*

At Airfield Millpond var. *galiiforme* forms definite carpets in the *Sphagnum* and wet peat quite apart from the gigantic typical *H. canadense*, also found there and from the heteromorphic and always puzzling half-sterile *H. dissimulatum* Bicknell, which there reaches a height of 7.5 dm. See p. 87.

LECHEA MARITIMA Leggett, var. VIRGINICA Hodgdon. To the few recorded stations, in Northampton, Elizabeth City and Princess Anne Counties, add another in PRINCESS ANNE COUNTY: hollows in sand dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,301. See p. 101.

RHEXIA CILIOSA Michx. Range extended farther east in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,311. See p. 98.

*LUDWIGIA VIRGATA Michx. Range extended northward into southeastern Virginia. NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,315.

Found on September 8th, presumably two to three months after flowering, only a single much depleted fruit being left. The foliage and basal habit are those of *L. virgata*. See p. 99.

L. alata Ell. To the recorded stations in Princess Anne add one in Norfolk County: fresh tidal reed-marsh along Northwest River below Northwest, *Fernald & Long*, no. 14,965. See p. 90.

L. pilosa Walt. To the single station each, recorded in Norfolk and Nansemond, add from Nansemond County: sphagnous and peaty bog (Magnolia swamp) by Norfolk and Western Railway, 1–1½ miles west of Kilby, *Fernald, Long & Clement*, no. 15,316; wet hollow in old woodroad about 1 mile east of Buckroe (Purvis R. R. station), *F. L. & C.*, nos. 15,317 and 15,318; border of swampy pineland south of Buckroe, *F. L. & C.*, no. 15,319.

Most characteristic plants, like no. 15,319, are tall (up to 1.2 m. high or long), soon freely and divergently branched, either ascending or becoming topheavy and arching to the ground and rooting at tip, the leaves of the fertile stems and branches soft-pilose. Late in the season the prostrate overwintering basal shoots develop, these having short and broad glabrous or nearly glabrous leaves purple beneath. At the station for nos. 15,317 and 15,318, east of Buckroe, small and simple juvenile plants without branches and with nearly or quite glabrous broad leaves purple beneath were fruiting, precocious individuals not waiting for the next year! See p. 99.

L. brevipes (Long) Eames. To the few recorded stations (in Princess Anne, Isle of Wight and Norfolk) add two others. Princess Anne County: border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,324. Southampton County: wet peaty margin of Whitefield's Millpond, southwest of Corinth, *Fernald & Moore*, no. 15,119, *Fernald, Long & Clement*, no. 15,323.

At Whitefield Pond, the most inland station known, it was possible to extract continuous fruiting strands up to 7.5 dm. long. See pp. 92 and 100.

Sanicula Smallii Bicknell. Local range extending eastward into Nansemond County: rich sandy and loamy oak and hickory woods just east of Suffolk, *Fernald, Long & Clement*, no. 15,327. See p. 96.

The Virginian Record of Oxypolis filiformis.—For nearly a century *Oxypolis filiformis* (Walt.) Britton, either under that name or one of its synonyms, *Tiedemannia teretifolia* (Muhl.) DC., has been credited with growing in Virginia, and this record had apparent validation by Coulter & Rose, in their *Notes on*

Umbelliferae of E. United States. III, Bot. Gaz. xii. 74 (1887) where it was stated by the monographers of the family to grow from "Virginia to Florida and Louisiana", although later, when it "came to a show-down" in their Monograph of the North American Umbelliferae, Contrib. U. S. Nat. Herb. vii. no. 1: 193 (1900), though still holding to "Ponds and swamps from southern Virginia to Florida and west to Louisiana", they could cite as "*Specimens examined*" only material from Florida and Mississippi, except for their very local var. *Canbyi* of Ellendale, Delaware (*O. Canbyi* (C. & R.) Fernald). Actually, *O. filiformis* is represented in the Gray Herbarium as extending westward into Texas and northward along the Coastal Plain into southeastern North Carolina. There are in this herbarium alone six numbers from North Carolina, but the northernmost material is from Onslow County (shallow water, stagnant pool, Dixon, *L. F. & Fannie R. Randolph*, no. 972), fully 125 miles south of the Coastal Plain of Virginia. Mr. Long and I, anxious to collect a species seemingly well attested as growing in southern Virginia, have wallowed through innumerable inundated pond-margins for a plant which the Randolphs would probably have seen if it had been there. Finally, deciding to follow up the record, I have found that it started in Gray, Man. ed. 2: 153 (1856), without specific description, "Virginia (Harper's Ferry) and southward". Harper's Ferry, then in Virginia, is not well defined by Coulter & Rose's "southern Virginia". Furthermore, the plant of Harper's Ferry, "collected by Doctor Aiken some seventy-five years before [before 1911], near Harper's Ferry, W. Va." (Rose in Contrib. U. S. Nat. Herb., xiii. 289 (1911)), extends farther down the Potomac into Maryland and Virginia and is the remarkable little aquatic described as *Harperella* (not named for Harper's Ferry) *vivipara* Rose, l. c. 290 (1911), and subsequently transferred to *Ptilimnium* as *P. viviparum* (Rose) Mathias in Brittonia, ii. 244 (1936).[1] Obviously, if *Oxypolis filiformis* is now detected about ponds or savannas of southeastern Virginia it will be new to the flora of the state. One may also, with some hope, watch

[1] "Southern Virginia" of the treatment in the North American Fl. xxviii B, 200 (1945), one of its authors being the author of *Ptilimnium viviparum* of *northern* Virginia, should obviously be dropped. The range of *Oxypolis ternata* on the same page (in 1945) could have been extended into the baffling "southern Virginia" on the basis of collections reported in RHODORA, xli. 552, with map 8 on p. 471 (1939).

there for *O. Canbyi* (Coult. & Rose) Fernald in RHODORA, xii. 139 (1939) for, although perhaps extinct at its original station in Delaware, there is beautiful material of it in the Ravenel herbarium at Converse College from Lee County, Georgia. Georgia material is also cited by Mathias & Constance in the North American Flora.

VIRGINIAN OCCURRENCE OF KALMIA HIRSUTA DOUBTED.—*Kalmia hirsuta* Walt., so distinct that Small considered it a monotypic genus, was described from South Carolina. Michaux knew it only from Georgia and even Pursh was content with "South Carolina and Georgia". M. A. Curtis did not know it from North Carolina; at least he did not mention it in his various enumerations of plants of that state. In the Gray Herbarium, there is no material of it from north of the Coastal Plain of South Carolina. Just how it wandered into Gray, Man. ed. 2: 256 (1856) I can not determine, but it is there entered: "Sandy pine-barren swamps, E. Virginia and southward". Virginia has subsequently stood in practically all manuals as having *K. hirsuta*. Until real evidence of it in the state is forthcoming it should be dropped. See p. 86.

*LYONIA LIGUSTRINA (L.) DC., forma **nanella,** f. nov. (TAB. 1077). Frutex 1.5–2 dm. altus, foliis maturis 1–3 cm. longis 0.5–1.4 cm. latis; capsulis 2–3 mm. diametro.—Nansemond County, VIRGINIA: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, September 8 and 12, 1946, *Fernald, Long & Clement*, no. 15,331.

Forma *nanella* is the tiniest extreme of *Lyonia ligustrina*. Whether it is a dwarf form of typical *L. ligustrina* or of var. *salicifolia* (Wats.) DC. is at present questionable. One individual has the leafy inflorescence of the latter. The others have leafless inflorescences, but the plants are so mature that the leafy bracts may have disappeared. Further material, secured earlier in the summer, will settle that point. See p. 100.

SYMPLOCOS TINCTORIA (L.) L'Hér., var. PYGMAEA Fernald. Add another station in ISLE OF WIGHT COUNTY: sandy pine-barrens south of Zuni, *Fernald & Moore*, no. 15,137.

FRAXINUS AMERICANA L. Local range extended eastward to the Blackwater River. NANSEMOND COUNTY: sandy woods, bank of Blackwater River, George's Bend, south of South Quay, *Fernald, Long & Clement*, no. 15,338.

No. 15,338, with the glabrous branchlets and petioles of typical *Fraxinus americana*, grew beside a similar tree (not fruiting) with the branchlets, petioles and leaf-rachises tomentulose. This was obviously the relatively southern var. *biltmoreana*.[1]

F. PENNSYLVANICA Marsh., var. **subintegerrima** (Vahl), comb. nov. *F. juglandifolia*, β. *subintegerrima* Vahl. Enum. i. 50 (1804). *F. juglandifolia* Willd. Berl. Baumg. 117 (1796), not Lam. (1788). *F. caroliniana* Willd. l. c. 119 (1796), not Mill. (1768). *F. lanceolata* Borkhausen, Handb. Forst. Bot. i. 820 (1800). *F. caroliniana*, β. *F. latifolia* Willd. Sp. iv. 1103 (1806). *F. pubescens*, **subpubescens* Pers. Synop. ii. 605 (1807). *F. expansa* Willd. Berl. Baumg. ed. 2: 150 (1811). *F. viridis* Michx. Hist. Arb. Am. iii. 115, t. 10 (1813). *F. pubescens*, δ. *subpubescens* (Pers.) Pursh, Fl. Am. Sept. i. 9 (1814). *F. pennsylvanica*, var. *lanceolata* (Borkh.) Sargent, Silva, vi. 50 (1894).

The International Rules of Botanical Nomenclature demand the retention of the first validly published and legitimate name in each rank. The current *Fraxinus pennsylvanica*, var. *lanceolata* fails to satisfy this requirement.

*SABATIA DIFFORMIS (L.) Druce. SUSSEX COUNTY: sandy and peaty shore of Airfield Millpond, southwest of Wakefield, *Fernald & Long*, no. 14,977; *Fernald, Long & Clement*, no. 15,340.

First station known between North Carolina and eastern Maryland. Only a few plants noted in 1945, when the pond was abnormally high. In 1946, the pond being very low, the Sabatia was relatively abundant. See pp. 86 and 95.

(*To be continued*)

[1] FRAXINUS AMERICANA L., var. **biltmoreana** (Beadle) J. Wright in Gray Herb., July, 1941. *F. biltmoreana* Beadle in Bot. Gaz. xxv. 358 (1898).

ADDITIONS TO AND SUBTRACTIONS FROM THE FLORA OF VIRGINIA

M. L. Fernald

(*Continued from page 159*)

*Gentiana Catesbaei Walt., var. **nummulariaefolia,** var. nov. (tab. 1078, fig. 3 et 4), a var. typica recedit foliis elliptico-ovalibus utrinque obtusis vel subrotundis 1–1.8 cm. longis 6–12 mm. latis membranaceis; calycis lobis late oblanceolatis ad 4.5 mm. latis.—Greensville County, Virginia: sphagnous bog about 1 mile northwest of Dahlia, October 12, 1938, *Fernald & Long*, no. 9618 (type in Herb. Gray.).

Gentiana Catesbaei, var. *nummulariaefolia* has for several years stood apart in the herbarium from all other material of the species and it seems very definite. Typical *G. Catesbaei* (plates 1078, figs. 1 and 2, and 1079), frequent in southeastern Virginia, has firm narrowly lanceolate to oblong-ovate acute or subacute leaves mostly 3–7 cm. long, though in the most extreme dwarfs down to 1.5 cm. but acutish; and its calyx-lobes are linear or narrowly lanceolate. Var. *nummulariaefolia*, on the other hand, has small membranaceous blunt or round-tipped elliptic-oval leaves only 1–1.8 cm. long, and its dilated calyx-lobes are broadly oblanceolate.

As I pointed out in Rhodora, xli. 555 (1939), Walter had two species of *Gentiana* with campanulate-ventricose corollas. What he took for *G. Saponaria* L. was described "corollis viridescentibus, foliis ovatis trinerviis" and (as shown by Walter's material) was the misnamed greenish-flowered *G. villosa* L. Since *G. villosa*, as shown by its type, is strictly glabrous, Walter, quite naturally, did not so identify his greenish-flowered plant. Walter's *G. Catesbaei* was defined "corollis extus caeruleis, foliis lanceolatis remotis". The material in Walter's Herbarium shows, besides a summit of *G. villosa*, one of true *G. Saponaria* L. The other two specimens (our PLATE 1078, FIGS. 1 and 2) are the new element, *G. Catesbaei*, the larger specimen (FIG. 1) so marked by the late James Britten (apparently). Besides them (PLATE 1079) I am showing summits of two modern specimens from eastern Virginia. These are of the plant described from "Pine-barren swamps near the coast, Georgia and Florida", as *G. Elliottii* Chapm., var. *parvifolia* Chapm. Fl. So. U. S. 356 (1860), specimens before me, and which has been variously known as *G. Elliottii* Chapm., *G. parvifolia* (Chapm.) Britton and *Dasystephana parvifolia* (Chapm.) Small. Since some have doubted the identity of *G. Catesbaei* I am showing the type-material.

Although Walter did not cite Catesby's plate, his intent in giving the name *G. Catesbaei* is pretty obvious. As M. A. Curtis wrote in Bost. Journ. Nat. Hist. i. 128 (1835): "*Gentiana Catesbaei*. This species is readily distinguished from G. saponària, by the long linear segments of the calyx and its open corolla. It is finely delineated in Bigelow's Medical Botany. Tab. 70. of Catesby's Carolina, represents it". Both Bigelow's plate of *G. Catesbaei*, received from Charleston, South Carolina, and Catesby's are indeed very fine; and Bigelow pointed out that it is not *G. Saponaria* for "It differs widely, however, from that species in the size of its leaves, the length of its calyx, the open mouth of its corolla and shape of its segments." Catesby, like Bigelow, showing the open summit of the corolla, said "blue flowers; which, before they open, are in form of a Rolling-pin; but, when blown, are in shape of a Cup, with the verge divided into five sections". There should be no question about the identity of *G. Catesbaei*.

BARTONIA VERNA (Michx.) Muhl. In RHODORA, xlviii. 327 (1946) I explained my reasons for believing that the basis of the record of this vernal species from Virginia was a confusion made by Pursh in 1814. If the species is later found in the state it will presumably be as a considerable northern extension of range.

PHACELIA MACULATA Wood, Am. Bot. Fl. 255 (1873). *P. fallax* Fernald in RHODORA, xlvi. 51, t. 814 (1944).

Dr. Lincoln Constance calls my attention to Wood's species from Stone Mountain (type-region of *Phacelia fallax*), Wood's species very generally overlooked by American botanists and somewhat obscured by the entry in Index Kewensis "Quid?".

SCUTELLARIA INTEGRIFOLIA L., var. HISPIDA Benth. To the stations in Norfolk and Gloucester Counties cited by Epling in Univ. Calif. Publ. xx. 93 (1942) add one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald & Moore*, no. 15,149. See p. 94.

*S. INTEGRIFOLIA, var. MULTIGLANDULOSA Kearney (*S. multiglandulosa* (Kearney) Small). Range extended north from Georgia. NANSEMOND COUNTY: sphagnous and peaty bog (Magnolia swamp) by Norfolk and Western Railway, 1–1½ miles west of Kilby, *Fernald, Long & Clement*, no. 15,345. SOUTHAMPTON COUNTY: upper border of sandy and peaty shore of Darden's Pond, north of Courtland, *Fernald, Long & Clement*, no. 15,346.

Close matches for specimens identified by Epling as an "unusually stable" species, *Scutellaria multiglandulosa*, although it is difficult to believe that the "stability" would hold over a considerable area and that *S. multiglandulosa* is more than a somewhat minor variation of *S. integrifolia*, perhaps extending still farther north. Epling, l. c. 94, cites 18 collections of var. *multiglandulosa* (his *S. multiglandulosa*). Under 4 citations he adds: "occurs here with *S. integrifolia* subsp. *hispida*" or phrases of the same import. In Nansemond County the two are in bogs toward a mile apart! See pp. 99 and 101.

*LYCOPUS EUROPAEUS L., var. MOLLIS (Kern.) Briq. Numerous stations in southeastern Virginia. NORFOLK COUNTY: old collection from Norfolk, coll. *Rugel?*; between Princess Anne and Berkely, *Heller*, no. 1072. NANSEMOND COUNTY: border of fresh to brackish marsh, near Western Branch, south of Reid's Ferry, *Fernald & Long*, no. 13,438. ISLE OF WIGHT COUNTY: along path, Burwell's Bay, James River, below Rushmere (Fergusson's Wharf), *F. & L.*, no. 12,791. SURRY COUNTY: springy swale by Cobham Bay, James River, northwest of Chippokes, *F. & L.*, no. 12,790; roadside by sandy thicket, Sunken Meadow Beach, *F. & L.*, no. 6865.

Typical *Lycopus europaeus* L., recorded from Virginia but not seen from there by me, has the leaves broadly lanceolate to narrowly ovate, acuminate, the lower and median primary ones deeply pinnatifid or incised, with the longest teeth or lobes 1–4 cm. long, the upper surface strigose, the lower surface but slightly pubescent to glabrescent. It is occasional in waste near Boston and is represented by *House*, nos. 19,639 and 20,772 from Monroe County, New York. Most eastern American specimens belong to var. *mollis*, which has smaller oval, obtuse to subacute leaves with short and blunt teeth and villous or soft-pilose beneath.

Physalis pubescens L. Add another station in Nansemond County: wet peaty and sandy shore of Exchange Pond, southwest of Everett's Bridge, *Fernald, Long & Clement*, no. 15,348.

*P. heterophylla Nees, var. **clavipes,** var. nov. (tab. 1080 et tab. 1081, fig. 4 et 5), rhizoma sublignea 1 cm. crassa; caule basin versus subligneo ad 1.5 cm. crasso; internodiis pilosis glandulosisque, pilis confertis 0.5 mm. longis; foliis membranaceis translucentibus, venis venulisque conspicuis, subtus villoso-strigosis, margine divergenter acute dentato.— Southampton County, Virginia: sandy woods near Darden's Pond, northeast of Courtland, September 16, 1946, *Fernald, Long & Clement*, no. 15,347 (type in Herb. Gray.; isotype in Herb. Phil. Acad.). See p. 102.

In its thick, subligneous and heavy deeply buried horizontal rhizome, its strongly subligneous subterranean (often clubshaped) vertical base of the fruiting stem, in the very thin and conspicuously veiny leaves, very evidently translucent to transmitted light, var. *clavipes* stands out from the other three recognized varieties of *Physalis heterophylla*. Typical *P. heterophylla* (plate 1081, figs. 1–3), has the horizontal rhizome (fig. 1) slender and cord-like and the buried vertical base of the stem relatively slender and not ligneous, the leaves less prominently toothed and, when illuminated from below (fig. 3), appearing dense and opaque. The pubescence of the internodes is dense, with abundant glands and very short intermixed pilosity. Var. *ambigua* (Gray) Rydb. (plate 1082, figs. 1–3) has the slender rhizome and base of stem, but its internodes are spreading-villous with slender trichomes up to 2 or 3 mm. long and its leaves are thick as in typical *P. heterophylla* and (fig. 3) nearly as opaque. Var. *nyctaginea* (Dunal) Rydb. (figs. 4–6) has the slender rhizome and base of stem and the pubescence of internodes as in var. *ambigua*, but the only slightly toothed or entire leaf is thin and membranaceous and subtranslucent but without the very obvious veins and veinlets of var. *clavipes*. All the four varieties occur in southeastern Virginia. To clear the record, specimens from the southeastern counties are cited below.

P. HETEROPHYLLA Nees (typical). PRINCE GEORGE COUNTY: rich alluvial woods and thickets by James River, Upper Brandon, *Fernald & Long*, no. 9425. SUSSEX COUNTY: border of dry sandy woods, 4 miles south of Stony Creek, *Fernald, Griscom & Long*, no. 6684, in somewhat thickened and subligneous base and in toothing of leaves transitional to var. *clavipes*.

P. HETEROPHYLLA, var. AMBIGUA (Gray) Rydb. ISLE OF WIGHT COUNTY: dry sandy woods about 1 mile north of Pons, *Fernald & Long*, no. 13,440; sand-beach along James River, Ragged Island, northeast of Carrollton, *Fernald & Long*, no. 12,795.

*P. HETEROPHYLLA, var. NYCTAGINEA (Dunal) Rydb. PRINCE GEORGE COUNTY: rich alluvial thicket back of sand-beach of James River, Jordan Point, *Fernald & Long*, no. 9427. SURRY COUNTY: rich alluvial woods and thickets back of sand-beach of James River, Eastover, *F. & L.*, no. 8840. SOUTHAMPTON COUNTY: dry sandy old clearing near Nottoway River, north of Smith's Ferry, *Fernald & Long*, no. 8841. GREENSVILLE COUNTY: open thickets, clearings, and borders of woods southeast of Emporia, *F. & L.*, no. 9428. Several collections from western counties.

PENSTEMON CANESCENS Britton. Range extended from the outer Piedmont well out into the Coastal Plain. HENRICO COUNTY: rich wooded slopes by James River, west of Varina, *Fernald & Long*, no. 13,133. PRINCE GEORGE COUNTY: dry wooded slopes of gullies near Powell's Creek, Garysville, *F. & L.*, no. 8456. SUSSEX COUNTY: dry sandy hickory and oak woods, Burt, *F. & L.*, no. 6385 (distrib. as *P. australis* Small). Identifications confirmed by Dr. Pennell.

Penstemon canescens adds another to the long list of primarily montane species with extensions out to the Coastal Plain, for Pennell, Scroph. E. Temp. N. Am. 221, and map 48, p. 219 (1935) found it to be a plant of "the Appalachian Mountains, both Eastern and Western . . .; eastward descending along rivers into the Piedmont, . . . on the James River reaching nearly to the Fall Line." At Varina it is associated with many inland or upland plants: *Carex conjuncta* Boott, *C. tenera* Dewey, *C. normalis* Mackenz., *Xanthorhiza simplicissima* Marsh., *Corydalis flavula* DC., *Scutellaria elliptica* Muhl., var. *hirsuta* (Short) Fern. (first station east of Blue Ridge), etc. Along Powell's

Creek it is associated with many prevailingly inland species: *Carex Frankii* Kunth, *Stellaria pubera* Michx., *Ranunculus micranthus* Nutt., *Sedum ternatum* Michx., *Phaseolus polystachios* (L.) BSP., *Ruellia strepens* L. and *Chrysogonum virginianum* L. The patch of hickory and oak woods near Burt is, as pointed out in Rhodora, xxxix. 342 (1937), a bit of upland forest on the Coastal Plain, with such inland species as *Festuca paradoxa* Desv., *Hexalectris spicata* (Walt.) Barnh., *Clematis ochroleuca* Ait., *Lathyrus venosus* Muhl., *Scrophularia marilandica* L. and *Houstonia tenuifolia* Nutt. *Penstemon canescens*, pushing out to the Coastal Plain, stays with its inland associates.

Chelone obliqua L. To the few recorded stations add another in Nansemond County: along rill in rich sandy and loamy oak and hickory woods just east of Suffolk, *Fernald, Long & Clement*, no. 15,350. See p. 96.

*Galium tinctorium L., var. floridanum Wiegand in Bull. Torr. Bot. Cl. xxiv. 397 (1897). Range extended north from Florida. Princess Anne County: border of fresh pond back of the dunes, Chesapeake Beach, *Fernald, Long & Clement*, no. 15,358; wet sandy soil, Cape Henry, *L. F. & Fannie R. Randolph*, no. 332, as *G. Claytoni;* marshes bordering ponds, Dam Neck, *Fernald & Long*, no. 4206, as *G. Claytoni*. Southampton County: alluvial woods, bottomland of Mill Creek, Hart's Bridge, *F. & L.*, no. 8481, as *G. Claytoni*. See p. 100.

Wiegand, in his early revision of the group, treated *Galium tinctorium* as a heteromorphic species, his *G. tinctorium* proper being the plant we now know as *G. obtusum* Bigelow; his *G. tinctorium*, var. *filifolium* being *G. obtusum*, var. *filifolium* (Wieg.) Fernald; and his *G. tinctorium*, var. *labradoricum* being the wholly different *G. labradoricum* (Wieg.) Wieg. Wiegand treated as *G. Claytoni* Michx. a very weak plant with the leaves scabrous- or bristly-margined, the sprawling stems with prostrate, matted basal offshoots and 3 (sometimes 4)-lobed corollas at most 1.5 mm. broad. This plant, as shown by me in Rhodora, xxxvii. 443–445, plate 403, figs. 1 and 2 (1935), is really the true *G. tinctorium* of Linnaeus, while *G. tinctorium* sensu Wiegand is *G. obtusum* Bigelow, Fl. Bost. ed. 2: 54 (1824). Although *G. tinctorium* sensu Wiegand was not the true *G. tinctorium* of Linnaeus, and although *G. tinctorium*, var. *labradoricum* Wiegand and *G. tinctorium*, var. *filifolium* Wiegand are not conspecific with the Linnaean *G. tinctorium* (*G. Claytoni* Michx.), it so happens that *G. tinctorium*, var. *floridanum* is a southeastern large-fruited extreme of the Linnaean species!

Whereas true *Galium tinctorium* has the mature pairs of fruits relatively small (2–3 mm. across), var. *floridanum* has them larger, the pairs measuring 3.5–5 mm. across. The longest peduncles of true *G. tinctorium* range from 10–17 mm. long but the longest in var. *floridanum* are up to 23 mm. long, while the longest pedicels of typical *G. tinctorium* are 4–8 mm. long, those of var. *floridanum* ranging up to 13 mm. long. Furthermore, var. *floridanum* often bears long unforking and recurving very slender peduncles suggestive of those of the more northern *G. trifidum* L. Although var. *floridanum* was described only from Florida, it extends along the Coastal Plain of South and North Carolina into southeastern Virginia. The record in RHODORA, xxxvii. 178 (1935) was based on the very large-fruited and smooth *G. obtusum* Bigel., var. *filifolium* (Wiegand) Fern.

DIODIA TERES Walt., var. HYSTRICINA Fern. & Griscom. Add another station in PRINCESS ANNE COUNTY: hollows in sand dunes, Chesapeake Beach, *Fernald, Long & Clement*, nos. 15,354 (simple, crowded, upright plants) and 15,355 (depressed, freely branching). See p. 100.

*CEPHALANTHUS OCCIDENTALIS L., forma **lanceolatus,** f. nov., foliis oppositis lanceolatis vel lanceolato-oblongis utrinque attenuatis submembranaceis subtus pallidis, laminis 4–9 cm. longis 1–3 cm. latis.—Southampton County, VIRGINIA: wet thicket bordering Darden's Pond, north of Courtland, September 16, 1946, *Fernald, Long & Clement*, no. 15,357 (TYPE in Herb. Gray.; isotype in Herb. Phil. Acad.). See p. 101.

Cephalanthus occidentalis in its typical form has the leaf oblong-ovate and abruptly short-acuminate. It varies from small-leaved extremes at the northern border of its range, with blades only 4 cm. long and 2.3 cm. broad, to the largest-leaved shrubs or small trees of the southeastern states, with blades up to 2.5 dm. long and 1.5 dm. broad, the leaves either opposite or in 3's. Forma *lanceolatus*, with narrowly lanceolate leaves attenuate to both ends grows at its type-station with the ordinary broad-leaved shrub and strongly contrasts with it.

Although several authors treat the Mexican *Cephalanthus salicifolius* Humb. & Bonpl., as a narrowly lance- or linear-leaved variety of *C. occidentalis*, *C. occidentalis*, var. *salicifolius* (Humb. & Bonpl.) Gray, Syn. Fl. i^2. 29 (1878), they overlook the very narrow (essentially linear) and elongate outline, the coriaceous texture and the obscure lateral nerves of the latter (and other characters), *C. occidentalis* and forma *lanceolatus* having thinner leaves with the lateral nerves quite evident.

It is possible that forma *lanceolatus* is the shrub cultivated in Europe as the ill-begotten *C. angustifolius* Hort. ex André in Rev. Hort. 1889, 280, 281, fig. 70 (1889) and Dippel, Handb. Laubholzk. i. 164 (1889), this in both cases treated as *C. occidentalis*, var. *angustifolius* André l. c., based on the horticultural binomial *C. angustifolius* Hort. ex André (1889), not Lour. Fl. Cochinch. i. 67 (1790). Since, according to Haviland, *Revision of the Naucleeae*, in Journ. Linn. Soc. xxxiii. 39 (1897), *C. angustifolius* Lour. of Cochinchina has the coriaceous very short-petioled leaves oblong-linear (in *C. occidentalis* oblong-ovate to -lanceolate and membranaceous), the peduncles ebracteate (in *C. occidentalis* with small bracts), the calyx-lobes linear (in *C. occidentalis* ovate), etc., it is evident that the cultivated shrub in European gardens has nothing to do with *C. angustifolius* Lour.; neither does the narrow-leaved form of *C. occidentalis*. I am, therefore, not taking up the later and rather vaguely founded *C. occidentalis*, var. *angustifolius* André.

Viburnum nudum L., var. angustifolium Torr. & Gray. New stations. Nansemond County: wet *Sphagnum* of pine-barrens east of Cherry Grove, south of South Quay, *Fernald & Moore*, no. 15,154, flowering shrubs only 4–6 dm. high. Sussex County: swampy depression in sandy pinelands 3 to 4 miles northwest of Waverly, *Fernald, Long & Clement*, no. 15,360. See p. 93.

The Geographic Varieties of Lobelia puberula.—In his Flora Boreali-Americana, ii. 152 (1803) Michaux described *Lobelia puberula:*

> L. erecta, simplicissima, pubescens: foliis oblongo-ovalibus, obtusis, repando-serrulatis: spica non pedunculata; floribus paucis, alternis, subsessilibus: calycibus ciliatis. *Hab.* in Carolina.

This was regularly taken to be the definitely pubescent plant of coastwise distribution in the Atlantic states, with the calyx-tube densely whitish-hirsute to -villous. When he studied Michaux's Herbarium in Paris in 1851 Asa Gray made a memorandum indicating that the specimen is what he knew and in his

Manual (1848) had described as *L. puberula:* "*minutely downy-pubescent; leaves ovate or oblong, obtuse,* . . . leafy bracts ovate, acute, serrate as long as the flower, *lobes of the calyx scarcely shorter than the corolla, the auricles as long as the hairy tube*". Again, when I studied the Michaux Herbarium in 1903, I similarly recorded that the type of *L. puberula* was the coastwise plant we know by that name. That is as it should be, for this pubescent plant so clearly matches Michaux's description and his plant came from Carolina. Michaux generally treated the two Carolinas as one but occasionally North Carolina appeared as Carolina superior, South Carolina as Carolina inferior; but he made a sharp distinction between the Coastal Plain and outer Piedmont region and the high mountains, plants of the latter area growing "in montibus Carolinae", "a Pensylvania ad Carolinam, per montium tractus", "a Canada ad Carolinam montosam". His pubescent *Lobelia puberula* simply from "Carolina" was obviously from east of the mountains, whence there are in the Gray Herbarium 8 sheets (4 from 4 counties in eastern North Carolina, 4 from 3 counties in eastern South Carolina, as well as specimens from 10 counties on the Coastal Plain of Virginia).

In Rhodora, xxxviii. 292 (1936) McVaugh stated that "There is no material of this species in the Michaux Herbarium in Paris". In view of the fact that Asa Gray found and studied it in 1851 and that I did likewise in 1903, it was evident that Michaux's material had existed. Professor Jacques Rousseau, expecting to visit Paris in the autumn of 1946, most kindly offered to look into the matter. Forced to abandon his plan, he communicated with M. J. Léandri of the Muséum d'Histoire Naturelle, who writes that the type of *Lobelia puberula* had merely been misplaced and that "As to the calix, it is similar to the sample of 'B' which Prof. Fernald has sent."

In his study of the genus McVaugh broke *Lobelia puberula* into 4 "pronounced geographic forms which may or may not be worthy of varietal names" (Rhodora, xxxviii. 293 (1936)), saying (p. 292) "In the absence of type material, and in view of the variability of the forms [on the next page they were "pronounced geographic forms"], it seems impossible at present to determine the exact identity of *L. puberula* of Michaux". Under other species with pronounced geographic segregation, as in *L.*

spicata, he definitely called such plants varieties. In view of his "Form a" concentrating itself on the Appalachian Upland and Cumberland Plateau, his "Form b", "on the southeastern Coastal Plain and adjacent Piedmont, New Jersey and Pennsylvania south to Georgia", this the plant described by Michaux from Carolina and checked by Asa Gray in 1851, by myself in 1903, "Form c" "Alabama to Louisiana, especially on the Coastal Plain", and "Form d", Missouri and Arkansas southward to eastern Oklahoma and Texas, and eastward to Alabama and southern Mississippi"—in view of these geographic segregations (much greater than in the admitted varieties of *L. spicata*), it would seem that the 4 extreme and largely isolated trends in *L. puberula* are quite as clear varieties as are those of *L. spicata*. The typical *L. puberula* being the eastern pubescent coastwise plant so adequately described by Elliott with "Tube of the *calyx* short, villous, the segments lanceolate, ciliate, three times as long as the tube" and by McVaugh as his form b with "a densely long-hirsute calyx", etc., we may designate the other three varieties.

*Var. **simulans,** var. nov., a var. typica recedit caule minute puberulo, foliis patentibus, bracteis lanceolatis vel linearibus, tubo calycis glabrescenti vel sparse pubescenti lobis lineari-lanceolatis 1.5–2 mm. latis. Form a of McVaugh in Rhodora, xxxviii. 293, fig. 12 (1936)—West Virginia to Illinois, south to Florida, Alabama, Mississippi and Louisiana, largely on the upland. Type: Wytheville, Wythe County, Virginia, Sept. 16, 1878, *Howard Shriver* (in Herb. Gray.). The asterisk used since the variety is here named for the first time.

Var. **obtusifolia** (A. DC.), comb. nov. *L. glandulosa*, γ. *obtusifolia* A. DC. in DC. Prodr. vii. 378 (1839). *L. puberula*, β. *glabella* Hook. Bot. Mag. lxi. t. 3292 (1834), not Ell. Sk. i. 267 (1817). *L. puberula*, var. *laeviuscula* Mohr in Contrib. U. S. Nat. Herb. vi. 750 (1901). Form c of McVaugh, l. c. 296 (1936) —Alabama to Louisiana.

I get no difference between the type (in Gray Herb.) of Alphonse De Candolle's *Lobelia glandulosa* γ. *obtusifolia* and the original of *L. puberula* β. *glabella* Hook., nor from the Drummond material from Louisiana from seed of which Hooker's plant was grown. Hooker's varietal name has to be discarded under *L. puberula* on account of *L. puberula*, var. *glabella* of Elliott.

The latter, from Chatham County, Georgia, was defined as follows: "with a stem 12–18 inches high, very smooth; leaves linear lanceolate, obscurely denticulate; margins of the calyx slightly reflexed. Seems to be an intermediate plant between this species [*L. puberula*] and L. glandulosa". Its exact identity may never be settled, for the specimen is apparently lost. At least, in studying all the types preserved in Elliott's herbarium at the Charleston Museum, Weatherby in RHODORA, xliv. 256 (1942) found nothing to show for it. In his treatment of *L. puberula* McVaugh (p. 292) says of Elliott's variety "probably *L. elongata Small*"; and again (p. 284) "was probably *L. elongata* Small, as was *L. puberula* var. *glabella*, Elliott", but in his discussion of *L. elongata* itself he made no mention of the supposed synonym. Whatever Elliott had, his name invalidates the use of the same appellation for another plant. His diagnosis is to me quite as close to McVaugh's description of *L. glandulosa* Walt. as to that of *L. elongata*. Incidentally Small's *L. elongata* was originally given a very inclusive description but the TYPE was from Northwest in southeastern Norfolk County, Virginia, Small describing the "sepals elongated . . . , entire, as long as the corolla or shorter", while for *L. glandulosa* Small correctly described the "corolla . . . tube much longer than the calyx". The plant at Northwest, type-locality of *L. elongata*, is confined to fresh to brackish tidal reed-marshes along the river and it also abounds on the adjacent fresh to brackish tidal marshes (there as at Northwest, along with *Scirpus Olneyi* and other halophytes or near-halophytes) of North Landing River. Messrs. Griscom, Long or Fogg and I have collected it either at the type-locality or nearby and Mackenzie also got it. I have before me 8 beautiful sheets of it, all quite consistent (except that in one the inflorescence is paniculate-branched). The brittle stem is 0.45–1.5 m. high and all but the most crowded and etiolated ones 4–6 mm thick at base. The leaves are linear- to oblong-lanceolate or oblanceolate, entire or dentate, submembranaceous, the median ones 0.5–2.5 cm. wide; the median bracts of the raceme are linear-lanceolate and 1–2.5 cm. long; the flowering calyx is 1–1.7 cm. long, its non-glangular segments about two thirds as long as the corolla-tube; seeds 0.8–1 mm. long, reticulate-pitted, with cells 3–10 times as long as broad. As already noted, *L. elongata* is a plant of brackish to fresh tidal reed-marsh. Frequently and needlessly confused with *L. elongata* are plants of *L. glandulo*

Walt., var. with glabrous, instead of densely chaffy-hirsute, calyx-tube, the plant more slender than *L. elongata,* its subcoriaceous leaves linear to linear-lanceolate and mostly 2–8 (rarely –15) mm. broad, the principal bracts of the raceme 0.5–1.8 cm. long, the calyx 6–15 mm. long, its segments usually much shorter than the corolla-tube; seeds 0.5–0.6 mm. long, its pits mostly shorter and more uniform than in *L. elongata. L. glandulosa* is a plant of fresh-savannas, pinelands and pine-barrens.

The variety of *Lobelia glandulosa* with glabrous calyx-tube was distributed by M. A. Curtis as *L. glandulosa,* var. *glabra,* he perhaps thinking it the *L. glandulosa* β. *glabra* A. DC. l. c. 378 (1839), from South Carolina, but, unfortunately, Alphonse DeCandolle described the "Foliae ovato-acuta", which will not do for *L. glandulosa.* The variety under discussion may be called

L. GLANDULOSA Walt., var. **laevicalyx,** var. nov. a var. typica recedit tubo calycis glabro.—Florida to eastern North Carolina. TYPE in Herb. Gray.: swampy pineland at Middlesex, Nash County, North Carolina, October 9, 1938, *Godfrey & Kerr,* no. 6661 (distrib. as *L. elongata*).

Returning to the varieties of *Lobelia puberula,* the two remaining varieties here need little further comment. McVaugh's "Form d" is, as he states, var. *mineolana* E. Wimmer in Fedde, Repert. Spec. Nov. xxvi. 4 (1929).

EUPATORIUM RECURVANS Small. To the stations about the Great Dismal Swamp in Norfolk Co. add one in PRINCESS ANNE COUNTY: hollows in sand dunes, Chesapeake Beach, *Fernald, Long & Clement,* nos. 15,363 and 15,364, both nos. showing the fleshy and often 2- or 3-forked tuberous roots which characterize this southeastern species. See p. 101.

LIATRIS.—The monograph of *Liatris* by Dr. L. O. Gaiser, in RHODORA, xlviii, August to December (1946) contains records of several Virginian species and varieties. That the record may be quickly available I am noting these here.

L. SPICATA L. (var. TYPICA Gaiser). Recorded only from Fairfax, Montgomery and Giles Cos. See Gaiser, l. c. 180.

L. SPICATA, forma MONTANA (Gray) Gaiser, l. c. 216. Bath Co.

*L. SPICATA, var. RESINOSA (Nutt.) Gaiser, l. c. Virginian stations cited in Sussex and Dinwiddie Cos. To these add one in NANSEMOND COUNTY: sphagnous and peaty bog by the Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement,* no. 15,365. See p. 98.

L. GRAMINIFOLIA (Walt.) Willd. (var. TYPICA Gaiser, l. c. 248). Many stations cited, from Arlington Co. to Princess Anne Co., thence westward across the Coastal Plain.

L. GRAMINIFOLIA, var. DUBIA (Barton) Gray. See Gasier, l. c. 250. Stations cited from Arlington Co. to the mountains and down the Coastal Plain to Princess Anne, Sussex and Greensville Cos.

L. GRAMINIFOLIA, var. SMALLII (Britt.) Fern. & Grisc. See Gaiser, l. c. 253. Cited only from the montane counties. Found at inner margin of Coastal Plain in western SUSSEX COUNTY: damp sandy pine and oak woods south of Stony Creek, *Fernald & Long*, no. 11,455.

*L. TURGIDA Gaiser, l. c. 261. Many stations from the Blue Ridge westward.

*L. REGIOMONTANIS (Small) K. Schum. Cited from Wythe Co. See Gaiser, l. c. 277.

L. SCARIOSA (L.) Willd. (var. TYPICA Gaiser, l. c. 294). Cited from many stations in the western counties.

L. SCARIOSA, var. VIRGINIANA (Lunell) Gaiser, l. c. 296. Many stations in the western counties.

L. SQUARROSA (L.) Michx. (var. TYPICA Gaiser, l. c. 394). Stations south to Greensville and Mecklenburg and westward.

LIATRIS ELEGANS NOT VIRGINIAN.—Although the somewhat unique *Liatris elegans* (Walt.) Michx. had its recorded range suddenly extend northward from South Carolina in Gray Man. ed. 2:184 (1856), where it was said to grow in "Barren soil, Virginia?", the doubt was fully justified, for Dr. Gaiser, examining the material in most American herbaria could find no evidence of it from north of South Carolina—see RHODORA, xlviii. 341 (1946).

CARPHEPHORUS TOMENTOSUS (Michx.) Torr. & Gray, var. WALTERI (Ell.) Fernald. To the stations farther inland in dry pine-barren add two in boggy habitats in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,366; similar habitat 1–1½ miles west of Kilby, *F. L. & C.*, no. 15,367. See p. 98.

CHRYSOPSIS NERVOSA (Willd.) Fern., var. STENOLEPIS Fern. To the few recorded stations add one in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,368.

Our previous stations in dry pine-barren.

*C. MARIANA (L.) Ell., forma EFULGENS Fern. in RHODORA, xlviii. 60 (1946). Rayless form from 2 stations in SUSSEX COUNTY.

*Solidago juncea Ait., var. **neobohemica,** var. nov., a var. typica recedit involucro 3–4 mm. alto, phyllariis dorso intense viridibus; ligulis 3.5–3.8 mm. longis; corollis disci 3–3.4 mm. longis; pappo maturo 2–2.5 mm. longo; achaeniis 1.4 mm. longis. —Prince George County, Virginia: dry woods and clearings south of New Bohemia, June 7, 1946, *Fernald & Moore*, no. 15,155 (type in Herb. Gray.; isotype in Herb. Phil. Acad.), Sept. 9, 1946, (ripe fruit), *Fernald, Long & Clement*, no. 15,373.

Clearly an extreme of the wide-ranging northern, inland and upland *Solidago juncea*, var. *neobohemica* stands apart as a Coastal Plain variety. Smaller in most parts than the great bulk of *S. juncea*, its measurements mostly touch those of the smaller-headed and -flowered inland and northern plant, but its phyllaries are strikingly dark green along the midrib, those of true *S. juncea* paler and more stramineous. The leaves of the basal rosette are relatively narrow, as are the lower cauline leaves, but the combination of capitular characters combined with the vividly green phyllaries, are most important. Measurements of heads in flower and in fruit from well developed *S. juncea* and several heads in both flower and fruit of var. *neobohemica* give the following results, these checked for me by Dr. Robert C. Foster:

S. juncea: involucre 3.5–4.5 mm. high, phyllaries pale green or stramineous on back; ligules 4–5 mm. long; disk-corollas 3.2–3.8 mm. long; pappus (incl. longest bristles) 2.6–3.3 mm. long; achenes 1.5–1.7 mm. long.

Var. neobohemica: involucre 3–4 mm. high; phyllaries vividly green along midrib; ligules 3.5–3.8 mm. long; disk-corollas 3–3.4 mm. long; pappus 2–2.5 mm. long; achenes 1.4 mm. long.

Solidago juncea in the Maritime Provinces, Quebec and New England has a flowering period (with youngest heads still unexpanded) from earliest July to early September; in New Jersey and Pennsylvania similarly from late June into early September (Stone, Pl. S. N. J. says "Mid-July to early September"); on the Piedmont and upland of Virginia, West Virginia and North Carolina (as shown by a meagre representation) from June 27 to August 22. Near New Bohemia, on the Coastal Plain of southeastern Virginia, var. *neobohemica* was well flowering on June 7. Its season of bloom must have begun in late May. See p. 93.

S. nemoralis Ait., var. Haleana Fern. To the only recorded stations northeast of Georgia (in Northampton County) add one in Nansemond County: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,374. See p. 98.

*S. FISTULOSA Mill., forma **epilis,** f. nov., caule glabro; foliis glabris vel glabratis.—Nansemond County, VIRGINIA: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, September 8 and 12, 1946, *Fernald, Long & Clement*, no. 15,372 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); sphagnous savanna-like swale east of Cherry Grove, south of South Quay, August 21, 1939, *Fernald & Long*, no. 11,177, and October 15, 1939, no. 11,627.

Typical *Solidago fistulosa* (*S. pilosa* Walt., *S. villosa* Ell.) usually has the internodes (especially the median and upper ones) densely pilose to villous and the lower surfaces of the leaves somewhat so. The three numbers from bogs of Nansemond County are glabrous. See p. 98.

*× S. HIRTIPES Fern. in RHODORA, xlviii. 65, pl. 1011 (1946). SUSSEX COUNTY: roadside thicket about 1½ miles north of Waverly, *Fernald & Long*, no. 15,015.

A very handsome and tall plant, presumably a hybrid of *Solidago graminifolia* (L.) Salisb., var. *Nuttallii* (Greene) Fernald and *S. microcephala* (Greene) Bush. A large and uniform colony. See p. 89.

ASTER SPECTABILIS Ait., var. SUFFULTUS Fernald. An additional station in NANSEMOND COUNTY: sphagnous and peaty bog by Norfolk and Western Railway, about ½ mile west of Kilby, *Fernald, Long & Clement*, no. 15,375, plants smaller than those of dry habitats.

ERIGERON PHILADELPHICUS L., var. **scaturicola** (Fernald), stat. nov., *E. scaturicola* Fernald in RHODORA, xliii. 654, pl. 695, figs. 1 and 2 (1941).

Further experience indicates that the local *Erigeron scaturicola* is better treated as a variety of the wide-ranging *E. philadelphicus.*

BACCHARIS GLOMERULIFLORA PRESUMABLY NOT VIRGINIAN.—*Baccharis glomeruliflora* Pers. was based by Persoon on *B. sessiliflora* Michx., not Vahl, Michaux having found it "in sylvis maritimis Carolinae". Very soon thereafter Pursh cited it as growing "on the coast of Virginia and Carolina". Thereafter it appeared pretty regularly as Virginian, until in the Synoptical Flora Gray cut off Virginia from the stated range. Subsequently its occurrence in the state has been doubted, and, certainly close watching near the coast, southward to Knott's Island and nearly to False Cape, has revealed only the ubiquitous *B. halimifolia.* Judging from the Gray Herbarium *B. glomeruliflora,* a very distinct species, is rare north of Florida. Aside from the abundant material from that state there are only two sheets from the southeastern states; one from Bluffton in the extreme southeastern corner of South Carolina (*Mellichamp* in 1878); the other from Wilmington (*M. A. Curtis*) in the southeastern corner of North Carolina. We may safely stop straining to see *B. glomeruliflora* in Virginia; probably Pursh did not see it.

*Helianthus angustifolius L., var. **planifolius,** var. nov. (tab. 1083), var. typica recedit caule simplici vel subsimplici 4.5–6 dm. alto; foliis imis mediisque oppositis vel suboppositis planis oblongis vel oblongo-lanceolatis obtusis vel subacutis 3–8.5 cm. longis 6–18 cm. latis, jugis remotis, foliis superioris alternis vel suboppositis.—Southeastern Virginia and apparently north to New Jersey, with typical *H. angustifolius* or by itself. Virginia: *Sphagnum-Magnolia* swamp 2 miles west of Williamsburg, Sept. 27, 1921, *Grimes,* no. 4474, sent for identification and tentatively called *H. Schweinitzii* T. & G.; sandy pine and oak woods south of Stony Creek, Sept. 21, 1939, *Fernald & Long,* nos. 11,470 and 11,471 (type in Herb. Gray.). A specimen from shrubby swamp, with *H. angustifolius,* Lakewood, New Jersey, Sept. 15, 1897, *E. H. Eames,* specimen sent to Gray Herbarium as not good *H. angustifolius,* is placed with var. *planifolius,* although with mostly alternate leaves.

In its blunt leaves and its very slender and low stem var. *planifolius* stands off pretty sharply from typical *Helianthus angustifolius.* The type (plate 1084, fig. 1) of the latter, from eastern Virginia (*Clayton*), belongs to the usual form of the species, commonly tall (up to 1.7 m. high), with often short fascicles in the leaf-axils, the abundant hard and scabrous leaves narrowly lanceolate to linear and long-attenuate, commonly with recurved margins. In its relatively short and blunt leaves *H. angustifolius,* var. *planifolius* simulates *H. floridanus* Gray. Many diverse plants have been sent out as *H. floridanus* and the type, *Palmer,* no. 283 (our plate 1085, figs. 1 and 2), is a mere broken-off top. So far as it shows, however, it has the phyllaries blunter than the caudate-attenuate ones of *H. angustifolius* and its leaves are usually less attenuate to quite blunt. It is matched or strongly approached by a large series of specimens, either broad- or narrow-leaved, found from Florida to Arkansas and

Texas and north to the Carolinas, in which the disk may be either yellow on expanding or brown. Whenever the roots have been well collected they show a slender rhizome, with elongate stolons: such specimens from Florida as *Curtiss*, no. 1437 (PLATE 1085, FIG. 3), on a sheet bearing Gray's validation, *Curtiss*, no. 6727, *Fredholm*, nos. 6084 and 6055, *Small, De Winkeler and Mosier*, no. 11,096; or from Alabama as *Blanton*, no. 7080; from Arkansas as *Demaree*, no. 8794; or from Texas as *Cory*, no. 19,811 and *Parks*, no. 41,008 (this erroneously distributed as the quite different *H. heterophyllus* Nutt.). These specimens, largely identified as *H. angustifolius*, have a very different root-system from true *H. angustifolius*, as typified by the Clayton specimen. The latter species has a knotty, short crown without stolons and in autumn develops crown-buds. Its bases, rarely collected, since it is easier not to do so, are well shown in a few numbered specimens: *Muenscher & Curtis*, no. 6621 from Long Island; *Benner*, no. 479, *Fogg*, no. 9920, *Long*, no. 19,462 from New Jersey; *Allard*, no. 5626 and *Fernald & Long*, nos. 6904 (our PLATE 1084, FIG. 2) and 11,469 from Virginia. Whether *H. floridanus* should be merged as a variety with *H. angustifolius* I do not know. Its root-habit and phyllaries seem to indicate a true species—as species go in *Helianthus*.

*H. ATRORUBENS L., var. ALSODES Fernald in RHODORA, xliii. 74, pl. 1020 (1946). Specimens cited from James City, Princess Anne (TYPE), Sussex and Bedford Counties.

H. MOLLIS Lam., var. CORDATUS S. Wats.

The plants of eastern Virginia previously reported as *H. mollis* belong to var. *cordatus*, with the principal leaves deeply cordate and clasping, typical (mostly inland) *H. mollis* having them with rounded to barely subcordate bases.

*H. DIVARICATUS L., var. ANGUSTIFOLIUS Ktze. JAMES CITY COUNTY: dry open ground about 3 miles north of Williamsburg, *Menzel*, no. 122.

Var. *angustifolius*, found chiefly on the Coastal Plain from Florida to Cape Cod, has narrowly lanceolate leaves (at 7–12 nodes below the solitary head or crowded infloresecence), these caudate-attenuate, the larger ones only 0.6–2 cm. broad and 5–10 cm. long.

*H. tracheliifolius Mill. Sussex County: sandy wooded terrace of Nottoway River, 3 miles north-northwest of Bethel Church, *Fernald, Long & Clement*, no. 15,381.

Balduina[1] uniflora Nutt. Gen. ii. 175 (1818), a distinguished and very definite plant with upright small-leaved stems terminated by a large golden-yellow head, therefore not easily overlooked, was described by Nuttall as found "In open grassy swamps from the maritime parts of Virginia to Florida" but its occurrence in Virginia is extremely doubtful. In the Synoptical Flora Gray said under the needlessly substituted *Baldwinia uniflora*, "Low pine barrens, S. Carolina to Florida and Louisiana" and in 1898 Britton & Brown, calling it by a later generic name, *Actinospermum*, said "Virginia (according to Torrey and Gray)" etc. Had they looked up Nuttall's original account they would have discovered that Torrey & Gray merely accepted Nuttall's statement. In the 7th edition of Gray's Manual the doubt was indicated by "Va. (?)". In the Gray Herbarium the northernmost stations represented are in Onslow, Duplin and Sampson Counties, North Carolina, at least 110 miles south of the "maritime parts of Virginia". In North Carolina, as indicated by the labels, it occurs on savannas and peaty pinelands, flowering through August and September. Nuttall was not often guilty of inaccuracy; his statement is a challenge.

Explanation of Plates 1056–1085

Plate 1056, Sagittaria planipes Fernald (figs. 1–6) and S. latifolia Willd., var. obtusa (Muhl.) Wiegand (figs. 7 and 8). S. planipes, all figs. from type: fig. 1, plant, × ½; fig. 2, bract, × 10; fig. 3, broad side, and fig. 4, narrow side of pedicel, × 10; fig. 5, anthers, × 10; fig. 6, achene, × 10. S. latifolia, var. obtusa: fig. 7, bract, × 10, from Medford, Massachusetts, August, 1865, *Wm. Boott:* fig. 8, anthers, × 10, from Concord, Massachusetts, July 25, 1893, *W. Deane.*

Plate 1057, Paspalum setaceum Michx., var. calvescens Fernald, all figs. from type: sufficiently explained in caption of plate.

Plate 1058, Paspalum setaceum Michx. and var. longepedunculatum (Le Conte) Wood. P. setaceum, all figs. from dry sandy pine-barrens south of Zuni, Isle of Wight Co., Virginia, *Fernald, Griscom & Long*, no. 6465: fig. 1, lower, and fig. 2, upper leaf-surface, × 10; fig. 3, spikelets, × 10. Var. longepedunculatum: fig. 4, base of plant, × 1, from Eustis, Lake Co., Florida, *Nash*, no. 1417.

Plate 1059, Panicum glutinoscabrum Fernald, all figs. from type: sufficiently explained in caption of plate.

[1] In spite of his ultra-English spelling of Baldwin, Nuttall's dedication of the genus *Balduina* was a model: "Dedicated as a just tribute of respect for the talents and industry of William Baldwyn, M.D., late of Savannah in Georgia; a gentleman whose botanical zeal and knowledge has rarely been excelled in America".

PLATE 1060, RHYNCHOSPORA PERPLEXA Britton, figs. 1–4, and var. VIRGINIANA Fernald, figs. 5–8. R. PERPLEXA: FIG. 1, terminal corymb, × 1.8, from an ISOTYPE, Florida, *Chapman;* FIG. 2, achene, × 10, from same plant; FIG. 3, achenes, × 10, from Ponce de Leon, Florida, *Curtiss*, no. 6482; FIG. 4, achenes, × 10, from Mobile, Alabama, May, 1845, *Sullivant.* Var. VIRGINIANA: FIG. 5, terminal corymb, × 1.8, from TYPE; FIG. 6, achenes, × 10, from TYPE; FIG. 7, achenes, × 10, from south of Mercy Seat Church, Surry Co., Virginia, *Fernald & Long*, no. 8989; FIG. 8, achenes, × 10, from Airfield Millpond, southwest of Wakefield, Virginia, *Fernald & Long*, no. 14,298.

PLATES 1061–1063, NYMPHAEA ODORATA Ait., var. STENOPETALA Fernald, all figs. from TYPE. PLATE 1061, a colony in pool in the Great Dismal Swamp, Virginia, showing the flowers raised above the leaves, the author at the margin of the pool, × 1/15, after small kodachrome by *H. E. Moore*, this labeled "Water-nymphs in the G. D. Swamp". PLATE 1062, FIG. 1, lower surface of leaf, × 1; FIG. 2, base of flower, showing reflexed sepals, × 1. PLATE 1063, FIG. 1, dorsal, and FIG. 2, ventral view of flower, × 1.

PLATES 1064–1066, RUBUS HYPOLASIUS Fernald, all figs., from the TYPE. Sufficient explanation in the captions.

PLATES 1067–1069, RUBUS SUBINNOXIUS Fernald, all figs. from the TYPE. Sufficiently explained in the captions.

PLATES 1070 and 1071, RUBUS ULIGINOSUS Fernald, all figs. from TYPE. Sufficiently explained in the captions.

PLATES 1072–1074, RUBUS CUPRESSORUM Fernald, all figs. from TYPE. Sufficiently explained in the captions.

PLATE 1075, CROTALARIA PURSHII DC. (fig. 1) and var. BRACTEOLIFERA Fernald (figs. 2 and 3), all figs. × 1. C. PURSHII: FIG. 1, two portions from summit of plant, from general type-area, border of dry sandy woods near Carson, Dinwiddie Co., Virginia, *Fernald, Long & Smart*, no. 5805. Var. BRACTEOLIFERA: FIGS. 2 and 3, portions of summit of TYPE.

PLATE 1076, HYPERICUM CANADENSE L., var. GALIIFORME Fernald, both figs. from TYPE: sufficiently explained in caption of plate.

PLATE 1077, LYONIA LIGUSTRINA (L.) DC., forma NANELLA Fernald, figs. × 1, from TYPE. Sufficiently explained in caption.

PLATE 1078, GENTIANA CATESBAEI Walt. (figs. 1 and 2) and var. NUMMULARIAEFOLIA Fernald (figs. 3 and 4). G. CATESBAEI, both FIGS. 1 and 2 from Walter's TYPE, courtesy of Dr. J. RAMSBOTTOM. Var. NUMMULARIAEFOLIA, FIGS. 3 and 4, the TYPE, × 1.

PLATE 1079, inflorescences of GENTIANA CATESBAEI Walt., both × 1: FIG. 1 from wet pine woods east of Eastville, Northampton Co., Virginia, *Fernald & Long*, no. 5414; FIG. 2 from upper border of sandy and peaty shore of Darden's Pond, north of Courtland, Virginia, *Fernald & Long*, no. 15,343.

PLATE 1080, PHYSALIS HETEROPHYLLA Nees, var. CLAVIPES Fern., all figs. from TYPE. Sufficiently explained in caption of plate.

PLATE 1081, PHYSALIS HETEROPHYLLA Nees (figs. 1–3) and var. CLAVIPES Fernald (figs. 4 and 5). P. HETEROPHYLLA: FIG. 1, base of plant and leaf at upper right, × 1, from sandy soil, Alstead, New Hampshire, *Fernald*, no. 315; FIG. 2, pubescence of stem, × 10, from no. 315; FIG. 3, leaf, × 1, illuminated from below, from Foxcroft, Maine, August 31, 1897, *Fernald.* Var. CLAVIPES, both figs. from TYPE: FIG. 4, leaf, × 1, illuminated from below; FIG. 5, enlarged and subligneous base of stem, × 1.

PLATE 1082, PHYSALIS HETEROPHYLLA, var. AMBIGUA (Gray) Rydberg (figs. 1–3) and var. NYCTAGINEA (Dunal) Rydberg (figs. 4–6). Var. AMBIGUA: FIG. 1, portion of horizontal rhizome and base of erect stem, × 1, from Wallingford, Vermont, August 3, 1907, *G. G. Kennedy;* FIG. 2, pubescence of stem, × 10, from Suffield Township, Portage Co., Ohio, *Webb, Rood et al.*, no. 1547; FIG. 3, leaf, × 1, illuminated from below, from Norwich, Vermont, July 15, 1910, *E. F. Williams*, Var. NYCTAGINEA: FIG. 4, base of plant, × 1, from sandy old clearing near Nottoway River, north of Smith's Ferry, Southampton Co., Virginia, *Fernald & Long*, no. 8841; FIG. 5, pubescence of stem, × 10, from dry woods near Middletown, Frederick Co., Virginia, *Hunnewell*, no. 14,019; FIG. 6, leaf × 1, illuminated from below, from no. 8841.

PLATE 1083, HELIANTHUS ANGUSTIFOLIUS L., var. PLANIFOLIUS Fernald, all figs. from TYPE. Sufficiently explained in caption of plate.

PLATE 1084, HELIANTHUS ANGUSTIFOLIUS L.: FIG. 1, TYPE, × ca. ¼, courtesy of Dr. J. RAMSBOTTOM; FIG. 2, ascending caudex and erect basal sprouts, × 1, from pineland northwest of Waverly, Virginia, *Fernald & Long*, no. 6904.

PLATE 1085, HELIANTHUS FLORIDANUS Gray, all figs. × 1: FIGS. 1 and 2, portions of TYPE; FIG. 3, characteristic stoloniferous base, from Duval County, Florida, *A. H. Curtiss*, no. 1437.

INDEX

New scientific names are printed in full-face type

Photo I. D. Clement

SAGITTARIA PLANIPES, all figs. from TYPE: FIG. 1, plant, × ½; FIG. 2, bract, × 10; FIGS. 3 and 4, broad and narrow sides of pedicel, × 10; FIG. 5, anthers, × 10; FIG. 6, achene, × 10.

S. LATIFOLIA, var. OBTUSA: FIG. 7, bract, × 10; FIG. 8, anthers, × 10.

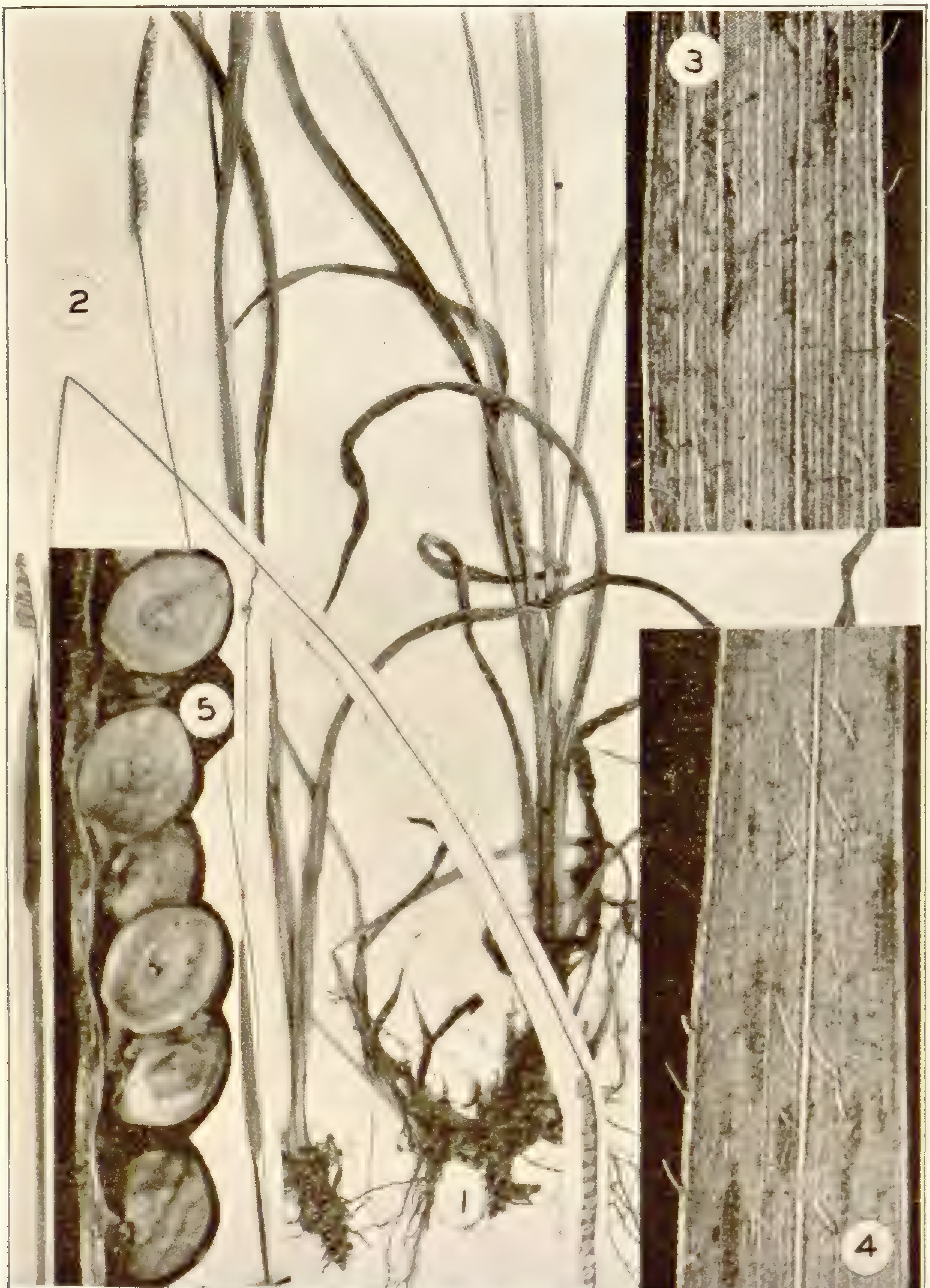

Photo B. G. Schubert

PASPALUM SETACEUM, var. CALVESCENS, all figs. from TYPE: FIGS. 1 and 2, portions of plants, × 1; FIG. 3, upper, and FIG. 4, lower leaf-surface, × 10; FIG. 5, spikelets, × 10.

Photo B. G. Schubert

Paspalum setaceum: fig. 1, lower, and fig. 2, upper leaf-surface, × 10; fig. 3, spikelets, × 10.
P. setaceum, var. longepedunculatum: fig. 4, base of plant, × 1.

Photo B. G. Schubert

Panicum glutinoscabrum, all figs. from type: fig. 1, plant, × ½; fig. 2, axillary autumnal panicle, × 5; fig. 3, surface of culm, × 10; figs. 4 and 5, leaf-surfaces, × 10; fig. 6, summit of sheath and ligule, × 10; fig. 7, axis of panicle, × 10; fig. 8, spikelets, × 10

Photo B. G. Schubert

RHYNCHOSPORA PERPLEXA: FIG. 1, terminal corymb, × 1.8, from ISOTYPE; FIGS. 2–4, achenes, × 10.
Var. VIRGINIANA: FIG. 5, terminal corymb, × 1.8, from TYPE; FIGS. 6–8, achenes, × 10.

After photo by H. E. Moore

NYMPHAEA ODORATA, var. STENOPETALA: "Water-nymphs in the G. D. Swamp."

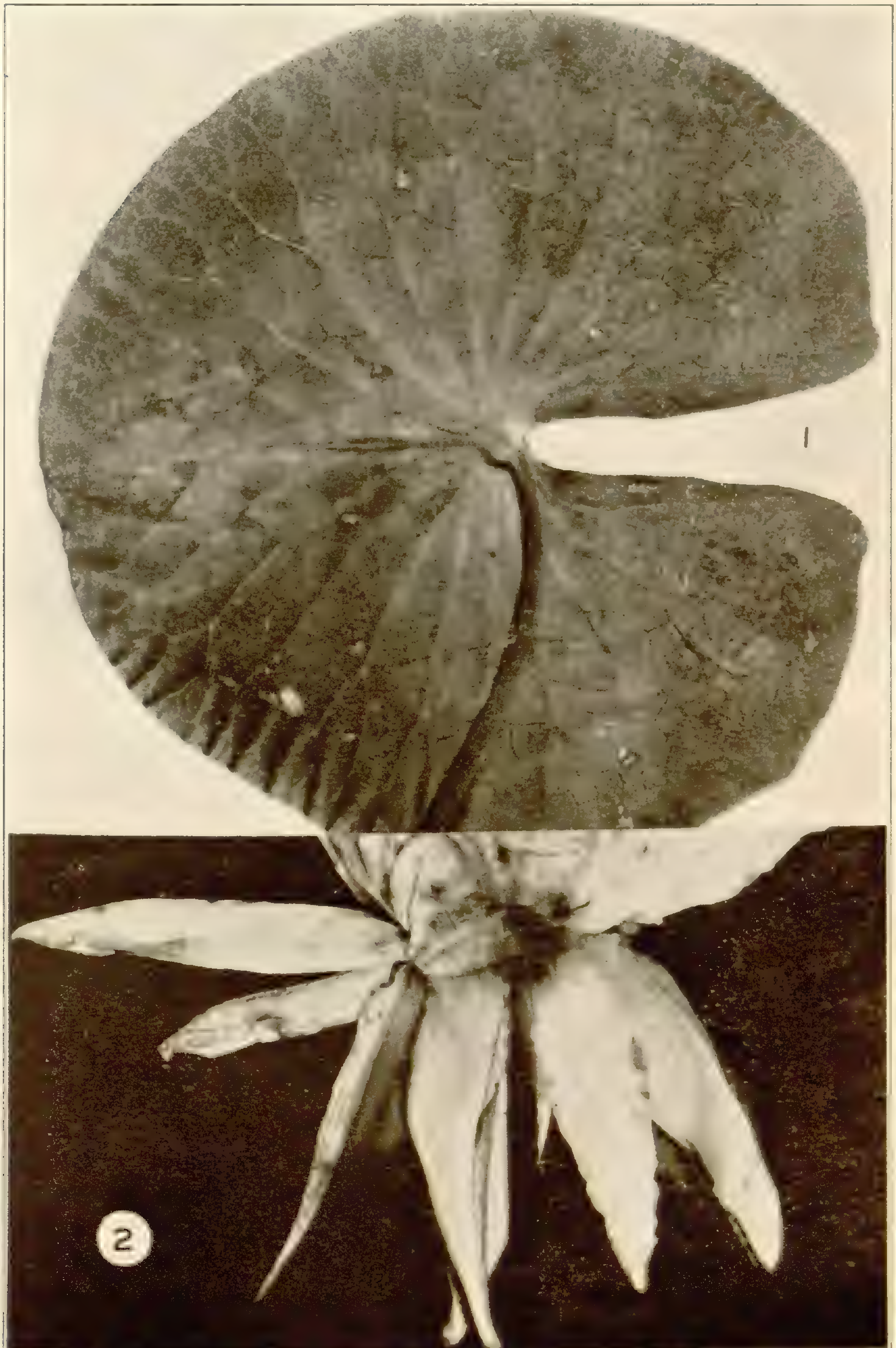

Photo B. G. Schubert

NYMPHAEA ODORATA, var. STENOPETALA: FIG. 1, lower surface of leaf, × 1: FIG. 2, base of flower, showing reflexed sepals, × 1.

Photo B. G. Schubert

NYMPHAEA ODORATA, var. STENOPETALA: FIG. 1, dorsal and FIG. 2, ventral view of flower, × 1.

Photo B. G. Schubert

RUBUS HYPOLASIUS, figs. from TYPE: FIG. 1, portion of primocane, × 1; FIG. 2, upper, and FIG. 3, lower surface of leaf, × 10.

Photo B. G. Schubert

RUBUS HYPOLASIUS, both figs. from TYPE: FIG. 1, branch of floricane, × 1/3; FIG. 2, upper surface of leaf, × 10.

Photo B. G. Schubert

RUBUS HYPOLASIUS, all figs. from TYPE: FIG. 1, fruiting branchlets, × 1; FIG. 2, lower surface of floricane-leaf, × 10; FIG. 3, fruiting pedicel and calyx, × 5.

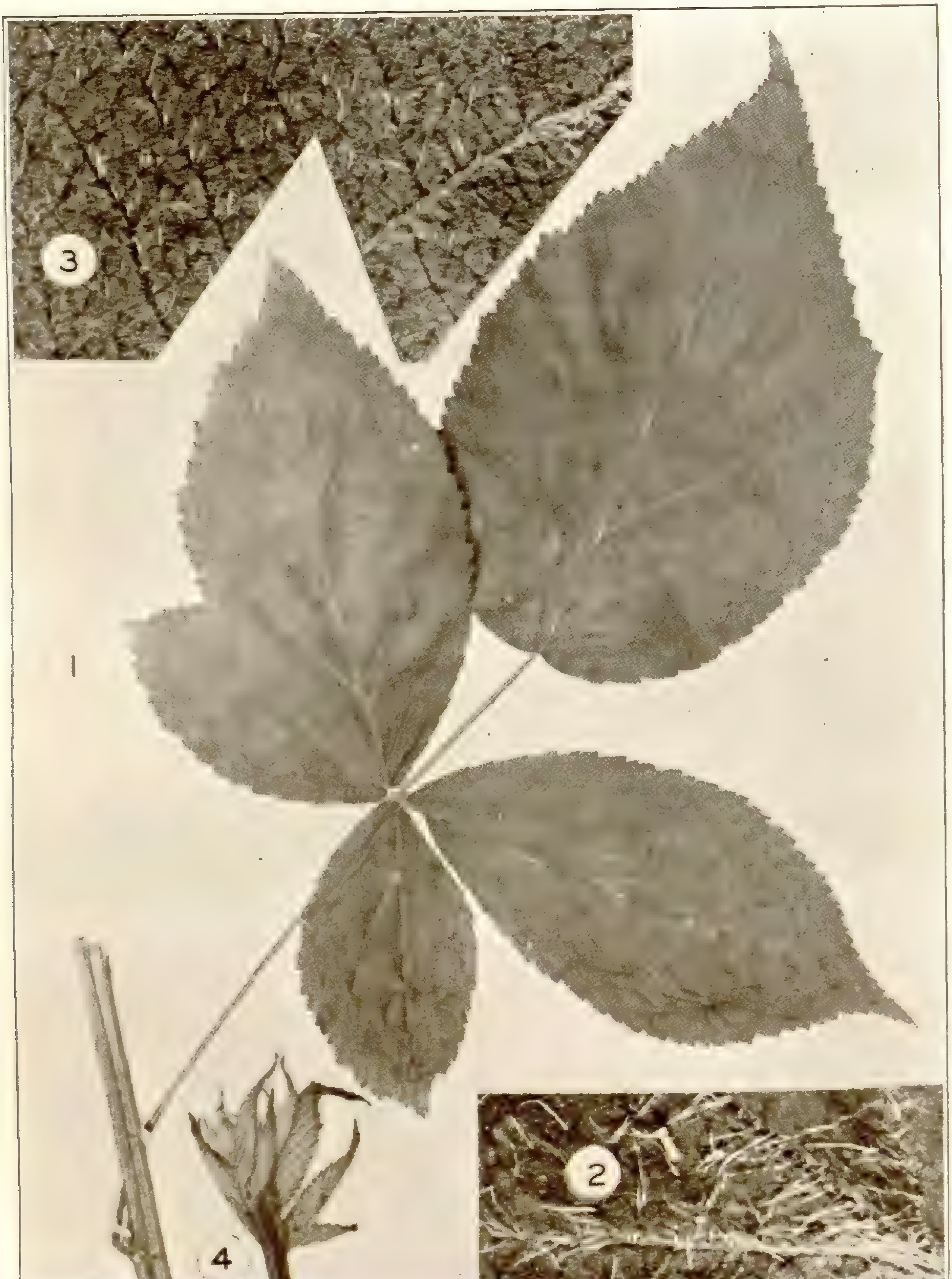

Photo B. G. Schubert

RUBUS SUBINNOXIUS, all figs. from TYPE: FIG. 1, portion of primocane and a primocane-leaf, × 1; FIG. 2, upper and FIG. 3, lower leaf-surface, × 10; FIG. 4, unexpanded young leaves, × 1.

Photo B. G. Schubert

Rubus subinnoxius, both figs. from type: fig. 1, portion of floricane, × 1/3; fig. 2, lower surface of primocane-leaf, × 10.

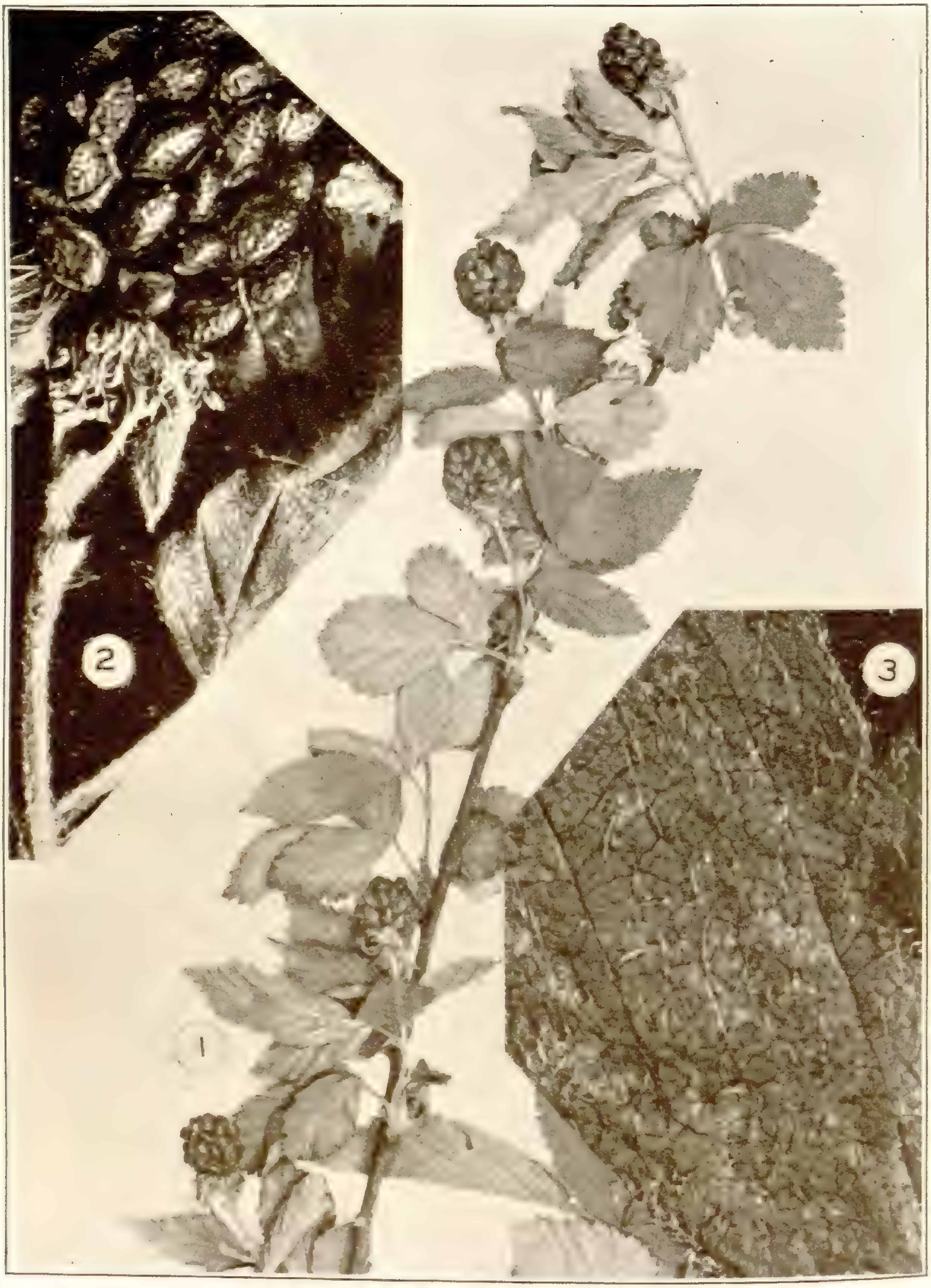

Photo B. G. Schubert

RUBUS SUBINNOXIUS, all figs. from TYPE: FIG. 1, small fruiting branchlet, × 1; FIG. 2, fruiting pedicel and fruit, × 5; FIG. 3, upper surface of floricane-leaf, × 10.

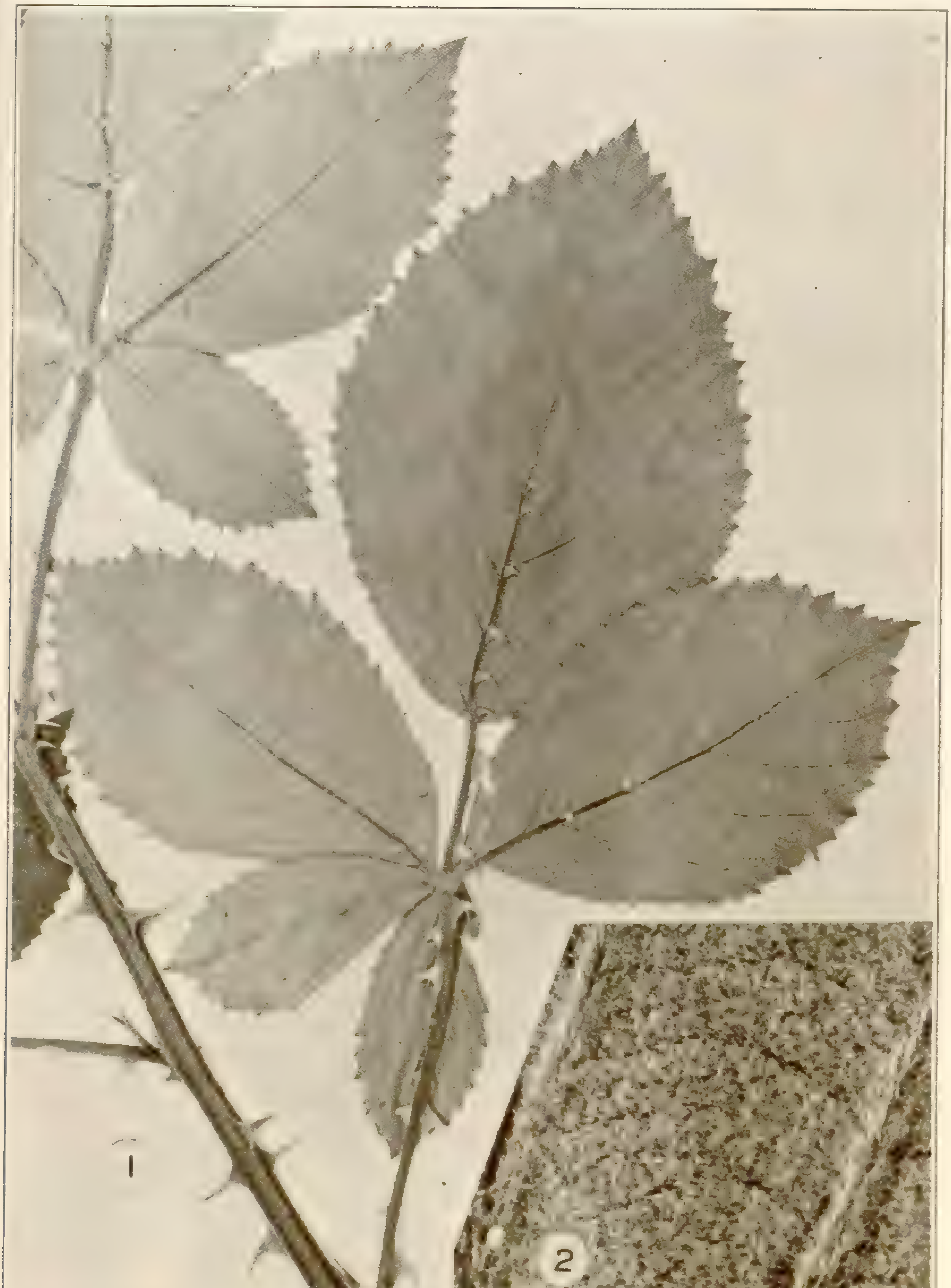

Photo B. G. Schubert

Rubus uliginosus, both figs. from type: fig. 1, portion of primocane, × 1: fig. 2, lower surface of primocane-leaf, × 10.

Photo B. G. Schubert

RUBUS ULIGINOSUS, both figs. from TYPE: FIG. 1, fruiting cane, × 1· FIG. 2, upper surface of floricane-leaf, × 10.

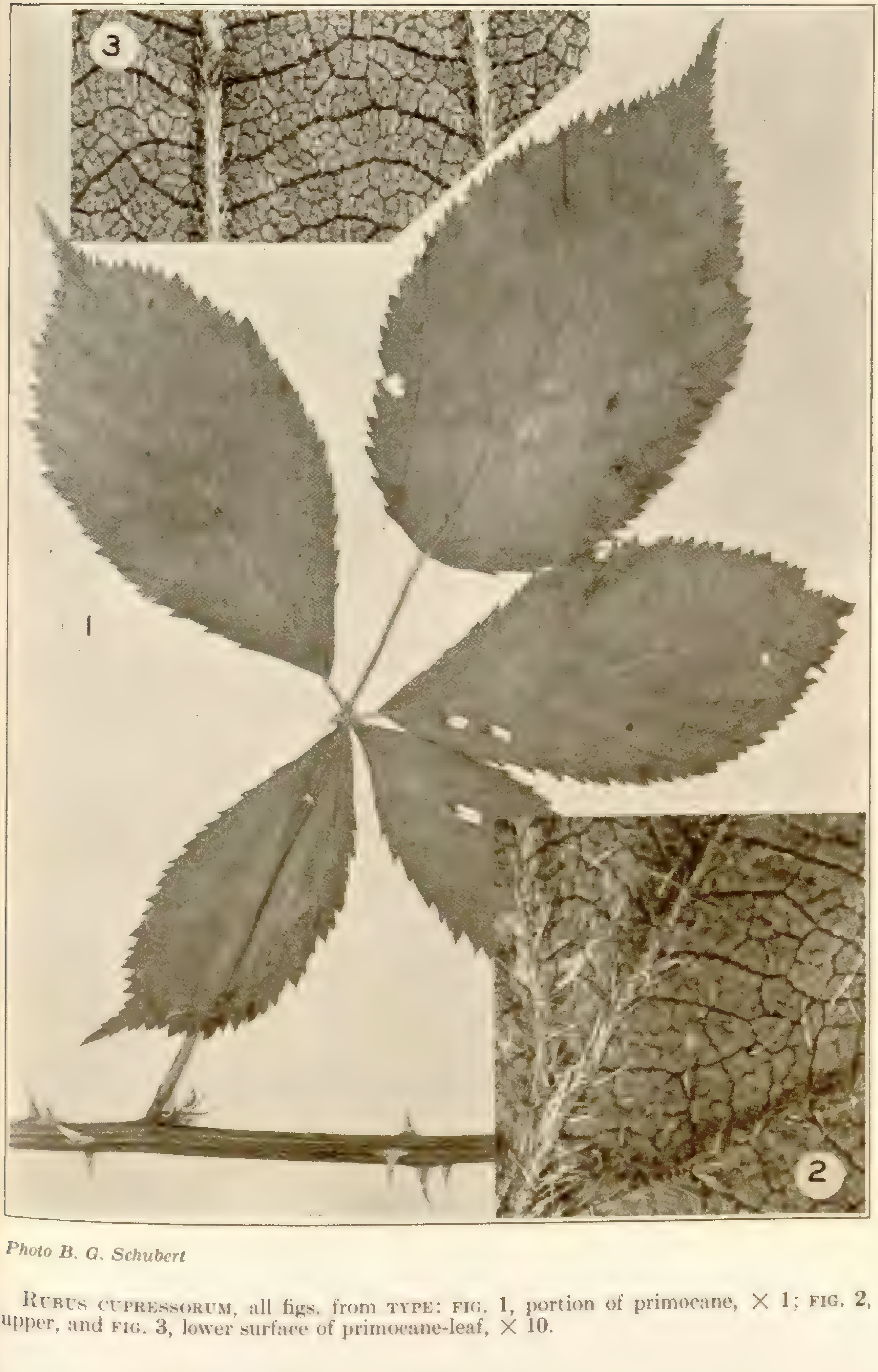

Photo B. G. Schubert

Rubus cupressorum, all figs. from type: fig. 1, portion of primocane, × 1; fig. 2, upper, and fig. 3, lower surface of primocane-leaf, × 10.

Photo B. G. Schubert

RUBUS CUPRESSORUM, all figs. from TYPE: FIG. 1, fruiting branchlets, × 1/3; FIG. 2, upper, and FIG. 3, lower surface of floricane-leaf, × 10.

Photo B. G. Schubert

RUBUS CUPRESSORUM, both figs. from TYPE: FIG. 1, pedicel and fruiting calyx, × 5; FIG. 2, fruiting branchlets, × 1.

Photo B. G. Schubert

CROTALARIA PURSHII: FIG. 1, summit (in two parts) of plant, × 1. Var. BRACTEOLIFERA: FIGS. 2 and 3, portions from summit of TYPE, × 1.

Photo I. D. Clement

HYPERICUM CANADENSE, var. GALIIFORME, both figs. from TYPE: FIG. 1, three plants, × 1; FIG. 2, fruits, × 10.

Photo B. G. Schubert

LYONIA LIGUSTRINA, forma NANELLA, all figs. from the TYPE: FIGS. 1 and 2, largest plant, × 1; FIG. 3, summit of small plant, × 1.

Photo B. G. Schubert

GENTIANA CATESBAEI: FIGS 1 and 2, Walter's TYPE, after photo. from Dr. *J. Ramsbottom*

Var. NUMMULARIAEFOLIA: FIGS. 3 and 4, TYPE, × 1

Photo B. G. Schubert

GENTIANA CATESBAEI: FIGS. 1 and 2, inflorescences, × 1, of modern specimens

Photo B. G. Schubert

PHYSALIS HETEROPHYLLA, var. CLAVIPES; all figs. from TYPE: FIG. 1, portion of fruiting plant, × 1; FIG. 2, a large leaf, × 1; FIG. 3, pubescence of stem, × 10; FIG. 4, a base, with portion of horizontal subterranean rhizome, × 1

Photo B. G. Schubert

PHYSALIS HETEROPHYLLA: FIG. 1, base of plant and leaf at upper right, × 1; FIG. 2, pubescence of stem, × 10; FIG. 3, leaf, × 1, illuminated from below

Var. CLAVIPES, both figs. from type: FIG. 4, leaf, × 1, illuminated from below; FIG. 5, base of large plant, × 1

Photo B. G. Schubert

PHYSALIS HETEROPHYLLA, var. AMBIGUA: FIG. 1, base, × 1; FIG. 2, pubescence of stem, × 10; FIG. 3, leaf, × 1, illuminated from below

Var. NYCTAGINEA: FIG. 4, base, × 1; FIG. 5, pubescence of stem, × 10; FIG. 6, leaves, × 1, illuminated from below

Photo I. D. Clement

HELIANTHUS ANGUSTIFOLIUS, var. PLANIFOLIUS, portions of TYPE, × 1; FIG. 1, base of plant; FIG. 2, median leaves; FIG. 3, involucre.

Photo. I. D. Clement

Helianthus angustifolius: fig. 1, type, × ca. 1/4; fig. 2, perennating base of plant, × 1

Photo I. D. Clement.

HELIANTHUS FLORIDANUS: FIGS. 1 and 2, portions of TYPE, × 1; FIG. 3, stoloniferous base, × 1

Reprinted from CALDASIA, Vol. IV, May-October, 1946.

CONTRIBUTIONS FROM THE GRAY HERBARIUM
OF HARVARD UNIVERSITY

CLXIV

The Begoniaceae of Colombia

LYMAN B. SMITH and BERNICE G. SCHUBERT

DATES OF ISSUE

Pages 3-38 and Plates 1-7 .... May 10, 1946.
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ERRATA

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Page 11, line 7; **for** F. Serres **read** Fl. Serres.
Page 11, line 26; **for** tepala **read** tepalis.
Page 12, line 29; **for** Sc. Nat. **read** Sci. Nat.
Page 14, line 9; **for** it **read** if.
Page 18, line 21; **for** unico **read** unica.
Page 22, line 20; **for** Cordilera **read** Cordillera.
Page 25, for line 22; **substitute** duis ellipticis, integris, 8 mm. longis; pedicellis ad 10 mm. longis.
Page 32, line 9; **for** it **read** is.
Page 33, line 11; **for** srongly **read** strongly.
Page 33, line 21; **for** anther **read** anthers.
Page 79, line 34; **for** 2-6 dm. **read** 2-3 dm.
Page 80, line 27; **for** 240-260 m. **read** 240-600 m.
Page 80, line 28; **for** *1244* **read** *1264*.
Page 83, line 18; **for** 1-8 cm. **read** 1.8 cm.
Page 87, line 16; **for** not are **read** nor are.
Page 96, line 24; remove the word **type.**

INDEX

New scientific names are printed in full-face type

Separado de CALDASIA Nº 16, de mayo 10 de 1946

BOTANICA

THE BEGONIACEAE OF COLOMBIA (*)

By LYMAN B. SMITH and BERNICE G. SCHUBERT
Gray Herbarium of Harvard University, Cambridge, Massachusetts.

There has been no systematic treatment covering the *Begoniaceae* fo Colombia since A. De Candolle's world-monograph in the Prodromus in 1864, so it was to be expected that subsequent collections would yield some novelties. However, after studying the *Begoniaceae* of Argentina, Perú, Bolivia (**) and Guatemala in detail, we were quite unprepared for the rich development of the family in Colombia, where a third of the species proved to be new and well over half of them endemic. Undoubtedly these results are attributable to the complex mountain system and we can expect many more novelties as collectors go to new valleys and river-basins. In fact an analysis of the distribution of species by the twenty-three Departments and territories of Colombia shows that only twelve Departments are represented by the twenty new species and four are not represented at all.

In most cases when we say *Begoniaceae* it is equivalent to *Begonia* alone, since outside of that we have only the Colombian *Begoniella* and Ecuadorian *Semibegoniella* in the New World. *Begoniella* consists of a mere three species and a variety and *Semibegoniella* is of very doubtful value, being probably nothing more than aberrant plants of *Begonia* section *Casparya*.

The characters on which sectional and specific distinctions may be based in the genus *Begonia* are many, their range of development

(*) Contributions from the Gray Herbarium of Harvard University. No. CLXIV.

(**) See: Smith & Schubert in Darwiniana v. 78-117 (1941); in Field Mus. Pub. Bot. xiii, pt. 4, No. 1. 181-202 (1941); in Rev. Univ. Cuzco xxxiii, No. 87, 71-93 (1945).

is great and the combinations in which they occur almost as numerous as the mathematical possibilities. Habital types from the very delicately herbaceous to the stout fruticose occur and are scapose or caulescent and tuberous or fibrous-rooted. The habit is, in general, uniform throughout a section but much careless misidentification has resulted from observation of habit alone without study of the more fundamental characters. The leaves are basifixed to peltate, simple (so far as we know in the Colombian species), entire to lobed and straight to oblique or transverse. Variation in texture and indument is very great and is probably due in part to ecological influences.

It is difficult to say with accuracy whether a given species is monoecious or dioecious because, although both staminate and pistillate flowers may be borne on the same plant, their flowering periods are often spaced at such intervals that the two sexes are never observed together. One plant may, however, often bear a completely staminate and a completely pistillate inflorescence, both maturing at the same time or a plant may have a truly monoecious inflorescence. Although we do not feel that monoecism or dioecism of the inflorescence should be used alone as a diagnostic character, the form of the inflorescence (most often cymose) and the manner in which the staminate and pistillate flowers are borne (either separately or together with one pistillate flower terminal or otherwise) are specific.

It is in consideration of the flowers that most interesting examples of diversity are found. The characters are, for the most part, constant for the species and, to a certain extent, for the sections. The tepals of both sexes vary in number, texture, indument and shape. We are following the practice, established in the Natürlichen Pflanzenfamilien by Warburg and Irmscher, of designating the perianth-segments as tepals (where necessary as outer and inner tepals) and not distinguishing between calyx and corolla. Although in some species the distinction between the two series is definite, in others it appears to be a gradual regression from well developed to abortive members. In general, distinct series of perianth-segments are the rule in staminate flowers and the exception in the pistillate. Color has been considered diagnostic only occasionally in our treatment and then only in combination with other characters. The staminate flowers, which are always ebracteolate, have, in addition to their diagnostic tepal-characters, great distinctiveness in the stamens and receptacle. The stamens vary in anther-length as well as in the length of production of the connective beyond the loculi. The receptacle ranges from a low torus to an elongate column and derives still greater variation from the length and position of the filaments which are sometimes short and sufficiently crowded to give a strobilate appearance to the androecium. The variation of filament-length is gradual except in *B. Killipiana* where the stamens are in two distinct series.

The pistillate flowers are frequently bracteolate and the bracteoles though usually small and inconspicuous (often early deciduous) are occasionally large, persistent, fimbriate and in one species, *B. Rossmanniae,* accrescent. When persistent they are of diagnostic value and their presence or absence is a specific character. The pistillate tepals as noted previously, are more often than not of only one series, somewhat irregular in shape, and usually becoming progressively smaller toward the center. Their number may vary: when the usual number is two, a small third inner tepal is often found; when the number is more than five it is usually not constant. The styles have also reached a high degree of development and their character is constant for the species and in most cases for sections. Variation occurs in the degree of fusion, ramification, and in the position of the stigmatic papillae.

In his treatment in the Prodromus (p. 279) A. De Candolle noted that the condition of the placentae varies "... integris vel bipartitis, nunc in eodem ovario variantibus (sect. Poecilia)...". Warburg and Irmscher in the Pflanzenfamilien, however, make the first division of their keys to the American sections on the basis of whether the placentae are simple or divided, admitting only a rare exception under the section *Poecilia.* Schulz (in Urb. Symb. Ant. vii, p. 28) follows De Candolle, demonstrating in his key that the character of the placentae is variable and stating under *Begonia humilis* that "Placentae in speciminibus robustis bipartitae, in teneris ± simplices". On the basis of very numerous dissections we are unable to consider this character a constant one to distinguish sections or even constant within species; in the specific descriptions we have noted the condition as we have found it. The fruit which is always a capsule may be horned or winged. The horned type is characteristic of section *Casparya;* the winged type of the other sections. In the development of horns and wings there is usually sufficient constancy for diagnostic purposes. The fruit together with both types of flowers are, in general essential for determining the systematic position of the species.

There are too many gaps in our knowledge to allow us to arrange the species of *Begonia* by sections, so the key and sequence are frankly artificial. However, it has been possible to segregate some sections, most notably *Casparya*. In this key we have emphasized characters of habit and leaf, because so many specimens do not have complete flowers and fruit.

We are indebted to the following institutions for the privilege of studying their collections or duplicates in the preparation of this paper:

Chicago Natural History (Field Museum) Museum, Chicago, Illinois (CM); Comisión de Botánica de la Secretaría de Agricultura y Fomento del Departamento del Valle del Cauca (Valle); Herbario Nacional Colombiano, Bogotá (Col); Missouri Botanical Garden, St. Louis, Missouri (Mo); New York Botanical Garden, New York, New York (NY); United States National Herbarium, Smithsonian Institution, Washington, D. C. (US).

Photographs of types in European herbaria taken by Mr. J. Francis Macbride under the Rockefeller Foundation Fund have proved of great value, especially in view of the subsequent destruction of many of the specimens. These were taken at the Conservatory of Botany at Geneva (Gen) including the Delessert Herbarium and at the Berlin Herbarium (Berlin). Where the identity seems reasonably certain we have recorded collections on the basis of A. De Candolle's citations (! A. DC.) in the Prodromus. Mr. E. P. Killip has most kindly placed at our disposal his critical notes and photographs of types made during a preliminary study of the group.

BEGONIACEAE R. Br. Annual or perennial herbs, shrubs or rarely small trees. Stem elongate and succulent or woody or sometimes reduced to a tuberous rhizome, sometimes climbing. Leaves usually alternate or rarely subverticillate, entire, serrate, lobed or digitately parted, usually asymmetric, sometimes peltate. Stipules 2, free, persistent or deciduous. Peduncles axillary. Inflorescence most commonly cymose, sometimes 1-flowered or racemose. Cymes regular or strongly one-sided, unisexual or bisexual. Flowers monoecious. Tepals free or connate. Stamens indefinite, inserted on the receptacle, filaments free or united. Styles usually 3, free or connate, usually bifid. Ovary inferior in the American species, usually 3-celled and 3-winged or 3-horned. Placentae usually axile, simple or divided. Fruit usually capsular.—R. Br. in Tuckey, Congo. 464 (1818); Lindl. Syst. Nat. ed. 2, 56(1836); Klotzsch, Begoniaceen-Gattungen und Arten in Abhandlungen der Königl. Akademie der Wissenschaften zu Berlin, 1854. 1-135, t. 1-12 (1855)[1]; A. DC. in DC. Prod. xv. pt. 1, 266 (1864); Irmscher in Engler & Prantl, Pflanzenfam. ed. 2, xxi. 548 (1925). C. Chevalier, Les Bégonias (1938).

Key to Genera

Tepals of both staminate and pistillate flowers free. .... 1. **Begonia.**
Tepals of both staminate and pistillate flowers connate. ...... 2. **Begoniella.**

1. **BEGONIA** L.

General characters of the family of which it contains more than ninety per cent of the species. Tepals free, usualy 4 staminate in two pairs and 5 pistillate. Placentae simple or divided. Fruit usually bearing 3 unequal wings.—Sp. Pl. 1056 (1753).

About 800 species. Nearly pantropical.

Note: On the advice of the editor, Dr. A. Dugand, we have placed the key to species of *Begonia* at the end of the treatment, so that there will be no confusion regarding the date of publication of new species in this continued article.

1. **Begonia (? § Huszia) hydrophylloides** Smith & Schubert, spec. nov., e fragmentis solum cognita sed verisimiliter acaulis, omnino glabra; folio unico cognito latissime ovato, subsymmetrico, acuminatim lobato, basi cordato, 23 cm. lato, palmatim 6-nervato, dentato, petiolo minimum 2 dm. longo, stipulis ignotis; scapo unico cognito 57 cm. longo, 8 mm. diametro; inflorescentia cymosa, multiflora, ca. 10 cm. diametro; bracteis deciduis, ellipticis, 5 mm. longis, integris, membranaceis; pedicellis masculinis ad 17 mm. longis; tepalis masculinis 4, integris, albis, exterioribus late ovatis, basi cordatis, 10 mm. longis, interioribus oblongis; staminibus in columna insertis, multis, antheris obovoideis, quam filamentis multo brevioribus; floribus femi-

[1] Cited simply as "Kl. Begon." hereafter.

neis perjuvenilibus solum cognitis; tepalis femineis 5, inaequalibus, ovatis, integris; stylis 3, bifidis; ovario 3-alato, alis verisimiliter inaequalibus. Tab. 1.

CUNDINAMARCA: moist bank, Guayabetal to "Monte Redondo" (= Monterredondo) southeast of Quetame, alt. 1300-1500 m., Sept. 6, 1917, *Pennell 1803* (NY, **type**).

Although we can not be sure of the relationship of this species or even of its section on the basis of an unconnected leaf and inflorescence, the relatively great size of the petiole and peduncle make it appear extremely probable that this is a scapose plant with a tuberous base.

2. **Begonia (§ Huszia) quetamensis** Smith & Schubert, spec. nov., acaulis, tuberosa; foliis late ovatis, acutis, basi obliquis subtruncatisque, ad 13 cm. longis, palmate nervatis, dentatis, supra dissite et subtus ad nervos puberulis, petiolo 22-24 cm. longo, piloso, stipulis ignotis; scapo ad 5 dm. longo, 4 mm. diametro, plus minusve piloso; inflorescentia pauciflora, pseudoracemosa, puberula, bracteis persistentibus, ellipticis, 12 mm. longis, integris; floribus albis; pedicellis ad 4 cm. longis; tepalis masculinis 5, inaequalibus, ellipticis, ad 17 mm. longis, minute. ciliato-serrulatis, intus dense minuteque papillatis; staminibus multis, antheris subglobosis, quam filamentis multo brevioribus, connectivo haud producto; floribus femineis ebracteatis; tepalis femineis 6, inaequalibus, late ellipticis, ad 10 mm. longis; stylis multifidis, stigmatibus capitatis; ovario ellipsoideo, placentis bipartitis, undique ovuliferis; capsula alata, alis valde inaequalibus, ala maxima oblonga, adscendente, 15 mm. lata, reliquis triangularibus, parvis. Tab. 1.

CUNDINAMARCA: moist bank, "Monte Redondo" (= Monterredondo) to Quetame, alt. 1400-1500 m., Sept. 7, 1917, *Pennell 1853* (NY, **type**).

Begonia quetamensis appears to be most closely related to *B. rubricaulis* Hook. of Argentina, which was placed in the section *Huszia* by A. De Candolle although it contradicted his character of a merely bifid style. It seems best for the present to keep such species in *Huszia* on account of their scapose habit, rather than to place them under the caulescent *Eupetalum* where both A. De Candolle's and Irmscher's keys would take them.


B. hydrophylloides
× 5
× 1
× 1/4
B. quetamensis
× 5
× 1
× 1
× 1/2
B. macra
× 1
× 1/5
B. rosacea
× 1/2

TAB. 1

3. **Begonia (§ Huszia) macra** A. DC. Stemless herb; base tuberous, about 25 mm. long, bearing gemmae and fibrous roots; leaves usually 2, broadly ovate to suborbicular, 5-7.5 cm. long, acute, deeply cordate at base, dentate, fulvous-tomentose on both sides, petiole 35-60 mm. long, tomentose, stipules ovate, acute, 4-6 mm. long, becoming glabrous; scapes often 2, naked, slender, soon glabrous, 2-3 dm. high, much exceeding the leaves; cymes only 2- or 3-branched, few-flowered, bracts deciduous, elliptic, crenulate, colored, the middle ones 9 mm. long; pedicels 6-24 mm. long, puberulent; flowers rose; staminate tepals 6, the outer broadly elliptic, 12 mm. long, the inner obovate, 10 mm. long; anthers obovoid, less than 1 mm. long, slightly shorter than the filaments; pistillate bractlets doubtful; pistillate tepals 5, accrescent, 6-8 mm. long at anthesis, later increasing to 10-12 mm.; capsule 3-celled, obovoid, subacute at base, 12 mm. long, 18 mm. wide, purplish, bearing a single ovate obtuse wing.—Endemic.—A. DC. in Ann. Sci. Nat. ser. 4, xi. 121 (1859); in DC. Prod. xv. pt. 1, 284 (1864). Tab. 1.

CUNDINAMARCA: Eastern slope, Ubalá, alt. 1700 m., 1851-57, *Triana 3029* (British Museum, isotype, phot. Killip).

Doubtfully referred here: CUNDINAMARCA: Páramo de Guasca, eastern slope, Quebrada de Juiquín, Cordillera Oriental, alt. 2500 m., Aug. 27, 1941, *Cuatrecasas & Jaramillo 11989* (US). This specimen agrees in most details with what we know of *Begonia macra*, but it has only four staminate tepals where *B. macra* is described as having six. However, in both of its staminate flowers, one of the inner tepals is deeply cleft while the other is not even emarginate, thus suggesting considerable irregularity in the tepal number. The styles are much branched and the placentae bifid, characters not noted in the original description of *B. macra*.

4. **Begonia (§ Huszia) rosacea** Putz. Herbaceous, stemless, tuberous; leaves few, very broadly ovate, obtuse, deeply and narrowly cordate at base, 7-11 cm. long, to 10 cm. wide, crenate, ciliate, green and glabrous above, paler beneath and pilose on the nerves, petiole 7-10 cm. long, red, pilose; scape 30-50 cm. high, red, pilose; cymes 4-flowered, dichotomous, very lax, monoecious; bracts persistent, ovate, acute, 6-8 mm. long, glabrous; pedicels to 35 mm. long; staminate tepals 7-8, broadly elliptic, 10-16 mm. long, pinkish white, spreading, the outer ones broader and somewhat greenish; stamens

numerous on a torus, filaments free, anthers obovoid; pistillate bracts obovate, acute, nearly equaling the ovary; pistillate tepals 6-7, like the staminate; styles much branched, the stigmatic tissue spiral but not continuous, placentae bifid, ovuliferous throughout; capsule subglobose, pubescent (! Putzeys), unequally 3-winged, the smaller wings marginiform, the larger ovate, subacute, slightly ascending. — Endemic. — Putz. in F. Serres, ser. 2, ii. 25, t. 1194 (1857); in Belg. Hortic. vii. 366, fig. 63 (1857); A. DC. in DC. Prod. xv. pt. 1, 284 (1864). Tab. 1.

META or VICHADA: between the Río Meta and the Río Guaviare. Described and illustrated from cultivated material. It is doubtful if there is or ever was herbarium material.

5. **Begonia** (? § **Huszia) lutea** Smith & Schubert, spec. nov., herbacea, acaulis, tuberosa; tubero ca. 1 cm. diametro; foliis paucis, paulo asymmetricis, rectis vel obliquis, late ovatis vel suborbicularibus, breviter acutis vel obtusis, basi cordatis, ad 12 cm. longis, 11 cm. latis, dentatis, utrinque sparse tomentosis, subtus ad nervos ferrugineis, petiolo ad 10 cm. longo sed plerumque multo breviore, tomentoso, stipulis deciduis, ignotis; scapis 1-5, gracillimis, nudis, tomentosis, ad 14 cm. longis; cymis paucifloris, diffusis, subunilateralibus, bracteis persistentibus, lacerato-palmatifidis, 3-5 mm. longis, membranaceis; floribus luteis; pedicellis gracillimis, ad 2 cm. longis, tepalis masculinis 4, exterioribus late ovatis, 6 mm. longis, interioribus anguste obovatis, brevioribus; staminibus in columna insertis, multis, antheris subglobosis, quam filamentis brevioribus, connectivo obtuse producto; floribus femineis ebracteatis, tepala femineis 5, ellipticis, subaequalibus, ca. 5 mm. longis; stylis 3, breviter connatis, bifidis, stigmatibus spiraliter cinctis; ovario 3-loculato, ellipsoideo, placentis simplicibus, angustis; capsula trialata, alis inaequalibus, ala maxima ovata, plus minusve obtusa, ad 1 cm. lata. Tab. 2.

META: moist forest-slope near Río Guatiquía, Villavicencio, Aug.-Sept., 1917, *Pennell 1537* (NY, **type**; G).

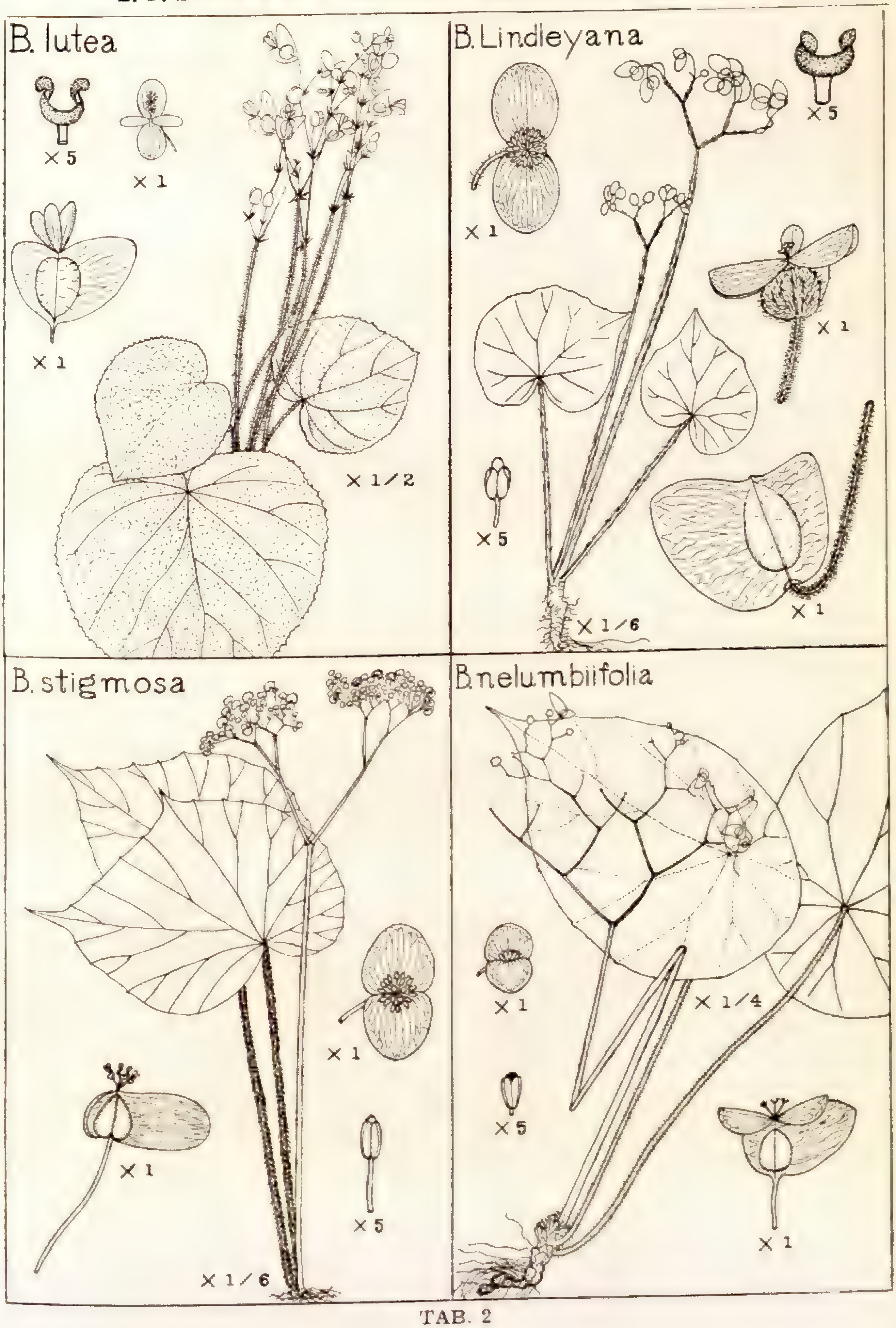
VAUPES: on mossy rocks in forest, Río Guayabero, alt. 240 m., Nov. 8, 1939, *Cuatrecasas 7547* (US); on damp mossy crags of sandstone cliffs, Cerro del Castillo, upper Apaporis Basin, Apaporis River, alt. ca. 300 m., July 27, 1943, *R. E. Schultes 5658* (G).

6. **Begonia** (§ **Magnusia) Lindleyana** Walp. Herbaceous, fuscous-villous throughout at least when young; rhizome usually erect, up

to 3 dm. long, subligneous at base, 10-25 mm. thick, internodes very short; leaves palmately 7-9-nerved, oblique, very broadly ovate, abruptly acuminate, from almost evenly rounded and entire to deeply acuminate-lobed and coarsely dentate, 8-22 cm. long, thin, soon glabrous above, petioles erect, 3-22 cm. long, 2-5 mm. thick, stipules persistent, imbricate, subtriangular, acuminate-setiferous, 15-25 mm. long, entire; peduncles exceeding the leaves, up to 48 cm. long; cymes usually unisexual and somewhat irregular with one side slightly longer but diffuse and broader than high, few-to many-flowered; bracts deciduous, very broad, obtuse, the lowest 17-20 mm. long, serrate, ciliate, very thin; staminate tepals 2 or 4, the outer ones suborbicular, 6-13 mm. long, entire, white, the inner when present smaller and narrowly obovate; stamens numerous, filaments short, anthers oblong, obtuse; pistillate flowers bracteolate, tepals 2 or sometimes a smaller one inside the others, suborbicular, smaller than the staminate; ovary 3-celled, placentae bifid, ovuliferous throughout, styles short-connate, the stigmatic tissue lunate-capitate at their apices; capsule suberect, ellipsoid, 8-12 mm. long, wings unequal, the largest ovate, obtuse or acute, subascending, 11-15 mm. wide.—Southern Mexico, Central America.—Walp. Rep. ii. 209 (1843); A. DC. in DC. Prod. xv. pt. 1, 336 (1864). *B. vitifolia* Lindl. in Bot. Reg. xxviii. misc. 21 (1842), non Schott (1827). *B. sarchophylla* Liebm. in Kjoeb. Vidensk. Meddell. 1852. 12 (1853); A. DC. op. cit. 337. *B. sericoneura* Liebm. op. cit. 13; A. DC. op. cit. 336. *B. cardiocarpa* Liebm. loc. cit.; A. DC. op. cit. 337. *Gireoudia Lindleyana* Kl. in Monatsber. Berlin Akad. 125 (1854). *G. cardiocarpa* Kl. loc. cit. *G. fibrillosa* Kl. Begon. 86 (1855). *G. pilifera* Kl. loc. cit. *G. vitifolia* Kl. op. cit. 87. *G. sarchophylla* Kl. op. cit. 88. *G. sericoneura* Kl. op. cit. 89. *Begonia lanuginosa* A. DC. in Ann. Sc. Nat. ser. 4, xi. 131 (1859); in DC. Prod. xv. pt. 1, 327 (1864). *B. pilifera* A. DC. op. cit. 337. *B. Biolleyi* C. DC. in Bull. Soc. Bot. Belg. xxxv. pt. 1, 263 (1896). *B. nicaraguensis* Standl. in Pub. Field Mus. Bot. iv. 237 (1929). Tab. 2.

SANTANDER: rocky bank, valley of Río Suratá, between Bucaramanga and El Jaboncillo, alt. 800-1500 m., Jan. 2, 1927, *Killip & A. C. Smith 16351* (G, NY).

VALLE: Naranjo, Río Dagua, April 1, 1876, *André 2499* (NY); wet cliffs, Cisneros, Dagua Valley, alt. 300-400 m., Sept. 21, 1922, *Killip 11439* (G, NY); thickets along Río Dagua, Cisneros, alt. 300-500 m., May 5, 1939, *Killip 35577* (G, US).


B. lutea
× 5
× 1
× 1
× 1/2
B. Lindleyana
× 1
× 5
× 1
× 5
× 1
× 1/6
B. stigmosa
× 1
× 1
× 5
× 1/6
B. nelumbiifolia
× 1
× 1/4
× 5
× 1

TAB. 2

NARIÑO: "Prov. de Pasto, Juanambú, alt. 1200 m., June 1853", *Triana (6)* (Col); Juanambú, alt. 1200 m., 1866, *Triana 3032* (Gen, phot. Macbride, CM no. 24191, type of *Begonia lanuginosa* A. DC.).

7. **Begonia (§ Magnusia) stigmosa** Lindl. Herbaceous; rhizome repent, to 12 cm. long, 1 cm. in diameter, coarsely lepidote, internodes very short and covered by the stipules; leaves oblique and strongly asymmetric, very broadly ovate or suborbicular, abruptly acuminate and usually with a second cusp more nearly opposite the petiole, cordate at base, 15-30 cm. long, scarcely it at all lobed, ciliate-denticulate, thin, glabrous above or with a few small white trichomes, the nerves beneath bearing trichomes like those on the petiole but smaller, petioles erect, to 38 cm. long, 4-10 mm. in diameter, covered with spreading to reflexed narrowly triangular lacerate pink scales 3-5 mm. long, stipules tardily deciduous, lanceolate, pilose, membranaceous, 15-20 mm. long; peduncle 2-5 dm. long (! Cuatrecasas), 7 mm. in diameter, soon glabrous; cymes bisexual, nearly regular, few- to many-flowered, 7-22 cm. long, lax, glabrous; bracts quickly deciduous, oblong, acute, fimbriate; pedicels slender, 7-23 mm. long; flowers white or pink; staminate tepals 2, suborbicular, cordate at base, 10-15 mm. long; stamens free, very numerous, filaments much longer than the broadly oblong anthers, connective apiculate-produced; bracteolae lacking; pistillate tepals 2 like the staminate or rarely a smaller one inside the others; ovary 3-celled, placentae bifid, ovuliferous throughout; styles bifid, the stigmatic tissue linear, spiral, continuous; capsule erect, broadly ovoid. 6-8 mm. long, wings very unequal, the largest oblong or subdolabriform, 10-15 mm. wide, the others narrowly marginiform.—Southern Mexico, Central America.—Lindl. in Bot. Reg. xxxi. misc. 32 (1845); A. DC. in DC. Prod. xv. pt. 1. 343 (1864). *B. squarrosa* sensu Seemann, Bot. Herald, 128 (1853), non Liebm., nomen. *Gireoudia stigmosa* Kl. in Monatsber. Berlin Akad. 125 (1854). Tab. 2.

MAGDALENA: Santa Marta, alt. 1200 m., 1898-1901, *H. H. Smith 1262* (NY, US, G); Vista de Nieve. Santa Marta Mountains, Dec. 18, 1922, *Viereck 8* (US); stream above Manaure, alt. ca. 800 m., Jan. 16, 1944, *O. Haught 3953* (US).

NORTE DE SANTANDER: bank of the Río Margua between Junín and Córdoba, region of Sarare, Cordillera Oriental, alt. 920-1240 m., Nov. 22, 1941, *Cuatrecasas 13375* (G).

8. **Begonia (§ Magnusia) nelumbiifolia** Schlecht. & Cham. Herbaceous; rhizome repent, short, 15 mm. thick, setose, internodes extremely short; leaves peltate, obliquely very broadly ovate or subelliptic, 7-9-nerved, evenly rounded except for the abruptly acuminate apex or slightly produced at the ends of the nerves, 17-40 cm. long, 10-28 cm. wide, remotely denticulate, soon glabrous, the margin ciliate and sometimes purple, thin, petioles 15-45 cm. long, to 8 mm. thick, sparsely rufous-hirsute, becoming glabrous, stipules persistent, lanceolate, over 2 cm. long, entire, rather firm, pilose; peduncle usually exceeding the leaves, to 66 cm. long, 6 mm. thick, soon glabrous; cyme regular, much branched, diffuse, 2-5 dm. broad; bracts deciduous, ovate, obtuse; pedicels slender, 9-22 mm. long; staminate tepals 2, suborbicular, 6-8 mm. long, white; stamens few, anthers narrowly obovate, equaling or longer than the filaments; pistillate bracteoles lacking; pistillate tepals 2, like the staminate; ovary 3-celled, placentae bifid, ovuliferous throughout, styles connate at base, distinctly divided, the stigmatic surface linear, spiral, continuous; capsule erect or somewhat nutant, broadly ovoid, 6-10 mm. long, wings very unequal, the largest ovate, obtuse, to 15 mm. wide, seeds ellipsoid, blunt.—Southern Mexico to Colombia.—Schlecht. & Cham. in Linnaea, v. 604 (1830); A. DC. in DC. Prod. xv. pt. 1, 343 (1864). *B. derycxiana* Lem. in Hortic. Univ. v. misc. 355 (1844). *Gireoudia nelumbiifolia* Kl. in Monatsber. Akad. Berlin, 125 (1854). *Begonia caudilimba* C. DC. in Smithson. Misc. Coll. lxix. no. 12, 9 (1919). Tab. 2.

BOLIVAR: bank in forest, Boca Verde, on Río Sinú, alt. 100-400 m., Mar. 4, 1918, *Pennell 4577* (NY, G).

9. **Begonia (§ Casparya) trispathulata** (A. DC.) Warb. Fruticose, possibly scandent; branches flexuous, glabrous; leaves strongly oblique and asymmetric, ovate or elliptic, abruptly acuminate, shallowly cordate at base, 10-11 cm. long, 5-6.5 cm. wide, penninerved, doubly serrate, setose-ciliate, ferruginous-puberulent on the nerves beneath, petiole 6-10 cm. long, glabrous, stipules deciduous, lanceolate, acuminate-setiferous, 18 mm. long, glabrous; peduncles axillary, few-flowered, shorter than the leaves; bracts ovate, obtuse, to 6 mm. long, 4 mm. wide, glabrous; outer staminate tepals broadly elliptic, 6-8 mm. long, glabrous, inner obovate, shorter; anthers longer than the filaments, obtuse with the connective scarcely produced; pistil-

late tepals 5, unequal; placentae bilamellate; capsule broadly turbinate, not produced at apex, dehiscing by the 3 angles, horns equal, flattened in a horizontal plane, subfoliaceous, obtuse or mucronulate, 10-12 mm. long.—Venezuela.—Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 146 (1894); Irmscher, loc. cit. ed. 2, xxi. 584 (1925). *Casparya trispathulata* A. DC. in Ann. Sci. Nat. ser. 4, xi. 117 (1859); in DC. Prod. xv. pt. 1, 271 (1864). Tab. 3.

"NOVA GRANATA", without further locality, *Linden 1459* (Kew, **type**; phot. Killip).

Our illustration of this species was made from Venezuelan material. *H. Pittier 10032,* and it is quite likely that the type also came from Venezuela, since Linden collected near the border. However, it is to be expected in Colombia even if the type locality should prove to be erroneous.

The horizontally flattened appendages in this and the following species and *B. Trapa* of Venezuela set them apart not only from the remainder of the section *Casparya* but from all other American species of *Begonia* as well.

10. **Begonia (§ Casparya) chlorolepis** Smith & Schubert, spec. nov., verisimiliter suffruticosa et metralis, ramis petiolis pedunculisque ferrugineo-puberulis; foliis fere rectis, valde asymmetricis, oblongo-ellipticis, abrupte acuminatis, basis latere prope axin rotundato, altero cuneato-decurrente, 10 cm. longis, 5 cm. latis, crenato-serrulatis, supra dissite setulosis, subtus ad nervos dense ferrugineo-setulosis, petiolo 10-25 mm. longo, stipulis persistentibus, subreniformibus, 15 mm. longis, firmis, viridibus, setulosis; pedunculis axillaribus, erectis, 4 cm. longis, femineis unifloris; inflorescentiis masculinis ramis 3-4 aequalibus compositis, ramis simplicibus, ad apicem versus dense florigeris, bracteis mox deciduis, ovatis vel ellipticis, obtusis, 5 mm. longis, membranaceis, glabris; tepalis masculinis 4, integris, glabris, exterioribus ellipticis, obtusis, 7 mm. longis, rubris, interioribus anguste obovatis, acutis, 5 mm. longis, albis; staminibus multis, in columna insertis, antheris anguste oblongis, quam filamentis bene longioribus, connectivo producto, acuminato, tepalis femineis 6, anguste ellipticis, obtusis, puberulis, exterioribus ex sicco rubris, subaequalibus, ad 18 mm. longis, interioribus pallidis, multo minoribus: stylis multifidis, ovario 3-partito, placentis bilamellatis, undique ovuliferis; capsula late turbinata, medio superne non producta, puberu-

la, cornubus 3, aequalibus, horizontaliter complanatis, ellipticis, erosis, 6-7 mm. longis. Tab. 3.

MAGDALENA: common in damp clearing near stream, Las Nubes, Santa Marta Mountains, alt. 1350 m., 1898-1901, *H. H. Smith 1268* (G, **type**; NY).

By its capsule, *B. chlorolepis* is evidently closely related to *B. trispathulata*, but it differs in all other details such as pubescence, leaf-form, stipules, inflorescence and tepals.

11. **Begonia (§ Casparya) Trianae** (A. DC.) Warb. Ferruginous-puberulent with at least the branches herbaceous; leaves transverse and strongly asymmetric, ovate, acute, shallowly cordate at base, 3-10 cm. long, 2-5 cm. wide, crenate-dentate, dark green above, paler beneath, petiole 12-32 mm. long, stipules tardily deciduous, ovate, obtuse, auricled, firm, 8-10 mm. long; peduncles axillary, 2.5-6 cm. long; staminate cymes densely few-flowered, pistillate 1-flowered; bracts deciduous, ovate, 8 mm. long, ciliate-serrulate, pilose; staminate tepals 4, the outer suborbicular, 6-8 mm. wide, ciliate-serrulate, pilose, the inner narrowly obovate, half as long, glabrous; anthers oblong, much longer than the filaments, the connective slightly produced, obtuse; pistillate tepals 5, obovate, acute, 6-8 mm. long, pubescent; styles much branched, the segments twisted with stigmatic papillae along the edge; placentae bilamellate; capsule broadly turbinate, truncate at apex, its horns subequal, flattened in a vertical plane, ovate, obtuse.—Endemic.—Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 146 (1894); Irmscher, loc. cit. ed. 2, xxi. 584 (1925). *Casparya Trianaei* A. DC. in Ann. Sci. Nat. ser. 4, xi. 117 (1859); in DC. Prod. xv. pt. 1, 271 (1864). Tab. 3.

NORTE DE SANTANDER: Páramo de Ramírez, prov. Ocaña, alt. 3000 m., Mar. 1853, *Schlim 1145* (Gen, phot. Macbride, CM no. 24209).

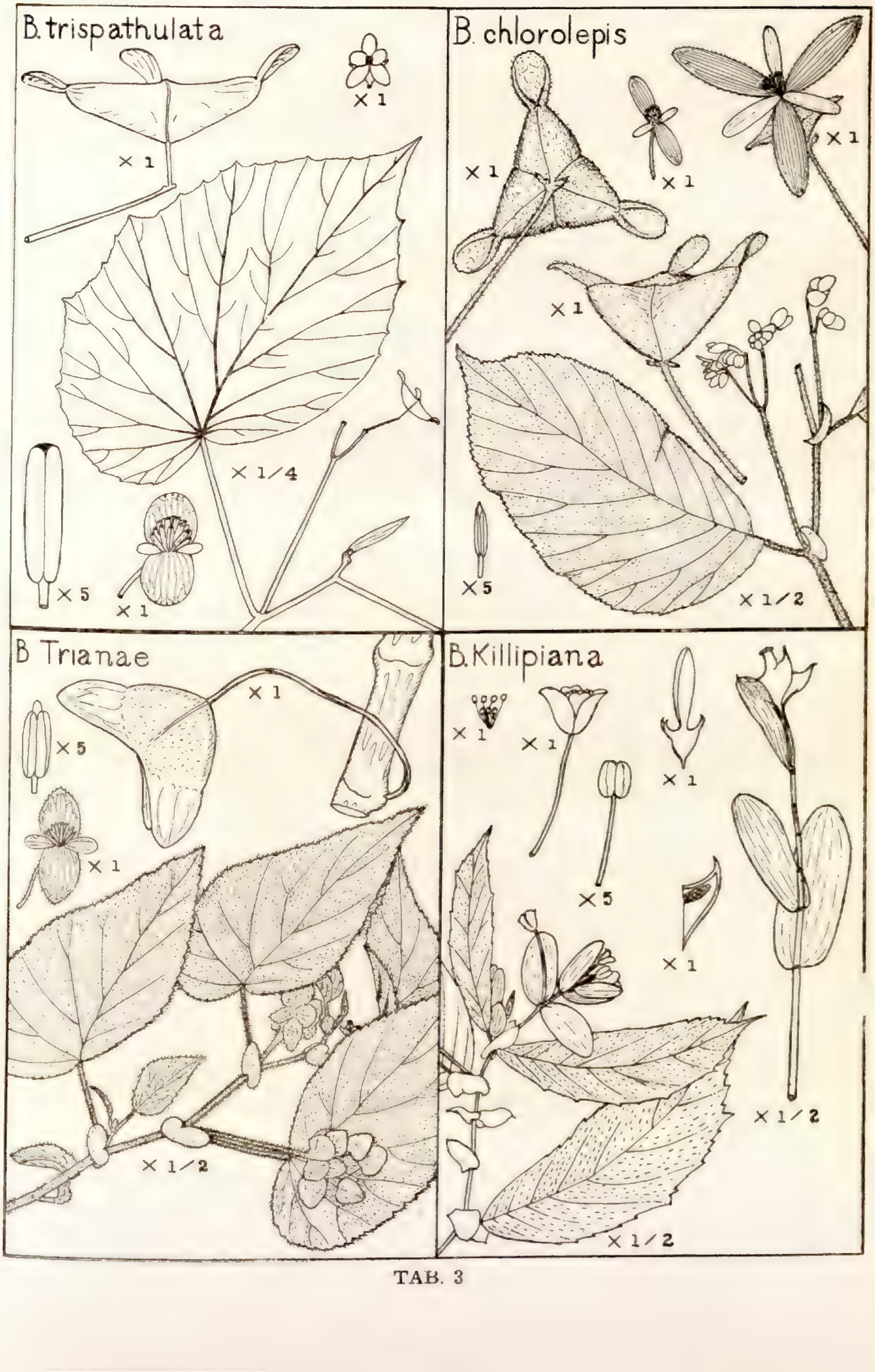
CUNDINAMARCA: Ubalá, alt. 1750 m., 1855, *Triana 3048* (British Museum, isotype; phot. Killip); "Prov. de Bogotá, Ubalá, 1750 m., *Triana (20)* (Col); Páramo de Guasca, eastern slope, Quebrada de Juiquín, Cordillera Oriental, alt. 2500 m., Aug. 27, 1941, *Cuatrecasas & Jaramillo 11990* (US).

It should be noted that the stem and leaves of *Begonia Trianae* are practically indistinguishable from those of *B. ferruginea*. We had no material to illustrate the pistillate tepals of *B. Trianae* and their description is drawn from A. De Candolle. The horns of this species are more wing-like than elsewhere in section *Casparya* but their uniformity and position at the top of the capsule indicate their true nature.

12. **Begonia (§ Casparya) Killipiana** Smith & Schubert, spec. nov., herbacea vel fruticosa, caulescens, erecta, ramosa, verisimiliter metralis vel ultra; caule glabro, rubro; foliis rectis, paulo asymmetricis, lanceolatis, abrupte acuminatis, basi subrotundatis, basis latere ab axi decurrente, 8-12 cm. longis, 3-5 cm. latis, crenato-serratis, supra dissite setulosis, subtus glabris vel ad nervos scaberulis; petiolo brevissimo, stipulis persistentibus, subreniformibus, 15-25 mm. longis, integris, firmis, fulgide rubris; pedunculis axillaribus, erectis, 15-40 mm. longis, gracilibus, glabris; inflorescentiis plurifloris, simplicibus, laxe racemosis, glabris; bracteis erectis, dense imbricatis, oblongo-ellipticis, obtusis, 20-45 mm. longis, fulgide scarlatinis; pedicellis ad 17 mm. longis; tepalis masculinis 4, liberis, integris, exterioribus ellipticis, obtusis, 6-8 mm. longis, scarlatinis vel apice aureis vel fere omnino albis, interioribus brevioribus, obcordatis, valde retusis, aureis vel albis; staminibus liberis, paucis, distincte biseriatis, aliis paulo aliis profunde inclusis, antheris quam filamentis bene brevioribus, late ellipticis, connectivo non producto, bracteolis femineis deciduis, ignotis; tepalis femineis verisimiliter 5 (e flore unico imperfecte cognitis), extremo elliptico, obtuso, 8 mm. longo, aliis gradatim brevioribus et in formam obcordatam mutatis; stylis 3, 4-partitis, segmentis ultimis linearibus, acutis; ovario 3-loculato, placentis simplicibus, anguste lanceolatis, capsula late turbinata, basi acuta, apice columna crasse cylindrica 6-8 mm. longa aucta, aequaliter 3-cornuta, cornubus acuminatis, leviter adscendentibus. Tab. 3.

CAUCA: western slopes, Andes of Popayán, alt. 2800-3000 m., *Lehmann 8250* (G, **type**); shrub-zone ("paramillo"), Mount "El Derrumbo" (= El Derrumbe), Cordillera Occidental, alt. 2500-2900 m., July 1, 1922, *Killip 7994* (G, NY); forest, "La Gallera", Micay Valley, Cordillera Occidental, alt. 2200-2600 m., July 1, 1922, *Killip 8004* (NY); Cordillera Occidental, Cerro de Munchique, western slope, bank of Río Tambito, alt. 2000-2500 m., July 16, 1939, *Pérez & Cuatrecasas 6235* (US).

It is a pleasure to name this species for Mr. Ellsworth P. Killip who has done so much in the flora of Colombia and who has been so generous in sharing his knowledge with others.


B. trispathulata
× 1
× 1
× 1/4
× 5
× 1
B. chlorolepis
× 1
× 1
× 1
× 1
× 5
× 1/2
B Trianae
× 1
× 5
× 1
× 1/2
B. Killipiana
× 1
× 1
× 1
× 5
× 1
× 1/2
× 1/2

TAB. 3

The large brilliantly colored bracts of *Begonia Killipiana* give it a very striking appearance which should make it popular in cultivation. Its technical characters are very unusual, especially the two-ranked stamens.

13. **Begonia (§ Casparya) ferruginea** L. f. Herbaceous to suffruticose, 0.6-4 m. high; stem soon glabrous, branches, peduncles and petioles sparsely to densely ferruginous-pubescent; leaves mostly transverse and strongly asymmetric, ovate, acute or acuminate, cordate at base, 7-13 cm. long, 5-7 cm. wide, dentate, dark green and scaberulous above, paler green or purplish beneath and ferruginous-pubescent on the nerves but soon glabrous between them, petiole 2-8 cm. long, stipules tardily deciduous, oblong, obtuse or apiculate, asymmetric, auricled, 12-25 mm. long, green, firm, scaberulous; peduncles axillary, 2-9 cm. long; cymes 2-4 times dichotomous; bracts deciduous, elliptic, obtuse, ciliate at apex, the lower ones 1 cm. long; flowers red; staminate pedicels 1-4 cm. long; staminate tepals 4, 20-30 mm. long, pilosulous outside, the outer oblong, obtuse or subacute, setose-serrulate toward apex, the inner oblong to obovate, subtruncate or emarginate; stamens free, numerous, anthers oblong, much longer than the filaments, the connective produced into an elongate seta; pistillate pedicels stouter, 5 mm. long; pistillate tepals 6, like the staminate, 15-35 mm. long; styles much branched with the erect linear segments bearing stigmatic tissue throughout, ovary 3-celled, placentae bifid, ovuliferous throughout; capsule obconic with a short column at apex, at maturity bearing 3 deflexed horns from the upper angles, tomentose.—Endemic.—L. f. Suppl. 419 (1781); J. E. Smith, Pl. Icon. Ined. ii. t. 44 (1790); Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 146 (1894); Irmscher, loc. cit. ed. 2, xxi. 584 (1925). *Stiradotheca ferruginea* Kl. in Monatsber. Berlin Akad. 127 (1854). *Stibadotheca magnifica* Kl. Begon. 129, t. 12, fig. A (1855). *S. ferruginea* Kl. loc. cit. 130. *Begonia magnifica* Linden, Cat. (1855); in Belg. Hortic. vi. 5 (1856); Carr. in Rev. Hortic. xlii. 271 (1870); C. Chevalier, Begon. 307, t. 53 (1938). *Casparya ferruginea* A. DC. in DC. Prod. xv. pt. 1, 269 (1864). *C. ferruginea* β. *Holtonis* A. DC. loc. cit. Tab. 4.

NORTE DE SANTANDER: woods, road from Pamplona to Toledo, crossing the divide between Río La Teja (Maracaibo drainage) and Río Mesme (Orinoco drainage), alt. 2800 m., Feb. 27, 28, 1927,

Begonia ferruginea Linn.

TAB. 4

Killip & A. C. Smith 19826 (G, NY, US); Páramo del Hatico, en route from Toledo to Pamplona, alt. ca. 2900 m., Mar. 12, 13, 1927, *Killip & A. C. Smith 20618* (G, NY).

CUNDINAMARCA: prov. Bogotá, *Triana 3026* (! A. DC.); near Bogotá, *Goudot 872* (! A. DC.); by the falls of Tequendama, Dec. 8-11, 1852, *Holton 712* (G, NY, Gen, phot. Macbride, CM no. 7319); Tequendama above Fusagasugá near Pandi, alt. 2200-2600 m., Feb. 2, 1883, *Lehmann 2581* (US); Páramos de Une, July 1916, *Dawe 379* (US); forest on slope of mountain 2-4 miles south of Sibaté, alt. 2900-3000 m., Oct. 13-15, 1917, *Pennell 2440* (G, NY, Mo, US); Bogotá, June 1919, *Ariste Joseph A346* (US); rain forest below El Peñón near Sibaté alt. 2700 m., Aug. 15, 1920. *Popenoe 1112* (US); Bogotá, 1925, *A. Schultze s. n.* (US); dense forest of La Hondonada, Salto de Tequendama, Cordillera Oriental, alt. 2250-2300 m., Oct. 2, 1938, *Cuatrecasas 201* (US); Macizo de Bogotá, Quebrada del Rosal alt. 3200 m., June 29, 1939, *Cuatrecasas 5709* (US); Finca Bethania, abajo de Peña Negra, Municipio de Anolaima, alt. 2700 m., May 29, 1941, *H. García B. & Jaramillo 10419* (G).

TOLIMA: Aguadita, Jan. 27, 1938, *L. Javier 21* (US).

BOYACA: Cordilera of Tunja, *Warsczewicz s. n.* (! A. DC.); Yanacá, Maripí, July 21, 1936, *H. García B. 4852* (US); Cordillera Oriental, Quebrada de Susacón, alt. 3100-3300 m., July 17, 1940, *Cuatrecasas & H. García B. 9809* (US).

DEPARTMENT UNKNOWN: "in Nova Granada", *Mutis* (Linnean Herbarium, type, phot. Arnold Arboretum no. 1125.1); *Linden 1224* (! A. DC.); "Colombia", *Triana 196* (! A. DC.); *Holton 722* (NY, Kew, type of *Casparya ferruginea* var. *Holtonis* A. DC.); Casanare, *Christianos 18* (NY).

We reproduce here the plate of J. E. Smith, which is the earliest illustration of the species. It is fairly accurate except that it shows two appendages above the anther instead of one.

This species was in cultivation at an early date and evidently was popular, but according to Chevalier it has now disappeared.

Var. **dilatata** Smith & Schubert, var. nov., tepalis masculinis interioribus valde dilatatis, late ellipticis, quam exterioribus multo latioribus.

CUNDINAMARCA: Falls of Tequendama, alt. 2480 m., Feb. 3, 1876, *André 1320* (NY, not so extreme as the type); wet forested bank along road from San Miguel to Aguadita, Eastern Cordillera, alt. 2680 m., April 30, 1944, *Killip 38095* (G, **type**; US).

14. **Begonia (§ Casparya) gamolepis** Smith & Schubert, spec. nov., fruticosa, erecta vel subprostrata, 3-15 dm. alta; ramis gracilibus, puberulis; foliis rectis, asymmetricis, subellipticis, breviter acuminatis, basi dimidiatis, 4-6 cm. longis, 2-3 cm. latis, serratis, supra et ad nervos subtus hirsutis, petiolo 7-10 mm. longo, fusco-hirtello, stipulis deciduis, oblongis, 6-8 mm. longis, integris; pedunculis axillaribus, gracilibus, 1-4 cm. longis; inflorescentiis bisexualibus, e floribus masculinis 3-4 et femineo unico formatis, bracteis deciduis, ellipticis, plus minusve coalitis, 8 mm. longis, inflorescentiam juvenilem involucrantibus, integris, glabris; pedicellis masculinis ad 13 mm. longis; tepalis masculinis 2, orbicularibus, basi cordatis, 8 mm. longis, integris, carnosis, glabris, viridibus vel albis (! Killip & A. C. Smith); staminibus multis, antheris oblongis, quam filamentis multo longioribus, connectivo producto, obtuso; floribus femineis perjuvenilibus solum cognitis; tepalis femineis 5, inaequalibus, apice fimbriato-laceratis, extus hirsutis; placentis bilamellatis; capsula turbinata, aequaliter 3-cornuta, cornubus gracilibus, sursum curvatis, apice hirsutis, columna crasse conica, 6 mm. alta. Tab. 5.

SANTANDER: Eastern Cordillera, dense woods along stream, vicinity of Las Vegas, alt. 2600-3000 m., Dec. 21-23, 1926, *Killip & A. C. Smith 16037* (G, NY, US); forest, vicinity of Charta, alt. 2000-2600 m., Feb. 1-11, 1927, *Killip & A. C. Smith 18914* (G, NY, US); dense wet woods, western slope of Mount San Vicente, near Charta, alt. 2500-2700 m., Feb. 9, 1927, *Killip & A. C. Smith 18974* (G, NY, US); dense woods, southern slope of Mount San Martín, near Charta, alt. 2300-2500 m., *Killip & A. C. Smith 19137* (NY, **type**; G, US).

This species is unique in *Casparya* in having only two staminate tepals which are quite fleshy. The name alludes to the involucre of connate bracts at the base of the inflorescence.

15. **Begonia (§ Casparya) umbellata** HBK. Herbaceous or suffruticose; branches glabrous; leaves straight or oblique, strongly asymmetric, ovate, acuminate, unequally cordate at base with one lobe much larger than the other or slightly dimidiate, 5-7 cm. long, 2.5-5 cm. wide, densely setose-serrate, very sparsely setose above, hirtellous on the nerves beneath, petiole 1-5 cm. long, hirtellous to glabrous,

stipules tardily deciduous, oblong-elliptic, obtuse, entire, 10-18 mm. long, soon glabrous, brown, membranaceous; peduncles axillary, 4-7 cm. long, the pistillate 1-flowered; staminate cymes flat and umbelliform, 2-20-flowered, glabrous; bracts deciduous, elliptic or obovate, 4-6 mm. long, entire, thin, brown; pedicels very slender, up to 6 cm. long; staminate tepals 4, subequal, 12-20 mm. long, red, the outer elliptic obtuse, pilose and more or less serrulate at least toward apex, the inner obovate, broader, lacerate-serrate at apex, paler; stamens free, included, up to 20, anthers oblong, obtuse, several times shorter than the filaments; pistillate bracts like the others; pistillate tepals 6, the outer 3 slightly longer and narrower, to 28 mm. long, the inner lacerate-serrate at apex; styles much branched, the branches linear and covered with stigmatic papillae, ovary 3-celled, placentae bifid, ovuliferous throughout; capsule clavate-turbinate, bearing 3 slightly ascending horns from the upper angles and a short column at apex, setose, becoming glabrous.—Endemic.—HBK. Nov. Gen. & Sp. vii, 187 (1825); Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 146 (1894); Irmscher, loc. cit. ed. 2, xxi. 584, fig. 259 (1925). *Isopteris umbellata* Kl. in Monatsber. Berlin Akad. 127 (1854). *Isopteryx umbellata* Kl. Begon. 132, t. 12, fig. B (1855). *Casparya umbellata* A. DC. in DC. Prod. xv. pt. 1, 270 (1864). Tab. 5.

TOLIMA: Mt. Tolima near tree-line, *Goudot s. n.* (! A. DC.); prov. Mariquita, *Triana 3033* (! A. DC.); La Ceja (Quindío), prov. Mariquita, alt. 2800 m., 1851-7, *Triana s. n.* (NY); Volcancito, Jan. 26, 1853, *Holton 720* (G, NY); San Juan (?), Quindío, Mar. 1876, *André 2195* (NY); wet cliffs at cascade, "La Lora" to summit, new Quindío trail, Cordillera Central, Aug. 14, 1922, ***Killip 9773*** (G, NY, US); in open, along Quindío Highway, between Cajamarca and summit of Divide, alt. 3200 m., Mar. 27, 28, 1939, *Killip & Varela 34565* (US) along divide near Quindío Highway, alt. 3300-3500 m., Mar. 27, 1939, *Killip & Varela 34621* (US).

CALDAS: "Crescit in declivitate occidentali Andium quinduensium, prope El Inciensal, alt. 240 hex.", (ca. 470 m.) (*). Sept. 1801. *Humboldt & Bonpland s. n.* (**type**, Paris, not seen); Páramo del Ruiz, alt. 2500-3000 m., Sept. 1883, *Lehmann 3091* (US); "Magana" to Quindío Pass, old Quindío trail, Cordillera Central, alt. 3200-3500 m., Aug.

(*) The altitude of 240 hexapedes (= 467 meters) given for El Inciensal is wrong. The proper altitude is about 2800 meters.—EDITOR.

2, 1922, *Killip & Hazen 9165* (G, NY, US); stream-margin, edge of forest, "Pinares", above Salento, Cordillera Central alt. 2700-2900 m., Aug. 2-10, 1922, *Pennell 9338, 9355* (G, NY, US); mossy forest on spur, Cerro Tatamá, Cordillera Occidental, alt. 2800-3300 m., Sept. 8-10, 1922, *Pennell 10453, 10454* (NY); on rock, Quindío-"La Lima" (= La Linea), alt. 3000-3200 m., Feb. 1937, *E. Dryander s. n.* (US).

CAUCA: upper forest zone, Páramo de Buena Vista, Huila Group, Central Cordillera, alt. 3000-3600 m., Jan. 1906, *H. Pittier 1179* (US, type of *B. fissisepala* C. DC.).

DEPARTMENT UNKNOWN: 1851-7, *Triana s. n.* (US); *Linden 388* (! A. DC.).

The specific name refers to the form of the staminate inflorescence. However, the inflorescence is not a true umbel, but a cyme with some branches greatly abbreviated.

16. **Begonia (§ Casparya) cornuta** Smith & Schubert, spec. nov., suffruticosa, ad 3 m. alta (! H. García B. & Jaramillo); ramis glabris; foliis transversis vel valde obliquis, anguste ovatis, acuminatis, basi cordatis, ad 9 cm. longis, 4 cm. latis, acute serratis, supra glabris, subtus ad nervos setulosis, petiolo 2-5 cm. longo, glabro, stipulis mox deciduis, ignotis; pedunculis, robustis, 25-75 mm. longis; cymis multifloris, ultra 2 dm. diametro, glabris, bracteis mox decipaulo producto, obtuso; bracteolis femineis late obovatis, 6 mm. longis, tepalis masculinis 4, integris, albis vel pallide purpurascentibus, exterioribus late ellipticis vel suborbicularibus, 9-11 mm. longis, interioribus anguste obovatis, 6 mm. longis; staminibus liberis, ca. 20, antheris oblongis, quam filamentis subduplo longioribus, connectivo paulo producto, obtuso; bracteolis femineis late obovatis, 6 mm. longis, integris, glabris; tepalis femineis 5, subaequalibus, late ellipticis, 15 mm. longis, ad apicem versus ciliato-serratis; stylis 3, 6-partitis, segmentis ultimis brevibus, oblongis; ovario 3-loculato, placentis bilamellatis, undique ovuliferis; capsula late turbinata, apice columna brevissima aucta, aequaliter 3-cornuta, cornubus gracilibus, acuminatis, leviter adscendentibus. Tab. 5.

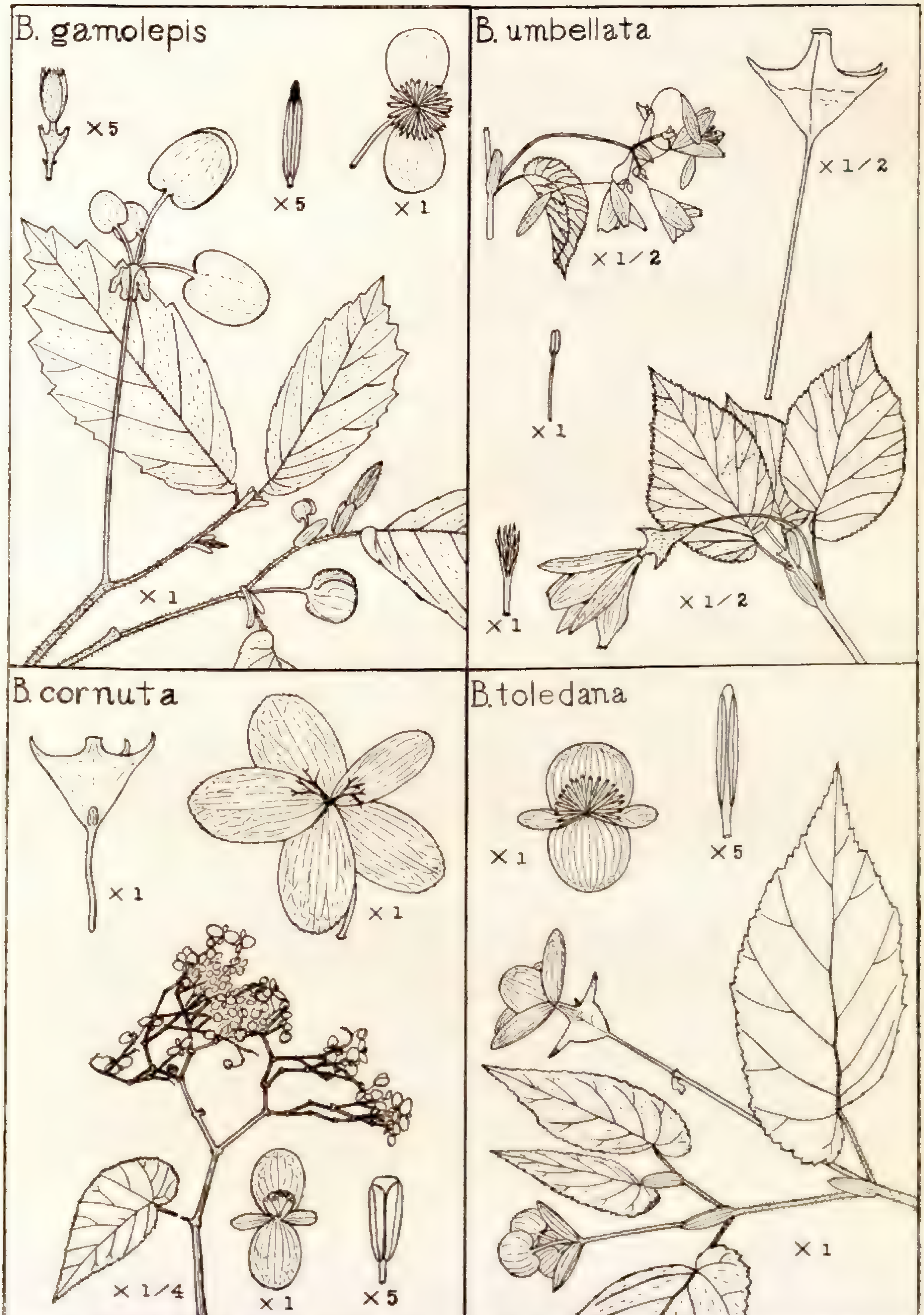
CUNDINAMARCA: beyond "Cibaté" (= Sibaté), Jan. 3, 1854, *Holton s. n.* (NY); Aguadita near Barroblanco, Feb. 4, 1876, *André 1425* (NY); forest, El Peñón, southwest of Sibaté, alt. 2800-2900 m., Oct. 13, 1917, *Pennell 2414* (NY); San Miguel, extreme southern end of the savanna of Bogotá, hills, alt. 2840 m., Aug. 15, 1939, *Cuatreca-*

sas 6677 (US, **type**); Municipio de Facatativá, Alto de Peña Negra, Cordillera Oriental, western slope, alt. 2810-2820 m., May 29, 1941, *H. García B. & Jaramillo 10407* (US).

Its ample many-flowered inflorescence serves to distinguish *B. cornuta* from the remainder of *Casparya*. In fact, specimens without pistillate flowers are all too easily confused with other sections. It is an interesting commentary that *B. cornuta* was collected five times over a period of more than ninety years without having been described.

17. **Begonia (§ Casparya) toledana** Smith & Schubert, spec. nov., herbacea, erecta diffusaque, 6-9 dm. alta; ramis gracilibus, junioribus plus minusve puberulis; foliis plerumque obliquis, ovatis, acuminatis, basi cordatis, 5-7 cm. longis, 2-3.6 cm. latis, serratis, supra et ad nervos subtus sparse puberulis, petiolo 1-4 cm. longo, stipulis deciduis, oblongis, 8-12 mm. longis, integris; pedunculis axillaribus, gracilibus, ad 36 mm. longis; inflorescentiis verisimiliter unisexualibus, paucifloris, bracteis deciduis, ellipticis, integris, basalibus ad 7 mm. longis; pedicellis 10-12 mm. longis; tepalis masculinis 4, integris, albis, glabris, exterioribus suborbicularibus, ad 10 mm. longis, interioribus anguste ellipticis, minoribus; staminibus multis, antheris oblongis, filamentis brevissimis, connectivo producto, obtuso; bracteolis femineis verisimiliter nullis; tepalis femineis 5, paulo inaequalibus, ellipticis, obtusis, integris, ad 20 mm. longis, albis glabris; styli 3, multo connatis, multifidis; ovario turbinato, aequaliter 3-cornuto, cornubus gracilibus, sursum curvatis, acuminatis, placentis bilamellatis; capsula ignota. Tab. 5.

NORTE DE SANTANDER: Eastern Cordillera, dense woods, road from Pamplona to Toledo, crossing the divide between Río La Teja (Maracaibo drainage) and Río Mesme (Orinoco drainage), alt. 2800-3000 m., Feb. 27-28, 1927, *Killip & A. C. Smith 19981* (G, NY, US); dense woods, Pica-Pica Valley, above Tapatá (north of Toledo), alt. 2100-2400 m., Mar. 1-5, 1927, *Killip & A. C. Smith 20270* (G); woods along stream, Loso and vicinity (north of Toledo), alt. 2200-2400 m., Mar. 6-7, 1927, *Killip & A. C. Smith 20359* (G, **type**; NY, US); edge of woods, western slope of Páramo del Hatico, en route from Toledo to Pamplona, alt. 2800-2900 m., Mar. 13, 1927, *Killip & A. C. Smith 20726* (G, NY, US).


B. gamolepis
×5
×5
×1
×1
B. umbellata
×1/2
×1/2
×1
×1
×1/2
B. cornuta
×1
×1
×1/4
×1
×5
B. toledana
×1
×5
×1

TAB. 5

At first glance, *Begonia toledana* closely resembles *B. Urticae*, but it has oblique leaves with cordate bases, whereas those of *B. Urticae* are straight and dimidiate. Also the flowers of *B. toledana* are much larger.

Var. **erubescens** Smith & Schubert, var. nov., planta omnino erubescens; foliis lanceolatis, acuminatis, basi profunde cordatis.

NORTE DE SANTANDER: woods, region of Sarare, between Alto del Loro and Alto de Santa Inés, alt. 1800-2200 m., Oct. 18-21, 1941, *Cuatrecasas, Schultes & E. Smith 12492* (US); Hoya de Samaria (Municipio Toledo), alt. 2000-2100 m., Oct. 30, 1941, *Cuatrecasas, Schultes & E. Smith 12772* (**US, type**).

18. **Begonia (§ Casparya) ursina** Smith & Schubert, spec. nov., e fragmentis solum cognita, verisimiliter fruticosa, utrinque dense ferrugineo-hirsuta; foliis rectis, asymmetricis, lanceolatis, acuminatis, basi dimidiatis, ad 5 cm. longis, 2 cm. latis, serratis, petiolo 3-5 mm. longo, stipulis persistentibus, oblique ovatis, acutis 6 mm. longis, serratis; pedunculis axillaribus, ad 2 cm. longis; inflorescentiis masculinis densissime paucifloris; femineis unifloris; bracteis ovatis, acutis, 10 mm. longis, integris; pedicellis brevissimis; floribus masculinis crasse ovoideis vel subglobosis, acutis, nucem simulantibus; tepalis masculinis 4, exterioribus semiovoideis, basi excavatis, 6 mm. longis dense ferrugineo-hirsutis, interioribus ellipticis, obtusis, 2 mm. longis, glabris; staminibus toro paulo convexo insertis, antheris oblongis, quam filamentis bene longioribus, connectivo paulo producto, obtuso; bracteolis femineis bracteas masculinas aequalibus; tepalis femineis 6, anguste ovatis, acutis, ad apicem versus ciliato-seratis, exterioribus 3, subaequalibus, 9-12 mm. longis, extus dense intus sparse hirsutis, ex sicco fuscis, interioribus subaequalibus, 7 mm. longis, subglabris, albidis; stylis multiramosis, ramis brevibus, tortuosis; ovario 3-loculato, placentis bilamellatis, undique ovuliferis; capsula late turbinata, apice columna subnulla, aequaliter 3-cornuta, cornubus gracilibus, acuminatis, sursum curvatis. Tab. 6.

MAGDALENA: Cerro Pintado, Sierra Perijá, alt. 3100 m., July 3-6, 1942, *M. A. Carriker, Jr., 25* (**US, type**).

The extremely dense indument alone is sufficient to distinguish *Begonia ursina*, but the technical characters also are most unusual. The hemispherical outer staminate tepals are unique to the best of our knowledge, and the regularly biseriate character of the pistillate tepals is quite rare.

19. **Begonia (§ Casparya) grewiaefolia** (A. DC.) Warb. Suffruticose, decumbent and rooting at the nodes; branches erect, 15-30 cm. long, fuscous-tomentose, becoming glabrous toward base; leaves straight or slightly oblique, strongly asymmetric, oblong-ovate to oblong-obovate, acuminate, unequally cordate at base, 2-8 cm. long, 1-4 cm. wide, 7-8 pinnate nerves on each side, doubly serrate, setose-ciliate, sparsely setose above and on the nerves beneath, petioles 2-6 mm. long, stipules ovate, acute or obtuse, 6 mm. long, entire, soon glabrous; peduncles axillary, 2-4 cm. long, 1-flowered; bracts elliptic, deciduous; pedicels short; flowers rose; staminate tepals 4, subequal, obovate, 14 mm. long, entire, glabrous; anthers unequal, slender, longer than the filaments, the connective produced, acute; pistillate bracteoles like the bracts, obtuse, 6 mm. long, 4 mm. wide, glabrous; pistillate tepals 5-6, obovate-oblong, 10-12 mm. long, entire, glabrous; styles 6-parted, the ultimate branches inflexed, neither slender nor twisted, ovary pilose; capsule broadly turbinate, obtuse at base, 6 mm. high, bearing 3 narrowly triangular subascending horns from the angles, apical column 2 mm. high.—Ecuador, Perú (?).—Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 146 (1894); Irmscher, loc. cit. ed. 2, xxi. 584 (1925). *Casparya grewiaefolia* A. DC. in Ann. Sci. Nat. ser. 4, xi. 117 (1859); in DC. Prod. xv. pt. 1, 271 (1864).

CALDAS: Manizales, alt. 2150 m., Feb. 1853, *Triana 3055* (British Museum, phot. Killip).

VALLE: prov. Buenaventura, *Triana 3056* (! A. DC.).

DEPARTMENT UNKNOWN: *Linden 392* (! A. DC.).

Our knowledge of *Begonia grewiaefolia* is unsatisfactory, since the Colombian material was only tentatively associated with the Ecuadorian type by A. De Candolle and we have only photographs of poor specimens for examination. We have not illustrated this species since the photographs disclose practically nothing of its habit which would distinguish it from the following one and the technical characters indicated in the description are not observable.

20. **Begonia (§ Casparya) colombiana** Smith & Schubert. spec. nov., e fragmentis solum cognita, herbacea vel suffruticosa, verisimiliter metralis; ramis junioribus sparse puberulis; foliis rectis, asym-

metricis, ellipticis, acuminatis, basi breviter et valde inaequaliter cordatis, ad 6.5 cm. longis et 3 cm. latis, grosse duplicato-serratis, breviter setoso-ciliatis, supra dissite et subtus ad nervos strigosis, petiolis ad 9 mm. longis, puberulis; stipulis deciduis, late ovatis vel ellipticis, apice rotundatis et setoso-mucronatis, 3-4 mm. longis, integris, membranaceis, glabris; pedunculis axillaribus, 15-25 mm. longis, puberulis; inflorescentiis bisexualibus, dense racemosis, paucifloris; bracteis suborbicularibus, grosse serratis, membranaceis, sparse puberulis, fulgide rubris; pedicellis brevibus; tepalis masculinis 4, valde inaequalibus, integris, fulgide rubris, exterioribus late ellipticis apiculatisque, 14 mm. longis, extus puberulis, interioribus obovatis, subduplo brevioribus; staminibus paucis, liberis, profunde inclusis, antheris oblongis, cum filamentis subaequalibus, connectivo valde producto, acuto; bracteolis femineis bracteas simulantibus sed densiore puberulis, ovarium fere occultantibus; tepalis femineis 6, subaequalibus, ellipticis, obtusis, integris, 14-15 mm. longis, fulgide rubris, puberulis; stylis multifidis, ovario puberulo, placentis bilamellatis; capsula late turbinata, 3-cornuta, cornubus acuminatis, deciduis, columna 3 mm. longa. Tab. 6.

PUTUMAYO: eastern slope of the Cordillera, between El Silencio and La Cabaña (road from Sibundoy to Urcusique), alt. 2200-2400 m., Dec. 31, 1940, *Cuatrecasas 11517* (US, **type**; G).

We have described *Begonia colombiana* as a new species with a certain hesitation because it is obviously so close to the poorly understood *B. grewiaefolia*, but it has very unequal staminate tepals and suborbicular bracts and bracteoles which are sufficient distinction if *B. grewiaefolia* has been described correctly.

21. **Begonia (§ Casparya) antioquensis** (A. DC.) Warb. Fruticose; branches fulvous-pubescent, becoming glabrous; leaves straight or slightly oblique, strongly asymmetric, lance-elliptic, penninerved, acute or acuminate, unequal at base with the adaxial side cuneate and the other rounded and attached further down the petiole, 25-75 mm. long, 12-26 mm. wide, doubly serrate, sparsely pilose on both sides, petiole 4-6 mm. long, pilose, stipules subpersistent, ovate, acute, pilose, 6-8 mm. long, 2-4 mm. wide; peduncles erect, to 5 cm. long, pubescent, few-flowered; bracts deciduous, ovate, obtuse, pilose, 4-6 mm. long; flowers red or rose; staminate tepals 4, equal, 12 mm. long, entire, the outer ovate, puberulent, the inner obovate; anthers nu-


B. ursina
× 1
× 2
× 1
× 1
× 2
× 5
× 5
× 1/2
B. colombiana
× 5
× 1
× 1
× 1
B antioquensis
× 5
× 1
× 1/2
× 1
B. diffusa
× 1
× 5
× 1

TAB. 6

merous on a long column, linear, obtuse; pistillate tepals 5, up to 6 mm. long; capsule broadly turbinate, apical column 6-8 mm. long, conical, the 3 acute horns subascending.—Endemic.—Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 146 (1894); Irmscher, loc. cit. ed. 2, xxi. 584 (1925). *Casparya antioquensis* A. DC. in Ann. Sci. Nat. ser. 4, xi. 116 (1859); in DC. Prod. xv. pt. 1, 270 (1864). Tab. 6.

ANTIOQUIA: *Triana 3041* (Kew, isotype; phot. Killip); Tamesis, vicinity of Medellín, Feb. 1, 1928, *R. A. Toro 982* (NY). The latter specimen it placed here with some uncertainty because of our incomplete knowledge of the type. Its long staminal column is not noted in the type-description and its capsule column is longer than indicated there, but otherwise the agreement is so close that we feel justified in calling the two the same. From necessity the illustration is taken from the Toro specimen.

22. **Begonia (§ Casparya) diffusa** Smith & Schubert, spec. nov., herbacea vel fruticosa, diffusa, 0.3-3.5 m. alta; ramis patentibus, gracilibus, pilis rubris articulatisque plus minusve dense vestitis; foliis rectis, asymmetricis, subellipticis, late acutis, basi dimidiatis, 18-34 mm. longis, 7-20 mm. latis, grosse ciliato-serratis, supra dissite subtus ad nervos pilosis, petiolo 3-18 mm. longo, sparse vel dense piloso, stipulis subpersistentibus, oblongis, integris, apice setiferis, 4-5 mm. longis; pedunculis axillaribus, gracilibus, 14-42 mm. longis; inflorescentiis masculinis cymosis, paucifloris vel submultifloris; bracteis ellipticis, parvis, fimbriatis; inflorescentia feminea uniflora; tepalis masculinis 4, albis vel rubris, plus minusve pilosis, exterioribus ovatis vel ellipticis, apiculatis, basi cordatis, 4-6 mm. longis, interioribus obovatis, brevioribus; staminibus subpaucis in columna insertis, antheris oblongis, quam filamentis longioribus, connectivo producto, late obtuso; bracteolis femineis cum bracteis similibus; tepalis femineis 5, subaequalibus, ellipticis, 9-14 mm. longis; stylis 3, multifidis; ovario turbinato, piloso, aequaliter 3-cornuto, cornubus gracilibus, sursum curvatis, placentis verisimiliter simplicibus. Tab. 6.

SANTANDER: Eastern Cordillera, woods, western slope of Páramo Rico, alt. 3200 m., Jan. 15-19, 1927, *Killip & A. C. Smith 17852* (G, NY, US); oak forest, vicinity of La Baja, alt. 2700-3500 m., Jan. 14-31, 1927, *Killip & A. C. Smith 18107* (G, NY); paramillo, Páramo de las Puentes, above La Baja, alt. 3500-3700 m., Jan. 25, 1927, *Killip & A. C. Smith 18178* (G, NY); dense forest, Quebrada de Pais (= Páez?), north of La Baja, alt. ca. 3200 m., Jan. 31, 1927, *Killip & A. C. Smith 18772* (NY, **type**; G, US).

Begonia diffusa is much like the Venezuelan *B. montana* except for the staminate flowers which are much smaller and more numerous and are borne in a separate inflorescence. The combination of diffuse habit and very small leaves readily distinguishes it from other Colombian species of *Casparya*.

23. **Begonia (§ Casparya) Urticae** L. f. Herbaceous to suffruticose; stem branching, decumbent, rooting at the nodes, 15-40 cm. high, rarely over 2 m. (! Dryander), the younger parts usually ferruginous-puberulent; leaves straight or nearly so, srongly asymmetric, ovate or elliptic, acute or acuminate, base acute on the adaxial side, obtuse and decurrent on the other, 3-8 cm. long, penninerved, doubly serrate, ciliate, sparsely hirtellous to glabrous above, densely pubescent on the nerves to wholly glabrous beneath, petiole 2-15 mm. long, stipules deciduous, ovate, obtuse, setose, 2-6 (rarely to 12) mm. long; peduncles axillary, erect, 12-45 mm. long, 1-few-flowered; bracts deciduous, elliptic, setaceous-dentate at apex; pedicels 6-18 mm. long; staminate tepals 4, subequal, 3-8 mm. long, the outer elliptic, entire, red, often pilose, the inner obovate, white; stamens on a slender colum 2 mm. high, filaments short, anther linear, the connective slightly produced; pistillate bracteolae deciduous, elliptic; pistillate tepals 5, subequal, elliptic, 3-5 mm. long, entire, red or white, the outer often pilose; styles 3 with many short branches wholly covered by stigmatic papillae, placentae bilamellate, ovuliferous on all sides; capsule very variable, broadly turbinate, obtuse at base, with 3 ascending horns on the angles, the tips of the horns often deciduous, the apical column well developed, angled or terete, slender, conical or cylindric or subclavate, from longer than the wings to rarely shorter.—Costa Rica, Panama, Ecuador, Perú.—L. f. Suppl. 420 (1781); Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 146 (1894); Irmscher in Engler & Prantl, Pflanzenfam. ed. 2, xxi. 584 (1925). *B. urticaefolia* J. E. Smith, Pl. Icon. Ined. ii. t. 45 (1790), pro errore. *B. columnaris* Benth. Pl. Hartweg. 131 (1844); Warb. loc. cit.; Irmscher, loc. cit. *B. trachyptera* Benth. op. cit. 184 (1845); Warb. loc. cit.; Irmscher, loc. cit. *Stiradotheca trachyptera* Kl. in Monatsber. Berlin Akad. 127 (1854). *Casparya coccinea* Kl. loc. cit. e. p., nomen; Begon. 128 (1855). *Begonia coccinea* Ruiz ex Kl. in Monatsber. Berlin Akad. 127 (1854) e. p.,

nomen in synon. *Sassea Urticae* Kl. op. cit. 128; Begon. 133 (1855). *S. columnaris* Kl. in Monatsber. Berlin Akad. 128 (1854); Begon. 134 (1855). *S. glabra* Kl. in Monatsber. Berlin Akad. 128 (1854); Begon. 134 (1855). *Begonia glabra* Ruiz ex Kl. in Monatsber. Berlin Akad. 128 (1854), nomen in synon. *Stibadotheca trachyptera* Kl. Begon. 131 (1855). *Begonia cucullata* Ruiz ex Kl. Begon. 134 (1855), nomen in synon. *Casparya trachyptera* A. DC. in DC. Prod. xv. pt. 1, 274 (1864). *C. columnaris* A. DC. loc. cit., non Kl. (1854). *C. columnaris* β *glabra* A. DC. loc. cit. *C. Urticae* A. DC. loc. cit. *C. Urticae* β *hispida* A. DC. loc. cit. *Sassea Hoffmanniana* Kl. ex A. DC. op. cit. 275, nomen in synon. *Begonia monticola* C. DC. in Bull. Herb. Boiss. ser. 2, viii. 325 (1908). *B. Torresii* Standl. in Journ. Wash. Acad. Sci. xvii. 313 (1927). *B. chiriquensis* Standl. in Woodson & Schery in Ann. Mo. Bot. Gard. xxvii. 321 (1940). *B. columnaris* var. *glabra* Smith & Schubert in Macbride, Fl. Perú, in Field Mus. Pub. Bot. xiii. pt. 4, 187 (1941). Tab. 7.

BOLIVAR: forest, Cascada Chorrón, south of Antizales, alt. 1800-2500 m., Feb. 25, 1918, *Pennel 4411* (NY).

ANTIOQUIA: Támesis, Feb. 1, 1928, *R. A. Toro 968* (NY); Páramo de Sonsón, alt. 2700-2850 m., Jan. 26, 1945, *Daniel 3426* (US).

CUNDINAMARCA: mountains east of Bogotá, *Holton 723* (NY); in mountains near Bogotá, Oct. 1852, *Holton 727* (G, NY); Boquerón de Monserrate, alt. 2700 m., Sept. 1853, *Triana (10)* (Col); Boquerón de Bogotá, Jan. 26, 1876, *André 1303* (NY); Viotá, Feb. 1876, *André K. 1070* (G); Bogotá, Jan. 1916, *Dawe 2* (US); moist cliff, Río San Francisco above Bogotá, alt. 2700-2800 m., Sept. 13, 1917, *Pennell 1926* (G, Mo, NY, US); forest, El Peñón southwest of Sibaté, alt. 2800-2900 m., Oct. 13, 1917, *Pennell 2413, 2421* (NY); Boquerón, Bogotá, alt. 2800-2900 m., Feb. 1925, *A. Schultze 136* (US); no further locality, *Ariste Joseph B57* (US); Bogotá, *Ariste Joseph s. n.* (US); Sopó, *Ariste Joseph B143* (US); Chapinero, Bogotá, July 3, 1934, *Pérez 3077* (US); western slopes of Páramo de Cruz Verde, alt. 3150 m., Oct. 1938, *Cuatrecasas 360* (US); woods along stream, Los Gaques, western slope of Páramo de Guasca, alt. ca. 3250 m., Mar. 12, 1939, *Killip 34163* (US); Macizo de Bogotá, Quebrada Chicó, alt. 2800-3000 m., June 14, 1939, *Cuatrecasas 5483* (US); Macizo de Bogotá, Quebrada del Rosal, malezas, alt. 3200 m., June 29, 1939, *Cuatrecasas 5710* (US), *5710-B* (Col); San Miguel, extreme western end of the savanna of Bogotá, hills, alt. 2840 m., Aug. 15, 1939, *Cuatrecasas 6668* (US); wet ground,

Begonia urticaefolia. Linn

TAB. 7

Páramo de Guasca, alt. 3000-3500 m., Oct. 11, 1939, *H. García B. 8092* (US).

TOLIMA: forest, "Rosalito" near Páramo del Ruiz, alt. 2900-3200 m., Dec. 15-17, 1917, *Pennel 3126* (NY); forest, Murillo, alt. 2200-2600 m., Dec. 18, 1917, *Pennell 3162* (NY); forest; "La Lora" to summit, New Quindío Trail, Cordillera Central, Aug. 14, 1922, *Killip 9777* (NY, US); along Divide, near Quindió Highway, alt. 3300-3500 m., Mar. 17, 1939, *Killip & Varela 34623* (US); same, Mar. 27, 1939, *Killip & Varela 34595* (G).

CALDAS: Consota, Quindío, alt. 1300 m., *Triana s. n.* (NY); Andes of Quindío, *Triana 3042* (Gen, phot. Macbride, CM no. 7314); Manizales, alt. 2000 m., Feb. 1853, *Triana (389)* (Col); along stream in forest, east of Salento, Cordillera Central, alt. 2000-2200 m., July 25-31, 1922, *Pennell 8930* (G, NY); along stream, edge of forest, "Pinares" above Salento, Cordillera Central, alt. 2700-2900 m., Aug. 2-10, 1922, *Pennell 9348* (G, NY); forest, "Magaña", old Quindío Trail, Cordillera Central, alt. 3200-3300 m., Aug. 1-2, 1922, *Killip & Hazen 9435* (G, NY, US); forest, Río Santa Rita, Salento, alt. 1600-1800 m., Aug. 26, 1922, *Killip & Hazen 10132* (NY); forest, Río San Rafael, below Cerro Tatamá, Cordillera Occidental, alt. 2200-2500 m., Sept. 7-11, 1922, *Pennell 10327* (G, NY); steep open gulch in forest, Cerro Tatamá, alt. 3200-3400 m., Sept. 8-10, 1922, *Pennell 10482* (G, NY); Quebrada de los Termales, alt. 2700 m., Aug. 1944, *Dryander 2760* (US); valleys, Salamina, alt. 3500 m., July 1945, *Tomas 2380* (US).

CHOCO: Dauró, April 6, 1928, *R. A. Toro 1158* (NY).

HUILA: edge of bog, "Balsillas", on Río Balsillas, alt. 2100-2200 m., Aug. 3-5, 1917, *Rusby & Pennell 832* (NY); Cordillera Oriental, on the Caquetá boundary line, Gabinete, alt. 2300-2450 m., Mar. 22, 1940, *Cuatrecasas 8495* (US).

VALLE: Guabito, near Río Tuluá, Sept. 17, 1853, *Holton s. n.* (NY); Western Cordillera at Versalles, 1918-19, *Dawe 838* (NY).

CAUCA: above Paletará, alt. 3000 m., Feb. 1884, *Lehmann 3534* (US); Páramo de Buena Vista, Huila group, Central Cordillera, alt. 3000-3600 m., Jan. 1906, *H. Pittier 1152* (US); Las Escaleritas, Moras Valley, Río Páez basin, Tierra Adentro, alt. 2500-3000 m., Feb. 1906, *H. Pittier 1375* (US); forest, south side of "Llano", "Paletará", Cordillera Central, alt. 3000-3200 m., June 15-17, 1922, *Pennell 6948* (G), *6949* (G, NY, US); moist forest, "San José", San Antonio, Cordillera Occidental, alt. 2400-2700 m., June 28, 1922, *Pennell & Killip 7286* (G, NY, US); hot springs on páramo, Pedro Piso, Puracé, alt. 3600 m., Sept. 1936, *Dryander 1694* (US); slopes in virgin forest, Puracé Pedro, alt. 3400 m., Sept. 1936, *Dryander 1697* (US); woods between the ranges of Munchique and Altamira, Carpinterías, Cordillera Occidental, alt. 2450-2500 m., July 15, 1939, *Pérez & Cuatrecasas 6184* (G); Cordillera Central, eastern slope near the boundary, valley of Río San Marcos, between Jardín and San Rafael, alt. 2700-2900 m., July 25, 1943, *Cuatrecasas 14746, 14759, 14765* (G).

NARIÑO: Páramo del Tábano, crest of the Cordillera, between Pasto and El Encano, western slope, alt. 3200 m., Jan. 11, 1941, *Cuatrecasas 11889* (US).

CAQUETA: Cordillera Oriental, eastern slope, valley of the Río Hacha, woods, Ruidosa, alt. 2000 m., Mar. 26, 1940, *Cuatrecasas 8717* (G); same, below Gabinete, alt. 2100-2250 m., Mar. 23, 1940, *Cuatrecasas 8550* (US).

PUTUMAYO: Páramo del Tábano (?), May 14, 1935, *García 4561* (US); El Encano, Laguna de la Cocha, Páramo "El Tábano", alt. 3300 m., Aug. 10-11, 1939, *García 7837, 7837-A, Balls B-7503* (US); south side of Laguna de la Cocha, Páramo de Santa Lucía (source of the Río Alisales), alt. 2900-3100 m., Jan. 9, 1941, *Cuatrecasas 11867* (US).

DEPARTMENT UNKNOWN: *Mutis* (**type**, not seen); *Bonpland* (! A. DC.); *Linden 389, 390* (! A. DC.); *Holton 726* (NY); July 5, 1920, *Dawe 838* (US); West Cordillera, Río Mundidó, alt. 2700 m., Aug. 1941, *Dryander 2512* (US); West Cordillera, Observatorio, alt. 2600-2700 m., Aug. 1941, *Dryander 2510, 2513* (US).

This species is characterized by innumerable minor forms most of which we find impossible to classify at present. There is some variation in leaf-form, much in indument and very much in the form of the capsule. Furthermore the capsule changes its shape to a very great degree as it develops, the base being late in development but persisting after the horns and column disintegrate. To complicate matters further, the type as shown in J. E. Smith's illustration, has only very young fruit, so that it is impossible to decide what is the typical form of the mature fruit.

Var. **retusa** Smith & Schubert, var. nov., tepalis masculinis interioribus retusis, ad 13 mm. longis, quam eis var. typicae multo majoribus.

VALLE: Cordillera Occidental, páramos, Los Farallones, crest of the cordillera, extreme north of the Alto del Buey range, alt. 3500-3600 m., Oct. 11, 1944, *Cuatrecasas 17942* (G, **type**; US); Los Farallones, extreme north, northwest slope, between Alto del Buey and Quebrada de los Ramos, alt. 3350-3450 m., Oct. 12, 1944, *Cuatrecasas 18039* (G); woods, Los Farallones, extreme north, east slope of Alto del Buey, alt. 3300-3450 m., Oct. 13, 1944, *Cuatrecasas 18095* (G).

Material of var. *retusa* is outstanding because it is somewhat larger in all its parts than that of the typical variety and because the inner staminate tepals are always retuse.

(To be continued)

Separado de CALDASIA, Vol. IV, No. 17, Agosto 15 de 1946.

BOTANICA

THE BEGONIACEAE OF COLOMBIA (*)

By LYMAN B. SMITH and BERNICE G. SCHUBERT
Gray Herbarium of Harvard University, Cambridge. Massachusetts.

24. **Begonia (§ Poecilia) semiovata** Liebm. Herbaceous, slender, 2-6 dm. high; stem simple or slightly branched, essentially glabrous or glabrescent, prostrate to ascending, sometimes rooting at the nodes; leaves strongly asymmetric, straight (or rarely transversely ovate), acuminate, unequally cuneate to cordate at base, subpinnately nerved, occasionally shallowly lobed with ciliate-serrate margins, 4.5-7 cm. long, 1.5-2 cm. wide, essentially glabrous on both surfaces, petioles 0.5-2 cm. long, glabrous, stipules persistent, lanceolate, up to 2 cm. long, entire, glabrous, acuminate; peduncles axillary, 2-3 cm. long, glabrous; cymes laxly few-flowered; bracts persistent, lanceolate to ovate, subentire to ciliate-serrulate, 1-2 mm. long; staminate pedicels very slender, to 6 mm. long; staminate tepals 2, ovate to suborbicular, 2 mm. long and broad; stamens free, few, anthers elliptic or ovate, the connective produced; pistillate bracteoles persistent, obovate to orbicular, entire to ciliolate-serrulate to almost lacerate, about 3 mm. long; pistillate pedicels to 5 mm. long; pistillate tepals 5, elliptic to ovate, 2-3 mm. long, varying in width; styles 3, 2-parted with the stigmatic tissue forming a continuous, linear, spiral band, ovary 3-celled, placentae variable, even in the same ovary; capsule subelliptic to orbicular, glabrous, 6-14 mm. long, with subequal, rounded wings, seeds stalked, oblong and obtuse, truncate at the base, 0.2-0.3 mm. long.—Mexico and Guiana to Perú.—Liebm. in Kjoeb. Vidensk. Meddel. 1852. 22(1853); A. DC. in DC. Prod. xv. pt.

(*) Continued from page 38.

1, 382(1864). *B. rosea* (Kl.) A. DC. loc. cit. 299. *Hoffmannella rosea* Kl. in A. DC. loc. cit. nomen. *B. Spruceana* A. DC. in Ann. Sci. Nat. ser. 4, xi. 142(1859); in DC. Prod. xv. pt. 1, 381(1864); Smith & Schubert in Field Mus. Pub. Bot. xiii. pt. 4, no. 1, 199(1941). *B. flexuosa* A. DC. in Ann. Sci. Nat. loc. cit.; in DC. Prod. xv. pt. 1, 382. *B. guyanensis* A. DC. in Ann. Sci. Nat. loc. cit.; in DC. Prod. xv. pt. 1. 381(1864); Irmscher in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, xxi; 581(1925). *B. guyanensis,* var. *glaberrima* C. DC. in Bot. Gaz. xx. 540(1895). Tab. 8.

SANTANDER: along creek on moist shaded bank, virgin forest, vicinity of Barranca Bermeja, Magdalena Valley, between Sogamoso and Carare Rivers, alt. 100-500 m., June 29, 1936, *Haught 1889* (G, US).

CHOCO: between La Oveja and Quibdó, April 1, 2, 1931, *Archer 1695* (US); La Concepción, 15 km. east of Quibdó, alt. ca. 75 m., April 20-May 23, 1931, *Archer 1953* (US).

VALLE: exposed cliffs, Pacific coast, Buenaventura, alt. 0-10 m., Oct. 5-10, 1922, *Killip 11689* (NY); woods, Pacific Coast, Río Yurumanguí, Veneral, alt. 5-50 m., Jan.-Feb., 1944, *Cuatrecasas 15855* (G); Río Calima (Chocó region), La Trojita, alt. 5-50 m., Feb.-Mar. 1944, *Cuatrecasas 16432* (G); stream-bed, Río Sabaletas, Sabaletas, km. 29 of highway from Buenaventura to Cali, alt. 25 m. June 4. 6. 1944. *Killip & Cuatrecasas 38860* (US).

NARIÑO: Prov. de Barbacoas, alt. 250 m., May, 1853, *Triana (17)* (Herb. Nac. Colomb.).

Begonia semiovata can be distinguished from its relatives in Colombia by the nearly equal wings which give the capsule an orbicular outline. From *B. subcostata, B. semiovata* differs notably in having its essentially glabrous leaves lobate and dimidiate and in having the anther-connective only slightly produced beyond the loculi.

For each of the names which we have placed in the synonymy of *B semiovata* we have examined either an authentic specimen or a type-photograph. There was no way in which the capsule or leaf-form could be distinguished between these species. In this section the condition of the placentae as well as the number of pistillate tepals seem to be poor diagnostic characters.

25. **Begonia (? § Poecilia) subcostata** Rusby. Herbaceous, rhizomatous, about 4.5 dm. high; stem branched, ascending, finely ridged,

glabrous; leaves subobliquely ovate, long acuminate, rounded to truncate at base, coarsely serrate and somewhat ciliate above the base, 3-8 cm. long, 1-2.5 cm. wide, venation subpalmate, both surfaces with a few scattered short thick hairs, petiole glabrous, 2-4.5 cm. long, stipules somewhat persistent, obliquely ovate, acute, ca. 3 mm. long and 2.5 mm. broad, glabrous, their margins short-lacerate; peduncles axillary, glabrous, 2-2.5 cm. long; inflorescence composed of few-flowered cymes; bracts small, more or less persistent, usually ovate and with somewhat lacerate-ciliolate margins; pedicels 8-23 mm. long; staminate tepals 4, the outer 2 orbicular, entire, up to 8 mm. long and broad, the inner 2 slenderly elliptic, obtuse, ca. 7 mm. long, 2 mm. broad; stamens free, connective produced, some times equaling anther in length; pistillate bracteoles linear to oblong with a setose tip, sometimes broader above and incised, up to 1 mm. long excluding tip; pistillate tepals 5, the outer orbicular, up to about 5 mm. long and 4 mm. wide, becoming progressively narrower and more acute, the smallest 5 mm. long and 1.5 mm. wide; styles 3 with 2 main branches and several smaller ones, each branch with the stigmatic surface at its apex, ovary 3-celled, placentae simple, ovuliferous throughout; capsule up to about 1 cm. long, largest wing to about 6 mm. wide, acute, the two small wings subequal; seeds oblong, apparently not stalked, surface alveolate, alveolae the same size throughout.—Endemic.—Rusby, Descr. S. Am. Pl. 67(1920). Tab. 8.

MAGDALENA: local and not common, on wet rock by stream, forest and clearing, Las Nubes, Santa Marta, alt. 1350 m., Dec. 15, 1898 or 1899, *H. H. Smith 1265* (NY, **type**; G. US).

Begonia subcostata may be distinguished at once from the species here placed near it by its almost glabrous, essentially straight and unlobed leaves, by the four tepals of its staminate flowers and by the anther-connective which is usually produced far beyond the locules although its length is variable, even in one flower. The styles in this species are multifid, in the three species here associated with it bifid.—The seeds are sessile here, stalked in the other three species.

26. **Begonia (§ Poecilia) filipes** Benth. Herbaceous. 2-6 dm. high; stem simple to slightly branched, glabrous, finely ridged; leaves strongly asymmetric, semiovate to obliquely or transversely ovate, acuminate, mostly truncate at base, palmately nerved with the chief veins branching divaricately above and with the margins crenate-

dentate and ciliate, 4-10 cm. long, 2-4 cm. wide, rather abundantly appressed-pilose above with long tapering hairs, essentially glabrous on lower surface, petiole 0.5-4 cm. long, glabrous, stipules mostly persistent, oblong-ovate, acute to acuminate to the setulose tip, 6-12 mm. long, 2-4 mm. wide, very thin, entire; peduncles axillary, up to 5 cm. long, glabrous; cymes few-flowered; bracts persistent, ovate-acute with setulose tip, up to 7 mm. long and 2 mm. wide; pedicels glabrous, 4-10 mm. long; staminate tepals 2, ovate-acute up to 3.5 mm. long and 2 mm. broad; stamens few, attached to a short column, connective slightly produced; bracteoles obovate, serrate-ciliate to 3.5 mm. long, more or less persistent; pistillate tepals 4 or occasionally 5. ovate-acute to orbicular, ca. 2 mm. long, slightly more than 1 mm. broad; styles 3, 2-parted, with the papillate stigmatic surface forming spiral bands, ovary 3-celled, placentae variable; capsule glabrous, 4-6 mm. long, the largest wing mostly obtuse, produced to 1 cm. in width, the other two subequal, narrow; seeds as in *B. semiovata*, but somewhat smaller.—Panama and Costa Rica to Colombia.—Benth. Bot. Voy. Sulph. 101(1844). Liebm. in Kjoeb. Vidensk. Meddel. 1852. 22 (1853); A. DC. in DC. Prod. xv. pt. 1, 300(1864); Hemsl. Biol. Centr.-Am. i. 495(1880); Standley in Contrib. U. S. Nat. Herb. xxvii. 277 (1928); in Field Mus. Pub. Bot. xviii. pt. 2, 741(1937). *B. hygrophila* C. DC. ex Th. Dur. & Pittier in Bull. Soc. Bot. Belg. xxxv. pt. 1, 265(1896). B. *hygrophila* var. *puberula* C. DC. op. cit. 266. *B mameiana* D. DC. in Smithson. Misc. Coll. lxix. no. 12 4(1919). *B. heterodonta* Rusby, Descr. New Sp. S. Am. Pl. 66 (1926). Tab. 8.

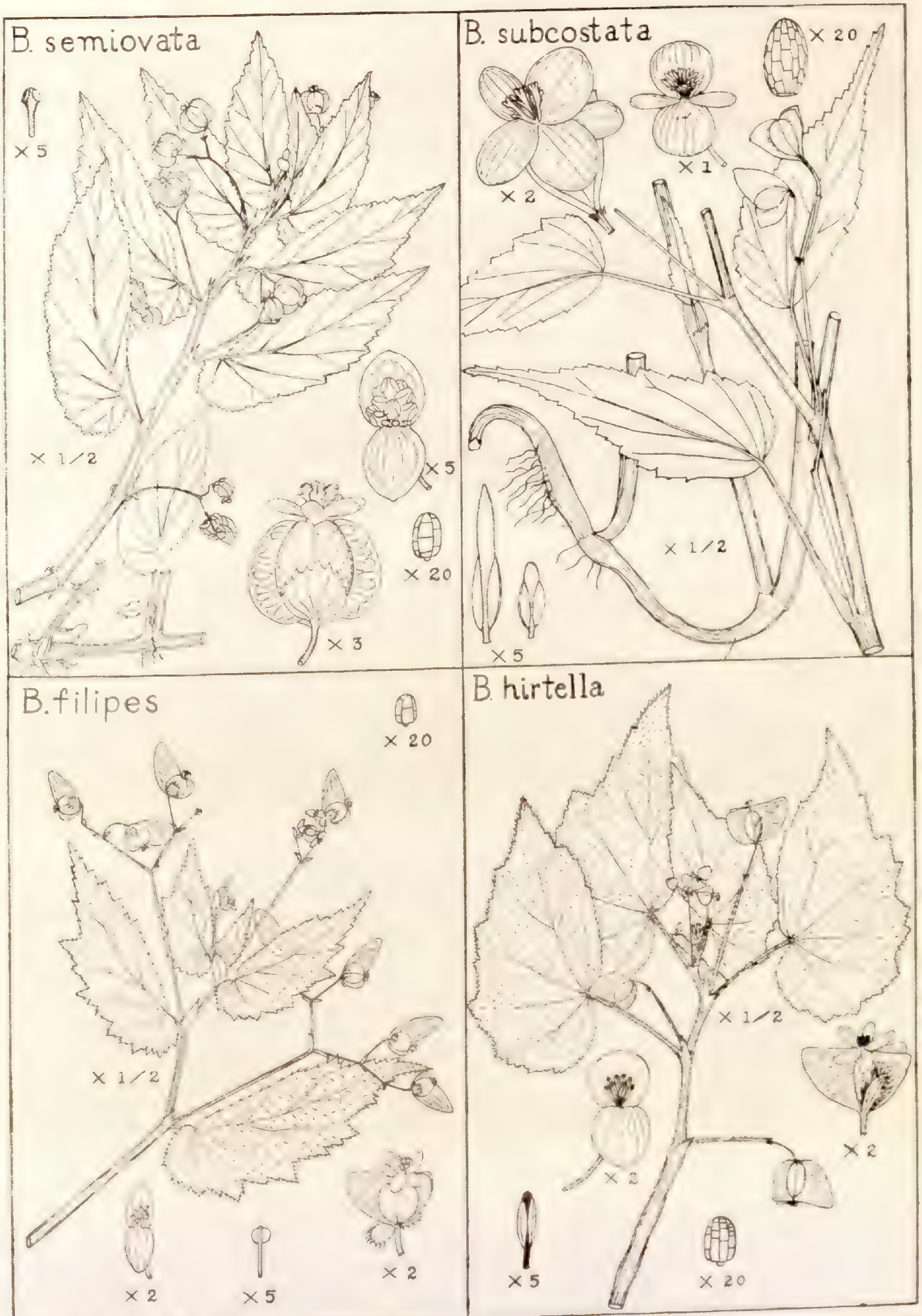
MAGDALENA: common on rocks in damp shady places about 300 m. from the Agua Dulce Road, alt. 240-260 m., Nov. 21, 1898-1901, *H. H. Smith 1244* (NY, type of *B. heterodonta* Rusby; G. US).

CHOCO or ANTIOQUIA: Atrato River basin, *Schott 208* (CM, labelled merely "South America", but he was nowhere else in South America).

ATLANTICO: Los Pendales, hacienda "Riodulce", alt. 20-50 m., in forest, Jan. 21-26, 1946, *Dugand & Jaramillo 4147* (Herb. Nac. Colomb.).

CHOCO: edge of forest along Quebrada Jella, Bahía Solano, near Ciudad Mutis, alt. 0-75 m., Feb. 21-23, 1939, *Killip & García 33602* (G).

From the two preceding species *Begonia filipes* may be separated by its leaves which are abundantly pubescent above. Its capsule, in which the largest wing is subdeltoid and ascending, distinguishes it


B. semiovata
× 5
× 1/2
× 5
× 20
× 3
B. subcostata
× 20
× 2
× 1
× 1/2
× 5
B. filipes
× 20
× 1/2
× 2
× 5
× 2
B. hirtella
× 1/2
× 2
× 2
× 5
× 20

TAB. 8

from all three of its Colombian relatives. In a co-type collection, the number of pistillate tepals varies, and in many specimens the placentae are variable in the same ovary.

27. **Begonia (§ Poecilia) hirtella** Link. Herbaceous, 2-9 dm. high; stem simple to branching, villous with slender, multicellular brownish hairs up to 2.5 mm. long; leaves strongly asymmetric, semiovate (when young) to transversely ovate, acute to acuminate, very shallowly cordate to almost truncate at base, 3-11 cm. long, 3-4.5 cm. broad, palmately nerved, shallowly or not at all lobed, moderately appressed-pilose on both surfaces, crenate-serrate and ciliate, petioles rather densely villous, 2-7 cm. long, stipules persistent, narrowly ovate, acuminate, 5-6 mm. long, lacerate-ciliate; peduncles axillary, sparsely pilose, 1.5-5 cm. long; cymes usually few-flowered; bracts persistent, linear to oblong or ovate, ciliate-lacerate, smaller than the stipules; pedicels essentially glabrous, 4-12 mm. long; staminate tepals 2-4, the outer suborbicular, up to 4 mm. long, the inner if present, smaller, lanceolate; stamens free, 9-22; pistillate bracteoles elliptic to subspatulate, ciliate-serrulate, 3.5-4 mm. long, not persistent in fruit; pistillate tepals 5, oblong to obovate, acute, ca. 2 mm. long; styles 3, 2-parted with the stigmatic tissue forming continuous linear spiral bands, placentae variable, seed-bearing throughout; capsule glandular-punctate, 10-14 mm. long with subdeltoid obtusely angled unequal wings, the largest 9-12 mm. wide; seeds oblong, obtuse, truncate and stalked at base, ca. 0.4 mm. long, surface alveolate, the basal alveolae longer than broad, the apical subrectangular. —West Indies, Brazil, Colombia and Perú.—Link, Enum. Hort. Berol. ii. 396(1822); A. DC. in DC. Prod. xv. pt. 1, 299(1864); Schulz in Urb. Symb. Ant. vii. 28(1911); Irmscher in Engler & Prantl, Nat. Pflanzenfam. ed. 2, xxi. 586(1925); Smith & Schubert in Field Mus. Pub. Bot. xiii. pt. 4, no. 1. 192(1941). *B. ciliata* HBK. Nov. Gen. & Sp. vii. 178(1825). *B. villosa* Lindl. in Bot. Reg. xv. t. 1252(1829). *B. diversifolia* Grah. β *nana* Walp. in Nov. Act. Acad. Leop.-Carol. xix. suppl. 1. 408(1843). *B. hirtella* Link var. *nana* A. DC. in Mart. Fl. Bras. iv. pt. 1, 345(1861). Tab. 8.

CUNDINAMARCA: Caparrapí, alt. 1280 m., June 8-13, 1939, *García 7727* (US).

TOLIMA: Santa Ana, near Mariquita, alt. 720 m., *Humboldt & Bonpland* (! A. DC.).

PUTUMAYO: wet woods in the valley of Río Afán, Mocoa, alt. 570-680 m., Dec. 27, 1940, *Cuatrecasas 11351* (G, US).

Begonia hirtella is the only member of this small group of species which is pubescent in most of its parts. The palmate venation of the usually transversely ovate leaves also serves as a distinguishing character; the largest capsule-wing which is very broad separates it from *B. filipes*. The seeds of *B. hirtella* differ from those of the three preceding species in having the apical alveolae subrectangular and the basal longer than broad.

28. **Begonia (§ Begoniastrum) microcarpa** A. DC., var. **typica.** Herbaceous, known only from upper portion of the plant, including a fragment of the stem which is somewhat villous; leaves asymmetric, obliquely to broadly elliptic to transversely ovate or suborbicular, abruptly acuminate, cordate at the base, 9-10 cm. long, 7.5-9.5 cm. broad, palmately 7-nerved, glabrous above, pubescent chiefly on the nerves beneath, margin shallowly lobed or slightly undulate, obscurely denticulate to entire, petioles 8.5-11 cm. long, abundantly villous, stipules persistent, deltoid ovate, cuspidate, 1-8 cm. long, entire, glabrous; peduncle axillary so far as is known, 1.4 dm. long, sparsely glandular; inflorescence laxly and somewhat irregularly cymose, ca. 8 cm. long, bracts elliptic, 4 mm. long, 2 mm. broad, obtuse, early deciduous; pedicels slender, to 11 mm. long, glandular; staminate tepals 4, entire, broadly ovate becoming more nearly elliptic in age, subapiculate, 3 mm. long and 2.5 mm. broad, stamens inserted on a column, filaments short, anthers subglobose, the connective not at all produced; pistillate bracteoles ovate-elliptic, obtuse, entire, 3 mm. long, 2 mm. broad; pistillate tepals 5, obovate, obtuse, the outer to 4 mm. long, 2.5 mm. broad; styles 3, persistent, short-connate at base, bifid with spiral stigmatic bands, ovary essentially globose, placentae bilamellate, ovuliferous throughout, wings subequal, similar, broadest at the middle and angled, a little over 1 mm. broad, seeds ellipsoidal, obtuse.—Ecuador.—A. DC. in DC. Prod. xv. pt. 1, 311 (1864). Tab. 9.

ECUADOR: in Andibus, 1857-9, *Spruce 5070* (Geneva, **type**; G. phot. (CM neg. 7344) **isotype**).

Var. **acuta** Smith & Schubert, var. nov., herbacea; caule ca. 3 dm. alto, decumbente, in nodis radicante, sparse longeque villoso, demum paene glabro, foliis 6.5-8.5 cm. longis, 9-10 cm. latis, ut in varietate *typica* vel cum paucis trichomis supra, petiolis 6-12.5 cm. longis, stipulis oblongis, acutis ad apice paene setuloso, 1.5-2 cm. longis; tepalis masculinis exterioribus ad 6.5 mm. longis et 2.5 mm. latis; tepalis femineis plerumque ellipticis in maturitate, ad ca. 6 mm. longis et 2 mm. latis; ovario glabro, alis inaequalibus, acutis, supra horizontalibus inferne rotundatis, glanduloso-punctatis, maxima 6 mm. longa et 4.5 mm. lata. Tab. 9.

HUILA: Cordillera Oriental, woods, west slope below Gabinete in the valley of the Abra de San Andrés, alt. 1900-2100 m., Mar. 24 1940, *Cuatrecasas 8606* (US, **type**; phot. G).

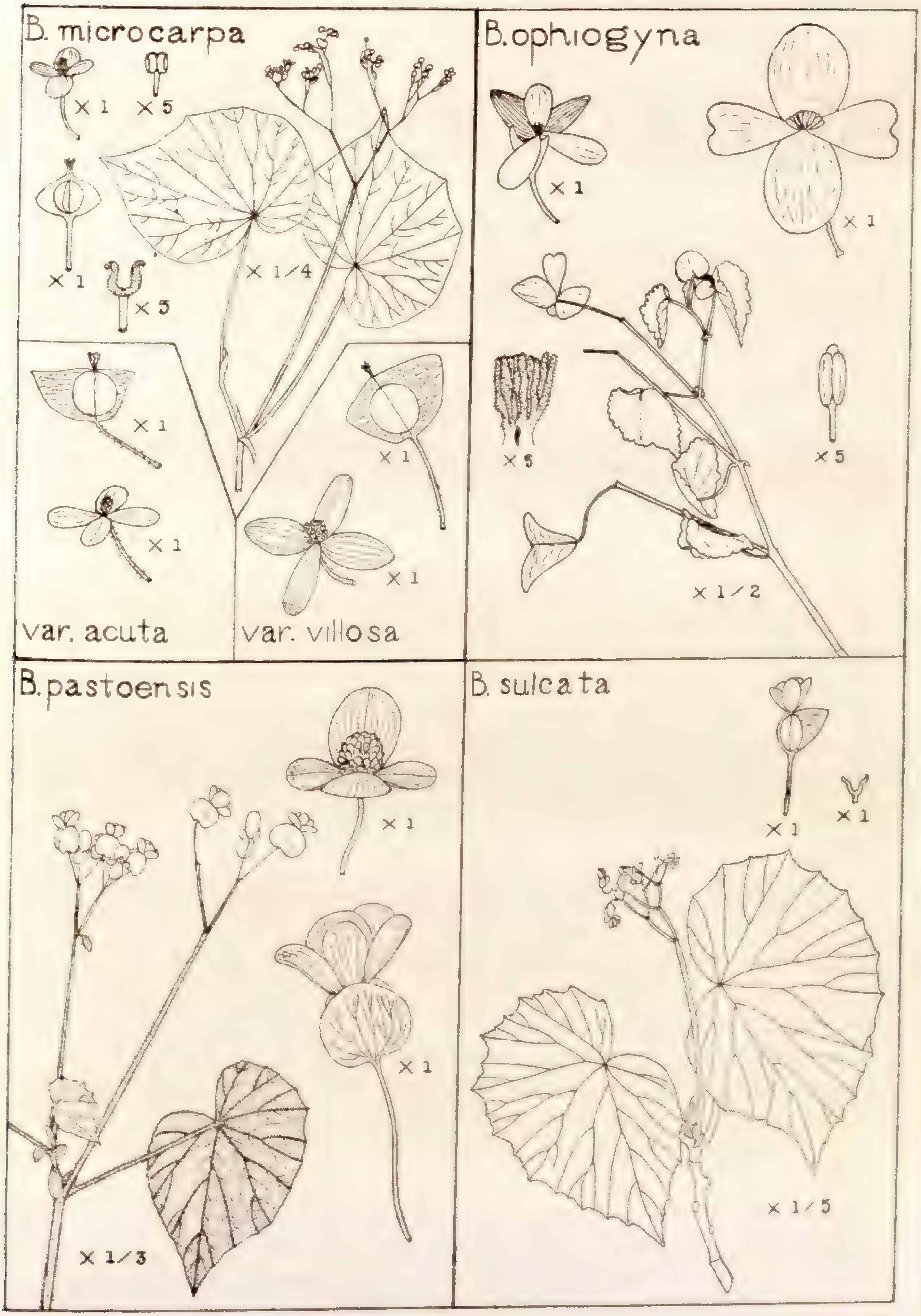
Var. **villosa** Smith & Schubert, var. nov., herbacea (! Cuatrecasas); caule ca. 3.5 dm. alto, simplice, non flexuoso, base decumbente radicante, villoso, demum glabro; foliis 10-12 cm. longis, 6.5-7.5 cm. latis, palmate 8-9—nervatis, supra glabrescentibus, subtus villosis densior in nervis, petiolis 7-10 cm. longis, stipulis lanceolatis vel deltoideo-lanceolatis, valde cuspidatis, ad 12 mm. longis; inflorescentiis 6 cm. longis, paucifloris, moderate villosis, bracteis ad 7 mm. longis; pedicellis juvenile dense villosis in maturitate glabrescentibus ad 15 mm. longis; tepalis masculinis exterioribus 9 mm. longis, interioribus 7 mm. longis; bracteolis femineis 4 mm. longis; tepalis femineis perjuvenilibus solum cognitis verisimiliter 5, certe 4, ovatis; ovario glanduloso-punctato, juvenili paullo villoso; alis inaequalibus, subacutis, supra descendentibus, inferne rotundatis, majoribus duabus 6 mm. latis, glanduloso-punctatis. Tab. 9.

VALLE: dense forest, El Silencio, Yanaconas, alt. 1900-2200 m., Feb. 28, 1939, *Killip & García 33768* (G, US).

CAQUETA: thicket, Cordillera Oriental, east slope, Sucre, banks of Río Hacha, alt. 1000 m., Apr. 3, 6, 7, 1940, *Cuatrecasas 9170* (US, **type**; phot. G).

Variety *villosa* differs from varieties *typica* and *acuta* in its villous pedicels which may also have sessile, but never stipitate, glands and in its glandular-punctate ovary and wings. In variety *acuta* the ovary is glabrous although the wings are glandular-punctate and in variety *typica* the whole capsule is glabrous.

29. **Begonia (? § Hydristyles) ophiogyna** Smith & Schubert, spec. nov., e fragmentis solum cognita, verisimiliter fruticosa, glabra;


B. microcarpa
× 1
× 5
× 1
× 5
× 1/4
× 1
× 1
var. acuta
× 1
× 1
var. villosa
B. ophiogyna
× 1
× 1
× 5
× 5
× 1/2
B. pastoensis
× 1
× 1
× 1/3
B. sulcata
× 1
× 1
× 1/5

TAB. 9

foliis obliquis ovatis, valde asymmetricis, acuminatis, basi cordatis, ad 35 mm. longis, 20 mm. latis, serratis vel crenatis, petiolis ad 35 mm. longis, stipulis subpersistentibus, ovatis, 3 mm. longis, integris; pedunculis axillaribus, 30-45 mm. longis; inflorescentia dioeca, 2-3 (vel -4?)-floris, bracteis persistentibus, parvis, ellipticis, rubris; pedicellis 15 mm. longis; tepalis masculinis 4, integris, exterioribus ellipticis, obtusis, 14 mm. longis, rubescentibus, interioribus obcordatis, 12 mm. longis, albis, staminibus liberis, antheris oblongis, quam filamentis longioribus, connectivo producto, ovato, obtuso; bracteolis femineis bracteis similibus; tepalis femineis 5, integris subaequalibus, 8-9 mm. longis; exterioribus ovatis, rubescentibus, interioribus obovatis, albis; stylis 3, liberis, multiramosis, ramis tortuosis, undique papilliferis; ovario 3-loculato, subturbinato, placentis bifidis, undique ovuliferis; capsulis 13 mm. longis, inaequaliter trialatis, alis subtriangularibus. **Tab. 9.**

MAGDALENA: Cerro Pintado, Sierra de Perijá, alt. 3100 m., July 3-6, 1942, *M. A. Carriker, Jr. 47* (US, **type**).

Note: *Carriker 21,* from the same locality, appears to be a dwarfed ecological form due to exposure.

Begonia ophiogyna is distinguished by having its inner staminate tepals obcordate and its five pistillate tepals sharply differentiated into two series, the outer two being ovate and reddish, the inner three obovate and white. The wings of the capsule are so thick that a sharp differentiation between ovary and wings is not always clear.

30. **Begonia (§ Huszia) pastoensis** A. DC. Herbaceous, probably not much over 3 dm. high; stem subsimple, with the petioles fulvous-pubescent; leaves oblique and strongly asymmetric, broadly ovate, abruptly acuminate, cordate at base, 5-9 cm. long, 3-6 cm. wide, palmately 7-9-nerved, undulate-denticulate, fulvous-puberulent on both sides, petiole slender, 5-7.5 cm. long, stipules persistent, broadly ovate, mucronulate, 8-12 mm. long, firm, glabrous; peduncles axillary and terminal, erect, to 12 cm. long, fulvous pubescent at least when young; cymes bisexual, dichotomous, few-flowered, glabrous; bracts tardily deciduous, obovate, ample, undulate, the lowest 10 mm. long, pedicels 1-3 cm. long; flowers probably rose; staminate tepals 4, the outer broadly elliptic, 12-16 mm. long, the inner obovate, 10-13 mm. long; stamens numerous, anthers obovoid, shorter than the filaments,

connective not produced, pistillate bracteolae persistent, orbicular, 8-10 mm. long, ample, concealing the ovary; pistillate tepals 5, obovate, 10-12 mm. long; styles 3, 2-branched, somewhat irregular, the stigmatic tissue linear, spiral, continuous; placentae bilamellate, the laminae irregularly 1-2-lobed, ovuliferous on all sides; capsule globose, unequally 3-winged, the wings all marginiform.—Ecuador.—A. DC. in Ann. Sci. Nat. sér. IV. 11:121. 1859; in DC. Prod. XV. pt. 1, 285 (1864). Tab. 9.

NARIÑO: near Pasto, alt. 2200 m., 1851-57, *Triana 3031* (Kew, **type,** Killip neg. no. 501; Geneva, **isotype,** CM. neg. no. 24198; NY, **isotype**); between Meneses and Pasto, Apr. 29, 1876, *André 2880* (NY).

Begonia pastoensis may be distinguished by the fulvous pubescence of its leaves and petioles, by the obtuse inner tepals of the staminate flower and by the large, persistent bracteoles of the pistillate flower. Its pistillate tepals, unlike those of *B. ophiogyna,* are not differentiated into two series, not are the two outer ones distinctly shorter as in *B. sulcata.*

31. **Begonia (§ Saueria) sulcata** Scheidw. Fruticose, about 1 m. high (! Haught); stem and branches sulcate, glabrous; leaves obliquely ovate, acute, shallowly cordate at base, palmately 6-7-nerved, 5-10 cm. long, 4-6 cm. wide, shallowly lobate, doubly crenate-serrate, ciliate, membranaceous, sparsely pilose at base on the nerves, petiole 2.5-7.5 cm. long, stipules deciduous, oblong, obtuse or mucronate, 16-18 mm. long, entire, membranaceous; peduncles axillary, at least 9 cm. long; inflorescence dichotomously much branched, flat-topped, 5-7 cm. in diameter; bracts persistent, falcate-spreading, linear-lanceolate, entire, 2-3 mm. long; pedicels slender, 6-10 mm. long; staminate tepals 4, white, the outer suborbicular, 6-8 mm. long, the inner obovate, 4-6 mm. long; stamens on a low torus, anthers oblong, slightly longer than the filaments, connective slightly produced, obtuse; pistillate bracteoles oblong, obtuse or acute, 2 mm. long; pistillate tepals 5, elliptic or obovate, 4-8 mm. long, the 2 outer distinctly shorter; styles 3, bifid, stigmatic tissue linear, spiral, continuous; ovary 3-celled, placentae bifid, ovuliferous throughout; capsule ellipsoid, unequal 3-winged, the largest sublunate, the others marginiform.—Endemic.—Scheidw. in Otto & Dietr. Allg. Gartenzeit. xvi. 130(1848); A. DC. in DC. Prod., xv. pt. 1, 288(1864); Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 148(1894); Irmscher, op.

cit. ed. 2, xxi. 586(1925). *Saueria sulcata* Kl. in Monatsb. Berlin Akad. 122(1854); idem, Begon. 41, t. 2, fig. A (1855). Tab. 9.

MAGDALENA: forest above Manaure, alt. ca. 700 m., Jan. 23. 1944, *O. Haught 3983* (US).

Note: The species was described from material cultivated at Brussels and said to have come from Colombia (Herb. Brussels?, Berlin).

The characteristically entire bracts, many flowered inflorescence and large leaves of *B. sulcata* serve to distinguish it from *B. tovarensis*, while the presence of one large and well developed capsule-wing separates it from *B. pastoensis* in which the wings are all marginiform.

32. **Begonia (§ Begoniastrum) tovarensis** Kl. Herbaceous, 2-12 dm. high, sparsely brown-pilose to glabrous; stem erect, red; branches short; leaves more or less asymmetric, broadly ovate or suborbicular, acute or rounded, cordate at base, 2-9 cm. long, palminerved, crenate-serrate, ciliate, glabrous above, more or less brown-pilose beneath especially on the nerves, petioles 5-45 mm. long, stipules deciduous, ovate-oblong, to 10 mm. long, ciliate-serrulate; peduncles axillary, 15-55 mm. long; cymes bisexual, few-flowered; bracts persistent, ovate, 2-4 mm. long, fimbriate; pedicels 5-20 mm. long; staminate tepals 4, the outer orbicular, 8 mm. long, the inner smaller, narrowly obovate; stamens free, numerous, filaments short, anthers oblong, the connective produced, obtuse; pistillate bracteoles like the bracts; pistillate tepals 5, obovate, 3-6 mm. long; styles 3, bifid, the stigmatic tissue linear, spiral, continuous, placentae bilamellate, ovuliferous throughout; capsule 10-15 mm. long, its wings decurrent, very unequal, the largest typically ascending and tapering, often hooked, to 23 mm. wide, seeds fusiform.—Cuba; Mexico; Central America; Colombia; Venezuela; Perú; Bolivia.—Kl. Begon. 31 (1855); A. DC. in DC. Prod. xv. pt. 1, 303(1864). Hemsl. Biol. Centr.-Am. i. 500(1880); Schulz in Urb. Symb. Ant. vii. 25(1911). Knuth in Fedde. Rep. Beihefte, xliii. 502(1927). Standley in Field. Mus. Pub. Bot. xviii. pt. 2, 747(1937). Smith & Schubert, op. cit. xiii. pt. 4, no. 1, 200(1941); in Rev. Univ. Cuzco, xxxiii. no. 87, 80, t. 13, fig. 22(1945). *B. populifolia* sensu Liebm. in Kjoeb. Vidensk. Meddel. 1852. 16(1853); Kl. Begon. 30(1855), non HBK. *Begonia Moritziana* Kl. l. c. 31, non

Kunth & Bouché, 1848. *Begonia tovarensis* β *ocanensis* A. DC. in DC. Prod. xv. pt. 1, 303(1864). Tab. 10.

MAGDALENA: Santa Marta, 1898-1901, *H. H. Smith 2078* (G, NY, US).

SANTANDER: marshy land, Mesa de los Santos, alt. 1500 m., Dec. 11-15, 1926, *Killip & Smith 15298* (G, NY, US); in very wet soil by spring, vicinity of Barranca Bermeja, Magdalena Valley, between Sogamoso and Colorado Rivers, alt. 100-500 m., Mar. 10, 1935, *O. Haught 1595* (US).

CALDAS: Cauca Valley, swale west of Armenia, alt. 1100-1400 m., July 24-25, 1922, *Pennell, Killip & Hazen 8647* (NY, var.?, no fruit).

ANTIOQUIA: Prov. de Antioquia, Rionegro, Mar., 1853, *Triana (19)* (Herb. Nac. Colomb.).

CAUCA: Popayán, alt. 1750 m., *Lehmann 8031* (CM); swale, Río Sucio to Río Piedras, west fo Popayán, Cauca Valley, alt. 1500-1700 m., July 3, 1922, *Pennell & Killip 8218* (G, NY); Cauca Valley, moist wayside north of Popayán, alt. 1700-1750 m., July 12, 1922, *Pennell & Killip 8268* (NY, var.?, no mature fruit).

META: wet trail in forest, Villavicencio, alt. 450 m., Aug. 26-31, 1917, *Pennell 1479* (G, NY); Villavicencio, June 1937, *E. Pérez A. 5322* (US); same locality, alt. 500 m., Nov. 9, 1938, *Cuatrecasas 4502* (US); sabana, Apiay, Villavicencio, alt. 500 m., Nov. 12, 1938, *Cuatrecasas 4784* (US); woods, along Río Guatiquía, near Villavicencio, alt. ca. 500 m., Mar. 18-19, 1939, *Killip 34436* (G).

CAQUETA: Florencia, in woods, cerro de La Sardina, alt. ca. 500 m., Mar. 30, 1940, *Cuatrecasas 8903* (G).

DEPARTMENT UNKNOWN: Queremal, Jan. 4, 1935, *E. Pérez A. 3093* (US).

Begonia tovarensis is wide-ranging and rather variable but it may be easily determined by its combination of fimbriate bracts, few flowered inflorescence, large unequally winged fruit and fusiform seeds.

Var. **palustris** (Benth.) Smith & Schubert, comb. nov. Largest wing of capsule rounded, not ascending.—*Begonia palustris* Hartweg ex Benth. Pl. Hartweg. 184(1845). Tab. 10.

CUNDINAMARCA: swale in meadow, Zipaquirá, alt. 2650 m., Oct. 20-24, 1917, *Pennell 2543* (G, Mo, NY, US); swamp, Laguna de Fúquene, alt. 2600 m., Mar. 1930, *E. Pérez A. 65* (US).

HUILA: swale, "Balsillas" on Río Balsillas, alt. 2000-2100 m., Aug. 3-5, 1917, *Rusby & Pennel 717* (NY, US).

VALLE: Bitaco, alt. 1550 m., Aug. 15, 1939, *H. García B. 8035* (US).

CAUCA: "Ad fossas prope Popayán", *Hartweg 1022* (Kew, **type**; Berlin, **isotype**, phot. G (CM neg. no. 20902)

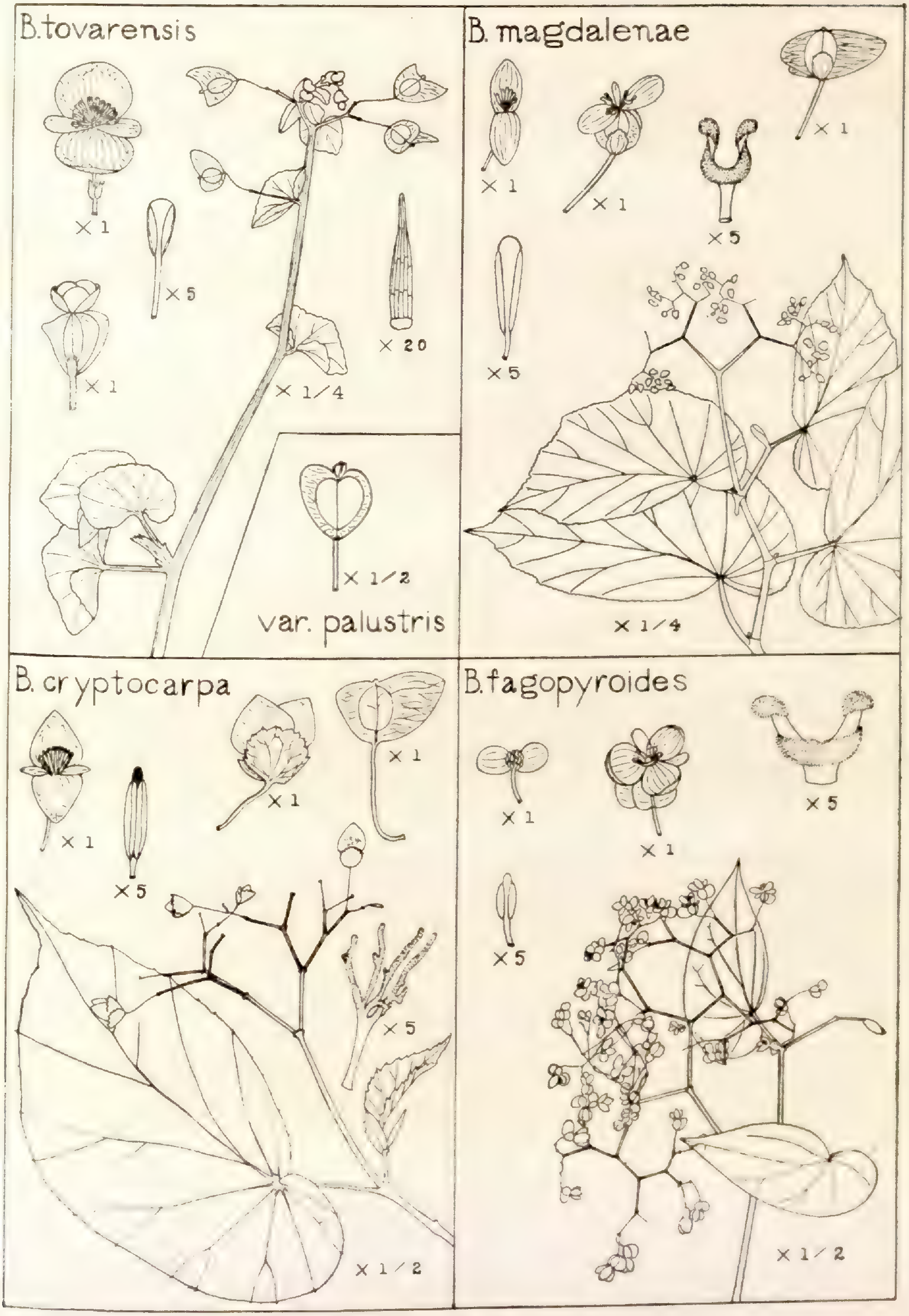
The character by which this variety is distinguished is very variable on a single plant and there are intergrades with the typical variety.

33. **Begonia (? §) magdalenae** Smith & Schubert, spec. nov., herba succulenta ad 1 m. alta (! Haught), glabra; caule flexuoso, internodiis ultra 8 cm. longis; foliis transversis vel valde obliquis, subellipticis, apice abrupte acuminatis, basi late cordatis, ad 17 cm. longis et 8.5 cm. latis, serratis, ad apicem versus sublobatis, petiolo 1-4 cm. longo, stipulis mox deciduis, ellipticis, ca. 2 cm. longis, integris; pedunculis axillaribus, 5-6 cm. longis; cymis multifloris, 10-11 cm. diametro, bracteis deciduis, linearibus, obtusis, 5 mm. longis; pedicellis 3-10 mm. longis; tepalis masculinis 2, ovatis, 7 mm. longis, integris, albis; staminibus ca. 13, subliberis, paucis, antheris oblongis, quam filamentis multo longioribus, connectivo producto, obtuso; bracteolis femineis suborbicularibus, grosse dentatis, quam ovario subduplo minoribus; tepalis femineis 3, exterioribus ellipticis, obtusis, interiori minore, lineari-obovato; stylis 3, bipartitis, stigmatibus spiraliter cinctis; ovario ellipsoideo, placentis bilamellatis; capsula inaequaliter 3-alata, alis triangulari-ovatis. Tab. 10.

MAGDALENA: in a tangled mass of lycopods, mosses, ferns and orchids in dense damp forest on mountains just east of Manaure, alt. 1900 m., Apr. 15, 1944, *O. Haught 4088* (G; US, **type**).

By its two staminate and three pistillate tepals, few anthers with obtuse connective, small bracteoles and bifid styles it is easy to differentiate between *B. magdalenae* and *B. cryptocarpa* which it resembles superficially.

34. **Begonia (? §) cryptocarpa** Smith & Schubert, spec. nov., e fragmentis solum cognita, verisimiliter suffruticosa, glabra; caule flexuoso; foliis valde obliquis, subellipticis, abrupte acuminatis, basi profunde cordatis, 10-14 cm. longis, 4-6.5 cm. latis, penninerviis, minute, denticulatis, rotundatis vel leviter angulatis, petiolo ad 35 mm. longo, stipulis deciduis, lanceolatis, cuspidatis, 12 mm. longis, mem-


B. tovarensis
× 1
× 5
× 1
× 20
× 1/4
× 1/2
var. palustris
B. magdalenae
× 1
× 1
× 5
× 1
× 5
× 1/4
B. cryptocarpa
× 1
× 5
× 1
× 1
× 5
× 1/2
B. fagopyroides
× 1
× 1
× 5
× 5
× 1/2

TAB. 10

branaceis, brunneis; pedunculo unico viso, axillari, 45 mm. longo; inflorescentia laxe cymosa, 8 cm. diametro, ca. 16-flora, bracteis deciduis; pedicellis ad 13 mm. longis; tepalis masculinis 4, integris, exterioribus late ovatis, acutis, basi cordatis, 9 mm. longis, interioribus oblongis, multo brevioribus; staminibus submultis, antheris linearibus, quam filamentis longioribus, connectivo producto, obtuso; bracteolis femineis orbicularibus, dentatis, 5-6 mm. longis, ovarium omnino occultantibus; tepalis femineis 2, late ovatis, subacutis, 8 mm. longis, integris, albis; stylis 3, multifidis, ramis spiraliter tortis, undique papilliferis, placentis bilamellatis, undique ovuliferis; capsula ellipsoidea, inaequaliter 3-alata, alis triangulo-ovatis. Tab. 10.

MAGDALENA: Santa Marta, alt. 1350 m., (fl. Aug. 22, fr. Dec. 18) 1898-1901, *H. H. Smith 1266* (G, **type**; NY, **isotype**).

Begonia cryptocarpa, so named because the fruit is hidden by the dentate bracteoles, also differs strikingly from the species closest to it in having four staminate and two pistillate tepals as well as multifid styles.

35. **Begonia (§ Begoniastrum) fagopyroides** Knuth & Bouché. Herbaceous, 3-12 dm. high, glabrous; stem flexuous; leaves transversely ovate, acuminate, cordate at base, palmately 7-8-nerved, 7-11 cm. long, 2.5-5 cm. wide, remotely and obscurely denticulate, petiole 1-4 cm. long, stipules deciduous, ovate-oblong, entire, 12-16 mm. long; peduncles axillary, 2.5-8 cm. long; cymes unisexual, many-flowered, dichotomous, globose, to 25 cm. in diameter; bracts deciduous, very minute; pedicels 5-15 mm. long; flowers white; staminate tepals 2, suborbicular, 4-5 mm. long; stamens on a low torus, anthers oblong, slightly shorter than the filaments, the connective produced, obtuse; pistillate bracteoles like the bracts; pistillate tepals 5, the 3 inner ovate. 4-5.5 mm. long, the outer much smaller; styles 3, bifid, the stigmatic tissue linear, spiral, continuous, placentae bilamellate, ovuliferous on all sides; capsules ovoid, acute, unequally 3-winged, the largest wing sublunate and slightly broader above, to 11 mm. wide, the other 2 narrowly marginiform.—Venezuela.—Kunth & Bouché in Ind. Pl. Hort. Berol. (1848); A. DC. in DC. Prod. xv. pt. 1, 289(1864). *Moschkowitzia fagopyroides* Kl. in Monatsb. Berlin. Akad. 127(1854); idem, Begon. 77, t. 8, fig. A. (1855). *Begonia fagopyroides β Fendleriana* A. DC. in DC. Prod. xv. pt. 1, 289(1864). Tab. 10.

NORTE DE SANTANDER: dense woods, Pica-Pica Valley, above Tapatá (north of Toledo), alt. 2100-2400 m., Mar. 1-5, 1927, ***Killip** & Smith 20213* (G, NY, staminate flowers only).

Note: The details on plate 10 were drawn after Klotzsch (Begon. t. 8, fig. A); the habit from a photograph (CM neg. 20887).

Although only fragmentary Colombian material of this species has been examined by us, it seemed to agree well with the photograph of authentic material, cultivated in Berlin. The species is distinctive because of its two outer pistillate tepals which are smaller than the inner. In addition it may be separated from *B. magdalenae* by its five pistillate tepals (rather than three) and minute, promptly deciduous bracteoles. From *B. cryptocarpa, B. fagopyroides* also differs in the character of its bracteoles as well as in its bifid styles and staminate flowers with only two tepals.

36. **Begonia (§ Scheidweileria) parviflora** Poepp. & Endl. Shrub or small tree, 2-4 m. high with simple trunk 4-5 cm. in diameter at base, slightly branched near the top, branches spreading, 6 dm. long; leaves palmate, subsymmetrical, shallowly or deeply 5-7-lobed with the lobes sometimes subdivided, cordate at base, 2-6 dm. wide, finely serrate, subglabrous and bright green above, gray green beneath and ferruginous-tomentose especially on the nerves, bearing cystoliths, petioles up to 6 dm. long, ferruginous-tomentose, stipules lanceolate, deciduous; inflorescences axillary and terminal, cymose, each composed of hundreds of flowers, 2-6 dm. broad, white (! Cuatrecasas), peduncle 3-6 dm. long, ridged and grooved, rather densely hirtellous, stout, white (! Cuatrecasas); bracts minute, deciduous; pedicels slender, lax, hirtellous, up to 2 cm. long; staminate tepals 4, elliptic or obovate, subequal, 3-4 mm. long; stamens on a low torus, anthers elliptic; pistillate tepals 5, elliptic, remotely serrate-setose, 4 mm. long; styles 3, 2-branched, the stigmatic tissue linear, spiral, continuous, ovary densely hirtellous becoming less so in age; placentae simple; capsule 10-12 mm. wide including the obcordate wings which are cuneate and ciliate becoming essentially glabrous at maturity, decurrent at base.—Ecuador, Perú, Bolivia.—Poepp. & Endl. Nov. Gen. & Sp. i. 7, t. 12(1835); A. DC. in DC. Prod. xv. pt. 1, 370(1864); Smith & Schubert in Field Mus. Pub. Bot. xiii. pt. 4. no. 1, 195(1941); in Rev. Univ. Cuzco, xxxiii. no. 87, 83, t. 14, fig. 46-48(1945). *Begonia micrantha* Steud. Nomencl. ed. 2, i. 194(1840). *Scheidweileria parvi-*

flora Kl. Begon. 59(1855). *Begonia myriantha* Britton in Bull. Torrey Club xviii. 35(1891). Tab. 11.

VALLE: dense forest, Río Digua Valley, between La Elsa and Río Blanco, alt. 880 m., Apr. 2-5, 1939, *Killip 34817* (G); woods, right bank near mouth of Río Digua, La Elsa, ravine La Cristalina, Cordillera Occidental. west slope, alt. 1000-1150 m. Sept. 30, 1943, *Cuatrecasas 15229* (G).

CAUCA: clearing along Río San Joaquín, alt. 1100-1300 m., June 29-30, 1922, *Killip 7837* (G, NY).

NARIÑO: Prov. de Túquerres, 2200 m. alt., *Triana (13)* (Herb. Nac. Colomb.).

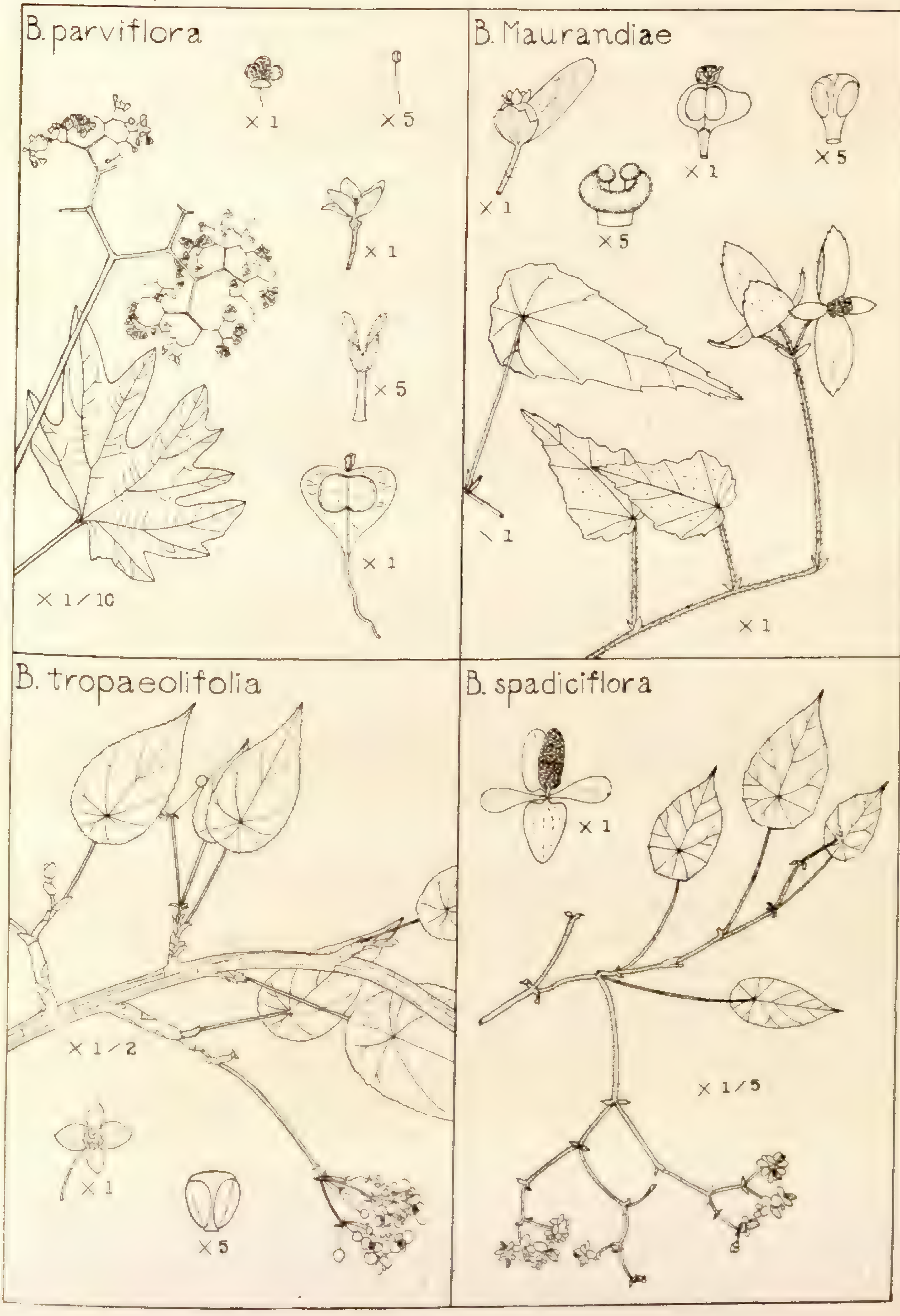
BOYACA: thick forest, region of Mt. Chapón, extreme western part of Boyacá, northwest of Bogotá, alt. 1350 m., June 3, 1932, *Lawrance 155* (NY).

PUTUMAYO: thickets, Cordillera Oriental, east slope, Sucre, banks of the Río Hacha, alt. 1000 m., April 7, 1940, *Cuatrecasas 9207* (US); moist woods in the valley of Río Mulato, alt. 570-600 m., Dec. 26, 1940, *Cuatrecasas 11311* (US).

NO LOCALITY: 1851-7, *Triana s. n.* (US).

With its very large lobate leaves, much branched inflorescences, tiny flowers and capsules with obcordate wings *B. parviflora* is easily distinguished.

37. **Begonia (§ Gobenia) Maurandiae** A. DC. Branching vine; branches slender, soon glabrous; leaves symmetrical, ovate, acuminate, at base from obtuse to cordate with overlapping or short peltate lobes, 1-7 cm. long, 8-nerved, laxly dentate, sparsely pilose above and chiefly on the nerves beneath, becoming glabrous, petioles 6-50 mm. long, pilose, stipules persistent, ovate, entire, brown, 2-6 mm. long; cymes axillary, few-flowered, pubescent, peduncles 1-4 cm. long, bracts persistent, elliptic, 2-4 mm. long; pedicels very slender, 5-20 mm. long, glabrescent to abundantly spreading pilose; staminate tepals 4, dentate, rose, the outer broadly elliptic, moderately long-pilose without, 8-15 mm. long, the inner shorter and obovate, stamens essentially sessile on a column, connective not produced; pistillate bracts suborbicular, nearly equaling the ovary, dentate; pistillate tepals 5-7, ovate, 2-3 mm. long; styles 3-4, very short, bifid-capitate, placentae bifid, ovuliferous throughout; capsule subglobose, its wings from subequal to very unequal in the same plant, all or the smaller


B. parviflora
× 1
× 5
× 1
× 5
× 1
× 1/10
B. Maurandiae
× 1
× 1
× 5
× 5
× 1
× 1
B. tropaeolifolia
× 1/2
× 1
× 5
B. spadiciflora
× 1
× 1/5

TAB. 11

ones marginiform or angled above, the largest in its extreme phase strongly falcate-ascending and up to 15 mm. wide.—Ecuador.—A. DC. in Ann. Sci. Nat. sér. 4, xi. 119(1859); A. DC. in DC. Prod. xv. pt. 1, 279(1864); Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 146(1894); Irmscher, op. cit. ed. 2, xxi. 582(1925). *Begonia hederacea* A. DC. in Ann. Sci. Nat. sér. 4, xi. 120(1859); in DC. Prod. xv. pt. 1, 280(1864). Tab. 11.

ANTIOQUIA: Támesis, Feb. 1, 1928, *R. A. Toro 973* (NY, sterile).

CUNDINAMARCA: Prov. de Bogotá, on Monte del Colegio and Tenasucá, alt. 2300 m., June, 1853, *Triana (11)* (Herb. Nac. Colomb.).

CALDAS: trailing on tree-trunks, Caldas, alt. 2500 m., 1918, *Dawe 765* (NY, US); stream-margin, edge of forest, "Pinares", above Salento, Cordillera Central, alt. 2700-2900 m., Aug. 2-10, 1922, *Pennell 9339* (G, NY, US); same, in clearing, *Pennell 9356* (G, NY, US); mossy forest, Cerro Tatamá, Cordillera Occidental, alt. 3200-3400 m., Sept. 8-10, 1922, *Pennell 10506* (NY, sterile).

CAUCA: Alto de Pesares, Popayán, alt. 2500-2800 m., *Lehmann 5934* (CM); forest, "Canaan", Mt. Puracé, Cordillera Central, alt. 3100-3300 m., June 11-13, 1922, *Pennell & Killip 6685* (G, NY); Cordillera Central, east slope near the crest, valley of Río San Marcos, between Jardín and San Rafael, alt. 2700-2900 m., July 25, 1943, *Cuatrecasas 14782* (G).

NARIÑO: Altaquer, Barbacoas, alt. 1000 m., *Triana 3039* (Kew, **type**, Killip neg. 620; NY, isotype of *B. hederacea;* CM, frag.); Río Cuaiquer, May, 1876, *André 3315* (NY).

PUTUMAYO: El Encano, Laguna de la Cocha, Páramo "El Tábano", alt. 3300 m., Aug. 10, 11, 1939, *H. García B. 7795* (US).

Specimens with peltate leaves but otherwise identical:

CALDAS: woods, La Línea, Quindío, alt. 3200 m., Feb., 1937, *Dryander 2134* (US).

VALLE: forest, La Cumbre, Cordillera Occidental, alt. 1800-2100 m., May 21-25, 1922, *Pennell & Killip 5881* (G, NY).

CAUCA: ravine in forest, "San José", San Antonio, Cordillera Occidental, alt. 2400-2700 m., July 1, 1922, *Pennell 7612* (G, NY, US); forest, "La Gallera", Micay Valley, Cordillera Occidental, alt. 2200-2600 m., July 1, 1922, *Killip 8009* (NY); Cordillera Occidental, Cerro de Munchique, west slope, at the mouth of Río Tambito, alt. 2000-2500 m., July 16, 1939, *Pérez & Cuatrecasas 6221* (US).

From *B. tropaeolifolia,* with which it is most often confused, *B. Maurandiae* may be distinguished by its dentate (rather than denticulate to subentire) leaves, its dentate (rather than entire) tepals and its few-flowered inflorescence. Some specimens of *B. Maurandiae* bear peltate leaves, but since the other characters are typical there is no question of their affinity. The capsule-wings are very variable throughout the species but there is no basis for even varietal distinction.

38. **Begonia (§ Gobenia) tropaeolifolia** A. DC. Branching vine, branches slender, cortex pale gray, friable, glabrous; leaves symmetrical, peltate, ovate to suborbicular, short-acuminate, rounded at base, 3-5 cm. long, 8-nerved, obscurely dentate, glabrous, petioles 3-7 cm. long, stipules persistent, ovate, entire, brown, 4-7 mm. long; cymes axillary, many-flowered, peduncles 4 cm. long, bracts persistent, elliptic, 2-4 mm. long; staminate tepals 4, entire, the outer suborbicular, the inner shorter and obovate; anthers globose, on a short column; pistillate flowers unknown.—Ecuador.—A. DC. in Ann. Sci. Nat. sér. 4, xi. 120(1859); in DC. Prod. xv. pt. 1, 280(1864). Tab. 11.

CUNDINAMARCA: "In Novae Granatae, prov. Bogotá, Monte del Colegio (Triana! n. 3637)" (BM, **type**-collection; G, phot. (Killip neg. no. 621); near Salto de Tequendama, July, 1919, *Bro. Ariste-Joseph A. 406* (US); forest, Salto de Tequendama, alt. 2500 m., Oct. 1-3, 1938, *Cuatrecasas 68* (US); same locality, dependent over partially shaded bank, Mar. 8, 1939, *Killip 34034* (US); thickets, between El Salto and El Colegio, alt. 2100-2200 m., Mar. 3, 1940, *Cuatrecasas 8203* (US).

Although often confused with *Begonia Maurandiae, B. tropaeolifolia* may be distinguished by its always peltate and obscurely dentate leaves, many-flowered inflorescence and entire staminate tepals. From both *B. Maurandiae* and *B. spadiciflora, B. tropaeolifolia* may be separated by its cortex which is friable and lustrous gray rather than red and by its very short staminal column. The two latter species are known only from staminate material. Pistillate flowers and mature capsules are needed to determine the true relationships of both species.

39. **Begonia (§ Gobenia) spadiciflora** Smith & Schubert, spec. nov., e fragmento plantae masculinae solum cognita, ramosa, verisimiliter scandens; ramis flexuosis, gracilibus, cortice persistente, ru-

bro-brunneo, dense piloso, internodiis 3-4 cm. longis; foliis peltatis, ovatis, abrupte acuminatis, basi late rotundatis, ad 9.5 cm. longis et 5 cm. latis, 7-8-nervatis, obsolete denticulatis, utrinque sparse pilosis, petiolis 4-9 cm. longis, sparse pilosis, stipulis persistentibus, ellipticis, integris, 6 mm. longis; pedunculo unico cognito axillari, 9 cm. longo; inflorescentia multiflora, laxe cymosa, ca. 2 dm. diametro, glabra, bracteis persistentibus, ellipticis, truncatis, integris, infimis 5 mm. longis; pedicellis 3-4 mm. longis; tepalis masculinis 4, integris, exterioribus ovatis, obtusis, 8 mm. longis, interioribus obovatis, paulo brevioribus; staminibus multis in columna ad 10 mm. alta insertis, antheris ellipticis, sessilibus, connectivo haud producto. Tab. 11.

ANTIOQUIA: Salgar, July 20, 1928, *R. A. Toro 1259* (NY, **type**).

B. spadiciflora is so named because of the spadix-like androecium, the outstanding character of the species. The reddish-brown pilose bark and long peduncle also distinguish the species clarly from *B. tropaeolifolia.*

40. **Begonia (§ Hydristyles) novo-granatae** A. DC. Species known only from fragments, probably herbaceous and subacaulescent; leaves peltate, ovate, obtuse, thin, 8 cm. long, 6 cm. wide, crenulate-setiferous, sparsely pubescent on both sides, petiole pilose, 5 cm. long; peduncle 25 cm. long tomentose, cyme few-flowered, bracts elliptic-oblong, obtuse or subacute, persistently pilose, the lowest 8 mm. long; staminate tepals 8 mm. long, pilosulous, the outer broadly obovate, the inner narrower (3 in number in the only flower seen by A. De Candolle but he believed 2 the normal number), anthers obovoid, the connective not produced; pistillate tepals 5, oblong-obovate; styles much branched with the stigmatic tissue capitate at the branch-ends, placentae bifid, ovuliferous throughout; capsule rounded at base, 8-10 mm. long, 6-8 mm. wide, pilosulous, wings unequal, the largest obtuse, subascending.—Endemic.—A. DC. in DC. Prod. xv. pt. 1, 402, 403(1864). *Begonia rosacea* Linden Cat. 15(1860) nomen nudum; Linden ex A. DC. in DC. Prod. xv. pt. 1, 330(1864) non Putz. (1857).

Note: The type-material is probably in Geneva; it was cultivated by Linden and is said to have come from Colombia. We have not examined it. Material of this species, one of the few of which we have seen no representative material, is much desired.

41. **Begonia (§ Begoniastrum) cucullata** Willd. Perennial succulent herb, caulescent, stoloniferous, glabrous, 0.1-1 m. high; leaves slightly asymmetric, straight, broadly ovate with the base truncate and usually inrolled, obtuse, palminerved, to 10 cm. long and 9 cm. wide, crenate-serrate, ciliate, petiole 25-50 mm. long, stipules persistent, oblong or elliptic, obtuse, 2-3 cm. long, green; cymes axillary, few-flowered, peduncle 3-6 cm. long; bracts persistent, ovate, serrulate, 5 mm. long; pedicels slender; staminate tepals 4, the outer ones suborbicular, 8-13 mm. long, the inner smaller and narrowly obovate; stamens free, numerous, filaments short, anthers elliptic; pistillate tepals 4-5, obovate, styles 3, 2-parted, the stigmatic tissue linear, spiral, continuous, placentae bilamellate, ovuliferous throughout; capsule unequally 3-winged, the largest wing triangular, subacute, seeds acute in the typical variety.—Guiana, Brazil, Paraguay, Uruguay, Argentina. Widely cultivated.—Willd. Sp. Pl. iv. 414(1805); Kl. Begon. 27(1855); A. DC. in Mart. Fl. Bras. iv. pt. 1, 341(1861); in DC. Prod. xv. pt. 1, 292(1864); Herter, Fl. Uruguayensis, 89(1930); Smith & Schubert in Darwiniana, v. 101, fig. 11(1941). *Begonia spatulata* Lodd. Bot. Cab. ii. t. 107(1817). *B. paludicola* C. DC. in Bull. Soc. Bot. Genève, sér. 2, vi. 125, fig. 7(1914).—Tab. 12.

CALDAS: meadow, "La Palmita", west of Armenia, Cauca Valley, alt. 1000-1200 m., July 23, 1922, *Pennell, Killip & Hazen 8618* (G, NY); swale, west of Armenia, Cauca Valley, alt. 1100-1400 m., July 24-25, 1922, *Pennell, Killip & Hazen 8647* (G).

CHOCO: between Carmen de Atrato and Tutunendo (road from Bolívar (Antioquia) to Quibdó, km. 52 to 70), valley of the upper Atrato, alt. 500-600 m., July 25, 26, 1944, *H. García B. 11119* (US).

VALLE: woods, km. 17 on highway beteen Cali and Buenaventura, alt. 2000 m., Oct. 1937, *E. Dryander 2016* (US); open hillside, Río Digua Valley, between La Elsa and Río Blanco, alt. 900 m., Apr. 2-5, 1939, *Killip 34820* (G); woods, mouth of Río Digua, right bank, La Elsa, ravine La Cristalina, west slope Cordillera Occidental, alt. 1000-1150 m., Sept. 30, 1943, *Cuatrecasas 15221* (G).

Begonia cucullata may be readily distinguished by its succulent habit and large persistent stipules. The species is rather variable and much cultivated. The illustration of the habit is taken from Loddiges.

42. **Begonia (? §) tiliaefolia** C. DC. Herbaceous, caulescent, usually prostrate at base and rooting at the nodes; leaves slightly asym-

metric, straight or nearly so, broadly ovate, abruptly acuminate, short-cordate at base, 8-10 cm. long, 6-8.5 cm. wide, palmi-penni-nerved, crenate, sparsely ferruginous-pilose on the nerves above and densely on the nerves beneath, thin, petioles 2-8 cm. long, pilose, stipules soon deciduous, triangular-oblong, acute, 9 mm. long, glabrous; peduncles axillary, very short to absent, cymes very few-flowered; bracts and bracteoles persistent, ample and concealing most of the flowers, ca. 10 mm. long, crenulate, membranaceous; staminate tepals (only incomplete material seen), entire; stamens few, free, anthers oblong, much longer than the filaments; pistillate tepals 5, oblong, obtuse, 9 mm. long; styles 3, bifid, the stigmatic tissue linear, spiral;; ovary broadly ovoid or subglobose, placentae bilamellate, ovuliferous on all sides; capsule-wings unequal, spreading, narrowly triangular, attached to the upper edge of the capsule.—Ecuador.—C. DC. in Bull. Herb. Boiss, ser. 2, viii. 324(1908).—Tab. 12.

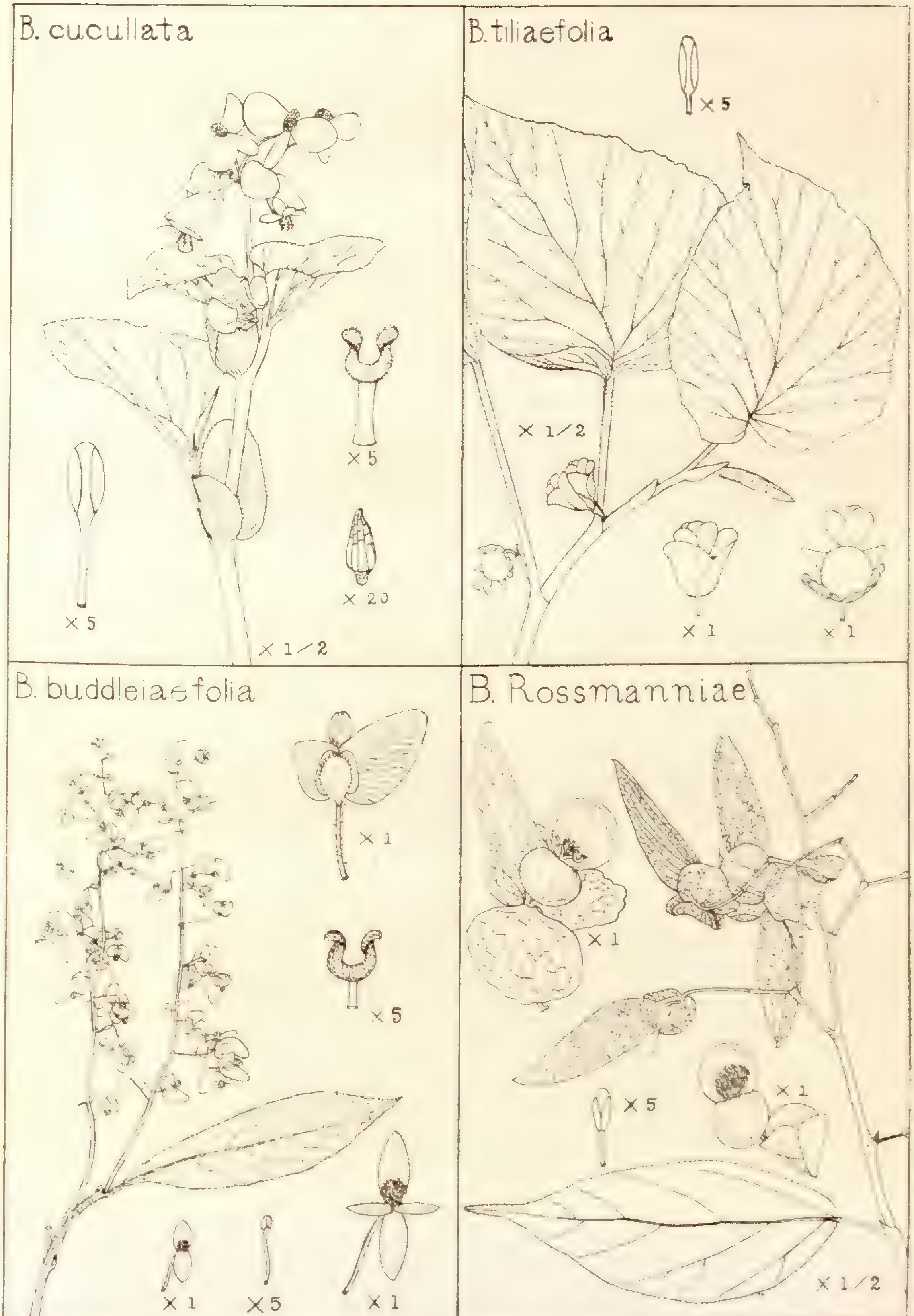
CAUCA: Cordillera Occidental, forest, "La Gallera", Micay Valley, alt. 1400-1500 m., June 29-30, 1922, *Killip 7697* (G, NY, US).

Begonia tiliaefolia may be distinguished by its large persistent bracteoles and the unique position of the capsule-wings; it may also be separated from *B. cucullata* by its somewhat pubescent, abruptly acuminate leaves.

The attachment of the capsule-wings to the upper portion of the capsule suggests relationship in section *Casparya;* however, the wings are unequal (in section *Casparya* the horns are equal); also the styles in *B. tiliaefolia* are bifid rather than multifid as in section *Casparya*.

There is great need for staminate material for study. On only one specimen have we seen a staminate flower and that was in too poor condition to count tepals, although a few stamens were present.

43. **Begonia (§ Pilderia) buddleiaefolia** A. DC. Herbaceous, succulent, 0.3-0.9 m. high; stem slender, erect, branched, the apices as well as the petioles and peduncles ferruginous-tomentose; leaves nearly straight, but strongly inequilateral, narrowly lanceolate or oblanceolate, acuminate, rounded at base with one side attached much lower than the other, 9-26 cm. long, 2-7 cm. wide, finely double-serrate, ciliate, thin, often somewhat bullate, hirsute above except on the veins, hirsute beneath especially on the veins, petioles 6-20 mm. long,


B. cucullata
× 5
× 5
× 20
× 1/2
B. tiliaefolia
× 5
× 1/2
× 1
× 1
B. buddleiaefolia
× 1
× 5
× 1
× 5
× 1
B. Rossmanniae
× 1
× 5
× 1
× 1/2

TAB. 12

stipules lanceolate, 8 mm. long; inflorescences terminal, laxly racemose or paniculate, few-flowered, 7-12 cm. long; bracts lanceolate to ovate, much shorter than the pedicels; staminate tepals 2 or 4, the outer broadly ovate or elliptic, 2-8 mm. long, hirsute, the inner oblong, much shorter; stamens on a low torus or column, anthers elliptic, shorter than the filaments; pistillate bracteoles broadly ovate or elliptic, ciliate-serrate, nearly equaling the ovary; pistillate tepals 4-5, elliptic, 4-7 mm. long, glabrous or pubescent; styles 3, slenderly bifid, stigmatic tissue linear, spiral, placentae simple; capsule cordate at base, its wings unequal, ovate, obtuse.—Venezuela, Ecuador,Perú.—Ann. Sci. Nat. Sér. 4, xi. 141(1859); A. DC. in DC. Prod. xv. pt. 1, 380(1864); Irmscher in Diels in Bibl. Bot. cxvi. 111 (1937); Smith & Schubert in Field Mus. Pub. Bot. xiii. pt. 4, no. 1, 186(1941). *Pilderia urticaefolia* Kl. in Monatsb. Berlin Akad. 127 (1854); idem, Begon. 66, t. 7, fig. A (1855), non *Begonia urticaefolia* Smith (1790). *B. urticaefolia* Hort. ex Kl. loc. cit., nomen in synon.; (Kl.) Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 144 (1894); Irmscher, op. cit. ed. 2, xxi. 581(1925). *B. lantanaefolia* A. DC. in Ann. Sci. Nat. Sér. 4, xi. 141(1859). *B. Pilderia* A. DC. in DC. Prod. xv. pt. 1, 380(1864).—Tab. 12.

NORTE DE SANTANDER: Prov. Ocaña, alt. 2100-2400 m. *Schlim 578* (Gen; CM, G, phot.; type of *Begonia lantanaefolia*); Cordillera Oriental, region of Sarare, mouth of Río Margua between Junín and Córdoba, alt. 920-1240 m., Nov. 22, 1941, *Cuatrecasas 13391* (US); woods, Cordillera Oriental, region of Sarare, between Alto del Loro and Alto de Santa Inés, alt. 1800-2200 m., Oct. 18-21, 1941, *Cuatrecasas, Schultes & E. Smith 12413* (US).

ANTIOQUIA: moist roadside, between Valdivia and Yarumal, alt. 2200 m., Feb. 1942, *Metcalf & Cuatrecasas 30127* (U Cal).

CUNDINAMARCA-META: moist bank, shade, Pipiral to Susumuco, southeast of Quetame, alt. 1100-1300 m., Sept. 5, 1917, *Pennell 1721* (NY).

CAQUETA: Cordillera Oriental, east slope, Quebrada del Río Hacha, open woods in Cajón de Pulido, alt. 1700 m., Mar. 26, 1940, *Cuatrecasas 8749* (Herb. Nac. Colomb.).

The laxly racemose or paniculate inflorescence of *B. buddleiaefolia* is in sharp contrast to that of most associated species which do not have long central axes. From *B. Rossmanniae, B. buddleiaefolia* may be separated by its pubescence, its serrate pistillate bracteoles which are not accrescent (undulate or entire and accrescent in *B. Rossmanniae*) and its 5 pistillate tepals (2 in *B. Rossmanniae*).

44. **Begonia (§ Ruizopavonia) Rossmanniae** A. DC. Scandent shrub, essentially glabrous; leaves straight only slightly asymmetric, elliptic, acuminate, rounded at base, 6-10.5 cm. long, 1.9-4 cm. wide, penninerved, serrate, ciliate, petioles 4-17 mm. long stipules deciduous, oblong, acuminate, 3-11 mm. long; inflorescence terminal, thyrsoid, 4-12-flowered, peduncle 1.5-3 cm. long; lower bracts large, obovate or oblanceolate, membranaceous, red, fugacious; pedicels 15 mm. long; flowers rose to brick red; staminate tepals 2, broadly ovate, 6-8 mm. long; stamens free, anthers elliptic, obtuse, shorter than the filaments, the connective produced; pistillate bracteoles 12-15 mm. long, persistent, accrescent, suborbicular, cordate at base, entire to somewhat lobed, exceeding the ovary; pistillate tepals 2, broadly ovate to suborbicular; styles 3, 2-parted, the stigmatic tissue linear, spiral, continuous, placentae bilamellate; capsule orbicular, with 2 very small wings, the third subascending, deltoid to ovate, acute to obtuse, 2-4 cm. long.—A. DC. in DC. Prod. xv. pt. 1, 333(1864); Warb. in Engler & Prantl, Pflanzenfam. iii. Abt. 6a, 147, fig. 44b (1894); Irmscher, op. cit. ed. 2, xxi. 584, fig 254b (1925); Smith & Schubert in Field Mus. Pub. Bot. xiii. pt. 4, no. 1, 199(1941). *Begonia repens* Ruiz ex Kl., nomen in synon., non Vell. nec Lam. *Rossmannia repens* Kl., Begon. 99, t. 9, fig. A (1855).—Colombia and Perú.—Tab. 12.

PUTUMAYO: forest, Umbria, 0°54'N, 76°10'W, alt. 325 m., Oct-Nov., 1930. *Klug 1674* (CM, G); same locality, Dec., 1930, *Klug 1869* (CM, G); moist woods of Río San Miguel, between the ravines of Sipenae and Churruyaco, alt. 400 m., Dec. 11, 1940, *Cuatrecasas 10955* (US).

Begonia Rossmanniae may be distinguished from *B. Cuatrecasana* by its two staminate and two pistillate tepals (rather than four staminate and three pistillate) and by its inflorescence which appears to have a simple axis with only secondary lateral cymes rather than a highly ramified cymose form.

45. **Begonia (? § Ruizopavonia) extensa** Smith & Schubert, spec. nov., e fragmentis solum cognita, herbacea, ramosa, glabra; foliis fere rectis sed valde asymmetricis, oblongo-ellipticis, breviter acuminatis, basi leviter cordatis, 8-11 cm. longis, 3.5-6 cm. latis, crenato-

serratis, petiolis 5-15 mm. longis, stipulis elliptico-ovatis, acutis, ca. 1 cm. longis; cymis terminalibus et axillaribus, ca. 7-16-floris; pedunculis gracilibus, 3-4 cm. longis; bracteis deciduis, ellipticis, 5 mm. longis, integris; pedicellis gracillimis, 15 mm. vel ultra longis; tepalis masculinis 2, anguste ovatis, 16 mm. longis, integris, carnosis, rubris; staminibus multis, toro pulvinato insertis, filamentis brevibus, antheris oblongis, connectivo ultra loculos perlonge extenso; floribus femineis capsulisque ignotis.—Tab. 13.

BOYACA: overhanging streams in thick forest, region of Mt. Chapón, extreme western part of Dept. Boyacá, northwest of Bogotá, alt. 900 m., June 8, 1932, *Lawrence 187* (Mo, **type**; G, NY, **isotypes**).

This distinctive species is known from only one staminate collection. It is unique because of the very elongate anther connective which exceeds the loculi in length. Pistillate material is much desired.

46. **Begonia (§ Ruizopavonia) Cuatrecasana**, spec. nov., frutex scandens; caule glabro, foliis penninervatis paulo asymmetricis, anguste obovatis vel ovato-ellipticis, apice acuminatis, basi cuneatis, undique glabris cum venis primariis subtus prominentibus et venis secundariis reticulatis et prominentibus undique, marginibus serratis in tertia parte superiore reliquis integris, 12.5-15 cm. longis, 4.3-5.6 cm. latis; petiolis 3-4 mm. longis; stipulis oblongo-acuminatis vel ovato-acuminatis, 10-14 mm. longis, 3-6 mm. latis, glabris; pedunculo glabro, lineato, ca. 4.5 cm. longo; inflorescentia cymosa; bracteis primariis persistentibus, stipulis simillimis sed minoribus, bracteis secundariis ovatis vel suborbicularibus, acuminatis, ciliatis ad 14 mm. longis et 5 mm. latis, ad apicem decrescentibus; pedicellis masculinis glabris, 11-15 mm. longis, tepalis 4, duobus exterioribus ovato-acuminatis, basi cordatis, 20-28 mm. longis, 12-15 mm. latis, duobus interioribus elliptico-obtusis, 13-18 mm. longis, 3.5-4 mm. latis, staminibus 11-14, antheris ellipticis, filamentis subaequantibus, connectivo producto, obtuso, bracteolis femineis 2, parte superiore serrulata ovario tegentibus, ca. 15 mm. longis, 11 mm. latis; tepalis 3, duobus exterioribus magnis ovatisque, acutis, 2.5 cm. longis, 1.8 cm. latis, interiori anguste ovato, obtuso, 15 mm. longo, 6 mm. lato; ovario 3-loculato, stylis 3, bifidis, ramis linearibus, stigmatibus spiraliter cinctis; capsula glabra, ala maxima deltoidea, acuta, ascendente, ca. 1.5 cm. longa, 1 cm. lata, duobus alteris minoribus.—Tab. 13.

VALLE: Cordillera Occidental, western slopes; left bank of Río Sanjuniquín, La Laguna, woods, alt. 1250-1400 m., Dec. 10-20, 1943, *José Cuatrecasas 15553* (G, **type**).

We are happy to name this species for Dr. José Cuatrecasas of Cali, Colombia, whose collections are making such a great contribution to the flora of that country. *Begonia Cuatrecasana* has its closest alliance with *B. consobrina* and *B. cymbalifera* which also have four staminate tepals and three pistillate tepals. These three species, as well as *B. Rossmanniae,* all have conspicuous bracteoles at the base of and often covering the ovary. Our new species is distinguished from the others by the great size of the outer tepals of both the staminate and pistillate flowers, by the small number of stamens and by the much longer and more slender style-branches, as well as by the thick leaves with prominent reticulate venation, and presumably, when living, by its very striking orange-red flowers.

47. **Begonia (§ Ruizopavonia) xylopoda** Smith & Schubert, spec. nov., perennis, humilis sed suffruticosa, basi valde lignosa, 3-6 dm. alta; caule erecto, geniculato, pilosiusculo, nodis tumidis; foliis rectis, paulo asymmetricis, elliptico-lanceolatis, acuminatis, basi rotundatis, ad 7 cm. longis, paulo ultra 2 cm. latis, laxe serratis, supra glabris, subtus ad nervos adpresse pubescentibus, petiolis 10 mm. longis, pubescentibus, stipulis oblongis, integris, 10-13 mm. longis, subglabris; pedunculo axillari, gracillimo, 20-35 mm. longo; inflorescentia laxe cymosa, pauciflora, pubescenti, bracteis deciduis, ellipticis, 2-4 mm. longis, apice serrulatis; pedicellis 10-20 mm. longis; tepalis masculinis 2, orbicularibus, integris, 6 mm. longis, albis; staminibus multis, antheris oblongis quam filamentis multo longioribus, connnectivo producto; bracteolis femineis 3, late ellipticis, serrulatis; tepalis femineis 4, perjuvenilibus solum cognitis, valde inaequalibus, suborbicularibus vel reniformibus, integris; stylis 3, multiramosis; ovario late ellipsoideo, placentis bilamellatis; capsulis inaequaliter trialatis, alis ovatis, obtusis, maxima 12 mm. lata.—Tab. 13.

PUTUMAYO: eastern slope of the Cordillera, wet forest between Mocoa and Sachamates, alt. 600-700 m., Dec. 29, 1940, *Cuatrecasas 11400* (US, **type**).

Its comparatively small, straight leaves, 3 bracteoles at the base of each ovary, 4 very unequal pistillate tepals and much branched styles distinguish *Begonia xylopoda* from its closest relatives in the section.

48. **Begonia (§ Ruizopavonia) cymbalifera,** Smith & Schubert, spec. nov., herbacea, caule glabro, lineato; foliis penninervatis, rectis, ovatis, apice acuminatis, basi obtusis vel truncatis, dimidia parte paulo vel non lobata, superficiebus glabris, venis primariis secundariisque subtus pilosis, 10-14 cm. longis, 5-7.5 cm. latis, marginibus magis minusve serrato-denticulatis, dentibus setiferis, petiolis rugosis, glabris, 1.5-2 cm. longis, stipulis mox deciduis, tantum cicatrices visis; gemmis axillaribus hamulis prominentibus formandis, spinis similibus; inflorescentia pedunculata; cymosa, pedunculo glabro, bracteis primariis mox deciduis, tantum cicatrices visis; floribus pedicellatis, pedicellis masculinis 6-9 mm. longis, sparsissime pilosis, tepalis 4, duobus exterioribus foris pilosis, ciliatis, subreniformibus vel suborbicularibus vel paene obovatis, in basi quidpiam cordatis, ca. 5 mm. longis, 9 mm. latis, tepalis interioribus glabris, anguste ellipticis apice obtusis et basi contractis, ca. 5 mm. longis, 2 mm. latis; staminibus numerosis, liberis, antheris ellipticis, connectivo producto; bracteolis femineis ovatis vel orbicularibus laceratisque, 2 vel 3, plerumque cum duobus aequalibus et uno profunde bifido et pergrandi; tepalis femineis 3, duobus exterioribus aequalibus, suborbicularibus, ciliatis et pilosis foris, ca. 5 mm. longis et 7 mm. latis, interiori glabro, elliptico vel anguste obovato, 4-5 mm. longo, 2.5-3 mm. lato; ovario 3-loculato, stylis 3, multo ramosis; capsula glabra vel sparsissime pilosa, ca. 10 mm. alta, alis saepe ciliatis, ala maxima 10 mm. longa, subquadrata, duabus alis ceteris subaequalibus, marginiformibus.—Tab. 13.

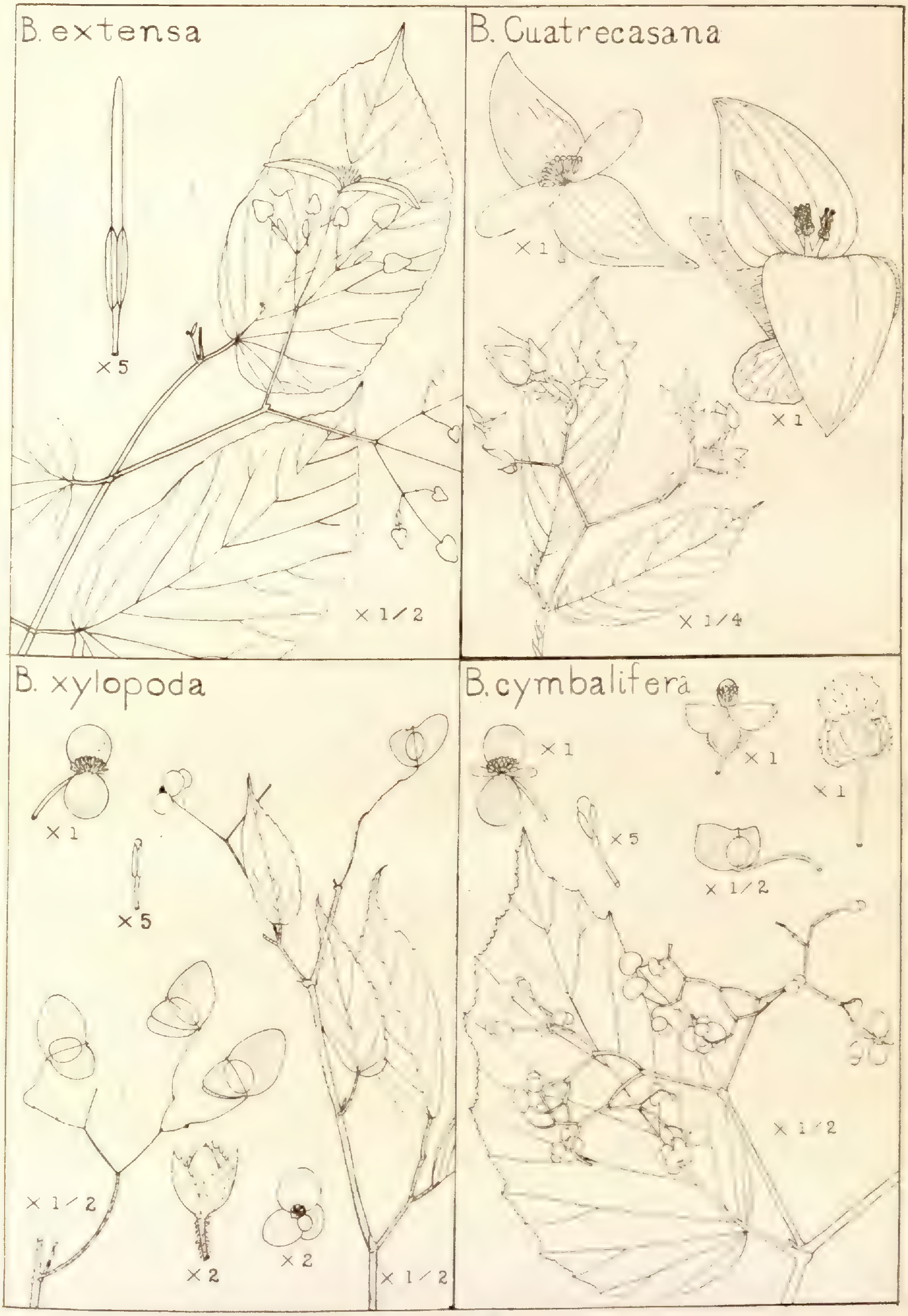
PUTUMAYO: eastern slope of the Cordillera, between Sachamates and San Francisco de Sibundoy, alt. 1600-1750 m., Dec. 30, 1940, *Cuatrecasas 11518* (US, **type**); same locality and date, *Cuatrecasas 11470* (US, **cotype**).

This species is most closely related to *Begonia consobrina* from which it may be distinguished by its penninerved, scarcely if at all, basally lobate leaves (those of *B. consobrina* being pennipalmate), by its pilose, ciliate outer tepals of both the staminate and pistillate flowers and the often ciliate capsule-wings.

Var, **recta** Smith & Schubert, var. nov., a var. *typica* differt foliis paene rectis, subsymmetricis, stylis paulo ramosis.

CALDAS: Cordillera Occidental, Río San Rafael, below Cerro Tatamá, alt. 2200-2500 m., Sept. 7-11, 1922, *Pennell 10328* (NY, **type**; phot. G).

(To be continued).


B. extensa
×5
×1/2
B. Cuatrecasana
×1
×1
×1/4
B. xylopoda
×1
×5
×1/2
×2
×2
×1/2
B. cymbalifera
×1
×1
×1
×5
×1/2
×1/2

TAB. 13

(Separado de CALDASIA, Vol. IV, No. 18, Octubre 25 de 1946).

BOTANICA

THE BEGONIACEAE OF COLOMBIA (*)

By LYMAN B. SMITH and BERNICE G. SCHUBERT
Gray Herbarium of Harvard University, Cambridge, Massachusetts.

49. **Begonia (§ Ruizopavonia) Dugandiana** Smith & Schubert, spec. nov., herba, ad 7 dm. alta (! *Killip & Varela*), caule ramoso, lineato, glabro, stipulis ellipticis, integris, acutis, plus minusve pubescentibus, ad 8 mm. longis, mox deciduis, hamulis axillaribus spinis similibus saepe prominentibus; petiolis hirsutis, ad 1.5 cm. longis; laminis oblique ellipticis, acuminatis, basi oblique truncatis vel leviter cordatis, 8-10 cm. longis, 3.5-6 cm. latis; supra glabris, subtus hirsutis, remote serratis; pedunculis axillaribus lineatis hirsutisque, inflorescentiis cymosis, multifloris; pedicellis tenuibus, hirsutis; bracteis deciduis; pedicellis masculinis 5-6 mm. longis, tepalis 4, albis, exterioribus orbicularibus vel obovatis, ad 5.5 mm. longis, 5 mm. latis, interioribus ellipticis, ad 3.5 mm. longis, 1.5 mm. latis, staminibus ca. 20, liberis, antheris oblongis, obtusis, connectivo producto; floribus femineis bracteolatis, cum pedicellis fructiferis ad 20 mm. longis, bracteolis longe persistentibus, orbicularibus, serrulato-ciliatis, saepe retusis, ad 5.5 mm. diametro, basi cordatis; tepalis stylisque non visis; placentis bifidis undique ovuliferis; capsulis trilocularibus, ca. 5 mm. altis, alis inaequalibus, ala maxima adscendente dolabriforme, 10-15 mm. alta, 8-10 mm. lata, obtusa, duobus ceteris marginiformibus; seminibus obtusis, striatis. Tab. 14.

TOLIMA: along Quindío Highway, between Cajamarca and summit of Divide, alt. 2400 m., Mar. 27, 28, 1939, *Killip & Varela 34536* (**US, type**; G, **isotype**).

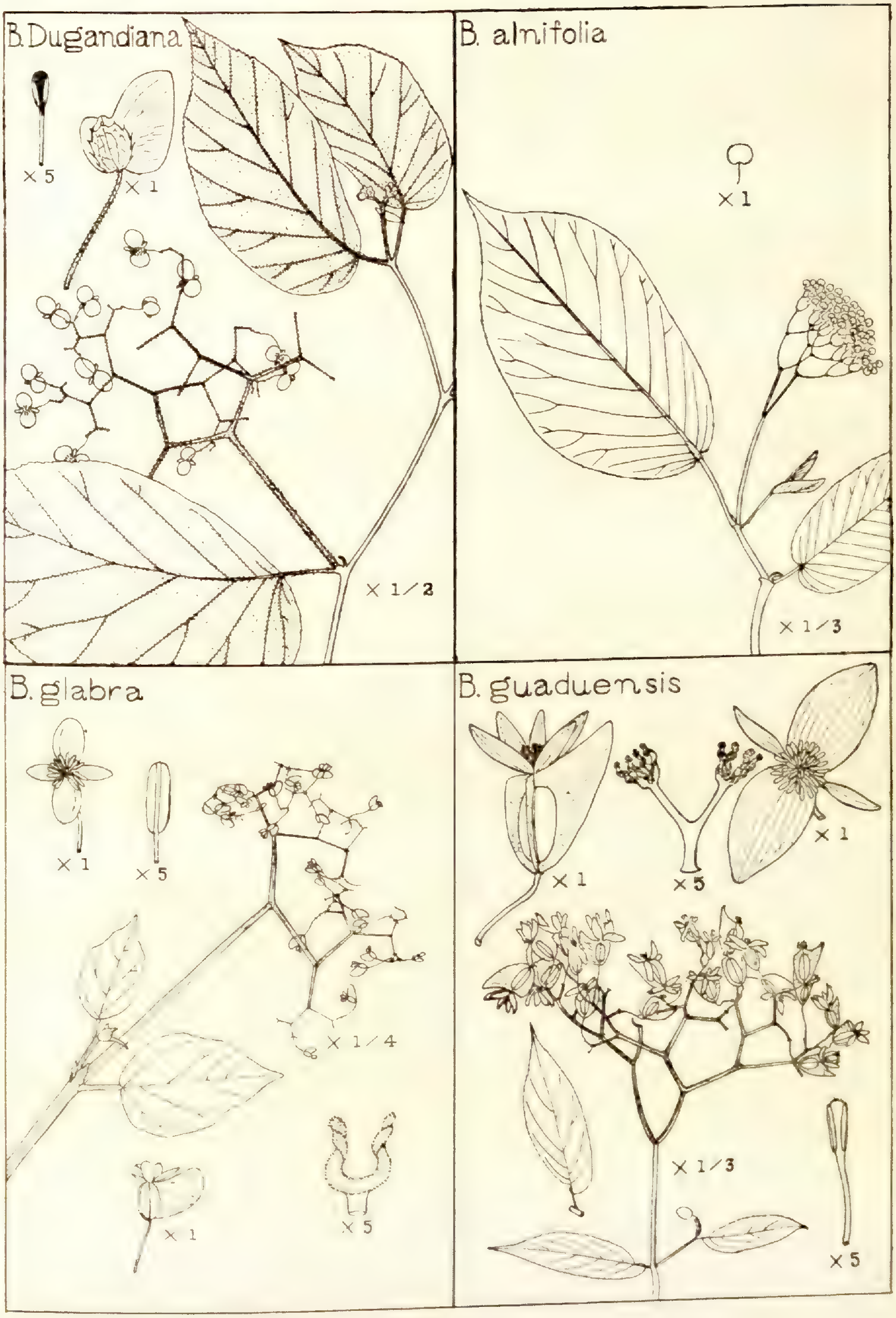
(*) Continued from page 107.

B. Dugandiana belongs to that group of species in section *Ruizopavonia* whose members possess conspicuous and usually persistent bracteoles. Although its general aspect is that of *B. alnifolia*, its relationship is with the group of species having four staminate tepals (the pistillate are presumably three). From *B. Cuatrecasana*, *B. Dugandiana* differs in having more oblique leaves and smaller flowers with orbicular outer tepals; from *B. cymbalifera* it differs in having its capsule-wings only remotely and minutely, if at all, ciliate; from *B. consobrina* (of Ecuador) in its penninerved leaves and pubescent lower leaf-surfaces. From all three species *B. Dugandiana* is distinct in having its largest capsule-wing exceeding the body of the capsule both above and below.

It is very pleasant indeed, to name this species for Dr. Armando Dugand, Director of the Instituto de Ciencias Naturales, Bogotá, Colombia, and editor of CALDASIA, who has shown great interest in our studies and whose coöperation has been most helpful in their prosecution.

50. **Begonia (§ Ruizopavonia) alnifolia** A. DC. Scandent to erect, essentially glabrous shrub; stem usually not more than 5 mm. thick, ribbed, internodes of main axis 5.5-14 cm. long; leaves unequally elliptic-obovate, 11-15 cm. long, 4-8 cm. broad, the obtuse subcordate base usually with broader half only slightly produced on the petiole, the broad apex abruptly narrowed into a short acumination, surfaces smooth or foveolate, margin denticulate-setiferous; petioles very short; stipules caducous, oblong, obtuse, 14-16 mm. long; inflorescence cymose, cymes chiefly axillary, exceeded by the leaves; bracts caducous, obtuse, entire, 2-3 mm. long; staminate pedicels slender. ca. 7 mm. long, staminate tepals 2, orbicular, 4 mm. broad; anthers oblong, exceeding the filaments in length, connective produced beyond the loculi, ovate-acute; pistillate bracteoles appressed to the ovary. ovate, dentate, 2-2.5 mm. long, tepals 2, orbicular; ovary glabrous, with bifid styles, the branches divided and spiraling, 4-winged, 1 wing larger.—Endemic.—A. DC. in Ann. Sci. Nat. sér. 4, xi. 133 (1859); in DC. Prod. xv. pt. 1, 331 (1864). Tab. 14.

NORTE DE SANTANDER: Ocaña, *Schlim 561* (Gen, **type**; Kew, **isotype**; G, photos (of type, CM neg. no. 24177; of isotype, Killip neg. no. 502)).


B. Dugandiana
× 5
× 1
× 1/2
B. alnifolia
× 1
× 1/3
B. glabra
× 1
× 5
× 1/4
× 1
× 5
B. guaduensis
× 1
× 5
× 1
× 1/3
× 5

TAB. 14

Begonia alnifolia is known to us only from photographs of the type- and isotype-material, which is staminate. The description of the pistillate flowers is taken from DeCandolle's diagnosis in the Prodromus.

51. **Begonia (§ Pritzelia) glabra** Aubl. Succulent herb to 8 m. high (*! Haught*); stem scandent, rooting at the nodes, glabrous; leaves nearly symmetrical, broadly ovate, 4-15 cm. long, short-acuminate, rounded or barely cordate at base, sparsely serrate and ciliate to entire, often undulate, glabrous, petioles 1-8 cm. long, stipules persistent, ovate-oblong, mucronate, entire, 10-24 mm. long, membranaceous, red-brown; peduncles axillary, 6-20 cm. long; cymes many-flowered, diffuse; bracts persistent, minute; pedicels slender, 6-16 mm. long; staminate tepals 4, white, the outer broadly obovate, 3-8 mm. long, the inner narrowly elliptic; stamens free, few, anthers oblong; pistillate tepals 5, 4-6 mm. long; styles 3, 2-parted, completely covered by stigmatic papillae, placentae simple; capsule 6-9 mm. long, largest wing oblong to triangular, 10-14 mm. wide, the other two marginiform, very narrow.—Southern Mexico and the West Indies to Guiana, Bolivia and Perú.—Aubl. Pl. Guian. ii. 916, t. 349 (1775). *B. scandens* Sw. Prod. 86 (1788); Irmscher in Engl. & Prantl. Nat. Pflanzenfam. ed. 2, xxi. 582 (1925). *B. elliptica* HBK. Nov. Gen. & Sp. vii. 180, t. 641 (1825). *B. lucida* Otto & Dietr. in Allg. Gartenz. xvi. 162 (1848). *B. Moritziana* Kunth & Bouché in Ind. Sem. Hort. Berol. 16 (1848). *B. physalifolia* Liebm. in Kjoeb. Vidensk. Meddell. 1852. 19 (1853). *Wageneria deflexa* Kl. Begon. 113 (1855). *W. lucida* Kl. op. cit. 114. *W. montana* Kl. op. cit. 115. *W. glabra* Kl. loc. cit. Tab. 14.

MAGDALENA: along stream, above Manaure, alt. ca. 700 m., Jan. 1-23, 1944, *Haught 3984* (G).

NORTE DE SANTANDER: Cordillera Oriental, región of Sarare, mouth of Río Margua between Junín and Córdoba, alt. 920-1240 m., Nov. 22, 1941, *Cuatrecasas 13379* (US).

CHOCO: edge of forest along Quebrada Jella, Bahía Solano, near Ciudad Mutis, alt. 0-75 m., Feb. 21-23, 1939, *Killip & H. García B. 33595* (G).

VALLE: forest, Cisneros, alt. 300-500 m., Sept. 21, 1922, *Killip 11456* (G, NY); woods, west slope of Cordillera Occidental, left bank of mouth of Río Digua, Piedra de Moler, alt. 900-1180 m., Aug. 19-28, 1943, *Cuatrecasas 15084* (G).

PUTUMAYO: forest, Umbría, alt. 325 m., Oct.-Nov., 1930, *Klug 1661* (G, NY, US); moist thicket by Río San Miguel, Quebrada de la Hormiga, alt. 290 m., Dec. 17, 1940, *Cuatrecasas 11129* (US).

Var. **amplifolia** (A. DC.) Smith & Schubert. Leaves up to 20 cm. long and 15 cm. wide, undulate to entire; largest wing of the ovary often ascending.—Endemic.—Smith & Schubert in Bot. Ser. Field Mus. xiii. 191 (1941). *B. scandens β amplifolia* A. DC. in DC. Prod. xv. pt. 1, 362 (1864).

MAGDALENA: occasional in damp forest, near Don Amo Viejo, Santa Marta, alt. 600 m., Jan. 14, 1899, *H. H. Smith 1267* (G, Mo, NY, US).

CAUCA: forest, "La Gallera", Micay Valley, alt. 1400-1500 m., June 29-30, 1922, *Killip 7722* (G, NY, US); same, alt. 1800-1900 m., July 1, 1922, *Killip 7916* (G, NY, US).

Begonia glabra, a common species throughout its range, is easily recognizable by its almost symmetrical leaves. In works of older authors the species was most frequently called *B. scandens*.

There are many transitions between the typical variety and var. *amplifolia*, but the extremes are sufficiently marked to warrant maintaining the latter entity.

52. **Begonia (§ Begoniastrum) guaduensis** HBK. Suffruticose, scandent to 2 m. high (! *Cuatrecasas*), glabrous; stem erect, branched; leaves straight, asymmetric, pinnate-nerved, lanceolate to elliptic-lanceolate, acute or acuminate, unequal at base with the adaxial side cuneate and the other rounded and decurrent, 5-9 cm. long, 16-40 mm. wide, doubly crenate-serrate, ciliate, membranaceous, glabrous, petiole 2-8 mm. long, stipules deciduous or subpersistent, oblong-ovate, acuminate-setiferous, 8-10 mm. long, scarious, glabrous; peduncles terminal and axillary, 4-5 cm. long; cymes dichotomous, few-many-flowered, 6-15 cm. in diameter, glabrous; bracts deciduous or subpersistent, ovate, obtuse, acute or mucronate, 4-7 mm. long, scarious; pedicels 4-19 mm. long; flowers pinkinsh white; staminate tepals 4, the outer elliptic-ovate, entire or dentate at apex, 8-15 mm. long, the inner obovate, distinctly shorter; stamens free, very numerous, anthers oblong, mostly shorter than the filaments, connective

produced, apiculate or obtuse; pistillate bracteoles deciduous, ovate to narrowly obovate, 6 mm. long, entire; pistillate tepals 5, subequal, with the two outer slightly smaller, elliptic, acute, 6-10 mm. long; styles 3, bifid nearly to base, each main branch with 3-4 short spiral branches; placentae bifid, ovuliferous throughout; capsule ellipsoid, the largest wing triangular, horizontal or slightly ascending, 15 mm. wide, the other two marginiform.—Panama; Venezuela.—HBK. Nov. Gen. & Sp. vii. 178 (1825). Irmscher in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, xxi. 582 (1925). *B. Ottonis* Walpers, Repert. Bot. Syst. ii. 212 (1843). *B. Walpersii* Heynh. Nom. ii. 63 (1846)). *Donaldia Ottonis* Kl. in Monatsb. Berlin Akad. 127 (1854); idem, Begon. 79 (1855). *B. laurina* Hort. ex A. DC. in DC. Prod. xv. pt. 1, 292 (1864), nomen in synon. *B. serratifolia* C. DC. in Smithsonian Misc. Coll. lxix. no. 12, 7 (1919). Tab. 14.

MAGDALENA: saxicolous or terrestrial in damp forest, Agua Dulce Road, Santa Marta, alt. 360 m., Jan., 1899, *H. H. Smith 1263* (G, NY); on sandstone cliffs in forest about 7 km. east of Codazzi, alt. ca. 300 m., Oct. 21, 1943, *Haught 3767* (G).

NORTE DE SANTANDER: Cordillera Oriental, region of Sarare, Quebrada de la China (tributary of Río Cubugón), between Santa Librada and El Caraño, alt. 600-830 m., Nov. 11, 1941, *Cuatrecasas 12983, 12988* (US); Cordillera Oriental, region of Sarare, basin of Río Margua between Campohermoso and Río Negro, alt. 1200-1500 m., Nov. 8, 1941, *Cuatrecasas 12901* (US); Cordillera Oriental, region of Sarare, mouth of Río Chitagá between Chorro Colorado and Bata, alt. 1300 m., Oct. 14-17, 1941, *Cuatrecasas, Schultes & E. Smith 12231* (US).

ANTIOQUIA: near Samaná, Jan. 4, 1946, *L. Uribe 1145* (Col).

CUNDINAMARCA: "prope Guaduas, inter Honda et Santa Fe de Bogotá, alt. 590 hex.", *Humboldt & Bonpland* (Paris, **type**, not seen; CM, fragment); (mixed with *Impatiens*), thickets and coffee groves, vicinity of San Bernardo to Sasaima, alt. 1600-1800 m., June 23, 1940, *Cuatrecasas 9619a* (G, US); Estación San Bernardo, between Sasaima and Albán, alt. 1700-1800 m., Aug. 2-5, 1945, *Dugand & Jaramillo 3945* (US).

META: Los Llanos, Villavicencio toward El Parrao, alt. 500 m., Oct. 10, 1938, *Cuatrecasas 4643* (US).

VAUPES: thicket, Río Guayabero, alt. 240 m., Nov. 8, 1939, *Cuatrecasas 7545* (US).

The following appears to be a large-flowered form:

BOYACA: forest fronts, region of M. Chapón, 100 miles nw. of Bogotá, alt. 900 m., Aug. 6, 1932, *Lawrance 391* (G, Mo, NY).

The material of this species from Panama was named *B. serratifolia*, but we have not been able to discover any significant characters by which to distinguish it from the South American collections.

Var. **Andreana** (Sprague) Smith & Schubert, comb. nov. Leaves acute; stamen-connectives apiculate; largest capsule-wing obtuse and horizontal.—Endemic.—*B. Andreana* Sprague in Trans. Proc. Bot. Soc. Edinb. xxii. 433 (1905).

META: Villavicencio, 1898-99, *Sprague 133* (US, **isotype**); common on road to Villavicencio, alt. ± 800 m., Dec. 12, 1938, *Haught 2453* (G).

Study of isotypic material of *B. Andreana* from the United States National Herbarium shows its very close affinity to *B. guaduensis*. The chief differences are noted in our diagnosis. One fragmentary specimen, *Cuatrecasas 9619a*, has the leaves of var. *Andreana* and the fruit of the typical variety (so far as we can tell from its immature condition); *Haught 2453* agrees very well with Sprague's isotype.

53. **Begonia (§ Begoniastrum) Barrigae** Smith & Schubert, spec. nov., suffruticosa, verisimiliter grandis, ramosa; ramis juvenilibus puberulis; foliis rectis, asymmetricis, lanceolatis, acuminatis, basi valde dimidiatis, 4-5 cm. longis, ad 2 cm. latis, serratis ciliatisque, supra glabris, subtus ad nervos puberulis petiolis 4-6 mm. longis, puberulis, stipulis persistentibus, ovatis, acuminatis, 8 mm. longis, integris; pedunculis verisimiliter terminalibus, 4 cm. longis, puberulis; inflorescentia corymbosa, multiflora, ca. 16 cm. diametro, glabra; bracteis persistentibus, lanceolatis, acuminatis, 3 mm. longis, serrulatis, hyalinis; pedicellis gracillimis, ad 12 mm. longis; tepalis masculinis 4, exterioribus suborbicularibus, 5 mm. longis, apice serrulatis, interioribus ellipticis, parvis; staminibus multis, antheris suborbicularibus quam filamentis multo brevioribus, connectivo producto obtuso; bracteolis femineis parvis, bracteis similibus; tepalis femineis 5, paulo inaequalibus, ovatis, ad 7 mm. longis, serrulato-ciliatis; stylis 3, bifidis, stigmatibus linearibus, spiraliter tortis, placentis bilamellatis, undique ovuliferis; capsula ellipsoidea, inaequaliter alata, alis triangulo-ovatis. Tab. 15.

CUNDINAMARCA: Nocaima, Hacienda Tobia, alt. 850 m., Jan. 15-20, 1942, *H. García-Barriga 10577* (US, **type**); grassy bank, "Guayabetal", southeast of Quetame, alt. 1300-1500 m., Sept. 5, 1917, *Pennell 1749* (NY).

From *B. guaduensis, B. Barrigae* may be distinguished by its much smaller staminate flowers with suborbicular rather than elliptic-ovate outer tepals and suborbicular rather than oblong anthers; by its serrulate-ciliate pistillate tepals and by its much narrower capsule-wings. From *B. Holtonis, B. Barrigae* also differs in the shape of the outer staminate tepals, and in the pistillate tepals which in *B. Holtonis* are narrowly obovate and entire.

54. **Begonia (§ Meionanthera) Holtonis** A. DC. Fruticose or herbaceous, 12-15 dm. high, glabrous; leaves straight, slightly asymmetric, penninerved, elliptic, abruptly acuminate, dimidiate at base, 4-6.5 cm. long, 2.5-4.5 cm. wide, crenate-serrate, ciliate, petiole 2-6 mm. long, stipules deciduous, linear-lanceolate, acuminate; peduncles axillary, 3.5-8 cm. long; cymes dichotomous, many-flowered, 7-30 cm. in diameter; bracts deciduous, elliptic to narrowly ovate, obtuse to acuminate, setiferous, over 4 mm. long; pedicels filiform, the pistillate to 15 mm. long, the staminate much shorter; staminate tepals 2 or 4, the outer broadly ovate, 3-6 mm. long, white, the inner narrowly obovate, obtuse; stamens on a low torus, numerous, anthers subglobose, much shorter than the filaments, connective not produced; pistillate bracteoles deciduous, 4 mm. long; pistillate tepals 5, narrowly obovate, 5-8 mm. long, white; styles 3, bifid, branches spiral, covered with stigmatic papillae, placentae simple to bilamellate (intermediate in the type), ovuliferous throughout; capsule ellipsoid, very unequally 3-winged, the largest wing triangular-ovate, 1 cm. wide, the other 2 narrowly marginiform.—Endemic.—A. DC. in Ann. Sci. Nat. sér. 4, xi. 141 (1859). Irmscher in Engl. & Prantl. Nat. Pflanzenfam. ed. 2, xxi. 582 (1925). ? *B. umbrata* A. DC. in DC. Prod. xv. pt. 1, 396 (1864). Tab. 15.

BOLIVAR: forest, Cascada Chorrón, south of Antizales, alt. 1500-1800 m., Feb. 25, 1918, *Pennell 4427* (NY).

ANTIOQUIA: San Antonio de Pereira, Dec. 1937, *Daniel 1374* (CM); Monte San Félix, Sept. 1940, *Daniel 2326* (US).

CUNDINAMARCA: woods, Icononzo, alt. 1400-1800 m., Dec. 1-4, 1917, *Pennell 2865* (NY).

TOLIMA: Prov. de Mariquita: Azufral del Quindío, alt. 2000 m., Jan. 1853, *Triana (8)* (Col); forest, "La Virginia", Líbano, alt. 1200-1500 m., Dec. 22, 1917, *Pennell 3284* (G, NY, US); Cordillera Central: forest, "Buenavista" to "Azufral", old Quindío trail, alt. 1800-2300 m., Aug. 3, 1922, *Killip & Hazen 9599* (G, NY); Río Coello, new Quindío trail, alt. 1000-1500 m., Aug. 7, 1922, *Hazen 9648* (NY); Ibagué, alt. ca. 1100 m., July 7, 1939, *Pérez & Cuatrecasas 5732* (US).

CALDAS: Cordillera Central: moist soil near river, Río Quindío, above Armenia, alt. 1300-1500 m., July 25, 1922, *Pennell, Killip & Hazen 8718* (NY); edge of forest, Río Santa Rita, Salento, alt. 1600-1800 m., July 29, 1922, *Killip & Hazen 8972* (G, NY, US).

HUILA: forest, Cordillera Oriental, east of Neiva, alt. 1800-2300 m., Aug. 1-8, 1917, *Rusby & Pennell 576* (G, Mo, NY, US), *872* and *873* (NY).

VALLE: Cordillera Occidental: edge of forest, La Cumbre, alt. 1800-2100 m., May 21-25, 1922, *Pennel & Killip 5883* (G, NY); Dagua, "Queremal", Jan. 20, 1935, *E. Pérez-Arbeláez 3095* (Col, US); woods, Cordillera Occidental, western slope, basin or Río Sanquininí, left bank, La Laguna, alt. 1250-1400 m., Dec. 10-20, 1943, *Cuatrecasas 15694* (G).

BOYACA: in shade, side of precipice facing south, region of Mt. Chapón, extreme western Boyacá, alt. 1020 m., June 14, 1932, *Lawrance 221* (G, Mo, NY).

DEPARTMENT UNKNOWN: Colombia, without further locality, *Holton 725* (Gen. **type**; G. **isotype**).

The small orbicular anthers, long slender filaments and elongate pistillate tepals serve to make *B. Holtonis* easily recognizable from its relatives.

Var. **macrophylla** Smith & Schubert var. nov., foliis ad 11 cm. longis et 5 cm. latis; bracteis amplis, floribus juvenilibus omnino occultantibus.

CAUCA: Cordillera Occidental: woodland, Río Ortega to "El Ramal", alt. 1900-2200 m., July 2, 1922, *Pennell & Killip 8073* (NY, **type**).

The following specimen is probably best cited here too:

CAUCA: around Tacueyó, Río Palo Valley, Huila group, central Cordillera, alt. 1800 m., Jan. 1906, *H. Pittier 1029* (US).

This variety may be separated from the typical by its larger leaves and broader, persistent bracts.

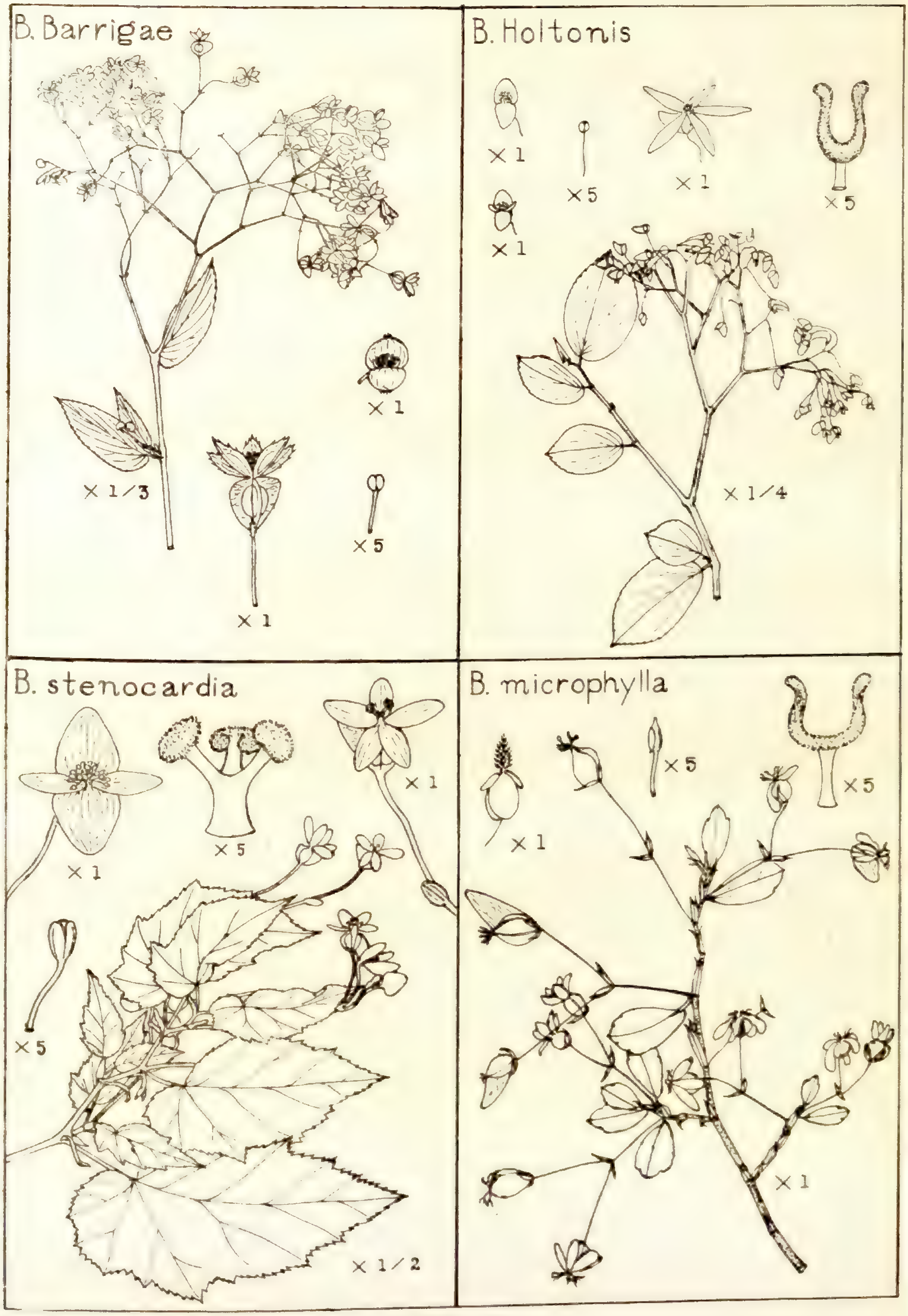
55. **Begonia (? §) stenocardia** Smith & Schubert spec. nov., e fragmento solum cognita, verisimiliter herbacea et perennis, glabra; ramis gracilibus, geniculatis; foliis rectis vel subrectis, valde asymmetricis, anguste ovatis, acutis, basi valde inaequaliter cordatis, ad 8.5 cm. longis et 4.3 cm. latis, sublobatis, serratis, ciliatis, petiolis ad 2 cm. longis, stipulis persistentibus, oblongis, setoso-apiculatis, integris, 11 mm. longis, tenuibus, brunneis; pedunculis axillaribus, gracillimis, 2-3 cm. longis; inflorescentia laxe pauciflora, bracteis deciduis, ellipticis, integris, 4 mm. longis; pedicellis 8-16 mm. longis; tepalis masculinis 4, integris, roseis, exterioribus late ovatis, 10 mm. longis, interioribus oblongis, haud brevioribus; staminibus multis, in columnam insertis, antheris ellipsoideis, quam filamentis brevioribus; bracteolis femineis nullis; tepalis femineis 5, ellipticis, subaequalibus, integris; stylis 3, basi connatis, apice lunulato-bilobis; ovario late ellipsoideo, placentis bilamellatis (?); capsula perjuvenili solum cognita, inaequaliter trialata, ala maxima subtriangulari. Tab. 15.

CHOCO: Truandó Falls, (Atrato River), Jan. 1858, *Schott 1* (CM. **type**).

Begonia stenocardia differs from *B. Holtonis,* in addition to having persistent rather than deciduous bracts and stipules, by its much larger staminate tepals and anthers, its broader pistillate tepals and its styles which are bilobate only at the apex.

From *B. microphylla, B. stenocardia* is differentiated by its smooth branches, its short stamen-column and its barely produced anther-connective as well as by its styles.

56. **Begonia (§ Lepsia) microphylla** A. DC. Fruticose, 1-3 m. high, much branched; the ultimate branches densely papillose, densely and persistently foliate; leaves straight, slightly asymmetric, obovate-oblong, broadly acute or obtuse, dimidiate at base, 8-10 (rarely to 15) mm. long, coarsely crenate-serrate, ciliate, dark green above, finely white-spotted beneath, petiole very short, stipules persistent, lanceolate, setiferous-acuminate, 4-6 mm. long, 1-nerved, membranaceous, brown; peduncles axillary, 6-10 mm. long, almost capillary; staminate inflorescences 2-7-flowered, the pistillate 2-flowered; bracts persistent, ovate, like the stipules but shorter; pedicels capillary, 4-10 mm. long; flowers white; staminate tepals 4, the outer ovate or elliptic, obtuse, 3-5 mm. long, the inner oblong, shorter; stamens on an elongate column, anthers ellipsoid, connective well produced, acute; pistil-


B. Barrigae
× 1/3
× 1
× 1
× 5
B. Holtonis
× 1
× 1
× 5
× 1
× 5
× 1/4
B. stenocardia
× 1
× 5
× 1
× 5
× 1/2
B. microphylla
× 1
× 5
× 5
× 1

TAB. 15

late bracteoles like the bracts, nearly equaling the ovary at anthesis; pistillate tepals 5, 5-6 mm. long; styles 3 or 4, bifid, the stigmatic tissue linear, spiral, continuous; placentae simple; capsule broadly ovoid, 4-6 mm. long excluding the wings, unequally 3-winged, the largest wing ovate or lunate, 4-8 mm. wide, the other 2 marginiform.—Venezuela.—A. DC. in DC. Prod. xv. pt. 1, 375 (1864), non Willd. ex Kl. in Monatsb. Berlin Akad. 123 (1854), nomen in synom., Irmscher in Engl. & Prantl. Nat. Pflanzenfam. ed. 2, xxi. 581 (1925). *Lepsia microphylla* Kl. Begon. 62 (1855), non *L. microphylla* Kl. in Monatsb. Berlin Akad. 123 (1854). *L. foliosa* Kl. Begon. (1855) quoad synon. p. 62 et t. 5, fig. A.—Tab. 15.

SANTANDER: edge of forest, Río Suratá valley, above Suratá, alt. 2000-2300 m., Jan. 5-6, 1927, *Killip & A. C. Smith 16702* (G, NY, US); same, dense forest, Jan. 5-6, 1927, *Killip & A. C. Smith 21159* (G, US); dense forest, vicinity of La Baja, alt. 3000 m., Jan. 14-31, 1927, *Killip & A. C. Smith 18339* (G, NY, US), *18355* (G, NY, US); forest, vicinity of Charta, alt. 2600 m., Feb., 1-11, 1927, *Killip & A. C. Smith 18843* (G, NY, US).

Begonia microphylla is easily recognizable even in sterile condition by its densely papillose branches.

57. **Begonia (§ Lepsia) foliosa** HBK. Fruticose, 1-2.5 m. high, much branched, glabrous; the ultimate branches smooth; leaves tardily deciduous, straight, slightly asymmetric, obovate-oblong, acute, dimidiate-cuneate at base, 16-35 mm. long, 6-16 mm. wide, coarsely crenate-serrate, ciliate, green above, paler beneath with fine white spots, petiole to 3 mm. long, stipules persistent, lanceolate, setiferous-acuminate, 4-6 mm. long, 3-5-nerved, membranaceous, brown; peduncles axillary, 1-2 cm. long, almost capillary; inflorescences 1-2-flowered; bracts persistent, ovate, like the stipules but shorter; pedicels subcapillary, 14-18 mm. long; flowers white; staminate tepals 4, the outer broadly ovate, acute, 7 mm. long, the inner oblong, obtuse, shorter; stamens short-connate, anthers linear, mostly longer than the filaments, connective produced, obtuse; pistillate bracteoles like the bracts, at the base of the ovary; pistillate tepals 5, 4-6 mm. long; styles 3, bifid, the stigmatic tissue linear, spiral, continuous; placentae simple; capsule ellipsoid, 10-12 mm. long excluding the wings, unequally 3-winged, all the wings triangular, acute or subacute, the largest 12-15 mm. wide.—Endemic, as to typical variety.—HBK. Nov.

Gen. & Sp. Pl. vii. 183, t. 642 (1825); Irmscher in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, xxi. 581 (1925). *B. microphylla* Willd. ex Kl. in Monatsb. Berlin Akad. 123 (1854), nomen in synon. *Lepsia foliosa* Kl. Begon. 62 (1855). Tab. 16.

MAGDALENA: on a log, damp forest slope by a stream, Las Nubes, alt. 1350 m., Dec. 18, 1898, *H. H. Smith 1270* (NY, var.?, only staminate flowers).

NORTE DE SANTANDER: thickets, Cordillera Oriental, east slope, Pamplona, Quebrada de Cariongo, alt. 2500 m., July 26, 1940, *Cuatrecasas & H. García B. 10259* (G).

SANTANDER: wooded banks of Río de la Baja, below La Baja, Eastern Cordillera, alt. 2200-2300 m., Jan. 26, 1927, *Killip & A. C. Smith 18299* (G, NY, US); forest, vicinity of Charta, Eastern Cordillera, alt. 2000 m., Feb. 1-11, 1927, *Killip & A. C. Smith 19017* (US).

DEPARTMENT UNKNOWN: *Humboldt & Bonpland* (Paris, **type**; CM, frag.).

In this study we are maintaining five varieties of *Begonia foliosa* besides the typical. There is a certain amount of instability in the morphological characters, but the existing tendencies seem to be correlated with the geographical ranges of the entities and therefore, we consider segregation into varieties the most practical and logical way to deal with the mass of material here considered, in order to show the relationships as well as the distinctions between collections.

The typical variety is shown as illustrated in the original publication of the species. For the other varieties representative portions of characteristic material are illustrated. In the original diagnosis *B. foliosa* is described with a "5-phyllus" pistillate flower; in the plate, with the exception of fig. 1 which shows a flower with 5 tepals, all the other "pistillate" flowers, i. e. those surmounting the capsules, have 4 tepals and like the flower in fig. 1 have stamens but no styles! We assume that the plate was not drawn directly from nature.

KEY TO THE VARIETIES OF BEGONIA FOLIOSA.

1. Inflorescence 1-2-flowered; peduncles capillary, mostly less than 0.5 mm. thick; anthers linear to oblong, filaments elongate.

   2. Wings of the capsule all acute or subacute; bracteoles borne at the base of the capsule .... *B. foliosa* (typical).

   2. Wings of the capsule or at least the smaller ones rounded.

3. Bracteoles borne at the base of the capsule; capsule 8-10 mm. long excluding the wings; leaves acute .... Var. *rotundata.*

3. Bracteoles borne below the base of the capsule.

Leaves broadly acute; capsule 6-11 mm. long excluding the wings .... Var. *Putzeysiana.*
Leaves acuminate; capsule 6-8 mm. long excluding the wings .... Var. *australis.*

1. Inflorescence usually more than 2-flowered; peduncles more than 0.5 mm. thick; anthers ellipsoid; filaments short.

Stipules imbricate in tufts on short shoots; leaves not more than 2 cm. wide; branches usually straight. .... Var. *miniata.*
Stipules not imbricate in tufts; leaves more than 3 cm. wide; branches geniculate .... Var. *amplifolia.*

Var. **rotundata** Smith & Schubert, var. nov., bracteolis femineis basem capsulae tegentibus; capsula alis exceptis 8-10 mm. longa, alis rotundatis. Tab. 17.

NORTE DE SANTANDER: thickets, Cordillera Oriental, eastern slope, Pamplona, Quebrada de Cariongo, alt. 2500 m., July 26, 1940, *Cuatrecasas & H. García B. 10249* (US).

SANTANDER: open hillside, vicinity of California, Eastern Cordillera, alt. 2100 m., Jan. 11-27, 1927, *Killip & A. C. Smith 16761* (G, **type**; NY, US, **isotype**); thicket along stream, vicinity of Charta, Eastern Cordillera, alt. 2000-2600 m., Feb. 1-11, 1927, *Killip & A. C. Smith 19221* (G, NY, US).

The following specimen is doubtfully referred here:

SANTANDER: woods, vicinity of California, alt. 2000 m., Jan. 11-27, 1927, *Killip & A. C. Smith 17015* (G, NY, US), staminate flowers only.

The chief differences between typical *Begonia foliosa* and its variety *rotundata* are in the capsules; the former with the largest wing ascending as well as acute, the latter with the largest wing horizontal and obtuse.

Var. **Putzeysiana** (A. DC.) Smith & Schubert comb. nov. Leaves broadly acute, 16-47 mm. long, 8-17 mm. wide; bracteoles attached below the base of the capsule; capsule 6-11 mm. long without the wings, wings rounded.—Venezuela.—*B. Putzeysiana* A. DC. in Ann. Sci. Nat. sér. 4, xi. 139 (1859). Tab. 17.

NORTE DE SANTANDER: thickets along stream, road from Pamplona to Toledo, crossing the divide between Río La Teja (Maracaibo

TAB. 16

drainage) and Río Mesme (Orinoco drainage), alt. 2500-2800 m., Feb. 28, 1927, *Killip & A. C. Smith 19817* (G, NY, US); woods, vicinity of Toledo, alt. 1700-1900 m., Mar. 3-11, 1927, *Killip & A. C. Smith 20090* (G, NY, US).

We have examined the type-photograph of *Begonia Putzeysiana* (CM neg. 24205) and a fragment of the type (from Venezuela). The Colombian material is found only in the province adjacent to Venezuela.

Var. **australis** Smith & Schubert, var. nov., foliis lanceolatis, acuminatis vel raro acutis, 20-40 mm. longis, 6-15 mm. latis; bracteolis e basi capsulae plus minusve remotis; capsulis alis exceptis 6-8 (raro ad 10) mm. longis, alis rotundatis.—Endemic.—? *B. elegans* HBK. Nov. Gen. & Sp. vii. 182 (1825). **Tab. 17**.

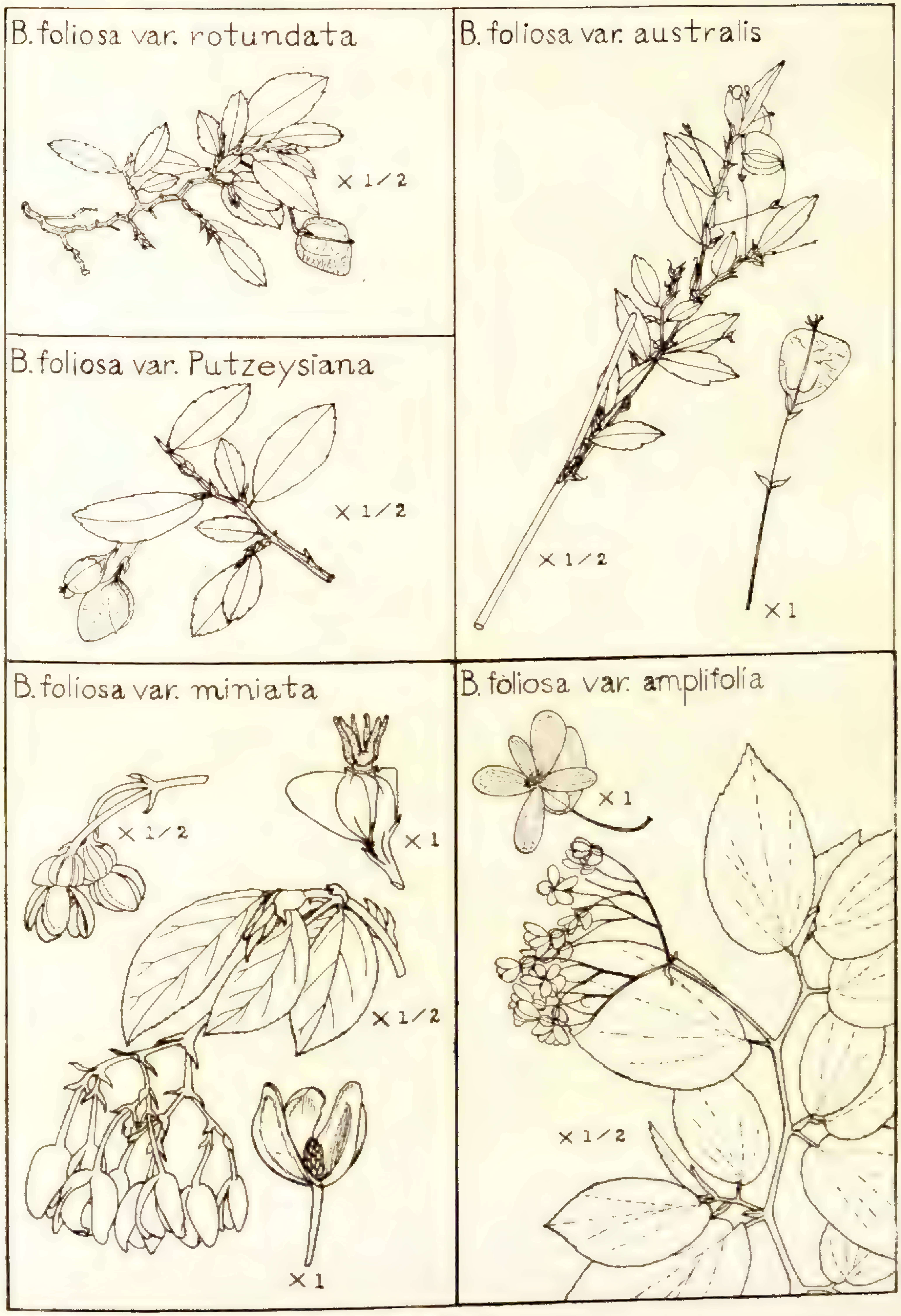
ANTIOQUIA: Dauro, April 6, 1928, *R. A. Toro 1135* (NY); La Sierra, 18 kilometers north of Medellín, alt. ca. 2000 m., Jan. 1931, *Archer 1516* (US, **type**); wet places, La Ceja, Dec. 1939, *Daniel 2159* (G, US).

CUNDINAMARCA: woods, Salto de Tequendama, alt. ca. 2500 m., Mar. 8, 1939, *Killip 33976* (G, staminate material placed here on the basis of leaf-form); climbing herb, San Francisco, Cordillera Oriental, Finca "El Carmero", El Tablazo between Subachoque and San Francisco, alt. 1900-2100 m., Jan. 26, 1944, *H. García B. 11026* (US, no fruit, variety not certain); west slope: Quebrada Sosiego, below Tequendama, alt. 2300 m., July 15, 1944, *Dugand 3558* (G).

TOLIMA: forest "La Virginia", Líbano, alt. 1200-1500 m., Dec. 22, 1917, *Pennell 3283* (NY, US); forest, "Buenavista" to "Azufral", old Quindío trail, Cordillera Central, alt. 2300 m., Aug. 3, 1922, *Killip & Hazen 9601* (NY); dense forest, along Quindío Highway, between Cajamarca and summit of Divide, alt. 3000-3100 m., Mar. 27-28, 1939, *Killip & Varela 34650* (US).

CALDAS: forest above Salento, Cordillera Central, July 25-31, 1922, *Pennell 8939* (G, NY); region of Quindío, between Circasia and Pereira, near Alto de "El Roble", alt. 2200 m., Aug. 16, 1941, *Dugand & Jaramillo 2987* (US); Los Alpes, alt. 2700 m., Aug. 1944, *E. Dryander 2780* (US).

VALLE: Juntas, Río Dagua, April 1, 1876, *André 2503* (NY); dense forest, San Antonio, west of Cali, near summit of Cordillera Occidental, alt. 1900-2350 m., Feb. 26-Mar. 2, 1939, *Killip & H. García B. 33938*


B. foliosa var. rotundata
× 1/2
B. foliosa var. australis
× 1/2
× 1
B. foliosa var. Putzeysiana
× 1/2
B. foliosa var. miniata
× 1/2
× 1
× 1/2
× 1
B. foliosa var. amplifolia
× 1
× 1/2

TAB. 17

(G); road to the sea, Alto Mercedes, alt. 2200 m., Sept. 1939, *Dryander 2413* (G).

CAUCA: Cuesta de Tocotá, road from Buenaventura to Cali, Cordillera Occidental, alt. 1500-1900 m., Dec., 1905, *H. Pittier 723* (US); moist bank, near stream, San Antonio to Río Ortega, Cordillera Occidental, alt. 2100-2200 m., July 2, 1922, *Pennell & Killip 8035* (G, NY, US).

This variety is somewhat difficult to define because of the degree of variation often found on a single plant. Some specimens have leaves broader at the apex (like var. *Putzeysiana*) and small capsules, while others have acuminate leaves and the bracteole close to the base of the capsule (as in var. *rotundata*).

Begonia elegans HBK. may belong here; a fragment of the type, from the Chicago Natural History Museum, consisting of twigs, stipule and acuminate leaf, agrees well enough with our variety, as does the description of the filiform peduncle, and the type-locality ("prope La Vega de San Lorenzo, inter Popayán et Almaguer, alt. 1140 hex."). Certain identification is not possible however, without fruit.

Var. **miniata** (Planch.) Smith & Schubert, comb. nov. Suffruticose, erect, 6-12 dm. high, glabrous, very variable in the size of the parts; stem stout, succulent; lateral branches numerous, divergent, densely foliate, 6-12 cm. long; leaves distichous, straight, slightly asymmetric, obovate-oblong or elliptic-oblong, acute, dimidiate at base, 2-5 cm. long, 1-2 cm. wide, crenate-serrate, ciliate, dark green above, paler beneath, often tinged with red especially along the margins, petiole usually about 2 mm. long, rarely up to 8 mm. (! A. DC.), stipules marcescent, lanceolate, setose-cuspidate, 4-10 mm. long, 1-nerved, entire, membranaceous, brown; peduncles axillary, 2-4.5 cm. long; cymes dichotomous, 2-30-flowered, flat, generally pendent, to 10 cm. in diameter; bracts persistent, like the stipules but usually roseate; pedicels slender, 5-25 mm. long; flowers red or rose; staminate tepals 4, the outer broadly ovate, 6-16 mm. long, the inner narrowly obovate, shorter; stamens numerous, anthers ellipsoid, shorter than the filaments, the connective produced; pistillate bracteoles like the bracts; pistillate tepals 5, subequal, elliptic, obtuse or setose-cuspidate, 6-13 mm. long; styles 3, bifid, placentae bifid ? (very difficult to see in dried material), ovuliferous throughout; capsule broadly ellipsoid, the largest wing ovate, obtuse, 1 cm. wide, the other 2 submarginiform, but slightly wider and angled above.—Venezuela; widely cultivated.—*B. miniata* Planch. in Fl. Serres, viii. 105, t. 787 (1853). *Tittelbachia miniata* Kl. Begon. 106 (1855). *B. fuchsioides* β *miniata* (Planch.) A. DC. in DC. Prod. xv. pt. 1, 291 (1864). *B. fuchsioides* Hook. in Bot. Mag. lxxiii. t. 4281 (1847). *Tittelbachia fuchsioides* Kl. loc. cit. et t. 10, fig. A. Tab. 17.

MAGDALENA: on ground or logs, Las Nubes, Santa Marta, alt. 1350 m., Dec. 15, 1898, *H. H. Smith 1269* (G, NY, US).

NORTE DE SANTANDER: edge of woods, between Mutiscua and Pamplona, alt. 2700 m., Feb. 23, 1927, *Killip & A. C. Smith 19763* (G, NY, US); thickets along stream, road from Pamplona to Toledo, crossing the divide between Río La Teja (Maracaibo drainage) and Río Mesme (Orinoco drainage), alt. 2500-2800 m., Feb. 28, 1927, *Killip & A. C. Smith 19819* (G, NY, US); edge of woods, eastern slope of Páramo del Hatico, en route from Toledo to Pamplona, alt. 1800 m., Mar. 12, 1927, *Killip & A. C. Smith 20552* (G, NY, US).

SANTANDER: thickets along river, vicinity of Suratá, alt. ca. 1700 m., Jan. 4-10, 1927, *Killip & A. C. Smith 16805* (G, NY, US).

CUNDINAMARCA: locality illegible, probably near Bogotá, alt. 2000 m., 1851-57, *Triana s. n.* (NY); Salto de Tequendama, Dec. 8-11, 1852, *Holton 724* (NY); Prov. de Bogotá: Monte de Tenasucá, alt. 2000 m., Jan. 1854, *Triana (2)* (Col); El Colegio, Feb. 1916. *Dawe 48* (US); Salto de Tequendama, alt. 2400 m., Sept. 15, 1917, *Pennell 1964* (NY); same, alt. 2400-2500 m., Oct. 28, 1917, *Pennell 2653* (G, Mo, NY, US); same, forest, alt. 2500 m., Dec. 1-3, 1938, *Cuatrecasas 102* (US); La Florida, Dec. 1932, *Pérez 2301* (US); Dintel (Facatativá-La Vega), alt. 2300-2700 m., June 4, 1939, *Pérez & Cuatrecasas 5300* (US); above Tequendama Falls (on Sabana) about 15 miles from Bogotá, Feb. 27, 1945, *Schiefer & Ewan 484* (G).

In the material cited above the stigmatic tissue is linear and spiral about the style-branches, not completely covering them as described in the type.

Although *B. fuchsioides* Hooker was described six years before *B. miniata* Planchon we are using *miniata* to designate this variety since it was the first epithet to be used in the varietal rank and as such has priority over earlier published specific epithets (cf. Int. Rules Bot. Nomencl. art. 55, p. 16 (1935)).

Variety *miniata* can be easily distinguished from var. *amplifolia*, the only other variety with a many-flowered inflorescence, by its non-cordate, narrower leaves and fewer, not imbricated stipules, as well as its usually straight branches.

A. DeCandolle considered this plant not only a distinct species, *B. fuchsioides*, but placed it in a separate section. However, we have found his character of simple or bilamellate placentae very unreliable here and elsewhere, and Professor Roger Gauthier of the University of Montreal has kindly shown us further evidence from his morphological researches.

Var. **amplifolia** Smith & Schubert, var. nov., ramis geniculatis; foliis ultra 3 cm. latis, stipulis haud imbricatis; pedunculis ultra 0.5 mm. diametro; inflorescentiis submultifloris; antheris ellipsoideis, filamentis brevibus. Tab. 17.

ANTIOQUIA: Fredonia, April 14, 1927, *R. A. Toro 57* (NY, **type**; G, phot.).

This variety is outstanding because of its very broad leaves. The characters by which it may be distinguished from var. *miniata* are noted under that variety. In habit this variety approaches closely *Begonia Holtonis,* but its persistent stipules and elliptic anthers establish its affinity with *B. foliosa.*

Key to Colombian species of Begonia.

1. Plants scapose, tuberous or having a stout rhizome with suppressed internodes and the leaves and inflorescence clustered at its apex (base not known in *B. hydrophylloides*).

  2. Staminate tepals 4-8, pistillate tepals 5-6; plants tuberous so far as known; leaves usually straight and subsymmetric, broadly ovate to suborbicular, never peltate.

    3. Leaves acuminate-lobed; bracts deciduous; styles bifid. 1. *B. hydrophylloides.*

    3. Leaves not lobed.

      4. Tepals rose or white 10-17 mm. long, staminate tepals 4-8; styles multifid (not known in *B. macra*).

        5. Petioles much longer than the blades; tepals white, the staminate 5, pistillate 6. ....2. *B. quetamensis.*

        5. Petioles about as long as the blades.

          6. Tepals rose, the staminate 6, the pistillate 5. ...... 3. *B. macra.*

          6. Tepals white, the staminate 7-8, the pistillate 6-7. ...4. *B. rosacea.*

4. Tepals yellow, 5-6 mm. long, staminate tepals only 4; styles bifid; placentae simple. ....5. *B. lutea.*

2. Staminate tepals 2, pistillate tepals 2 or rarely 3; rhizome with suppressed internodes; leaves peltate or oblique with their longest nerve at about 120° from the petiole; inflorescence obviously cymose; bracts deciduous.

7. Leaves basifixed.

8. Inflorescence, petioles and principal veins beneath the leaves fuscous-villous; leaves coarsely and sparsely dentate or entire; largest capsule-wing ovate. .... 6. *B. Lindleyana.*

8. Inflorescence essentially glabrous; petioles covered with coarse reflexed scales; leaves denticulate; largest capsule-wing oblong or subdolabriform. ....7. *B. stigmosa.*

7. Leaves peltate. .... 8. *B. nelumbiifolia.*

1. Plants with elongate leafy stems with distinct internodes.

9. Ovary and capsule turbinate, not winged but equally 3-horned from the upper part of the angles; stigmatic tissue usually covering all sides of the styles; capsule dehiscent at the angles; staminate tepals usually 4.

10. Capsule truncate without any column; horn of the capsule obtuse.

11. Horns flattened in a horizontal plane.

12. Leaves oblique; stipules deciduous. .... 9. *B. trispathulata.*

12. Leaves straight; stipules persistent. .... 10. *B. chlorolepis.*

11. Horn flattened in a vertical plane; stipules tardily deciduous. .... 11. *B. Trianae.*

10. Capsule with a definite (though sometimes short) column; horns of the capsule acute or acuminate.

13. Stipules green or red, firm, more or less persistent, oblong or subreniform, 12-25 mm. long.

14. Leaves straight, dimidiate at base; stipules red; inflorescence racemose; bracts persistent, showy, densely imbricate; anther-connective not produced. .... 12. *B. Killipiana.*

14. Leaves oblique, cordate at base; stipules green; inflorescence cymose; bracts deciduous; anther-connective subulate-produced. ... . 13. *B. ferruginea.*

13. Stipules brown or hyaline, thin, usually soon deciduous, small and inconspicuous.

15. Basal bracts forming a more or less gamophyllous involucre about the inflorescence; staminate tepals 2, fleshy, entire; pistillate tepals 5, fimbriate. .... 14. *B. gamolepis.*

15. Basal bracts not involucrate; staminate tepals 4.

16. Tepals lacerate-serrulate at apex, narrow; ultimate branches of the staminate inflorescence aborted making the flowers appear umbellate; pistillate inflorescence 1-flowered. .... 15. *B. umbellata.*

16. Tepals entire or else very broad.

17. Leaves strongly oblique or transverse, cordate at base, never dimidiate.

18. Inflorescence many-flowered, to 2 dm. in diameter; column of the ovary or capsule very short but distinct. .... 16. *B. cornuta.*

18. Inflorescence few-flowered; column of the ovary as long as the radius, exclusive of the horns. .... 17. *B. toledana.*

17. Leaves nearly or quite straight, usually dimidiate at base.

19. Capsule-column much shorter than the capsule-radius.

20. Plant densely ferruginous-hirsute; the outer staminate tepals very thick, forming an ovoid nut-like husk around the stamens; pistillate tepals in 2 very distinct series .... 18. *B. ursina.*

20. Plant sparsely and incompletely pubescent; staminate tepals thin; pistillate tepals subsimilar, not in distinct series.

21. Staminate tepals subequal; bracteoles elliptic. .... 19. *B. grewiaefolia.*

21. Staminate tepals very unequal; bracteoles suborbicular. .... 20. *B. colombiana.*

19. Capsule-column about equaling the capsule-radius.

22. Staminate tepals 12 mm. long; stamens on a 6 mm. long column; tepals red or rose in both sexes. .... 21. *B. antioquensis.*

22. Staminate tepals not more than 8 mm. long; staminal column much shorter or lacking.

23. Staminate inflorescences usually many-flowered; outer staminate tepals apiculate; pistillate tepals showy, 9-14 mm. long; branches diffuse. .... 22. *B. diffusa.*

23. Staminate inflorescences few-flowered; staminate tepals obtuse; pistillate tepals 3-5 mm. long; branches strict. .... 23. *B. Urticae.*

9. Ovary and capsule ovoid, ellipsoid or globose (subturbinate in *B. ophiogyna*, but the wings very unequal), usually bearing 3 unequal wings; stigmatic tissue usually linear and spiral about the styles; capsule dehiscent beside the wings; staminate tepals 2 or 4.

24. Annuals with soft fibrous bases; leaves never peltate.

25. Wings extending the whole length of the ovary; pistillate bracteoles shorter than the ovary at anthesis.

26. Stamens free or on a short column, the connective more or less produced; placentae often simple and bilamellate in the same capsule.

27. Capsule-wings subequal, lunate; leaves mostly straight, glabrous or subglabrous. .... 24. *B. semiovata.*

27. Capsule-wings very unequal, subdeltoid.

28. Leaves straight; plant glabrous except for a few scattered hairs on the leaves; staminate tepals 4, anther-connective much produced; pistillate tepals unequal; styles more than bifid. .... 25. *B. subcostata.*

28. Leaves oblique or transverse; plant at least partially pubescent; staminate tepals usually 2, anther-connective only slightly produced; pistillate tepals subequal; styles not more than bifid.

29. Largest capsule-wing much wider than high; anthers globose; leaves narrowly elliptic-oblong, about 3 times as long as wide. .... 26. *B. filipes.*

29. Largest capsule-wing about as high as wide; anthers ellipsoid; leaves ovate, mostly about twice as long as wide. .... 27. *B. hirtella.*

26. Stamens on a definite column, the subglobose anthers emarginate; placentae bilamellate. .... 28. *B. microcarpa.*

25. Wings along only the upper half of the ovary; pistillate bracteoles exceeding and concealing the ovary at anthesis. (42. *B. tiliaefolia*).

24. Perennials with firm bases.

30. Leaves distinctly oblique to transverse, never peltate.

31. Peduncles very short to absent; leaves only slightly oblique. .... (42. *B. tiliaefolia*).

31. Peduncles 1.5-14 cm. long.

32. Leaves entire or obscurely denticulate and very broadly cordate-ovate (their long axis less than twice their short one); stamens on a column, the subglobose anthers emarginate.... .... 28. *B. microcarpa.*

32. Leaves either distinctly serrate or else at least twice as long as wide.

33. Leaves distinctly serrate or crenate.

34. Inner staminate tepals obcordate; styles multifid. .... 29. *B. ophiogyna.*

34. Inner staminate tepals obtuse or wanting.

35. Stipules broadly ovate, persistent; capsule-wings all narrow; bracts deciduous but bracteoles persistent, ample, concealing ovary. 30. *B. pastoensis.*

35. Stipules lance-oblong to elliptic, deciduous.

36. Bracts persistent; pistillate bracteoles ovate or narrower.

37. Bracts linear-lanceolate, entire; inflorescence many-flowered, 5-7 cm. in diameter. .... 31. *B. sulcata.*

37. Bracts ovate, fimbriate; inflorescence few-flowered. .... 32. *B. tovarensis.*

36. Bracts deciduous; pistillate bracteoles suborbicular. .... 33. *B. magdalenae.*

33. Leaves partially and very obscurely denticulate.

38. Staminate tepals 4; styles multifid; capsule ellipsoid. .... 34. *B. cryptocarpa.*

38. Staminate tepals 2; styles bifid; capsule ovoid. acute. .... 35. *B. fagopyroides.*

30. Leaves nearly or quite straight or else peltate.

39. Leaves palmate- or peltate-nerved, usually symmetric or nearly so.

40. Plants large and stout; leaves 2-6 dm. wide; inflorescence of very many minute flowers. .... 36. *B. parviflora.*

40. Plants slender; leaves much less than 2 dm. wide.

41. Stamens borne on a column; plants suffrutescent. scandent.

42. Inflorescence few-flowered, pubescent; tepals dentate; leaves cordate or short-peltate, dentate. .... 37. *B. Maurandiae.*

42. Inflorescence many-flowered; tepals entire; leaves denticulate to subentire, always peltate.

43. Cortex of even the ultimate branches pale gray, glabrous. friable; staminal column very short. ... . 38. *B. tropaeolifolia.*

43. Cortex dark red-brown, densely pubescent, not friable; staminal column equaling or slightly exceeding the tepals. .... 39. *B. spadiciflora.*

41. Stamens free or only on a low torus.

44. Leaves peltate, 8 cm. long. 6 cm. wide, obtuse; styles multifid. .... 40. *B. novo-granatae*.

44. Leaves basifixed.

45. Leaves obtuse, truncate at base, glabrous; stipules persistent, obtuse; capsule-wings attached the whole length of the capsule. .... 41. *B. cucullata*.

45. Leaves abruptly acuminate, cordate at base, partially pubescent; capsule-wings attached to the upper edge of the capsule. .... 42. *B. tiliaefolia*.

39. Leaves pinnate-nerved, often strongly asymmetric at base.

46. Inflorescence laxly racemose, thyrsoid or paniculate with a central axis.

47. Pistillate tepals 4-5; pistillate bracteoles serrate; plant pubescent. .... 43. *B. buddleiaefolia*.

47. Pistillate tepals 2; pistillate bracteoles obscurely undulate or entire, very ample, accrescent; plant essentially glabrous. .... 44. *B. Rossmanniae*.

46. Inflorescence cymose or very few-flowered.

48. Connective produced into a subulus longer than the anther; staminate tepals 2. .... 45. *B. extensa*.

48. Connective only slightly produced.

49. Pistillate tepals 2-4.

50. Bracts persistent, bright red, showy; outer tepals ovate, acute. .... 46. *B. Cuatrecasana*.

50. Bracts deciduous, inconspicuous.

51. Cymes laxly few-flowered; leaves lance-elliptic, only about 2 cm. wide; pistillate bracteoles broadly elliptic, serrulate. .... 47. *B. xylopoda*.

51. Cymes many-flowered; leaves 3.5-8 cm. wide.

52. Staminate tepals 4; filaments equaling or exceeding anthers; pistillate bracteoles orbicular.

53. Peduncle glabrous; capsule-wings ciliate. .... 48. *B. cymbalifera*.

53. Peduncle hirsute; capsule-wings entire. .... 49. *B. Dugandiana*.

52. Staminate tepals 2; filaments shorter than anthers; pistillate bracteoles ovate. 50. *B. alnifolia*.

49. Pistillate tepals 5.

54. Leaves nearly symmetrical, broadly ovate; petioles 1-8 cm. long. .... 51. *B. glabra.*

54. Leaves strongly asymmetric, at least at base.

55. Styles multifid; inflorescence many-flowered; stipules and bracts tardily deciduous; anthers oblong, mostly shorter than the filaments. .... 52. *B. guaduensis.*

55. Styles only bifid.

56. Tepals serrate; inflorescence many-flowered; stipules and bracts persistent; anthers globose. .... 53. *B. Barrigae.*

56. Tepals entire.

57. Stipules and bracts deciduous; inflorescence many-flowered. .... 54. *B. Holtonis.*

57. Stipules and bracts persistent.

58. Leaves deeply and very asymmetrically cordate at base with one lobe much enlarged. .... 55. *B. stenocardia.*

58. Leaves dimidiate at base, not over 2 cm. wide.

59. Ultimate branches densely papillose... .... 56. *B. microphylla.*

59. Ultimate branches smooth. .... 57. *B. foliosa.*

EXCLUDED OR DOUBTFUL SPECIES:

BEGONIA OPULIFLORA Putz. in Fl. Serres, ser. 1, x. 71, t. 995 (1854-55). "Prov. Soto, ... Nouvelle Grenade" which is given as the type-locality is now Coclé in Panama.

BEGONIA ELEGANS HBK. Nov. Gen. & Sp. Pl. vii. 182 (1825). Described from imperfect material. Apparently equivalent to one of the varieties of *B. foliosa* HBK., but we cannot be certain without seeing the type.

BEGONIA MULTIFLORA Benth. Pl. Hartweg. 185 (1845). Type unavailable; identity doubtful.

2. **Begoniella** Oliver emend. Smith & Schubert

Caulescent, herbaceous to suffruticose. Leaves straight. Tepals usually connate for most of their length resulting in a 2- or 4-lobed perianth in both staminate and pistillate flowers, often with a similar or undulate, shorter inner perianth also. Stamens 4-6, variously inserted. Fruit a horned capsule.—In Trans. Linn. Soc. xxviii. 513 (1873); emended by Oliver in Hook. Ic. xiv. 38 (1881).

Although our knowledge of Oliver's species is based only on his descriptions and illustrations together with a single collection of *B. Kalbreyeri* and our new species is described from but one ample specimen the specific lines in the genus *Begoniella* seem to be very distinct even though the relationships are unusually strong. More adequate collections are greatly desired. Additional material will do much to increase our understanding of the relationships between *Begonia* and *Begoniella*. The transition is obviously through *Begonia* § *Casparya* and specifically through *B. Killipiana* which rather strikingly resembles *Begoniella Whitei*.

Four species.—Endemic.

Key to Colombian species of Begoniella.

1. Leaves asymmetric, elliptic, dimidiate; ca. 2-3 times as long as broad.

  2. Inflorescence with many distichous imbricate bracts; perianth uniseriate. .... 1. *B. Whitei*.

  2. Inflorescence with only a pair of bracts; perianth biseriate at least in the staminate flowers.

    Stamens six, anthers equal to the filaments in length, connective dilated, produced as a broad appendage beyond the loculi. .... 2. *B. libera*.

    Stamens four, sessile or essentially so, slender, connective produced as a subulus beyond the loculi. .... 3. *B. Kalbreyeri*.

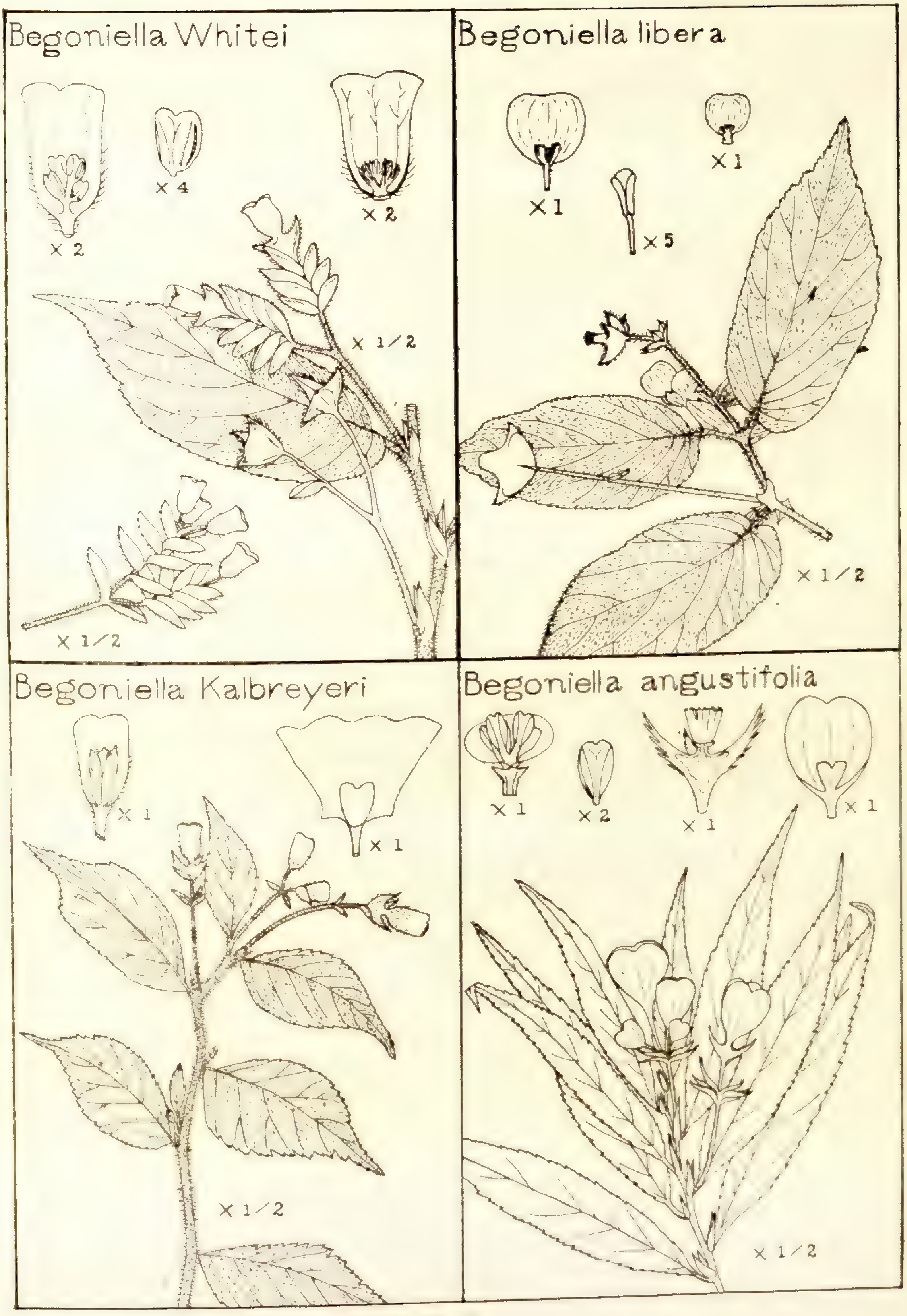
1. Leaves symmetric, lance-acuminate, cuneate at base, ca. 6 times as long as broad. .... 4. *B. angustifolia*.

1. **Begoniella Whitei** Oliver. Erect, herbaceous to suffruticose, 2.3-4.5 dm. high, stem papillose-setigerous; leaves straight, somewhat asymmetric, elliptic- to ovate-lanceolate, rather abruptly acuminate, the broader half of the base suborbicular, the narrower tapering to the petioles, 6-10 cm. long, 2.5-3.5 cm. broad, crenate-serrate, the teeth setiferous, appressed-pilose above, pubescent on the nerves beneath; petiole less than 1 cm. long, spreading-pubescent, stipules subpersistent, ovate-acuminate, 8-12 mm. long, entire; peduncle axillary, erect; inflorescence apparently racemose, many-flowered, simple or branched, shorter than to equaling the leaves; bracts erect to spreading,

densely imbricate, ovate-oblong, 10-15 mm. long, mucronate; pedicels delicate, spreading-pubescent, in the staminate flowers exceeding the bracts; staminate perianth 4-lobed, pilose toward the base without, 9 mm. high, each lobe ca. 7 mm. broad; stamens 4, distichous on a short column, anthers almost sessile, obovate, retuse; bracteoles of the pistillate flowers up to 1 cm. long, setiferous, persistent; pistillate perianth similar to staminate, styles almost fastigiate at base, much branched and the branches many times divided above; ovary 3-locular, placentae simple, multiovulate, capsule broadly turbinate, truncate at apex, equally 3-horned, the horns acuminate-ascending, spreading-pubescent particularly on the angles.—Endemic.—Oliver in Trans. Linn. Soc. xxviii. 513, t. 41 (1873). Tab. 18.

CHOCO: new path through forests of the Atrato valley ca. 30 miles east of Quibdó on the Atrato river, alt. 150 m., *R. B. White* (K, **type**, not seen).

2. **Begoniella libera** Smith & Schubert, spec. nov., herbacea caule viridi, infra purpureo, tenui, erecto, lineato, hispido; foliis rectis, paulo asymmetricis, oblongo-ellipticis, abrupte acuminatis, basi subrotundatis, basis latere ab axi decurrente, 7-10 cm. longis, 3-4 cm. latis, denticulatis, tuberculato-pilosis in nervo centrali et intra nervis lateralibus supra, in et intra nervis infra; petiolo brevissimo vel ad 11 mm. longo, dense hispido, stipulis persistentibus, oblongo-ellipticis, apice setiferis, obtusiusculis, 10-12 mm. longis, integris, hyalinis; pedunculis axillaribus, longe patenti-pilosis, inflorescentiis cymosis, paucifloris; bracteis stipulis similibus; pedicellis 5-10 mm. longis, patenti-pilosis; perianthio florum masculinorum de 2 seriebus, parte exteriori campanulato, 1 cm. alto, extus setifero, 4-lobato, lobis obtusis, parte interiori ca. 4 mm. alto, 4-lobato vel 2-lobato cum lobis subliberis, retusis, staminibus 6, liberis, antheris 1 mm. longis, filamentis aequalibus, connectivo producto dilatatoque, obtuso; bracteolis femineis persistentibus, oblongo-ovatis, acuminatis, ciliato-setiferis, 6 mm. longis, 2 mm. latis; perianthio florum femineorum verisimiliter uniseriato, ca. 1 cm. alto, extus setifero, 4-lobato, lobis obtusis, stylis breviter et multo ramosis; ovario 3-loculato, placentis simplicibus, capsula turbinata, basi acuta, apice columna crasse cylindrica 12 mm. longa aucta, aequaliter 3-cornuta, cornubus acuminatis, adscendentibus. Tab. 18.


Begoniella Whitei
× 2
× 4
× 2
× 1/2
× 1/2
Begoniella libera
× 1
× 5
× 1
× 1/2
Begoniella Kalbreyeri
× 1
× 1
× 1/2
Begoniella angustifolia
× 1
× 2
× 1
× 1
× 1/2

TAB. 18

VALLE: west slope of the Cordillera Occidental, woods, right bank of Río Digua, La Elsa, alt. 1000-1200 m., Nov. 9, 1943, *Cuatrecasas 15320* (G, **type**).

3. **Begoniella Kalbreyeri** Oliver. Erect, herbaceous to suffruticose, 1.5-4.5 dm. high, stem papillose-hirsute; leaves a little asymmetric, ovate-acuminate, cuneate, the narrower half shorter and not extending so far down the petiole as the broader, 5-7.5 cm. long, rather coarsely serrate, setiferous, papillate-pubescent above and below; petioles very short, stipules linear-lanceolate, a little longer; peduncles axillary, shorter than the leaves, 1-4-flowered; bracts few, ovate-oblong to lanceolate, 4-7 mm. long; pedicels delicate, spreading-pubescent, to 7 mm. long; outer perianth 4-lobed, pilose toward base without, 10-12 mm. long, lobes ca. 4 mm. broad, inner perianth short-campanulate, membranaceous, about equaling the stamens; stamens 4, slender, slightly broadened above, essentially free but almost sessile, connective produced beyond the loculi; pistillate bracteoles similar to bracts but a little broader, setiferous, persistent; pistillate perianth similar to staminate, the inner about equaling the much divided style-branches; ovary 3-locular, placentae simple, capsule turbinate with a short column, equally 3-horned, the horns ascending, spreading-pubescent throughout.—Endemic.—Oliver in Hooker, Ic. xiv. 38, t. 1352 (1881). Tab. 18.

ANTIOQUIA: *Kalbreyer* (K, **type**, not seen).

CALDAS: Andes del Quindío, Sta. Rosa de Cabal, alt. 1600 m., Feb. 1852, *J. Triana (23)* (Col; G, phot.).

4. **Begoniella angustifolia** Oliver. Herbaceous, stem erect, slender, glabrate; leaves symmetric, lance-acuminate, ca. 6-15 cm. long and 1-2.5 cm. broad, duplicate-serrate, mostly sparsely appressed-pilose on both surfaces and on midrib above, petioles short, ca. 2-4 mm. long, stipules persistent membranaceous, lance-acuminate, about 4-10 mm. long and exceeding the petioles; peduncles axillary, few-flowered, shorter than the leaves, bracts distichous, spreading imbricated, lance-acuminate, about equaling the stipules, pedicels 7-15 mm. long; flowers scarlet, outer perianth-segment of staminate flowers deeply 2-lobed, lobes suborbicular, retuse, 15 mm. long and broad, inner segment ca. 4 mm. long, more or less shallowly 4-lobed, stamens 4, filaments a little shorter than the anthers, apparently fused in a short

column at the base, anthers obovate, emarginate; pistillate perianth single, about equaling the staminate, styles more or less connate below, unequally multifid, ovary apparently glabrous with presumably simple placentae, capsule turbinate, 3-celled with a short column at apex, equally 3-horned, horns ascending and lacerate.—Endemic.—Oliver in Hook. Ic. xv. 68, t. 1487 (1885). Tab. 18.

CHOCO: Nóvita, *R. B. White* (K, **type**, not seen).

Begoniella angustifolia is similar to *B. Whitei* in having distichous (though less numerous and slenderer) bracts and in the number and form of its stamens (although their insertion is different). It is similar to *B. Kalbreyeri* and to our *B. libera* in having the perianth double in the staminate flowers and agrees with *B. libera* also in having ony a single perianth in the pistillate flowers.