

STUDIES IN THE "BROMELIACEAE"¹

XII

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RESUMEN

Estudios en Bromeliáceas. XII. — En la parte preliminar el autor publica las novedades : *Hohenbergia guatemalensis* L. B. Smith, *Pitcairnia heterophylla* (Lindl.) Beer forma *albiflora* Standley et L. B. Smith, *P. Tuerckheimii* Donn. Smith var. *macrolepis* L. B. Smith, *Tillandsia ionantha* Planch. var. *scaposa* L. B. Smith, *T. Penlandii* L. B. Smith y su var. *pedunculata* L. B. Smith, *T. polita* L. B. Smith, *Vriesia lancifolia* (Baker) L. B. Smith, *V. pectinata* L. B. Smith y *V. Racinae* L. B. Smith.

En la segunda parte el autor continúa sus sinopsis de la Tribu *Tillandseae* (ahora subfamilia *Tillandsioideae* de acuerdo a Harms). En esta parte estudia las especies con inflorescencias simples y flores que se dirigen todas hacia un lado, con un total de 26 del género *Vriesia*. La primera parte de las sinopsis ha sido publicada en los números LXXXVI y CVI de *Contributions from the Gray Herbarium of Harvard University*.

1. PRELIMINARY RECORDS

In preparing the present paper the author has been especially fortunate in receiving recent collections of *Bromeliaceae* from several regions still not very well represented in American herbaria. Dr. C. W. Penland's specimens from Ecuador beside furnishing one new species of *Tillandsia* also provided new and beautifully prepared material of poorly known species of André and others. Dr. P. C. Standley in his intensive collec-

¹ Contributions from the Gray Herbarium of Harvard University, N° CXXXVII.

ting preparatory to a flora of Guatemala has uncovered a number of novelties and much enlarged our knowledge of other species. Mr. and Mrs. Mulford B. Foster of Orlando, Florida, have botanized extensively in Brazil in 1939 and again in 1940 and have discovered many new species of *Bromeliaceae*. However, only one of these has direct application here, the remainder being intended for publication in Brazil.

Since this is the first appearance of this series in *Lilloa* it seems well to list again the explanation of abbreviations of herbaria as follows: the Gray Herbarium of Harvard University (G) the United States National Museum (US) the New York Botanical Garden (NY), the Field Museum of Natural History (FM), the Missouri Botanical Garden (Mo), the University of Michigan (Mich), the Royal Botanic Gardens at Kew (K), the British Museum of Natural History (BM), the Riks Museum at Stockholm (S), the Botanical Museum of Copenhagen (Ko), the Herbarium of the Botanical Museum at Berlin-Dahlem (B), the Botanical Museum of Munich (Mun), the Muséum National d'Histoire Naturelle at Paris (P), the Barbey-Boissier Herbarium (Boiss) now with the Conservatory of Botany at Geneva, the Departamento de Botânico do Estado, São Paulo (SP) formerly the Instituto Biológico, the private collection of Dr. Carl Mez (Mez) now at Berlin-Dahlem, the Herbarium of the Botanic Garden of the University of Liège (Liège), the Herbarium of the Natural History Museum of Vienna (Hb. Mus. Vienna), the Jenman Herbarium at Georgetown, British Guiana (Jenman), the Colegio de La Salle of Havana-Vedado, Cuba (La Salle) and the Estación Experimental Agronómica of Santiago de Las Vegas, Cuba (Las Vegas). The material from Berlin-Dahlem has been studied by means of photographs taken by Mr. J. Francis Macbride under the Rockefeller Foundation Fund.

***Hohenbergia guatemalensis*, spec. nov.,** *florifera* 5-6 dm. *alta* ; *laminis foliorum lingulatis*, 8 cm. *latis*, *planis*, *late acutis et apiculo involuto gracili ad 1 cm. longo auctis*, *utrinque lepidibus parvis albidis adpressis obsitis*, *margine spinis latis ad 1.5 mm. longis subdense armatis*; *scapo erecto, valido, dense flocculoso*;

scapi bracteis erectis, dense imbricatis, ample ellipticis, acuminate pungentibusque, obscure punctulato-lepidotis; inflorescentia bipinnatim paniculata, dense cylindrica, 2 dm. longa; rhachi valida, alato-angulata, badio-flocculosa; bracteis primariis eis scapi similibus sed multo minoribus, infimis spicas longe superantibus; spicis crasse ellipsoideis, per anthesin ad 3 cm. longis, multifloris, perdense strobiliformibus; bracteis florigeris e suborbicularibus longe acuminatis, 18 mm. longis, 12 mm. latis, subtenuibus, obscure nervatis, brunneis, mox glabris, ad apicem versus paulo carinatis; floribus sessilibus; sepalis ovatis, valde mucronatis, 8 mm. longis; petalis staminibusque ignotis; ovario obconico, parvo, bacca ex ovario multo incrassato, tubo epigyno nullo, placentis apicalibus, ovulis longe caudatis. Tab. I, figs. 1-4.

GUATEMALA : ALTA VERAPAZ : on tree in dense wet forest, mountains east of Tactic, on road to Tamahú, alt. 1500-1650 m., April 9, 1939, Standley 71169 (FM, type; phot. G), 71364 (FM, cotype; phot. G).

The above constitutes the first record for the genus *Hohenbergia* on the mainland of North America. *H. guatemalensis* shows no strong resemblance to any other species and its caudate ovules would relate it to the Brazilian rather than to the West Indian series of species.

***Pitcairnia heterophylla* (Lindl.) Beer forma *albiflora* Standley et L. B. Smith, forma nov., petalis omnino albis.**

GUATEMALA : SACATEPÉQUEZ : near Las Lajas, alt. ca. 1200 m., Nov. 28, 1938, Standley 58302 (FM, type; G).

***Pitcairnia Tuerckheimii* Donn. Smith var. *macrolepis*, var. nov., foliis ad 22 mm. latis; axi inflorescentiae valido, dense albido-floccoso; bracteis florigeris pedicellos multo superantibus; sepalis ad 33 mm. longis, basi alato-carinatis. Tab. I, fig. 5-6.**

GUATEMALA : HUEHUETENANGO : sunny cliff, San Miguel Acatán, alt. 2080 m., Aug. 18, 1934, Skutch 995 (G, type).

This variety is a more robust more differentiated development from the typical. Its leaves are broader, setting a new mark for the deciduous type, and the tendency toward a dorsal

wing on the sepals has become pronounced where it is scarcely noticeable in the typical form. The varietal name refers to the relatively larger floral bracts.

Tillandsia ionantha Planch. in Fl. des Serres, x. 101, t. 1006 (1855). *T. erubescens* Schlecht. sensu Mez in Engl. Pflanzenreich, iv. Fam. 32, 496, fig. 98 (1935).

In his treatment of *Tillandsia erubescens* in the Pflanzenreich, Mez nowhere cites any Schiede material which was the basis of the original description. Schlechtendal's description contains the following phrases: «Eine nur 1/2 Fuss hohe Art,»... «etwa 3/4 Zoll dicken Aehre»... «Die Blumen erschienen getrocknet gelb»; and none of these are easily reconciled with *Tillandsia ionantha*. Yet Mez reduces *T. ionantha* to the synonymy of the *T. erubescens*.

It is probably best for the present to place *T. erubescens* on the dubious list and hope for the appearance of the type later. Judging from the description there is some possibility that *T. erubescens* is the same as *T. benthamiana*.

Tillandsia ionantha Planch. var. **scaposa**, var. nov., inflorescentia scapo brevi sed distincto elata. Tab. I, fig. 7.

GUATEMALA : SACATEPÉQUEZ : near Antigua, alt. 1500-1600 m., Nov. 1938-Feb. 1939, Standley 63065 (FM, G, type); 58817 (FM, G); hills of Finca Carmona, southeast of Antigua, alt. 1590-1800 m., Jan. 27, 1939, Standley 63751 (FM, G); barranca above Dueñas, alt. 1590-1800 m., Jan. 21, 1939, Standley 63185 (FM); near Pastores, 1560-1650 m., Dec. 14, 1938, Standley 59956 (FM); ESCUINTLA : above Palín, alt. 1500 m., Dec. 16, 1938, Standley 60107 (FM, G).

Tillandsia (subgen. *Pseudo-Catopsis*) **Penlandii**, spec. nov. acaulis, ca. 6 dm. alta; foliis 3 dm. longis, extimis valde redditis, vaginis ellipticis, ventricosis, pseudobulbum ellipsoideum magnum efformantibus, densissime minuteque adpresso-lepidotis, basi atro-castaneis, ad apicem versus viridibus et violaceo-maculatis, laminis angustissime triangularibus, involutis contortisque, utrinque lepidibus minutis albidis adpresso-dense obsitis; scapo erecto, gracili, albido-lepidoto; scapi bracteis late ellipticis, cum laminis linearibus elongatis contortis internodia superantibus; inflorescentia laxa quadripinnatum paniculata, subcylindrica, ca. 3 dm.

longa, 8 cm. diametro, albido flocculoso; bracteis primariis bases steriles ramorum aequantibus vel superantibus, infimis eis scapi similibus, reliquis apiculatis; ramis spicas ad 10 laxae gerentibus; spicis dense paucifloris, 10-15 mm. longis; rhachi gracili, geniculata; bracteis florigeris late ovatis, obtusis, quam sepala paulo brevioribus, rhachis nullo modo obtegentibus; floribus subpatentibus; sepalis asymmetricis, 5 mm. longis, dissite lepidotis; petalis paulo exsertis, pallide flavis; staminibus styloque inclusis. Tab. I, figs. 14-15.

ECUADOR : LOJA : epiphytic, near Loja, alt. 2300 m., July 28, 1939, Penland & Summers 1138 (G, type).

This species is closely related to *Tillandsia ropalocarpa* but differs by its ventricose spotted leaf-sheaths and long-laminate scape-bracts.

Tillandsia Penlandii L. B. Smith var. **pedunculata**, var. nov., a typo differt basibus sterilibus ramorum elongatis, quam bracteas primarias multo longioribus; bracteis florigeris triangularibus, acutis, quam sepala multo brevioribus. Tab. I, figs. 16-17.

COLOMBIA : ANTIOQUIA : San Pedro, Dec. 1937, Bro. Daniel & Bro. Tomás 1558 (US, type : phot. G).

Tillandsia polita, spec. nov., acaulis, ad 45 cm. alta; foliis multis, dense rosulatis, 3 dm. longis, vaginis anguste ovatis, atro-brunneis, densissime minuteque adpresso-lepidotis, laminis angustissime triangularibus, acuminatis, subpungentibus, basi ca. 15 mm. latis, lepidibus minutis cinereis subpruinosis utrinque densissime indutis; scapo erecto, 6 mm. diametro, glabro; scapi vaginis erectis, dense imbricatis, infimis foliaceis, supremis late ovatis, acuminatis, dissite punctulato-lepidotis, laevibus, lucidis; inflorescentia densissime bipinnatim paniculata, crasse fusiformi, in specimine typico 11 cm. longa; bracteis primariis supremis scapi similibus, quam spicas axillares multo brevioribus; spicis suberectis, anguste lanceolatis, acutis, valde complanatis, basi bracteis sterilibus reductis gerentibus, ad 55 mm. longis et 15 mm. latis, dense 5-floris; bracteis florigeris erectis, distichis, dense imbricatis, 20-25 mm. longis, quam sepala bene brevioribus, carinatis, apice minute incurvatis, glabris lucidisque, coriaceis, ad apicem versus obscure

punctulato-lepidotis, fulgide rubris (! Standley); *floribus subsessilibus; sepalis anguste lanceolatis, acutis, fere 3 cm. longis, ad apicem versus dissite punctulato-lepidotis, posticis alte connatis; petalis violaceis; staminibus maturis ignotis sed verisimiliter exertis.* Tab. I, fig. 8-9.

GUATEMALA : QUICHÉ : on tree, dry rolling hills with pine and oak forest, between Quiché and San Pedro Jocopilas, alt. 1800-2100 m., Jan. 12, 1939, Standley 62465 (FM, type : phot. G).

The dense spikes and exserted sepals of *Tillandsia polita* give it a combination of characters found in very few North American species. Except for the exserted sepals it looks like a reduced form of *T. fasciculata*, but these place it with *T. lineatispica*. The latter, however, is tripinnate with long-laminate primary bracts.

Vriesia lancifolia (Bak.), comb. nov. *Tillandsia lancifolia* Bak. Brom. 202 (1889). *Vriesea Platzmanni* Mez in Mart. Fl. Bras. iii. pt. 3, 546 (1894) in part, not as to type.

In view of the shortness of Baker's original description the following enlarged one may be helpful :

Planta ad 7 dm. alta; foliis multis, erectis, densissime rosulatis, ad 25 cm. longis, vaginis maximis, late ellipticis, laminis anguste subtriangularibus, acuminatis, basi 35 mm. latis, subglabris; scapo gracillimo sed verisimiliter erecto; scapi vaginis erectis, quam internodia multo brevioribus, ellipticis, infimis anguste laminatis, supremis apiculatis; inflorescentia simplicissima, laxa, nullo modo secundiflora, ultra 8 cm. longa, 8-flora; axi flexuoso, gracili; bracteis florigeris subpatentibus, late ovatis, obtusis, 8-12 mm. longis, quam sepala multo brevioribus; floribus divergentibus; pedicellis brevibus; sepalis ellipticis, obtusis, 18 mm. longis; petalis delapsis solum cognitis, ultra 25 mm. longis; staminibus ignotis. Tab. II, figs. 3-4.

BRAZIL : BAHIA : near Igreja Velha, 1841, Blanchet 3458 (BM, type; phot. G).

Since the flowers of *Vriesia lancifolia* are not secund and its stamens are unknown, the chances are about even of its belonging to Section *Psittacinae* or to Section *Xiphion*. In Section

Psittacinae it would fall next to *V. amethystina*, from which it differs in the form of its leaves, and in Section *Xiphion* next to *V. brassicoides* from which it differs in not having its flowers secund.

Vriesia pectinata, spec. nov., *e fragmentis solum cognita, sed sine dubia ultra metralis; foliis ca. 5 dm. longis, laminis ligulatis, acuminatis, ultra 3 cm. latis, concoloribus, utrinque sparse brunneopunctulato-lepidotis; scapo erecto, 8 mm. diametro, glabro; scapi bracteis omnibus quam internodia brevioribus, late ovatis, acutis, scapum arete involventibus, brunneo-punctulatis, laevibus; inflorescentia simplicissima, dense multiflora, 6 dm. longa; rhachi flexuosa, leviter angulata, glabra; bracteis florigeris cum floribus secunde versis, late ovatis, acutis, minute cucullatis, ad 32 mm. longis, internodia plus quam duplo superantibus, obtuse carinatis, coriaceis, ex sicco leviter nervatis, viridibus, brunneo-punctulatis; floribus secunde patentibus; pedicellis crassis, ca. 1 cm. longis; sepalis late ellipticis, acutis, 23 mm. longis, ecarinatis, coriaceis; petalis anguste ellipticis, obtusis vel emarginatis, 28 mm. longis, basi ligulis binis magnis acutis auctis, ex sicco flavo-virentibus; staminibus inclusis, filamentis ad apicem versus paulo incrassatis.* Tab. I, figs. 10-13.

GUATEMALA : ALTA VERAPAZ : terrestrial in wet thicket near Cobán, alt. 1260-1440 m., March-April, 1939, Standley 69055 (FM, type; phot. G).

Vriesia pectinata closely resembles the West Indian *V. Tuerczheimii* in its flowers and elongate axis, but differs in its much larger bracts and simple dense inflorescence.

Vriesia Racinae, spec. nov., *florifera infra 3 dm. alta; foliis multis, dense rosulatis, 10-11 cm. longis, vaginis late ellipticis, nonnunquam cum laminis aequilongis et omnibus quam eas multo latioribus, brunneo-punctulato-lepidotis, prope basin atro-castaneis, ad apicem versus brunneo-maculatis, laminis ligulatis, late acutis apiculatisque, 15-20 mm. latis, planis et spiraliter recurvatis, supra glabris, subtus obscure punctulato-lepidotis et dense atro-maculatis; scapo erecto, gracili, glabro; scapi bracteis erectis, imbricatis, scapum arete amplectentibus, ellipticis, acutis; inflorescentia simplicissima, laxa, in specimine typico 5-flora, glabra; rhachi fere*

recta, ca. 6 cm. longa; bracteis florigeris alteris erectis alteris cum floribus secunde versis, late ovatis, acutis, ad 18 mm. longis, internodia aequantibus vel paulo superantibus, convexis, nullo modo carinatis, laevibus; pedicellis graciliter obconicis, 1 cm. longis; floribus secundis, patentibus; sepalis anguste ellipticis, 18 mm. longis, bracteas longe superantibus, convexis, ecarinatis; petalis staminibus styloque ignotis. Tab. III, figs. 5, 6.

BRAZIL : ESPÍRITO SANTO : epiphytic, Santa Teresa, alt. 775 m., July 26, 1939, M. B. & R. Foster 270 (G, type).

Vriesia Racinae is unusual for the Brazilian species of the genus in its combination of variegated leaves and simple secund-flowered inflorescence.

The specific name is in honor of Mrs. Mulford B. Foster, able partner in her husband's Bromeliad collecting enterprise.

2. Synopsis of the Tribe Tillandsieae. Part 3

This installment of the synopsis treats twenty-six species of *Vriesia* characterized by an acaulescent habit and a simple inflorescence of secund flowers. At present no species of *Tillandsia* with such characters are known and secund flowers are generally much rarer in the genus than in *Vriesia*.

The paper has a further unity because so far as is known all the species treated belong to the Section *Xiphion*. It must be admitted, however, that the petals and stamens of several species have not been seen.

Technically speaking some species of the Section *Euvriesia* like *Vriesia erythrodactylon* can be called secund-flowered because their petals all emerge on one side of the inflorescence. But this character is not evident in fruiting material and since the object of this synopsis is the determination of fruiting material such species are excluded from the present part. In flowering condition they may be determined from the natural keys of standard monographs.

KEY TO SPECIES

1. Spikes with the flowers distichous or secund, or else the inflorescence reduced to a single flower.
2. Sepals asymmetric, free, oblong or broadest near the apex, not over 10 mm. long. *Tillandsia* § *Pseudo-Catopsis*. ¹
2. Sepals symmetric, or if slightly asymmetric, ovate or lanceolate, broadest near the base.
3. Inflorescence of a single spike or reduced to a single flower, either terminal or pseudoaxillary.
4. Plant caulescent : leaf-blades linear or triangular. *Tillandsia* in part. ²
4. Plant acaulescent : leaves often ligulate.
5. Flowers becoming secund at anthesis.
6. Floral bracts acute or obtuse or rarely the lowest ones acuminate : axis of the inflorescence smooth or ridged but never verrucose.
7. Inflorescence dense, the floral bracts at least twice as long as the internodes.
8. Scape-bracts shorter than the internodes.
9. Floral bracts acute, green : leaves acuminate. Guatemala. ^{1. *V. pectinata*.}
9. Floral bracts obtuse, castaneous : leaves broadly rounded or subtruncate. Brazil. ^{2. *V. Clausseniana*.}
8. Scape-bracts exceeding the internodes.
10. Floral bracts rugulose throughout when dry, thick, coriaceous.
11. Floral bracts with a triangular apex : sepals acute. Panama. ^{3. *V. Woodsoniana*.}
11. Floral bracts broadly subacute or obtuse : sepals broadly obtuse.
12. Floral bracts becoming secund with the flowers : sepals twice as long as broad. British Guiana. ^{4. *V. pachychlamys*.}
12. Floral bracts remaining erect : sepals much less than twice as long as broad.
13. Leaves broadly obtuse or acute, apiculate : floral bracts three to four times as long as the internodes. Guatemala to Colombia. ^{5. *V. gladioliflora*.}

¹ Contrib. Gray. Herb. lxxxix. 15 (1930).

² Proc. Am. Acad, lxx. (Contrib. Gray Herb. cvi.) 156 (1935).

13. Leaves acuminate : floral bracts slightly more than twice as long as the internodes. Costa Rica.
6. *V. Tonduziana*.
10. Floral bracts not rugulose when dry, or only near their apices.
14. Floral bracts each with its apical third rugulose and much paler and softer than the castaneous coriaceous remainder. Brazil.
7. *V. longicaulis*.
14. Floral bracts essentially uniform in texture (verrucose toward apex in *V. viridiflora*).
15. Floral bracts not becoming secund with the flowers.
16. Floral bracts ecarinate, barely more than twice as long as the internodes. Brazil.
23. *V. unilateralis*.
16. Floral bracts obtusely carinate toward the apex, much more than twice as long as the internodes.
17. Leaves acuminate : floral bracts up to 5 cm. long, much exceeding the sepals. Lesser Antilles.
8. *V. guadelupensis*
17. Leaves rounded and apiculate : floral bracts up to 35 mm. long, often exceeded by the sepals. Brazil.
9. *V. longiscapa*.
15. Floral bracts becoming secund with the flowers.
18. Rhachis subalate, up to 10 mm. in diameter, dark, its internodes narrowly oboconical : leaves mostly red-spotted : plant 1-2 m. high. Costa Rica to Colombia, Cuba, Jamaica, Hispaniola.
10. *V. sanguinolenta*.
18. Rhachis terete or angled with its internodes subcylindrical, rarely more than 5 mm. in diameter.
19. Leaf-blades less than 2 cm. wide, acuminate : plants not over 5 dm. high : inflorescence few-flowered. Costa Rica, Panama.
11. *V. subsecunda*.
19. Leaf-blades 3-10 cm. wide : plants

- 5-20 dm. high : inflorescence usually many-flowered.
20. Floral bracts drying dark castaneous with a narrow pale margin, even, lustrous. Costa Rica.
12. *V. Pittieri*.
20. Floral bracts green or dull buff.
21. Floral bracts evenly convex without any keel.
22. Sepals 15-20 mm. long : leaf-blades 3-4 cm. wide. Costa Rica, British Guiana.
13. *V. viridiflora*.
22. Sepals 35 mm. long : leaf-blades 6 cm. wide. Cuba.
14. *V. haplostachya*.
21. Floral bracts obtusely carinate : leaves broadly acute or rounded and apiculate.
23. Sepals up to 34 mm. long : floral bracts barely twice as long as the internodes : plant usually 2 m. high or more. Brazil.
15. *V. Hoehneana*.
23. Sepals 20-27 mm. long : floral bracts two and a half to three and a half times as long as the internodes : plant 6-12 dm. high. Brazil.
9. *V. longiscapa*.
- 7 Inflorescence lax, the floral bracts distinctly less than twice as long as the internodes.
24. Leaf-blades linear, 4 dm. long and not over 5 mm. wide : inflorescence typically 3-flowered : floral bracts membranaceous. Costa Rica.
16. *V. graminifolia*.
24. Leaf-blades narrowly triangular or ligulate, 15-80 mm. wide : inflorescence normally much more than 3-flowered : floral bracts firmer.
25. Scape-bracts, or at least the upper ones, shorter than the internodes : sepals much exceeding the floral bracts.
26. Leaf-blades narrowly triangular, acuminate : floral bracts obtuse, ecarinate. Brazil.
17. *V. brassicoides*.

26. Leaf-blades ligulate, broadly rounded and apiculate : floral bracts acute, carinate. Brazil. 18. *V. Platzmannii*.
25. Scape-bracts all imbricate.
27. Floral bracts exceeding the sepals.
28. Floral bracts acute or acuminate : sepals 17 mm. long. British Honduras. 19. *V. Schippii*.
28. Floral bracts obtuse : sepals 26 mm. long. Costa Rica. 20. *V. macrochlamys*.
27. Floral bracts distinctly exceeded by the sepals.
29. Leaf-blades narrowly triangular, long-acuminate, not over 3 cm. wide.
30. Floral bracts fleshy-coriaceous, coarsely lepidote except in age : flowers divergent : sepals oblong, 27-30 mm. long. Brazil. 21. *V. oligantha*.
30. Floral bracts subchartaceous, sparsely and minutely lepidote : flowers spreading : sepals broadly elliptic, 18 mm. long. Trinidad. 22. *V. Broadwayi*.
29. Leaf-blades ligulate, acute or rounded and apiculate or sometimes the apex acuminate for a short distance, 15-80 mm. wide.
31. Plants less than 1 m. high : scape slender : floral bracts ecarinate.
32. Floral bracts about twice as long as the internodes : leaf-blades concolorous. Brazil. 23. *V. unilateralis*.
32. Floral bracts little more than once as long as the internodes : leaf-blades densely maroon-spotted. Brazil. 24. *V. Racinae*.
31. Plants 1-2 m. high or more : scape stout : floral bracts obtusely carinate toward apex.
33. Sepals narrowly elliptic : floral bracts about twice as long as the internodes. Brazil. 15. *V. Hoehneana*.
33. Sepals very broadly elliptic : floral bracts about as long as the internodes. Brazil. 25. *V. amazonica*.
6. Floral bracts all acuminate, sharply carinate toward

the apex : axis of the inflorescence verrucose just below the nodes. Costa Rica, Panama, West Indies, Colombia. 26. *V. ringens*.

1. ***Vriesia pectinata*** L. B. Smith (see p. 387). Known only from fragments, but the flowering plant certainly over 1 m. high ; leaves ca. 5 dm. long, the blades ligulate, acuminate, over 3 cm. broad, concolorous, sparsely brown-punctulate-lepidote on both sides ; scape erect, 8 mm. in diameter, glabrous ; scape-bracts all shorter than the internodes, broadly ovate, acute, closely enfolding the scape, brown-punctulate, even ; inflorescence simple, densely many-flowered, 6 dm. long ; rachis flexuous, faintly angled, glabrous ; floral bracts becoming secund with the flowers, broadly ovate, acute, minutely ciliate, up to 32 mm. long, more than twice as long as the internodes, obtusely carinate, coriaceous, faintly nerved when dry, green, brown-punctulate ; flowers secund-spreading ; pedicels stout, ca. 1 cm. long ; sepals broadly elliptic, acute, 23 mm. long, ecarinate, coriaceous ; petals narrowly elliptic, obtuse or emarginate, 28 mm. long, bearing 2 large acute scales at base, greenish yellow when dry ; stamens included, filaments slightly thickened toward apex. — Terrestrial ; Guatemala. — Pl. I, figs. 10-13.

GUATEMALA : ALTA VERAPAZ : terrestrial in wet thicket near Cobán, alt. 1260-1440 m., March-April, 1939, Standley 69055 (FM, type ; phot. G).

2. ***Vriesia Clausseniana*** (Bak.) Mez. Flowering plant up to 16 dm. high ; leaves erect, 25-48 cm. long, wholly suffused or spotted with blue-violet or only toward base, finely and rather densely appressed-lepidote throughout, sheaths large, blades suboblong, tapering, broadly rounded or subtruncate, apiculate, 40-65 mm. wide, flat ; scape erect, stout ; scape-bracts erect, enfolding the scape, shorter than the internodes, broadly ovate, broadly rounded and apiculate ; inflorescence simple, densely many-flowered, 35-40 cm. long, glabrous ; axis stout, sulcate on drying ; floral bracts remaining erect, $2\frac{1}{2}$ times as long as the internodes, broadly elliptic, obtuse, ca. 35 mm. long and 45 mm. wide, exceeded by the sepals, strongly convex, obtusely or not at all carinate, coriaceous, rigid, even or some-

what nerved, castaneous with a narrow magenta margin when fresh, sublustrous; flowers suberect, secund, 5 cm. long; pedicels very stout, up to 1 cm. long; sepals elliptic, obtuse, ca. 30 mm. long and 17 mm. wide, pale green, drying stramineous; petals elliptic, pale yellow, bearing 2 large triangular scales at base; stamens included, filaments thickened toward apex; pistil exserted. — Terrestrial; Brazil. — Mez in Mart. Fl. Bras. iii. pt. 3, 545 (1894); in DC. Mon. Phan. ix. 593 (1896); and in Engler, Pflanzenreich, iv. Fam. 32, 386 (1935). *Tillandsia Clausseniana* Bak. Brom. 213 (1889). — Pl. I, fig. 22.

BRAZIL: MINAS GERAES: Serra de Caraça, *Claussen s. n.* (P, type; phot. G); most common *Vriesia* in the region, on rocks in full sun, Caraça, Municipio Santa Barbara, alt. 1500 m., July 22, 1940, M. B. & R. Foster 688 (G).

3. ***Vriesia Woodsoniana*** L. B. Smith. Leaves rosulate, up to 5 dm. long, sheaths elliptic, castaneous toward base, densely punctate-lepidote, blades ligulate, 3 cm. broad, flat, rounded at apex and apiculate, concolorous, densely and minutely lepidote beneath, glabrous above; scape erect, glabrous, its bracts foliaceous, densely imbricate; inflorescence simple, curved, subdensely few-flowered, ca. 15 cm. long; floral bracts imbricate, slightly secund, very broadly ovate, triangular-acute, up to 45 mm. long and 33 mm. wide, exceeding the sepals, glabrous, strongly rugose when dry, not at all carinate, dark castaneous toward base; flowers strongly secund; pedicels 1 cm. long, very thick; sepals broadly ovate, acute, 35-40 mm. long, rather thin, impressed-punctulate, rugulose when dry; petals imperfectly known, at base bearing 2 scales 1 cm. long, stamens apparently included. — Panamá. — L. B. Smith in Woodson & Seibert, Fl. Panamá, III, in Ann. Missouri Bot. Gard. xxvi. 275, t. 20 (1939).

PANAMA: CHIRIQUÍ: Bajo Mona, mouth of Quebrada Chiquero, along Río Caldera, alt. ca. 1500-2000 m., July 3, 1938, *Woodson, Allen & Seibert 1029* (Mo, type; phot. G).

4. ***Vriesia pachychlamys*** Mez. Known only from fragments, flowering plant at least 7 dm. high; leaves 5-8 dm. long, sheaths large, broadly elliptic, blades ligulate, broadly acute or round-

ed, apiculate, 6 cm. wide, green, concolorous, appearing glabrous at maturity; scape erect, stout; scape-bracts erect, imbricate, very broadly elliptic, apiculate; inflorescence simple, densely 14-17-flowered, ca. 3 dm. long, 35 mm. wide; axis stout, thickened at the nodes; floral bracts distichous, becoming secund with the flowers, very broadly elliptic, obtuse, 5 cm. long, ecarinate, very thick, coriaceous, rugulose and pale brown when dry; flowers suberect, secund; sepals elliptic, obtuse, 35 mm. long, 17 mm. wide, ecarinate, glabrous, even. — British Guiana. — Mez in DC. Mon. Phan. ix. 594 (1896); in Engler, Pflanzenreich, iv. Fam. 32, 386 (1935); L. B. Smith in Contrib. Gray Herb. lxxxix. 69 (1930). *Tillandsia pachychlamys* Bak. ex Mez in DC. Mon. Phan. ix. 594 (1896), nomen in synon. — Pl. I, figs. 18-19.

BRITISH GUIANA: Camounie Creek, April 1883, *Jenman 2044* (K, type; hb. Jenman, phot. G).

5. ***Vriesia gladioliflora*** (Wendl.) Ant. Plant up to 1 m. high; leaves rosulate, 6 dm. long, purplish when young (! Antoine), becoming deep green especially above; sheaths elliptic, inconspicuous, densely lepidote with brown punctiform scales; blades ligulate, broadly acute or obtuse, apiculate, 6-8 cm. wide, unmarked, glabrous above, obscurely punctulate-lepidote beneath; scape erect, very stout; scape-bracts exceeding the internodes, elliptic, abruptly acute; inflorescence simple, densely many-flowered, subcylindric at anthesis, acute, 2-4 dm. long, up to 5 cm. wide; floral bracts distichous, erect, imbricate, very broadly ovate, obtuse or broadly subacute, 45-55 mm. long, ecarinate, equaling to much exceeding the sepals, three to four times as long as the internodes, coriaceous, glabrous, green, purplish toward the apex, becoming buff and finely rugulose when dry; flowers suberect, slightly or not at all secund; pedicels very short and stout; sepals broadly elliptic, obtuse, 20-45 mm. long, coriaceous; petals ligulate with suborbicular blade, 4-7 cm. long, greenish white, bearing 2 obovate subincised scales at the base; stamens and pistil shorter than the petals. — Terrestrial and epiphytic; Guatemala to Colombia. — Ant. in Wiener Ill. Gart.-Zeit. v. 97 (1880);

Phyto-Iconogr. 23, t. 15 (1884); E. Morr. in Belg. Hort. xxx. 87, 216 (1880); Wittm. in Engler & Prantl, Nat. Pflanzenfam. ii. Abt. 4, 59 (1888); Mez in DC. Mon. Phan. ix. 594 (1896); in Engler, Pflanzenr., iv. Fam. 32, 386 (1935); Harms in Engler & Prantl, Nat. Pflanzenfam. ed. 2, xv a. 125 (1930); L. B. Smith & Standley in Standley, Fl. Costa Rica in Bot. Ser. Field Mus. xviii. 161 (1937); in Mus. Nac. Costa Rica, Ser. Bot. i. 173 (1940); L. B. Smith in North American Flora, xix. 161 (1938); L. B. Smith & Lundell, Bromel. Yucatán Penin. in Carnegie Inst. Washington Publ. n° 522, 122 (1940). *Tillandsia gladioliflora* H. Wendl. in Hamb. Gartenz. xix. 31 (1863); Bak. Brom. 214 (1889). *Vriesia gladioliflora purpurascens* Ant. in Wiener Ill. Gart.-Zeit. v. 97, t. 1 (1880). *V. gladioliflora* var. *purpurascens* Ant. Phyto-Iconogr. 23 (1884), in synon. *V. princeps* Hort. Linden ex Batal. in Gartenfl. xxvi. 158 (1877); cf. E. Morr. in Belg. Hort. xxx. 216 (1880). — Pl. II, figs. 1-2.

BRITISH HONDURAS : STANN CREEK DISTRICT : swampy forest, Mulins River Road, alt. 30 m., Jan. 4, 1932, Schipp S-189 (FM); BELIZE DISTRICT : Gracie Rock, Sibun River, Jan. 30, 1936, Gentle 1782 (Mich).

GUATEMALA : PETEN : Yaloch road from Dos Arroyas, May 2, 1931, Bartlett 12851 (Mich); Chiebul, La Libertad, April 8, 1933, Lundell 2631 (G, Mich); IZABAL : terrestrial and epiphytic, lowland jungle at Punta Palma, across bay from Puerto Barrios, April 23, 1940, Steyermark 39859 (FM).

COSTA RICA : CARTAGO : vicinity of Cartago, alt. 1200-1600 m., 1901, Wercklé 16205 (US); INDEFINITE : cultivated in Liége, Belgium, from Costa Rican material, 1881, E. Morren (Liége).

PANAMA : CANAL ZONE : Zetek Trail, Barro Colorado Island, Dec. 4, 1931, O. Shattuck 524 (FM); westerly arm of Quebrada Salamanca, alt. 70 m., Dec. 16, 1934, Dodge, Steyermark & Allen 17037 (Mo, G).

COLOMBIA : EL VALLE : epiphyte, coastal thickets, Punta Arenas, Buenaventura Bay, Feb. 3, 1939, Killip 33018 (G); epiphyte, dense forest, Córdoba, alt. 50-100 m., Feb. 17, 1939, Killip & García 33455 (US).

Wendland described *Vriesia gladioliflora* from material which he had brought from northern Costa Rica to Hamburg and cultivated. It is not known whether an actual herbarium specimen of the type exists but the progeny of his plants appear to have been widely distributed in European gardens. He gave the size of the sepals as 30-35 mm., dimensions which have been considerably extended in both directions by subsequent collections.

In the Pflanzenfamilien, Wittmack gives «Caracas» as a locality for this species but so far it has not been possible to find proof for any Venezuelan stations for the species. Possibly it is an error for *V. macrostachya* which has a somewhat similar habit.

6. ***Vriesia Tonduziana*** L. B. Smith. About 8 dm. high; leaf-blades ligulate, acuminate, over 8 dm. long, 4 cm. wide, green, concolorous, very obscurely punctulate-lepidote; scape stout; scape-bracts erect, densely imbricate, broadly elliptic, apiculate; inflorescence simple, 15-flowered, 3 dm. long; floral bracts remaining erect, barely imbricate, very broadly ovate with a short triangular obtuse cucullate apex, 45 mm. long, about equaling the sepals, ecarinate, thick, coriaceous, rugulose when dry, obscurely punctulate; flowers secund, divergent; pedicels stout; sepals broadly ovate, obtuse, 40 mm. long, 28 mm. wide, coriaceous; petals elliptic-oblong, each bearing 2 large scales at the base. — Epiphytic; Costa Rica. — L. B. Smith in North American Flora, xix. 166 (1938). — Pl. II, figs. 18, 19.

COSTA RICA : SAN JOSÉ : epiphytic, La Palma, alt. 1520 m., May 22, 1898, Tonduz. in hb. inst. phys.-geogr. costar. 12349 (US, type; phot. G).

7. ***Vriesia longicaulis*** (Bak.) Mez. Flowering plant 6-12 dm. high; leaves 4-9 dm. long, sheaths large, elliptic, minutely brown-appressed-lepidote, deep castaneous toward base, blade ligulate, broadly rounded and apiculate, flat, 30-45 mm. wide, concolorous, green, glabrous above, very obscurely punctulate-lepidote beneath; scape erect, elongate, rather stout, glabrous; scape-bracts erect, densely imbricate, the lower ones foliaceous, the upper ones ovate and acute; inflorescence simple or rarely with a small lateral branch and short primary bract similar to the scape-bracts, densely many-flowered, 14-42 cm. long; rachis stout, angled, geniculate, glabrous; floral bracts suberect and densely imbricate, then often more or less secund with the flowers, broadly ovate, acute, 3-8 cm. long, usually much exceeding the sepals, convex, obtusely and faintly carinate, glabrous, pale brown and slightly rugulose near their apices, elsewhere deep castaneous and even; pedicels stout, obconic, 8

mm. long; flowers often secund at anthesis, subspreading; sepals lance-ovate, acute, 20-35 mm. long, obtusely carinate toward base, coriaceous, even, glabrous; petals elliptic, about one and a half times as long as the sepals, all yellow or with a brown margin, bearing 2 large subtriangular acuminate scales at base; stamens included. — Epiphytic; Brazil. — Mez in Mart. Fl. Bras. iii. pt. 3, 542 (1894); in DC. Mon. Phan. ix. 592 (1896); in Engler, Pflanzenr. iv. Fam. 32, 386 (1935). *V. Jonghei* E. Morr. sensu Wawra in Oesterr. Bot. Zeitschr. xxx. 220 (1880); It. Sax.-Cob. 167 (1883). *V. Jonghei* « fm. capsulis secundis » Wawra, op. c. 168. *Tillandsia longicaulis* Bak. in Journ. Bot. xxvi. 80 (1888); Brom. 214 (1889). *V. longicaulis* var. *secunda* Mez. in Mart. Fl. Bras. iii. pt. 3, 543 (1894); in DC. Mon. Phan. ix. 593 (1896), incorrectly attributed to Wawra. — Pl. I, figs. 20, 21.

BRAZIL: MINAS GERAES: in deepest jungle, Vaccaria, Serra do Cipo, north of Belo Horizonte, alt. 1400 m., July 12, 13, 1940, M. B. & R. Foster 604 (G); ESPIRITO SANTO: Santa Teresa, alt. 780 m., July 27, 1939, M. B. & R. Foster 111 A (G); Santa Teresa, Aug. 7, 1940, M. B. & R. Foster 833 (G); RIO DE JANEIRO: forests, Organ Mountains, 1879, Wawra II 359 (Hb. Mus. Vienna, phot. FM; type of *V. longicaulis* var. *secunda* Mez); by Morro do Retiro near Petropolis, Glaziou 8988 (K, type; phot. G); in shade, Itatiaya, alt. 750-1000 m., June 29, 1939, M. B. & R. Foster 111 (G); Petropolis, Aug. 10, 1939, M. B. & R. Foster 506 (G); Therezopolis, Aug. 21, 1940, M. B. & R. Foster 978, 1026 (G).

The fine series of *Vriesia longicaulis* collected by Mr. and Mrs. Foster in 1939 and 1940 demonstrates that it is a quite variable species and that no importance can be attached to the secund flowers occurring in some specimens. Most of their material has the flowers definitely secund or not, but their n° 833 shows a few mature flowers secund but most of them not. This also is the only collection with a branched inflorescence.

The type of the species is so young that it is impossible to say whether the flowers would be secund eventually, so that it is preferable not to divide the species along these lines.

The other line of variation is that of size, and it may at times be very striking. Mr. Foster notes that his n° 1026 was about half the size of his n° 978 and that it grew at higher alti-

tudes than did any of the larger plants. Yet the shape and color of the parts of the two numbers are very uniform and other collections of his lie between the two in size so that there seems to be no satisfactory basis for division on the line of size either.

8. ***Vriesia guadelupensis*** (Bak.) Mez. Flowering plant about 1 m. high; leaves 5-8 dm. long; sheaths elliptic-oblong, inconspicuous, densely and minutely brown-lepidote; blades ligulate, acuminate, 5 cm. wide, concolorous, glabrous or nearly so above, very inconspicuously punctulate-lepidote beneath; scape erect, very stout; scape-bracts densely imbricate, rigidly coriaceous, the very lowest foliaceous, the rest ovate and abruptly acute; inflorescence simple, dense, up to 30-flowered, 3-4 dm. long, about 6 cm. wide; floral bracts erect or suberect, not becoming secund with the flowers, very broadly ovate, subacute, 5 cm. long, much exceeding the sepals, obtusely carinate toward the apex and not incurved, stiffly coriaceous, even, glabrous, concolorous or spotted with dark brown; flowers suberect, becoming secund; pedicels very short and stout; sepals broadly ovate, acute, up to 30 mm. long and 15 mm. wide; petals obtuse, 36 mm. long, bearing 2 large acute scales near the base; ovules conspicuously caudate; coma flavescent. — Epiphytic; Lesser Antilles. — Mez in DC. Mon. Phan. ix. 596 (1896), as « *Guadeloupensis* »; in Engler, Pflanzenr. iv. Fam. 32, 389 (1935); Duss. Fl. Phan. Antill. Françaises, in Ann. Inst. Colon. Marseille, iii. 575 (1897); Boldingh, Fl. Dutch West Ind. Is. i. 34 (1909); Fl. Ned. West-Ind. Eilanden, 144 (1913); L. B. Smith in N. Am. Fl. xix. 165 (1938). *Tillandsia guadelupensis* Bak. Brom. 213 (1889). *Neovriesia guadalupensis* Britton ex Stehlé, Fl. Guadeloupe, i. 212 (1936), nomen. — Pl. II, figs. 9, 10.

LESSER ANTILLES: ANTIGUA: very rare on exposed rocky precipices on summits of the highest hills in the southwest, Macarthy Hills, alt. ca. 380 m., Dec. 19, 1937, H. E. Box 1327 (US); MONTSERRAT: on tree, foot of Fergus Mt., Jan. 30, 1907, Shafer 353 (NY, US, FM); GUADELOUPE: epiphytic in woods, Plateau des Palmistes, 1895, Duss 3321 (US, NY, isotype; phot. G); DOMINICA: epiphytic, rainforest bordering Campbell Track, Sylvania, alt. 549 m., Feb. 13, 1940, W. H. & B. T. Hodge 1128 (G); common epiphyte, Lisdara, alt. 457 m., Mar. 27, 1940, W. H. & B. T. Hodge 2468 (G).

9. *Vriesia longiscapa* Ule. Flowering plant 6-12 dm. high; leaves 35-67 cm. long, sheaths elliptic, not much wider than the blades, densely dark-punctulate-lepidote, blades ligulate, broadly rounded and apiculate, flat, 35-40 mm. wide, pale or dark green and glabrous above, dark green or maroon, glaucous and obscurely punctulate-lepidote beneath; scape erect, rather stout, glabrous; scape-bracts erect, imbricate, the lower ones foliaceous, the upper elliptic, acute; inflorescence simple or rarely with 1-3 lateral racemes, the principal or only raceme 17-28 cm. long, densely many-flowered; rhachis geniculate, angled, stout, glabrous; floral bracts subspreading at anthesis and more or less secund, two and one half to three and one half times as long as the internodes, broadly ovate, broadly acute, up to 35 mm. long, obtusely carinate, slightly incurved at apex, faintly nerved, obscurely punctulate-lepidote, pale greenish brown at anthesis becoming darker with age; flowers secund-spreading; pedicels oboconic, stout, 5-8 mm. long; sepals elliptic, subacute, 20-27 mm. long, about equaling or somewhat exceeding the bracts, fleshy-coriaceous; petals narrowly obovate or elliptic, ca. 3 cm. long, yellow, bearing 2 acute scales 8 mm. long at the base; stamens included, equaling the pistil, filaments much dilated toward apex. — Epiphytic; Brazil. — Ule in Bericht. Deutsch. Bot. Gesellsch. xviii. 323 (1900); Mez in Engler, Pflanzenr., iv. Fam. 32, 393 (1935). — Pl. II, figs. 11-13.

BRAZIL: ESPIRITO SANTO: Santa Teresa, alt. 775 m., July 26, 1939, M. B. & R. Foster 259 (G); RIO DE JANEIRO: Serra do Macahé, Nova Friburgo, alt. 900-1400 m., Jan. 1900, Ule 4956 (Berlin, type; phot. G); near Meio da Serra, alt. ca. 500 m., April 7, 1929, L. B. Smith & A. C. Brade 2293 (G); Petropolis, alt. 760 m., Aug. 9, 1939, M. B. & R. Foster 338 (G); Therezopolis, alt. 900-1000 m., Aug. 21, 1940, M. B. & R. Foster 979 (G); FEDERAL DISTRICT: Rio de Janeiro, 1838, Wilkes Expedition s. n. (G).

Ule gives rather larger measurements for this species than the photograph of his type bears out. Of course there may be other and larger material of the type number than that which was photographed, but it seems unlikely and none of the above collections reach Ule's measurements although they agree closely with the type in all details of form.

10. *Vriesia sanguinolenta* Cogn. et Marchal. Flowering plant 1-2 m. high; leaves about 10 in a dense rosette, suberect, 6-7 dm. long, green, usually with large irregular spots of deep red especially near the base, obscurely punctulate-lepidote; sheaths ovate-elliptic, the same color as the blades and but slightly broader; blades ligulate, acute or subrounded with a long apiculus, 8-10 cm. wide; scape erect, greatly exceeding the leaves, well over 1 cm. in diameter at the summit, glabrous; scape-bracts erect, imbricate, very broadly ovate, acute or the lower ones triangular-laminate, glabrous, even, thick, coriaceous; inflorescence simple or few-branched, up to 4 dm. long; primary bracts suberect, like the upper scape-bracts, covering only the sterile bases of the branches; branches suberect, secundly 11-15 flowered, the lateral ones 25 cm. long with 1 or 2 sterile bracts at the base, the terminal one nearly 4 dm. long with a sterile base as long as the fertile part and appearing like a continuation of the scape; rhachis up to 10 mm. in diameter, flexuous, strongly 4-angled, glabrous, dark, its internodes narrowly oboconical; floral bracts becoming secund with the flowers, broadly elliptic to suborbicular, abruptly acute, up to 5 cm. long, some and usually all more than twice as long as the internodes, glabrous, even, rigid, coriaceous, green, drying to light brown, incurved and carinate toward the apex; flowers spreading and downwardly secund; pedicels very stout, up to 12 mm. long; sepals very broadly elliptic or ovate, obtuse or broadly acute, 30-45 mm. long, rigid, coriaceous, even and glabrous outside, striate and punctulate-lepidote within; petals white, slightly exceeding the sepals, bearing 2 scales at base. — Terrestrial and epiphytic; Costa Rica to Colombia, Cuba, Jamaica, Hispaniola. — Pl. Ornem. t. 52 (1874); André in Ill. Hort. xxii. 44, t. 200 (1875); Mez in DC. Mon. ix. 609 (1896); in Engler, Pflanzenr. iv. Fam. 32, 400 (1935); L. B. Smith & Standley in Standley, Fl. Costa Rica in Bot. Ser. Field. Mus. xviii. 162 (1937); in Mus. Nac. Costa Rica, Ser. Bot. i. 174 (1940); L. B. Smith in N. Am. Fl. xix. 166 (1938). *Tillandsia sanguinolenta* (Cogn. et Marchal) Bak. Brom. 226 (1889). *Vriesea Alfarovii* Mez in Fedde, Rep. Spec. Nov. xiv. 247 (1916); in Engler, Pflanzenr. iv. Fam. 32, 387 (1935); L. B. Smith in

Proc. Am. Acad. (Contrib. Gray Herb. cii.) lxviii. 149 (1933). *Tillandsia ingens* Mez. in Urb. Symb. Ant. ii. 256 (1900); in Engler, Pflanzenr. iv. Fam. 32, 458 (1935). *Vriesea Urbaniana* Harms in Notizbl. xii. 532 (1935). — Pl. II, figs. 14, 15.

COSTA RICA: PUNTARENAS: on *Hippomane Mancinella* on the beach, Santo Domingo de Golfo Dulce, Mar. 1896, Tonduz in hb. Nat. Costar. 9883 and in hb. J. D. Smith 7184 (G, US, Boiss; isotype of *Vriesea Alfarovii* Mez).

PANAMA: COCLE: vicinity of Penonome, Feb.-Mar., 1908, R. S. Williams 621 (NY); PANAMÁ: top of peak among rocks, hills northeast of Hacienda La Joya, alt. 50-300 m., Dec. 9, 1934, C. W. Dodge, Hunter, Steyermark & Allen 16907 (Mo, G); CANAL ZONE: westerly arm of Quebrada Salamanca, alt. 70 m., Dec. 16, 1934, C. W. Dodge, Steyermark & Allen 17038 (Mo, G).

CUBA: ORIENTE: on trees in large clumps, Alto Cedro, Mar., 1903, Underwood & Earle 1614 (NY); on trees in dense woods along railroad, Alto Cedro to Paso Estancia, Apr. 28, 1909, Shafer 1627 (NY, G); Vista Alegre, alt. 1000 m., 1940, Carabia 2192 (phot. G).

JAMAICA: MIDDLESEX: on banks and trees between Lancaster and Moody's Gap, alt. 750 m., Mar. 8, 1895, W. Harris 5565 (Hb. Hope Gardens, Jamaica, and sketch NY, Las Vegas, G; isotype of *Tillandsia ingens* Mez); SURREY: on Bank, Mansfield, Parish of St. Thomas, Sept. 15-19, 1908, N. L. Britton 3608 (NY).

COLOMBIA: EL VALLE: epiphytic, coastal thickets, Buenaventura, alt. 0-10 m., Oct. 5-10, 1922, Killip 11736 (G); Indefinite: cultivated, Jan. 1880, F. Massange Liége, phot. G; cultivated, May 14, 1885, E. Morren (Liège, phot. G).

Judging from Harms' description of his *Vriesea Urbaniana* and his reference to Shafer 1627, the species is equivalent to *V. sanguinolenta*.

The exsiccatae of cultivated plants at Liége are probably the nearest thing we have for a type of *Vriesea sanguinolenta*. They are almost certainly lineal descendants of the type.

This Liége material closely resembles Mez's *V. Alfarovii* which he separates on the basis of its having a simple inflorescence. However, isotype material of *V. Alfarovii* at Washington with Tonduz's own label shows an indubitable lateral branch. With this not too good distinction removed, I find nothing left to separate the two species.

Some of the West Indian material has the floral bracts

narrower than is typical but this character does not appear to be constant enough to be worth even varietal rank.

11. *Vriesea subsecunda* Wittm. Flowering plant 5 dm. high or less, very slender; leaves 20-35 cm. long, chartaceous, densely appressed-lepidote, brownish green, sometimes tinged with red or violet; blades linear, acuminate, 13-18 mm. wide; scape slender, erect, usually exceeding the leaves; scape-bracts imbricate, ovate or elliptic, acuminate or the upper ones acute, brown, submembranaceous, not foliaceous; inflorescence simple, densely 4-9-flowered, 4-9 cm. long; rhachis slender, flexuous, slightly angled; floral bracts becoming secund with the flowers, broadly ovate, about 26 mm. long, equaling the sepals at anthesis, convex and not carinate, strongly incurved toward the apex, even, chartaceous, light brown, slightly lustrous; flowers subereet, 28 mm. long; pedicels very stout, 4 mm. long; sepals elliptic, rounded and apiculate, 22 mm. long, 10 mm. wide, thin, even, glabrous outside, dark-punctulate-lepidote inside; petals yellow, each bearing 2 lanceolate acute or bicuspidate scales near the base; stamens and pistil included; ovules with a short stout protuberance, not truly caudate. — Epiphytic; Costa Rica, Panamá. — Wittm. in Engler, Bot. Jahrb. xi. 69 (1889); Mez in DC. Mon. Phan. ix. 595 (1896); in Engler, Pflanzenr. iv. Fam. 32, 389 (1935); L. B. Smith & Standley in Standley, Fl. Costa Rica in Bot. Ser. Field. Mus. xviii. 162 (1937); in Mus. Nac. Costa Rica, Ser. Bot. i. 174 (1940); L. B. Smith in North American Flora, xix. 167 (1938). *Tillandsia subsecunda* (Wittm.) Bak. Brom. 217 (1889). *Vriesea diminuta* Mez et Wercklé in Bull. Herb. Boiss. ser. 2, iv. 869 (1904); Mez in Engler, Pflanzenr. iv. Fam. 32, 387 (1935); L. B. Smith & Standley in Standley, Fl. Costa Rica in Bot. Ser. Field. Mus. xviii. 161 (1937); in Mus. Nac. Costa Rica, Ser. Bot. i. 173 (1940); L. B. Smith in North American Flora, xix. 167 (1938). — Pl. II, figs. 6-8.

COSTA RICA: HEREDIA: on trees near Río Sucio, alt. 400 m., Mar. 17, 1884, Lehmann 1775 (Boiss, type; phot. G); ALAJUELA: on tree, vicinity of Fraijanes, alt. 1500-1700 m., Feb. 12-13, 1926, Standley & Torres 47677 (US) and 47701 (US, phot. G); CARTAGO: on tree, Cerro

de La Carpintera, alt. 1500-1850 m., Feb. 1924, Standley 34440 (US); SAN JOSÉ: on tree, Cerro de Piedra Blanca, above Escasú, Jan. 31, 1924, Standley 32601 (US, phot. G); on tree, Zurqui, alt. 2000-2500 m., Feb. 13, 1926, Standley & Valerio 48332 (US) and 48336 (US); Cerro de Escasú, alt. 1800 m., Aug. 2, 1933, F. Solis 278 (FM).

PANAMA: CHIRIQUI: valley of the upper Río Chiriquí Viejo, vicinity of Monte Lirio, alt. 1300-1900 m., June-July, 1935, Seibert 229 (Mo, phot. G).

Since I have seen no authentic material of *Vriesia diminuta* Mez I am forced to judge solely by its description. From this it appears to be young material of *V. subsecunda* like Standley 32601. The floral bracts develop first and consequently they exceed the sepals in young material, but only equal them by anthesis.

12. ***Vriesia Pittieri*** Mez. Stemless, 5-10 dm. high; leaves 4-6 dm. long; sheaths elliptic, densely brown-punctulate-lepidote; blades ligulate, broadly acute and apiculate to acuminate, 3-4 cm. wide, flat, soon glabrous above, very obscurely punctulate-lepidote beneath; scape erect or ascending, stout; scape-bracts erect, exceeding the internodes, the lower foliaceous, the upper elliptic, acute or apiculate, rigidly coriaceous, subinflated; inflorescence simple, secundly 12-20-flowered, dense, 15-20 cm. long; rhachis stout, angled, geniculate; floral bracts secund with the flowers, very broadly ovate, obtuse and minutely cucullate, usually appearing acute by the inrolling of the margins, 30-35 mm. long, exceeding the sepals, 2-3 times as long as the internodes, coriaceous, even, bronze-green when fresh, drying to deep castaneous with a narrow pale margin, glabrous, lustrous; flowers subspreading; pedicels stout, 7-10 mm. long; sepals broadly elliptic, obtuse, 17-27 mm. long, coriaceous, dark brown, glabrous; petals broadly ligulate, 25-40 mm. long, pale green; stamens and pistil included; capsule stout, short-beaked, 3 cm. long, seeds with a usually reddish coma. — Epiphytic; Costa Rica. — Mez in Bull. Herb. Boiss. ser. 2, iii. 135 (1903); in Engler, Pflanzenr. iv. Fam. 32, 387 (1935); L. B. Smith & Standley in Standley, Fl. Costa Rica in Bot. Ser. Field Mus. xviii. 162 (1937); in Mus. Nac. Costa Rica, Ser. Bot. i. 175 (1940); L. B. Smith in North American Flora, xix. 167 (1938). *Pitcairnia viridiflora* Regel in Ind. Sem. Hort. Petrop. 1866. 81 (1867). *Tillandsia viridiflora* Regel, l. c., nomen in synon. *Vriesia viminalis* E. Morr. in Belg. Hort. xxviii. 257, t. 14-15 (1878); Ant. Phyto-Iconogr. 21, t. 14 (1884); Mez in DC. Mon. Phan. ix. 595 (1896); Harms in Engler & Prantl, Nat. Pflanzenfam. ed. 2, xv a. 125 (1930). *Tillandsia viminalis*

COSTA RICA: ALAJUELA: Volcán Poás, alt. 2100 m., Mar. 1896, J. D. Smith 6794 (US); epiphytic in subtropical zone, Palmira, Cantón Alfaro Ruiz, alt. 2000 m., June 21, 1938, A. Smith n° H 789 (FM); subtropical zone, Palmira, near Zarcero, alt. 1900 m., Dec. 22, 1937, A. Smith n° A 745 (FM, G); CARTAGO: on tree, Cerro de La Carpintera, alt. 1500-1850 m., Feb. 1924, Standley 34364 (US, phot. G); SAN JOSÉ: forests, Santa Rosa de Copey, alt. 2600-2700 m., April 1898, Tonduz in hb. Inst. Nat. Costaric. 12229 (US, isotype; phot. G); on tree in dense oak and bamboo forest near Laguna de la Escuadra, northeast of El Copey, alt. 2000-2200 m., Dec. 16, 1925, Standley 42082 (US); on tree in wet forest, Laguna de la Chonta, northeast of Santa María de Dota, alt. 2000-2100 m., Dec. 18, 1925, Standley 42146 (US); common, on tree in wet forest, near Finca La Cima, above Los Lotes, north of El Copey, alt. 2100-2400 m., Dec. 21-22, 1925, Standley 42651, 42731 (US).

13. ***Vriesia viridiflora*** (Regel) Wittm. ex Mez. Flowering plant barely 1 m. high, slender; leaves densely rosulate, up to 55 cm. long; blades ligulate, acuminate, 3-4 cm. wide, green, concolorous, glabrous above, obscurely punctulate beneath; scape erect, 4 mm. in diameter, elongate; scape-bracts erect and tubular-involute, slightly exceeding the internodes, broadly elliptic, acute, stramineous; inflorescence simple, densely distichous-flowered, 15-18 cm. long; floral bracts becoming secund with the flowers, very broadly ovate, obtuse, equaling the sepals, ecarinate, thin-coriaceous, minutely verrucose near the apex, green with brownish tips; flowers suberect; pedicels stout, 4-5 mm. long; sepals elliptic, obtuse, 15-20 mm. long; petals oblong, subtruncate and emarginate, about 4 cm. long, white, spreading above the sepals, each bearing 2 acute serrulate scales at the base; stamens slightly shorter than the petals; capsule fusiform, 4 cm. long; coma white. — Epiphytic; Costa Rica, British Guiana. — Wittm. ex Mez in Engler, Pflanzenr. iv. Fam. 32, 387 (1935); L. B. Smith & Standley in Standley, Fl. Costa Rica in Bot. Ser. Field Mus. xviii. 162 (1937); in Mus. Nac. Costa Rica, Ser. Bot. i. 175 (1940); L. B. Smith in North American Flora, xix. 167 (1938). *Pitcairnia viridiflora* Regel in Ind. Sem. Hort. Petrop. 1866. 81 (1867). *Tillandsia viridiflora* Regel, l. c., nomen in synon. *Vriesia viminalis* E. Morr. in Belg. Hort. xxviii. 257, t. 14-15 (1878); Ant. Phyto-Iconogr. 21, t. 14 (1884); Mez in DC. Mon. Phan. ix. 595 (1896); Harms in Engler & Prantl, Nat. Pflanzenfam. ed. 2, xv a. 125 (1930). *Tillandsia viminalis*

(E. Morr.) Hemsl. Biol. Centr.-Am. Bot. iii. 323 (1884); Bak. Brom. 214 (1889). — Pl. II, fig. 5.

COSTA RICA : GUANACASTE : on tree in moist forest, Naranjos Agrios, alt. 600-700 m., Jan. 29, 1926, Standley & Valerio 46512 (US); CARTAGO : cultivated in the botanic garden at Liége from material originally collected by Wendland on Volcán Irazú near Cartago (hb. Liége, phot. G).

BRITISH GUIANA: NORTH WESTERN DISTRICT : on tree trunk in forest, portage between Aruau and Yarikita Rivers, lat. 8° N., long. 59°55' W., Jan. 17, 1920, Hitchcock 17593 (G).

The Liége material is undoubtedly from the same stock as *Vriesia viminalis* and quite possibly as *V. viridiflora* also.

The British Guiana material is so old and shattered that its identification is not certain, but what remains certainly accords better with *V. viridiflora* than with any other known species.

14. *Vriesia haplostachya* (C. Wright ex Sauv.) L. B. Smith. Leaves 4-6 dm. long, very obscurely punctulate-lepidote; sheaths elliptic, ample, nearly half as long as the blade; blades ligulate, acuminate, flat, 6 cm. wide; scape erect, 7-8 mm. in diameter, glabrous; scape-bracts densely imbricate, subfoliaceous, elliptic, acuminate, densely punctulate toward the apex and rugulose in drying; inflorescence simple, secundly 12-22-flowered, 20-35 cm. long; rhachis stout, flexuous to geniculate, faintly angled; floral bracts secund with the flowers, very broadly ovate, obtuse, ecarinate, cucullate, equaling the sepals, thin-coriaceous, faintly many-nerved, obscurely punctulate; flowers stoutly short-pedicellate; sepals elliptic-oblong, obtuse, 35 mm. long, coriaceous; petals ligulate, probably obtuse, 5 cm. long, green, bearing 2 large scales at the base; stamens included; capsule 45 mm. long, acuminate. — Cuba. — L. B. Smith in Contrib. Gray Herb. exiv. 9, t. 2, fig. 6 (1936); in North American Flora, xix. 168 (1938). *Tillandsia haplostachya* C. Wright ex Sauv. in Anal. Acad. Ci. Habana, viii. 73 (1871).

CUBA : ORIENTE : near the village of Monte Verde, 1859, C. Wright (G, isotype); Serra de Nipe on the border of Rio Piloto, 1914, Ekman 3363 (S).

15. *Vriesia Hoehneana* L. B. Smith. Usually 2 m. or more high; leaves numerous in a spreading rosette, 3.5-5 dm. long;

sheaths large, broadly elliptic, dark castaneous, very densely and minutely appressed-lepidote; blades ligulate, broadly acute or obtuse and apiculate, flat, 6-8 cm. broad, pale green, concolorous, very finely reticulate with irregular cross-veins, obscurely punctulate-lepidote beneath, glabrous above; scape erect, elongate, 14 mm. in diameter at base, glabrous; scape-bracts erect, the lower foliaceous and densely imbricate, the upper broadly lanceolate and about equaling the internodes; inflorescence simple and bent obliquely from the summit of the scape or more often laxly few-branched; primary bracts like the upper scape-bracts, mostly shorter than the sterile bases of the racemes; racemes up to 28 cm. long, 8-16-flowered, the lateral ones divergent, slenderly stipitate, erophyllate or with a single sterile bract in the same inflorescence, the terminal raceme long-stipitate with many sterile bracts like the upper scape-bracts; floral bracts becoming secund with the flowers at anthesis, up to 32 mm. long, about twice as long as the internodes, suborbicular, very broadly acute or apiculate, obtusely carinate toward the apex and slightly incurved, flavous, nearly or quite even, obscurely and very minutely brown-lepidote; flowers downwardly secund at anthesis, spreading; pedicels rather slender, up to 10 mm. long; sepals narrowly elliptic, obtuse, up to 34 mm. long, exceeding the floral bracts, minutely brown-lepidote especially inside; petals oblanceolate, obtuse, up to 5 cm. long, lemon-yellow, bearing 2 large acute scales at base; stamens included, filaments much thickened toward apex. — Terrestrial; Brazil. — L. B. Smith in Proc. Am. Acad. Arts & Sci. (Contrib. Gray Herb. cii.), lxviii. 150, t. 1, figs. 11-13 (1933); Mez in Engler, Pflanzennr. iv. Fam. 32, 398 (1935). *V. tessellata* E. Morr. sensu Hoehne, Album da Secção de Botanica do Museu Paulista, 97, c. fig. (1925).

BRAZIL : SÃO PAULO : in campo, Alto da Serra, Estrada do Vergueiro, Dec. 23, 1920, Hoehne 4724 (G, SP); Campo Grande, Jan. 12, 1924, Hoehne 9478 (G, SP); in campo, Estação Biológica, Alto da Serra, alt. 800-900 m., Feb. 17, 1929, L. B. Smith 1945 (G, type); Oct. 28, 1936, Hoehne & Gehrt 36647 (SP); Alto da Serra, Aug. 19, 1939, M. B. & R. Foster 369 (G).

In my original publication of *Vriesia Hoehneana*, I referred to its relation to *V. Tweedieana* as interpreted by Mez in De

Candolle's *Monographiae*. Mez, evidently, read no further, for in the *Pflanzenreich* he treated *V. Hoehneana* as a dubious segregate of *V. Tweedieana* and took no account of my demonstration that true *V. Tweedieana* does not even belong in the same section of the genus as *V. Hoehneana*. However, the fact remains that *V. Hoehneana* has included stamens and belongs in the Section *Xiphion*, while true *V. Tweedieana* has exserted stamens, as shown in the type and noted in the original description, and thus belongs in the Section *Euvriesia*. In fact *V. Tweedieana* can not be distinguished from *V. Rodigasiana* and must be considered a synonym of that species.

Actually *V. Hoehneana* shows no very strong relations with any other species, though habitually its greatest resemblance is doubtless to *V. sanguinolenta*.

16. ***Vriesia graminifolia*** Mez et Wercklé. Flowering plant barely 4 dm. high, very slender; leaves up to 4 dm. long, 5 mm. wide, linear and grass-like, acuminate, appressed-pale-lepidote, chartaceous when dry; sheaths violet-tinged; blades green, concolorous; scape erect, very slender, terete, glabrous; scape-bracts lax, very narrow, reddish with foliaceous blades; inflorescence simple, 3-flowered in the type, exceeded by the leaves, lax, 7 cm. long; axis slightly angled and undulate; floral bracts secund with the flowers and enfolding their bases on one side, membranaceous, striate, the lowest produced into a long acuminate blade, the others acute, 17 mm. long and about equaling the sepals; flowers suberect; pedicels stout, 5 mm. long; sepals elliptic, narrowly obtuse, 15 mm. long, 7 mm. wide, castaneous with a pale membranaceous border when dry, even and shiny; capsule acuminate, gray-black, opaque. — Costa Rica. — Mez & Wercklé in Bull. Herb. Boiss. ser. 2, iv. 868 (1904); Harms in Engler & Prantl, Nat. Pflanzenfam. ed. 2, xv a. 125 (1930); Mez in Engler, Pflanzenr. iv. Fam. 32, 390 (1935); L. B. Smith & Standley in Standley, Fl. Costa Rica in Bot. Ser. Field Mus. xviii. 161 (1937); in Mus. Nac. Costa Rica, Ser. Bot. i. 173 (1940); L. B. Smith in N. Am. Fl., xix. 163 (1938).

COSTA RICA: CARTAGO: near Cartago, Wercklé 92 and in Herb. Inst. Phys.-Geogr. Costaric. 17438 (hb. Mez, type).

In the original description no locality was given beyond «Costa Rica». Mez's collection of *Bromeliaceae* is now in the Berlin-Dahlem herbarium.

17. ***Vriesia brassicoides*** (Bak.) Mez. Flowering plant slightly over 4 dm. high; leaves numerous, 2-3 dm. long, densely ferruginous-lepidote throughout; sheaths suborbicular, more than half as long as the blades; blades narrowly triangular, 28 mm. broad at base, uncinate-recurved at apex; scape erect, rather stout; scape-bracts erect, broadly elliptic with decurrent auricles, acute, 25 mm. long, distinctly shorter than the internodes, coriaceous; inflorescence simple, laxly 6-8-flowered, ca. 13 cm. long; rachis stout, flexuous; floral bracts erect or secund with the flowers, suborbicular, obtuse, ecarinate, 23 mm. long, about equaling the internodes, much exceeded by the sepals, thick, coriaceous; flowers suberect to spreading, strongly secund; pedicels stout, 8 mm. long; sepals elliptic, obtuse, 27 mm. long, very thick and coriaceous; petals and stamens unknown. — Terrestrial; Brazil. — Mez in DC. Mon. Phan. ix. 598 (1896); in Engler, Pflanzenr. iv. Fam. 32, 391 (1935). *Tillandsia brassicoides* Bak. in Journ. Bot. xxvi. 12 (1888); Brom. 189 (1889); Mez in Mart. Fl. Bras. iii. pt. 3, 615 (1894). — Pl. III, fig. 1.

BRAZIL: FEDERAL DISTRICT: on cliffs near the summit of the Corcovado, Rio de Janeiro, 1826, Burchell 1393 (K, type; phot. G).

18. ***Vriesia Platzmannii*** E. Morr. Plant 9-12 dm. high; leaves numerous in a dense crateriforme rosette, 1-5 dm. long, sheaths elliptic, 10-15 cm. long, dark brownish purple toward base, densely brown-punctulate-lepidote on both sides, blades ligulate, broadly rounded and apiculate, ca. 25 mm. wide at base, more or less blotched with red, glabrous above, obscurely punctulate-lepidote beneath; scape erect, slender, glabrous; scape-bracts erect, the lowest subfoliaceous and imbricate, the others elliptic, apiculate, much shorter than the internodes; inflorescence erect, simple, laxly 8-11-flowered, 1-2 dm. long, glabrous; axis slender, slightly geniculate, angled; floral bracts remaining erect, broadly ovate, acute, ca. 25 mm. long, barely exceeding the internodes, much exceeded by the sepals, convex, obtusely carinate, subcoriaceous, faintly nerved, dark purple; flowers

strongly secund, spreading; pedicels thick-cylindric, 1 cm. long; sepals elliptic, obtuse, 25-28 mm. long, ecarinate, even, yellow except for the brownish base; petals oblong, obtuse, over 4 cm. long, bearing 2 lobed scales at base; stamens included, filaments thickened toward apex, conglutinated; capsule cylindric, acute, 5 cm. long, seeds with a reddish brown coma. — Epiphytic; Brazil. — E. Morr. in Belg. Hort. xxv. 349, t. 23 (1875); Mez in Mart. Fl. Bras. iii. pt. 3, 546 (1894), as to type; in DC. Mon. Phan. ix. 599 (1896), as to type; in Engler, Pflanzenr. iv. Fam. 32, 392 (1935), as to name only. *Tillandsia Platzmannii* (E. Morr.) Bak. in Journ. Bot. xxvi. 104 (1888); Brom. 218 (1889). Pl. III, figs. 9-10.

BRAZIL: PARANÁ: in swamp at sea level, near Paranaguá on the road to Curityba, Sept. 1, 1939, M. B. & R. Foster 445 (G); same, M. Kuhlmann 41604 (SP).

Two previously unnoted species were involved in the original description of *Vriesia Platzmannii*. It seems best to preserve as the type the species discovered by Platzmann rather than the Blanchet specimen added by Morren. Mez proceeded rather uncertainly in the other direction and wound up in the Pflanzenreich by excluding the original plate by Platzmann and including the Blanchet material. However, he dropped the citation of *Tillandsia lancifolia* Baker based on that same Blanchet collection, where he had included it in his earlier monograph.

19. ***Vriesia Schippii*** L. B. Smith. About 4 dm. high; leaves rosulate, up to 3 dm. long, minutely punctulate-lepidote, marked below with transverse dark brown bands; sheaths large, elliptic; blades ligulate, acute, 3 cm. wide or slightly wider at the base; scape erect, slender, glabrous; scape-bracts imbricate, acuminate from an ovate base, inflated, pale brown, lepidote toward the apex but elsewhere glabrous, nearly even; inflorescence simple, laxly few-flowered; floral bracts broadly ovate, the lower ones acuminate, up to 43 mm. long, exceeding the sepals, not at all carinate nor imbricate, becoming secund with the flowers; rhachis slender, flexuous; flowers secund; pedicels 5 mm. long; sepals broadly elliptic, obtuse, 17 mm. long, glabrous, faintly nerved; capsule slenderly ellipsoid, 3 cm. long. —

Epiphytic; British Honduras. — L. B. Smith in Contrib. Gray Herb. xviii. 18, t. 5, figs. 5-6 (1932); in North American Flora, xix. 164 (1938); Mez in Engler, Pflanzenr. iv. Fam. 32, 390 (1935); L. B. Smith & Lundell, Bromel. Yucatan Penin. in Carnegie Inst. Washington Publ. no 522, 123 (1940).

BRITISH HONDURAS: STANN CREEK: epiphytic in mountain forest near Middlesex, alt. 600 m., W. A. Schipp no. S 82 (FM, type; phot. G).

20. ***Vriesia macrochlamys*** Mez et Wercklé. Flowering up to 7 dm. high, very stout; leaves 45 cm. long, 35 mm. wide, abruptly acute, green with irregular violet spots, rigid, subglabrous at maturity; scape erect, stout, glabrous, slightly exceeding the leaves; scape-bracts imbricate, elliptic, abruptly acute, rigid, shiny; inflorescence simple, laxly about 10-flowered, 18 cm. long; floral bracts becoming secund with the flowers, very broadly ovate, obtuse, 42 mm. long, inflated-convex, not at all carinate, very thick and rigid, punctulate-lepidote with immersed scales; flower-pedicels very stout; sepals very broadly elliptic, obtuse, 26 mm. long, 20 mm. wide, very thick, even except for the finely striate apex. — Costa Rica. — Mez & Wercklé in Bull. Herb. Boiss. ser. 2, iv. 865 (1904); Mez in Engler, Pflanzenr. iv. Fam. 32, 391 (1935); L. B. Smith & Standley in Standley, Fl. Costa Rica in Bot. Ser. Field Mus. xviii. 162 (1937); in Mus. Nac. Costa Rica, Ser. Bot. i. 174 (1940); L. B. Smith in North American Flora, xix. 164 (1938).

COSTA RICA: without further locality, Wercklé 115 (Hb. Mez).

21. ***Vriesia oligantha*** (Bak.) Mez. Flowering plant 5-9 dm. high; leaves forming a slenderly crateriform rosette, 3 dm. long, sheaths elliptic, large, densely and minutely brown-appressed-lepidote, blades narrowly triangular, long-acuminate, nearly flat, ca. 3 cm. broad at base, densely cinereous-lepidote, not at all spotted, suffused with violet especially toward apex; scape erect, rather slender; scape-bracts erect, the lower foliaceous and much exceeding the internodes, the upper ovate apiculate and about equaling the internodes; inflorescence simple, laxly few-flowered, 12-19 cm. long; rhachis flexuous; floral bracts more or less secund with the flowers, ovate, acute, only slightly carinate

toward apex, 24 mm. long, somewhat longer than the internodes, distinctly shorter than the sepals, fleshy-coriaceous, coarsely lepidote or rarely becoming glabrous; flowers divergent-secund; pedicels 6 mm. long, stout; sepals oblong, obtuse, 30 mm. long, 8.5 mm. wide; petals and stamens unknown; capsule slenderly cylindric, acute, 7 cm. long, seeds with a pale ferruginous or white coma. — Epiphytic; Brazil. — Mez in Mart. Fl. Bras. iii. pt. 3, 544 (1894); in DC. Mon. Phan. ix. 596 (1896); in Engler, Pflanzenreich, iv. Fam. 32, 390 (1935). *Tillandsia oligantha* Bak. in Journ. Bot. xxv. 345 (1887); Brom. 215 (1889). Pl. III, fig. 7.

BRAZIL: MINAS GERAES: epiphytic, Serra d'Ouro Preto, 1883-4, *Glaziou* 15472 (K, type; phot. G; Ko, phot. G; B, fide Mez); on rocks and dwarf trees in extremely exposed situations, Vaccaria north of Bello Horizonte, Serra do Cipo, Minas Geraes, alt. 1400 m., July 12, 13, 1940. M. B. & R. Foster 621 (G).

Mez also cites *Schenck* 3507 from the same locality as the Glaziou material, and *Schwacke* 9315 from Serra de Capanema. He gives the Glaziou locality as « Ouro Branco » while the Kew label reads « Ouro Preto ». Judging from Urban's account in the introductory volume of the Flora Brasiliensis, these are two different but not widely separated localities.

22. ***Vriesia Broadwayi*** L. B. Smith. Plant 5 dm. tall; leaves 3 dm. long, sheaths elliptic, densely and minutely ferruginous-lepidote on both sides, blades narrowly triangular, acuminate, 2 cm. wide at base, glabrous above, sparsely and obscurely punctulate-lepidote beneath; scape erect, slender, glabrous; scape-bracts erect, densely imbricate, sparsely punctulate-lepidote, the lower ones foliaceous, the upper broadly elliptic, apiculate, pale brown; inflorescence simple, racemose, 7-9 cm. long, laxly 5-7-flowered, minutely ferruginous-lepidote; rhachis slender, flexuous; floral bracts becoming secund with the flowers, broadly ovate, abruptly acute, brown, up to 22 mm. long, exceeded by the sepals and distinctly less than twice as long as the internodes, subchartaceous, brown, sparsely appressed-ferruginous-lepidote toward the base; flowers spreading-secund; pedicels rather stout, 7-8 mm. long.; sepals broadly elliptic, obtuse, 18 mm. long, subcoriaceous, faintly nerved, dark brown

except for the pale margin; petals unknown; capsule subcylindric, 35 mm. long. — Epiphytic; Trinidad. — L. B. Smith in Proc. Am. Acad. Arts & Sci. (Contrib. Gray Herb. eii.) lxviii. 149, t. 1, figs. 9, 10 (1933); Broadway & Smith, op. c. 172; Mez in Engler, Pflanzenr. iv. Fam. 32, 390 (1935).

TRINIDAD: Heights of Aripo, Jan. 10-26, 1922, *Broadway* 9916 (Trin, type; phot. G; K, NY); Mt. Tucuche, April 3-5, 1920, N. L. Britton, Hazen & Mendelson 1258 in part (G, NY); in large patches on tree-trunks, 11-12 mile posts, Tucuche, April 19, 1929, *Broadway* 7096 (K).

23. ***Vriesia unilateralis*** (Bak.) Mez. Plant 55-95 cm. high; leaves many in a dense crateriform rosette, 35-50 cm. long, sheaths broadly elliptic, much wider than the blades, blades ligulate, broadly rounded and apiculate, 3-4 cm. wide, concolorous, yellow-green, glabrous above, obscurely punctulate-lepidote beneath; scape erect, 5-8 mm. in diameter; scape-bracts erect, imbricate and closely enfolding the scape, broadly ovate, apiculate, submembranaceous; inflorescence erect, simple, 6-20-flowered, 10-15 cm. long; axis slender, flexuous; floral bracts remaining erect or nearly so, broadly ovate, acute, up to 35 mm. long, about twice as long as the internodes, broadly convex, ecarinate, greenish; flowers strongly secund, spreading; pedicels subcylindric, stout, 1 cm. long; sepals narrowly elliptic, obtuse, 24 mm. long, exceeding the floral bracts, ecarinate; petals ligulate, 3 cm. long; stamens included. — Epiphytic; Brazil. — Mez in Mart. Fl. Bras. iii. pt. 3, 545 (1894); in DC. Mon. Phan. ix. 598 (1896); in Engler, Pflanzenr. iv. Fam. 32, 391 (1935). *Tillandsia unilateralis* Bak. in Journ. Bot. xxvi. 105 (1888); Brom. 218 (1889). — Pl. III, figs. 2-4.

BRAZIL: ESPIRITO SANTO: Vargem Alta, Morro do Sal, Aug. 16, 1940, M. B. & R. Foster 950 (G); SÃO PAULO: São Bento near Santos, Oct. 25, 1826, Burchell 3347 (K, type; phot. G); PARANÁ: on tree-trunks in virgin forest, Porto de Cima, Serra do Mar, alt. 200 m., Feb. 18, 1915, Dusén 16663 (US, S, phot. G); SANTA CATARINA: near Blumenau, Fritz Mueller (Mez!).

24. ***Vriesia Racinae*** L. B. Smith (see p. 387). Flowering plant less than 3 dm. high; leaves numerous in a dense rosette, 10-11 cm. long, sheaths broadly elliptic, sometimes as long as the

blade and always much wider, brown-punctulate-lepidote, deep castaneous near base, brown-spotted near apex, blades ligulate, broadly acute and apiculate, 15-20 mm. wide, flat and coiled-recurving, glabrous above, beneath obscurely punctulate-lepidote and coarsely and densely maroon-spotted; scape erect, slender, glabrous; scape-bracts erect, imbricate, closely enfolding the scape, elliptic, acute; inflorescence simple, lax, 5-flowered in the type, glabrous; rhachis nearly straight, ca. 6 cm. long; floral bracts partly erect, partly secund with the flowers, broadly ovate, acute, up to 18 mm. long, equalling or slightly exceeding the internodes, convex, ecarinate, even; flowers secund, spreading; pedicels slenderly obconic, 1 cm. long; sepals narrowly elliptic, 18 mm. long, much exceeding the floral bracts, convex, ecarinate; petals, stamens and pistil not known. — Epiphytic; Brazil. — Pl. III, figs. 5, 6.

BRAZIL: ESPIRITO SANTO: epiphytic, Santa Teresa, alt. 775 m., July 26, 1939, M. B. & R. Foster 270 (G, type).

25. *Vriesia amazonica* (Bak.) Mez. Flowering plant 1 m. or more high; leaves at least 5 dm. long; blades ligulate, broadly acute then long-apiculate and pungent, over 8 cm. wide, green, concolorous, glabrous at maturity; scape erect, 15-20 mm. in diameter; scape-bracts straight, erect, densely imbricate, very broadly ovate with a narrowly triangular elongate blade; inflorescence few-branched or simple; primary bracts like the upper scape-bracts, much shorter than the sterile bases of the branches; racemes divergent, 2-4 dm. long, laxly 6-20-flowered, bearing 2 sterile bracts at base; floral bracts secund with the flowers, very broadly ovate, acute, ca. 25 mm. long, much shorter than the sepals, about equaling the internodes, obtusely carinate, inflated-convex, coriaceous, even, glabrous; flowers spreading, downwardly secund; pedicels stout, up to 1 cm. long; sepals very broadly elliptic, 20-25 mm. long, broadly obtuse, ecarinate, coriaceous; petals and stamens not known; capsule subellipsoid, acute, 40-45 mm. long, nearly black. — Epiphytic and terrestrial; French Guiana, Brazil. — Mez in Mart. Fl. Bras. iii. pt. 3, 554 (1894); L. B. Smith in Contrib. Gray Herb. exxiv. 11 (1939). *Tillandsia gigantea* Mart. ex R. et S. Syst.

vii. 1224 (1830); Bak. Brom. 222 (1889). *Tillandsia amazonica* Bak. in Jour. Bot. xxvi. 108 (1888); Brom. 220 (1889). *Vriesia gigantea* (Mart. ex R. et S.) Mez in Mart. Fl. Bras. iii. pt. 3, 566 (1894); in DC Mon. Phan. ix. 612 (1896); in Engler, Pflanzenr. iv. Fam. 32, 402 (1935), non Gaud. (1846). — Pl. III, fig. 8.

FRENCH GUIANA: without further locality, *Melinon* (Mez!).

BRAZIL: PARÁ: near Belem (Pará), 1829, Burchell 9440 (K, type; phot. G); AMAZONAS: on banks and trees, Rio Negro, *Martius s. n.* (Mun., type of *Tillandsia gigantea* Mart. ex R. et S.; phot. G); MATTO GROSSO: on large branches in virgin forest, Serra do Itapirapuan, Cascata do Anzelim, April 26, 1894, Lindman n° A 3517 (S, phot. G).

The inflorescence is simple in the type specimen and for that reason I have included the description of the species in this treatment although I believe it is more usual for the inflorescence to be compound.

The general habit is much like that of *Vriesia sanguinolenta* but the leaves are concolorous so far as known and the racemes much more laxly flowered.

26. *Vriesia ringens* (Griseb.) Harms. Flowering plant very variable in size; leaves up to 9 dm. long; sheaths ovate-elliptic, mostly indistinct, brown-punctulate-lepidote; blades ligulate, acute or acuminate, 6 cm. wide, green or occasionally with a faint purplish tinge, concolorous or obscurely banded, obscurely punctulate-lepidote beneath; scape erect, stout; scape-bracts erect, densely imbricate, elliptic-lanceolate, acute, pale green; inflorescence laxly compound or rarely simple, up to 5 dm. long; primary bracts like the scape-bracts but thinner, much shorter than the axillary branches; branches suberect, secundly few-flowered, bearing several imbricate sterile bracts at the base; rhachis usually slender, verrucose just below the nodes; floral bracts very broadly ovate, acuminate, 30-65 mm. long, enfolding the flowers, exceeding the sepals of at least the lower flowers, straight, carinate toward the apex, green or brownish; flowers erect, up to 8 cm. long, glabrous; sepals elliptic, acuminate, 25-35 mm. long, 13 mm. wide, subcoriaceous, lustrous; petals white or yellow (Duss!), coiling-recurved, shorter than the stamens, flaccid, bearing 2 large spat-

late acute scales at the base. — Epiphytic; Costa Rica, Panamá, West Indies, Colombia. — Harms in Notizbl. x. 801 (1929); in Engler, Nat. Pflanzenfam. ed. 2, xv a. 124 (1930); Mez in Engler, Pflanzenr. iv. Fam. 32, 403 (1935); L. B. Smith in North American Flora, xix. 163 (1938). *Tillandsia ringens* Griseb. Cat. Pl. Cub. 255 (1866); Wright & Sauvalle, Fl. Cub. 168 (1873); Bak. Brom. 222 (1889). *T. chagresiana* Bak. in Jour. Bot. xxvi. 109 (1888); Brom. 222 (1889). *T. Veitchii* Bak. Brom. 223 (1889). *Vriesia Veitchii* E. Morr. ex Bak. l. c., nomen in synonym. *V. paniculata* Mez in DC. Mon. Phan. ix. 614 (1896), as *V. panniculata*, quoad *Tillandsia ringens* Griseb., non quoad *T. paniculata* L.; Urb. Fl. Doming. in Symb. Ant. viii. 87 (1920); Broadway & L. B. Smith in Proc. Am. Acad. (Contrib. Gray Herb. eii.) lxviii. 173 (1933); Standley, Fl. Panama Canal Zone in Contrib. U. S. Nat. Herb. xxvii. 108 (1928); Fl. Barro Colorado Is. in Contrib. Arnold Arboretum, v. 43 (1933). — Pl. III, figs. 11-14.

COSTA RICA : Carillo, Werckle 73, 143, 147, in hb. Inst. Phys.-Geogr. Costaric. 17442, 17462 (fide Mez).

PANAMA : COLÓN : Chagres, Feb. 11, 1850, Fendler 448 (K, type of *Tillandsia chagresiana* Bak., phot. G); CANAL ZONE : on trees, common, Mount Hope Cemetery, Dec. 28, 1923, Standley 28812 (US); westerly arm of Quebrada Salamanca, alt. 70 m., Dec. 16, 1934, C. W. Dodge, Steyermark & Allen s. n. (Mo, G); DARIEN : Chepigana District, rain forest, Cana-Cuasi Trail, alt. 1370 m., Mar. 12, 1940, M. E. & R. A. Terry 1527 (FM).

CUBA : ORIENTE : near Monte Verde, Jan.-July, 1859, C. Wright 1518 (G, isotype, Mo), 1520a (G); deciduous woods and thickets, Serra Nipe, near Woodfred, alt. 450-550 m., Dec. 16, 1909, Shafer 3193 (NY); same Jan. 10, 1910, Shafer 3499, 3499a (NY); vicinity of Loma del Gato, Cobre Range of Sierra Maestra, July-Aug., 1921, Leon, Clement & Roca 10408 (NY); slope near Rio Sabanilla, Sabaneta, Baracoa, July 23, 1938, Leon 18379 (Inst. La Salle); SANTA CLARA : between El Porvenir and Aguacate, Trinidad Mountains, alt. 700-900 m., Mar. 10, 1910, N. L. Britton & Wilson 5362 (NY, phot. G); Pico Potrerillo, April 9, 1940, Acuña 11125 (Est. Las Vegas).

JAMAICA : SURREY : on tree, Parish of St. Thomas, alt. 800 m., Sept. 15-19, 1908, N. L. Britton 3546 (NY, phot. G); on trees, eastern slopes, John Crow Mountains, alt. 520 m., Mar. 9-11, 1909, N. L. Britton 4147 (NY); MIDDLESEX : near Moody's Gap, alt. 750 m., Mar. 8, 1895, W. Harris 5217 (G); on log in woods, Union Hill near Moneague, Parish of St.

Ann's, alt. 700 m., April 6-7, 1908, N. L. Britton & Hollick 2800 (NY); on tree, between Lancaster and Moody's Gap, Sept. 10, 1908, N. L. Britton 3357 (NY); CORNWALL : woods, summit of Dolphin Head, Mar. 17, 1908, N. L. Britton & Hollick 2854 (NY).

HAITI : on trees, between Petit Brogne and Mt. Casse, alt. ca. 150 m., Aug. 16, 1903, Nash 560 (NY, phot. G); epiphytic valley of Rivière de Barre, St. Louis du Nord, Massif du Nord, alt. ca. 50 m., April 14, 1925, Ekman no. H 3796 (US); road to M. Baron at Vital, St. Louis du Nord, alt. 250 m., April 23, 1925, Ekman no. H 3896 (US).

LESSER ANTILLES : GUADELOUPE : 1896, Duss 3725 (G, NY, Mo); DOMINICA : Feb. 2, 1933, Cooper « orchid 6 » (G); epiphytic, cleared lands and forest borders, Sylvania, Feb. 16, 1940, W. H. & B. T. Hodge 1167 (G); common epiphyte on *Citharexylum*, Lisdara, alt. 457 m., Mar. 30, 1940, Hodge 2346 (G); epiphytic, border of high-stem rainforests, Syndicate Plantations, close to northwest slopes of Morne Diablotin, alt. 600 m., Apr. 8, 1940, Hodge 2628 (G); same, Apr. 10, 1940, Hodge 2911 (G); very common epiphyte throughout moist forests bordering Pegoua River in vicinity of Deux Branches, Concorde Valley, May 6-7, 1940, Hodge 3465 (G). MARTINIQUE : epiphytic, heights of Trois-Flets, 1879, Duss 274 (US, NY, phot. G). TRINIDAD : Broadway 3235 (Mez !).

COLOMBIA : BOLIVAR : epiphytic, coastal thickets, Cartagena, Oct. 5-10, 1922, Pennell 11736 (G); EL VALLE : epiphyte, coastal thickets, Punta Arenas, Feb. 3, 1939, Killip 33019 (G).

At first it seemed as if it might be possible to separate the specimens of *Vriesia ringens* from the Lesser Antilles as a variety. But as more and more material has been studied, supposed distinctions have broken down. Figures 11 and 12 of plate III illustrate the typical form with large firm floral bracts and firm sepals, while figures 13 and 14 show the other extreme with smaller thinner floral bracts and thinner but equally large sepals.

PLATE I

- Fig. 1. *Hohenbergia guatemalensis* L. B. Smith (*Standley 71169*), leaf and inflorescence $\times 1/5$.
2. Same, floral bract $\times 1$.
 3. Same, sepal $\times 2$.
 4. Same, longitudinal section of ovary $\times 2$.
 5. *Pitcairnia tuerckheimii* Donn. Smith var. *MACROLEPIS* L. B. Smith (*Skutch 995*), flower and bract $\times 1/2$.
 6. Same, sepal $\times 1$.
 7. *Tillandsia ionantha* Planch. var. *SCAPOSA* L. B. Smith (*Standley 63065*), plant $\times 1/2$.
 8. *Tillandsia polita* L. B. Smith (*Standley 62465*), leaf and inflorescence $\times 1/5$.
 9. Same, young flower and bract $\times 1$.
 10. *Vriesia pectinata* L. B. Smith (*Standley 69055*), section of scape $\times 1/2$.
 11. Same, section of inflorescence and leaf $\times 1/2$.
 12. Same, sepal $\times 1$.
 13. Same, petal $\times 1$.
 14. *Tillandsia penlandii* L. B. Smith (*Penland & Summers 1138*), branch of inflorescence $\times 1/2$.
 15. Same, flower $\times 2$.
 16. *Tillandsia penlandii* L. B. Smith var. *PEDUNCULATA* L. B. Smith (*Daniel & Tomás 1558*), branch of inflorescence $\times 1/2$.
 17. Same, flower and bract $\times 2$.
 18. *Vriesia pachychlamys* (Bak.) Mez (*Jenman 2044*), leaf and inflorescence $\times 1/5$.
 19. Same, sepal $\times 1$.
 20. *Vriesia longicaulis* (Bak.) Mez (*Foster 111*), leaf and inflorescence $\times 1/5$.
 21. Same, sepal $\times 1$.
 22. *Vriesia clauseniana* Mez (*Claussen s. n.*), inflorescence and leaf $\times 1/8$.

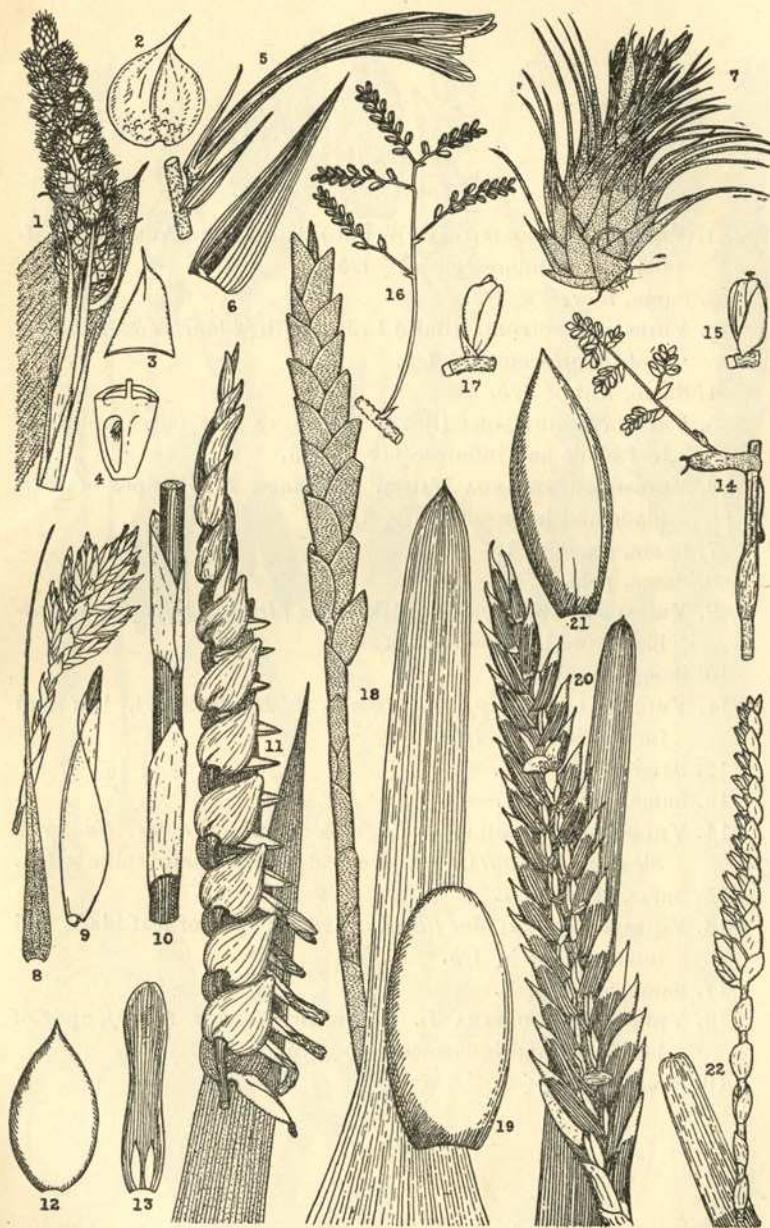


PLATE II

- Fig. 1. *VRIESIA GLADIOLIFLORA* (Wendl.) Ant. (after Antoine), leaf-blade and inflorescence $\times 1/5$.
 2. Same, flower $\times 1/2$.
 3. *VRIESIA LANCIFOLIA* (Bak.) L. B. Smith (*Blanchet 3458*), scape and inflorescence $\times 1/5$.
 4. Same, leaf $\times 1/5$.
 5. *VRIESIA VIRIDIFLORA* (Regel) Wittm. ex Mez (after Antoine), leaf-blade and inflorescence $\times 1/5$.
 6. *VRIESIA SUBSECUNDA* Wittm. (*Lehmann 1775*), apex of leaf-blade and inflorescence $\times 1/2$.
 7. Same, sepal $\times 1$.
 8. Same, petal $\times 1$.
 9. *VRIESIA GUADELOUPENSIS* (Bak.) Mez (*Duss 3321*), apex of leaf-blade and inflorescence $\times 1/5$.
 10. Same, sepal $\times 1$.
 11. *VRIESIA LONGISCAPA* Ule (*Smith & Brade 2293*), leaf and inflorescence $\times 1/5$.
 12. Same, sepal $\times 1$.
 13. Same, petal $\times 1$.
 14. *VRIESIA SANGUINOLENTA* Cogn. & March. (*Dodge, Hunter & Steyermark 16907*), apex of leaf-blade and lateral spike $\times 1/5$.
 15. Same, sepal $\times 1$.
 16. *VRIESIA PITTIERI* Mez (*Tonduz 12229*), apex of leaf-blade and inflorescence $\times 1/5$.
 17. Same, sepal $\times 1$.
 18. *VRIESIA TONDUZIANA* L. B. Smith (*Tonduz 12349*), apex of leaf-blade and inflorescence $\times 1/5$.
 19. Same, sepal $\times 1$.

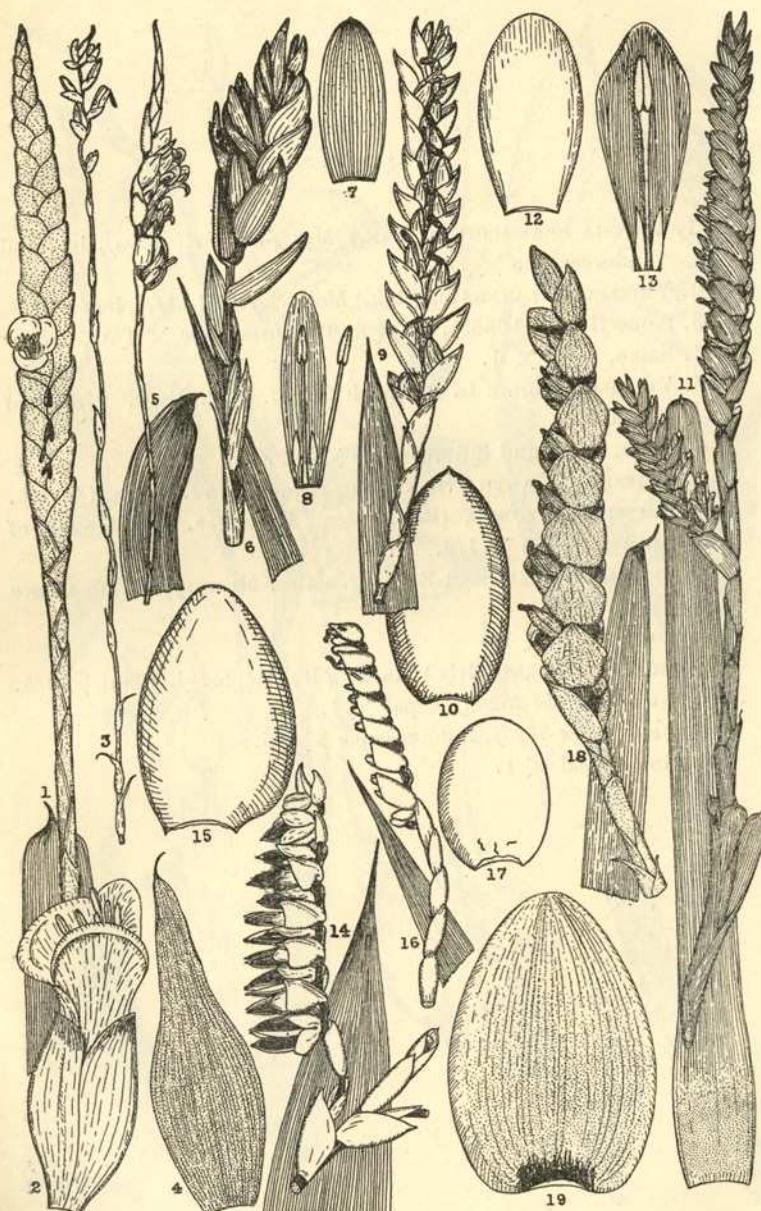


PLATE III

- Fig. 1. *VRIESIA BRASSICOIDES* (Bak.) Mez (*Burchell* 1393), leaf and inflorescence $\times 1/5$.
2. *VRIESIA UNILATERALIS* (Bak.) Mez (*Burchell* 3347), leaf $\times 1/5$.
3. Same (Dusén 16663), scape and inflorescence $\times 1/5$.
4. Same, sepal $\times 1$.
5. *VRIESIA RACINAE* L. B. Smith (*M. B. & R. Foster* 270), leaf $\times 1/2$.
6. Same, scape and inflorescence $\times 1/2$.
7. *VRIESIA OLIGANTHA* (Bak.) Mez (*Glaziou* 15472), plant $\times 1/5$.
8. *VRIESIA AMAZONICA* (Bak.) Mez (*Martius s. n.*), branch of inflorescence $\times 1/2$.
9. *VRIESIA PLATZMANNII* E. Morr. (after Morren), inflorescence $\times 1/2$.
10. Same, petal $\times 1$.
11. *VRIESIA RINGENS* (Gris.) Harms (*Wright* 1518), plant $\times 1/5$.
12. Same (*Wright* 1520a), sepal $\times 1$.
13. Same (*Duss* 3725), inflorescence $\times 1/5$.
14. Same, sepal $\times 1$.

