

NOTES ON BROMELIACEAE, XXVII

Lyman B. Smith

AECHMEA

AECHMEA CASTELNAVII Baker, Handb. Bromel. 39. 1889. Type: Castelnau s. n. Aechmea paniculigera sensu Baker, op. c. 40, in part, not as to type. Ae. sprucei Mez in DC. Mon. 9: 226. 1896. Type: Spruce 140. Pl. I, fig. 1: Trichome of inflorescence x 10.

COSTA RICA: ALAJUELA: On tree, Capulín, Río Grande de Tarcoles, alt. 80 m, 2 April 1924, Standley 40183 (US).

VENEZUELA: LARA: Margin of pond, Santa Rosa, alt. 400 m, 16 Jan. 1939, Alston 6329 (BM, US). BOLÍVAR: Moist woods, mouth of Caño Bejuco, Río Parguaza, alt. 140 m, 15 April 1946, Badillo 1429 (VEN).

COLOMBIA: VICHADA: Epiphytic, dense forest, bank of Río Guaviare, Amanabel, alt. 250 m, 23 Nov. 1948, Araque & Barkley 18-V-129 (US).

BOLIVIA: SANTA CRUZ: June 1847, Castelnau s. n. (P, type; phot. GH).

BRAZIL: AMAZONAS: Epiphytic, Taperinha, Santarem, 22 Aug., 1927, Ginzberger s. n. (W); Ginzberger & Zerny 392 (F). PARA: Spruce 104 (K, type of Aechmea sprucei Mez; phot. GH). Approagas Rio Capim, July 1897, Huber s. n. (MG); 695 (G). On tree, Tome Assú, Dist. Acará, alt. 35 m, 1 Aug. 1931, Mexia 6032 (GH, US). São Miguel do Guamá, Rio Guamá and Rio Irituia, 22-23 Aug. 1948, Dárdano & Black 48-3162 (IAN); 48-3195 (IAN). Epiphytic, km 261-255 of the Belém-Brasília highway, 10 July 1960, E. Oliveira 904 (IAN). Epiphytic, Rio Vizeu, region of Cametá, 8 Feb. 1961, E. Oliveira 1320 (IAN). Riverine forest, banks of Rio Piria, south of BR 22, 23 Aug. 1964, Prance & Silva 58837 (NY). MARANHÃO: 1824, Hesketh s. n. (CGE, phot. GH). Epiphytic, forest, 15 km south of border Pará-Maranhão, Belém-Brasília highway, 31 Aug. 1964, Prance & Silva 58973 (NY, US). CEARÁ: On carnauba palms along Rio Pacoti, 6 km south of Aquiraz, 15 Oct. 1935, Drouet 2616 (GH, US). Serra da Baturité, July 1961, Mee 45 (SP). GOIÁS: Epiphytic, low woods, Igarapé Ucuricaca, region of Araguaínas, 23 Aug. 1961, E. Oliveira 1818 (IAN).

Examination of the type of Aechmea castelnavii Baker shows that it has the same unusual trichomes in the inflorescence as Aechmea sprucei Mez. Mez's supposed distinction in the shape of the anthers is not very convincing in the face of all the similarities between the two types.

AECHMEA SMITHIORUM Mez in DC. Mon. 9: 246. 1896; L. B. Smith. No. Am. Fl. 19: 209. 1938. Ae. serrata sensu Duss, Fl. Phan. Ant. Franç. 570. 1897, non (L.) Mez 1896. Ae. lavandulacea C. H. Wright, Bot. Mag. 131: pl. 8005. 1905; L. B. Smith, No. Am. Fl. 19: 209. 1938.

LESSER ANTILLES: MONTSERRAT: Blakes, on trees, foot of the

mountains, 8 Feb. 1907, Shafer 472 (NY, US). On rocks, Harris Lookout, 14-18 June 1950, Howard 11876 (GH, inflorescence dense, stipe 20 mm long). On top of cliff, Harris's, alt. 240-300 m, 2 Feb. 1959, Proctor 18979 (AA, US, spikes spreading, long-stipitate).

GUADELOUPE: On trees, Bois de Matouba and Des Baines, 1894, Duss 3325 (US, spikes spreading, long-stipitate, basis of Aechmea serrata sensu Duss). Epiphytic, dense wet forest, Baines-jaunes, alt. 850 m, 15 Feb. 1936, Stehlé 886 (US, spikes suberect, long-stipitate). Dense wet forest, Malanga (ravine road), alt. 800 m, 1 Jan. 1937, Stehlé 1525 (US, spikes spreading, long-stipitate). On tree, Ravine Montebello, alt. 50 m, 28 Jan. 1938, Questel 502 (US, spikes spreading, long-stipitate). On tree, mountains above St. Claude, 27 Oct. 1938, L. H. & E. Z. Bailey 88 (GH, US, spikes spreading, long-stipitate).

DOMINICA: Rainforest on the precipitous slopes of Morne Colla Anglais, Sylvania, alt. 610-732 m, 19 Feb. 1940, Hodge 3991 (GH). Epiphytic, rainforest between Laudat and Freshwater Lake, alt. 665 m, 8 March 1940, Hodge 1823 (GH, 1-1.3 m tall, spikes spreading, long-stipitate). On 8 March 1946, Beard 647 (US).

MARTINIQUE: Epiphytic, Bois du Lorrain, Mt. Pelée, Sept. 1881, Duss 272 (US, spikes spreading, long-stipitate).

ST. LUCIA: Terrestrial, Le Toc to Cul de Sac Bay, April-May 1950, Howard 11366 (GH, inflorescence dense, stipe 2 cm long). Epiphytic, trail from Quillesse to Piton St. Esprit, April-May 1950, Howard 11626 (GH, inflorescence dense, stipe 12 mm long). Terrestrial, shores of Marigot Lagoon, west coast, alt. 30-200 m, 21 March 1956, A. C. Smith 10203 (US, stipes suberect, 15 mm long).

ST. VINCENT: Guiliding (K, phot. GH, inflorescence dense, stipes short). Terrestrial, Calvary, Dec. 1889, Eggers 6666 (US). In trees, mountain forest, alt. 300-600 m, Jan. 1890, H. H. & G. W. Smith 1425 (B, type, phot. US, inflorescence dense, stipes very short but young); same, 1426 (GH). Rainforest, Buccent Valley, alt. 300 m, 21 Nov. 1945, Beard 602 (GH, inflorescence dense, stipes 8 mm long at anthesis). Epiphytic, Chateaubelair River, alt. 300-400 m, 16-25 April 1947, Morton 5406 (US, inflorescence dense, stipes short). St. Patrick Parish: Epiphytic, upper reaches of Rutland River, alt. 330 m, 20 Jan. 1962 (GH, inflorescence dense, stipes short).

GRENADA: Cliffs at St. George, on rocks overhanging the sea, flowered at Kew 21 July 1904, Broadway (K, type of Aechmea lavandulacea C. H. Wright; phot. GH, inflorescence subslax, short). Bolanio Station, 14 April 1906, Broadway (F, phot. GH).

My grouping of Aechmea serrata, dichlamydea, smithiorum and lavandulacea in the North American Flora appears to have been correct taxonomically except for the separation of the last two species. Ae. serrata is at once the oldest in point of discovery, the most distinctive with its serrate primary bracts, and the most narrowly endemic with its limitation to the single island of Martinique. The largest interisland distance by far is from Tobago to Grenada and this is the sharpest break in the group,

Ae. dichlamydea being all south of it and the others all north.

The type of Ae. smithiorum is an extreme in its complex for both density of inflorescence and shortness of stipe, characters quite possibly due to immaturity of material. Ae. lavandulacea is the opposite extreme in laxity of inflorescence and is much further from average in this respect. Its stipes, however, are far from the opposite extreme and if anything are on the short side along with those of Ae. smithiorum.

In sum, it does not seem possible to maintain Ae. lavandulacea as a separate species without setting up still another species for the specimens with long stipes and dense inflorescence and the intergradation is too much for that.

CATOPSIS

A revision of Catopsis is long overdue and requires a new approach. Originally Mez (DC. Mon. 9: 619. 1896) divided it into two subgenera, Eucatopsis with perfect flowers and equal stamens and Tridynandra with unisexual flowers and unequal stamens. However, the character of equal stamens was evidently assumed and not based on any observation, for it has never been verified for any species and in his final work (Pflanzenreich IV. Fam. 32: 426. 1935) Mez dropped the stamen character and used only the distinction between perfect and unisexual flowers.

This distinction between flower types proves untenable because species like Catopsis nutans and sessiliflora have dimorphic flowers in Mexico and Central America but never in the West Indies and South America. Incidentally, the evolution of dimorphic flowers in all three subfamilies is curiously concentrated in mainland North America with Hechtia in the Pitcairnioideae and Aechmea mariae-reginae and the monotypic Androlepis in the Bromelioideae.

My treatment of Catopsis in the North American Flora purposely dropped Mez's classification by subgenera as unwarranted by the evidence. However, I gave too much emphasis to the size of the sepals and consequently overlooked certain synonymy in dimorphic species as pointed out by Rohweder (Die Farinosae in der Vegetation von El Salvador, Abhandl. Gebiet Auslandskunde 18: 84. 1956). Unfortunately, although admitting the correctness of his findings at the time, I subsequently overlooked them. I now take the opportunity to make a more nearly perfect revision by using them.

1. Petals ligulate with a flaring bright yellow blade as long as the claw and much wider; leaf-blades not over 25 mm wide; sepals strongly asymmetric, to 15 mm long; scape slender, usually decurved. Mexico, Central America, Greater Antilles Venezuela, Ecuador.....1. C. nutans
1. Petals broad with small barely exerted blade, mostly white or flavous (unknown in C. wawraneae and werckleana where the leaf-blades are much more than 25 mm wide).

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2. Floral bracts exceeding the sepals, cucullate; scape often decurved; leaf-blades ligulate to narrowly subtriangular. Southern Mexico, Central America.....2. C. wangerinii
2. Floral bracts shorter than the sepals, straight at apex.
3. Leaf-blades triangular or subtriangular, attenuate.
4. Sheaths distinct, contracted into the very narrow blades.
5. Leaves to 10 cm long, their blades 5 mm wide. Central America.....3. C. juncifolia
5. Leaves 15-30 cm long, their blades 10 mm wide. Southern Mexico to Honduras.....4. C. subulata
4. Sheaths merging almost imperceptibly into the blades.
6. Sepals coriaceous, even or obscurely nerved; lower primary bracts very broadly ovate, apiculate, mostly shorter than the sterile bases of the branches. Florida, Central America and Greater Antilles to eastern Brazil.
5. C. berteroniana
6. Sepals thin, nerved; lower primary bracts mostly subtriangular and attenuate, shorter than to exceeding the sterile bases of the branches.
7. Leaf-blades to 12 mm wide, much longer than the sheaths; lower primary bracts filiform-attenuate, about equaling the spikes. Guatemala.....6. C. delicatula
7. Leaf-blades 15-70 mm wide.
8. Sepals with a broad apical white to hyaline margin soon subtended by a dark brown band.
9. Inflorescence erect; primary bracts mostly shorter than the sterile bases of the branches; sepals 4-6 mm long; leaf-blades 15-30 mm wide. Florida, West Indies, Central America, Venezuela.....7. C. floribunda
9. Inflorescence decurved; primary bracts mostly equaling the sterile bases of the branches; leaf-blades 30-60 mm wide. Southern Mexico, Central America.
8. C. paniculata
8. Sepals nearly uniform in texture and color.
10. Spikes lax; leaf-blades to 33 mm wide. Guatemala, Honduras.....9. C. montana
10. Spikes dense; leaf-blades to 70 mm wide.
11. Sepals 5 mm long; scape erect; primary bracts mostly shorter than the axillary branches. Southern Mexico.....10. C. compacta
11. Sepals 8-9 mm long.
12. Lower primary bracts equaling or exceeding the branches; leaf-blades to 40 mm wide; scape usually erect. Southern Mexico, Central America.
11. C. hahnii
12. Lower primary bracts shorter than the branches; leaf-blades to 70 mm wide; scape decurved. Southern Mexico.....12. C. mexicana
3. Leaf-blades ligulate, very broadly acute or rounded or even emarginate, apiculate.
13. Scape-bracts exceeding the internodes or rarely the highest slightly shorter.

14. Floral bracts barely exceeding the slender 1.5 mm long pedicels; sepals 2.5 mm long in fruiting material. Guatemala.....13. C. pedicellata
14. Floral bracts much larger; flowers subsessile.
15. Leaf-blades prominently pale-margined, 15-25 mm wide; staminate sepals 4.5 mm long. Mexico, Central America
14. C. morreniana
15. Leaf-blades concolorous, to 40 mm wide; staminate sepals 2 mm long. Panama.....15. C. micrantha
13. Scape-bracts mostly much shorter than the internodes.
16. Sepals subsymmetric, 15-18 mm long. Southern Mexico, Central America.....16. C. wawraana
16. Sepals strongly asymmetric, 5-9 mm long.
17. Leaves in a cylindric rosette, usually strict; sepals cuneate on the right with the wing much exceeding the midnerve, 5-6 mm long. Greater Antilles, Central America, Guiana.....17. C. nitida
17. Leaves in a funnellform rosette, arching-divergent.
18. Leaf-blades to 53 mm wide; branches of the inflorescence with long sterile bases. Costa Rica.
18. C. werckleana
18. Leaf-blades not over 25 mm wide; branches of the inflorescence, if any, with short sterile bases. West Indies and southern Mexico to southern Brazil and Peru.
19. C. sessiliflora

1. C. NUTANS (Sw.) Griseb. Fl. Brit. W. Ind. 599. 1864; Baker, Journ. Bot. 25: 176. 1887, as n. comb.

a. Var. NUTANS. Tillandsia nutans Sw. Prodr. 56. 1788. Type: Wright s. n. T. vitellina Kl. in Lk., Kl. & Otto, Ic. Pl. Rar. 101, pl. 40. 1843. Type: Otto s. n. Tussacia vitellina (Kl.) Kl. ex Beer, Bromel. 99. 1857. Pogospermum flavum Brongn. Ann. Sci. Nat. V. 1: 328. 1864. Type: Linden s. n. P. nutans (Sw.) Brongn. l. c. Catopsis fulgens Griseb. Nachr. Ges. Wiss. Göttingen. 21. 1865. Type: Fendler 1507. C. vitellina (Kl.) Baker Journ. Bot. 25: 176. 1887. Flowers uniform, perfect; scape slender, mostly decurved; inflorescence mostly simple.

b. Var. ROBUSTIOR L. B. Smith, Contr. Gray Herb. 154: 34. 1945 Type: Standley 87157. Scape stout, erect or suberect, to 3 mm in diameter, scape-bracts only slightly shorter than the internodes or even partly imbricate; flowers uniform so far as known. Guatemala.

c. Var. STENOPETALA (Baker) L. B. Smith, No. Am. Fl. 19: 193. 1938. C. stenopetala Baker, Journ. Bot. 25: 176. 1887. Type: Bernouilli & Cario 685. C. tenella Mez in DC. Mon. 9: 631. 1896. Type: Liebmann Brom. 32. Flowers dimorphic, the larger, whether perfect or pistillate, indistinguishable from those of var. nutans, the smaller functionally staminate with a mostly compound inflorescence. Southern Mexico, Central America.

2. C. WANGERINII Mez & Wercklé, Bull. Herb. Boiss. II. 4: 1126 1904. Type: Wercklé Brom. 105. C. pusilla Mez & Wercklé Fedde Rep. Spec. Nov. 14: 248. 1916. Type: Wercklé s. n. C. cu-

- cullata L. B. Smith, Contr. Gray Herb. 104: 72, pl. 3, figs. 3-5. 1934. Type: Com. Geogr. Explor. Rep. Mex. 366. C. triticea L. B. Smith, op. c. 127: 19, pl. 1, figs. 8-10. 1934. Type: Matuda 2570.
3. C. JUNCIFOLIA Mez & Wercklé, Bull. Herb. Boiss. II. 4: 1124. 1904. Type: Wercklé Brom. Costar. 133. C. lundelliana L. B. Smith, Contr. Gray Herb. 117: 6, pl. 1, figs. 6-8. 1937. Type: Lundell 6256.
4. C. SUBULATA L. B. Smith, Contr. Gray Herb. 114: 5, pl. 1, fig. 12. 1936. Type: Purpus 335.
5. C. BERTERONIANA (Schult. f.) Mez in DC. Mon. 9: 621. 1896. Renealmia pendula Gaertn. Fruct. 3: 13, pl. 182, fig. 3. 1805, non Catopsis pendula Baker, 1889. Type: Description and figure. Tillandsia pendula Thunb. ex Gaertn. Fruct. 3: 13. 1805, nomen in synon. T. berteroniana Schult. f. in R. & S. Syst. 7, pt. 2: 1221. 1830. Type: Bertero s. n. Pogospermum berteronianum (Schult. f.) Brongn. Ann. Sci. Nat. V. 1: 328. 1864. Catopsis mosenii Mez in DC. Mon. 9: 622. 1896. Type: Mosen 3475.
6. C. DELICATULA L. B. Smith, Contr. Gray Herb. 117: 4, pl. 1, figs. 4, 5. 1937. Type: Rojas 445.
7. C. FLORIBUNDA L. B. Smith, Contr. Gray Herb. 117: 5. 1937, proposed as a new combination but really a new name because supposed basonym invalid. Type: Plée s. n. Pogospermum floribundum Brongn. Ann. Sci. Nat. V. 1: 329. 1864, nomen provisorium. Catopsis nutans Griseb. Fl. Brit. W. Ind. 599. 1864; Harms, Pflanzenfam. ed. 2, 15a: 131, fig. 48 A-J. 1930; Mez, Pflanzenreich IV Fam. 32: 429, fig. 91 A-J. 1935, in part, not as to type.
8. C. PANICULATA E. Morr. in Makoy, Cat. Hort. no. 121. Oct. 1883; L. B. Smith, Phytologia 15: 179. 1967. Type: Hort. Makoy. C. pendula Baker, Handb. Bromel. 155. 1889. Type: Morren Icon.
9. C. MONTANA L. B. Smith, Contr. Gray Herb. 117: 6. 1937. Type: Ekman 16555.
10. C. COMPACTA Mez, Bull. Herb. Boiss. II. 3: 140. 1903. Type: L. C. Smith 543.
11. C. HAHNII Baker, Journ. Bot. 25: 175. 1887. Type: Hahn 587. C. oerstediana Mez in DC. Mon. 9: 630. 1896. Type: Oersted Brom. 18.
12. C. MEXICANA L. B. Smith, Contr. Gray Herb. 114: 4, pl. 1, figs. 10, 11. 1936. Type: Hinton 4692.
13. C. PEDICELLATA L. B. Smith, Contr. Gray Herb. 154: 34, pl. 4, fig. 1. 1945. Type: Steyermark 31641.
14. C. MORRENIANA Mez in DC. Mon. 9: 628. 1896. Type: Liebmann Brom. 18. C. bakeri Mez, Bull. Torrey Club 30: 435. 1903. Type: C. F. Baker 2460. C. brevifolia Mez & Wercklé, Bull. Herb. Boiss. II. 4: 1127. 1904. Type: Wercklé Brom. Costar. 135. C. paniculata hort. ex Gentil, Fl. Cult. Serres Jard. Bot. Brux. 48. 1907; Mez, Pflanzenreich IV. Fam. 32: 433. 1935, nomen.
15. C. MICRANTHA L. B. Smith, Ann. Missouri Bot. Gard. 30: 83, fig. 1. 1943. Type: von Wedel 2236. This is possibly a natural hybrid as indicated by the dwarf plant in the same clump with quite different scape-bracts.
16. C. WAWRANEA Mez in DC. Mon. 9: 626. 1896. Type: Wawra

I-843.

17. *C. NITIDA* (Hook.) Griseb. Fl. Brit. W. Ind. 599. 1864.

Tillandsia nitida Hook. Exot. Fl. 3: pl. 218. 1827. Type: Wiles in Hort. Liverpool. *Tussacia nitida* (Hook.) Beer, Bromel. 100. 1857. *T. cornucopia* Bertero ex Beer, l. c., nomen in synonym. *Pogospermum nitidum* (Hook.) Brongn. Ann. Sci. Nat. V. 1: 328. 1864. ? *P. inconspicuum* Brongn. op. c. 329. Type: Melinon s. n. ? *Catopsis inconspicua* (Brongn.) Baker, Journ. Bot. 25: 174. 1887. *C. nutans* sensu Baker, op. c. 176, in part, not as to type.

18. *C. WERCKLEANA* Mez, Bull. Herb. Boiss. II. 4: 1125. 1904. Type: Wercklé Brom. Costar. 65.

19. *C. SESSILIFLORA* (R. & P.) Mez in DC. Mon. 9: 625. 1896.

a. Var. *SESSILIFLORA*. *Tillandsia sessiliflora* R. & P. Fl. Peruv. 3: 42, pl. 271, fig. b. 1802. Type: Ruiz & Pavon s. n. *Bromelia sessiliflora* Lodd. ex Loud. Hort. Brit. 118. 1830. *Tussacia sessiliflora* (R. & P.) Beer, Bromel. 101. 1857. *Pogospermum sessiliflorum* (R. & P.) Brongn. Ann. Sci. Nat. V. 1: 328. 1864. *Catopsis nutans* sensu Baker, Journ. Bot. 25: 176. 1887, in part, not as to type. *C. nutans* var. *erecta* Wittm. Bot. Jahrb. 11: 71. 1889. Type: Lehmann 1088. *C. modesta* Fritz Müller, Gartenflora 42: 717. 1893. Type: F. Müller s. n.

b. Var. *DIOICA* L. B. Smith, Wrightia 2: 64, fig. 9. 1960.

Type: Gentle 6186. *Tillandsia aloides* Schlecht. & Cham. Linnaea 6: 55. 1831. Type: Schiede & Deppe 1009. *T. apicroides* Schlecht. & Cham. l. c. Type: Schiede 1010. *Tussacia apicroides* Beer, Bromel. 263. 1857, nomen in synonym. *Catopsis apicroides* (Schlecht. & Cham.) Baker, Journ. Bot. 25: 174. 1887. *C. aloides* (Schlecht. & Cham.) Baker, Handb. Bromel. 154. 1889. *Tussacia aloides* E. Morr. ex André, Brom. Andr. 61. 1889, nomen in synonym. *Catopsis vitellina* Baker, Journ. Bot. 25: 176. 1887, in part, not as to type. *C. schindleri* Mez & Wercklé, Bull. Herb. Boiss. II. 4: 1124. 1904. Type: Wercklé Brom. Costar. 136. *C. tenuis* Cufodontis, Archivio Bot. 9: 181. 1933. Type: Cufodontis 720. Flowers dimorphic, the smaller functionally staminate with inflorescence usually compound.

INDEX

(by species numbers of *Catopsis*)*BROMELIA sessiliflora* 19-a.

CATOPSIS aloides 19-b; *apicroides* 19-b; *bakeri* 14; *berteroniana* 5; *brevifolia* 14; *compacta* 10; *cucullata* 2; *delicatula* 6; *floribunda* 7; *fulgens* 1-a; *hahnii* 11; *inconspicua* 17; *juncifolia* 3; *lundelliana* 3; *mexicana* 12; *micrantha* 15; *modesta* 19-a; *montana* 9; *morreniana* 14; *mosenii* 5; *nitida* 17; *nutans* Baker 1, 17, 19-a; *nutans* Griseb. 1; var. *robustior* 1-b; var. *stenopetala* 1-c; *oerstediana* 11; *paniculata hort.* 14; *paniculata* E. Morr. 8; *pedicellata* 13; *pendula* 8; *pusilla* 2; *schindleri* 19-b; *sessiliflora* 19; var. *dioica* 19-b; *stenopetala* 1-c; *subulata* 4; *tenella* 1-c; *tenuis* 19-b; *triticea* 2; *vitellina* Baker 19-b; *vitellina* Lk. 1-a; *wangerinii* 2; *wawraea* 16; *werckleana* 18.

POGOSPERMUM berteronianum 5; *flavum* 1; *floribundum* 7; *inconspi-*

cuum 17; nitidum 17; nutans 1-a; sessiliflorum 19-a.

RENEALMIA pendula 5.

TILLANDSIA aloides 19-b; apicroides 19-b; berteroniana 5; nitida 17; nutans 1; pendula 5; sessiliflora 19-a; vitellina 1-a.

TUSSACIA aloides 19-b; apicroides 19-b; cornucopia 17; nitida 17; sessiliflora 19-a; vitellina 1-a.

APPENDIX

(Excluded taxa)

alba E. Morr. ex Baker, Handb. Bromel. 192. 1889 = TILLANDSIA MONADELPHA (E. Morr.) Baker

deflexa Ule, Ber. Deutsch. Bot. Gesellsch. 18: 323, pl. 10, figs. 1-6. 1900 = TILLANDSIA AERIS-INCOLA (Mez) Mez

fendleri Baker, Journ. Bot. 25: 175. 1887 = TILLANDSIA CARI-BAEA L. B. Smith

flexuosa Baker, Journ. Bot. 25: 175. 1887 = TILLANDSIA BAKERI L. B. Smith

garckeana Wittm. Bot. Jahrb. 11: 70. 1889 = TILLANDSIA TETRANTHA R. & P. var. AURANTIACA (Griseb.) L. B. Smith

gracilis Rusby, Bull. N. Y. Bot. Gard. 6: 489. 1910 = FOSTER-ELLA GRACILIS (Rusby) L. B. Smith

latifolia Ule, Verhandl. Bot. Ver. Brandenb. 48: 142. 1907 = TILLANDSIA BREVILINGUA Mez ex Harms

maculata E. Morr. ex Baker, Handb. Bromel. 155. 1889 = TILLANDSIA AERIS-INCOLA (Mez) Mez

penduliflora C. H. Wright, Kew Bull. 1910: 197. 1910 = FOSTER-ELLA PENDULIFLORA (C. H. Wright) L. B. Smith

schumanniana Wittm. Bot. Jahrb. 11: 70. 1889 = TILLANDSIA AD-PRESSA André var. TONDUZIANA (Mez) L. B. Smith

tripinnata Baker, Handb. Bromel. 156. 1889 = TILLANDSIA TRI-PINNATA (Baker) Mez

ENCHOLIRIUM

ENCHOLIRIUM GRACILE L. B. Smith, sp. nov. A E. lutzii L. B. Smith, cui affinis, foliis glabris, inflorescentia simplici (an semper?), floribus majoribus, ovulis apice longe caudatis differt

PLANT flowering 1.35 m high. LEAVES (only the inner known) to 4 dm long; sheaths inconspicuous; blades very narrowly triangular 15 mm wide, glabrous, laxly serrate with spreading spines 5 mm long. SCAPE erect, 8 mm thick near base, glabrous; lower scape-bracts subfoliaceous but much reduced, the upper narrowly triangular, entire, much shorter than the internodes. INFLORESCENCE simple, lax, 25 cm long, glabrous; axis slender, curved. FLORAL BRACTS broadly ovate, apiculate, shorter than the pedicels; pedicels spreading, 6 mm long, 3 mm wide, sulcate when dry. SEPALS very broadly elliptic, subtruncate, 8 mm long; petals narrowly elliptic, obtuse, 15 mm long, cream (! Belém); stamens nearly equaling the petals; anthers linear with a cordate base, 4 mm long, greenish (! Belém); ovules numerous, obliquely long-caudate at apex. Pl. I, fig. 2: Flower x 1; 3: Sepal x 1; 4: Ovule x 10.

BRAZIL: MINAS GERAIS: On calcareous outcrop, along road from Nanuque to Teófilo Otoni, 14 Aug. 1965, R. P. Belém 1620 (US, type; hb. Univ. Brasilia, isotype).

GREIGIA

In the nineteen years since my last brief revision of Greigia (Contrib. U. S. Nat. Herb. 29: 286-292. 1949), seven additional species have appeared. The present work is intended to place these in relation to the others and by changes of the key to look at the older species from a new perspective. The genus, although small, remains one of the most difficult to classify because of scanty material and the lack of characters that inspire much confidence. Skottsberg's division with only the type species remaining in Greigia and the remainder consigned to the new Hesperogreigia is impossible to verify at present, and at best seems to be based on distinctions not considered important elsewhere in the family.

In the key I am using "outer bracts" to combine the large uppermost scape-bracts with the primary bracts.

1. Sepals to 40 mm long; floral bracts serrulate; leaf-spines 3-4 mm long. Chile.....1. G. sphacelata
1. Sepals not more than 27 mm long.
 2. Primary bracts wholly covered with brilliant white appressed scales; upper scape-bracts abruptly subulate-laminate. Amazonian Peru.....2. G. amazonica
 2. Primary bracts only partially vestite with dull white or colored scales, or glabrous.
 3. Upper scape-bracts triangular-ovate without distinction between base and blade.
 4. Sepals not over 16 mm long; primary bracts entire or subentire; leaf-blades partially lepidote.
 5. Teeth restricted to the apical quarter of the flat leaf-blade, minute; sheaths narrow, pale, indistinct. Chile.
 3. G. pearcei
 5. Teeth not restricted to the apical quarter of the leaf-blade; sheaths broad, dark, distinct. Colombia.
 6. Leaf-blades flat; sepals 15-16 mm long.
 7. Sepals coriaceous, even, castaneous; leaf-blades soon glabrous; sheaths subdensely brown-lepidote.
 4. G. danielii
 7. Sepals thin, nerved, pale; leaf-blades and sheaths densely cinereous-lepidote beneath.....5. G. collina
 6. Leaf-blades flat; sepals 10-11 mm long.
 8. Leaf-blades minutely serrulate with teeth less than 0.5 mm long, densely cinereous-lepidote above.
 6. G. racinae
 8. Leaf-blades with slender basal spines up to 5 mm long, sparsely lepidote and soon glabrous above.
 7. G. nubigena

4. Sepals more than 16 mm long or else the primary bracts strongly serrate.
9. Upper scape-bracts 7-8 cm long.
10. Leaf-sheaths elliptic, 15 cm long, very dark castaneous; primary bracts entire or nearly so. Mexico.
8. G. van-hyningii
10. Leaf-sheaths inconspicuous, pale; primary bracts distinctly serrate. Salvador.....9. G. rohwederi
9. Upper scape-bracts scarcely more than 4 cm long.
11. Outer bracts entire or subentire, thin, strongly nerved; sepals 12 mm long. Mexico.....10. G. juareziana
11. Outer bracts strongly serrate; sepals 15-22 mm long.
12. Outer bracts green; sepals 15 mm long. Costa Rica.
11. G. sylvicola
12. Outer bracts largely castaneous, conspicuously white-lepidote; sepals 17-22 mm long.
13. Leaf-sheaths subdensely serrate with dark stout spines 4 mm long; sepals 22 mm long. Guatemala.
12. G. steyermarkii
13. Leaf-sheaths serrulate with spines 1 mm long; sepals 17 mm long. Mexico.....13. G. oaxacana
3. Upper scape-bracts rounded-apiculate with good distinction between base and blade.
14. Outer bracts largely or wholly green.
15. Primary bracts entire or subentire, much thickened at apex; scales of leaf-blade black-centered, very sparse. Venezuela.....14. G. ocellata
15. Primary bracts strongly serrate toward apex; scales of leaf-blade wholly white, dense.
16. Sepals and primary bracts castaneous toward base; plant subacaulescent. Venezuela.....15. G. albo-rosea
16. Sepals and primary bracts wholly green; plant 12 dm or higher. Colombia.....16. G. sanctae-martae
14. Outer bracts wholly dark castaneous or with pale borders or apices (uncertain in G. berteroi).
17. Leaf-blades in large part entire, the spines all less than 1 mm long or a few larger ones near base.
18. Blades 28-48 mm wide.
19. Primary bracts serrate; leaf-blades to 28 mm wide. Ecuador.....17. G. sodiroana
19. Primary bracts entire; leaf-blades to 48 mm wide. Chile.....18. G. landbeckii
18. Blades 16-18 mm wide.
20. Sheaths pale brown; blades serrate only toward apex. Chile: Juan Fernandez.....19. G. berteroi
20. Sheaths dark castaneous; blades serrulate at base as well as apex. Venezuela.....20. G. aristeguietae
17. Leaf-bases strongly serrate, especially at base, with spines 4-12 mm long.
21. Primary bracts with a prominent green blade. Colombia.
21. G. columbiana
21. Primary bracts merely apiculate or castaneous at apex.

22. Leaf-blades 22 mm wide; primary bracts with a narrowly triangular blade. Peru.....22. G. macbrideana
22. Leaf-blades 40-50 mm wide; primary bracts mostly apiculate.
23. Primary bracts much shorter than the sepals, barely exceeding the ovaries, sparsely serrate. Colombia.
23. G. exserta
23. Primary bracts equaling or exceeding the sepals.
24. Leaf-blades coarsely serrate throughout; nearly or all of the margin of the primary bracts serrate; sepals asymmetric. Colombia, Ecuador.
24. G. vulcanica
24. Leaf-blades coarsely serrate only at base; primary bracts serrate only near apex; sepals symmetric. Ecuador.....25. G. mulfordii

1. G. SPHACELATA (R. & P.) Regel, Gartenflora 14: 137, pl. 474 1865. Bromelia sphacelata R. & P. Fl. Peruv. 3: 32. 1802. Type: Ruiz & Pavon s. n. Billbergia sphacelata (R. & P.) Schult. f. in R. & S. Syst. 7, pt. 2: 1269. 1830. Bromelia discolor Lindl. Bot. Reg. 24, Misc.: 48. 1838. Type: Hort. Garnier. Bromelia crassa Steud. in Lechler, Bearb. Am. Austr. 53. 1857. Nomen based on Lechler 677. Bromelia clandestina hort. ex Carr. Rev. Hort. 52: 256. 1880. Nomen in synonym.

2. G. AMAZONICA L. B. Smith, Phytologia 8: 226, pl. 2, figs. 4, 5. 1962. Type: Moore A-120.

3. G. PEARCEI Mez in DC. Mon. 9: 46. 1896. Type: Pearce 269. Bromelia pearcei anonymous ex Baker, Handb. Brom. 13. 1889. Nomen. Greigia landbeckii Baker, l. c. In part, non Phil.

4. G. DANIELII L. B. Smith, Caldasia 5: 1, fig. 1948. Type: Daniel 3428.

5. G. COLLINA L. B. Smith, Contr. U. S. Nat. Herb. 29: 286, fig. 11. 1949. Type: Foster 1868.

6. G. RACINAE L. B. Smith, Contr. U. S. Nat. Herb. 29: 288, fig. 14. 1949. Type: Foster 2044.

7. G. NUBIGENA L. B. Smith, Contr. U. S. Nat. Herb. 29: 287, fig. 13. 1949. Type: Foster 2043.

8. G. VAN-HYNINGII L. B. Smith, Bromel. Soc. Bull. 9: 53, figs 1959. Type: Van Hyning 5910.

9. G. ROHWEDERI L. B. Smith, Phytologia 13: 456, pl. 1, figs. 6, 7. 1966. Type: Rohweder no. El Salvador 526.

10. G. JUAREZIANA L. B. Smith, Bromel. Soc. Bull. 9: 51, fig. 1959. Type: Van Hyning 5962.

11. G. SYLVICOLA Standl. Journ. Washington Acad. 17: 160. 1927 Type: Standley 41975.

12. G. STEYERMARKII L. B. Smith, Contr. Gray Herb. 154: 35, pl. 4, fig. 2. 1945. Type: Steyermark 42553.

13. G. OAXACANA L. B. Smith, Bromel. Soc. Bull. 9: 52, fig. 1959. Type: Van Hyning 5958.

14. G. OCELLATA L. B. Smith & J. A. Steyermark, sp. nov. G. albo-rosea (Griseb.) Mez in systemate mea affinis sed foliorum lepidibus atro-ocellatis, bracteis primariis subintegris apice

valde incrassatis differt.

PLANT evidently short-caulescent. LEAVES spreading to erect, 6 dm long; sheaths ovate, ca 10 cm long, green marked irregularly with dark castaneous, very sparsely dark-lepidote; blades linear, attenuate, slightly contracted at base, to 3 cm wide, very sparsely vestite beneath with appressed dark-centered scales, serrulate toward apex, entire elsewhere or with a few dark 2 mm long teeth at base. INFLORESCENCES axillary, 4 cm wide; primary bracts broadly ovate, triangular-acute and much thickened at apex, subentire, 4 cm long, about equaling the sepals, green becoming irregularly dark castaneous toward base, sparsely dark-lepidote. FLORAL BRACTS ovate, ca 25 mm long, coriaceous and dark castaneous at apex, thinner and paler elsewhere. SEPALS subtriangular, 19 mm long, castaneous toward base and apex. Pl. I, fig. 5: Outer bract x 1/2; fig. 6: Flower x 1.

VENEZUELA: TACHIRA: Terrestrial, dwarf rainforest, below Páramo de La Negra on the road to Pregonero, alt. 2600 m, 29-30 August 1966, J. A. Steyermark & M. Rabe 96951 (US, type; VEN).

15. G. ALBO-ROSEA (Griseb.) Mez in Mart. Fl. Bras. 3, pt. 3: 247. 1891. Nidularium albo-roseum Griseb. Nachr. Ges. Wiss. Gött "1864": 12. 1865. Type: Fendler 1521. Karatas albo-rosea (Griseb.) Baker, Handb. Brom. 4. 1889. Cryptanthus andicola Moritz ex Baker, l. c. Nomen.

16. G. SANCTAE-MARTAE L. B. Smith, Contr. U. S. Nat. Herb. 29: 289, fig. 15. 1949. Type: Foster 1463.

17. G. SODIROANA Mez, Bull. Herb. Boiss. II. 4: 619. 1904. Type: Sodirol 171/1-a.

18. G. LANDBECKII (Lechler ex Phil.) Phil. Cat. Chil. 278. 1881. Bromelia landbeckii Lechler ex Phil. Linnaea 33: 246. 1864-65. Type: Lechler 3098.

19. G. BERTEROI Skottsberg, Nat. Hist. Juan Fernandez & Easter Island 2: 109. 1922. Type: Bertero 1219. Hesperogreigia berteroi (Skottsberg) Skottsberg, Acta Horti Gotoburgensis 11: 220. 1936.

20. G. ARISTEGUIETAE L. B. Smith, Phytologia 7: 106, pl. 1, figs. 1-3. 1960. Type: Aristeguieta 3591.

21. G. COLUMBIANA L. B. Smith, Contr. Gray Herb. 98: 7, pl. 1, figs. 7, 8. 1932. Type: Killip & Smith 18689.

a. Var. COLUMBIANA. Blades of the primary bracts densely and coarsely serrate.

b. Var. SUBINERMIS L. B. Smith, Phytologia 5: 397. 1956. Type: Garganta 980. Blades of the primary bracts very obscurely serrate.

22. G. MACBRIDEANA L. B. Smith, Contr. Gray Herb. 98: 7, pl. 1, figs. 9-11. 1932. Type: Macbride 4442.

23. G. EXSERTA L. B. Smith, Caldasia 3: 238, fig. 1945. Type: Cuatrecasas 11897.

24. G. VULCANICA André, Énum. Bromél. 3. 13 Dec. 1888; Rev. Hort. 60: 563. 16 Dec. 1888. Type: André 2664.

25. G. MULFORDII L. B. Smith, Contr. U. S. Nat. Herb. 29: 286, fig. 12. 1949. Type: Foster 2041.

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NAVIA

(Supplement to revision in Bromeliaceae of the Guayana Highland,
Mem. New York Bot. Gard. 14, pt. 3: 15. 1967;
species alphabetical)

36a. *N. INCRASSATA* Smith & Steyermark, sp. nov. A *N. pauciflora* L. B. Smith, cui valde affinis, foliis bracteisque apice incrassatis obtusisque, sepalis fortius cucullatis differt.

PLANT low, in colonies. LEAVES rosulate at the ends of the short stems; blades spreading, lance-oblong, contracted to a thick obtuse apex, 4-5 cm long, 12 mm wide, stiff-coriaceous, finely and densely serrate with the teeth becoming obscure toward apex, covered beneath with appressed cinereous scales, glabrous elsewhere except for the barbellate axils of the lower teeth. INFLORESCENCE sessile, globose, few-flowered, 1 cm wide, glabrous outer bracts foliaceous but reduced and creamy yellow for most of their length. FLORAL BRACTS lance-elliptic, obtuse and thickened at apex, slightly shorter than the sepals, broadly subcarinate, brown with scarious margins; flowers subsessile. SEPALS free, oblong, conduplicate, strongly cucullate, 7 mm long, 1 mm wide on the side, narrowly alate-carinate; ovary superior; ovules naked. Pl. I, fig. 7: Floral bract x 5; fig. 8: Sepal x 5.

VENEZUELA: BOLIVAR: On rock exposures, Meseta de Jáua, Cerro Jáua, 60 km northwest of the mission of Campamento Sanidad del Río Kanarakuni, 4° 45' N, 64° 26' W, alt. 1922-2100 m, 22-27 March 1967, J. A. Steyermark 97881 (US, type; VEN).

44a. *N. INTERMEDIA* Smith & Steyermark, sp. nov. A *N. cucullata* L. B. Smith foliorum laminis angustioribus, bracteis florigeris acutis, a *N. abysmophila* L. B. Smith bracteis florigeris apice incrassatis, a ambobus foliorum laminis supra lepidibus angustis sparse vestitis differt.

PLANT growing in colonies, caulescent; stem erect, simple, to 24 cm long, 1 cm thick, covered with the remains of old leaves. LEAVES rosulate at the stem-apex; sheaths broadly ovate, 1 cm long, yellow, glabrous; blades spreading, linear, acute, 9 cm long, 3.5 mm wide, stiff-coriaceous, dull olive-green both sides, finely serrulate throughout, glabrous beneath, bearing narrow scales above toward base, barbellate in the teeth-axils. INFLORESCENCE subsessile, very few-flowered, dense, glabrous; outer bracts like the leaves but reduced and yellowish toward base. FLORAL BRACTS broadly ovate, acute and thickened at apex, exceeding the distinctly immature sepals; flowers sessile. SEPALS free oblong, cucullate, conduplicate, at least 7 mm long (immature), 1.3 mm wide on the side, narrowly alate-carinate; ovary superior. Pl. I, fig. 9: Floral bract x 1; fig. 10: Sepal x 5.

VENEZUELA: BOLIVAR: Meseta de Jáua, Cerro Jáua, cumbre of the west central part of the meseta 60 km northwest of the mission Campamento Sanidad del Río Kanarakuni, 4° 45' N, 64° 26' W, alt. 1922-2100 m, 22-27 March 1967, J. A. Steyermark 97865 (US, type; VEN).

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45a. *N. LASIANTHA* Smith & Steyermark, sp. nov. A *N. abysmo-phila* L. B. Smith, cui affinis, foliorum laminis subtus dense adpresso-lepidotis, bracteis sepalisque apice dense lanoso-lepidotis differt.

PLANT growing in colonies, caulescent; stem erect, simple or few-branched, to 35 cm long, 1 cm thick, covered with the remains of old leaves. LEAVES rosulate at the stem-apices; sheaths sub-orbicular, 1 cm long, glabrous; blades spreading to reflexed, linear, acute, 4 cm long, 4 mm wide, thick, finely and densely serrulate throughout, covered beneath with a thick layer of white appressed scales, glabrous elsewhere except for the barbellate teeth-axils. INFLORESCENCE subsessile, ovoid, densely few-flowered, 8 mm wide; outer bracts like the leaves but reduced. FLORAL BRACTS lanceolate, about equaling the sepals, cucullate, entire, obtusely carinate, densely white-lanate toward apex with finely divided stellate scales; flowers subsessile. SEPALS free, narrowly lance-triangular, acute, cucullate, conduplicate, 1.4 mm long, 1.4 mm wide on the side, narrowly alate-carinate, densely white-lanate toward apex; ovary superior. Pl. I, fig. 11: Apex of floral bract x 5; fig. 12: Sepal x 5.

VENEZUELA: BOLIVAR: Meseta de Jáua, Cerro Jáua, cumbre of west central part of the meseta, 60 km northwest of the mission of Campamento Sanidad del Río Kanarakuni, 4^o 45" N, 64^o 26' W, alt. 1922-2100 m, 22-27 March 1967, J. A. Steyermark 97865-A (US, type; VEN).

NEOREGELIA

29. *N. BREVIFOLIA* Smith & Reitz, sp. nov.; *Phytologia* 15: 188, pl. 3, fig. 21. 1967. Nomen, because type not cited.

BRAZIL: ESPIRITO SANTO: Morro Pinga-Fogo, Castelo, 6 January 1965, A. Seidel s. n. (HBR, type).

I might argue that my use of the collector's name for affirmation of characters in the description constitutes citation of type, but to be perfectly sure of valid publication I am citing the type in full above.

ORTHOPHYTUM

(Supplement to revision in *Phytologia* 13: 459. 1966)

2a. *O. HUMILE* L. B. Smith, sp. nov. A *O. navioide* L. B. Smith cui valde affinis, foliorum laminis utrinque albo-lepidotis, omnibus partibus valde minoribus differt.

PLANT short-caulescent but branched. LEAVES numerous in a spreading rosette at the apex of the stem, 9 cm long; sheaths broadly ovate, thin, nerved, glabrous; blades linear, filiform-attenuate, 2.5 mm wide, covered on both sides with appressed white scales, laxly serrate with spreading spines over 1 mm long. INFLORESCENCE terminal, sessile, capitate, many-flowered, 15 mm wide. FLORAL BRACTS subfoliaceous, exceeding the sepals; flowers sessile. SEPALS free, straight, symmetric, narrowly triangular, attenuate, 9 mm long; petals free; ovary broadly obconic, 3 mm

long; epigynous tube very shallow. Pl. I, fig. 13: Section of leaf-blade x 1; fig. 14: Sepals x 1.

BRAZIL: MINAS GERAIS: Locally frequent on rocks, slopes below (north) Grao Mogul, 18 August 1960, B. Maguire, G. M. Magalhães & C. K. Maguire 49288 (US, type; NY).

PITCAIRNIA

(Supplement to revision in Phytologia 10: 1. 1964)

169a. *P. VENEZUELANA* Smith & Steyermark, sp. nov. A *P. lanuginosa* R. & P., cui affinis, scapi bracteis supremis internodia subaequantibus vel superantibus differt.

PLANT caulescent, flowering 60-75 cm high. LEAVES fasciculate at the apex of the stem, all persistent, dimorphic, the outer with sheaths broadly ovate, dark castaneous, and blades reduced to small spinose-serrate spines; inner leaves 6 cm long, slightly narrowed above the large sheath, entire; blades linear, long-attenuate, 12-18 mm wide, glabrous above, covered beneath with a white membrane of fused scales. SCAPE erect, slender, white-lepidote becoming glabrous; scape-bracts erect, the lower subfoliaceous, the upper narrowly triangular, long-attenuate, nearly equaling to exceeding the internodes. INFLORESCENCE laxly racemose, to 32 cm long, finely white-flocculose at anthesis. FLORAL BRACTS like the upper scape-bracts, exceeding the pedicels pedicels divergent, 15-22 mm long, slender. SEPALS oblong, subtruncate and apiculate, 14-20 mm long; petals to 5 cm long, orange (! Trujillo), appendaged; ovary 3/5 superior; ovules caudate. Pl. I, fig. 15: Floral bract and flower x 1; fig. 16: Sepal x 1.

VENEZUELA: PORTUGUESA: Common on calcareous bluffs and as ground cover around summit of bluff, forming dense masses, 5 km east-northeast of Agua Blanca, 22 km northeast of Acarigua, alt. 190 m, 24 August 1966, J. A. Steyermark & M. Rabe 96472 (US, type; VEN). LARA: Semiarid slopes, near Río Claro, 28 May 1964, B. Trujillo 6434 (VEN, phot. US).

PUYA

(Supplement to revision in Phytologia 10: 454. 1964)

With the present paper I am closing my description of new species in *Puya* until the genus is published in my projected monograph of the family. In a large genus such as this it is not possible to remake the key constantly.

34a. *P. ADSCENDENS* L. B. Smith, sp. nov. A *P. bicolor* Mez, cui verisimiliter affinis, ramis subduplo longioribus laxioribus, indumento cinereo differt.

PLANT known only from fragments but probably near 2 m high. LEAVES (largest?) over 4 dm long; blades very narrowly triangular 15 mm wide, glabrous above, covered beneath with appressed cinereous scales, laxly serrate with slender brown antrorse spines 5 mm long. SCAPE unknown. INFLORESCENCE laxly bipinnate, except

for the petals densely cinereous-tomentose from finely stellate scales; primary bracts broadly ovate, attenuate, to 5 cm long, slightly exceeding the sterile naked bases of the branches, chartaceous and blackish brown when dry, obscurely serrulate toward apex; branches divergent, ascending, 15 cm long (immature), slender, slightly flexuous, laxly flowered. FLORAL BRACTS broadly ovate, attenuate, 2 cm long, covering the lower half of each sepal and more or less secund with the flowers, thin, nerved dark when dry; pedicels rather slender, 5 mm long. SEPALS oblanceolate, broadly rounded and mucronulate, 23 mm long, probably fleshy in life, subcoriaceous and strongly rugose when dry; petals green (! Sagástegui). Pl. I, fig. 17: Branch of inflorescence x 1/2; fig. 18: Sepal x 1.

PERU: AMAZONAS: Prov. Chachapoyas: Slope, Jalca de Calla-Calla (Leimebamba-Balsas), alt. 2800 m, 23 Oct. 1965, A. Sagástegui A. 6073 (TRP, type; phot. US).

TILLANDSIA

T. ARENICOLA L. B. Smith, sp. nov. A T. caulescente Brongn., cui affinis, omnibus partibus minoribus, foliis patentibus, bracteis florigeris acute carinatis, sepalis posterioribus alte connatis differt.

PLANT caulescent; roots sometimes present; stem prostrate, branching, over 12 cm long. LEAVES densely polystichous, 6-7 cm long, covered with cinereous subappressed black-centered scales; sheaths ovate, small and almost indistinguishable; blades spreading, very narrowly triangular, filiform-attenuate, 6 mm wide, involute on drying. SCAPE almost none. INFLORESCENCE simple, lanceolate, acute, complanate, 25-40 mm long, 10-13 mm wide, densely few-flowered. FLORAL BRACTS imbricate and wholly covering the rhachis, ovate, acute, about equaling the sepals, coriaceous, almost wholly even, red, glabrous or with a few scales at apex, lustrous; flowers subsessile. SEPALS lanceolate, cucullate, 12 mm long, the posterior more than half connate; petals exceeding the stamens. Pl. I, fig. 19: Leaf x 1; fig. 20: Inflorescence x 1.

PERU: LA LIBERTAD: Prov. Trujillo: Rocky sandy ground, Quebrada de Laredo, 9 October 1949, N. Angulo 1254 (US, type; TRP).

T. CALCICOLA L. B. Smith & G. R. Proctor, sp. nov. A T. utriculata L., cui valde affinis, foliorum vaginis atro-castaneis, laminis ex sicco subpatente lepidotis, sepalis lepidotis differt.

PLANT flowering 1 m high, producing offsets when very young. LEAVES rosulate, numerous, to 66 cm long; sheaths ample, elliptic dark castaneous, minutely appressed-lepidote; blades narrowly triangular, attenuate to a blunt succulent apex, 4-6 cm wide at base, covered on both sides with cinereous subspreading scales. SCAPE erect, slender, sparsely lepidote; scape-bracts erect, subfoliaceous but their sheaths shorter than the internodes. INFLORESCENCE laxly paniculate, tripinnate; axis striaght, sometimes drying geniculate; primary bracts broadly ovate, much shorter

than the bracteate sterile bases of the branches; branches 25-35 cm long; spikes 15-25 cm long, very lax; rhachis nearly straight to geniculate, very slender. FLORAL BRACTS subspreading, elliptic, obtuse, 15-22 mm long, shorter than the internodes, much exceeded by the sepals, ecarinate, thin, prominently nerved; pedicels 5 mm long. SEPALs elliptic, 15-20 mm long, ecarinate, thin, prominently nerved, sparsely appressed-lepidote; petals 4 cm long, zygomorphic, greenish white; blades elliptic; stamens exerted. CAPSULE fusiform, slenderly beaked, 3 cm long. Pl. I, fig. 21: Floral bract and flower x 1; fig. 22: Sepal x 1.

JAMAICA: TRELAWNY PARISH: On vertical limestone cliff in sun, Ramgoat Cave, along road between Albert Town and Kinloss, alt. 450 m (1500 ft), 4 July 1955, Howard & Proctor 14433 (IJ); 10 April 1967 (flowering), R. W. Read 1759 (US, type; IJ, UCWI); 5 April 1967, R. W. Read 1856 (US).

T. DURATII Visiani, Ill. Piante Nuove Ort. Bot. Padova in Nuovi Saggi Padova 5: 271, pl. 29. 1840. Type: Hort. Padua.

a. Var. DURATII. T. circinalis Griseb. Goett. Abh. 19: 272. 1874. Type: Hieronymus 149. INFLORESCENCE largely bipinnate; spikes strict. FLORAL BRACTS densely and persistently lepidote. Bolivia, Uruguay (! Mez), Argentina.

b. Var. CONFUSA (Hassler) L. B. Smith, comb. nov., stat. nov. Tillandsia confusa Hassler, Ann. Conserv. & Jard. Bot. Genève 20: 327. 1919. Type: Hassler 3101. INFLORESCENCE 2-3-pinnate; spikes curved-spreading. FLORAL BRACTS densely and persistently lepidote. Paraguay.

c. Var. SAXATILIS (Hassler) L. B. Smith, comb. nov. T. confusa Hassler var. saxatilis Hassler, Ann. Conserv. & Jard. Bot. Genève 20: 329. 1919. Type: Hassler 3416. T. decomposita Baker, Handb. Bromel. 168. 1889. Type: Balansa 707. T. weddellii Baker op. c. 181. Type: Weddell 4035. T. tomentosa N. E. Brown, Trans. Proc. Bot. Soc. Edinburgh 20: 73. 1894. Type: Kerr s. n. T. decomposita Baker var. minor Hassler, Ann. Cons. & Jard. Bot. Genève 20: 327. 1919. Type: Hassler 3683. INFLORESCENCE 2-3-pinnate; spikes curved-spreading. FLORAL BRACTS glabrous or subglabrous. Bolivia, Paraguay, Brazil, Argentina.

T. TERES L. B. Smith, sp. nov. A T. rauhi L. B. Smith, cui affinis, omnibus partibus minoribus, spicis teretibus differt.

PLANT known only from fragments, but certainly over 7 dm long with the inflorescence extended. LEAVES rosulate (! López & Sagástegui), 5 dm long; sheaths elliptic, ample, ca 2 dm long, laxly and finely brown-lepidote beneath, densely so above; blades ligulate, rounded and apiculate, 6 cm wide, obscurely punctulate-lepidote on both sides. SCAPE decurved, stout, 1 cm thick at apex, glabrous; scape-bracts subfoliaceous, large, erect and densely imbricate. INFLORESCENCE pendent, laxly bipinnate, 3-4 dm long; primary bracts broadly ovate or the lowest subligulate, apiculate, much shorter than the spikes but exceeding their sterile bracteate bases, glaucous and rose when dry; spikes spreading, linear, terete, to 13 cm long at anthesis and 17 cm in

fruit, very dense; rhachis nearly straight, the narrow wings extending onto the bases of the floral bracts, the internodes ca 5 mm long. FLORAL BRACTS erect and very tightly imbricate, ovate, rounded and apiculate, 20 mm long, exceeding the sepals, broadly convex, ecarinate, probably somewhat fleshy, strongly nerved and somewhat rugose on drying, rose at least toward the thin apex; flowers subsessile. SEPALS elliptic, broadly obtuse, 14 mm long, subequally very short-connate, subchartaceous, the posterior carinate; petals slightly exceeding the stamens, violet (! López & Sagástegui); style slender, elongate. CAPSULE ellipsoid, about equaling the floral bracts. Pl. I, fig. 23: Primary bract and spike x 1/2; fig. 24: Sepal x 1.

PERU: CAJAMARCA: Prov. Chota: Hanging from rocks by the road, Cumbil-Llama, alt. 750 m, 21 May 1965, López & Sagástegui 5541 (TRP, type; phot. US). Prov. Santa Cruz: Hanging by road, Catache-Cumbil, alt. 800 m, 21 May 1965 (fruit), López & Sagástegui 5192 (TRP, US).

T. TRICOLOR Schlecht. & Cham. Linnaea 6: 54. 1831. Type: Schiede & Deppe 1006. T. acroleuca Mez & Purpus, Fedde Rep. Spec. Nov. 16: 72. 1919. Type: Purpus s. n.

In the North American Flora (19: 135. 1938), I placed Tillandsia acroleuca Mez & Purpus doubtfully in the synonymy of T. polystachia, but examination of the type shows that it belongs under T. tricolor var. tricolor and that, Mez to the contrary, it does not have exerted sepals.

VRIESEA

(Supplement to revision in Phytologia 13: 84. 1966,
species alphabetical)

127a. V. BITUMINOSA Wawra var. MINOR L. B. Smith, var. nov. A var. bituminosa bracteis florigeris floribusque valde minoribus differt.

FLORAL BRACTS 25 mm long. SEPALS 20 mm long.

BRAZIL: MINAS GERAIS: Tijuca and Serro highway, alt. 1300 m, 4 April 1957, E. Pereira 2861 & Pabst 3697 (RB 97988, type).

23a. V. CACUMINIS L. B. Smith, sp. nov. A V. rodigasiana E. Morr., cui affinis, foliis erectis cylindrico-rosulatis vaginis paulo distinctis, inflorescentia brevi compacta differt.

PLANT flowering 32 cm high. LEAVES erect in a cylindric rosette, 24 cm long, subdensely vestite with minute dark appressed scales; sheaths elliptic-oblong, scarcely wider than the blades but somewhat darker; blades ligulate, rounded and apiculate, 5 cm wide. SCAPE erect, slender, hidden by the leaves; upper scape-bracts barely imbricate, suborbicular, apiculate. INFLORESCENCE subdensely bipinnate, ellipsoid, 11 cm long; primary bracts like the upper scape-bracts, ca 2 cm long, punctate-lepidote at apex; branches to 3 cm long including the naked sterile base, laxly 3-4-flowered; rhachis flexuous, 1.5 mm wide. FLORAL BRACTS broadly elliptic, 15 mm long, carinate toward apex, thin-

coriaceous, nerved; pedicels obconic, 4 mm long. SEPALS oblong-elliptic, rounded, 18 mm long; petals yellow (! Schwacke). Pl. I, fig. 25: Inflorescence x 1/2; fig. 26: Sepal x 1.

BRAZIL: MINAS GERAIS: Very common, summit of Mount Serrinha, near Ibitipoca, 21° 35' S, 43° 55' W, August 1896, Schwacke 12296 (RB 112310, type).

186. V. CAPIULIGERA (Griseb.) Sm. & Pitt. Guzmania harrisii Mez in DC. Mon. Phan. 9: 927. 1896. Type: Harris Fl. Jam. 5146.

87. V. COWELLII (Mez & N. L. Britton) L. B. Smith, comb. nov. Tillandsia cowellii Mez & N. L. Britton, Bull. Herb. Boiss. II. 3: 225. 1903. Vriesea egregia L. B. Smith, Phytologia 4: 355, pl. 1, figs. 4-6. 1953.

LESSER ANTILLES: ST. KITTS: Summit of Mount Misery, September-October 1901, N. L. Britton & Cowell 553 (B, type of Tillandsia cowellii Mez & N. L. Britton).

VENEZUELA: ARAGUA: Cloud forest, Rancho Grande, alt. 1800 m, October 13, 1951, M. B. Foster 2746 (US, type of Vriesea egregia L. B. Smith).

The two types are nearly identical except that the scape is erect in the West Indian one and decurved in the Venezuelan.

162a. V. DODSONII L. B. Smith, sp. nov. V. unilaterale (Baker) Mez in systemate mea proxima sed foliis subtus insigniter albo-lepidotis, bracteis florigeris sepalisque latioribus et crassioribus differt.

PLANT flowering 18-21 cm high. LEAVES more than 20 in an obconical rosette, 13-15 cm long, strongly purple-tinged and strikingly white-lepidote beneath especially toward base; sheaths elliptic, 5 cm long; blades ligulate, broadly rounded and apiculate, 15 mm wide. SCAPE erect, slightly curved, about equaling the leaves; scape-bracts densely imbricate, ovate with a short stout apiculus, coriaceous, even, lepidote. INFLORESCENCE to 3-flowered with the terminal flower vestigial; rhachis flexuous, obtusely angled. FLORAL BRACTS somewhat less than twice as long as the internodes, becoming secund with the flowers, broadly ovate, 20 mm long, exceeded by the sepals, coriaceous, ecarinate, glabrous in age; pedicels stout, obconic, 5 mm long. SEPALS broadly elliptic, obtuse, 18 mm long, ecarinate; petals and stamens unknown. CAPSULE ellipsoid, 28 mm long. Pl. II, fig. 1: Apex of leaf x 1; fig. 2: Inflorescence x 1.

COSTA RICA: SAN JOSE: On stump on open hillcrest, 14 km south of San Isidro de el General on the road to Dominical, 2 March 1966, L. B. Smith & Calaway H. Dodson 15306 (US, type).

148a. V. DUARTEANA L. B. sp. nov. In systemate mea V. penduliflora L. B. Smith atque V. segadas-viannae L. B. Smith affinis, a priore bracteis florigeris brevibus, a posteriore ramorum basibus sterilibus nudis, a amobus foliis, scapi bracteis atque bracteis primariis inferioribus longe attenuatis distinguenda. In systemate naturali Mezii V. geniculata (Wawra) Wawra affinis

sed foliis longe attenuatis, floribus secundis differt.

PLANT flowering over 1 m high (base unknown). LEAVES presumably rosulate, to 63 cm long; sheaths elliptic, 15 cm long, covered throughout with appressed brown-centered scales; blade narrowly subtriangular, long-attenuate, 4 cm wide at base, densely and finely appressed-lepidote beneath, glabrous above. SCAPE erect, 2 cm in diameter, glabrous, red (! Duarte); scape-bracts erect, densely imbricate, the lower foliaceous, the upper long-attenuate from an ovate base. INFLORESCENCE bipinnate, subcylindric, ca 8 cm in diameter; primary bracts like the upper scape-bracts, suberect, their blades exceeding the lower branches; racemes divergent or arching from a long erect naked sterile base, to 8 cm long in all, few-flowered; rhachis slender, geniculate, quadrangular, glabrous. FLORAL BRACTS more or less downwardly secund with the flowers, ovate, acute, 2 cm long, about 4 times as long as the internodes, much exceeded by the sepals, carinate, subchartaceous and nerved when dry, glabrous; flowers in part downwardly secund, yellow (! Duarte); pedicels rather slender, 7 mm long. SEPALS elliptic, obtuse, 25 mm long, ecarinate, nerved; petals (old) evidently more than twice as long as the sepals and soon flaccid and drooping; pistil to 6 cm long. Pl. II, fig. 3: Primary bract x 1/2; fig. 4: Branch x 1/2; fig. 5: Sepal x 1.

BRAZIL: MINAS GERAIS: Terrestrial, near Diamantina, 2 February 1965, A. P. Duarte 9017 (HB 35657, type).

118, (174_a). V. LANCIFOLIA (Baker) L. B. Smith, Lilloa 6: 386, pl. 2, fig. 3, 4. 1941; Phytologia 13: 122. 1966.

A specimen of the type collection (Blanchet 3458) in the Brussels herbarium shows the flowers distinctly secund. This requires an alternative position in my key next to V. fibrosa L. B. Smith from which it differs in its relatively larger leaf-sheaths, wider and not exactly triangular blades, and smaller sepals.

36a. V. MONSTRUM (Mez) L. B. Smith, comb. nov. Tillandsia monstrum Mez in Fedde Rep. Spec. Nov. 16: 78. 1919. Type: Kalbreyer 1393.

COSTA RICA: CARTAGO: Atlantic rainforest, near Pavones, 9° 56' N, 83° 38' W, alt. 800 m, Horich Vriesea spec. no. 32, cultivated August 1966, J. Marnier-Lapostolle s. n. (US).

Bottled material received from J. Marnier-Lapostolle has confirmed my suspicion that this species is a Vriesea. He makes the interesting observation that, even at anthesis, the flower is wholly enclosed in the floral bract.

210a. V. ORJUELAE L. B. Smith, sp. nov. A V. viride (Mez & Wercklé) Sm. & Pitt., cui affinis, foliorum vaginis extus atrocastaneis, laminis angustioribus, inflorescentia laxa, sepalis angustioribus differt.

PLANT short-caulescent, reproducing vegetatively by basal offsets, flowering 55 cm high. LEAVES many in a funnelform rosette, 3 dm long, minutely brown-lepidote throughout; sheaths subellip-

tic, 7 cm long, dark castaneous with pale margins and apex; blades narrowly triangular, 2-3 cm wide, flat. SCAPE erect, 4 mm in diameter at apex, glabrous; scape-bracts erect, imbricate, the lower subfoliaceous, the upper broadly elliptic, long-stenuate. INFLORESCENCE known only from a single old specimen, cylindrical, laxly bipinnate, 15 cm long, glabrous; primary bracts like the upper scape-bracts, erect to spreading, exceeding the flowers; branches completely aborted with 2 flowers fasciculate in the axil of each primary bract. FLORAL BRACTS incompletely known but evidently broad and about equaling the 7 mm long spreading pedicels. SEPALS elliptic, obtuse, 17 mm long, coriaceous, even. Pl. II, fig. 6: Apex of leaf x 1; fig. 7: Primary bract and branch x 1; fig. 8: Sepal x 1.

COLOMBIA: VALLE: Seacoast, Río Raposo, ca 3° 43' N, 77° 10' W, alt. 3 m, 20 August 1966, Pablo A. Orjuela 290 (US, type; Univ. del Valle, isotype).

143a. V. PEREIRAE L. B. Smith, sp. nov. A V. itatiaiae Wawra, cui affinis, foliis attenuatis, rhachi gracile, bracteis florigeris sepalsisque multo angustioribus differt.

PLANT flowering over 1 m high (base unknown). LEAVES presumably rosulate, to 63 cm long, obscurely punctulate-lepidote throughout; sheaths elliptic, 15 cm long, somewhat darkened apically; blades ligulate, attenuate, to 55 mm wide. SCAPE erect, ca 1 cm in diameter, glabrous; scape-bracts densely imbricate, the lower subfoliaceous, the upper ovate, attenuate. INFLORESCENCE bipinnate with ca 16 branches; primary bracts like the upper scape-bracts, erect and imbricate; racemes spreading from a suberect bracteate sterile base, the fertile part to 13 cm long, densely 15-flowered; rhachis geniculate, quadrangular, 2 mm wide. FLORAL BRACTS imbricate, more or less downwardly second with the flowers, ovate, acute, subcoriaceous, even, glabrous, red (! E. Pereira), drying to castaneous; pedicels 3 mm long, rather slender. SEPALS linear-lanceolate, acute, 28 mm long, the posterior ones with basal keels decurrent on the pedicel; petals ca 35 mm long, about equaling the stamens. Pl. II, fig. 9: Apex of leaf x 1/2; fig. 10: Branch of inflorescence x 1/2; fig. 11: Sepal x 1.

BRAZIL: ESPIRITO SANTO: Castelo, Forno Grande, 6 December 1956, E. Pereira 2235 (RB 96093, type).

6a. V. SAGASTEGUII L. B. Smith, sp. nov. A V. cylindrica L. B. Smith, cui affinis, spicis fere omnibus occultis, bracteis primariis florigerisque densissime lepidotis differt.

PLANT flowering 75 cm high. LEAVES rosulate, 80 cm long, covered with appressed cinereous brown-centered scales; sheaths indistinct; blades very narrowly triangular, 4 cm wide. SCAPE straight, 1 cm in diameter; scape-bracts densely imbricate, broadly elliptic, covered with pale appressed scales, linear-laminate. INFLORESCENCE bipinnate, densely cylindrical, 30 cm long 3 cm in diameter; primary bracts like the scape-bracts but merely apiculate, to 7 cm long, covering all but the highest spikes; spikes lanceolate, complanate, densely 7-flowered, 5 cm long

without the naked sterile base, 17 mm wide. FLORAL BRACTS ovate, 25 mm long, covering the sepals, ecarinate, chartaceous, nerved, densely pale-lepidote. SEPALS ovate, 20 mm long, ecarinate, thin-coriaceous, glabrous except at apex; petals tubular-erect, 5-6 cm long; stamens exerted. Pl. II, fig. 12: Spike x 1/2; fig. 13: Sepal x 1.

PERU: CAJAMARCA: Prov. Santa Cruz: On rocks, between Catache and Santa Cruz, alt. 1500 m, 20 May 1965, A. Lopez & A. Sagástegui 5175 (US, type; TRP, isotype).

153a. *V. SAXICOLA* L. B. Smith, sp. nov. A *V. cearensis* L. B. Smith, cui affinis, foliorum vaginis atro-castaneis, bracteis florigeris sepalisque multo majoribus differt.

PLANT flowering 125 cm high (! Schwacke). LEAVES 15 or more in a funnelform rosette, 4 dm long, subdensely vestite throughout with minute dark appressed scales; sheaths elliptic, nearly as long as the blades, their lower half dark castaneous; blades ligulate, broadly rounded and apiculate, 45 mm wide, finely purple-spotted. SCAPE erect, 7 mm in diameter near the middle, glabrous; scape-bracts erect, the lower subfoliaceous and densely imbricate, the upper broadly ovate, apiculate, about equaling the internodes. INFLORESCENCE bipinnate, 27 cm long, typically of 4 branches; primary bracts like the upper scape-bracts, shorter than the prophyllate bases of the lateral spikes; spikes subdensely 6-8-flowered, 13-18 cm long, the lateral suberect, the terminal on the end of a scape-like peduncle with several imbricate bracts; rhachis flexuous, 2-3 mm wide, angled. FLORAL BRACTS more or less downwardly secund with the flowers especially on the lateral branches, broadly ovate, minutely cucullate, 23 mm long, nearly or quite twice the internodes, equaling about the middle of the sepals, obtusely if at all carinate, coriaceous, even, whitish (! Schwacke), punctulate-lepidote at apex; pedicels obconic, 6 mm long. SEPALS elliptic, obtuse, 27 mm long; petals white (! Schwacke). Pl. II, fig. 14: Branch of inflorescence x 1/2; fig. 15: Sepal x 1.

BRAZIL: MINAS GERAIS: Serra do Lenheiro, near São João d'El Rei, alt. 900 m, 27 December 1895, Schwacke 12086 (RB 112303, type).

170a. *V. WURDACKII* L. B. Smith, sp. nov. *V. haplostachyae* (C. Wright) L. B. Smith in systemate meo affinis sed foliorum laminis angustissime triangularibus, bracteis sepalisque chartaceis differt.

PLANT known only from fragments over 7 dm long but probably flowering very much higher. LEAVES ca 1 m long, densely and finely brown-lepidote beneath; sheaths ovate, 15 cm long; blades very narrowly triangular, long-attenuate, flat, 35 mm wide. SCAPE straight, 8 mm in diameter, glabrous; scape-bracts erect, closely enfolding the scape, the lower subfoliaceous, the upper ovate, apiculate, slightly exceeding the internodes. INFLORESCENCE simple, ca 25 cm long, glabrous in age; rhachis slender, flexuous, angled. FLORAL BRACTS more or less secund with the

flowers, broadly ovate, acute, 4 cm long, all but the lowest twice as long as the internodes, exceeded by the sepals, ecarinate, chartaceous, nerved. SEPALS oblong-elliptic, obtuse, 33 mm long, 8 mm wide, chartaceous, nerved. Pl. II, fig. 16: Scape and base of inflorescence x 1/2; fig. 17: Sepal x 1.

VENEZUELA: AMAZONAS: Terrestrial, locally frequent in scrub forest on granite dome on right bank of Río Siapa just below Raudal Gallineta (about 110 river km from mouth), alt. 600-700 m, 21 July 1959, Wurdack & Adderley 43569 (US, type; NY, isotype).

Possibly Vriesea wurdackii is more nearly related to V. fibrosa L. B. Smith because of its thin floral bracts and sepals, but it is eliminated earlier in my key because of its imbricate scape-bracts.

Plate I

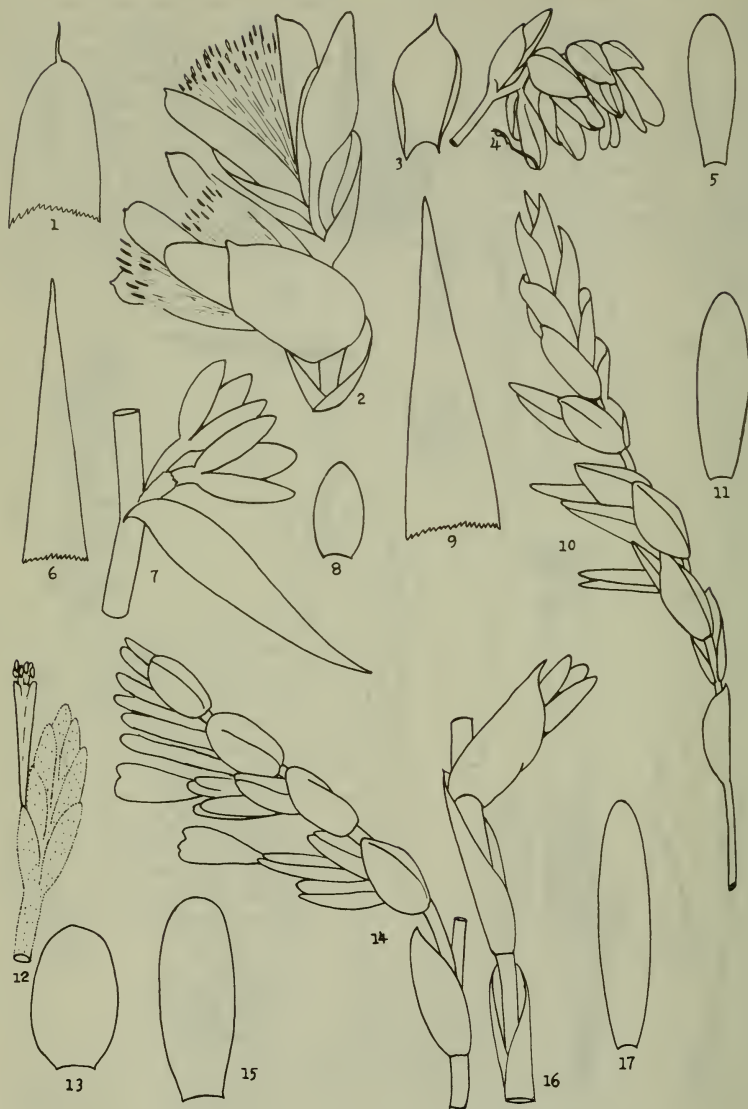
- Fig. 1: *Aechmea castelnavii*.
2 - 4: *Encholirium gracile*.
5, 6: *Greigia ocellata*.
7, 8: *Navia incrassata*.
9, 10: *Navia intermedia*.
11, 12: *Navia lasiantha*.
13, 14: *Orthophytum humile*.
15, 16: *Pitcairnia venezuelana*.
17, 18: *Puya adscendens*.
19, 20: *Tillandsia arenicola*.
21, 22: *Tillandsia calcicola*.
23, 24: *Tillandsia teres*.
25, 26: *Vriesea cacuminis*.

Plate I



See opposite page for explanation.

Plate II



Figs. 1, 2: *Vriesea dodsonii*. 3-5: *V. Duarteana*.
 6-8: *V. orjuelae*. 9-11: *V. pereirae*.
 12, 13: *V. sagasteguii*. 14, 15: *V. saxicola*.
 16, 17: *V. wurdackii*.