

NOTES ON BROMELIACEAE, XXXV

Lyman B. Smith

KEY TO TILLANDSIA AND SIMULATORS,

SUPPLEMENT II

Thanks largely to the collecting and publications of Professor Eizi Matuda, Dr. Edmundo Pereira, and Professor Werner Rauh, I am obliged to write a second supplement to my Tillandsia key (Phytologia 20: 121. 1970) after only four years. Supplement I immediately followed the original key on p. 157. As in the first supplement, there is an indication of the species relation to the original key and that is followed in a second section by whatever note or description is necessary. The notes below are intended as the final ones before completion of the manuscript of Tillandsia for my monograph.

In a number of cases Professor Rauh has given me previews of his new species to enable me to place them in my key. These are in press and are not validly published here since they lack Latin diagnoses. So far I have not examined several types of new species proposed by Dr. Pereira and by Professor Matuda and for lack of evidence am unable to place them in my key.

In the following supplementary sections to the key, species to be added or substituted are marked with an asterisk.

Subkey I

- 28(1). Floral bracts carinate and incurved toward apex.
 28a. Spikes about 7-flowered; sepals glabrous. Ecuador, Peru.
 (T. straminea).....T. purpurea
 28a. Spikes 3-flowered including a sterile apical one; sepals
 lepidote. Brazil. (cf. also III-19(2)).....*T. sucrei
- 33(1). Inflorescence simple.
 33a. Floral bracts to 21 mm long; leaf-blades narrowly triangular. Mexico.....T. albida
 33a. Floral bracts ca. 4 mm long; leaf-blades filiform. Peru.
 *T. schunkei
- 39(1). In place of T. calocephala write *T. nana

Subkey II

- 29(2). Inflorescence amply bipinnate; scape elongate.
 29a. Spikes all erect; inflorescence dense and narrow. Hispaniola.....T. baliophylla
 29a. Spikes all but the terminal decurved; inflorescence very
 lax and broad. Mexico.....*T. superinsignis
- 36(2). Sepals covered by the floral bracts.

- 36a. Inflorescence not over 5 cm long; sepals not over 20 mm long. Mexico, Peru.....T. lepidosepala, T. reducta
- 36a. Inflorescence to 50 cm long, simple, 2-3 cm wide; sepals to 30 mm long. Mexico.....*T. califanii
- 37(1). Inflorescence 3-5 cm long, simple or with a single small lateral spike.
- 37a. Scape distinct; scape-bracts longer than the floral bracts; flowers all exactly distichous. Mexico...T. lepidosepala
- 37a. Scape very short; scape-bracts shorter than the floral bracts; lower flowers slightly more than distichous. Guatemala.....*T. velickiana
- 49(1). Floral bracts strongly nerved.
- 49a. Sepals exserted; spikes linear, about 15 cm long. West Indies.....T. lineatispica
- 49a. Sepals included; spikes lanceolate or narrowly lanceolate, 5-8 cm long. Mexico.
- 49b. Primary bracts scarcely larger than the floral bracts or the inflorescence simple.....*T. maritima
- 49b. Primary bracts more than half as long as their axillary spikes; inflorescence always compound.....*T. hintoniana
- 57(1). Floral bracts prominently nerved.
- 57a. Upper scape-bracts distichous; leaf-blades 12-18 mm wide. Peru, Ecuador.....T. lindenii, T. umbellata
- 57a. Upper scape-bracts polystichous; leaf-blades 35 mm wide. Guatemala.....*T. nervata
- 83(2). Leaf-sheaths ferruginous (or dark brown).
- 83a. Sepals connate only posteriorly; (stamens exserted). Florida, West Indies and Mexico to northern South America. T. fasciculata
- 83a. Sepals equally connate into a tube for half their length, 4 cm long; (stamens included). Mexico....*T. beutelspacheri
- 89(1). Spikes thick; posterior sepals alate-carinate. Mexico.
- 89a. Floral bracts dull, laxly lepidote throughout, verrucose when dry as if somewhat fleshy.....T. intumescens
- 89a. Floral bracts lustrous and glabrous except the lepidote apex, even.....*T. langlasseana

Subkey III

- 10(1). Sepals lepidote. Mexico.
- 10a. Scape short, almost hidden by the leaves; leaf-sheaths 10-15 mm long, not at all inflated.....T. lepidosepala
- 10a. Scape elongate; leaf-sheaths 60 mm long, subinflated, dark castaneous.....*T. subinflata
- 14(2). Floral bracts ecarinate, nerves about equally developed.

- 14a. Upper scape-bracts long-laminate. Mexico; Ecuador and Peru.
T. gymnobotrya, T. oroyensis
- 14a. Upper scape-bracts bladeless. Jamaica.....*T. adamsii
- 19(2). Floral bracts prominently nerved.
- 19a. Spikes more than 3-flowered. Paraguay, Bolivia, Brazil and Argentina; and Florida, West Indies and Mexico to Venezuela and Bolivia.....T. lorentziana, T. valenzuelana
- 19a. Spikes 3-flowered including a reduced sterile apical flower. Brazil.....*T. sucrei
- 22(2). Inflorescence simple or rarely of 2 spikes.
- 22a. Scape very short and mostly concealed by the leaves; upper scape-bracts polystichous. Salvador, Honduras.
T. cryptopoda
- 22a. Scape elongate; upper scape-bracts distichous. Ecuador.
 *T. rhodosticta
- 46(2). Floral bracts obtuse (add: "to acuminate"), nerved or rugose (add: "When dry"); rhachis prominently winged (excavated). Peru. to cover T. extensa Mez emend. Rauh.
- 48(1). Spikes 15 mm wide; floral bracts 20 mm long.
- 48a. Floral bracts glabrous; inflorescence amply tripinnate. Peru.....T. extensa
- 48a. Floral bracts cinereous-lepidote at apex; inflorescence bipinnate. Ecuador.....*T. lehmannii

Subkey IV

- 9(1). Branches nearly or quite straight, slender, sterile for about half their length from base.
- 9a. Leaf-blades 9-11 cm wide, green; sepals 25-27 mm long, slightly exserted above the floral bracts. Hispaniola.
T. paniculata
- 9a. Leaf-blades 1.5-2.5 cm wide, cinereous; sepals 18-20 mm long, wholly covered by the floral bracts. Peru.
 *T. propagulifera

Subkey V

- 11(1). Internodes of the rhachis 20-30 mm long.
- 11a. Floral bracts about equaling the internodes, equaling or shorter than the sepals; leaf-sheaths concolorous and merging gradually with the blades; (petal-blades narrow; stamens exserted). Florida, West Indies, Panama, northern South America.....T. flexuosa
- 11a. Floral bracts distinctly longer than the internodes, longer than the sepals; leaf-sheaths dark brown, contrasting with the blade; (petal-blades suborbicular; stamens deeply included). Ecuador.....
 *T. dodsonii

16(1). Floral bracts lepidote.

16a. Leaf-sheaths large, distinct, very dark castaneous; floral bracts equaling or exceeding the sepals. Honduras.

T. steiropoda

16a. Leaf-sheaths narrow, concolorous with and indistinguishable from the blades; floral bracts slightly exceeded by the sepals. Mexico.....*T. gracillima

17(1). Floral bracts 3 times as long as the internodes. Mexico.

17a. Floral bracts convex, but not inflated nor cretaceous.

T. parryi

17a. Floral bracts inflated, cretaceous.....*T. cretacea

Subkey VI

14(1). Pseudo-bulb elongate, one-third to more than one-half the total length of the plant.

14a. Leaves even. Florida, West Indies and Mexico to Colombia.

T. circinnata

14a. Leaves strongly sulcate even when living. Mexico.

*T. circinnatoides

Subkey VII

36(1). Floral bracts with convex sides, wrinkled when dry; spikes slightly compressed.

36a. Spikes ovate or lanceolate, acute; floral bracts narrow and partially exposing the rhachis at anthesis. Mexico.

T. violacea

36a. Spikes elliptic, very broadly acute or rounded; floral bracts ample, wholly covering the rhachis at all times.

Mexico, Guatemala.....*T. eizii

35(2). Spikes 2-3 cm wide, lance-oblong to elliptic.

35a. Leaf-blades 45-60 mm wide; (stamens included). Colombia and Venezuela; Peru.....T. cuatrecasasii, T. wurdackii

35a. Leaf-blades 20 mm wide; (stamens exerted). Mexico.

*T. carlos-hankii

Subkey VIII

8(1). Bracts acute.

8a. Scape distinct; scape-bracts longer than the floral bracts; flowers all polystichous. Mexico.....T. benthamiana

8a. Scape very short; scape-bracts shorter than the floral bracts; upper leaves distichous. Guatemala.

*T. velickiana

10(1). Scape short or none; (add: "scales spreading especially along the leaf-margins. Bolivia.") (replacing T. nana but differing in its leaf-scales).....

*T. edithae

Subkey IX

- 1(1). Posterior and anterior sepals all ecarinate and alike.
 1a. Floral bracts fleshy, strongly rugose-sulcate in drying, 4-6 times as long as the internodes. Peru.....*T. carnosa
 1a. Floral bracts coriaceous or subcoriaceous, even to nervéd, but not rugose in drying.....Remaining species under 1(1)
- 12(2). Spikes nutant.
 12a. Floral bracts 15-20 mm long. Venezuela to Peru. T. denudata
 12a. Floral bracts 50 mm long. Mexico.....*T. superinsignis
- 34(2). Sepals 20 mm long. Ecuador.
 34a. Capsules about equaling the sepals; floral bracts narrow and partially exposing the rhachis at anthesis. T. brevicapsula
 34a. Capsules more than twice as long as the sepals; floral bracts ample, wholly covering the rhachis at anthesis. *T. nervisepala
- 36(1). floral bracts 27-35 mm long.
 36a. Spikes more or less caudate-acuminate from a base 3-5 cm wide, sessile or subsessile. Ecuador, Peru...T. stenoura
 36a. Spikes elliptic and equally narrowed at base and apex, distinctly stipitate with a sterile base nearly equaling to exceeding the primary bracts. Peru.....*T. reuteri
- 45(1). Floral bracts oblong, (20-) 25 (-27) mm long. Peru.
 45a. Primary bracts barely exceeding the sterile bases of the branches; inflorescence tripinnate; sheaths concolorous with the blades.....T. glauca
 45a. Primary bracts 1/2 to 3/4 as long as the basal branches (spikes).
 45b. Sheaths dark violet; posterior sepals connate. *T. pomacochae
 45b. Sheaths concolorous with the blades; posterior sepals free *T. bongarana
- 54(1). Floral bracts drying pale.
 54a. Primary bracts scarcely longer than the floral bracts, apiculate; spikes linear-lanceolate. Colombia....T. reversa
 54a. Primary bracts large, the lower laminate and covering about half the axillary spike; spikes lanceolate. Peru. *T. dudleyi

Subkey X

- 1(1). Lower floral bracts less than twice the internodes; rhachis slender.
 1a. Flowers downwardly secund. Ecuador..*T. marnier-lapostollei
 1a. Flowers not secund as a whole but the petals sometimes

drooping. Colombia; Peru....T. rariflora, T. hutchisonii

2(2). Rhachis geniculate; inflorescence tripinnate. Peru.

2a. Leaves concolorous; blades ligulate, broadly subacute and apiculate; flowers subspreading.....T. hutchisonii

2a. Leaves strongly cross-banded; blades attenuate-ligulate to a stout cusp; flowers erect.....*T. hildae

9(2). Floral bracts broadly convex, ecarinate.

9a. Flowers suberect; margins of the floral bracts narrow, nearly or quite even. Bolivia and Argentina; Peru.

T. maxima, T. platyphylla

9a. Flowers subspreading; margins of the floral bracts broad, strongly bullate-crisped. Peru.*T. undulatobracteata

21. Inflorescence much branched; plant to 3.3 m high; (add:

"floral bracts 4-5 times as long as the internodes, ample, covering nearly or all of each sepal; leaves thick.").

T. grandis

21. Inflorescence simple or few-branched; (add: "plant less than 2 m high; floral bracts 2-3 times as long as the internodes, narrow, exposing much of each sepal; leaves thin.").

T. viridiflora

Subkey XII

3(2). Floral bracts imbricate and concealing the rhachis; inflorescence erect or nearly so.

3a. Leaves 8-20 cm long, shorter than to equaling the inflorescence; blades narrowly triangular, 5-12 mm wide; floral bracts suborbicular. Colombia to Bolivia.....T. seemanii

3a. Leaves to 45 cm long, much exceeding the inflorescence; blades subfiliform, to 4 mm wide at base; floral bracts ovate. Venezuela.....*T. steyermarkii

29(2). Sepals rounded to truncate; leaf-blades (20-) 30-50 mm wide.

29a. Leaf-sheaths strongly inflated. Ecuador.....*T. blassii

29a. Leaf-sheaths nearly flat.....Remaining species under 29(2)

42(2). Branches divergent or curved-ascending.

42a. Leaf-blades linear, about 5 mm wide. Peru, Bolivia.

*T. parviflora

42a. Leaf-blades narrowly triangular or ligulate, 8-30 mm wide.

Remaining species under 42(2)

TILLANDSIA

Relative to Mez in Engler, Pflanzenreich IV. Fam. 32. 1935.

ADAMSII R. W. Read, Phytologia, cf. preceding article in this issue. TIL.

ANDREANA E. Morr. ex André; Pflr. 496, TIL; L. B. Smith,

Contr. U. S. Nat. Herb. 29: 476, fig. 54. 1951; Rauh, Bromelien 1: 197. 1970. T. funckiana Baker, Pflr. 496; Padilla, Bromel. Soc. Bull. 17: 49 (fig.), 52. 1967. TIL.

M. B. Foster, Padilla, and others consider T. funckiana specifically distinct, while Rauh considers it a variety of T. andreana, although he has not gone so far as to give it a valid name. Foster's own collections show a great variation in stem length of flowering plants and are the original and continuing reason for my reducing T. funckiana. In reality we can not be sure until flowering T. andreana is collected from the topotype locality.

What is a much more interesting question is the position of the species within the genus. Technically it can be said to belong in subgenus Tillandsia but the corolla is asymmetric like those of most species of Pitcairnia and the recurving petal-tips expose the shorter of the unequal stamens.

BAKERI, Pflr. 502. PS-C. Omitted by mistake; insert after BAILEYI.

BEUTELSPACHERI Matuda, nom. nov. ALL. T. insignis Matuda, Cact. y Sucul. Mex. 16: 91, fig. 48. 1971, non L. B. Smith & Pittendrigh, 1953.

BLASSII L. B. Smith, Phytologia 22: 85, pl. 1, fig. 5, 6. 1971. PS-C.

BONGARANA L. B. Smith, sp. nov. A T. pomacochoae Rauh, cui affinis, foliis concoloribus, sepalis liberis differt. ALL.

PLANT stemless, flowering 1 m high. LEAVES many in a funnellform rosette, to 45 cm long, green; sheaths broadly ovate, ca. 15 cm long, minutely appressed-lepidote; blades ligulate, attenuate at apex, flat, 4 cm wide, densely and minutely lepidote beneath, soon glabrous above. SCAPE erect, much exceeding the leaves; scape-bracts imbricate, the lowest sub-foliaceous, the others elliptic, acute. INFLORESCENCE fusiform, laxly bipinnate, glabrous; primary bracts like the upper scape-bracts, about half as long as the axillary spikes; spikes divergent, 7 cm long, lanceolate with a sterile bracteate base, densely 4-flowered, complanate. FLORAL BRACTS imbricate, oblong, acute, 3 cm long, exceeding the sepals, carinate, coriaceous, even, red; flowers subsessile. SEPALS free, linear, acute, 25 mm long, the posterior carinate; petals 35 mm long, the blades purple with white apices; stamens included. Pl. III, fig. E: Inflorescence; fig. F: Sepal.

PERU: AMAZONAS: Prov. Bongará: Epiphyte in moist high forest, hills 1-5 km southeast (150°) of Yambrasbamba, 2100-2400 m alt, 25 June 1962, Wurdack 1037 (US, type).

CALIFANII Rauh, Journ. Bromel. Soc. 21: 65, fig. 1971. TIL.

At first glance T. califanii so closely resembles T. achyrostachys that it is easily mistaken for that species. However, its densely lepidote floral bracts quickly distinguish it and even bring it out to a different position in the key from T. achyrostachys.

The leaf-sheaths are slightly different from the original description in that their scales are brown-centered like those

on the blade. The sheath-color is derived from the dark tissue below showing through the large pale scale-margins and covers only the base of the sheath.

CARLOS-HANKII Matuda, Cact. & Succul. Journ. (U. S.) 45: 186, fig. 1, 2. 1973. TIL.

CARNOSA L. B. Smith. TIL. IX-4 (2).

Var. CARNOSA. INFLORESCENCE bipinnate; branches spreading, the sterile base about twice as long as the 18 cm spike. FLORAL BRACTS to 5 cm long; flowers short-pedicellate. SEPALS free, to 42 mm long; stamens slightly exerted at anthesis.

Var. LONGISPICATA Rauh, ined. INFLORESCENCE bipinnate; branches ascending relative to the axis, 40 cm long, the sterile base only 6-15 cm long. FLORAL BRACTS 35-40 mm long; flowers sessile. SEPALS connate for 2 mm, to 30 mm long; stamens much exerted at anthesis.

Var. BREVISTIPITA Rauh, ined. INFLORESCENCE tripinnate at base; branches ascending relative to the axis, the basal sterile bases to 20 cm long; spikes 12-15 cm long with sterile bases 3 cm long. FLORAL BRACTS 30 mm long; flowers sessile. SEPALS connate for 3 mm, ca. 25 mm long; stamens much exerted at anthesis.

Owing to the relatively short floral bracts of the above variety, my key has had to be realigned to bring forward the fleshy character of the floral bracts. All three varieties have dense spikes with floral bracts 4-6 times the internodes where they are barely more than 2 in nearly related T. ecarinata.

CIRCINNATOIDES Matuda, Cact. & Succul. Journ. (U. S.) 45: 187, fig. 4, 4a, 5, 1973, as "circinnatioides." TIL. Matuda gives other distinctions than the sulcate leaves cited above but they are all covered in the very variable characters of T. circinnata. Horticulturists will thank him for giving a name to a taxon that was becoming a problem.

CRETACEA L. B. Smith, sp. nov. A T. inflata Mez, cui valde affinis, spicis laxis, internodiis longioribus, bracteis florigeris angustioribus differt. TIL.

PLANT known only from fragments but probably stemless and flowering over 1 m high. LEAVES ca. 50 cm long, bearing minute, appressed, brown-centered scales throughout; sheaths ample, densely lepidote, brownish; blades narrowly triangular, attenuate, 5 cm wide at base, laxly lepidote, green. SCAPE unknown. INFLORESCENCE laxly bipinnate, over 32 cm long, white-cretaceous except the petals; primary bracts broadly ovate, apiculate, about equaling the 1-bracteate sterile base of the spike; spikes oblong, acute, 20 cm long, laxly many-flowered; rhachis straight or nearly so, narrowly winged. FLORAL BRACTS strongly divergent at anthesis, 32 mm long, 3 times the internodes and about equaling the sepals, broadly elliptic, apiculate, ecarinate, inflated, probably fleshy because wrinkled and nerveless when dry, inconspicuously lepidote; pedicels short. SEPALS all alike, elliptic, 28 mm long, ecarinate; petals ca. 45 mm long, drying violet; stamens and style exerted. Pl. III, fig. A: Primary bract and spike;

fig. B: Sepal.

MEXICO: CHIHUAHUA: On igneous rocks, La Bufa, southeast of Creel, 22 September 1957, I. Knobloch 564 (US, type).

DODSONII L. B. Smith, sp. nov. A T. narthecioide Presl, cui affinis, bracteis florigeris quam internodiis haud subduplo longioribus, omnibus partibus multo majoribus differt. PHY.

PLANT flowering to 84 cm high. LEAVES many in a funnellform rosette, to 22 cm long, covered throughout with minute, flat, brown-centered scales; sheaths elliptic, ca. 4 cm long, dark brown; blades narrowly triangular, ca. 12 mm wide at base, the outer much reduced. SCAPE erect, slender, much exceeding the leaves; scape-bracts erect, imbricate, elliptic, apiculate. INFLORESCENCE erect, simple, lax, many-flowered; sparsely pale-lepidote; rhachis very slender, flexuous. FLORAL BRACTS spreading, to 30 mm long, exceeding the internodes and the sepals, ovate, convex and rolled around the sepals, thin-coriaceous, nerved; flowers short-pedicellate. SEPALS free, 20 mm long, elliptic, broadly acute; petal-blades suborbicular, spreading, 20 mm long, white with yellow eye; stamens and pistil deeply included. Pl. II, fig. F: Inflorescence; fig. G: Sepal.

ECUADOR: PICHINCHA: epiphytic in old orange trees along road, km 30 on Santo Domingo to Quito road, 1100 m, 27 December 1972, C. H. Dodson 5225 (US, type).

DUDLEYI L. B. Smith, sp. nov. A T. reversa L. B. Smith, cui verisimiliter affinis, bracteis primariis amplis, inferioribus laminatis, spicas axillares semioccultantibus, spicis lanceolatis differt. ALL.

PLANT stemless, flowering 30 to probably 50 cm high. LEAVES in a spreading rosette, 35-40 cm long, covered with fine, appressed, brown-centered scales; sheaths ample, 10-15 cm long, maculate with red-purple merging into solid purple at base; blades ligulate, attenuate, 2-3 cm wide, maculate, more or less cinereous beneath. SCAPE erect; scape-bracts erect, densely imbricate, subfoliaceous. INFLORESCENCE densely bipinnate, ellipsoid, 13-18 cm long; primary bracts broadly ovate, even, sublustrous, red, sparsely and obscurely lepidote, the lower laminate and covering about half the axillary spike; spikes lanceolate, acute, strongly complanate, 5-7 cm long, 15-20 mm wide, densely 8-12-flowered. FLORAL BRACTS broadly ovate, apiculate, 20-25 mm long, covering the sepals, strongly carinate, thin-coriaceous, even, glabrous, lustrous, bright blood-red (! Dudley), drying to stramineous; pedicels short. SEPALS lanceolate, acute, 18 mm long, the posterior carinate, connate for 5 mm; petal-blades elliptic, obtuse, 10 mm long, lavender (! Dudley); stamens and pistil included. Pl. III, fig. G: Inflorescence; fig. H: Posterior sepals.

PERU: CUZCO: Prov. La Convencion: Cordillera Vilcabamba: epiphyte 6-18 m (20-60 ft) in tree branches, very dense and damp cloud forest, about half way between Camp 2 $\frac{1}{2}$, 1730 m, and Camp 3, 2100 m, 12° 38' S, 73° 37' W, 24 July 1968, T. R. Dudley 11332 (NA, type); cloud forest, 90 m (300 ft) northwest of Camp 2 $\frac{1}{2}$, by cascade, 1750 m, 12° 38' S, 73° 38' W, 26 June 1968,

Dudley 10528 (NA); steep and dry ridge (ceja) of reduced elfin forest, just above Camp 4, 2660 m, 12° 37' S, 73° 33' W, 30 June 1968, Dudley 10637 (NA); epiphyte, Chusquea thicket at edge of steep dry ridge, half way between Camps 2½ and 3 in reduced elfin forest, 12° 38' S, 73° 36' W, 30 June 1968, Dudley 10657 (NA).

EDITHAE Rauh, ined. ALL. This takes the place of T. nana Baker, which was placed here because of its supposed simple inflorescence. T. nana takes the place of the later T. calocephala and Rauh has pointed out the close relationship with his T. edithae. Besides its simple inflorescence, T. edithae also differs in its shorter broader leaf-blades with spreading scales and in its larger petals.

EIZII L. B. Smith, sp. nov. A T. violacea Baker, cui valde affinis, spicis ellipticis, latissime acutis vel rotundatis, bracteis florigeris latioribus et rhachin omnino occultantibus differt. TIL.

PLANT stemless, flowering to 2 m high (extended). LEAVES densely rosulate, 50-70 cm long, covered with minute, appressed, brown-centered scales; sheaths elliptic, ample, 18 cm long, brown to dark purple; blades narrowly triangular, 5 cm wide, green. SCAPE stout, decurved; scape-bracts foliaceous, densely imbricate. INFLORESCENCE bipinnate, sublux except at apex, over 1 m long; primary bracts spreading, their ample bases exceeding the lower branches, their blades foliaceous; spikes short-stipitate, elliptic, very broadly acute or rounded, 10 cm long, convex and slightly complanate. FLORAL BRACTS ample and densely imbricate, wholly concealing the rhachis, 30-35 mm long, broadly convex, probably fleshy because nerveless and strongly wrinkled when dry, glabrous, glaucous; flowers subsessile. SEPALS oblong, 25 mm long, subfree, the posterior incurved, alate-carinate; petal-blades erect, 30 mm long, violet; stamens exerted. CAPSULES slenderly cylindrical, 4 cm long. Pl. III, fig. C: Primary bract and spike; fig. D: Posterior sepals.

MEXICO: CHIAPAS: In wet forest, on tree, Cascada, Siltepec, 1200 m, 1 March 1951, E. Matuda 21012 (US, type; MEXU, isotype); San Cristobal las Casas, Mar 1949, Carlson 1652 e p (US); 29 Mar 1956, MacDougall s n (US); 22 Jan 1965, Breedlove & Raven 8299 (DS, US); Zinacantan, 31 March 1966, Laughlin 522 (US); 13 Apr 1966, 669 (US).

GUATEMALA: HUEHUETENANGO: San Mateo to Soloma, Feb 1969, Krukoff s n (US).

EXTENSA Mez, emend Rauh, Akad. Wiss. & Lit. Mainz "1973", no. 3: 29, fig. 16a-c, 17. 1973. TIL. III-48 (1).

PLANT stemless, flowering to 1.6 m high, producing many adventitious plants at base. LEAVES numerous, erect to spreading; sheaths 18-20 cm long, merging with the blades, brown-lepidote; blades cinereous-lepidote. SCAPE glabrous or sparsely lepidote. INFLORESCENCE broadly pyramidal, 50 cm long; axis straight, faintly angled, puniceous; spikes to 25 cm long. CAPSULE slenderly cylindrical, ca. 5 cm long.

PERU: LAMBAYEQUE: on rock, Rio Sana Valley, 7° 05' S, 79° 44' W, 600-700 m, August 1970, Rauh 24168 (HEID, US).

GRACILLIMA L. B. Smith, sp. nov. A T. setacea Sw., cui verisimiliter affinis, spicis laxis, sepalis paulo exsertis differt. TIL.

PLANT flowering 45-60 cm high (! Foster). LEAVES (unattached) fasciculate (?), 40 cm long, covered with pale subappressed scales; sheaths narrow, concolorous and merging with the blades, blackish and auricled at extreme base; blades very narrowly triangular, filiform-attenuate, ca. 5 mm wide at base, more or less involute at least when dry. SCAPE erect, very long and slender; scape-bracts erect, imbricate, the lower subfoliaceous, the upper lanceolate, apiculate. INFLORESCENCE typically 2-branched; primary bract like the upper scape-bracts, much shorter than the axillary spike; spikes elliptic with a narrow, sterile, bracteate base, lax; rhachis slender, nearly straight. FLORAL BRACTS strongly divergent at anthesis and exposing the rhachis, ovate, acute, to 19 mm long, convex, white-lepidote, thin-coriaceous, nerved at apex; pedicels short, obscure. SEPALs oblong, acute, 22 mm long, slightly exserted, glabrous, the posterior carinate, connate for 10 mm; petals tubular-involute, ca. 4 cm long, violet; stamens exserted. Pl. II, fig. H: Scape and inflorescence; fig I: Posterior sepals.

MEXICO: PUEBLA: near Cholula, February 11, 1958, M. B. Foster 3033 (US, type).

21. Inflorescence much branched; plant to 3.3 m high; (add: "floral bracts 4-5 times as long as the internodes, ample, covering nearly or all of sepal; leaves thick.").

T. grandis

21. Inflorescence simple or few-branched; (add: "floral bracts 2-3 times as long as the internodes, narrow, exposing much of each sepal; leaves thin.").

T. viridiflora

GRANDIS Schlecht.; Pflr. 455. PSA. Further study has revealed more distinctions between this species and T. viridiflora. Cf. key, X - 21 above.

HILDAE Rauh, Journ. Bromel. Soc. 21: 139, photo 1-4. 1971, nomen, without Latin diagnosis; valid publication: Akad. Wiss. & Lit. Mainz, ^{no. 3} 19, fig. 9-13. 1973. T. platyphylla sensu L. B. Smith, Phytologia 13: 146. 1966, quoad Hutchison & Wright 3516, non Mez, 1906. TIL.

HINTONIANA L. B. Smith, sp. nov. A T. lineatispica Mez et T. maritima Matuda, quibus affinis, bracteis primariis magnis a T. bourgaei Baker, quam simulans, foliis concoloribus viridibus, bracteis primariis angustioribus, laminis suis vix distinctis differt. TIL.

PLANT stemless, flowering 40-70 cm high. LEAVES over 10 in a funnelform rosette, 30-50 cm long, concolorous and green or slightly darkened at extreme base, covered with minute, appressed, brown-centered scales; sheaths ovate, ca. 10 cm long; blades narrowly triangular, 15-25 mm wide, flat. SCAPE erect; scape-bracts erect, densely imbricate, subfoliaceous. INFLORESCENCE densely bipinnate, subcylindric or fusiform, 13-26 cm

long; primary bracts large but typically somewhat shorter than their axillary spikes; spikes sessile, suberect, lanceolate, acute, 5 (-8) cm long, 2 cm wide, complanate. FLORAL BRACTS densely imbricate and concealing the rhachis at anthesis, 3 cm long, exceeding the sepals, ovate, attenuate, thin, nerved, sharply carinate, glabrous or subglabrous; flowers subsessile. SEPALs lanceolate, acute, 25 mm long, thin, nerved, glabrous, the posterior carinate, short-connate; petals erect, ca. 4 cm long; stamens exserted. CAPSULE slenderly cylindrical, 3-4 cm long. Pl. I, fig. I: Primary bract and spike; fig. J: flower.

MEXICO: MEXICO: Dist. Temascaltepec: On oak, Tejupilco, 18 April 1935, G. B. Hinton 7636 (US, type; GH, isotype); dry rocky slope, Cerro de la Muñeca, 1500 m, 27-28 February 1954, Matuda 30516 (MEXU, US); dry slope, high matorral, Ixtapantongo to La Junta, 600-800 m, 24-25 April 1954, Matuda 30662 (MEXU, US); moist slope, mixed oak and pine forest, Cañada de Nanchititla, 1600 m, 25-26 May 1954, Matuda 30791 (MEXU, US); moist ravine, Malinalco to Charma, 1300 m, 22 April 1954, Matuda 32175 (MEXU, US).

The concentration of Matuda's collections in 1954 suggests that this species has flowering years like many bamboos and like my own experience with Nidularium microps in Rio de Janeiro.

INTUMESCENS L. B. Smith var. BREVILAMINA L. B. Smith, var. nov. A var. intumescenti bractearum primariarum laminis quam spicis multo brevioribus, spicis subduplo majoribus differt. TIL. Pl. I, fig. G: Lower primary bract and spike; fig. H: Posterior sepals.

MEXICO: MICHOACAN: cult. Sue Gardner (US, type).

LANGLASSEANA Mez, Bull. Herb. Boiss. II. 3: 142. 1903. TIL.

Owing to a confusion of the type with another collection, I formerly placed this species in the synonymy of T. bourgaei Baker (North American Flora 19: 140. 1938). In reality it is a distinct species and is more nearly related to T. intumescens L. B. Smith as indicated in the key above.

LEHMANNII Rauh, ined. TIL. Ecuador.

MARITIMA Matuda, Cact. y Sucul. Mex. 16: 90, fig. 47. 1971. TIL.

MARNIER-LAPOSTOLLEI Rauh, Journ. Bromel. Soc. 22: 41, figs. (p. 40, 42). 1972, nomen, without Latin diagnosis; valid publication: Akad. Wiss. & Lit. Mainz "1973", no. 3: 6, fig. 1-3. 1973. ALL.

MOSCOSOI L. B. Smith & Jiménez, Phytologia 5: 281. 1955; Revist. Soc. Cub. Bot. 12: 65. 1955. TIL. VII-30 (1).

NANA Baker; Pflr. 549. ALL.

PERU: without exact locality, Gay s n (P, type).

BOLIVIA: COCHABAMBA: Río Montehuaiko, June 1911, Herzog 2300 (L, type of T. calocephala Wittm.; F photo 11484).

Examination of the type of T. nana shows that it has a depauperately compound inflorescence not a simple one and that consequently it equals and replaces the later T. calocephala Wittm.

NERVATA L. B. Smith, sp. nov. Sepalis posterioribus alato-carinatis T. punctulata Schlecht. & Cham. (Subgen. Tillandsia) affinis sed foliorum vaginis pallidis et scapi bracteis inflorescentiam haud involucrantibus differt. TIL.

PLANT flowering to 66 cm high. LEAVES many in a more or less funnellform rosette, to 55 cm long, green, minutely appressed-lepidote throughout; sheaths merging with the blades, large; blades narrowly triangular, ca. 35 mm wide. SCAPE erect, stout, about equaling the leaves; scape-bracts all polystichous, erect, densely imbricate, the lower foliaceous with long blades, the upper ovate, acute and apiculate, subinflated, sublustrous. INFLORESCENCE simple, 12 cm long, 4 cm wide, lanceolate, acute, complanate, ca. 10-flowered. FLORAL BRACTS erect and densely imbricate, 45 mm long, ovate, acuminate, subcoriaceous, nerved, carinate, bright red (! L. O. Williams), lepidote at apex, elsewhere glabrous; flowers sessile. SEPALS 30 mm long, elliptic, acute, glabrous, the posterior alate-carinate, nearly free. Pl. I, fig. K: Inflorescence; fig. L: Posterior sepals.

GUATEMALA: SAN MARCOS: Montane cloud forest area on outer slopes of Tajumulco Volcano, Sierra Madre Mountains, about 10 km west of San Marcos, 2400-2700 m, 3 January 1965, L. O. Williams et al. 27215 (F, type).

The petals and stamens of Tillandsia nervata are very immature but in all probability they are of the subgenus Tillandsia type, although in an artificial key they come close to species of subgenus Phytarrhiza. There is also the lesser possibility of its belonging to subgenus Allardtia.

NERVISEPALA (Gilmartin) L. B. Smith, comb. nov. T. fendleri Griseb. var. nervisepala Gilmartin, *Phytologia* 16: 157. 1968. ALL.

PARVIFLORA R. & P. PS-C. XII-47 (1).

Var. PARVIFLORA. Scape-bracts acute or attenuate. Inflorescence bipinnate.

Var. EXPANSA L. B. Smith, *Phytologia* 22: 87, pl. 1, fig. 7. 1971. Scape-bracts long-caudate. Inflorescence amply tripinnate.

POMACCHAE Rauh, *Akad. Wiss. & Lit. Mainz* "1973", no. 3: 25, fig. 14-15. 1973. ALL.

PROPAGULIFERA Rauh, *Akad. Wiss. & Lit. Mainz* "1973", no. 3: 10, fig. 4-6. 1973. TIL.

As indicated in the key above, T. propagulifera closely resembles T. paniculata (L.) L. in habit, the most distinctive difference in photographs being the much narrower leaf-blades of T. propagulifera.

PYRAMIDATA Andre. ALL. IX-43 (1).

Var. PYRAMIDATA. Flowers all normal.

Var. VIVIPARA Rauh, *Akad. Wiss. & Lit. Mainz* "1973", no. 3: 17, fig. 7, 8. 1973. Flowers largely viviparous.

REUTERI Rauh. ined. ALL. In his manuscript, Rauh compares this species with T. glauca L. B. Smith, but its strongly beaked floral bracts places it next to T. stenoura Harms in my key.

RHODOSTICTA L. B. Smith, sp. nov. A T. deppeana Steud., cui verisimiliter affinis, inflorescentia simplici, bracteis florigeris laevibus differt. A T. pretiosa Mez, Quam valde simulans, foliis rubropictis, inflorescentia laxiore differt. ALL.

PLANT presumably stemless, flowering ca. 50 cm high. LEAVES to 28 cm long, inconspicuously appressed-lepidote throughout, green with prominent red spots; sheaths elliptic, 6 cm long; blades narrowly triangular, 15-20 mm wide at base. SCAPE slender, curved; scape-bracts erect, imbricate, the lower polystichous, subfoliaceous but much reduced, the upper like the floral bracts but smaller and distichous. INFLORESCENCE simple, linear-lanceolate, acute, to 27 cm long, 4 cm wide, strongly complanate, glabrous; rhachis slender, nearly straight. FLORAL BRACTS distichous, divergent at anthesis and exposing the rhachis, elliptic, acute, to 44 mm long, exceeding the sepals, 11 mm wide on the side, carinate, coriaceous, even, sublustrous, rose with a violet apex. SEPALS free, linear, acute, 35 mm long, thin, nerved, the posterior carinate; petal-blades elliptic, obtuse, dark blue (! Blass); stamens included. Pl. II, fig. D: Scape and inflorescence; fig. E: Sepal.

ECUADOR: AZUAY: Cuenca, 1967, cultivated by Alfred Blass (US, type), in 1970.

SCHUNKEI L. B. Smith, sp. nov. A T. caerulea H.B.K., cui verisimiliter affinis, spica multiflora, floribus multo minoribus, sepalis dense lepidotis, petalis breviter unguiculatis differt. PHY.

PLANTS evidently in dense masses; roots present; stems at least 4 cm long, ca. 8 mm thick including the leaf-sheaths. LEAVES polystichous, to 17 cm long, densely cinereous-lepidote with retrorse-divergent scales; sheaths suborbicular, 8 mm long; blades filamentous, nearly straight, ca. 2 mm wide at base. Scape erect, 1 mm thick, glabrescent; scape-bracts involute, erect, ovate with a filiform apex, shorter than the internodes. Inflorescence simple and distichous-flowered or rarely a short branch at base, densely lepidote except the petals, lax, many-flowered; rhachis slender, straight. FLORAL BRACTS broadly ovate, acute, about half as long as the sepals; flowers strongly divergent, more than twice as long as the internodes. SEPALS free, lance-elliptic, acute and beaked, 5 mm long, carinate; yellowish when dry, the claw very short, the blade elliptic, acute, mostly included; stamens deeply included but exceeding the pistil; anthers apiculate. Style about equaling the ovary. CAPSULE slenderly cylindrical, 15 mm long. Pl. I, fig. A: Inflorescence; fig. B: Sepal; fig. C: Petal; fig. D: Stamens & pistil.

PERU: TUMBES: Zarumilla: Matapalo: Campoverde 68 km from Tumbes, dry woods, 600-800 m alt., 14 December 1967, J. Schunke V. 2404 (US, type; F, isotype).

STENOURA var. TRIPINNATA (L. B. Smith) L. B. Smith, Phytologia 21: 93. 1971. T. deppeana var. tripinnata L. B. Smith, Phytologia 5: 49. 1954. T. stenoura var. gonzalezii Gilmartin,

Phytologia 16: 155. 1968. T. fendleri var. fendleri sensu L. B. Smith, Phytologia 20: 175. 1970. ALL.

STEYERMARKII L. B. Smith, sp. nov. A T. seemannii (Baker) Mez, cui affinis, foliorum laminis subfiliformibus, inflorescentiam subduplo superantibus, bracteis florigeris ovatis differt. PS-C.

PLANT stemless, flowering to 15 cm high. LEAVES in a sub-bulbous, ovoid rosette, to 45 cm long, covered with appressed, brown-centered scales; sheaths ovate, to 7 cm long, dark castaneous; blades subfiliform, to 4 mm wide at base, involute, green. SCAPE erect, slender; scape-bracts erect, imbricate, the lower with foliaceous blades, the upper acute. INFLORESCENCE simple, oblong, 3 cm long, complanate, ca. 8-flowered. FLORAL BRACTS imbricate, ovate, 8 mm long, convex, thin, nerved, densely lepidote. SEPALS asymmetric, obovate, truncate, 3 mm long, thin, densely pale-lepidote. Pl. III, fig. I: Leaf; fig. J: Inflorescence; fig. K: Sepal.

VENEZUELA: YARACUY: virgin cloud forest at the crest of the range, El Amparo to Candelaria, 7-10 km north of Norte de Salom, 1200-1300 m, 27-30 December 1972, J. A. Steyermark, V. C. Espinoza & E. Diederichs 106763 (US, type; VEN, isotype).

SUBINFLATA L. B. Smith, sp. nov. Ab omnibus speciebus subgeneris Tillandsiae, foliorum laminis anguste triangularibus, cinereo-lepidotis, vaginis subinflatis, atro-castaneis, bracteis florigeris lepidotis, sepala superantibus, sepalis lepidotis, posterioribus carinatis differt. TIL.

PLANT (known only from fragments) flowering at least 25 cm high. LEAVES almost certainly rosulate, over 30 cm long, covered with fine, subspreading, cinereous scales; sheaths sub-orbicular, 6 cm long, subinflated, dark castaneous; blades very narrowly triangular, ca. 15 mm wide at base, involute, contorted. SCAPE erect; scape-bracts erect, imbricate, lanceolate, attenuate, cinereous-lepidote. INFLORESCENCE typically simple although separate spikes appear to have been lateral, to 11 cm long, lax, apically distichous-flowered, basally polystichous; rhachis slender, flexuous, lepidote. FLORAL BRACTS divergent, lepidote, ecarinate, equaling or exceeding the sepals, the lower like the scape-bracts, the upper ovate, acute, red; flowers subsessile. SEPALS oblong, subacute, 25 mm long, lepidote, the posterior carinate, more or less connate; petals tubular-convolute, 4 cm long, violet; stamens exerted. Pl. II, fig. A: Leaf; fig. B: Inflorescence; fig. C: Posterior sepals.

MEXICO: ZACATECAS: without exact locality, cult. & comm. A. Blass (US, type), June 1973.

SUCREI E. Pereira, Rodriguesia 26: 115, pl. 4. 1971; Leandra 2, no. 2: 70, pl. 7. 1972. ANO.

Although it is fairly clear that this is a new species it is not certain where it should be inserted in my key. Neither of the descriptions states whether the floral bracts are lepidote or glabrous or whether even or nerved.

SUPERINSIGNIS Matuda, Cact. & Succul. Journ. (U. S.) 45: 189,

fig. 6. 1973. TIL. Cf. also under Subkey IX because the form of the leaf-blade is uncertain in the description and may well be in fact also. There are tillandsias such as T. multiflora Benth. that vary from a perfectly triangular blade to a subligulate one. In either case T. superinsignis is abundantly distinct in my key.

TECTORUM E. Morr. ALL. I-37 (2).

Var. TECTORUM. Leaf-blades filiform-attenuate, to 20 cm long, 4 mm wide at base. Spikes to 45 mm long and 7-flowered.

Var. BRACHYPHYLLA Rauh, ined. Leaf-blades attenuate to a blunt apex, 5-7 cm long, 5 mm wide at base. Spikes 15 mm long and 2-3-flowered.

TERES L. B. Smith, emend. Rauh, Akad. Wiss. & Lit. Mainz 1973^{ij}, no. 3: 33, fig. 18-20. 1973. TIL. IX-16 (1).

PLANT stemless, flowering 2 m long when extended. LEAVES to 80 cm long; blades 8 cm wide. SCAPE to 60 cm long, 3 cm thick at base; upper scape-bracts rufescent-violet. INFLORESCENCE laxly 2-3-pinnate, 1.4 m long; branches to 60 cm long; spikes to 20 cm long; rhachis internodes 5-7 mm long. FLORAL BRACTS to 27 mm long and wide. SEPALS 14-22 mm long; petals exceeding the floral bracts by about 1 cm.

Data from Rauh 2221⁴ (HEID, US, topotype).

UNDULATOBRACTEATA Rauh, ined. ALL. In his manuscript, Rauh relates this species to T. hutchisonii L. B. Smith, but by emphasizing the relative length of the floral bracts my artificial key places it with T. maxima and T. platyphylla Mez. In reality, T. undulato-bracteata is immediately distinguishable from all species of subgenus Allardtia by the broad, bullate-crested margins of its floral bracts.

VELICKIANA L. B. Smith, sp. nov. T. lepidosepala L. B. Smith et T. benthamiana Kl. ex Baker affinis, sed scapo brevissimo, scapi bracteis quam bracteis florigeris brevioribus differt.

PLANT flowering to 12 cm high. LEAVES very many in a dense spreading rosette, to 11 cm long, covered with subspreading cinereous scales; sheaths elliptic-oblong, merging with the blades; blades very narrowly triangular, filiform-attenuate, soon involute, ca. 1 cm wide at base. SCAPE very short and hidden by the leaves; scape-bracts elliptic, caudate to apiculate, green, subcoriaceous, lepidote, shorter than the floral bracts, subinvolute beneath the inflorescence. INFLORESCENCE erect, simple, 6 cm long, 2 cm wide and nearly as thick, subfusiform, narrowly acute, densely few-flowered. FLORAL BRACTS slightly more than distichous at base, exactly so above, ovate, acute, 4 cm long, much exceeding the sepals, ecarinate, thin, roseate, subdensely white-lepidote; flowers sessile. SEPALS elliptic, obtuse, 28 mm long, free, thin, sparsely lepidote, the posterior carinate; petals erect in a tube, 4 cm long, white; stamens exerted. Pl. I, fig. E: Inner leaves and inflorescence; fig. F: Flower.

GUATEMALA: without exact locality, cultivated in Los Angeles, California, September 1973, G. J. Velick s. n. (US, type).

Plate I

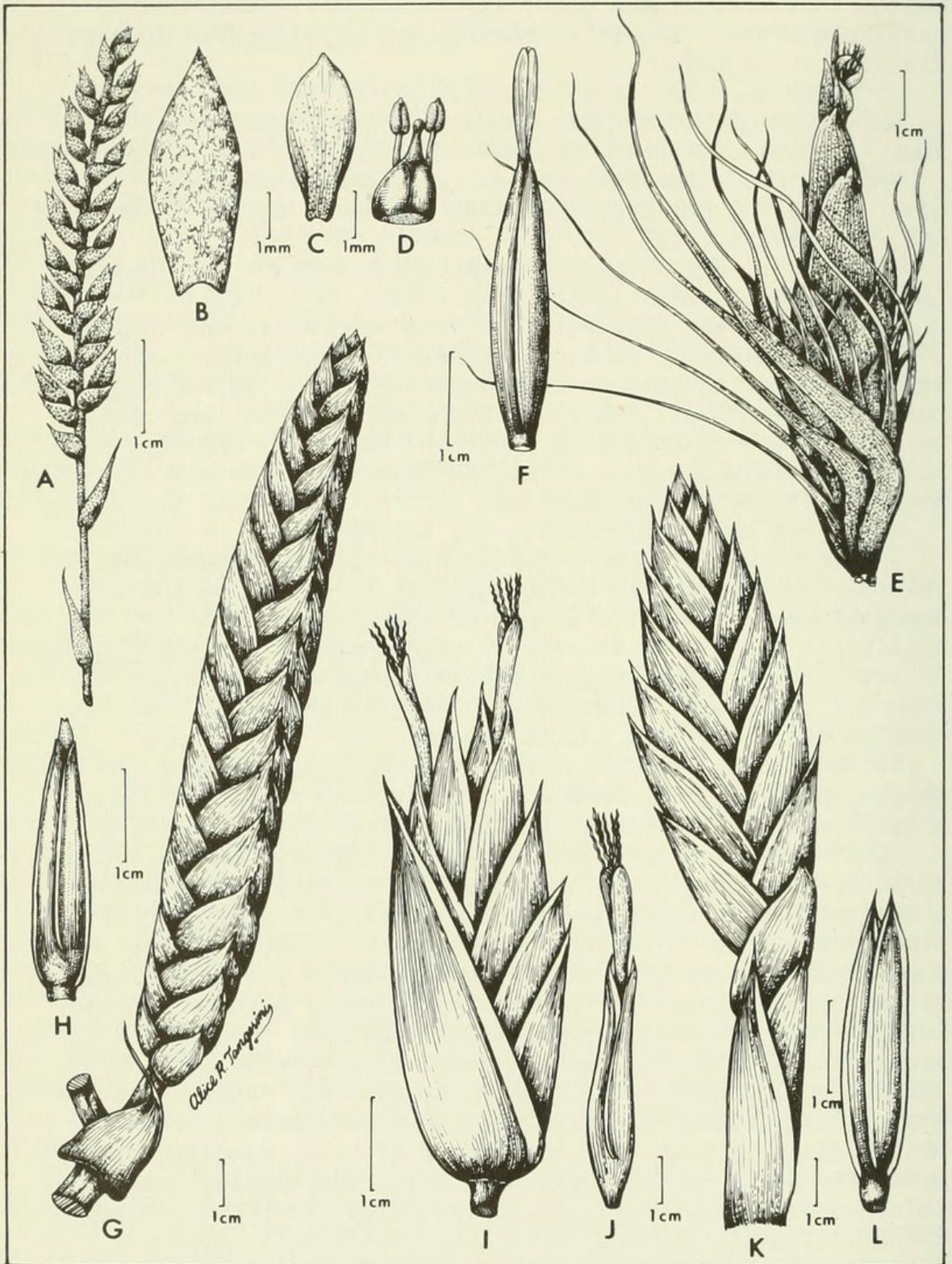


Fig. A-D: *Tillandsia schunkei*. E, F: *T. velickiana*.
 G, H: *T. intumescens* var. *brevilamina*.
 I, J: *T. hintoniana*. K, L: *T. nervata*.

Plate II

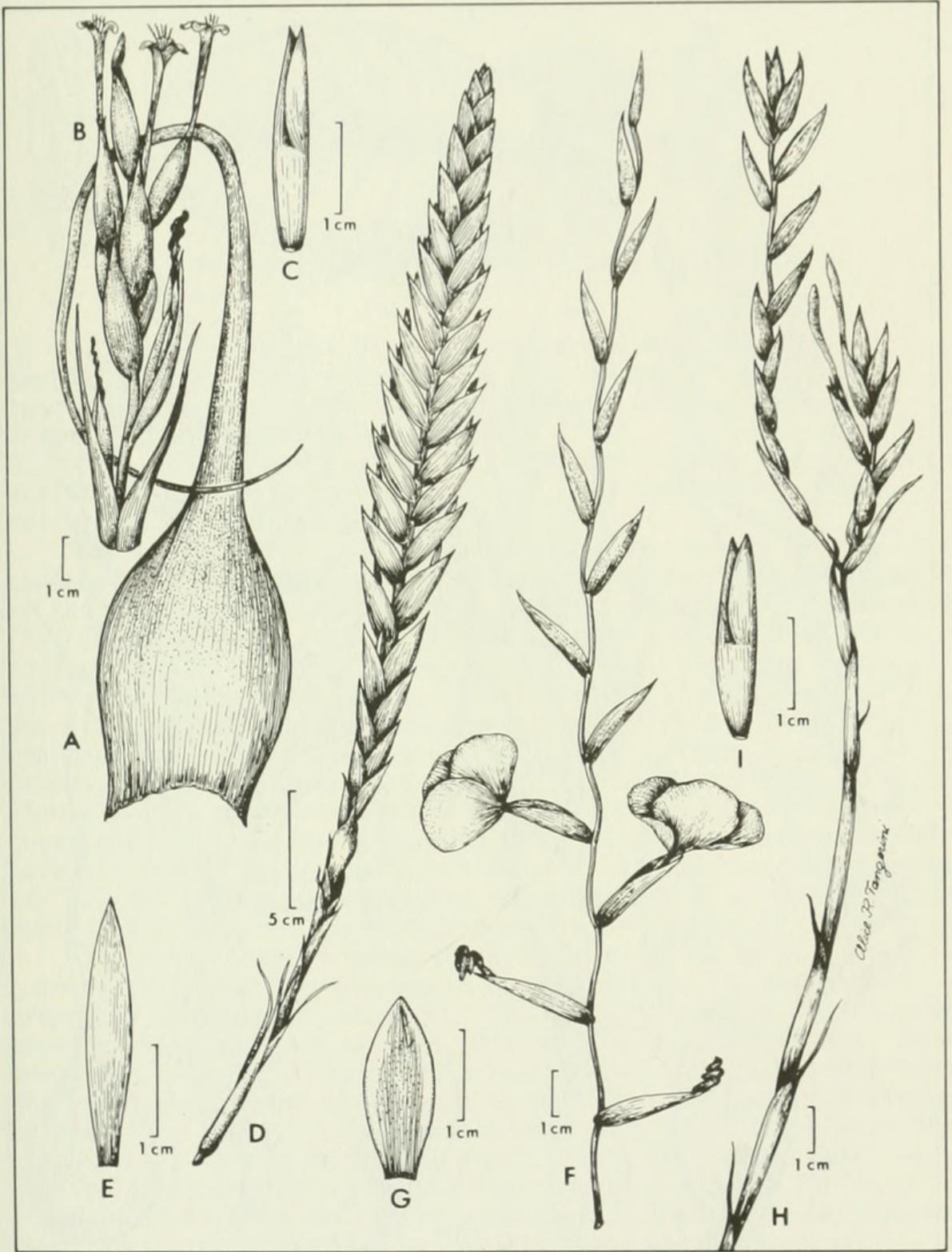


Fig. A-C: *Tillandsia subinflata*. D, E: *T. rhodosticta*.
F, G: *T. dodsonii*. H, I: *T. gracillima*.

Plate III

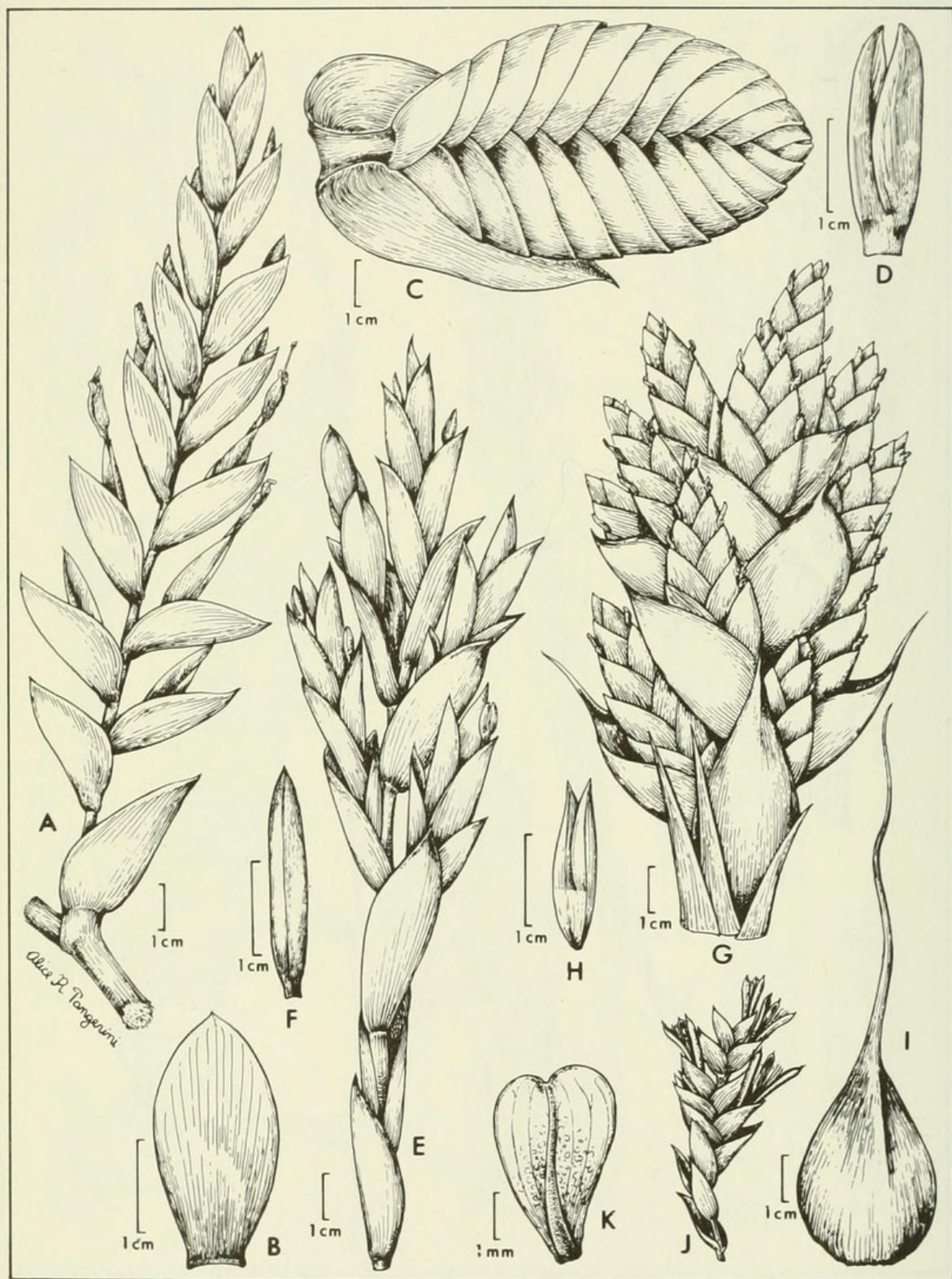


Fig. A, B: *Tillandsia cretacea*. C, D: *T. eizii*.
 E, F: *T. bongarana*. G, H: *T. dudleyi*.
 I-K: *T. steyermarkii*.



Smith, Lyman B. 1974. "Notes on Bromeliaceae, XXXV. Key to Tillandsia and simulators, supplement II." *Phytologia* 28(1), 24-42.

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