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STUDIES IN THE BROMELIACEAE, XVII

By LYMAN B. SMITH



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## PREFACE

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The present paper, by Lyman B. Smith, associate curator of the Department of Botany, U. S. National Museum, is the seventeenth in his series of studies of the family Bromeliaceae. New and noteworthy species from Mexico to Bolivia are discussed. Sixteen species and one variety are described as new.

JASON R. SWALLEN,  
*Head Curator, Department of Botany,  
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# STUDIES IN THE BROMELIACEAE, XVII<sup>1</sup>

By LYMAN B. SMITH

## INTRODUCTION

The notes and novelties that follow are published here as a miscellany since there is no prospect of their inclusion in any comprehensive work in the near future. As in numbers XV and XVI of this series, the species are arranged geographically to facilitate their use in floristic studies.

I am indebted to those in charge of the herbaria of the following institutions for the opportunity to examine their material: the British Museum of Natural History (BM); the Gray Herbarium of Harvard University (GH); the Institute of Jamaica; the Royal Botanic Gardens, Kew (K); the Rijks Herbarium of Leiden (L); the Botanical Museum of Munich (M); the New York Botanical Garden (NY); the United States National Museum (US); and the United States National Arboretum. Subsequent to the submission of this paper for publication, all material studied at the National Arboretum has been transferred to the National Museum.

All drawings with the exception of those for *Pitcairnia mooreana*, *P. sandemanii*, and *Tillandsia cacticola* have been made by R. J. Downs.

## MEXICO

*Hechtia laxissima* L. B. Smith, sp. nov.

FIGURE 77

A *H. meiziana* L. B. Smith, cui affinis, bracteis florigeris minimis quam pedicellis conspicuis brevioribus, floribus subduplo minoribus, minus roseis differt.

Flowering plant over 1.7 meters high, very slender and graceful; leaves over 4 dm. long, the blades narrowly triangular, 4 cm. wide, glabrous above, beneath finely nerved and covered with pale appressed scales, laxly armed with pale slender spines 4 mm. long; scape flattened at base indicating that it is probably lateral, about 1 cm. in diameter, glabrous; scape-bracts all small and remote, triangular, acuminate, thin, stramineous; inflorescence very laxly bipinnate, glabrous; primary bracts narrowly triangular, much shorter than the sterile bases

<sup>1</sup> Number XVI of this series, "Studies in the Bromeliaceae," was published in *Contr. U. S. Nat. Herb.* 29 (10) 1951.

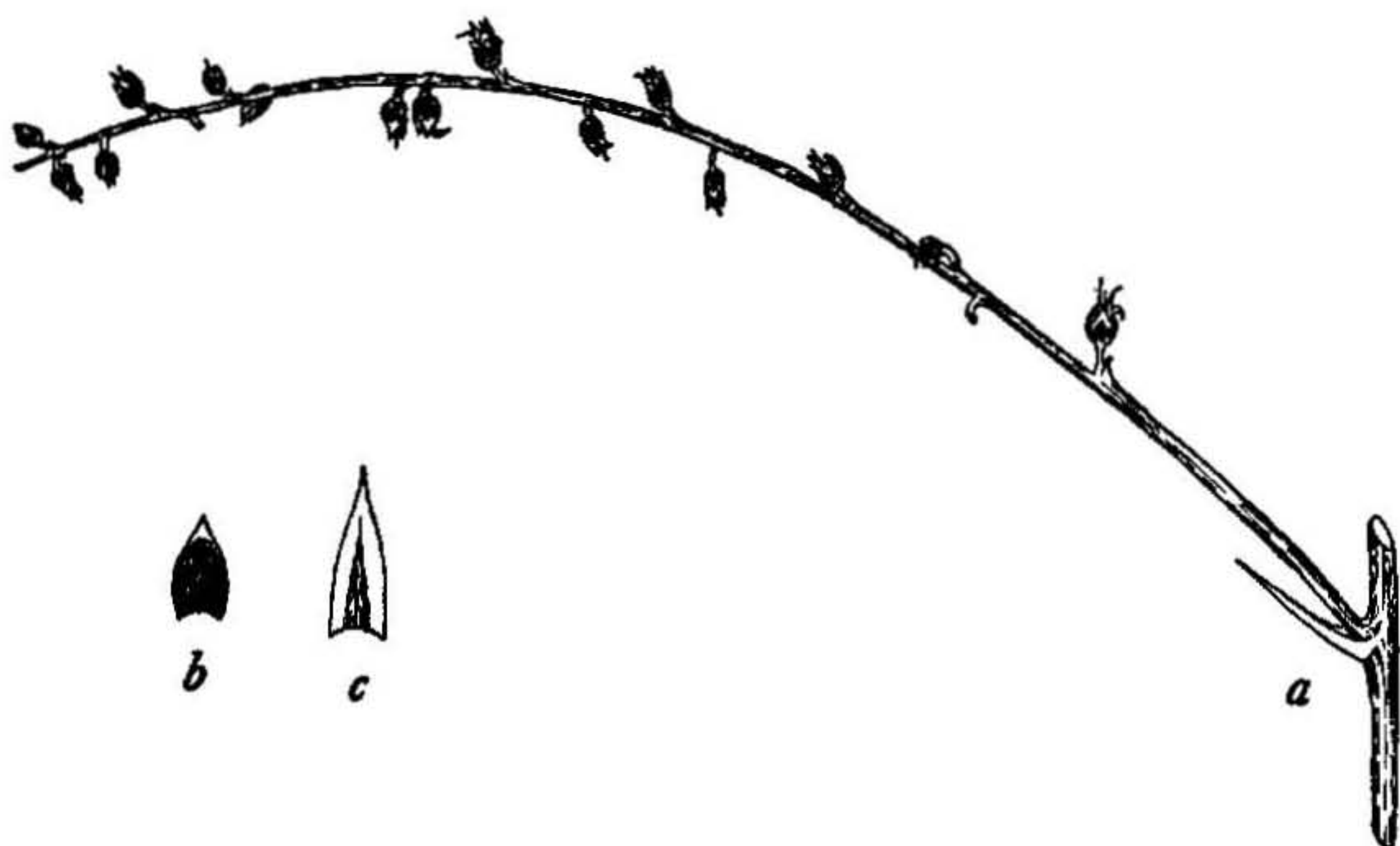


FIGURE 77.—*Hechtia laxissima*: *a*, Branch of inflorescence,  $\times 1$ ; *b*, sepal,  $\times 2$ ; *c*, petal,  $\times 2$ .

of the branches; branches spreading or ascending, very slender, 20 cm. long, slightly if at all flexuous, very laxly flowered; floral bracts ovate, acute, mostly about half as long as the pedicels, thin, greenish rose; pedicels slenderly cylindrical, 2–4 mm. long; flowers spreading, only the pistillate known; sepals very broadly ovate, acute, 3 mm. long, dark rose with a greenish tinge; petals ovate, acute, 5 mm. long, green with roseate tips; ovary glabrous.

Type in the U. S. National Herbarium, No. 1979365, collected on rock by the bridge in Cañon de Marquez between Nueva Italia and Nueva Lombardia, State of Michoacan, Mexico, altitude 420 meters, November 16, 1949, by H. E. Moore, Jr., E. Hernandez X., and H. Porras H. (No. 5770).

*Hechtia mooreana* L. B. Smith, sp. nov.

FIGURE 78

A *H. pedicellata* Watson, cui affinis, scapi bracteis remotis, ramis dense florigeris, pedicellis brevioribus differt.

Caulescent with an ascending stem 36 cm. long, flowering shoot 1.2 meters high; leaves densely imbricate, 3 dm. long, the sheaths suborbicular, 3 cm. long, glabrous except for the exposed apex, the blades narrowly triangular, acuminate, pungent, 15 mm. wide, covered on both sides with appressed cinereous scales, laxly armed with pale curved spines 2 mm. long; scape elongate, 9 mm. in diameter, glabrous; scape-bracts small and remote, triangular, thin, stramineous; inflorescence slenderly cylindrical, laxly bipinnate, glabrous; primary bracts lost but evidently small; branches slender, divergent to spreading, 4–5 cm. long, densely flowered to the base; floral bracts triangular, acuminate, much shorter than the pedicels, thin; pedicels slenderly obconic, 2 mm. long, sulcate; flowers more or less upwardly secund,

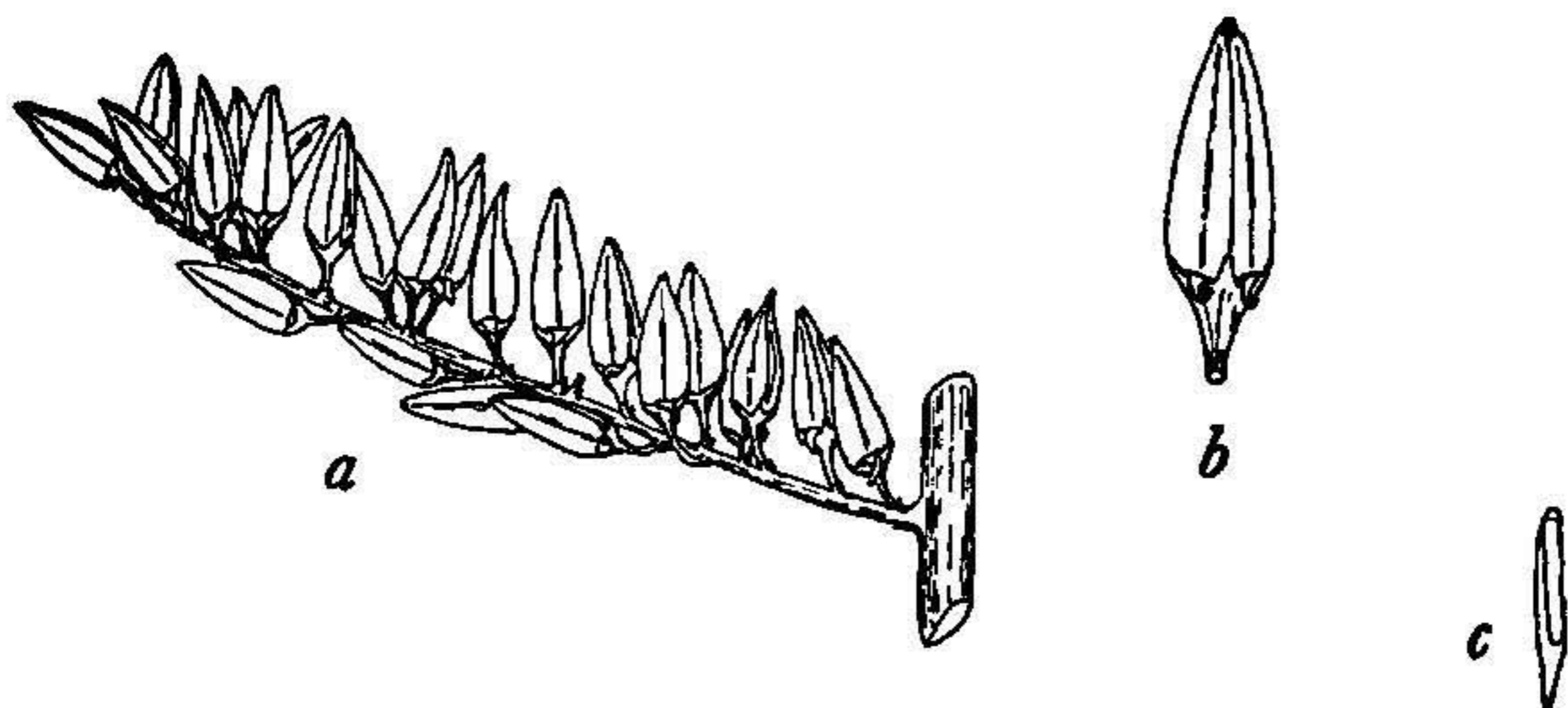


FIGURE 78.—*Hechtia mooreana*: *a*, Branch of inflorescence,  $\times 1$ ; *b*, flower and capsule,  $\times 2$ ; *c*, seed,  $\times 2$ .

only the pistillate known; sepals very broadly ovate, acute, 2 mm. long, thin except at base; petals triangular, acute, 3 mm. long; capsule slenderly ovoid, brown, slightly rugose; seeds oblong with a broad apical wing.

Type in the U. S. National Herbarium, No. 1978457, collected on steep slopes, limestone talus and riversides by road, vicinity of kilometer 278, Cañon del Zopilote between Mexcala and Zumpango, State of Guerrero, Mexico, altitude 810 meters, October 3, 1949, by H. E. Moore, Jr. (No. 5196).

*Pitcairnia mooreana* L. B. Smith, sp. nov.

FIGURE 79

A *P. tuerckheimii* Donn. Smith, cui affinis, pedicellis elongatis bracteis florigeras superantibus, floribus minoribus differt.

Flowering plant 7 dm. high; leaves in a dense pseudobulb, probably dimorphic but only the inner known, the sheaths suborbicular, 4 cm. long, brown lustrous and glabrous except for the cinereous-lepidote apex, the blades deciduous along a straight transverse line, linear, acuminate, 46 cm. long, 10 mm. wide, entire, glabrous, the persistent base of the blade cinereous-lepidote and armed with slender dark curved spines; scape erect, glabrous; scape-bracts erect, the lower with elongate linear serrate blades, the upper ovate, acute, shorter than the internodes; inflorescence laxly racemose, glabrous; floral bracts broadly ovate, apiculate, shorter than the pedicels, green;

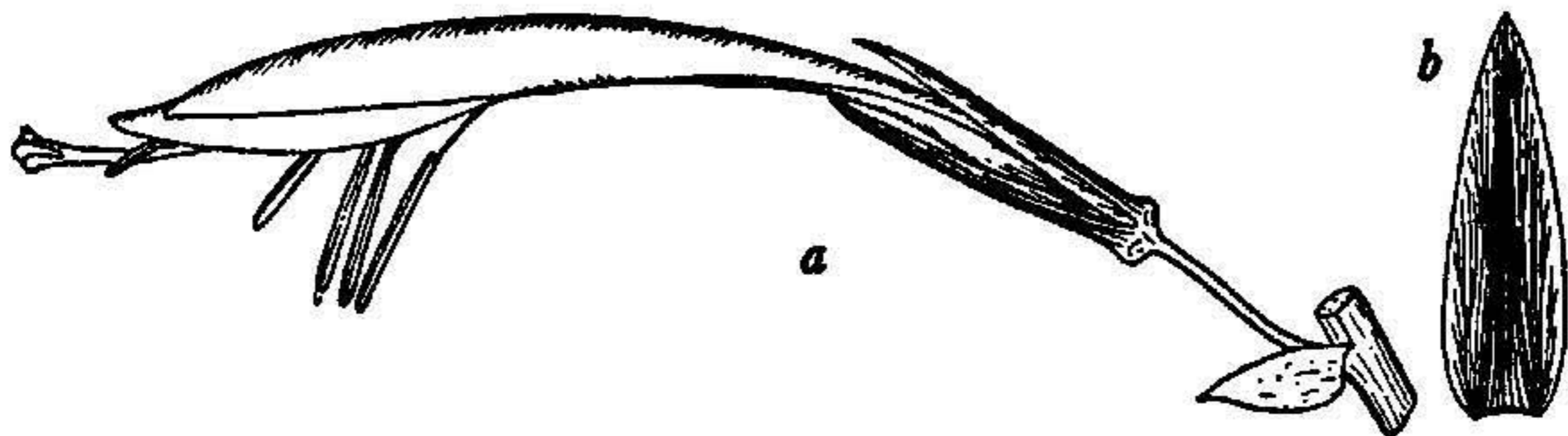


FIGURE 79.—*Pitcairnia mooreana*: *a*, Flower and floral bract,  $\times 1$ ; *b*, sepal,  $\times 1$ .



pedicels slender, 15 mm. long; flowers ascending at anthesis, later reflexed; sepals lance-oblong, acute, 24 mm. long, ecarinate; petals 7 cm. long, reddish green, naked, equaling the stamens; ovary  $\frac{2}{3}$  superior; ovules caudate.

Type in the U. S. National Herbarium, No. 1979364, collected on steep grassy slopes and narrow ravine with open pine woods and scattered oaks on granitic soil at km. 339-40 between Acahuzotla and Agua del Obispo on highway to Acapulco, State of Guerrero, Mexico, altitude ca. 900 meters, September 30, 1949, by H. E. Moore, Jr. (No. 5117).

#### JAMAICA

*Vriesia gibba* L. B. Smith, sp. nov.

FIGURE 80

A *V. alta* (Baker) E. Morren ex Mez, cui affinis, foliis parvis, floribus secundis, sepalis omnino ecarinatis, petalis subduplo minoribus differt.

Known only from fragments but the flowering plant undoubtedly over 1 meter high; leaves to 66 cm. long, the sheaths ample, dark castaneous, punctulate-lepidote, the blades ligulate, acuminate, 7 cm. wide, flat, green, concolorous, obscurely punctulate-lepidote beneath, glabrous above; scape unknown; inflorescence very laxly bipinnate; primary bracts broadly ovate, the lower ones with a narrowly triangular blade exceeding the mostly 2-prophyllate bases of the branches; branches divergent to spreading, subdensely 7-10-flowered, the rhachis flexuous, slender, angled; floral bracts more or less secund with the flowers, broadly obovate, truncate, 25-30 mm. long, about twice as long as the internodes, much exceeded by the sepals, coriaceous,

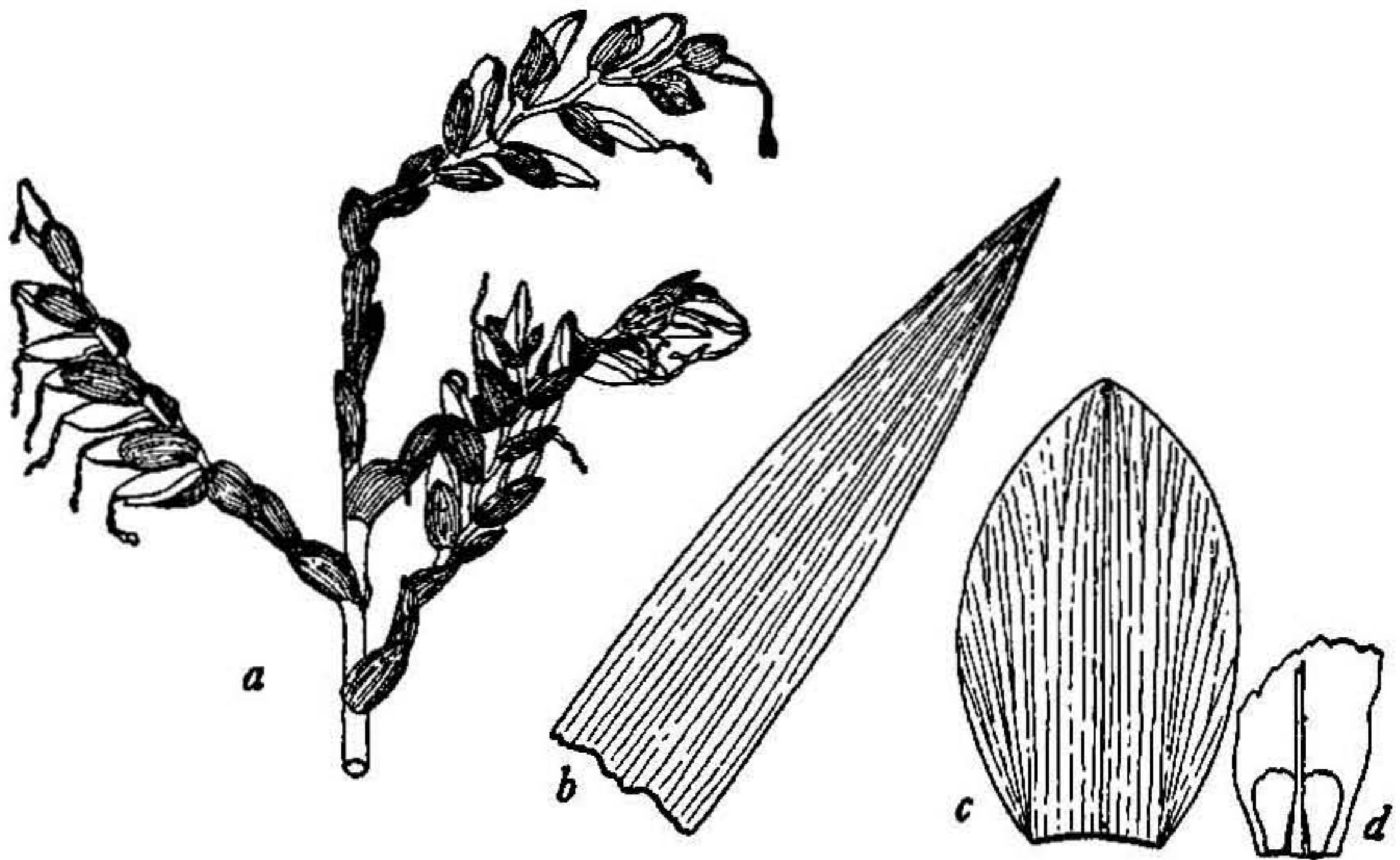


FIGURE 80.—*Vriesia gibba*: a, Upper part of inflorescence,  $\times 1/5$ ; b, apex of leaf,  $\times 1/5$ ; c, sepal,  $\times 1$ ; d, base of petal,  $\times 1$ .

pale green when dry, obscurely punctulate-lepidote, carinate toward the apex, strongly gibbous about one third below the apex; pedicels to 10 mm. long; flowers deflexed-secund; sepals ovate, obtuse, to 32 mm. long, coriaceous and castaneous with a broad thin pale margin, ecarinate, glabrous; petals 6 cm. long, equaling the stamens, bearing two large acute scales at base, the long narrow blades soon drooping.

Type in the Institute of Jamaica, collected on trees, Knox College, Spaldings, Parish of Manchester, Jamaica, altitude ca. 600 m., July 20, 1949, by Kathleen Dignum (No. 2785).

ADDITIONAL SPECIMEN EXAMINED:

JAMAICA:

MANCHESTER: On tree, woodlands near Newport, Sept. 3-7, 1908, *N. L. Britton* 3208 (NY, US).

In the North American Flora (19: 159), the Britton collection which is in fruit was the basis for my citation of *Vriesia alta* from Jamaica. The Dignum collection with corollas and stamens shows that such a view is not correct.

SURINAME

*Aechmea lateralis* L. B. Smith, sp. nov.

FIGURE 81

A *Ae. magdalenae* (André) André ex Baker, *Ae. fernandae* (E. Morr.) Baker, et *Ae. rubiginosa* Mez, quibus affinis, scapis lateralibus, scapi vaginis minimis, squamiformibus differt.

Cespitose in large masses, proliferating by short erect basal branches, the flowering shoots lateral, to 35 cm. long, radiating from the base of the plant; leaves to 2.4 m. long, the sheaths relatively small, coarsely brown-furfuraceous, the blades linear, at least 3 cm. wide, deeply channeled, brown-furfuraceous beneath, laxly armed with flat uncinete spines 4 mm. long; scapes 7 mm. broad, compressed; scape-bracts triangular-ovate, acute, serrulate, red, pale-lepidote, the upper ones imbricate, the lower about equaling the internodes and exposing most of the scape; inflorescence simple, strobilate, globose or ellipsoid, 5 cm. in diameter, reddish green, covered with coarse pale brown appressed scales; floral bracts erect, broadly ovate, acute, 35 mm. long, exceeding the sepals at anthesis; flowers sessile; sepals asymmetric, triangular, acuminate, pungent, 30 mm. long, free, coriaceous, the posterior ones carinate; petals broadly elliptic, acute, 15 mm. long, fleshy except for the thin margins, bearing two narrowly sacciform lacerate scales at the base; stamens included; ovary ellipsoid, compressed, the epigynous tube shallowly infundibuliform; placentae apical; ovules few; seeds cochleate, 5 mm. long, longitudinally striate.

Type in the U. S. National Herbarium, No. 1951856, collected on ground in swampy forest, Paramaribo, Suriname, altitude 15 meters, October 2, 1948, by M. B. Foster (No. 2387).

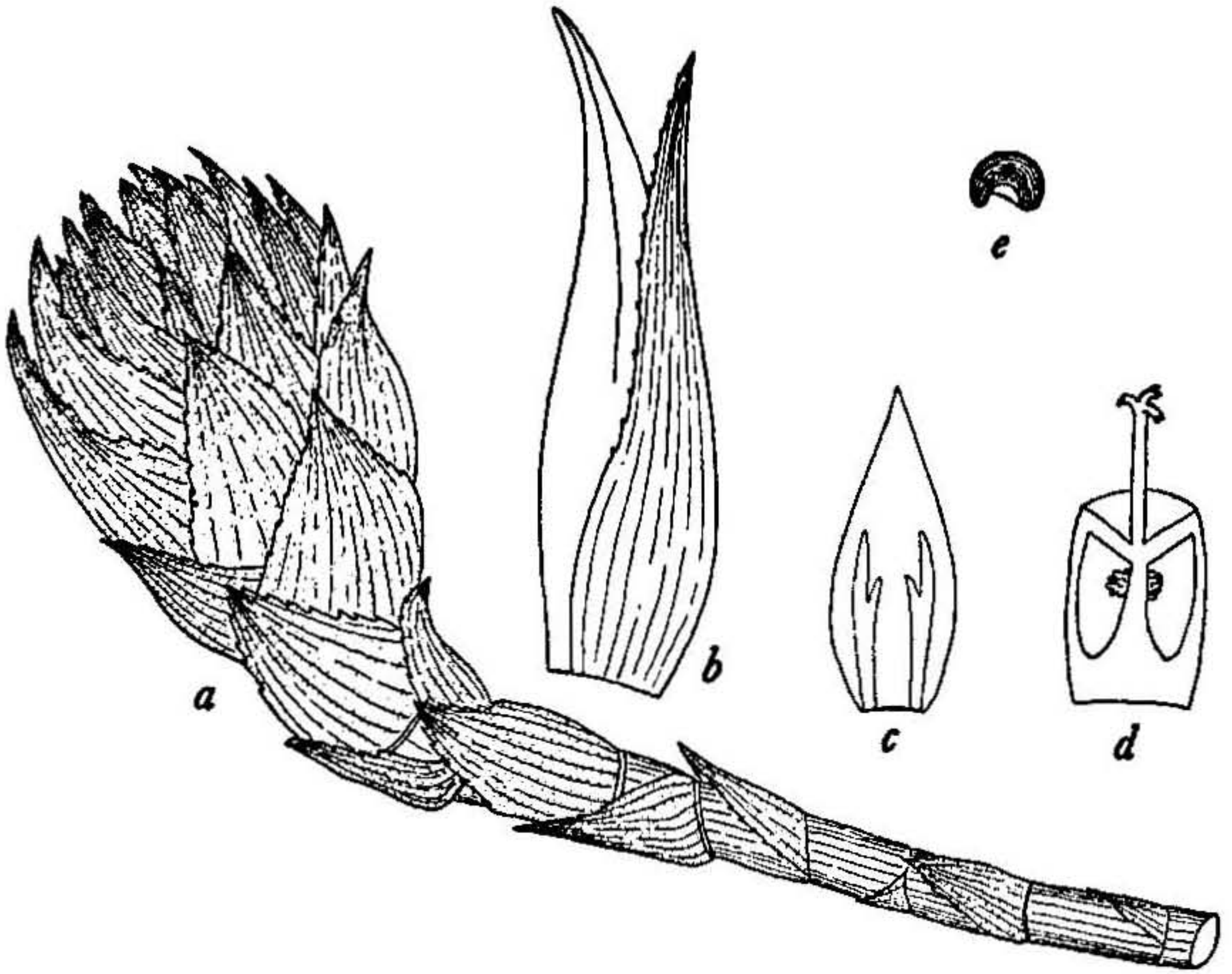


FIGURE 81.—*Aechmea lateralis*: *a*, Scape and inflorescence,  $\times 1/2$ ; *b*, flower and floral bract,  $\times 1$ ; *c*, petal,  $\times 1$ ; *d*, longitudinal section of ovary,  $\times 1$ ; *e*, seed,  $\times 1$ . (All after M. B. Foster.)

### ECUADOR

*Guzmania drewii* L. B. Smith, sp. nov.

FIGURE 82

A *G. tarapotina* Ule, cui affinis, foliis apice late acutis apiculatisque, spicis patentibus, bracteis florigeris rubris, sepalis obtusis differt.

Known only from fragments, probably about 1 m. high; leaves 5–6 dm. long, green, obscurely punctulate-lepidote, the sheaths elliptic, 15–20 cm. long, the blades ligulate, broadly acute and apiculate, 4–7 cm. wide; scape known only by its apex, 8 mm. in diameter, glabrous, red; scape-bracts erect and densely imbricate, elliptic, apiculate; inflorescence bipinnate, lax except near the apex, 18–48 cm. long; axis flexuous; primary bracts ovate, acute, subchartaceous, red, minutely pale-lepidote especially toward their apices, the lowest about equaling the spikes, the others much shorter; spikes spreading or slightly reflexed, densely ellipsoid, 4–7 cm. long including the short sterile base, 20–25 mm. in diameter; floral bracts erect, imbricate, elliptic, obtuse, cucullate, ecarinate, 20–25 mm. long, exceeding the sepals, chartaceous, nerved, red, sparsely and minutely pale-lepidote; pedicels obconic, stout, 3–5 mm. long; sepals oblong-elliptic, obtuse, 17–20 mm. long, connate for 4–5 mm., strongly nerved,

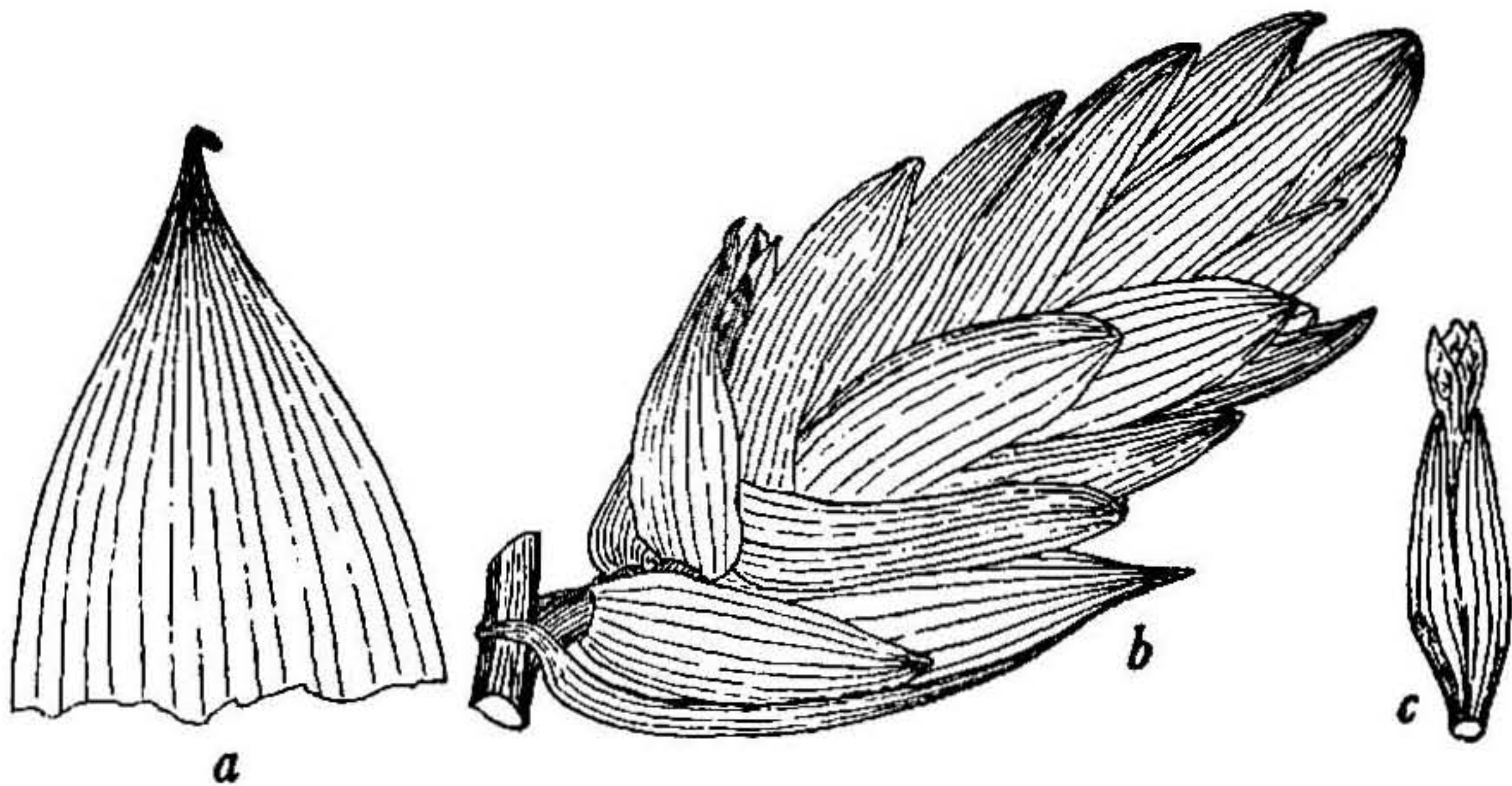


FIGURE 82.—*Guzmania drewii*: *a*, Apex of leaf,  $\times 1$ ; *b*, branch of inflorescence,  $\times 1$ ; *c*, flower,  $\times 1$ .

sparsely and obscurely lepidote; petals agglutinated, naked, the blades elliptic, yellow; stamens included.

Type in the U. S. National Herbarium, No. 1995429, collected on stump in wet forest, along trail between Toldadas and Rio Arturo, east of Volcán de Cayambe, Cordillera Oriental, Province of Imbabura, Ecuador, altitude 3,000 meters, May 15, 1944, by W. B. Drew (No. E-198).

ADDITIONAL SPECIMEN EXAMINED:

ECUADOR:

IMBABURA: Epiphyte in rainforest, Camp Arenillas, east of Volcán de Cayambe, alt. 3,120 m., July 21, 1944, W. B. Drew E-339 (US).

The second collection of *Guzmania drewii* has smaller leaves and inflorescence and slightly larger flowers than does the type, but it does not differ in essential details.

*Tillandsia demissa* L. B. Smith, sp. nov.

FIGURE 83

A *T. sodiroi* Mez, cui ex descriptione affinis, foliis latioribus, spicis omnibus erectis et multifloris, bracteis florigeris sepalsisque majoribus differt.

Caulescent with a branched caudex covered with the remains of old leaves, the flowering shoot 2 m. long when extended; leaves numerous in a spreading rosette at the top of the caudex, 9–12 dm. long, obscurely punctulate-lepidote, the sheaths ample, 3 dm. long, the blades ligulate, flat, acuminate, 10 cm. wide, green; scape decurved, short, hidden by the leaves; scape-bracts subfoliaceous, densely imbricate; inflorescence densely bipinnate, slenderly cylindrical, green, glaucous; primary bracts broadly ovate with a foliaceous blade, exceeding the spikes, erect, imbricate; spikes elliptic-oblong, 15 cm. long including the short stout sterile base, 4 cm. wide, strongly complanate, densely

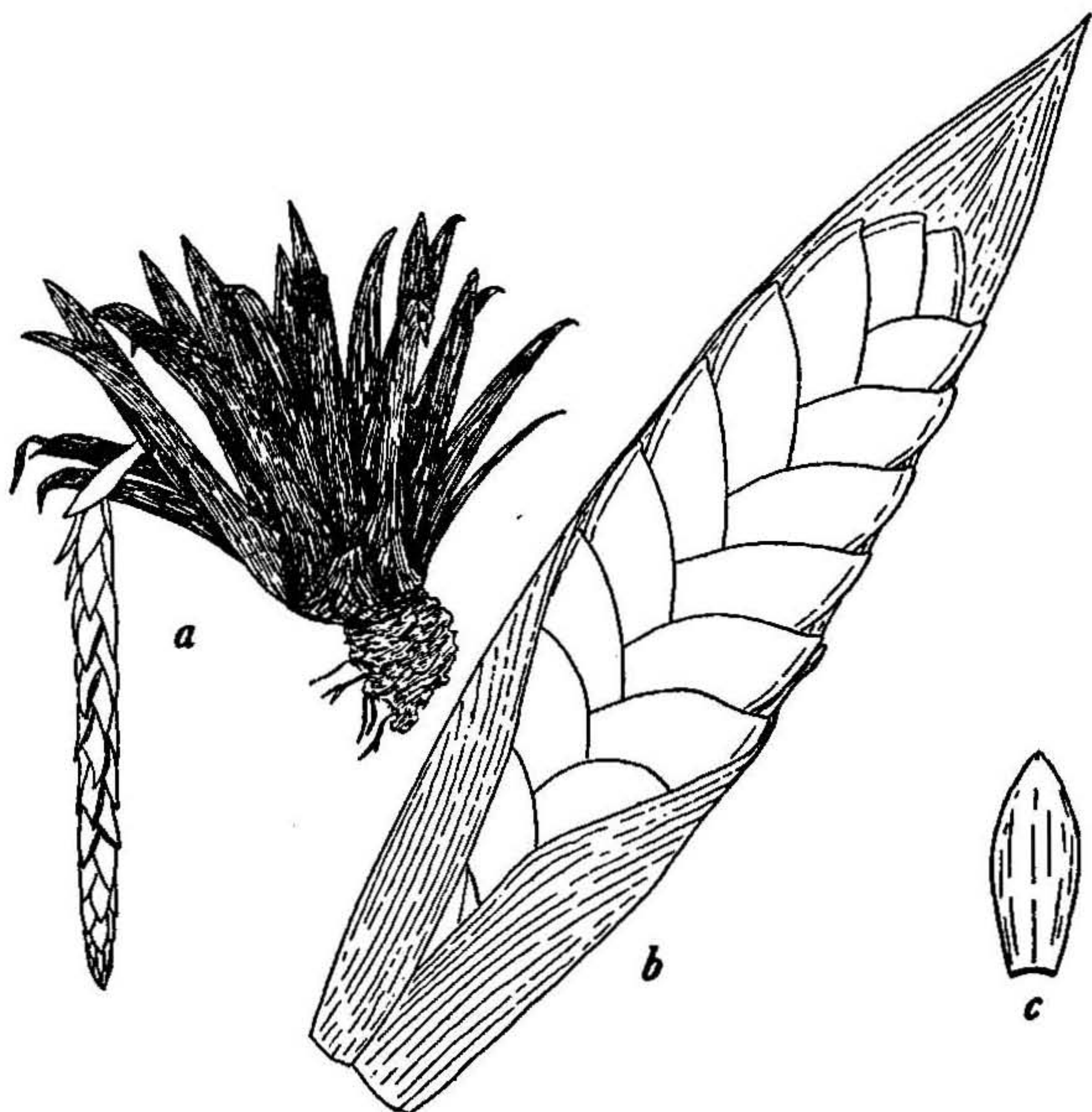


FIGURE 83.—*Tillandsia demissa*: *a*, Habit,  $\times 1/40$ ; *b*, branch of inflorescence and primary bract,  $\times 1/2$ ; *c*, sepal,  $\times 1/2$ .

17-flowered; floral bracts suborbicular, equaling the sepals, carinate and minutely incurved at the apex, coriaceous, even; flowers subsessile; sepals elliptic, obtuse, 30 mm. long; petal-blades 15 mm. long, lavender; stamens included.

Type in the U. S. National Herbarium, Nos. 1985901 and 1985902, collected on perpendicular canyon walls, between kilometer 120 and 140 on the road from Oña to Zaraguro, Province of Loja, Ecuador, altitude 1,800–2,100 meters, December 4, 1948, by M. B. Foster (No. 2624).

*Tillandsia elegans* L. B. Smith, sp. nov.

FIGURE 84

A *T. riocreuxii* André, cui affinis, inflorescentia amplissime tripinnata, spicis laxis differt.

Epiphytic, known only from fragments but undoubtedly 1.5–2 m. high; leaf 45 cm. long, densely appressed-lepidote, the sheath large, elliptic, dark castaneous, the blade subtriangular, 4 cm. wide, green,



FIGURE 84.—*Tillandsia elegans*: *a*, Branch of inflorescence,  $\times 1/4$ ; *b*, flower and floral bract,  $\times 1$ ; *c*, sepal,  $\times 1$ .

pale-lepidote; scape unknown; inflorescence amply and very laxly tripinnate, sparsely pale-lepidote; axis slender, flexuous; primary bracts ovate, 4 cm. long, slightly shorter than the sterile 1-prophyllate bases of the branches, subchartaceous; branches spreading, diffuse, to 30 cm. long; secondary bracts like the primary but much smaller, exceeding the sterile bases of the spikes; spikes lax, the lateral to 10 cm. long, the terminal to 15 cm.; rhachis slender, geniculate; floral bracts divergent, elliptic, acute and minutely incurved, to 13 mm. long on the lateral spikes and 19 mm. on the terminal, exceeding the sepals, about equaling the lower internodes, slightly carinate toward their apices, subchartaceous, faintly nerved; flowers not at all secund; pedicels very short and stout; sepals free, asymmetric, obovate, subtruncate, 7 mm. long, sparsely pale-lepidote; petals white; stamens included.

Type in the U. S. National Herbarium, No. 1995434, collected in rainforest, along trail between Laguna de la Virgen and Camp Arenillas, east of Volcán de Cayambe, Cordillera Oriental, Province of Imbabura, Ecuador, altitude 2,655 meters, July 27, 1944, by W. B. Drew (No. E-391).

Recent collections of *Tillandsia riocreuxii* André show that its inflorescence can vary from wholly bipinnate to tripinnate by the division of a few basal branches as in *T. tristis* Mez which now becomes a synonym of it. However, *T. riocreuxii* is never amply tripinnate like *T. elegans* and its spikes are always dense. The character of secund flowers in *T. riocreuxii* is neither strong nor constant, so it is of no use as a contrast with *T. elegans*.

*Tillandsia truncata* L. B. Smith, sp. nov.

FIGURE 85

A *T. singularis* Mez & Wercklé, cui affinis, foliis multo majoribus, inflorescentia elongata, bracteis florigeris sepala aequantibus differt.

To 8 dm. high; leaves rosulate, 30–55 cm. long, the sheaths ample, 10–15 cm. long, black, covered with a very thin paintlike layer of white scales, the blades ligulate, broadly truncate and apiculate, to 7 cm. wide, obscurely lepidote, red beneath, green above; scape erect, slender, glabrous; scape-bracts elliptic, apiculate, all but the lowest imbricate; inflorescence laxly bipinnate, cylindric, 3 dm. long, glabrous; primary bracts broadly ovate, acute, 2–3 cm. long, always shorter than the spikes, membranaceous, striate, red; spikes suberect, lanceolate, 3–4 cm. long, laxly 11-flowered, short-stipitate, the rhachis slender, geniculate; floral bracts like the primary bracts but obtuse, equaling the sepals, ecarinate; flowers divergent to spreading; sepals oblong, obtuse, 10 mm. long, subequally short-connate; petals greenish or white; stamens included.

Type in the U. S. National Herbarium, No. 1985918, collected on bank along the road between Quito and Santo Domingo [de los Colorados], Province of Pichincha, Ecuador, altitude 1,500 meters, December 8, 1948, by M. B. Foster (No. 2642).

ADDITIONAL SPECIMEN EXAMINED:

ECUADOR:

PICHINCHA: Road between Quito and Santo Domingo, alt. 1,200 m., Dec. 8, 1948, *M. B. Foster* 2644 (US).

PERU

*Lindmania aletroides* L. B. Smith, sp. nov.

FIGURE 86

Statura parva; laminis foliorum parvis, lanceolatis; scapi vaginis minimis, remotis; inflorescentia simplici vel subsimplici; bracteis florigeris pedicellos superantibus; floribus nec nutantibus nec secundis.

Stemless, propagating by basal offsets, the flowering shoot 14–26 cm. high; leaves few, to 9 cm. long, entire, thin, sparsely pale-lepidote when very young, completely glabrous by maturity, the sheaths broadly ovate, about 1 cm. long, the blades lanceolate, flat, acuminate, 12 mm. wide, strongly nerved; scape straight, very slender, sparsely white-flocculose; scape-bracts lanceolate, acuminate, small and remote; inflorescence simple or with a few very short branches at the base, 5–9 cm. long, lax, sparsely white-flocculose; floral bracts ovate, acuminate, exceeding the pedicels; flowers divergent to spreading, not at all secund; pedicels slender, 1 mm. long; sepals ovate, obtuse, nearly 2 mm. long; petals elliptic, obtuse, 5 mm. long, exceeding stamens, white, coiling-recurved at anthesis.

Type in the U. S. National Herbarium, No. 1995359, collected on the border of woods, Sapansachayoc, Province of Paucartambo, Department of Cusco, Peru, altitude 900 meters, July 24–30, 1948, by C. Vargas C. (No. 7358).

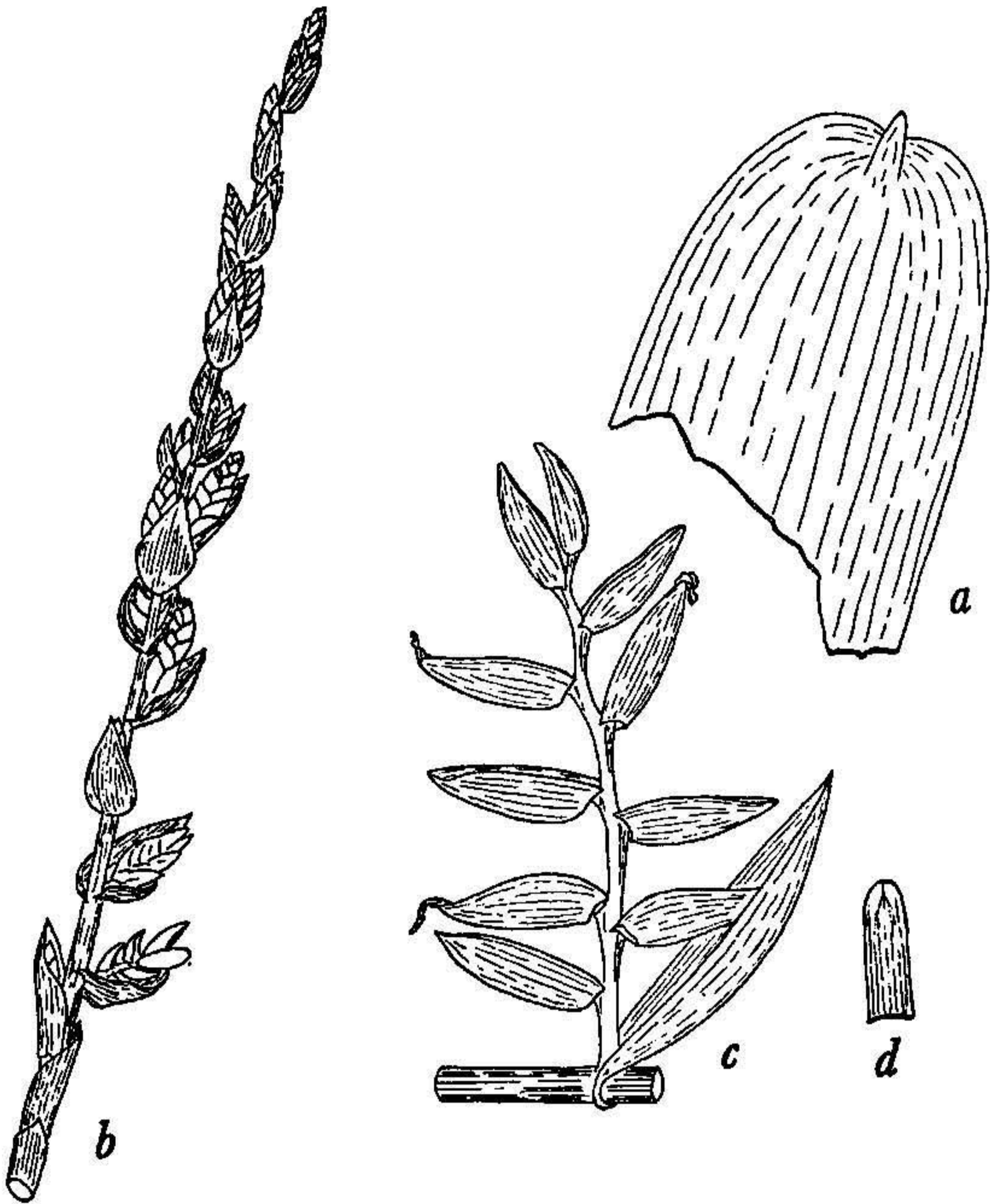


FIGURE 85.—*Tillandsia truncata*: *a*, Apex of leaf,  $\times 1/2$ ; *b*, young inflorescence,  $\times 1/2$ ; *c*, branch of mature inflorescence,  $\times 1$ ; *d*, sepal,  $\times 1$ .

The combination of simple or subsimple inflorescence and non-secund flowers removes *Lindmania aletroides* from close relationship with any known species. Also the leaves and scape-bracts are unusually small for the genus.

*Pitcairnia sandemanii* L. B. Smith, sp. nov.

FIGURE 87

Foliis verisimiliter subpetiolatis integrisque; scapi vaginis scapum paulo occultantibus, integris; inflorescentia simplicissima; bracteis florigeris magnis; floribus subsessilibus; ovulis caudatis.

Known only from fragments; leaf-blades linear-lanceolate, long-acuminate, narrowed toward the base, more than 66 cm. long and 2 cm. wide, entire so far as known, white-flocculose above, glabrous



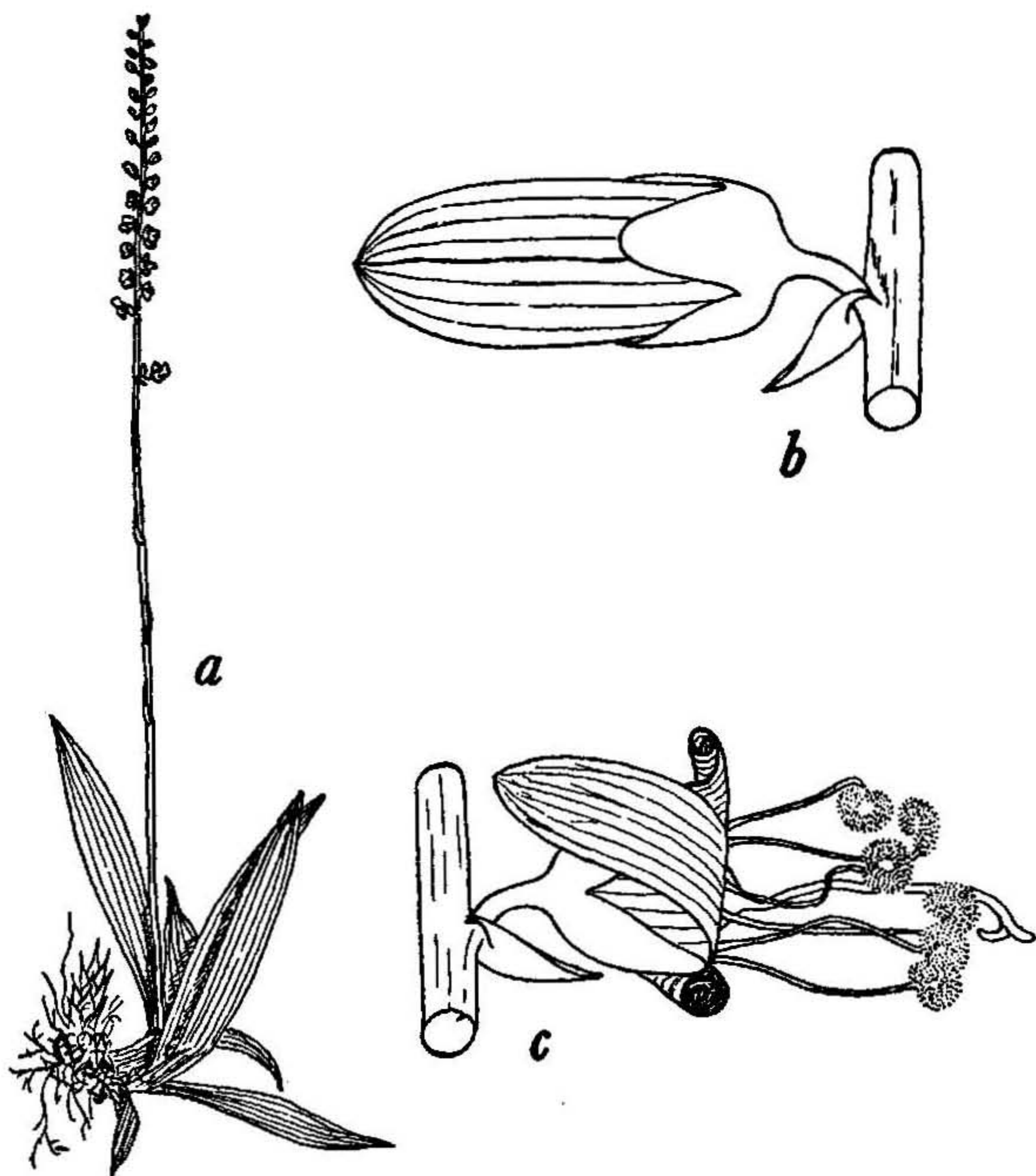


FIGURE 86.—*Lindmania aletroides*: *a*, Habit,  $\times 1/4$ ; *b*, young flower and floral bract,  $\times 5$ ; *c*, mature flower and floral bract,  $\times 5$ .

beneath, strongly channeled in the center; scape 3 dm. long, curved, 4 mm. in diameter, white-flocculose; scape-bracts erect, entire, the lower subfoliaceous, the upper broadly ovate, acuminate, shorter than the internodes and exposing the greater part of the scape; inflorescence simple, densely ellipsoid, 8 cm. long, 3 cm. in diameter, sparsely white-flocculose; floral bracts straight, broadly ovate, acuminate, 2 cm. long, much exceeded by the sepals, strongly nerved; flowers subsessile, erect; sepals lance-oblong, acute, 30 mm. long, nerved, the two posterior sepals broadly alate-carinate, the anterior flat, ecarinate; petals to 45 mm. long, bright scarlet (!Sandeman), bearing a large truncate scale at base; stamens included; ovary globose,  $\frac{3}{4}$  superior; ovules caudate.

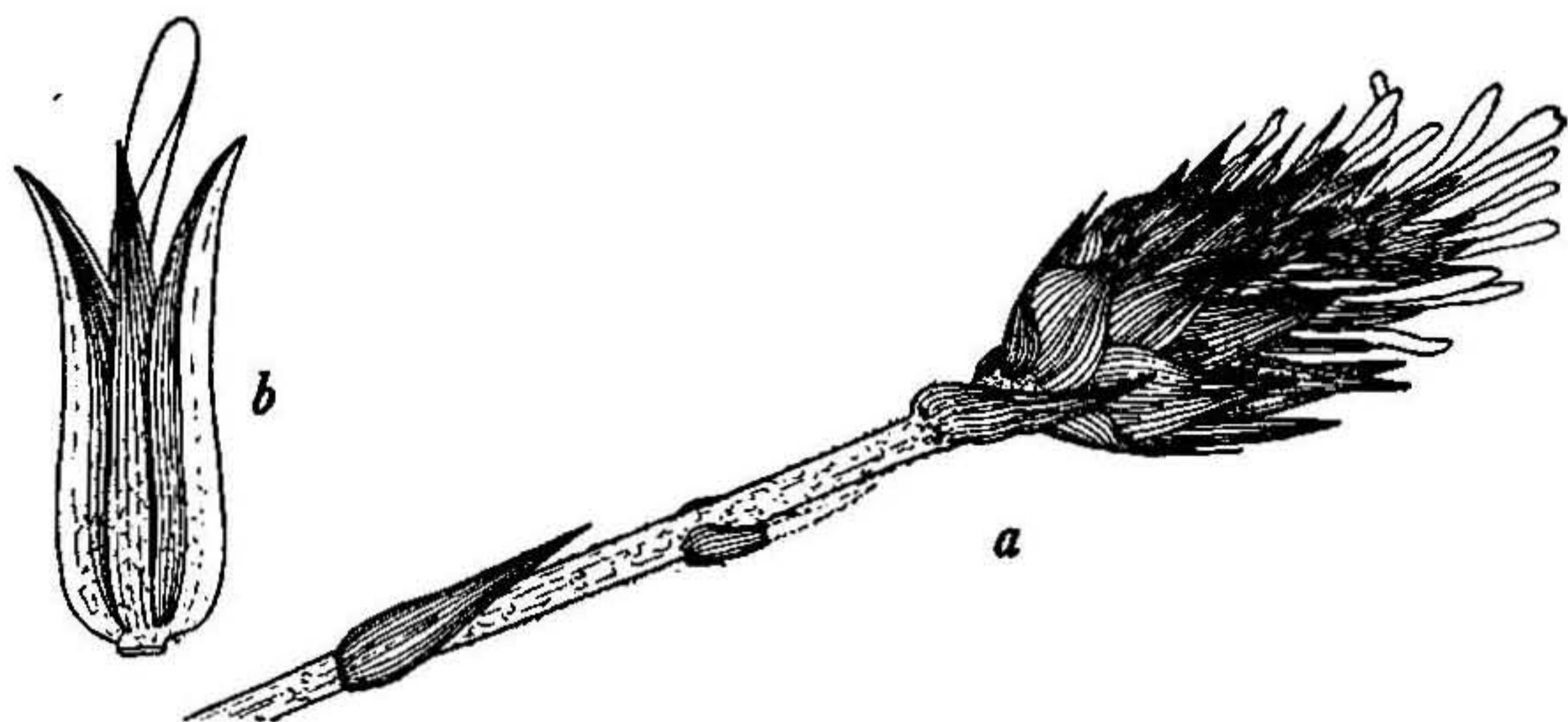


FIGURE 87.—*Pitcairnia sandemanii*: *a*, Scape and inflorescence  $\times 1/2$ ; *b*, flower,  $\times 1$ .

Type in the herbarium of the Royal Botanic Gardens, Kew, collected in fully exposed habitat, Huacapistana, Department of Junín, Peru, altitude 1,680 meters, October 7, 1943, by Christopher Sandeman (No. 4586).

Its simple inflorescence, ample floral bracts, and sessile flowers place *Pitcairnia sandemanii* in the subgenus *Neumannia*. Among its other characters are some so distinctive that it can not be said to show any clear relationship. Its lax scape-bracts are found nowhere else in the subgenus with the possible exception of *P. poeppigiana* whose scape is unknown. Only *P. archeri* resembles it in having floral bracts much shorter than the sepals, and no other species appears to have such broadly alate posterior sepals.

*Puya cerrateana* L. B. Smith, sp. nov.

FIGURE 88

A *P. lanuginosa* (R. & P.) Schult. fil., cui valde affinis, bracteis florigeris elongatis, acuminatis, sepala superantibus, per anthesin recurvatis differt.

Flowering plant 1–1.5 m. high; leaves 7 dm. long, the sheaths elliptic, 9 cm. long, mostly glabrous, the blades linear-triangular, 3–4 cm. wide, glabrous above, beneath covered with fine white appressed scales, laxly armed with red-brown uncinat spines 7 mm. long; scape 18 mm. in diameter, glabrous at anthesis; scape-bracts quickly deciduous, unknown; inflorescence simple, densely cylindric, 35 cm. long, 7 cm. in diameter; floral bracts ovate, acuminate, to 5 cm. long, exceeding the sepals but with the upper half coiling-reflexed at anthesis, entire, covered with a short-lanose dusty white tomentum outside, glabrous and nearly black inside; pedicels obconic, 10 mm. long, lanate; sepals elliptic, broadly acute, 35 mm. long, ecarinate, lanate outside; petals 56 mm. long, naked, olive green turning to brown; stamens slightly exserted; ovary superior, ovules winged.

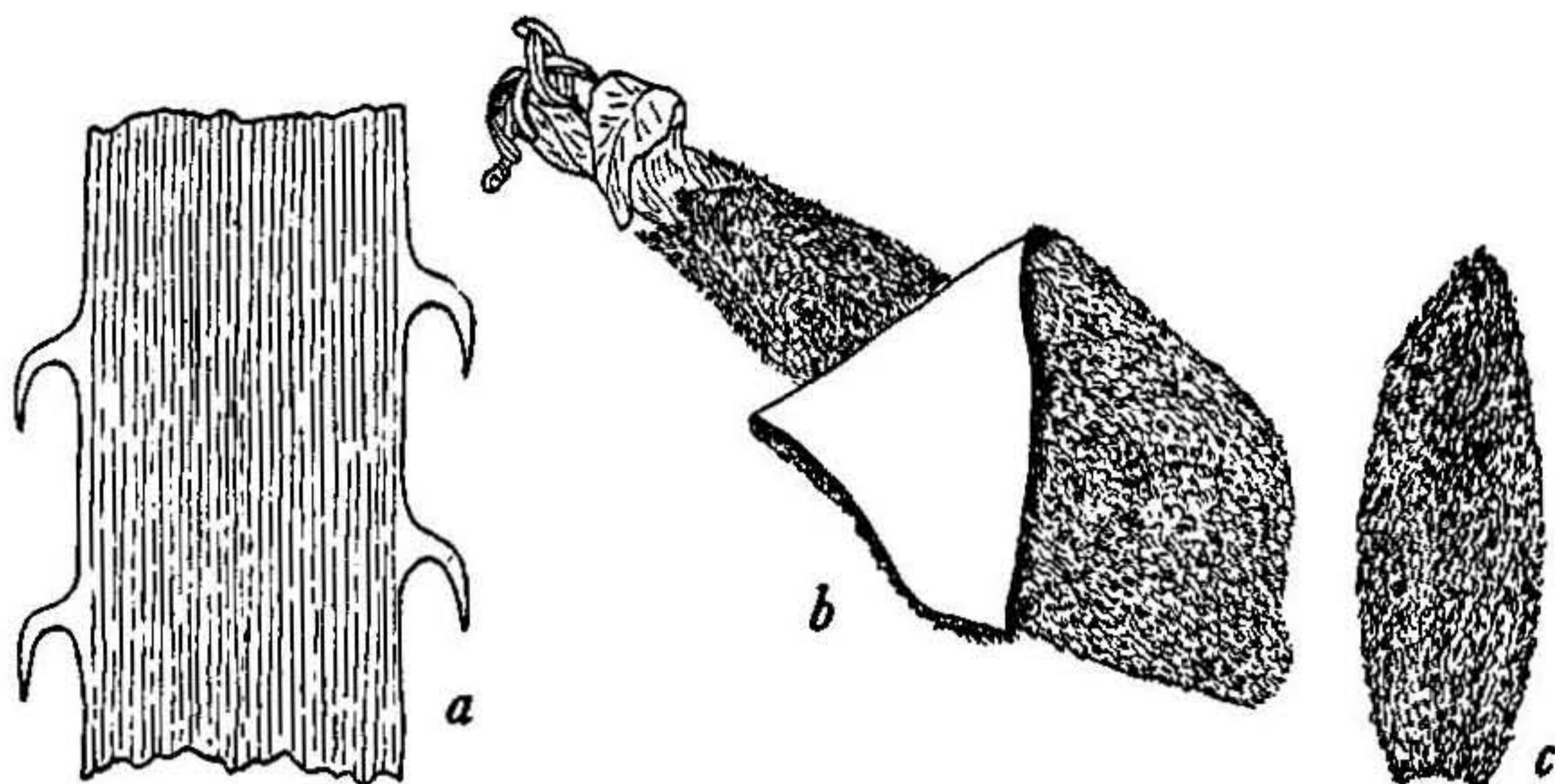


FIGURE 88.—*Puya cerrateana*: *a*, Section of leaf-blade,  $\times 1$ ; *b*, flower and floral bract,  $\times 1$ ; *c*, sepal,  $\times 1$ .

Type in the U. S. National Herbarium, Nos. 2027896 and 2027897, collected on rocky ground, Cashapata, near Chiquián, Province of Bolognesi, Department of Ancash, Peru, altitude 3,560 meters, August 5, 1949, by Emma Cerrate (No. 369).

This species must present a striking picture in the field with its slender white inflorescence checked with green petals and dark brown bract-tips.

*Tillandsia cacticola* L. B. Smith, sp. nov.

FIGURE 89

A *T. straminea* H. B. K., cui affinis, inflorescentia lepidota, bracteis florigeris sepala valde superantibus, petalis aureis differt.

Type stemless and 15 cm. high (collector notes that species grows much larger); leaves numerous, spreading, 8 cm. long, covered with coarse subspreading cinereous scales, the sheaths indistinct, the blades linear-triangular, subulate-acuminate, 1 cm. wide; scape slender, curved; scape-bracts imbricate, closely involute about the scape, densely lepidote, caudate at the apex; inflorescence digitate from 3 spikes; primary bracts elliptic, acute, more than half as long as the spikes, thin, lepidote; spikes sessile, broadly elliptic, strongly compressed, 3 cm. long, 2 cm. wide, subdensely 5-6-flowered; rhachis geniculate, slender, lepidote; floral bracts many times longer than the internodes but exposing most of the rhachis, elliptic, acute, to 20 mm. long, exceeding the sepals, membranaceous, sparsely lepidote, carinate, incurved at apex; sepals lanceolate, acute, 16 mm. long, very sparsely lepidote, connate posteriorly for 1 mm.; petals yellow, the blades spreading, suborbicular, 6 mm. long; stamens deeply included, exceeding the pistil.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected on cacti, at Huancabamba, Department of Piura, Peru, altitude 1,800 meters, August 1943, by Christopher Sandeman (No. 4325).

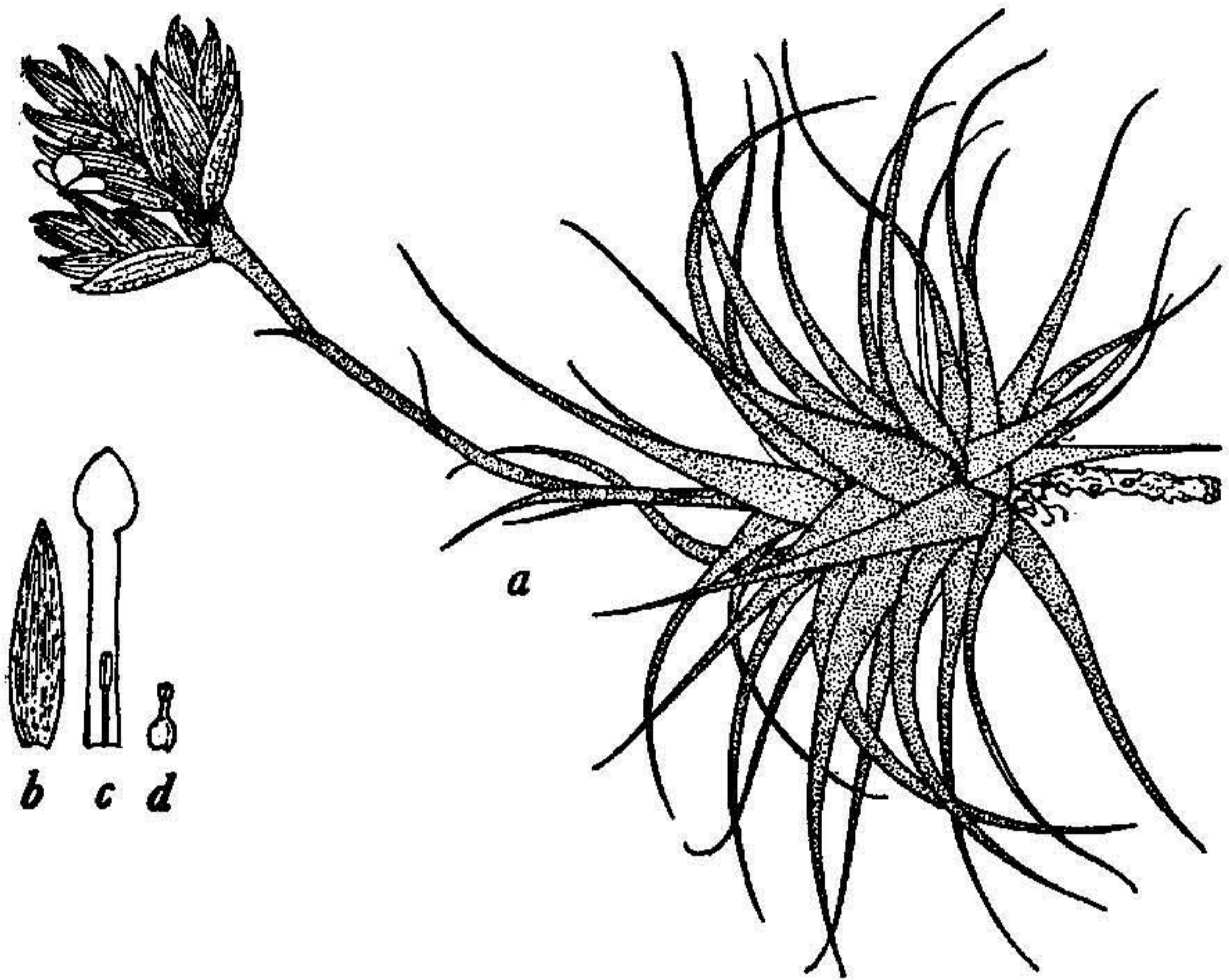


FIGURE 89.—*Tillandsia cacticola*: *a*, Habit,  $\times 1/2$ ; *b*, sepal,  $\times 1$ ; *c*, petal and stamen,  $\times 1$ ; *d*, pistil,  $\times 1$ .

In his first monograph, Mez placed *Tillandsia straminea* under the subgenus *Anoplophytum*, then shifted it to *Allardtia* in his treatment in the *Pflanzenreich*. Actually its flowers with their deeply included stamens, straight filaments, and very short pistil, are quite typical of the subgenus *Phytarrhiza*. *T. cacticola* has yellow petals according to the collector yet they turn partially blue in drying, so that they are a close match for faded ones of *T. straminea* in the herbarium.

#### BOLIVIA

*Deuterocohnia strobilifera* Mez var. *inermis* L. B. Smith, var. nov.

A var. *strobilifera* foliis omnino inermibus differt.

Differs from the typical variety in its entire leaves.

Type in the U. S. National Herbarium, No. 1986011, collected on rocky slopes, near Sivingamayú, Province of Cinti, Department of Chuquisaca, Bolivia, altitude 3,400 meters, February 1949, by M. Cárdenas (No. 4094).

#### ADDITIONAL SPECIMENS EXAMINED:

#### BOLIVIA:

Potosí: Forming hilly mounds 1-2 meters in diameter and 60 cm. high, on dry rocky slopes associated with cacti, between Oploca and Atocha, alt. 3,000 m., Dec. 1946, M. Cárdenas 3741 (GH, US).

TARIJA: On barren gravelly canyon slopes, with *Oreocereus celsianus*, other cacti and xerophytic bushes, Quebrada Tenalpa, 20 km. east of Villazón on road to Tarija, alt. ca. 3,400 m., Feb. 12, 1937, *J. West* 8379 (GH).

The most recent collection was chosen as the type because its more mature flowers show the appendage on the petals most clearly.

*Puya atra* L. B. Smith, sp. nov.

FIGURE 90

Inflorescentia bipinnata, stellato-tomentosa, mox glabra; ramis dense ellipsoideis, stipitatis, bracteis primariis lucidas aterrimas superantibus; bracteis florigeris late rotundatis, sepala superantibus.

Caulescent with a caudex like that of *Yucca aloifolia* (! Foster), the flowering shoot over 2 m. high; leaves 6 dm. long, very soon glabrous,

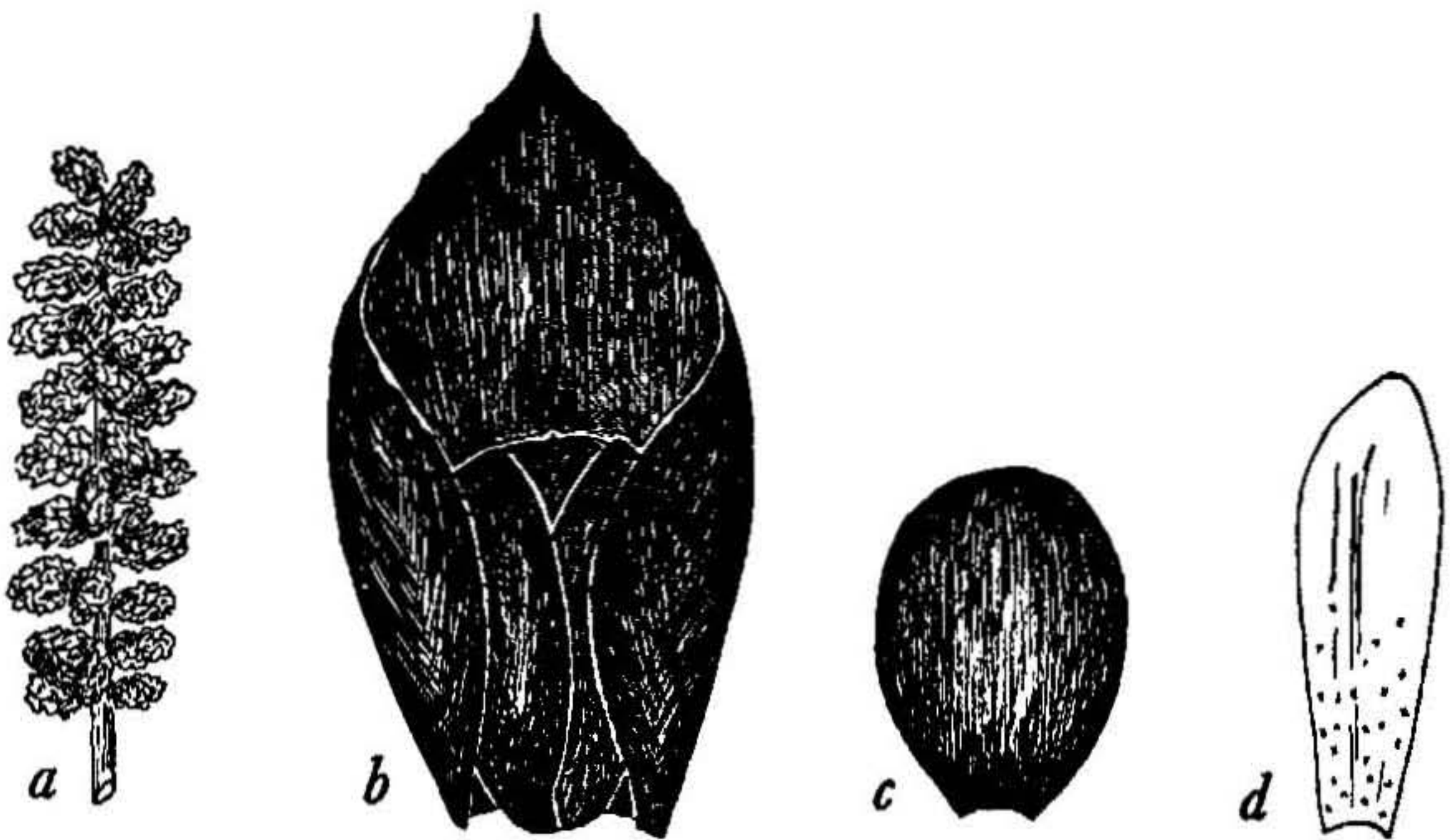


FIGURE 90.—*Puya atra*: *a*, Mature inflorescence,  $\times 1/20$ ; *b*, branch of very young inflorescence and primary bract,  $\times 1/2$ ; *c*, floral bract,  $\times 1/2$ ; *d*, sepal,  $\times 1$ .

the sheaths suborbicular, 6 cm. long, castaneous and serrulate toward the apex, the blades linear-triangular, acuminate, pungent, laxly armed with dark mostly ascending spines 5 mm. long; scape erect, about 2 cm. in diameter, tomentose-lepidote, very quickly glabrous; scape-bracts densely imbricate, subfoliaceous, the blades subdensely lepidote above with fine irregular white scales; inflorescence densely bipinnate, covered with fine stellate ferruginous scales, soon glabrous; primary bracts broadly ovate, acute, 8 cm. long, even or faintly striate, black, lustrous; branches spreading to slightly deflexed, ellipsoid, 9–10 cm. long exclusive of the short stout sterile base, 5–6 cm. in diameter; floral bracts imbricate, very broadly elliptic, obtuse, 4 cm. long, exceeding the sepals, sparsely and very minutely serrulate, subchartaceous, black, lustrous; pedicels slenderly cylindrical, 8 mm.

long; sepals narrowly elliptic, obtuse, 26 mm. long, carinate, lustrous; ovary wholly superior; seeds winged.

Type in the U. S. National Herbarium, Nos. 1985813 and 1985814, collected in cloud forests above Yungas, Department of Cochabamba, Bolivia, altitude 3,150 meters, November 13, 1948, by M. B. Foster (No. 2551).

It is not possible to indicate any real affinity for *Puya atra*. In the Pflanzenreich key it comes out to *P. venusta* Philippi, a dwarf Chilean species with a lax few-branched inflorescence. Its inflorescence has much more the outline of that of *P. weberbaueri* Mez, but that species has dull bracts and a pale long-lanate indument as well as sessile spikes.

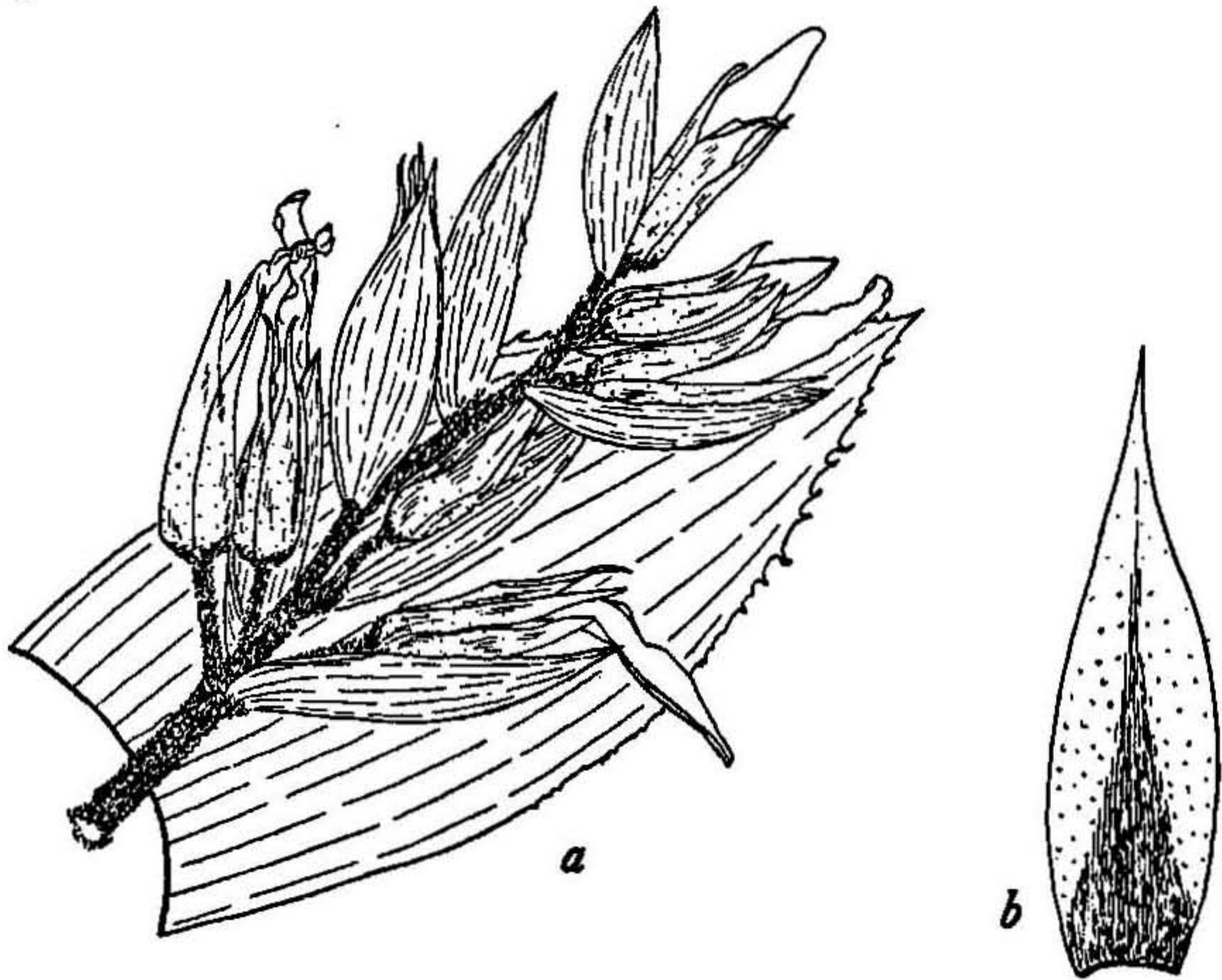


FIGURE 91.—*Puya glabrescens*: *a*, Branch of inflorescence and primary bract,  $\times 1/2$ ; *b*, sepal,  $\times 1$ .

*Puya glabrescens* L. B. Smith, sp. nov.

FIGURE 91

Planta mediocris; inflorescentia bipinnata, dense cylindrica; bracteis sepalsque mox glabris; bracteis primariis magnis, ramos aequantibus, serratis; bracteis florigeris sepala subaequantibus, serrulatis; sepals acuminatis.

Flowering plant 6–8 dm. high (! Cárdenas); leaves 4–7 dm. long, the sheaths suborbicular, 5–9 cm. wide, the blades linear, acuminate, 2–3 cm. wide, at first covered on both sides with gray appressed scales, laxly serrate with slender hooked teeth 10 mm. long; scape erect,

shorter than the leaves, stout; inflorescence bipinnate, densely cylindrical, densely and finely white-lanate with the bracts and sepals soon becoming glabrous; primary bracts elliptic, ample, acute, to 13 cm. long, equaling the branches, serrate; floral bracts elliptic, acute, about equaling the sepals, serrulate; pedicels slender, to 16 mm. long; sepals lance-ovate, acuminate, much thickened centrally but not winged, 35 mm. long, coriaceous; petals 55 mm. long, naked, purple.

Type in the U. S. National Herbarium, Nos. 1986196 and 1986197, collected on rocky slopes, Llallaguani to Anzaldo, Department of Cochabamba, Bolivia, altitude 3,000 meters, January 1949, by M. Cárdenas (No. 4384).

The following, although it has somewhat smaller flowers and yellowish green petals, does not appear to be specifically different:

**BOLIVIA:**

**COCHABAMBA:** On rocky slopes, Llallaguani to Anzaldo, alt. 3,000 m., Jan. 1949, *Cárdenas* 4383 (US).

The flowers of *Puya glabrescens* are similar to those of *P. meiziana* but the inflorescence is compound and the floral bracts are large and serrulate.

***Puya olivacea*** Wittm. Mededeel. Rijks Herb. Leiden 29: 83. 1916. **FIGURE 92**

*Pitcairnia olivacea* Mez in Engl. Pflanzenreich IV. 32: 247. 1935.

Emended description: Flowering plant to 1.5 m. high; leaves 9 dm. long, pale-lepidote, becoming glabrous, the sheaths ovate, small, the blades linear, acuminate, 3-4 cm. wide, laxly armed with dark slender spines 5 mm. long; scape elongate, glabrous; scape-bracts soon disintegrating, broadly ovate; inflorescence amply paniculate, lax, olivaceous-glaucous covered with fine white stellate trichomes when young; primary bracts suborbicular, apiculate, 4 cm. long, exceeding the short sterile naked bases of the branches, serrate, subchartaceous, soon disintegrating; branches divergent, simple, laxly few-flowered, 10-12 cm. long; floral bracts elliptic, apiculate, 3 cm. long, equaling or exceeding the slender pedicels, serrulate; sepals lanceolate, obtuse and mucronulate, 35-40 mm. long, thickened at the base but not carinate; petals 60-70 mm. long, naked, pale lilac; stamens included; ovary wholly superior, ovules broadly winged.

**TYPE LOCALITY:** Quebrada de Charagua, Bolivia.

**BOLIVIA:**

**SANTA CRUZ:** Prov. Cordillera: Quebrada de Charagua, alt. 950 m., Dec. 1910, *Herzog* 1216 (L, type; B, Macbride photo No. 11412). On sandstone hills. near Lagunillas, alt. 1,050 m., Feb. 1951, *Cárdenas* 4786 (US).

The Cárdenas specimen, which is from near the type locality, agrees closely with the type of *Puya olivacea* and gives additional information on the species by its well preserved primary and floral

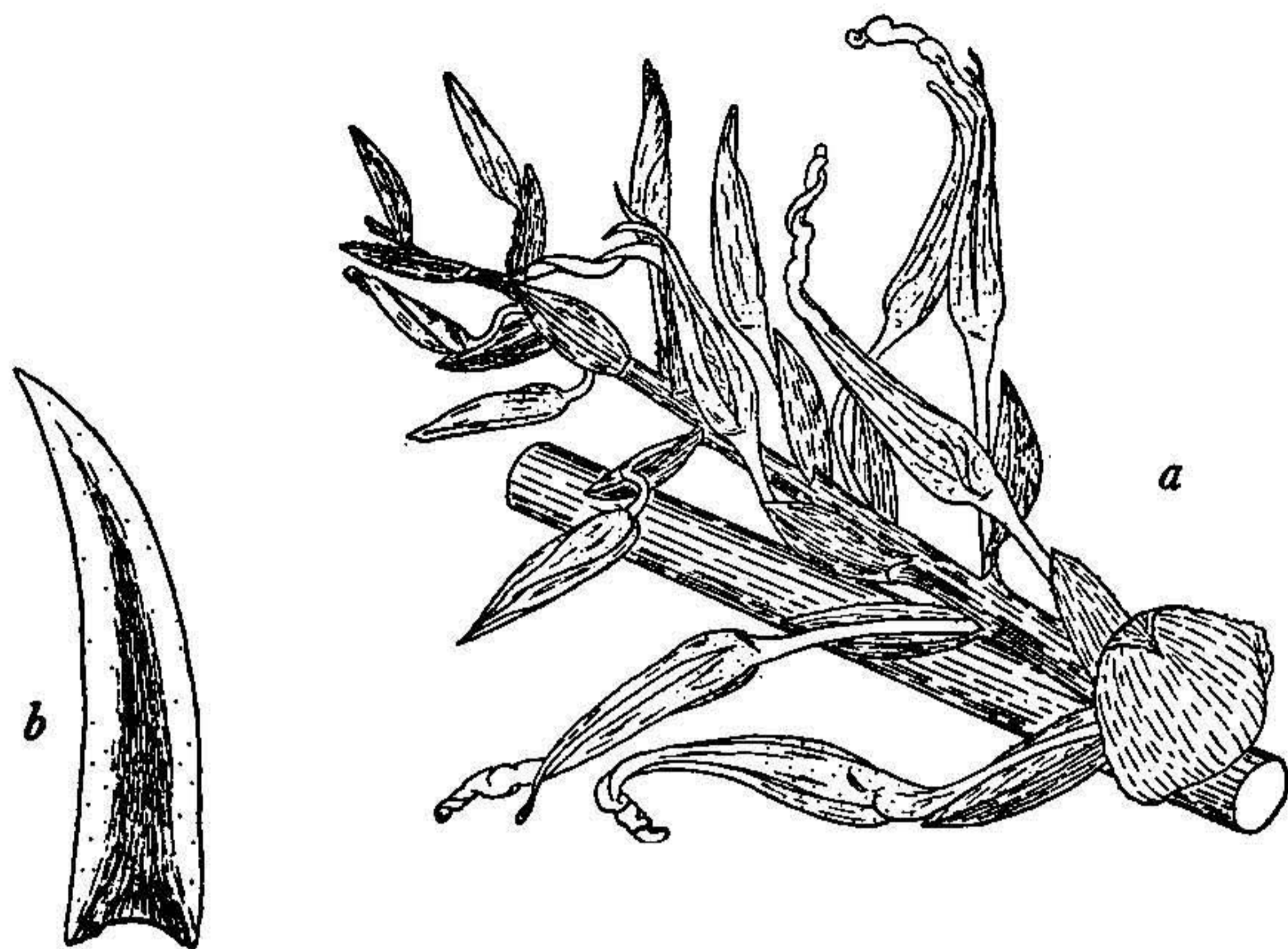


FIGURE 92.—*Puya olivacea*: *a*, Branch of inflorescence and primary bract,  $\times 1/2$ ; *b*, sepal,  $\times 1$ .

bracts. Mez gives no explanation for his transfer of the species to *Pitcairnia* and his description gives only characters that would place it in *Puya* by his own definition of the genus. The flowers are very similar to those of *Puya hofstenii* Mez.

*Puya tuberosa* Mez in DC. Monogr. Phan. 9: 483. 1896.

FIGURE 93

Emended description: Flowering plant less than 3 dm. high including the very short erect rhizome; leaves 15–30, the sheaths suborbicular, blackish brown, pale-lepidote, forming a globose bulb 3 cm. in diameter, the blades linear, flexuous, filiform-acuminate, 15–18 cm. long, 2–3.5 mm. wide, glabrous above, covered with pale narrow spreading scales beneath, laxly armed with fine spreading or ascending spines 1–2 mm. long; scape erect, slender, white-flocculose becoming glabrous; scape-bracts ovate with long filiform blades, covering relatively little of the scape, pale-lepidote; inflorescence simple or with a few short branches at base, cylindric, 7–10 cm. long, white-flocculose at first; primary bracts ovate, acuminate, 2 cm. long, longer or shorter than the laxly few-flowered branches, minutely serrulate; floral bracts ovate, acute, thin, red; pedicels slender, 4–7 mm. long, longer or shorter than the floral bracts; sepals lance-oblong, acute, 7–9 mm. long; petals 14 mm. long, blue-violet.



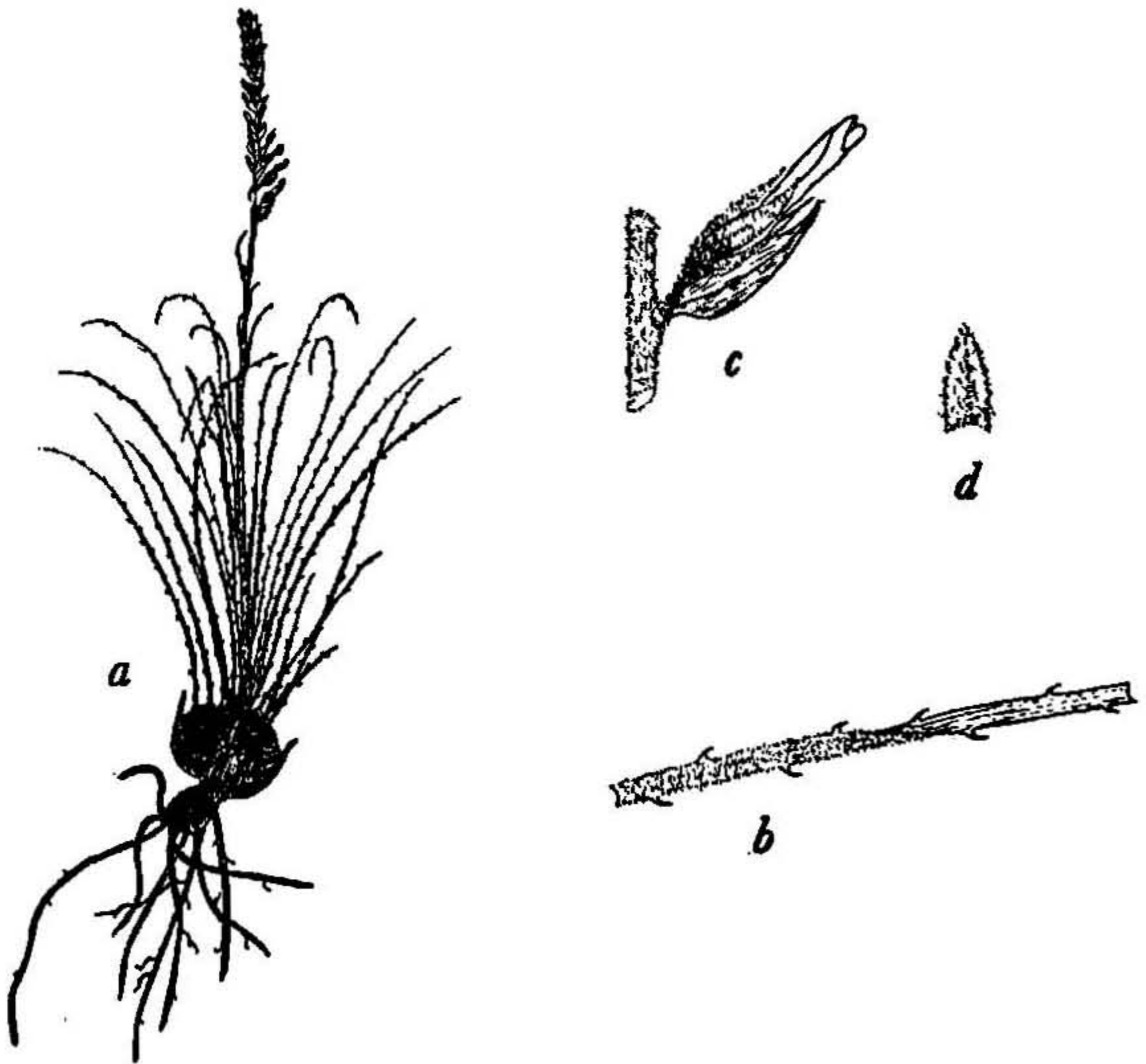


FIGURE 93.—*Puya tuberosa*: *a*, Habit,  $\times 1/5$ ; *b*, section of leaf-blade,  $\times 1$ ; *c*, flower and floral bract,  $\times 1$ ; *d*, sepal,  $\times 1$ .

TYPE LOCALITY: "Peru".

BOLIVIA: *Haenke* (M, type).

SANTA CRUZ: Among grasses on rocky slopes, near Cuesta de Monos, alt. 1,000 m., Nov. 1950, *Cárdenas* 4647 (US).

There has been considerable confusion in the labels of *Haenke's* plants. Also, *Haenke* collected in central Bolivia. These facts and the restricted range of nearly all species of *Puya* make it seem very likely that the *Cárdenas* plant comes from close to the type locality. The type lacks all but the base of the inflorescence and is in fruit. Except for longer pedicels, perhaps attributable to age, it agrees closely with the *Cárdenas* material.

*Puya ultima* L. B. Smith, sp. nov.

FIGURE 94

A *P. pearcei* (Baker) Mez, cui habitu simillima, ramis longissimis, bracteis florigeris pectinato-serratis, sepalis valde carinatis differt.

Flowering plant to 1.5 m. high; leaves 9 dm. long, covered with white appressed scales beneath, becoming wholly glabrous, the sheaths distinguishable only by their shorter teeth and dark castaneous coloration,

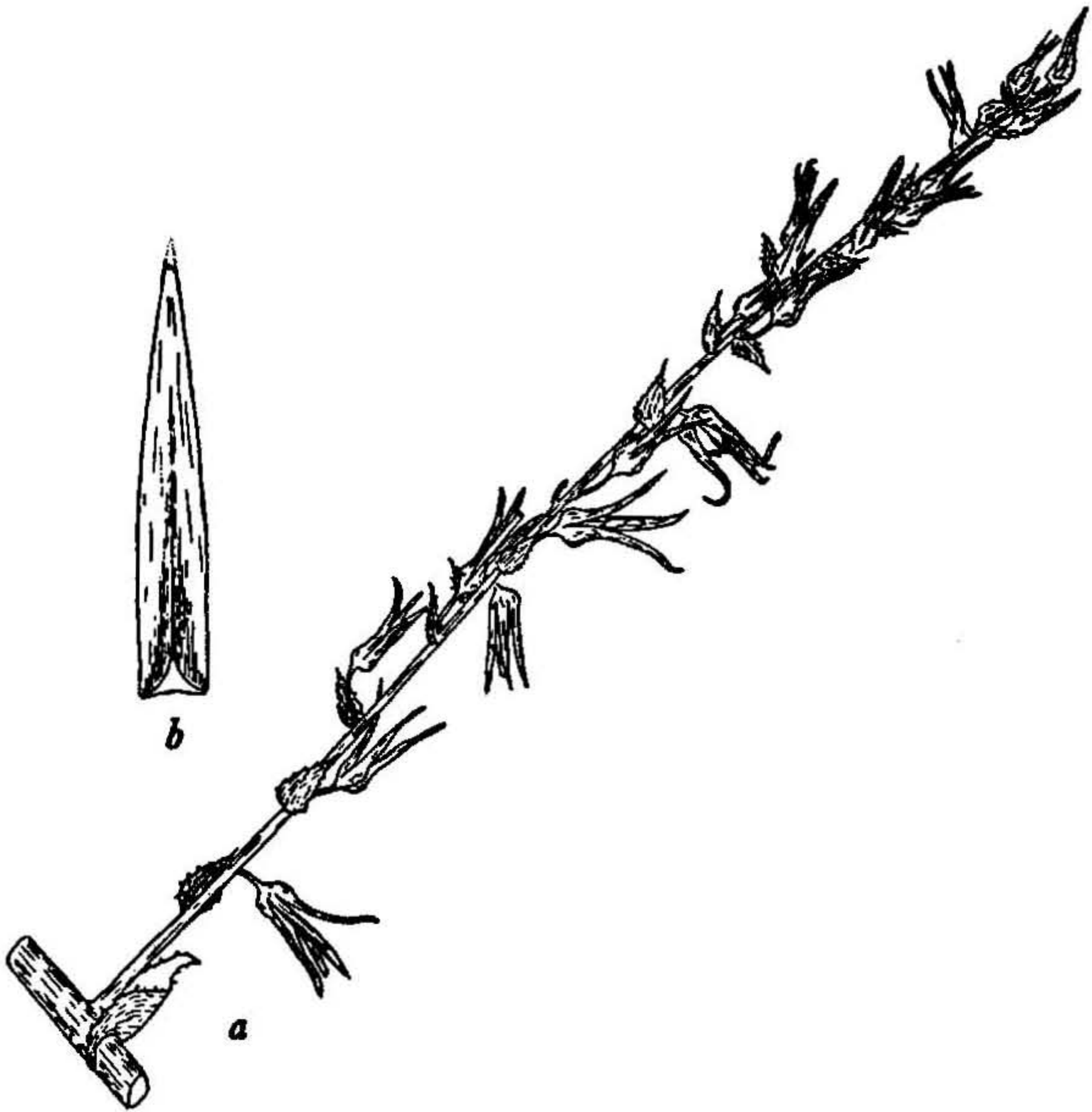


FIGURE 94.—*Puya ultima*: *a*, Branch of inflorescence and primary bract,  $\times 1/4$ ; *b*, sepal,  $\times 1$ .

the blades linear-triangular, acuminate, pungent, 6 cm. wide, laxly armed with black broad ascending spines 10 mm. long; scape unknown; inflorescence bipinnate, ample, very lax, glabrous at least after anthesis; primary bracts broadly ovate, acuminate, 5 cm. long, about equaling the sterile naked bases of the branches, pectinate-serrate, subchartaceous; branches spreading, slender, 5 dm. long, laxly flowered especially toward the base; floral bracts ovate, acuminate, 2 cm. long, equaling or exceeding the slender pedicels, pectinate-serrate; flowers ascending; sepals narrowly triangular, strongly carinate, at least 40 mm. long, their apices unknown; petals naked; ovary superior; seeds winged.

Type in the U. S. National Herbarium, Nos. 1985832 and 1985833, collected on humid rocky slopes, eastern slope of the Eastern Cordillera, on the road to Irupana, east of La Paz, Department of La Paz, Bolivia, altitude 1,500 meters, November 20, 1948, by M. B. Foster (No. 2575).

Owing to the absence of complete sepals in *Puya ultima* it is not possible to place it exactly in reference to Mez's treatment in the Pflanzenreich. None of the species with blunt sepals have such strongly serrate floral bracts, and those with acute or acuminate sepals and pectinate bracts, such as *P. roezlii* E. Morr., have little resemblance to *P. ultima*. *Puya ultima* is extreme in three characters, its long branches, pectinate bracts, and carinate sepals, hence the specific name.

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