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STUDIES IN THE BROMELIACEAE, XV

By LYMAN B. SMITH



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**II**

## PREFACE

THE present paper, by Lyman B. Smith, associate curator of the Department of Botany, U. S. National Herbarium, is a continuation of his series of studies of the family Bromeliaceae, being the fifteenth in the series. New and noteworthy species, occurring from Mexico and the Lesser Antilles south to Ecuador, are discussed. Thirty-four species and three varieties, based upon recently collected material, are described as new.

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# STUDIES IN THE BROMELIACEAE, XV

By LYMAN B. SMITH

## INTRODUCTION

SINCE the publication of No. 14 in "Studies in the Bromeliaceae"<sup>1</sup> a number of species requiring description or critical notes have been studied. As their publication here is largely preliminary to their inclusion in various floristic works, they are grouped by countries. By far the largest number are new species from Colombia collected by Mulford and Racine Foster in 1946.

Thanks to the kindness of those in charge it has been possible to study material from the following herbaria: The Chicago Natural History Museum (CM), the Gray Herbarium of Harvard University (G), the herbarium of the Royal Botanic Gardens, Kew (K), the Botanical Museum, Munich (M), and the United States National Museum (US). Material from the Botanical Museum, Berlin-Dahlem (B), and from the Natural History Museum, Vienna (Vienna), was studied on the basis of type descriptions.

## MEXICO

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

FIGURE 2

Acaulis; foliis acuminatis, utrinque lepidibus cinereis patentibus vestitis; inflorescentia simplicissima, polystiche florigera; bracteis membranaceis, acutis vel caudatis; sepalis late oblanceolatis, dense lepidotis; petalis violaceis; staminibus exsertis.

Stemless; leaves numerous, 15–20 cm. long, covered with cinereous spreading scales, the sheaths distinct, broadly elliptic, the blades narrowly triangular, caudate-acuminate, 15 mm. wide at base; scape short and largely concealed by the leaves, curved; scape-bracts densely imbricate, elliptic with long foliaceous blades, membranaceous, roseate, densely lepidote; inflorescence simple with the flowers in several ranks, ellipsoid, 12 cm. long; bracts imbricate, the lower ones like the scape-bracts, the upper merely acute, all much exceeding the sepals; sepals subfree, broadly oblanceolate, acute, 35 mm. long, thin, densely cinereous-lepidote; petals erect, 6 cm. long, violet, stamens exserted.

Type in the U. S. National Herbarium, No. 1894950, collected at lower altitudes, at Lachatao, State of Oaxaca, Mexico, December 31, 1947, by T. MacDougall.

<sup>1</sup> Contr. Gray Herb. 161: 29–35. 1946.

In its inflorescence and bracts, *Tillandsia macdougallii* closely resembles *T. benthamiana* Kl. and *T. andrieuxii* (Mez) L. B. Smith. It differs from *T. benthamiana* in its violet petals and from *T. andrieuxii* in its acute to caudate bracts. It is unlike either in its broadly oblanceolate densely lepidote sepals.

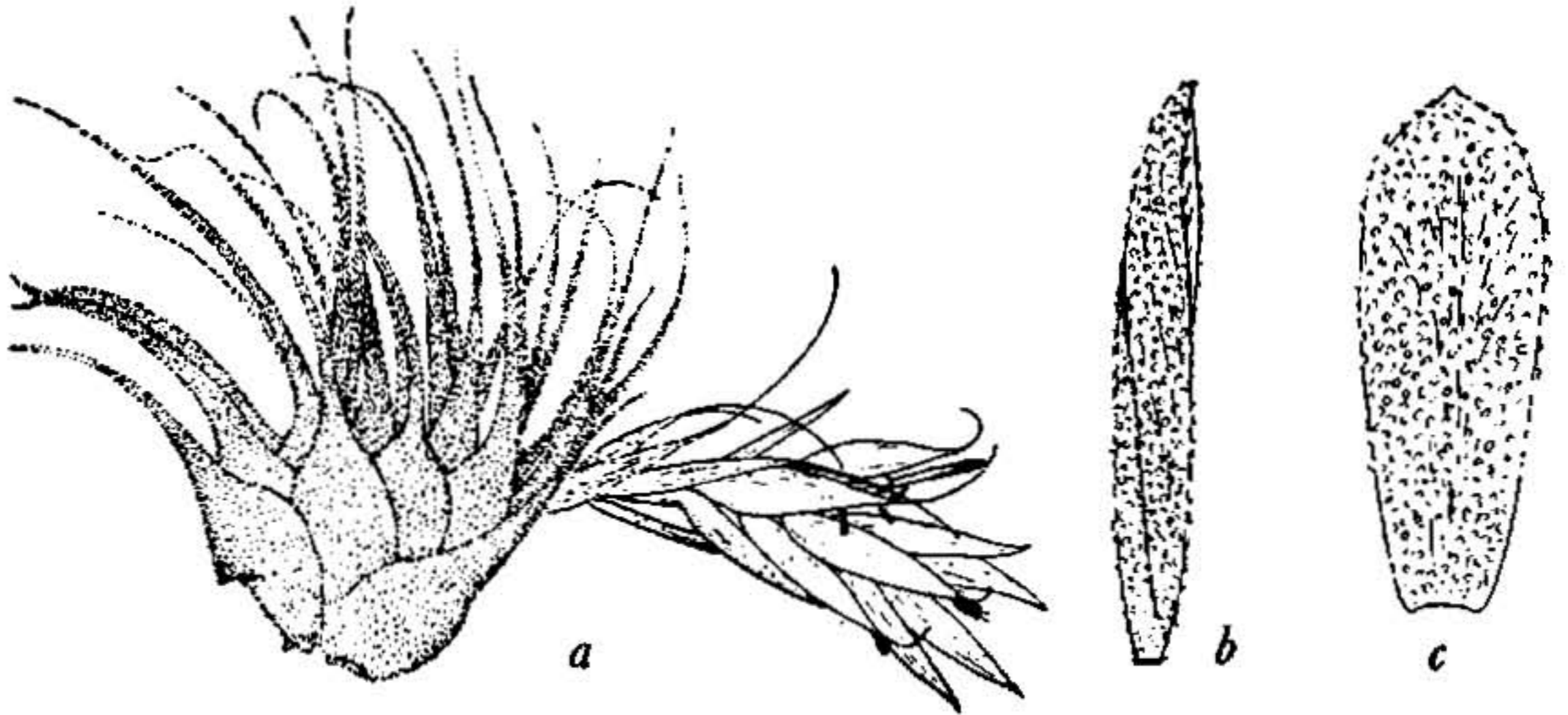


FIGURE 2.—*Tillandsia macdougallii*: a, Habit,  $\times \frac{1}{4}$ ; b, calyx,  $\times 1$ ; c, expanded sepal,  $\times 1$ .

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

FIGURE 3

Acaulis; foliis inflorescentiam multo superantibus, vaginis haud inflatis, laminis acuminatis; inflorescentia digitata subpendula; bractearum primarium vaginis quam spicis brevioribus; bracteis florigeris imbricatis, sepala superantibus; sepalis liberis; staminibus inclusis.

Stemless; leaves numerous, 14 cm. long, much exceeding the inflorescence, covered with spreading cinereous scales, sheaths elliptic, scarcely inflated, 4 cm. long, blades very narrowly triangular, acuminate, involute-subulate; scape very short, hidden by the leaves, decurved; scape-bracts foliaceous, densely imbricate; inflorescence of 7 spikes, densely digitate; primary bracts like the upper scape-bracts, their sheaths much shorter than the axillary spikes; spikes lanceolate, acute, densely few-flowered, slightly complanate; floral bracts densely imbricate, elliptic, broadly acute, to 37 mm. long, exceeding the sepals, ecarinate, chartaceous, nerved, probably rose, sparsely and obscurely lepidote; sepals free, narrowly lanceolate, 3 cm. long, alate-carinate, thin, glabrous; petals 4 cm. long, slightly exceeding the stamens.

Type in the Gray Herbarium, collected by carriage-road between Conitán and Amatenango del Valle, State of Chiapas, Mexico, altitude 2,100 meters, June 9, 1945, by E. Matuda (No. 5811).

Probably the only near relative of *Tillandsia matudai* is *T. mauryana* L. B. Smith, which has sharply carinate floral bracts and much smaller flowers. The habit of *T. matudai* is strikingly like that of certain Brazilian species such as *T. gardneri* Lindl.

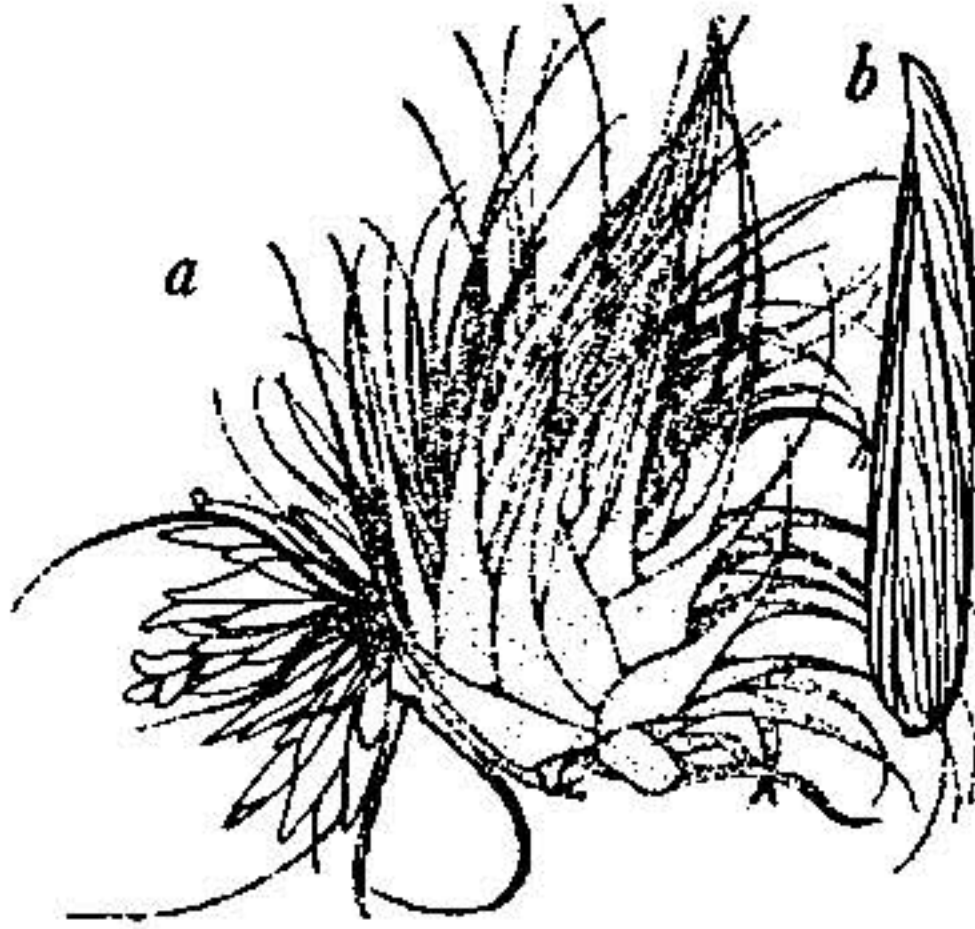


FIGURE 3.—*Tillandsia matudai*: a, Habit,  $\times \frac{1}{4}$ ; b, calyx,  $\times 1$ .

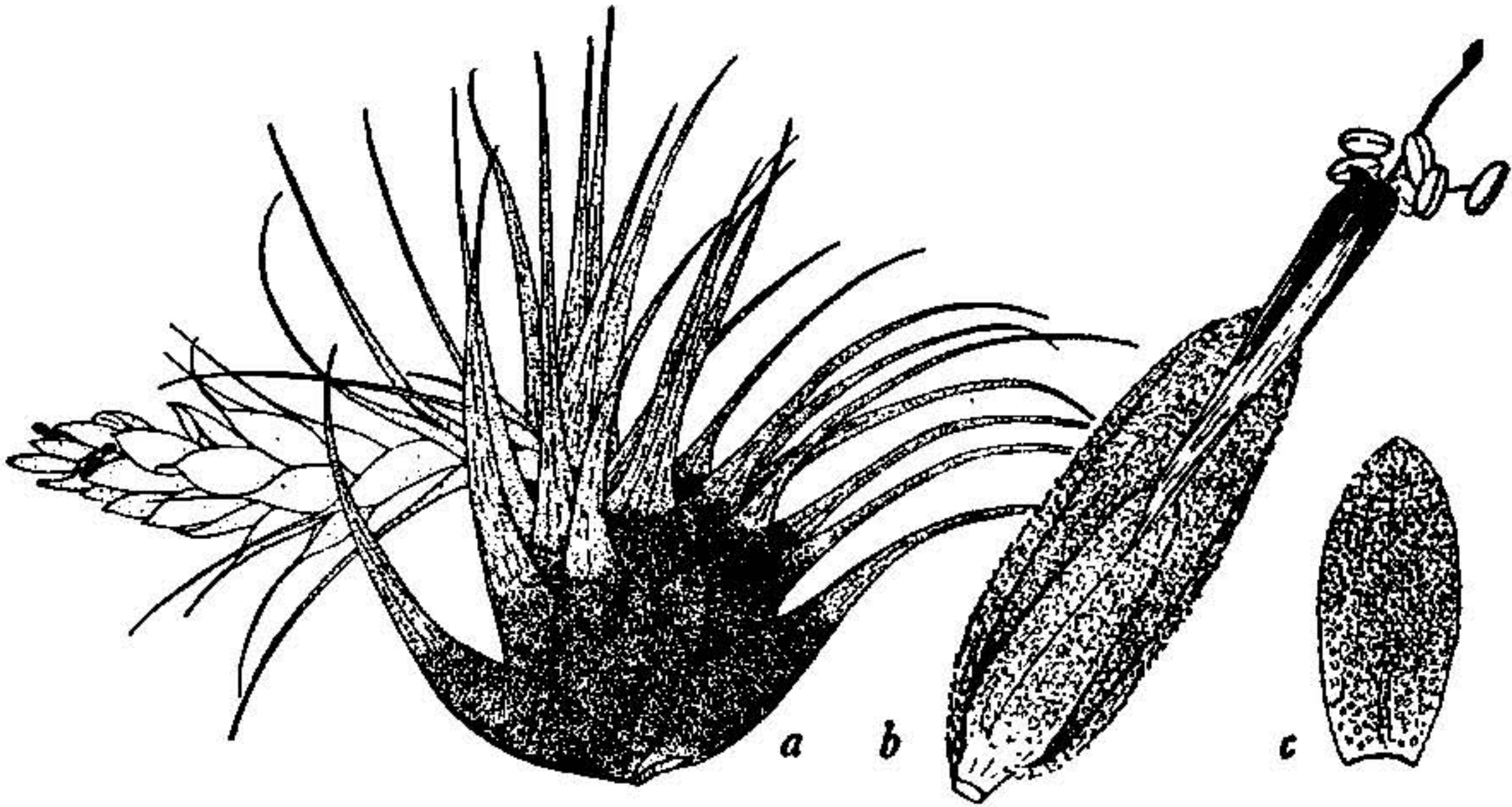


FIGURE 4.—*Tillandsia oaxacana*: a, Habit,  $\times \frac{1}{4}$ ; b, flower and bract,  $\times 1$ ; c, expanded sepal,  $\times 1$ .

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

FIGURE 4

Acaulis; foliis densissime adpresseque lepidotis, vaginis atro-castaneis, laminis acuminatis; scapo decurvato; scapi bracteis imbricatis; inflorescentia simplicissima, polystiche florifera; bracteis imbricatis, sepala superantibus, tenuibus, sepalis liberis, ellipticis, lepidotis; petalis violaceis; staminibus exsertis.

Stemless; leaves numerous, 2 dm. long, very densely appressed-lepidote, the sheaths distinct, broadly elliptic, dark castaneous, the

blades narrowly triangular, cinereous-lepidote; scape short, decurved, hidden by the leaves; scape-bracts densely imbricate, subfoliaceous but the bases roseate; inflorescence simple with the flowers in several ranks, subcylindric, 12 cm. long; bracts imbricate, exceeding the sepals, elliptic, subpapyraceous, roseate, densely cinereous-lepidote, the lowest with long foliaceous blades; sepals free, elliptic, 25 mm. long, thin, densely lepidote; petals erect, 5 cm. long, violet; stamens exerted.

Type in the U. S. National Herbarium, No. 1894945, collected at Lachatao, State of Oaxaca, Mexico, December 21, 1947, by T. MacDougall.

Its simple many-ranked inflorescence and thin roseate bracts place *Tillandsia oaxacana* next to *T. benthamiana* Kl. and *T. andrieuxii* (Mez) L. B. Smith, but its leaves with their appressed scales and dark castaneous sheaths are strikingly different.

#### GUATEMALA

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

FIGURE 5

Caulescens; foliorum vaginis parvis, suborbicularibus; laminis dimorphis, alteris flagelliformibus, alteris supra basin paulo angustatis, linearibus; scapi bracteis quam internodiis brevioribus; inflorescentia depauperatim paniculata; bracteis florigeris quam pedicellis brevioribus; sepalis acutis; petalis rubris, basi ligula auctis; ovulis caudatis.

Reproducing by stolons, the flowering plant over 5 dm. high; stem prostrate, at least 9 cm. long, covered with the remnants of old leaves; leaves numerous, subrosulate, to 7.5 dm. long, subspreading, the sheaths small, suborbicular, dark castaneous, serrulate toward the apex, the blades apparently all persistent, serrate at base, dimorphic, some very slenderly flagelliform, others slightly narrowed above the base but not petiolate, linear, acuminate, 11 mm. wide; scape erect, slender, glabrous; scape-bracts narrowly triangular, much shorter than the internodes; inflorescence a lax depauperate panicle, 33 cm. long; primary bract scarcely larger than the lower floral bracts; the single lateral branch 13 cm. long with a long sterile base; floral bracts lanceolate, about half as long as the pedicels; flowers subspreading; pedicels very slender, 19 mm. long, white-flocculose at the base; sepals oblong-lanceolate, acute, 14 mm. long, ecarinate, glabrous; petals obtuse, red, bearing a truncate lacerate scale at base; stamens included; ovary two-thirds superior, the ovules short-caudate.

Type in the Chicago Natural History Museum, collected on vertical limestone bluff, Montaña Yxocubvain, 2½ miles west of Cubilgüitz, Department of Alta Verapaz, Guatemala, altitude 300–500 meters, March 12, 1942, by J. A. Steyermark (No. 44976). Duplicate at G.

The green whiplike form of its reduced leaf-blades is the most outstanding character of *Pitcairnia flagellaris*. The great majority of the



species of *Pitcairnia* with dimorphic leaf-blades have the reduced ones in the form of stiff serrate chestnut-colored spines. It is hard to say where to place *P. flagellaris* in a key like that of the Pflanzenreich because one does not know whether to consider the inflorescence truly compound or not. Phylogenetically it appears to be a forerunner of the specialized type, with a simple inflorescence and partly deciduous dimorphic blades, that is so common in Mexico.

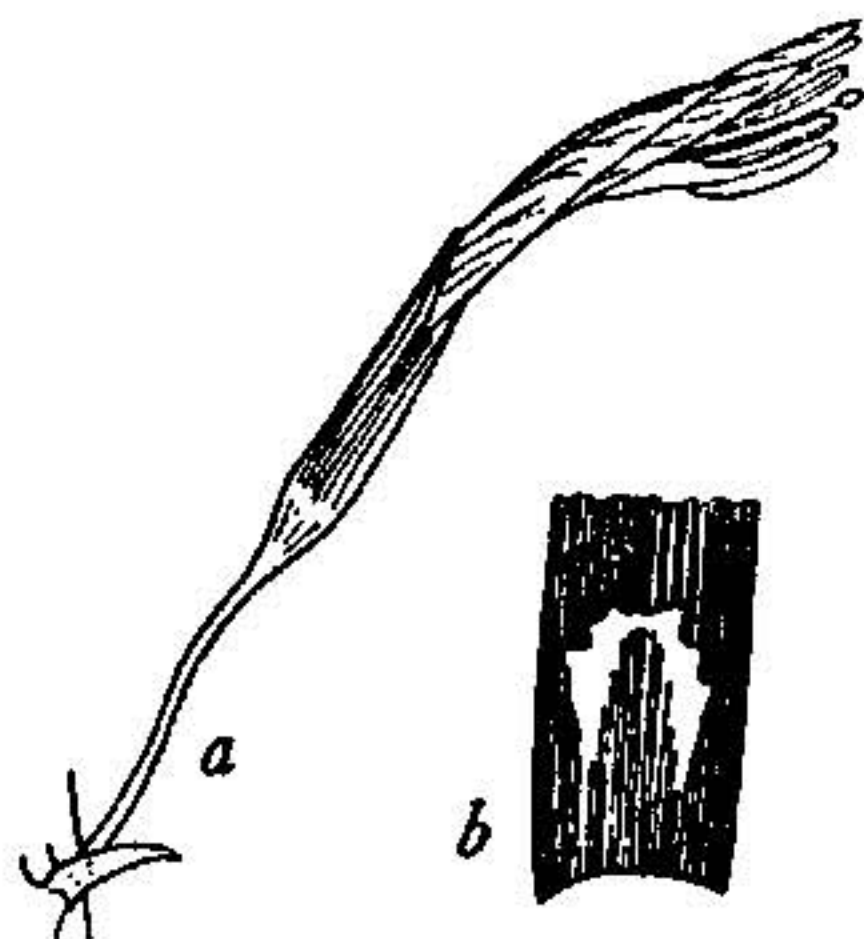


FIGURE 5.—*Pitcairnia flagellaris*: *a*, Flower and bract,  $\times 1$ ; *b*, base of petal,  $\times 3$ .

***Tillandsia guatemalensis* L. B. Smith, nom. nov.**

*Allardtia cyanea* A. Dietr. in Otto & Dietr. Allgem. Gartenzeit. 20: 241. 1852.

*Tillandsia cyanea* (A. Dietr.) E. Morr. Belg. Hort. 29: 297. 1879, not Linden ex Koch, Wochenschr. 10: 140. 1867.

*Tillandsia excelsa* sensu L. B. Smith & Lundell, Brom. Yucatan Penin. in Carnegie Inst. Washington Publ. 522: 112. 1940, not Griseb. 1864.

The discovery of a scanty but technically adequate use of the name *Tillandsia cyanea* prior to E. Morren's combination forces us to discard his name as a later homonym.

In previous papers I made the main distinction between *T. cyanea* E. Morr. and *T. excelsa* Griseb. on the absolute size of the sepals and thereby misdetermined the larger-flowered material of *T. cyanea*. The best distinction is in the large secondary bracts of *T. excelsa*, which are half as long as the broad few-flowered spikes, and in the consistently ecarinate sepals.

#### PANAMA

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

FIGURE 6

Foliis dimorphis, laminis alteris ad spinas brunneas aculeatas reductis, alteris linearibus integerrimis; scapi bracteis internodia superantibus; inflorescentia laxa paniculata, bracteis florigeris pedicellos superantibus, angustis; sepalis lanceolatis, 15 mm. longis; petalis rubris; ovulis apiculatis.

Flowering plant 9 dm. high; leaves dimorphic, the outer ones with small orbicular deep castaneous sheaths and blades reduced to spinose-

serrate spines, the inner 75 cm. long, entire, slightly constricted between sheath and blade, sparsely flocculose, soon glabrous, the sheath narrowly triangular, pale, the blade linear with a median channel, 23 mm. wide; scape erect, slender; inflorescence laxly compound, white-flocculose; primary bracts linear, much shorter than the ascending branches; only the apical half of the lateral branches fertile; floral bracts narrowly triangular, exceeding the slender 5 mm. long pedicels; flowers ascending; sepals lanceolate, acute, 15 mm. long, ecarinate; petals 5 cm. long, red, bearing a bidentate scale at base; stamens included; ovary two-thirds superior; ovules apiculate.

Type in the U. S. National Herbarium, No. 1945467, collected on sheer rock faces, at Cerro Galera Chorchá, vicinity of Gualaca, Province of Chiriquí, Panama, altitude 300 meters, August 1, 1947, by Paul H. Allen (No. 5016).

In the key in the Pflanzenreich *Pitcairnia chiriquensis* would fall next to *P. hartmanni* Mez, from which it differs in its dimorphic leaves.



FIGURE 6.—*Pitcairnia chiriquensis*: a, Branch of inflorescence,  $\times \frac{1}{2}$ ; b, flower and bract,  $\times 1$ ; c, sepal,  $\times 1$ ; d, base of petal,  $\times 1$ .

#### LESSER ANTILLES

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

FIGURE 7

Foliorum laminis angustissime triangularibus; inflorescentia bipinnatim paniculata; bracteis primariis brevissimis; spicis longe stipitatis; bracteis florigeris internodia plus quam duplo superantibus sed rhachin haud obtegentibus, quam sepalis brevioribus; sepalis liberis; staminibus inclusis.

Epiphytic, known only from fragments but undoubtedly stemless; leaves 6 dm. long, densely and minutely appressed-lepidote, sheaths large, castaneous, blades very narrowly triangular; scape unknown; inflorescence bipinnate, the axis 8 mm. in diameter, the internodes 15–20 mm. long; primary bracts ovate with a caudate apex, much shorter than the sterile base of the spike, cinereous-lepidote; spikes strict, long-stipitate with many imbricate sterile bracts; floral bracts more than twice as long as the internodes but divergent and not at all imbricate, elliptic, carinate, incurved, 28 mm. long, distinctly exceeded by the sepals, subcoriaceous, sulcate, glabrous; pedicels 2

mm. long; sepals free, lanceolate, the posterior ones carinate with the keel decurrent on the pedicel; petals 4 cm. long; stamens included.

Type in the U. S. National Herbarium, No. 1559010, collected in humid place, La Josephine au Matouba, Guadeloupe, French West Indies, altitude 560 meters, February 20, 1936, by H. Stehlé (No. 887).

The exserted sepals distinguish *Tillandsia antillana* from most of the large species of the subgenus *Allardtia*, and it is difficult to suggest any close relative for the species. Possibly the nearest would be *T. subimbricata* Bak., which is widely distributed around the Caribbean Sea.

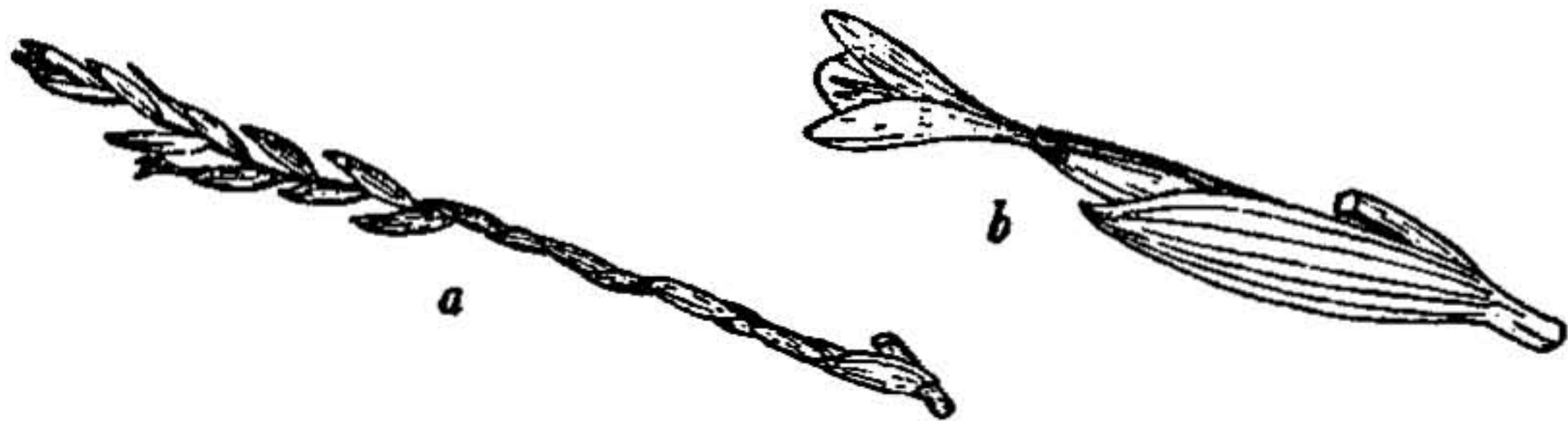


FIGURE 7.—*Tillandsia antillana*: a, Branch of inflorescence,  $\times \frac{1}{4}$ ; b, flower and bract,  $\times 1$ .

#### VENEZUELA

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

FIGURE 8

Verisimiliter grandis; foliis ensiformibus, basi haud angustatis, utrinque dense serrulatis; inflorescentia bipinnatim paniculata; sepalis late ellipticis, serrulatis.

Known only from leaves and fragments of a very young inflorescence, probably a meter or more high; leaves ensiform, without a distinct sheath, subulate-acuminate, 3–4 dm. long, 28 mm. wide, subdensely serrulate with curved spines 0.5 mm. long, sparsely and obscurely pale-lepidote above, nearly glabrous beneath; inflorescence bipinnate; primary bracts very narrowly triangular, 35 mm. long, the lowest already exceeded by its axillary branch, serrulate, membranaceous, flocculose with fine linear scales; branches suberect, simple, densely many-flowered; floral bracts like the primary bracts, 7 mm. long; unopened flowers 3.5 mm. long, short-pedicellate, not



FIGURE 8.—*Lindmania serrulata*: a, Apex of leaf,  $\times 1$ ; b, branch of inflorescence,  $\times 1$ ; c, sepal  $\times 5$ .

secund; sepals broadly elliptic, obtuse, densely and minutely serrulate; anthers apiculate.

Type in the U. S. National Herbarium, No. 1909909, collected in rocky places at Cerro Apacara, Río Caroní, State of Bolívar, Venezuela, altitude 2,000 meters, July 7, 1946, by F. Cardona (No. 1587).

In habit, *Lindmania serrulata* probably resembles *L. albicans* (Griseb.) Mez of Argentina more closely than it does any other species. However, the serrulation of its parts, extending even to the sepals, is the most extreme in the genus.

### COLOMBIA

*Aechmea corymbosa* (Mart.) Mez in Mart. Pl. Bras. 3<sup>3</sup>: 316. 1892. FIGURE 9

*Billbergia corymbosa* Mart. ex Schultes in R. & S. Syst. 7: 1268. 1830.

TYPE LOCALITY: Porto dos Miranhas (Puerto Mirañas), on Río Caquetá, Amazonas, Colombia. Type collected by Martius.

#### COLOMBIA:

VAUPÉS: Epiphytic, forest between Río Apoporís and Río Vaupés, path from Puerto Naré to Victoria, alt. ca. 300 m., April 10-17, 1943, R. E. Schultes 5377 (G).

AMAZONAS: Puerto Mirañas, on Río Caquetá, 1820, Martius (M, type).

#### PERU:

LORETO: Epiphytic, Mishuyacu, near Iquitos, alt. 100 m., Feb.-Mar. 1930, Klug 1095 (CM, US).

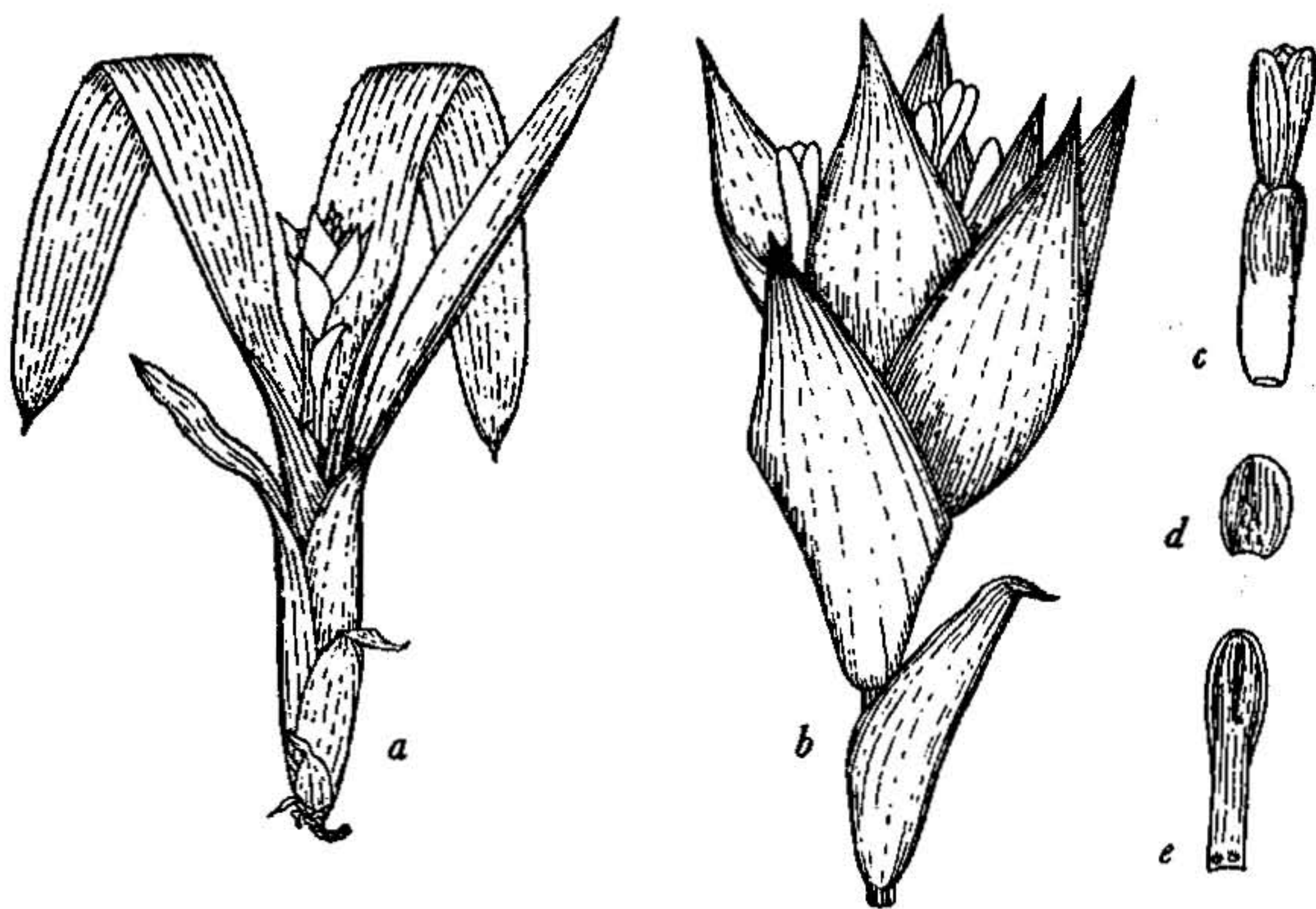


FIGURE 9.—*Aechmea corymbosa*: a, Habit,  $\times \frac{5}{16}$ ; b, inflorescence,  $\times 1$ ; c, flower,  $\times 1$ ; d, sepal,  $\times 1$ ; e, petal,  $\times 1$ .

Until now *Aechmea corymbosa* has been known only from the type and has always been ascribed to Brazil. Actually, as shown by Dugand,<sup>2</sup> Martius' locality is within the present boundaries of Colombia. The Schultes specimen here illustrated has a few teeth on the bracts, but they are so very small that they may well have been overlooked in the type where the bracts are described as entire.

*Bromelia fragilis* L. B. Smith, sp. nov.

FIGURE 10

Laminis foliorum basi nullo modo angustatis; inflorescentia corymbosa, inter folia nidulante, lepidibus linearibus atro-brunneis vestita; bracteis florigeris elliptico-oblongis, ovarium subaequantibus, per-tenuibus; sepalis integris, quam ovario multo brevioribus; petalis ultra medium connatis.

Plant terrestrial, 60–75 cm. high (! Foster); leaves over 120 cm. long, sheaths large, suborbicular, their apices covered with dark brown linear scales, blades linear, not at all petiolate, to 4 cm. wide, laxly serrate with hooked spines to 5 mm. long, covered with appressed white scales; scape none; inflorescence densely corymbose, sunk in the center of the rosette, few-flowered, covered with dark brown linear scales; primary bracts broadly elliptic, 7 cm. long, coarsely serrate, dark brown and rather papery when dry; floral bracts elliptic-oblong, about equaling the ovary, laxly serrulate, very thin; sepals lance-oblong, cucullate, 22 mm. long, entire, thin; petals 33 mm. long, joined with the filaments into a tube 18 mm. high; ovary cylindric, 5 cm. long.

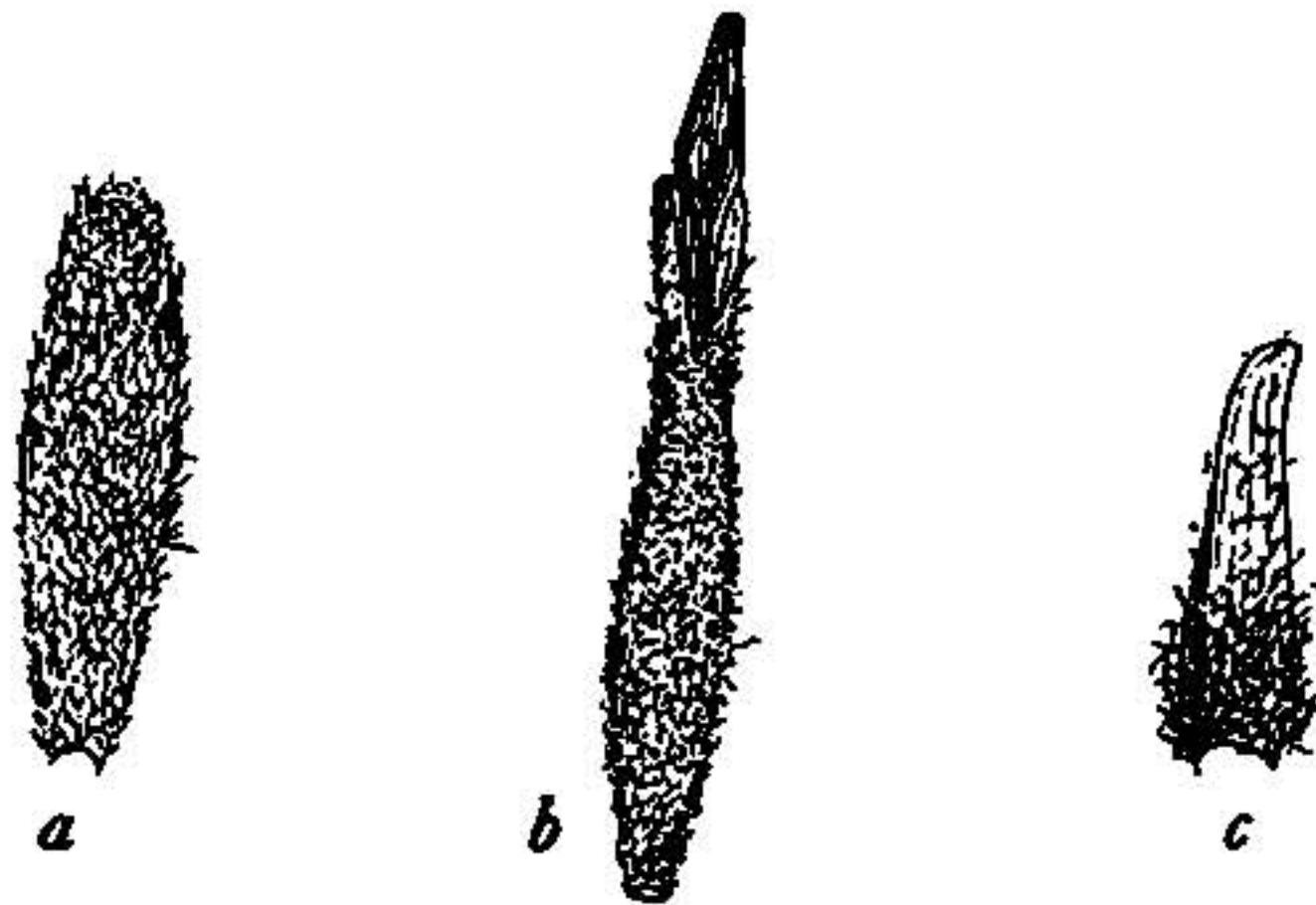


FIGURE 10.—*Bromelia fragilis*: a, Floral bract,  $\times \frac{1}{2}$ ; b, flower,  $\times \frac{1}{2}$ ; c, sepal,  $\times 1$ .

Type in the Gray Herbarium, collected at Pueblo Bello, Sierra Nevada de Santa Marta, Department of Magdalena, Colombia, altitude 960 meters, August 19, 1946, by M. B. and R. Foster and E. Smith (No. 1469).

The collectors note that the whole plant of *Bromelia fragilis* is about one-fourth the size of *B. karatas* L. This new species appears most

<sup>2</sup> Rev. Acad. Colombiana de Ciencias 5: 212–216. Dec. 1942.

nearly related to *B. nidus-puellae* André but differs from that species in its smaller sepals and broader floral bracts.

*Greigia collina* L. B. Smith, sp. nov.

FIGURE 11

Foliis subtus dense cinereo-lepidotis, laminis ad 28 mm. latis, basi angustatis et spinis atris 5 mm. longis armatis; inflorescentiis laterali-bus, paucifloris; bracteis primariis atro-castaneis, integerrimis; sepalis 15 mm. longis, tenuibus, nervatis.

Terrestrial, growing in masses, short-caulescent; leaves many, sub-rosulate, 9–12 dm. long (! Foster), densely cinereous-lepidote beneath, the sheaths oblong, entire, dark castaneous at base, the blades linear, acuminate, 28 mm. wide, narrowed at base and armed with dark teeth 5 mm. long, entire near the middle, densely serrulate toward apex; inflorescences lateral, few-flowered, compressed, 5 cm. long; primary bracts broadly triangular-ovate, thick-subulate toward apex, 4 cm. long, much exceeding the sepals, dark castaneous, sparsely white-lepidote, entire; floral bracts broadly lanceolate, subulate-acuminate, 24 mm. long, about equaling the sepals, dark castaneous except for the pale base and margins, nerved, sparsely appressed-white-lepidote; flowers sessile; sepals elliptic, 15 mm. long, thin, nerved, pale castaneous, sparsely lepidote; ovary sparsely ferruginous-lepidote.

Type in the Gray Herbarium, collected near Fusagasugá, Department of Cundinamarca, Colombia, altitude, 2,700 meters, October 12, 1946, by M. B. and R. Foster (No. 1868). Duplicate in U. S. National Herbarium.

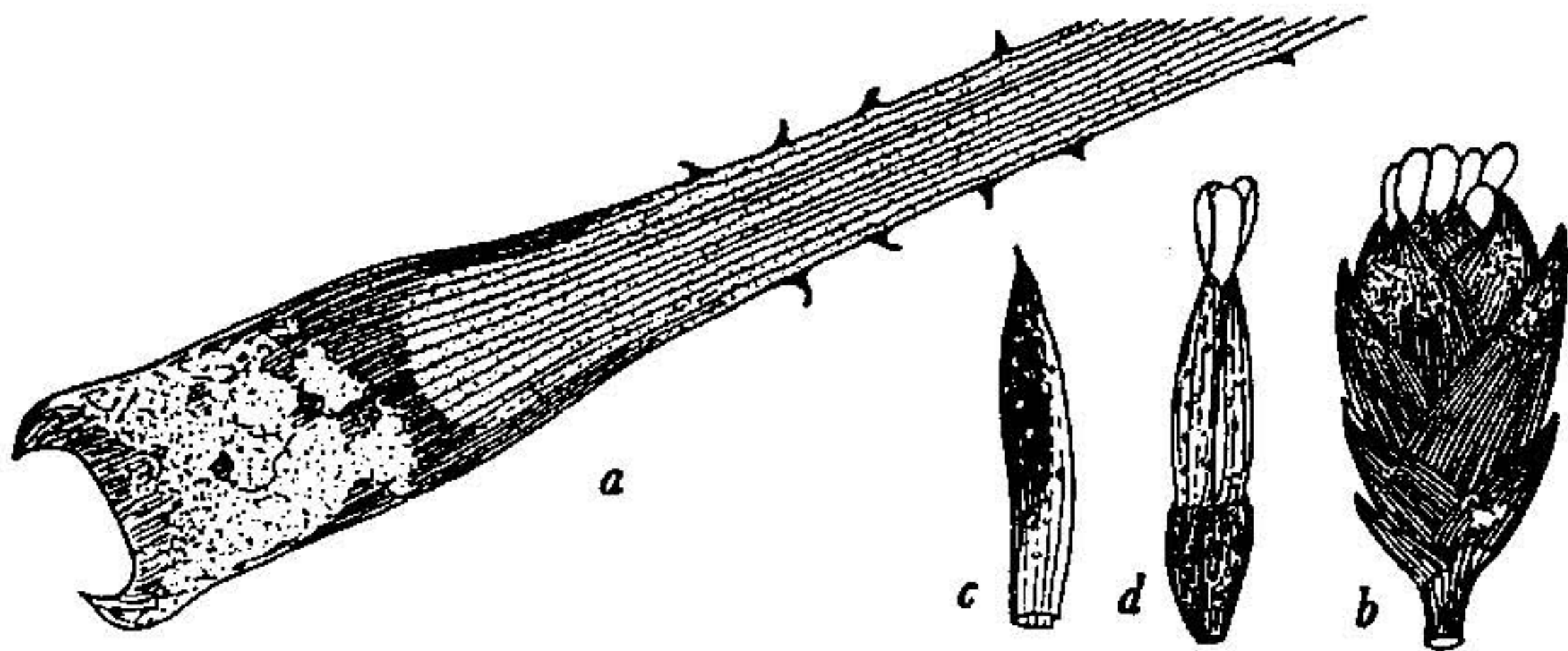


FIGURE 11.—*Greigia collina*: *a*, Base of leaf,  $\times \frac{1}{2}$ ; *b*, inflorescence,  $\times \frac{1}{2}$ ; *c*, floral bract,  $\times 1$ ; *d*, flower,  $\times 1$ .

*Greigia mulfordii* L. B. Smith, sp. nov.

FIGURE 12

Laminis foliorum ad 4 cm. latis, basi angustatis et cum apice vaginarum spinis subatris ad 4 mm. longis laxe armatis; inflorescentiis lateralibus, multifloris; bracteis primariis sepala per anthesin superantibus, sub apicem spinis paucis obscurisque praeditis; sepalis triangulari-lanceolatis.

Terrestrial, caulescent; stem erect, 3–15 dm. long (! Foster); leaves 8 dm. long, brown-lepidote throughout, concolorous, the sheaths elliptic, the blades linear, acuminate, 4 cm. wide, narrowed at base and with the apex of the sheath laxly serrate with dark spines 4 mm. long; inflorescences lateral, numerous, compressed, many-flowered, 6–7 cm. long; primary bracts broadly elliptic with narrowly triangular apices, 35–45 mm. long, exceeding the sepals at anthesis, dark castaneous except for narrow green margins and apices, nearly even, coriaceous, bearing a few obscure teeth toward apex, sparsely pale-appressed-lepidote; floral bracts lanceolate, subulate-acuminate, 3 cm. long, sparsely lepidote, base and margins pale and membranaceous, elsewhere castaneous and coriaceous; flowers sessile; sepals lance-triangular, subulate-acute, 21 mm. long, pale except for the castaneous apex, sparsely lepidote; petals 35 mm. long, the blades pale lilac (! Foster), sparsely lepidote within.

Type in the Gray Herbarium, collected in cloud-forest of páramo, Alto Tabano above Encano, Territory of Putumayo, Colombia, altitude 3,300 meters, October 31, 1946, by M. B. and R. Foster (No. 2041). Duplicate in U. S. National Herbarium.

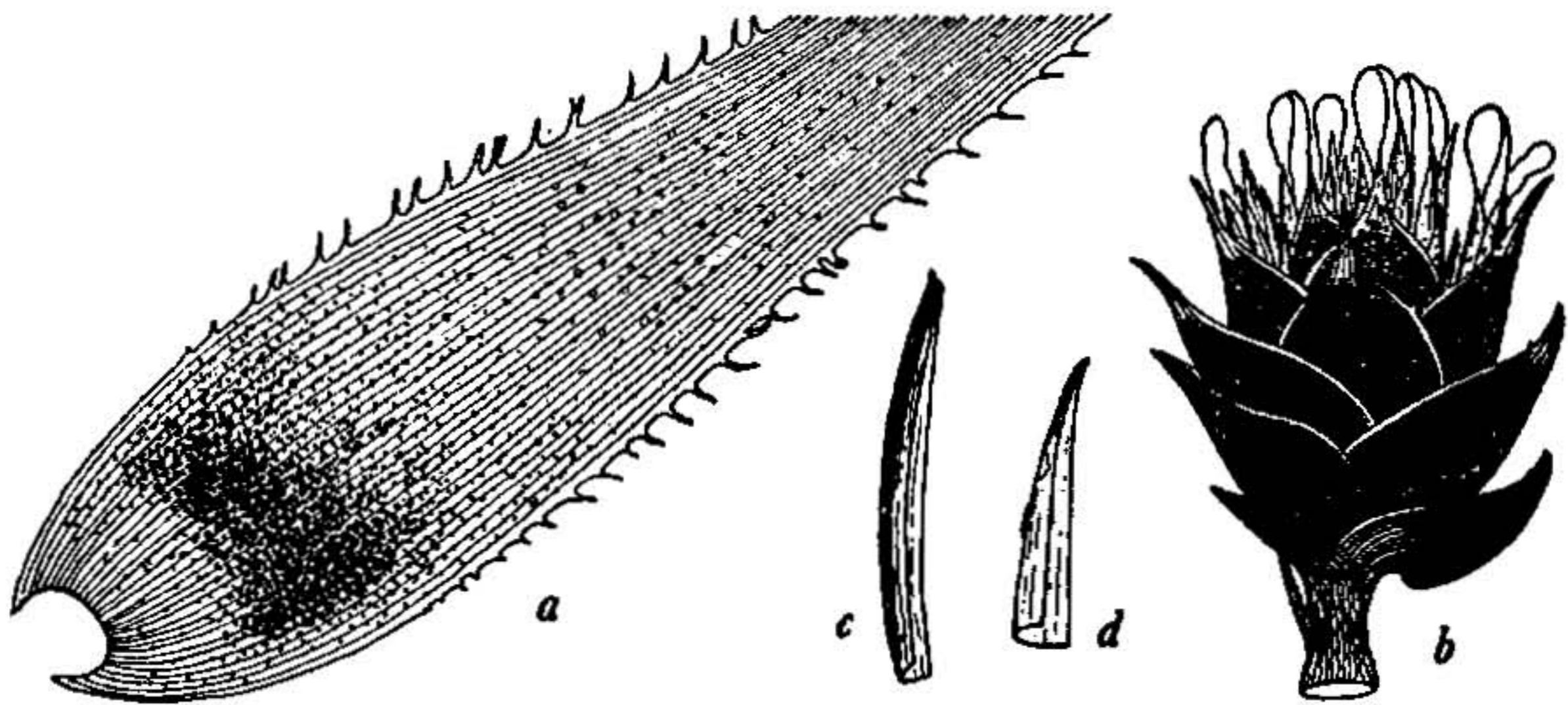


FIGURE 12.—*Greigia mulfordii*: a, Base of leaf,  $\times \frac{1}{2}$ ; b, inflorescence,  $\times \frac{1}{2}$ ; c, floral bract,  $\times 1$ ; d, sepal,  $\times 1$ .

*Greigia nubigena* L. B. Smith, sp. nov.

FIGURE 13

Laminis foliorum ad 23 mm. latis, basi angustatis et cum apice vaginarum spinis gracilibus ad 5 mm. longis dense armatis; inflorescentiis paucifloris; bracteis primariis exterioribus integris, interioribus spinulis paucis nonnunquam praeditis; sepalis 11 mm. longis.

Terrestrial, growing in dense masses, 45–60 cm. high (! Foster); leaves 30–45 cm. long (! Foster), the sheaths broadly elliptic, 5 cm. long, dark castaneous, the blades linear, acuminate, 23 mm. wide, at base narrowed and bearing close-ranked slender spines 5 mm. long, elsewhere sparsely and obscurely serrulate; tomentose-lepidote above

(! Foster), soon glabrous throughout; inflorescences probably lateral, few-flowered, dense, compressed, 4 cm. long; primary bracts broadly elliptic, thick-subulate at apex, 25–30 mm. long, much exceeding the sepals, the center and apex coriaceous and castaneous, elsewhere thin and green, sparsely appressed-brown-lepidote, the outer ones entire, the inner sometimes bearing a few minute teeth; floral bracts broadly lanceolate, 22 mm. long, membranaceous except for the thick-subulate apex, entire, sparsely lepidote; flowers sessile; sepals triangular-ovate, acute, 11 mm. long, thin, sparsely lepidote; petals 22 mm. long, nearly white (! Foster), lepidote outside.

Type in the Gray Herbarium, collected in moist places, páramo cloud-forest, Alto de Cruz above Encano, Territory of Putumayo, Colombia, altitude 3,300 meters, November 1, 1946, by M. B. and R. Foster (No. 2043).

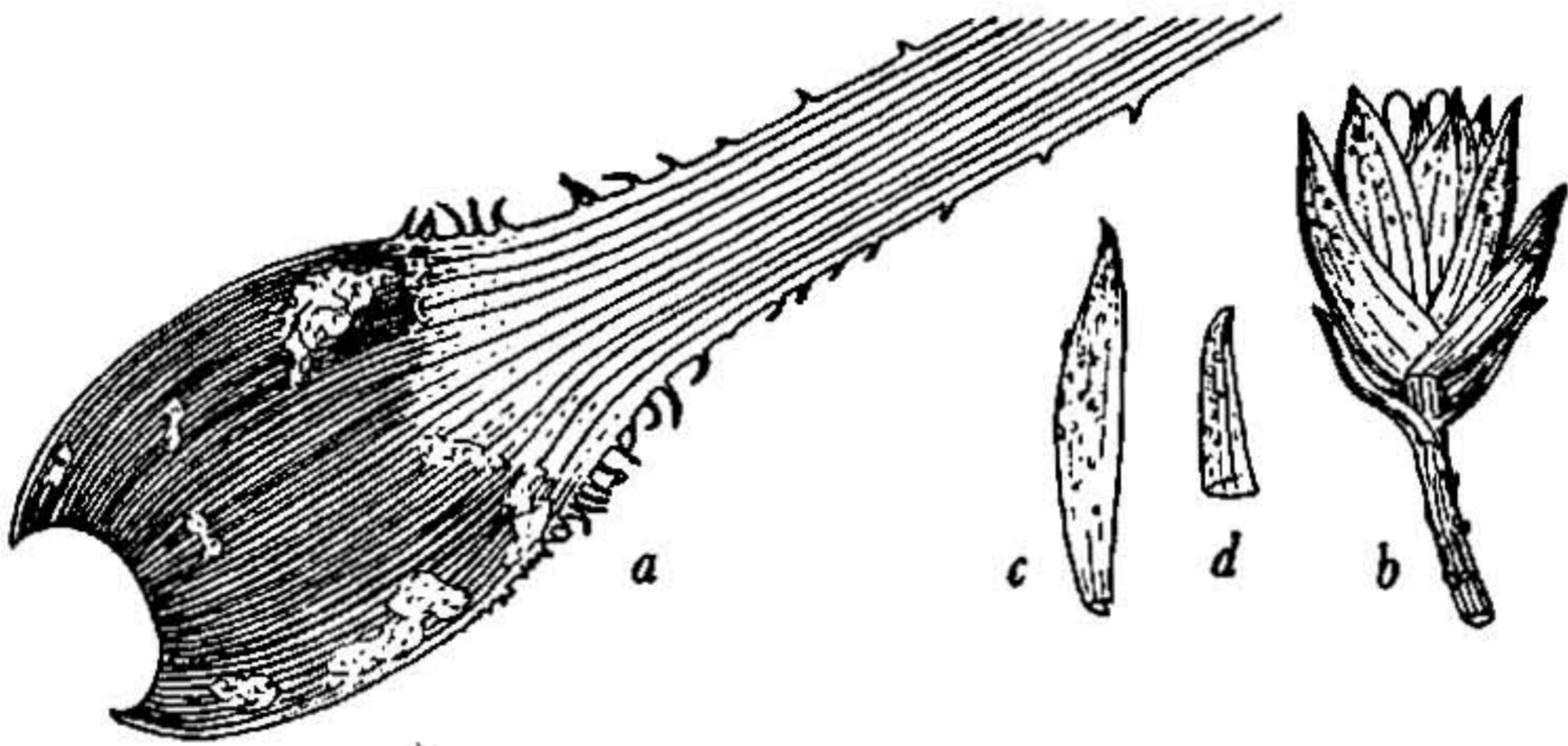


FIGURE 13.—*Greigia nubigena*: a, Base of leaf,  $\times \frac{1}{2}$ ; b, inflorescence,  $\times \frac{1}{2}$ ; c, floral bract,  $\times 1$ ; d, sepal,  $\times 1$ .

*Greigia racinae* L. B. Smith, sp. nov.

FIGURE 14

Foliis laxè perobscureque serrulatis, laminis ca. 2 cm. latis, supra dense cinereo-pruinosis; inflorescentiis paucifloris, verisimiliter simplicibus; sepalis 10 mm. longis.

Terrestrial, growing in dense masses (! Foster); leaves 3–4 dm. long, laxly and very obscurely serrulate, the sheaths elliptic, 6–7 cm. long, brown except for the green apex, covered with coarse pale strongly appressed scales, the blades linear, acuminate to a subulate thickened apex, 2 cm. wide, slightly narrowed at base, strongly revolute when dry, densely cinereous-pruinose above, glabrous beneath; inflorescences lateral, numerous, few-flowered, apparently simple, compressed, 3 cm. long; bracts broadly elliptic, 15–23 mm. long, exceeding the sepals, pale and membranaceous except for the castaneous keel and the subconical apex, brown-lepidote, entire; flowers sessile; sepals triangular-ovate, acute, 10 mm. long, green except for the castaneous apex, sparsely lepidote; petals 25 mm. long, pale lilac (! Foster), lepidote outside.



Type in the Gray Herbarium, collected in páramo cloud-forest, Alto de Cruz, above Encano, Territory of Putumayo, Colombia, altitude 3,300 meters, November 1, 1946, by M. B. and R. Foster (No. 2044).

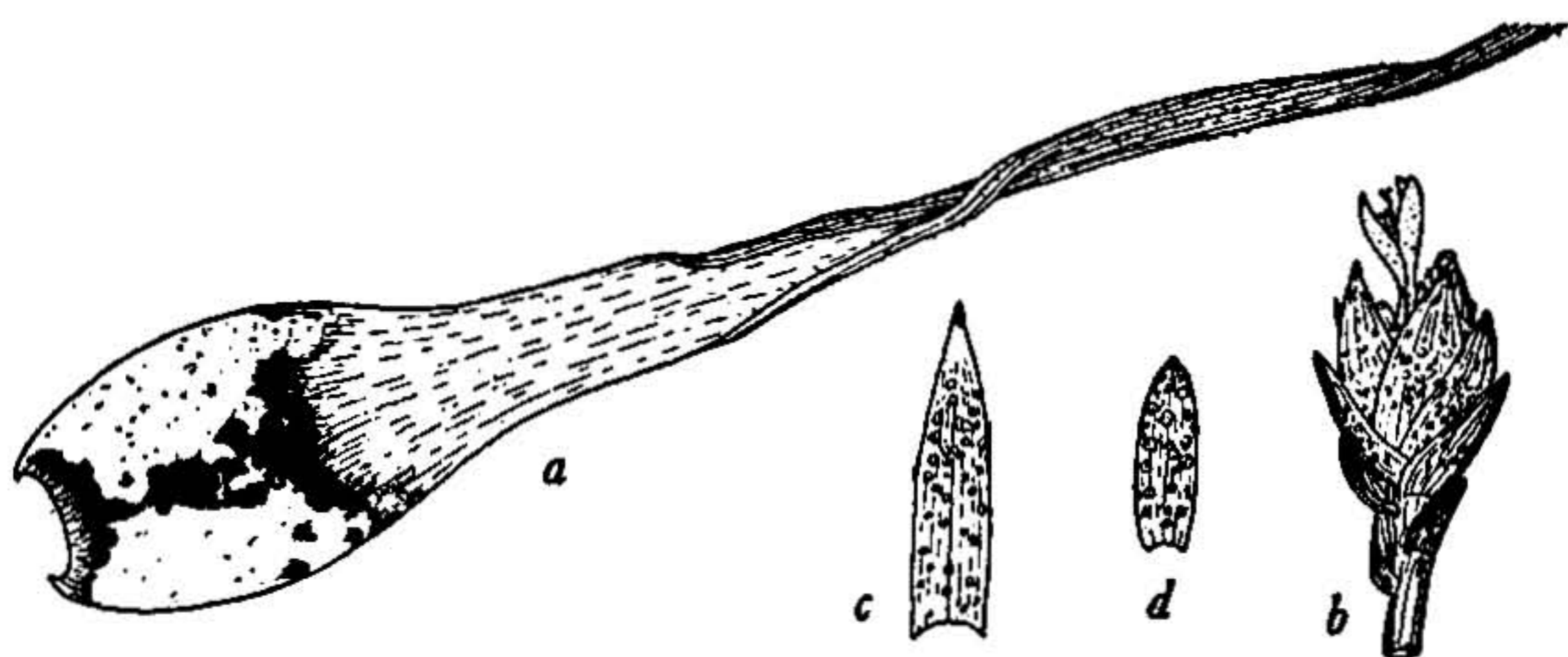


FIGURE 14.—*Greigia racinae*: *a*, Base of leaf,  $\times \frac{1}{2}$ ; *b*, inflorescence,  $\times \frac{1}{2}$ ; *c*, floral bract,  $\times 1$ ; *d*, sepal,  $\times 1$ .

*Greigia sanctae-martae* L. B. Smith, sp. nov.

FIGURE 15

Caulescens, 1.2–1.35 m. alta; foliorum laminis ad 35 mm. latis; inflorescentiis multifloris; bracteis primariis ad apicem versus dense serrulatis viridibusque, basi fere albis; sepalis 16–20 mm. longis.

Terrestrial, caulescent, 1.2–1.35 meters high (! Foster); leaves 1.5–2.5 meters long (! Foster), green throughout, glabrous above, the sheaths elliptic, entire, covered beneath with dark ferruginous scales, the blades linear, acuminate, to 35 mm. wide, narrowed at base, densely white-pruinose beneath, very laxly serrate with spines 1 mm.

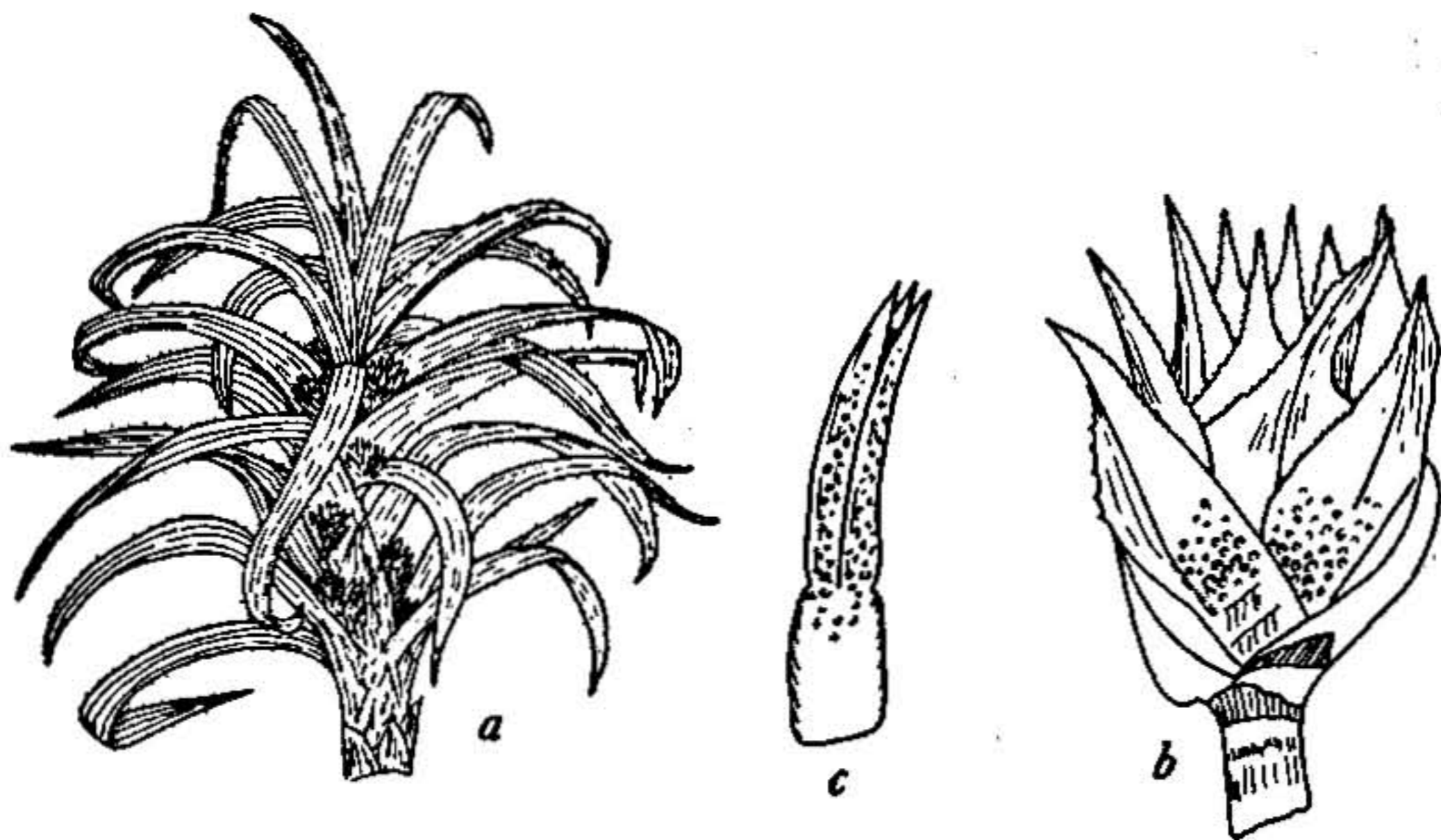


FIGURE 15.—*Greigia sanctae-martae*: *a*, Habit,  $\times \frac{1}{20}$ ; *b*, inflorescence,  $\times \frac{1}{2}$ ; *c*, flower,  $\times 1$ . (All after M. B. Foster.)

long; inflorescences lateral, numerous, compressed, many-flowered, 4–6 cm. long; primary bracts broadly ovate or elliptic with narrowly triangular apex, 6 cm. long, exceeding the sepals at anthesis, toward apex green, densely serrulate, and white-lepidote, toward base nearly white, entire, and ferruginous-lepidote, subcoriaceous; floral bracts broadly lanceolate, acuminate, 25 mm. long, entire, green at apex and keel, elsewhere white, sparsely lepidote; flowers sessile; sepals like the floral bracts, 16–20 mm. long; petals brown with white margins (! Foster), 22 mm. long, externally lepidote.

Type in the Gray Herbarium, collected in heavy undergrowth in heavy dark rain forests, Siminchicua, Sierra Nevada de Santa Marta, Department of Magdalena, Colombia, altitude, 2,520 meters, August 19, 1946, by M. B. and R. Foster (No. 1463).

Most collections of *Greigia* are necessarily fragmentary and frequently there is no note of the habit. Some species like *G. sanctae-martae* and *G. berteroi* have a tall stem as long or longer than the leaves, while others have a relatively short one as in *G. vulcanica*,<sup>3</sup> but this character is noted so rarely that it is impossible to use it in a key. A similar situation exists regarding the position of the inflorescence, so that I had to ignore it in making my first summary of the genus.<sup>4</sup> The form of the inflorescence varies very little, but it should be noted that it is usually compound as indicated by Harms<sup>5</sup> and Skottsberg.<sup>6</sup>

Thus a key is largely restricted to characters of leaf, bract, and flower, and new species are based on single fragmentary collections. Within such limitations the following key to all known species is presented as the simplest way of placing the new species made here:

#### GREIGIA

Outer bracts of the compound or rarely simple inflorescence entire.

Teeth restricted to the apical quarter of the leaf-blade.

Stem short and slender.

Primary bracts castaneous, lustrous; leaf-blades up to 48 mm. wide; sepals 25 mm. long. Chile.....*G. landbeckii* Phil.

Primary bracts pale, thin; leaf-blades not over 18 mm. wide; sepals 15 mm. long. Chile.....*G. pearcei* (H. Krause) Mez

Stem over 1 m. long and 3 cm. thick, woody; leaf-blades not over 18 mm. wide; sepals 17–20 mm. long. Juan Fernández

*G. berteroi* Skottsberg.

Teeth not restricted to the apical quarter of the leaf-blade.

Leaf-blades 40–50 mm. wide.

Primary bracts barely exceeding the ovaries; leaf-blades serrate throughout. Colombia.....*G. exserta* L. B. Sm.

<sup>3</sup> André, Bromel. Andr. *pl.* 2. 1889.

<sup>4</sup> Contr. Gray Herb. 98: 8. 1932.

<sup>5</sup> Engl. & Prantl, Pflanzenfam. ed. 2, 15a. 136. 1930.

<sup>6</sup> Act. Hort. Gothoburg. 11: 211. 1936.

Primary bracts exceeding the sepals; leaf-blades serrate only toward base. Colombia.....(*G. mulfordii* L. B. Sm.)<sup>7</sup>

Leaf-blades not over 25 mm. wide.

Sepals 15-16 mm. long; leaf-blades flat.

Leaf-blades glabrous, leaf-sheaths subdensely brown-lepidote beneath with distinct scales; sepals coriaceous, even, castaneous. Colombia.....*G. danielii* L. B. Sm.

Leaf-blades and sheaths densely cinereous-lepidote beneath; sepals, thin, nerved, pale. Colombia...*G. collina* L. B. Sm.

Sepals 10-11 mm. long; leaf-blades revolute.

Leaf-blades minutely serrulate with teeth less than 0.5 mm. long, densely cinereous-lepidote above. Colombia

*G. racinae* L. B. Sm.

Leaf-blades with slender basal spines up to 5 mm. long; sparsely lepidote and soon glabrous above. Colombia

*G. nubigena* L. B. Sm.

Outer bracts of the compound inflorescence serrate.

Sepals 40 mm. long, connate at base, ecarinate, white. Chile

*G. sphacelata* (R. & P.) Regel

Sepals not more than 23 mm. long.

Leaf-blades coarsely and subdensely serrate.

Primary bracts with long narrowly triangular serrate green apices. Colombia.....*G. columbiana* L. B. Sm.

Primary bracts with short scarcely differentiated apices.

Primary bracts barely exceeding the ovaries, sparsely serrate.

Colombia.....*G. exserta* L. B. Sm.

Primary bracts equaling or exceeding the ovaries.

Leaf-bracts coarsely serrate throughout; nearly or all the margin of the primary bracts serrate; sepals asymmetric.

Colombia.....*G. vulcanica* André

Leaf-blades coarsely serrate only at base; primary bracts serrate only near apex; sepals asymmetric. Colombia

*G. mulfordii* L. B. Sm.

Leaf-blades finely and remotely serrulate.

Teeth restricted to the apical quarter of the leaf-blade.

Leaf-blades not over 18 mm. wide; stem over 1 m. tall and 3 cm. thick. Juan Fernández.....*G. berteroi* Skottsb.

Leaf-blades to 28 mm. wide; plant slender. Ecuador

*G. sodiroana* Mez

Teeth not restricted to the apical quarter of the leaf-blade.

Primary bracts castaneous toward apex or throughout; leaf-blades not over 30 mm. wide.

Floral bracts and sepals wholly castaneous; leaf-blades sometimes bearing a few teeth at the base as well as at the apex. Ecuador.....*G. sodiroana* Mez

Floral bracts and sepals castaneous only toward the apex.

Floral bracts 35 mm. long, exceeding the sepals; mucro of sepals subapical. Peru...*G. macbrideana* L. B. Sm.

Floral bracts 26 mm. long, exceeded by the sepals; mucro of the sepals terminal. Guatemala

*G. steyermarkii* L. B. Sm.

<sup>7</sup> The teeth on the outer bracts of *G. mulfordii* are so rare as to make it seem probable that they may be entirely lacking in further collections.

Primary bracts pale toward apex.

Leaf-blades not over 20 mm. wide; primary bracts with a long narrowly triangular apex. Costa Rica

*G. sylvicola* Standl.

Leaf-blades over 30 mm. wide; primary bracts with short scarcely differentiated apices.

Primary bracts and sepals castaneous toward base; plant subcaulescent. Venezuela

*G. albo-rosea* (Griseb.) Mez

Primary bracts and sepals wholly green; plant 12 dm. high or more. Colombia

*G. sanctae-martae* L. B. Sm.

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

FIGURE 16

Foliorum laminis ligulatis; acuminatis; scapi bracteis imbricatis; inflorescentia bipinnatim paniculata; bracteis primariis quam spicis densifloris subduplo brevioribus; bracteis florigeris oblongo-ellipticis, sepala multo superantibus, ecarinatis; floribus erectis sed per anthesin subsecundis; sepalis ellipticis, 30 mm. longis.

Terrestrial, flowering plant up to 1 meter high (! Foster); leaves rosulate, 4-5 dm. long, subdensely lepidote throughout with small pale appressed scales, the sheaths elliptic, distinct, dark castaneous, the blades ligulate, acuminate, 25 mm. wide; scape erect, about 7 mm. thick when dry, glabrous; scape-bracts erect, densely imbricate, the lower foliaceous, the upper broadly ovate, acuminate; inflorescence bipinnate, 35 cm. long; primary bracts like the upper scape-bracts, about half as long as the spikes; spikes erect but subsecund, short-stipitate, slenderly ellipsoid, dense, 10 cm. long, 2-3 cm. in diameter; floral bracts at first enfolding the whole diameter of the spike, later as they diverge enfolding merely a single axillary flower each, oblong-

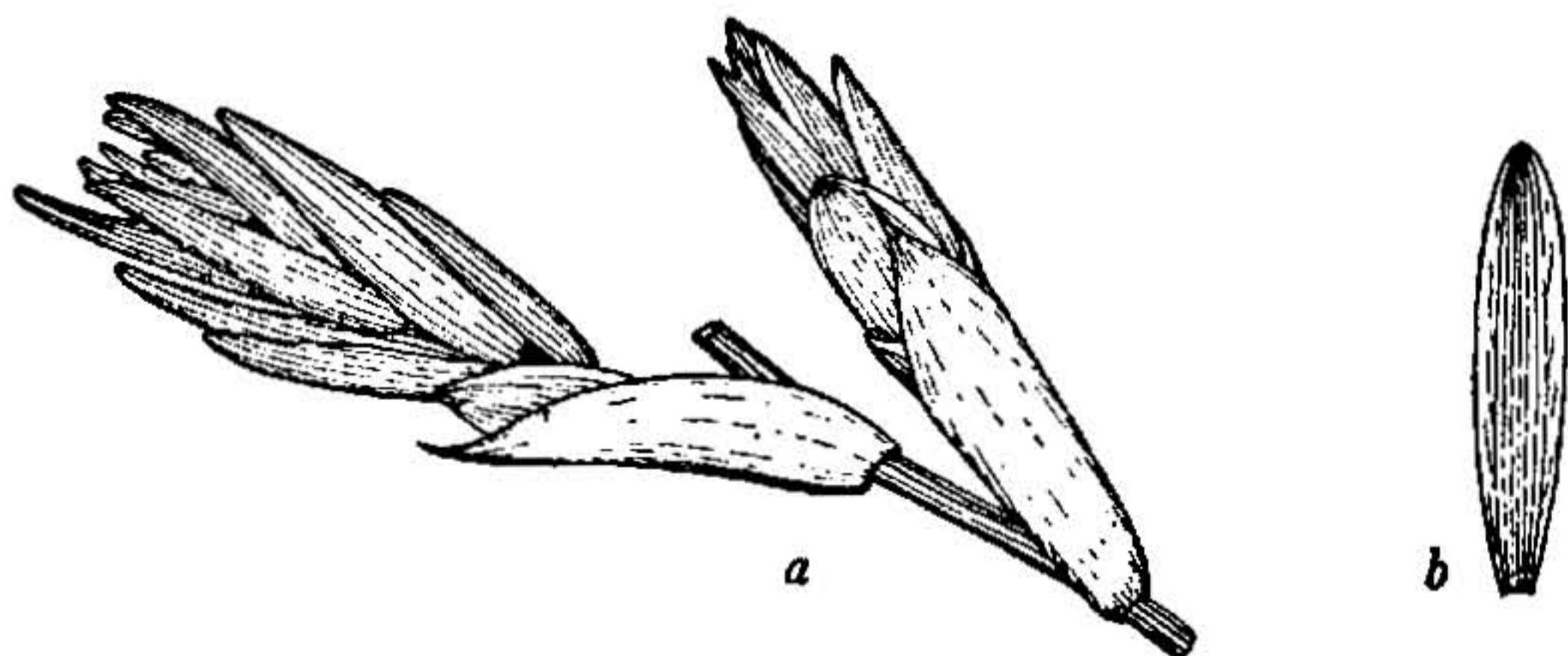


FIGURE 16.—*Guzmania amplexans*: a, Branches of inflorescence,  $\times \frac{1}{2}$ ; b, sepal,  $\times 1$ .

elliptic, 48 mm. long, much exceeding the sepals, ecarinate, obscurely pale-appressed-lepidote, bright red except for the orange apex, the center subcoriaceous, the margins membranaceous; flowers sessile, erect but subsecund at anthesis; sepals elliptic, obtuse, 30 mm. long,

sparsely white-lepidote, the posterior ones carinate, connate for 8 mm. with each other and for 4 mm. with the ecarinate anterior one.

Type in the Gray Herbarium, collected near Junín, Department of Nariño, Colombia, altitude 840 meters, November 14, 1946, by M. B. and R. Foster (No. 2169). Duplicate in U. S. National Herbarium.

In the Pflanzenreich *Guzmania amplexans* keys out to the vicinity of *G. splitgerberi* Mez and *G. altsonii* L. B. Smith. From the first it differs in its ecarinate floral bracts and from the second in its much larger sepals. Since it has not been possible to examine good corollas of *G. amplexans*, it cannot be assigned to this genus with complete certainty. There is a possibility it might belong to *Mezobromelia*.

*Guzmania musaica* (Linden & André) Mez var. *concolor* L. B. Smith, var. nov.

A var. *typica* differt laminis foliorum omnino viridibus, nullo modo pictis; floribus minoribus.

Differs from the typical variety in its concolorous green leaf-blades and smaller flowers; sepals 32 mm. long, connate for 10 mm.

Type in the Gray Herbarium, collected on trees at Buenaventura, Department of El Valle, Colombia, altitude 15 meters, December 5, 1946, by M. B. and R. Foster (No. 2335).

Although this variety differs chiefly in the color of its leaves, their uniform green makes a striking contrast with the beautiful penciling of the typical form.

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

FIGURE 17

Foliorum laminis ligulatis, acuminatis, apice valde incrassatis; scapi bracteis imbricatis; inflorescentia laxe paniculata; bracteis primariis infimis verisimiliter spicas fere aequantibus; spicis ad 3 cm. stipitatis; bracteis florigeris tenuibus, sepala aequantibus vel brevioribus; sepalis anguste lanceolatis, tenuibus.

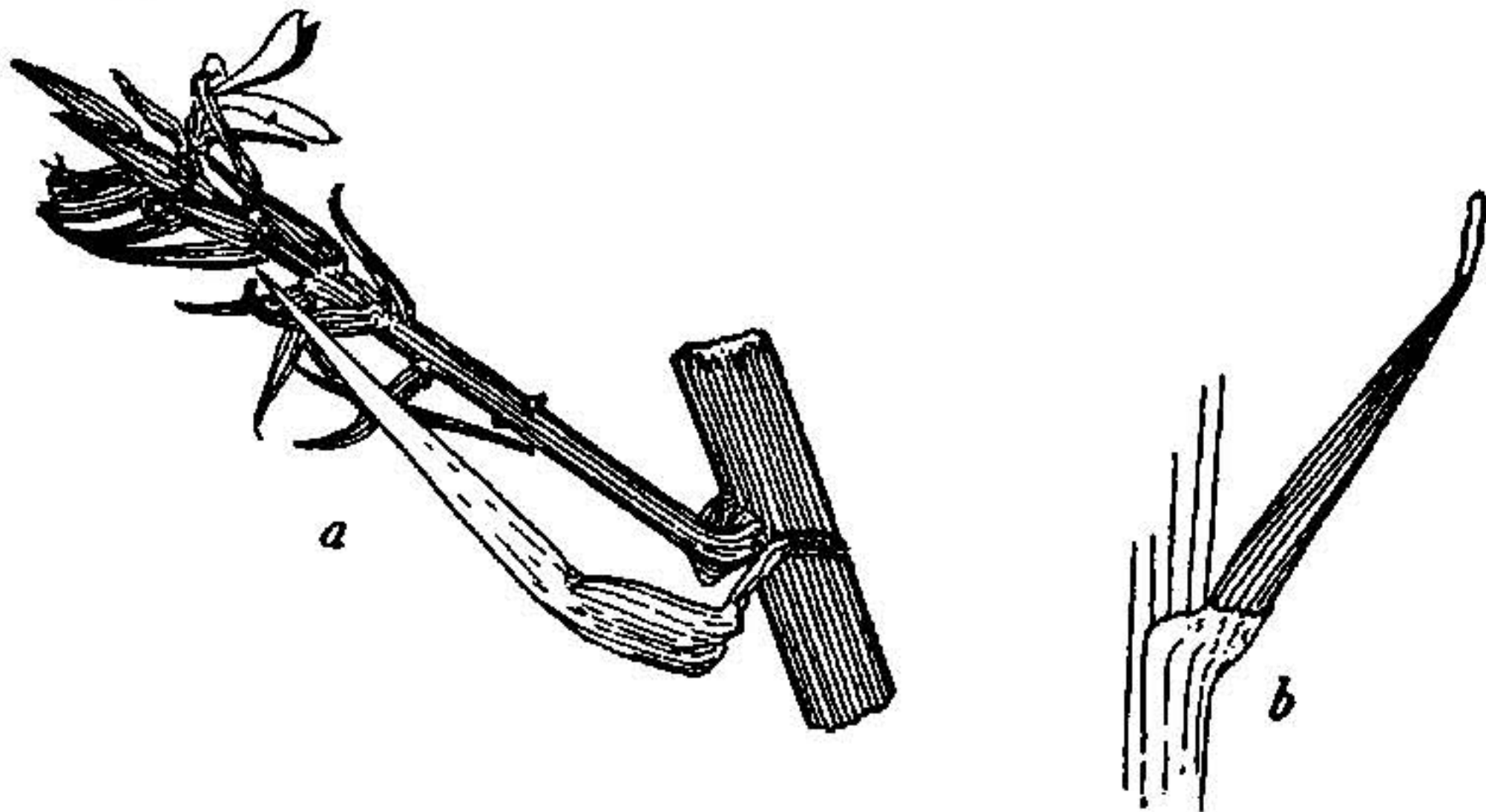


FIGURE 17.—*Guzmania pungens*: a, Branch of inflorescence,  $\times \frac{1}{2}$ ; b, flower and bract,  $\times 1$ .

Flowering plant 1.5 meters high or more; leaves 9–12 dm. long (! Foster), the sheaths large, elliptic, the blades ligulate, about 9 cm. wide, acuminate to a strongly thickened pungent apex, minutely appressed-lepidote throughout; scape erect, stout; scape-bracts foliaceous, erect, densely imbricate; inflorescence laxly bipinnate; primary bracts narrowly lanceolate, acuminate, pungent, the lowest probably almost equaling the spikes, the upper much shorter; spikes suberect, stipitate for 3 cm., cylindric, subdense, 8 cm. long; floral bracts thin, known only from remnants, apparently lanceolate and equaling the sepals or shorter; flowers suberect, subsessile; sepals narrowly lanceolate, acute, 25 mm. long, ecarinate, thin, nerved, probably glabrous; petals and stamens unknown; capsule slenderly ellipsoid, 28 mm. long.

Type in the Gray Herbarium, collected above El Diviso, Department of Nariño, Colombia, altitude 705 meters, November 13, 1946, by M. B. and R. Foster (No. 2156). Duplicate in U. S. National Herbarium.

The only material of *Guzmania pungens* is so old and battered that the exact relationship of the species is uncertain. The remains of the flowers and bracts appear much like those of *G. plumieri* (Griseb.) Mez of the Lesser Antilles, as do also the curiously thickened tips of the leaves and primary bracts. Unlike *G. plumieri*, however, the spikes are long-stipitate with a stout rhachis and the flowers show no tendency to become secund.

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

FIGURE 18

Acaulis; foliorum laminis ligulatis, acuminatis; scapi bracteis imbricatis; inflorescentia laxissime paniculata; spicis patentibus, manifeste stipitatis, laxe 3–6-floris; bracteis florigeris quam sepalis subduplo brevioribus, margine late crispatis; sepalis anguste oblongis, 31 mm. longis, margine crispatis.

Aggregated, flowering plant 1 meter high; leaves densely rosulate, 6 dm. long, minutely and very obscurely lepidote throughout, the sheaths elliptic, about 10 cm. long, the blades ligulate, acuminate, 25 mm. wide (! Foster), green above, reddish beneath, green-spotted on both sides (! Foster); scape erect or suberect, slender, red, pale-flocculose; scape-bracts subfoliaceous, very densely imbricate; inflorescence very laxly bipinnate, 32 cm. long, pale-flocculose; primary bracts long-acuminate from an ovate base, the lowest about equaling the branches; spikes spreading, distinctly stipitate with a sterile bract at base, laxly 3–6-flowered; floral bracts broadly obovate, truncate, 15 mm. long, ecarinate, flavous with red stripes (! Foster), nerved, the broad margin membranaceous and crisped; flowers not at all secund; pedicels 4 mm. long; sepals narrowly oblong, obtuse, 31 mm. long, nerved, equally connate for 2 mm., the margins membrana-

ceous and crisped; petals and stamens unknown; capsule subcylindric, much shorter than the sepals.

Type in the Gray Herbarium, collected on moss and stumps, at El Páramo, above Diviso, Department of Nariño, Colombia, altitude 720 meters, November 13, 1946, by M. B. and R. Foster (No. 2162). Duplicate in U. S. National Herbarium.

In its short spikes and floral bracts and long narrow sepals, *Guzmania radiata* resembles *G. lehmanniana* (Wittm.) Mez, but its flowers radiate in all directions instead of being secund, and the broad crisped margins of its floral bracts and sepals are quite unlike those of *G. lehmanniana*.

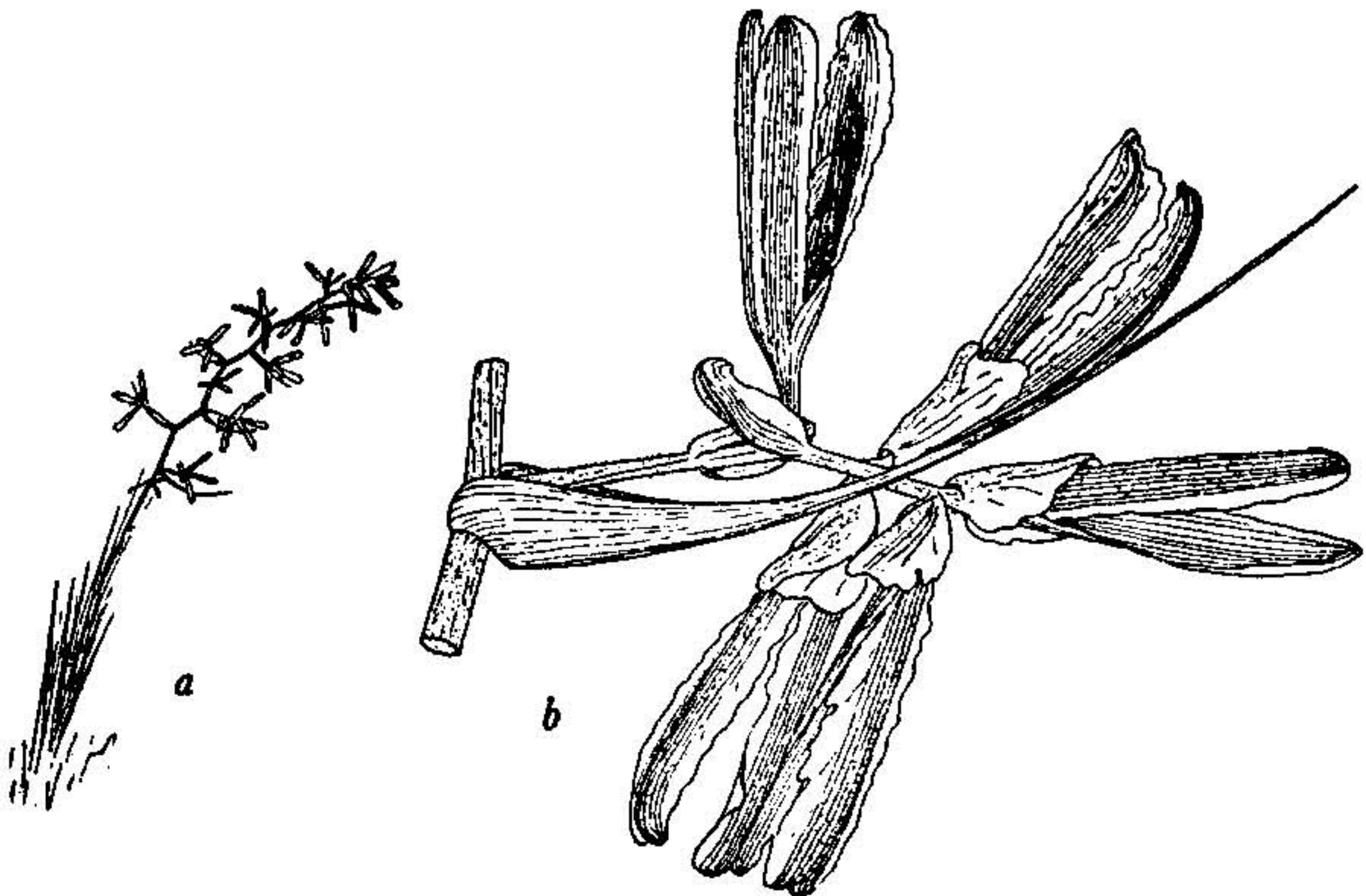


FIGURE 18.—*Guzmania radiata*: a, Habit,  $\times \frac{1}{20}$ ; b, branch of inflorescence,  $\times 1$ .

*Guzmania rhonhofiana* Harms, Notizbl. 14: 329. 1939.

TYPE LOCALITY: San Carlos de los Colorados, Los Ríos, Ecuador. Type collected by Hertha Schultze-Rhonhof (No. 1981).

COLOMBIA:

EL VALLE: Epiphytic in forest, Cisneros, Dagua Valley, Sept. 21, 1922, Killip 11474 (G); epiphytic, Pacific coast, Río Naya, between Puerto Merizalde and Meregildo, to the headwaters of Río Chabirrú, alt. 5 m., Mar. 2, 1943, Cuatrecasas 14343 (G); epiphytic in woods, western slope of the Cordillera Occidental, valley of the Río Digua, La Elsa, alt. 1,000–1,200 m., Sept. 9, 1943, Cuatrecasas 15302 (G); in trees, Buenaventura, sea level, Dec. 8, 1946, M. B. & R. Foster 2324 (G).

NARIÑO: On trees, Ricaurte, alt. 1,200 m., Nov. 15, 1946, M. B. & R. Foster 2183 (G); Barbacoas, Río Nembi, alt. 450 m., Nov. 16, 1946, M. B. & R. Foster 2188 (G, US).

ECUADOR:

Los Ríos: Epiphytic, border of potrero, San Carlos de los Colorados, Oct. 19, 1935, Hertha Schultze-Rhonhof 1981 (B, type; presumably destroyed).

For some time two species have been going under the name *Guzmania roezlii*. True *G. roezlii* (E. Morr.) Mez, a species of Guiana, Peru, and Bolivia, has branches with sterile bases as long as the fertile part and usually three or four sterile bracts and floral bracts nearly as long as the ovate-obtuse sepals. The second species, which proves to be *G. rhonhofiana*, has branches with short sterile bases and only one or two sterile bracts and floral bracts not more than half as long as the oblanceolate truncate emarginate sepals.

*Guzmania scherzeriana* Mez in DC. Monogr. Phan. 9: 949. 1896.

† *Guzmania herthae* Harms, Notizbl. 14: 329. 1939.

TYPE LOCALITY: Near Cartago, Costa Rica, altitude 1,700 meters. Type collected by Scherzer.

COSTA RICA:

CARTAGO: Near Cartago, alt. 1,700 m., Scherzer (Vienna, probably destroyed, Macbride photo No. 29976).

PANAMA:

VERAGUAS: Forested slopes of Cerro Tute, vicinity of Santa Fé, alt. 7,500 m., Mar. 25, 1947, Allen 4359 (US, between typical and var. *guatemalensis*).

COLOMBIA:

EL VALLE: Epiphyte, dense forest along Río Dagua, about 20 km. east of Buenaventura, alt. 40 m., Feb. 15, 1939, Killip & Garcia 33327 (US); epiphyte, dense forest, Córdoba, alt. 50-100 m., Feb. 17, 1939, Killip & Garcia 33454 (US); epiphyte, wooded slopes, drainage of the Río Anchicayá, left bank, El Prado, alt. 250-350 m., Aug. 4, 1943, Cuatrecasas 14848 (G); Silva, Pacific coast, Río Cajambre, alt. 5-80 m., May 5-15, 1944, Cuatrecasas 17618 (G); epiphyte, dense forest, Agua Clara, along highway from Buenaventura to Cali, alt. 100 m., June 6, 1944, Killip & Cuatrecasas 38882 (US).

NARIÑO: Dense forest along stream, east side of Gorgona Island, alt. 50-100 m., Feb. 11, 1939, Killip & Garcia 33187 (US).

ECUADOR:

Los Ríos: Epiphytic, rain forest, San Carlos de los Colorados, Sept. 27, 1935, Hertha Schultze-Rhonhof 1923 (B, type of *Guzmania herthae* Harms).

I am in the awkward position of not having seen the type of *Guzmania herthae*, and it is probable that it no longer exists. However, the material cited here forces me to reach a decision and at the same time indicates by its variation that *G. herthae* does not have sufficient distinction to warrant even varietal status.

*Guzmania scherzeriana* var. *guatemalensis* (L. B. Smith) L. B. Smith, comb. nov.

*Guzmania guatemalensis* L. B. Smith, Contr. Gray Herb. 117: 8. pl. 1, fig. 13. 1937.

TYPE LOCALITY: Chamá, Alta Verapaz, Guatemala. Type collected by H. Johnson (No. 391).

GUATEMALA:

ALTA VERAPAZ: Chamá, alt. 330 m., July 26, 1920, H. Johnson 391 (US).

PANAMA:

COCLÉ: Epiphyte, vicinity of La Mesa, north of El Valle de Anton, alt. 1,000 m., May 12, 1941, P. H. Allen 2368 (US).



## COLOMBIA:

EL VALLE: Epiphyte, non-inundable woods at edge of mangrove swamp, Punta Arenas, north shore of Buenaventura Bay, near sea level, June 2, 1944, Killip & Cuatrecasas 38644 (US); epiphytic, drainage of Río Dagua, Córdoba, alt. 39–60 m., Nov. 14, 1945, Cuatrecasas 19826 (CM); epiphytic, Pacific coast, Buenaventura Bay, Quebrada de Aguadulce, alt. 0–10 m., Feb. 24, 1946, Cuatrecasas 19997 (CM); on trees, above Buenaventura, alt. 30 m., Dec. 8, 1946, M. B. & R. Foster 2326 and 2327 (G).

At the time I described *Guzmania guatemalensis* I had only a single specimen on which to base my judgment, and what then seemed sufficient to distinguish it from *G. scherzeriana* as a species assumes less significance in the light of later collections. Furthermore, the emphasis should be shifted in the variety to its lax branches, 10–13 cm. long, and divergent to spreading flowers, as contrasted with typical *G. scherzeriana* where the dense or subdense branches are 5–7 cm. or rarely up to 10 cm. long and the flowers are suberect.

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

FIGURE 19

Foliorum laminis acuminatis, valde plicatis; scapo erecto; scapi bracteis imbricatis; inflorescentia paniculata; spicis strictis vel paulo divergentibus, subdensifloris, infimis stipitatis; bracteis florigeris sepalis superatis; sepalis lanceolatis, membranaceis, posticis ad 2 mm. connatis.

Terrestrial, flowering plant over 1 meter high; leaves 12 dm. long, very minutely and obscurely lepidote, the sheaths inconspicuous, the blades linear, acuminate, 25 mm. wide, strongly plicate; scape erect, 1 cm. in diameter when dry; scape-bracts erect, densely imbricate, the lower ones foliaceous, the upper ovate, acuminate; inflorescence bipinnate, 25 cm. long, glabrous; primary bracts like the upper scape-bracts but thinner, much shorter than the axillary spikes; spikes strict or slightly divergent, cylindric, rather dense, 10 cm. long, 2–2.5 cm. in diameter, the lower distinctly stipitate; floral bracts broadly elliptic, truncate, 18 mm. long, slightly but constantly shorter than the sepals,



FIGURE 19.—*Guzmania stricta*: a, Branch of inflorescence,  $\times \frac{1}{2}$ ; b, fruit and bract,  $\times 1$ ; c, sepal,  $\times 1$ .

ecarinate, nerved, green, membranaceous; flowers suberect, short-pedicellate; sepals lanceolate, acute, 17 mm. long, carinate, membranaceous, yellow toward apex (! Foster), the posterior ones connate for 2 mm., the anterior subfree; petals 25 mm. long, pale yellow, the blades elliptic, obtuse; stamens included; capsule cylindrical, barely exceeding the sepals.

Type in the Gray Herbarium, collected near El Páramo, above El Diviso, Department of Nariño, Colombia, altitude 720 meters, November 13, 1946, by M. B. and R. Foster (No. 2160). Duplicate in U. S. National Herbarium.

Because of its relatively short floral bracts, *Guzmania stricta* arrives in a key next to *G. patula* Mez & Wercklé, but its sepals and curious plicate leaves are almost identical with those of *G. plicatifolia* L. B. Smith.

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

FIGURE 20

Foliis petiolatis, laminis oblanceolatis, ad 6 cm. latis; scapi bracteis supremis internodia subaequantibus; inflorescentia simplicissima; bracteis florigeris late ellipticis, pedicellos multo superantibus; sepalis angustissime triangularibus; petalis aureis, basi auriculis binis auctis.

Epiphytic, scandent, 2.4–6 meters long, including the 1.2 meters long flowering part (! Foster); stem branched; leaves possibly dimorphic but only large ones seen, 45–60 cm. long (! Foster), petiolate, the sheaths suborbicular, 15 mm. wide, dark castaneous, densely appressed-white-lepidote, the petioles 10 cm. long, slender, densely serrate with dark spines 2 mm. long, the blades oblanceolate, acute, 6 cm. wide, soon glabrous, reticulate beneath; scape straight, stout, flocculose; lower scape-bracts subfoliaceous, densely imbricate, the others broadly lanceolate, acute, the uppermost about equaling the internodes; inflorescence straight, simple, 75 cm. long, laxly many-flowered, flocculose; floral bracts spreading to reflexed, broadly elliptic, apiculate, 15–20 mm. long, much exceeding the pedicels, membranaceous, brown (! Foster); pedicels slender, 4 mm. long; sepals very narrowly triangular, 34 mm.

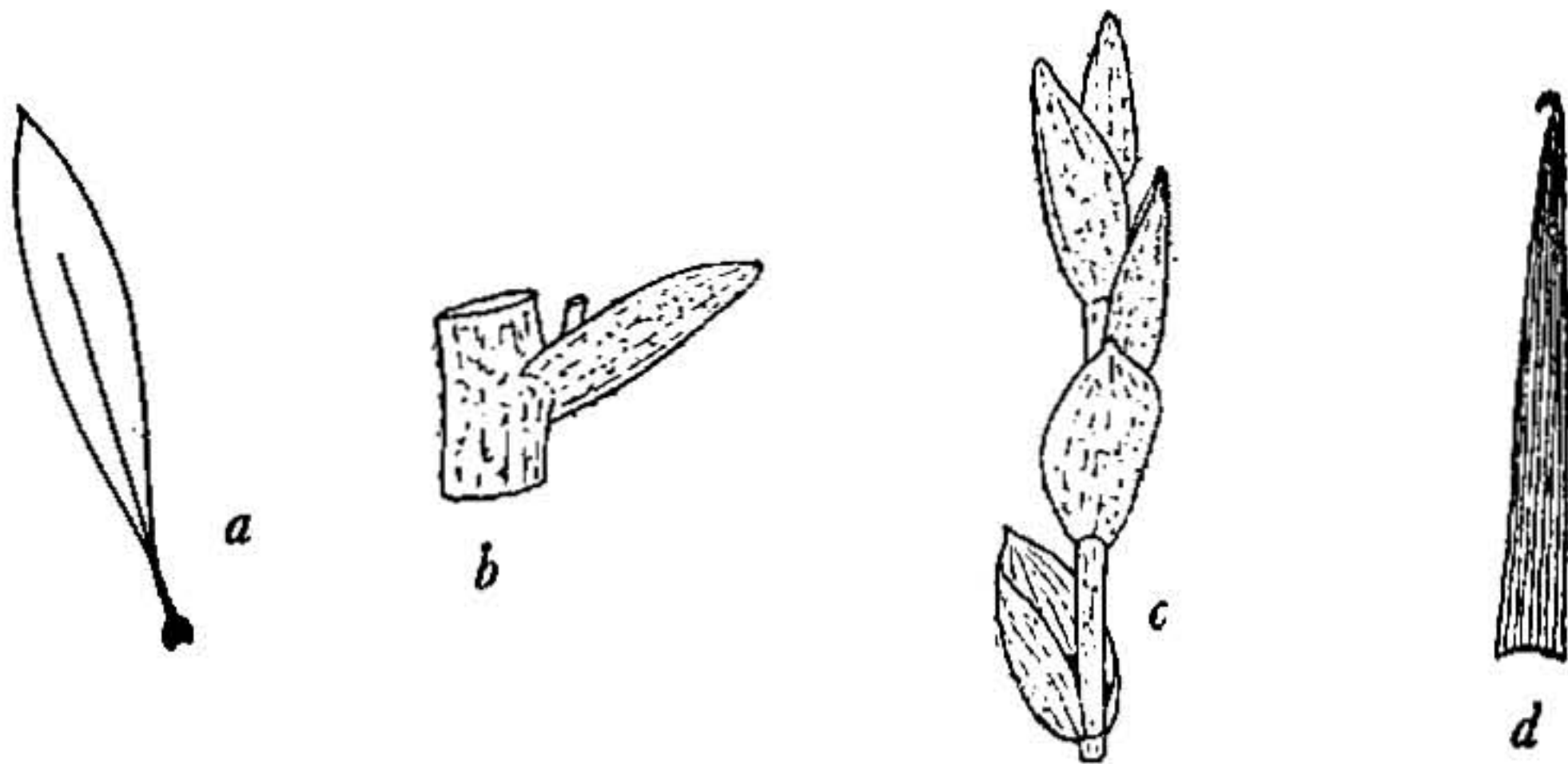


FIGURE 20.—*Pitcairnia adscendens*: a, Leaf,  $\times \frac{1}{10}$ ; b, floral bract and pedicel,  $\times 1$ ; c, apex of inflorescence,  $\times 1$ ; d, sepal,  $\times 1$ .

long, green; petals 85 mm. long, yellow (! Foster), bearing two auricles which are probably the remains of a deeply incised ligule; ovary three-fourths superior.

Type in the Gray Herbarium, collected at Buenaventura, Department of El Valle, Colombia, near sea level, December 8, 1946, by M. B. and R. Foster (No. 2318).

Although its petals are appendaged, *Pitcairnia adscendens* more nearly resembles *P. kalbreyeri* Bak. in the *Eligulatae* than it does any other species in the genus. However, it has much shorter pedicels than *P. kalbreyeri* and its petals are yellow.

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

FIGURE 21

Foliis dimorphis, alteris persistentibus, aculeatis, reductis, alteris integerrimis, supra vaginam deciduis, laminis linearibus; scapi bracteis supremis quam internodiis paulo brevioribus; inflorescentia paupere paniculata; bracteis florigeris quam pedicellis subduplo brevioribus; sepalis obtusis; petalis luteis, ligula auctis.

Flowering plant 1 meter high; leaves fasciculate, dimorphic, some persistent, reduced to suborbicular dark castaneous brown-flocculose sheaths and short linear spinose-serrate blades, others 1.1 meters long, slightly narrowed and deciduous above the large elliptic-oblong sheath but not petiolate, glabrous, the blades linear, long-acuminate, 25 mm. wide; scape erect, slender, white-flocculose; scape-bracts very narrowly triangular, long-acuminate, the upper ones slightly shorter than the internodes; inflorescence a depauperate panicle, lax, sparsely flocculose; primary bracts like the scape-bracts, much shorter than the subdense racemes; lateral racemes 7 cm. long, the terminal 17 cm. long; floral bracts elliptic, apiculate, about half as long as the pedicels, scarious; pedicels slender, 6 mm. long; flowers divergent; sepals narrowly oblong, obtuse, 22 mm. long, carinate, nerved, red (! Foster),

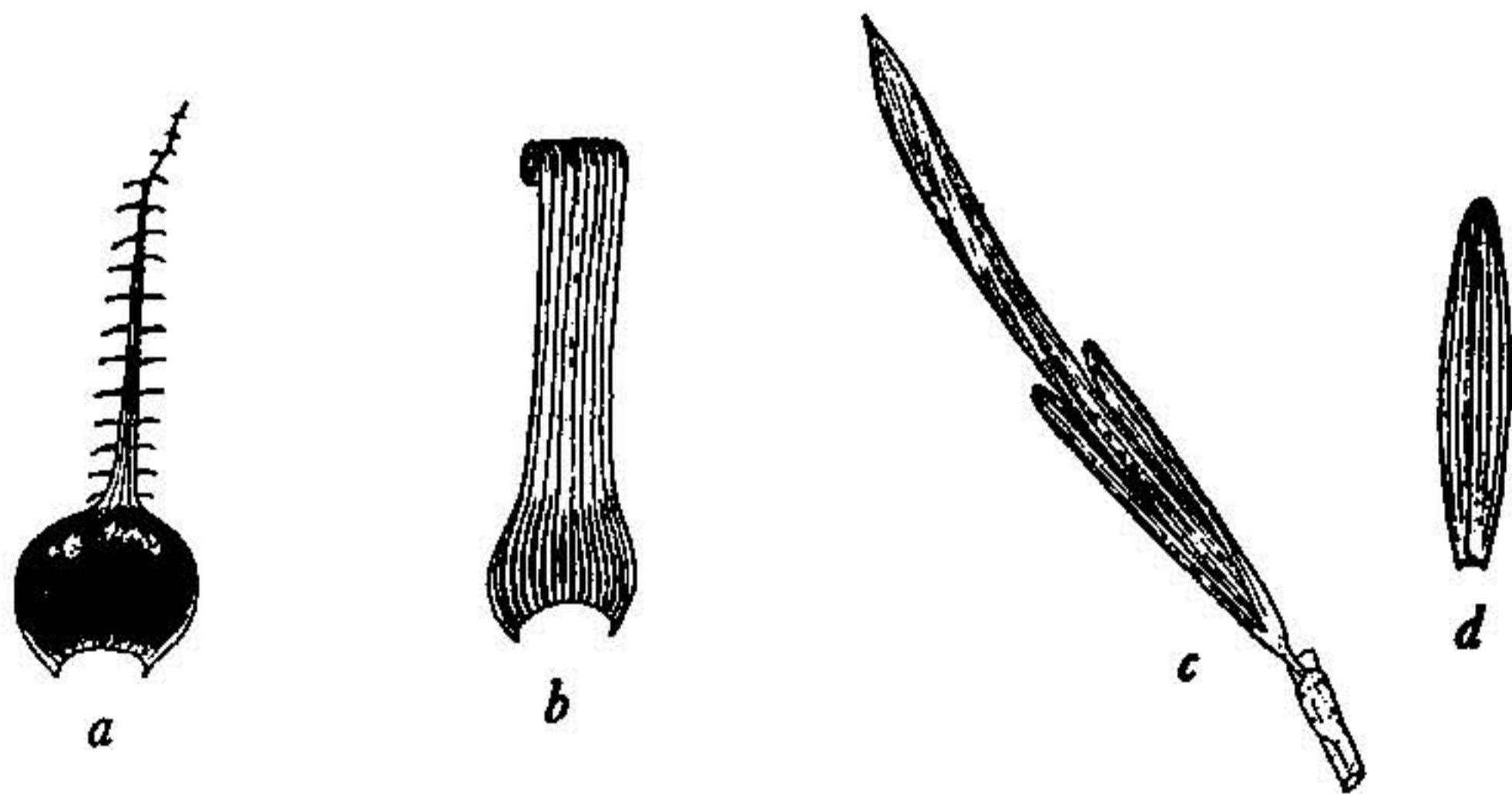


FIGURE 21.—*Pitcairnia arenicola*: a, Persistent leaf,  $\times \frac{1}{2}$ ; b, base of deciduous leaf,  $\times \frac{1}{2}$ ; c, flower and bract,  $\times 1$ ; d, sepal,  $\times 1$ .

glabrous; petals 47 mm. long, pale yellow, bearing a ligule at base; ovary two-thirds superior; ovules caudate.

Type in the Gray Herbarium, collected on sandstone rocks in ravines, Orú on Pipeline, Department of Norte de Santander, Colombia, altitude 540 meters, September 18, 1946, by M. B. and R. Foster (No. 1733).

Because of its dimorphic partly deciduous leaves, compound inflorescence, and appendaged petals, *Pitcairnia arenicola* does not follow the Pflanzenreich key very far. If we disregard the branching of its inflorescence, it has some habital similarity to *P. camptocalyx* André but differs from it in nearly all details of the flower.

*Pitcairnia bella* L. B. Smith var. *densior* L. B. Smith, var. nov.

A var. *typica* differt scapi bracteis longioribus; sepalis haud ultra 17 mm. longis.

Differs from the typical variety in its longer scape-bracts all of which exceed the internodes and in its sepals, which are not longer than 17 mm.

Type in the Gray Herbarium, collected on rocks, at Pepino, near Mocoa, Territory of Putumayo, Colombia, altitude 1,200 meters, November 21, 1946, by M. B. and R. Foster (No. 2211). Duplicate in U. S. National Herbarium.

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

FIGURE 22

Foliorum laminis basi angustatis et spinis dense armatis sed haud petiolatis; scapi bracteis dense serratis; inflorescentia simplicissima; bracteis florigeris imbricatis, magnis, serratis; floribus graciliter pedicellatis; sepalis acuminatis, 4 cm. longis; petalis nudis, albis (! Foster); antheris 20 mm. longis.

Flowering plant over 1 meter high stem branched (! Foster); leaves all alike, up to 1.2 meters long (! Foster), the blades linear-lanceolate, narrowed at base and bearing dark spines 5 mm. long but scarcely petiolate, entire elsewhere, acuminate, at least 4 cm. wide, soon glabrous; scape elongate, ascending; scape-bracts densely imbricate, the lower foliaceous; the upper elliptic, acute, densely serrate, green (! Foster), inconspicuously pale-flocculose; inflorescence simple, very dense, cylindric, many-flowered, 30 cm. long, 7 cm. in diameter; floral bracts erect, imbricate but with the apices spreading, lanceolate, 10 cm. long, serrate, subcoriaceous and rugulose when dry, brownish (! Foster), the bases brown-flocculose; pedicels short but slender; sepals narrowly triangular, acuminate, 4 cm. long, glabrous, green except for the dark brown apex (! Foster); petals recurved, lingulate, broadly rounded, 9–10 cm. long, 2 cm. wide, when dry, naked, white (! Foster); stamens included, the anthers 20 mm. long; ovary four-fifths superior; ovules caudate.

Type in the Gray Herbarium, collected at Sibundoy, near Buenos Aires, Territory of Putumayo, Colombia, altitude, 2,700 meters, October 29, 1946, by M. B. and R. Foster (No. 2010). Duplicate in U. S. National Herbarium.

In the Pflanzenreich, *Pitcairnia brunnescens* would fall next to *P. macranthera* André, from which it differs in its serrate scape-bracts and floral bracts, more numerous flowers in more ranks, and smaller sepals.

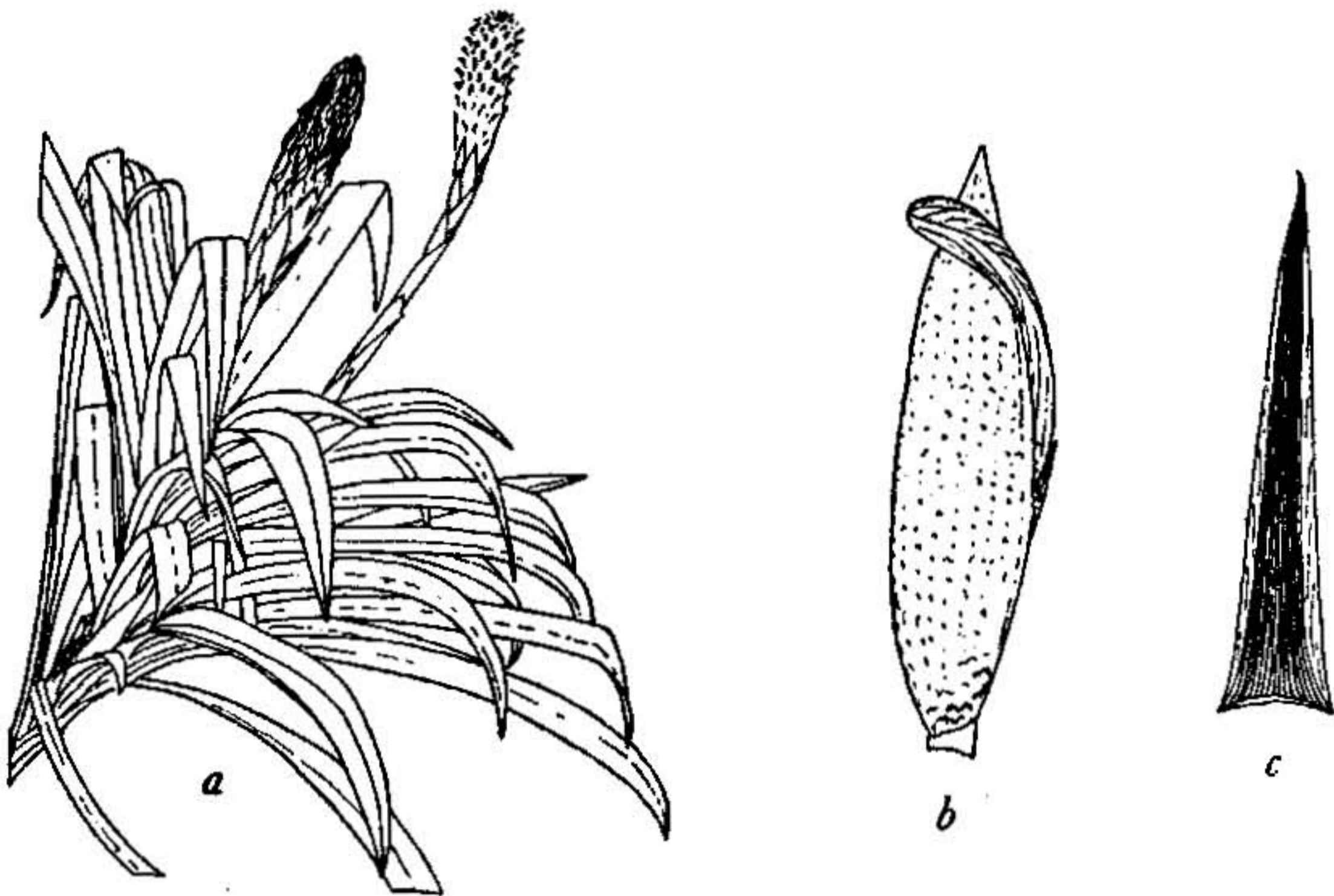


FIGURE 22.—*Pitcairnia brunnescens*: a, Habit,  $\times \frac{1}{20}$ ; b, flower and bract,  $\times \frac{1}{2}$ ; c, sepal,  $\times 1$

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

FIGURE 23

Foliis supra vaginam paulo angustatis, inermibus, laminis linearibus; scapi vaginis internodia superantibus; inflorescentia simplicissima, densissime ellipsoidea; bracteis florigeris infimis sepala superantibus; floribus graciliter pedicellatis; petalis nudis, azureis; seminibus longe caudatis.

Aggregated, subcaulescent, flowering plant 3–4 dm. high (! Foster); leaves numerous, fasciculate, uniform, slightly exceeding the inflorescence, somewhat narrowed above the sheath but not petiolate, entire, glabrous, the sheaths narrowly triangular, the blades linear, long-acuminate, 13 mm. wide; scape erect, slender, soon glabrous, red; scape-bracts erect and exceeding the internodes but not covering much of the scape, the lower subfoliaceous, the upper narrowly lanceolate, acuminate, membranaceous; inflorescence simple, densely ellipsoid, 5 cm. long, glabrous; floral bracts elliptic, acuminate, membranaceous, nerved, bright red (! Foster), the lowest exceeding the sepals, the upper shorter; pedicels short but slender; sepals oblong,

acute, 14 mm. long, strongly alate-carinate with the wings decurrent on the ovary; petals 22 mm. long, obtuse, naked, blue except for the pale margin (! Foster), about equaling the stamens; ovary four-fifths superior; seeds long-caudate.

Type in the Gray Herbarium, collected on rocks, near San Francisco, Territory of Putumayo, Colombia, altitude 2,400 meters, November 26, 1946, by M. B. and R. Foster (No. 2262).

*Pitcairnia capitata* is a problem. In its leaves and flowers it appears much like a number of species in subgenus *Eupitcairnia*, but because of its extremely short pedicels and dense inflorescence it must be placed in subgenus *Phlomostachys*. In addition, the blue color of its petals is an extremely rare character throughout the genus.



FIGURE 23.—*Pitcairnia capitata*: a, Upper part of habit,  $\times 1$ ; b, sepal,  $\times 1$ .

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

FIGURE 24

Foliis integris, petiolatis, laminis lineari-lanceolatis; inflorescentia laxissime paniculata; bracteis florigeris quam pedicellis brevioribus; pedicellis 2 cm. longis, biangulatis; floribus plus minusve secundis; sepalis 38 mm. longis, glabris; petalis verisimiliter nudis.

Terrestrial, leaves persistent, entire, more than 1 meter long (! Haught), distinctly petiolate, the sheaths unknown, the blades linear-lanceolate, long-acuminate, 55 mm. wide, glabrous; scape unknown; inflorescence 1 meter high (! Haught), very laxly bipinnate, the axes slender, glabrous, bright red; primary bracts unknown, probably small; racemes ascending, very lax, 45 cm. long, the sterile

base 11 cm. long; floral bracts ovate, acute, about half as long as the pedicels; pedicels slender, 2 cm. long, biangulate, sparsely stellate-lepidote; flowers spreading, more or less secund, pale green (! Haught); sepals narrowly lanceolate, acute, 38 mm. long, ecarinate, even, glabrous; only very immature petals seen, apparently naked.

Type in the U. S. National Herbarium, No. 1903262, collected at Río Nuqui, Territory of Chocó, Colombia, January 25, 1947, by O. Haught (No. 5481).

*Pitcairnia chocoensis* appears more closely related to *P. spectabilis* Mez than to any other known species, but its secund flowers and much shorter pedicels give it an entirely different aspect. The strongly compressed and sharply two-edged pedicels of *P. chocoensis* are unusual in the genus.

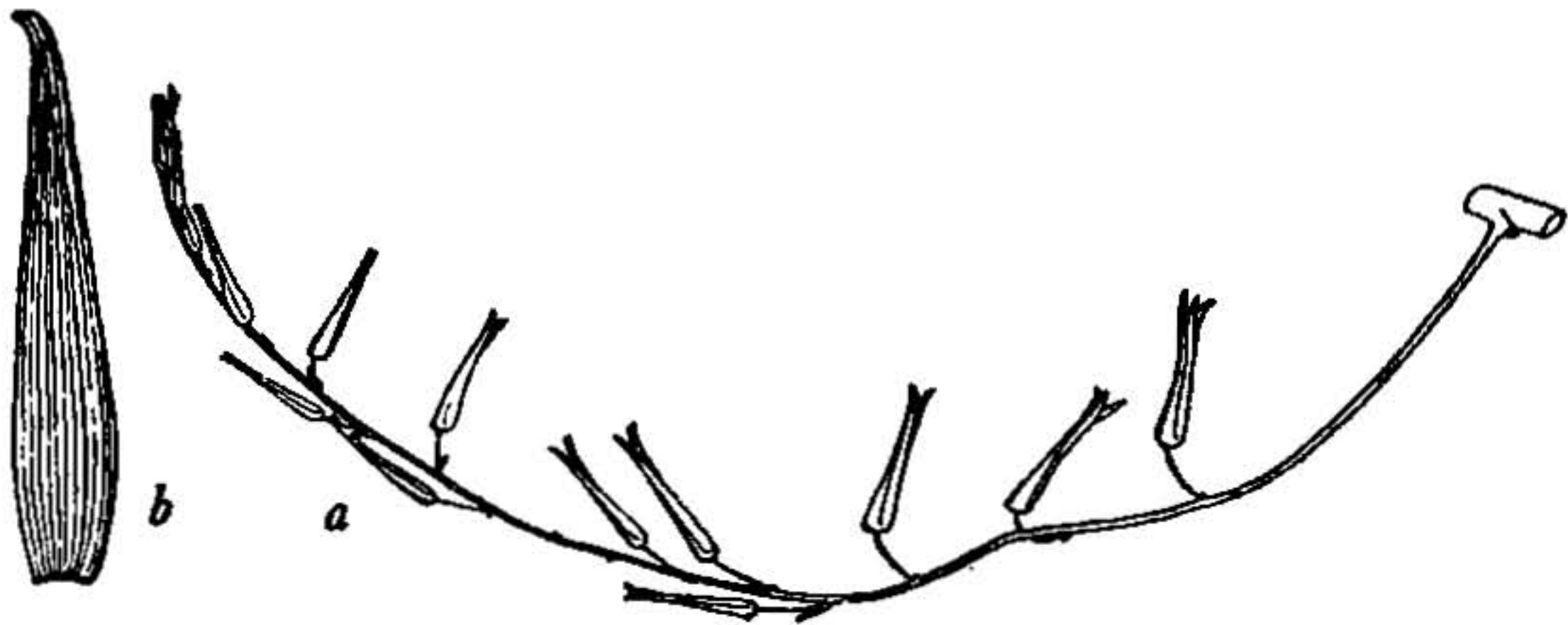


FIGURE 24.—*Pitcairnia chocoensis*: a, Branch of inflorescence,  $\times \frac{1}{4}$ ; b, sepal,  $\times 1$ .

*Pitcairnia commixta* L. B. Smith, nom. nov.

*Pitcairnia orgyalis* sensu André, Énum. Bromél, nomen; Rev. Hort. 60: 564. 1888, nomen; André ex Mez in DC. Monogr. Phan. 9: 412. 1896, not Baker, 1881.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected on steep wet rocks on the left bank of Río Silante, western slope of Mount Corazón, Pichincha, Ecuador, altitude 2,500 meters; June 22, 1876, by E. André (No. 3747).  
COLOMBIA:

NARIÑO: In trees, Altaquer, alt. 1050 m., Nov. 11, 1946, M. B. & R. Foster 2125 (G, US).

ECUADOR: Lehmann 7766 (B, probably destroyed; Macbride photo No. 11371).

PICHINCHA: Steep wet rocks on the left bank of Río Silante, western slope of Mount Corazón, alt. 2,500 m., June 22, 1876, André 3747 (K).

André misidentified his No. 3747 as *Pitcairnia orgyalis* Baker. Mez, against all rules, used the name "*orgyalis*" for André's plant after reducing "*orgyalis*" of Baker to the synonymy of another species.

Foster 2125 shows no scales on the petals, but the flowers are so old that any scales may have disappeared, and in *Pitcairnia* this character seems to be diminishing steadily in importance anyway.

*Pitcairnia echinata* Hook. var. *sublaevis* L. B. Smith, var. nov.

A var. typica differt sepalis ovarioque minute sparseque stellato-echinatis, fere laevibus.

Differs from the typical variety in its minutely and sparsely stellate nearly even sepals and ovary.

Type in the Gray Herbarium, collected on rocks along river near Pandi, Department of Cundinamarca, Colombia, altitude 900 meters, October 13, 1946, by M. B. and R. Foster (No. 1889).

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

FIGURE 25

Foliorum petiolis spinis validis armatis, laminis oblanceolatis, integris; scapo decurvato; scapi bracteis imbricatis; inflorescentia simplicissima, perelongata, basi laxa; bracteis florigeris lanceolatis, sepala multo superantibus; sepalis lanceolatis, 75 mm. longis; petalis aureis, basi ligula auctis.

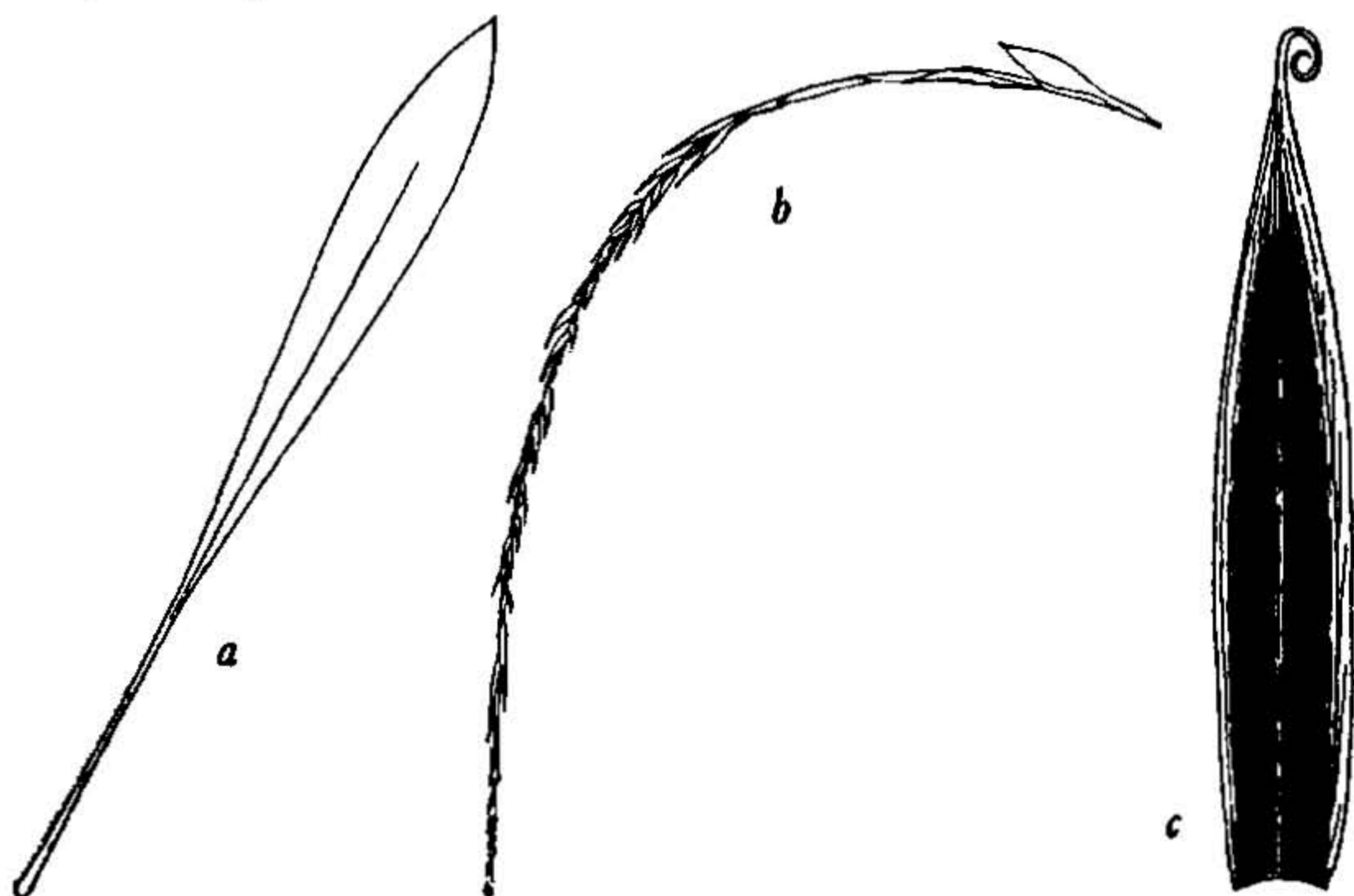


FIGURE 25.—*Pitcairnia elongata*: a, Leaf,  $\times \frac{1}{20}$ ; b, scape and inflorescence,  $\times \frac{1}{20}$ ; c, sepal,  $\times 1$ .

Scandent, long-caulescent, flowering plant 1.8–2.1 meters long (! Foster); leaves persistent, up to 1.5 meters long, strongly petiolate, the sheaths small, broadly ovate, dark castaneous, covered with a brown membrane of coalesced scales, the petioles elongate, densely armed with dark stout often forked spines 5 mm. long, wholly brown-lepidote, the blades oblanceolate, acute, long-cuneate, 1 meter long, 15 cm. wide, glabrous, reticulate; scape decurved (! Foster), slender, densely appressed-brown-lepidote; scape bracts densely imbricate, the lower subfoliaceous, the others broadly lanceolate, acuminate, papyraceous; inflorescence simple, elongate, slenderly cylindrical, lax at the base, but the sterile or immature (! Foster) apex covered with bright



red bracts, the axis densely brown-lepidote; floral bracts over 15 cm. long, much exceeding the sepals, stramineous (! Foster); flowers erect or suberect but not imbricate or concealing the axis; pedicels very short and stout; sepals lanceolate with caudate-acuminate spirally recurved apices, 75 mm. long, coriaceous, dark castaneous except for the flavous margins and apex, glabrous; petals yellow (! Foster), densely flocculose-lepidote outside, at the base bearing a ligule 2 cm. long; stamens included, anthers linear, 25 mm. long; ovary one-half superior; ovules caudate.

Type in the Gray Herbarium, collected on mounds of shrubbery, above El Diviso, Department of Nariño, Colombia, altitude 705 meters, November 13, 1946, by M. B. and R. Foster (No. 2154).

It is enough to say that *Pitcairnia elongata* belongs to the subgenus *Neumannia*, since its lax elongate inflorescence is quite unlike anything there.

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

FIGURE 26

Foliorum petiolis spinosis, laminis anguste lanceolatis, integris; scapo elongato, adscendente; scapi bracteis imbricatis; inflorescentia dense simplicissima, dense strobiliforme, axi et florum basibus floccis atrocastaneis vestitis; bracteis florigeris sepala superantibus; pedicellis gracilibus; sepalis 5 cm. longis.



FIGURE 26.—*Pitcairnia fosteriana*: a, Habit,  $\times \frac{1}{40}$ ; b, base of leaf,  $\times \frac{1}{2}$ ; c, sepal,  $\times 1$ .

Terrestrial, flowering plant over 2 meters high; stem stout, elongate, branched (! Foster), rather laxly foliate; leaf-sheaths broadly ovate, enfolding the stem, covered with a brown membrane of coalesced

scales, densely serrate with straight dark castaneous spines 5 mm. long, the blades persistent, dimorphic, some reduced to linear-triangular spinose-serrate spines, others green, 1.2 meters long, the petioles distinct, spinose-serrate, soon glabrous, the blades narrowly lanceolate, acuminate, 8 cm. wide, entire, glabrous; scape elongate, ascending; scape-bracts imbricate, elliptic, strongly spinose-serrate, subcoriaceous, dark castaneous, soon glabrous, the lower with long caudate blades, the upper acute and pungent; inflorescence simple, densely strobilate, fusiform, 30 cm. long, 5 cm. in diameter, the axis and the bases of the flowers covered with spreading dark castaneous scales; floral bracts straight, densely imbricate, like the upper scape-bracts, exceeding the sepals; pedicels slender; sepals linear-lanceolate, acuminate, 5 cm. long, carinate, nerved; petals 12 cm. long when dry, greenish white (! Foster), appendaged (! Foster), strongly curved; stamens slightly exerted, anthers 25 mm. long; ovary three-fifths superior; ovules caudate.

Type in the Gray Herbarium, collected near Sibundoy, Territory of Putumayo, Colombia, altitude 2,220 meters, October 29, 1946, by M. B. and R. Foster (No. 1977).

In the Pflanzenreich, *Pitcairnia fosteriana* would belong in the vicinity of *P. brongniartiana* André, but it is easily distinguished by its much larger and firmer floral bracts, which completely conceal the sepals. Field notes indicate that the petals have an appendage, but as yet I have failed to find it in the dried material.

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

FIGURE 27

Foliis integerrimis, breviter petiolatis, laminis lineari-lanceolatis; scapi vaginis densissime imbricatis; inflorescentia simplicissima, densissime ovoidea; bracteis florigeris acuminatis, quam floribus longioribus sed valde reflexis; floribus subsessilibus; sepalis late obtusis; ovulis obtusis.

Short-caulescent; leaves few, all alike, fascicled, 7 dm. long, much exceeding the inflorescence, entire, short-petiolate, minutely white-flocculose beneath, glabrous above, the sheaths elliptic, 12 cm. long, the blades linear-lanceolate, acuminate, 35 mm. wide; scape-bracts very densely imbricate, concealing the slender scape, the lower foliaceous, the upper elliptic, acuminate, chartaceous when dry, subinflated; inflorescence simple, very dense, ovoid, 4.5 cm. long, nearly 4 cm. in diameter; floral bracts broadly ovate, acuminate, longer than the flowers but reflexed, pale below, dark red above; flowers subsessile, more than half of them open at one time; sepals subtriangular, broadly obtuse, 14 mm. long, scarcely carinate, coriaceous, coarsely nerved, sparsely flocculose; petals 25 mm. long, white; stamens included; ovary two-thirds superior; ovules obtuse.

Type in the Gray Herbarium, collected on rocks, between San Francisco and Las Mesas, Territory of Putumayo, Colombia, altitude 2,550 meters, November 26, 1946, by M. B. and R. Foster (No. 2263).

Its relatively large floral bracts, dense simple inflorescence, and sessile flowers place *Pitcairnia guzmanoides* in the subgenus *Neumania*, although its obtuse ovules suggest affinity with section *Schweideleria* of subgenus *Eupitcairnia*. In either event, its reflexed floral bracts quickly distinguish it, and it seems to be without any close relative.



FIGURE 27.—*Pitcairnia guzmanoides*: a, Apex of scape and inflorescence,  $\times \frac{1}{2}$ ; b, sepal  $\times 1$ .

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

FIGURE 28

Foliis petiolatis, integris, laminis lineari-lanceolatis, 5 cm. latis; scapi bracteis internodia multo superantibus; inflorescentia subsimplici; bracteis florigeris mox deciduis, unica cognita lanceolata, pedicellum paulo superante; sepalis anguste lanceolatis, acutis; petalis basi ligula auctis; ovario fere omnino supero, ovulis obtusis.

Terrestrial, the flowering plant about 1 meter high (! Haught); leaves few, to 1.5 meters long, petiolate, entire, glabrous, the blades linear-lanceolate, long-acuminate, 5 cm. wide; scape apparently erect or ascending, 7 mm. in diameter, densely brown-lanate; scape-bracts foliaceous and much exceeding the internodes but covering little of the scape; inflorescence subsimple with a short 2-flowered branch at base, lax, sparsely brown-flocculose, the axis slender, straight; primary bract deciduous, unknown; floral bracts quickly deciduous, the only one known lanceolate, acuminate, slightly exceeding the pedicel; flowers spreading or reflexed; pedicels slender, 2 cm. long; sepals asymmetric, narrowly lanceolate, acute, 50 mm. long, green; petals linear-spatulate, broadly rounded and apiculate, 8 cm. long, red, bearing a large truncate scale at base; stamens included; ovary almost wholly superior, the ovules obtuse.

Type in the U. S. National Herbarium, Nos. 1903260 and 1903261, collected in very sterile soil, at Chuare, Department of El Cauca, Colombia, altitude about 70 meters, December 24, 1946, by O. Haught (No. 5389).

*Pitcairnia haughtii* belongs to the section *Schweideleria* and would fall next to *P. alborubra* Baker in the Pflanzenreich key were the latter species correctly placed. Since *P. alborubra* does not belong in that section, *P. haughtii* can be said to differ from the remaining species of section *Schweideleria* in the Pflanzenreich by its linear-lanceolate entire leaf-blades. Probably it is nearer to *P. lepidopetalon* L. B. Smith than to any species in the Pflanzenreich, but differs from that species in its broader leaves and acute sepals.

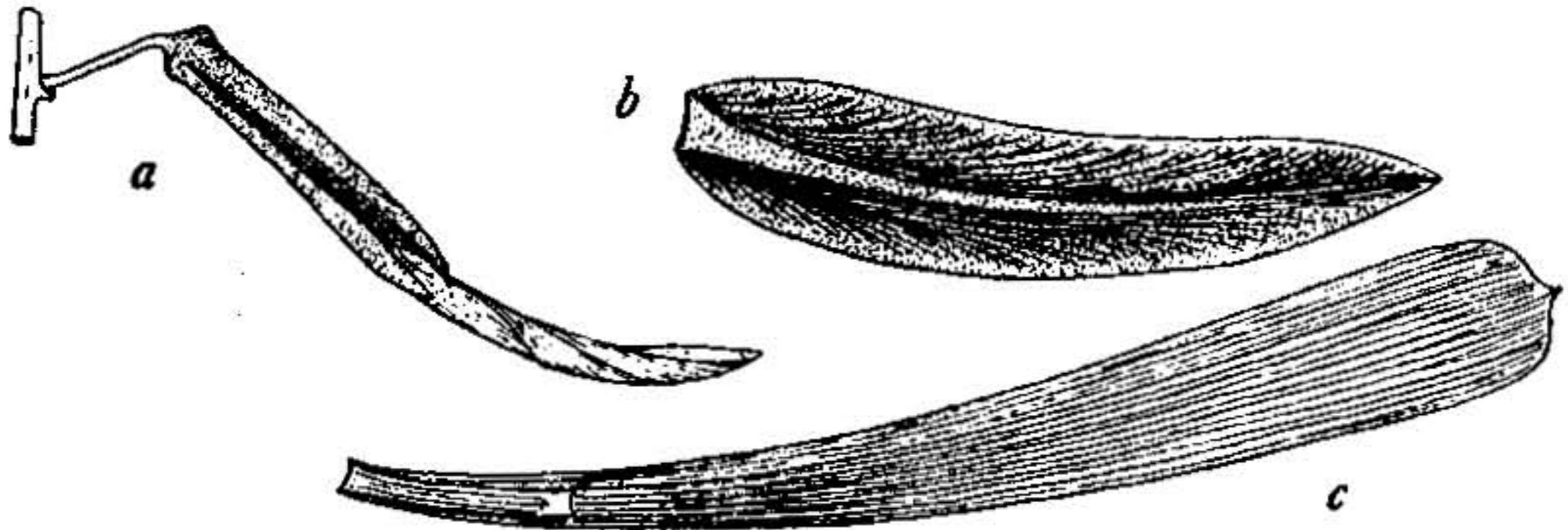


FIGURE 28.—*Pitcairnia haughtii*: a, Flower,  $\times \frac{1}{2}$ ; b, sepal,  $\times 1$ ; c, petal,  $\times 1$ .

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

FIGURE 29

Foliis integris, supra vaginam paulo angustatis sed haud petiolatis, laminis linearibus; scapi bracteis internodia superantibus; inflorescentia laxissime paniculata; bracteis florigeris ellipticis, acutis, quam pedicellis brevioribus; sepalis oblongis, rotundatis apiculatisque; petalis basi ligula auctis.

Terrestrial, flowering plant 85 cm. high; stem horizontal, apparently subterranean; leaves fascicled, all alike, entire, nearly 9 dm. long, slightly narrowed above the narrowly elliptic sheath but hardly petiolate, the blades linear, long-acuminate, 3 cm. wide, glabrous; scape erect, slender, sparsely ferruginous-lepidote; scape-bracts erect, subfoliaceous, exceeding the internodes but covering little of the scape; inflorescence very laxly bipinnate, sparsely pale-lepidote; primary bracts quickly deciduous, unknown but probably small; racemes ascending, the sterile naked base 6 cm. long; floral bracts elliptic, acute, shorter than the pedicels; flowers divergent, subdistichous, red (! Killip); pedicels slender, 15–19 mm. long; sepals oblong, rounded and apiculate, 33 mm. long, nerved, glabrous; only the withered petals known, about 6 cm. long, bearing a large bidentate scale at base; ovary subglobose, almost wholly superior.

Type in the U. S. National Herbarium, No. 1771987, collected in dense forest, Corcovada Region, upper Río San Juan, ridge along Yeracúf Valley, Territory of El Chocó, Colombia, altitude 200–275 meters, August 24, 25, 1939, by E. P. Killip (No. 35245). Duplicate at G.

This species comes out with the Brazilian *Pitcairnia anthericoides* Mez in the Pflanzenreich but differs in its acute floral bracts and oblong sepals. Although its leaves are entire it is probably more nearly related to such Colombian species as *P. poortmani* André and *P. commixta* L. B. Smith.

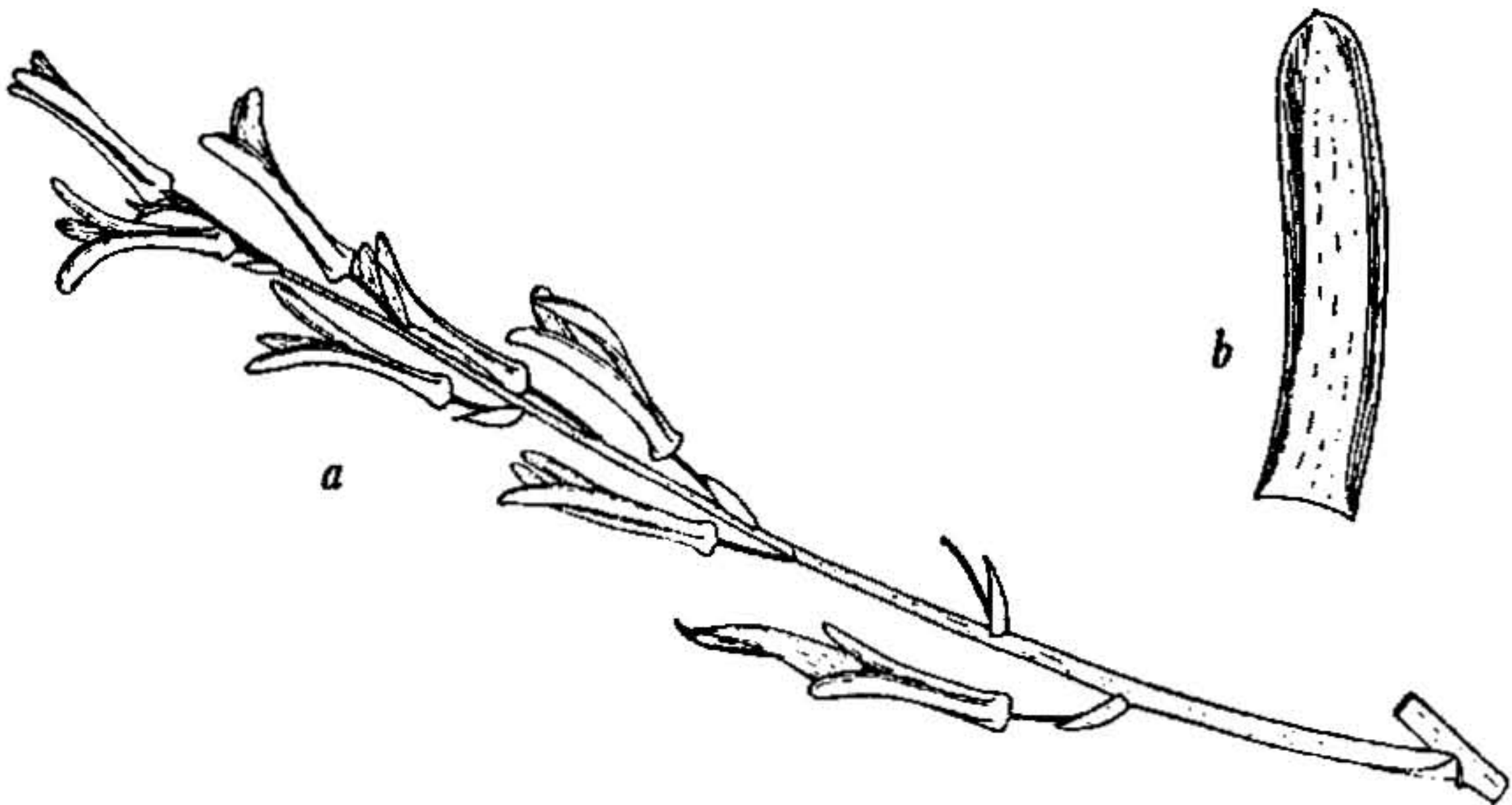


FIGURE 29.—*Pitcairnia killipiana*: a, Branch of inflorescence,  $\times \frac{1}{2}$ ; b, sepal,  $\times 1$ .

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

FIGURE 30

Caule elongato, ramoso, lignoso; foliis homomorphis, laminis linearibus, deciduis; scapo erecto; scapi bracteis internodia superantibus; inflorescentia simplicissima, basi laxa; bracteis florigeris infimis sepala fere aequantibus; sepalis anguste triangularibus; petalis verisimiliter nudis; ovulis caudatis.

Terrestrial, long-caulescent, the flowering shoot about 5 dm. high; stem branched, woody, covered with the remains of old leaf-sheaths; leaves all alike, 3–4 dm. long, the sheaths suborbicular, 2 cm. in diameter, dark castaneous, white-flocculose, the blades linear, long-acuminate, about 10 mm. wide, glabrous above, densely white-lepidote beneath, deciduous along a straight transverse line 4 cm. above the sheath, subdensely serrate below the line with brown teeth 2 mm. long, the remnant spirally incurved, entire above the line; scape erect, 8 mm. in diameter densely white-flocculose; scape-bracts long-acuminate from an ovate base, much exceeding the internodes but covering little of the scape, white-lepidote; only withered inflorescences known, apparently white-flocculose, simple, 15–19 cm. long, lax at base, rather dense toward apex; floral bracts like the scape-bracts, the lowest much exceeding the pedicels and nearly equaling the sepals; flowers divergent; pedicels slender, 16 mm. long; sepals narrowly triangular, acuminate, 17 mm. long, carinate; petals about 5 cm. long, apparently naked; ovary three-fourths superior; ovules caudate.

Type in the Gray Herbarium, collected on the road between Tangüa and Tuquerres, Department of Nariño, Colombia, altitude 3,000 meters, November 18, 1946, by M. B. and R. Foster (No. 2200).

This new species seems more nearly related to *Pitcairnia tolimensis* L. B. Smith than to any species in the Pflanzenreich, but unlike that species it has slender pedicels and narrow floral bracts.

The following specimen, although larger and more robust than the type, appears to be conspecific:

COLOMBIA:

EL CAUCA: On dry rocks and banks, near Mercaderes on the road to Pasto, alt. 1167 m., Oct. 25, 1946, M. B. & R. Foster 1928 (G).

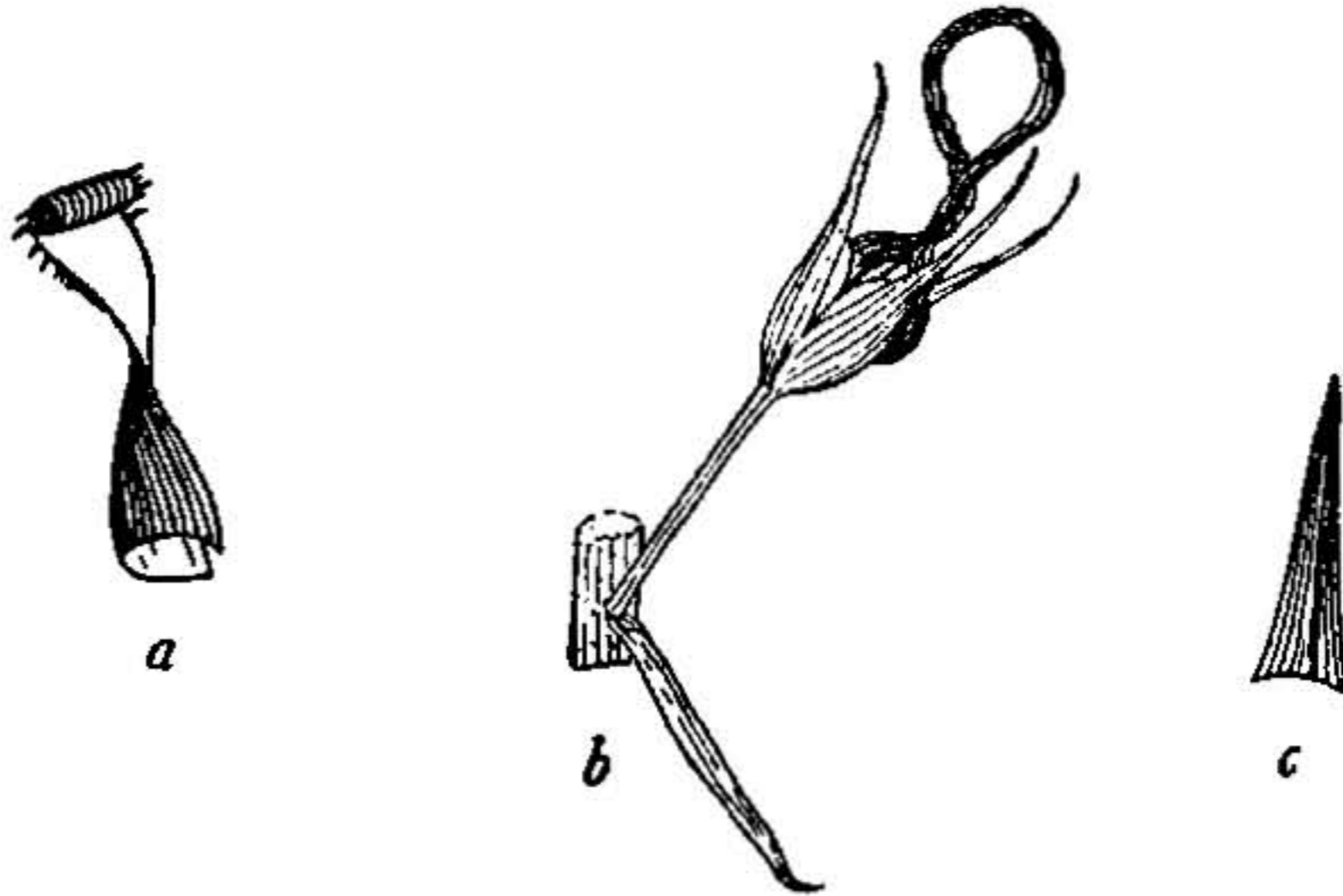


FIGURE 30.—*Pitcairnia lignosa*: a, Base of leaf,  $\times \frac{1}{2}$ ; b, flower and bract,  $\times 1$ ; c, sepal,  $\times 1$ .

*Pitcairnia macranthera* André, Enum. Bromél. 5. Dec. 13, 1888; Rev. Hort. 60: 565. Dec. 16, 1888; Bromel. Andr. 29, pl. 9, fig. F. 1889.

Emended description: Stem erect, scandent, bearing widely separated fascicles of leaves, elsewhere covered with large triangular-oblong mucronate dark-castaneous buff-lepidote sheaths; leaves 5–6 dm. long, petiolate, the sheaths small, broadly ovate, the petioles short, rather densely serrate with dark spines 2 mm. long, buff-lepidote, the blades narrowly oblanceolate, acuminate, cuneate, 4–5 cm. wide, entire, glabrous, reticulate beneath; scape erect, 8 dm. long; scape-bracts large, imbricate and tightly sheathing the scape, the lowest like those of the stem, the upper lanceolate, acuminate, green; inflorescence simple, cylindric, 16 cm. long, 3.5 cm. in diameter, the axis sparsely buff-lepidote; floral bracts erect, densely imbricate, broadly ovate, acute, 48 mm. long, even, glabrous, green; flowers 4-ranked; pedicels short but slender; sepals linear-lanceolate, acuminate, uncinuate, 6 cm. long, much exceeding the bracts, glabrous; petals linear, acute, 12 cm. long, about equaling the stamens, arcuate-recurved, white, bearing a serrate ligule at base; anthers 2 cm. long; ovary four-fifths superior; ovules caudate.

Type in the herbarium of the Royal Botanic Gardens, Kew, collected on sandstone rocks, near El Espino, Department of Nariño, Colombia, May 1876, by E. André (No. 2593).

The type of this species is extremely fragmentary, but so far as it is known it is very close in all characters to the following ample material:

COLOMBIA:

NARIÑO: Climbing in dense shrubbery, Altaquer, Río Cuaciquiere, alt. 900 m., Nov. 12, 1946, *M. B. & R. Foster* 2145 (G).

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

FIGURE 31

Foliorum petiolis serratis, laminis lineari-lanceolatis, integris; scapi bracteis imbricatis, lanceolatis, tenuibus, verisimiliter integris; inflorescentia simplicissima, dense brunneo-lanosa; bracteis florigeris imbricatis, sepalis paulo superatis, laevibus; floribus tristiche ordinatis, brevissime crasseque pedicellatis; sepalis acutis, valde asymmetricis; petalis ligula auctis.

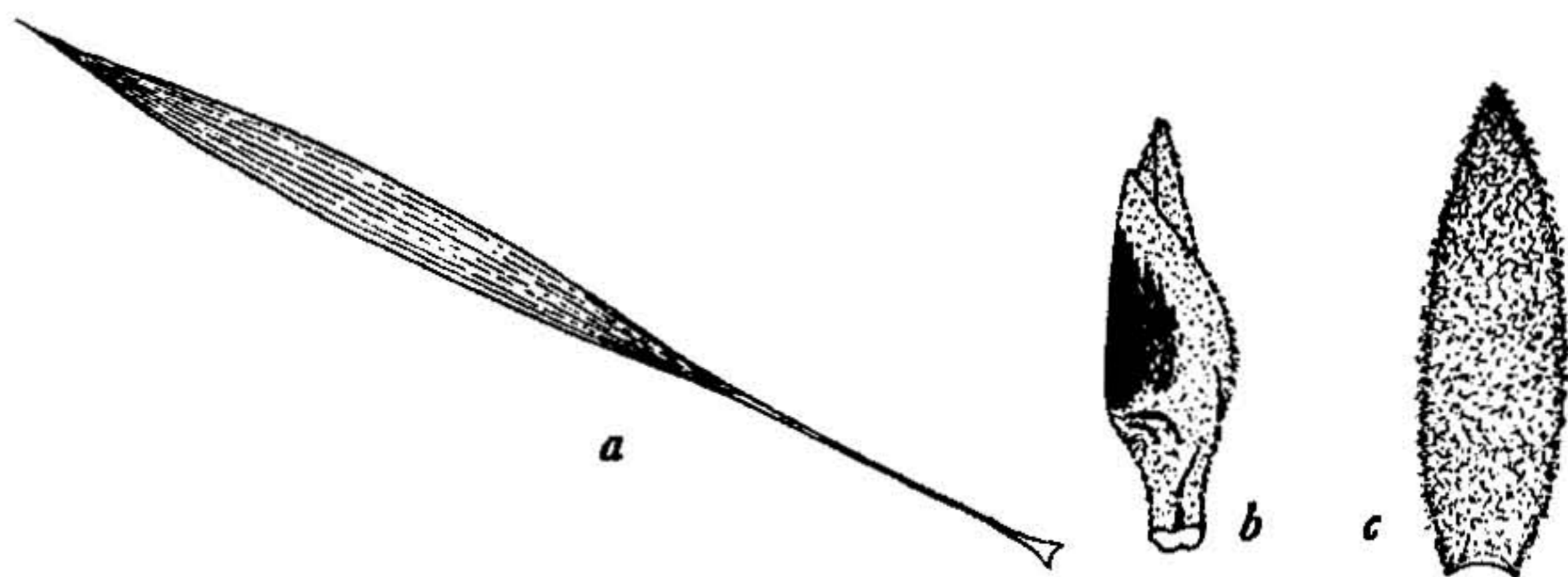


FIGURE 31.—*Pitcairnia maritima*: *a*, Leaf,  $\times \frac{1}{20}$ ; *b*, flower and bract,  $\times \frac{1}{2}$ ; *c*, sepal,  $\times 1$ .

Flowering plant 1.8 meters high (! Foster); leaves few, 1.8 meters long, long-petiolate, the sheaths small, broadly reniform, dark ferruginous-lanate, petioles serrate with dark spines 2 mm. long, the blades linear-lanceolate, acuminate, cuneate, entire, 9 cm. wide, brown-lanate but soon glabrous; scape straight, nearly 1 meter long, 1 cm. in diameter, densely lanate; scape-bracts erect, very densely imbricate, large, lanceolate, thin, known only from old and imperfect material but apparently entire; inflorescence simple, densely cylindrical, over 7 dm. long, 4 cm. in diameter, brown-lanate; floral bracts erect, imbricate, broadly ovate, acute, 4 cm. long, slightly exceeded by the sepals, even, dark brown, thin-coriaceous; flowers 3-ranked; pedicels short and stout; sepals lanceolate, acute, strongly asymmetric, 37 mm. long, brown; petals recurving after anthesis (! Foster), strap-shaped, broadly rounded, 55 mm. long, yellow (! Foster), densely and minutely brown-lepidote outside, bearing a cupuliform scale at base; ovary three-fifths superior; ovules unknown.

Type in Gray Herbarium, collected on rocks near sea level, Buenaventura, Department of El Valle, Colombia, December 8, 1946, by M. B. and R. Foster (No. 2319).

*Pitcairnia maritima* appears to be related to *P. bakeri* André but has the flowers in very few ranks, even floral bracts, and a cup-shaped scale on the petal.

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

FIGURE 32

Foliis dimorphis, alteris ad vaginas acutas reductis, alteris longe petiolatis, laminis late oblanceolatis; scapo erecto; scapi bracteis internodia superantibus; inflorescentia simplicissima, permultiflora; bracteis florigeris valde reflexis; pedicellis gracillimis; sepalis acuminatis; petalis quam sepalis haud longioribus, albis, nudis; ovulis caudatis.

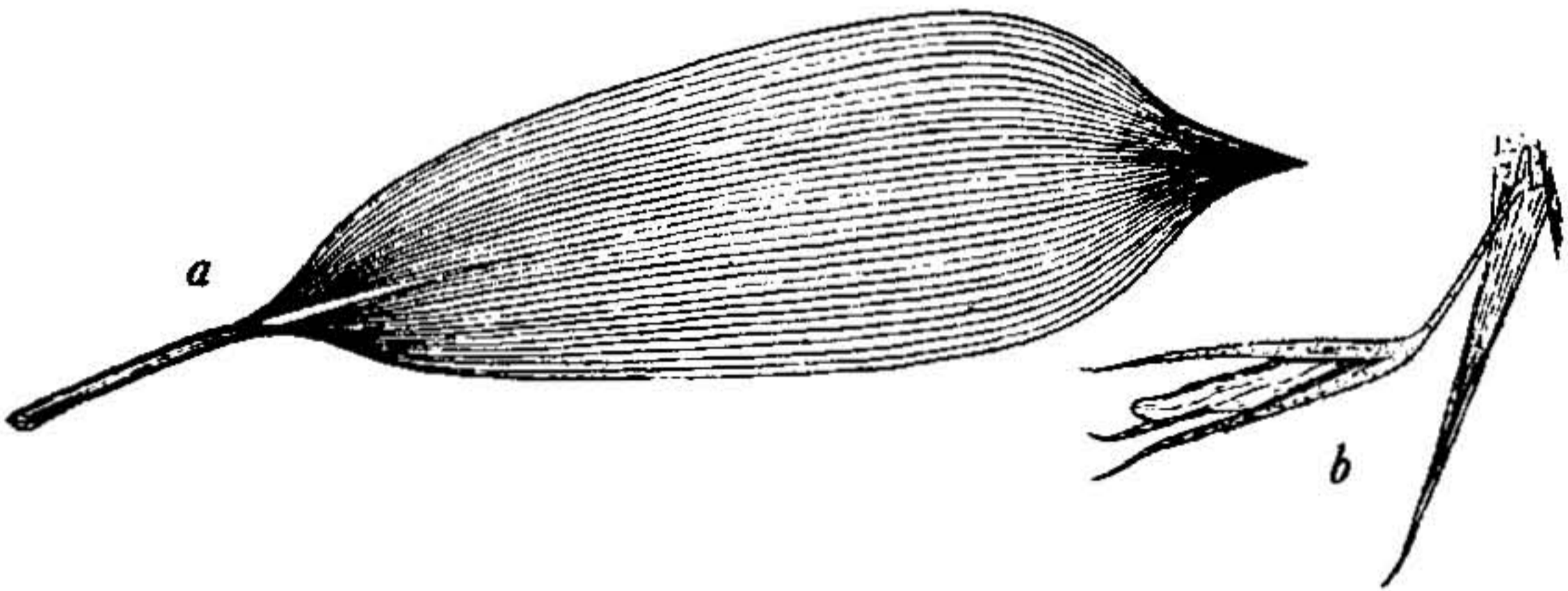


FIGURE 32.—*Pitcairnia multiflora*: a, Leaf-blade,  $\times \frac{1}{6}$ ; b, flower and bract,  $\times 1$ .

Terrestrial, flowering plant over 1 meter high (! Haught); leaves few (! Haught), apparently rosulate, entire, dimorphic, some reduced to elliptic acute pale-appressed-lepidote sheaths, others long-petiolate, the blades broadly oblanceolate, acute, 42 cm. long, 14 cm. wide, glabrous, reticulate beneath; scape erect, slender, pale-flocculose; scape-bracts erect, much exceeding the internodes, narrowly lanceolate, acuminate, entire, thin, red, flocculose at base; inflorescence simple, cylindric, 55 cm. long, 7 cm. in diameter, many-flowered, minutely pale-flocculose, the axis straight, sulcate; floral bracts sharply reflexed, nearly covering the axis, narrowly lanceolate, acuminate, membranaceous, red, the lowest longer than the pedicels, the upper only about half as long; pedicels very slender, 16 mm. long, the lower ones sub-reflexed, the upper spreading or slightly ascending; sepals linear-lanceolate, acuminate, 20 mm. long, ecarinate, green (! Haught); petals narrowly elliptic, acute, barely exceeding the sepals, white, naked; stamens included; ovary almost wholly superior; ovules long-caudate.

Type in the U. S. National Herbarium Nos. 1903257 and 1903258, collected at Kilometer 95 on the Cali-Buenaventura Highway, Department of El Valle,



Colombia, altitude 450 meters (but common to at least 1,500 meters according to Haught), December 11, 1946, by O. Haught (No. 5348).

In the Pflanzenreich this species would stand next to *Pitcairnia reflexiflora* André, but it differs from that species in its very wide oblanceolate leaves, long pedicels, and short white petals.

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

FIGURE 33

Foliis subpetiolatis, laminis lineari-lanceolatis; scapo decurvato et dein prostrato; scapi bracteis infimis foliaceis; inflorescentia simplicissima, strobiliformi; bracteis florigeris deciduis, ignotis; floribus subsessilibus; sepalis late acutis; petalis basi ligula auctis; ovario patente dein abrupte sursum curvato,  $\frac{3}{4}$  infero, indehiscente, alato; ovulis alatis.

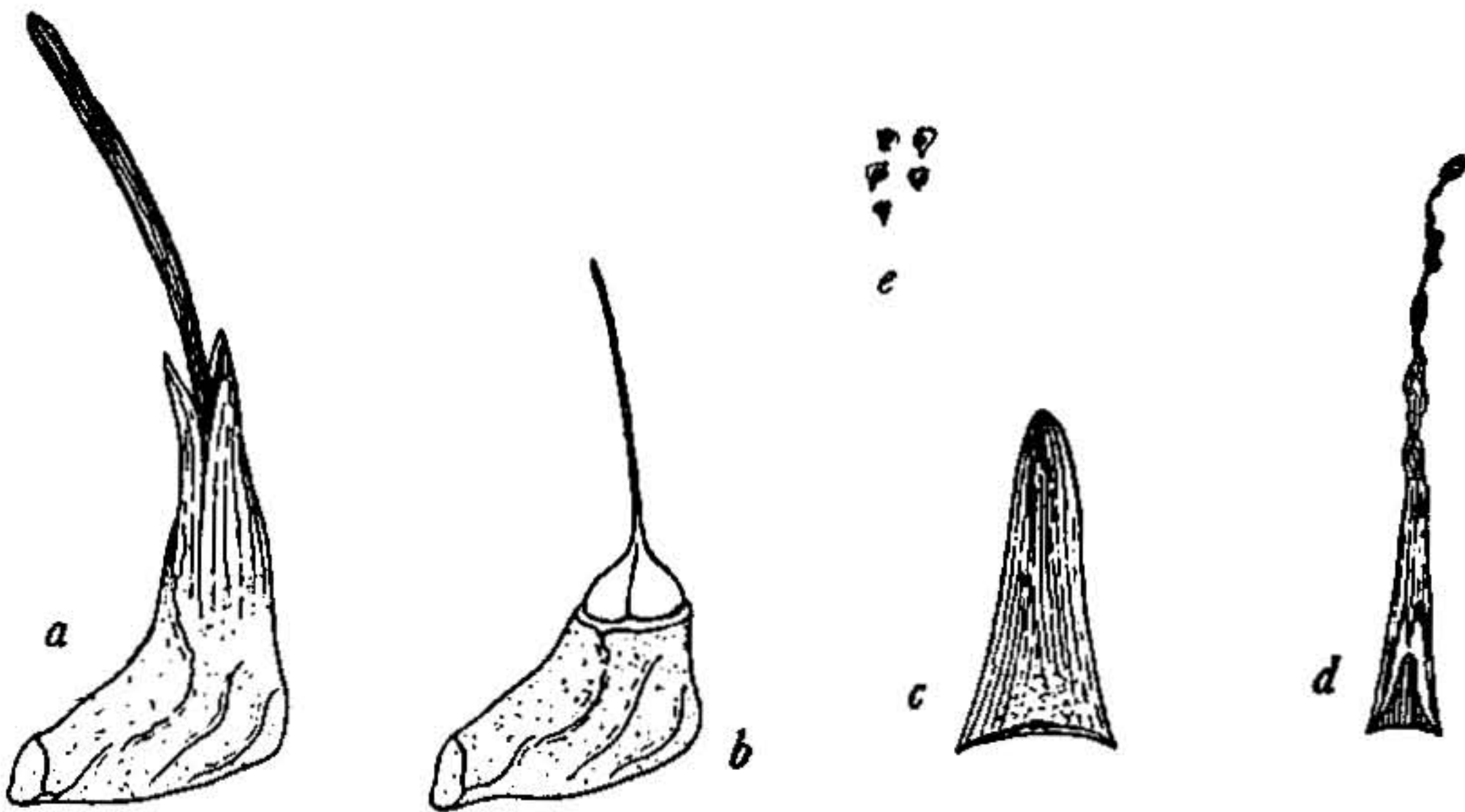


FIGURE 33.—*Pitcairnia quesnelioides*: a, Flower,  $\times 1$ ; b, ovary,  $\times 1$ ; c, sepal,  $\times 1$ ; d, petal,  $\times 1$ ; e, seeds,  $\times 1$ .

Plants growing in dense masses; leaves over 1.5 meters long, subpetiolate, laxly serrulate at base, densely brown-flocculose beneath, soon glabrous above, the blades linear-lanceolate, acuminate, 4 cm. wide; scape erect for 15–20 cm. then decurved and prostrate; lower scape-bracts foliaceous, the upper deciduous and not known but probably imbricate; inflorescence simple, strobilate, cylindric, 15 cm. long, 5 cm. in diameter; floral bracts deciduous, unknown; flowers subsessile; sepals triangular-lanceolate, broadly acute, 24 mm. long, strongly nerved, glabrous in age, the posterior ones strongly carinate; only old petals known, 5 cm. long, bearing a large lacerate scale at base; ovary spreading then abruptly ascending, three-fourths inferior, indehiscent, winged, brown-flocculose at base; ovules winged.

Type in the Gray Herbarium, collected at Puerto Limón, Territory of Putumayo, Colombia, altitude 900 meters, November 24, 1946, by M. B. and R. Foster (No. 2257).

The strobilate prostrate inflorescence of *Pitcairnia quesnelioides* is quite unlike that of any species in the subgenus *Melinonia*, in which its largely inferior indehiscent ovary places it.

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

FIGURE 34

Foliis homomorphis, petiolatis, laminis lanceolatis, acuminatis, 7 cm. latis; scapo erecto; scapi bracteis quam internodia multo brevioribus; inflorescentia simplicissima, laxa; bracteis florigeris quam pedicellis brevioribus; pedicellis gracillimis, ad 4 cm. longis; sepalis anguste oblongis, obtusis; petalis viridibus, basi ligula auctis; ovulis caudatis.

Flowering plant 1.3 meters high; leaves few, all alike, slightly shorter than the inflorescence, entire, distinctly petiolate, the sheaths small, broadly ovate, dark castaneous, densely ferrugineous-lepidote, becoming glabrous, the petioles elongate, red (! Foster), the blades lanceolate, acuminate, 7 cm. wide, dark green above (! Foster) and glabrous, beneath reddish (! Foster) and densely white-lepidote; scape erect, slender, white-flocculose; scape-bracts erect, lanceolate, acuminate, much shorter than the internodes, densely white-flocculose; inflorescence simple, lax, 14 cm. long, densely white-flocculose; floral bracts lanceolate, acute; about a third as long as the pedicels; pedicels very slender, ascending, to 4 cm. long; sepals narrowly oblong, obtuse, 30 mm. long; strongly nerved, carinate, crested at base; petals 45 mm. long, acute, green, bearing a large scale at base; stamens included; ovary two-thirds superior; ovules caudate.

Type in the Gray Herbarium, collected on mounds of roots and mosses, at Altaquer, Department of Nariño, Colombia, altitude, 1,050 meters, November 10, 1946, by M. B. and R. Foster (No. 2071).

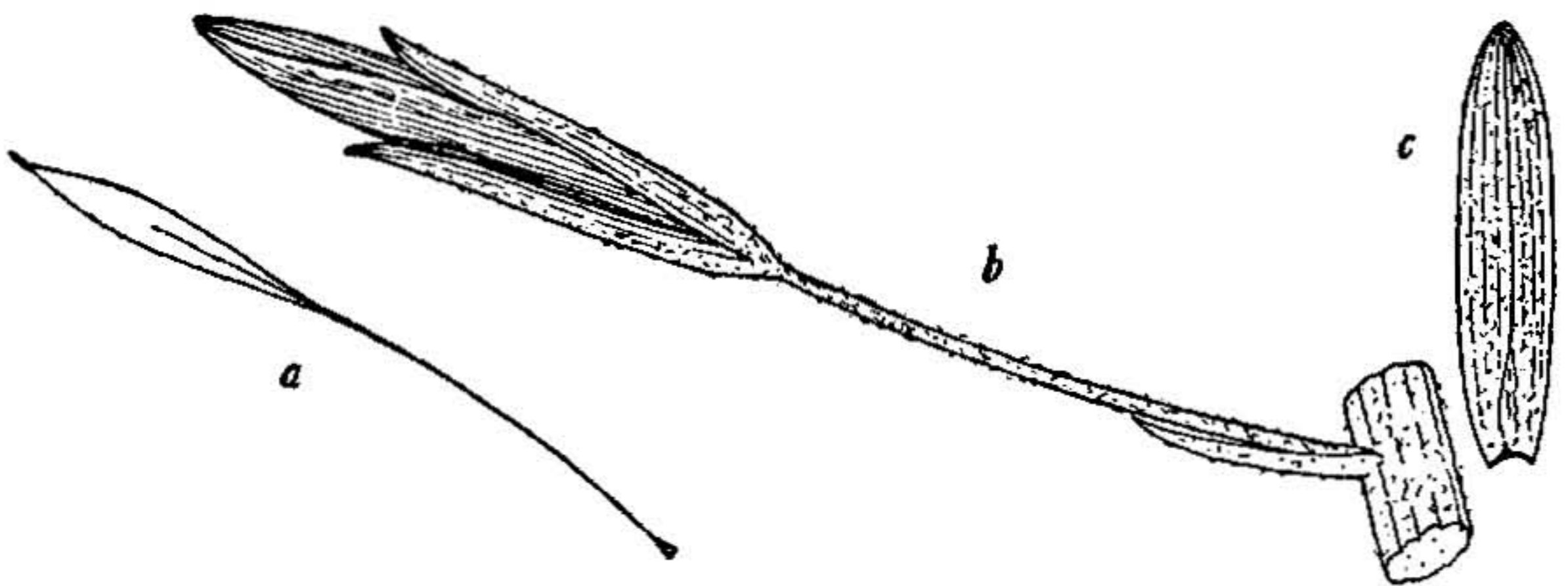


FIGURE 34.—*Pitcairnia tumulicola*: a, Leaf,  $\times \frac{1}{20}$ ; b, flower and bract,  $\times 1$ ; c, sepal  $\times 1$ .

Its dense indument would place *Pitcairnia tumulicola* next to *P. pavonii* Mez in the Pflanzenreich key, but its very long pedicels and short floral bracts make it appear more like *P. longipes* Mez. Its

leaf-blades are more than twice as wide as those of either of the other species and its petals are green.

## ECUADOR

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

FIGURE 35

Foliorum spinis ad 15 mm. longis; inflorescentia cylindrica, densissime bipinnatim paniculata, dense albo-lanata; bracteis primariis ramos superantibus, integris; racemis subglobosis; bracteis florigeris integris, sepala subaequantibus; sepalis late ellipticis, ad 23 mm. longis.

Flowering plant 3–4 meters high (! Hitchcock); leaves 9–15 dm. long (! Hitchcock), the sheaths ample, minutely serrate toward apex, the blades linear, acuminate, pungent, 3 cm. wide, flat, glabrous above, beneath minutely pale-lepidote between the nerves, laxly serrate with broad dark hooked teeth 15 mm. long; scape erect, 1 dm. in diameter; inflorescence cylindric, very densely bipinnate, 2 dm. or more in diameter, densely white-lanate; primary bracts acuminate from an ovate base, exceeding the axillary branches at anthesis, entire; racemes subglobose, sessile; floral bracts elliptic, acute, entire, about equaling the sepals, chartaceous when dry; pedicels stout, about 1 cm. long; sepals broadly elliptic, slightly asymmetric, to 23 mm. long, ecarinate, coriaceous; petals obtuse, 4 cm. long, dark blue.

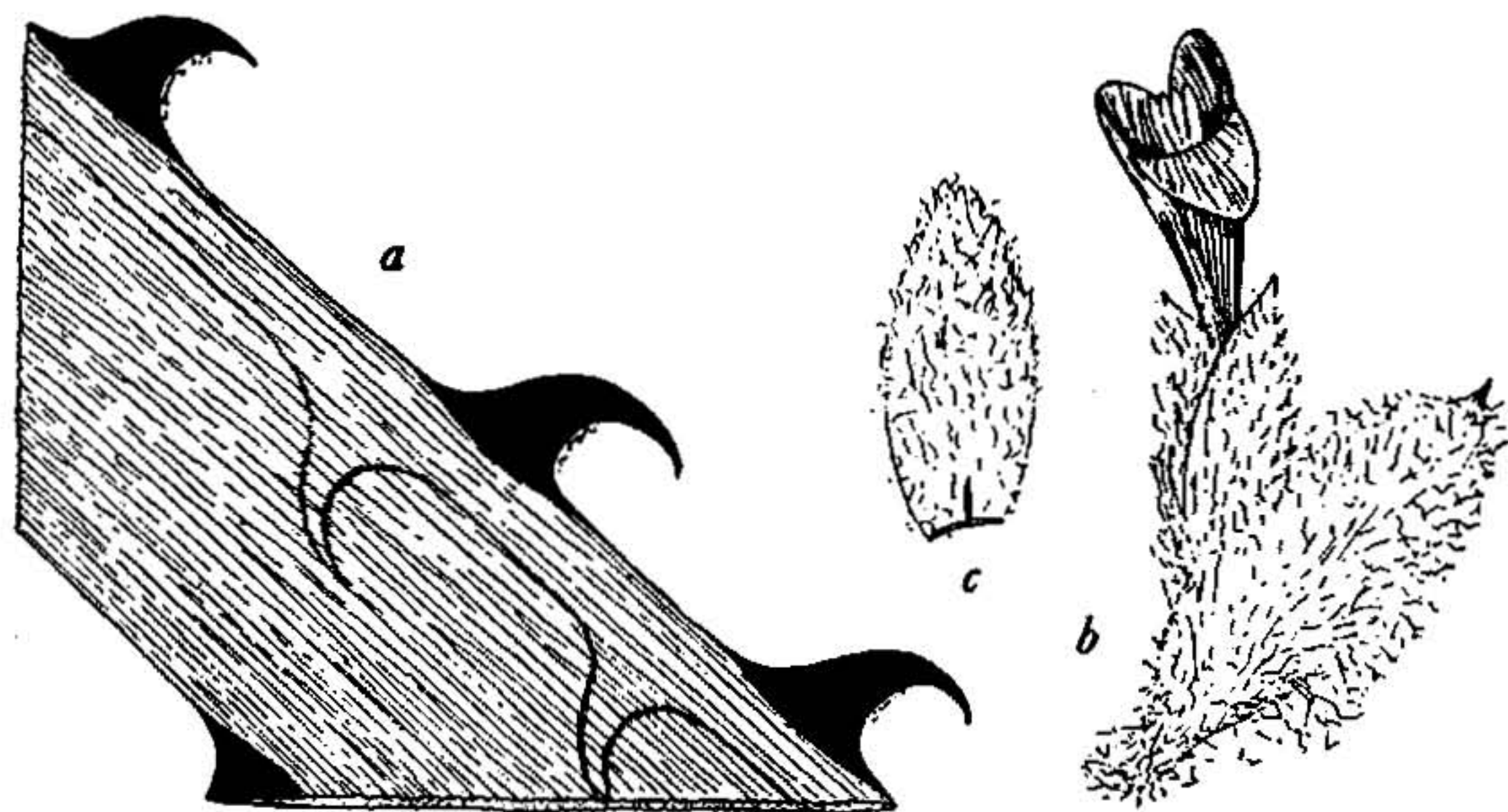


FIGURE 35.—*Puya hamata*: *a*, Section of leaf-blade,  $\times 1$ ; *b*, flower and bract,  $\times 1$ ; *c*, sepal,  $\times 1$ .

Type in the U. S. National Herbarium, No. 1196106, collected on páramos 12 miles west of Tulcán, Province of Carchi, Ecuador, altitude, 3,300 meters, August 10, 1923, by A. S. Hitchcock (No. 20915).

Additional specimen examined:

ECUADOR:

CARCHI: Margins of páramo and páramo along road from Tulcán to El Pun, alt. 3,150–3,420 m., Aug. 18, 1944, *Wiggins* 10645 (G).

In the key to *Puya* in the *Pflanzenreich*, *P. hamata* would fall in the vicinity of *P. mollis* Baker, but it differs in its relatively large floral bracts, denser spikes and indument, and most obviously of all in its tremendous leaf-spines.

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

FIGURE 36

Laminis foliorum supra dense albo-lepidotis, subtus apice excepto mox glabris; inflorescentia metralis (! Espinosa), ramosa; axibus albo-flocculosis; racemis substrobiliformibus, breviter stipitatis, bracteis primariis bene superantibus; bracteis florigeris late ovatis, breviter acuminatis, sepala subaequantibus; floribus breviter pedicellatis; sepalis lanceolatis, carinatis, 16 mm. longis.

Known only from fragments; leaf-blades linear, acuminate, 20–26 cm. long, 15 mm. wide, densely appressed-pale-lepidote above, soon glabrous beneath except near apex; scape unknown; inflorescence 1 m. long (! Espinosa), laxly bipinnate but subdense toward apex;

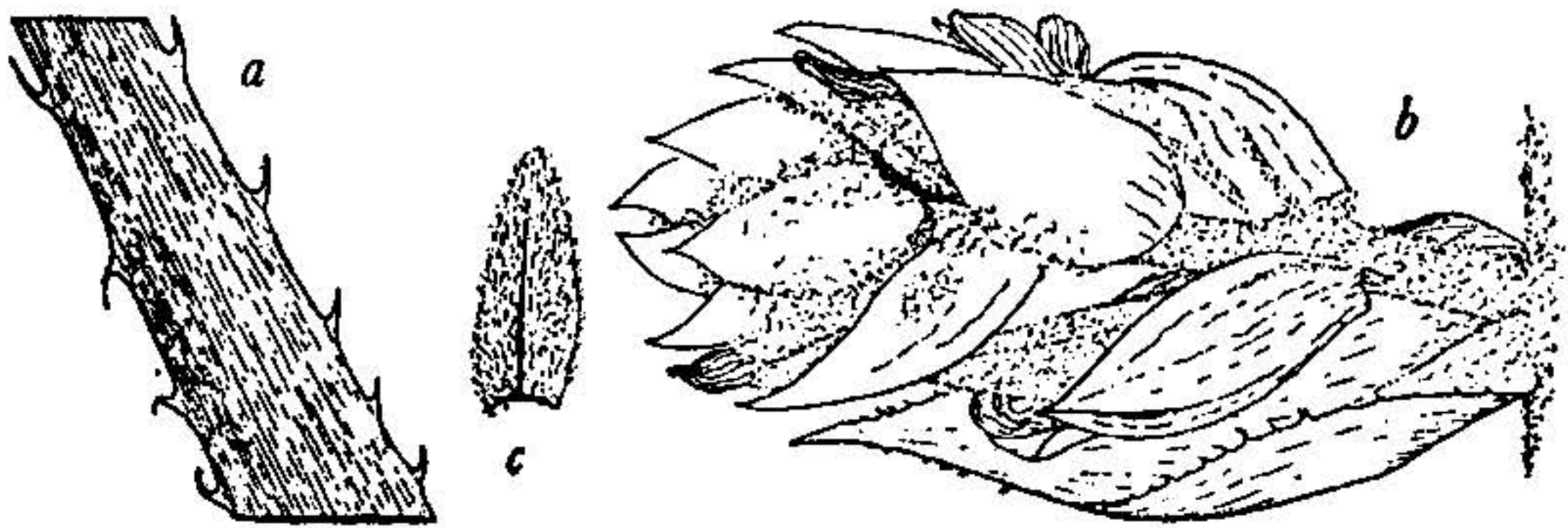


FIGURE 36.—*Puya parviflora*: a, Section of leaf-blade,  $\times 1$ ; b, branch of inflorescence,  $\times 1$ ; c, sepal,  $\times 1$ .

axes densely white-flocculose; primary bracts broadly ovate, acuminate, distinctly shorter than the spikes, serrate, thin-coriaceous, sublustrous, soon glabrous beneath except near apex; racemes spreading, substrobilate, 6–7 cm. long, 3 cm. in diameter, about 15-flowered, the naked sterile base 1 cm. long; floral bracts broadly ovate, short-acuminate, 22 mm. long, about equaling the sepals, erose-denticulate, sublustrous; flowers suberect; pedicels short and stout; sepals lanceolate, 16 mm. long, carinate, densely white-flocculose; petals 25 mm. long, green.

Type in the U. S. National Herbarium, No. 1950602, collected at Hacienda Ambocas, northeast of Zaruma, Tío Loma, Province of El Oro, Ecuador, altitude 2,200–2,900 meters, August 30, 1947, by R. Espinosa (No. E2052).

In Mez's monograph in the *Pflanzenreich*, *Puya parviflora* would fall next to *P. stipitata* L. B. Smith, from which it differs in many characters, most strikingly in its white-flocculose indument and relatively large sublustrous floral bracts.