

BOTANY OF THE CHIMANTÁ MASSIF—I
GRAN SABANA, VENEZUELA²²

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AND COLLABORATORS

The Chimantá Massif, probably the largest of the Roraima-formation mountains, has been the object of joint exploration by the New York Botanical Garden and the Chicago Natural History Museum. Parts of the massif (Abácapa-tepuí and Acopan-tepuí) had earlier been visited briefly by Captain Felix Cardona. During January and February, 1953, The New York Botanical Garden in conjunction with the American Museum of Natural History visited the east-central slopes of the Massif and the east cumbre of Churi-tepuí (Muru-tepuí). From March to July of the same year, under the same arrangement, the Chicago Natural History Museum expedition collected on the western and southern slopes and cumbres (Abácapa-tepuí, Torono-tepuí, and Apácara-tepuí). The joint expedition in January, February, and March of 1955 explored the slopes and cumbres of the central part of the Massif and adjoining Apácara and Torono-tepuís.

The botanical materials of these three expeditions are being studied jointly by the Chicago Natural History Museum and The New York Botanical Garden, and are to be reported upon under the above title. In addition, materials obtained by The New York Botanical Garden in 1952 from the Gran Sabana, Ptari-tepuí and Sororopán-tepuí, and incidental collections made by Captain Felix Cardona on the Chimantá massif and on Auyán-tepuí are included herein. Geographical notes obtained on the Chimantá expeditions will be published at a later date.

The collected materials of certain families of The New York Botanical Garden field operation to date have been presented in "Botany of the Guayan Highland—Part II." Collaborators who studied the larger body of materials have made occasion also to review the specimens of the same families (viz. Gramineae, Eriocaulaceae, Bromeliaceae, Piperaceae and Annonaceae) for the present article.

By mutual agreement, the Chicago Natural History Museum and The New York Botanical Garden will hold in abeyance the further study and publication of Chimantá collections until the publication of the larger body of Guayana materials will have been completed.

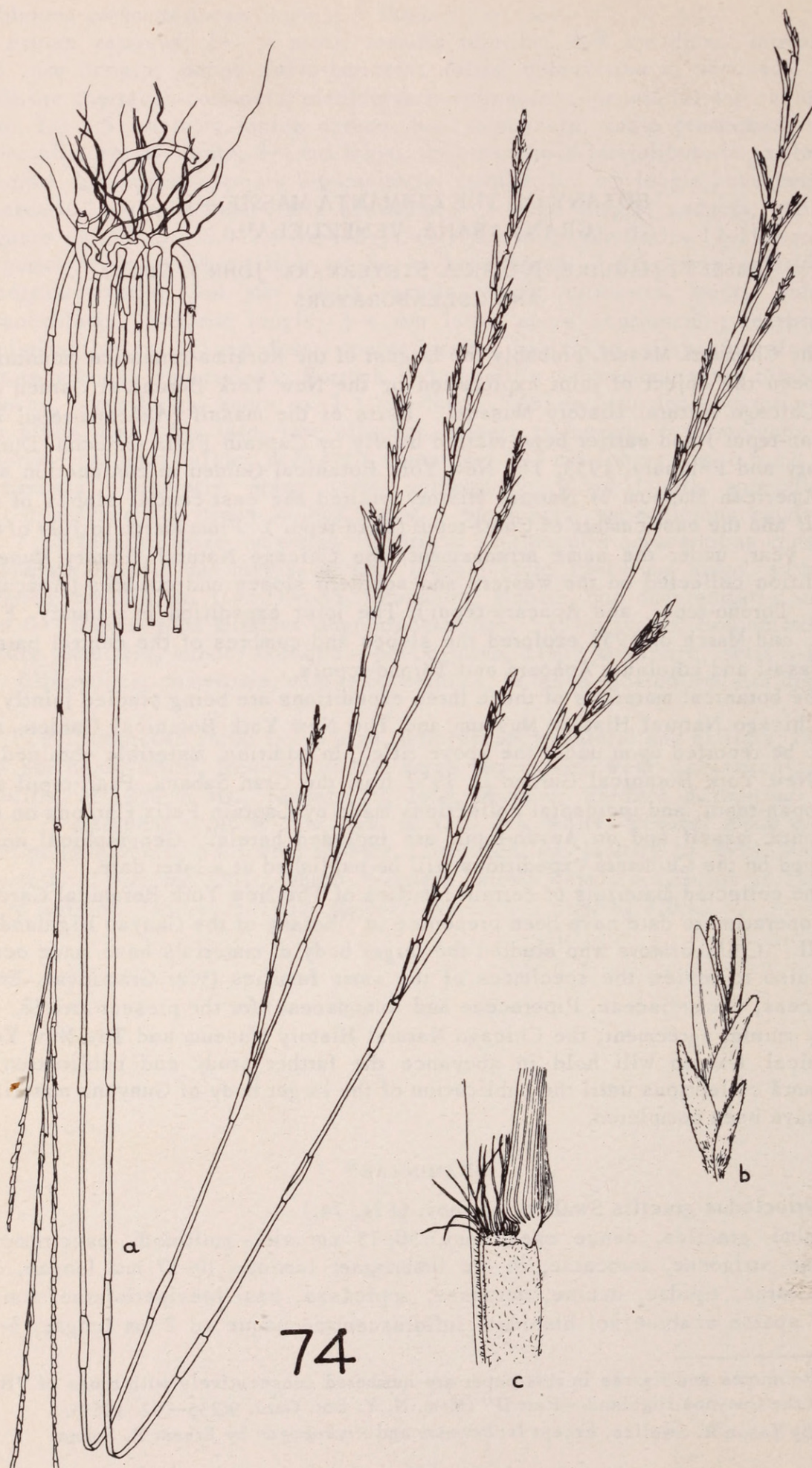
GRAMINEAE²³

1. *Myriocladus gracilis* Swallen, sp. nov. (Fig. 74.)

Culmi graciles, dense caespitosi, 50-75 cm alti, multinodi, pauciramosi; vaginae strigosae, truncatae, in ore fimbriatae; laminae 10-17 mm longae, ca. 2 mm latae, rigidae, acutae, nervosae, appressae, basi brevipetiolatae, marginibus sparse scabrae vel hispidae; inflorescentiae usque ad 2 cm longae, 3-5-

²²Footnotes and figures in this paper are numbered consecutively with those of "Botany of the Guayana Highland—Part II" (Mem. N. Y. Bot. Gard. 9:235-392. 1957).

²³By Jason R. Swallen, except *Ischaemum* and *Andropogon* by Ernest R. Sohns.



spiculatae, axe pedicellisue dense pubescentibus; rachilla pilosa; glumae obtusae, pubescentes, prima 1.5–2.5 mm longa, secunda 2–3 mm longa, plerumque arista crassa ca. 1 mm longa; lemma sterile 4 mm longum, sparse pubescens, ad summum compressum, apice glabrum; lemma fertile 5–5.2 mm longum, lemma sterile simulans, ad summum pubescens; palea lemma aequans vel superans, concava, in parte superiore pubescens, apice angusta, truncata, dense hispidula, carinis hispidociliatis.

Culms densely tufted, without elongate internodes, wiry, erect from a knotty, rhizomatous base, simple or with a few primary branches from some of the upper nodes, the flowering culms 50–75 cm tall, apparently with some shorter sterile culms intermixed; internodes mostly 2–3 cm long; sheaths much shorter than the internodes, becoming crowded and overlapping toward the top of the sterile culms and on the primary branches, persistent, the blades deciduous except the flowering portion, strigose-pubescent, truncate, fimbriate in the throat, the rim somewhat thickened but inconspicuous; blades 10–17 mm long, about 2 mm wide, rigid, appressed, rounded at the base to a short, thick petiole much narrower than the mouth of the sheath, bluntly acute, strongly nerved, the margins rather sparsely appressed scabrous or hispid, otherwise glabrous; inflorescence not more than 2 cm long with 3–5 appressed spikelets, partly enclosed in the sheath, terminal on the primary branches but usually on very short branchlets, the rachis and pedicels densely pubescent; spikelets 2-flowered, the upper rudimentary, the rachilla pilose, the segment between the sterile and fertile lemma 1 mm long, thick, the segment between the fertile lemma and rudiment more slender, 2.5 mm long; glumes usually obtuse, pubescent, the first mostly 2 mm (1.5–2.5) long, the second 2–3 mm long, commonly with a thick awn almost 1 mm long; sterile lemma 4 mm long, sparsely pubescent, somewhat compressed toward the smooth, round, beak-like tip; fertile lemma 5–5.2 mm long, similar to the sterile lemma, pubescent only toward the tip, the beak more prominent; palea as long as or somewhat longer than the lemma, compressed, deeply concave with very broad margins, pubescent in the upper half, the narrow tip truncate, densely hispidulous, the keels conspicuously hispid-ciliate.

TYPE: locally frequent, island in Río Tirica above Middle Falls below Summit Camp, alt. 1925 m, Central Section, Chimantá Massif, Bolívar, Venezuela, February 5, 1955, Julian A. Steyermark & John J. Wurdack 489 (US 2,182,094).

2. *Myriocladus steyermarkii* Swallen, sp. nov. (Mem. N. Y. Bot. Gard. 9:247, f. 3, a.)

Culmi erecti, graciles, ca. 90 cm alti, summo ramosi, in parte 1/3 inferiore 6-nodosi, internodiis 6–11 cm longis et vaginis 1.5–2 cm longis; rami 9–17 cm longi ramulis brevibus appressis; vaginarum pars manifesta ca. 5 mm longa, strigosa, truncata, in ore fimbriata; laminae 9–14 mm longae, 1.5–2 mm latae, appressae, nervosae, brevipetiolatae, marginibus scabrae; inflorescentia usque ad 1.5 cm longa, 3–5-spiculata, axe pedicellisue dense pubescentibus; spiculae 2-florae, superior reducta; glumae acutae vel breviaristatae, pubescentes, ciliatae, prima 1–2.5 mm longa, secunda 2–2.5 mm longa; lemma sterile 3–3.5 mm longum, obtusum, pubescens, ciliatum; lemma fertile 3.8–4.2 mm longum, lemma sterile simulans; palea lemmate sterile longior, inter carinam pubescens, carinis ciliata, apice angusta, truncata.

Explanation of figure 74

FIG. 74. *Myriocladus gracilis* Swallen. a, plant, $\times \frac{1}{2}$; b, spikelet, $\times 5$; c, junction of sheath and blade, $\times 5$. Drawings by LaVerne Helen Richardson.

Culms erect, wiry, about 90 cm high, with numerous slender branches on the upper third, the lower part about 6-noded, the internodes 6-11 cm long, the persistent sheaths 1.5-2 cm long; branches 9-17 cm long, with short appressed branchlets above the middle; exposed portion of sheaths about 5 mm long, strigose-pubescent, truncate, fimbriate in the throat, the rim inconspicuous; ligule about 0.3 mm long; blades 9-14 mm long, 1.5-2 mm wide, appressed, firm, strongly nerved, rounded at the base to a short, thick petiole, the margins appressed-scabrous; panicles not more than 1.5 cm long, just exerted from the sheath, bearing 3-5 short-pedicellate, appressed spikelets, the axis and pedicels densely pubescent; spikelets 2-flowered, the upper floret rudimentary, the rachilla-segment between the sterile lemma and fertile floret 0.5 mm long, glabrous, the segment between the fertile floret and rudiment 1.5 mm long, glabrous, or pubescent toward the top; glumes pubescent, ciliate, often with a stout awn 0.5-1.5 mm long, the first 1-2.5 mm long, the second 2-2.5 mm long, not including the awn; sterile lemma 3-3.5 mm long, obtuse, pubescent, ciliate, the midnerve thickened at the tip; fertile lemma similar to the sterile lemma, 3.8-4.2 mm long; palea distinctly longer than the lemma, pubescent between the keels and on the margins in the upper half, the keels ciliate, the tip narrow, truncate.

TYPE: frequent, rocky escarpment between west and east branches of Río Tirica, alt. 2260 m, Central Section, Chimantá Massif, Bolívar, Venezuela, February 13, 1955, *Julian A. Steyermark & John J. Wurdack* 819 (US 2,182,095).

14. *Myriocladus variabilis* Swallen, sp. nov. (Mem. N. Y. Bot. Gard. 9:248, f. 4, a.)

Culmi rhizomatosi, erecti, graciles, usque ad 3 m alti, summo ramis 2, 55-65 cm longis; vaginae paucae, 5-6 cm longae, suprema longior, glabrae, in ore dense fimbriatae, ligula exteriore tenui, 1 mm longa, erosa vel ciliata; laminae 24-28 cm longae, 4.3-4.8 cm latae, acuminatae, glabrae, petiolatae, marginibus scabrae; culmorum sterilium laminae 28-29 cm longae, 5-6 cm latae, marginibus scaberrimae; panicula 38-50 cm longa, ramis paucifloris patentibus, inferioribus usque ad 10 cm longis ramulis brevibus distantibus divergentibus; superioribus brevibus unifloris; spiculae 1-1.5 cm longae, distantes, appressae vel patentes, pedicellis usque ad 5 mm longis, floribus fertilibus 2-5; glumae variabiles, angustissimae, subattenuatae, vel latae, acutae vel breviaristatae, hispidae, prima 1.5-3 mm longa vel nulla, secunda 2-5.5 mm longa; lemma sterile 3-4.5 mm longum, acutum vel subobtusum, rare mucronatum, summo hispidulum; lemma fertile primum 4.5-5.5 mm longum, subacutum, summo hispidulum; palea quam lemma multo brevior vel longior, abrupte acuta vel anguste truncata, inter carinam sparse pilosa, summo hispidula.

Flowering culms as much as 3 m high, erect from rhizomes, relatively slender, about 4 mm thick near the base, with two small groups of shortened internodes, the upper group bearing two branches; sheaths few, 5-6 cm long, the uppermost longer, glabrous, the rim rather thin, 1 mm long, minutely erose or ciliate, densely fimbriate in the throat, the hairs elongate, tangled; blades 24-28 cm long, 4.3-4.8 cm wide, acuminate, rounded to a thick, petiole-like base about 2 mm long, glabrous, scabrous on the margins; blades of sterile culms 28-29 cm long, 5-6 cm wide, the margins very scabrous; inflorescence 38-50 cm long, open, the lower branches as much as 10 cm long, with short, distant, divergent branchlets, becoming shorter upward, but not crowded, bearing 3 or 4 spikelets, or those at the summit with a single spikelet, the axis and branches densely villous; spikelets 1-1.5 cm long, distant, appressed or stiffly spreading, with 2-5 fertile florets, the pedicels as much as 5 mm long; glumes very variable, very narrow, subattenuate, to rather broad, acute, sometimes with a short awn, hispid at least at the

summit, the first 1.5–3 mm long, occasionally undeveloped, the second 2–5.5 mm long; sterile lemma 3–4.5 mm long, acute or subobtusate, rarely mucronate, the tip hispidulous; fertile lemmas 4.5–5.5 mm long, subacute, more or less hispidulous at the summit; palea much shorter to longer than the lemma, abruptly acute or narrowly truncate, the nerves sometimes minutely excurrent, sparsely pilose between the keels, the tip hispidulous.

TYPE: in recesses of deep fissures, in moist ground with shrubs and small trees, east-central portion of summit of Apácará-tepuí, alt. 2450–2500 m, Chimantá Massif, Bolívar, Venezuela, June 21–22, 1953, *Julian A. Steyermark* 75879 (US 2,182,908).

16. *Myriocladus confertus* Swallen, sp. nov. (Mem. N. Y. Bot. Gard. 9:248, f.4, c.)

Culmi caespitosi, erecti, 65–125 cm alti, glabri, internodiis brevibus et elongatis alternatis, ramosi; vaginae ca. 7 cm longae, ligula exterior minute ciliata 1 mm longa, in ore dense fimbriatae; ligula 1 mm longa, minute erosa vel ciliata; laminae usque ad 15 cm longae, 3.5–4 cm latae, acutae, brevipetiolatae; panicula 40–45 cm longa, ramis numerosis anguste adscendentibus, inferioribus 8–9 cm longis, axe, ramis, pedicellis glabris; spiculae 2–3-florae, suprema reducta; gluma prima angusta, acuta vel subobtusata, 2.0–2.3 mm longa, glabra, vel summo sparse pilosa; gluma secunda et lemma sterile aequalia, 3–3.3 mm longa, gluma acuta, lemma latius, obtusum; lemma fertile primum 4.5–5 mm longum, obtusum, glabrum, lucidum; palea acuta, glabra, lemma aequans vel superans.

Culms in small clumps, erect, 65–125 cm high, glabrous; lowest internodes very short, with short, early deciduous, bladeless sheaths, the next internode elongate, as much as 55 cm long, succeeded by numerous very short internodes, the sheaths crowded, about 7 cm long, the upper somewhat elongate, bearing at the summit a membranaceous, minutely erose rim about 1 mm long, with a dense mass of tangled bristles on the sides extending inward behind the ligule; ligule about 1 mm long, minutely erose or ciliate; blades as much as 15 cm long, mostly 3.5–4 cm wide, acute, gradually narrowed from near the broadly rounded base, this abruptly narrowed to a short, thick petiole; inflorescence 40–45 cm long, the numerous branches narrowly ascending or somewhat spreading, the lower ones somewhat distant, sometimes with short branchlets, 8–9 cm long, becoming shorter and more crowded upward, the axis, branches, and pedicels glabrous; spikelets 2–3-flowered, the upper floret reduced or rudimentary; first glume narrow, acute or subobtusate, 2.0–2.3 mm long, glabrous, sometimes with a few hairs at the tip; second glume and sterile lemma equal, 3–3.3 mm long, the glume similar to the first glume, usually acute, the lemma broader, obtuse; lemma of the first fertile floret 4.5–5 mm long, gradually narrowed to the obtuse tip, usually purple, smooth and shining; palea acute, glabrous, equaling or somewhat exceeding the lemma.

TYPE: west side of Middle Falls of Río Tirica below Summit Camp, alt. 1760 m, Chimantá Massif, Torono-tepuí, Bolívar, Venezuela, March 1, 1955, *Julian A. Steyermark & John J. Wurdack* 1220 (US 2,182,098).

18. *Myriocladus purpureus* Swallen, sp. nov. (Mem. N. Y. Bot. Gard. 9:248, f.4, e.)

Culmi 3–4 m alti, ramis 1–4 fasciculatis; vaginae ca. 7 cm longae, confertae, glabrae, costo crasso, ligula exterior brevissima minute ciliata; ligula crassa, 1–1.5 mm longa; laminae lanceolatae, acutae, 18–20 cm longae, 4–5 cm latae, superiores breviores, glabrae, marginibus scabrae; paniculae 60–75 cm longae, racemis numerosis adscendentibus vel patentibus, inferioribus 3–4 cm longis, superioribus brevioribus, axe, ramis, pedicellis pubescentibus; spiculae appressae, 3–4-florae, suprema reducta; gluma prima angusta, acuta vel sub-

obtusa, 1.5-2 mm longa, summo sparse pilosa; gluma secunda 2.5-3 mm longa, mucronata; lemma sterile 3.5 mm longum, obtusum; lemma fertile 5 mm longum, obtusum, glabrum, summo minute ciliatae, crassum; palea lemma aequans vel superans.

Leafy shoots 1.5 m tall; flowering culms 3-4 m tall, the flowering branches in fascicles of 1-4; sheaths of the branches about 7 cm long, crowded, glabrous, the back thickened, with a very short, minutely ciliate rim at the summit; ligule thick, 1-1.5 mm long; blades lanceolate, acute, 18 cm to more than 20 cm long, 4-5 cm wide, or the uppermost smaller, broadly rounded at the base but not cordate, glabrous, the margins somewhat scabrous; inflorescence 60-75 cm long, the numerous racemes stiffly ascending or spreading, the lower somewhat distant, 3-4 cm long, becoming gradually shorter upward, the tip dense, spikelike, the axis, branches and pedicels pubescent; spikelets appressed, 3-4-flowered, the uppermost floret reduced or rudimentary, first glume narrow, acute or subobtuse, 1.5-2 mm long, with a few hairs at the summit; second glume similar to the first, 2.5-3 mm long, the thick midnerve excurrent in a short mucro; sterile lemma 3.5 mm long, obtuse, the midnerve thickened at the summit, sometimes excurrent, bearing a few short hairs; first fertile floret 5 mm long, the lemma obtuse, glabrous, the tip sometimes minutely ciliate, the midnerve thickened at summit, but not excurrent; palea equalling the lemma or slightly exceeding it.

TYPE: summit, at edge of escarpment in and among zanjones, alt. 2165-2180 m, Chimantá Massif, Torono-tepuí, Bolívar, Venezuela, February 9, 1955, *Julian A. Steyermark & John J. Wurdack* 658 (US 2,182,096).

19. *Myriocladus wurdackii* Swallen, sp. nov. (Mem. N. Y. Bot. Gard. 9:248, f.4, f.)

Culmi usque ad 4 m alti, summo ramis 2-3, 100-110 cm longis; vaginarum pars manifesta 1-2 cm longa, glabra, subtruncata, in ore fimbriata; laminae 15-20 cm longae, 2.7-4.7 cm latae, acuminatae, basi 4 mm latae, glabrae, marginibus plus minusve scabrae; inflorescentia 30-38 cm longa, 5-6 cm lata, multiramosa, axe hirsuto; rami divergentes, hirsuti, inferiores ramulis brevibus patentibus; spiculae flosculis fertilibus 1 vel 2, distantibus; rachilla gracilis, glabra, inter lemma sterile et lemma fertile 1.5 mm longa; gluma prima 2-2.5 mm longa, angusta, acuta vel subobtusa, in parte superior hispidula; gluma secunda latior, 3-3.5 mm longa; lemma sterile 3.5-4 mm longum, obtusum, apice hispidulum; flosculi primi lemma 4-4.5 mm longum, lemma sterile simulans; palea lemma 1 mm superans, apice angusta, hispidula, carinis plus minusve scabris vel ciliatis.

Culms as much as 4 m high, with two or three flowering branches at the summit, these 100-110 cm long; exposed portion of the sheaths about 1-2 cm long, or the upper somewhat elongate, glabrous, the rim relatively thin, about 0.5 mm long, glabrous or minutely ciliate, the throat somewhat rounded, fimbriate; blades 15-20 cm long, 2.7-4.7 cm wide or the uppermost smaller, acuminate, gradually rounded to the base, this about 4 mm wide, scarcely petiolate, much narrower than the mouth of the sheath, glabrous on both surfaces, the margins more or less scabrous; inflorescence 30-38 cm long, 5-6 cm wide, the numerous branches stiffly spreading, at least the lower ones with short divergent branchlets in the lower half, the main axis and branches hirsute; spikelets with 1 or 2 fertile florets and a rudiment, the florets distant, the rachilla slender, glabrous, the segment above the sterile lemma 1.5 mm long, the segment above the first fertile floret 2 mm long, the segment above the second fertile floret 2.5 mm long; first glume 2-2.5 mm long, narrow, acute or subobtuse, the tip and the upper part of the midnerve and the margins hispidulous; second glume 3-3.5 mm long, similar to the first but broader; sterile lemma 3.5-4 mm long, obtuse, the tip hispidulous,

the midnerve thickened above, sometimes very shortly excurrent; lemma of first fertile floret 4-4.5 mm long, similar to the sterile lemma; palea about 1 mm longer than the lemma, the narrow tip hispidulous, the keels more or less scabrous or ciliate.

TYPE: locally frequent in lower part of lower cumbre, alt. 2100-2200 m, north-west cumbres, Churi-tepuí (Muru-tepuí), Bolívar, Venezuela, January 24, 1953, John J. Wurdack 34194 (US 2,116,114).

Neurolepis glomerata Swallen, sp. nov.

Panicula 80 cm longa, anguste pyramidata, basi 20 cm lata, ramis crassis patentibus vel adscendentibus, inferioribus ramulis brevibus, patentibus, densifloris; spiculae glomeratae, 5.5-6.3 mm longae, brevissime pedicellatae; glumae latae, acuate vel obtusae, prima, 1.3-1.6 mm longa, secunda 2-2.3 mm longa; lammata sterilia obtusa, minute ciliata, primum ca. 2.6 mm longum, secundum 3.6-4 mm longum; lemma fertile acutum vel mucronatum, acre.

Panicle more than 80 cm long, narrowly pyramidal, at least 20 cm wide at the base, the coarse branches spreading or widely ascending with a very large pulvinus at the base, the lower branches with short, spreading, very densely flowered, somewhat distant branchlets, the very short secondary branchlets subtended by glume-like bracts; spikelets 5.5-6.3 mm long, very short-pedicellate; glumes broad, acute or obtuse, the first 1.3-1.6 mm long, the second 2-2.3 mm long; sterile lemmas obtuse, the tip minutely ciliate, the first about 2.6 mm long, the second 3.6-4 mm long; fertile lemma acute or mucronate, sharp-pointed; palea about as long as the lemma, blunt, not keeled.

TYPE: common type; inflorescence often leafless, straight; stem 20-25 feet tall; *Bonnetia* forest, northwestern part of summit of Abácapa-tepuí, alt. 2125-2300 m, Chimantá Massif, Bolívar, Venezuela, April 13, 1953, Julian A. Steyermark 74925 (in part; US 2,182,879). Steyermark 74925 is a mixture; the inflorescence is *Neurolepis* but the vegetative sheets are *Myriocladus*. Steyermark 74926 is entirely *Neurolepis*, but all the spikelets have fallen from the panicle. It is obviously, however, the same as described above. The vegetative parts are as follows:

Base hard, woody, about 8 mm thick, about 50 cm long, consisting of about 12 shortened internodes, the leaves fallen, with occasional prop roots; sheaths smooth and shining, the back much thickened toward the summit, somewhat auriculate, the auricles fimbriate; ligule about 8 mm long, the membrane behind it about 2 cm long; blades deciduous, 1.5 m long or probably longer, 4-5 cm wide, more or less scabrous on the margins, attenuate-pointed, attenuate toward the base to a hard, sulcate petiole about 10 cm long.

Neurolepis densiflora Swallen, sp. nov.

Culmi usque ad 9 m alti; vaginae ca. 30 cm longae, subauriculatae, in ore fimbriatae; panicula 85 cm longa, ca. 12 cm lata, attenuata, ramis rigide adscendentibus, basi nudis, ramulis brevibus appressis; spiculae 6-6.5 mm longae, brevissime pedicellatae, appressae; glumae et lemmata sterilia acuta vel sub-obtusa, interdum apiculata; gluma prima 1-1.2 mm longa; gluma secunda 1.5-2 mm longa; lemma sterile primum 2.4-3 mm longum; lemma sterile secundum 3.5-3.8 mm longum; lemma fertile mucronatum, mucrone 0.5-0.8 mm longo.

Vegetative specimen consists of a fascicle of lower sheaths (blades fallen) and a portion of the culm above it; culm 1 cm thick with relatively thin walls; sheaths about 30 cm long, the back thick and hard, the margins very thin, scarcely auriculate, fimbriate in the throat; panicle 85 cm long, about 12 cm wide at the

widest part, tapering, the relatively coarse branches stiffly ascending or the upper ones spreading, densely flowered, naked for a short distance at the base, with short appressed branchlets; spikelets 6-6.5 mm long, very short-pedicellate, appressed; glumes and sterile lemmas acute or subobtusate, sometimes apiculate; first glume 1-1.2 mm long; second glume 1.5-2 mm long; first sterile lemma 2.4-3 mm long; second sterile lemma 3.5-3.8 mm long; fertile lemma mucronate, the point 0.5-0.8 mm long; palea as long as the body of the lemma, not keeled.

TYPE: common in openings, flowering culms up to 30 feet high, lower mixed *Bonnetia* forest above southeast-facing upper shoulder on slope leading to summit of Apácará-tepuí, alt. 2000-2150 m, Chimantá Massif, Bolívar, Venezuela, June 20, 1953, *Julian A. Steyermark* 75806 (US 2,182,907, 2,182,910).

This species is closely related to *N. angusta*, differing in having smaller spikelets, branches naked at the base, and more open panicles, the axis densely hirsute.

Neurolepis nigra Swallen, sp. nov.

Culmi erecti usque ad 10 m alti foliis ad basin confertis; vaginae plus minusve auriculatae efimbriatae, inferiores ca. 20 cm longae marginibus tenuibus, culmorum vaginae elongatae solutae; ligula 5-10 mm longa; laminae 85-100 cm longae, 4 cm latae, acuminatae, marginibus scabrae, inferiores ad basin attenuatae petiolo ca. 10 cm longo, deciduae, culmorum laminae ad basin attenuatae, epetiolatae, persistentes; panícula ca. 1 m longa, 4 cm lata, densa, interrupta, ramis densifloris adscendentibus vel patentibus, usque ad 3 cm longis; spiculae 5-6 mm longae, brevipedicellatae; glumae et lemmata sterilia obtusa summo minute pubescentia; gluma prima 1.1-1.3 mm longa; gluma secunda 1.8-2 mm longa; lemma sterile primum 2.2-2.8 mm longum; lemma sterile secundum 3.2-4 mm longum; lemma fertile 4.8-5.8 mm longum, acutum, glabrum, nigrum, laeve, lucidum.

Coarse perennial, the leaves densely crowded at the base in a fan-shaped cluster, the upper part of the culm naked; culms erect, as much as 10 m high, hollow with thin walls; sheaths somewhat auriculate, not fimbriate, the basal ones about 20 cm long, much thickened and rounded on the back with thin margins, the upper culm sheaths elongate, loose, scarcely thickened; ligule 5-10 mm long, with a fibrous membrane behind it and extending beyond it; blades 85 cm to more than 1 m long, about 4 cm wide, acuminate, the margins scabrous, the lower ones deciduous, attenuate to a thick, hard petiole-like base about 10 cm long, sulcate above, the upper ones attenuate but without a petiole-like base, apparently persistent; panicle about 1 m long, 4 cm wide, dense, attenuate, interrupted below, the very densely flowered branches ascending to spreading, not more than 3 cm long, usually less; spikelets 5-6 (mostly 6) mm long, short-pedicellate; glumes and sterile lemmas obtuse, minutely pubescent at the summit; first glume 1.1-1.3 mm long; second glume 1.8-2 mm long; first sterile lemma 2.2-2.8 mm long; second sterile lemma 3.2-4 mm long; fertile lemma 4.8-5.8 mm long, acute, glabrous, black, smooth and shining; palea a little shorter than the lemma, subobtusate, not keeled, apparently 3-nerved.

TYPE: locally frequent, open forested laterite slopes along tributary of east branch of headwaters of Río Tirica, alt. 2185-2210 m, Chimantá Massif, Central Section, Bolívar, Venezuela, February 13, 1955, *Julian A. Steyermark & John J. Wurdack* 860 (US 2,182,130, 2,182,131, 2,182,132).

Panicum tiricaense Swallen, sp. nov.

Perenne; culmi erecti, 20-35 cm alti, papilloso-pilosi vel glabri, nodis barbatis,

ad nodos intermedios ramosi; vaginae internodia aequantes, pilosae vel papilloso-pilosae in collo pubescentes marginibus ciliatae; ligula ciliata 2 mm longa; laminae 4-6.5 cm longae, 5-9 mm latae, acutae, subcordatae, dense pilosae; paniculae 3-7 cm longae, 1.5-3.5 cm latae, ramis solitariis adscendentibus vel patentibus axe pilosae; spiculae 2-2.2 mm longae, purpureae, sparse pubescentes vel pilosae; gluma prima 1.5-1.6 mm longa, acuta, 1-nervia; gluma secunda et lemma sterile tenuia fructu paulo longiora, gluma obtusa, lemma subobtusum; fructus 1.8 mm longus, ellipticus, subacutus, striatus, glabrus, lucidus.

Perennial; culms erect, 20-35 cm high, branching at the middle nodes, papillose-pilose to glabrous, the nodes bearded; sheaths mostly about as long as the internodes, pilose or papillose-pilose, pubescent on the collar, the margins ciliate; ligule a rim of hairs about 2 mm long; blades 4-6.5 cm long, 5-9 mm wide, acute, rounded and somewhat cordate at the base, softly and rather densely pilose on the lower surface, sparsely pilose above but the hairs longer, somewhat ciliate at the base; panicles 3-7 cm long, 1.5-3.5 cm wide, the solitary branches stiffly ascending to spreading, branching at or near the base, the axis and branches pilose; spikelets 2-2.2 mm long, tinged with purple, sparsely pubescent or pilose; first glume 1.5-1.6 mm long, 1-nerved, usually acute; second glume and sterile lemma thin, slightly longer than the fruit, the glume obtuse, the lemma subobtusum with a palea but apparently without a staminate flower; fruit 1.8 mm long, elliptic, blunt, striate, smooth and shining.

TYPE: locally frequent at base of Upper Falls of Río Tirica above Summit Camp, alt. 1940-1950 m, Central Section, Chimantá Massif, Bolívar, Venezuela, February 7, 1955, *Julian A. Steyermark & John J. Wurdack* 535 (US 2,182,126).

This species is closely allied to *Panicum albociliatum* Swallen, which differs in having larger, glabrous spikelets, and shorter, ovate, glabrous, ciliate blades.

***Panicum tiricaoides* Swallen, sp. nov.**

Perenne; culmi erecti vel adscendentes basi decumbentes, ramosi, ca. 80 cm longi nodis pubescentibus; vaginae sparse pilosae vel papilloso-pilosae in collo dense pubescentes; ligula ciliata, 2-3 mm longa; laminae usque ad 8 cm longae, 10 mm latae, in ramis multo breviores, subtus dense pubescentes, supra sparse pilosae vel subglabrae; paniculae 8 cm longae, 6 cm latae, ramorum parviores; spiculae 2.4-2.5 mm longae, acutae, glabrae; gluma prima 1.5-1.7 mm longa, acuta, 3-nerviis; gluma secunda et lemma sterile aequalia fructum aequantia; fructus 2.3 mm longus, summo compressus scabrus.

Perennial; culms erect or ascending from a decumbent base, about 80 cm long, branching, the nodes pubescent or nearly glabrous; sheaths sparsely pilose or papillose-pilose, densely pubescent on the collar; ligule a short ciliate membrane 2-3 mm long; blades as much as 8 cm long, 10 mm wide, much smaller on the branches, softly and densely pubescent on the lower surface, sparsely pilose or nearly glabrous above; panicle 8 cm long, 6 cm wide, smaller on the branches; spikelets 2.4-2.5 mm long, acute, glabrous; first glume 1.5-1.7 mm long, acute, 3-nerved; second glume and sterile lemma equal, about as long as the fruit; fruit 2.3 mm long, scabrous at the summit, the tip laterally compressed.

TYPE: frequent, thickets along Río Tirica, below Summit Camp, alt. 1925 m, Central Section, Chimantá Massif, Bolívar, Venezuela, February 5, 1955, *Julian A. Steyermark & John J. Wurdack* 475 (US 2,182,124).

***Panicum wurdackii* Swallen, sp. nov.**

Perenne; culmi erecti basi decumbentes 110 cm alti, glabri; folia inferiora conferta laminis 8-12 mm latis curvatis; culmorum vaginae elongatae internodiis multo breviores; laminae erectae, 25-30 cm longae, 7-8 mm latae, superiores

breviores, supra ad basin dense pilosae marginibus scaberrimae; panícula pyramidata, 14 cm longa, 12 mm lata, ramis adscendentibus ramulis divergentibus, superne paucifloris; spiculae 3.2-3.4 mm longae; gluma prima lata, acuta, spicula ca. $\frac{1}{2}$ brevior carina scabra; gluma secunda et lemma sterile aequalia fructum superantia, glabra vel ad summum scabra; fructus 2.6-2.7 mm longus, laevis, flavidus.

Perennial; culms stiffly erect from a decumbent, rhizome-like base, 110 cm high, glabrous; basal leaves crowded, the blades 8-12 mm wide, becoming loosely curled; sheaths of the culm leaves elongate but much shorter than the internodes; ligule wanting; blades very firm, erect, gray-green. 25-30 cm long, 7-8 mm wide, the upper smaller, densely pilose on the upper surface toward the base, the margins very scabrous; panicle pyramidal, 14 cm long, about 12 mm wide, the branches stiffly ascending, the divergent branchlets bearing a few spikelets above the middle; spikelets 3.2-3.4 mm long; first glume broad, acute, a little more than half as long as the spikelet, the midnerve prominent, scabrous; second glume and sterile lemma equal, pointed beyond the fruit, glabrous, or scabrous on the midnerve toward the summit; fruit 2.6-2.7 mm long, smooth, straw-colored.

TYPE: locally frequent, scrub forest near Summit Camp, Central Section, Chimantá Massif, alt. 1925 m, Bolívar, Venezuela, February 2, 1955 *Julian A. Steyermark & John J. Wurdack* 351 (US 2,182,119).

***Panicum steyermarkii* Swallen, sp. nov.**

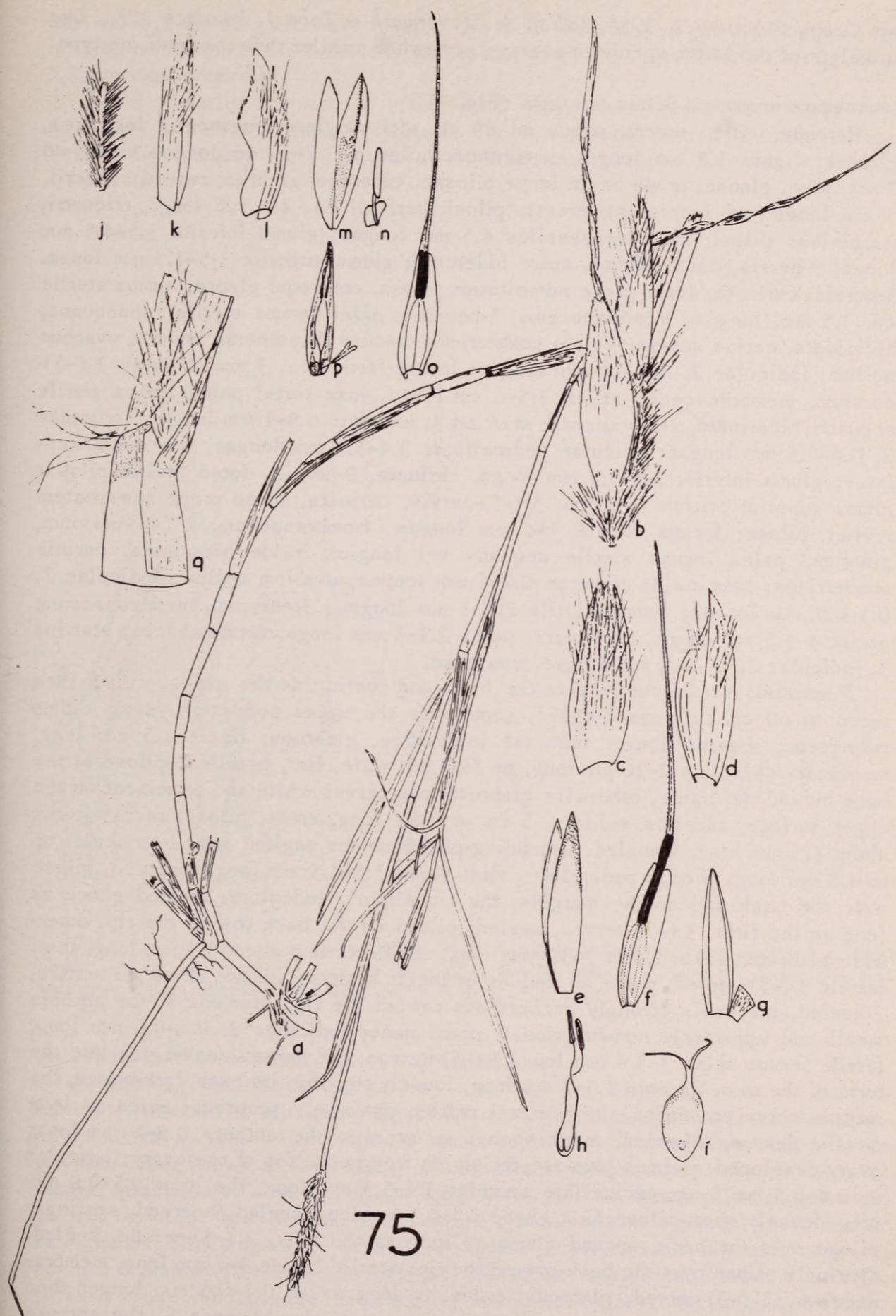
Perenne; culmi erecti basi decumbentes, ca. 60 cm alti; folia ad basin conferta; vaginae solutae, glabrae, basi sparse pilosae; laminae erectae, subattenuatae, planae, 20-25 cm longae, 5 mm latae, glabrae; culmorum folia 2, elaminata, supremum basin paniculae attingens; paniculae 7-8 cm longae ramis paucis adscendentibus inferioribus usque ad 5 cm longis; spiculae 3.6-4.0 mm longae pedicellis appressis, lateralibus spicula multo brevioribus; gluma prima acuta, spicula ca. $\frac{1}{2}$ brevior; gluma secunda et lemma sterile fructu longiora, gluma lemmate sterili paulo brevior; fructus acuminatus, 3 mm longus.

Perennial; culms erect from a somewhat decumbent base, about 60 cm high; leaves mostly crowded toward the base, the sheaths loose, glabrous except for a few hairs at the base, the blades erect, subattenuate, flat or becoming loosely rolled, about 20-25 cm long, about 5 mm wide, entirely glabrous; culm leaves 2, the uppermost sheath reaching the base of the panicle, bladeless; panicles 7-8 cm long, the few branches stiffly ascending, the lower ones as much as 5 cm long; spikelets 3.6-4.0 mm long, glabrous, the pedicels appressed, rather stout, the lateral ones usually much shorter than the spikelet; first glume acute, a little more than half as long as the spikelet; second glume and sterile lemma pointed beyond the fruit, the glume a little shorter than the lemma; fruit acuminate, 3 mm long.

TYPE: frequent along banks of Caño Mojado, east of north escarpment, below upper falls of Caño Mojado, alt. 1895-1910 m, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, February 20, 1955, *Julian A. Steyermark & John J. Wurdack* 954 (US 2,182,133). Also collected along river banks in a scrub forest near Sum-

Explanation of figure 75

FIG. 75. *Ischaemum arenosum* Sohns. *a*, plant; *b*, pair of spikelets; *c*, first glume; *d*, second glume; *e*, lemma and palea of lower floret; *f*, fertile lemma; *g*, palea and one lodicule; *h*, stamens (only two shown); *i*, caryopsis; *j*, pedicel; *k*, first glume; *l*, second glume; *m*, lemma and palea of lower floret; *n*, stamen and lodicule; *o*, fertile lemma; *p*, palea and essential organs; *q*, ligule, sheath, and blade. *j-p* from the pedicellate spikelet. *a* $\times \frac{1}{2}$; *b-p*, $\times 8$; *q*, $\times 5$ (type).



mit Camp, February 2, 1955, *Julian A. Steyermark & John J. Wurdack* 327. The spikelets of the latter specimen average somewhat smaller than those of the type.

Ischaemum arenosum Sohns, sp. nov. (Fig. 75.)

Perenne; culmi erecti, usque ad 60 cm alti; vaginae internodiis longiores, glabrae; ligula 1.5 mm longa, membranacea; laminae 2-10 cm longae usque ad 7 mm latae, planae, prope basin longe pilosae, ceteroqui glabrae; racemi solitarii, 5 cm longi (vel longiores), erecti, pilosi; articuli ca. 4.5 mm longi, triquetri, marginibus pilosi; spiculae sessiles 4.5 mm longae; gluma inferior 3.5-4.5 mm longa, 9-nervia, dorso pilosa, apice bidentata; gluma superior 3.5-4.5 mm longa, 3-nervia, carinata, dorso prope summitatem pilosa, ceteroqui glabra; lemma sterile ca. 3.5 mm. longum, membranaceum, 3-nervium; palea lemma sterile subaequans, bicarinata, carina superne valide scaberrima; stamina 3; antherae breves; ovarium nullum; lodiculae 2, 0.4-0.6 mm longae; lemma fertile ca. 3 mm. longum, 3 (-5)-nervium, membranaceum; arista 3.5-6 cm longa, laxa torta; palea lemma fertile aequans, bicarinata, membranacea; stamina 3; antherae 0.8-1 mm longae; lodiculae 2, 0.4-0.5 mm longae; spiculae pedicellatae 3.4-5.5 mm longae, breviter articulatatae; gluma inferior 3.4-5.5 mm longa, carinata, 9-nervia, dorso leviter pilosa; gluma superior primam aequans, 3 (-5)-nervis, carinata, dorso prope summitatem leviter pilosa; lemma sterile 3-4 mm longum, membranaceum, 1 (-3)-nervium, glabrum; palea lemma sterile aequans vel longior, valde bicarinata, carinis scaberrimis; stamina 3; antherae 0.9-1 mm longae; ovarium nullum; lodiculae 2, 0.3-0.5 mm longae; lemma fertile 2.5-3 mm longum, 3-nervium, membranaceum; arista 4-5.5 mm longa, laxa torta; palea 2.1-3 mm longa, membranacea; stamina 3; lodiculae 2, ca. 0.8 mm longae, truncatae.

Perennial; semidecumbent at the base and rooting at the nodes, culms then erect to 60 cm tall, many-noded, sometimes the upper nodes of young culms pubescent; sheaths longer than the internodes, glabrous; ligule 1.5 mm long, membranous; blades 2-10 cm long, up to 7 mm wide, flat, papillose-pilose at the base behind the ligule, otherwise glabrous, the nerves white and prominent on the upper surface; racemes solitary, 5 cm or more long, erect, pilose; rachis joints about 4.5 mm long, 3-angled, ascending-pilose on the angles; sessile spikelet up to 4.8 mm long, shortly pedicellate; first glume 3.5-4.5 mm long, 9-nerved, pilose over the back and on the margins, the tip slightly bidentate; second glume as long as the first, 3 (-5)-nerved, keeled, pilose on the back toward the tip, otherwise glabrous; lower floret 3-3.5 mm long; sterile lemma about 3.5 mm long, thin, faintly 3 (-5)-nerved; palea as long as or longer than the lemma, firmer in texture, 2-keeled, the keels strongly scaberulous toward the tip; stamens 3, the anthers small and apparently non-functional; pistil none; lodicules 2, 0.4-0.6 mm long; fertile lemma about 3-3.4 mm long, 3 (-5)-nerved, the nerves converging into the base of the awn, the awn 3.5-6 mm long, loosely twisted, its base dark-brown, the median nerve prominent, the terminal portion antrorsely scabrous; palea as long as the lemma, 2-keeled, membranous; stamens 3, the anthers 0.8-1 mm long; ovary developed, stigmas plumose, the styles free to the top of the ovary; lodicules 2, 0.4-0.5 mm long; pedicellate spikelet 3.4-5.5 mm long, the joint 0.5-0.8 mm long, densely short-pilose; first glume 3.4-5.5 mm long, keeled, 9-nerved, sparingly pilose over the back; second glume as long as the first, 3 (-5)-nerved, keeled, sparingly pilose over the back toward the tip; sterile lemma 3-4 mm long, membranaceous, 1 (-3)-nerved, glabrous; palea as long as or 0.1-0.5 mm longer than the lemma, firmer, 2-keeled, scaberulous on the keels; stamens 3, the anthers 0.9-1 mm long; ovary 0; lodicules 2, 0.3-0.5 mm long; fertile lemma 2.5-3 mm long, 3-nerved, the nerves converging into the base of the awn, membranaceous;

awn 4.0–5.5 mm long, loosely twisted, its base dark brown; palea as long as the lemma, membranaceous, 2-keeled; stamens 3; ovary developed; lodicules 2, about 0.8 mm long, truncate.

TYPE: locally frequent in moist sand along river, along Río Tirica (Río Aparurén) just above Techiné-merú, alt. 470 m, Chimantá Massif, Estado Bolívar, Venezuela, January 16, 1955, *Julian A. Steyermark & John J. Wurdack* 122 (US 2,182,116).

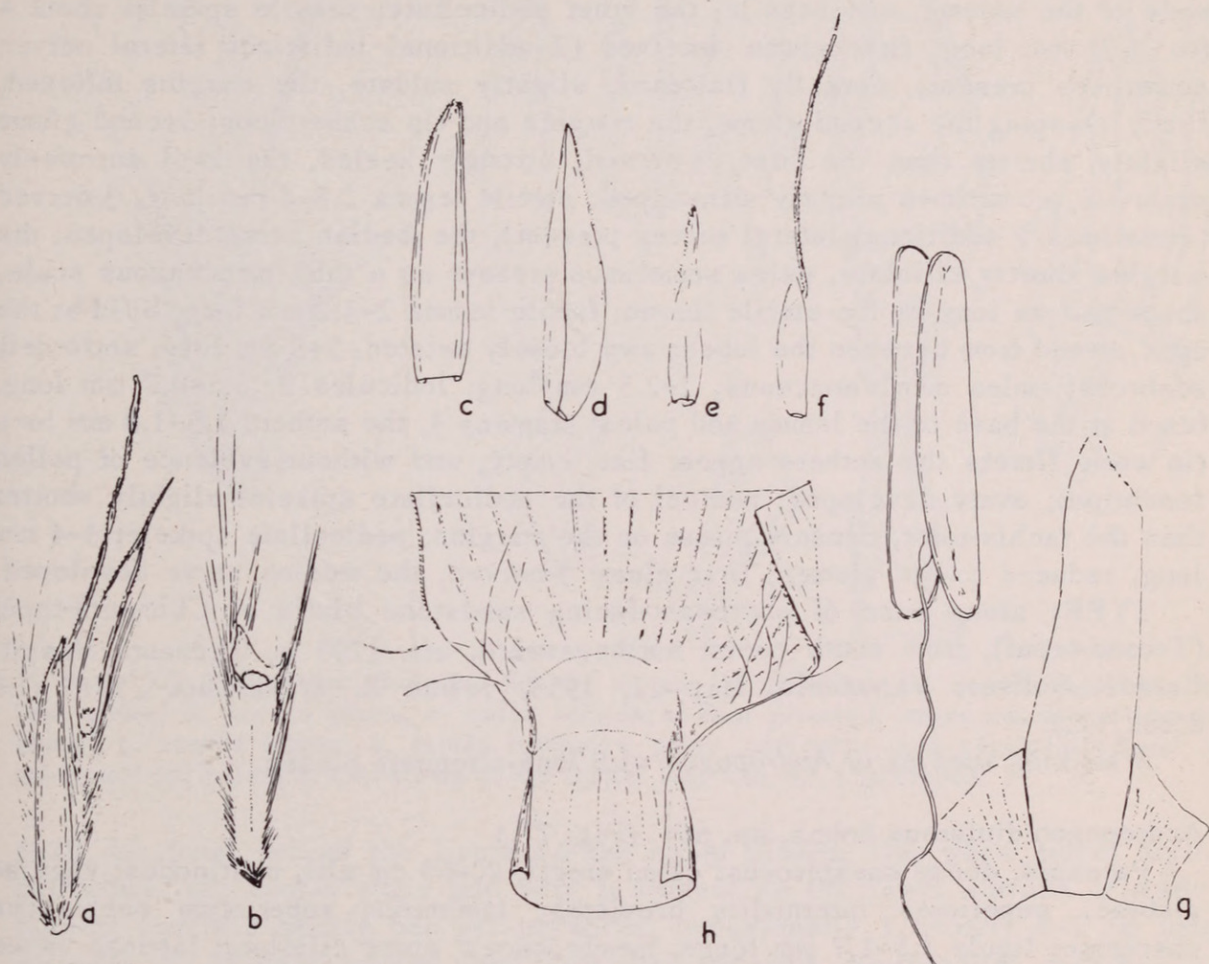


FIG. 76. *Andropogon crassus* Sohns. *a*, pair of spikelets; *b*, rachis-joints; *c*, first glume; *d*, second glume; *e*, sterile lemma; *f*, fertile lemma; *g*, stamen, lodicules, and palea; *h*, ligule, sheath, and blade. *a-f*, *b*, $\times 8$; *g*, $\times 20$ (type).

Andropogon crassus Sohns, sp. nov. (Fig. 76.)

Perennis; culmi erecti, graciles, 1 m alti vel altiores; vaginae glabrae, inferiores internodiis breviores; ligula 1.5 mm longa; laminae lanceolato-lineares, 45 cm longae, usque ad 2 cm latae, omnes glabrae vel supra basin versus longe pilosae, marginibus scaberrimae; inflorescentia multispatha, racemis 1–4 cm longis, gracillimis, articulis 3 mm longis, marginibus dense pilosis, ceteroqui glabris; spiculae sessiles ca. 4 mm longae; gluma inferior 4-nervia, dorso leviter sulcata, marginibus apiceque scaberrimae; gluma superior 3-nervia, valde carinata, scabra; lemma sterile 2.8–4 mm longum, 3-nervium, marginibus leviter ciliolatis; palea lemmate subduplo brevior, enervia; lemma fertile 2–3.2 mm longum, bifidum; arista laxa torta, 5–8 mm longa, scaberrima; palea 2–2.5 mm longa, membranacea, enervia; lodiculae 2, 0.5–0.7 mm longae; stamina 3; antherae 1.5–1.8 mm longae; spiculae pedicellatae 3–4 mm longae; anthoecia nulla.

Perennial; erect, one or more m tall, the nodes glabrous; sheaths glabrous, the lower shorter than the internodes, the upper longer; ligule a membranous rim, 1.5 mm long; blades long-attenuate, up to 45 cm long, to 2 cm wide, glabrous on both surfaces, sparingly long-pilose on the upper surface at the base back of the ligule, the margins antrorsely scabrous; inflorescence of numerous spatheate racemes, a single raceme terminating each peduncle; racemes 1-4 cm long, mostly enclosed by the spathes; rachis-joints mostly 3 (3.2) mm long, densely pilose on the margins, the ad- and abaxial faces glabrous; spikelets 2 at each node of the raceme, one sessile, the other pedicellate; sessile spikelet about 4 (to 4.2) mm long; first glume 4-nerved (2 additional indistinct lateral nerves sometimes present), dorsally flattened, slightly sulcate, the margins inflexed, firmly clasping the second glume, the margins and tip scaberulous; second glume slightly shorter than the first, 3-nerved, strongly keeled, the keel antrorsely scabrous, sometimes slightly awn-tipped; sterile lemma 2.8-4 mm long, 3-nerved (sometimes 2 additional lateral nerves present), the median nerve developed, the margins shortly ciliolate; palea sometimes present as a thin, membranous scale, about half as long as the sterile lemma; fertile lemma 2-3.2 mm long, bifid at the apex, awned from between the lobes; awn loosely twisted, 5-8 mm long, antrorsely scabrous; palea membranaceous, 2-2.5 mm long; lodicules 2, 0.5-0.7 mm long, fused at the base to the lemma and palea; stamens 3, the anthers 1.5-1.8 mm long (in some florets the anthers appear flat, empty, and without evidence of pollen formation); ovary developed; pedicel of the pedicellate spikelet slightly shorter than the rachis-joint, densely pilose on the margins; pedicellate spikelet 3-4 mm long, reduced to the glumes; first glume 5-nerved, the median nerve developed.

TYPE: along base of southeast-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí), from south corner northeastward, alt. 1700 m, Chimantá Massif, Estado Bolívar, Venezuela, May 21, 1953, Julian A. Steyermark 75515 (US 2,182,901).

A striking species of *Andropogon* with long-attenuate blades.

Andropogon diuturnus Sohns, sp. nov. (Fig. 77.)

Perennis, dense caespitosus; culmi erecti, 20-65 cm alti, multinodes; vaginae glabrae, superiores internodiis breviores; laminarum superiorum saepissime obsoletae; ligula 1.5-1.7 mm longa, membranacea, apice ciliolata; laminae usque ad 15 cm longae, usque ad 5 mm latae, omnes glabrae vel leviter scaberrimae, prope basin saepius pilosae, subtus costa media alba; racemi solitarii, interdum bini, plerumque 4-5 cm longi, recti vel leviter flexuosi, dense albo-pilosi; articuli dense longeque pilosi; spiculae sessiles 4.1-6 mm longae (plerumque 5.2 mm); gluma inferior plana, longitudine sulcata, glabra, summitatem versus scabra, saepe bidentata; gluma superior primam aequans, valde carinata, 3-nervia, apice scaberrima; lemma sterile 0.9-1.5 mm longum, membranaceum, marginibus ciliolatum; lemma fertile membranaceum, 3-nervium, apice bifidum; arista 7.5-14 mm longa, scabra; palea 1-2 mm longa, enervia, saepe fissa; lodiculae 2, 0.5-0.7 mm longae, truncatae; stamina 3; antherae 1-1.5 mm longae; pedicellus spiculam sessilem subaequans, marginibus dense longeque pilosus; spiculae pedicellatae 1.1-4.3 mm longae; anthoecia nulla.

Perennial, densely tufted; culms erect, 20-65 cm tall; nodes several, the lower internodes short; sheaths glabrous, longer than the lower internodes, shorter than the upper; ligule a membranous rim, the tip ciliolate, 1.5-1.7 mm long, the margins of the sheath auriculate; blades mostly evenly distributed along the culm, progressively shorter upward, 0.1-15 cm long, 0.5-5 mm wide, glabrous or slightly scaberulous on both surfaces, occasionally with a few hairs,

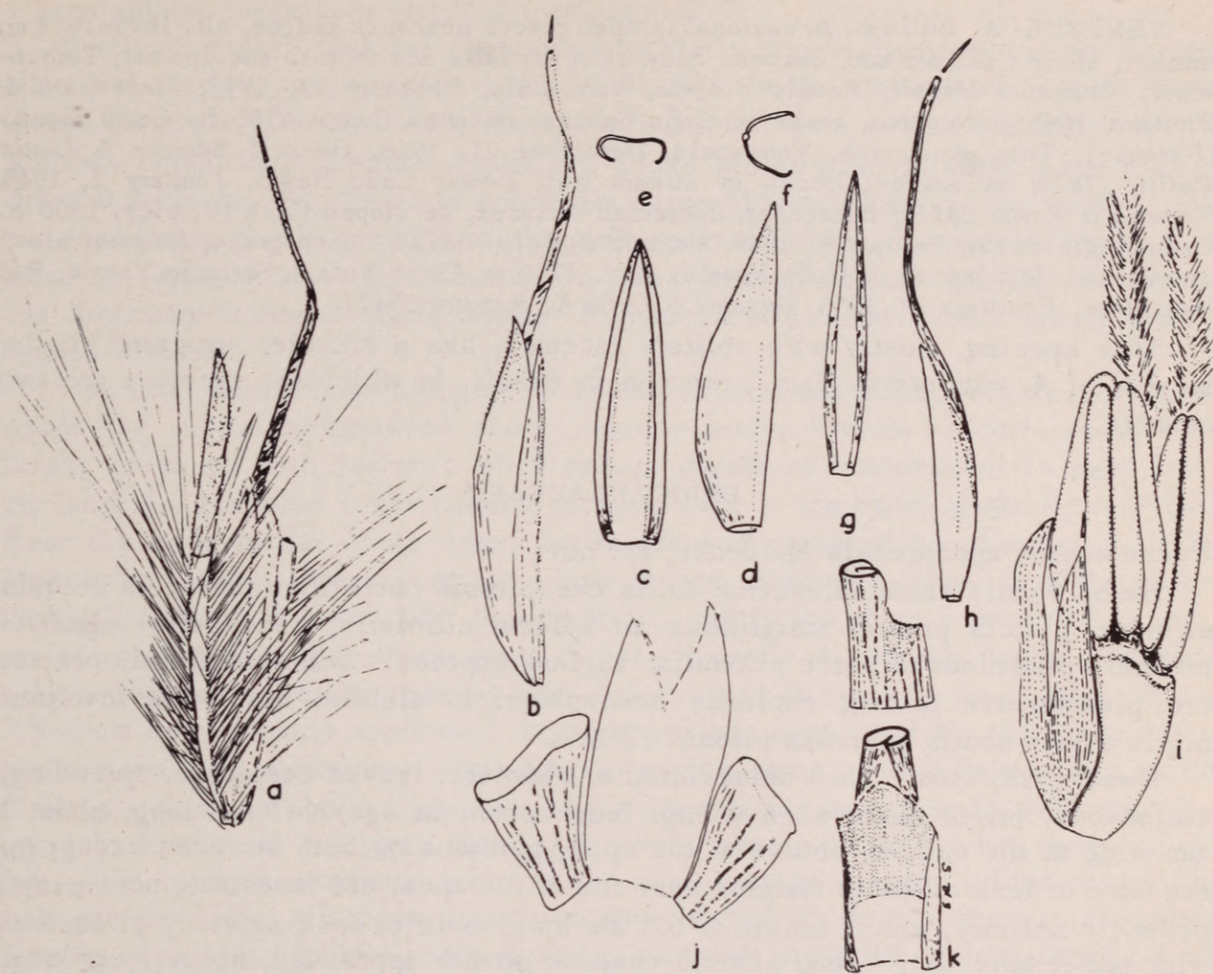


FIG. 77. *Andropogon diuturnus* Sohns. *a*, pair of spikelets; *b*, sessile spikelet; *c*, first glume; *d*, second glume, *e*, cross section of first glume; *f*, cross section of second glume; *g*, sterile lemma; *h*, fertile lemma; *i*, palea, lodicules, and essential organs; *j*, palea and lodicules; *k*, two views of the ligule. *a-h*, $\times 8$; *i-j*, $\times 20$ (type).

8-10 mm long, behind the ligule on the basal blades, flat when green, drying convolute, the midrib white and very prominent on the lower surface of mature blades; racemes mostly one per peduncle, occasionally 2, mostly 4-5 cm long, straight or slightly curved (not flexuous), densely white-hairy; rachis-joints densely long-pilose from base to apex; sessile spikelet 4.1-6 mm long (excluding the awn), their average length 5.2 mm (for 18 spikelets); first glume flat, sulcate, glabrous, the tip slightly scabrous, often slightly bidentate; second glume as long as the first, strongly-keeled, 3-nerved, the tip slightly scabrous; sterile lemma 0.9-1.5 mm long, thin, transparent, appearing 2-keeled, the margins finely ciliate; fertile lemma thin, transparent, 3-nerved, bifid at the apex, awned from between the lobes, the awn 7.5-14 mm long (measured from the tip of the first glume), the column flat, twisted 3 or 4 times, brown, terminal portion pale, antrorsely scabrous; palea a nerveless scale 1-2 mm long, often splitting at the tip; lodicules 2, 0.5-0.7 mm long, truncate, thickened at the top; stamens 3, the anthers yellow, 1-1.5 mm long; pistil well developed, the stigmas laterally exserted; pedicel about 1 mm shorter than the sessile spikelet, flattened, densely long-pilose on the margins from base to apex; sterile spikelet 1.1-4.3 mm long (their average length 3 mm), reduced to the first glume and a rudiment (probably the second glume).

TYPE: locally frequent in small clumps; alt. 1925 m, vicinity of Summit Camp along Río Tirica, Central Section, Chimantá Massif, Estado Bolívar, Venezuela, February 5, 1955, Julian A. Steyermark & John J. Wurdack 492 (US 2,182,125).

VENEZUELA: Bolívar: occasional in open places near rock ledges, alt. 1895-1910 m, summit, along Caño Mojado, between base of upper falls and drop to escarpment, Toronotepuí, Chimantá Massif, Estado Bolívar, Venezuela, February 23, 1955, *Steyermark & Wurdack* 1066; infrequent, rocks in Caño Sabana, Savanna Camp, 4500 ft, Cerro Sipapo (Paráque), Terr. Amazonas, Venezuela, December 21, 1948, *Bassett Maguire & Louis Politi* 27829; occasional, rocks in stream bed, Lower Caño Negro, January 1, 1949, *Maguire & Politi* 28115; infrequent, dissected terraces, se slopes Peak IV, elev. 1800 m, Caño Negro Basin, January 3, 1949, *Maguire & Politi* 28143; bunch grass, frequent along stream bed, left branch of Caño Yutaje, elev. 1200 m, Cerro Yutaje, Serranía Yutaje, Río Manapiare, February 25, 1953, *Bassett & Celia K. Maguire* 35411.

This species, mostly with solitary racemes, has a spikelet structure similar to that of *A. macrothrix* Trin. common in Brazil, in which the racemes are two or more.

ERIOCAULACEAE²⁴

Paepalanthus apacarensis Moldenke, sp. nov.

Herba pumila subacaulescens; foliis caespitosis patentibus coriaceis obtusis utrinque glabris praeter marginibus ad apicem ciliolatis; pedunculis solitariis brunneis plusminusve parce pilosulis; vaginis adpressis brunneis glabris praeter ore plusminusve piloso; capitulis hemisphaericis albidis; bracteolis involucri nigris ovatis acutis adpresso-pilosis ciliatis.

Dwarf herb; stems much abbreviated or obsolete; leaves caespitose, spreading, coriaceous, bright-green when young, brunnescent in age, 4-7 mm long, about 1 mm wide at the middle, obtuse at the apex, glabrous on both surfaces except for the more or less ciliolate margins near and at the apex, not fenestrate nor striate; peduncle solitary, erect, brown, 5-6.5 cm long, more or less sparsely pilosulous with rather spreading hairs, several-costate; sheath appressed, about 1 cm long, brownish, glabrous except for the more or less pilose mouth, the blade erect, about 2 mm long, appressed, acute at the apex, somewhat ciliolate-margined; heads hemispheric, whitish, about 7 mm wide; involucre bractlets rather firm, black, ovate, about 2.5 mm long and 1.2 mm wide, acute at the apex, appressed-pilose on the back, ciliate-margined; flowers subsessile; staminate florets: sepals 3, separate, oblanceolate, brownish toward the apex, about 2 mm long and 0.7 mm wide, more or less navicular and concave, acute at the apex, slightly falcate, densely white-barbate on the back near and at the apex; petals 3, united into a slender tube about 2.2 mm long, stramineous, the free portions minute; stamens 3, exserted; filaments filiform; anthers pale yellow or white; pistillrudiment included; pistillate florets: sepals 3, separate, narrow-elliptic, navicular, concave, about 2 mm long and 0.7 mm wide, blackish or brownish, subacute at the apex, densely white-barbate at the apex; petals 3, separate, brownish, oblong, flat, about 2 mm long and 0.5 mm wide, subacute or obtuse at the apex, thin-textured, long-pilose from base to apex, very sparsely barbellate at the apex; style rather stout, stramineous, about 1.2 mm long, glabrous, its 3 appendages borne at the same level and alternate with the stigmas, about 0.5 mm long; stigmas 3, about 0.5 mm long; ovary subglobose, stramineous, about 0.5 mm long, 3-sulcate, 3-celled.

TYPE: *Julian A. Steyermark* 75864, moist ledges of rock around talus of large high rock on the east-central portion of the summit of Apácaratepuí, altitude 2450-2500 m, Chimantá Massif, Bolívar, Venezuela, on June 21 or 22, 1953 (Herb. H. N. Moldenke).

²⁴ By H. N. Moldenke.

Paepalanthus cumbricola Moldenke, sp. nov.

Herba perennis; caulibus elongatis brachiatis densissime foliosis adscendentibus vel erectis; ramis brevibus dense foliosis; foliis subcoriaceis acutis supra dense longeque pilosis, dein glabrescentibus nitidisque, subtus parce pilosis vel glabris; pedunculis obscure 4-costatis dense albido-pilosis, pilis antrorsis adpressis sericeis; vaginis arcte adpressis parce pilosis multistriatis, laminis ovatis acuminatis paullo patentibus, marginibus interioribus plusminusve longe ciliatis, ad apicem breviter ciliatis; capitulis hemisphaericis griseis; bracteolis involucri atro-brunneis ovatis argute attenuato-acutis ciliatis densiuscule apicem versus pilosis.

Perennial herb; stems elongate to 17 cm, several-branched, very densely leafy ascending or erect; branches short, densely leafy; leaves subcoriaceous, firm, bright green on both surfaces when young, darker or brunnescient in age, 1.5–3 cm long, 3–4 mm wide at the middle, to 5 mm wide at the base, gradually attenuate from the base to the acute apex, entire, densely long-pilose above with white hairs when young, glabrescent and shiny in age, scattered-pilose or glabrous beneath, the venation practically indiscernible; peduncles about 5 per branch, borne at its apex, erect, 13.5–15 cm long, rather obscurely 4-costate, densely whitish-pilose with antrorse, appressed silky hairs, more irregularly so in age; sheath 2.5–4 cm long, closely appressed, scattered-pilose, many-striate, the blade ovate, about 4 mm long, acuminate, somewhat spreading, more or less long-ciliate on the lower margins and short-ciliate toward the apex; heads hemispheric, 8–10 mm wide, grayish; involucre bractlets firm, dark-brown, ovate, about 2.5 mm long and 1.5 mm wide, sharply attenuate-acute at the apex, rather densely pilose toward the apex on the back, ciliate-margined; receptacle pilose; florets sessile; staminate florets: sepals 3, separate, oblanceolate, brownish toward the apex, about 2.5 mm long and 0.75 mm wide, obtuse at the apex, densely white-barbate near and at the apex on the back; petals 3, connate into a stramineous tube about 2.5 mm long, the free portions very short, hyaline, glabrous; stamens 3, exserted; filaments white, flattened, glabrous; anthers pale yellowish; pistil rudiment short, brown, included in the corolla-tube; pistillate florets: sepals 3, separate, brownish toward the apex, oblong, navicular, concave, about 2.5 mm long and 1.15 mm wide, obtuse or subacute at the apex, densely white-barbate at the apex on the back; petals 3, separate, flat, stramineous or subhyaline, oblong or oblong-spatulate, about 2.7 mm long and 0.75 mm wide, obtuse or subacute at the apex, densely long-pilose, with the basal hairs equaling or surpassing the petals in length; style stout, stramineous, about 1.2 mm long, glabrous, its appendages 3, alternating with and at the same level as the stigmas, about 0.75 mm long; stigmas 3, about 0.75 mm long; ovary oblong, 0.9–1 mm long, glabrous, 3-celled, 3-sulcate.

TYPE: *John J. Wurdack* 34308, upper part of the cumbre, 2300–2350 m alt., northwest cumbres, Churi-tepuí (Muru-tepuí), Bolívar, Venezuela, February 3, 1953 (N Y). The collector notes that the species is locally abundant, in bud and in old fruit, but mostly sterile.

Paepalanthus stegolepoides Moldenke, sp. nov.

Herba perennis multiramosa; caulibus crassis dense foliosis; ramis gracilibus densissime foliosis longe pilosis; foliis graminoideis adscendentibus vel patentibus, denique reflexis, acutis chartaceis utrinque glabris; pedunculis erectis 4-costatis paullo contortis brunneis glabris; vaginis brunneis arcte adpressis gracilibus glabris multistriatis paullo contortis, laminis attenuato-acutis; capitulis hemisphaericis albidis vel griseis, ad basin nigris; bracteolis involucri nigris obovato-lingulatis obtusis ad apicem obscure breviterque ciliolatis.

Perennial much-branched herb; stems 5-10 cm long, 1-10 mm thick, densely leafy, with many ascending-spreading branches; branches slender, to 10 cm long, very densely leafy, long-pilose; leaves dark green, intensely blue-green by reflected daylight or with an iridescent purplish-blue sheen when fresh (as in some species of *Stegolepis*), grass-like, ascending or spreading, reflexed in age, 1.5-4 cm long, about 3 mm wide at the middle, acute at the apex, chartaceous, glabrous on both surfaces, conspicuously parallel-veined, the 6 or 7 veins slightly subimpressed above and prominulous beneath; peduncles several or few per branch, terminal, erect, 7-14 cm long, 4-costate, slightly twisted, brown, glabrous; sheath brown, closely appressed to the peduncle, slender, about 2.5 cm long, glabrous, many-striate, slightly twisted, obliquely split at the apex, the blade erect, appressed, 2-3 mm long, attenuate-acute at the apex; heads hemispheric, dull white or gray, 6-9 mm wide, blackish at the base; involucrel bractlets black, obovate-lingulate, about 2 mm long and 1.4 mm wide, obtuse or rounded at the apex, rather obscurely short-ciliolate at the apex, otherwise glabrous, shiny; receptacular bractlets oblong, blackish toward the apex, about 2.2 mm long and 0.4 mm wide, subacute or obtuse at the apex, pilose at the apex on the back; staminate florets: sepals 3 (rarely 4), separate, oblanceolate, black toward the apex, about 1.7 mm long and 0.6 mm wide, white-barbate at and near the apex, otherwise glabrous; petals hyaline, connate into a slender tube about 1.2 mm long, glabrous, the free apical portions about 1.2 mm long; stamens 3, exserted; pistillate florets: sepals 3, separate, obovate, black toward the apex, about 2.5 mm long and 1 mm wide, rounded at the apex, white barbate-pilose at the apex on the back; petals 3, separate, subhyaline, oblong-elliptic, about 2 mm long and 0.5 mm wide, obtuse at the apex, densely long-pilose at the base, sparsely pilose at the apex; pistil brown, about 2 mm long, glabrous; style-appendages 3, about 0.7 mm long, inserted at the same level as and alternate with the 3 slender stigmas; ovary oblong, about 0.5 mm long, glabrous, 3-sulcate, 3-celled.

TYPE: *John J. Wurdack 34315*, upper part of the upper cumbre at 2300-2350 m alt., northwest cumbres, Churi-tepuí (Muru-tepuí), Bolívar, Venezuela, February 3, 1953 (NY). This beautiful species is said to be locally frequent in large mats on the dry rocky face of cliffs. It was also collected on the Chimantá Massif by Steyermark and Wurdack (491, 822).

Syngonanthus obtusifolius Moldenke, sp. nov.

Herba perennis; caulibus valde abbreviatis densissime tomentosis, pilis pallide rubellis; foliis caespitosis coriaceis oblongis obtusis utrinque glabris; pedunculis 1-3, brunneis 5-costatis paullo contortis plusminusve adpresso-pilosis, pilis antrorsis albidis sericeis; vaginis gracilibus firmis adpressis obscure adpresso-pilosulis vel glabrescentibus, laminis elongatis lanceolatis plusminusve adpresso-pilosis acutis; capitulis hemisphaericis; bracteolis involucri firmis griseis anguste lanceolatis attenuatis acutis adpresso-pilosis, pilis antrorsis albidis-sericeis; receptaculo longe piloso.

Perennial herb; stems much abbreviated, to about 2 cm long, very densely matted-tomentose with pale pinkish hairs; leaves cespitose, erect, coriaceous, uniformly olive-green and shiny on both surfaces, 5-12 cm long, oblong, rather uniformly 2-5 mm wide from the base to the apex, rounded at the apex, glabrous on both surfaces, very obscurely many-veined but the parallel veins indiscernible above; peduncles 1-3, brown, erect, 28-40 cm long, 5-costate, slightly twisted, more or less appressed-pilose with antrorse, whitish silky hairs; sheath slender, firm, appressed to the peduncle, 8-10 cm long, obscurely appressed-pilosulous or glabrescent, obliquely split at the apex, the blade elongate, lanceolate, 2-3 cm

long, more or less appressed-pilose, acute at the apex, erect, sometimes somewhat expanded toward the base; heads hemispheric, 12-15 mm wide; involucre bractlets stiff, grayish-white, tawny at the base, narrow-lanceolate, about 4.2 mm long and 1.2 mm wide, gradually attenuate from the base to the acute apex, appressed-pilose with antrorse whitish-silky hairs; receptacle long-pilose; outer receptacular bractlets firm-textured, lanceolate, blackish especially toward the margins and apex, about 4.2 mm long and 1.5 mm wide, gradually attenuate to the acute apex, appressed-pilose with antrorse hairs on the back, long-ciliate on the margins with antrorsely spreading hairs; inner receptacular bractlets narrow-elliptic, black except at the base, more or less concave, about 4.5 mm long and 1.2 mm wide, attenuate to the acute apex, densely long-pilose on both surfaces with antrorse hairs; staminate florets pedicellate, the pedicel filiform, gray, about 1.5 mm long, long-pilose at the base; sepals 3, separate, oblanceolate, black on the upper half, navicular-concave, about 2.5 mm long and 0.7 mm wide, very densely long-barbate at the apex, the white hairs surpassing the apex by 1.5 mm; petals 3, hyaline, connate into a broad tube about 2.5 mm long and 1 mm wide at the middle, the free apical portions ovate, hyaline, about 0.7 mm long and 0.5 mm wide, barbellate-pilose at the apex; stamens 3, subincluded or very slightly exerted; filaments filiform, about 2 mm long, white, inserted near the base of the petals; anthers oblong, white, about 0.4 mm long, composed of 2 thecae; pistil-rudiment very small; pistillate florets subsessile: sepals 3, separate, white, lanceolate, about 2.7 mm long and 0.3 mm wide, attenuate to the acute apex, densely appressed-pilose with antrorse hairs; petals 3, separate at the base and apex, connate in the middle, white, barbate at the apex.

TYPE: *Julian A. Steyermark & John J. Wurdack* 406, swampy savanna above Summit Camp, alt. 1940 m, in the central section of Chimantá Massif, Bolívar, Venezuela, February 4, 1955 (NY). The species is said to be frequent at the type locality. All pistillate florets examined were extremely immature although the staminate florets in the same head were completely developed.

Syngonanthus rivularis Moldenke, sp. nov.

Herba parva annua; caulibus valde abbreviatis ad apicem densissime albido-tomentosis; foliis caespitosis leviter membranaceis linearibus parce minuteque pilosulis obtusis; pedunculis solitariis filiformibus stramineis 2-costatis adpresso-pilosulis; vaginis gracilibus arcte adpressis stramineis multistriatis minute parceque pilosulis, laminis obtusis; capitulis hemisphaericis griseo-albis; bracteolis involucri herbaceis brunneis oblongis obtusis glabris; receptaculo longe piloso.

Small annual herb; stems greatly abbreviated, very densely whitish-tomentose at the apex; roots elongate, white, spongy; leaves caespitose, thin-membranous, linear, pale green, erect, 2-4 cm long, rather uniformly 0.5 mm wide, sparsely and minutely pilosulous, blunt at the apex; peduncles solitary, filiform, stramineous, 19-21 cm long, 2-costate, antrorsely appressed-pilosulous, especially in the sulcations; sheath slender, closely appressed, 3-4.5 cm long, stramineous, many-striate, minutely scattered-pilosulous, the blade erect, appressed, about 3 mm long, obtuse at the apex; heads hemispheric, about 9 mm wide, grayish-white; involucre bractlets herbaceous, brownish, oblong, about 2 mm long and 1 mm wide, obtuse at the apex, glabrous; receptacle long-pilose; flowers long-pedicellate; receptacular bractlets subhyaline, oblong-oblanceolate, about 3 mm long and 0.7 mm wide, subacute at the apex, long-pilose at the base, otherwise glabrous; staminate florets: sepals 3, separate, hyaline, oblong-oblanceolate, more or less falcate, about 2 mm long and 0.7 mm wide, subacute at the apex, glabrous; petals

3, hyaline, connate at the base, separate at the apex, about 1.2 mm long, glabrous; stamens 3, short-exserted; anthers white, about 0.2 mm long; pistillate florets: sepals 3, separate, hyaline, navicular, concave, lanceolate, about 2.2 mm long and 0.6 mm wide, acute at the apex, glabrous; petals 3, hyaline, free at the base and apex, oblanceolate, about 1.7 mm long and 0.5 mm wide, glabrous; style abbreviated, about 0.2 mm long, glabrous, its 3 appendages slender, erect, about 1.2 mm long, borne at the same level as and alternate with the stigmas; stigmas 3, about 1 mm long; ovary globose, glabrous, stramineous, 3-sulcate, 3-celled.

TYPE: *Julian A. Steyermark & John J. Wurdack* 792, swampy depressions along the river in wet savannas along the east branch of the headwaters of the Río Tirica, alt. of 2120 m, in the central section of Chimantá Massif, Bolívar, Venezuela, February 12, 1955 (NY). The collectors state that the species was locally frequent, forming large masses.

Syngonanthus savannarum var. *glabrescens* Moldenke, var. nov.

Haec varietas a forma typica speciei recedit caulibus multiramosis, ramis ca. 10 cm longis dense foliosis et ubique glabris vel subglabris.

TYPE: *Julian A. Steyermark & John J. Wurdack* 539, along a rivulet at the base of the Upper Falls of the Río Tirica above Summit Camp, growing in dense tufts, alt. 1940-1050 m, Central Section of the Chimantá Massif, Bolívar, Venezuela, February 7, 1955 (NY). The collectors note that the leaves are membranous, grass-green, ascending, the peduncles pale-green, the involucres gray-blackish, and the heads white, and that the plant is rare at the type locality.

Syngonanthus tiricensis Moldenke, sp. nov.

Herba pumila; caulibus valde abbreviatis ad apicem dense albido-tomentosis; foliis dense caespitosis linearibus vel graminoides pluminusve subulatis obtusis glabris; pedunculis 1-3, griseis densiuscule albido-pilosis, pilis sericeis plusminusve subadpressis; vaginis gracilibus contortis multistriatis stramineis glabris, laminis obtusis glabris; capitulis hemisphaericis sordido-albidis; bracteis involucri stramineis anguste ellipticis obtusis glabris nitidis; receptaculo glabro.

Dwarf herb; stems much abbreviated, with a dense mass of gray-white tomentum at the apex; leaves densely caespitose, erect, thin-textured but not membranous, bright-green, linear or grass-like, 5-18 mm long, more or less subulate, obtuse at the apex, glabrous, not fenestrate nor striate; peduncles 1-3, erect, grayish, 11-14.5 cm long, rather densely whitish-pilose with silky and more or less subappressed hairs; sheaths slender, 2-3 cm long, twisted, many-striate, stramineous, glabrous, the blade erect or suberect, about 4 mm long, obtuse at the apex, glabrous; heads buff-white, hemispheric 1-1.3 cm wide; involucre bractlets stramineous, rather firm, narrow-elliptic, about 4 mm long and 1.2 mm wide, obtuse at the apex, glabrous, shiny; receptacle glabrous; flowers pedicellate; staminate florets: sepals 3, separate, hyaline, oblong, about 2.5 mm long and 0.5 mm wide, obtuse or subacute at the apex, glabrous; petals 3, hyaline, connate at the base into a tube about 0.7 mm long, the free apical portions ovate, about 1 mm long, 0.5-0.7 mm wide, erect, rounded at the apex; stamens 3, slightly exserted; filaments rather stout, white, about 0.7 mm long, glabrous; anthers small, white, about 0.2 mm long and wide; pistillate florets not seen.

TYPE: *Julian A. Steyermark & John J. Wurdack* 739, among rocks in rocky and swampy savanna between the west and east branches of the headwaters of the Río Tirica, alt. 2120-2210 m, in the central section of Chimantá Massif, Bolívar, Venezuela, February 11, 1955 (NY).

Wurdackia Moldenke, gen. nov.

Herbae perennes, caulibus crassis elongatis; foliis rigidis distichis flabelliformibus; bracteolis involucri et receptaculi magnis; floribus omnibus perfectis pedicellatis; sepalibus 3, separatis; petalibus 3 praeter ad apicem separatis; staminibus 3 inclusis ad basin petalorum affixis; stylo brevissimo, appendicibus 3, bulboso-clavatis; stigmatibus 3, valde elongatis albidis bifidis; ovario subgloboso glabro 3-loculare.

TYPE species: *W. flabelliformis* Moldenke.

The genus is named in honor of John J. Wurdack, who has done noteworthy collecting in various parts of the United States, Canada, Japan, Brazil, and Venezuela.

Wurdackia flabelliformis Moldenke, sp. nov.

Herba perennis; caulibus simplicibus dense foliosis densissime tomentosis; foliis coriaceis patentibus arctissime imbricatis, ad apicem rotundatis vel subacutis, utrinque glabris; pedunculis paucis brunneis 4 vel 5-costatis glabris nitidis paullo contortis; vaginis gracilibus glabris multistriatis non contortis, laminis lanceolatis subulato-acutis glabris; capitulis hemisphaericis; bracteolis involucri fulvo-brunneis oblongis obtusis glabris; receptaculo glabro.

Perennial herb; stems simple, elongate, thick, to 16 cm long, very densely matted-tomentose, densely leafy; leaves coriaceous, rigid, wide-spreading, 2-ranked in fan-like fashion, very closely imbricate, uniformly 10-12 cm long, about 8 mm wide at the middle, rounded or subacute at the apex, the base hidden in the nigrescent tomentum of the stems, glabrous on both surfaces, shiny, many-veined but the parallel veins very obscure or indiscernible on both surfaces; peduncles few, borne on the upper portion but not at the apex of the stem, erect, brown, 13-16 cm long, 4- or 5-costate, glabrous, shiny, hardly twisted; sheaths slender, closely appressed to the peduncles, shorter than and hidden by the leaves, about 6 cm long, glabrous, many-striate, not twisted, obliquely split at the apex, the blade erect, lanceolate, about 2 cm long, appressed, subulate-acute at the apex, glabrous throughout; heads hemispheric, 1.6-1.9 cm wide; involucre bractlets tawny-brown, oblong, about 5.5 mm long and 1.2 mm wide, rather firm, obtuse at the apex, glabrous; receptacle glabrous; receptacular bractlets oblanceolate-spatulate, navicular-concave, black except at the base, about 6 mm long and 1.2 mm wide, obtuse or subacute at the apex, gradually attenuate to the base, glabrous except for the long-barbate apex, the white hairs beginning on the back somewhat below the apex and extending 2.2-2.5 mm beyond it; all the florets perfect, pedicellate; pedicels white, filiform, about 2 mm long; sepals 3, separate, elliptic, about 3.5 mm long and 1.5 mm wide, hyaline, obtuse or subacute at the apex, densely white-barbate at and near the apex, otherwise glabrous; petals 3, hyaline, separate except at the apex, about 3.2 mm long and 1.2 mm wide, obovate, rounded at the apex, gradually attenuate at the base, densely long-ciliate in barbate fashion at the apex; stamens 3, attached near the base of the petals, included; filaments filiform, white, glabrous, the free portion about 1.5 mm long; anthers white, oblong, about 0.4 mm long and 0.2 mm wide, composed of 2 thecae; style very short, about 0.2 mm long, its appendages 3, bulbous-clavate, stramineous, about 0.5 mm long, borne at the same level as and alternate with the stigmas; stigmas 3, hyaline, erect, about 2 mm long, bifid at the apex; ovary stramineous, subglobose, about 0.7 mm long and wide, glabrous, 3-sulcate, 3-celled.

TYPE: Julian A. Steyermark & John J. Wurdack 671, in moist places at the base of a rock and on dripping rocks of zanjone at the edge of the escarpment in and among zanjones, at the summit of Torono-tepuí, Chimantá Massif, Bolívar,

Venezuela, alt. of 2165-2180 m, February 9, 1955 (NY). The collectors of this amazing species note that the plant was locally frequent, the caudex elongated in wet places, the leaves "spreading in 2 planes," the involucre of the head "tawny-brown, the heads white with blackish parts at base and around rim."

BROMELIACEAE²⁵

1. *Lindmania serrulata* var. *reducta* L. B. Smith, var. nov.

Differt in partibus minor, florifera 6 dm alta; foliis 13 mm latis.

TYPE: frequent in dense rosettes on vertical southeast face of escarpment base at 1955 m alt., Agparamán-tepuí, Chimantá Massif, Bolívar, Venezuela, February 26, 1955, J. A. Steyermark & J. J. Wurdack 1167.

The typical variety of the species was described from Cerro Apácará, Río Caroní (Contr. U. S. Nat. Herb. 29: 283. 1949) and has been collected since in the central section of the Chimantá Massif.

5. *Lindmania argentea* L. B. Smith, sp. nov. (Fig. 78.)

E plantis vetustis solum cognita, caulescens, florifera metralis; caule ultra 15 cm longo, foliis vetustis dense vestito; foliis juvenilibus erectis, 6-7.5 dm longis, vaginis late ovatis, 4 cm longis, laminis linearibus, longe acuminatis, basi haud attenuatis, 15 mm latis, coriaceis, supra glabris, subtus dense argenteo-lepidotis, basi laxè obscureque denticulatis, vetustis revolutis; scapo erecto, gracili; scapi bracteis subfoliaceis, internodia multo superantibus, integris; inflorescentia laxè bipinnatim paniculata; bracteis primariis linearibus, quam ramis multo brevioribus; ramis patentibus, 17 cm longis, gracilibus, laxè florigeris, basi sterili nuda ad 6 cm longa; bracteis florigeris triangularibus, quam pedicellis gracilibus 7 mm longis subduplo brevioribus; floribus decurvato-subsecundis; sepalis valde imperfecte cognitis, late ellipticis, 4.5 mm longis; capsula ovoidea; seminibus longe bicaudatis.

TYPE: terrestrial, locally frequent on rocky slopes at 2165-2180 m alt., summit, at edge of escarpment in and among *zanjones*, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, February 9, 1955, J. A. Steyermark & J. J. Wurdack 678.

VENEZUELA: Bolívar: among *Bonnetia* and *Abolboda* thickets, *Bonnetia* forest at 2125-2300 m alt., northwestern part of Abácapa-tepuí, April 13, 1953, J. A. Steyermark 74936.

7. *Lindmania geniculata* L. B. Smith, sp. nov. (Fig. 79.)

Verisimiliter acaulis, florifera ad 1.3 m alta; foliis multis, 4 dm longis, vaginis late ovatis, 4 cm longis, glabris, prope apicem castaneis lucidisque, laminis angustissime triangularibus, 15 mm latis, pungentibus, prope basin laxè serrulatis, alibi integris, subtus dissite albo-flocculosus, supra mox glabris; scapo erecto gracili; scapi bracteis subfoliaceis, supremis quam internodia multo brevioribus; inflorescentia laxè bipinnata; axe geniculato; bracteis primariis eis scapi similibus, brevibus; ramis suberectis, 15 cm longis, dense multifloris, haud secundifloris; bracteis florigeris triangularibus, quam pedicellis graciliter obconicis 5 mm longis subduplo brevioribus; floribus subpatentibus; sepalis convolutis, late ovatis, 5 mm longis, integris; capsula ovoidea, 7 mm longa, rostro longo excluso; seminibus ignotis.

TYPE: around rocky swampy savanna at 2000-2100 m alt., rocky plateau on southeast-facing upper shoulder of Apácará-tepuí, below summit, Chimantá Massif, Bolívar, Venezuela, June 20, 1953, J. A. Steyermark 75774.

²⁵By Lyman B. Smith.

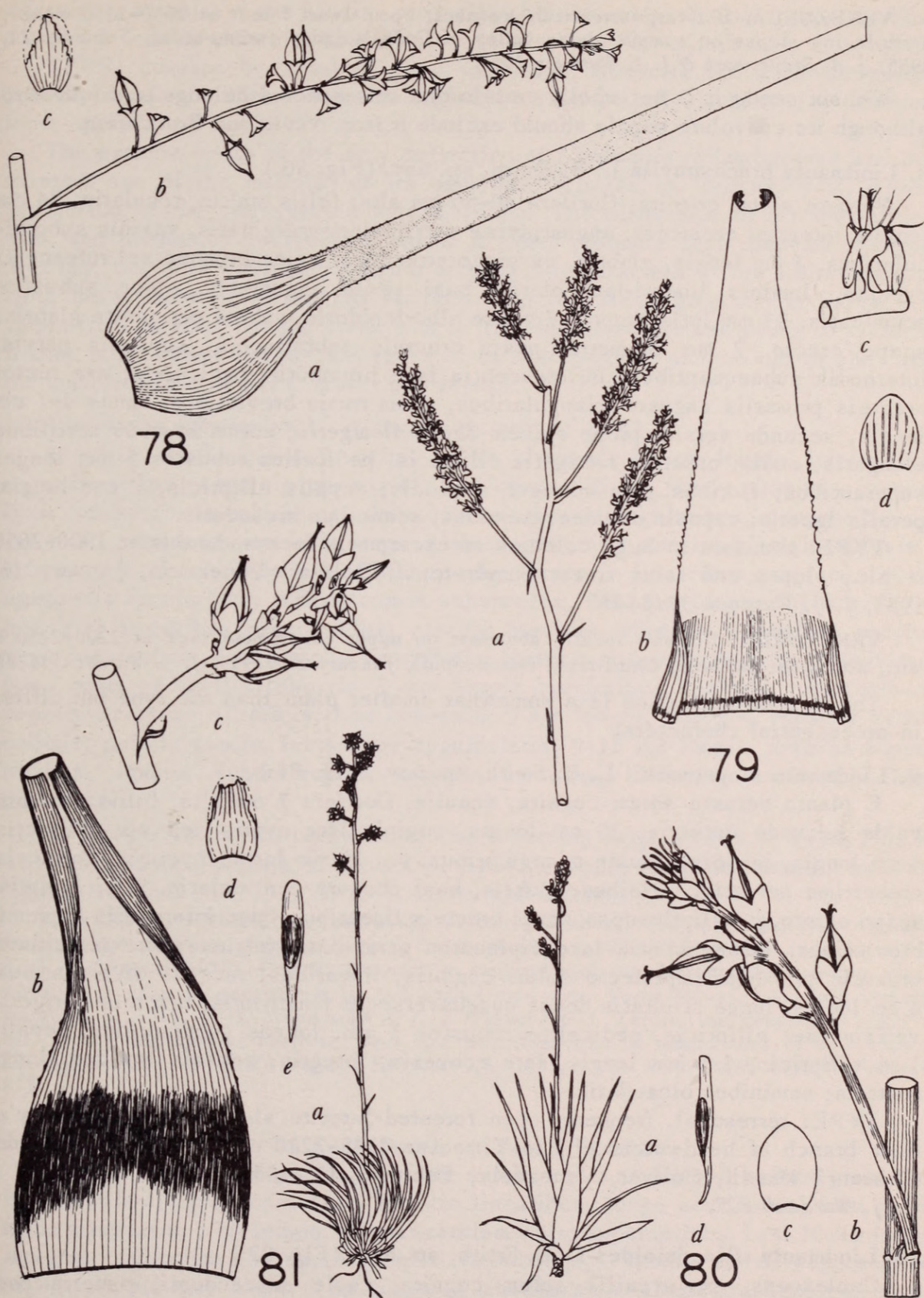


FIG. 78. *Lindmania argentea*. *a*, base of leaf, $\times \frac{1}{2}$; *b*, branch of inflorescence, $\times \frac{1}{2}$; *c*, sepal (reconstructed), $\times 2$. From Steyermark & Wurdack 678. FIG. 79. *Lindmania geniculata*. *a*, scape and inflorescence, $\times \frac{1}{4}$; *b*, base of leaf, $\times 1$; *c*, flower, $\times 1$; *d*, sepal, $\times 2$. From Steyermark 75774. FIG. 80. *Lindmania brachyphylla*. *a*, habit, $\times \frac{1}{10}$; *b*, branch, $\times 1$; *c*, sepal, $\times 2$; *d*, seed, $\times 4$. From Wurdack 34134-B. FIG. 81. *Lindmania steyermarkii*. *a*, habit, $\times \frac{1}{10}$; *b*, base of leaf, $\times 1$; *c*, branch of inflorescence, $\times 1$; *d*, sepal (reconstructed), $\times 2$; *e*, seed, $\times 4$. From Steyermark & Wurdack 827.

VENEZUELA: Bolívar; terrestrial, frequent, open dwarf forest at 2030–2150 m alt., north-facing slopes on summit above valley of Caño Mojado, Torono-tepuí, February 21, 1955, J. A. Steyermark & J. J. Wurdack 1050.

Without seeds it is not wholly certain that this species belongs to *Lindmania*, although its convolute sepals should exclude it from *Navia* and *Brocchinia*.

8. *Lindmania brachyphylla* L. B. Smith, sp. nov. (Fig. 80.)

Vetusta solum cognita, florifera 40–56 cm alta; foliis multis, rosulatis, 24 cm longis, integris, coriaceis, angustissime cartilagineo-marginatis, vaginis suborbicularibus, 4 cm longis, glabris, ex sicco stramineis apice brunneo vel rufescenti excepto, laminis lineari-lanceolatis, basi paulo angustatis, apice subulato-acuminatis, 33 mm latis, supra adpresse albo-lepidotis, subtus per aetate glabris; scapo erecto, 7 mm diametro; scapi bracteis subfoliaceis, supremis parvis, internodia subaequantibus; inflorescentia laxa bipinnatim paniculata; axe recto; bracteis primariis anguste triangularibus, quam ramis brevioribus; ramis 4–7 cm longis, secunde versis, prope apicem dense florigeris, eorum basibus sterilibus elongatis, nudis; bracteis florigeris ellipticis, pedicellos robustos 5 mm longos superantibus; floribus plus minusve secundis; sepalis ellipticis, 7 mm longis; petalis ignotis; capsula ovoidea, castanea; seminibus bicaudatis.

TYPE: abundant in large colonies on escarpment face and talus at 1900–2050 m alt., slopes and talus forest Sarvén-tepuí, Bolívar, Venezuela, January 13, 1953, J. J. Wurdack 34134-B.

VENEZUELA: Bolívar: locally abundant on upper escarpment face at 2200–2250 m alt., northwest cumbres, Churi-tepuí (Muru-tepuí), January 26, 1953, J. J. Wurdack 34246.

The second collection is a somewhat smaller plant than the type but differs in no essential characters.

9. *Lindmania steyermarkii* L. B. Smith, sp. nov. (Fig. 81.)

E planta vetusta solum cognita, acaulis, florifera 7 dm alta; foliis plurimis, valde secunde curvatis, 20 cm longis, vaginis late ovatis sed vix distinctis, 4 cm longis, laminis anguste triangularibus, ca. 15 mm latis, involutis, coriaceis, creberrime nervatis, viridibus, glabris, basi obscure denticulatis, alibi integris; scapo erecto, gracili, flexuoso; scapi bracteis linearibus, quam internodiis supremis brevioribus; inflorescentia laxa bipinnatim paniculata, angusta; axe geniculato; bracteis primariis imperfecte solum cognitae, linearibus; racemis divergentibus, 4 cm longis, longe stipitatis dense quaquaverseque paucifloris; bracteis florigeris verisimiliter ellipticis, pedicellos robustos 3 mm. longos superantibus; sepalis late ellipticis, 5.5 mm longis, late convexis, integris; capsula ovoidea, longe rostrata; seminibus bicaudatis.

TYPE: terrestrial, frequent, open forested laterite slopes along tributary of east branch of headwaters of Río Tirica at 2185–2210 m alt., Central Section, Chimantá Massif, Bolívar, Venezuela, February 13, 1955, J. A. Steyermark & J. J. Wurdack 827.

10. *Lindmania tillandsioides* L. B. Smith, sp. nov. (Fig. 82.)

Caulescens, perjuvenilis solum cognita; caule adscendenti, pauciramoso, ultra 2 dm longo; foliis multis, ad apicem caulis aggregatis, integerrimis, vaginis suborbicularibus, 2 cm diametro, dense nervatis, ex sicco aureo-brunneis, laminis angustissime triangularibus, 2 dm longis, 15 mm latis, conspicue cartilagineo-marginatis; scapo erecto, gracillimo, glabro, folia superanti; scapi bracteis angustissime triangularibus, erectis, supremis quam internodiis bene brevioribus; inflorescentia laxa bipinnatim paniculata, glabra; axe recto; bracteis primariis triangularibus, ramos juveniles paucifloros superantibus; bracteis florigeris late

ellipticis, obtusis, 4 mm longis, pedicellos breves robustos multo superantibus, tenuibus; sepalis suborbicularibus, 5 mm longis, integris, tenuibus.

TYPE: common by waterfall over sandstone, *Bonnetia* forest, northwestern part of summit of Abácapa-tepui at 2125-2300 m alt., April 13, 1953, J. A. Steyermark 74863.

The extreme youth of the only collection of *Lindmania tillandsioides* and the extreme age of the material of its only near relative, *L. brachyphylla*, makes evaluation of the two species very difficult. The difference in the leaf-blades plus the difference in locality makes it seem probable that they are distinct species, but it is difficult to affirm or deny by characters of the inflorescence. Both have dense, few-flowered racemes with relatively long sterile bases and ample floral bracts, but the flowers of *L. tillandsioides* are too young to indicate if they will become secund and those of *L. brachyphylla* are too old to show the complete form of floral bracts and sepals.

11. *Lindmania subsimplex* L. B. Smith, sp. nov. (Fig. 83.)

Acaulis, florifera 3-4 dm alta; foliis plurimis, 15 cm longis, inferioribus marcescentibus castaneisque, vaginis late ovatis, 15 mm longis, integris, juvenilibus ex sicco stramineis, laminis angustissime triangularibus, pungentibus, 7 mm latis, subdense serrulatis, supra glabris, subtus et margine albo-flocculosis, subtus mox glabris; scapo gracillimo; scapi bracteis linearibus, supremis quam internodia brevioribus; inflorescentia subsimplex, 9-12 cm longa, angusta, laxa, lepidibus linearibus minutis albis vestita; bracteis primariis linearibus, parvis; ramis brevissimis, fasciculatim paucifloris; bracteis florigeris anguste triangularibus, quam pedicellis robustis 3 mm longis brevioribus vel eos superantibus; sepalis latissime ellipticis, late convexis, 5 mm longis, integris, vetustis verruculosis; petalis aureis, brevissime unguiculatis, 9-11 mm longis, stamina superantibus, lamina suborbiculare; capsula ovoidea, castanea; seminibus late bicaudatis.

TYPE: terrestrial on rocky hummocks bordering large swamp at 2450-2500 m alt., east-central portion of summit of Apácará-tepuí, Chimantá Massif, Bolívar, Venezuela, June 21-22, 1953, J. A. Steyermark 75924.

VENEZUELA: Bolívar: around rocky swampy savanna, rocky plateau, on southeast-facing upper shoulder of Apácará-tepuí, below summit at 2000-2100 m alt., June 20, 1953, J. A. Steyermark 75775. Locally frequent in exposed rock crevices at 2165-2180 m. alt., summit, at edge of escarpment in and among *zanjones*, Torono-tepuí, Chimantá Massif, February 9, 1955, J. A. Steyermark & J. J. Wurdack 653. Terrestrial, common at 2260 m alt., rocky escarpment between west and east branches of headwaters of Río Tirica, Central Section, Chimantá Massif, February 13, 1955, J. A. Steyermark & J. J. Wurdack 873.

13. *Lindmania stenophylla* L. B. Smith, sp. nov. (Fig. 84.)

Acaulis; foliis plurimis, vaginis late ovatis, ca. 3 cm longis, bulbum globosum efformantibus, apice castaneis, laminis linearibus, longe acuminatis, basi nullo modo attenuatis, 6 dm longis, inflorescentiam multo superantibus, basi 10 mm latis, integris, subcoriaceis, supra glabris viridibusque, subtus dense adpresseque argenteo-lepidotis; scapo 6 cm longo, 4 mm diametro, albido-arachnoideo; scapi vaginis foliaceis, inflorescentiam superantibus; inflorescentia bipinnata, dense cylindrica, 13 cm longa, 3 cm diametro, petalis exceptis albido-arachnoidea; bracteis primariis linearibus, ramos infimos superantibus; ramis brevissimis, densifloris, haud secundifloris; bracteis florigeris anguste triangularibus, pedicellis crassiusculis 2-3 mm longis superantibus; sepalis plerumque convolutis, paulo asymmetricis, late ovatis, cucullatis, 5 mm longis, obscure serrulatis;

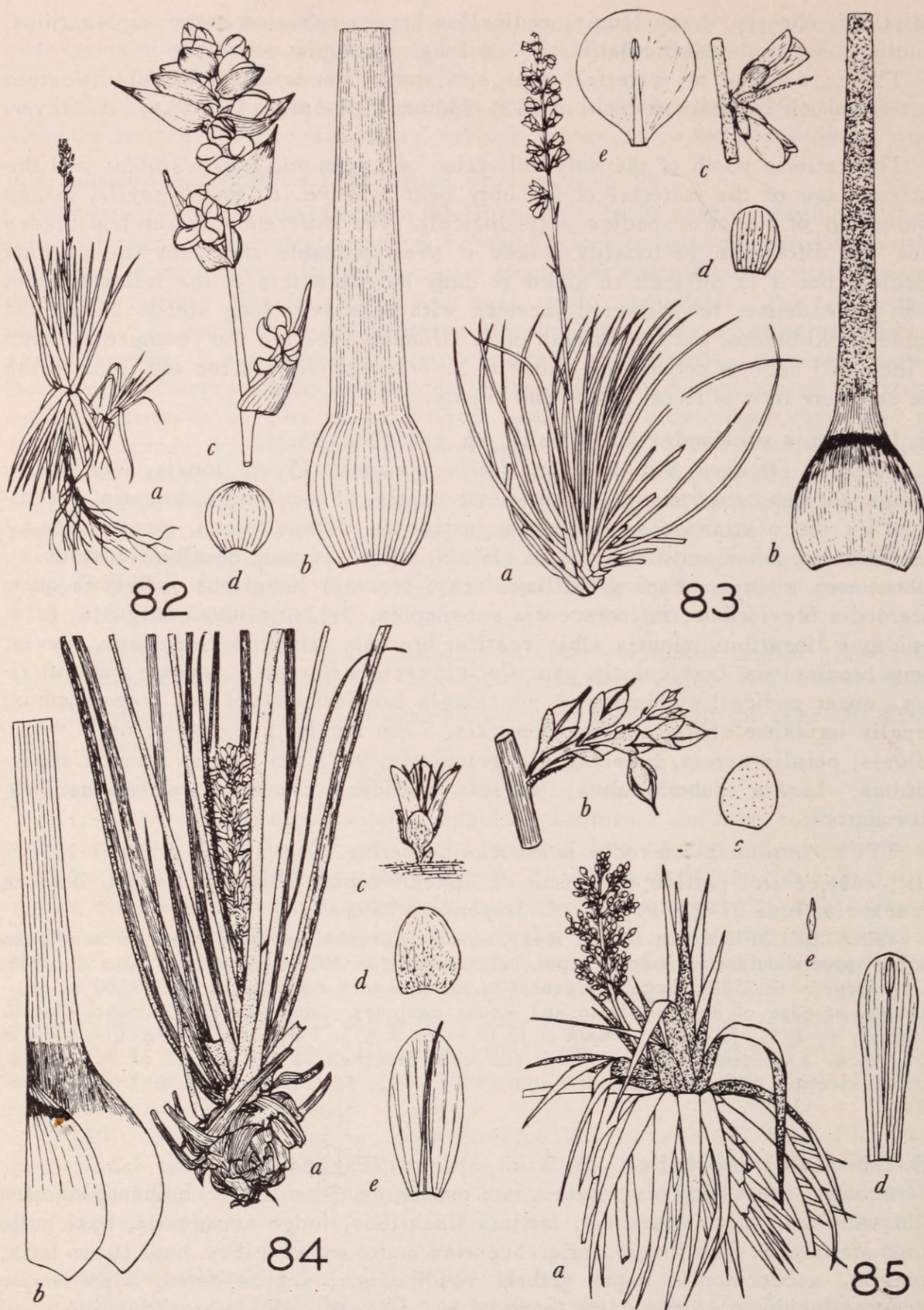


FIG. 82. *Lindmania tillandsioides*. a, habit, $\times \frac{1}{10}$; b, base of leaf, $\times 1$; c, inflorescence, $\times 1$; d, sepal, $\times 2$. From Steyermark 74863. FIG. 83. *Lindmania subsimplex*. a, habit, $\times \frac{1}{4}$; b, base of leaf, $\times 1$; c, branch of inflorescence, $\times 1$; d, sepal, $\times 2$; e, petal and stamen, $\times 2$. From Steyermark 75924. FIG. 84. *Lindmania stenophylla*. a, habit, $\times \frac{1}{4}$; b, base of leaf, $\times 1$; c, flower, $\times 1$; d, sepal, $\times 2$; e, petal and filament, $\times 2$. From Steyermark & Wurdack 951. FIG. 85. *Lindmania minor*. a, habit, $\times \frac{1}{4}$; b, branch of inflorescence, $\times 1$; c, sepal, $\times 2$; d, petal and stamen, $\times 2$; e, ovule, $\times 5$. a-c from Steyermark & Wurdack 685.

petalis ellipticis, obtusis, 12 mm longis, haud unguiculatis; staminibus verisimiliter exsertis; capsula ovoidea; seminibus fusiformibus, breviter bicaudatis.

TYPE: terrestrial, locally frequent, along banks of Caño Mojado, east of north escarpment, below upper falls of Caño Mojado at 1895–1910 m alt., Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, February 20, 1955, J. A. Steyermark & J. J. Wurdack 951.

One flower was found with cochleate sepals and the seeds are short-caudate, making the species appear transitional to *Navia*.

14. *Lindmania minor* L. B. Smith, sp. nov. (Fig. 85.)

Breviter caulescens, florifera ad 13 cm alta; foliis multis, vaginis late triangularibus, 15 mm longis, vetustis brunneis, lucidis, supra dissite albo-flocculosis, laminis anguste triangularibus, pungentibus, ad 10 cm longis, 12 mm latis, obscure laxaque denticulatis, supra glabris lucidisque, subtus dense adpressequae albo-flocculosis; scapo brevi, gracili, flocculoso; scapi bracteis subfoliaceis, internodia multo superantibus; inflorescentia subdense bipinnata, ad 8 cm longa, albo-flocculosa; bracteis primariis angustissime triangularibus; ramis 2 cm longis, laxe florigeris; bracteis florigeris triangularibus, quam pedicellis graciliter obconicis 5 mm longis subduplo brevioribus; floribus plus minusve erecto-secundis; sepalis late ellipticis, obtusis, 4.5 mm longis, late convexis; petalis anguste spathulatis, obtusis, 13 mm longis; capsula ovoidea, longe rostrata; seminibus breviter bicaudatis.

TYPE: exposed rock crevices, summit, at edge of escarpment, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, February 9, 1955, J. A. Steyermark & J. J. Wurdack 654. Numbers 685 and 678-A from the same locality are this species although the latter has a reduced subsimple inflorescence.

VENEZUELA: Bolívar: on large rock bordering savanna above Summit Camp at 1940 m alt., Central Section, Chimantá Massif February 4, 1955, Steyermark & Wurdack 394.

15. *Lindmania navioides* L. B. Smith, sp. nov. (Fig. 86.)

Caulescens; caule simplici, recto, ad 5 dm longo, 6 mm diametro, foliis vetustis deflexis densissime induto; foliis supremis erectis, pallide viridibus, dense albo-cretaceis, tenuibus, integris, vaginis late ovatis, 1 cm longis, laminis anguste triangularibus, acuminatis, pungentibus, 6 cm longis, 9 mm latis, planis; scapo nullo; inflorescentia terminali, foliis abscondita, corymbosa, pauciflora, glabra; bracteis florigeris angustissime triangularibus, pedicellos 9 mm longos superantibus; sepalis late lanceolatis, obtusis, 9 mm longis, tenuibus sed basi plus minusve incrassatis; petalis anguste spathulatis, obtusis, 18 mm longis, stamina subaequantibus; capsula ovoidea, longe rostrata, castanea, lucida; seminibus anguste fusiformibus, longe bicaudatis.

TYPE: on bluffs, summit, at edge of escarpment in and among *zanjones* at 2165–2180 m alt., Torono-tepuí Chimantá Massif, Bolívar, Venezuela, February 9, 1955, J. A. Steyermark & J. J. Wurdack 677.

VENEZUELA: Bolívar: locally frequent on bluff base, northwest-facing forested slopes between Summit Camp and base of escarpment, 1880–1970 m alt., Torono-tepuí, Chimantá Massif, Feb. 27, 1955, Steyermark & Wurdack 1198. Crevices of large rocks on upper shaded side of deep fissure at 2450–2500 m alt., east-central portion of summit of Apácará-tepuí, Chimantá Massif, June 21–22, 1953, J. A. Steyermark 75892.

6. *Navia wurdackii* L. B. Smith, sp. nov. (Fig. 87.)

Breviter caulescens; caule adscendenti; foliis multis, vaginis parvis, quam laminis vix latioribus, brunneis, laminis patentibus, curvatis, linearibus, acuminatis, 3–6 dm longis, 20–25 mm latis, viridibus cum linea mediana lata pallida pictis, supra glabris, subtus lepidibus minutis albis dissite obtectis, spinis

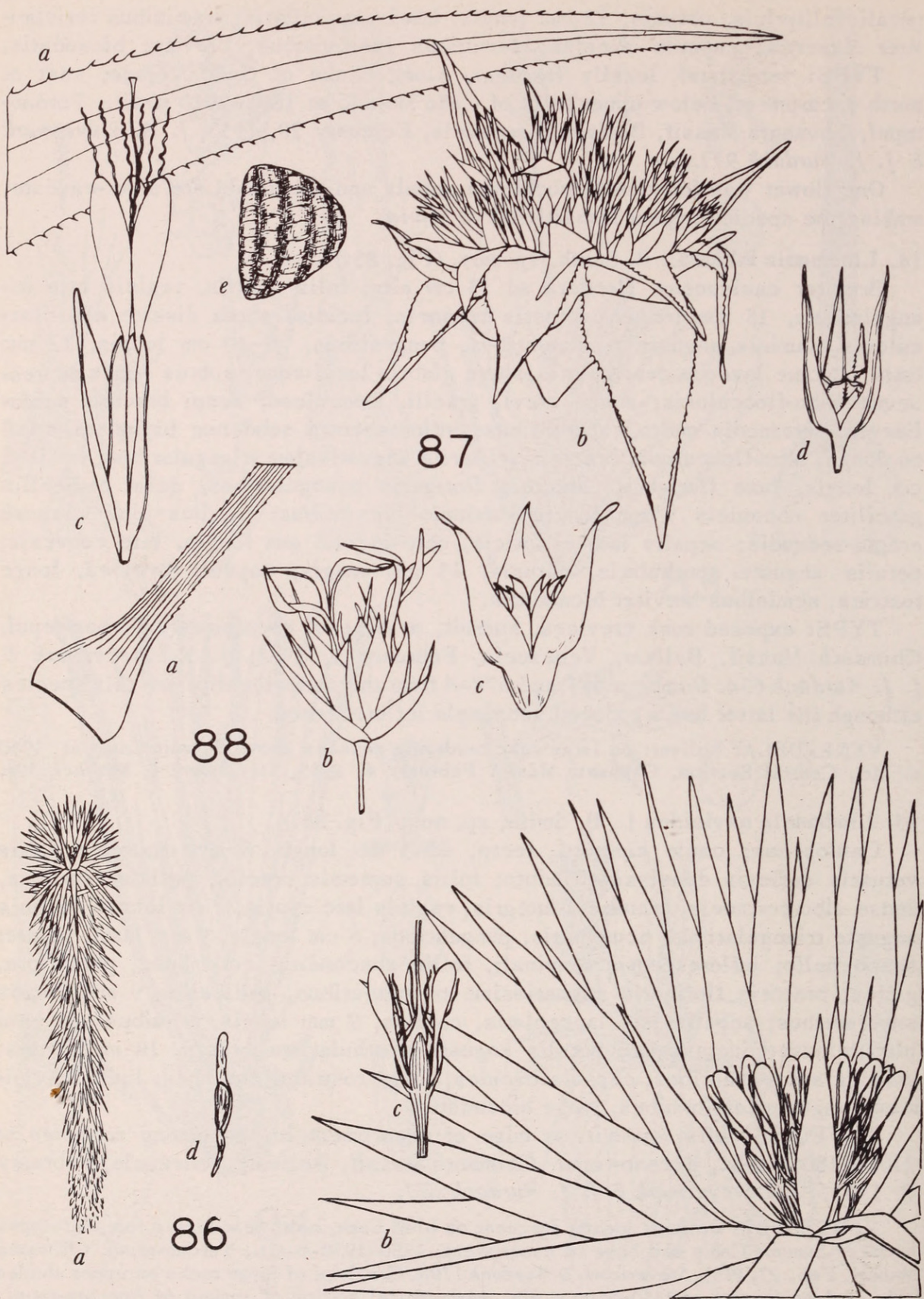


FIG. 86. *Lindmania navioides*. *a*, habit, $\times \frac{1}{10}$; *b*, inflorescence, $\times 1$; *c*, flower, $\times 1$; *d*, seed, $\times 4$. From Steyermark & Wurdack 677. FIG. 87. *Navia wurdackii*. *a*, apex of leaf, $\times 1$; *b*, inflorescence in fruit, $\times \frac{1}{2}$; *c*, floral bract and flower, $\times 1$; *d*, fruit, $\times 1$; *e*, seed, $\times 10$. From Wurdack 34324. FIG. 88. *Navia scopulorum*. *a*, base of leaf, $\times 1$; *b*, inflorescence, $\times 1$; *c*, fruit, $\times 2$. From Steyermark 75613.

rectis applanatis 2 mm longis subaxe armatis; scapo nudo, brevi, vaginis foliorum omnino occulto; inflorescentia hemisphaerica, digitato-glomerata, 4–6 cm diametro; bracteis exterioribus subfoliaceis, latis, inflorescentiam involucrantibus et flores subaequantibus, basi rubris; bracteis florigeris lanceolatis, acuminatis, sepala subaequantibus, apice incrassatis, integris vel obscure serrulatis, rubris; floribus breviter crasseque pedicellatis; sepalis liberis, lanceolatis, rectis, acuminatis, 22–30 mm longis, integris, rubris, obscure lepidotis; petalis 5 cm longis, obtusis, pulcherrime aureis, apice macula viridi ornatis; staminibus styloque longe exsertis; ovario supero; seminibus nudis, corrugatis, nigris.

TYPE: on soil-covered cliff-face along Río Sarven near Camp 9 at 1200 m alt., Sarvén-tepuí, Bolívar, Venezuela, February 7, 1953, J. J. Wurdack 34324.

VENEZUELA: Bolívar: Chimantá Massif: on shaded sandstone boulders and on bluffs above, trail between Camp 3 and Camp 4, vicinity of stream between northwestern part of Abácapa-tepuí and Apácará-tepuí at 1200–1600 m alt., April 19, 1953, J. A. Steyermark 75159. Common on vertical sandstone banks and boulders, southwestern-facing forested slopes of Chimantá-tepuí (Torono-tepuí), between base Camp and steep slopes above valley of Río Tirica at 1000–1400 m alt., May 15, 1953, J. A. Steyermark 75392. Common all along shaded bluffs at base where damp, along southwest-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí) near southern corner at 1700 m alt., May 19, 20, 1953, J. A. Steyermark 75495.

34. *Navia scopulorum* L. B. Smith, sp. nov. (Fig. 88.)

Dense aggregata; caule imperfecte solum cognito, 8 mm diametro; foliis plurimis, patentibus, 14 cm longis, vaginis late ovatis, 15 mm longis, integris, brunneis, tenuibus, glabris, laminis linearibus, acuminatis, basi haud attenuatis, 6 mm latis, ex sicco involutis, laxe serrulatis, mox glabris; scapo gracili, 1 cm longo, omnino occulto; inflorescentia nidulanti, pauciflora, glabra; bracteis exterioribus e late ovato longe acuminatis, ad 2 cm longis, apice obscure serrulatis; floribus subsessilibus; sepalis liberis, cochleari-imbricatis, lanceolatis, acuminatis, 11–15 mm longis; petalis 25 mm longis; ovario $\frac{1}{2}$ infero; capsula ellipsoidea, 7 mm longa.

TYPE: leaves rich green on both sides, not glaucous as in number 75497, in dry crevices at base of bluff, densely forested slopes along trail from Base Camp to Bluff Camp, western slopes of Chimantá-tepuí (Torono-tepuí) at 1100–1700 m alt., Chimantá Massif, Bolívar, Venezuela, May 30, 31, 1953, J. A. Steyermark 75613.

VENEZUELA: Bolívar: leaves rigid, coriaceous, rich green in upper half, silvery gray in lower half, below gray or pale green, bracts erect, rigid, silvery-yellow green, in crevices and on sheer walls, often pointing downward, along base of southeast-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí), from south corner northeastward at 1700 m alt., May 21, 1953, J. A. Steyermark 75497.

Tillandsia turneri var. *orientalis* L. B. Smith, var. nov.

Tillandsia rhodocincta Baker, Jour. Bot. 26: 143. 1888.

Tillandsia multifolia Mez, Repert. Spec. Nov. 12: 420. 1913.

Differt in omnibus partibus minor, florifera 15–40 cm alta; laminis foliorum 15–30 mm latis; inflorescentia pauciramosa vel simplici; spicis paucifloris; sepalis 13–15 mm longis.

TYPE: epiphyte, vicinity of Summit Camp along Río Tirica at 1925 m alt., Central Section, Chimantá Massif, Bolívar, Venezuela, February 18, 1955, J. A. Steyermark and J. J. Wurdack 928.

VENEZUELA: Bolívar: Mount Roraima summit, December 18, 1884, *im Thurn* 316 (type of *Tillandsia rhodocincta* Baker); McConnell & Quelch 671. On shrubs, frequent in upper part of upper cumbre at 2300–2350 m alt., northwest cumbres, Churi-tepuí (Muru-Tepuí), February 3, 1953, J. J. Wurdack 34305. Amazonas: Cerro Yavi summit at 2200 m

alt., March 1-3, 1947, K. D. Phelps & C. B. Hitchcock 67. On tree trunks, occasional in scrub forest 1-3 km north of Cumbre Camp at 1700-1800 m. alt., Cerro de la Neblina, Río Yatua, January 10, 1954, B. Maguire, J. J. Wurdack & G. S. Bunting 37224. BRAZIL: Branco: Humirida Mountains, 1863-64, Appun 1416. Slopes of Mount Roraima at 2100 m alt., January 1910, Ule 8558 (type of *Tillandsia multifolia* Mez).

I have taken advantage of the opportunity to retype this taxon from more familiar material on changing the category to which it belongs.

PIPERACEAE²⁶

Piper deminutum Yuncker, sp. nov.

Suffrutex ligno molli glaber nodosus; foliis oblongo-lanceolatis, apice sensim longe acuminatis, basi subinaequilateraliter acutis a medio infero pinnatim venosis, nerviis utrinque ca. 3-4 seorsum laqueatis; petiolo ad medium vel ultra vaginato-alato; bracteis triangulari-subpeltatis margine conferte luteo-fimbriatis; drupa glabra obpyramidali-trigona; stigmatibus parvis sessilibus.

A small, softwooded, glabrous, nodose, rhizomatous shrub up to 50 cm (or occasionally 1.5 m) tall, the twigs slender; leaves oblong-lanceolate, with gradually long-acuminate, subapiculate apex and equilateral or more commonly inaequilaterally acute base, 1.3-2 (-4) cm wide, 8-11 (-15) cm long, pinnately nerved from below the middle, the nerves about 3 or 4 on each side, abruptly curved and loop-connected upward, with slender nervules cross-connecting with the midrib to near the tip, drying thin, translucent, finely pellucid-dotted, the petiole from 5 mm long above to 2 or sometimes 3 cm long on the lower leaves, vaginate-winged to the middle or above; spikes 3 mm thick, 2-3 (-5) cm long, the peduncle slender, to 2 cm long, the bracts triangular-subpeltate, strongly yellow-fringed, the drupe glabrous, strongly obpyramidal-trigonal, with depressed-truncate apex, the stigmas small, sessile.

Distribution: Western British Guiana and southeastern Venezuela.

TYPE: VENEZUELA: Bolívar: Uaipán-tepuí, bush about 0.5 m tall, in wet forest near waterfall, alt. 1400 m, Jan. 27, 1948, Kathleen D. Phelps & Charles B. Hitchcock 356 (NY).

VENEZUELA: Bolívar: Chimanta Massif, rich rainforest on lower northwestern slopes of Abácapa-tepuí, vicinity of Camp 1 along Río Abácapa, subherbaceous, spikes ascending, white, turning green, at first 2 mm thick, becoming 3 mm thick, leaves membranous, erect, dark green above, pale green below, alt. 420 m, Mar. 30-31, 1953, Julian A. Steyermark 74768 (F; NY); forested slopes, along trail between Camp 2 and Camp 3, northwestern part of Abácapa-tepuí, along stream vicinity of Camp 2, leaves firmly membranous, dark green above, pale green below; spikes ascending, whitish, alt. 750-1100 m, Apr. 5, 1953, Julian A. Steyermark 74840 (F; NY); along southwest-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí) near southern corner, herb by waterfall, leaves subcoriaceous, deep green above, pale green below; spikes erect, buff-green, 3 mm in diameter; stems 3-5 mm in diameter, swollen at nodes to 8 mm, alt. 1700 m, May 19-20, 1953, Julian A. Steyermark 75485 (F; NY); Steyermark Falls (Steyermark-Merú) on upper reaches of Río Tirica (left-hand fork), separating eastern part of Apácará-tepuí from western part of Chimantá-tepuí (Torono-tepuí), alt. 1700-1750 m, July 3, 1953, Julian A. Steyermark 76019 (F; NY); along Río Tirica (Río Aparurén) just above Techiné-merú, herbaceous, leaves dull green above, pale green below; inflorescence erect, whitish, 3 mm diam., frequent in middle gorge forest, alt. 470 m, Jan. 16, 1955, Julian A. Steyermark & John J. Wurdack 119 (F; NY) (this specimen is reported as being up to 1.5 m tall but it otherwise agrees well with the other specimens cited); Torono-tepuí, vicinity of Lower Falls of Río Tirica, on northwest side of falls, locally frequent; leaves ascending, membranous, dull green above, silvery green below tinged dull lavender basally; petioles dull madder; stem deep purple, 2.5 mm diam., enlarged at nodes; peduncles erect, dull lavender, 1 m diam.; spikes erect, creamy white, 2 mm diam., alt. 1000-1090 m, Mar. 6, 1955, Julian A. Steyermark & John J. Wurdack 1277 (F; NY).

²⁶By T. G. Yuncker.

BRITISH GUIANA: Pakaraima Mountains, Kamarang River, Wenamu Trail, rare, by landing place between Paruima Falls and Paruima Mission, shrublet to 25 cm high, rhizomatous; fl. spikes pale cream, alt. 600 m, Nov. 8, 1951, *Bassett Maguire & D. B. Fanshawe* 32446 (NY).

The small, subwoody plants, the narrow leaves with vaginate-winged petioles, the slender peduncle, short spikes, and obpyramidal-trigonus, glabrous drupes characterize this species. It bears a slight resemblance to *P. suratanum* Trel. & Yun. of Colombia but differs in the type of nervation, shape of fruit, and more densely fringed bracts. From *P. salicifolium* Vahl of Suriname, also with narrow leaves, it differs in its somewhat larger, glabrous, non-scabrid leaves, and longer peduncles. It also differs from *P. eucalyptifolium* Rudge of British Guiana, with which it bears some resemblance, in the size of plant and shape of leaves, in its more slender spikes, characters of the drupe, etc.

Piper chimantanum Yuncker, sp. nov.

Suffrutex ligno molli nodosus, caule glabro; foliis lanceolato-ellipticis, apice subfalcatis longo-acuminatis, basi acutis obtusisve, aequilateralibus vel subinaequilateralibus glabris vel subtus ad venas sub margine parcius adpresse hirtulis, seorsum ciliolatis, a tertio supero deorsum pinnatim venosis, nerviis ca. utrinque 5, petiolo fere ad laminam vaginato-alato; pedunculo gracili, bracteis rotundato-subpeltatis plus minusve umbonatis conferte luteo-fimbriatis, drupa trigona apice depressa, stigmatibus sessilibus.

A soft-wooded, branching, nodose shrub scarcely 1 m tall, "dull purplish at the nodes" [this character not evident in the dried specimen], the stem 6 mm thick at the base when dry, glabrous, the internodes mostly 6-8 cm long; leaves lance-elliptic, the apex subfalcately long-acuminate, the base acute or obtuse, equilateral or one side slightly shorter, 4-7 cm wide, 15-19 cm long, "membranous, dark green above, silvery green below with elevated nerves, the midrib dull lavender at base" when growing, pinnately nerved to the upper one-third, the nerves about 5 on each side, with cross-connecting nervules, drying subopaque, dark above, paler beneath, glabrous, or the nerves near the margin beneath sparsely subappressed hirtellous, the margin ciliolate at least above the middle, the petiole "green with purplish stripes" when growing, up to 1.5 cm long, glabrous, vaginate and broadly winged to near the blade; spikes 1-2 mm thick 4 cm long, the peduncle slender, glabrous, 2 cm long, the bracts round-subpeltate, somewhat umbonate, strongly yellow-fringed, the ovary trigonus with pointed apex, the drupe exserted, trigonus with depressed apex, the stigmas sessile.

TYPE: VENEZUELA: Bolívar: Chimantá Massif, between Bluff Camp and low promontory north of Bluff Camp, along west-facing portion of Chimantá-tepuí (Torono-tepuí), slopes near waterfall, alt. 1600-1700 m, June 5, 1953, *Julian A. Steyermark* 75673 (F, as sheet no. 1,443,524; NY).

The small, subherbaceous, essentially glabrous plants, the strongly vaginate-winged petiole, and the rather short, slender spikes with trigonus, exserted drupes are distinctive characters of this species. It resembles *P. steyermarkii* Yun., also from Bolívar, in some respects, but that species is scandent, has the lateral nerves arising from the lower half of the blade, spikes 5 mm thick, and subglobose, stylose drupes.

Peperomia chimantana Yuncker, sp. nov.

Herba epiphytica diffusa; ramulis conferte hirtellis, pilis minutis erectis; foliis alternis, ellipticis vel obovatis emarginatis, basi acutis, petiolo pergracili hirtello; spicis terminalibus axillaribusque; drupa ovoidea apice obliqua, stigmate subapicali.

A small, spreading epiphyte; stem 2 mm thick at the base when dry, the branches ascending 8-10 cm from the decumbent base, rooting from the lower nodes, densely minutely hirtellous, the hairs erect, the internodes 1 cm long toward the base, shorter upward; leaves alternate, elliptic, or the lower obovate, narrowed to the blunt, emarginate apex, or the apex of the lower leaves rounded and retuse, the base acute, 5-8 (-10) mm wide, 1.2-1.8 cm long, "subcoriaceous, rich green above, pale green suffused with rose-orchid below with midrib and 2 lateral nerves green" when growing, palmately 3-nerved, glabrous above, paler and hirtellous beneath, at least along the nerves, ciliolate toward the apex, drying brown, subopaque, the petiole very slender hirtellous, mostly 3-7 mm long; spikes terminal and axillary, scarcely 1 mm thick and 2 cm long, "pale green" when growing, the peduncle scarcely more than 5 mm long, glabrous, the bracts round-peltate, the drupe ovoid with oblique apex, the stigma subapical.

TYPE: VENEZUELA: Bolívar: Chimantá Massif, moist mossy forest, vicinity of camp 4, southwestern edge of Apácará-tepuí, epiphyte on moist trunk, alt. 1600-1800 m, Apr. 15, 1953, *Julian A. Steyermark* 75016 (F, as sheet no. 1,443,515; NY).

This species is characterized by its hirtellous stems and emarginulate, 3-nerved leaves which distinguish it from *P. calimana* Trel. & Yun., *P. tafelbergensis* Yun., and *P. jamesoniana* C.DC., species to which it bears some slight resemblance. From the last-named species it also differs in its larger leaves.

***Peperomia wurdackii* Yuncker, sp. nov.**

Herba repens epiphytica; caule pergracili crispe pubescenti; foliis alternis ellipticis utrinque acutis supra crispe puberulis glabratissive subtus glabris ciliolatis palmatim 3-nerviis; petiolo glabrato; spicis terminalibus atque in axillis superis pedunculo glabrato; drupa globoso-ovoidea apice obliqua, stigmatibus subapicalibus.

A very slender, spreading, epiphytic herb; stem filiform, less than 1 mm thick when dry, freely branching, prostrate and rooting at the nodes, with fertile branches ascending up to about 5 cm, moderately crisp-pubescent, the hairs mostly upwardly curved, the internodes mostly less than 1 cm long; leaves alternate, elliptic, the apex gradually acute or sometimes obtusish, the base acute, 3-6 mm wide, 8-15 mm long, crisp-pubescent glabrescent above, paler and glabrous beneath, ciliolate, palmately 3-nerved, with a very slender submarginal nerve as seen by transmitted light, the midrib delicately branched upward, drying thin and translucent, the petiole filiform, 2-4 mm long, glabrous, clasping at the base; spikes terminal and axillary, 0.5 mm thick, 3-4 cm long, loosely flowered, the peduncle about 5 mm long, glabrous, the bracts round-peltate, the drupe globose-ovoid with oblique apex and subapical stigma.

TYPE: VENEZUELA: Bolívar: epiphyte on lower part of tree trunk, occasional on forested slopes below the south rim of savanna plateau, vicinity of Mission Santa Teresita de Kavanayáyen, alt. 1200-1300 m, Dec. 11, 1952, *Bassett Maguire* & *John J. Wurdack* 33762 (NY).

The crisp-pubescent, filiform stems and especially the elliptic leaves acute at both ends distinguish this species. It appears to be near *P. truncivaga* C.DC. but differs in its smaller leaves and longer spikes. It also bears a resemblance to *P. calimana* Trel. & Yun., which, however, has somewhat larger leaves that are commonly wider above the middle and rounded-obtuse at the apex.

ANNONACEAE²⁷

Anaxagorea petiolata R. E. Fr. *Lloydia* 2: 179. 1939.

Venezuela, Estado Bolívar, in rainforest at base of Ptari-tepuí, elev. 1100 m, Dec. 18, 1952, *Bassett Maguire & John J. Wurdack* 33819.

Tree 12 m, cauliflorous and ramiflorous. Previously known from British Guiana, Kanuku Mountains.

COMPOSITAE²⁸

Alomia ballotaefolia Maguire, Steyermark & Wurdack, sp. nov.

Herbacea annua 3.5–5 dm alta, caulibus vinaceis teretibus erectis subsimplicibus vel pauciramosis dense puberulis, 2–4 mm diam.; foliis plerumque oppositis petiolatis, petiolis 1–2.5 cm longis, dense puberulis; laminis membranaceis ovato-deltoides vel rhomboideis grosse inaequaliterque dentatis vel parce lobatis, supra molliter puberulis subtus dense molliter strigosis, 1.5–5.5 cm longis 1–3.5 cm latis, apice subacutis vel obtusiusculis basi cuneatis vel subtruncatis, penninerviis nervis lateralibus utroque latere 2–4, dentibus utroque latere 5–8 obtusis vel rotundatis; capitulis 11–14-floris ad apices ramorum modice numerosis corymbulis confertis dichotome dispositis campanulatis, 4–4.5 mm longis 3–4 mm latis; involucri bracteis 12–14, 3–4-seriatis viridibus infimis lineari-lanceolatis vel anguste lanceolatis acutiusculis, 1.8–2 mm longis, extus dense hirtellis pilis adscendentibus, ceteris lanceolatis vel elliptico-lanceolatis acuminatis vel subacuminatis, 2.5–3 mm longis 0.5–0.8 mm latis, extus dense hirtellis prominenter 3-costatis; receptaculo subhemisphaerico subalveolato glabro paleifero; floribus lilacinis, 2.5 mm longis, in tubum proprium et fauces distinctas paullo differentiatas, a basi ad limbum sensim ampliatis, tubo extus parce glanduloso-puberulo limbo glabro, lobis ovatis hebeti-acutis 0.5 mm longis glabris; paleis nonnullis tenuibus oblanceolatis vel ligulato-oblanceolatis cuspidato-vel subito acuminatis, 2.2–2.5 mm longis 0.5 mm latis, extus parte superiore puberulis; achaeniis prismaticis nigris, 1.5 mm longis 0.4 mm latis, calvis apice annulo carnosio integerrimo.

TYPE: along base of southeast-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí), Chimantá Massif, Bolívar, Venezuela, 1700 m alt., May 21, 1953, *Julian A. Steyermark* 75520 (holotype F, isotype NY).

This species most closely resembles *A. angustata* (Gard.) Benth. and *A. regnellii* Malme, both from Brazil. From the former it differs in the receptacular pales, shorter phyllaries, opposite leaves, and dense non-glandular pubescence of leaves and involucre. From the latter it may be distinguished by the glandular-puberulent outside of the corolla tube, more or less differentiation of corolla into tube and limb, 11–14- instead of 40-flowered heads, the presence of receptacular pales, and dense, non-glandular pubescence of stems and leaves.

Eupatorium ibaguense Schultz-Bip. var. *indiscretum* Maguire, Steyermark & Wurdack, var. nov.

A typo differt foliis anguste ovatis acutis vel parce acuminatis obscure serrulatis (mucronibus callosis ca. 0.5 mm altis utrinque ca. 6) basi late cuneatis supra basin 3-plinerviis vel obscure 5-plinerviis, 4–9 cm longis 2–3 cm latis; corollae lobis apicem versus puberulis; achaeniis 2.3–2.5 mm longis.

TYPE: frequent along lower escarpment face, Sarvén-tepuí, Chimantá Massif, Bolívar, Venezuela, 1900–2050 m alt., Jan 13, 1953, *John J. Wurdack* 34112 (holotype NY, isotype F).

²⁷By R. E. Fries.

²⁸*Mikania florida* by Leandro Aristeguieta.

Mikania florida Aristeguieta, sp. nov.

Frutex volubilis; caule tereti juventate puberulo tardius glabrato; foliis oppositis petiolatis lanceolato-oblongis apice subacutis basi rotundatis vel subobtusis, 4-6 cm longis, 1.8-3 cm latis, utrinque glabris integris chartaceo-membranaceis subtrinervatis; petiolo 8-12 mm longo glabro; paniculis terminalibus et lateralibus; capitulis ca. 8 mm altis; pedicellis 2-7 mm longis; bracteolis lanceolatis 4 mm longis; involucris squamis lanceolatis apice acutis, 6-7 mm longis dorso puberulis vel glabris; corollis 4.2 mm longis, glabris; tubo proprio 2 mm longo; dentibus limbi 0.7 mm longis; achaeniis 4 mm longis sparse puberulis vel glabris dense glandulosis; pappi setis albis 4 mm longis.

TYPE: woody vine in low trees, flowers white, upper northwest cumbre of Churi-tepuí (Murú-tepuí), alt. 2250-2300 m, Edo. Bolívar, Venezuela, Jan. 26, 1953, John J. Wurdack 34226. (NY).

This species is related to *M. lucida* Blake, from which it can easily be differentiated by its larger heads, pedicels, and involucre.

Verbesina angusta Maguire, Steyermark & Wurdack, sp. nov.

Frutex 1-2-metralis simplex vel superne parce ramosus, caule atropurpureo vetustiore glabro tereti superne 5-8 mm diam., ramis superne primum hirtellis demum glabratis exalatis; foliis alternis erectis subtus pallido-viridibus petiolatis, petiolis 2-5 (-10) mm longis 2-3 mm latis, hirtellis vel glabrescentibus, laminis firmiter membranaceis oblanceolatis hebeti-acutis vel apiculatis basi cuneatis, 3-10 cm longis 0.7-2 cm latis crenulato-serrulatis (dentibus inter se 3-9 mm distantibus), supra in nervo mediano sparse strigosis alioqui glabris, subtus primum scaberulo-strigosis demum glabratis, penninerviis nervis lateralibus utroque 4-8 arcuato-adscendentibus 1-3 mm ante marginem anastomosantibus subtus prominulis; inflorescentia 4.5-9 cm elongata, corymbiformi-paniculata; paniculis terminalibus 3-8-capitulis; pedunculis atropurpureis gracilibus, 1.5-6 cm longis 0.5-1.5 mm latis, dense hirtellis; capitulis radiatis, disco 1-1.5 cm alto 1-1.5 cm lato; receptaculo late subhemisphaerico, 2.5 mm alto 4.5 mm diam.; involucre 2-3-seriato gradato, bracteis oblongis vel oblanceolato-oblongis rotundatis vel late obtusis, extimis 2 mm longis 1.2 mm latis, reliquis 4-5.5 (-8) mm longis 1-2 mm latis, extus basi marginibus sparse vel modice hirsutulis; radiis 7-13, aureis, laminis subelliptico-oblongis apice retusis tridentatis, 8.5-11 mm longis 3.7-4 mm latis, plerumque glabris nervis principalibus duobus nervis secundariis 7, tubo 1-1.7 mm longo 0.6-1 mm lato extus puberulo; corollis disci 39-45 luteis subcylindricis, 4.2-7 mm longis, quinquelobatis, lobis ovatis subacutis, 1-1.5 mm longis 0.75 mm latis, marginibus incrassatis hirtello-papillatis, tubo 3.2-5.5 mm longo basi infra mediumque 0.6-1 mm lato, supra medium 1-1.5 mm lato, infra medium hirsutulo aliter glabro; paleis fere complicatis late oblanceolatis vel spathulato-obovatis carinatis retusis rotundatis vel obtusis, 6-6.7 mm longis 1.8-2.5 mm latis, extus parce substrigosis, carina marginibusque modice vel dense hirtellis, leviter 4-striatis; filamentis ligulatis 1.2 mm longis 0.2 mm latis; antheris brunneis, 2.75-3.2 mm longis, sagittatis, appendicibus terminalibus ovato-oblongis obtusis 0.4 mm longis, caudicibus tenuibus rectis liberis, 0.2-0.3 mm longis; stylo 5 mm longo, bifido, ramis 1.8-2.2 mm longis, recurvatis ligulatis, appendice stigmatica ovata acuta extus dense pilosula; achaeniis brunneo-nigrescentibus compressis late oblongis vel obovatis, 3-4.8 mm longis 1.3-3 mm latis, prominenter alatis superficie parce strigillosa uno latere valde 1-costato, alis 0.3-0.6 mm latis, marginibus hispidulis supra medium praesertim eis achaeniorum disci basi angustatis latitudine achaeniorum radiorum extremorumque subaequalibus; aristis 2, inaequalibus minutissime setulosis, 2.5-3.2 mm longis.

TYPE: swampy savanna in depression along tributary valley of east branch of headwaters of Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 2120 m alt., February 13, 1955, *Julian A. Steyermark & John J. Wurdack* 851 (holotype NY, isotype F). Paratype: swampy depression in wet savanna along east branch of headwaters of Río Tirica, Central Section, Chimantá Massif, February 12, 1955, *Steyermark & Wurdack* 816.

V. angusta is closely related to *V. schomburgkii* Schultz-Bip., differing in the smaller, proportionately narrower leaves, sparser pubescence throughout, and generally fewer capitula in a relatively more elongated inflorescence.

Stenopadus chimantensis Maguire, Steyermark, & Wurdack, sp. nov.²⁹

Frutex vel arbor 2-5-metralis, ramis novellis fulvo-tomentosis vetustioribus glabris; foliis alternis apice ramorum confertis petiolatis, petiolis incrassatis 4-7 mm longis 4-5 mm latis, fulvo-tomentosis demum glabrescentibus, laminis adscendentibus coriaceis supra atroviridibus subtus pallidioribus late obovatis vel subrotundato-obovatis, 7-15 cm longis 3-9 cm latis, leviter revolutis penninerviis, nervis lateralibus utroque latere 6-8 utrinque prominulis, costa media subtus elevata, novellis utrinque fulvo-strigillosis vetustioribus parce remoteque strigillosis vel glabrescentibus; capitulis solitariis apice ramorum sessilibus homogamis 22-44-floris; involucro late campanulato, 3.0-4.0 cm longo 2.5-3 cm lato ca. 6-8-seriato, phyllariis valde gradatis adpressis extus cinereo-ochroleuco-strigillosis, exterioribus coriaceis late ovatis vel oblongo-ovatis obtusis, 0.8-2.3 cm longis 0.6-0.8 cm latis, intimis chartaceis lanceolatis subacutis 3.2-3.4 cm longis 4-5 mm latis; receptaculo subplano alveolato 7 mm diam., alveolis parce adpresso-puberulis marginibus alveolarum glabris; paleis 4-5 chartaceis persistentibus subulato-setaceis, 3 cm longis 0.5 mm latis, apice extus hispidulis marginibus serrulato-hispidulis; floribus 22-44 subventricosis, actinomorphicis stramineis vel vinaceis; corollis 33 mm longis, glabris, tubo stramineo prismatico-cylindrico, (18) 20-25 mm longo 2.5 mm lato, lobis 5, vinaceis linearibus acutis, 17 mm longis 1 mm latis, valde revolutis; filamentis vinaceis, in sinibus affixis; antheris stramineis linearibus, 12.5 mm longis, appendicibus terminalibus triangularibus subacutis, 1 mm longis, caudicibus sagittatis lineari-lanceolatis falcato-acuminatis retrorse serrulatis; stylo 45 mm longo, scabrido-papilloso, ramis adpressis ab corona carnea 1 mm longa subtentis; achaeniis fulvis vel atrobrunneis lineari-cylindricis 10-costatis, 9 mm longis 2 mm latis, pappo stramineo 3-5-seriato, ad 18 mm longo, hispidulo, longioribus apice dilatatis.

TYPE: on summit, at edge of escarpment in and among *zanjones*, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, 2165-2180 m alt., February 9, 1955, *Julian A. Steyermark & John J. Wurdack* 652 (holotype NY; isotype F). Paratypes: around rocky ground, east-central portion of summit of Apácará-tepuí, Chimantá Massif, 2450-2500 m alt., June 21-22, 1953, *Steyermark* 75875; swampy depression in wet savanna along east branch of headwaters of Río Tirica, Central Section, Chimantá Massif, 2120 m alt., February 12, 1955, *Steyermark & Wurdack* 787.

Stenopadus affinis Maguire, Steyermark & Wurdack, sp. nov.

Arbor 10-12-metralis, ramis teretibus griseis juvenilibus parce strigosis vetustioribus glabris; foliis alternis petiolatis, petiolis 4-15(-35) mm longis 2-2.5 mm latis, parce strigillosis demum glabris, laminis patentibus chartaceo-coriaceis supra atroviridibus nitidis subtus pallido-viridibus elliptico-ovatis vel obovatis acutis vel obtusiusculis, 5-15 (-20) cm longis 2.5-6.5 cm latis,

²⁹A generic description and key to the species of *Stenopadus* is to be found in Mem. N. Y. Bot. Gard. 9:379, 380.

penninerviis utrinque prominenter reticulato-venosis, nervis lateralibus utroque latere 8-10 costa media subtus elevata, plerumque glabris, foliorum juvenilium costa media supra parce puberula excepta; capitulis solitariis terminalibus sessilibus homogamis 10-21-floris; involucri pyriformi basi angustato, 4-4.5 cm longo 1.5-2 cm lato, ca. 10-seriato, phyllariis valde gradatis adpressis extus fulvo-strigillosis, inferioribus coriaceis late ovatis obtusis vel acutiusculis, 10-13 mm longis 8-9 mm latis, superioribus oblongo- vel late lanceolatis acutiusculis vel acutis, 17-21 mm longis 5-7 mm latis, supremis linearibus vel lineari-lanceolatis, 25-30 mm longis 2-3 mm latis; receptaculo plano alveolato glabro, 5-6 mm diam. paleifero, paleis 3-4, chartaceis deciduis subulato-setaceis, 32-35 mm longis 1 mm latis, extus marginibusque hirsutulis; floribus 19-21 actinomorphicis albidis; corollis 32 mm longis glabris, tubo hypocrateriformi, 20-22 mm longo basi 1.5 mm lato apice 2.5 mm lato, quinquelobato, lobis subaequalibus anguste linearibus, 13-15 mm longis 1 mm latis, acuminatis valde revolutis apice marginibusque incrassatis; filamentis in sinibus affixis, 5-6 mm longis, antheris 11-11.5 mm longis, appendicibus terminalibus triangularibus acutiusculis 1 mm longis, caudicibus sagittatis, 2.5 mm longis, lineari-lanceolatis falcato-acuminatis remote retrorso-serrulatis; pappo 18-20 mm longo, sordido, setis 5-6-seriatis longioribus apice dilatatis hispidulis; achaeniis nigris lineari-cylindricis prismaticis 5-7-angulatis, 11 mm longis 2 mm latis, glabris.

TYPE: common on forested west-facing slopes with sandstone boulders, between camp 2 and camp 3, northwestern part of Abácapa-tepuí, Chimantá-Massif, Bolívar, Venezuela, 850-1100 m alt., April 18, 1953, *Julian A. Steyermark 75410* (holotype F; isotype NY). Paratype: along southwest-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí), near southern corner, Chimantá Massif, 1700 m alt., May 19-20, 1953, *Steyermark 75479*.

Chimantaea Maguire, Steyermark & Wurdack, gen. nov.

Capitulis solitariis, terminalibus, majusculis, multifloris (20-50); phyllariis gradatis acutis, multiseriatis; receptaculo plano-convexo pubescenti; paleis paucis (2-5), marginalibus; corollis actinomorphicis, membraneis, tubo 5-nervato, intus ad sinus pilosis, lobis erectis vel recurvatis, plus minusve barbellatis, 2-nervatis, tubum excedentibus; filamentis in sinibus affixis, antheris sagittatis, appendicibus caudatis linearibus liberis; granis pollinis luteis tricolporatis sulcis longiacutis, prolatis vel prolato-sphaeroidiis, spinulosis, axibus polaris 50-55 μ longis; stylis sursum asperulis, ramis erectis brevibus indifferentiatis; achaeniis prismaticis 10-costatis, glabris vel pubescentibus; annulo deficienti; corona 5-partitilobata, lobis saepe ad basim liberis; pappo 2-4-seriatis, setis inaequaliter longis, ad basim compressis, sursum barbellatis, ad apicem subgeniculatis, appendicibus aristatis.

Typus: *Chimantaea mirabilis* Maguire, Steyermark & Wurdack.

Key to the Sections and Species of *Chimantaea*

1. Heads not imbedded in woolly pubescence and apical leaves, the involucre exposed; leaves broadly oblanceolate; branched, thick-stemmed shrubs; sect. *Cinerea*.
 2. Achenes and receptacle densely villose or pilose; heads 2.5-3.5 cm long; phyllaries at length strongly recurved or reflexed. 1. *Chimantaea cinerea*.
 2. Achenes and receptacle glabrous; heads 3.5-4.0 cm long; phyllaries ascending, neither recurved nor reflexed. 2. *Chimantaea similis*.
1. Heads imbedded in copious woolly pubescence and apical leaves, the involucre partly or wholly obscured; sect. *Chimantaea*.
 3. Achenes and receptacle densely villose or pilose; leaves spreading or ascending, not marcescent.

4. Leaves broadly spatulate or cuneate, 3-4 cm broad, 6-7 cm long; stems remaining densely woolly-tomentose. 3. *Chimantaea lanocaulis*.
4. Leaves narrow, not exceeding 2 cm broad.
5. Leaves oblanceolate, 1.2-2.0 cm broad.
6. Heads almost completely immersed in woolly pubescence; phyllaries glabrous, merely hispidulous at the summit. 4. *Chimantaea eriocephala*.
6. Heads immersed in woolly pubescence only at the base; phyllaries densely red-tawny tomentose on the back. 5. *Chimantaea rupicola*.
5. Leaves narrowly elliptic-linear, 5-8 mm broad. 6. *Chimantaea humilis*.
3. Achenes and receptacle glabrous; old leaves strongly reflexed and marcescent on the stem.
7. Leaves narrowly linear, base of the upper leaves immersed in very copious and voluminous arachnoid tomentum. 7. *Chimantaea mirabilis*.
7. Leaves oblanceolate, base of the upper leaves imbedded in a compact subpannose tomentum. 8. *Chimantaea espeletoidea*.

Chimantaea sect. *Cinerea* Maguire, Steyermark & Wurdack, sect. nov.

Stenopadus subg. *Eriostenopadus* Blake, Brittonia 3: 201. 1939, as to type.

Frutex depressa; capitulis non in foliis supremis et copiosis tomentosis insessis; lobis corollarum tenue pilosis non-barbellatis.

Typus: *Chimantaea cinerea* (Gl. & Blake) Maguire, Steyermark & Wurdack.

1. *Chimantaea cinerea* (Gl. & Blake) Maguire, Steyermark & Wurdack, comb. nov.

Stenopadus cinereus Gleason & Blake, Brittonia 3: 200. 1939.

TYPE: Tate 1111, Auyán-tepuí, Gran Sabana, Venezuela, at 2200 m alt. (NY).

Distribution. Known only from Auyán-tepuí, and besides the type only by Cardona 2717. Reported by Cardona as a shrub to 3 m high with a resinous trunk, common on the cumbre at 2100-2500 m alt.

2. *Chimantaea similis* Maguire, Steyermark, & Wurdack, sp. nov.

Frutex vel arbor 2-5-metralis, ramis divaricatis paucibus teretibus juvenilibus, 1-1.5 cm diam.; foliis alternis apice ramorum confertis petiolatis, petiolis incrassatis vel alatis tomentosis, 2-4 (15) mm longis 5-8 mm latis vel laminis sessilibus, laminis coriaceis obovatis vel oblongo-obovatis apice rotundatis, 5.5-10 (15) cm longis (1.5) 2.5-6.0 (8.0) cm latis, revolutis supra glabris vel subglabris (costa tomentulosa excepta) subtus densissime cinereo-ochroleucopannoso-tomentosis penninerviis nervis lateralibus utroque latere 6-10 jugis subtus laminis vetustioribus prominulis laminis juvenilibus fecte nullis, costa media supra subsulcata subtus elevata; capitulis solitariis terminalibus sessilibus 25-30-floris homogamis; involucri late campanulato 10-12-seriato, 3.5-4.0 cm longo 1.2-1.5 cm lato, phyllariis indurato-chartaceis exterioribus 6-7-seriatis arcte gradatis anguste ovatis vel lanceolatis acuminatis, 7-16 mm longis 2-2.5 mm latis, supra media cinereo-tomentosis, interioribus 3-5-seriatis fulvis subito longioribus ante maturitatem erectis eis maturis laxe recurvatis linearibus vel subulato-setaceis cuspidato-acuminatis, 28-30 mm longis 1.25-1.5 mm latis, apice hispidulis extus dense papilloso-scabridulosis remote denticulato-ciliolatis; receptaculo 4-5 mm diam., alveolato alveolis cinereo-pilosulis marginibus alveolarum glabris; paleis 1-2 deciduis marginalibus chartaceis setaceo-subulatis, 29-30 mm longis 0.5-0.75 mm latis, apice extusque scabridulis vel hispidulis intus glabris; floribus actinomorphicis stramineo-viridibus, 22-25 mm longis, tubo prismatico-cylindrico, 6-8 longo 2 mm diam. extus glabro intus fauce pilis albis hirsutulo-barbato (in statu sico fecte pilis patentibus in speciem extus tantum intus unde), lobis 5 erectis linearibus apice subobtusis incrassato-cucullatis glabris, 16-18 mm longis 0.7-0.8 mm latis; filamentis filiformibus in orificio tubi affixis; antheris linearibus, 10.5-11 mm longis, appendicibus termi-

nalibus late triangularibus acutiusculis, 0.5 mm longis, caudicibus sagittatis liberis inaequilateralibus lanceolatis subacutis, 1.3-1.4 mm longis; stylo pallido viridi, 43 mm longo papillato apice bifido extus scabridulo-papillato basi ab corona carnea parce undulata 0.6-0.8 mm longa subtento; achaeniis lineari-turbinatis, 6-8 mm longis 2 mm latis, 10-costatis glabris; pappo stramineo-rufescenti, 23 mm longo, 3-4-seriato, setis barbellatis.

TYPE: open rocky places by savanna bordering escarpment below Summit Camp above Middle Falls near Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 1925 m alt., February 5, 1955 *Julian A. Steyermark & John J. Wurdack 511* (holotype NY, isotype F.). Paratypes: at edge of escarpment, east-central portion of summit of Apácará-tepuí, Chimantá Massif, 2450-2500 m alt., June 21-22, 1953, *Steyermark 75922*; northwest cumbres, Churi-tepuí (Murú-tepuí), Chimantá Massif, 2300-2350 m alt., February 3, 1953, *Wurdack 34312 pp.*

Chimantaea sect. *Chimantaea*.

Virgate, little-branched or sometimes moderately branched shrubs; heads at the stem apex deeply immersed in the uppermost leaves, and a voluminous copious tomentum; corolla-lobes conspicuously barbellate, the tuft of long hairs often quickly deciduous.

TYPE: *Chimantaea mirabilis* Maguire, Steyermark & Wurdack.

3. *Chimantaea lanocaulis* Maguire, Steyermark, & Wurdack, sp. nov.

Frutex 1.5-2.0-metrális, caule erecto ligneo, 2 cm diam., simplici solitario infra denudato aliter apice conferte folioso, parte denudata plerumque glabra parte foliosa densissime ochroleuco-luteo-lanosa; foliis caulis parte suprema confertis alternis subsessilibus vel brevissime petiolatis, petiolis crassis 5-8 mm longis 5-7.5 mm. latis densissime ochroleuco-luteo-lanosis, laminis patentibus coriaceis cuneato-vel rhomboideo-obovatis rotundatis vel subtruncatis basi cuneatis, (4.5) 6-8 cm longis 3-5(7) cm latis, marginibus revolutis, penninerviis nervis lateralibus utroque latere 2-4 prominentibus supra sulcatis subtus elevatis supra oliveo-viridibus glabris vel glabrescentibus supremis juvenilibus irregulariter cinereo-vel ochroleuco-lanulosis subtus densissime ochroleuco-luteo-lanulosis; capitulis solitariis terminalibus sessilibus in foliis supremis et copiosis tomentis insessis 60-100-floris homogamis maturis distentis, 3-3.5 cm longis 5-5.5 cm latis, primum minoribus; involucrio maturo distento late campanulato 5-6-seriato, phyllariis indurato-subcoriaceis 75-85 exterioribus medianisque late lanceolatis obtusis vel acutis ad 15 mm longis 5-6 mm latis basi ipsa densissime fulvo-tomentosis supra medium fulvo-tomentosis marginibus dense ciliato-hirsutis aliter glabris, interioribus intimisque lineari-lanceolatis acuminatis vel caudatis, 22-25 mm longis 2-2.5 mm latis, extus tomentosis basi ipsa excepta; receptaculo areolarum dense ferrugineo-hirsutulo pilis erectis; paleis non visis; floribus actinomorphicis; corollis 22-25 mm longis, tubo prismatico-cylindrico, 8-9 mm longo 1.5 mm diam., extus glabro intus fauce barbato-piloso, lobis fulvis erectis linearibus acutiusculis, 14-16 mm longis 0.75 mm latis, circa apicem rufo-barbatis; filamentis filiformibus in orificio tubi affixis; antheris pallido brunneis, 6-8 mm longis, glabris, appendicibus terminalibus triangulari-lanceolatis acutis, 1.0-1.5 mm longis, caudicibus sagittatis liberis lineari-subulatis, 1.5 mm longis, glabris; stylo subulato longe exserto, 3.1-3.8 cm longo, vinaceo, ramis subadpressis erectis, 0.7-1.0 mm longis, glabris, basi ab corona carnea 5-lobata 1.5 mm alta subtento; achaeniis oblongo-turbinatis prismaticis, 7-8 mm longis, 10-costatis densissime fulvo-hirsutulis pilis sursum directis; pappo rufescenti 2-3-seriato, setis ad 19 mm longis, barbellatis, aristatis.

TYPE: east-central portion of summit of Apácará-tepuí, Chimantá Massif, Bolívar, Venezuela, 2450-2500 m alt., June 21-22, 1953, *Julian A. Steyermark* 75912 (holotype F, isotype NY).

4. *Chimantaea eriocephala* Maguire, Steyermark & Wurdack, sp. nov.

Frutex depressus 0.2-0.5-metralis, caulibus simplicibus vel parce ramosis ligneis infra denudatis, ad 1.5-2.0 cm diam., apice conferte foliosis ferrugineo-lanulosis; foliis apice confertis alternis breviter subito petiolatis, petiolis 7-10 mm longis 2-3 mm latis, densissime fulvo-lanulosis pilis ad 2 cm longis, laminis coriaceis patentibus vel adscendentibus oblanceolatis rotundatis, 2.5-4.5 cm longis 1.0-1.8 cm latis, valde revolutis supra oliveo- vel fulvo-viridibus glabris sulcatis obscure nervatis subtus densissime fulvo-pannosis nervis lateralibus prominulis utroque latere 1-3, costa media subtus elevata; capitulis solitariis terminalibus sessilibus in foliis supremis et copiosis tomentis insessis 20-25-floris homogamis ad 3 cm latis; involucri phyllariis anguste lanceolatis acuminatis, ca. 23 mm longis 1.8 mm latis, extus per medium parce leviter strigosus intus glabris apice utrinque hispidulo excepto; floribus actinomorphicis; corollae tubo paullo prismatico-cylindrico, 5-6 mm longo 1.5 mm diam. extus, glabro intus fauce piloso lobis stramineis erectis linearibus acutis, 15-16 mm longis 0.5 mm latis, parce longiciliatis pilis 2-3 mm longis circa apicem barbatis pilis palidis; filamentis filiformibus in orificio tubi affixis; antheris non visis; stylo subulato basi ad corona carnosa 5-lobato 1 mm alta subtento; achaeniis cylindrico-turbinatis, 5.5-6.0 mm longis 2 mm latis, densissime stramineo-hirsutulis pilis sursum directis; pappo stramineo ca. 2-3-seriato, setis ad 20 mm longis 0.1-0.2 mm latis barbellatis, aristatis.

TYPE: upper cumbre and deep canos, northwest cumbres, Churi-tepuí (Murú-tepuí), Chimantá Massif, Bolívar, Venezuela, 2250-2300 m alt., January 26, 1953, *John J. Wurdack* 34225 (NY).

5. *Chimantaea rupicola* Maguire, Steyermark & Wurdack, sp. nov.

Frutex depressus ramiferus 0.1-0.3-metralis, caulibus ramisque irregulariter curvatis ligneis rugosis, ad 4 cm diam., infra denudatis apice conferte foliosis, ferrugineo- vel pallido-brunneo-pannosis vel vetustioribus glabris; foliis apice confertis sessilibus alternis coriaceis patentibus vel adscendentibus oblanceolatis obtusis vel rotundatis, 3-6 cm longis 0.6-1.5 cm latis, valde revolutis supra oliveo-viridibus penninerviis nervis lateralibus utroque latere 2-4 glabris vel supremis juvenilibus cinereo-pannosis subtus vetustioribus densissime cinereo-pannoso-tomentosis juvenilibus ferrugineo-pannoso-tomentosis; capitulis solitariis terminalibus sessilibus in foliis et copiosis tomentis supremis insessis homogamis, primum 2-2.5 cm longis 1-1.3 cm latis, maturis distentis ad 2.8 cm longis ad 3.5 cm latis; involucri oblongo-campanulato ca. 8-seriato, phyllariis 50-55 indurato-chartaceis extus supra medium densissime ferrugineo-tomentosis intus glabris exterioribus medianisque lanceolatis acutis, 6-12 mm longis 2-3 mm latis, interioribus 18-22 mm longis 1.5-2 mm latis; receptaculo plano vel plano-convexo ca. 2.5 mm diam. valde alveolato marginibus areolarum ferrugineo-hirsutulis; paleis 1-2 deciduis marginalibus submembranaceis setaceo-subulatis, ad 25 mm longis 0.2 mm latis, marginibus parce barbellato-hispidulis extus supra medium ferrugineo-pilosis; floribus 12-24 actinomorphicis; tubo paullo prismatico-cylindrico, 6 mm longo 2 mm diam., extus glabro intus fauce piloso; lobis luteis erectis linearibus obtusis marginibus incrassatis, 12-16 mm longis 0.5-0.8 mm latis, parce longiciliatis extus circa apicem rufo-barbatis; filamentis filiformibus in orificio tubi affixis; antheris ochroleucis linearibus, 5.5-6.5 mm longis, glabris, appendicibus terminalibus lanceolatis acutis, 1.2 mm longis, caudicibus sagit-

tatis liberis linearibus, 1-1.3 mm longis, glabris; stylo subulato longe exserto, 3-3.3 cm longo, superne luteo, ramis erectis, 0.6-0.7 mm longis, glabris, basi ab corona carnea 5-lobata 1-1.2 mm alta subtento; achaeniis oblongo-turbinatis prismaticis, 5-6 mm longis, 10-costatis densissime ferrugineo-hirsutulis pilis sursum directis vel interdum sterilibus glabris; pappo rufescenti 3-seriato, setis ad 18 mm longis, 0.05-0.25 mm latis, barbellatis, appendicum apicibus geniculatis ca. 1 mm longis.

TYPE: rocky and swampy savanna between west and east branches of headwaters of Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 2120-2210 m alt., February 11, 1955, *Julian A. Steyermark & John J. Wurdack* 748 (holotype NY, isotype F).

6. *Chimantaea humilis* Maguire, Steyermark & Wurdack, sp. nov.

Frutex 0.1-0.3-metralis, caule erecto ligneo 0.8-1 cm diam. simplici solitario conferte folioso fulvo-lanoso; foliis supremis patentibus aliis reflexis, alternis subsessilibus basi angustatis coriaceis supra olivaceo-viridibus subtus pallide fulvis anguste spathulatis vel lineari-ellipticis rotundatis, 4.0-6.0 cm. longis 5-8 mm. latis, valde revolutis supra convexis canaliculatis supremis juvenilibusque supra minutissime scabridulis subtus cano-tomentosis; capitulis terminalibus solitariis sessilibus homogamis in foliis supremis et copiosis tomentis insessis in statu sicco campanulatis; floribus actinomorphicis 20 vel paucioribus extus glabris, 23-24 mm longis, tubo prismatico-cylindrico, 7-8 mm longo 1.8 mm diam., extus glabro intus fauce barbato-piloso, lobis 5 erectis linearibus acutiusculis marginibus incrassatis, 14-16 mm longis 0.7 mm latis, glabris apice incrassato incurvato; filamentis filiformibus in orificio tubi affixis; antheris linearibus, 8.5 mm longis, glabris, appendicibus terminalibus late triangularibus acutiusculis, 0.5 mm longis, caudicibus sagittatis liberis spathulatis apicibus late rotundatis; stylo basi ab corona carnea 5-lobata 1.2 mm alto subtento; achaeniis anguste cylindrico-turbinatis prismaticis, 8-9 mm longis superne 2-3 mm latis, 10-costatis fulvo-velutinis pilis sursum directis; pappo stramineo-brunneo vel rufescenti, ad 18 mm longo, 3-4-seriato, setis barbellatis, aristatis.

TYPE: dry rocky places on rocky and swampy savanna between west and east branches of headwaters of Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 2120-2210 m alt., February 11, 1955, *Julian A. Steyermark & John J. Wurdack* 747 (holotype NY, isotype F).

7. *Chimantaea mirabilis* Maguire, Steyermark, & Wurdack, sp. nov.

Frutex 0.5-3.0-metralis, caule erecto ligneo ad 5 cm diam. plerumque simplici solitario interdum apice bifurcato infra denudato aliter conferte folioso, parte denudata glabra, parte foliosa stramineo-lanulosa; foliis congestis sessilibus supremis erecto-patentibus vetustioribus inferioribusque reflexis, coriaceis marginibus valde revolutis supra oliveo-viridibus supremis pilis longissimis densis cremeo-stramineis lanulosis praeditis tandem plerumque deciduis vetustioribus glabris, subtus ochroleuco-pannosis, subteretibus linearibus vel lineari-subulatis praeter basim ipsam ampliata chartaceam obtusis basi ampliatis, 5-8 cm longis 3.5-5 mm latis, basi ipsa 12-15 mm lata, supra canaliculatis basi ampliata 5-nervatis; capitulis terminalibus solitariis sessilibus 45-50-floris homogamis in foliis supremis et copiosis tomentosis insessis in statu vivo ovoideo-cylindricis in statu sicco campanulatis; eis maturis distentis, 4.5-5 cm longis 2-4 cm latis, eis ante maturitatem 3-4.5 cm longis 12-20 mm latis; involucri ca. 5-seriato, phyllariis 90-100, ante maturitatem erectis, eis maturis squarrosis vel laxe recurvatis, indurato-chartaceis, extimis medianisque ovato-lanceolatis vel lineari-lanceolatis acuminatis, 14-18 mm longis infra medium 2-3 mm latis, intus glabris

extus circa apicem parce pilosulis superne minute hispidulis vel strigillosis aliter glabris, marginibus eroso-serrulatis, intimis lineari-lanceolatis vel linearibus, 20-34 mm longis 1-2 mm latis, extus superne dense pilosis vel lanulosis; receptaculo plano-convexo, ca. 6 mm diam., alveolato glabro; paleis 2-5 deciduis marginalibus extus parce pilosis marginibus superne hispidulis; floribus actinomorphicis extus glabris, 24-25 mm longis, aurantiacis et stramineo-brunneis, tubo stramineo-brunneo paullo prismatico-cylindrico, 9-10 mm longo 1.5-2 mm diam., extus glabro intus fauce piloso, lobis aurantiacis vel stramineis 5, erectis in statu sicco apice recurvatis linearibus acutis marginibus incrassatis, 15-17 mm longis 0.6-0.8 mm latis, circa apicem puberulis marginibus ciliatis pilis rufis 1-3 mm longis praeditis; filamentis filiformibus in orificio tubi affixis, 16-18 mm longis; antheris brunneo-stramineis vel aurantiacis linearibus, 7.5-8.5 mm longis, glabris, appendicibus terminalibus anguste triangularibus 1 mm longis, caudicibus sagittatis liberis inaequilateralibus subulatis, 0.7-1.3 mm longis; stylo aurantiaco vel aureo, 35-42 mm longo 1 mm crasso, apice bifido extus subscabridulo-papillato basi ab corona carnosa 5-lobata 1-1.3 mm alta subtento; achaeniis lineari-turbinatis prismaticis, 7-8.5 mm longis superne ad 2 mm latis, plerumque 12-costatis fulvo-velutinis aetate parte inferiore glabrescentibus; pappo stramineo-brunneo, 20-22 mm longo basi 0.2-0.3 mm lato, 3-4-seriato, setis barbellatis.

TYPE: swampy savanna in depression below ridge west of west branch of headwaters of Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 2120 m alt., February 13, 1955, *Julian A. Steyermark & John J. Wurdack* 821 (holotype F, isotype NY). Paratypes: thickets bordering savanna below Upper Falls of Río Tirica above Summit Camp, Central Section, Chimantá Massif, 1940 m alt., February 7, 1955, *Steyermark & Wurdack* 605; dominant in large swamp, east-central portion of summit of Apácará-tepuí, Chimantá Massif, 2450-2500 m alt., June 21-22, 1953, *Steyermark* 75923.

8. *Chimantaea espeletoidea* Maguire, Steyermark, & Wurdack, sp. nov.

Frutex 2-3-metralis, caule erecto ligneo 1.5-2 cm diam. simplici solitario infra denudato aliter conferte folioso, parte denudata cano-tomentosa vel glabra, parte foliosa cano-tomentosa; foliis supremis congestis adscendentibus vetustioribus patentibus alternis petiolatis, petiolis crassis, 1-2 cm longis 1-1.3 cm latis, basi ampliatis utrinque cano-lanosis vetustioribus tomentellis, laminis coriaceis supra atroviridibus glabris vel subglabris subtus ochroleucis dense tomentosis vel vetustioribus cano-tomentosis anguste elliptico-lanceolatis obtusis, 6-10 cm longis 1-2 cm latis, supra sulcatis nervis lateralibus obscuris valde revolutis; capitulis solitariis terminalibus sessilibus in basi lanosa foliorum supremorum et copiosis tomentosis insessis 25-35-floris homogamis maturis distentis, 3.5 cm altis 5.5 cm latis; involucro maturo distento late campanulato 5-6-seriato, phyllariis 75-80, maturis squarrosis vel laxe recurvatis indurato-chartaceis, extimis medianisque late lanceolatis acuminatis, 10-12 mm longis 2.5-3 mm latis, intus glabris extus cano-tomentosis, interioribus intimisque linearibus vel subulatis acuminatis vel caudatis, 30-32 mm longis 1.8-2 mm latis, supra medium ochroleuco-tomentosis intus glabris; receptaculo profunde concavo, 4.5-5 mm diam., areolis parce cano-tomentellis; paleis 3-4, deciduis marginalibus chartaceis subulatis, 30-31 mm longis 0.8-0.9 mm latis, extus medium supra parce pilosis intus glabris; floribus actinomorphicis extus glabris, 26 mm longis, tubo prismatico-cylindrico, 9 mm longo 1.5 mm diam., extus glabro intus fauce dense hirsutulo, lobis pallide luteis 5, erectis apice recurvatis linearibus acutiusculis marginibus incrassatis, 17-18 mm longis 0.7-0.8 mm latis, parce ciliolatis apice

cano-barbatis; filamentis filiformibus vinaceis in orificio tubi affixis, 16-17 mm longis; antheris linearibus, 9.5-10 mm longis, glabris, appendicibus terminalibus triangularibus acutis, 0.6-0.7 mm longis, caudicibus sagittatis liberis subulatis acutis, 1.7-1.8 mm longis; stylo papillato luteo, 43 mm longo apice bifido; acheniis lineari-turbinatis, 8-9 mm longis ad 2 mm latis, 12-costatis glabris; pappo stramineo vel rufescenti, ad 22 mm longo, 3-4-seriato, setis barbellatis.

TYPE: thickets bordering savanna below Upper Falls of Río Tirica above Summit Camp, Central Section, Chimantá Massif, Bolívar, Venezuela, 1940 m alt., February 7, 1955, *Julian A. Steyermark & John J. Wurdack* 574 (holotype F, isotype NY).

Quelchia N. E. Brown, Trans. Linn. Soc. Lond. II. Bot. 6: 41. 1901.

Inflorescences loosely or compactly glomerate, axillary; heads uniflorous; involucre small, cylindric, phyllaries 8-12; corolla regular, thin-textured, the lobes and tube subequal, the first 2-veined, the tube 5-veined, the lobes recurved; filaments short, attached in the sinus; caudal appendage of the anthers sagittate, connate except at the tip; pollen grains yellowish, tricolporate, furrows long pointed; grains subprolate to prolate, sphaeroidal, spinulose; polar axis 50-55 μ ; style glabrous, bulbous at the base, the branches moderately long (1.5-1.75 mm), recurved, dilated compressed, bluntly 3-lobed at the apex, the marginal stigmatic lines obvious; achene fusiform, 10-nerved, annulate at the base, the disk at the summit broader than the body; corona 2-3 mm long, entire; pappus 3-4-seriate, the setae filamentous, flattened at the base, barbellate.

Branched or virgate shrubs with alternate net-veined leaves and malpighioid pubescence. A genus of four species and one recognized hybrid population. Confined to the mesitas of the Roraima chain and Chimantá-tepuí.

TYPE species: *Quelchia conferta* N. E. Brown.

Key to the Species of *Quelchia*

1. Inflorescences pedunculate; stems closely or densely sericeous; corollas white.
 2. Leaves oblanceolate or oblong-oblanceolate; petioles 1.5-2.5 cm long; peduncles 4-8 cm long.
 3. Leaves oblanceolate to elliptic-obovate, 3-7 cm long, acute or acuminate at the base; upper phyllaries glabrous on the back; corollas 10-11 mm long.
 1. *Quelchia conferta*.
 3. Leaves oblong-oblanceolate to oblong, 6-12 cm long, obtuse or acute at the base; all phyllaries tomentose on the back; corollas 12-14 mm long.
 2. *Quelchia cardonae*.
 2. Leaves broadly elliptic to oblong-obovate, 4-6 cm long; petioles ca. 5 mm long; peduncles 1-3 cm long; phyllaries glabrous on the back, scantily pilose at the apex; corollas 9-10 mm long.
 3. *Quelchia bracteata*.
1. Inflorescences sessile; stems copiously lanate or tomentose; corollas red or pink.
 4. Virgate unbranched shrub; leaves elliptic-oblong, oblong or obovate, 4-6 cm long, 2.5-4 cm broad, copiously lanate-tomentose beneath.
 4. *Quelchia eriocaulis*.
 4. Virgate shrub, branched above; leaves obovate to elliptic-obovate, 6-10 cm long, 4-6 cm broad, thinly tomentose becoming more or less glabrescent.
 5. X *Quelchia grandifolia*.

1. *Quelchia conferta* N. E. Brown, Trans. Linn. Soc. II. Bot. 6:41. 1901.

TYPE: summit of Mt. Roraima 8600 ft, *McConnell & Quelch* 652 (Kew).

Distribution. Originally collected on Mt. Roraima, Gran Sabana, Edo. Bolívar, Venezuela. More recent collections from Roraima are: *Tate* 384; *Pinkus* 112; *Steyermark* 58801, 58840; and from Ilú-tepuí north of Roraima: *Maguire* 33428.

A shrub 1-4 m high, of cumbre elfin Woodland, of the Roraima chain, occurring above 2000 m altitude.

2. *Quelchia cardonae* Steyermark, Fieldiana 28:670. 1953.

TYPE: cumbre, Cerro Acopán-tepuí at 2200 m alt., October 1947, F. Cardona 2288 (US No. 19322272).

Distribution. Known only from Acopán-tepuí, Gran Sabana, Edo. Bolívar, Venezuela, where it is an occasional tree of openings and elfin woodlands. Additional specimens, Chimantá Massif: Steyermark & Wurdack 403, 565, 1007.

3. *Quelchia bracteata* Maguire, Steyermark & Wurdack, sp. nov.

Frutex 2-4-metralis, caule erecto ligneo, ramulis erectis infra denudatis aliter conferte foliosis, 0.4-0.7 cm diam., parte media supraque stramineo-tomentosa infra strigoso, pilis malphigio-pauciramosis, foliis alternis densissime confertis erectis breviter petiolatis, petiolis incrassatis, 3-7 mm longis basi 2.5-4 mm latis, pubescentibus vel glabrescentibus, laminis coriaceis supra atroviridibus subtus argenteo-viridibus utrinque valde reticulato-venosis late oblongis vel obovato-oblongis rotundatis vel obtusis apiculatis basi subcordatis vel subobtusis, 3-8 cm longis 1.5-3.5 cm latis, costa media subtus prominenti, nervis lateralibus utroque latere 8-9; capitulorum glomerulis axillaribus, saepe pseudo-terminalibus dense confertis numerosis pedunculatis, pedunculis 0.3-3 cm longis, plerumque strigosis; corymbis 2-2.5 cm latis; capitulis congestis unifloris, 17-21 mm longis cum bracteis foliosis vel lanceolatis acutis vel subacutis, 12-17 mm longis 3-10 mm latis, strigillosis vel supra glabrescentibus subtendentibus; involucri fusiformi-elliptico, 9-12 mm longo 3-4 mm lato, 4-5-seriato, phyllariis 7-9 chartaceo-coriaceis lanceolatis extimis apice acutis vel subobtusis, 8-9 mm longis 2-2.5 mm latis, apice ciliatis extus circa apicem leviter pilosis, medianis intimisque apice obtusis vel subobtusis, 7.5-9 mm longis 2.5 mm latis, apicibus marginibusque parte superiore ciliolatis aliter glabris; corollis albidis actinomorphicis glabris profunde 5-fidis tubo cylindrico 3.5-4.0 mm longo 1.2 mm lato, lobis valde recurvatis linearibus acutis, 6 mm longis 1 mm latis; antheris atropurpureis, 6-6.25 mm longis, basi caudato-sagittatis, appendicibus terminalibus triangulari-lanceolatis acutis, 1.5 mm longis, caudicibus lineari-lanceolatis, 1.5-2.0 mm longis, acutiusculis hispidulis adjacentibus connatis; styli ramulis albidis divaricatis, ca. 1.75 mm longis, minute 3-lobatis; achaeniis subfusiformi-oblongis griseis vel brunneo-purpureis, 4-5 mm longis 1.5 mm latis, leviter 10-costatis glabris; pappo stramineo vel purpureo, vel supra stramineo et basi purpureo, 7-8 mm longo, setis scabridulis.

TYPE: forested slopes below summit of western escarpment, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, 1970 m, February 9, 1955, Julian A. Steyermark & John J. Wurdack 683 (holotype NY, isotype F). Paratypes: rocky slopes around zanjones between east and west branches of headwaters of Río Tirica, Central Section, Chimantá Massif, 2185 m alt., February 12, 1955, Steyermark & Wurdack 754 (putative parent of $\times Q.$ *grandifolia*); Bonnetia forest, north-western part of summit of Abácapa-tepuí, Chimantá Massif, 2125-2300 m alt., April 13, 1953, Steyermark 74872.

4. *Quelchia eriocaulis* Maguire, Steyermark & Wurdack, sp. nov.

Frutex 1-3-metralis, caule erecto ligneo simplici solitario infra denudato aliter conferte folioso, parte media supraque densissime ferrugineo-lanulosa infra tomentoso vel glabrescenti, 0.7-1.2 cm diam.; foliis alternis densissime confertis breviter petiolatis, petiolis incrassatis, 0.7-1.5 cm longis, densissime

fulvo-lanulosis, laminis valde patentibus coriaceis supra atroviridibus glabris obscure vel valde reticulato-venosis subtus densissime fulvo-lanatis oblongo-obovatis vel ovato-oblongis rotundatis vel subobtusis apiculatis basi subcuneatis vel rotundatis, 2-9 cm longis 1-4.5 cm latis, caulium sterilium foliis majoribus ad 12 cm longis ad 5.5 cm latis, costa media supra subsulcata, nervis lateralibus primariis utroque latere 4-12, supra obscuris subtus nullis; capitulorum glomerulis axillaribus dense confertis numerosis inter folia per caulem; capitulis congestis sessilibus unifloris anguste subhemisphaericis vel late fusiformibus, 1.5-2 cm longis 1-2 cm latis, cum bracteis subulatis vel lineari-lanceolatis 11-23 mm longis 1-2 mm latis extus densissime ferrugineo-lanulosis intus glabris subtendentibus; involucro elliptico-ovato vel lanceolato, 2 cm longo 5-6 mm lato, 4-5-seriato, phyllariis 7-9-(10), extimis ovatis vel ovato-lanceolatis abrupte acuminatis, 7-8-(10) mm longis 4 mm latis, extus rufo-pubescentibus vestioribus glabris, medianis late lanceolatis abrupte acutis, ca. 10 mm longis 4 mm latis, parte superiore tertia rufo-pubescentibus vestustioribus glabris, intimis oblanceolatis vel lanceolatis subacutis vel subobtusis, 10-12 mm longis 2-3 mm latis, parte superiore quarta rufo-pubescentibus vetustioribus glabris; corollis rosaceo-rubris regularibus (actinomorphicis), 10-15 mm longis, cylindricis profunde 5-lobis, tubo 6-7 mm longo 1.5-2.5 mm diam. extus puberulo, lobis late lanceolatis acutis, 6-7 mm longis 1.25 mm latis, glabris; antheris 5.5-7 mm longis, basi caudato-sagittatis, appendicibus terminalibus triangulari-lanceolatis subacuminatis glabris, 1 mm longis, caudicibus lanceolatis vel lineari-oblongis subobtusis, 1.5-2.5 mm longis, hispidulis adjacentibus per 0.75-1 mm connatis; styli ramulis subtruncatis apice minute 3-lobatis, 1.5 mm longis, glabris; achaeniis subelliptico-oblongis castaneis, 5 mm longis 1.0-1.5 mm latis, 10-costatis glabris; pappo stramineo, 6-8 mm longo, setis scabridulis.

TYPE: summit, at edge of escarpment in and among zanjones, Torono-tepuí, Chimantá Massif, Bolívar, Venezuela, 2165-2180 m alt., February 9, 1955, *Julian A. Steyermark & John J. Wurdack* 675 (holotype F, isotype NY). Paratypes: east-central portion of summit of Apácará-tepuí, Chimantá Massif, 2450-2500 m alt., June 21-22, 1953, *Steyermark* 75902; rocky slopes around zanjones between east and west branches of Río Tirica, Central Section, Chimantá Massif, 2185 m alt., February 12, 1955, *Steyermark & Wurdack* 753 (putative parent plant of *Q. grandifolia*).

5. *× Quelchia grandifolia* Maguire, Steyermark, & Wurdack, hybrida nov.

Frutex 2-3-metralis, caule erecto ligneo simplici solitario infra denudato aliter conferte folioso, parte media supraque densissime rufo-lanulosa, 1-1.2 cm diam.; foliis alternis densissime confertis patentibus vel adscendentibus breviter petiolatis, petiolis incrassatis, 0.5-1 cm longis, densissime rufo-lanulosis, laminis coriaceis late oblongis vel obovato-oblongis rotundatis basi obtusis supra atroviridibus lucidis subtus argenteo-viridibus vel ferrugineis supra glabris praeter costam mediam basi tomentosam subtus tomentosis novellis dense velutinis, 7-10.5 cm longis 3-6 cm latis, utrinque reticulato-venosis nervis lateralibus utroque latere 7-8; capitulorum glomerulis subsessilibus plerumque in axillis foliorum superiorum; capitulis congestis sessilibus unifloris subhemisphaericis cum bracteis foliosis extimis ovatis 1.5 cm longis 1 cm latis subtus brunneo-velutinis, intimis subulatis vel lineari-lanceolatis extus ferrugineo-tomentosis praeditis; involucro oblongo-lanceolato, 12-13 mm longo 5-6 mm lato, phyllariis 9 chartaceis extus supra medium ferrugineo-lanulosis et extimis ciliolatis aliter glabris, extimis ovatis vel ovato-lanceolatis acutis vel acuminatis 6.5-7 mm longis, medianis intimisque ovato-lanceolatis vel lanceolatis subacutis vel

obtusis 10-12 mm longis extus circa apicem laxe ferrugineo-lanulosis aliter glabris, corollis rosaceis; achaeniis 5-6 mm longis, glabris; pappo 7.5-8 mm longo, plerumque purpureo.

TYPE: rocky slopes around zanjones between east and west branches of headwaters of Río Tirica, Central Section, Chimantá Massif, Bolívar, Venezuela, 2185 m alt., February 12, 1955, *Julian A. Steyermark & John J. Wurdack* 756 (holotype F). Paratypes: same data as above, *Steyermark & Wurdack* 755 (NY); east central portion of summit of Apácará-tepui, Chimantá Massif, 2450-2500 m alt., June 21-22, 1953, *Steyermark* 75913 (F, NY).

Gongylolepis fruticosa Maguire, Steyermark & Wurdack, sp. nov.

Frutex 0.2-0.5-metralis, ramis divaricatis glabris denudatis, caulibus juvenilibus subincrassatis glabris, 2.5-4 mm diam., internodiis 5-10 mm longis; foliis subtus pallide viridibus coriaceis apice caulium principalium rosulato-confertis sessilibus patentibus oblanceolatis acutiusculis vel subobtusis sensim ad basim cuneatis, 4-6 cm longis 1.5-2 cm latis, glabris basi ipsa dilatata excepta strigosis, subtus sulcatis parce penninerviis nervis lateralibus inconspicuis utroque latere 3-4, subtus valde reticulato-venosis costa media prominenti, foliis caulium juvenilium elongatorum alternis adscendentibus paullo minoribus omnino glabris; capitulis solitariis campanulatis terminalibus sessilibus, ca. 2 cm longis 1.3 cm latis; phyllariis firmiter membranaceis 12-18 gradatis 5-seriatis ciliolatis apice subscariosis, exterioribus late ovatis apice rotundatis, 4-9 mm longis 5-6 mm latis, medianis interioribusque angustate oblongis vel oblanceolatis apice rotundatis, 12-16 mm longis 3-5 mm latis; receptaculo subplano paullo alveolato, ca. 4 mm diam. medio pilis paucibus albidis 0.5-1 mm longis praeditis aliter glabro epaleaceo; floribus ca. 10, bilabiatis homogamis, corollis albidis, 18-19 mm longis, tubo infundibuliformi, 8 mm longo, extus puberulo, lobo posteriore (exteriore) elliptico-oblongo, 11 mm longo 5 mm lato, glabro 3-dentato dentibus ovato-oblongis obtusis ad 1.5 mm longis 0.6 mm latis duobus minoribus, lobo anteriore (interiore) 2-partito, segmentis linearibus subacutis valde revolutis 8.5 mm longis 0.5-0.8 mm latis glabris; antheris purpureis, 7.5 mm longis, caudicibus linearibus subacutis, 2 mm longis, liberis; filamentis in orificio tubi affixis; stylo ramulis divaricatis apicibus rotundatis recurvatis; pappo fusco-stramineo, 11 mm longo, adscendenti barbellato; achaeniis immaturis nigrescenti-fuscis, 7.5-8 mm longis, glabris, annulo brevissimo.

TYPE: edge of plunge basin of waterfall, southeast-facing forested slopes below escarpment, Agparamán-tepui, Chimantá Massif, Bolívar, Venezuela, 1880-1955 m alt., February 26, 1955, *Julian A. Steyermark & John J. Wurdack* 1136 (holotype, NY; isotype, F).

Known only from the type locality, *G. fruticosa* represents the ultimate reductive stage in *Gongylolepis* as it is known at this time. Habitally it is similar to the next, and suggests the evolutionary line through which the monotypic genus *Achnopogon* may have been derived.

G. fruticosa belongs to the subsection *Erioclada*, in which it seems to be most closely related to *G. erioclada*, but differs most obviously in its lack of pubescence and narrowly oblanceolate leaves, which in the latter species are elliptic or obovate and non-cuneate.

Achnopogon Maguire, Steyermark & Wurdack, gen. nov.

Capitula parva, in cymis lateralibus dispositis, 3-5-floris, homogamis, floribus bilabiatis; involucro campanulato-cylindrico; phyllariis nonnihil gradatis, obovatis vel oblanceolatis, coriaceis, ad apicem valde barbatis; receptaculo

hemisphaerico, parvo, valde hirsuto, nonalveolato; corollis parvis submembranaceis bilabiatis, tubo cylindrico 5-nervato, limbo longiore, campanulato, lobo posteriore 4-nervato, minute tridentato, lobo anteriore profunde bifido, segmentis linearibus circinnatis 2-nervatis; antheris caudatis, appendicibus apicalibus acutiusculis, appendicibus caudalibus linearibus, integris, liberis; granis pollini luteis, tricolporatis, sulcis longiacutis; granis sphaeroideis, spinulosis, axibus polaribus ca. 52 μ ; achaeniis cylindrico-fusiformibus, aliquantulum 10 (12)-costatis; annulis prominentibus, corona perbrevis, minute 5-lobata, collare pappifero non evidenti, pappo pluriseriato (5) tortili, setis filiformibus minute barbellatis; stylo filiformi laevi; ramis adscendentibus vix exsertis, dorso unilobatis, partibus stigmatibus projectis minutissimis.

Frutex parvus; trunculo brevi, ramis non ramosis; foliis alternis sessilibus confertis coriaceis, penninerviis reticulatis, ellipticis vel elliptico-oblongeolatis.

Genus monotypicum.

TYPUS: *Achnopogon virgatus* Maguire, Steyermark & Wurdack.

Achne ("αχνη), chaff; pogon (πωγων), beard.

Achnopogon virgatus Maguire, Steyermark & Wurdack, sp. nov.

Frutex 0.3-0.6-metralis, caule principali cinereo erecto, 2-12 cm longo 7-12 mm diam., apice cinereo-tomentello aliter glabro, ramis lateralibus simplicibus vel interdum ramosis arcuato-adscendentibus gracilibus, 2-3 mm diam. basi ad 5 mm diam. 2-6 dm altis, cano-pubescentibus vel glabrescentibus; foliis coriaceis apice caulis principalibus vel caulium lateralium brevium rosulato-confertis sessilibus vel breviter petiolatis, laminis subtus pallido-viridibus anguste elliptico-lanceolatis vel oblanceolatis acutiusculis apiculatis vel obtusis, 2-6 cm longis 6-12 mm latis, subtus leviter penninerviis nervis lateralibus utroque latere plerumque 10-12 valde reticulato-venosis supra nervis obscuris vel nullis, irregulariter pilosis vel glabrescentibus, costa media prominenti, supra canaliculata subtus prominenti, marginibus valde nervatis, foliis caulium floriferum lateralium erecto-adscendentibus alternis plerumque breviter petiolatis, petiolis 3-5 mm longis 1.5-2 mm latis, laminis oblongo-lanceolatis vel elliptico-oblongis acutis vel acuminatis apiculatis, 1.5-2.5 cm longis 4-9 mm latis, subtus leviter penninerviis nervis lateralibus utroque latere 4-7 valde reticulato-venosis supra nervis obscuris vel nullis dense vel parce pilosis; inflorescentiis lateralibus in axillis foliorum superiorum in cymis dispositis breviter pedunculatis; capitulis 2-3 in cyma, campanulato-cylindricis, 10-15 mm longis 4-5 mm latis, homogamis 4-6-floris; phyllariis 15-20, firme chartaceis vel apice subcoriaceis ca 5-seriatis aequaliter gradatis adpressis, 5-9-striatis, extremis ovatis vel lanceolatis acutis, 3-5 mm longis 0.8-1.6 mm latis, extus omnino cano-hirtellis intus glabris, medianis oblanceolatis vel obovatis acutis, 6-7 mm longis 2-3 mm latis, extus apice et parte suprema cano-barbatis pilis erectis infra medium intusque glabris, intimis supremisque oblanceolatis acutis, 9-10.5 mm longis 1.5-2.0 mm latis; receptaculo hemisphaerico, 0.6-0.9 mm diam., apice hirsutis pilis erectis 2-4 mm longis; corollis bilabiatis, 8.0-8.5 mm longis, tubo cylindrico, 3-3.5 mm longo 0.4-1.5 mm diam., extus supra basim minute puberulo, limbo 5 mm longo, lobo posteriore (exteriore) intus albido extus albido-lilacino apice purpureo, 4-5 mm longo, 3-dentato lobis ovatis obtusis 0.2-0.3 mm longis, lobo anteriore (interiore) 2-partito, lobis albidis ligulatis acutiusculis valde revolutis, 3-4 mm longis 0.5-0.6 mm latis; filamentis ca. 0.5 mm longis, in orificio tubi affixis; antheris vinaceis, 3.75-4.0 mm longis, appendicibus terminalibus ovatis subacutis, 0.5-0.6 mm longis, caudicibus simplicibus non sagittatis linearibus suba-



Maguire, Bassett, Steyermark, Julian A., and Wurdack, John J. 1957. "Botany of the Chimanta Massif — I. Gran Sabana, Venezuela." *Memoirs of the New York Botanical Garden* 9(3), 393–439.

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