Plant terrestrial or epiphytic. ***Roots*** ca. 1 mm in diameter; pseudobulb ovoid-ellipsoid, exposed, ca 2.5 × 1.2 cm. ***Leaves*** 2, petiole tubular, 3.5–8 cm, with sheaths 1.5–4 cm without, blade 4.5–8.5 × 3–5.5 cm, broadly ovate, short-acuminate. ***Peduncle*** ca. 14 cm, raceme subumbellate, to 1.5 cm, floral bracts ca. 1 × 1–1.3 mm, ovate, acute. ***Flowers*** pale green; pedicel 5–8 mm; dorsal sepal 2–2.7 × 0.8–1 mm, oblong, obtuse, revolute, lateral sepals 2–3 × ca. 1 mm, oblong, obtuse; petals 1.8 mm, ligulate; lip 2–2.3 × ca. 2 mm (if flattened), deeply concave, apically tridentate/trilobulate, beak ca. 0.5 mm, the three lobules subequal; column ca. 0.7 mm.

This species has very small flowers that are reminiscent of both *Malaxis aurea* and *M. simillima,* but the lip is shorter, proportionately deeper and more abruptly beaked. The beak is much shorter than that of *M. simillima,* with the mid-lobule only about 0.5 mm long. At present the species is known only from the region of Cerro Colorado, a mountain that is badly cut over and may yet become the site of a copper mine. The epithet *rostratula,* from *rostrata,* or beaked, with the diminutive suffix *ula,* refers to its small size and the abrupt beak at the apex of the lip.

Paratype. Panama. Chiriquí: San Félix, Cerro Colorado, on road, 31.6 km from Río San Félix bridge, 1690 m, 15 July 1976; epiphyte, flowers yellow, *G.A. Sullivan 348* (MO).

Malaxis triangularis Dressler, sp. nov. Holotype: Guatemala. Quezaltenango: near Quezaltenango, 8200 ft, 22 July 1934, *A.F. Skutch 972,* AMES.

Plant terrestrial. ***Roots*** 0.3–0.7 mm in diameter; corm globose-ovoid, subterranean, 0.7–1.5 cm. ***Leaf*** 1, petiole tubular, 6–13 cm, with a tubular sheath 3–9 cm without, blade 3–8 × 1.8–5 cm, ovate, subcuneate to cordate, apiculate. ***Peduncle*** 15–28 cm, raceme subumbellate, to 2.5 cm, floral bracts 0.9–1 × 0.8–1 mm, triangular, acute; flowers pale green; pedicel 6–10 mm; dorsal sepal 2–3 × 1–1.8 mm, ovate or oblong-ovate, obtuse or acute, lateral sepals 2.4–4 × 1.2–1.4 mm, ovate, subacute, apices thickened; petals ca. 2.4 mm, linear; lip 2–3 × 1.4–2 mm, subtruncate to shallowly hastate, narrowly triangular, acute, auricles 0.2–0.7 mm; column ca. 0.8 mm.

Central American plants of this species have been identified as *Malaxis corymbosa* (S.Wats.) Kuntze, but that species, of the USA and northern Mexico, has subcircular, apiculate lips. Some Guatemalan material has been identified as *M. brachystachys* Rchb.f., but that Mexican species has flowers about twice as large and with a proportionately broader lip. In *M. triangularis,* the lip is triangular (a bit too narrow to be called deltoid) and about half as large as in *M. brachystachys.*

Paratypes. Mexico. Veracruz: Cerros above Santiago, W. of Huayacocotla, 1900–2000 m; 23 July 1973, oak, pine, madroño, and juniper, flowers yellowish green, *R.L. Dressler 4437* (AMO); flowers translucent green, lip darker, *Dressler 4438* (AMO, MO); Chiapas: Km. 1220, Pan-American Highway, 4 June 1950, *J.T. Baldwin 14343* (LL). Guatemala. El Quiché: El Boquerón, 8000–8200 ft, 10 August 1964, *G.R. Proctor 25480* (LL); Valley of the Rio de las Violetas, n. of Nebaj, 25 June–17 August 1964, *G.R. Proctor 25300* (LL); Sacatepéquez: Antigua 6 July 1938, *J.R. Johnston 1248* (AMES). Honduras. Tegucigalpa: Cedros Abajo, 3000 ft, 18 September 1931, *J.B. Edwards 42* (AMES). El Salvador. V. San Salvador, Boquerón, interior, 1800 m, 1 September 1969, *F. Hamer 160* (MO); Finca El Pital, Cerro El Pital, 2450 m, 22 July 1975, *F. Hamer 496* (AMES).

Acknowledgments

I thank Miguel Angel Soto and Gerardo Salazar for helpful discussion of this troublesome genus, Franco Pupulin for help with Latin diagnoses and Stig Dalström for preparing the drawings.

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Selbyana 24(2): 144–164. 2003.

REVIEW OF THE *MAXILLARIA GRAMINIFOLIA* (Kunth) RCHB.F. (ORCHIDACEAE) SUBALLIANCE

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ABSTRACT. Specimens from the *Maxillaria graminifolia* suballiance (here redefined) were examined with 50 flowers analyzed from SEL, AMES, and MO. From 26 published names including 14 basionyms, six species from the *Maxillaria graminifolia* complex are recognized. Three basionyms of R. Schlechter, of which no types have been located, are tentatively placed among the accepted species. The earliest name in the group, *Isochilus graminifolium* Kunth, has been misapplied. A specimen intermediate between specimens of two other accepted species is interpreted as a natural hybrid. From this study some unique vegetative characters are identified for convenient field identification in addition to unique distribution ranges (i.e., Central America vs. South America). Range maps and complete exsiccati are cited. A key to accepted species is provided.

Key words: *Maxillaria,* Orchid, Orchidaceae

INTRODUCTION

The informally circumscribed *Maxillaria graminifolia* suballiance is redefined and presented as a hypothesis of monophylesis on the basis of narrowly ellipsoid to linear capsules, apparently monopodial stems in the adults, and leaves that are lanceolate to elliptic and generally less than 2 cm broad. Juveniles with renewal shoots terminated by a pseudobulb are unknown. Flowering scapes are single per leaf axil, and floral bracts generally far exceed a quarter the ovary length. This circumscription includes both the informally circumscribed Graminifolia (lanceolate leaves) and Luteorubra (elliptic leaves) suballiances published by the Florida Museum of Natural History at (http://www.flmnh.ufl.edu/natsci/herbarium/max/default.htm) by J. Atwood, G. Carnevali, and C.H. Dodson. The acceptance of two circumscriptions fails to reflect the nearly indistinguishable flowers of *M. cassapensis* Rchb.f. and *M. brevifolia* (Lindl.) Rchb.f., each from different suballiances. This current circumscription excludes *M. nitidula* Rchb.f., a species with distinct pseudobulbs. The remaining species of the *Maxillaria graminifolia* alliance (Dendrobioides suballiance) have broadly ellipsoid to globose capsules, rounded to bilobed leaf apices, and one or two flowers per leaf axil.

Images are published for four of the species. *Maxillaria appendiculoides* C.Schweinf. and *M. linearifolia* Ames & C.Schweinf. have been illustrated in Atwood and Mora (1999); *Maxillaria cassapensis* Rchb.f. has been illustrated in Dunsterville and Garay (1966, p. 147), Foldats (1970, p. 469), Dodson and Dodson (1989), and in Dodson and Vásquez (1989) under various names; and *M. graminifolia* (Kunth) Rchb.f. has been illustrated under erroneous names and later synonyms discussed below.

This study was initiated in an attempt to resolve the species and their distributions over the entire range of the complex and may be used either as a basis for species treatments in national and local floras (when cited) or as a basis for field study.

METHODS

For this study 50 flowers were analyzed from spirit collections or from rehydrated flowers selected from herbarium sheets. These were drawn with the aid of a drawing tube, and the drawings were carefully compared with each other and with available types or images of types, type illustrations, and their original descriptions. Use of the drawing tube produces comparable sizes and shapes of floral parts being illustrated. All images of herbarium specimens were photo reduced to 65% on archival quality acid-free paper and glued to their respective sheets as evidence for public documentation of observations as well as for readily accessible comparisons of floral details. Acceptance of species was further facilitated by consultation with C.H. Dodson and G. Carnevali (for Venezuela) with field knowledge of the complex in South America.

Six species were revealed with 26 names based on 14 basionyms distributed among them. Although intensive field comparisons may reveal more species among the names accepted

here as synonyms, over-description appears to have contributed to nomenclatural complexities caused by the use of the same specific epithets in the genera *Maxillaria, Ornithidium,* and *Camaridium* and by the lack of understanding of the earlier published names by later authors in this cumbersome and complex genus. Numbers of specimens analyzed vary depending on complexity. Central America is relatively well known with but two distinct species based on field observations requiring few analyses. The greatest number of analyses was given to *Maxillaria brevifolia* and *M. graminifolia* in an attempt to resolve their "variability" into yet more species.

The distribution maps provided contain symbols that represent the approximate location of a single collection per political subdivision and not on actual coordinates. They reveal that the *Maxillaria graminifolia* alliance is strictly montane. The species often occur along divides in windy and wet cloud forests that often coincide with political borders, hence the occurrence of many symbols on such boundaries.

Taxonomic Treatment

Maxillaria appendiculoides C. Schweinf., Bot. Mus. Leafl. 4: 119–121. 1937. Type: Costa Rica: *Brenes (239) 1427* (Holotype: AMES!, Isotype: NY!). FIGURES 1, 7.

Habit epiphytic, straggly, often pendent; juveniles unknown; adult stems elongate, lacking pseudobulbs, concealed by sheaths; roots to ca. 1 mm in diameter, white. ***Leaves*** distichous, deciduous on the lower stems, thin; blade 1–4 cm × 5–13 mm, elliptic to broadly lanceolate, rounded and unequally 2-lobate apically. ***Inflorescence*** single per leaf axil, shorter than the subtending leaf; peduncle 1–2 cm; ovary with pedicel ca. 1 cm, subtended by a somewhat shorter, acute bract. ***Flowers*** yellow or greenish; lip with purple. ***Sepals*** 8–9 × 3–3.5 mm, ovate-lanceolate, somewhat concave, ovate-lanceolate, lateral sepals somewhat oblique, acute. ***Petals*** 6.5–7.5 × 1.5–1.75 mm, narrowly elliptic-linear, somewhat falcate, acute. ***Lip*** 6 × 4.5–5 mm when spread, hinged to the foot, rhombic-ovate in outline when spread, somewhat 3-lobate above the middle; lateral lobes rounded and somewhat clasping the column; midlobe subquadrate, rounded to truncate; callus simple, from near the base to about the middle, ligulate, rounded in front. ***Column*** ca. 4 mm excluding the anther; foot 2–2.5 mm. ***Capsule*** 1.5–1.9 cm, ellipsoid, separating into 6 valves, with persistent column.

The species is apparently endemic to premontane and lower montane rain forests of Costa Rica at 800–1600 m elevation where it is rare or at least inconspicuous, but it is expected in Panama (FIGURE 14). Flowering August to November.

Maxillaria appendiculoides is closely related to *M. brevifolia* (Lindl.) Rchb.f. from South America, a species with somewhat larger flowers and less pendent habit. From sympatric *M. linearifolia* Ames & C.Schweinf. it is easily distinguished by the shorter elliptic leaves and lower elevation range. Flowers analyzed: 2 including holotype and isotype.

COSTA RICA: Prov. Alajuela: Reserva Biologica Monteverde, Río Peñas Blancas, 10°19′N, 84°43′W, 820 m elev., 13 Oct. 1988, *Bello & Cruz 460* (MO); [no collector], San Pedro de San Ramon, 1400(?) m, 8 Aug. 1925 (AMES).

Maxillaria brevifolia (Lindl.) Rchb.f., Ann. Bot. Syst. 6: 540–541. 1863. *Camaridium brevifolium* Lindl., Benth. Pl. Hartw. 154. 1845. Type: Ecuador: in the mountains of Loja, *Hartweg* (microfiche SEL! ex K). FIGURES 2, 8.

Camaridium luteo-rubrum Lindl., Orch. Lind. 22. 1846. Type: Venezuela, "forests in the neighbourhood of Merida," *Linden 633* (microfiche SEL! ex K). *Maxillaria luteo-rubra* (Lindl.) Rchb.f., Ann. Bot. Syst. 6: 539–540. 1863.

Camaridium longum Schltr., Repert. Spec. Nov. Regni Veg. Beih. 8: 99. 1921. Type: Prov. Pichincha: near Quito, *Sodiro 128b* (B, destroyed). *Maxillaria longa* (Schltr.) Dodson, Orquideologia 19: 96. 1994.

Habit erect to decumbent, epiphytic or opportunistically terrestrial appearing monopodial as adults to ca. 1 m; juveniles unknown; roots to 1 mm across, white. ***Adult stems*** to 8 mm across, concealed by leaf sheaths, lacking pseudobulbs, usually branched, the branches forming an acute angle with the apical shoot. ***Leaves*** distichous; sheaths moderately rugose; blades 2–7.5 × 0.6–1.8 cm, reflexed above the articulation, thin, keeled beneath, elliptic to elliptic-lanceolate, acute. ***Inflorescence*** single per leaf axil; scape ca. 1.5–2.5 cm, mostly concealed by the leaf sheath; ovary (18)21–30(33) mm, cylindric, wiry, with usually shorter, subtending, acute, floral bract 9–23 mm. ***Flower*** erect, yellow with dark red to purple callus. ***Sepals*** similar, acute to acuminate; dorsal 12–16 × 4.5–6 mm, ovate, somewhat appressed to the column; lateral sepals 12–18 × 4.5–6.5 mm, spreading, obliquely and broadly lanceolate to triangular. ***Petals*** 10–13 × 3.5–5 mm, obliquely elliptic, with apices recurved, acute to acuminate. ***Lip*** 8.5–11.5 ×

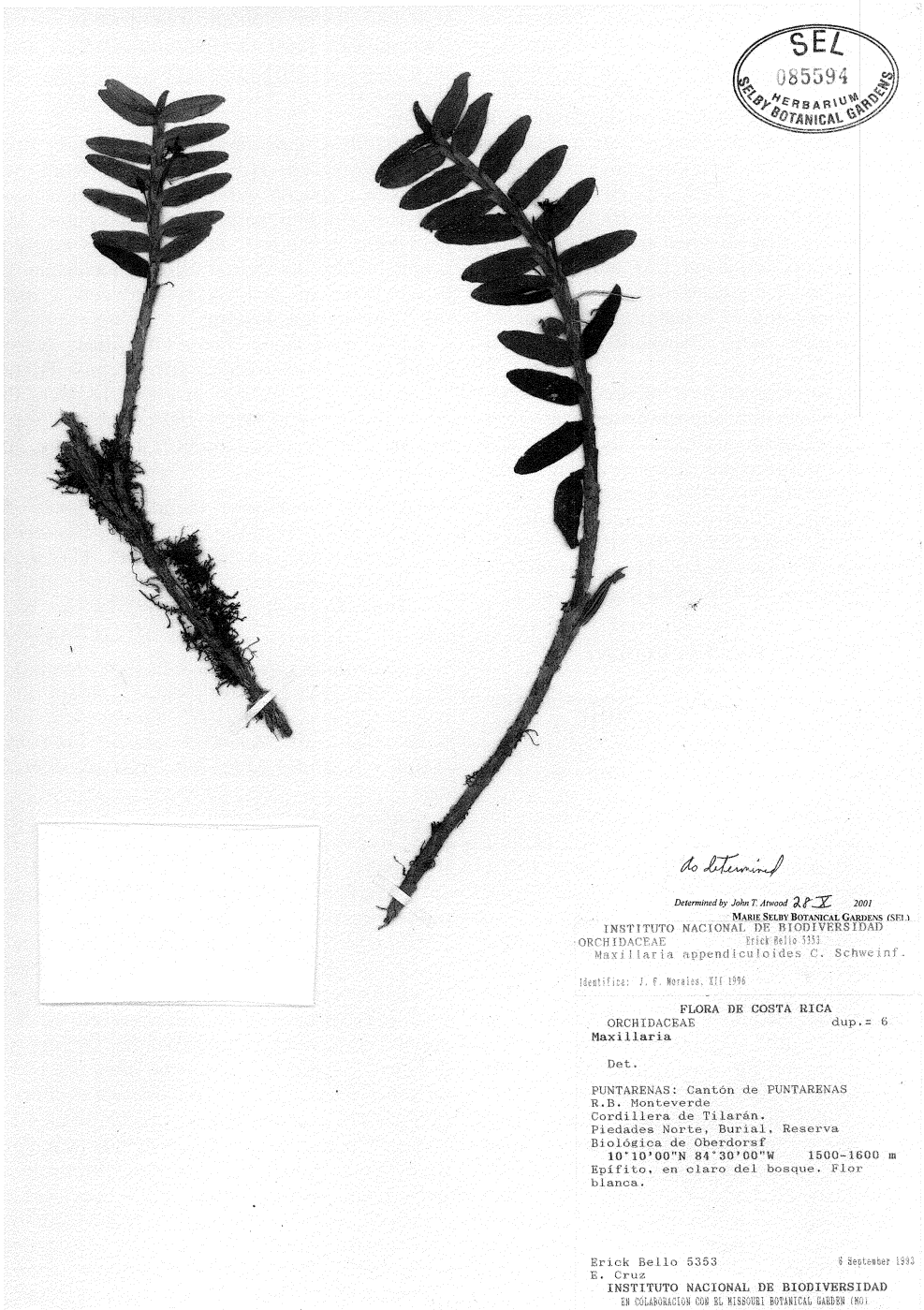

FIGURE 1. *Maxillaria appendiculoides* C. Schweinf.

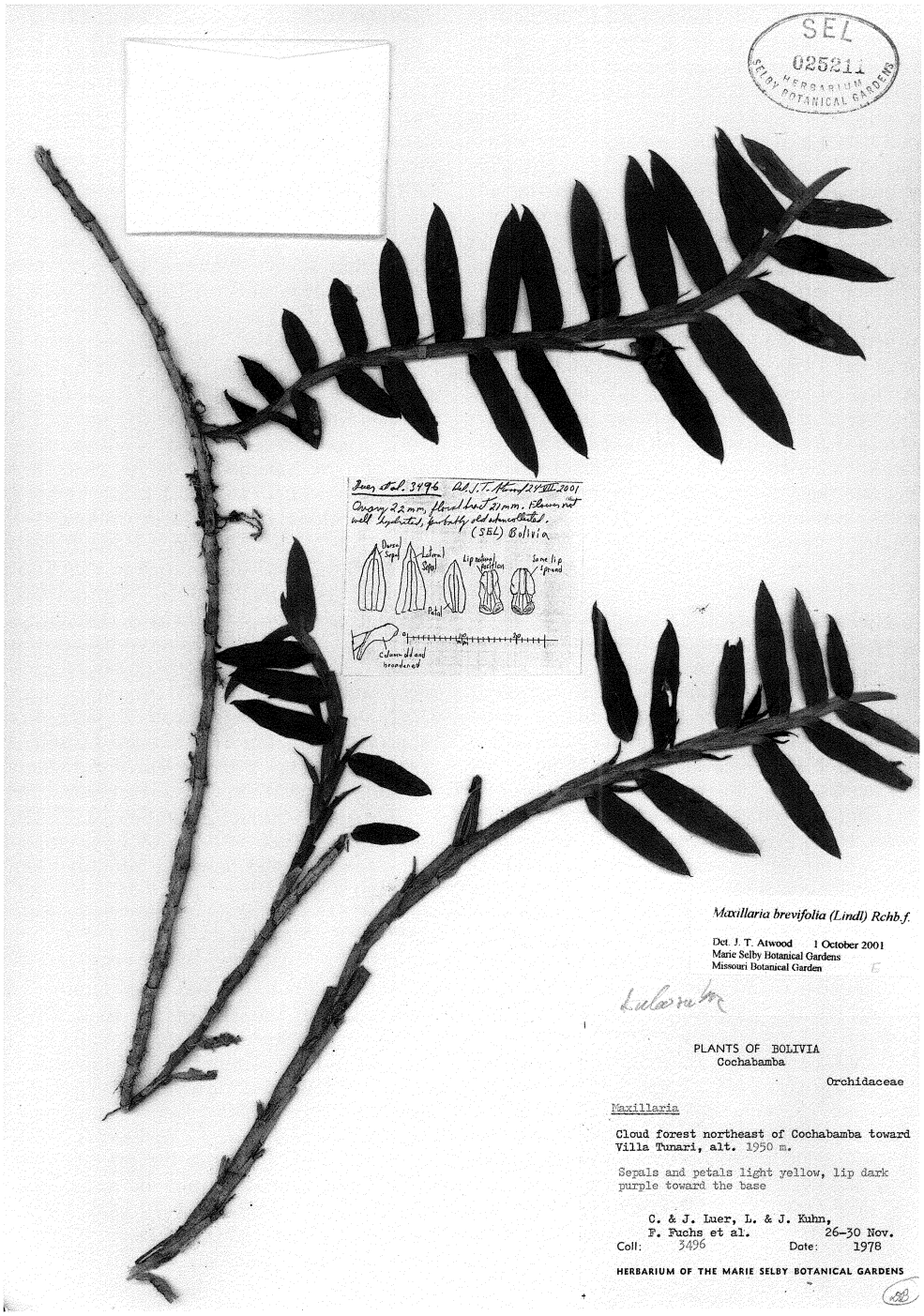

FIGURE 2. *Maxillaria brevifolia* (Lindl.) Rchb.f.

4.5–5.5 mm with side lobes spread, hinged to the column foot, 3-lobate at about the middle; side lobes low, embracing the column; midlobe subquadrate, rounded to emarginate in front, with an apical thickening on each side; callus shaped like a loaf of bread, ending at the sinuses, the width much less than half the length. ***Column*** arcuate, 5.5–7(8) mm long excluding anther; foot 2.5–4 mm; anther 1.5 mm in diameter. ***Capsules*** 2–3 cm, ellipsoid, separating into 6 valves but united at the apex, apex with persistent flower parts.

A widespread species of cloud forests (often disturbed) from Venezuela to Ecuador, Peru, and Bolivia at 1250–2600 m elev. (FIGURE 15). Flowering November to April, July and August.

Maxillaria brevifolia is similar to *M. longibracteata* (Lindl.) Rchb.f., but it occurs at lower elevations than the latter; it is often branched above; and the flowers, especially the petals and capsules, are smaller.

Lindley compared his *Camaridium luteo-rubrum,* a "normal" plant with elongate leaves, with his *Maxillaria brevifolia,* a smaller plant with shorter leaves, which appears to be a stressed form of the species, possibly in more windy habitats. Although no type was seen of *Camaridium longum,* Schlechter's description of the elongate stem with dense foliage, acute leaves to 8 × 1.4 cm, and matching published drawing (Schlechter & Mansfeld 1929, t. 98 [383]) leaves little doubt of its synonymy with *M. brevifolia.* Foldats (1970) included *M. cassapensis* Rchb.f. as a synonym of *Maxillaria longibracteata* var. *luteorubra,* but the distinctly lanceolate leaves of the former easily distinguish it, although the flowers are similar. Flowers analyzed: 21. This higher number of rehydrations supports recognition of but a single variable species. Extensive fieldwork over the entire range might resolve the variation into more than one species.

VENEZUELA: Edo. Barinas: Distr. Pedraza: w. of Carrizal (La Escaza), Parque Nacional Sierra Nevada, 8.31°N 70.46°W, 27 June 1988, *Dorr et al. 5740* (AMES). Edo. Mérida: above Las Cuadras, along Quebrada Molino, n. of Torondoy, 1820–2255 m, 27 March 1944, *Steyermark 55809* (AMES). **COLOMBIA:** Dept. Antioquia: Mpio de Guatapé, ca. 8 km NNE of Guatapé, Vereda Santa Rita, Finca Montepinar, 6°17′N, 75°8′W, 1840 m elev., 20 Nov. 1986, *Zarucchi 4187* (MO, SEL); 1850 m, 6 June 1985, *Escobar et al. 5278* (MO); 1850 m, 13 Feb. 1986 (in fruit), *Escobar et al. 6297* (MO); Medellín, ca. 1500 m, 4 Jan 1931, *Archer 1353* (AMES). Dept. Cauca: El Halico, Popayan, 1500–1800 m, January, *Lehmann "B.T. 213"* (AMES); El Halico 1500–1700 m, *Lehmann 8279* (AMES, 2 sheets). Dept. El Valle: La Cumbre, 1700–2200 m, 11–18 Sept. 1922, *Killip 11334* (AMES). Dept. Huila: Cordillera Oriental, east of Neiva, 18–2300 m, 1–8 Aug. 1917, *Rusby & Pennell 866* (AMES). Dept. Putumayo: Valle de Sibundoy, ca. 2200 m, 6 km SW of Sibundoy, 9 May 1963, *Bristol 992* (AMES). **ECUADOR:** Prov. Imbabura: in wet area E of Selva Alegre, 2100 m elev., 1 March 1992, *Dalström 1593* (SEL). Prov. Loja: cloud forest above San Pedro, 2400 m elev., 17 February 1983, *Dalström 508* (SEL); cloud forest above San Pedro, 2450 m elev., April 1984, *Höijer & Dalström 760* (SEL); Nudo de Sabanilla in road to Yangana, 2600 m, 6 Feb. 1985, *Harling & Andersson 21726* (MO, AMES); Nudo de Sabanilla, s of Yangana, 7500 ft. elev., 20 August 1982, *Clemants 2383* (SEL); along new army road east of Yangana, 2480 m elev., 4 March 1982, *Luer et al. 7182* (SEL); San Pedro de Vilcabamba along road to Loja walking 2 hrs up path, 2400 m elev., 23 April 1986, *Dalessandro 633* (MO); Cerro Toledo, road to "La Torre" ca. 7 km SE Yangana, 2500 m, 7 April 1985, *Harling & Andersson 23810* (MO, AMES); 40 km. NE Loja, curso del Río Zamora hacia el Oriente, 9 June 1947, *Espinosa 1505* (AMES). Prov. Morona-Santiago: 1250–1400 m elev., 1–24 July 1982, *Dodson & Embree 13177* (SEL); Road Limón-Gualaceo, km 16–18 from Limón, 1900–2000 m, 22 March 1974, *Harling & Andersson 12713* (MO, AMES). Prov. Pichincha: between km 37 and km 50 along Río Saloya, 22–23 April 1943, *Steyermark 52491* (AMES); cloud forest along the old road between San Juan and Chiriboga, 1800–2200 m elev., 7 March 1982, *Hirtz & Leon 212* (SEL); road from Tandapi to Zarapullo off highway from Quito to Santo Domingo, 1500 m elev., 28 May 1988, *Hirtz 3875* (MO); km 59 of the old road Quito to Santo Domingo, 3.5 km NE of the road, 0°13′53″S, 78°48′10″W, 1800–2200 m, 18 Feb. 1986, *Zak 855* (MO). Prov. Tungurahua: 5 km west of Baños, ca. 1850 m, 28 May 1968, *Harling et al. 9901* (AMES). **PERU:** Dept. Amazonas: Prov. Chachapoyas: Vic. of Leimebamba, 2250 m, 4 April 1964, *Hutchison & Wright 4913* (AMES). Dept. Ayacucho: Ccarrapa between Huanta & Río Apurimac, 1500 m, 5–17 May 1929, *Killip & Smith 22366* (AMES). Dept. Cuzco: Prov. Convención(?): 1800 m, 13 Jan. 1968, *C. Vargas 20245* (AMES). Dept. Junín: Huacapistana, 1800–2400 m, 5–8 June 1929, *Killip & Smith 24313* (AMES). Dept. Pasco: Prov. Oxapampa: 19 km W of Oxapampa, 75°33′W, 10°36′S, 2080 m, 19 Nov. 1982, *Smith 2716* (MO). Dept. Puno: Prov. Sancha(?): Sto. Domingo area, 1550 m, 2 March 1940, *McCarroll 144* (AMES). **BOLIVIA:** Dpto. La Paz: Prov. Murillo: 27.4 km below

N dam at Lago Zongo, Valle del Zongo, 16°7′S, 68°7′W, 2500 m elev., 16 March 1984, *Solomon et al. 11865* (MO); 30.5 km N of dam at Lago Zongo, 16°7′S, 68°5′W, 2200 m elev., 16–17 December 1982, *Solomon 9092* (MO, SEL); 30.5 km N of dam at Lago Zongo, 16°7′S, 68°5′W, 2200 m elev., *Solomon 9122* (MO, SEL); 28.5 km al N de la cumbre, 30 January 1988, *Solomon 17771* (MO, SEL). Dept. Cochabamba: NE of Cochabamba toward Villa Tunari, 1950 m elev., 26–30 Nov. 1978, *Luer et al. 3496* (SEL); Dept. Cochabamba: Prov. Chapare: between Cochabamba and Villa Tunari, near km 100, 1850 m elev., 17 January 1984, *Luer et al. 9392* (SEL). Dept. unknown: Yungas, 1890, *Bang 478* (MO, GH).

Maxillaria cassapensis Rchb.f., Ann. Bot. Syst. 6: 539. 1863. Type: Peru, at Cassapi and Cuchero, Sept. 1828, *Poeppig 1387* (photo AMES! ex Holotype W). *Camaridium cassapense* (Rchb.f.) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 9: 165. 1921.

FIGURES 3, 9.

?*Isochilus grandiflorum* Lindl., Edwards's Bot. Reg. 27, sub. T.1. 1841. Type: Peru: (microfiche SEL! ex Holotype K). *Maxillaria haenkei* Correll, Bot. Mus. Leafl. 10: 13. 1941. *Camaridium grandiflorum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 9: 165. Sept. 1921. Not Ames, Proc. Biol. Soc. Wash. 34: 149. Dec. 1921. *Maxillaria longibracteata* (Lindl.) Rchb.f. var. *grandiflora* (Lindl.) C.Schweinf., Bot. Mus. Leafl. 11: 279. 1945.

?*Camaridium flavum* Schltr. Repert. Spec. Nov. Regni Veg. 27: 76–77. 1929. Type: Bolivia: La Paz, "Auf Bäumen, Hacienda Simaco, oberhalb des Weges nach Tipuani," 1400 m elev., April 1920, *Buchtien 5057* (Syntype: B, destroyed); same locality, September 1922, *Buchtien 7229* (Syntype: B, destroyed).

Maxillaria pungens Poepp., unpublished herbarium name.

Habit epiphytic or opportunistically terrestrial, often dense and bush-like, to 1 m tall with elongate scrambling monopodial stems lacking pseudobulbs as adults; juveniles unknown; roots to under 1 mm in diameter, whitish to brownish. ***Stems*** rarely to 8 mm in diameter, wiry, concealed by leaf sheaths, usually branched above, the branches forming an acute angle with the apical shoot. ***Leaves*** distichous; sheaths smooth; blades 2–11 cm × 3–11 mm wide, strongly reflexed at 90 degrees from the sheath just above the articulation, lanceolate, acute, keeled beneath, with revolute margins. ***Inflorescence*** 1 per leaf; scapes ca. 2 cm mostly concealed by the leaf sheath, ovary 16–22 mm, subtending floral bract 8–13 mm, lanceolate, acute. ***Flowers*** with cream to white sepals and petals and lip red to purple with white apex. ***Sepals*** dissimilar, acute to shortly acuminate; dorsal sepal 9–12 × 3–4 mm, somewhat hooded with recurved apex, narrowly ovate to broadly lanceolate; lateral sepals 11–12 × 3–4 mm, spreading, lanceolate, usually with somewhat recurved apices. ***Petals*** 9–10 × 2–3 mm, elliptic-ovate, at least 4-veined, acute, closely appressed to the column, acute with recurved apices. ***Lip*** 9 × 4.5–5.5 mm when spread, hinged to the column foot, 3-lobate on the upper third to one half; lateral lobes broadly rounded, somewhat embracing the column; midlobe somewhat reflexed, subquadrate, rounded in front, somewhat thickened apically on both sides; callus ca. 5 × 1.3 mm, thick, rounded on top and in front, texture waxy or starchy. ***Column*** somewhat arcuate, 6–7 mm long excluding the anther, foot 2–2.5 mm long. ***Capsules*** 1.5–2 cm excluding the persistent column (beak), cylindric with persistent floral parts.

A widespread species of humid montane (cloud) forests from Venezuela to Ecuador, Peru and probably Bolivia (see below) at 1110–2500 m. elev. (FIGURE 15). Flowering at least September to June.

Maxillaria cassapensis is most similar to *M. linearifolia* Ames & C.Schweinf. from Costa Rica and Panama, but the latter species differs conveniently in its geography as well as in its much longer ovary.

Maxillaria cassapensis seems to be the earliest available name for plants recognized by Dunsterville and Garay (1976, p. 40) and Dodson and Dodson (1989, t. 534) as *M. graminifolia* (see notes under that name), a species with much shorter column but with the same narrowly lanceolate leaves. From these studies, there is only a single widespread species in South America with narrowly lanceolate leaves and relatively long columns, and it is *M. cassapensis.* Charles Schweinfurth recognized this species as a variety of *M. longibracteata,* a species with more erect canes and elliptic leaves; moreover the flowers are indeed very similar. Beside plant habit and leaf shape differences, the sepals and petals of *M. cassapensis* are cream to white (one specimen from Venezuela described as "yellow") while those of *M. longibracteata* are yellow.

Isochilus grandiflorum Lindl. is tentatively placed here based on the drawing of the flower showing an elongate column and description of the leaves as linear-lanceolate and most acute. Otherwise it could match *Camaridium brevifolium* Lindl.

Schlechter compares his *Camaridium flavum* with *C. luteo-rubrum* and *C. caucanum* Schltr., so it most likely belongs to the *Maxillaria gra-*

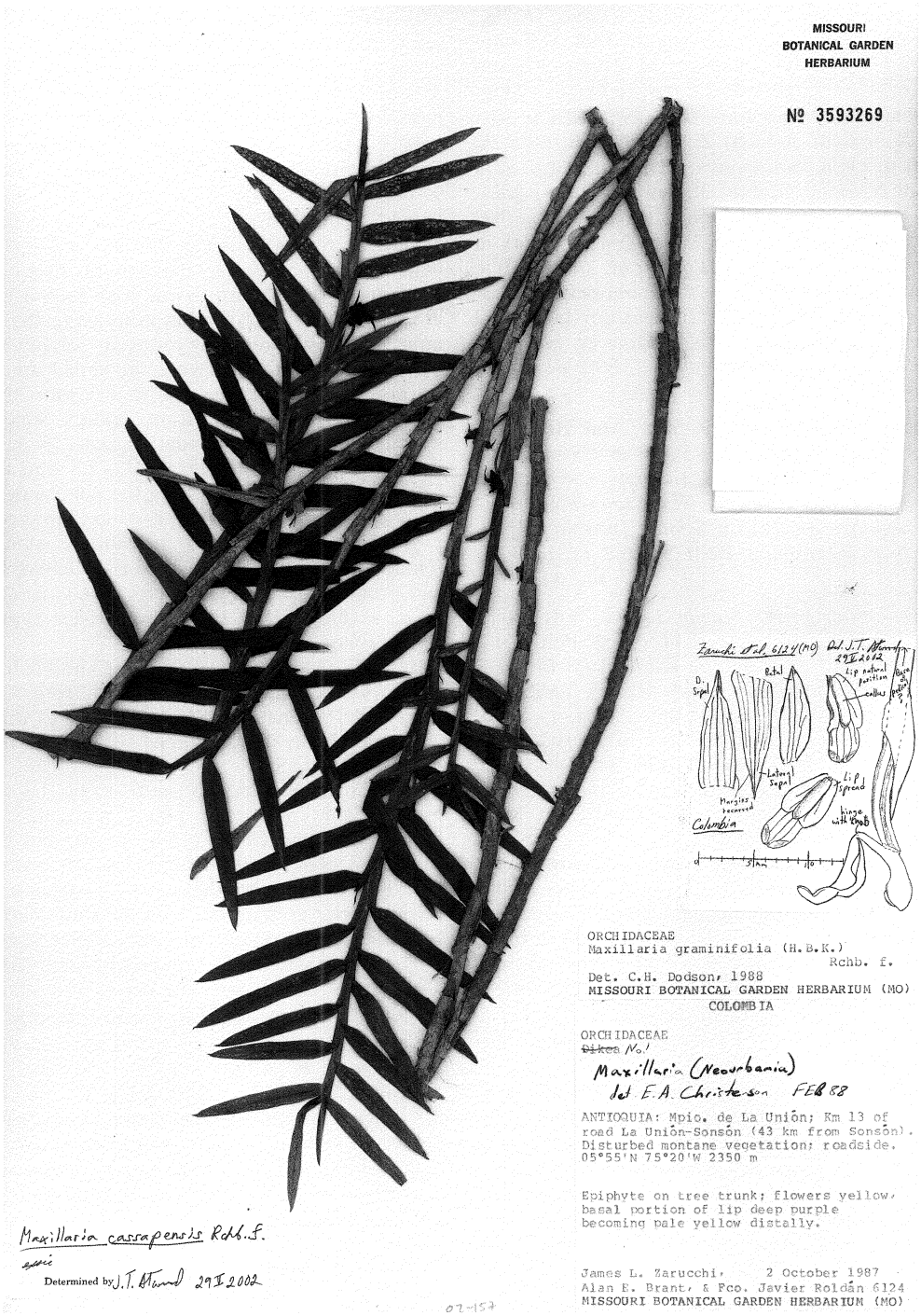

FIGURE 3. *Maxillaria cassapensis* Rchb.f.

FIGURE 4. *Maxillaria graminifolia* (Kunth) Rchb.f.

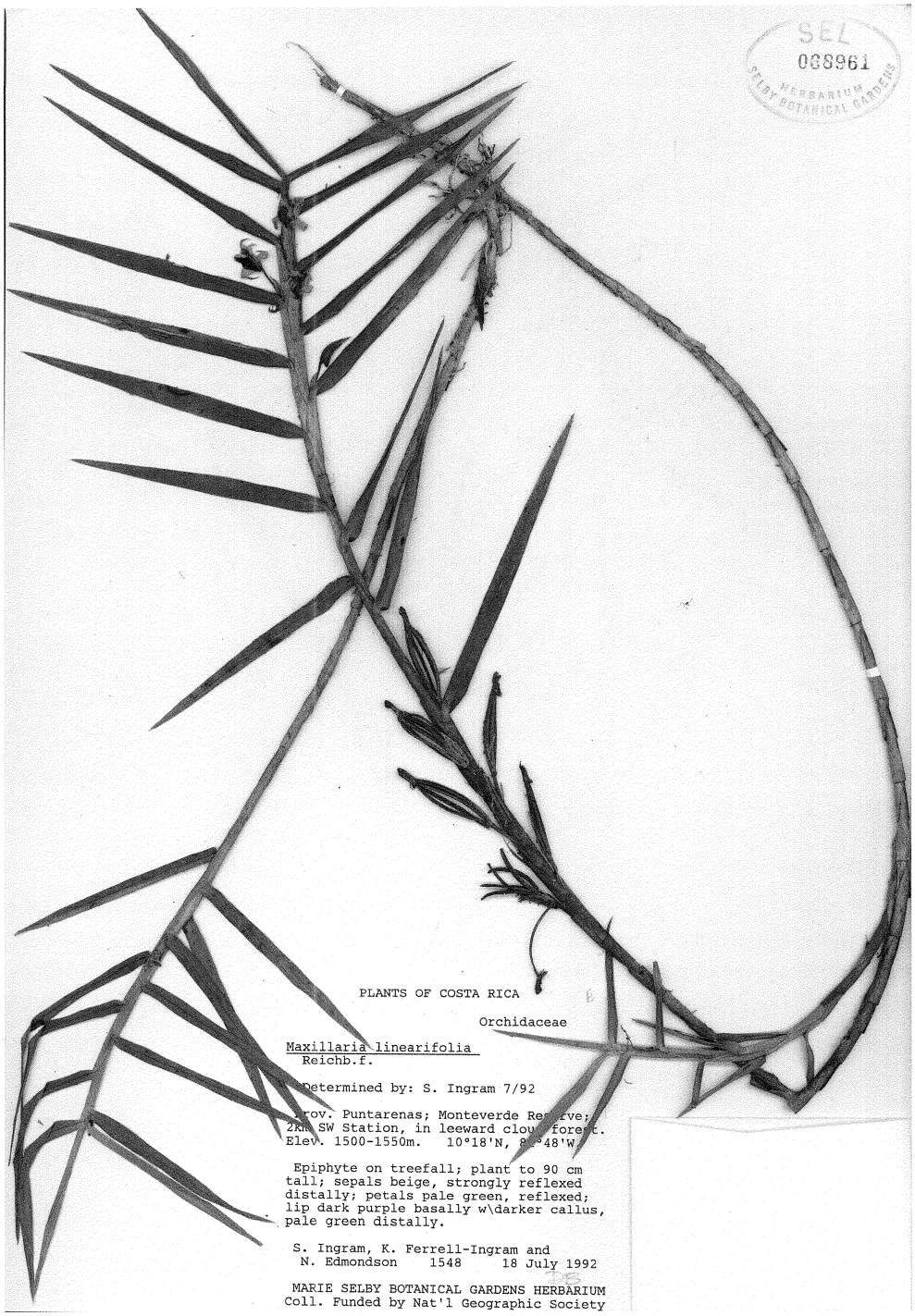

FIGURE 5. *Maxillaria linearifolia* Rchb.f.

FIGURE 6. *Maxillaria longibracteata* (Lindl.) Rchb.f.

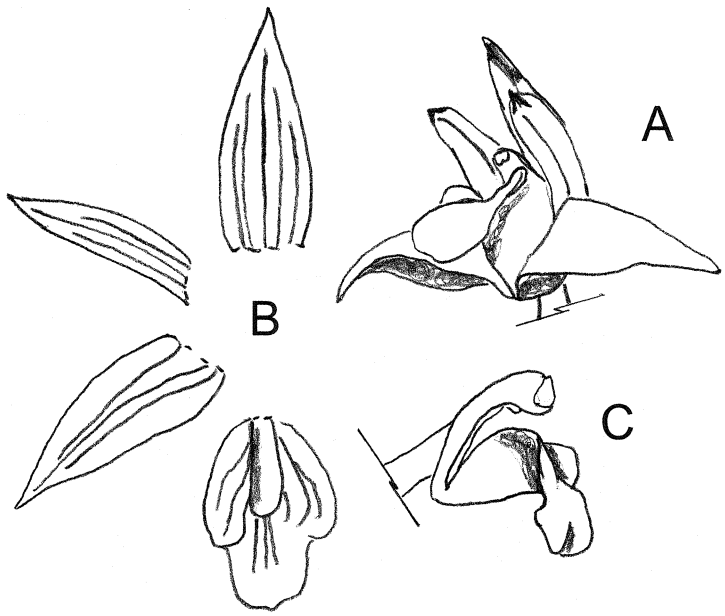

FIGURE 7. *Maxillaria appendiculoides* C.Schweinf. from Costa Rica. **A.** Flower, oblique view. **B.** Dissected perianth. **C.** Lip and column profile view. Scale: 10 mm. *Brenes 1427* (NY).

minifolia complex. The leaf is described as linear, the ovary is given as "c. 1.5 cm," and the flower color as light or pale yellow ("*flavis tenuibus*"), features that best match *M. cassapensis,* although this species is otherwise unknown from Bolivia. Conceivably *Camaridium flavum* belongs with *M. brevifolia* (Lindl.) Rchb.f., a species well known from Bolivia, but the above mentioned features are inconsistent. Neither drawings nor specimens from the original collection of *Camaridium flavum* have been found. Flowers analyzed: 6.

VENEZUELA: Edo. Barinas: Distrito Pedraza, w. of Carrizal (La Escaza on maps) and N of the Río Canagua in areas known as "La Reynosa, Los Laureles, and Los Granates." Parque Nacional sierra Nevada, 8°31′N, 70°46′W, 27 June 1988, *Dorr et al., 5740.* **COLOMBIA:** Dept. Antioquia: "cerca de Santa Helena, camino entre Medellín y Río Negro," ca. 2500 m, 2 Oct. 1947, *Barkeley et al. 15* (AMES); Mpio. De La Unión, km 13 from road La Unión-Sonsón (43 km from Sonsón), 5°55′N, 75°20′W, 2350 m, 2 October 1987, *Zaruchi et al. 6124* (MO). Fontino, West Andes of Antioquia, Sept. 1891, *Lehmann 8294* (AMES). Dept. Caldas: Pueblo Rico, 1500 m, 12 Jan. 1946, *K.v. Sneidern 5493* (A). Dept. Cauca: Micay Valley, "La Gallera," 1500–1800 m, 1 July 1922, *Killip 7897* (AMES); Popayan, 1300–1700 m, January(?), *Lehmann* (?) *7107* (GH, 2 sheets). Dept. Cundinamarca: "carretera hacia San Francisco y La Vega," 2000–2500 m, Nov. 1956, *Ospina H. 29* (AMES); Fusugasuga, 4 Jan. 1853, *Holton 196* (AMES, 2 sheets). Dept. El Valle: La Cumbre, 1800–2100 m, 14–19 May 1922, *Killip 5575* (AMES, 2 sheets). Dept. Huila: Cordillera Oriental, east of Neiva, 1300–1800 m, 1–8 Aug. 1917, *Rusby & Pennell 974* (AMES). **ECUADOR:** Prov. Carchi: 12 km west of Maldonado, 25 Sept. 1979, *Gentry & Shupp 26558* (SEL). Prov. Chimborazo: Road Baños-Riobamba, 24 April 1971, collector unknown (AMES). Prov. Esmeraldas: NW of Cristal, 10 km NW of Lita, 1450 m, 29 Dec. 1990, *Dodson et al. 18630* (MO). Prov. Morona-Santiago: "Tumbes, 17–18 km N. of Gualaquiza," 1700–1800 m, 17 April 1985, *Harling & Andersson 24234* (AMES, MO). Prov. Napo-Pastaza: "just west of Río Topo bridge," 1226 m 23 March 1939, *Penland & Summers 243* (AMES). Prov. Pastaza: Mera on road to [from] Baños to Puyo, 1110 m elev., 10 Dec. 1986, *Dodson & Hagsater 16720* (MO, SEL); Mera, ca. 1100 m, 20 Sept. 1968, *Lugo 467* (AMES). Prov. Pichincha: Quito to Santo Domingo via Chiriboga at km 72, 1700 m elev., 5 Feb. 1963, *Dodson & Thien 2224* (SEL). Prov. Santiago-Zamora: Tambo Chontal to Tambo Consuelo, 5700–8000 Ft., 16 Dec. 1944, *Camp E1575* (AMES). Prov. Tungurahua: Terrestrial in

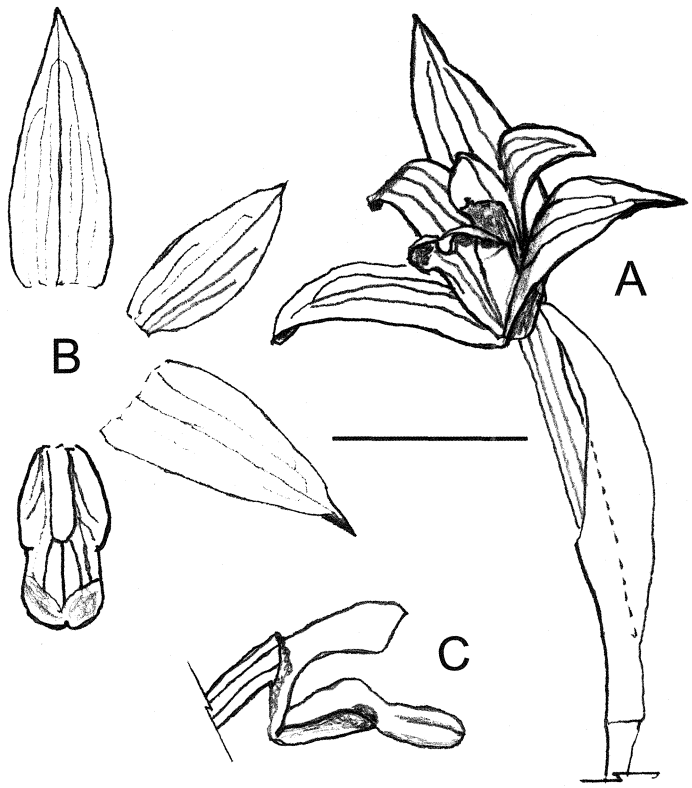

FIGURE 8. *Maxillaria brevifolia* (Lindl.) Rchb.f. from Bolivia. **A.** Flower, oblique view. **B.** Dissected perianth. **C.** Lip and column, profile view. Scale: 10 mm. *Solomon 17771* (SEL).

Valle de Chaupe above Baños, 2200 m elev., 17 March 1976, *Luer et al. 877* (SEL); Río Verde entre Baños y Puyo, 1700 m, 15 March 1985, *Dodson et al. 15678* (AMES); Mt. Tungurahua, 11 Nov. 1984, *Hirtz 2089* (MO, RPSC); Río Verde entre Baños y Puyo, 1700 m, 13 March 1985, *Dodson & Bermeo 15678* (MO). Prov. Zamora-Chinchipe: Road Loja-Zamora above Tambo, ca. 1800 m, 18 April 1974, *Harling & Andersson 13671* (AMES). **PERU:** Dept. Amazonas: Prov. Bongara: Shillac, N by trail from Pedro Ruíz, 31 Aug.–2 Sept. 1983, *Smith & Vasquez 4942* (MO, SEL); A few km from Molinapampa, 14 March 1988, *van der Werff et al. 14966* (SEL); "3 km N. of N. end of Lago Pomacocha on the road to La Rioja," 2100–2200 m, *Hutchison & Wright 4061* (AMES, MO) and *4066* (AMES). Dept. Cajamarca: La Palma, 10 km NW of Chirinos in remnant patch of *Podocarpus* forest, 5 Feb. 1988, *Gentry et al. 61268* (MO, SEL); Prov. San Ignacio: S. José de Lourdes, base del Cerro Picorama, 4°59′25″S, 78°54′5″W, 2010 m, *Diaz et al. 10368* (MO). Dept. Cusco: Quillabama, Santa Teresa, on a hillside called Mandornilloc 0.5 km west of La Playa, 5 Sept. 1982, *Peyton and Peyton 1155* (SEL); Prov. Paucartambo: Yanomayo, 1200 m, 4 May 1947, *Vargas 6494* (AMES). Dept. Huánuco: Prov. Huánuco: "Hacienda Paty abajo de Carpish, entre Huánuco y Tingo María," 1700–1800 m, 22 June 1953, *Ferreyra 9396* (AMES). Dept. Puno: Prov. Carabaya: Headwaters of the Río Candamo, 13°23′N, 69°47′W, 1200 m, 3 June 1997, *Corneja & Balarezo 3036* (MO). **BOLIVIA:** "Hacienda Simaco sobre el camino a Tipuani," 1400 m, Feb. 1920, *Buchtien 5057* (AMES).

Maxillaria graminifolia (Kunth) Rchb.f., Ann. Bot. Syst. 6: 538. 1863. *Isochilus graminifolius* Kunth, Nov. Gen. et Sp. 1: 340, t. 78. 1816. Type: Colombia, Popayan, 1064 fathoms (ca. 1900 m), *Humboldt and Bonpland* (microfiche SEL! ex Holotype P).

FIGURES 4, 10, 11.

Camaridium lancifolium Rchb.f., Linnaea 22: 857. 1849. Type: Venezuela, Merida, 6500′, Sept. 1846, *Funk and Schlim 761* (number misprinted? Perhaps *731* on herbarium sheet, microfiche SEL! ex Holotype W). *Maxillaria lancifolia* (Rchb.f.) Rchb.f., Ann. Bot. Syst. 6: 539. 1863.

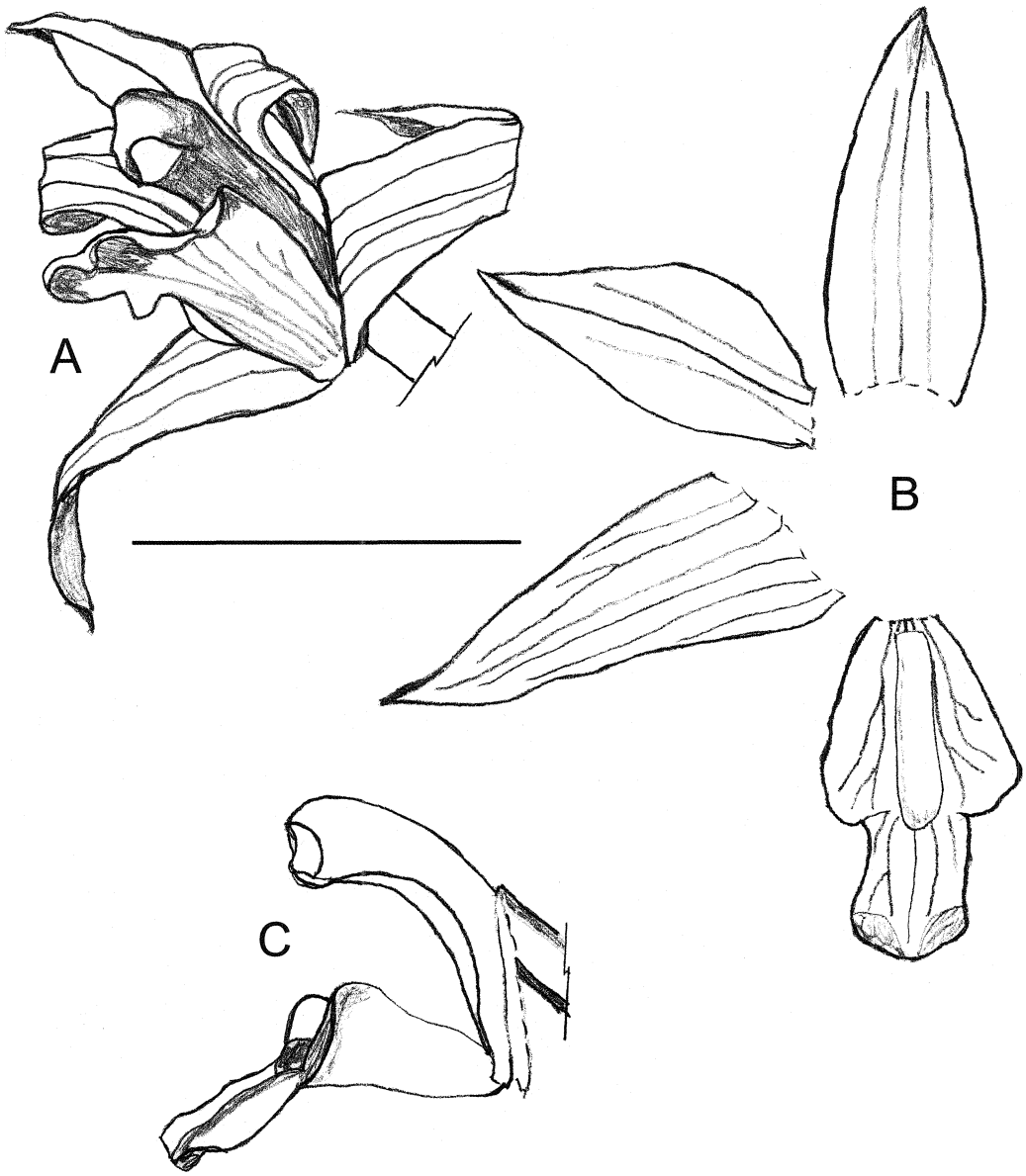

FIGURE 9. *Maxillaria cassapensis* Rchb.f. from Colombia. **A.** Flower, oblique view. **B.** Dissected perianth. **C.** Lip and column, profile view. Scale: 10 mm. *Dorr et al. 5740* (MO).

Maxillaria polyphylla Rchb.f., Ann. Bot. Syst. 6: 539. 1863. Type: Ecuador, Pichincha, *Jamieson* (Holotype W, not seen, drawing AMES! not clearly based on the holotype).

Maxillaria matthewsii Rchb.f., Ann. Bot. Syst. 6: 539. 1863, not Lindl. 1845. *Camaridium Matthewsii* (Rchb.f) Schltr., Repert. Spec. Nov. Regni Veg. Beih. 9: 165. 1921. Type: Peru, *Matthews 1064* (Holotype K; photo AMES! ex G).

Maxillaria similis Garay & Dunsterville, Venez. Orch. Ill. 6: 268. 1976.

Habit Sprawling, epiphytic, lithophytic or opportunistically terrestrial with elongate grass-like stems and leaves; the adults lacking pseudobulbs; juveniles unknown; roots slender, to about 0.75 mm across, white. ***Stems*** of adults covered by persistent distichous leaf sheaths, to ca. 6 mm in diameter, often branched above, the branches forming an acute angle with the apical shoot. ***Leaves*** with smooth sheaths; blades 1–6 cm × 2–7 mm, thin, linear-lanceolate and reflexed at the articulation, acute, sulcate above,

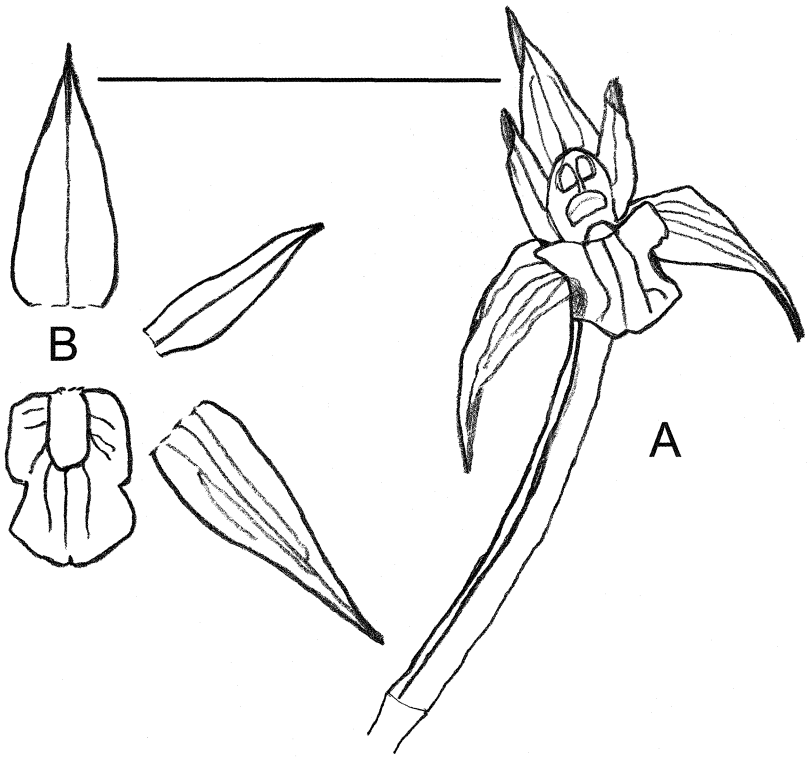

FIGURE 10. *Maxillaria graminifolia* (Kunth) Rchb.f. from Peru. **A.** Flower, frontal view. **B.** Dissected perianth. Scale: 10 mm. *Van der Werff et al. 8306* (SEL).

keeled below. ***Inflorescences*** single per leaf axil, somewhat exceeding the sheath, scape very short and hidden by the sheath; ovary 9–13 mm, cylindric, subtended by an acute appressed floral bract 7–11 mm. ***Flowers*** 9–12 mm across, usually with several open at once per stem, spreading, white to greenish or cream with purple to black callus. ***Sepals*** similar, acute, the dorsal 5.5–8.5 × 2–3 mm, slightly hooded, narrowly ovate-triangular; lateral sepals 6.5–10 × 2–2.7 mm, narrowly ovate. ***Petals*** 5–6.5 × 1.2–2 mm, flat to somewhat recurved, elliptic lanceolate, acute, with 1–3 veins. ***Lip*** 4–6 × 3–4 mm, hinged to the column foot, simple to subpandurate, subquadrate to trapezoid, the base somewhat embracing the column, apex somewhat emarginate, the apical margins recurved; callus subquadrate terminating just below the middle, somewhat rounded above and in front. ***Column*** stout, 2–3 mm without anther, foot very short, less than 0.5 mm, anther ca. 1 mm in diameter. ***Capsules*** 1.4–1.9 cm, at dehiscence, the six valves united at the apex.

A widespread species of cloud forests from Venezuela to Peru and Bolivia at 1500–3000 m elev., apparently somewhat weedy on roadsides (FIGURE 16). Flowering September to May.

Flowers from specimens from Bolivia and one from Peru (*Hutchison & Wright 4887*) exhibit somewhat larger flowers than those from other parts of the range, and also an enlarged rostellum. Otherwise, the small flowers with short column on plants with narrowly lanceolate leaves are convenient field characters for recognition.

In the Reichenbach herbarium is an interpretive floral analysis of *Camaridium lancifolium* from the holotype (separate sheet) showing the very short stout column characteristic of this species. The callus of the lip shown in this drawing is very broad with irregular margins unlike that of any other specimens seen, probably the result of a flower squashed during pressing. The identity of *Maxillaria matthewsii* Rchb.f. is based here on a herbarium specimen at Kew with drawing showing the very attenuate floral segments and somewhat three lobed lip. A drawing of an isotype of *Maxillaria matthewsii* at the Delessert Herbarium (G) found at AMES shows the short column and relatively simple lip consistent with *M. graminifolia.*

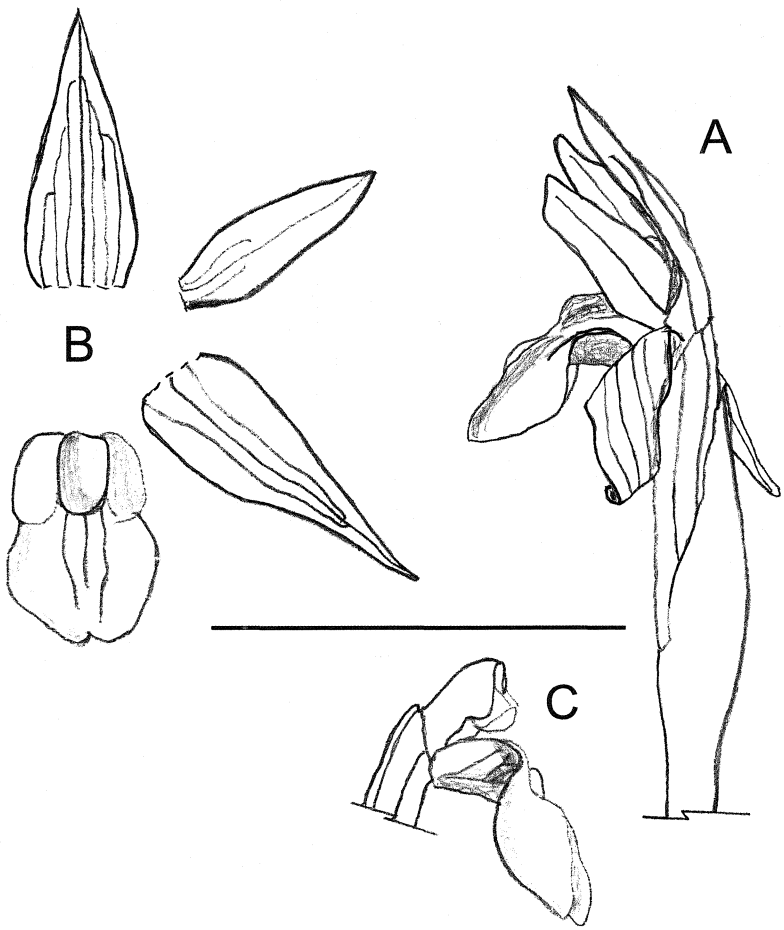

FIGURE 11. *Maxillaria graminifolia* (Kunth) Rchb.f. from Bolivia showing larger rostellum. **A.** Flower, profile view. **B.** Dissected perianth. **C.** Lip and column, profile view. Scale: 10 mm. *Solomon 8990* (SEL).

This treatment follows that of Schweinfurth (1960) who used the name *Maxillaria graminifolia* (Kunth) Rchb.f. as the earliest available name for this species with the shortest column in the group. The original description of basionym *Isochilus graminifolius* Kunth indicates that the column is about a quarter as long as the perianth parts (*Gynostemum calyce quadruplo brevius*) and the capsule is described as only 1.7 cm long (*octo lineas longa*). Other authors (Dunsterville & Garay 1966, p. 147; Dodson & Dodson 1989, t.534) have applied the name *Maxillaria graminifolia* to plants with much longer columns and which are accepted here as *M. cassapensis* Rchb.f. Dunsterville and Garay (1976, p. 268) applied the much later synonym *M. similis* to *Maxillaria graminifolia.* Flowers analyzed: 13.

VENEZUELA: State of Merida: above Tabay, 18 May 1944, 2285–2745 m, *Steyermark 56650* (AMES). **COLOMBIA:** Dept. Antioquia: Municipio of Rio Negro, epiphytic in forest along Rio Piedras, 2150 m elev., 29 April 1983, *Luer et al. 8870* (SEL); Alto de Alegrías, 2000–2500 m, Oct. 1884, *F.C. Lehmann "B.J. 1317"* (AMES); Municipio "El Retiro," 2500 m, *Ospina H. 83* (AMES). Dept. Bogotá: Quebrada del Chicó, 2700–2900 m, 9 Sept. 1943, *Schneider 249* (AMES), 16 Sept. 1943, *Schneider 68* (AMES, 2 sheets). Dept. Cauca: Moscopan, 2600 m, 7 March 1943, *v. Sneidern 4319* (A). Dept. El Valle: La Cumbre, 1700–2200 m, 11, 18 Sept. 1922, *Killip 11326* (AMES). Dept. Cundinimarca: Hills above Bogotá, 11,000 ft., 11 July 1943, *Allen 2996* (MO). Dept. Santander: Vicinity of La Baja, 3000 m, 14–31 Jan. 1927, *Killip & Smith 18364* (AMES). **ECUADOR:** Prov. Imbabura: along river near Apuela on road Otovalo to Selva Alegre, 1600 m elev., 6 Dec. 1986, *Dodson et al. 16684* (MO, SEL).

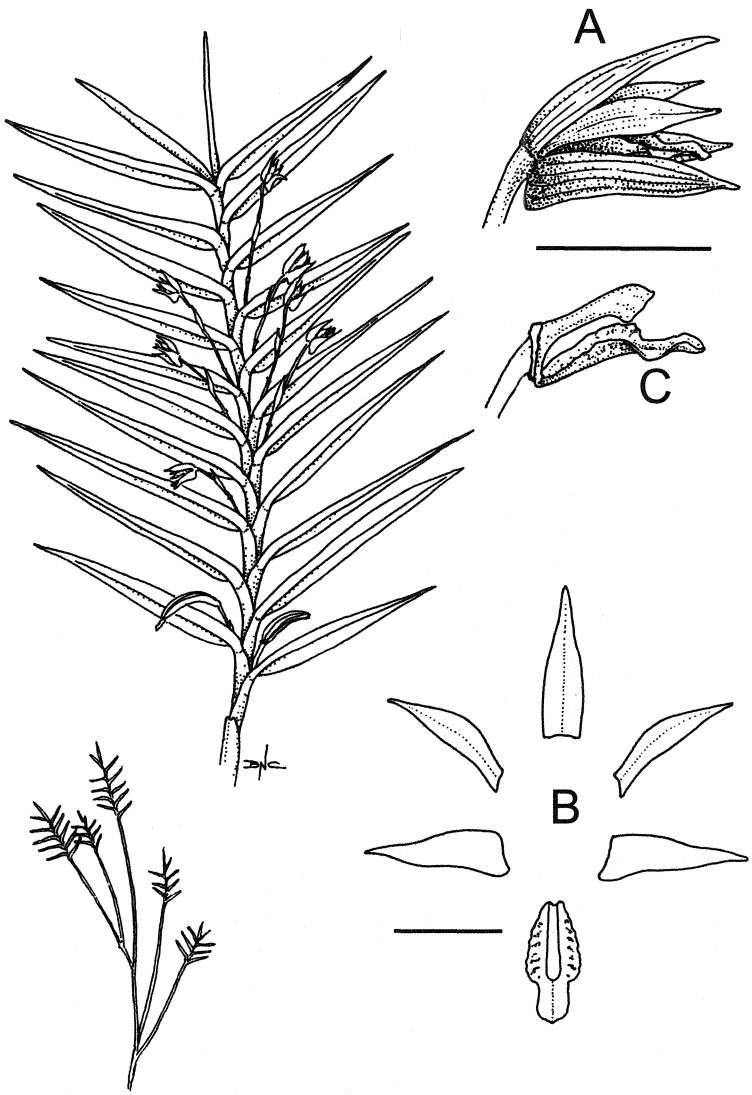

FIGURE 12. *Maxillaria linearifolia* C.Schweinf. from Costa Rica (Icones Plantarum Tropicarum 14: pl. 1350, 1989. artist: B. N. Culbertson). **A.** Flower, profile view. **B.** Dissected perianth. **C.** Lip and column, profile view. Scales: 10 mm. *Lent 1432* (SEL).

Prov. Napo: along the road between Papallacta and Baeza, 2100 m elev., 20 Feb. 1982, *Luer & A. Hirtz 6853* (SEL). Prov. Napo: Baeza, ca. 2000 m, 3 Nov. 1980, *Harling & Andersson 16147* (AMES, MO). Prov. Napo-Pastaza: along Río Pastaza, 1158–1675 m, 6 Nov. 1943, *Steyermark 54870* (AMES). Prov. Pichincha: new road Quito to Santa Domingo, 2000 m elev., 1 March 1975, *Luer & Kent s.n.* (SEL); Guayumo, on road from Quito to Nanegal, 2000 m elev., 26 Oct. 1961, *Dodson & Thien 1092* (SEL). **PERU:** Dept. Amazonas: Prov. Bongara: between Puente Ingenio and Pomacocha, km 327-329 on the Pomacocha-Rioja Road, 2160–2210 m, 31 Jan. 1964, *Hutchison & Wright 3910* (AMES); [Province?] Pichis Trail, Eneñas, 1700 m, 1 July 1929, *Killip & Smith 25691* (AMES); Prov. Chachapoyas: 5 km above Leimebamba on road to Balsas in area known as "San Miguel," 2400 m, 1 April 1964, *Hutchison & Wright 4887* (AMES). Dept. Ayacucho: Ccarrapa, between Huanta and Río Apurimac, 1500 m, 5,6,17 May 1929, *Killip & Smith 22367* (AMES). Dept. Cajamarca: San Ignacio, S. José de Lourdes, base del Cerro Picorama, 4°59′25″S, 78°54′5″W, 2010 m, *Diaz et al. 10368* (MO). Dept. Cuzco: Prov.

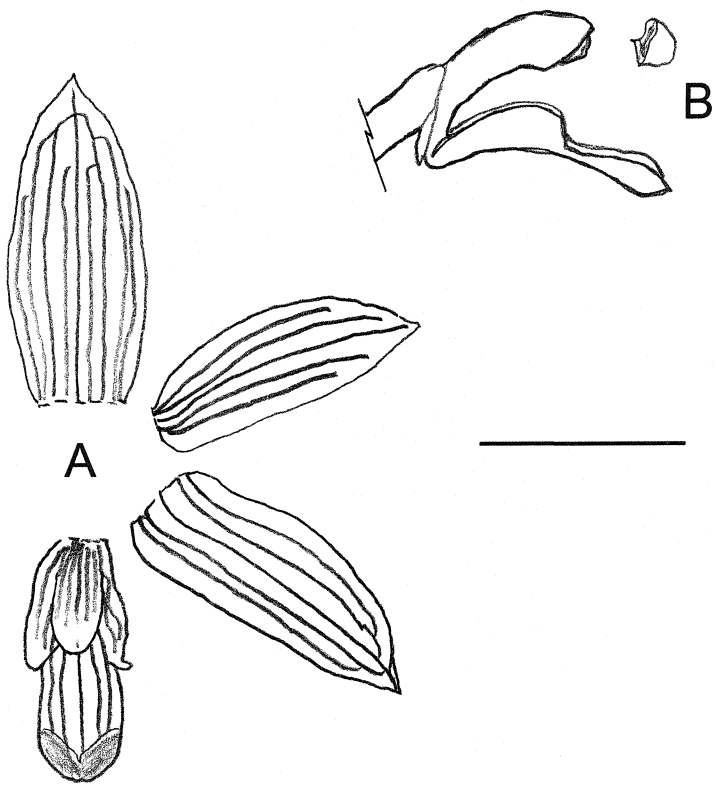

FIGURE 13. *Maxillaria longibracteata* (Lindl.) Rchb.f. from Ecuador. **A.** Dissected perianth. **B.** Lip, column, and anther, profile view. Scale: 10 mm. *Luer et al. 4710* (SEL).

Quispicanchio: Marcapata, 2000 m, 27 Jan. 1943, *Vargas C. 3118* (AMES). Dept. Huanuco: Chaglia (Macora), 21 March 1959, *Woytkowski 5279* (GH, MO). Dept. Junin: Chanchamayo Valley, [1924–1927], *Schunke 519* (AMES). Dept. Loreto: Prov. Cornel Portillo: Divisoria, entre Tingo María y Pucallpa, 1500–1600 m, 28 Feb. 1947, *Ferreyra 1685* (AMES). Dept. Pasco: cloud forest ca. 5 km S of Oxapampa, 1800 m elev., 30–31 Jan. 1979, *Luer & Luer 3827* (SEL); Villa Rica, Santa Polonia Alta, 1500 m elev., 27 Feb. 1986, *van der Werff et al. 8306* (SEL). Dept. San Martín: between Moyobamba and Chachapoyas, ca. km 400, 1280 m, 5°45′S, 77°29, 12 April 1984, *Croat 58197* (MO); La Divisora, between Tingo Maria and Aguaytia, Cordillera Azul, 1500–1600 m, 3 June 1983, *Smith & Jaramillo 41441* (MO). **BOLIVIA**: Cochabamba: Prov. Chapare: cloud forest along road to Tablas, 2600 m elev., 9 Feb. 1980, *Luer et al. 5182* (SEL). cloud forest between Cochabamba and Villa Tunari near km 100, 1850 m elev., 17 Jan. 1984, *Luer et al. 9368* (SEL); cloud forest northeast of Cochabamba toward Villa Tunari, 2500 m elev., 26–30 Nov. 1978, *Luer et al. 3556* (SEL). La Paz: Prov. Inquisivi: cloud forest near the pass above Circuata, Polea, 2500 m elev., 1 Feb 1983, *Luer et al. 8623* (SEL); cloud forest between Inquisivi and Circuata, 2700 m elev., 27–28 Jan 1981, *Luer et al. 5771* (SEL). Prov. Murillo: 27.4 km N (below) dam at Lago Zongo. 16.08′S, 68.06′W, moist forest on rock face with some disturbance and burned areas, 2500 m elev., 27–28 Nov. 1982, *Solomon 8990* (MO, SEL). Dept. Santa Cruz: 50 km N de Mataral, 2000–2100 m, 26 May 1989, *Smith et al. 13439* (MO).

Maxillaria linearifolia Ames & C.Schweinf., *Sched. Orch.* 10: 95–96. 1930. Type: Costa Rica, *Brenes (19)314* (microfiche SEL! ex Holotype AMES). FIGURES 5, 12.

Habit straggly, epiphytic, somewhat vine-like, monopodial (at least as adults), pendent or decumbent, forming wiry sparsely branched canes to ca. 4 mm in diameter; roots to 0.5 mm in diameter, white to grayish. ***Stems*** covered by leaf-sheaths; pseudobulbs lacking in adults (juveniles unknown). ***Leaf blades*** 2–10 cm × 3–8 mm, narrowly lanceolate, coriaceous, shiny, acute. ***Inflorescence*** single per leaf axil; scape ca. 1.5–2 cm; ovary with pedicel 3–3.5 cm, far

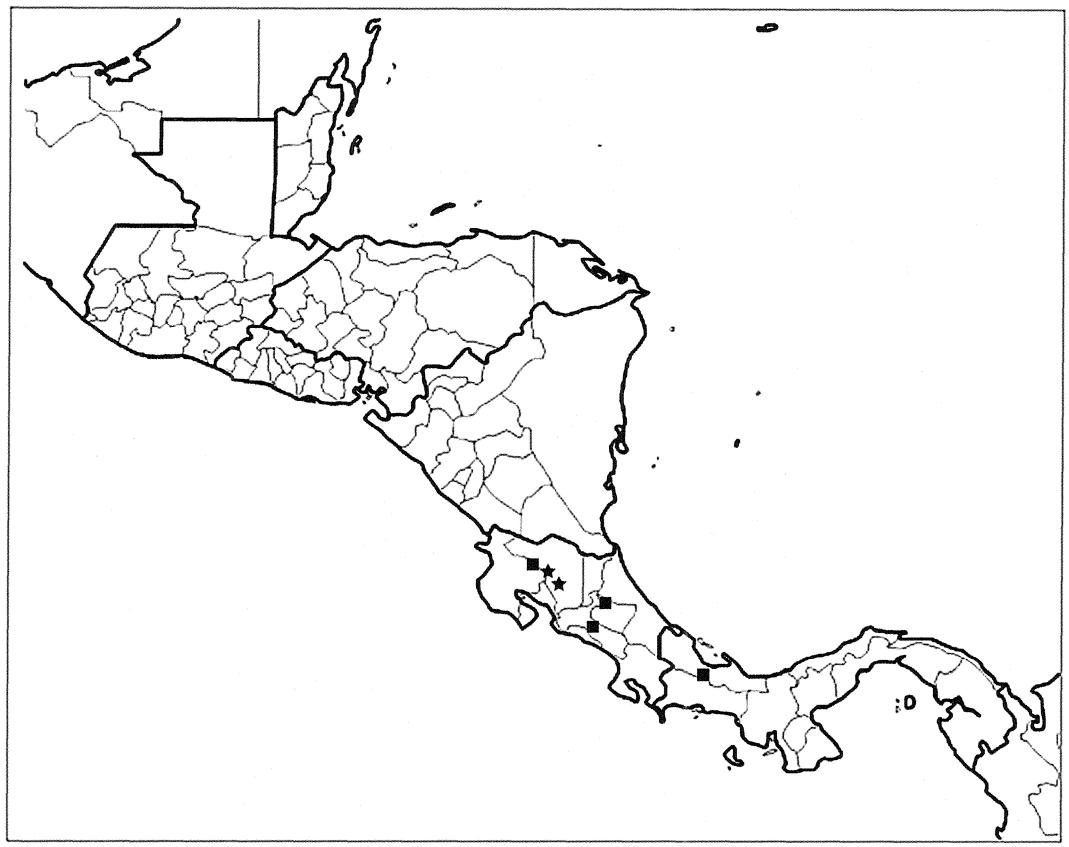

FIGURE 14. Distributions of *Maxillaria appendiculoides* (★) and *M. linearifolia* (■).

exceeding the subtending acute floral bract ca. 1.7 cm. ***Flowers*** spreading, white or cream marked with purple spots, the lip purple or spotted with purple. ***Sepals*** 13–14 × 3.5–4 mm, narrowly ovate to lanceolate, acute with sharp, thick apicule; margins recurved; dorsal sepal somewhat concave; lateral sepals recurved. ***Petals*** 11–12 × 3–3.5 mm, lanceolate, falcate; apex acute with sharp thick apicule. ***Lip*** 10–12 × 3–4 mm (5 mm wide when spread), hinged to the column foot, cuneate, shallowly 3-lobate on the upper third; lateral lobes arching forming a canaliculate base; midlobe 4–5 × 3 mm, somewhat broadened above, broadly rounded at the apex; callus 6 × 1.5 mm, an oblong ligule from base to the sinuses between lobes. ***Column*** 7–8 mm excluding the anther, arcuate, much broadened above; foot 3 mm, forming an obtuse angle with the column base. ***Capsule*** 2.5–3 cm, ellipsoid.

Endemic to premontane and lower montane rain forests of Costa Rica and adjacent Panama. 800–2000 m. (FIGURE 14). Flowering September to February, July; fruits seen in March.

Within its range *Maxillaria linearifolia* is most similar to *M. appendiculoides* C.Schweinf., differing in its distinctly lanceolate rather than elliptic leaves in addition to the flower with a narrower lip with much narrower lateral lobes, proportionally longer callus and longer column. Its sister species is probably *M. cassapensis* Rchb.f. from South America, which has much shorter ovaries. Flowers analyzed: 2.

COSTA RICA: Prov. Cartago: Remnant woods along Río Naranje, 3.5 km E. of Cachí, 1360 m elev., 15 Oct. 1967, *Lent 1432* (SEL). Tapanti, 1250 m elev., 16 Oct. 1993, *Atwood et al. 4132* (SEL, AMES); El Muñeco south of Navarro, 1400 m, 8–9 Feb. 1924, *Standley 33835* (AMES); Vicinity of Orosí, 30 March 1924, *Standley 39907* (AMES); El Muñeco, 3700 ft., 10 April 1928, *Stork 1465* (AMES). Prov. San José: Región Sur Este del Lago Dabagri, cruzando las filas hacia Telire (Laguna tiestos y fila de los aguacatillos), date(?): 5-11-4, *Gómez et al. 23204* (SEL); *Grayum et al. 7945* (SEL); 1300–1700 m, 2–4 March 1924, *Standley 36421*

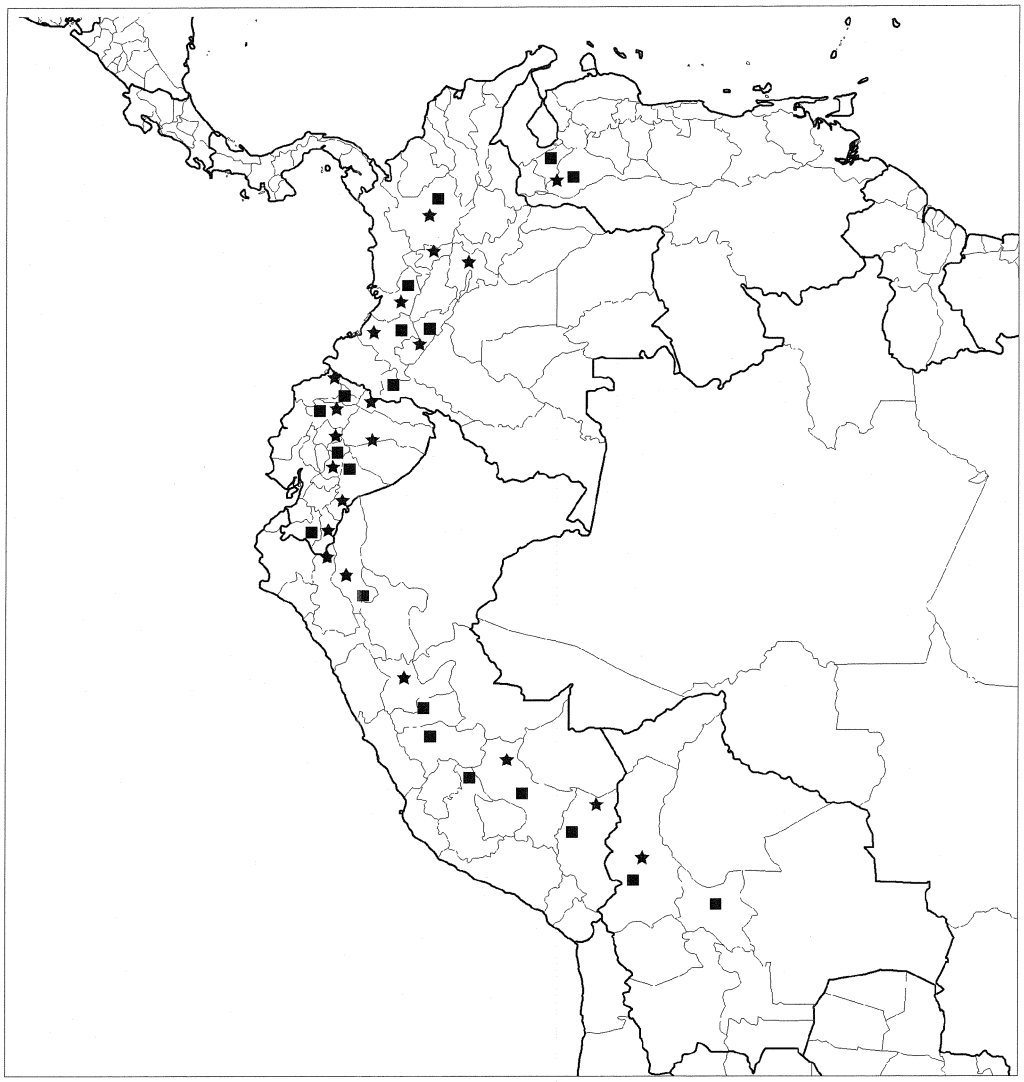

FIGURE 15. Distributions of *Maxillaria brevifolia* (■), *M. cassapensis* (★).

(AMES); La Hondura, 1300–1700 m, 16 March 1924, *Standley 37625* (AMES). Prov. Puntarenas: Monteverde, 10°20′N, 84°50′W, epiphytic on large fallen *Sapium* on research forest trail, 1510 m elev., 15 Sept. 1988, *Ingram 239* (SEL); Monteverde Reserve, 10°18′N, 84°48′W, 2 km SW station, in leeward cloud forest, 1500–1550 m elev., *Ingram et al. 1548* (SEL). **PANAMA:** Prov. Chiriqui: Distrito Boquete, Fortuna dam site, 1200 m elev., 7 Feb. 1985, *van der Werff & van Hardeveld 6668* (SEL); *McPherson 11992* (MO).

Maxillaria longibracteata (Lindl.) Rchb.f., Ann. Bot. Syst. 6: 540. 1863.

FIGURES 6, 13.

Basionym: *Camaridium longibracteatum* Lindl., Benth. Pl. Hartw. 154. 1845. Type: Ecuador, Loja (microfiche SEL! ex Holotype K).

?*Camaridium caucanum* Schltr., Repert. Spec. Nov. Regni Veg. Beih. 7: 175–176. 1920. Type: Colombia, Cauca, ca. 2200 m elev., *M. Madero* (Holotype B, destroyed).

Habit erect to decumbent, epiphytic or opportunistically terrestrial appearing monopodial as adults to ca. 1 m; juveniles unknown; roots to ca. 1.2 mm across, white. ***Adult stems*** to 1 cm across, concealed by leaf sheaths, lacking pseudobulbs, rarely branched above. ***Leaves*** distichous; sheaths rugose; blades 5–13 × 0.6–2 cm, reflexed above the articulation, thin, keeled

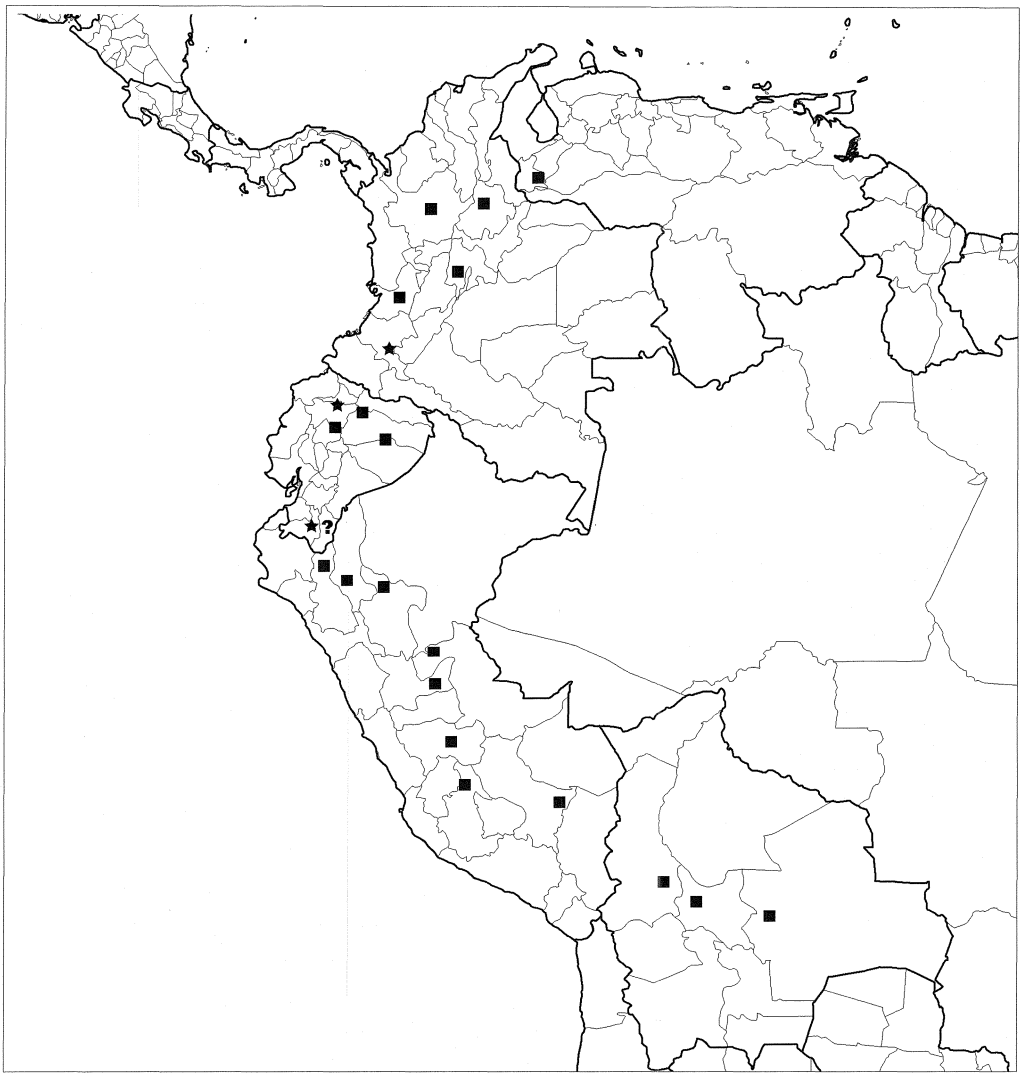

FIGURE 16. Distributions of *Maxillaria graminifolia* (■), and *M. longibracteata* (★).

beneath, elliptic to elliptic-lanceolate, acute. ***Inflorescence*** single per leaf axil; scape ca. 2 cm, mostly concealed by the leaf sheath; ovary 21–28 mm with subtending, acute, floral bract 19–25 mm. ***Flower*** erect, yellow with red to purple callus. ***Sepals*** similar, acute to acuminate; dorsal 16–19 × 6.5–8 mm, elliptic-ovate, somewhat appressed to the column; lateral sepals 16–19 × 6–7.5 mm, spreading, obliquely and broadly lanceolate. ***Petals*** 14–16 × 5–7 mm, obliquely elliptic, with apices recurved, acute. ***Lip*** (12)17–19 × 5–6 mm with side lobes spread, hinged to the column foot, 3-lobate at about the middle; side lobes low, embracing the column; midlobe suborbicular to subquadrate, rounded to emarginate in front, with an apical thickening on each side; callus bib-like, ending below the sinuses, the width usually at least half the length. ***Column*** arcuate, 7–8 mm long excluding anther; foot 2.5–3 mm; anther 2 mm in diameter. ***Capsules*** 3–3.7 cm, ellipsoid, separating into 6 valves but united at the apex, apex with persistent flower parts.

A species of upper montane (cloud) forests from Ecuador, Peru, and possibly Colombia at 2200–2800 m elev. (FIGURE 16). Flowering time November to May.

Maxillaria longibracteata is closely related to *M. brevifolia* (Lindl.) Rchb.f., but the latter species forms a somewhat smaller more branched

plant with smaller flowers, which have proportionally narrower sepals and petals, the latter of which are more ovate and more attenuate. Also, the callus is proportionately narrower in *M. brevifolia,* which usually occurs at lower elevation.

Schlechter compares his *Camaridium caucanum* to *C. luteorubrum* Lindl. (Syn.: *Maxillaria brevifolium* (Lindl.) Rchb.f.) stating that his species has a larger midlobe and is apparently a larger plant, features consistent with *M. longibracteata,* a long published species with which he did not compare. The ovary "c. 1.1 cm" long in Schlechter's description seems odd for any member of this group other than *M. graminifolia.* Possibly the measurement was based on an immature flower or recorded in error. Unfortunately no original materials have been located other than a published floral analysis (Schlechter & Mansfeld 1929, t. 62 (241)), hence its uncertainty of placement. Flowers analyzed: 6.

COLOMBIA: Prov. Cauca (type of *Camaridium caucanum*). **ECUADOR:** Prov. Pichincha: Km 78, Santo Domingo to Quito via Tandapi along path to electric tower, 2600 m elev., 2 March 1986, *Dodson et al. 16334* (MO); below Nono above the fork in the road to Mindo, ca. 2200 m elev., 11 Nov. 1979, *Luer et al. 4710* (SEL); Pelagallo km 14, Calacali to Neibli, 2800 m elev., 6 Dec. 1984, *Hirtz 2139* (MO); Carretera vieja, Quito-Santo Domingo via Chillogallo-San Juan-Chiriboga, km 40, 2670 m elev., *Dodson et al. 15828* (AMES, MO); La Iberia, km 4–6, Calacali-Hacienda Gallopellado near Niebli, 2800 m elev., 4 April 1985, *Dodson et al. 15764* (MO); Km 62 Quito-Santo Domingo via nueva por Tandapi, 2300 m elev., 1 Feb. 1985, *Dodson & Dodson 1556* (MO); near Nono, ca. 2700 m, 16 April 1956, *Asplund 20283* (AMES); near Salvador between San Juan and Chiriboga, ca. 2600 m, 20 Jan. 1956, *Asplund 19058* (AMES); La Iberia, Calcacali, Hacienda Gallopellado. . .en la región Niebli, 2800 m, 4 April 1985, *Dodson & Dodson et al. 15764* (AMES); km 42 from Quito toward Puerto Quito, elev. 7100 ft., 15 Nov. 1975, *Plowman & Davis 4443* (AMES).

Possible Natural Hybrid

ECUADOR: Prov. Zamora-Chinchipe: "Plants collected along river bank of Rio Valladolid about 2 km upstream from the town," 1700–1800 m elev., 16 April 1986, *Dalessandro 600* (RPSC). This specimen exhibits features intermediate between those of *Maxillaria longibracteata* (or possibly *M. brevifolia*) and *M. cassapensis* Rchb.f. The plant is robust and has the broad callus of the former species, but also has shiny leaf sheaths, lighter colored flowers, and the narrower floral segments with fewer veins of the latter species. Ovary length (22 mm) overlaps comparable measurements of both species. One flower was analyzed.

Key to Species

1. Leaves linear-lanceolate, broadest on the lower quarter 2
   2. Column less than 4 mm long . . . . . *M. graminifolia*
   2. Column more than 5 mm long 3
      3. Ovary more than 27 mm long; Costa Rica and Panama . . . . . *M. linearifolia*
      3. Ovary less than 27 mm long; South America . . . . . *M. cassapensis*
1. Leaves elliptic, broadest well above the lower quarter 4
      4. Column 5 mm long or shorter; Central America . . . . . *M. appendiculoides*
      4. Column 5 mm long or longer; South America 5
         5. Plants not branched above; petals more than 13 mm long; capsules 3 cm long or longer . . . . . *M. longibracteata*
         5. Plants branched above; petals less than 13 mm long; capsules 3 cm long or less . . . . . *M. brevifolia*

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