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SYNOPSIS OF *PHILODENDRON* SUBGENUS *PTEROMISCHUM* (ARACEAE) IN BOLIVIA, WITH TWO NEW ENDEMIC SPECIES

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ABSTRACT

This synoptic treatment, the first assessment of *Philodendron* subg. *Pteromischum* (Araceae) for Bolivia, accepts a conservative total of 12 species for the country. Three of these species are provisionally named, and two others, both endemic, are described as new: **Philodendron noelii** Grayum, **sp. nov.**, known definitely only from the Department of Cochabamba, and **P. renateae** Grayum, **sp. nov.**, the fifth rheophytic species known in the subgenus (and genus). In addition, a lectotype is designated for *Philodendron leucanthum* K. Krause. All species of subg. *Pteromischum* are restricted in Bolivia to the Amazonian basin, at elevations below 1900 m, in five departments (Beni, Cochabamba, La Paz, Pando, and Santa Cruz). The species total for subg. *Pteromischum* in Bolivia may be modest compared to several other South American countries, but the biodiversity of Bolivia—and in particular of the humid lowland regions favored by subg. *Pteromischum*—has been understudied.

RESUMEN

Este tratamiento sinóptico, la primera evaluación de *Philodendron* subg. *Pteromischum* (Araceae) para Bolivia, reconoce un total conservador de 12 especies para el pais. Tres de dichas especies se nombran provisoriamente, y dos otras, ambas endémicas, se describen como nuevas: **Philodendron noelii** Grayum, **sp. nov.**, registrada definitivamente solo del Departamento de Cochabamba, y **P. renateae** Grayum, **sp. nov.**, la quinta especie reofítica conocida en el subgénero (y también el género). Además, se designa un lectotipo para *Philodendron leucanthum* K. Krause. Todas las especies del subg. *Pteromischum* se encuentran restringidas en Bolivia a la cuenca amazónica, por debajo de 1900 m de altitud, en cinco departamentos (Beni, Cochabamba, La Paz, Pando y Santa Cruz). El total de especies del subg. *Pteromischum* para Bolivia puede ser modesto en comparación con varios otros países de América del Sur, pero la biodiversidad de Bolivia—y en particular de las regiones húmedas de tierras bajas favorecidas por el subg. *Pteromischum*—ha sido poco estudiada.

Anthurium Schott and *Philodendron* Schott, both exclusively neotropical, are the two largest genera of Araceae, with estimated species totals of at least 900 and 700 (Mabberley 2017), respectively. *Philodendron*, the subject of this paper, has been divided traditionally into three subgenera, of which subg. *Philodendron* is by far the largest, followed by subg. *Pteromischum* (Schott) Mayo (with perhaps 80 species) and subg. *Meconostigma* (Schott) Engl. (with ca. 35 species). The last-mentioned taxon (sometimes elevated to generic rank under the name *Thaumatophyllum* Schott) is restricted to South America, while the other two subgenera have geographic ranges roughly coextensive with that of the genus, i.e., throughout the Neotropics.

The most recent comprehensive taxonomic revision of the genus *Philodendron* (Krause 1913) is now more than a century old. Since that time, a partial revision has been provided for *P.* subg. *Philodendron* (for Mexico and Central America; Croat 1997), while *P.* subg. *Meconostigma* has been revised in its entirety (Mayo 1991). *Philodendron* subg. *Pteromischum*, to which the remainder of this paper will be devoted, has been revised for Pacific and Caribbean tropical America (Grayum 1996), an area defined to include Mexico and Central America, the West Indies, the Pacific slope of South

America, and the extra-Amazonian portions of Colombia and Venezuela. Limited inroads have also been made into some other parts of South America, e.g., French Guiana (Croat & Grayum 1994) and the extra-Amazonian portions of Brazil (Barbosa & Sakuragui 2014); however, there have been no significant revisionary studies of subg. *Pteromischum* for the vast Amazonian basin, where the taxon attains its greatest diversity (especially in the Andean foothills of Ecuador and Peru). This synoptic treatment of the relatively modest Bolivian quotient of subg. *Pteromischum* is tendered as a first step in that direction. Even though some taxonomic problems remain unresolved, this contribution is expected to be of heuristic value in highlighting those issues and suggesting avenues for future field studies (which sorely are needed in this group, and also in Bolivia).

The genus *Philodendron* is generally recognized by its scandent habit, clear or resinous (not milky) sap, spirally arranged leaves with the lamina simple, inflorescences with a more or less persistent spathe enveloping the spadix, and unisexual flowers lacking a perianth. Within that context, subg. *Pteromischum* may be characterized by anisophyllous (vs. homeophyllous) adult growth, sympodial leaves with an extensive sheath (more than 40% of the petiole length), and pistillate flowers with more than 20 ovules per locule and a broad, shallow stylar compitum (see Grayum 1996 for more information). In more practical terms, adult (fertile) specimens of subg. *Pteromischum* are easily recognized in both the field and herbarium by their leaves with extensively sheathed petioles, with the sheath narrowly clasping the stem, and the lamina generally (though not always) non-cordate at the base, as well as their often solitary inflorescences, with the spathe uniformly whitish to green internally (with few exceptions) and externally. Sterile specimens are often misdetermined (at least in herbaria) as belonging to the distantly related genus *Rhodospatha* Poepp., which may have leaf blades of similar shape and venation but differs vegetatively by its distichous leaves (not always obvious on herbarium specimens), finely striate petioles, and the presence of trichosclereids (clearly visible in torn leaf tissues).

Two sections have been circumscribed within subg. *Pteromischum* (Grayum 1996), based mainly on morphological evidence: sect. *Pteromischum* (Schott) Engl., characterized by sylleptic growth in the adult phase, a generally appressed-climbing habit with adventitious roots at most nodes, petioles with the unsheathed portion relatively long, and inflorescences often two (or more) per axil, borne close to the supporting trunk on relatively long peduncles, and with catapyhylls manifest; and sect. *Fruticosa* Grayum, with proleptic sympodial growth in the adult phase, a generally widely branched and shrubby habit, lacking adventitious nodal roots on flowering branches, petioles with the unsheathed portion relatively short, and inflorescences usually solitary in the axils and borne well away from the supporting tree on divergent or pendulous branches and relatively short peduncles, with cataphylls rarely manifest. The two sections are more or less equally represented throughout the range of subg. *Pteromischum*, broadly speaking; sect. *Fruticosa*, however, predominates in southern Central America and sect. *Pteromischum* in the Amazonian drainage of Ecuador and Peru (these being the two areas with the greatest species diversity for the subgenus). Although this sectional classification has yet to be rigorously tested with modern molecular analyses, some preliminary studies have suggested that it may be at least partly artificial (M. Cedeño and O. Ortiz, pers. comm.); for that reason, I have decided to avoid placing undue emphasis on sectional affinities in the present paper.

Species of subg. *Pteromischum* are generally well represented in lowland wet forests throughout the Neotropics, especially in the Tropical Wet and Premontane Rain Forest life zones of the Holdridge system (e.g., Holdridge et al. 1971) below ca. 1600 m (though occasionally ascending to at least 2200 m). All species studied to date are pollinated by dynastine scarab beetles, with flowering synchronized in relatively brief episodes (see, e.g., Grayum 1996: 31–32); as a consequence, the majority of herbarium specimens are usually sterile. The Bolivian contingent of subg. *Pteromischum* exhibits these same tendencies — all of the collections examined for this study are from the Amazonian basin, at elevations of ca. 150–1550(–1850) m, in five departments (Beni, Cochabamba, La Paz, Pando, and Santa Cruz). Two species, *P. acreanum* K. Krause and *P. leucanthum* K. Krause, have so far been

found only at the northernmost edge of the country (in the departments of Pando or Beni, respectively), a tendency documented for Araceae in general by Kessler and Croat (1999: 228). Flowering in subg. *Pteromischum* may occur during most months of the year (depending on the species) in Bolivia, but about half the records are from November and December. Approximately 77% of the Bolivian herbarium specimens examined for this study (i.e., 104 of 135) were sterile, including the entire set for three of the species here treated.

The collecting history for Araceae in Bolivia was briefly recounted by Kessler and Croat (1999), up to the date of that publication. The earliest known collections were made in 1830 (by d'Orbigny), but more than a century passed before an attempt at a comprehensive floristic account appeared. The latter, an unvouchered "catalogue" of the entire vascular flora (Foster 1958), listed just 47 species of Araceae, with *Philodendron* subg. *Pteromischum* represented by a single species, *P. caudatum* K. Krause (overlooking the Bolivian syntype of a second species, *P. acreanum* K. Krause). The vouchered list of Bolivian vascular epiphytes provided by Ibisch (1996) included two formally named species of subg. *Pteromischum*, in addition to at least one species named provisionally (*Philodendron* "sp. A"). A vouchered checklist of Bolivian Araceae appended by Kessler & Croat (1999) enumerated five formally named species (two determined tentatively) of subg. *Pteromischum*, as well as at least two provisionally named species ([Araceae] "sp. 5" and [Araceae] "sp. 22"). The most recent accounting of Bolivian Araceae (Croat & Acebey, 2014), also (mostly) vouchered, lists eight species of subg. *Pteromischum*. Some of the names used in all three of the last-mentioned sources were misapplied, as revealed by the cited vouchers (these misapplications are referenced in the species accounts that follow). The present contribution, which accepts 12 species of subg. *Pteromischum* in Bolivia, incorporates collections made during the present millennium, including those of Bruno Aguilar (in 2002), Noel Altamirano (2004), Saúl Altamirano (2004), Alejandro Araujo M. (2004, 2006), Leslie Cayola (2003), Thomas B. Croat (2000), Diego De La Quintana (2002), Alfredo F. Fuentes (2002), Michael Kessler (2003), Thorsten Krömer (2000), F. Miranda (2004), Michael Nee (2000), Narel Paniagua (2002), Renate Seidel (2002), Jehizon Terán (2008), Evert Thomas (2004), Israel G. Vargas C. (2001), and Modesto Zárate (2002). These inconspicuous plants have clearly been neglected during the past 15–20 years, at least according to the specimens (both mounted and unmounted) currently available at MO (the most recent of which was collected in 2008). Indeed, the biodiversity of Bolivia in general has been understudied, with the wettest low-elevation regions — i.e., those most likely to harbor species of subg. *Pteromischum* — having received the least attention. According to a recent conservation assessment of the reptilian fauna of one such region (the Department of Beni), "little is known of the reptile biodiversity of Bolivia, and even less so in Beni" (Eversole et al. 2024: 3).

I have been conservative in circumscribing species of subg. *Pteromischum* for Bolivia (deliberately, and partly out of necesity, given the large number of sterile specimens), hence it is likely that the species total for the country will exceed the number (12) accepted in this synopsis. Similarly, I have deferred speculation on synonymy involving names based on types from other countries until a thorough study of all available material from those countries has been completed; I do not wish to impact neotropical floristics with rash conclusions that may later prove false. Greek letters (α, β, and γ) are used as notation for the three provisionally named species treated in this synopsis to avoid confusion, both Latin letters and Arabic numerals having been used for the same purpose by previous authors for species of subg. *Pteromischum* occurring in Bolivia.

The characters utilized in the following key and descriptions are explained in Grayum (1996: 39), and for the most part are conventional. However, several merit reiteration. Four different ratios are employed throughout: **P/L**=petiole length/lamina length; **L/W**=lamina length/lamina width (measured at the widest point); **P/S**=peduncle length/total spadix length; and **F/S**=length of female portion of spadix/total spadix length. In the last two cases, "total spadix length" includes the stipe. Leaf asymmetry is accounted for by means of an "inequilaterality index" (**IQI**), calculated by dividing the width of the widest side of the lamina (measured at the widest point) by the total lamina width,

multiplying the quotient by 100, and subtracting 50 from the product (a perfectly symmetrical leaf would have an IQI of 0, with higher numbers indicating progressively greater asymmetry). Subjective characters (color, sheen, texture, relief, odors, etc.) have been abstracted directly from specimen labels, unless stated as applying to dried organs. I am well aware of the brouhaha, in recent decades, surrounding the inconsistent or erroneous usage of certain habit descriptors, especially "hemiepiphyte" (see, e.g., Zotz et al. 2020); nevertheless, in the absence of critical field studies involving the species here treated, I can do no better than to repeat the subjective judgments of collectors for this character as well. With respect to specimen citations, I have endeavored to reproduce the relevant data exactly as rendered on the labels themselves; this factor will explain most apparent inconsistencies involving such details as capitalization and the usage (or not) of diacritical marks (for example, "rio" or "río," vs. "Rio" or "Río"; "Kromer" vs. "Krömer"). When available, herbarium accession numbers (rather than bar-code numbers) are cited for type specimens or photos. Continuing a convention established in previous papers (e.g., Grayum 2022), specimens that I have actually studied in hand are flagged with an exclamation point (!), those of which I have seen only an image with the same symbol inverted (¡); "n.v." (non vidi) denotes the rare specimen that I have not seen at all but know to exist (e.g., from label annotations). Addenda such as "+2" following specimen citations indicate the number of unmounted duplicates available for distribution.

The key provided here is artificial, intended mainly to facilitate identification. Unless otherwise stated, all of the data in the key and the descriptions derive from specimens collected in Bolivia. Elevational ranges (in the key as well as the "Distribution and phenology" summaries) are rounded downward (for minima) or upward (for maxima) to the nearest 50 m.

Key to the species of *Philodendron* subgenus *Pteromischum* in Bolivia

1. Petiole with distal portion beyond sheath generally >2 cm long (on at least some leaves).

2. Leaf-blades with L/W generally <2.00; spadix ca. 5.9–6.7 cm long; pistillate flowers 5.7–5.9 mm long, with a conspicuous style ..... **Philodendron divaricatum**
2. Leaf-blades with L/W >2.00; spadix ca. 8.6–14.7 cm long; pistillate flowers 1.3–2.7 mm long, without a conspicuous style.

3. Leaf-blades with ca. 4–6(?) scarcely (if at all) evident primary lateral veins per side, drying (on both surfaces) densely alveolate; infls. 1–3 per axil; peduncle ca. 4.0–4.3[–7.7] cm long; spadix with F/S=ca. 0.17[–0.28]; ca. 250–300 m ..... **Philodendron acreanum**
3. Leaf-blades with 5–12 conspicuous primary lateral veins per side, drying (at least abaxially) densely and finely low-granular; infls. solitary; peduncle ca. 2.9–4.7 cm long; spadix with F/S=ca. 0.38–0.39; (300–)500–1100(–1300) m ..... **Philodendron** sp. **α**

1. Petioles with distal portion beyond sheath generally <2 cm long.

4. Plants terrestrial (along arroyos and rivers), rarely scandent; spadices with F/S ≤0.25 .....**Philodendron renateae**
4. Plants epiphytic or hemiepiphytic and scandent, rarely terrestrial; spadices with F/S ≥0.25 (or infls. unknown).

5. Leaf-blades with 4 or 5 primary lateral veins per side.

6. Leaves with the distal portion of the petiole beyond the sheath 0.1–0.4(–0.7) cm long; lamina with L/W generally >2.40; 350–600 m ..... **Philodendron noelii**
6. Leaves with the distal portion of the petiole beyond the sheath 0.3–1.3(–1.7) cm long; lamina with L/W generally ≤2.40; 1100–1550 m ..... **Philodendron** sp. **β**

5. Leaf-blades (at least some) with >5 primary lateral veins per side.

7. Leaves with P/L generally ≥0.60; lamina with L/W often <2.00 ..... **Philodendron** sp. **γ**

7. Leaves with P/L generally <0.60; lamina with L/W generally >2.00.

8. Leaves with the lamina drying brownish, generally with ≤7 primary lateral veins per side ..... **Philodendron caudatum**
8. Leaves with the lamina drying greenish, with ≥7 primary lateral veins per side.

9. Leaves with the lamina relatively symmetrical (IQI generally ≤4) ..... **Philodendron guttiferum**
9. Leaves with the lamina conspicuously asymmetrical (IQI generally ≥4).

10. Leaves with P/L generally <0.40; lamina with L/W often >3.00 (to >9.00 on juvenile leaves), with 7–13 primary lateral veins per side; inflorescences with P/S <0.30 ..... **Philodendron chanchamayense**
10. Leaves with P/L generally >0.40; lamina with L/W generally <3.00 (and never >6.00), with [8]9–17(–22) primary lateral veins per side; inflorescences with P/S >0.30.

11. Leaf-blades with IQI=(3–)8–13(14); inflorescences with P/S ≥0.50; spadix with F/S >0.35; 600–1150(–1850) m ..... **Philodendron gonzalezii**
11. Leaf-blades with IQI=[5]6–9[–11]; inflorescences (not known from Bolivia) with P/S generally ≤0.50; spadix with F/S <0.35; ca. 150 m ..... **Philodendron leucanthum**

PHILODENDRON ACREANUM K. Krause in Engl. & K. Krause, Pflanzenr. IV.23Db (Heft 60): 22. 1913. **LECTOTYPE** (Grayum 1996): **BOLIVIA**. [**Pando**]: Rio Acre, bei Cobija, Jan 1912 (fl), *E. Ule 9238* (B!; isolectotypes: U-048899!, UC-493022¡). Figure 1.

(Hemi)epiphytic, scandent herbs, [to at least 7 m]. **Internodes** to at least 3.0 cm long and 0.8 cm wide, subterete, drying yellowish brown or tan and coarsely sulcate; roots present at distal nodes, 0.5–1.1 mm thick. **Petiole** 9.0–14.9 cm long, P/L=(0.44–)0.58–0.63(–0.73), sheathed 87–93%, the sheath erect (at least toward base) to spreading, the free portion prolonged apically to ca. 0.3 cm; unsheathed portion of petiole ca. 0.80–1.90[–4.40] cm long. **Lamina** 16.6–25.9+ cm long, 6.1–9.1 cm wide, L/W=ca. 2.37–2.72, IQI=ca. 2–5, thinly coriaceous, narrowly ovate or narrowly obovate to narrowly elliptical, cuneate to subtruncate at the base, abruptly short-acuminate to gradually acuminate at the apex (the acumen 0.4–0.6(–2.6) cm long) and apiculate; primary lateral veins ca. 4–6(?) per side, ca. 1.7–4.8 cm apart, scarcely if at all evident; abaxial surface drying densely alveolate, with reticulate veins not evident; white stitching not evident; resin canals not evident; adaxial surface drying as abaxial surface. **Inflorescences** 1–3; cataphylls present, to at least 5.5 cm long, 0.25–1.20 cm wide, narrowly oblong to narrowly lanceolate, 2-keeled or -winged, also longitudinally costate, moderately granular, with white stitching between costae; peduncle ca. 4.0–4.3[–7.7] cm long, P/S=ca. [0.33–]0.42[–0.63]; spathe at anthesis ca. 10.3–10.4[–16.2+] cm long, 1.8–2.4[–3.4] cm wide, [green to cream externally, pink to reddish or red to reddish violet toward base internally]; spathe moderately to densely granular and weakly longitudinally costate-striate, with moderately dense short white stitching and with resin canals scarcely if at all evident externally, internally densely granular, with white stitching not evident, with longitudinal secretory striations in basal [1/2–2/3]; acumen of spathe to ca. 0.9[–1.1] cm long. Stipe of spadix [ca. 0.6–0.7 cm long]; spadix ca. 9.5[–14.7] cm long, the fertile male portion ca. 0.6[–1.2] cm wide; sterile male zone [ca. 0.9–1.2 cm long]; female portion of spadix ca. 1.6[–4.1] cm long, F/S=ca. 0.17[–0.28], ca. 0.9[–1.0] cm wide [to at least 2.3 cm in fruit]; fertile male flowers 1.0–1.2[–2.0] mm long, [0.3–]0.6–1.3[–2.1] mm wide, irregularly polygonal, columnar; sterile male flowers 1.0–1.1 mm long, 0.5–2.3 mm wide, irregularly rounded-polygonal, ± anvil-shaped; female flowers ca. [1.3–]1.9–2.0 mm long, 0.5–0.8[–1.0] mm wide. **Fruits** [yellowish]. **Seeds** [(± immature) ca. 0.9–1.0 mm long and 0.3 mm wide, ± straight, finely striate with the striae weakly beaded.].

Distribution and phenology. Departmento de Pando, ca. 250–300 m. Flowering has been recorded in January, ripe fruits not recorded. Distribution outside Bolivia: specimens closely matching

the type of *Philodendron acreanum* have been collected in the Amazonian piedmont region to at least as far north as Sucumbíos Province, Ecuador.

Philodendron acreanum, known from Bolivia only by the lectotype collection, is well characterized by its leaves with the petiole relatively short-sheathed, with the sheath horizontally spreading for most of its length, and the lamina proportionately narrow, drying densely and uniformly alveolate (without conspicuous granules, white stitching, or resin canals) on both surfaces, and lacking obvious primary lateral veins, as well as by its inflorescences often two or three per axil, with well-developed cataphylls and long peduncles. The labels of numerous collections (from adjacent countries) describe the spathe tube as pink to red or reddish violet within, and while such descriptions are often ambiguous (and likely in reference to the longitudinal secretory striations), some labels of *P. acreanum* clearly ascribe this coloration to the internal spathe surface. Pink or reddish spathes are highy unusual (though not unknown) in subg. *Pteromischum*, and the same is true of leaves with the lamina lacking clearly defined primary lateral veins. The latter feature, in particular, prompted Krause (1913) to class this species in *Philodendron* [subg. *Philodendron*] sect. *Baursia* (Rchb. ex Schott) Engl. This is one of the most distinctive species in subg. *Pteromischum* and need not be confused with any other (but see *P.* sp. α).

Based on the totality of its characters, *Philodendron acreanum* clearly belongs in sect. *Pteromischum* (Grayum 1996: 217). The only other documented (or suspected) examples of pink to reddish internal spathe coloration in subg. *Pteromischum* involve members of sect. *Fruticosa* (Grayum 1996: 24).

The data in the foregoing description (as well as the key) derive mainly from the Bolivian lecto- and isolectotype specimens, supplemented [in square brackets] with information from collections (including excluded syntypes) from immediately adjacent regions of Peru (see Fig. 1) and Brazil.

PHILODENDRON CAUDATUM K. Krause in Engl. & K. Krause, Pflanzenr. IV.23Db (Heft 60): 13. 1913. **LECTOTYPE** (Grayum 1996): **BOLIVIA**. [**Cochabamba**]: Antahuacana, Espíritu Santo, 750 m, Jun 1909 (fl), *O. Buchtien 2037* (B!; photo MO-1663866!). Figure 2.

(Hemi)epiphytic, scandent herbs to at least 2 m, often on trunks of small trees. **Internodes** to at least 7.8(–10.1) cm long and 0.5[–0.6] cm wide, very dark green to dark purplish and semiglossy, sharply flattened on one side, drying chestnut-brown to deep purplish brown and moderately sulcate, the epidermis eventually exfoliating; roots uncommon at distal nodes, 0.2–0.9(–1.3) mm thick. **Petiole** (0.9–)2.4–5.7 cm long, P/L=(0.28–)0.31–0.49(–0.64), more or less extensively sheathed (75–99%), the sheath broadly spreading horizontally (with the margins sometimes recurled), medium green, semiglossy, densely short-lineate, the free portion prolonged apically to ca. 0.29(–0.40) cm (sometimes beyond the base of the lamina); unsheathed portion of petiole ca. 0.03–0.14(–0.22) cm long. **Lamina** (1.4–)6.0–14.9[–16.0] cm long, (0.6–)2.0–5.9[–6.5] cm wide, L/W=2.18–3.49(–3.83), IQI=(1)2–9, thinly coriaceous, dark green and weakly glossy to semiglossy above, slightly paler and glossier below, drying brownish, lanceolate to elliptical or oblong to ovate or (rarely) narrowly obovate, cuneate to rounded or (rarely) subtruncate at the base, subacute to (more frequently) ± abruptly short-acuminate or gradually short- to long-acuminate at apex (the acumen 0.2–1.6 cm long) and generally ± apiculate (the filamentous tip to ca. 0.6 cm long); primary lateral veins (3)4–7(8)[9] per side (often scarcely visible above), 0.2–2.8 cm apart, weakly sunken above, weakly convex and concolorous below, often with some interprimaries; abaxial surface drying uniformly and ± densely low-granular, with reticulate veins evident only toward the margins; white stitching scarce (mainly toward base) and inconspicuous, or sometimes more widespread and moderately abundant over resin canals and major veins; resin canals not evident or (sometimes) moderately visible between all minor veins; adaxial surface drying virtually smooth and featureless, but with reticulate veins visible toward the margins (especially distally); short white stitching occasionally visible and ± abundant. **Inflorescences** solitary; cataphylls absent;

peduncle ca. [1.0–]1.7 cm long, P/S=ca. 0.14; spathe at anthesis [12.0–]12.8–15.1 cm long, [1.0–]1.2–2.3 cm wide, "yellow-green (the tip lighter)" (*Nee & Chávez 51562*); spathe drying moderately granular, finely striate, and with sparse white stitching (mainly toward base) externally, internally smooth and virtually featureless (or very densely granular?), with longitudinal secretory striations in basal 43–51%; acumen of spathe 1.0–1.6(–2.1)[–4.0] cm long. Stipe of spadix 0.2–0.9 cm long; spadix [8.0–]8.2–11.8 cm long, the fertile male portion ca. 0.4–0.7 cm wide; sterile male zone ca. 0.2–0.6 cm long; female portion of spadix 2.0–3.1 cm long, F/S=0.25–0.26, 0.6–1.2 cm wide (to at least 1.8 cm in fruit); fertile male flowers 1.0–1.5 mm long, 0.3–1.1 mm wide, irregularly polygonal, ± cylindrical; sterile male flowers 1.6–1.8 mm long, 0.6–1.2(–1.8) mm wide, irregulary rounded-polygonal, ± anvil-shaped; female flowers (1.1–)1.8–2.7 mm long, ca. 0.6–1.0 mm wide. **Fruits** not described (as to color). **Seeds** (± immature) 0.8–0.9 mm long, ca. 0.2 mm wide, ± straight to slightly curved, ± coarsely striate, the striae not conspicuously beaded.

Additional specimens examined. **BOLIVIA**. **Cochabamba**. Prov. Carrasco: Parque Nacional Carrasco, al S del Campamento Ichoa, 17°23'S, 64°30'W, 500 m, Bosque siempreverde, virgen, 12 Sep 1997 (st), *Acebey 506* (MO!); de Villa Tunari 62 kms. hacia Puerto Villarroel "Parque Litoral", cerca de Ivirgarzama, 5-30° [sic] W, Bosque siempre verde sobre pequeña colina, 2 May 1979 (st), *Beck 1525* (LPB [2 sheets!], MO!); Valle del Sajta, 17°08'S, 64°50'W, 220 m, Bosque siempreverde, secundario, 5 Oct 1996 (st), *Kessler et al. 8839* (MO!). Prov. Chapare: Territorio Indígena Parque Nacional Isiboro-Secure, cordillera de Mosetenez, laguna Carachupa, 16°14'S, 66°25'W, 1300 m, Bosque Húmedo Montano de los Yungas, bosque siempreverde, virgen, de 20 m de altura, 29 Aug 2003 (st), *Kessler et al. 12985* (MO!). **La Paz**. San Antonio b. Mapiri [illegible], 870 m, Auf Bäumen, Dec 1907 (fl), *Buchtien 2037* (NY!, US!; excluded isosyntypes). Prov. Bautista Saavedra: 3 Km Pauji-Yuyo, entre Apolo y Charasani, 15°02'S, 68°29'W, 1450 m, Bosque siempreverde, virgen de 20 m de altura con Dictiocaryum [sic] e Iriartea, 5 Jun 1997 (st), *Kessler et al. 9716* (MO!); Area Natural de Manejo Integrado Apolobamba, Wayrapata, aprox. 1 Km NE del caserio, Bosque yungueño subandino pluvial con Lauraceae spp, Rubiaceae spp. y Protium alstonii, ladera W, pendiente 40%, Parcela evaluacion epifitas 5, 15°05'05"S, 68°29'22W [sic], 1294 m, 21 May 2004 (st), *Miranda et al. 385* (MO!). Prov. Franz Tamayo: 42 Km al W y 1 Km al N de Rurrenabaque, 14°25'S, 67°55'W, 330 m, Bosque pluvial, Campamento Chalalan, con elementos de bosque amazónico y bosque húmedo de llanura, 6 Oct 1994 (st), *Helme 266* (MO!); Parque Nacional Madidi, refugio Chalalán, campamento Eslabon y alrededores, al otro lado del rio cerca del Campamento, 14°27S, 67°56W, 350 m, Bosque siempre verde, virgen pie de monte, 24 Apr 2000 (fr), *Kromer & Acebey 1109* (MO!). Prov. Nor Yungas: Localidad La cascada, K0693064-8299158 UTM, 1020 m, Selvas amazónicas pluviestacionales de tierra firme del Alto Beni serie de *Swietenia macrophylla* y *Tetragastris altissima*, 21 Sep 2002 (st), *Aguilar et al. 934A* (MO!); along road between Caranavi and Yucumo, vic. of Sapecho, along road to Colonia Tarapacá, Permanent Parcel #2, Projecto de Investigación Agro Forestal (RAF), 3.9 Km, 15°31'54"W, 67°21'24"W, 625 m, 6 Aug 2000 (st), *Croat et al. 84302* (MO!); along road between Caranavi and Yucumo, along side road NW off main road into Serrania de Marimones to Colonia Tupiza B, 15°31'25"S, 67°18'31"W, 600–850 m, 7 Aug 2000 (st), *Croat et al. 84344* (MO!). Prov. Sud Yungas: Alto Beni, Sapecho, Colonia Tarapaca, 15°32'S, 67°21'W, 650 m, Bosque siempreverde, exp. SE, empinado, 28 Jan 1997 (st), *Acebey & Jimenez 122* (MO!); Alto Beni, Colonia Tarapaca, parcela II subparcela F, 15°32'S, 67°21'W, 625 m, Bosque siempreverde, poco disturbado, 14 Apr 1999 (st), *Krömer & Acebey 260* (MO!); Alto Beni, Colonia Tarapacá, parcela II, subparcela F, 15°32'S, 67°21'W, 625 m, Bosque siempreverde, poco disturbado de 25 m de altura, 14 May 1999 (st), *Krömer & Acebey 387* (MO!), *392* (MO!), *411* (MO!); Alto Beni, Colonia Tupiza, parcela III, subparcela K3, 15°31'S, 67°17'W, 750 m, Bosque siempreverde, virgen de 30 m de altura, 11 Jun 1999 (st), *Krömer & Acebey 485* (MO!); Alto Beni, Colonia Tupiza, camino a la Parcela III, en barbecho, 15°31'S, 67°17'W, 600 m, Bosque siempreverde, virgen de 30 m de altura, 2 Jul 1999 (st), *Krömer & Acebey 540* (MO!); Alto Beni, Sapecho, Colonia Tarapaca, 15°32'S, 67°21'W, 610 m, Bosque siempreverde, virgen de 18 m de altura, Parcela II, 28 Oct 1997 (st), *Krömer et al. 72* (LPB [n.v.],

MO!). **Pando**. Rio Acre, im Walde bei Nova York, Feb 1911, *Ule 9234* (MG!). **Santa Cruz**. Prov. Ichilo: 6 km SW of Villa San Germán, south side of Río Moile, opposite Campamento Moile of Parque Nacional Amboró, 17°24'S, 64°08'W, 275 m, Evergreen tropical lowland forest in occasionally flooded flat area, partially disturbed, 20 Nov 2000 (fl), *Nee & Chávez 51562* (MO!, NY!, USZ¡).

Distribution and phenology. Departmentos de Cochabamba, La Paz, Pando, and Santa Cruz, 200–1050(–1450) m. Flowering has been recorded in June, November, and December, ripe fruits in April. Distribution outside Bolivia: see following discussion.

Philodendron caudatum may be easily distinguished among the Bolivian species of subg. *Pteromischum* by its scandent habit and smallish leaves with the petiole relatively short and extensively sheathed, with the sheath spreading horizontally, and the lamina drying brownish and with relatively few (mostly 4–7) primary lateral veins per side. The brownish-drying foliage is virtually diagnostic for herbarium specimens. The widely branching habit and solitary inflorescences, lacking cataphylls and with short peduncles, are consistent with membership in sect. *Fruticosa*, within which this species conforms morphologically to a still-unresolved complex of species and/or populations ranging northward in the Amazonian piedmont region to Venezuela and the Guayanas. Several binomials have been validated based on this material (see Grayum 1996: 179), most (but not all) of which are junior to *P. caudatum*; however, the French Guianan type of *P. martini* Schott, the oldest name in the group (1859), bears a disquieting resemblance to many Bolivian specimens of *P. caudatum*. Thus, although the name *P. caudatum* is applied here with confidence to the Bolivian specimens cited above, it cannot be accepted as the oldest name until the entire complex has been studied exhaustively over its whole geographic range. For the same reason, the distribution of *P. caudatum* outside Bolivia cannot yet be assessed.

Beck 1525, a rather typical specimen of *Philodendron caudatum*, served as the voucher for *P. guttiferum* Kunth in Ibisch (1996), and for *P.* "cf. *guttiferum*" in Kessler & Croat (1999); the latter source (but not the former) also attributed *P. caudatum* to Bolivia (whence the type!), citing a different (and correctly determined) voucher.

The square-bracketed extremes in the foregoing description of *Philodendron caudatum* derive from the protologue, which was based exclusively on Bolivian material involving at least two and as many as four syntypes, though only the lectotype has been available to me.

PHILODENDRON CHANCHAMAYENSE Engl., Bot. Jahrb. Syst. 37: 125. 1905 [nom. cons. prop.]. **TYPE**: **PERU**. **Junín**: Prov. Tarma, La Merced im Chanchamayo-Thal, 1000 m, lichter Wald, Dec 1902 (fl), *A. Weberbauer 1864* (holotype: B!). Figures 3–6.

(Hemi)epiphytic, scandent plants, climbing to at least 8 m. **Internodes** dark green, ± purplish-tinged, semiglossy, to at least 12.0 cm long and 0.6 cm wide, faintly ribbed, drying tan to medium brown and moderately sulcate, the epidermis sometimes exfoliating in patches; roots sometimes present at distal nodes (mainly on juvenile plants), 0.3–1.2 mm thick. **Petiole** (4.4–)6.4–10.7 cm long, P/L=(0.23–)0.28–0.39(–0.43), sheathed ca. 96–100%, the sheath ± erect, medium green, weakly glossy, the free portion prolonged apically to ca. 0.01–0.10 cm; unsheathed portion of petiole to ca. 0.02–0.10(–0.25) cm long. **Lamina** (16.8–)18.3–27.1 cm long, (2.1–)4.8–8.6 cm wide, L/W=2.55–4.67(–9.71), IQI=4–12(–15), thinly coriaceous to subcoriaceous, weakly bicolorous, semiglossy, linear-lanceolate or lanceolate to ± narrowly elliptical or oblong, broadly cuneate to subtruncate or rounded at the base, ± abruptly to gradually acuminate at the apex [the acumen (0.1–)0.6–2.1(–2.5) cm long] and apiculate; midrib sunken and concolorous above, narrowly raised and slightly paler below; primary lateral veins 7–13 per side (sometimes obscure, especially above and distally), 0.3–2.6 cm apart, sunken and concolorous above, convex or weakly pleated-raised and concolorous below, with interprimaries scarcely or partly evident, or not evident; minor veins fine, moderately visible or obscure; abaxial

surface drying moderately and minutely granular (in areolae and on reticulate veins) or with granules scarcely or not evident; resin canals ± obvious between all secondary lateral veins, brownish to black; adaxial surface drying obscurely or (more often) moderately to densely granular between prominulous reticulate veins (the areolae generally very small, diminishing distally); white stitching not evident, or occasional to moderately abundant between secondary lateral veins; resin canals obscurely to moderately visible, or not evident. **Inflorescences** solitary; cataphylls (rarely evident) to at least 3.5 cm long, 0.3–0.6 cm wide (*Cayola et al. 733*), lanceolate, with conspicuous longitudinal resin canals; peduncle 1.2–1.8 cm long, P/S=ca. 0.16–0.21; spathe at anthesis ca. 7.7–11.7 cm long, 1.3–2.1 cm wide, dark green (tube) to pale green (lamina) externally, pale yellow-green to white and glossy within; spathe drying obscurely to moderately or ± densely granular, with obscure to moderately dense white stitching and conspicuous, closely parallel brownish to blackish resin canals externally, internally obscurely to ± densely granular, with white stitching not evident, with longitudinal secretory striations in basal ca. 50–51%; acumen of spathe erect to deflexed or recurved, ca. 1.3–2.5 cm long. Stipe of spadix ca. 0.3–0.5 cm long; spadix cream to yellow, ca. 7.5–9.0 cm long, the fertile male portion 0.6–0.9 cm wide; sterile male zone ca. 0.4–0.5 cm long; female portion of spadix ca. 2.4–2.6 cm long, F/S=0.27–0.32, ca. 0.6–0.9 cm wide [to ca. 1.6 cm in fruit (galled)]; fertile male flowers 1.5–1.8 mm long, 0.3–1.3 mm wide, irregularly polygonal, cylindrical; sterile male flowers 1.4–2.0 mm long, ca. 0.8–1.0 mm wide, ± rounded-polygonal, cylindrical; female flowers 1.6–1.8 mm long, 0.6–1.1 mm wide. **Fruits** not described (as to color). **Seeds** not seen.

Additional specimens examined. **BOLIVIA**. **Beni**. Prov. Vaca Díez: Vicinity of Riberalta, along road between Riberalta and Guagaramirim, 21 Km E of Riberalta, then 5 Km N, vic. of Cachuela Esperanza, 10°56'23"S, 65°41'23"W, 175 m, disturbed primary forest, 15 Aug 2000 (st), *Croat et al. 84548* (MO!); Vicinity of Verdun, along road between Riberalta and Guagaramirim, 44.9 Km E of Riberalta (beginning at Gasolinera Natsumi), then 22.8 Km N on logging road, 10°52'05"S, 65°40'25"W, 190 m, disturbed primary forest, 16 Aug 2000 (st), *Croat et al. 84580* (MO!). **La Paz**. Prov. Abel Iturralde: Parque Nacional Madidi, laguna Chalalan, río Yariapo, 14°26'41"S, 67°53'05"W, 275 m, Bosque amazonico ribereño con Cecropia spp, Caliandra [sic] sp., Neea spp., Garcinia spp. y Jacaratia digitata, 26 Sep 2006 (fr), *Araujo-M. et al. 3110* (MO!); Puerto Muscoso, donde llega la pampa mas cerca del río Heath, 13°01'S, 68°50'W, 190 m, Bosque amazónico ribereño, sabanas húmedas estacionalmente inundadas al E del río Heath, sin influencia humana, 25 Jul 1995 (st), *Helme & Kruger 741* (LPB [n.v.], MO!), *864* (MO!), *925* (MO!); río San Antonio, 46 Km de Ixiamas a Alto Madidi, 13°38'S, 68°26'W, 300 m, Bosque siempreverde, poco disturbado de 30 m de altura, con Bombacaceae, 13 Aug 1997 (st), *Kessler et al. 11115* (MO!). Prov. Franz Tamayo: Parque Nacional y Área Natural de Manejo Integrado Madidi, San Jose-Bala, Chalalan, senderos Anta, Tucan y Wabucuro, 14°25'23"S, 67°55'26"W, 350 m, Bosque amazonico preandino, planicie con dominancia de Iriartea deltoidea, Socratea exhorriza [sic], Otoba parvifolia, Pachira cf., 30 Nov 2004 (fl), *Araujo-M. et al. 1255* (MO [2 sheets!]); Parque Nacional Madidi, Eslabon, a 2 km del Albergue Chalalan hacia el rio Tuichi, 14°25'13"S, 67°54'47"W, 323–407 m, Paleocauce, con presencia de Mauritia flexuosa, 18 Dec 2003 (st), *Cayola et al. 733* (MO!); Parque Nacional Madidi, río Hondo, parcela permanente y alrededores, al lado de la senda turística que sale al Tuichi, 14°36'52"S, 67°39'11"W, 220 m, Bosque amazónico estacional húmedo con Pentaplaris davidsmithii, Annonaceae, Moraceae y Lauraceae, en terraza antigua, 6 Apr 2002 (st), *Fuentes 4287* (MO!+1!); 42 Km al W y 1 Km al N de Rurrenabaque, 14°25'S, 67°55'W, 330 m, Bosque pluvial, Campamento Chalalan, con elementos de bosque amazónico y bosque húmedo de llanura, 6 Oct 1994 (st), *Helme 271* (MO!); 42 Km al W y 1 Km al N de Rurrenabaque, 14°25'S, 67°55'W, 330 m, Bosque pluvial, Campamento Chalalan, con elementos de bosque amazónico y bosque húmedo de llanura, 4 Nov 1994 (st), *Helme 481* (MO!); Parque Nacional Madidi, refugio Chalalán, campamento Eslabon y alrededores, al otro lado del río cerca del Campamento, 14°27S, 67°56W, 350 m, Bosque siempre verde, virgen pie de monte, 24 Apr 2000 (st), *Kromer & Acebey 1110* (MO!). **Pando**. W bank of Rio Madeira, 3 km. above Abunã, forest on terra firme, 13 Nov 1968 (fl), *Prance et al. 8392* (K!, NY!, US!).

Distribution and phenology. Departments of Beni, La Paz, and Pando, 150–350+ m. Flowering has been recorded in November, immature ("verde") fruits in September. Distribution outside Bolivia: extends northward in the Amazonian piedmont region to Colombia (Depto. Caquetá).

Philodendron chanchamayense is well characterized by its scandent habit and leaves with the petiole relatively short and extensively sheathed, with the sheath suberect, and the lamina proportionately narrow, conspicuously asymmetrical, and with conspicuous brownish to black resin canals and 7–13 primary lateral veins per side, as well as by its solitary, short-peduncled inflorescences. Several of these features combine to place this species unequivocally within sect. *Fruticosa*, while the distinctive epidermal micromorphology of the laminae (the adaxial surface drying with the tertiary venation prominulous and enclosing granular areolae) and orange ripe fruits (though fruit color has not been reported for Bolivian collections) are consistent with membership in the informal "*Philodendron guttiferum* group" of Grayum (1996: 14). Vegetatively, it differs from Bolivian material here assigned to *P. guttiferum* in having leaves with the petiole somewhat more extensively sheathed and the lamina more strongly inequilateral, with less numerous primary lateral veins and more conspicuous resin canals. The lamina in *P. chanchamayense* is, on average, proportionately much narrower than in *P. guttiferum*, approaching linear on some juvenile shoots (e.g., *Helme & Kruger 864*); an instructive transitional stage is preserved on *Araujo-M. et al. 1255* (Sheet 2 of 2; see Figure 6). See also the discussion under *Philodendron gonzalezii*.

The label of *Prance et al. 8392* states "fruit yellow," but the only fruits associated with this collection (on both the NY and US duplicates) belong to an unidentified species of *Heteropsis* Kunth (Araceae).

The voucher for *Philodendron* "*chinchamayense*" cited by Croat & Acebey (2014) instead corresponds to *P. leucanthum*, as here interpreted.

The epithet *chanchamayense*, based on the Peruvian type locality, was misspelled as "*chinchamayense*" in the protologue, where the locality itself was misspelled differently (as "Chanchamoyo"); the latter is handwritten correctly (as "Chanchamayo") and quite legibly on the label of the holotype specimen. Subsequent authors have addressed this problem inconsistently over the course of the past century, some maintaining Engler's original spelling of the epithet, others implementing the orthographically correct version; for that reason, conservation of the name (with the corrected spelling) was recently proposed (Grayum 2024).

PHILODENDRON DIVARICATUM K. Krause, Notizbl. Bot. Gart. Berlin-Dahlem 11: 618. 1932. **LECTOTYPE** (Grayum 1996): **PERU**. **Junín**: La Merced, E of Quimiri Bridge, ca. 700 m, dense forest, 29 May–4 Jun 1929, *E.P. Killip & A.C. Smith 24007* (F-615829!; isolectotype: US-13587522!). Figure 7.

Hemiepiphytic, scandent herbs, branching from main stems. **Internodes** grayish to brownish, to at least 7.6 cm long and 0.7 cm wide, longitudinally ribbed, drying tan to medium brown and moderately sulcate, the epidermis becoming transversely fissured and (eventually) exfoliating; roots sometimes present at distal nodes, ca. 1.0–1.4 mm thick. **Petiole** medium green, semiglossy, (7.4–)11.2–16.4 cm long, P/L=(0.37–)0.64–0.80, sheathed 59–75(–97)%, the sheath tightly inrolled, the free portion obsolete or prolonged apically to ca. 0.18 cm; unsheathed portion of petiole (0.2–)2.4–5.6 cm long. **Lamina** moderately glossy and very dark green above, moderately paler and weakly glossy below, 14.9–25.1 cm long, (4.7–)9.5–15.1 cm wide, L/W=1.57–1.82(–4.52), IQI=4–7(–10), broadly elliptical to ovate, truncate or rounded to shallowly cordate at the base, subobtuse to acute at the apex (the acumen 0.4–0.8 cm long) and apiculate; midrib concolorous and flat above, darker and narrowly raised below; primary lateral veins 8–12 per side (indistinct distally), 0.1–3.7 cm apart, weakly quilted-sunken above, pleated and convex below, occasionally with interprimaries; minor veins moderately

distinct; abaxial surface drying smooth to minutely alveolate, with reticulate veins ± obscure to moderately evident; white stitching scarcely evident to regular in lines between secondary lateral veins (presumably over resin canals that are not otherwise conspicuous in adult leaves); adaxial surface drying densely and finely granular (especially along veins of all orders); white stitching occasional (especially toward margins) to abundant (but inconspicuous); resin canals not evident. **Inflorescences** 1 or 2(3?); cataphylls to at least 6.3 cm long and 2.6 cm wide, elliptical, membranaceous, 2-keeled, moderately granular and longitudinally striate; peduncle (1.9–)2.4–4.3 cm long, P/S=(0.30–)0.38–0.72, coarsely raised-lineate; spathe at anthesis 6.7–8.1 cm long, 1.7–2.4 cm wide, medium green and short-lineate outside, greenish within; spathe drying moderately granular or rugulose-alveolate and striate, with inconspicuous to moderately dense longitudinal white stitching externally, internally moderately to densely granular, with longitudinal secretory striations in basal 69–88%; acumen of spathe ca. 0.2–0.5 cm long. Stipe of spadix ca. 0.4–1.0 cm; spadix ca. 5.9–6.7 cm long, the fertile male portion ca. 0.8 cm wide; sterile male zone ca. 0.3–0.4 cm long; female portion of spadix ca. 2.3(–3.1) cm long, F/S=0.34–0.39(–0.48), ca. 1.1–1.4 cm wide; fertile male flowers 1.0–2.1 mm long, 0.2–1.1 mm wide, irregularly polygonal, anvil-shaped; sterile male flowers ca. 2.0 mm long, ca. 1.4 mm wide, ± rounded-polygonal; female flowers 5.7–5.9 mm long, 1.0–1.5 mm wide. **Fruits** not described (as to color) or seen. **Seeds** not seen.

Additional specimens examined. **BOLIVIA**. **La Paz**. Prov. Abel Iturralde: Parque Nacional Madidi, 10.2 Km NW of turnoff in Tumupasas, 200–500 m from summit, 14°09'57"S, 67°55'02"W, 830 m, 9 Aug 2000 (fl), *Croat et al. 84428* (MO [2 sheets!]); río San Antonio, 46 Km de Ixiamas a Alto Madidi, 13°38'S, 68°26'W, 300 m, Bosque siempreverde, poco disturbado de 30 m de altura, con Bombacaceae, 13 Aug 1997 (st), *Kessler et al. 11117* (MO!). Prov. Franz Tamayo: Parque Nacional Madidi, refugio Chalalán, campamento Eslabon y alrededores, al otro lado del río cerca del Campamento, 14°27 S, 67°56 W, 350 m, 21 Apr 2000 (fl), *Kromer & Acebey 1064* (MO!).

Distribution and phenology. Department of La Paz, 300–850 m. Flowering has been recorded in April and August, ripe fruits are unknown. Distribution outside Bolivia: see following discussion.

Philodendron divaricatum is readily recognized among the Bolivian members of subg. *Pteromischum* by its scandent habit and leaves with the distal, unsheathed portion of the petiole relatively long and the lamina proportionately wide and truncate or rounded to shallowly cordate at the base, as well as its smallish inflorescences that are often paired. These and other features suggest placement in sect. *Pteromischum*, rather than sect. *Fruticosa* as was indicated by Grayum (1996: 218).

The application here of the name *Philodendron divaricatum* to Bolivian material is consistent with the usage of Kessler & Croat (1999; as *P.* "cf. *divaricatum*") and Croat & Acebey (2014), as according to the vouchers cited in those works. Nevertheless, the two flowering collections cited above differ strikingly from the Peruvian type of *P. divaricatum* in one, potentially critical respect: their pistillate flowers with a markedly elongate and narrow stylar region, immediately noticeable to the naked eye. As a consequence, the pistillate flowers of these specimens are at least twice the length of those on the type (2–3 mm, according to the protologue) and most other specimens so determined, which have distally truncate pistils. That said, specimens with these radically different pistils exhibit no other obvious morphological distinctions. I have seen specimens matching the Bolivian material (i.e., with elongate styles) northward in the Amazonian piedmont region to Prov. Sucumbíos, Ecuador, whereas specimens matching the type (with truncate pistils) have been collected (and much more frequently) from the Madre de Dios Region of Peru north to Colombia (Depto. Amazonas). The possibility cannot be ruled out that the one sterile Bolivian specimen actually represents a plant that would have truncate pistils. It is partly for that reason (my inability to distinguish sterile material) that I have opted not to pursue formal taxonomic recognition for the plants with elongate styles; furthermore, the distinction is not always so clearcut, especially northward (the pistils on several

Ecuadorian collections are neither truncate nor with the stylar region as conspicuously elongate as those on collections from Bolivia and Peru). It also bears mentioning that most of the mensural discrepancies between the protologue of *P. divaricatum* and the description provided here for Bolivian material (e.g., involving the lengths of the peduncles, spathes, and female portion of the spadices) disappear when long-styled specimens from Peru and Ecuador are added to the mix.

Although cited as an isolectotype by Grayum (1996), *Killip & Smith 24007* (NY!) is indicated on its label as having been collected at different elevational (800−1300 m) and date ranges (1−3 Jun 1929) from those cited in the protologue and specified on the labels of the lectotype (F) and the isolectotype at US; therefore, it must be considered a separate gathering, and is not a type of any kind.

PHILODENDRON GONZALEZII Grayum, Syst. Bot. Monogr. 47: 129. 1996. **TYPE**: **VENEZUELA**. **Táchira**: Buenana, 6–12 km W of Quebrada Colorado, ca. 35 km SSE of San Cristóbal, 600–1000 m, 7°28' N, 72°09' W, 19 Mar 1981, *Liesner & González 10793* (holotype: on 2 sheets, MO-3154060! and MO-3154061!). Figure 8.

(Hemi)epiphytic, scandent herbs, or (less commonly) terrestrial. **Internodes** dark green, to at least 10.6 cm long and 1.0 cm wide, drying medium brown to chestnut-brown and sulcate; roots at distal nodes (evident mainly in juvenile plants) (0.2–)0.4–1.0(–1.5) mm thick, occasionally branched. **Petiole** medium green, (5.6–)10.4–19.4 cm long, P/L=(0.28–)0.46–0.56, sheathed 89–98%, the sheath tightly inrolled, semiglossy, the free portion prolonged apically to ca. 0.10–0.20 cm; unsheathed portion of petiole 0.2–1.1(–2.4) cm long. **Lamina** 20.0–32.2(–38.6) cm long, (3.9–)9.4–13.8 cm wide, L/W=2.06–2.70(–5.58), IQI=(3–)8–13(14), thinly coriaceous, dark green and weakly glossy above, slightly paler and matte below, narrowly to broadly elliptical or narrowly subobovate and ± falcate, cuneate to truncate or rounded at the base, subacute to acuminate at the apex [the acumen 0.4–1.8(–2.2) cm long] and apiculate; midrib narrowly sunken and concolorous above, narrowly raised and concolorous below; primary lateral veins 14–17(–22) per side, 0.2–2.6 cm apart, quilted-sunken and concolorous above, pleated-raised and concolorous below, usually with several interprimaries; minor veins moderately distinct; abaxial surface drying ± densely but very obscurely granular (in areolae), the granules scarcely evident, with minor and reticulate veins prominulous (more so than on adaxial surface); white stitching uncommon (mainly along midrib and primary lateral veins); resin canals not evident (except sometimes on juvenile leaves); adaxial surface drying moderately granular (especially on veins of all orders), or granules scarcely evident; short white stitching sometimes evident especially near the proximal portion of the midrib; resin canals not evident. **Inflorescences** solitary or paired; cataphylls to at least 3.1 cm long and 0.6–0.7 cm wide, 2-keeled; peduncle ca. 3.0–3.9 cm long, P/S=ca. 0.50–0.61; spathe at anthesis ca. 8.0–10.5 cm long, 1.5–2.3 cm wide, color not reported; spathe drying ± densely rugulose and striate, with white stitching very obscure or not evident and with resin canals mostly obscure (except proximally and toward margins), internally densely and finely granular, with white stitching not evident, with longitudinal secretory striations in basal ca. 67–68%; acumen of spathe to at least 0.3 cm long. Stipe of spadix ca. 0.1–2.5(–0.5) cm long; spadix ca. 6.2–7.8 cm long, the fertile male portion ca. 0.5–0.9 cm wide; sterile male zone ca. 0.1–0.2 cm long; fertile female portion of spadix ca. 2.3–3.5 cm long, F/S=0.37–0.44, ca. 0.8–1.0 cm wide (to ca. 1.8 cm in fruit); fertile male flowers 1.2–1.4 mm long, 0.2–1.0 mm wide, irregularly polygonal, cylindrical to anvil-shaped; sterile male flowers ca. 1.1–1.2 mm long, 0.8–1.0 mm wide, ± rounded-polygonal and cylindrical; female flowers ca. 2.0 mm long, 0.5–1.0 mm wide. **Fruits** orange (*Krömer et al. 78*). **Seeds** ca. 0.7–1.0 mm long, 0.25–0.30 mm wide, straight to slightly curved or (less often) sigmoid or C-shaped, finely striate and very minutely beaded.

Additional specimens examined. **BOLIVIA**. **Cochabamba**. Prov. Carrasco: 147 Km antigua carretera Cochabamba–Villa Tunari, 17°07'S, 65°34'W, 1100 m, Bosque siempreverde, Virgen, 28 Aug 1996 (st), *Kessler et al. 7918* (MO!). **La Paz**. Prov. Bautista Saavedra: Pauji-Yuyo, entre Apolo y Charazani, 15°02'S, 68°29'W, 1450 m, Bosque siempreverde, disturbado de 20 m de altura, 8 Jun 1997

(st), *Kessler et al. 9914* (MO!). Prov. Caranavi: Serranía de Bella Vista, 47 Km de Caranavi hacia Sapecho, 15°29'S, 67°28'W, 1150 m, Bosque siempreverde, poco disturbado de 20 m de altura, 13 Aug 1997 (st), *Kessler et al. 11658* (MO!). Prov. Nor Yungas: Vicinity of Sapecho, along road between Caranavi and Yucumo, along side road NW off main road into Serrania de Marimones to Colonia Tupiza B, 15°31'25"S, 67°18'31"W, 600–850 m, 7 Aug 2000 (st), *Croat et al. 84345* (MO!). Prov. Sud Yungas: Alto Beni, Colonia Tupiza, camino a la Parcela III, subparcela K3, 15°31'S, 67°17'W, 600 m, Bosque siempreverde, virgen de 30 m de altura, 1 Jul 1999 (st), *Krömer & Acebey 509* (MO!); Alto Beni, territorio Moseten, cerca del campamento de la parcela V, 15°27S, 67°22W, 1850 m, Bosque Humedo Montano de los Yungas, bosque siempreverde virgen, 21 Oct 2000 (fl), *Kromer & Acebey 1626* (LPB¡, MO!); Alto Beni, Sapecho, Colonia Tarapaca, 15°32'S, 67°21'W, 640 m, Bosque siempreverde, virgen de 18 m de altura, Parcela II, 28 Oct 1997 (fr), *Krömer et al. 78* (LPB!, MO!); Alto Beni, Sapecho, Concesión de la Cooperativa Sapecho, 15°32'S, 67°20'W, 610 m, Bosque siempreverde, virgen, 30 Oct 1997 (st), *Krömer et al. 131* (MO!). **Santa Cruz**. Prov. Ichilo: 4 Km SW del Campamento Macuñucu, 17°44'S, 63°35'W, bosque siempreverde, virgen de 30 m de altura con Socrotea [sic], Iriartea, 27 Sep 1996 (st), *Kessler et al. 8678* (MO!).

Distribution and phenology. Departments of Cochabamba, La Paz, and Santa Cruz, 600–1150(–1850) m. Flowering has been recorded in October, ripe fruits in October. Distribution outside Bolivia: see following discussion.

Philodendron gonzalezii is characterized by its mainly scandent habit and leaves with the petiole relatively short and extensively sheathed, with the sheath involute, and the lamina with a distinctive epidermal micromorphology (the adaxial surface drying with the tertiary venation prominulous and enclosing granular areolae) and numerous primary lateral veins, as well as by its orange ripe fruits. These features combine to confer membership in the informal "*Philodendron guttiferum* group" of sect. *Fruticosa* (Grayum 1996: 14), together with (in Bolivia) *P. chanchamayense* and *P. guttiferum* itself. Bolivian material here assigned to both of the last-mentioned species differs from that included in *P. gonzalezii* by their leaf-blades with more or less conspicuous resin canals on the abaxial surface; furthermore, the blades of *P. chanchamayense* are proportionately narrower and with fewer primary lateral veins, while those of *P. guttiferum* are more symmetrical. Although more distantly related, *Philodendron leucanthum* (here referred to sect. *Pteromischum*) is superficially similar, but may be distinguished as according to couplet 11 of the accompanying key to species. All three of the species with which *P. gonzalezii* is compared in this paragraph are restricted in Bolivia to elevations below 500 m, whereas *P. gonzalezii* has been collected only at higher elevations.

Philodendron gonzalezii was treated as a Venezuelan endemic by Grayum (1996), and the application of the name to Bolivian material is tentative, pending a thorough revision of the entire "*P. guttiferum* group," which also includes (in South America) the following species (or names): *P. condorcanquense* Grayum & Croat, *P. krukovii* Gleason, *P. reticulatum* Grayum (in Croat et al. 2005: 109), and *P. tessmannii* K. Krause. The poorly known (only by the type specimen) *P. reticulatum*, in particular, bears a strong vegetative resemblance to the Bolivian specimens, and I at first favored that name; however, *P. reticulatum* differs notably by its leaf-blades with fewer primary lateral veins (8 or 9 per side) and much smaller inflorescences (spathe ca. 6.5 cm, spadix ca. 4.4 cm). In all of these respects, *P. gonzalezii* is a better match for the Bolivian material; but even so, the original (Venezuelan) material of *P. gonzalezii* has absolutely [(0.3–)1.2–1.9 cm] and relatively (P/S=0.15–0.22) shorter peduncles than the Bolivian specimens cited above, which better match *P. reticulatum* in those respects! Plus, the inflorescences of Venezuelan *P. gonzalezii* are even a bit larger (spadix 8.2–9.1 cm) than those in Bolivia, and with no overlap. Whether this represents a complex, perhaps comprising three or more local species, or a single, variable species widespread in the Amazonian piedmont region from Bolivia north to Venezuela, remains to be seen. In the former case, the Bolivian material could well represent an undescribed species; in the latter, the name *Philodendron gonzalezii* (1996) has priority over *P. reticulatum* (2005).

As far as I am aware, neither *Philodendron gonzalezii* nor *P. reticulatum* has been attributed to Bolivia until now. One of the specimens cited above, *Krömer et al. 78*, was distinguished as [Araceae] "sp. 5" by Kessler & Croat (1999); another, *Krömer & Acebey 509*, was identified as *Philodendron* "spec. nov. 1" in Krömer et al. (2007: 270), while *Kessler et al. 9914* was cited by Croat & Acebey (2014) as the voucher for *P. inaequilaterum* Liebm. (see under "Excluded Species").

PHILODENDRON GUTTIFERUM Kunth, Enum. Pl. 3: 51. 1841. **TYPE**: **PERU** ["Peruvia"]. "Andes," 1829, *Poeppig s.n.* (holotype: KIEL!; isotype: LE! p.p.). Figure 9.

Hemiepiphytic, scandent plants, climbing on trunks of trees, to at least 0.4 m. Internodes to at least 8.4 cm long and 0.4 cm wide, drying tan and moderately sulcate; roots occasional at distal nodes of juvenile shoots, ca. 0.1–0.9 mm thick. **Petiole** (4.2–)6.2–8.8 cm long, P/L=0.34–0.43(–0.48), sheathed (87–)90–95%, the sheath ± splayed (basally) to erect or involute, the free portion prolonged apically to ca. 0.12 cm; unsheathed portion of petiole (0.2–)0.5–0.8 cm. **Lamina** (11.4–)14.7–21.7 cm long, 5.4–6.3(–7.3) cm wide, L/W=(1.91–)2.64–3.28(–3.68), IQI=(0–)2–4(–6), narrowly ovate to elliptical or oblong to obovate, broadly cuneate to truncate or rounded to very shallowly cordate at the base, abruptly to ± gradually acuminate at the apex (the acumen 0.5–1.8 cm long) and apiculate; primary lateral veins 10–17 per side, 0.1–2.2 cm apart, regularly with interprimaries (often nearly indistinguishable from primary veins); abaxial surface drying moderately granular (in areolae), with reticulate veins abundant; white stitching irregularly scattered and few to (even on same shoot) ± uniformly distributed and abundant; resin canals scarcely to moderately visible between all secondary lateral veins, tan or grayish to blackish; adaxial surface drying granular (more conspicuously so than on abaxial surface) between reticulate veins; white stitching inconspicuous (very few and far between); resin canals not evident. **Inflorescences** (just one seen, detached and in late stage, with male portion missing) with peduncle to at least 2.9 cm long; spathe to at least 1.8 cm wide; spathe drying very densely and minutely granular, with some longitudinal white stitching and resin canals ± visible (especially distally) and raised externally, internally apparently relatively featureless. Stipe of spadix ca. 0.4 cm long; spadix with female portion ca. 2.5 cm long, ca. 1.1 cm wide; female flowers (galled?) 1.2–2.7 mm long, 0.7–1.9 mm wide. **Fruits** "verdes" (*Perry 1141*). **Seeds** not seen.

Additional specimens examined. **BOLIVIA**. **La Paz**. Prov. Franz Tamayo: ca. 5 km S del Cruce del Rio Beni y Tuichi, 14°40'S, 67°30'W, 400 m, Bosque alto, 6 Jun 1992 (fl/fr), *Perry 1141* (MO!+1!); Localidad Suapi, K 649613 – 8357884 UTM, 350 m, Selva de várzea de bajío del Alto Beni, Macroserie de *Calycophyllum spruceanum – Hura crepitans*, 19 Jul 2002 (st), *Zárate et al. MZ 1450* (MO!+1!), 21 Jul 2002 (st), *Zárate et al. MZ 1474* (MO!).

Distribution and phenology. Department of La Paz, 350–400 m. Flowering has been recorded in June, immature ("verdes") fruits in June. Distribution outside Bolivia: northward in the Amazonian piedmont region to Colombia and Venezuela.

The name *Philodendron guttiferum*, widely and variously misapplied since its validation, pertains correctly to a South American species characterized by leaves drying with the adaxial laminar surface with prominulous tertiary venation enclosing granular areolae and orange ripe fruits (though ripe fruit color has not been reported for Bolivian collections). The type species of sect. *Fruticosa*, *P. guttiferum* is the namesake of the informal "*Philodendron guttiferum* group" (Grayum 1996: 14), which also includes (in Bolivia) *P. chanchamayense* and *P. gonzalezii*. The three Bolivian collections (two of which are sterile) here assigned (somewhat speculatively) to *P. guttiferum* differ from those cited under *P. chanchamayense* in having relatively long-petioled leaves with the lamina more symmetrical, with less evident resin canals and somewhat more numerous primary lateral veins. See also the discussion under *P. gonzalezii*. The presence of *P. guttiferum* in Bolivia may be regarded as a hypothesis in need of testing with additional field work.

PHILODENDRON LEUCANTHUM K. Krause in Engl. & K. Krause, Pflanzenr. IV.23Db (Heft 60): 18. 1913. **TYPE**: **BRAZIL**. [**Acre**:] Am Rio Acre bei Amelia Velha, Feb 1912 (fl), *E. Ule 9231* (holotype: B[lost specimen with 3 leaves], photo MO-1663896!). **LECTOTYPE** (designated here: B[extant specimen with 4 leaves]!; isolectotypes: G!, K!, MG-14085¡). Figure 10.

(Hemi)epiphytic, scandent plants. Internodes to at least 13.9 cm long and 0.8 cm wide, medium to dark green and semiglossy, terete, drying greenish to tan or medium brown and moderately sulcate, the epidermis sometimes ± exfoliating; roots ± abundant at distal nodes, ca. 0.7–1 mm thick. **Petiole** [8.6–]11.0–12.1[–13.1] cm long, P/L=0.43–0.54[–0.60], sheathed 92–97[–98]%, the sheath erect to erect-incurled, medium green and semiglossy, the free portion prolonged apically to ca. 0.19[–0.20](–0.28) cm; unsheathed portion of petiole [0.1–]0.3–0.9 cm, sharply sulcate. **Lamina** [16.3–]22.4–26.4[–30.0](–30.6) cm long, 7.6–12.5 cm wide, L/W=[(1.87–)2.38–]2.45–2.58(–2.95), IQI=[5]6–9[–11], thinly coriaceous to subcoriaceous, dark green and semiglossy above, slightly paler and matte to weakly glossy below, narrowly ovate to elliptical or oblong, ± broadly cuneate to truncate or rounded at the base, subobtuse to acute at the apex [the acumen (0.1–)0.5–1.0[–1.5] cm long] and apiculate; midrib narrowly raised or narrowly round-raised and slightly paler below; primary lateral veins [8]9–17 per side, 0.3–3.4 cm apart, sunken, obtusely sunken, or weakly quilted-sunken and concolorous above, narrowly raised and concolorous below, with some (few) interprimaries; minor veins visible but not prominent; abaxial surface drying ± densely but obscurely low-granular (except over veins), with reticulate veins abundant and prominulous; white stitching evident above resin canals; resin canals ± evident (though pale) between secondary lateral veins; adaxial surface drying moderately to densely granular (especially on veins of all orders), otherwise ± minutely alveolate; white stitching irregularly scattered and very short, or not evident; resin canals not evident. **Inflorescences** not seen. **Fruits** not described (as to color) or seen. **Seeds** not seen.

Additional specimens examined. **BOLIVIA**. **Beni**. Prov. Vaca Díez: Along road between Riberalta and Cojija, 22 Km W of Riberalta then N ca. 2 Km to Lago Tumichucua, Isla Tumichucua, middle of Lago Tumichucua, 10°08'25"S, 66°10'08"W, 150 m, 14 Aug 2000 (st), *Croat et al. 84508* (MO!), *84520* (MO!).

Distribution and phenology. Department of Beni, ca. 150 m. Flowering and fruiting not recorded. Distribution outside Bolivia: specimens closely matching the type of *Philodendron leucanthum* have been collected northward in the Amazonian piedmont region to at least the Loreto Region of Peru.

The occurrence of *Philodendron leucanthum* in Bolivia is here predicated on just two specimens, collected on the same day and at the same low-elevation site; though both are sterile, they match the type material (collected in adjacent Acre State, Brazil) very well, in all appreciable details. These comprise scandent plants, the leaves with the petiole extensively sheathed, with the sheath erect to erect-incurled, and the lamina proportionately rather narrow, conspicuously asymmetrical, more or less minutely alveolate on the adaxial surface and with numerous primary lateral veins (mostly 9–17 per side). Flowering collections from Acre State evince smallish (spadix ca. 4.8–5.3 cm), relatively long-peduncled inflorescences that are often paired. The foregoing description, based on the sterile Bolivian specimens, may be supplemented provisionally by the following formal description of inflorescences based on the type material and another flowering specimen (*Silveira et al. 4067*, NY!) from Acre (the square-bracketed extremes in the foregoing vegetative description also derive from these Brazilian collections). The data taken from the type material are my own, and may differ from those reported in the protologue.

Inflorescences 1 or 2; cataphylls to at least 3.2 cm long and 0.75 cm wide, narrowly lanceolate, 2-keeled, ± densely and finely granular and with moderate white stitching; peduncle 1.9–3.1 cm long, P/S=0.36–0.53; spathe at anthesis 5.8–7.7 cm long, 1.1–2.2 cm wide, white inside; spathe drying

densely but ± obscurely granular and with fine longitudinal grooves and/or finely pleated striate, with abundant short white stitching (especially proximally) and resin canals not evident externally, internally densely but very finely granular, with longitudinal secretory striations in basal ca. 64%; acumen of spathe 0.3–0.7 cm long. Stipe of spadix ca. 0.3 cm; spadix ca. 4.8–5.3 cm long, the fertile male portion ca. 0.65 cm wide; sterile male zone ca. 0.2 cm long; female portion of spadix ca. 1.7 cm long, F/S=ca. 0.32, ca. 1.1 cm wide; fertile male flowers ca. 1.0–1.1 mm long, 0.2–0.8 mm wide, irregularly polygonal, cylindrical; sterile male flowers ca. 1.3 mm long, ca. 0.6–1.0 mm wide, ± rounded polygonal, cylindrical; female flowers ca. 2.0 mm long, 0.6–0.9 mm wide.

Grayum (1996: 219) accepted *Ule 9231* (B), collected in February 1912 along the Rio Acre, Brazil, as the holotype of *Philodendron leucanthum*, because those data concord precisely and uniquely with the information provided in the protologue (Krause 1913: 18). However, in the process of preparing this synopsis, I noticed that are (or were) two duplicates of this collection at B: an extant specimen (the one I had studied previously and presumed to be the holotype) is clearly not the same specimen as the one depicted in a Field Museum photograph (MO-1663896, and accessible via JSTOR). These specimens differ in numerous respects, e.g., leaf number (the extant specimen has four, vs. three in the photo), relative length of petioles (much shorter in the extant specimen), position and nature of leaf (insect?) damage, placement of mounting tape, and labeling. They are not labeled as being parts of a single specimen (see ICN Art. 8.3), and it is evident that the specimen in the photo (now presumably lost) must have been the one that was actually studied by Krause: it alone (among all the duplicates) bears Krause's determination as *P. leucanthum*, and moreover, the extant B duplicate bears a stamped date on the label indicating that it was accessioned to B on 28 Sep 1915—two years after the publication of the protologue. I also cannot confirm that the handwriting on the label of the extant B specimen matches that on the annotation label in the photo, and the same applies to the other duplicates (at G, K, and MG) cited above (none of which, in any case, was cited in the protologue). Based on all of this evidence, I conclude that the B specimen in the photo must be accepted as the holotype of *P. leucanthum*; the other four duplicates (including the extant B specimen) are accordingly isotypes, hence original material, even though not cited in the protologue and/or unavailable to Krause in a timely fashion. Because the holotype has been lost (presumably as a consequence of war action), lectotypification becomes necessary; for that purpose, the extant duplicate at B (which somehow survived) serves perfectly well, and the remaining duplicates become isolectotypes.

As in the case of *Philodendron guttiferum*, the name *P. leucanthum* has been abused in the literature and in herbaria (if not to the same extent). For example, the voucher cited for *P. leucanthum* by Croat & Acebey (2014) actually represents the species treated here as *P. renateae*. The same authors cited *Croat et al. 84508* — good *P. leucanthum*, in my view — under *P.* "*chinchamayense*."

I had originally assigned *Philodendron leucanthum* to sect. *Fruticosa* (Grayum 1996: 219), but am now persuaded (based mainly on inflorescence details) that it belongs instead to sect. *Pteromischum*.

PHILODENDRON NOELII Grayum, **sp. nov.** **TYPE**: **BOLIVIA**. **Cochabamba**: Provincia Carrasco, campamento Guacharos en el Parque Nacional Carrasco con coordenadas S 17°04'16" y O 65°39'04" a 600 msnm, bosque húmedo pie de monte con dosel de 25 a 30 m de alto caracterizado por *Talauma Boliviana* y *Eschweleria* [sic] *coriácea*, 16 May 2004 (fl), *N. Altamirano & J. Teran 528* (holotype: MO-7016648!). Figure 11.

Similar to *Philodendron aristeguietae* and *P. sulcatum* in its smallish leaves with the petiole more or less extensively sheathed and the lamina generally drying finely alveolate on the adaxial surface but otherwise relatively featureless (without evident reticulate veins, white stitching, or resin canals), but differs from *P. aristeguietae* by its relatively longer, less extensively sheathed petioles and larger inflorescences, and from *P. sulcatum* by its smaller leaf-blades with fewer primary lateral veins.

Scandent herbs. **Internodes** to at least 5.5 cm long and 0.8 cm wide, drying tan to medium brown and sulcate. Roots sometimes present at distal nodes, ca. 0.5–1.0 mm thick, sometimes pinnately branched. Petiole 4.65–14.0 cm long, P/L=(0.46–)0.86–1.16, sheathed 83–99%, the sheath erect (at least basally) to horizontally splayed, the free portion prolonged apically to ca. 0.2 cm; unsheathed portion of petiole 0.05–2.15 cm long. **Lamina** glossy, 9.7–16.6 cm long, 2.4–8.2 cm wide, L/W=1.80–2.74(–4.06), IQI=2–4(–7), narrowly to ± broadly elliptical or subobovate, cuneate at the base, subacute to ± long-acuminate at the apex [the acumen (0.3–)0.9–1.3(–1.8) cm long] and apiculate, very narrowly brown-scarious marginally; primary lateral veins (sometimes very obscure) 4 or 5 per side, 0.4–3.7 cm apart; abaxial surface drying ± densely and finely granular or rugulose-granular, otherwise ± featureless; adaxial surface drying irregularly and finely alveolate and/or moderately granular, otherwise ± featureless. **Inflorescences** solitary; cataphylls not evident; peduncle ca. 4.9–5.0 cm long, P/S=ca. 0.49–0.50; spathe at anthesis ca. 11.3 cm long, ca. 1.8 cm wide; spathe drying ± densely and minutely granular and finely striate, with ± obscure to moderately dense white stitching (especially toward margins) externally, internally densely granular, with moderately dense white stitching basally toward margins, with brown, longitudinal secretory striations in basal ca. 89%; acumen of spathe ca. 0.65 cm long. Stipe of spadix ca. 0.8–0.9 cm; spadix ca. 10.0 cm long, the fertile male portion ca. 1.05 cm wide; sterile male zone ca. 1.0 cm long; female portion of spadix ca. 2.6 cm long, F/S=ca. 0.26, ca. 1.0–1.1 cm wide; fertile male flowers 1.3–1.8 mm long, 0.6–1.7 mm wide, irregularly polygonal, cylindrical to ± clavate; sterile male flowers 1.4–2.0 mm long, 0.7–2.0 mm wide, irregularly polygonal to rounded-polygonal, ± anvil-shaped; female flowers 2.0–2.3 mm long, 0.8–1.1 mm wide. **Fruits** not described (as to color) or seen. **Seeds** not seen.

Additional specimens examined. **BOLIVIA**. **Cochabamba**. Prov. Carrasco: Parque Nacional Carrasco, al S del campamento Ichoa, 17°23'S, 64°30'W, 350 m, Bosque siempreverde, virgen, 12 Sep 1997 (st), *Acebey 449* (MO [2 sheets!]). Prov. Chapare: Cavernas del Repechón, PN Carrasco, 17°02'S, 65°26'W, 550 m, bosque siempreverde, virgen de 30 m de altura, 8 Sep 1996 (st), *Kessler et al. 8248* (MO!).

Distribution and phenology. Department of Cochabamba, 350–600 m. Flowering recorded in May, ripe fruits not recorded. Endemic to Bolivia.

Etymology. The epithet honors Bolivian botanist Noel Altamirano, collector of the type and many other fine specimens of Araceae.

Philodendron noelii, apparently endemic to Bolivia, is characterized by its scandent habit and leaves with the petiole relatively short-sheathed, with the sheath well developed, and the lamina elliptical to subobovate, drying without evident white stitching or resin canals, with few (4 or 5 per side) and relatively indistinct primary lateral veins, as well as by its relatively long-pedunculate inflorescences and lowland habitat. These features ally it with members of sect. *Pteromischum*, among which it is most similar in Bolivia to *P.* sp. β (see the discussion under that entry), known only by sterile specimens collected at elevations above 1000 m. Indeed, but a single fertile specimen (the type) of *P. noelii* itself has been collected to date, yet that specimen is sufficiently distinctive to warrant recognition as a separate species. I have seen no specimens matching it from other countries, where the most similar species are *Philodendron aristeguietae* G.S. Bunting, endemic to northern Venezuela, and *P. sulcatum* K. Krause, widespread from northern Nicaragua to the Pacific versant of Ecuador; the former differs by its relatively shorter [P/L=(0.42–)0.46–0.70(–0.78)] and more extensively sheathed petioles (with the distal unsheathed portion to ca. 0.35 cm long) and smaller inflorescences [peduncle 2.3–3.8(–4.8) long, spathe at anthesis 6.1–9.7(–10.0?) cm long, spadix 4.7–8.2 cm long], the latter by its larger leaf-blades [(8.2–)14.3–28.0(–31.9) cm long] with more numerous [(4)5–11(–17) per side] primary lateral veins (*P. sulcatum* is additionally distinctive in having cochleate or semicochleate seeds, but the seeds of *P. aristeguietae* and *P. noelii* are unknown). See Grayum (1996) for more information on these and other species.

Aside from the type, just two sterile collections (cited above) can be assigned with confidence (as paratypes) to *Philodendron noelii*. However, the following sterile (and mostly juvenile) specimens, though of less certain identity and not included in the species description, may be associated provisionally with this species.

BOLIVIA. **Cochabamba**. Prov. Carrasco: Valle del Sajta, 17°08'S, 64°50'W, 220 m, bosque siempreverde, secundario, 5 Oct 1996 (st), *Kessler et al. 8840* (MO!). Prov. Chapare: Villa Tunari, terreno de "El Puente", pozas en la zona sud, 16°59'S, 65°35'W, 400 m, Bosque pluvial pie de monte, 26 Jul 1993 (st), *Ibisch & Ibisch 93.0550* (MO!); 160 Km carretera antigua Cochabamba–Villa Tunari, 17°05'S, 65°30'W, 750 m, Bosque siempreverde, virgen de 25 m de altura, 5 Sep 1996 (st), *Kessler et al. 8155* (MO!). **La Paz** Prov. Franz Tamayo: Localidad Suapi, K0649613-8357884 UTM, 400 m, sevas de várzea de bajio del Alto Beni, macroserie de *Calycophyllum spruceanum* y *Hura crepitans*, 19 Jul 2002 (st), *Aguilar et al. MZ 1420* (MO!); Parque Madidi, orilla derecha del Río Quendeque, terraza aluvial, plana, 14°59'24"S, 67°47'34"W, 300 m, Bosque bajo con abundancia de palmeras, 6 Feb 2002 (st), *De La Quintana et al. 423* (MO!+2!); Parque Madidi, orilla izquierda Río Quendeque, una hora del campamento "Retamas", 14°15'24"S, 67°47'43"W, 500 m, Bosque bajo en bajío, abundantes bejucos, abudacia [sic] de Calatahea [sic] y Asplundia en sotobosque herbáceo, dosel aprox. 15 m, 24 Jan 2002 (st), *Paniagua et al. 4039* (MO!); Parque Madidi, orilla derecha de Río Quendeque, detras del campamento Retamas, terraza alta, 14°59'16"S, 67°47'20"W, 310 m, monte alto en terraza, sotobosque con Calathea, abundantes bejucos, 28 Jan 2002 (st), *Seidel et al. 8537* (MO!).

One of the above-cited specimens, *Ibisch & Ibisch 93.0550*, served as one of two vouchers for *Philodendron* "sp. A" sensu Ibisch (1996); I have not seen the other voucher (*Ibisch & Ibisch 93.0553*) for that entity. The label of *De La Quintana et al. 423* describes inflorescences, but the material at MO (which includes two unmounted duplicates) is sterile. The type specimen of *Philodendron noelii* is almost certainly duplicated in at least one Bolivian herbarium (most likely BOLV), but I have not seen any isotypes and cannot verify their existence.

PHILODENDRON RENATEAE Grayum, **sp. nov**. **TYPE**: **PERU**. **Cochabamba**: Chapare, Territorio Indigena Parque Nacional Isilboro - Secure, community of El Carmen de la Nueva Esperanza riverbank in primary forest on non-flooded plain, 16°23' S 065°57' W, 230 m, 16 Nov 2004 (fl), *E. Thomas & R. Berdeja 1374* (holotype: MO-04802092!). Figure 12.

Similar to *Philodendron rocioae* in its rheophytic habit and leaves with the petiole extensively sheathed and the lamina relatively narrow, but differing by its leaf-blades with the reticulate veins not prominulous and inflorescences with the peduncle, spathe, and spadix shorter, but the stipe of the spadix longer.

Terrestrial herbs ca. 0.6–1.5 m, rarely scandent, at the edges of arroyos and rivers. **Internodes** to at least 3.8 cm long and 0.7 cm wide, drying tan and sulcate; roots not evident at distal nodes of adult plants, ca. 0.3–1.4 mm thick on juveniles (*Beck 24124*). **Petiole** (4.4–)6.0–14.3 cm long, P/L=0.31–0.61, sheathed 84–98%, the sheath erect to involute or (especially distally) somewhat spreading, the free portion prolonged apically to ca. 0.10–0.25 cm; unsheathed portion of petiole 0.2–1.7 cm long. **Lamina** (10.6–)16.6–26.0 cm long, (1.9–)5.3–10.5 cm wide, L/W=2.28–3.63(–5.46), IQI=0–4(–6), lanceolate to narrowly elliptical or narrowly ovate, cuneate to subtruncate or rounded at the base, subacute to acuminate at the apex (the acumen 0.4–1.2 cm long) and apiculate; primary lateral veins 7–14 per side, 0.1–3.8 cm apart, occasionally with some interprimaries; abaxial surface drying nearly smooth to weakly but ± densely granular, with reticulate veins evident; white stitching sometimes evident over resin canals (especially in juvenile leaves); resin canals dark-colored, weakly to moderately evident between veins of all orders; adaxial surface drying more or less as abaxial surface, except often less evidently granular and with reticulate veins slightly more evident, and with white stitching not evident or very rare and scattered. **Inflorescences** solitary or paired; cataphylls at least

sometimes present, 0.4–0.8 cm long, ca. 0.35 cm wide, subovate to suborbicular, 0 or 1(2?)-ribbed, granular; peduncle 0.9–2.7 cm long, P/S=0.12–0.34; spathe at anthesis 7.6–11.2 cm long, 1.2–1.7 cm wide, green to yellowish (or, greenish white externally and white internally); spathe drying uniformly and moderately granular or alveolate-rugulose, sometimes longitudinally striate and with moderately dense white stitching externally, internally uniformly and densely granular, with white stitching not evident, with longitudinal secretory striations in basal 67–86%; acumen of spathe ca. 0.1–1.8 cm long. Stipe of spadix ca. 0.8–1.4 cm long; spadix 7.3–8.0 cm long, the fertile male portion purple to green, ca. 0.5–0.6 cm wide; sterile male zone pink, ca. 0.4–1.0 cm long; female portion of spadix greenish white, ca. 1.6–1.9 cm long, F/S=ca. 0.20–0.25, 0.7–0.8 cm wide (to at least 1.2 cm in fruit); fertile male flowers 0.8–1.2 mm long, 0.3–1.1(–1.8) mm wide, irregulary polygonal and obconic to anvil-shaped; sterile male flowers 1.2–1.5 mm long, ca. 0.3–1.8 mm wide, ± rounded-polygonal and fungoid or narrowly obpyramidal; female flowers 1.2–1.6 mm long, 0.7–1.4 mm wide. **Fruits** (ripe) not described or seen. **Seeds** not seen.

Additional specimens examined. **BOLIVIA**. **Cochabamba**. Prov. Chapare: Localidad Villa fatima, 16°28'37"S, 65°53'88" [sic] W, 280 m, Bosque humedo de Pie de Monte, con dosel de 25 a 30 m de alto caracterizado por *Talauma boliviana* y *Eschweleria coriaceae* [sic], 1 Dec 2004 (fl), *Altamirano et al. 561* (MO!+1!). **La Paz**. Prov. Abel Iturralde: Cantón San José de Chupiamonas, arroyo affluente del río Eslabon, 14°15'S, 68°04'W, 500 m, dentro del bosque submontano estacional, 20 Apr 1997 (st), *Beck 24124* (F [n.v.], MO!). Prov. Franz Tamayo: Parque Nacional Madidi, río Quendeque, arroyo Retama, 14°58'11"S, 67°47'41"W, 350 m, vegetacion ribereña con Inga spp., Moraceae sp y otras pioneras heliofilas, en partes bosque amazónico pluviestacional húmedo, de piedemonte subandino, con Pentaplaris davidsmithii, Annonaceae spp, Burseraceae spp y Moraceae spp, 31 Jan 2002 (st), *Fuentes et al. 3722* (MO!+1!). Prov. Sud Yungas: Alto Beni Concesión de la Cooperación de San José de Popoy, al borde de un arroyo, 27 Dec 1987 (fl/immature fr), *Seidel & Schulte 2248* (LPB [n.v.], MO!).

Distribution and phenology. Departments of Cochabamba and La Paz, ca. 200–550 m. Flowering has been recorded in November and December, ripe fruits not recorded. Endemic to Bolivia.

Etymology. The epithet honors German biologist Renate Seidel, who collected the first specimen of this species known to me, as well as numerous others of Araceae.

Philodendron renateae is characterized by its terrestrial, rheophytic habit, extensively sheathed petioles, and spadices with the female portion relatively short. This is the fifth rheophytic species of subg. *Pteromischum* (and indeed, of the entire genus *Philodendron*) described to date, and bears a strong superficial resemblance to the disjunct Peruvian endemic *Philodendron rocioae* Grayum (2022). The last-mentioned species differs, however, by its inflorescences with the peduncle [(1.7–)2.7–3.6 cm long], spathe at anthesis (10.3–14.3 cm long), and spadix (7.8–10.7 cm long) somewhat longer, yet with the stipe of the spadix (0.3–0.9 cm long) shorter. Perhaps more significantly, the leaf-blades of *P. rocioae* feature a distinctive type of epidermal micromorphology (with prominulous reticulate veins enclosing granular areolae) that is not evident in *P. renateae*. While working up the description of *P. rocioae*, I studied but deliberately excluded the Bolivian material here distinguished as *P. renateae*, largely on the basis of the epidermal distinction. The laminar epidermis of *P. rocioae* is consistent with that of *Philodendron guttiferum* and its close allies, members in good standing of sect. *Fruticosa*. That consideration was partly responsible for my referral of *P. rocioae* to the same section; *P. renateae* likely belongs there as well, but may not be as closely related to *P. rocioae* as suggested by its habit and gross morphology.

Seidel & Schulte 2248, here attributed to *Philodendron renateae*, was the voucher for [Araceae] "sp. 22" sensu Kessler & Croat (1999), and for *Philodendron leucanthum* sensu Croat & Acebey (2014).

As in the case of *Philodendron noelii*, I expect, but cannot be certain, that an isotype of *P. renateae* is deposited in some Bolivian herbarium.

PHILODENDRON sp. α. Figure 13.

(Hemi)epiphytic, scandent herbs to at least 2.5 m, rarely terrestrial. **Internodes** to at least 3.8(–13.3) cm long and 0.9(–1.3) cm wide, medium or dark green to grayish or brownish and matte to semiglossy, ± flattened or obtusely to deeply sulcate on one side, sometimes longitudinally wrinkled or transversely fissured or ridged, drying greenish to yellowish brown or tan and coarsely sulcate, the epidermis sometimes exfoliating; roots typically present at distal nodes, 0.1–1.8 mm thick. **Petiole** (3.6–)8.4–23.1(–26.5) cm long, P/L=(0.27–)0.43–0.95, sheathed 69–95%, the sheath erect (at least toward base) to spreading, medium green, matte (at least abaxially) or weakly glossy to semiglossy, the free portion prolonged apically to ca. 0.25 cm; unsheathed portion of petiole ca. (0.35–)2.05–6.40(–8.90+) cm long, flattened-sulcate to sharply sulcate. **Lamina** 12.4–21.4(–27.8) cm long, 4.6–12.3 cm wide, L/W=2.03–3.59(–4.33), IQI=1–6, thinly coriaceous to subcoriaceous, medium to dark green and semiglossy above, slightly to moderately paler and weakly glossy to semiglossy below, lanceolate to elliptical or oblong to ovate, cuneate to truncate or rounded to (rarely) shallowly cordate at the base, abruptly short-acuminate to gradually long-acuminate at the apex [the acumen (0.2–)0.7–1.6(–2.8) cm long] and apiculate; primary lateral veins 5–12 per side, 0.1–4.0 cm apart, weakly or obtusely sunken or quilted-sunken and concolorous above, convex to narrowly raised or pleated-raised and concolorous or slightly paler below, often with numerous interprimaries; abaxial surface drying densely and finely low-granular, with reticulate veins not evident or visible only toward margins; white stitching usually not evident, or scattered and very short, except smaller laminae sometimes with longer stitching over midrib; resin canals faint (especially on smaller laminae) or (usually) not evident, except irregularly, in interrupted segments, or vaguely and toward margins; adaxial surface usually drying as abaxial surface, except rarely finely and densely alveolate (e.g., *Kessler et al. 8611*) or with moderately abundant white stitching (*Altamirano 2464*). **Inflorescences** solitary; cataphylls occasional, to at least 5.9 cm long, 0.3–0.5 cm wide, narrowly lanceolate, sharply 2-keeled or -winged, also longitudinally costate; peduncle ca. 2.9–4.7 cm long, P/S=ca. 0.34–0.38; spathe at anthesis 8.2–11.0 cm long, 2.0–2.9 cm wide, color not reported; spathe drying densely and minutely granular or (less often) coarsely and more moderately granular and longtitudinally costate-striate, with moderately dense to dense short white stitching (or this not evident) and with resin canals visible toward base (and decurrent onto the peduncle) externally, internally ± densely and finely granular or granular-verrucose, with white stitching not evident, with longitudinal secretory striations in basal ca. 65%; acumen of spathe to ca. 0.5 cm long. Stipe of spadix ca. 0.6–1.3 cm long; spadix ca. 8.6–9.5 cm long, the fertile male portion ca. 0.5–0.7 cm wide; sterile male zone ca. 1.1 cm long; female portion of spadix 2.7–3.7 cm long, F/S=ca. 0.38–0.39, ca. 0.8–0.9 cm wide (to at least 1.8 cm in fruit); fertile male flowers 1.0–1.2 mm long, 0.6–1.3 mm wide, irregularly polygonal, ± cylindrical; sterile male flowers 0.9–1.0 mm long, 0.6–0.8 mm wide, ± rounded-polygonal, slightly anvil-shaped; female flowers (late?) 1.8–2.7 mm long, 0.8–1.1 mm wide. **Fruits** not described (as to color). **Seeds** to at least 1.0 mm long and 0.25 mm wide, ± straight, minutely beaded-striate.

Additional specimens examined. **BOLIVIA Beni**. Prov. José Ballivián: Along road between Rurrenabaque and Sapecho, 21.7 Km NW of border with La Paz Dept., 31.3 Km NW of La Cascada, 38.8 Km NW of Las Delicias, 15°15'34"S, 67°04'46"W, 940 m, 19 Aug 2000 (st), *Croat et al. 84668* (MO!), *84675A* (MO!); Serranía Pilón Lajas, La Cumbre del Pilón sobre La Carretera Quiquibe–Yucumo, 30 km oeste del Yucumo, 15°15'S, 67°00'W, 850–950 m, Bosque muy húmedo tropical, terreno muy pendiente hasta 60°, suelos rojos arcillosos desarrollado de areniscas rojas, superficiales, área con muchos disturbios naturales, 16 Feb 1992 (fr), *Killeen & Smith 3617* (LPB!, MO!, USZ¡). **Cochabamba**. Prov. Carrasco: 138 Km antigua carretera Cochabamba–Villa Tunari, 17°06'S, 65°34'W, 1800 m, Bosque siempreverde, abierto, disturbado, 16 Jul 1996 (st), *Kessler et al. 7333* (MO!); 143 Km antigua carretera Cochabamba–Villa Tunari, 17°07'S, 65°34'W, 1300 m, al borde de

la carretera, 22 Aug 1996 (st), *Kessler et al. 7527B* (MO!); 141 Km antigua carretera Cochabamba–Villa Tunari, 17°07'S, 65°33'W, 1400 m, Bosque siempreverde, virgen de 20 m de altura, 24 Aug 1996 (st), *Kessler et al 7731* (MO!); 147 Km antigua carretera Cochabamba–Villa Tunari, 17°07'S, 65°34'W, 1100 m, 28 Aug 1996 (st), *Kessler et al. 7919* (MO!). Prov. Chapare: Santa Anita, 16°39'28"S, 65°47'51"W, Selva amazónica edafohigrófila caracterizada por Poulsenia armata - Dypterix [sic] odorata, 13 Jun 2004 (fr), *Altamirano & Altamirano 2464* (MO!); rain forest ca. 30 km north of Villa Tunari, 300 m, 14 Jan 1981 (st), *Besse et al. 557* (SEL!); Parque Machia, 1 Km al E de Villa Tunari, 16°58'S, 65°24'W, 350 m, Bosque siempreverde, casi virgen, 14 Sep 1996 (st), *Kessler et al. 8482* (MO!); Territorio Indígena Parque Nacional Isiboro-Secure, cordillera de Mosetenez, laguna Carachupa, 16°14S, 66°25W, 1300 m, 29 Aug 2003 (st), *Kessler et al. 12964* (MO!); Zona del Sillar Km 92 a 1 km al Este de la Carretera, 17.11.44S, 65.47.24W, 1040 m, Bosque de unos 15 mt de altura, con pendiente elevada de 30% de inclinacion, suelo pedregoso con materia organica en descomposicion, 23 Nov 2008 (fl), *Teran et al. 3167* (MO!). **La Paz**. Prov. Abel Iturralde: Along road between Tumupasa and San José de Uchupiamonas, NW of Tumupasa along slope leading up to Parque Nacional Madidi, 5.5–5.8 Km above jct. to San José near Tumupasa, 15°45'N, 67°50"W, 830–850 m, 9 Aug 2000 (st), *Croat et al. 84402* (MO!), *84405* (MO!). Prov. Nor Yungas: Along road between Caranavi and Yucumo, vic. of Sapecho, along road to Colonia Tarapacá, Permanent Parcel #2, Projecto de Investigación Agro Forestal (RAF), 3.9 Km, 15°31'54"S, 67°21'24"W, 625 m, 6 Aug 2000 (st), *Croat et al. 84290* (MO!), *84300* (MO!), *84303* (MO!); Vicinity of Sapecho, along road between Caranavi and Yucumo, along side road NW off main road into Serrania de Marimones to Colonia Tupiza B, 15°31'25"S, 67°18'31"W, 600–850 m, 7 Aug 2000 (st), *Croat et al. 84347* (MO!). Prov. Sud Yungas: Colonia La Casada, along trail into disturbed virgin forest less than 1 Km from main Caranavi–Yucumo Road, 47.4 Km NE of Yucumo, 5.1 Km from frontier of Beni Dept., 15°24'S, 67°08'W, 900 m, 8 Aug 2000 (st), *Croat et al. 84368* (MO!), *84369* (MO!), *84381* (MO!); Alto Beni Colonia Tarapaca, parcela III, subparcela L, 15°32'S, 67°21'W, 625 m, Bosque siempreverde, poco disturbado de 20–25 m de altura, 22 Apr 1999 (fr), *Krömer & Acebey 336* (LPB!, MO!); Alto Beni, Colonia Tarapacá, parcela II, subparcela F, 15°32'S, 67°21'W, 625 m, Bosque siempreverde, poco disturbado de 25 m de altura, 14 May 1999 (st), *Krömer & Acebey 410* (MO!); Alto Beni, Sapecho, Concesión de la Cooperativa Sapecho, 15°32'S, 67°20'W, 610 m, Bosque siempreverde, virgen de 18 m de altura, Parcela I, 27 Oct 1997 (st), *Krömer et al. 37* (MO!); Alto Beni, cerca a la Colonia Cascada, 15°24'S, 67°08'W, 900 m, Bosque siempreverde, disturbado de 20–25 m de altura, 19 Jan 1999 (fl), *Krömer et al. 198* (MO!). **Santa Cruz**. Prov. Ichilo: Campamento Macuñucu, Parque Nacional Amboró, al borde del río, Macuñucu, 17°43'S, 63°34'W, 16 Sep 1996 (st), *Kessler et al. 8611* (MO!); 4 Km al SW del Campamento Macuñucu, 17°44'S, 63°35'W, Bosque siempreverde, virgen de 30 m de altura con Socratea, Iriartea, 27 Sep 1996 (st), *Kessler et al. 8677* (MO!); río Pitasama (campamento W), 17°43'S, 63°58'W, 500 m, Bosque, circundante al río, 100 m siguiendo una pequeña senda, 8 Aug 1986 (st), *Tarifa 23* (LPB!).

Distribution and phenology. Departmentos de Beni, Cochabamba, La Paz and Santa Cruz, (300–)500–1100(–1300) m. Flowering has been recorded in January and November, and ripe fruits in February and April. Distribution outside Bolivia: see following discussion.

Philodendron sp. α is characterized by its scandent habit and leaves with the distal, unsheathed portion of the petiole relatively long and the lamina proportionately narrow. The penultimate feature is characteristic of sect. *Pteromischum*, to which this species is here referred. Many Bolivian specimens of *P.* sp. α were previously identified as *P. acreanum* (including by the present author); however, *P. acreanum* is an unusually well-marked species, from which the collections cited above differ more or less consistently in several respects, in particular: their leaves with the lamina drying (especially adaxially) densely low-granular (vs. finely alveolate), with more numerous and much more conspicuous primary lateral veins, inflorescences strictly solitary (vs. potentially two or three per axil), with a shorter peduncle, and spadices with a relatively longer female portion. Furthermore, *P.* sp. α occurs at higher

elevations than *P. acreanum* in Bolivia, to at least 1300 m, perhaps even 1500 m as indicated by Croat & Acebey (2014: 263) under *P. acreanum* (which, in their concept, included *P.* sp. α, as attested by one of the cited vouchers). By contrast, the lone Bolivian collection (the lectotype) of *P. acreanum* was gathered at about 280 m elevation, below even the parenthetical lowest extreme for *P.* sp. α; moreover, in adjacent portions of Peru, specimens closely matching the type of *P. acreanum* do not surmount 550 m in the Cusco and Madre de Dios Regions (where *P.* sp. α has not been found), and I have not seen a single such specimen from the Puno Region. Although no voucher was cited, it is reasonably certain that *Philodendron acreanum* of Krömer et al. (2007) does not actually represent that species, more likely *P.* sp. α.

Although I have seen no specimens matching *Philodendron* sp. α from the regions of Peru immediately adjacent to Bolivia, I do have on hand many very similar collections from more distant regions of Peru, and into Ecuador as well. Some of these specimens have been determined as *Philodendron alatum* Poepp., a poorly understood and ambiguously typified name based on a long-lost specimen from the Huánuco Region of Peru. I hesitate to apply that name to Bolivian material, chiefly because the protologue specifies much larger leaves (petiole ca. 38–51 cm long, lamina ca. 20–23 cm wide); however, the original description (Poeppig 1845: 87) otherwise conforms generally with the Bolivian collections (and many others from nearby countries), and I cannot at present decisively rule out the possibility of a single, widespread species that is highy variable in leaf size. On the other hand, it is quite possible that just the Bolivian specimens here consigned to *P.* sp. α comprise more than one species: in particular, the three specimens cited above from the Department of Santa Cruz are distinctive by virtue of their relatively short-sheathed petioles and leaf-blades drying finely alveolate adaxially; unfortunately, all are sterile, stymieing further speculation.

PHILODENDRON sp. β. Figure 14.

(Hemi)epiphytic, scandent pants. **Internodes** to at least 10.5 cm long and 1.5 cm wide, dark green and matte, transversely cracked, drying tan to medium brown and sulcate; roots usually present at distal nodes, ca. 0.3–1.2(–1.8) mm thick, sometimes with ± numerous branches. **Petiole** (2.0–)5.0–14.8(–20.6) cm long, P/L=0.63–0.84(–0.89), sheathed (75–)85–93%, the sheath spreading, medium green and semiglossy internally, externally slightly darker, weakly glossy and dark short-lineate, the free portion prolonged apically to ca. 1.05 cm, strongly oblique apically in juvenile leaves; unsheathed portion of petiole 0.3–1.3(–1.7) cm long, slightly sulcate. **Lamina** (3.0–)5.0–21.4(–24.5) cm long, (2.4–)4.2–12.1 cm wide, L/W=(1.25–)1.61–2.40(–3.07), IQI=(0)1–5(6), subcoriaceous, dark green and semiglossy above, moderately paler and matte below, narrowly to broadly elliptical or subobovate, narrowly to broadly cuneate at the base, rounded to acute at the apex [the acumen obsolete to ca. 0.2(–0.3) cm long] and apiculate; midrib narrowly raised and concolorous below; primary lateral veins 4 or 5 per side, 0.2–5.7 cm apart, sunken and concolorous above, weakly raised and concolorous below, with interprimaries sometimes evident; minor veins obscure; abaxial surface drying essentially featureless to granular or ± rugulose-granular over major veins, with reticulate veins not evident; white stitching scarcely evident; resin canals sometimes visible along primary lateral veins; adaxial surface finely and moderately to densely granular and finely alveolate; white stitching rare (mainly in proximal portion of lamina), scarcely evident; minor and reticulate veins not evident. **Inflorescences** not seen. **Fruits** not described (as to color) or seen. **Seeds** not seen.

Additional specimens examined. **BOLIVIA**. **Cochabamba**. Prov. Carrasco: 143 Km antigua carretera Cochabamba–Villa Tunari, 17°07'S, 65°34'W, 1300 m, Bosque siempreverde, virgen de 22 m de altura en quebrada, 22 Aug 1996 (st), *Kessler et al. 7569* (MO!); 147 Km antigua carretera Cochabamba–Villa Tunari, 17°07'S, 65°34'W, 1100 m, Bosque siempreverde, virgen, 28 Aug 1996 (st), *Kessler et al. 7893* (MO!). Prov. Chapare: Territorio Indígena Parque Nacional Isiboro-Secure, cordillera de Mosetenez, laguna Carachupa, 16°14S, 66°25W, 1300 m, Bosque Húmedo Montano de los Yungas, bosque siempreverde, virgen, de 20 m de altura, 29 Aug 2003 (st), *Kessler et al. 12967*

(MO!). **La Paz**. Prov. Bautista Saavedra: Pauji-Yuyo, entre Apolo y Charasani, 15°02'S, 68°29'W, 1450 m, Bosque siempreverde, poco disturbado de 20 m de altura, en quebrada, 6 Jun 1997 (st), *Kessler et al. 9787* (MO!); Pauji-Yuyo, entre Apolo y Charazani, 15°02'S, 68°29'W, 1450 m, Bosque siempreverde, disturbado de 20 m de altura, 8 Jun 1997 (st), *Kessler et al. 9905* (MO!). Prov. Caranavi: Serranía Bella Vista, 38 Km de Caranavi hacia Sapecho, 15°40'S, 67°29'W, 1500 m, Bosque siempreverde, poco disturbado de 20 m de altura, con Dictyocaryum, 25 Aug 1997 (st), *Kessler et al. 11399* (MO!); serranía Bella Vista, 44 Km de Caranavi hacia Sapecho, 15°40'S, 67°29'W, 1300 m, Bosque siempreverde, poco disturbado de 20 m de altura, 29 Aug 1997 (st), *Kessler et al. 11563* (MO!). Prov. Nor Yungas: Polo-Polo bei Coroico, 1100 m, Oct or Nov 1912 (st), *Buchtien 3669* (US!); Parque Nacional Anmi Cotapata, Estación Biológica Tunquini, N of Coroico, NNE of La Paz, vic., of Chairo, 23 km W of Yolosa, 16°12'S, 67°50'W, 1300–1500 m, 21 Aug 2000 (st), *Croat et al. 84769* (MO [2 sheets!]); Parque Nacional Cotapata, 16°12S, 67°51W, 1550 m, Bosque Humedo Montano de los Yungas, siempreverde, disturbado al lado de la senda, 22 May 2000 (st), *Kromer & Acebey 1180A* (MO!).

Distribution and phenology. Departments of Cochabamba and La Paz, 1100–1550 m. Flowering and fruiting not recorded. Distribution outside Bolivia: see following discussion.

Philodendron sp. β is reasonably well marked by its scandent habit and leaves with the petiole relatively short-sheathed, with the sheath broadly spreading and apically oblique, and the lamina proportionately broad, subcoriaceous, and with just four or five primary lateral veins per side, as well as by its restriction to elevations above 1000 m. Among the Bolivian members of its subgenus, sp. β. is most comparable to *P. noelii*, which has leaf-blades with comparably few primary lateral veins. Indeed, I briefly entertained the notion that sp. β (represented only by sterile material) may comprise juvenile material of *P. noelii*; however, I have not seen any specimens clearly intermediate or transitional between the two entities, and there is also no overlap in their altitudinal ranges (*P. noelii* having been collected only below 1000 m).

Although *Philodendron* sp. β is known only by sterile specimens (at least in Bolivia), its growth habit and leaf characteristics strongly suggest placement in sect. *Pteromischum*. Specimens (including numerous fertile ones) closely matching the Bolivian material have been collected in the Amazonian piedmont region northward to Putumayo Department, Colombia. Many of these have been identified as *Philodendron palaciosii* Croat & Grayum (in Croat et al. 2005: 106–108); however, they are not a good match for that species, which differs (according to the protologue and Ecuadorian holotype of the name) in having a (mainly) terrestrial habit, petioles with a longer unsheathed portion, leaf-blades with much more numerous (13–17 per side) primary lateral veins, and inflorescences with a longer peduncle. The Bolivian entity may very well represent an undescribed species, that may be more widespread, but neither hypothesis can be tested in the absence of fertile material.

PHILODENDRON sp. γ. Figure 15.

(Hemi)epiphytic, scandent plants to at least 0.5 m. **Internodes** to at least 8.7 cm long and 0.65(–0.8) cm wide, dark green and semiglossy, drying greenish to tan and sulcate; roots usually present at distal nodes, 0.9–1.3 mm thick, potentially very long and pinnately branched. **Petiole** 14.1–17.1 cm long, P/L=0.58–0.82, sharply sulcate, sheathed 89–96%, the sheath spreading, the free portion prolonged apically to ca. 0.25–0.3(–0.75) cm; unsheathed portion of petiole 0.7–1.6 cm long. **Lamina** 17.8–28.4 cm long, 8.2–11.2 cm wide, L/W=1.60–2.56, IQI=2–5, dark green and semiglossy above, slightly paler and weakly glossy below, ± narrowly to broadly elliptical, very broadly cuneate to truncate or rounded at the base, abruptly short-acuminate at the apex [the acumen 0.5–1.0(–1.5) cm long] and apiculate; primary lateral veins 6–9(–11) per side, 0.6–4.4 cm apart, with some interprimaries; abaxial surface drying virtually smooth or obscurely to densely and minutely granular, with reticulate veins not or (especially toward margins) scarcely evident; white stitching not evident; resin canals not

evident or weakly to moderately visible between secondary lateral veins, dark-colored; adaxial surface drying ± uniformly and moderately to densely and minutely granular, with reticulate veins not or (toward margins) weakly evident; white stitching not evident, or irregularly scattered and few; resin canals not evident. **Inflorescences** not seen. **Fruits** not seen or described. **Seeds** not seen.

Additional specimens examined. **BOLIVIA**. **Cochabamba**. Prov. Chapare: Along road between Cochabamba and Villa Tunari in vicinity of Hotel Caballeros at Km 94 from Cochabamba, 17°05'S, 65°35'W, mildly disturbed virgin forest, 21 Nov 1980 (st), *Croat 51339* (MO!). **La Paz**. Prov. Sud Yungas: Along road between Rurrenabaque and Caranavi, 24.8 Km SW of middle of bridge over Río Beni at Sapecho, Serrania de Bella Vista, 17.8 Km E of Piquendo and Río Piquendo, 15°39'59"S, 67°28'19"W, 1330 m, 20 Aug 2000 (st), *Croat et al. 84722* (MO!). **Santa Cruz**. Prov. Ichilo: Cerro Amboró, parque Nal. Amboró, 1400 m, vive entre quebradas, 24 Aug 1986 (st), *Zarate 17* (LPB!).

Distribution and phenology. Departments of Cochabamba, La Paz, and Santa Cruz, ca. 1300–1400 m. Flowering and fruiting not recorded. Distribution outside Bolivia: see following discussion.

Philodendron sp. γ is characterized by its epiphytic habit and leaves with a relatively long and extensively sheathed petiole, with the sheath spreading, and a proportionately broad lamina, with moderately numerous primary lateral veins. Specimens have been determined as *P. acreanum*, and were probably subsumed under that name by Croat & Acebey (2014); however, *P.* sp. γ differs from even the broadly circumscribed concept of *P. acreanum* embraced in that work—which also included *P.* sp. α—by its leaves with the unsheathed distal portion of the petiole relatively short and the lamina proportionately broader. Furthermore, it is restricted to elevations much higher than those recorded for *P. acreanum* sensu stricto in Bolivia, and at the upper extreme (if not above) of the altitudinal range of even *P.* sp. α. Features such as the greenish to tan and sulcate internodes and spreading petiole sheaths consign *Philodendron* sp. γ to sect. *Pteromischum*, together with *P. acreanum* and *P.* sp. α; however, in the absence of fertile material, further speculation is pointless.

EXCLUDED SPECIES

Philodendron inaequilaterum Liebm. Though ranging widely from southern Mexico to Ecuador and Venezuela, this species is known from the Amazon drainage of South America by a single collection from Putumayo Department, Colombia (Grayum, 1996). Its attribution to Bolivia by Croat & Acebey (2014) was based on a misidentified specimen here assigned to *P. gonzalezii*.

Philodendron oblongum (Vell.) Kunth. This species was attributed to Bolivia by Croat & Acebey (2014) based solely on a prior literature report, with "no...ejemplares de herbario confirmados." However, the prior report in question (Foster & Hoke, 2002: 86), itself unvouchered, did not employ a Latin binomial at all, merely the informal name "*Philodendron* 'oblongo'" for an ad hoc morphospecies concept. This unfalsifiable record — not even verifiable as pertaining to the genus *Philodendron* — is an unconscionably tenuous basis for the inclusion in the Bolivian flora of a species otherwise known only from the Atlantic Forest region of Brazil (Barbosa & Sakuragui 2014).

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Figure 1. *Philodendron acreanum*. *Smith et al. 552* (MO-3662845; Peruvian specimen), with inflorescences in bud and at or near anthesis. Photo by M. Blomberg.

Figure 2. *Philodendron caudatum*. *Nee & Chávez 51562* (MO-5306438), with inflorescence at or near anthesis. Photo by M. Blomberg.

Figure 3. *Philodendron chanchamayense*. Living plant (vouchered by *Cayola et al. 733*), with inflorescence (viewed from directly above apex) at anthesis. Photo by A. Araujo.

Figure 4. *Philodendron chanchamayense*. *Cayola et al. 733* (MO-7016653), with adult leaves and inflorescence at or near anthesis. Photo by M. Blomberg.

Figure 5. *Philodendron chanchamayense*. *Helme & Kruger 864* (MO-4989844), sterile specimen with juvenile leaves. Photo by M. Blomberg.

Figure 6. *Philodendron chanchamayense*. *Araujo-M. et al. 1255* (MO-7016700; Sheet 2 of 2), with adult leaves (that on the left transitional morphologically from juvenile leaf) and inflorescence at or near anthesis. Photo by M. Blomberg.

Figure 7. *Philodendron divaricatum*. *Croat et al. 84428* (MO-5185324; Sheet 1 of 2), with inflorescences at or near anthesis. Photo by M. Blomberg.

Figure 8. *Philodendron gonzalezii*. *Kromer & Acebey 1626* (MO-5207995), with inflorescences at or near anthesis. Photo by M. Blomberg.

Figure 9. *Philodendron guttiferum*. *Perry 1141* (MO-7016587), with (partial) inflorescence at or near anthesis. Photo by M. Blomberg.

Figure 10. *Philodendron leucanthum*. *Croat et al. 84508* (MO-5185263), sterile specimen. Photo by M. Blomberg.

Figure 11. *Philodendron noelii*. Holotype (*Altamirano & Teran 528*, MO-7016648), with inflorescence at or near anthesis. Photo by M. Blomberg.

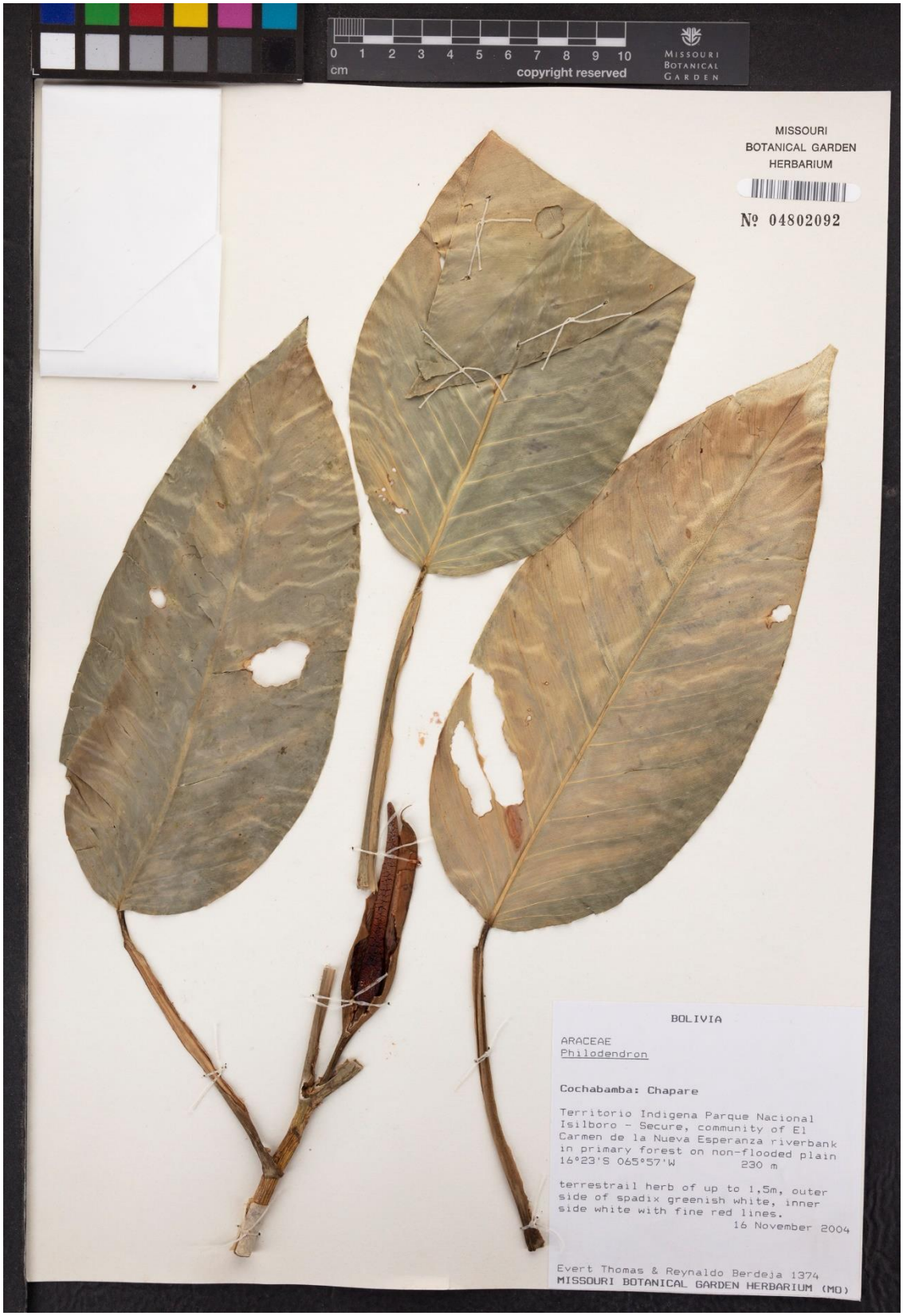

Figure 12. *Philodendron renateae*. Holotype (*Thomas & Berdeja 1374*, MO-4802092), with inflorescence at or near anthesis. Photo by M. Blomberg.

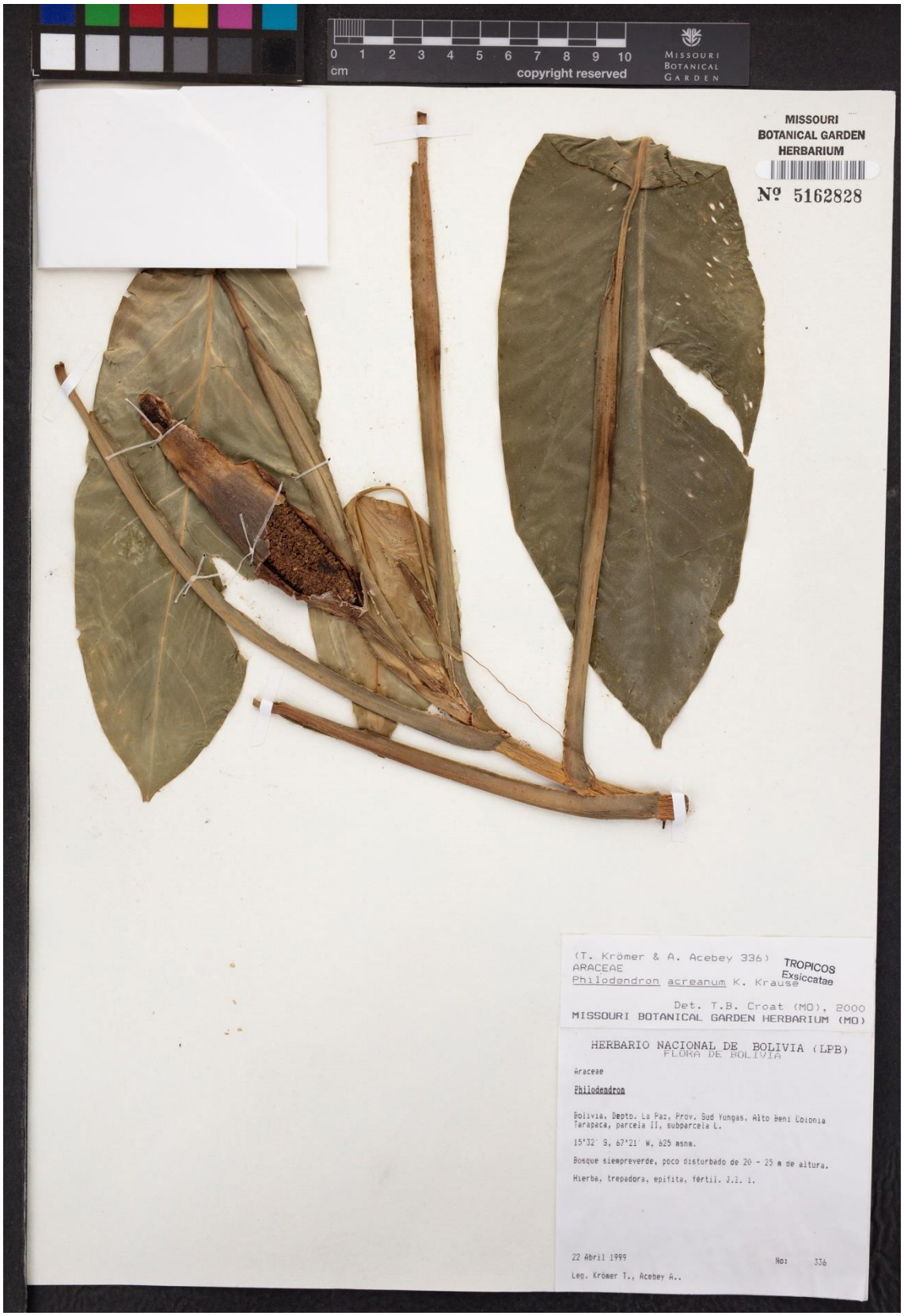

Figure 13. *Philodendron* sp. α. *Krömer & Acebey 336* (MO-5162828), with inflorescence past anthesis. Photo by M. Blomberg.

Figure 14. *Philodendron* sp. β. *Kessler et al. 12967* (MO-7016647), sterile specimen. Photo by M. Blomberg.

Figure 15. *Philodendron* sp. γ. *Croat 51339* (MO-2822615), sterile specimen. Photo by M. Blomberg.