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Source: Willdenowia, 35(2) : 345-358

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: https://doi.org/10.3372/wi.35.35217

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New taxa of *Anthurium* and *Philodendron (Araceae)* from western Amazonia

Abstract

Croat, T. B., Yates, E. D. & Hayworth, A.: New taxa of *Anthurium* and *Philodendron (Araceae)* from western Amazonia. – Willdenowia 35: 345-358. – ISSN 0511-9618; © 2005 BGBM Berlin-Dahlem.
doi:10.3372/wi.35.35217 (available via http://dx.doi.org/)

Five new species of *Anthurium* and *Philodendron (Araceae),* including two new subspecies, are described from Amazonian Ecuador and Peru. New taxa include: *Anthurium effusilobum* subsp. *effusilobum, A. effusilobum* subsp. *pallidispadix, A. fornicifolium, A. macdanielii, Philodendron parvilobum* and *P. pedunculum.*

Introduction

The most recent treatment of the *Araceae* for Ecuador lists 404 species (Croat 1999). Although not a thorough revision of the aroid species, this list accounts for all published species for Ecuador known up to that date. Many new species in Ecuador remain unpublished. In modern taxonomic revisions of any group of *Araceae,* the number of recognized species sometimes increases by as much as 100 %. It is expected that more thorough studies of the Ecuadorian flora will produce large increases in the number of species recognized and the total number of *Araceae* may approach 1500 species, a more than three-fold increase.

The aroid flora of the Amazon lowlands is the best known of any region of Ecuador. This region was studied by Susanne Renner and colleagues, who published a checklist of Amazonian Ecuador (Renner & al. 1990). Recent explorations in eastern and southeastern Ecuador have led to a better understanding of the *Araceae,* and current work is underway on local floras, one, a florula of the Shell-Mera region in Pastaza province, being compiled by the first author and Marck Menke of Washington University, and the other, a florula of Parque Nacional Sangay in Morona-Santiago, Tungurahua, and Azuay provinces, in collaboration with Carlos Cerón of the Universidad Central in Quito, Ecuador. The present paper treats new species from western Amazonia that are not encompassed by the two above-mentioned projects.

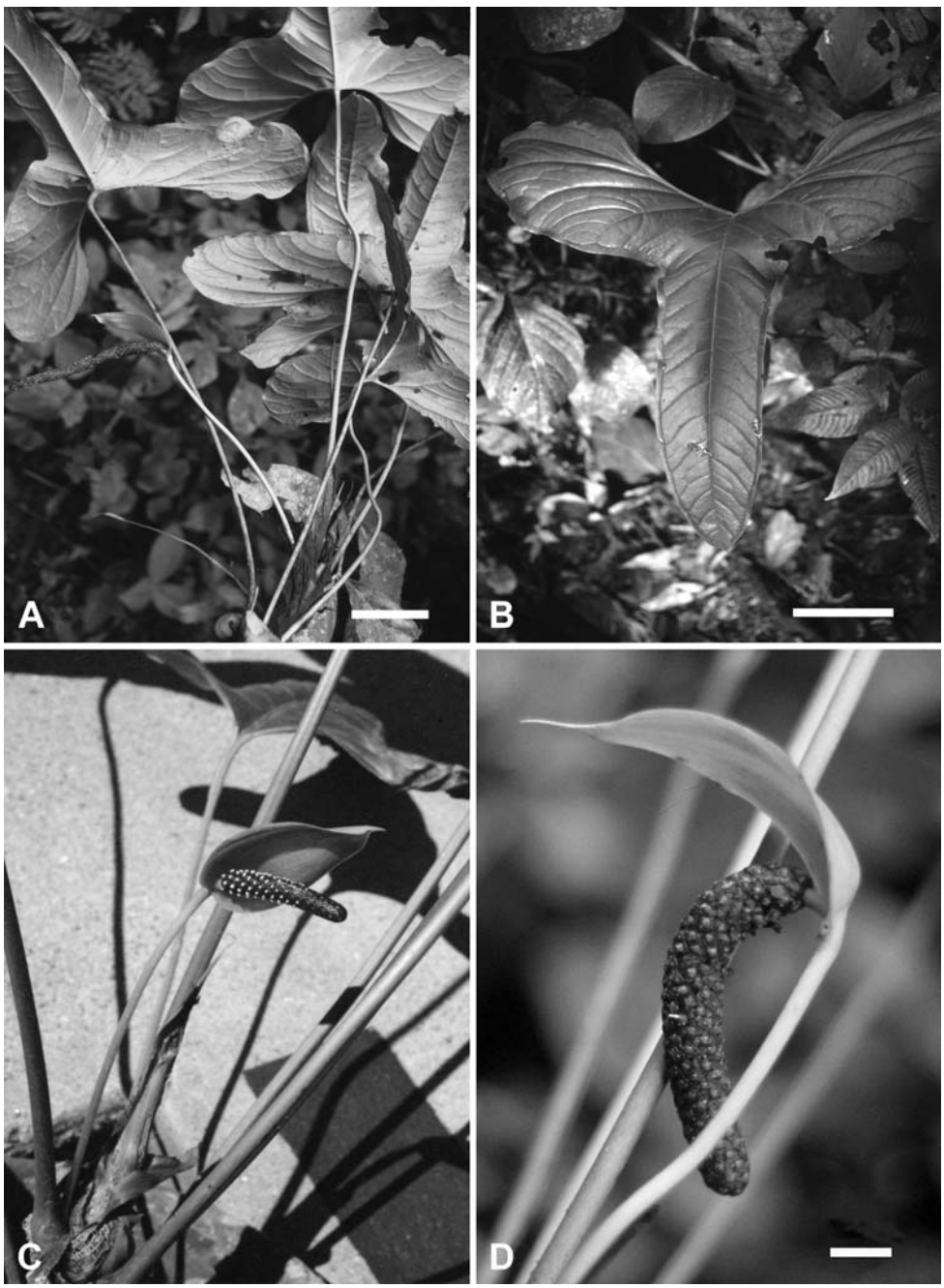

Fig. 1. *Anthurium effusilobum* subsp. *effusilobum* – A: habit, showing abaxial leaf surfaces; B: leaf blade, adaxial surface; C: petioles and inflorescence; D: inflorescence, close-up. – Scale bars: A-B = c. 10 cm, D = 4 mm; photographs from cultivated plants of the type collection.

Anthurium effusilobum Croat, **sp. nov.**
Planta terrestris vel epiphytica; cataphylla 8-12 cm longa, c. 1 cm lata demum in reticulum decomposita; petiolus erectus usque ad 50 cm longus, c. 4 mm diam.; lamina in sicco brunnea, bicolor, trilobata; spatha cucullata ad anguste ovata, viridis; spadice patens vel pendens, violascens vel pallide viridis vel cremeus.

Terrestrial or epiphytic; *stems* erect up to 60 cm long; internodes short and 2-3 cm in diam. *Cataphylls* 8-12 cm long, c. 1 cm wide before weathering, persistent as a dense net-like reticulum of reddish brown fibres that collectively envelop the entire stem. *Leaves* with *petiole* erect, to 50 cm long (slightly longer than median lobe of blade), c. 4 mm in diam., weakly flattened to sharply C-shaped, narrowly and obtusely or V-sulcate; geniculum c. 2 cm long, slightly swollen and paler than petiole in fresh material, usually drying only slightly darker than petiole; *blades* erect to spreading or pendent (lateral lobes held extended outward), subcoriaceous, semi-glossy and moderately bicolourous, drying dark brown-green above, lighter brown below, deeply 3-lobed, the median lobe 20-38 × 6-14 cm, 1.6-2 times longer than lateral lobes, narrowly acuminate (acumen 1.5-4 cm long); lateral lobes (very short in some juveniles) 12-24 × 6-18 cm, broadest in upper third, departing median lobe at 90-110° angle and curving to nearly 180° angle (relative to the median lobe) at apices, the leaf margin down-folded at junction of lateral and median lobes; midrib convexly prominent above, distinctly and acutely raised to rounded below; primary lateral veins 11-13 per side, departing midrib at 45-55° angle and slightly curving to collective vein, etched-sunken above, raised below; interprimary veins scarcely etched-sunken above, scarcely raised below; basal veins 5-8 per side, all entering the lateral lobes, fused into a 3-8 cm long naked basal rib, and departing at 1-2 cm intervals, equal in prominence to primary lateral veins; collective vein 3-7 mm from margin, arising from the 3rd- or 4th-from-highest-order basal vein. *Inflorescence* with *peduncle* erect, 10-36 cm long, 2-3 mm in diam.; *spathe* erect to spreading and hooding the spreading or pendent spadix, broadly ovate, 4-12 × 1-2 cm, apex with acumen to 1 cm long, green; *spadix* stipitate (stipe c. 5 mm long), usually about equal in length to spathe, cylindrical to slightly tapered, rounded at apex, either 4-7 cm long, 4-5 mm in diam. and purplish violet (subsp. *effusilobum*), or (3.8-)6-10(-15) cm long, 4-6(-10) mm in diam. and pale green to cream (subsp. *pallidispadix*). *Flowers* 7-8 visible in principal spiral, 5-8 in alternate spiral, ± square, 1.5-1.8 mm long and wide, with ± straight sides; tepals semi-glossy, with lateral tepals 0.8 × 0.5-0.7 mm, the inner margins straight to convex, the outer ones 2-sided; *anthers* red or cream and drying reddish; dried pollen cream or light yellow to pale yellow-green; *pistils* weakly emergent before maturity; *berries* orange, red or purple.

Etymology. – The species is named for its broadly spreading lateral lobes ("effusus" = spread out) making the leaves appear decidedly 3-lobed.

Relationship. – This species is a member of *Anthurium* sect. *Belolonchium* and characterized by its cataphylls that persist as a net-like reticulum of fibres sheathing the stem, the brown-drying, bicolourous three-lobed leaves, and the moderately short, spreading or pendent spadices that are hooded by a narrowly ovate, green spathe. Two subspecies are recognized.

Key to subspecies of *Anthurium effusilobum*

1. Spadix dark violet-purple; Napo and Morona-Santiago provinces, premontane rain forest . . . . . subsp. *effusilobum*
– Spadix pale green to greenish-white; Zamora-Chinchipe province, premontane moist to premontane wet forest or lower montane moist forest . . . . subsp. *pallidispadix* Croat

Anthurium effusilobum Croat subsp. ***effusilobum*****, subsp. nov.**
Holotype: Ecuador, Pastaza, Puyo-Diez de Agosto-Arajuno, 18 km NE of main Puyo-Macas rd., 8.2 km NE of Diez de Agosto, 1°27'S, 75°51'W, 970 m, *T. B. Croat 59063* (MO 3186742-4; isotypes: AAU, B, NY, QCA, QCNE, US) – Fig. 1.

Distribution. – *Anthurium effusilobum* subsp. *effusilobum* has been collected from the eastern slopes of the Andes in Ecuador at 450-1300 m, almost exclusively in the premontane rain forest

zone (for a classification of the vegetation see Holdridge 1971). The subspecies was first collected by Erik Asplund in 1939 *(Asplund 10186).*

Additional specimens seen. – ECUADOR: MORONA-SANTIAGO: Gualaquiza-Indanza, c. km 20, Túbez-Tucumbatza, *Harling 24382* (GH); Cordillera del Cóndor, Limón-Indanza, valley of Río Coangos, E of Shuar village of Tinkimints, *Neill & Manzanares 13207* (MO, QCNE). — NAPO: 20.1 km N of Archidona, vic. Jondachi, 5 km S of Hollín Rd., *Croat & al. 87788* (MO, QCNE); Cantón Archidona, *Asplund 9508* (S); rd. under construction Cotundo-Coca, 15 km E of Baeza-Tena rd., *Palacios & Neill 1564* (MO); Hollín-Loreto-Coca, Río Pucuno-Río Guamani, *Cerón 2906* (MO), *Palacios 2216* (MO); ibid., km 17, *Hurtado & Shinguango 1639* (MO); Chaluayacu, km 25, *Cerón & al. 5755A* (MO); ibid., *Hurtado & Alvarado 1139* (MO); ibid., km 31, *Alvarado 68* (MO), *Palacios 4073, 4103* (MO); km 32. 8 km W of Guamani, *Neill & al. 8616* (MO); ibid., km 40-50, *Hurtado 611, 648 & 738* (MO); Faldas al sur del Volcán Sumaco, carretera Hollín-Loreto, entre Huamaní y el Río Pucuno, *Palacios & C. Iguago 4651* (MO); km 45, nueva carretera a Galeras, *Hurtado & al. 2796* (MO); Tena-Baeza, 2.7 km N of Loreto-Coca Rd., *Croat 72642* (MO, QCNE); km 50, Comuna Huahua Sumaco, *Hurtado & al. 2055* (MO); 20 km W of Loreto, *Croat 72629* (MO, QCNE); Est. Biol. Jatún Sacha, 8 km E of Misahuallí, along Río Napo, *Cerón 1092, 1646, 2598 & 3667* (MO), *Cerón & Cerón 4621* (MO), *Palacios 436* (MO, NY, QAME), *Palacios 2444, 2456, 2843, 2944, 7079, 7080* (MO, QCNE), *Palacios & Rubio 7321* (MO), *Miller & al. 2230* (MO), *Neill 7703* (MO), *Neill & Cerón 7235* (MO); Pangayacu-Loreto, 10.6 km E of main N/S Baeza-Tena rd., *Croat 58786* (MO); Tena, *Asplund 10186* (S); Tena-Napo, *Asplund 10263* (S); along rd. from Narupa to Coca, 4 km E of Narupa (jct. of Baeza-Tena Rd.), *Croat & al. 87825* (MO); Pangayacu-Loreto, 10.6 km E of main N/S rd. between Baeza and Tena, departing main rd. 23.7 km N of Archidona, *Croat 58796* (MO); Comunidad 10 de Agosto, Río Pucuno, bloque 19, línea sísmica 22, Compañía Triton, *E. Freire & J. Cerda 318* (MO, QCNE). – PASTAZA: Arajuna, *Lugo 5765* (GB); Mera, *Asplund 18549* (MO); Mera, near Alpayacu, *Asplund 18500* (MO); 2 km NE of Mera, Hacienda San António, *Baker & al. 5408* (MO, NY, QAME, QCNE); 8 km NE of Mera, along Río Pastaza, *Baker & al. 5752* (MO, QAME); 9 km N of Mera, *Bohlin & al. 1567* (MO, QCA); 3 km from Puyo-Mera turnoff, *Croat 49702* (MO); Mera Cantón, Puyo-Baños, 5 km W of Mera, *Croat 72830* (MO, QCNE); 5.5 km NE of Shell, *Croat 73447* (MO, QCNE); Mera-Río Anzu, 11.7 km N of Mera, *Croat 73593* (MO, QCNE); Puyo, *Croat 75234* (MO); 1 km N of Shell, *Croat & al. 86604* (MO, QCNE); 1 km N of Shell, *Croat & Hannon 87143* (MO, QCNE); Shell, Río Pindo, *Croat & al. 88578* (MO, QCNE); 3.5 km N of Río Anzu, *Croat & al. 88747* (MO, QCNE); 7.7 km N of Río Alpayacu, *Croat & al. 88863* (MO); Mera, Río Chico, *Harling 3433* (MO, S), *Lugo 65* (MO, S), *Lugo 124* (MO, S); 5 km NE of Mera, along rd. to Río Anzu, *Palacios & al. 167* (MO, QCNE), *Plowman & Davis 4501* (MO); Puyo-Macas at km 19, *Croat 50569* (MO); Puyo-Macas, c. 33 km S of Puyo, 24.9 km S of Veracruz, 16 km S of Escuela Fiscal Cotopaxi, *Croat 58971* (MO, QCA); Puyo-Diez de Agosto-Arajuno, 18 km NE of main rd., 8.2 km NE of Diez de Agosto, *Croat 59063* (AAU, K, MO, NY, QCA, QCNE, S, US); Puyo-Diez de Agosto-Arajuno, 1-5 km SW of Diez de Agosto, *Harling & Andersson 16853, 16871* (GB); 1.8 km in on logging rd. past Veracruz (logging rd. 15.6 km from cemetery in Puyo), *H. Kennedy 3905* (M); Puyo-Macas, 31 km S of Puyo, *Øllgaard & Balslev 9059A* (AAU, NY); c. 33 km S of Puyo, 24.9 km S of Veracruz, 16 km S of Escuela Fiscal Cotopaxi, *Croat 58969* (MO, QCA); Puyo-Tena, c. 12 km N of Puyo, *Lugo 4742* (GB); c. 17 km NE of Puyo, *Harling & Andersson 17093* (GB); c. 18 km N of Puyo, at Tnte. H. Ortiz, 1 km E of main rd., *Øllgaard & Balslev 9206* (AAU); Puyo-Mera rd. to Tarabita and the portage over the Río Pastaza, *Croat 49702* (MO).

Cultivated plants. – ECUADOR: NAPO: Vic. of Puyo, collected 4.1991, vouchered as *Croat 75243* (MO, QCNE), cultivated at Missouri Botanical Garden.

Anthurium effusilobum subsp. ***pallidispadix*** Croat, **subsp. nov.**
Holotype: Ecuador, Zamora-Chinchipe, Loja-Zamora, Río Zamora near bridge, 39 km E of Loja, 4°05'S, 79°00'W, 610 m, *T. B. Croat 50764* (MO 2824582-3; isotypes, AAU, B, K, NY, QCA, US) – Fig. 2.

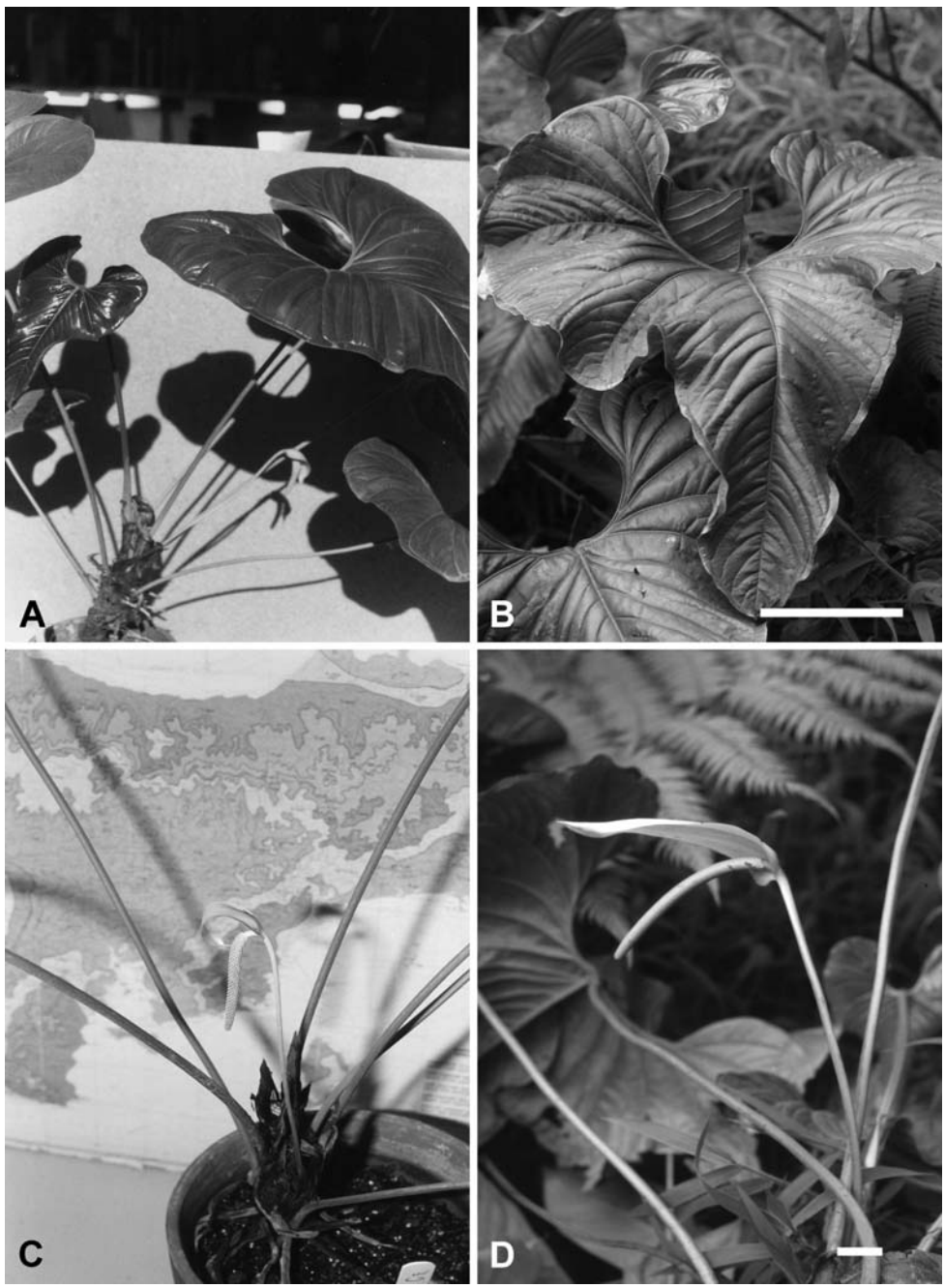

Fig. 2. *Anthurium effusilobum* subsp. *pallidispadix* – A: habit; B: leaf blade, adaxial surface; C: potted plant, petioles, cataphylls, and inflorescence; D: inflorescence, close-up. – Scale bars: B = c. 10 cm, D = 18 mm; photographs from cultivated plants of the type collection.

Planta terrestris vel epiphytica; cataphylla 8-12 cm longa, c. 1 cm lata demum in reticulum decomposita; petiolus erectus usque ad 50 cm longus, c. 4 mm diam.; lamina in sicco brunnea, bicolor, trilobata; spatha cucullata ad anguste ovata, viridis; spadix patens vel pendens, (3.8-)6-10 (-15) cm longus, 4-6(-10) mm diam., pallide viridis vel cremeus.

Distribution. – *Anthurium effusilobum* subsp. *pallidispadix* is endemic to southeastern Ecuador in the Zamora-Chinchipe province at (100-)610-975(-1100) m elevation in premontane moist forest to premontane wet forest or lower montane moist forest (for a classification of the vegetation see Holdridge 1971).

Additional specimens seen. – ECUADOR: ZAMORA-CHINCHIPE: Nangaritza Cantón, Río Nangaritza, Shaime, Márgen derecho del río, *Palacios 6658* (MO, QCNE); 3 km E of Paquisha, *Harling & Andersson 23985* (GB); Parque Nacional Podocarpus, Guarderia, Río Bombuscara, *Larrea & al. 61* (MO); 1 km SW of Zamora, *Croat & Menke 89701* (MO); 13.3 km N of Zamora, *Croat & Menke 89728* (MO, QCNE); Cordillera del Cóndor, El Cóndor, *Croat 75368* (MO, QCNE).

Cultivated plants. – ECUADOR: collected by Strobel, *Munich Botanical Garden 322/74* (M, MO).

Anthurium fornicifolium Croat, **sp. nov.**
Holotype: Ecuador, Morona-Santiago, Serranía de Cutucú, 800-1000 m, from a cultivated plant at Marie Selby Botanical Gardens, #76-28-13, originally collected by Mike Madison in 1976, vouchered as *T. B. Croat 81400* (MO; isotypes, AAU, B, CM, F, K, NY, QCA, QCNE, RSA, S, SEL, US, WU) – Fig. 3.

Planta epiphytica; internodia brevia, 0.9-1.2 cm diam.; cataphylla persistentia intacta; folium arcuatum; petiolus 14-28 cm longus, 2-3.5 mm diam., vagina 2.2-10 cm longa; lamina 27-59 cm longa, 1.9-6.6 cm lata, lineari-oblongata vel ad anguste oblanceolata; pedunculus 17-40 cm longus; spatha viridis, 2-3.6 cm longa, 6-8 mm lata; spadice 5-8 cm longus, 3-5 mm diam., luteus per anthesin; bacca aurantiaca.

Epiphyte; stems short; internodes short and 0.9-1.2 cm in diam., roots white; cataphylls and old petioles persisting. *Cataphylls* 5.5-7.5 cm long, persisting semi-intact, heavily tinged reddish, drying brown. *Leaves* arched with *petioles* erect-spreading, 14-28 cm long, 2-3.5 mm in diam., slightly thicker than broad, obtusely C-shaped, narrowly and obscurely sulcate, sheathed 0.10-0.25 % of its length, closely ensheathing peduncle, dark green, semi-glossy; *sheath* 2.2-10 cm long; geniculum sulcate, paler, conspicuously swollen; *blades* arcuate, 27-59 × 1.9-6.6 cm (averaging 42 × 3.7 cm), oblong-linear to narrowly oblanceolate, stiffly subcoriaceous to coriaceous, occasionally somewhat quilted above, dark green and weakly matte-subvelvety to weakly glossy above, slightly paler and weakly glossy below, narrowly acuminate at apex, narrowly acute at base, with the margins turned somewhat upward; midrib concolourous, bluntly acute at base, more acute and thicker than broad toward apex, sometimes narrowly round-raised toward apex above, narrowly rounded to weakly raised and concolourous to slightly paler than surface below; primary lateral veins weakly raised to narrowly convex and concolourous on upper surface, often pleated-raised and appearing somewhat acute above, scarcely raised on lower surface, only slightly darker than surface, sometimes scarcely visible on either surface; tertiary veins moderately obscure on lower surface; collective veins 1 pair, 3-6 mm from margin, moderately obscure on both surfaces, less conspicuous than primary lateral veins. *Inflorescence* erect or nearly so at anthesis, becoming spreading, sometimes with the spadix erect; *peduncle* 17-40 cm long at anthesis (to 50 cm long in fruit); *spathe* green, 2-3.6 × 6-8 mm, green, tinged reddish purple in age, erect-spreading, often twisted toward apex, sometimes recurled, sometimes arched inward toward spadix; *spadix* slightly tapered, 5-9 cm long, 3-5 mm in diam., pink, becoming somewhat olive-green, ultimately bright yellow at anthesis. *Flowers* 5-6 per spiral, 1.8-2.2 mm long and wide, the lateral margins straight to weakly sigmoid; lateral tepals 2-3-sided, 1-1.2 mm wide, weakly glossy; *pistils* medium green, moderately acute, weakly protruding; *stamens* held in tight cluster, the anthers contiguous or nearly so. *Infructescence* spreading-pendent; spadix dark green; *berries* orange-red, obovoid, 5-7 mm long, 5-6 mm in diam.

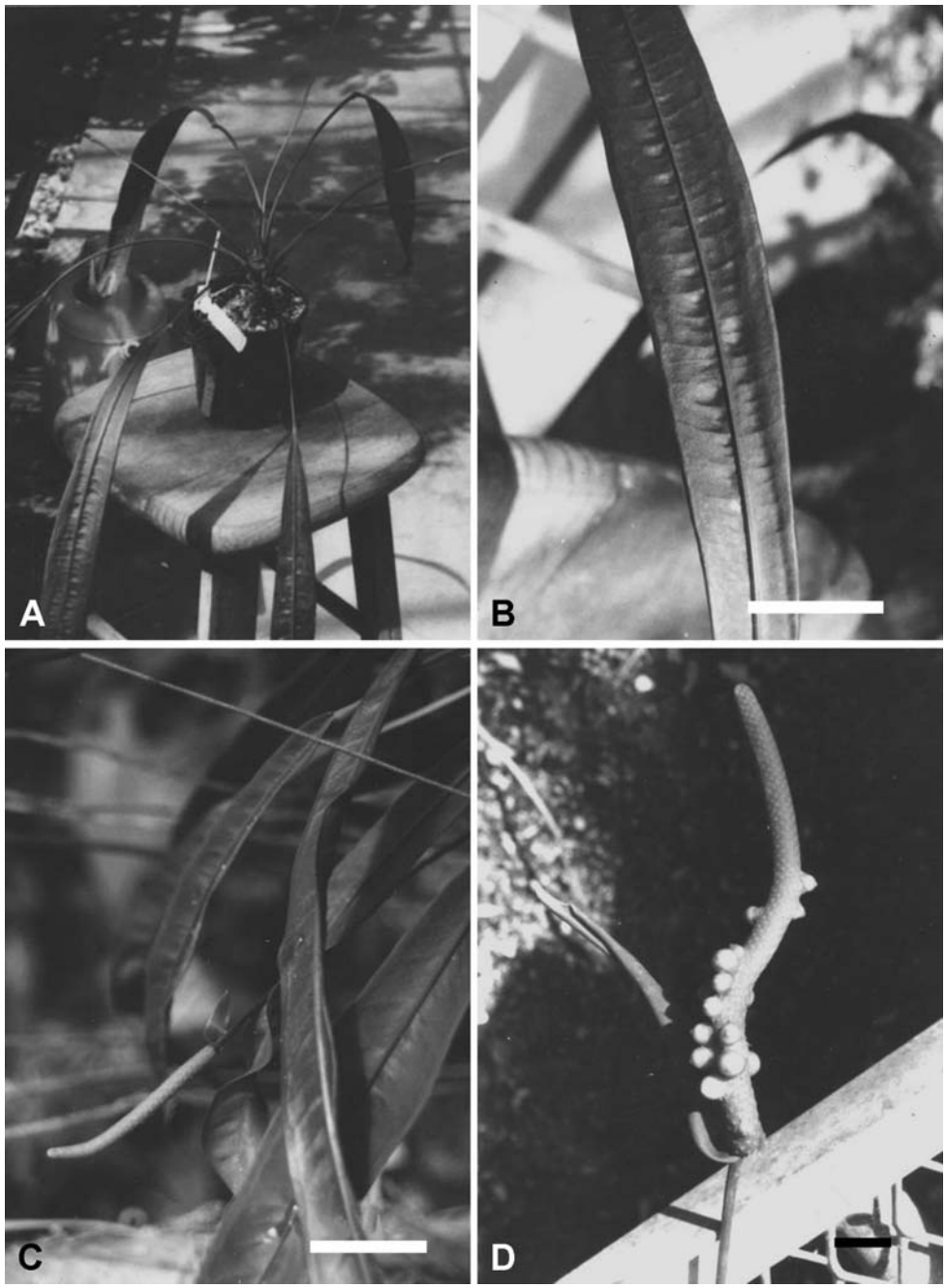

Fig. 3. *Anthurium fornicifolium* – A: habit; B: leaf blade, face view showing the prominently raised midrib and the weakly pleated primary lateral veins on upper surface; C: leaves showing arching shape and erect-spreading inflorescence; D: Infructescence showing the early-emergent berries and erect-spreading twisted spathe. – Scale bars: B-C = 3.5 cm, D = 8 mm; photographs from cultivated plants of the Marie Selby Botanical Garden living collection no. 28-76-13.

Note. – The species was first collected in 1976 by Dr Michael Madison *(Madison & al. 2696),* then of Marie Selby Botanical Gardens. It has been in cultivation since that time and was once rather widespread in cultivation in the Miami area and at the Missouri Botanical Garden. The Marie Selby Botanical Gardens living collection is no. 28-76-13, and it has been used by different collectors to generate several herbarium specimens.

Relationship. – The species is recognized by its slender, long-petiolate leaves with the petiole sheath closely clasping the peduncle, and the blades and petiole together forming a large arc. Additional characters are the matte-subvelvety upper blade surface with the primary lateral veins pleated to weakly quilted, the red, intact cataphylls, spadices that ultimately become bright yellow at anthesis, and the orange-red berries. *Anthurium fornicifolium* is related to two other undescribed species that also occur on the eastern slopes of the Ecuadorian Andes. One of these is represented by *Croat 61246* collected at 1332 m, near the San Rafael Falls just off the Baeza-Lago Agrio road in Sucumbíos province near El Reventador. This undescribed species is distinguished from *A. fornicifolium* by having longer internodes, proportionally broader blades, and a more narrowly tapered spadix. The other species, represented by *Croat 89314,* was collected in Morona-Santiago province, near San Juan Bosco, at 2500 m. It differs from *A. fornicifolium* in having fully sheathed petioles and oblong-elliptic blades rather than oblong-linear to narrowly oblanceolate blades as in *A. fornicifolium*.

Distribution. – Anthurium fornicifolium is endemic to Ecuador, presently known to range from Sucumbíos province in the north to Morona-Santiago, but with most collections coming only from the Serranía de Cutucú in Morona-Santiago province and around Tena and Archidona. It occurs at 800-1000 m elevation in premontane wet forest zone (for a classification of the vegetation see Holdridge 1971).

Additional specimens seen. – Ecuador: Morona-Santiago: Cordillera de Cutucú, W slopes, along trail from Logroño to Yaupi, c. 2°46'S, 78°06'W, *Madison & al. 3235* (SEL); Centro Shuar Yukutais, E side of Río Yukutais, 3°30'S, 78°10'W, 950-1020 m, 6.11.1988, *Bennett & Andrade 3533* (NY); Santiago-Río Morona, 36.1 km E of Santiago, 32.9 km E of Río Yaupi, *Croat & al. 90662* (B, MO, QCNE). – Napo: Archidona Cantón, Reserva Ecológia Antisana, Communidad Shamato, entrada por km 21-Samato, 0°43'S, 77°49'W, 1700 m, 22.4.1998, *Clark & al. 5056* (QCNE); San Jose, c. 3 km from Tena, 1.4.1969, *Lugo 973* (GB); ibid., 800 m, *Kennedy & Baker* (QCNE)*; Tena, 10.10.1939, Asplund 9216* (S); Bosque Protector de la Comunidad de Mushullacta, 0°49'39"S, 77°33'47"W, 1200 m, 25.2.2003, *Altamirano 199* (MO, QCNE); vic. Mushullacta, along Río Huayusayacu, vic. of Communidad Mushullacta, S of main Narupa-Coca Rd., 13.2 km S of main rd., 41 km E of Narupa, 0°48'S, 77°34'W, 1150-1250 m, 20.4.2003, *Croat & al. 87895* (MO, QCNE). – Pastaza: Puyo, 10.1990, *Croat 75251* (MO, QCNE). – Sucumbíos: Gonzalo Pizarro Cantón Parroquia Reventador, tercera linea al N de la carrentera, c. al Río Dué, 0°03'N, 77°35'W, 1800 m, 23.5.1990, *Cerón & Ayala 9860* (MO, QCNE).

Cultivated collections. – Ecuador: Morona-Santiago: Cordillera de Cutucú, living collection at Selby Gardens (SEL 28-76-13), *Madison 2696* (MO, SEL); 25 km SE of Logrono, 7.12.1977, *Madison 4182* (SEL); Selby 82-0565, 26.6.1991, *Ingram 1031* (MO; SEL), 26.6.1991, *Ingram 1032* (MO), 28.1.1992, *Ingram 1249* (SEL).

Anthurium macdanielii Croat, **sp. nov.**
Holotype: Ecuador, Napo, Coca to Yuca, 14.2 km S of Río Napo, 0°34'S, 76°50'W, 355 m, 29. 2.1992, *T.B. Croat 72547* (MO-4085496-97; isotypes: AAU, B, K, QCA, QCNE, US) – Fig. 4.

Planta epiphytica; caudex brevis; internodia brevia, 1-3.5 cm diam.; petiolus 53-104 cm longus, teres; lamina cordato-sagittata, 34-55 cm longa, 16-29 cm lata, coriacea; pedunculus 33-62 cm longus, 5-15 mm diam.; spatha pendens, 9.6-33.5 cm longa, 1.5-2.8 cm lata, viridis; stipes 2-4 mm longus; spadix viridis, 15-33 cm longus, ad basim 6-12 cm diam.

Epiphytic; stem short, drying dark yellowish brown; internodes short and 1-3.5 cm in diam. *Cataphylls* 14-25.3 cm long, acute at apex, coriaceous, drying grey-brown to brown, several persisting intact. *Leaves* with *petioles* semi-erect to erect, 53-104 cm long, 6-16 mm in diam., terete, cylindrical, medium green, short pale-lineate, weakly glossy, usually drying dark brown; geniculum 3-5 cm long, drying darker than rest of petiole; *blades* cordate-sagittate, coriaceous, acuminate to caudate-acuminate at apex, 34-55 × 16-29 cm, 1.8-2.1 longer than wide, broadest at base, c. 1/2 as long as petiole; upper surface dark green, weakly glossy, drying grey-brown to brown; lower surface moderately paler, weakly glossy, drying brown to grey-green; anterior lobe 38-52 cm long; posterior lobes 10.5-15 × 19-28 cm, 1.5-1.6 longer than wide, held upward at 45° to midrib, usually directed inward or being flattened, narrowly rounded at apex; sinus hippocrepiform to obovate, 11-14.5 cm deep; major veins convex on both sides; midrib drying brown above, prominently raised, drying brown to reddish brown below; primary lateral veins in 4-5(-6) pairs, arising at 40-60°, straight at first, finally forming a broad curve before merging into collective vein; basal veins 3-7, 1st pair free to base, 2nd pair coalesced for 1.5-2 cm, most of the remainder coalesced for 2.7-5 cm; posterior rib naked, 3.5-5 cm, weakly curved; tertiary veins clearly visible below, weakly raised, in part darker than surface, prominently raised on drying; collective veins arising from 1st basal veins with a secondary collective vein arising from the 2nd basal vein and not as prominent as primary lateral veins, 1st collective veins 8-15 mm from margin. *Inflorescence* semi-erect to erect; peduncle 33-62 cm long, 5-15 mm in diam., 0.5-0.6 times as long as petiole, drying brown to dark brown; *spath*e pendent, 9.6-33.5 × 1.5-2.8 cm, inserted at 30-40°, 1/3 to 1/2 as long as peduncle; subcoriaceous to coriaceous, green, usually drying dark reddish brown, often withering after anthesis, stipe 2-4 mm long in rear; *spadix* long-tapered, semi-erect, 15-33 cm long, 4-6 mm wide at apex, 6-12 mm wide at base, 32-38 times longer than wide, green, becoming purple to purplish brown. *Flowers* 7-12 visible per spiral, square, 1.8-2.3 × 1.3-1.4 mm, tepals 1.8-1.9 mm wide, subtriangular, with inner margins broadly rounded; pistils barely visible; *stigma* 0.6 × 0.3 mm, raised, ellipsoid with oblong slit; *stamens* held at level of tepals, anthers 4 × 5-5.5 mm, thecae ovoid-ellipsoid, moderately divergent. *Infructescence* with spadix 32-44 cm long, 2-3 cm wide; *berries* early emergent, green when young, turning yellowish, ultimately red-orange.

Eponymy. – *Anthurium macdanielii* is named for the first author's friend and fellow aroider Charlie MacDaniel, teacher and naturalist as well as an expert on ecotourism in Ecuador, who collected living material of the species for the first author.

Relationship. – The species is distinguished by short, thick internodes, cataphylls persisting intact, narrowly cordate-sagittate blades with two or more basal veins extending all the way to the apex and prominulous tertiary veins, by the purplish long-tapered spadix, the green, spreading spathe and orange berries.

It is most easily confused with and probably related to *Anthurium brownii* Masters, which occurs in Central America from Costa Rica to Panama and along the Pacific slopes of northwestern South America. Both species share purplish violet spadices, orange fruits and prominulous tertiary veins, but *A. brownie* differs in having cataphylls persisting as fibres, and typically, much larger blades with collective veins arising from the first basal veins or from one of the primary lateral veins. Moreover, *A. brownii* rarely has more than a single pair of collective veins reaching the blade apex.

Anthurium macdanielii could also be confused with *A. corallinum* Poepp. & Engl. because it has cataphylls that tend to be fibrous, basal veins that are fused to the basal rib, collective veins arising from the 1st or 2nd primary lateral vein (sometimes from the 1st basal vein), and conspicuous primary lateral veins. However, *A. corallinum* has entire cataphylls, basal veins that are free to the base, collective veins arising from the 1st and 2nd basal veins, inconspicuous primary lateral veins, and basal ribs.

Distribution. – *Anthurium macdanielii* occurs in Ecuador in Napo, Pastaza and Sucumbíos provinces in tropical moist forest and tropical wet forest zones; in Peru it occurs in Leoncio Prado and

Fig. 4. A-D. *Anthurium macdanielii* – A: habit; B: leaf blade, adaxial surface; C: leaves with inflorescence; D: inflorescence, close-up. – Scale bars: A-B = c. 22 cm, D = 10 cm; photographs from cultivated plants of the collection *Croat 72547* (A-D), *Croat 50532* (C) and *Croat 72547* (D).

Alto Amazonas provinces in premontane wet forest zones (for a classification of the vegetation see Holdridge 1971), at elevations from 200 to 1800 m.

Additional specimens seen. – Ecuador: Napo: Tena-Puyo, 40 km N of Puyo, *Croat 50532* (MO, QCNE); Parque Nac. Yasuní, Pozo Amo 2, trail to Río Daymi, *Cerón 3348* (MO), *3387* (MO), *Palacios 2396* (MO, QCNE), *Palacios & Cerón 8241* (MO, QCNE); SE of Estación Científica Yasuní, *Leimbeck 158* (AAU); Lagunas de Garza Cocha, along Río Garza, *Cerón & Gallo 4951* (MO); Laguna "Canal de la Hormiga", *Jaramillo 8467* (QCA); El Chaco Cantón, S of Volcán Reventador, Río Reventador, *Palacios 6161* (MO); Río Napo, 20 km downstream from Coca at Laguna Taracoa, *Besse & al. 1963* (SEL); Aguarico Cantón, Res. Etnica Huaorani, rd. to Maxus pipeline, *Dik & Andi 947* (MO); vic. Lago Agrio, CEPE ferry rd., 7.2 km S of Río Aguarico, *Croat 58637A* (MO, QCA), *Delinks & Suarez 197* (MO, QCNE), *Delinks & Suarez 202* (MO, QCNE); Est. Biol. Jatún Sacha, Río Napo, 8 km E of Misahuallí, *Palacios 4299* (MO, QCNE). – Pastaza: Pastaza Cantón, pozo petrolero "Masaramu" de Unocal, 40 km NE to Montalvo, *Espinosa 138* (MO); Curaray, Valle de la Muerte, *Holm-Nielson & al. 22377* (AAU). – Sucumbíos: Res. Faunistica Cuyabeno, along Laguna Grande and Quebrada la Hormiga, *Balslev & al. 84701* (AAU, MO); Laguna Grande and vic., including Río Cuyabeno from Pto. Bolívar to above Laguna Cañangueno, *Balslev & al. 97342* (AAU). — Peru: Leoncio Prado: Hermilio Valdizan, La Divisoria, rd. to Caserío San Agustín, *Schunke 11505* (MO). – Alto Amazonas: Andoas, Río Pastaza near Ecuador border, *Gentry & al. 29707* (MO).

Philodendron parvilobum Croat, **sp. nov.**
Holotype: Ecuador, Morona-Santiago, Macas-Sucua, 8.1 km S of Río Umbaino, 2°23'09"S, 78°10'01"W, 948 m, 21.8.2002, *T. B. Croat & L. Hannon 86728* (MO 5740895; isotypes, AAU, B, CAS, F, GB, K, MEXU, MO, NY, QCNE, SEL, US) – Fig. 5A-B, D.

Planta hemiepiphytica vel epiphytica; internodia (1-)2-3 cm longa, (1.2-)1.7-2 cm diam.; cataphylla 16 cm longa; lamina anguste triangulari-ovata, (25-)32-37 cm longa, (9-)11.5-18 cm lata; spatha viridis, 5-13 cm longa, (0.8-)1.7-2.6 cm lata, spadix eburneus.

Appressed-climbing hemiepiphyte to 1.5 m, epiphytic or occasionally on ground or rocks; stems apparently scandent. *Internodes* dark green to grey-green, (1-)2-3 cm long, (1.2-)1.7-2 cm in diam., becoming yellow-brown and semi-glossy, sharply flattened on one side, occasionally with acute marginal ribs. *Cataphylls* green, soft, deciduous, sharply 2-ribbed, 16 cm long, pale green, the ribs to 3-4 mm high, flaring, sometimes with spreading wings. *Leaves* with *petioles* spongy, subterete, dark green and semi-glossy, sometimes striate or densely short-lineate, conspicuously constricted and darker at apex where it meets the midrib, obtusely flattened adaxially; *blades* subcoriaceous, moderately bicolourous, semi-glossy, narrowly triangular-ovate, (25-)32-37 × (9-)11.5-18 cm, acuminate to cuspidate at apex, narrowly cordulate at base, posterior lobes (3-)4.3-4.5 × 2-4.5 cm midway, sinus v-shaped, 3-4 cm deep and 6-7.5 cm wide, narrowly rounded at apex; midrib convex and slightly paler above, narrowly rounded and paler to much paler below; primary lateral veins 4 to 5 per side, departing at 85° angle, then spreading at 60° angle near the margin, obtusely sunken to weakly quilted and concolourous above, convex and paler below; minor veins sparse, weakly visible below. *Inflorescences* 2 or 3(-5) per axil; *peduncle* 11.5-12 cm long, (3.5-)6-8 mm in diam., medium green, semi-glossy; *spathe* 5-13 cm long, semi-glossy, sometimes glossy, medium to dark green, paler green on blade outside, purple-tinged on open edge outside, pale green to whitish inside; spathe tube (0.8-)1.7-2.2 × 2.4-2.6 cm, dark purple-violet to dark maroon in lower $^1/_2$ to $^2/_3$ inside; *spadix* ivory throughout, 4.8-8 cm long; staminate portion 3.3-5.9 cm long, sometimes weakly protruding after anthesis, sterile staminate portion 8-9 mm in diam., middle of fertile staminate portion 9 mm in diam., at 1 cm from tip, 5 mm in diam.; pistillate portion 2.7-4 cm long in front, 3-3.5 cm long in rear, 0.8-0.9 cm in diam. at base, 1.2-1.4 cm in diam. midway, 1-1.2 cm in diam. at apex; pistillate flowers pale to medium green before anthesis, creamy white after anthesis; pistils medium green in early fruit; immature fruits pale green.

Distribution. – *Philodendron parvilobum* occurs in Ecuador (Morona-Santiago and Zamora-Chinchipe provinces) at 300-975(-1250) m elevation. Flowers have been seen in February.

Distinction. – This species can be confused with *Philodendron campii* Croat because both have elongated blades and similar on colours drying; however, *P. campii* has an acute leaf base and *P. parvilobum* has auriculate basal lobes (hence the name, "parvi" meaning short, "lobum" meaning lobes).

Additional specimens seen. – Ecuador: Morona-Santiago: March 1992, *B. Feuerstein in Croat 75464* (MO); Gualaquiza-Indanza, 12 km S of Indanza, along river, *Croat 87310* (MO, QCNE); Limón-Gualaquiza, 12 km S of Plan de Milagro (jct. of Limón-Gualaceo Rd.), 5.8 km S of Indanza at Río Cruzada, 14.1 km N of San Juan Bosco, *Croat & Menke 89299* (MO); Patuca-Santiago, along S edge of Cordillera de Cutucú, entering from main Limón-Macas rd. at 44.6 km N of Limón, 3.9 km N of Bella Unión and jct. to Méndez, 74.5 km SE of jct. at Río Kushis, *Croat 87369* (M, MO, QCNE); Santiago-Río Morona, vic. Río Morona ferry on rd. to S of San José de Morona, 50.3 km E of Santiago, *Croat 87388* (MO, QCNE); Patuca-Santiago, Cordillera de Cutucú, 11.4 km E from Patuca turnoff on Macas-Limón rd., 5.1 km E of Patuca, *Croat & al. 90613* (L, MO, RSA, USM); Santiago-Río Morona, 33.7 km E of Santiago, steep slope with virgin forest, *Croat & al. 90712* (MO, QCNE). – Zamora-Chinchipe: El Panguí-Zamora, vic. San Roque, 2 km S of San Roque, 10 km S of El Panguí, *Croat 87199* (AAU, GB, MO, QCNE); El Panguí-Monterrey, 5.8 km E of Monterrey, 11.9 km W of main Gualaquiza-Zamora Rd., *Croat & Menke 89398* (MO, QCNE); Zamora-Parque Nac. Podocarpus, 3.3 km NW of Zamora, *Croat & Menke 89651* (MO, QCNE); El Panquí-Zamora, 10.8 km S of El Panguí, 2.8 km S of San Roque, *Croat & al. 91079* (AAU, MO, QCNE); Cordillera del Cóndor, Los Encuentros-El Sarsa, 4.7 km E of Los Encuentros, *Croat & Menke 89445* (MO); Los Encuentros-El Sarsa, 4.7 km E of Los Encuentros, *Croat & Menke 89576* (MO, QCNE).

Philodendron pedunculum Croat & Grayum, **sp. nov.**
Holotype: Ecuador, Morona-Santiago, Patuca-Santiago, Cordillera de Cutucú, 11.4 km E from Patuca turnoff on Macas-Limón rd., 5.1 km E of Patuca, 2°46'30"S, 75°07'W, 944 m, 9.7.2004, *Croat, L. Hannon, G. Walhert & T. Katan Jua 90611* (MO 5866121; isotypes, B, K, NY, QCNE, US) – Fig. 5C, E.

Planta terrestris, repens; internodia 1-1.5 cm longa, 0.8-1(-2) cm lata, fusco-viridia; petiolus 16-19 cm longus; lamina anguste ovata vel ovato-elliptica, (13.5-)20-22 cm longa, (5.5-)10-12.5 cm lata; nervis primariis lateralibus 5-10 utroque; pedunculus (18-)21-23 cm longus, 7 mm latus, pallide viridis; spatha 13.5-16 cm longa, viridis ad fusco-viridia; spadix c. 8 cm longus, luteus ad luteo-brunneus in sicco; pistilla pallide viridia; fructus pallide luteus.

Terrestrial, creeping over ground in dense stand; stem repent; internodes 1-1.5 cm long, 0.8-1(-2) cm in diam., dark green, semiglossy to glossy. *Leaves* with *petioles* 16-19 cm long (averaging 17 cm), matte to weakly glossy or semiglossy, dark green and semiglossy, fully sheathed to within 4-6 mm from apex, sheath inturned, pale green tinged with pink and semiglossy inside free portion; geniculum sharply sulcate; *blades* narrowly ovate to ovate-elliptic, (13.5-)20-22 × (5.5-)10-12.5 cm (averaging 22 × 12.3 cm), 1.8 times longer than wide, abruptly and inequilaterally acuminate at apex, prominently inequilaterally attenuate at base, markedly inequilateral with one side 1-2 cm wider than opposite side, subcoriaceous, dark green and weakly glossy to matte-subvelvety above, moderately paler and matte below, drying grey to dark grey-brown above, dark yellow-brown to grey or greyish yellow below; midrib flat to obtusely sunken and concolourous above, bluntly angular and concolourous below; primary lateral veins 5-10 per side, weakly quilted-sunken and concolourous above, bluntly angular and pleated to convex and darker below, drying flat to concolourous above, weakly raised and darker than surface below, departing midrib at an acute angle then sweeping across blade at 35° angle; interprimary veins present between most pairs of primary lateral veins, conspicuous and flat on both surfaces; minor

Fig. 5. *Philodendron parvilobum* – A: habit; B: leaf, adaxial surface; D: inflorescences, close-up. – *P. pedunculum* – C: leaf, adaxial and abaxial surfaces, petioles and inflorescence; E: inflorescence, close-up, with spathe cut away to expose spadix. – Scale bars: A-B = 15 cm, C = 11 cm, D = 1 cm, E = 2.2 cm; photographs A-B + D from the type collection *Croat & Hannon 86728;* C + E from the type collection *Croat & al. 90611*.

veins moderately obscure on drying. *Inflorescence* solitary, erect with *peduncle* (18-)21-23 cm long, 7 mm in diam., pale green, weakly glossy; *spathe* 13.5-16 cm long, (2.5-)3-3.2 cm wide near base, 2 cm wide near apex, 3.3 cm thick on tube, medium to dark green, weakly glossy to semi-glossy outside, much paler green and glossy inside; *spadix* 8-10 cm long, 2.2 cm wide at anthesis, drying medium yellow to pale yellowish brown; pistillate portion 3.5 cm long, 1.8 cm in diam.; staminate portion 6 cm long, 7 mm in diam. midway, narrowly tapered to apex; sterile staminate portion 1.3 cm in diam.; *pistils* pale green to pale yellow, 1.4-1.6 mm in diam., drying pale brown; stigma broadly sunken with a thickly raised margin, medium dark yellow-brown, 0.5-0.9 mm in diam.; *berries* pale yellow.

Relationship. – The species is a member of *Philodendron* subg. *Pteromischum* and is characterized by its terrestrial habit, creeping stem, nearly fully sheathed petioles, ovate-elliptic to broadly ovate, inequilateral blades that dry greyish on the upper surface and yellowish brown below, and especially by the long-pedunculate inflorescence with a green spathe.

It is most closely related to and easily confused with *Philodendron palacioanum* Croat, a similar species of the same subgenus, which has very similar blades and petioles. *P. palacioanum* differs in having a short peduncle and in being an appressed-climbing hemiepiphyte.

Etymology. – The species epithet, "pedunculum", comes from the species' unusually long peduncle for a member of *P.* subg. *Pteromischum*. The peduncle of this species is critical in separating the species from what appears to be its closest ally, *P. palacioanum*.

Distribution. – Philodendron pedunculum is endemic to Eucador, known only from the eastern Andean slopes of central Ecuador in Sucumbíos, Napo, Pastaza and Morona-Santiago provinces at 400-945 m elevation. It will likely also be found in Pastaza province.

Additional specimen seen. – ECUADOR: MORONA-SANTIAGO: Patuca-Santiago, Cordillera de Cutucú, 11.4 km E from Patuca turnoff on Macas-Limón rd., 5.1 km E of Patuca, 2°46'30"S, 75°07'W, 944 m, 9.7.2004, *Croat & al. 90611* (B, K, MO, NY, QCNE, US). – NAPO: vic. Archidona, along rd. to San Pablo, 1.8 km E from main plaza in Archidona, 0°57'S, 77°49'W, 945 m, 21.4.2003, *Croat & al. 87927* (B, K, MO, NY, QCNE, US); Parroquia Puerto Misahuallí, Capirona village, trail to ceibo gigante, 13.8.1993, *Webster 29813* (DAV); *29822* (DAV). – SUCUMBÍOS: above rd. from Lumbaquí to La Bonita, 5.8 km E of Lumbaquí, 18.8.2004, *Croat & al. 93624* (MO, QCNE).

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