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NEW RECORDS OF ARACEAE FOR COSTA RICA AND PANAMA

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ABSTRACT

Four species are documented for the first time for the Costa Rican flora: *Anthurium curvispadix*, *Anthurium palosecense*, *Monstera integrifolia*, *Monstera spruceana*. Two species are first documented for the Panamanian flora: *Monstera costaricensis* and *Monstera epipremnoide*s.

The Cordillera de Talamanca is a biodiverse mountain range shared between Costa Rica and Panama and includes one of the most important protected areas in Central America, La Amistad International Park (Hammel et al. 2004; Monro et al. 2017). It contains a series of suitable habitats for the Araceae family (Croat 2019, pers. comm.).

The Araceae are widely distributed in Costa Rica and Panama at elevations ranging from 0 to 2800 m, showing high diversity mainly at middle elevations and lowland rainforests (Grayum 2003). In the Talamanca mountain range, the Araceae are represented mainly by the genera *Anthurium*, *Monstera*, *Philodendron*, and *Stenospermation*. Additionally, it is considered the center of diversity for the genus *Monstera* (Cedeño-Fonseca et al. 2018; Madison 1977; Zuluaga & Cameron 2018) and it is a region of high endemism for *Anthurium* and *Philodendron*, especially the Panamanian part (Croat 2019, pers. comm.).

Despite several expeditions to the Talamanca mountain range by the National Museum of Costa Rica (CR), the Missouri Botanical Garden (MO), and the Natural History Museum of London (BM), the appearance of new records is frequent (Monro et al. 2017). During recent herbarium studies and fieldwork documenting the Araceae family in parts of Costa Rica and Panama (including the Talamanca mountain range), species of the genus *Anthurium* and *Monstera* were collected that

constitute new distribution records. The collected samples were compared with the material housed at the Herbarium of the National Museum of Costa Rica (CR), Missouri Botanical Garden (MO) and the Herbarium of the University of Panama (PMA).

NEW RECORDS FOR COSTA RICA

1. ANTHURIUM CURVISPADIX Croat, Ann. Missouri Bot. Gard. 78: 639. 1991.

TYPE: **PANAMA**. **Colón**. Santa Rita Ridge Road, along trail at end of road which goes to Río Indio, beginning 10.6 km from Transisthmian Hwy, 3 km beyond hydrographic station, 09°22'30"N, 079°41'30"W, 380 m, 13 Apr 1976, *T.B. Croat 34294* (holotype: MO!; isotypes: K, MO!, PMA!, SEL, US).

New records. COSTA RICA. **Puntarenas**. Buenos Aires, P.N. La Amistad, Cuenca Térraba-Sierpe, fila que va desde el albergue Rancho Amuo a Cerro Seno, bosque denso de 5–25 m, predominado por *Cedrela tonduzii*, *Sloanea ampla*, *Quercus*, *Magnolia sororum*, sotobosque con Geonoma sp., 09°07'12"N, 083°05'18"W, 1800–1900 m, 25 Feb 2008, *Santamaria 7209* (CR, PMA).

Distribution. Costa Rica and Panama at 20–1900 m.

Comments. *Anthurium curvispadix* is a member of sect. *Calomystrium*, characterized by having broadly ovate to ovate-triangular leaf blades, long, marcescent cataphylls that do not disintegrate, pale whitish-green recurved spathes, and tapered and curved creamy white spadices. In Costa Rica, this species could be confused with *A. hoffmannii* Schott, which differs in having shorter cataphylls (up to 15 cm long), a parabolic to spathulate sinus, and shorter and less tapered or straight spadices (<9.0 cm long vs. >9.0 cm long).

2. ANTHURIUM PALOSECENSE Croat & O. Ortiz, Aroideana 39: 175. 2016.

TYPE: **PANAMA**. **Bocas del Toro**. Bosque Protector Palo Seco, área boscosa a los alrededores de Williemazu, 09°9'29"N, 082°30'29"W, 363 m, 1 Feb 2013, *O. Ortíz 1202* (holotype: MO!; isotype: PMA!).

New records. COSTA RICA. **Limón**. Z.P. Rio Banano, cuenca del Rio Banano, Valle de La Estrella, Fila Matama, ca. 11 km SW del pueblo de Aguas Zarcas, camino que lleva al rancho El Hotel, bosque nuboso primario, 09°49'27"N, 083°09'42"W, 700–800 m, 19 Oct 2007, *Santamaria 6496* (CR, PMA).

Distribution. Costa Rica and Panama at 200–800 m.

Comments. *Anthurium palosecense* is similar to *A. talamancae* Engl. (sect. *Polyneurium*), but differs in having leaf blades usually markedly cordate, subcordate to sagittate at base (vs. rounded to subcordate in *A. palosecense*), with 3–5 pairs of basal veins (vs. 1–2 basal veins) and longer (8–17 cm vs. up to 4.8 cm long) and wider (4–8 mm vs. 2–3 mm diam.) dark maroon to dark violet purple spadices (vs. yellowish to orange-red spadices).

3. MONSTERA INTEGRIFOLIA Zuluaga & Croat, Phytotaxa 334: 6, f. 4A–C, 5A–E. 2018.

TYPE: **PANAMA**. **Chiriqui**. Distrito Gualaca, corregimiento Hornito, Reserva Forestal Fortuna, trails near to research center Jorge L. Arauz. 1200–1500 m, 82°12.8'N, 8°47'W, 31 Jan 2013, *A. Zuluaga 916* (holotype: WIS; isotypes: MO, PMA).

New records. COSTA RICA. **Cartago**. Turrialba, Chirripó, Moravia de Chirripó, bosque nuboso, 9°46'2''N 83°25'21.6''W, 1602 m, 20 Dec 2019 (fr.), *Cedeño, Karremans, Chinchilla, Rojas 1638* (USJ); Turrialba, Chirripó, Moravia de Chirripó, bosque nuboso, 9°46'2''N 83°25'21.6''W, 1602 m, 20 Dec 2018 (fr.), *Cedeño, Karremans, Chinchilla, Rojas 1639* (USJ [2 parts]); Turrialba, Chirripó, Tayutic, Jicotea, Siguiendo la Fila Vereh, entre la Cueva del Sapo y Fila Vereh, 9°45'0''N

83°33’0’’W, 1634 m, 22 Dec 2018 (fl., fr.), *Herrera 8005* (CR, MO [2 dupl.]). **Heredia**. Sarapiqui, La Virgen, primary forest along Rio San Rafael, Atlantic slope of Volcan Barva, 10°13’0’’N 84°5’0’’W, 1500 m, 12 Apr 2019 (fr.), *Grayum 7017* (MO). Figure 1.

Distribution. Costa Rica and Panama at 1000–1700 m.

Comments. *Monstera integrifolia* is recognized by having narrow leaf blades with primary lateral veins that arise from the midrib at an angle of 35°, whitish and mottled petioles, with a petiolar sheath that disintegrates as fibrous residues, and flowers with a conical stigmatophore. It could be confused with *M. anomala* Zuluaga & Croat and *M. standleyana* G. Bunting, but *M. standleyana* plants are usually more robust, have a columnar stigmatophore, and inhabit at lower elevations (0–1360 m). On the other hand, *M. anomala* never has fenestrated leaf blades and the flowers have an elongated style with a constriction in the middle. *Monstera integrifolia* was described by Zuluaga & Cameron (2017) as a new species for Costa Rica and Panama. However, the paratype cited for Costa Rica (*Croat 66170*, MO) is actually *M. epipremnoides* Engl.

4. MONSTERA SPRUCEANA (Schott) Engl., Fl. Bras. 3(2): 115. 1878. *Tornelia spruceana* Schott, Oesterr. Bot. Z. 9(2): 40. 1859.

TYPE: **BRAZIL**. [**Amazonas**]. Rio Negro, São Gabriel, *R. Spruce 2293* (holotype: K!; photos: BH, BR, GH, NY, S).

New records. COSTA RICA. **Alajuela**. Upala, slope of Cerro Cacao, E to near Río Las Haciendas, 10°57’0’’N 85°27’0’’W, 1150 m, 14 Aug 2007 (sterile), *Grayum 12713* (MO). **Puntarenas**. Puntarenas, Monteverde, camino a Tilarán, 10°21’58.6’’N 84°51’12.6’’W, 1325 m, 21 Nov 2018 (fr.), *Cedeño & Cascante 1501* (USJ [2 parts]); Osa, Bahía Drake, camino a Rancho Quemado, 8°40’51.1’’N 83°33’32.6’’W, 188 m, 3 Feb 2019 (sterile), *Cedeño & Hay 1621* (USJ); Osa, Sierpe, along road between Rincon and Boscosa, 2 km W of bridge over Rio Rincon, 8°41’20’’N -83°29’50’’W, 50 m, 11 Sep 1996 (fr), *Croat 79253* (CR, MO [2 parts]). Figure 2.

Distribution. Costa Rica to Bolivia, Brazil, Venezuela and the Guayanas at 50–1600 m.

Comments. *Monstera spruceana* is recognized by its pinnatilobate adult leaf blade, the slightly verrucose or smooth petiole, sheathed up to the base of the geniculum or even up to the base of the blade, the petiolar sheath disintegrating as fibrous residues, short peduncles (<10 cm), long spadices (15–25 cm), and dark green stylar caps after the anthesis. It is similar to *M. anomala*, but this latter species is distinguished by its completely entire leaves, by the constricted stylar region, and by its occurrence (at least in Costa Rica and Panama) in lowland humid forests.

Both the description of *Monstera spruceana* by Grayum (2003), including the specimen cited there, as well as the other Costa Rican samples previously identified under this name correspond to the recently described *M. anomala* (Zuluaga & Cameron 2017). However, the samples listed below were identified as *M. spruceana* during this study.

In Costa Rica, *Monstera spruceana* has been collected only in cloud forests at 1200–1600 m and in lowlands in the Osa Peninsula (50 m). However, it has not been found at intermediate elevations, and only the populations in the Osa Peninsula and the Tilarán mountain range are known. Populations in Panama also grow in lowland humid forests and in cloud forests at 1200 m. In Colombia, it grows both in lowlands (Choco and Amazon regions) and cloud forests (parts of the Andean Western Cordillera). The populations in Panama and Colombia have some differences with those of Costa Rica; therefore, this species requires more study in the field to document the morphology of the flowers and the developing spathe in anthesis.

NEW RECORDS FOR PANAMA

1. MONSTERA COSTARICENSIS (Engl. & K. Krause) Croat & Grayum, Ann. Missouri Bot. Gard. 74: 659. 1987. *Rhodospatha costaricensis* Engl. & K. Krause in Engl., Pflanzenr. IV.23B (Heft 37): 95. 1908.

TYPE: **COSTA RICA**. [**Limón**.] Ferme de Boston, Atlantic watershed, 30 m elev., [10°01' N, 83°15'30"W], *A. Tonduz 14628* (holotype: B!).

New records. PANAMA. Bocas del Toro, 08°46'43"N 082°12'32"W, 1047 m, 25 Aug 2018 (fr.), *Ortiz et al. 3367* (MO, PMA). Figure 3.

Distribution. Costa Rica, Nicaragua and Panama at 0–1047 m.

Comments. *Monstera costaricensis* is recognized by the stem and verrucose petiole with white dots, persistent and markedly undulated petiolar wings (a unique feature in the genus), the leaf blade with an entire margin and few fenestrations, the perforations that develop mainly near the midrib, and the primary lateral veins parallel. Adult individuals are robust and become fertile when they grow on trees with diameters greater than 45 cm.

2. MONSTERA EPIPREMNOIDES Engl., Bot. Jahrb. Syst. 37: 118. 1905.

SYNTYPES: **COSTA RICA**. [**San José**]. Santa María de Dota, 1300 m, 4 Apr 1890, *H. Pittier 2486* (lectotype, designated by Madison [1977: 63]: B! [photos: BH, SEL, as *P. Biolley 2846*]; isolectotypes: CR! as *P. Biolley 2846*, BR! as *H. Pittier 2486*). **COSTA RICA**. [**San José**.] La Uruca, 1100 m, Jul 1890, *P. Biolley 2846* (CR in part; specimens in B and BR with this number are in fact *Pittier 2486*). See Madison (1977).

New records. **PANAMA**. Chiriquí, 08°50'N 082°43'W, 1200-1400 m, 11 Jul 1983 (fr.), *Hamilton & Krager* 3766 (MO). Figure 4.

Distribution. Costa Rica and Panama at 1200–2200 m.

Comments. *Monstera epipremnoides* is recognized by having mottled or white petioles, persistent sheaths with open wings, pinnatifid blades with fenestrations adjacent to the midrib, the externally yellowish green spathe which is up to 13 cm longer than the spadix, and the circular stigmas, slightly raised by stigmatophores. *Monstera epipremnoides* grows in the pre-montane forests of the Talamanca mountain range.

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Figure 1. *Monstera integrifolia*. (A) Adult plant. (B) Juvenile plant. (C) Whitish petioles, with somewhat persistent sheaths (arrow). (D) Left: developing infructescence with short, conical styles. Right: whitish petiole with green sheath speckled with white dots (arrow). Photographs: M. Cedeño-Fonseca.

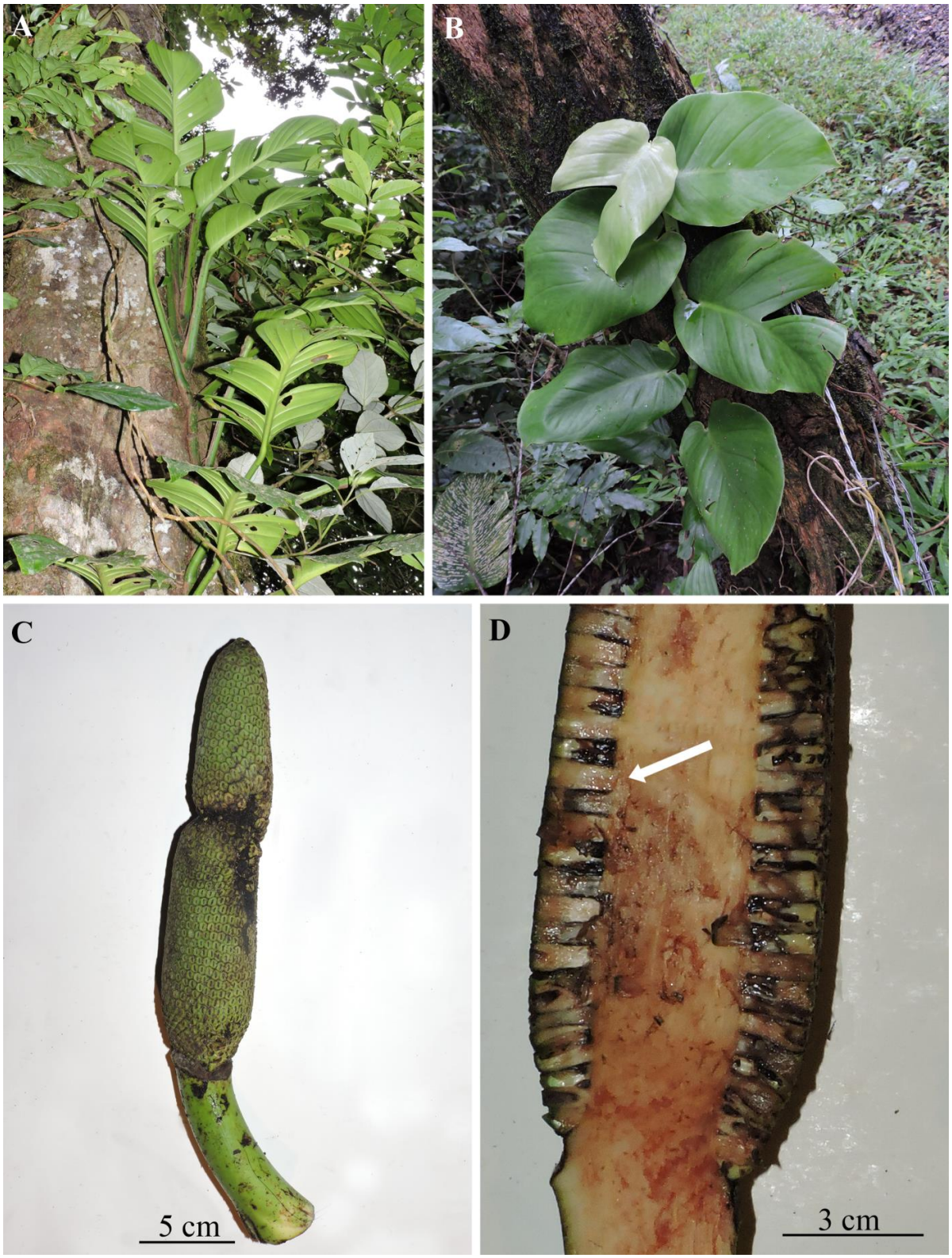

Figure 2. *Monstera spruceana*. (A) Adult plant. (B) Juvenile plant. (C) Developing infructescence. (D) Longitudinal section of the spadix to show the shape of the ovary (arrow). Photographs: M. Cedeño-Fonseca.

Figure 3. *Monstera costaricensis*. (A) Adult individual. (B) Markedly undulate petiole sheath reaching to the base of the leaf blade. (C) Developing infructescence with warty peduncle and persistent cataphyll (arrow). (D) Infructescence with pyramidal and conical styles. Photographs: M. Cedeño-Fonseca.

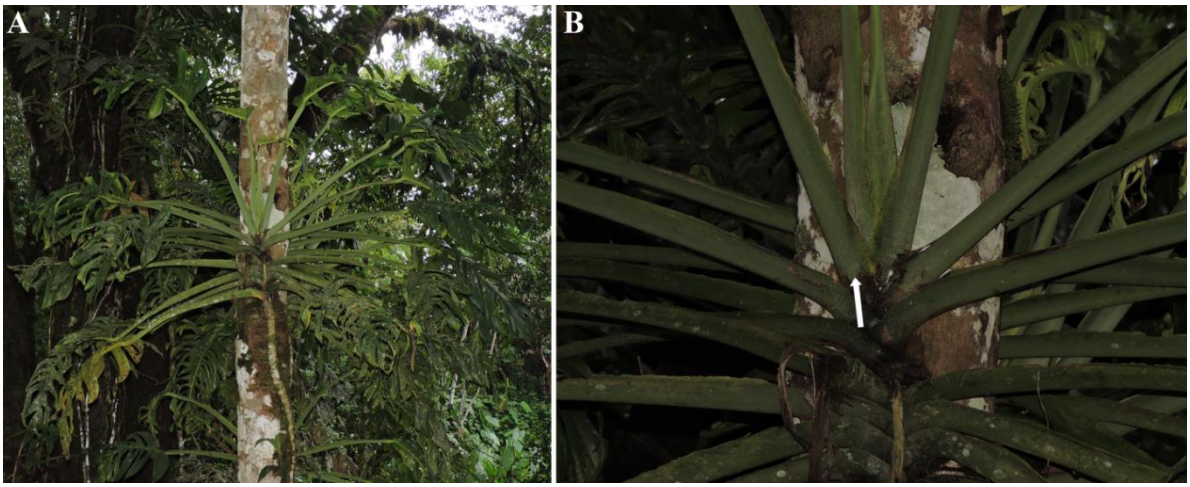

Figure 4. *Monstera epipremnoides*. (A) Adult individual. (B) Petioles speckled with white and green dots. Photographs: M. Cedeño-Fonseca.

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