DARWINIANA
NUEVA SERIE
www.ojs.darwin.edu.ar
ISSN 0011-6793 impresa - ISSN 1850-1699 en línea

DARWINIANA, nueva serie 12(1): 45-54. 2024
Versión de registro, efectivamente publicada el 6 de mayo de 2024
DOI: 10.14522/darwiniana.2024.121.1214

# A NEW SPECIES AND TWO NEW RECORDS OF THE GENUS *XANTHOSOMA* (ARACEAE) FROM THE EASTERN SLOPE OF THE ANDES IN COLOMBIA

Alejandro Zuluaga[1], Oscar M. López-Floriano[2], Jorge L. Contreras[3], Allison Muñoz[1] & Edwin Trujillo-Trujillo[4]

[1] *Departamento de Biología, Universidad del Valle, Calle 13 # 100-00, Cali, Colombia, 760032; zuluaga.alejandro@correounivalle.edu.co* (autor for correspondence)
[2] *Grupo de Investigación en Botánica Uniamazonia, Herbario Enrique Forero-HUAZ, Universidad de la Amazonia, Calle 17 Diagonal 17 con Carrera 3F - Barrio Porvenir, Florencia, Caquetá, Colombia.*
[3] *Grupo de Investigación en Recursos Naturales Amazónicos - GRAM, Facultad de Ingenierías y Ciencias Básicas, Instituto Tecnológico del Putumayo - ITP, Mocoa, Putumayo, Colombia.*
[4] *Grupo de Investigación en Agroecosistemas y Conservación en Bosques Amazónicos GAIA, Laboratorio de Agro-biodiversidad y Malherbologia LAMUA, Universidad de la Amazonia, Calle 17 Diagonal 17 con Carrera 3F - Barrio Porvenir, Florencia, Caquetá, Colombia.*

**Abstract.** Zuluaga, A.; O. M. López-Floriano, J. L. Contreras, A. Muñoz & E. Trujillo-Trujillo. 2024. A new species and two new records of the genus *Xanthosoma* (Araceae) from the eastern slope of the Andes in Colombia. *Darwiniana*, nueva serie 12(1): 45-54.

A new species of *Xanthosoma* of Colombia is described, and two chorological novelties are presented. *Xanthosoma alpayacuense* and *X. viviparum* are recorded for the first time in Colombia. Additionally, the distribution and description of *X. betancurii* are extended. These novelties were recorded from the south of Colombia in the departments of Caquetá and Putumayo, in the Andean/Amazon Transition. This study increases to 63 the number of *Xanthosoma* species known to Colombia.

Keywords. Amazon foothills, Angiosperms, Araceae, Caquetá, Putumayo.

**Resumen.** Zuluaga, A.; O. M. López-Floriano, J. L. Contreras, A. Muñoz & E. Trujillo-Trujillo. 2024. Una nueva especie y dos nuevos registros en el género *Xanthosoma* (Araceae) de la vertiente oriental de los Andes en Colombia. *Darwiniana*, nueva serie 12(1): 45-54.

Se describe una nueva especie de *Xanthosoma* de Colombia y se presentan dos novedades corológicas. *Xanthosoma alpayacuense* y *X. viviparum* se registran por primera vez para Colombia. Además, se amplían la distribución y descripción de *X. betancurii*. Estas novedades fueron registradas en el sur de Colombia, en los departamentos de Caquetá y Putumayo, en la transición Andino/Amazónica. Con este estudio se aumenta a 63 el número de especies conocidas de *Xanthosoma* en Colombia.

Palabras clave. Angiospermas, Araceae, Caquetá, Piedemonte Amazónico, Putumayo.

## INTRODUCTION

The genus *Xanthosoma* Schott in Schott & Endlicher (1832:19) is a group of rhizomatous terrestrial plants or geophytes restricted to tropical America. With 201 accepted species, it is the third most diverse genus in the family Araceae, after *Anthurium* Schott (1829a:828) and *Philodendron* Schott (1829b:780) (Boyce & Croat 2011). The genus was recently revised in a series of papers published by Croat et al. (2017a, 2017b, 2017c, 2017d), where 118 new species were described, but an estimated 40 species remained undescribed (Croat et al., 2017a). Colombia and Ecuador, with 60 spp., are the richest countries (Croat et al., 2017a; Delannay et

Original recibido el 21 de febrero de 2024, aceptado el 19 de abril de 2024
Editor Asociado: Fernando Biganzoli

al. 2019; Cornejo & Croat 2021, 2022). However, several regions of Colombia remain unexplored, and *Xanthosoma* species are poorly collected due to their morphological similarity or large size, discouraging many botanists. For example, for Caquetá and Putumayo, two departments located in southern Colombia, the number of species recorded for the genus *Xanthosoma* is low, considering that these regions are very diverse for other angiosperm groups and comprise a variety of ecosystems ranging from the Amazonian lowlands to Páramo. Croat and collaborators (2017a) recorded two species for Caquetá and four for Putumayo, while neighboring regions such as Carchi and Sucumbíos in Ecuador have eight and twelve species, respectively. Therefore, it is expected that with new explorations and detailed revisions of herbarium collections, the number of species in Colombia could grow rapidly in the coming years.

## MATERIALS AND METHODS

For this work, we made new collections between 2019 and 2022 and reviewed herbarium collections from Caquetá and Putumayo at herbaria COL, CUVC, HUAZ and HEAA, acronyms following Thiers (2023). To confirm the identity of the species, specialized bibliography was consulted (Croat et al., 2017a, 2017b, 2017c, 2017d). The terminology used in the descriptions was based on Beentje (2010) & Croat et al. (2017b). All measurements in the descriptions are from living and dry material unless otherwise specified. Observations on small structures like flowers were made on a Nikon SMZ745T dissecting microscope. For the observation of the leaf reticulum hand cross and peeled sections of the abaxial surface were made and observed in a CX21 Olympus light microscope. Digital images were taken with a Nikon d610 and the images were used for diagramming composite plate and figures in Adobe Photoshop® 2023.

## RESULTS

### Taxonomic treatment

**Xanthosoma camiloi** López-Flor., J. Contreras & Zuluaga **sp. nov.** TYPE: Colombia. Putumayo, municipio Mocoa, vereda Planadas, 1°06’27” N, 76°38’55” W, 616 m a.s.l., 15-IV-2020, *O. López & J. Contreras 67* (holotype: CUVC!; isotypes: COL, HEEA, HUAZ). Figs. 1, 2.

Diagnosis. *Xanthosoma camiloi* can be distinguished from other species in *Xanthosoma* by its overall small size, with petioles 11.5-23.7 cm, leaves 12.4-18.1 × 5.0-10.3 cm, and anterior lobes 3.4-7.9 times longer than posterior lobes. Also, *X. camiloi* presents abaxial leaf surface with several layers of cells forming a reticulum (especially over the minor veins), a posterior rib naked 0.3-0.5 cm, and has up to 3 inflorescences per axil.

Terrestrial herb, 19-30 cm tall; stem mostly subterranean or decumbent; internodes 0.5-1.0 (-2.1) × 0.4-0.8 cm (all measurements made from dried material unless otherwise mentioned), drying matte, dark brown; cataphylls 8.5 × 1.3 cm (spirit material), brown, matte, base persisting as reddish-brown fibers. Leaves 3 to 4, erect-spreading; petioles 11.5-23.7 cm, fleshy, glabrous, semiglossy, green, drying matte, light to dark brown, sheathed 7.4-9.6 cm (1/2-2/3 of its total length); sheath decurrent onto the petiole apex; free portion of the petiole 1.0-1.9 mm diam. midway; blades broadly triangular-ovate, inequilateral, conspicuously discolor, 12.4-18.1 × 5.0-10.3 cm, 1.5 to 2.5 times longer than wide, weakly hastate at base, acute to acuminate at apex, usually slightly broader across anterior lobe than at base; distance tip to tip across posterior lobes 6.6-10.2 cm; adaxial surface smooth, matte to semi-lustrous, drying olive green; abaxial surface, glossy, drying green to yellow-green, with several layers cells forming a reticulum (more concentrated over the minor veins); anterior lobe 10.0-14.2 × 5.0-10.3 cm, 1 to 2 times longer than wide, 3.4 to 7.9 times longer than posterior lobe, wider near the middle, ± asymmetrical; posterior lobes straight to slightly directed outwards, 1.5-4.0 × 1.3-3.6 cm, 0.8 to 1.9 times longer than wide, narrowly rounded to obtuse at apex, slightly broader at petiole insertion, symmetrical to asymmetrical, sinus parabolic; midrib and major venation usually darker than the surfaces, slightly sunken adaxially, round-raised and drying ± flattened abaxially; primary lateral veins 3 to 6 per side, arising at (28-)33°-52°, straight to weakly curving towards the margin; secondary veins abaxially sunken, drying visible and darker than the surface; 2 collective veins, the outermost arising from the first basiscopic vein, ± parallel to margin, the innermost arising from the second basiscopic vein; basal veins coalescent into a prominent posterior rib, 2-3(-4) acroscopic, 2-3(-4) basiscopic veins; minor veins slightly visible abaxially. Inflorescences erect, 1-3 per axil (all measurements for the spathe and spadix made from spirit material); peduncle pale green 5.0 × 0.4 cm, held within the sheath, drying pale brown; spathe erect, 6.5 cm, apiculate at apex, 0.8 mm longer than spadix; spathe tube pale green with darker veins on outer surface, light red on the edges, reddish-purple on inner surface, 3.4 cm × 2.0 cm, drying dark brown to black on

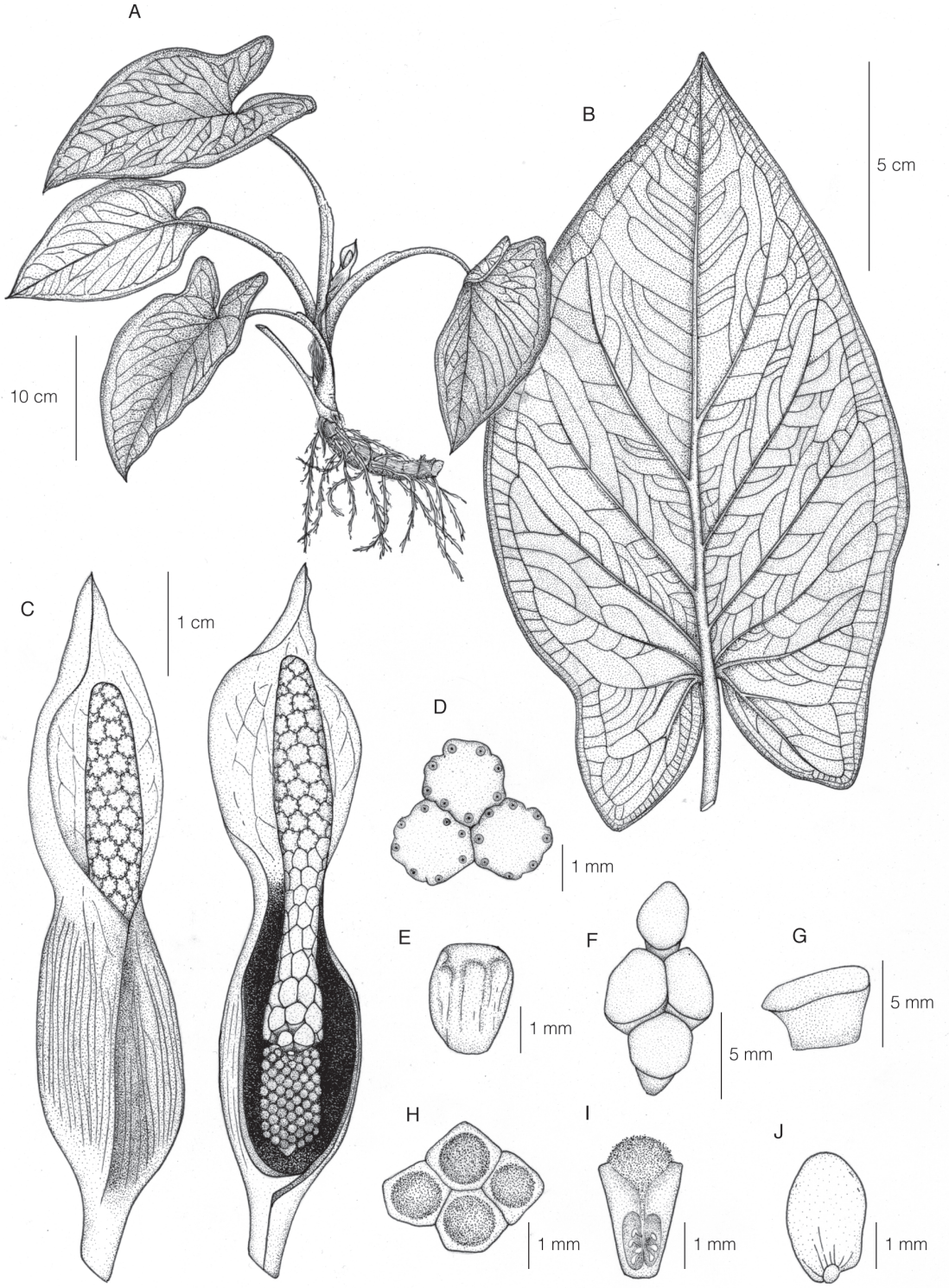


**Fig. 1.** Illustration of the type specimen of *Xanthosoma camiloi*. **A,** habit. **B,** Leaf, abaxial surface. **C,** Inflorescence, left showing the spathe, right, showing the spadix. **D,** male flowers, upper view. **E,** male flowers, lateral view. **F,** sterile flowers, upper view. **G,** sterile flowers, lateral view. **H,** female flowers, upper view. **I,** female flowers, lateral view. **J,** Seed, lateral view. Illustration by Eileen Muñoz.

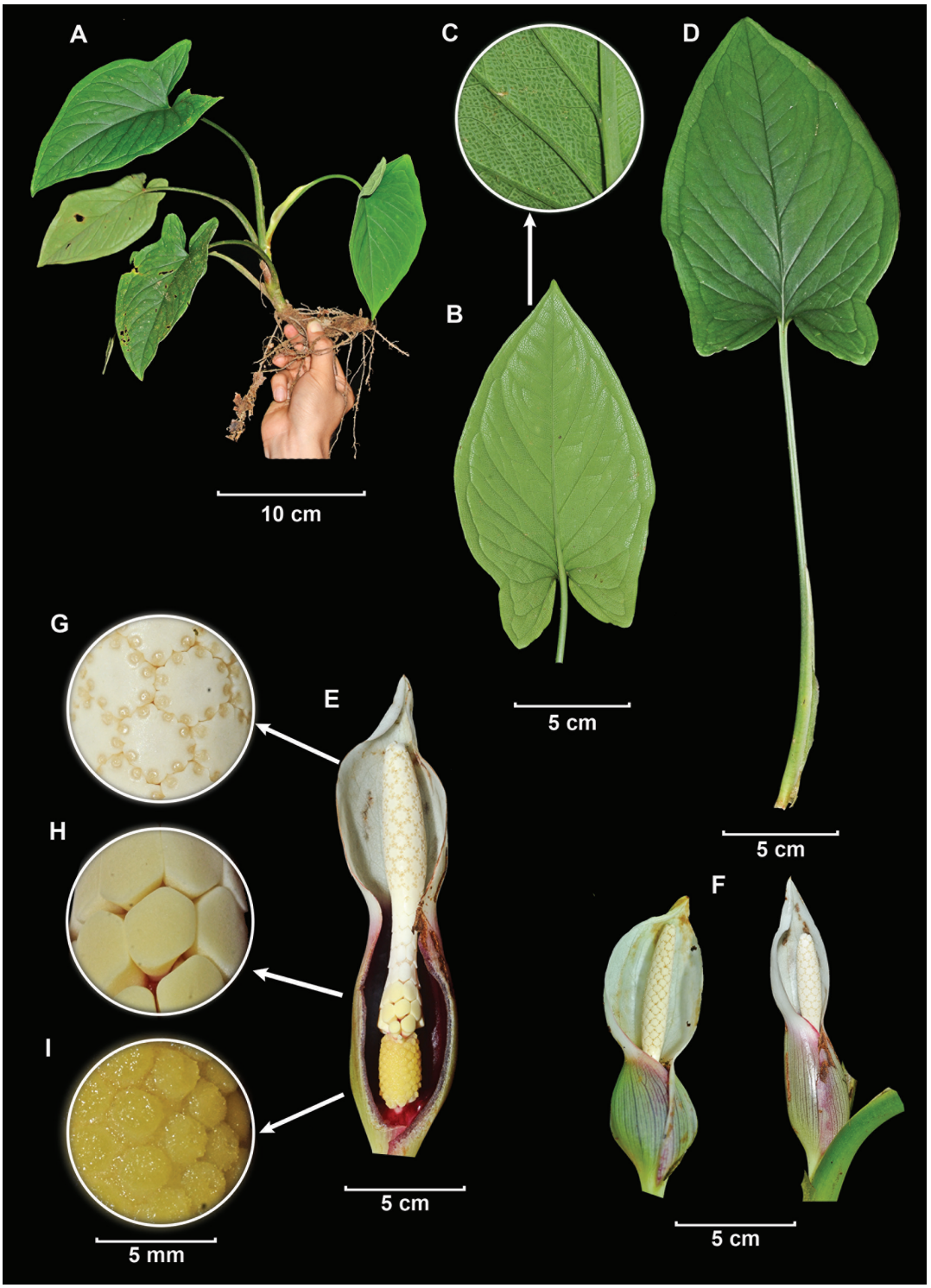


**Fig. 2.** Plate of *Xanthosoma camiloi*. **A,** habit. **B,** Leaf abaxial surface. **C,** close-up of the leaf abaxial surface. **D,** Leaf adaxial surface. **E,** Inflorescence, spathe open. **F,** Inflorescence, spathe closed. **G,** male flowers. **H,** sterile flowers. **I,** female flowers.

outer surface; spathe blade white, 3.1 × 5.6 cm, erect after anthesis, then marcescent, drying whitish brown; spadix erect, sessile; pistillate portion yellow, 1.2 cm long in front view, 0.8 cm long in dorsal view, 0.7 cm diam., pistils 2.3-2.8 × 1.0-1.2 mm diam. (middle); stigma yellow, sessile, 0.9-1.1 mm diam.; fertile staminate portion white, 2.9 × 0.6 cm, cylindrical, rounded at apex, drying brown, synandria 1.9-2.7 × 1.7-1.8 mm, coherent; sterile staminate portion cream in the base, white in the apex, 1.5 cm total long., base 0.8 × 0.7 cm, apex 0.7 × 0.4 cm (middle), wider at base, drying whitish brown, sterile flowers 2.2-3.1 × 1.5-4.3 mm, with rounded to straight borders (viewed from above). Infructescence (measurements made from spirit material) pendent, green, ca. 3.3 × 2.0 cm; peduncle 6.4 × 0.4 cm; berries cream (spirit material), ca. 5.6 × 3.0 mm; 28-29 ovules; seed white, 2-9 per berry, 1.3-1.8 × 0.8-1.2 mm, ovoid to ellipsoid, longitudinally weakly striate.

Etymology. The name of the species is dedicated to Camilo Andrés López Floriano (2002-2012), brother of one of the authors who passed away prematurely. The second author and his family remember him with great love for his joy and strength and consider him the driving force behind many of the achievements of his life.

Distribution and habitat. *Xanthosoma camiloi* is endemic to Colombia, department of Putumayo, municipality of Mocoa, in the biogeographic area known as Andean/Amazon Transition (eastern slope of the Cordillera Real del Ecuador or Nudo de los Pastos) at 650 m (Fig. 3). *Xanthosoma camiloi* grows inside relictual humid forests with moderate sun exposure. It is associated with understory species such as *Palicourea tomentosa* (Aubl.) Borhidi, *Costus* sp., *Dieffenbachia* sp. colonies, and some small trees such as *Herrania* sp., *Chrysochlamis* sp., *Clusia* sp., *Dendropanax* sp., *Palicourea lasiantha* K.Krause, and *Miconia trinervia* (Sw.) D.Don ex G.Don. The arboreal elements to highlight are *Apeiba* sp., *Jacaranda copaia* (Aubl.) D.Don, *Virola* sp., *Ormosia* sp., and palms such as *Euterpe precatoria* Mart., *Oenocarpus minor* Mart., *Socratea exorrhiza* (Mart.) H.Wendl., and *Geonoma macrostachys* Mart. These forests are threatened because of their location in the rural area of the municipality of

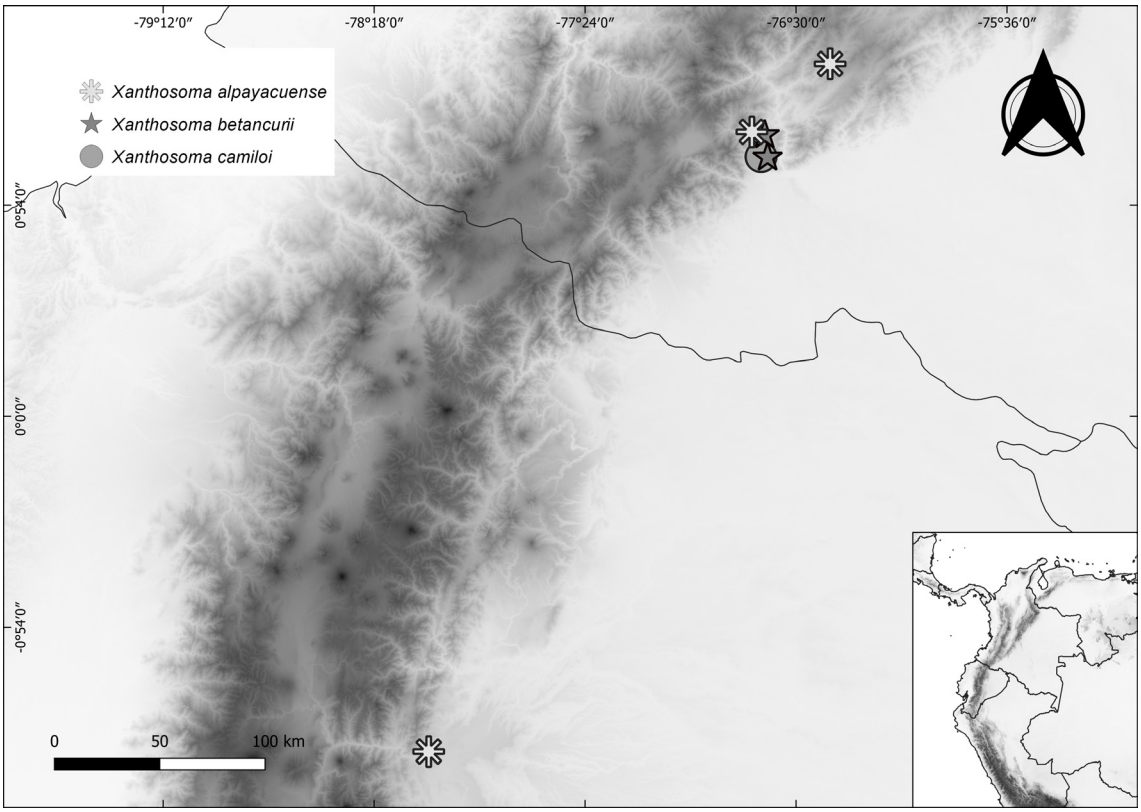


**Fig. 3.** Distribution map of *Xanthosoma camiloi*, *X. alpayacuense*, and *X. betancurii.*

Mocoa, where anthropic pressures are increasing by the construction of new houses due to the urban expansion generated by a landslide that occurred in 2017.

Phenology/Biological Interactions: Their flowering periods include the months of April to May. There were associated floral visitors of the genus *Cyclocephala* (Coleoptera) which have been reported as pollinators of *Xanthosoma*.

Notes. *Xanthosoma camiloi* is here placed as a member of *Xanthosoma* section *Chamaexanthosoma* recognized by its small size and a poorly developed basal rib that does not reach the apex of the posterior lobes (Croat et al., 2017a). Within this section it can only be confused with *Xanthosoma piquambiense* Croat, D. Scherberich & G. Ferry (Croat et al., 2017a) in herbarium collections. The living plants differ in leaf texture, which is bullate in *X. piquambiense* and smooth in *X. camiloi*. Of the species from the Amazonian slope of the Andes it is similar to *Xanthosma betancurii* Croat & Delannay and *Xanthosoma luteynii* Croat & Delannay (Croat et al., 2017a), which occur in the departments of Putumayo and Caquetá, but differs from these two species in having an overall smaller size among other characteristics (Table 1). In addition, *X. camiloi* has the abaxial surface of the leaf with several layers of cells forming a reticulum (more concentrated on the minor veins). Specimen Croat 83592 (MO) from Napo province in Ecuador and published as *Xanthosoma* sp. # 24 (Croat et al., 2017a) has some similarity to the new species but the collection only consists of one leaf so its identification cannot be confirmed.

Additional examined specimens. COLOMBIA. **Putumayo**. municipio Mocoa, vereda Planadas, 1°06'27" N, 76°38'55" W, 616 m a.s.l., 16-IV-2020, *O. López-F. & J. Contreras 62* (HEAA!).

**Xanthosoma alpayacuense** Croat & L.P. Hannon. Aroideana 40(2): 71-76. 2017. TYPE: Ecuador. Pastaza, along rd. from Mera to Río Anzu, 5.8 km N of Río Alpayacu, 01°25'46" S, 78°04'01" W, 1266 m, 6-V-2003, *T. B. Croat, L. P. Hannon & M. Menke 88762* (holotype: MO (5697849-51!); isotypes: AAU, B, CAS, COL, CUVC, F, G, GB, HUA, K, M, NY, PMA, QCNE, S, SEL, UB, US, USM). Fig. 4.

Distribution. This species was originally described from Ecuador (Pastaza) only know from three collections from the same area. In this paper we report three collections from Cauca and Putumayo Departments in Colombia, between 1000 and 1500 m a.s.l. The Colombian collections are located more than 300 km north from the type collection, but they are all located on the Amazonian slope of the Andes in premontane rainforests as well as the type locality (Fig. 3).

Notes. *Xanthosoma alpayacuense* is a member of *Xanthosoma* section *Basisectum*, which is recognized by the deeply trilobate or palmate compound leaves. It can only be confused with *X. ceronii* Croat & L.P. Hannon (Croat et al., 2017a:127) but differs in having 5-lobed leaves and one inflorescence (vs. 7-lobed and several inflorescences). See Croat et al. (2017a) for a detailed comparison. The isotypes at Colombian herbaria were not found, so we could not compare these specimens.

**Table 1.** Character comparison of *Xanthosoma camiloi* and similar species in Colombia.

| | *X. camiloi* | *X. luteynii* | *X. betancurii* |
|---|---|---|---|
| Petiole length | 11.5-23.7 cm | 26-39 cm | 41-42 cm |
| Leaf blade size | 12. 4-18.1 × 5.0-10.3 cm | 17-20 × 8-10 | 26 ×18-21 cm |
| Leaf Anterior lobe length | 3.4-7.9 times longer than posterior lobes | 1.6-1.7 times | 2.0-2.3 times |
| Leaf sinus shape | Parabolic | Parabolic | Spatulate |
| Posterior rib naked length | 0.3-0.5 cm | 0.5 cm | 1 cm |
| Inflorescences per axil | 1-3 | 1 | 1 |
| Peduncle length | 6.4 cm | 12 cm | 16 cm |
| Spathe tube length | 3.3 cm | 2.5 cm | 2.5 cm |
| Spathe tube color | Green with reddish margins | Purple | Purple |
| Infructescense | Pendulous | Erect | Erect |

Additional examined specimens. COLOMBIA. **Cauca.** municipio Santa Rosa, San Juan de Villalobos, Palmeras. 1°30'12.10" N, 76°21'15.57" W, 1500 m, *A. B. Quisoboni-H. & F. Quilindo-G. 108 (*HEAA!*)*; municipio Santa Rosa, San Juan de Villalobos, 1°27'44.14" N, 76°25'37.26" W, 1400 m, *O. López-F., J. Contreras, J. Restrepo, D. Hoyos & E. Domínguez 41* (CUVC!). **Putumayo.** municipio Mocoa, vereda Campucana, camino de los Sachamates, 1°12'48.08'' N, 76°41'16.92" W, 1000 m, 12-II-2020, *O. López-F. & E. Domínguez 47* (CUVC!).

**Xanthosoma betancurii** Croat & Delannay. Aroideana 40(2): 102-103. TYPE: Colombia. Putumayo, north of Mocoa, corregimiento de San Antonio, vereda Alto Campucana, camino entre la finca La Mariposa y el Alto La Sierra, vertiente amazónica de Colombia, 01°12' N, 76°38' W, 1500-1670 m, 20-IV al 1-V 1994, *J. C. Betancur, P. Galvis & Z. Marín 5447* (holotype: COL (366446!); isotype: MO!). Fig. 5.

Inflorescence erect; peduncle pale green, held within the sheath; spathe erect, 7-8 cm apiculate at apex; spathe tube 2 cm width, green in the base and dorsal portion, purple in middle to apex in the frontal portion, reddish-purple on inner surface; spathe blade 4.5 cm width, white, erect after anthesis, then marcescent; spadix erect, sessile; pistillate portion yellow; stigma yellow, sessile; fertile staminate portion white, cylindrical, rounded at apex whit terminal sterile flowers, synandria coherent; sterile portion cream in the base, white in the apex, wider at base, with rounded borders (viewed from above).

Distribution. *Xanthosoma betancurii* is known only from the type collection in Putumayo between 1500 and 1600 m altitude. In this paper we report another locality for Putumayo at 600 m altitude and one locality for the department of Caquetá about 100 km north of the type locality (Fig. 3).

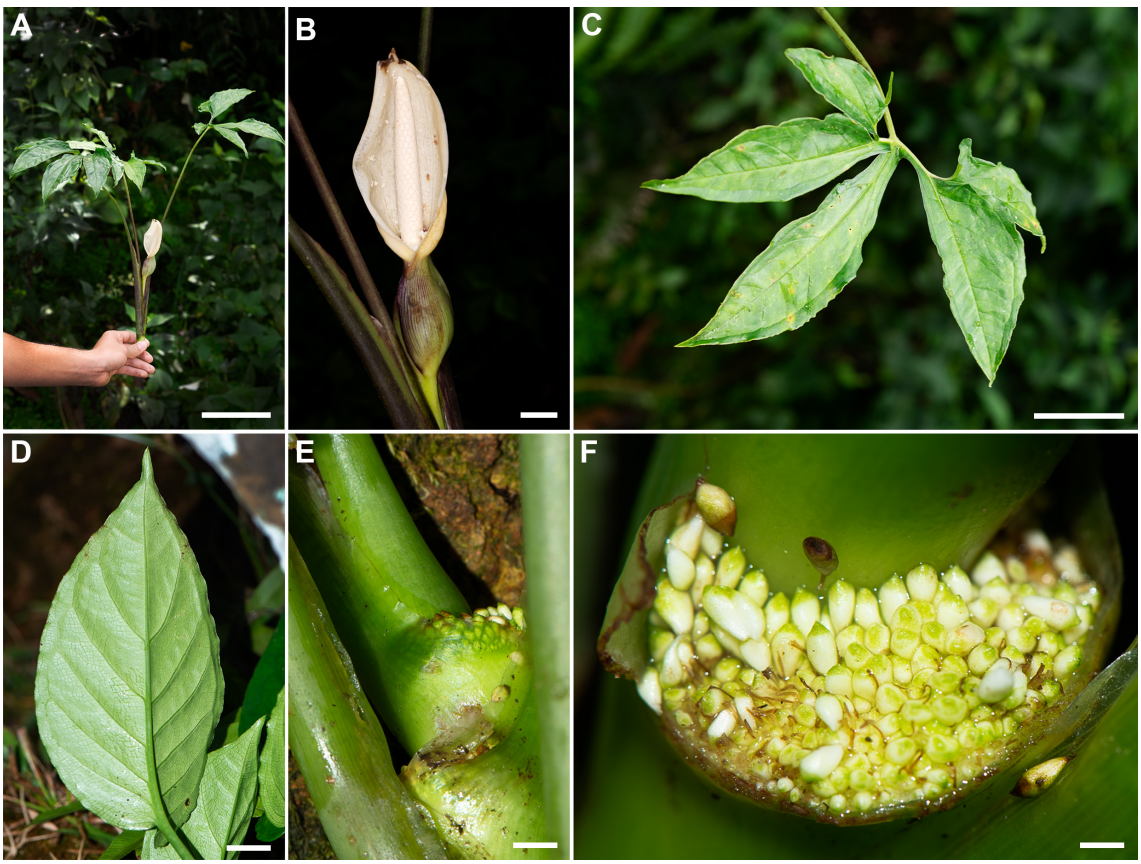


**Fig. 4. A-C**. *Xanthosoma alpayacuense*. **D-F,** *Xanthosoma viviparum*. **A,** habit. **B,** Inflorescence. **C,** Leaf. **D,** Leaf, abaxial surface. **E,** leaf sheat with propagules. **F,** propagules.

Notes. This species was described only from the type collection which lack inflorescences and only had one infructescence. Here we extend the original description and present the characteristics of the inflorescences.

Additional examined specimens. COLOMBIA. **Caquetá.** municipio Belén de los Andaquíes, sector Paramillo camino entre Acevedo-Belén de los Andaquíes, 1°40'58" N, 75°54'0" W, 1550-1750 m, 22-VII-2011, *D. Cárdenas, N. Castaño, X. Cornejo, N. Salinas & Hnos. Cerquera 41677* (COAH!, COL!); municipio Belén de los Andaquíes, camino Andaquí, reserva Andaquí, la profunda, 1°40'12" N, 75°54'8.9" W, 1136 m, 12-III-2016, *N. Castaño 7681* (COAH!); municipio Belén de los Andaquíes, Parque Natural Municipal Andaquí, camino Andaquí, sector La Mina, camino a El Aguacate, cuenca de la quebrada Las Verdes, 1°37'50" N, 75°54' 21" W, 770 m, 2-II-2017, *J. Betancur 20607* (COAH!). **Putumayo.** municipio Mocoa, vereda Planadas, 1°06'26" N, 76°38'57" W, 620 m, 23-II-2021, *O. López & J. Contreras 78* (HEEA!); municipio Mocoa, vereda San José del Pepino, 1°06'16" N, 76°37'16" W, 737 m, 26-II-2021, *O. López & J. Contreras 79* (HEEA!).

**Xanthosoma viviparum** Madison. Selbyana 5(3-4): 358. 1981. TYPE: Ecuador. Napo, Limoncocha, 240 m, 17-VI-1978, *M. T. Madison, T. C. Plowman & L. Besse 5429* (holotype: SEL; isotype: F, K, QCA, US). Figs. 4, 6.

Distribution. *Xanthosoma viviparum* was described in 1981 by M. Madison, from collections made in Peru and Ecuador. Currently, records of the species are widely distributed in Amazonian lowlands and foothills of Ecuador, Brazil and Peru, between 90 and 1500 m. Here

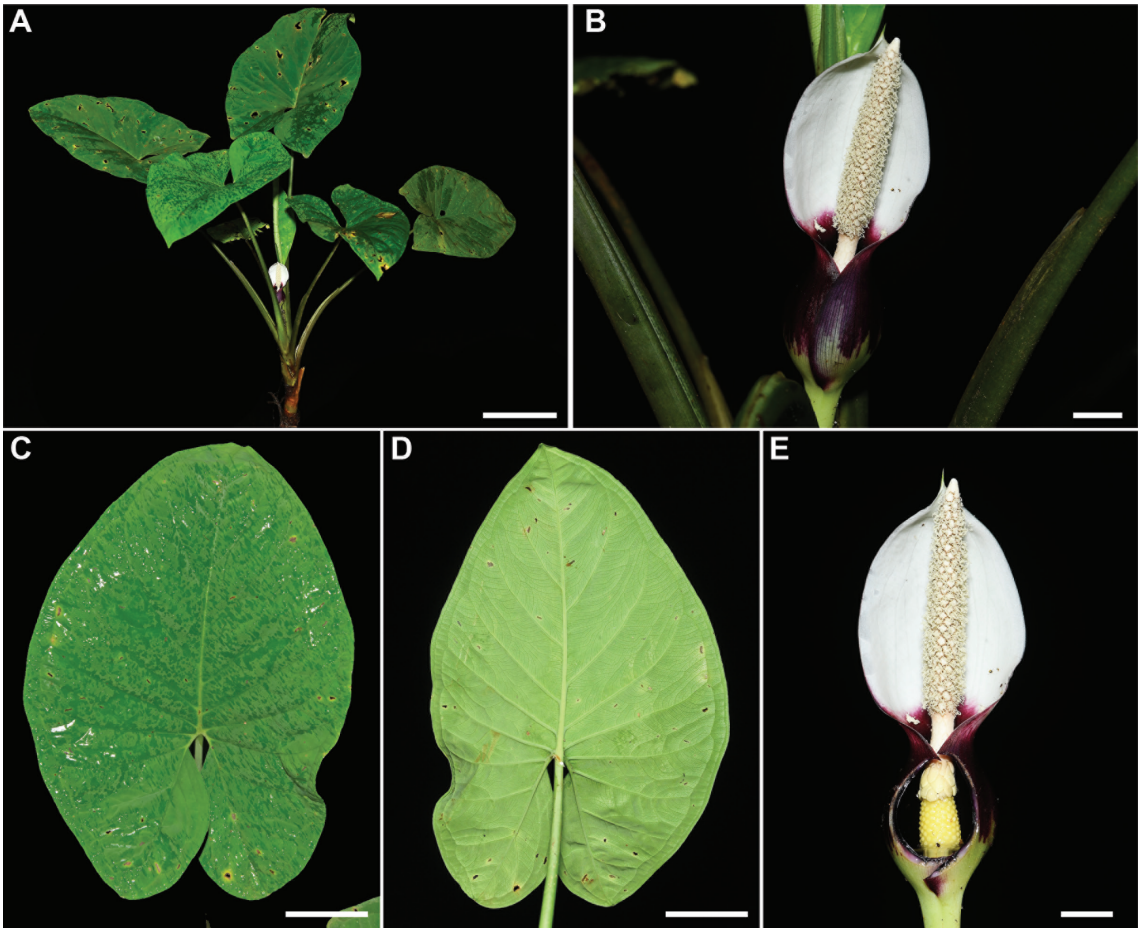


**Fig. 5.** *Xanthosoma betancurii*. **A,** habit. **B,** Inflorescence. **C,** Leaf, adaxial Surface. **D,** Leaf, abaxial Surface. **E,** Inflorescence, spathe open.

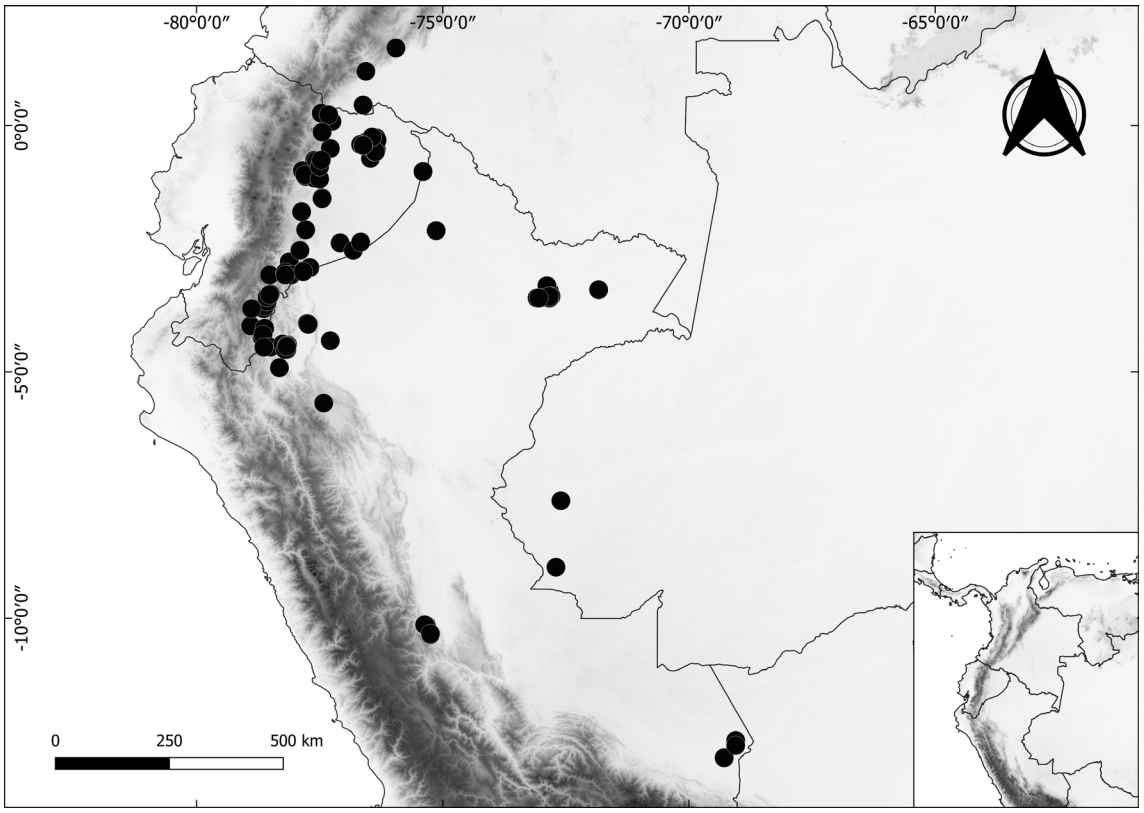


**Fig. 6.** Distribution map of *Xanthosoma viviparum*.

we report the first collections for Colombia (Caquetá and Cauca Departments). The species inhabits from very low humid forests to premontane humid forests and grows preferably near streams or as a rheophyte plant.

Notes. This species belongs to *Xanthosoma* section *Elobatum*. *X. viviparum* is easily distinguishable, even in the vegetative state, by the vegetative reproductive structures (propagules) located in the axils of the leaves (Fig. 4).

Additional examined specimens. COLOMBIA. **Cauca.** municipio de Santa Rosa, río Indiyaco, arriba de la desembocadura al río Caquetá, 1°5’59” N, 76°33’42” W, 390 m, 13-III-2015, *E. Trujillo, M. Angulo & D. González 2960* (HUAZ!); **Caquetá.** municipio de Belén de los Andaquies, vereda Las Verdes, camino al P.N.N. Alto Fragua Indi-Wasi, por la quebrada Aguas Claras, 1°34’30” N; 75°57’00” W, 800-1100 m., 4-X-2021, *A. Zuluaga, E. Trujillo, H. Mendoza & A. Orejuela 4396* (CUVC!).

## ACKNOWLEDGMENTS

We thank Universidad del Valle and Universidad Nacional de Colombia for funding the projects “Polinización y partición de nicho mediada por fragancias florales en una comunidad de aráceas en un bosque alto-andino de Colombia- CI71214” and “Exploración botánica para la elaboración de guías de identificación de plantas epífitas con flores con alto valor para la conservación en Colombia-Hermes51248” respectively, which allow us to collect the *Xanthosoma* species. Finally, we thank Maria Monica Henao Cardenas for his help during field work.

## BIBLIOGRAPHY

Boyce, P. C. & T. B. Croat. 2011 onwards. The Überlist of Araceae, Totals for Published and Estimated Number of Species in Aroid Genera. Available from: http://www.aroid.org/genera/20201008Uberlist.pdf (accessed 1 April 2024)

Cornejo, X. & T. B. Croat. 2021. *Anthurium gallardoae* and

*Xanthosoma isabellanum* (Araceae), two new species from coastal Ecuador. *Phytotaxa* 505 (1): 107-113.

Cornejo, X. & T. B. Croat. 2022. *Xanthosoma gratiae* (Araceae), a new species from the cordillera Chongón Colonche in coastal Ecuador. *Phytotaxa* 558(2): 238-241

Croat, T. B.; X. Delannay & L. P. Hannon. 2017a. A Revision of *Xanthosoma* (Araceae). Part 1: Western South America. *Aroideana*, 40(2):4-503.

Croat, T. B.; X. Delannay & O. O. Ortiz. 2017b. A Revision of *Xanthosoma* (Araceae). Part 2: Central America. *Aroideana* 40(2): 504-581.

Croat, T. B. & X. Delannay 2017c. A Revision of *Xanthosoma* (Araceae). Part 3: Guianas. *Aroideana* 40(2): 582-648.

Croat, T. B. & X. Delannay. 2017d. A Revision of *Xanthosoma* (Araceae). Part 4: New species from Venezuela and other Caribbean countries. *Aroideana* 40(2): 649-690.

Delannay, X.; X. Cornejo & T. B. Croat. 2019. Two new *Xanthosoma* (Araceae) species from Guayas province, Western Ecuador. *Aroideana* 42: 152-165.

Madison, M. 1981. Notes on Caladium (Araceae) and its allies. *Selbyana* 5(3/4): 342-377.

Schott, H. W. 1829a. Für Liebhaber der Botanik. Wiener Zeitschr. Kunst, Literatur, Theater und Mode 1829(3) 100: 828.

Schott, H. W. 1829b. Für Liebhaber der Botanik. Wiener Zeitschr. Kunst, Literatur, Theater und Mode 1829 (3) 94: 779-780.

Schott, H. W. 1832. *Araceae*. Pp. 16-22. In: H. W. Schott & S. Endlicher, Meletemata Botanica. C. Gerold, Vienna.