

RESEARCH ARTICLE

Phylogeny of subtribe Gonolobinae (Apocynaceae-Asclepiadoideae) based on molecular and morphological data with a revised generic classification

Sigrid Liede-Schumann,¹  Gilberto Morillo,²  Ulrich Meve,¹  Héctor A. Keller³  & Kurt Neubig⁴ 

¹ Department of Plant Systematics, University of Bayreuth, Universitätsstr. 30, 95440 Bayreuth, Germany

² Departamento de Botánica, Facultad de Ciencias Forestales y Ambientales, Universidad de Los Andes, 5101 Mérida, Edo. Mérida, Venezuela

³ Consejo Nacional de Investigaciones Científicas y Tecnológicas, Instituto de Botánica del Nordeste, Universidad Nacional del Nordeste, CC. 209, Corrientes, Argentina

⁴ School of Biological Sciences, Southern Illinois University, Carbondale, Illinois 62901, U.S.A.

Address for correspondence: Sigrid Liede-Schumann, sigrid.liede@uni-bayreuth.de

DOI <https://doi.org/10.1002/tax.70122>

Abstract The presently most densely sampled molecular phylogeny of the widespread New World subtribe Gonolobinae is presented, including about 35% of the ca. 520 species. Sampling focused on an even representation of the three main areas of total Gonolobinae distribution, South America, Central/North America, and the West Indian Islands, and the inclusion of as many of the mono- and bitypic genera as possible. Both Bayesian and maximum likelihood analyses of cpDNA and ITS roughly place the taxa in five clades, one exclusively composed of West Indian Island taxa, three of Central and North American taxa, and one including all South American taxa, but also including taxa from all American regions. A monophyletic *Matelea* would either subsume all Gonolobinae under this genus, including well-known and easily recognized genera such as *Fischeria*, *Gonolobus* and *Macroscepis*, or be restricted to a clade of South American plants mostly in wet and riparian transitional forests. To reconcile the phylogenetic structure of the subtribe and classification, the ongoing process of resurrecting genera recognized by early botanists (e.g., *Acomosperma*, *Callaeolepium*, *Himantostemma*, *Lhotzkyella*, *Poicilla*, *Poicillopsis*) is continued and five genera need to be described as new (*Pauciflora*, *Portoricana*, *Potamoampelos*, *Weigendia* [including its type, *Weigendia cajamarcana* sp. nov.], *Yucatania*). Furthermore, 25 new combinations at species level are proposed, and 13 lectotypes and 1 second-step lectotype are designated. A total of 50 genera is recognized in Gonolobinae, and a morphological description is given for each genus. One genus, *Stelmagonum*, is excluded from Gonolobinae. Keys are provided for the three main geographical areas, South America, West Indian Islands, and Central and North America.

Keywords Asclepiadoideae; classification; evolution; genus circumscription; Gonolobinae; phylogeny; systematics; taxonomy; typification

Supporting Information may be found online in the Supporting Information section at the end of the article.

■ INTRODUCTION

Apocynaceae subfamily Asclepiadoideae, characterized by the possession of pollinaria composed of two pollinia and a translator apparatus, is represented in the Americas by four major lineages, of which one, *Ruehssia* Karst. (Espírito Santo & al., 2019), is a member of tribe Marsdenieae, characterized by erect pollinia; the other three are members of tribe Asclepiadeae, characterized by essentially pendent pollinia. Apart from *Asclepias* L. (Asclepiadinae) with c. 140 species, and *Cynanchum* L. (Cynanchinae) with c. 20 species, all remaining species belong to a species-rich, exclusively American clade, that falls in eight subtribes, four of which are

monogeneric (Diplolepinae, 14 spp., Pentacyphinae, 3 spp., Tassadiinae, 35 spp., Topeinae, 2 spp., Liede-Schumann, 2024). The four larger, species-rich subtribes (Liede-Schumann, 2024), Metastelmatinae (12 genera / 297 spp.), Orthosiinae (4 genera / 143 spp.), Oxypetalinae (6 genera / 216 spp.) and Gonolobinae (48 genera / 522 spp.) have been termed the MO(O)G alliance (Rapini & al., 2003; Liede-Schumann & al., 2005). While the latter four subtribes still harbor enormous potential for the discovery of new species, the generic structure is fairly well understood in only two, Orthosiinae and Oxypetalinae. In particular the largest subtribe, Gonolobinae, so far lacks a comprehensive generic concept supported by both morphology and molecular data.

Article history: Received: 6 May 2025 | returned for (first) revision: 7 Jul 2025 | (last) revision received: 20 Nov 2025 | accepted: 1 Dec 2025

Associate Editor: Mary E. Endress | © 2026 The Author(s). *TAXON* published by John Wiley & Sons Ltd on behalf of International Association for Plant Taxonomy.

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

The first plants representing Gonolobinae were collected between 1762 and 1764 by the French botanist Jean-Baptiste Aublet (1720–1778) in French Guyana and named by him *Matelea palustris* Aubl. and *M. latifolia* Aubl. (today considered conspecific under *M. palustris*, see Howard, 1983: 274) in his *Histoire des plantes de la Guiane française* (Aublet, 1775).

The next genus to be recognized in Gonolobinae was *Gonolobus* Michx. (Michaux, 1803), with two species from South Carolina, *Vincetoxicum acanthocarpos* Walter (a synonym of *Odontostephana carolinensis* (Jacq.) Alexander) and *G. gonocarpos* (Walter) L.M.Perry, first described under the illegitimate name *Vincetoxicum* Walter (1788 non *Vincetoxicum* Wolf 1776) in *Flora Caroliniana* (Walter, 1788).

The number of Gonolobinae genera had increased to 44, when Woodson (1941) subsumed all North American species under a wide *Matelea* with 16 subgenera, and a wide *Gonolobus* with 3 subgenera. Woodson (1941) saw the main difference between *Matelea* and *Gonolobus* in the fleshy dorsal corona appendages present in *Gonolobus*, but missing in *Matelea*. Even though Woodson (1941) explicitly stated that his concept was made only for the North American genera (he maintained *Fischeria* DC. from Central America), it became custom to treat almost any new Gonolobinae species from all parts of the Americas under either *Matelea* or *Gonolobus*; only a genus morphologically as distinct as *Fischeria* was considered separate. Stevens (1983) was the first to untie the “*Matelea*” conglomerate of Woodson (1941) by publishing a new combination in the morphologically distinct genus *Macroscelis* Kunth. Later, Stevens (1999, 2000) also recognized *Dictyanthus* Decne., a group he had previously thoroughly studied (Stevens, 1988). In his treatment for the Flora of Nicaragua, Stevens (2001) additionally recognized *Labidostelma* Schltr., *Polystemma* Decne., and *Prosthecidiscus* Donn.Sm. Later, Stevens (2005) corrected his circumscription of *Polystemma* to include *Labidostelma*, and, in the same paper, recognized *Pherotrichis* Decne. Finally, *Ibatia* Decne. was resurrected in the treatment for *Flora Mesoamericana* (Stevens & Morales, 2009). Krings & al. (2008) focused on the monophyly of *Gonolobus* and considered their sampling insufficient to address the problems in *Matelea*. Disintegration of *Matelea* s.l. gained speed when Morillo (2012, 2013, 2015a,b, 2023a,b) consequently challenged the monophyly and morphological congruence of the genus based on thorough study of floral morphology, trichomes and colleters, and supported his results by formally describing new genera (18 altogether, two with H.A. Keller, one with J. Fontella Pereira), validating old genera (*Microstelma* Baill. ex Morillo) and providing new combinations for many species (56 since 2012). In the course of the work for the treatment of Apocynaceae for the Flora of Argentina (Keller & Ezcurra, 2021), two additional new genera were described (Keller & Cáceres Moral, 2017; Keller & Liede-Schumann, 2020), and one old genus was resurrected (*Rojasia* Malme; Morillo &

Keller, 2016). In the meantime, Alvarado-Cárdenas and his group have systematically worked on the Gonolobinae in Mexico, resulting in 3 new genera (Alvarado-Cárdenas, 2021; Alvarado-Cárdenas & Díaz-Mota, 2025; Lozada-Pérez & Alvarado-Cárdenas, 2025), 34 new species, and 31 new combinations, and a wealth of distributional and ecological data on these rather poorly known plants (e.g., Alvarado-Cárdenas, 2024; Alvarado-Cárdenas & al., 2024a,b; González-Martínez & al., 2024).

Most genera and species of subtribe Gonolobinae are immediately recognizable by their particular floral morphology, which has been studied in detail by Kunze (1995), elucidating the complex structures of gynostegium and corona. The subtribe is characterized by very short guide rails and often horizontally arranged (but pendent in almost half of the genera) pollinia. Swarupanandan & al. (1996) could show that this arrangement is derived from pendent pollinia and, therefore, of the Asclepiadeae-type. In addition, the insertion of the pollinia into the guide rail is usually conducted only by means of a crested margin. However, this crest does not serve as a germination mouth for the pollen tubes, which germinate instead from the fertile part of the pollinium, which hangs down from the guide rail. This specific mode of germination is unique to Gonolobinae (Kunze, 1995). The corona is highly complex, generally consisting of a ring of staminal and interstaminal parts, an annular corona derived from a thickening of the corolla tube, and, in some cases, a dorsal anther appendage. The general floral structure is reminiscent of the Old World Ceropegieae-Stapeliinae, with which the tribe shares the frequent fly pollination (Liede, 1994; Lipow & Wyatt, 1998; Krings, 1999; Kunze, 1999; Ramírez, 2004; Nihei & Schwarz, 2011; Alvarado-Cárdenas & al., 2024a) (Fig. 1E). As in Stapeliinae (e.g., Shuttleworth & al., 2017 and references therein), the few available records indicate that different groups and species of flies are quite specific for certain species of Gonolobinae, but detailed observations over a wider range of species are still wanting. However, Ollerton & al. (2019, and references therein [their Supplementary Material S2, sheet 2C]), Alvarado-Cárdenas & Cerchiai (2022), and Alvarado-Cárdenas & al. (2024a) report a far wider range of pollination systems in the subtribe: bees, butterflies, wasps (Fig. 2A), hawkmoths (Fig. 2G) and combinations of bees and butterflies, flies and wasps, as well as insect generalists have been observed.

In Asclepiadoideae, Gonolobinae is highly diverse with regard to follicle structure. The rather slender fusiform and unornamented follicles frequent in other tribes and subtribes of Asclepiadoideae are uncommon in Gonolobinae (e.g., in *Aneurochus* Mangelsdorff & al., and *Tylodontia* Griseb.). In most genera the follicles are broadly ovoid-fusiform, thick-walled, and either winged (e.g., in *Macroscelis*, Fig. 2H), or with hard or soft protuberances (emergences), that can be densely or widely spaced (e.g., in *Ibatia*, Fig. 2D, or *Prosthecidiscus*, Fig. 3H); smooth follicles are uncommon (e.g., *Potamoampelos* Morillo & al., in which they are 4- or

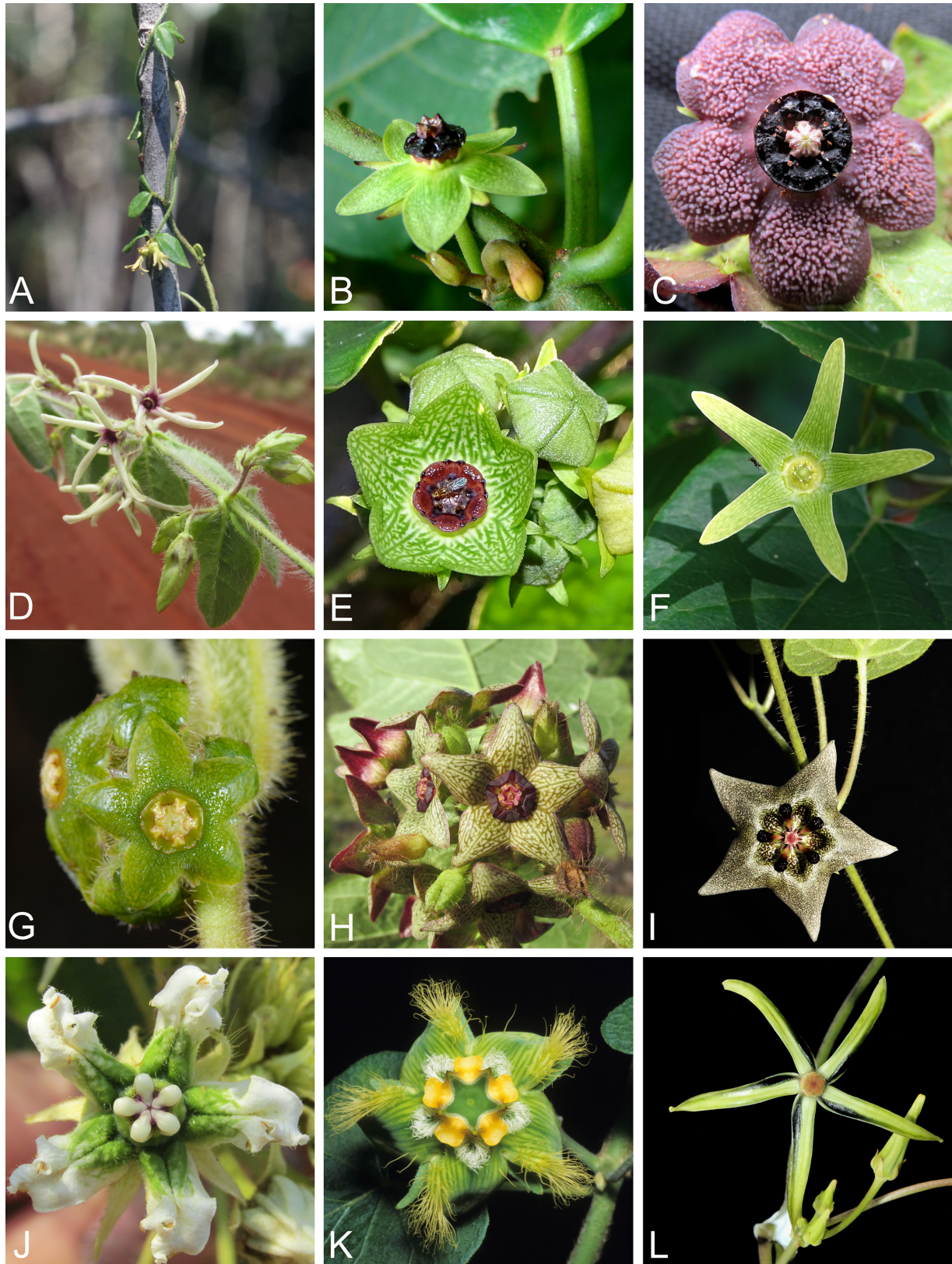


Fig. 1. Diversity in Gonolobinae – 1. **A**, *Anemotrochus yamanigüeyensis*; **B**, *Atrostemma xerophilum*; **C**, *Austrochthamalia teyucuaensis*; **D**, *Austrochthamalia bornmuelleri*; **E**, *Caa balansae* with unidentified fly (Diptera); **F**, *Chloropetalum viride*; **G**, *Cristobalia australis*; **H**, *Cristobalia bella*; **I**, *Dictyanthus yucatanensis*; **J**, *Fischeria stellata*; **K**, *Gonolobus barbatus*; **L**, *Gonolobus cteniophorus*. — Photos: A & K by U. Meve; B by G. Morillo; C–F, H & J by H.A. Keller; G by L. Deble; I & L by W. Cetzal-Ix.

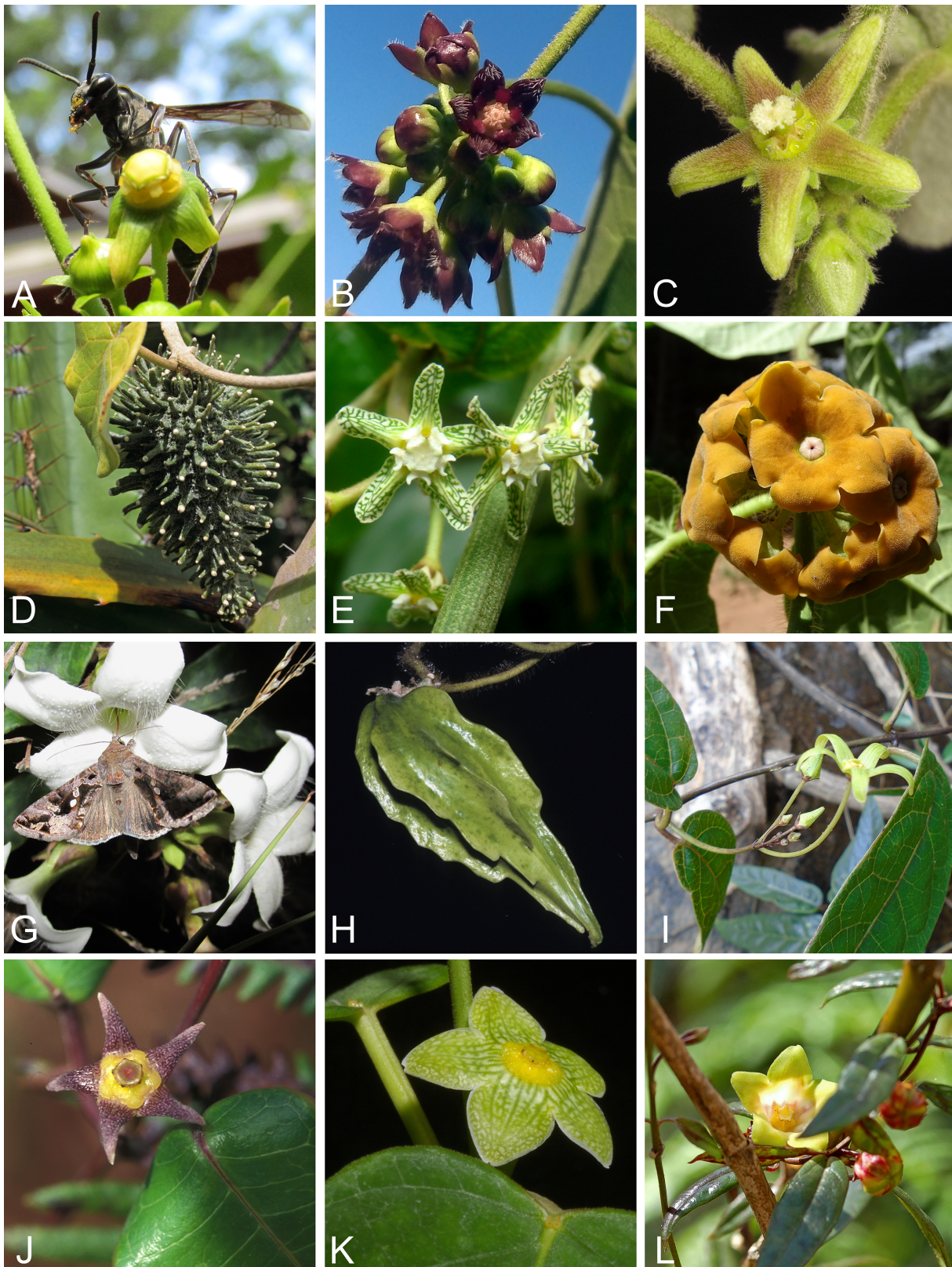


Fig. 2. Diversity in Gonolobinae – 2. **A**, *Gonolobus parviflorus* with *Polistes actaeon*, carrying pollinaria; **B**, *Ibatia friesii*; **C**, *Ibatia pacifica*; **D**, *Ibatia ganglinosa*, follicle; **E**, *Lachnostoma bricenoi*; **F**, *Macroscepis elliptica*; **G**, *Macroscepis grandiflora* with *Chrysodeixis includens*; **H**, *Macroscepis diademata*, follicle. **I**, *Malinvaudia capillacea*; **J**, *Matelea pastazana*; **K**, *Matelea ruiz-pavonii*; **L**, *Meveampelos bicolor*. — Photos: A, B, F & G by H.A. Keller; E by G. Morillo; C, D, H, K & L by U. Meve; I by R.M. Castro; J by S. Liede-Schumann.

5-sided and thinly costate, Fig. 3F, or in the *Matelea palustris* complex, e.g., in *M. graciliflora* Krings & Morillo). Unlike many other Asclepiadoideae, Gonolobinae often bear fruits while still in flower (pers. obs.), thus, many illustrations accompanying the description of new species also show follicle characters; Krings & al. (2008: fig. 5) present a comparative overview of follicle morphology in Gonolobinae.

As in all Asclepiadoideae, fossil evidence is scarce for Gonolobinae. The only assumed fossil, *Vincetoxicum? triner-vatum* MacGinitie (in Publ. Carnegie Inst. Wash. 416: 66. 1933, described under *Vincetoxicum* Walter, an illegitimate name now sunk into *Gonolobus*, non *Vincetoxicum* Wolf) has later been classified as “incertae sedis” (Graham, 1963: 935). This incomplete leaf from the Trout Creek Flora of southern Oregon shows a venation and a cluster of small glands at the base of the leaf, reminiscent of venation and colleters of a modern Gonolobinae species. The Trout Creek Flora has been dated to the upper Miocene, so both the locality north of the subtribe’s northern limit today and the large leaves (16–20 × 8–10 cm) could possibly be explained by the warmer climate at that period of time, but more evidence is needed before the existence of a fossil Gonolobinae can be confirmed.

The first phylogenetic study including more than a few Gonolobinae samples (Krings & al., 2008) was based on three markers: chloroplast *trnL-F* intergenic spacer (IGS), *rps16* intron and *LEAFY*. Their combined phylogeny strongly supports the monophyly of Gonolobinae, the monophyly of *Matelea* s.str. (represented by *M. palustris*) + *Fischeria* + *Gonolobus*, and the monophyly of several small “*Matelea*” groups, including exclusively West Indian Islands and Central/North American clades. In terms of nomenclature, the authors (Krings & al., 2008) preferred to stick with Woodson’s concept of “*Matelea*”, because “this lineage exhibits a dazzling array of floral variation that makes one appreciate the advantages of Woodson’s (1941) broad concept of *Matelea*”.

Later studies (for scope of these studies and markers used, see suppl. Appendix S2), confirmed the polyphyly of “*Matelea*”, but most focused on a particular group of species, such as Mangelsdorff & al. (2016; *Anemotrochus* and *Tylodontia*), Keller & Liede-Schumann (2020; *Caa* H.A.Keller & Liede), González-Martínez & al. (2024, *Urostephanus* B.L.Rob. & Greenm.), Lozada-Pérez & Alvarado-Cárdenas (2025; *Dic-tyanthus*). Morillo (2015a) included a tree (Neubig, unpub. results) that showed the position of several new or resurrected, mainly South American genera, but only McDonnell & al. (2018) presented a new study over the whole range of the subtribe, including 7 of the 30 genera recognized by these authors, with a focus on Central and North American species. They retrieved six clades (A–G); however, backbone resolution was poor throughout, and the nuclear markers could not be amplified for all species and did not support all clades, so that the combined tree (McDonnell & al., 2018: fig. 3) comprised only 22 terminals of Gonolobinae. Besides monophyly of the subtribe Gonolobinae, monophyly of *Gonolobus* (E), *Polystemma* (D), *Macroscepis*–*Schubertia* (G) and *Talayotea*

L.O.Alvarado (as *Matelea trachyantha* (Greenm.) W.D.Stevens)–*Suberogerens* Morillo was well supported, and ancestral state reconstruction of growth forms showed that a woody twining growth form is most likely plesiomorphic for Gonolobinae. However, even for this small dataset, both corolla shape and fruit ornamentation exhibited high levels of homoplasy (McDonnell & al., 2018: fig. 4).

The Tree of Life (Baker & al., 2022) included 15 species of Gonolobinae. The specimen labelled “*Cynanchum laeve*” meanwhile has been positively identified as *Chthamalia producta* (Torr.) L.O.Alvarado & E.B.Cortez, so that its placement in Gonolobinae is justified; *Phaeostemma kelleri* Morillo has been sunk in synonymy of *P. riedelii* E.Fourn. (Morillo, 2023b) and *Rhytidostemma* Morillo has been synonymized with *Fischeria* (Morillo, 2023a). To this dataset, Bitencourt & al. (unpub. data) added four species (*Chloro-petalum denticulatum* (Vahl) Morillo, *Peruviasclepias aliciae* (Morillo) Morillo, *Riparoampelos amazonica* (Morillo) Morillo, *Suberogerens cyclophylla* (Standl.) Morillo) and selected a Brazilian representative for *Macroscepis* instead of *Steinmann 4422* (OKLA) from Mexico. In both studies, Gonolobinae are supported as monophyletic sister to *Topea* H.A.Keller.

Despite these efforts, a workable taxonomy of Gonolobinae over their whole range, based on phylogenetic study, is still wanting. The present paper integrates the results of earlier studies, by sequencing missing markers of previously used specimens, as far as available, broadening the base of phylogenetic tree estimation to seven cpDNA regions sequenced, plus ITS, and adding 134 of our own samples. Further nuclear markers were not considered, because the ones used to date (*LEAFY*, Krings & al., 2008; At4g134300, At5g13420, At1g77370, McDonnell & al., 2018) were only available for a few of the published taxa and proved difficult to amplify in our own samples. Our samples were selected mainly from previously underexplored areas of the tree, focusing on bridging the gap between the two large datasets, Krings & al. (2008) with focus on the West Indian Islands and McDonnell & al. (2018) with focus on Central and North America. The present dataset allows the construction of an overall phylogeny of Gonolobinae, with a more even balance between the three main areas of its distribution (South America, 114 terminals; West Indian Islands, 33 terminals; Central/North America, 138 terminals). Combined with the available morphological knowledge, the main groups so far recognized throughout the Americas can be named and characterized, creating a framework that allows future testing of the concepts using more refined methods.

■ MATERIALS AND METHODS

Taxonomic revision. — The treatment summarizes the results of previous studies (Stevens, 1988, 2001; Krings, 2005, 2008, 2011; Krings & Xiang, 2005; Goyder, 2006; Stevens & Morales, 2009; Morillo, 2012, 2013, 2015a,

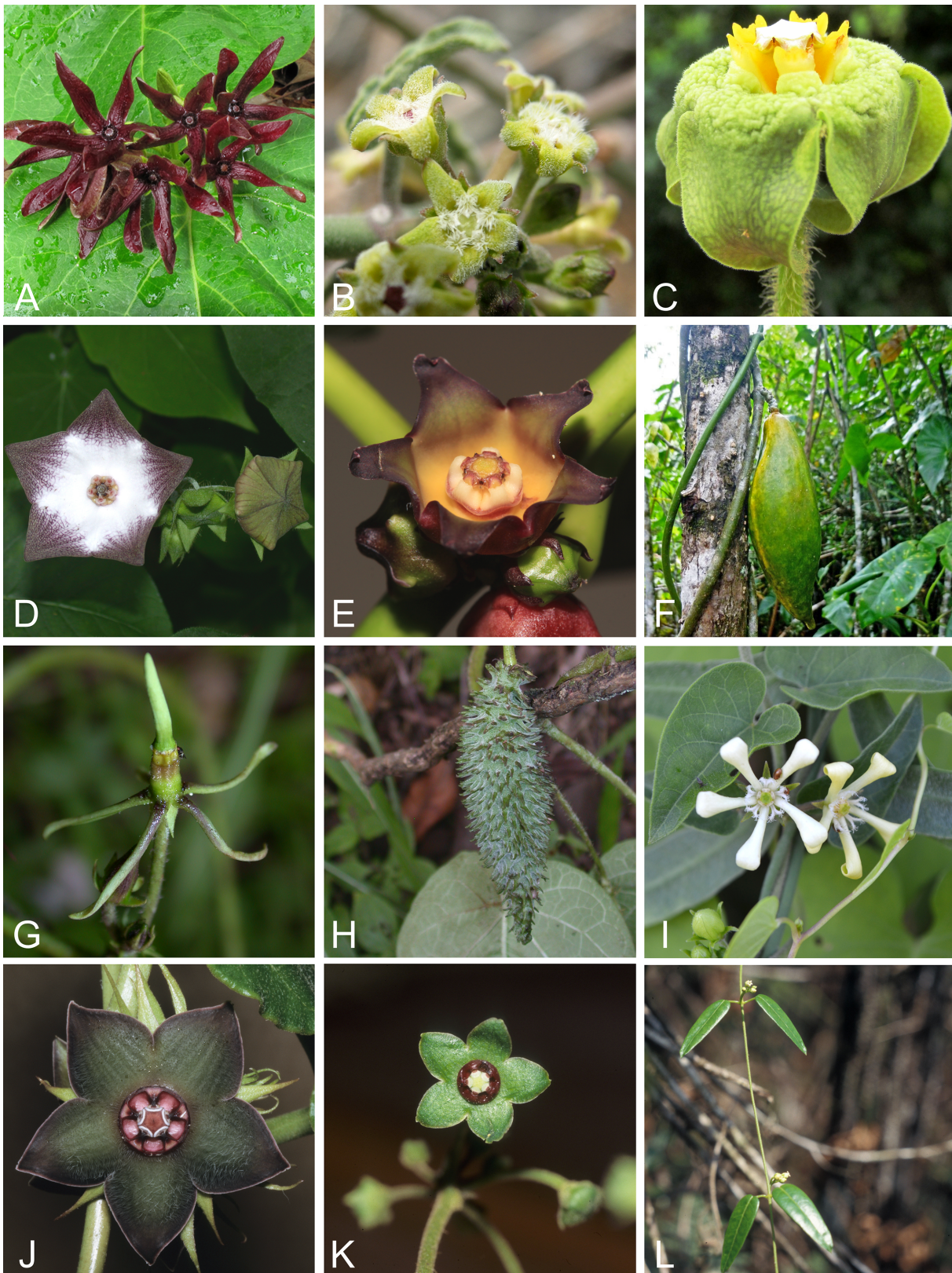


Fig. 3. Diversity in Gonolobinae – 3. **A**, *Odontostephana decipiens*; **B**, *Peruviasclepias aliciae*; **C**, *Phaeostemma riedelii*; **D**, *Polystemma guatemalense*; **E** & **F**, *Potamoampelos delascioi*: **E**, Flower; **F**, Follicle; **G** & **H**, *Prosthecidiscus guatemalensis*: **G**, Flower; **H**, Follicle; **I**, *Rojasia gracilis*; **J**, *Suberogerens cyclophylla*; **K**, *Tutunakanthus micranthus*; **L**, *Tylostontia stipitata*. — Photos: A by A. Cressler; B by H. Beltrán; C by H.A. Keller; D, G & H by J.F. Morales; E & F, by G. Léotard; I by A. Di Giacomo; J & L by U. Meve; K by S. Liede-Schumann.

2023a,b, 2025; Keller & Liede-Schumann, 2020; Alvarado-Cárdenas, 2021, 2024; Alvarado-Cárdenas & al., 2021, 2024a,b; González-Martínez & al., 2024, to name but a few) augmented by the study of ca. 500 additional herbarium specimens obtained from B, BM, BOLV, C, CTES, GH, K, MER,

MERF, MO, MY, NY, P, RB, S, SEL, SP, UBT, US, and VEN or studied online on GBIF (<https://www.gbif.org>), JSTOR Global Plants (<https://plants.jstor.org/>) or the home-pages of the respective institutions (online resources consulted 2020–2025). Vegetative, floral and fruit characteristics of the

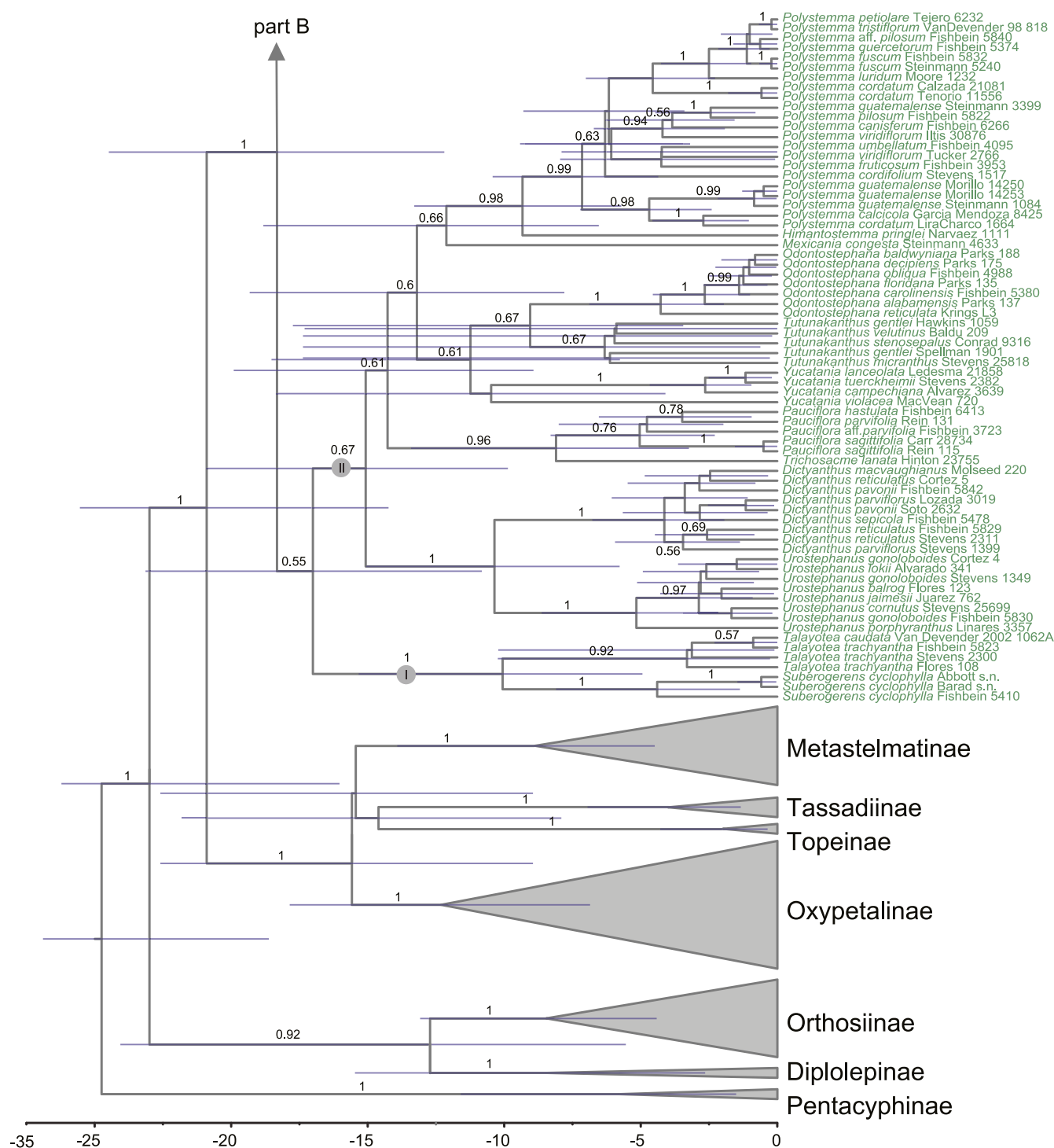
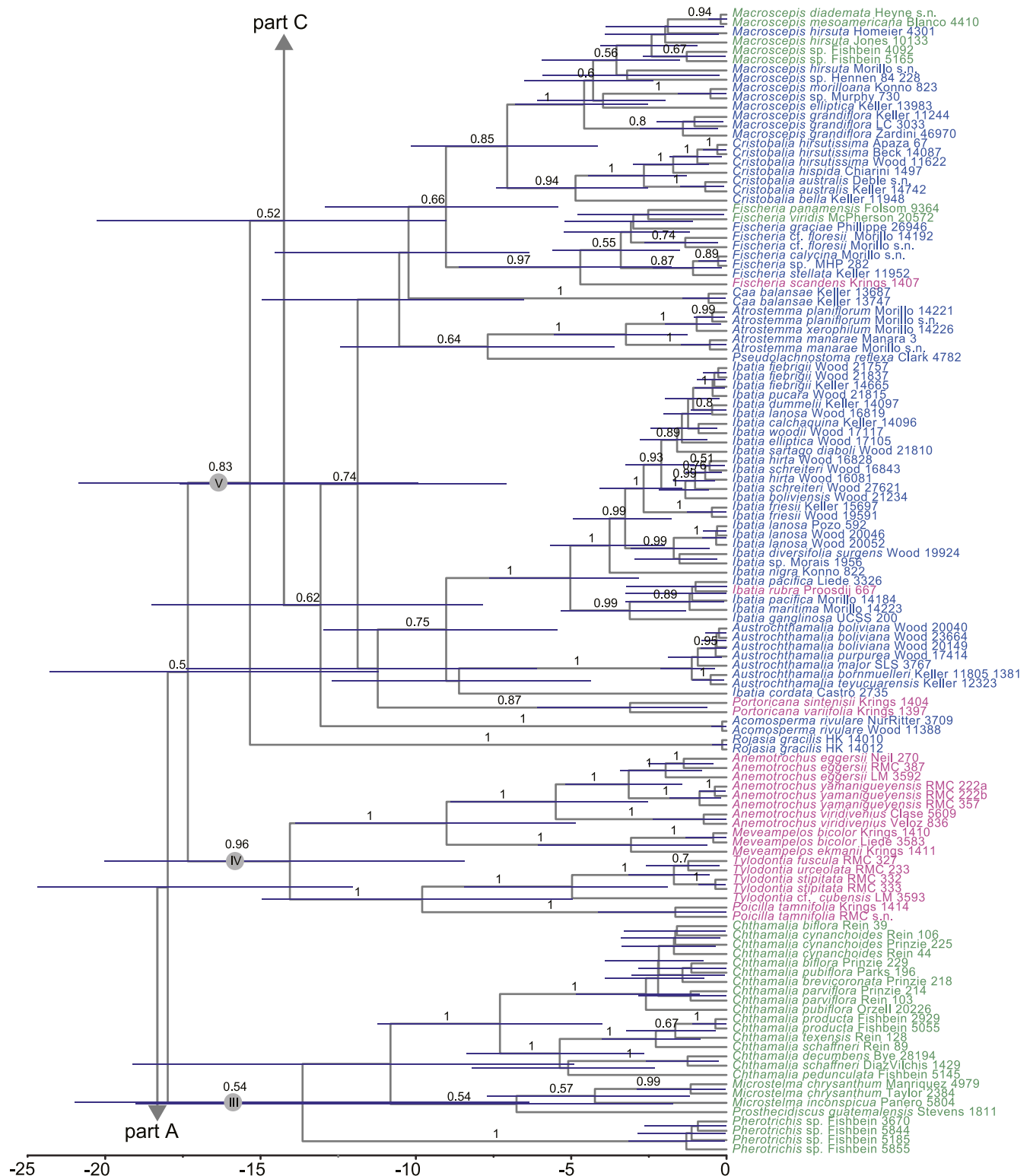


Fig. 4. Maximum clade credibility phylogenetic tree of common ancestor heights based on combined DNA datasets implemented in BEAST v.2.7.7. Error bars indicate 95% confidence intervals for estimated ages. Note that the scale bar is compressed at older ages to accommodate the long error bars in that part of the tree. Samples are colored based on geographic origin as referenced in the map.

specimens were studied using the traditional herbarium techniques, including measurements, drawings and photographs.

Molecular taxon sampling. — Taxon sampling aimed at including as many species of Gonolobinae as possible.

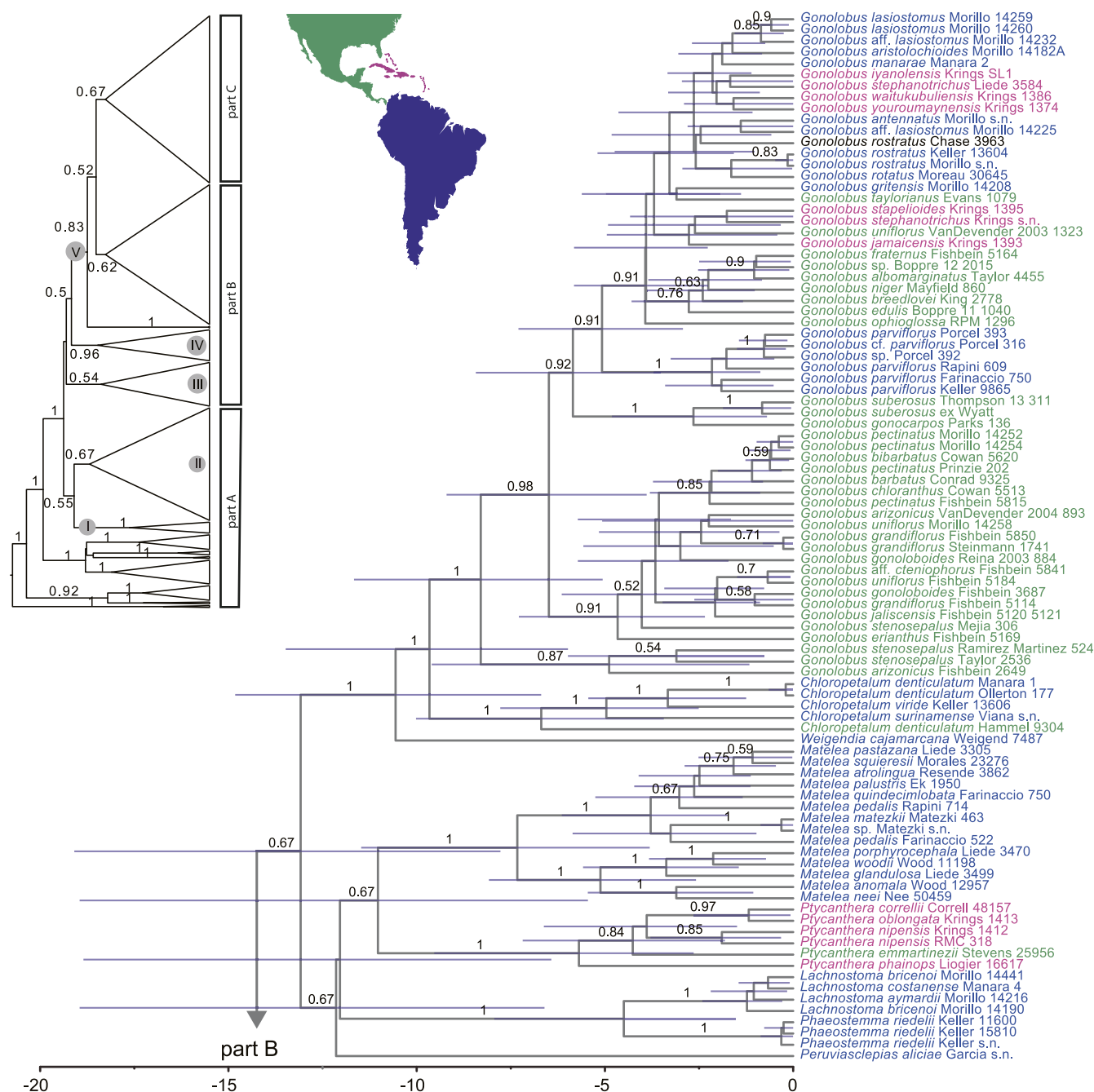
Sequences in GenBank from Krings & al. (2008; 49 accessions) and McDonnell & al. (2018; 70 accessions; 5 identical with Krings & al., 2008) were included, augmented by 136 accessions selected to fill gaps in the two large datasets. Twelve



further accessions were included from González-Martínez & al. (2024) and one from Konno & al. (2006), and one sample was contributed by RBG Edinburgh (Appendix 1). Another 22 accessions were included from previous studies of the present authors (Liede-Schumann & al., 2005; Mangelsdorff & al.; 2016, Keller & Liede-Schumann, 2020).

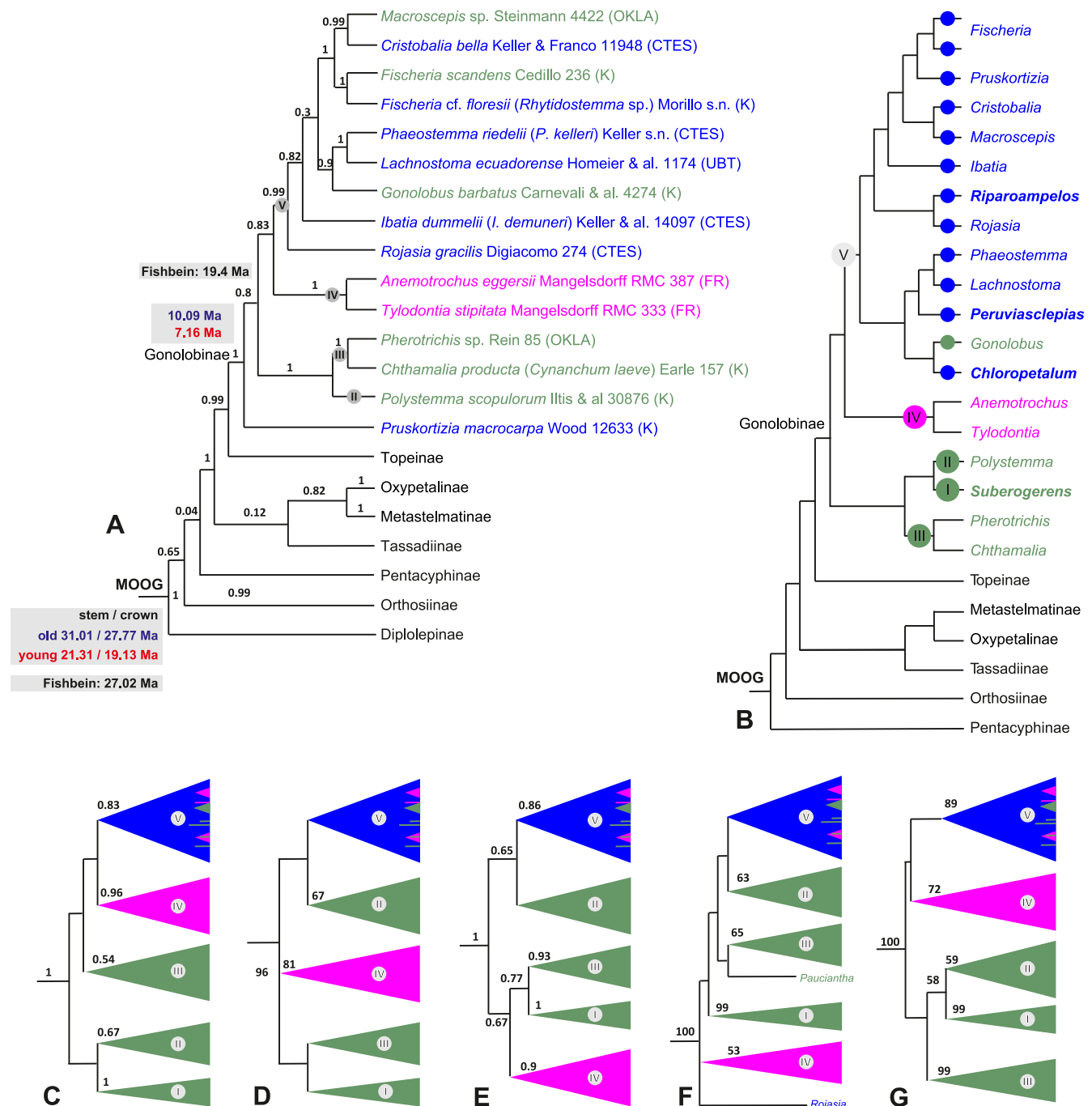
Taxa for which only a single partial sequence was available (*Matelea warscewiczii* (H.Karst.) Woodson, *Stevens & Grijalva 16147* [MO]) were excluded from the analysis. Also, from several samples of one species from the same

area, the one with the least number of partial sequences (and thus the poorest sequence coverage) was excluded (e.g., *Microstelmia chrysanthum* (Greenm.) Morillo from Oaxaca, *Fishbein 5834* [OKLA]). The two samples of *Gonolobus jaliscensis* B.L.Rob. & Greenm. from Michoacán, *Fishbein 5120* and *Fishbein 5121* (ARIZ) with complementary partial sequences, were combined. In total, 286 terminals were assembled from subtribe Gonolobinae, representing 183 identified species; 13 samples are presently unidentified to species.

**Fig. 4. Continued.**

In addition, 41 outgroup samples from all New World subtribes of Asclepiadeae (Diplolepineae, 2; Metastelmatinae, 9; Orthosiinae, 9; Oxypetalinae, 14; Pentacyphinae, 2; Tassadiinae, 3; Topeinae, 2) were included, so that the complete matrix comprised 327 terminals. Following results of Liede-

Schumann & al. (2005) and Fishbein & al. (2018), the two samples of *Pentacyphus* Schltr. were used to root trees. Switching the root to *Diplolepis* R.Br., as suggested by Zuntini & al. (2024), had no bearing on the relationships in the ingroup (suppl. Figs. S1, S2).



DNA isolation, PCR amplification, and sequencing.

DNA was extracted from silica-dried leaves (vouchers held at UBT) or from leaf fragments taken from herbarium specimens held at ARIZ, B, CORD, CR, CTES, EAC, FR, HUEFS, JAR, JBSD, K, MER, MEXU, MG, MJG, MO, MSUN, NY, SP, TRIN, ULM, US, VEN, WAG, and XAL. Extraction and amplification followed the methods described in Liede-Schumann & al. (2022) for the regions used in this paper (*trnT-L*, *trnL-F* and *psbA-trnH* IGS, *trnL* intron, *rps16* intron, ITS). For all newly acquired sequences, *trnL* intron and *trnL-F* IGS were amplified in one piece, termed *trnLLF* region. For the *rpl16* intron and the *trnC-rpoB* IGS, McDonnell & al. (2018) was followed, using the primers *rpl16-F71* and *rpl16-R1661* for the *rpl16* intron and *rpoB5'R* and *trnC5'R* for the *trnC-rpoB* IGS. The same primers were used for both PCR and Sanger sequencing. Both strands were sequenced for all PCR products. In total, 888 partial sequences were obtained newly for the present study (214 for 52 accessions by the lab of K. Neubig and 668 from 105 accessions by the lab of S. Liede-Schumann). All voucher and sequence information is provided in Appendix 1.

Phylogenetic analysis. — For all regions, forward and reverse sequences were aligned with CodonCode Aligner, v.3.0.3 (CodonCode Corp., Dedham, Massachusetts, U.S.A.), and the consensus sequence was exported in fasta format. Sequences previously published in GenBank were downloaded and included (see Molecular Taxon Sampling). For ITS and *psbA-trnH*, no outgroup sequences were used, even if available, because they could not be aligned to the ingroup sequences. The fasta files of each marker were aligned with the OPAL package (Wheeler & Kececioglu, 2007) inside Mesquite v.3.81 (Maddison & Maddison, 2023), using standard settings. All alignments were manually checked and corrected to fix gaps and alignment mistakes (see suppl. Appendix S1).

Because the matrix had an unusually high number of missing data (suppl. Table S2; suppl. Appendix S1), a second matrix was constructed excluding all accessions for which no data in the *trnLLF* region were available, resulting in a matrix with 286 taxa (41 outgroup, 245 ingroup; “intermediate dataset”, suppl. Fig. S3). Lastly, ambiguity was further reduced by eliminating all samples with the *trnL* intron not present in the *trnLLF* region, resulting in a matrix with 233 taxa (41 outgroup, 192 ingroup; “reduced dataset”, suppl. Fig. S4). Finally, ITS was removed from the reduced dataset to check for discordance between chloroplast and nuclear DNA (suppl. Fig. S5). The ITS dataset was analyzed separately, using *Topea micrantha* (H.A.Keller) H.A.Keller as outgroup (suppl. Fig. S6).

For maximum likelihood (ML), RAXML v.8.2.12 (Stamatakis, 2014) was used to search for the tree with the greatest likelihood and to conduct bootstrap search. All partitions (suppl. Table S2) were allowed to evolve independently under the GTR + Γ substitution model, because the most complex generalized time-reversible (GTR) model of DNA evolution is the only one available in RAXML, and for all

partitions except *trnT-L* IGS a gamma distribution was suggested. RAXML analyses were performed using the CIPRES Gateway (<https://www.phylo.org/>, Miller & al., 2010) with number of bootstrap replicates set automatically (Pattengale & al., 2010).

For Bayesian inference (BI), two simultaneous independent runs with four chains each (one cold, three heated) were conducted using MrBayes v.3.2.2 (Huelsenbeck & Ronquist, 2001; Ronquist & Huelsenbeck, 2003; Ronquist & al., 2012). They were initiated with random trees, saving one tree every 1000 generations and saving branch lengths. The nucleotide substitution models (suppl. Table S2) found by Modeltest2 (Guindon & Gascuel, 2003; Darriba & al., 2012) under the Akaike information criterion (Akaike, 1974), run on the CIPRES gateway <https://www.phylo.org/>, Miller & al., 2010) were implemented for each partition; the parameters *statfreq*, *revmat*, *shape*, and *pinvar* were all unlinked between the partitions. Following Huelsenbeck & Rannala (2004), selected models that are not implemented in MrBayes were substituted by the closest over-parameterized model. Thus, the TVM substitution model was replaced by the GTR model. Ten million generations were performed for analyses of the combined dataset, with a final deviation of split frequencies of 0.014675. Parameters from the independent runs were inspected with Tracer v.1.6 (Rambaut & al., 2014) to find where the chains converged (suppl. Table S3). The first 5000 trees (50%) of each run were discarded as burn-in, and the remaining 5000 trees were summarized in a 50% majority-rule consensus tree, with posterior probabilities (PP) as an estimate of support for nodes of the tree.

Time-calibrated phylogenetic analyses were conducted in BEAST v.2.7.7 (Bouckaert & al., 2019) using the same dataset as above. The dataset was unpartitioned, with a GTR substitution model with invariant sites estimated and an optimized relaxed clock model run for a chain length of 200,000,000. Three priors were set in order to calibrate the tree: (1) a Yule model, (2) a monophyletic constraint rooted with the two samples of *Pentacyphus* and (3) an age constraint of the whole tree (mean = 25.21 Ma, confidence interval 19.13–31.3 Ma, *s* = 0.014). This mean age was set as a midpoint between two recent age estimates of the clade made by Fishbein & al. (2018) and Zuntini & al. (2024). Gonolobinae was not constrained to be monophyletic. To ensure accurate analytical results, the analysis was replicated a total of three times and converged upon very similar parameters from the independent runs when inspected with Tracer v.1.6 (Rambaut & al., 2014). The resulting trees were imported into LogCombiner v.2.7.7 (Drummond & al., 2012) to combine the trees from the three separate runs, removing 10% as burn-in. The combined trees were imported into TreeAnnotator v.2.7.7 (Drummond & Rambaut, 2007) to calculate the maximum clade credibility tree, using the option “common ancestor heights”, aiming at summarizing clade ages across all posterior trees, avoiding negative branch lengths (Heled & Bouckaert, 2013). The maximum clade credibility tree was then graphically exported using FigTree v.1.4.4 (Rambaut, 2018).

Clades will be referred to as well supported if they have maximum likelihood bootstrap support values (BS_{ML}) of $\geq 90\%$ and $PP \geq 0.95$. Moderate support is defined as $75\% \leq BS_{ML} < 90\%$ and $0.85 \leq PP < 0.95$ and weak support as $55\% \leq BS_{ML} < 75\%$ and $0.60 \leq PP < 0.85$.

Geographic distribution. — To assess the spatial distribution of Gonolobinae derived from our analysis, the area of the subtribe was divided in (1) South America, inclusive of Trinidad and Tobago (see Baksh-Comeau & al., 2016; symbolized by blue color); (2) West Indian Islands (Antilles and Lucayan Archipelago; symbolized by pink color), and (3) Central and (southern) North America (symbolized by green color).

■ RESULTS

In all analyses, Gonolobinae form a well-supported clade ($BS_{ML} = 96$ or 100% , $PP = 1$; Fig. 4; suppl. Figs. S1–S6) in a sister-group position to a polytomy of Topeinae, Metastelmatainae, Tassadiinae, and Oxypetalinae. Gonolobinae fall into five clades (I–V), of which two are well supported (I, IV), one is moderately supported (V) and two are weakly supported (II, III) in the BEAST analysis (Fig. 4A–C). In the other analyses, support for Clade I remains good, while Clade IV is only well supported in the reduced dataset (suppl. Fig. S4), moderately supported in the other combined analyses (suppl. Figs. S1–S3) and weakly supported by the cpDNA and ITS datasets alone (suppl. Figs. S5, S6). Clade V is never more than moderately supported (suppl. Figs. S2, S6), and weakly supported or unsupported in the remaining analyses (suppl. Figs. S1, S3–S5). Clade II remains weakly supported in most analyses (suppl. Figs. S1, S3, S5, S6), except for Bayesian analysis (suppl. Fig. S2), in which it is well supported and the reduced dataset, in which it is moderately supported (suppl. Fig. S4). Clade III can be unsupported to well supported, depending on the analysis (suppl. Figs. S1–S6). Clades I–III exclusively comprise taxa of Central and North American origin, clade IV taxa of West Indian origin. In Clade V, all South American taxa studied are found, but interspersed with West Indian and Central/North American taxa, especially in *Gonolobus*.

The arrangement of the five main clades is unstable. BEAST analysis (Figs. 4, 5C) retrieves them in the sequence they are labelled, with two of the three Central/North American Clades (I, II) sister to the third Central/North American Clade (III) and the West Indian Clade (IV) and the South American Clade (V), but without support. ML analysis retrieves Clades I + III in a polytomy with Clades IV and II + V (Fig. 5D), also without support. Bayesian analysis places Clades IV + (I + III) in sister-group position to Clades II + V (Fig. 5E), with weak support. Removal of ITS from the reduced dataset (Fig. 5F, suppl. Fig. S5) sends the long branch of *Rojasia* from Clade V to an unresolved position with the West Indian Clade and a large Clade I + ((*Pauciflora* + III) + (II + V)). The ITS dataset alone (Fig. 5G, suppl. Fig. S6)

places the three Central/North American Clades in a single unsupported clade, with the sister-group relationship of Clades I and II weakly supported. The West Indian Clade IV is unsupported as sister of Clade V. This arrangement is supported by the backbone of the Tree of Life (Baker & al., 2022) (Fig. 5A, with corrected taxa identifications), which is lacking a member of Clade I, and also by Bitencourt & al. (unpub. data) (Fig. 5B), in which members of all three Central/North American Clades are represented.

Clade I comprises only the two genera *Suberogerens* and *Talayotea* from Mexico and is well supported in all analyses.

Clade II is the largest of the Central/North American clades and has weak support in most analyses but is well supported in the Bayesian analysis (suppl. Fig. S2). Inside Clade II, only a few relationships are well supported, such as *Dictyanthus*–*Urostephanus*, *Trichosacme* Zucc.–*Pauciflora* Morillo & al. and *Himantostemma* A.Gray–*Polystemma*, to which *Mexicania* L.O.Alvarado & Lozada-Pérez is the weakly to moderately supported sister. *Yucatania* Morillo & al. is sister to *Odontostephana* Alexander–*Tutunakanthus* L.O.Alvarado & Díaz-Mota. The relationship of these three genera is weakly supported in the analyses using the whole dataset, but support, in particular for *Odontostephana*–*Tutunakanthus*, increases when the incomplete samples are removed (suppl. Figs. S3, S4). *Yucatania violacea* Woodson takes an unsupported position as sister to the remaining *Yucatania* species in the BEAST analysis (Fig. 4), or as sister to *Odontostephana*–*Tutunakanthus* in ML and Bayesian analyses (suppl. Figs. S1–S4). In the reduced cpDNA dataset (Fig. 5F, suppl. Fig. S5), *Pauciflora* (*Trichosacme* is not included in this dataset) takes a position outside Clade II, as sister of Clade III with weak support.

Clade III, another Central/North American clade, receives weak to moderate support in most analyses, but is well supported by ITS (suppl. Fig. S6) and unsupported by ML analysis of the complete dataset (suppl. Fig. S1). It comprises *Pherotrichis*, *Microstelma*–*Prosthecidiscus*, and *Chthamalia* Decne.

Clade IV is moderately to well supported in all combined analyses (Fig. 4, suppl. Figs. S1–S4), but weakly supported by cpDNA or ITS alone (suppl. Figs. S5, S6). It comprises exclusively West Indian Island taxa, but not all West Indian taxa are members of Clade IV. In all analyses, Clade IV falls into two well-supported subclades, *Poicilla* Griseb.–*Tylodontia*, and *Meveampelos* Morillo–*Anemotrochus*.

Clade V harbors most of the diversity in Gonolobinae, and all South American taxa analyzed. It is unsupported to moderately supported and comprises several well-supported subclades but has no supported backbone structure. Aberrant small genera such as *Acomosperma* K.Schum. ex Ule, *Caa*, *Portoricana* Morillo & al., and *Rojasia* Malme form long branches and change position between the complete and the reduced dataset (Fig. 4, suppl. Figs. S1–S4). In the reduced cpDNA dataset (Fig. 5F, suppl. Fig. S5) *Rojasia* leaves Clade V and takes an unresolved position with Clade IV and Clades I + (III + (II + V)).

Well established in Clade V are *Austrochthamalia* Morillo & Fontella–*Ibatia* Decne., a relationship receiving at best moderate support in the analyses with the full dataset (Fig. 4, suppl. Figs. S1–S3), but good support in the reduced dataset with and without ITS (suppl. Figs. S4, S5). *Austrochthamalia* is a well-supported genus in all analyses but including the monotypic genus *Brargentina* Morillo & H.A.Keller with a strongly diverging floral morphology (compare Figs. 1C and 1D).

Cristobalia Morillo & al.–*Macroscopsis* Kunth also receives moderate support in the analyses with the full dataset (Fig. 4, suppl. Figs. S1–S3), but good support in the reduced dataset with and without ITS (suppl. Figs. S4–S6). *Fischeria* DC., on the other hand, is weakly supported as sister to *Cristobalia*–*Macroscopsis* in all analyses with the full dataset, and moderately supported in this position in the reduced dataset. *Caa* is sister to this clade in the BEAST and the ML analysis of the reduced dataset (Fig. 4, suppl. Fig. S4), while the two samples are unresolved in the other analyses. The reduced cpDNA dataset moves *Fischeria* to a position sister to the remainder of Clade V and places *Caa* as sister to *Cristobalia*–*Macroscopsis*, with weak support (suppl. Fig. S5). The monotypic *Gracemoriana* Morillo is firmly embedded in *Fischeria* in all analyses and also shares the particular indel structure of *Fischeria*, so that *Gracemoriana* had to be included in *Fischeria*, despite its aberrant flower structure.

Phaeostemma E.Fourn. and *Lachnostoma* Kunth are well-supported sisters in all analyses except for the cpDNA dataset (suppl. Fig. S5), and sister to the *Ptycanthera* Decne.–*Matelea* Aubl. s.str. clade, which is weakly to well supported by the combined datasets (Fig. 4, suppl. Figs. S1–S4), but unsupported by cpDNA and ITS alone. *Peruviasclepias* Morillo is either unsupported as sister to this whole clade in the BEAST analysis (Fig. 4) or weakly to moderately supported as sister to *Phaeostemma*–*Lachnostoma* in the other analyses.

Weigendia Morillo & al.–*Chloropetalum* Morillo–*Gonolobus* form a stable clade with support varying from weak to high (Fig. 4, suppl. Figs. S1–S4), but removal of ITS joins *Atrostemma* to *Chloropetalum* and one specimen of *Gonolobus stenosepalus* (Donn.Sm.) Woodson (*Ramirez Martinez* 524) in a weakly supported trichotomy, that is weakly supported as sister to *Gonolobus*, and *Weigendia* takes an isolated position in clade V (suppl. Fig. S5).

Whereas most genera maintain their position throughout the analyses, the position of some genera is unstable. Most variable is *Atrostemma* Morillo, which is well supported as a genus and always a member of Clade V. However, in the BEAST and the ML analyses of the full dataset (Fig. 4, suppl. Fig. S1), it takes an unsupported to weakly supported position as sister of *Pseudolachnostoma* Morillo. In the Bayesian analysis, *Pseudolachnostoma* takes an unresolved position in Clade V, and *Atrostemma* is weakly supported as sister to (*Peruviasclepias*–*Phaeostemma*–*Lachnostoma*–*Ptycanthera*–*Matelea*)–(*Weigendia*–*Chloropetalum*–*Gonolobus*) (suppl. Fig. S2), a position it also takes in the reduced dataset

(suppl. Fig. S4). The intermediate dataset, on the other hand, places *Atrostemma* in an unsupported trichotomy with *Caa*–(*Fischeria*–*Cristobalia*–*Macroscopsis*) (suppl. Fig. S3), a position favored also by ITS (suppl. Fig. S6), while the cpDNA dataset pushes it in an unsupported trichotomy with *Chloropetalum* and one specimen of *Gonolobus stenosepalus* (suppl. Fig. S5).

Other genera without clear affinities are those with long branches, i.e., *Acomosperma*, *Caa*, *Portoricana*, and *Rojasia*, all unresolved in Clade V by Bayesian analysis (suppl. Fig. S2) and in variable, at best weakly supported positions in Clade V in the other analyses (Fig. 4, suppl. Figs. S1, S3–S5).

The composition of the genera is much more stable than their position. Almost all genera form well-supported groups of species. Exceptions are *Yucatania violacea*, which is outside the rest of the well-supported *Yucatania* group (see above), and *Ibatia cordata* (Malme) Morillo, which is placed as sister of *Austrochthamalia* in the BEAST analysis (Fig. 4), as sister to *Austrochthamalia*–*Ibatia* in the ITS dataset (suppl. Fig. S6), and has at best weak support as sister to the remainder of the *Ibatia* species in the other analyses (suppl. Figs. S1–S5). *Gonolobus* is only weakly supported in the ML analysis of the full dataset (suppl. Fig. S1); however, support increases when the samples with poor sequence coverage are removed (suppl. Figs. S3, S4); removing ITS as well leads to one sample of *G. stenosepalus* being included in an unsupported *Chloropetalum*–*Atrostemma* clade. *Matelea* s.str. is well supported and moderately to well supported as sister to *Ptycanthera* in all analyses except for the ITS dataset, which places *Ptycanthera nipensis* (Urb.) Morillo & al., the only species of *Ptycanthera* for which this region is available, as sister to the Bolivian–Ecuadorian *Matelea* s.str. subclade.

Based on the time-calibrated phylogenetic analyses in this study, the crown ages and the 95% confidence intervals are as follows: Gonolobinae has a mean age of 18.32 Ma (12.19–24.48), Clade I has a mean age of 10.06 Ma (4.94–15.33), Clade II has a mean age of 15.07 Ma (9.87–20.93), Clade III has a mean age of 13.65 Ma (6.34–21.37), Clade IV has a mean age of 14.06 Ma (8.43–20.05), and Clade V has a mean age of 15.34 Ma (9.92–21.27).

DISCUSSION

The phylogeny presented here is based on the largest Gonolobinae dataset hitherto assembled, comprising 286 ingroup accessions, representing 183 described species, and 13 unidentified accessions, which probably represent as yet undescribed species. Using the large published datasets of Krings & al. (2008), McDonnell & al. (2018), and Pío-León & Alvarado-Cárdenas (2023) as the starting point, our additional sampling was aimed at reaching a rather even coverage of diversity and areas, and to bridge the gaps in sequence coverage between the earlier datasets. Our results are largely in accordance with the results of these earlier studies, confirming that

“*Matelea* s.l.” is a highly artificial genus, so that not only most of the segregate genera circumscribed in recent years are supported (for details, see under genus descriptions), but also the prediction of McDonnell & al. (2018: 78) that many of the American *Matelea* segregate genera need to be resurrected is fulfilled.

As in many lineages of Asclepiadoideae (e.g., Asclepiadiinae, Chuba & al., 2017; Marsdenieae, Liede-Schumann & al., 2022; *Orthosia*, Liede-Schumann & Meve, 2024), rampant parallelisms in floral structure make it difficult to assess the genus affiliation of a given species. Nevertheless, the genera included in the molecular phylogeny mostly show high molecular support and can in most cases be circumscribed satisfactorily to be distinguished from other genera in the same larger area.

At present, most genera are restricted to one of the three main areas. South America, where the southernmost representative is *Cristobalia australis* (Malme) H.A.Keller & Liede, reaching ca. 33° southern latitude in San Luis, Argentina, is home to 24 genera, 16 of which are endemic. Central and North America, where the northernmost representative is *Odontostephana decipiens* Alexander, reaching 38.5° northern latitude, are home to 29 genera, 19 of which are endemic. The West Indian Islands are home to 12 genera, 6 of which are endemic. Three genera, all in Clade V (*Atrostemma*, *Macroscepis*, *Pseudolachnostoma*) are found throughout tropical and subtropical continental America, and five genera, also all in Clade V (*Chloropetalum*, *Fischeria*, *Gonolobus*, *Ibatia*, *Ptycanthera*) are found in all three areas.

The size of the genera is highly variable. *Matelea*, under which 179 accepted species are still listed (WFO, 2025 [<http://www.worldfloraonline.org/>, snapshot Dec 2025]), is probably not the largest genus of Gonolobinae, because the transfer of many species and names to the segregate genera is not yet complete. With an estimated 70 species, it probably ranks second after *Gonolobus* with presently 141 accepted species. *Ibatia* with 38 species is considerably smaller, and several genera include between 10 and 30 species (*Atrostemma*, *Chthamalia*, *Dictyanthus*, *Fischeria*, *Lachnostoma*, *Macroscepis*, *Polystemma*, *Ptycanthera*). The high number of monotypic (*Acomosperma*, *Bruceholstia* Morillo, *Caa*, *Callaeolepium* H.Karst., *Himantostemma*, *Lhotzkyella* Rauschert, *Malinvaudia* E.Fourn., *Peruviasclepias*, *Poicilla*, *Potamoampelos*, *Prosthecidiscus*, *Riparoampelos* Morillo, *Rojasia*, *Rotundanthus* Morillo, *Suberogerens*, *Trichosacme*, *Vulcanoa* Morillo, *Weigendia*) and bitypic genera (*Meveampelos*, *Mexicania*, *Orinoquia* Morillo, *Portoricana*, *Pruskortizia* Morillo, *Talayotea*) might raise questions as to the validity of the generic concepts employed. However, taking the still-valid principles outlined in Backlund & Bremer (1998) into account, a classification should follow the main principle of monophyly, and the secondary principles of ease of identification and maximizing stability (among others). Of the mono- and bitypic genera listed here, all that are included in the present phylogeny fulfill these criteria. They are well supported as monophyletic, some forming very long branches and taking

isolated positions in the phylogeny (e.g., *Acomosperma*, *Caa*, *Portoricana*, *Rojasia*) and being morphologically distinct. Others (e.g., *Himantostemma*, *Meveampelos*, *Peruviasclepias*, *Poicilla*, *Prosthecidiscus*, *Suberogerens*, *Talayotea*, *Trichosacme*) are moderately to well supported as sister groups to larger genera or groups of genera but are morphologically distinct and easily recognizable.

On the other hand, the application of the criteria of Backlund & Bremer (1998) has led to the synonymization of three recently created monotypic genera, *Brargentina*, *Graciemori-ana* (by Morillo, 2025), and *Tressensia* (by Morillo, 2023b). *Brargentina bornmuelleri* (Schltr. ex Malme) Morillo & H.A.Keller, albeit morphologically distinct (Fig. 1C,D), is included in a well-supported *Austrochthamalia*, a genus with little internal resolution, in all phylogenetic analyses (suppl. Figs. S1–S6). Because ease of identification is secondary to the principle of monophyly (Backlund & Bremer, 1998), *Brargentina* is transferred to *Austrochthamalia*. *Tressensia viridis* is also included in a moderately to well-supported *Chloropetalum* (suppl. Figs. S1–S6) in all analyses, confirming the decision of Morillo (2023a) to transfer the species to *Chloropetalum*. Likewise, *Graciemori-ana graciae*, the only species of *Graciemori-ana*, while morphologically clearly distinct from the average species of *Fischeria*, is included in *Fischeria* in all phylogenetic analyses, and has therefore been included in *Fischeria* (Morillo, 2025). Whereas *Fischeria* (including *Graciemori-ana*) is only weakly to moderately supported in analyses of the full phylogenetic dataset (suppl. Figs. S1–S3), support is strong for the datasets excluding accessions with poor sequence coverage (suppl. Figs. S4–S6). In addition, indel structure of *Graciemori-ana* is identical to that of *Fischeria* for all regions analyzed.

For several monotypic genera, however, no material was available to assess their phylogenetic position (*Bruceholstia*, *Callaeolepium*, *Lhotzkyella*, *Malinvaudia*, *Orinoquia*, *Potamoampelos*, *Pruskortizia*, *Riparoampelos*, *Vulcanoa*). In these cases, the morphological distinctness of the species concerned was taken as the sole criterium to consider them at present as mono- or bitypic genera, inviting testing the monophyly hypothesis as soon as suitable material is available. Such a clear indication of the necessity to assess the position of particular species is preferred to hiding aberrant species in large genera without evidence that they form a monophyletic group with the other species in the genus, or to leave them under a certainly polyphyletic “*Matelea* s.l.”.

While members of Clades I (*Suberogerens* [Morillo, 2015a] and *Talayotea* [Alvarado-Cárdenas, 2021]) and Clade IV (*Anemotrochus*, *Tylodontia* [Mangelsdorff & al., 2016], *Meveampelos* [Morillo, 2023b]) have been transferred to independent genera recently, this work is not yet complete for Clades II, III and V. Some of the genera recognized here were also recognized by early botanists, whereas others have been discovered only recently. As in previous studies (e.g., Liede-Schumann & al., 2022), a combination of molecular phylogenetic analysis and morphological study is employed as the best compromise between the

identification of evolutionary lineages, production of a workable classification and compensation for missing material or information.

By comparing our phylogeny to the backbone of the Tree of Life (Baker & al., 2022) (Fig. 5A, with corrected taxa identifications), it becomes apparent that not even this dataset employing a large number of nuclear genes and few (15) species sampled could recover fully supported relationships in the backbone of Gonolobinae. Bitencourt & al.'s (unpub. data) (Fig. 5B) sampling of slightly more taxa (19) overcame this problem by removing noise genes.

The clades retrieved by Baker & al. (2022) essentially correspond to our results (Fig. 5A), with *Macroscepis*–*Cristobalia*–*Fischeria* (including *Rhytidostemma*) forming a well-supported clade, sister to *Gonolobus*–*Lachnostoma*–*Phaeostemma*, and both clades in a grade with *Rojasia* and *Ibatia*, corresponding to Clade V. The West Indian genera *Anemotrochus* and *Tylodontia* form a well-supported clade (corresponding to our Clade IV), sister to the group corresponding to Clade V, and the Central and North American *Polystemma*–*Chthamalia*–*Pherotrichis*, corresponding to Clades II and III are sister to the whole group. The same general arrangement is presented by Bitencourt & al. (unpub. data) (Fig. 5B), which places the additional taxa in the positions expected from our trees.

Earlier studies have retrieved some of the clades discussed here. Krings & al. (2008), combining two chloroplast regions and *LEAFY*, presented two moderately supported West Indian Clades, one including *Matelea sintenisii* (Schltr.) Woodson–*M. variifolia* (Schltr.) Woodson (here separated as *Portoricana*), a well-supported South American Clade comprising *Fischeria*, *Macroscepis* and *Ibatia*, a well-supported clade comprising *Chloropetalum* (*M. denticulata* (Vahl) Fontella & E.A.Schwarz)–*Gonolobus* (but with *G. stenosepalus* well supported as sister to *M. denticulata*) as sister to *Matelea* s.str. (*M. palustris*). They also retrieved Clade I (*Talayotea* (*M. trachyantha*)–*Suberogerens* (*M. cyclophylla*)) with good support, and a well-supported clade comprising the remaining Central/North American species included in the analysis.

McDonnell & al. (2018), combining nuclear and chloroplast data, also retrieved Clade I with good support (“F” in McDonnell & al., 2018), and the members analyzed of Clade II (*Polystemma* (“D”) + *Dictyanthus*–*Urostephanus* (“A”) + *Tutumakanthus*–*Odontostephana*–*Yucatania* (“C”)) and Clade III (*Chthamalia*, *Microstelma*, *Pherotrichis* (“B”)) with weak support. *Matelea* s.str. (*M. pedalis*) and *Ptycanthera* (*M. emmartinezii* W.D.Stevens) were also retrieved as sisters with moderate support and with good support as sisters to *Gonolobus*.

While Baker & al. (2022) retrieved *Pruskortizia*, a bitypic genus of large-leaved and large-flowered, tall twiners with big, unarmed follicles from western South America, which was not available in our sample, as sister to all other Gonolobinae, *Pruskortizia* was positioned as sister to *Fischeria* in Clade V in the tree of Bitencourt & al. (unpub. data) (Fig. 5B), a relationship also suggested by morphological data (the type

species of *Pruskortizia*, *P. macrocarpa* (Poepp.) Morillo was originally described under *Fischeria*).

The results presented here provide some detail to the analysis of Bitencourt & al. (2021), who state that “a dispersal from Africa to South America at the end of the Eocene gave rise to the MOG clade” and “dispersals to Mesoamerica were inferred starting in the Miocene, in Gonolobinae (ca. 20 mya) [...] Only Gonolobinae shows significant diversity in North America with dispersal back to South America.” Our analysis dates Gonolobinae to 18.32 Ma, (12.19–24.48 Ma), older than the ages given by Zuntini & al. (2024; 7.1625 Ma [young tree], and 10.0946 Ma [old tree]) but including the date given by Fishbein & al. (2018) with 19.4 Ma (Figs. 4, 5A). Following our results and the results of Bitencourt & al. (unpub. data) (Fig. 5B), the dispersal to Central/North America must have taken place very early in the history of Gonolobinae, at around 18 Ma, with dispersals to the West Indian Islands and back to South America not much later, at around 17 Ma. The poor backbone resolution and varying positions of the five main clades in our analyses (Fig. 5C–G) hint at rapid radiation of early Gonolobinae over its whole distribution area. From South America, several genera again dispersed to the West Indian Islands (*Fischeria*, *Gonolobus*, *Ibatia*, *Portoricana*, *Ptycanthera*) or to Central/North America (*Chloropetalum*, *Fischeria*, *Gonolobus*, *Macroscepis*, *Ptycanthera*). With the exception of the species-poor Central/North American Clade I, that is dated at 10.06 Ma (5–15.5 Ma), all clades radiated in relatively rapid sequence between 13 and 16 Ma (6–22 Ma), suggesting a peak of radiation near the end of the Middle Miocene Climatic Optimum, coinciding with a peak of plant diversity in South America (Hoorn & al., 2010). The dates estimated from our analyses, even if the rather large uncertainties are considered, fall into a period of intensified tectonic activity throughout the continental Americas (Hoorn & al., 2010; Gutiérrez-García & Vázquez-Domínguez, 2013) and intensified isolation of the major West Indian Islands (Iturralde-Vinent, 2006). Western Amazonia was gradually becoming submerged (“Lake Pebas”), with an extensive system of long-lived lakes and wetlands, for a rather long period of time (17–11 Ma, Antonelli & al., 2009), maybe reflected by the many relict water-affine lineages in Clade V (e.g. *Acomosperma*, *Potamoampelos*, *Riparoampelos*, many species of *Matelea*).

In our analysis, Gonolobinae is sister to a weakly supported quadrifurcation of Metastelmatinae, Oxypetalinae, Tassadiinae and Topeinae. In contrast, both Baker & al. (2022) and Bitencourt & al. (unpub. data) retrieve Topeinae, a small subtribe of two species from northeastern Argentina and Paraguay, as sister to Gonolobinae, and (Tassadiinae + (Metastelmatinae + Oxypetalinae)) as sister to both. Metastelmatinae (Liede-Schumann & al., 2014; Bitencourt & al., 2021) are a South American lineage (with later expansion to the West Indian Islands and Central/North America). Oxypetalinae have also been reconstructed with South American origin (suppl. figs. S2–S5 in Bitencourt & al., 2021). For the still-understudied Tassadiinae, however, the

Cuban *Tassadia richardiana* (Alain) Liede & Mangelsdorff, a species not included in Bitencourt & al. (2021), has been identified as sister to the remaining (South American) species analyzed (Liede-Schumann & Meve, 2015). Although the sister-group relationship to Topeinae suggests a South American origin for Gonolobinae, the analysis of Bitencourt & al. (unpub. data) indicates that its earliest radiations occurred in Central America. Consequently, the reconstruction of Bitencourt & al. (2021: their suppl. figs. S2–S5), which infers all of tropical America as the ancestral area for Gonolobinae, remains the most likely scenario.

■ CONCLUSIONS

As recognized by many workers since the time of Woodson (1941), the treatment of the vast majority of Gonolobinae species under “*Matelea*” is an over-simplification of the complex history of the subtribe. Recent approaches to circumscribe monophyletic lineages in the tribe are hampered by morphological (in particular floral) homoplasies and parallelisms, but also by genetic homologies between morphologically dissimilar floral structures, in both cases probably in adaptation to the most frequent pollinators. The present phylogeny shows that the diversity in Gonolobinae falls into five geographically well-circumscribed clades, which have probably rapidly radiated over the whole area of the subtribe in the early to middle Miocene. Three of the five main clades are restricted to Central/North America, one to the West Indian Islands, while the fifth harbors mainly South American lineages, but with several genera expanding to the other two areas. Despite the poor backbone resolution, attribution of the genera to one of these five clades is constant through all analyses and so are many sister-group relationships. Thus, our study allows for the first time the presentation of a phylogenetically informed classification of this difficult subtribe. However, phylogenetic analyses including a large number of loci, preferably from different genomes (nuclear, plastid, and mitochondrial) and an even larger number of taxa, in particular including the as yet unstudied mono- and bitypic genera, are needed to fully understand the generic composition and evolutionary history of Gonolobinae.

■ KEYS TO THE GENERA

Key to the South American genera of Gonolobinae

1. Mature branches and leaves usually with inconspicuously eglandular trichomes, sometimes glabrescent or glabrous2
1. Mature branches and leaves mixed pubescent, with eglandular and glandular trichomes (but usually eglandular trichomes on stems and glandular trichomes on main leaf veins in *Lachnostoma* and glandular trichomes scarce or hidden by eglandular trichomes in some species of *Phaeos-temma*)..... 8

2. Small rheophytic herbs, with stems rooting at nodes, forming dense colonies; leaf blades glabrous on both faces; follicles smooth, 2–3 cm long when mature; seeds small (<2.5 mm long), ecomose *Acomosperma*
2. Terrestrial or subaquatic subshrubs, with erect, prostrate or twining stems, usually not rooting at nodes, and not forming colonies in or close to water courses; leaf blades glabrous or variously pubescent on abaxial surface and/or on main veins; follicles fusiform to ovate-fusiform, mostly winged, costate or muricate, rarely smooth, usually more than 5 cm long when mature; seeds larger (>2.5 mm long), usually comose, rarely ecomose (fruits and seeds not known for *Weigendia*)3
3. Stems creeping or decumbent, mostly developed from a xylopodium; leaves distichous and/or verticillate; inflorescences 3-verticillate in upper nodes, or simple, subaxillary, 2–4-flowered; corolla lobes adaxially verrucose in most species (not verrucose in *A. bornmuelleri*) *Austrochthamalia*
3. Stems prostrate, creeping or vining, not developed from a xylopodium; leaves decussate; inflorescences simple, subaxillary, 2–24-flowered; corolla lobes not verrucose adaxially4
4. Inflorescences sessile or subsessile, peduncles less than 5 mm long.....5
4. Inflorescences pedunculate, peduncles more than 7 mm long (up to 72 mm long).....6
5. Corolla urceolate-campanulate, with pink, purple-brown or red non-ocellate lobes; follicles 4- or 5-angled and costate lengthwise; seeds ecomose *Potamoampelos*
5. Corolla rotate to campanulate, usually with green, yellowish-green or white ocellate lobes; follicles with 4 or 5 undulating wings, sometimes smooth; seeds comose..... *Ptycanthera*
6. Leaves up to 4.5 × 3 cm, early caducous; peduncles up to 15 mm long, corolla narrow-campanulate, 6–7 mm diam. *Peruviasclepias*
6. Leaves mostly larger than 7 × 4 cm, not caducous; peduncles 30–72 mm long; corolla campanulate or subcampanulate-rotate, 20–25 mm diam.7
7. Stems and leaves puberulous to glabrescent, with translucent eglandular trichomes not longer than 0.3 mm; corolla with 5 pubescent interlobular pads; follicles spindle-shaped, 5-costate; endemic to eastern Brazil *Malinvaudia*
7. Stems and leaves pilose, hispid or hirsute, with brownish eglandular trichomes to 1 mm long; corolla without interlobular pubescent pads; follicles not known, but ovaries muriculate; endemic to the cloud forest (2800 m) in the Peruvian Andes..... *Weigendia*
8. Axillary petiolar colleters present.....9
8. Axillary petiolar colleters absent.....12
9. Mature internodes lenticellate; corolla lobes crisped on at least one side, mostly with a medial band of papillae or a triangle of papillae on the adaxial surface (but corolla

- lobes not crisped, without papillose zones in *F. graciae*); pollinia horizontal.....**Fischeria**
9. Mature internodes suberized or smooth, not lenticellate; corolla lobes not crisped, without papillose zones; pollinia slightly to conspicuously pendent.....10
10. Stems and leaves with eglandular trichomes 0.25–1 mm long; corolline corona absent; follicles conspicuously muricate, projections often with suberized zones or at apex.....**Ibatia**
10. Stems and leaves with eglandular trichomes mostly 1–4.5 mm long; corolline corona often present; follicles winged, muricate or with short inconspicuous swellings, not suberized.....11
11. Twining vines; stems with conspicuously corky bases; corolla deeply campanulate, urceolate, tubular or narrow-infundibuliform; pollinia conspicuously pendent, usually with an external (lateral) conspicuous hyaline marginal wing or with a longitudinal furrow; follicles conspicuously 5–7-winged (with 7–9 rows of acute prickles in *M. grandiflora*).....**Macroscepis**
11. Twining vines, creeping or erect subshrubs, stems not corky; corolla rotate or rotate-campanulate; pollinia slightly pendent, without a thin lateral margin and without furrows; follicles with sparse to densely gathered swellings, often with small central acute projections.....**Cristobalia**
12. Stems and leaves with eglandular trichomes mostly to 1 mm long.....13
12. Stems and leaves with eglandular trichomes 0.5–8 mm long.....20
13. Mature internodes smooth or lenticellate, but not corky or only thinly corky.....14
13. Mature internodes not lenticellate, but conspicuously corky.....16
14. Mature stems neither corky nor lenticellate; corolline corona absent; pollinia slightly ascending; ovaries muricate.....**Caa**
14. Mature stems slightly to conspicuously lenticellate; corolline corona mostly present; pollinia horizontal in most species; ovaries (and follicles) mostly winged or costate, rarely muricate or smooth.....15
15. Mature stems conspicuously lenticellate in lower internodes; eglandular trichomes on stems and leaves 0.5–3 mm long; radial (dorsal) laminar anther appendages present (sometimes very small).....**Gonolobus**
15. Mature stems thinly suberized, rarely slightly lenticellate in lower internodes; eglandular trichomes on stems and leaves 0.2–1 mm long; dorsal laminar anther appendages absent.....**Chloropetalum**
16. Follicles pentagonal, 5-winged or 5-costate, rarely smooth.....17
16. Follicles not distinctly pentagonal, variously muricate... 18
17. Corolla lobes dark purple, oblong, tightly contorted in bud; staminal corona segments of 5 fleshy distinct bilobed elements, interstaminal segments not differentiated; pollinia pendent.....**Lhotzkyella**
17. Corolla lobes mostly cream, yellowish-green or green, rarely purple or pink, deltoid to ovate-oblong, often spreading, not contorted in bud; with staminal and interstaminal corona segments, often with crenulate, dentate or fimbriate thin margin; staminal corona lobes generally ridged or subtriangular and with apical ligule; interstaminal corona segments often distinctly differentiated, rather concave or plane; pollinia subhorizontal or horizontal.....**Matelea**
18. Stems with dense greyish-tomentose pubescence; corolla lobes white, erect and apically recurved, glabrous; corona of white, free, erect, apically bifid segments, branches conspicuously fimbriate; pollinia pendent; follicles with sparse long acute prickles (dry vegetation in Gran Chaco, N Argentina, SE Bolivia and S Paraguay).....**Rojasia**
18. Stems with yellow or yellowish-brown pubescence; corolla lobes purple, green or yellow with pink or purple margins, usually spreading; corona mostly of black or dark brown segments, laterally connate, not fimbriate; pollinia horizontal or pendent; follicles with short sparse conical projections scattered or in lines (from Costa Rica and Panama to the Amazon, the Guianas and south to Peru and probably Bolivia).....19
19. Inflorescences 2- or 3-flowered, subsessile; calyx with 4 or 5 colleters per axil; corolla lobes purple or yellow with purple margins and apex, usually with long ribbon-like trichomes at apical margins; gynostegial corona dark brown to dark purple or shiny black, fleshy, with undulating conspicuous segments, the staminal segments broadly round incurved towards the anthers, the interstaminal segments concave; pollinia horizontal; follicles irregularly muricate, with blunt-tipped conical prickles; seeds orange, thick, ecomose.....**Riparoampelos**
19. Inflorescences 3–7-flowered, pedunculate or sessile; calyx with 1 colleter per axil; corolla lobes white, green, purple or brown-purple, usually glabrous or with minute few-celled trichomes; gynostegial corona white, green or purple-pink, cyathiform or of 5 almost distinct segments connate at the base; pollinia pendent; follicles muricate, conical erect or antrorse projections distributed in lines along fruit; seeds light brown, thin, comose.....**Atrostemma**
20. Basal internodes of mature stems lenticellate; anthers with dorsal laminar appendages present, sometimes very small; follicles mostly 3–5-winged or costate
.....**Gonolobus**
20. Basal internodes of mature stems not lenticellate; anthers without dorsal laminar appendages; follicles muricate or with a combination of wings and conical or irregular projections.....21
21. Petioles with axillary colleters; inflorescences short-pedunculate (peduncle + rachis as long as or shorter than pedicels); corolla with slightly differentiated nectar cavities between corolla tube and stipe; gynostegial corona with 5 digitate (bilobed) apically free erect segments
.....**Phaeostemma**

21. Petioles without axillary colleters; inflorescences subsessile, slightly or long-pedunculate; corolla with or without nectar cavities; gynostegial corona diverse, sometimes bilobed and digitate.....22
22. Corolla rotate, 3.3–6.5 cm diam.; not forming conspicuous nectar chambers with the corona; pollinia horizontal.....23
22. Corolla rotate, rotate-campanulate or infundibuliform, 0.7–3(–3.5) cm diam.; forming 5 conspicuous nectar chambers with the corona; pollinia pendent24
23. Pubescence moderate-hirsute, with long golden yellow trichomes (4–8 mm long) on stems and leaves; leaf blades and calyx without colleters; inflorescences with peduncles 7–13 cm long; a ciliate corolline annular corona present, gynostegial corona discoidal 15-lobed, staminal corona 10-lobed, lobes grouped in pairs, apically lobed, crenate; interstaminal corona of 5 oblong lobes, sulcate lengthwise with narrower apex; follicles hirsute, with dense acicular projections; tropical rain forest in Venezuelan Amazonia and the edge of semi-deciduous forest in Mato Grosso, Brazil**Orinoquia**
23. Pubescence tomentose or villous, with long brown or yellowish-brown trichomes (1–8 mm long) on stems and leaves; leaf blades with 5–8 colleters and calyx with 1 colleter per sinus; inflorescences subsessile; corolline corona absent; gynostegial corona almost flat disk-shaped, of 5 hemidiscoidal staminal lobes, interstaminal segments not differentiated; follicles with small sparse conical projections; tropical rain forest and lower montane wet or rain forests, from Colombia to Bolivia ...
.....**Pruskortizia**
24. Inflorescences pedunculate; corolla usually infundibuliform or campanulate, rarely broadly tubular, with well-differentiated tube, lobes usually spreading and conspicuously reticulate (not reticulate in two species); corona of 5 staminal segments bifid-digitate or digitate-flabellate at apex; follicles with a combination of wings and conical or irregular projections distributed in lines; plants of wet mountain forests from the coastal range in Venezuela along the Colombian and Ecuadorian Andes to Peru, from 700–3000 m
.....**Lachnostoma**
24. Inflorescences sessile or subsessile; corolla shortly and openly campanulate, lobes strongly reflexed, slightly or conspicuously reticulate; corona tubular (of connate staminal-interstaminal segments and presumably adnate to a corolline corona); follicles 5-costate lengthwise; plants from the lowland rain forest or premontane rain or wet forest, from Nicaragua south to W Brazil and Peru, below 1000 m**Pseudolachnostoma**
- Key to the West Indian Island genera of Gonolobinae**
1. Leaf blades obtuse, rounded, cuneate or broadly and slightly subcordate at the base, generally small, 1–8.5 cm long (up to 11 cm long in *Portoricana* and *Ptycanthera acuminata* (Griseb.) Morillo)2
1. Leaf blades generally cordate-lobate at base, subcordate in few species, sagittate in one genus (*Poicilla*), small or large7
2. Leaf blades tapering and without colleters at base; pollinia pendent from the caudicles, without sterile hyaline regions; follicles fusiform or obclavate, with some isolated protuberances and with sparse trichomes
.....**Anemotrochus**
2. Leaf blade bases obtuse, rounded, truncate or inconspicuously subcordate, rarely cuneate, with 2 or more colleters adaxially; pollinia horizontal or pendent from the caudicles (in *Tylodontia*); follicles fusiform, minutely ridged, with 5 undulating or incomplete longitudinal wings or ribs, or smooth3
3. Pollinia pendent from the caudicles; corolline corona present (part of a complicated system of ridges and bulges mostly in fused part of corolla) or apparently absent or reduced; follicles smooth**Tylodontia**
3. Pollinia horizontal from the caudicles; corolline corona present or absent; follicles minutely ridged, with 5 undulating or incomplete longitudinal wings or ribs (*Ptycanthera*), or smooth4
4. Corolla lobes adaxially pubescent; staminal corona segments obovate to suborbicular, rounded to emarginate at apex, with a small adaxial ligule; follicles subcylindrical-linear to fusiform, very narrow (3.5–4.3 × 0.2–0.3 cm), smooth**Poicillopsis**
4. Corolla lobes adaxially glabrous; staminal corona segments diverse in shape, but never obovate or suborbicular or with a ligule; follicles narrow-fusiform, ellipsoid, ovoid or ventricose, 4.5 × 1 cm or larger, pentagonal, 5-ribbed, 5-winged or almost smooth5
5. Corolla lobes not ocellate, glabrous on both faces; follicles smooth or multi-minutely ridged6
5. Corolla lobes generally ocellate at apical third, adaxially glabrous, abaxially generally pubescent; follicles with 5 undulating or incomplete longitudinal wings or ribs (West Indies, Mesoamerica, northern South America)....
.....**Ptycanthera**
6. Latex translucent; pubescence of retrorse eglandular trichomes and occasionally few erect, capitate glandular trichomes; corolla campanulate; only gynostegial corona present; follicles fusiform smooth or multi-minutely ridged (Cuba)**Meveampelos**
6. Latex white; pubescence of only retrorse eglandular trichomes; corolla rotate-subcampanulate; corolline and gynostegial corona present; follicles smooth (Puerto Rico)**Portoricana**
7. Leaf blades sagittate at base; staminal corona segments prominent-convex and cucullate (hooded), not ligulate (Cuba)**Poicilla**
7. Leaf blades shortly or broadly cordate-lobate at base; staminal corona segments diverse, but never cucullate..8
8. Mature stems lenticellate, thinly suberized in lower internodes; corolla (sub-)rotate, rarely campanulate; pollinia horizontal from the caudicles; follicles irregularly

- smooth, with sparse small conical projections or 3- to 5-winged, wings sometimes discontinuous or reduced in size.....9
8. Mature stems conspicuously suberized and grooved; corolla campanulate, urceolate or tubular; pollinia pendent from the caudicles; follicles 4–7-winged or muricate..11
9. Stems and leaves with light brown pubescence of eglandular spreading trichomes (1.5–6 mm long), and glandular capitate trichomes (0.15–0.4 mm long), these turning black when dried and very dense in some species; corolla lobes conspicuously crisp marginally in most species; anthers usually inflated dorsally, vesicular, frequently pear-shaped; follicles smooth or with some small protuberances, neither muricate nor winged **Fischeria**
9. Stems and leaves usually with whitish or yellowish pubescence of eglandular trichomes spreading or retrorse (0.4–2.5) mm, and glandular capitate trichomes (0.1–0.4 mm long), translucent to light brown when dry; corolla lobes planar, sometimes somewhat concave or marginally undulate, but not crisp; anthers neither inflated nor vesicular; follicles 3- to 5-winged or muricate.....10
10. Mature stems usually lenticellate in lower internodes; laminar dorsal anther appendages present; follicles mostly obtuse or acute at apex, small or large **Gonolobus**
10. Mature stems thinly suberized, rarely slightly lenticellate in lower internodes; laminar dorsal anther appendages absent; follicles broadly attenuate at apex, relatively small..... **Chloropetalum**
11. Corolla urceolate or tubular; staminal corona segments usually fleshy, basally fused to the interstaminal corona, adnate to the corolla tube at least half of its length; gynostegium included, sessile, style-head concave or convex; follicles (5–)7-winged, two of the wings incomplete..... **Macroscepis**
11. Corolla rotate to subcampanulate; corona of fused, mostly laminar staminal and interstaminal parts, adnate to the stipe and to inner base of corolla tube, interstaminal corona segments frequently cup-like; gynostegium exserted, stipitate, style-head concave to rostrate; follicles wingless, tuberculate, usually with some suberized zones **Ibatia**
- smooth, with sparse small conical projections or 3- to 5-winged, wings sometimes discontinuous or reduced in size.....3
3. Gynostegial corona and corolline corona (annular or cup-like, entire or discontinuous) present4
3. Gynostegial corona present, corolline corona absent.....5
4. Lower internodes of mature stems conspicuously lenticellate; anthers with radial laminar dorsal appendages **Gonolobus**
4. Lower internodes of mature stems usually thinly suberized, rarely slightly lenticellate; anthers without dorsal appendages..... **Chloropetalum**
5. Plants with a thick, erect, conspicuously corky caudex; pubescence of stems, leaves, and inflorescence of appressed ferruginous more or less vermiform eglandular trichomes, these trichomes with thin, not sculptured walls, glandular-capitate trichomes few or absent; leaf blades suborbicular, early caducous; follicles narrowly fusiform, with short obtuse, suberized projections **Suberogerens**
5. Plants without a caudex; pubescence of stems, leaves and inflorescence of spreading or retrorse eglandular trichomes and sparse glandular-capitate trichomes, eglandular trichomes with sculptured walls; leaf blades ovate, elliptic or oblong-lanceolate, usually persistent; follicles fusiform or fusiform-attenuate, winged, ridged or smooth, and sometimes with conical or uncinat, not suberized projections.....6
6. Leaf blade abaxial face frequently with sparse or ubiquitous pubescence of short spreading eglandular trichomes; style-head concave; anthers somewhat bent toward flower axis; pollinia subpendent; corona of partly connate staminal and interstaminal segments, staminal segments thickly laminar or fleshy, adnate to the stipe only at base, interstaminal segments deeply concave, usually puberulous abaxially; follicles with 5 wings and several conical or conical-uncinate projections **Atrostemma**
6. Leaf blade abaxial face glabrous or with few sparse eglandular trichomes, sometimes short eglandular and glandular trichomes on midvein, and/or margins; style-head plane or convex, rarely rostrate; anthers and pollinia horizontal or almost so; corona made of partly connate staminal and interstaminal segments, staminal segments fleshy elevated ligulate ridges adnate to stipe over most of its length, interstaminal segments plane or slightly concave, glabrous throughout; follicles 5-winged, 5-ridged or almost smooth7
7. Corolla lobes ocellate in most species; follicles with 5 undulating or incomplete wings or ribs, rarely smooth **Ptycanthera**
7. Corolla lobes not ocellate; follicles with complete wings or ribs..... **Matelea** s.str.
8. Stems, leaves, inflorescences and follicles with dense white-silvery woolly indument of eglandular ribbon-like multicellular trichomes; corolla lobes with long-plumose, purple caudate appendages; pollinia pendent, with a

Key to the Central and North American genera of **Gonolobinae**

1. Mature branches and leaves inconspicuously short-pubescent, glabrescent or almost glabrous.....2
1. Mature branches and leaves usually moderately to densely puberulous to hirsute8
2. Erect shrubs with spreading branches up to 0.7 m long; pollinia pendent from the caudicles; follicles curved-ovate, muricate, with acute pungent prickles (Mexico) ... **Talayotea**
2. Trailing or twining vines, more than 1 m long when mature; pollinia horizontal or slightly bent towards flower axis, follicles fusiform or narrow-ovate, winged, ribbed,

- slender sterile horn-like basal process connected to the caudicles **Trichosacme**
8. Stems, leaves, inflorescences and follicles pubescent, sometimes glabrescent with age, pubescence generally hirsute, hirtellous or puberulous, usually with a mixture of short and long straight acicular or uncinate eglandular trichomes, or of glandular-capitate and eglandular acicular or uncinate trichomes; corolla lobes without plumose appendages, but sometimes pubescent in at least one face; pollinia horizontal or pendent, without a horn-like basal process..... 9
9. Erect herbs or subshrubs less than 1 m high, or prostrate, trailing, decumbent or twining stems, usually less than 2.5(–3) m long when mature..... 10
9. Herbs or shrubs with twining or sometimes partly trailing stems, generally 3–40 m long when mature 19
10. Erect herbs or shrubs, stems solitary or several from the base 11
10. Herbs or subshrubs with prostrate, decumbent, trailing or short twining stems 12
11. Stems solitary (rarely shortly branched from the base), up to 0.7 m long, with dilute white or translucent latex, leaf blades attenuate, obtuse, acute, rounded or slightly cordate at base; corolla urceolate or campanulate; style-head conical or rostrate, convex, obtuse or slightly concave at apex; pollinia pendent; follicles sharply deflexed, smooth, with densely villous to hirsute mixed conspicuous pubescence **Pherotrichis**
11. Stems usually several from a small caudex, up to 1 m high, with white latex; leaf blades cordate-lobate at the base; corolla widely campanulate to rotate-campanulate; style-head pentagonal, convex-bilobed, apiculate or shallowly concave at apex; pollinia horizontal or pendent from the caudicles, obliquely curved or flattened-obovate; follicles muricate, with few to many thick or thin spreading or curved acute or obtuse projections (prickles), pubescent or glabrous **Dictyanthus**
12. Glandular capitate trichomes with white crystalline inclusions present on stems, leaves and inflorescence; corona of 5 diversely digitately appendaged lobes; follicles long fusiform-cylindrical, smooth, glabrous and mottled **Polystemma**
12. Glandular capitate trichomes translucent, brown or black, or absent on stems, leaves and inflorescence; corona diverse in shape, usually not digitate, but digitate in some species of *Ibatia*; follicles ovate to fusiform, mostly muricate or tuberculate, glabrous or pubescent, striate in some species 13
13. Corolla tube and base of lobes adaxially with long linear-spatulate ascending whitish or purplish trichomes 2.5–3.5 mm long; gynostegial corona fused, tubular-conical-truncate, adnate to stipe, marginally with 10 ascending to erect ligulate-spatulate lobes, standing in pairs in interstaminal position, and 5 short subulate lobes in staminal position; anthers with dorsoapical dehiscence and without hyaline membranes **Himantostemma**
13. Corolla tube adaxially glabrous or pubescent, if pubescent, then trichomes acicular or papillate white-translucent, less than 1 mm long; gynostegial corona of 5 at least basally connate staminal lobes, cyathiform, lobate, crenulate, dentate or fimbriate; anthers with lateral or dorsolateral dehiscence and with hyaline membranes 14
14. Petioles with small axillary colleters; inflorescence sessile, congested-racemiform cymes, corolla lobes adaxially pubescent, with unicellular white trichomes; follicles muricate, with conical-clavate projections, usually suberized at apex, surface densely tomentulous..... **Ibatia**
14. Petioles without axillary colleters; inflorescence pedunculate or sessile, sometimes pedunculate and sessile in the same species, umbelliform or racemiform cymes, sometimes reduced to 1–2 flowers; corolla lobes adaxially glabrous or at the most puberulent or slightly pubescent at the base; follicles with obtuse, acute or uncinate projections, rarely smooth, surface glabrous or with conspicuous pubescence 15
15. Leaf blades 4–12 cm long, ovate or ovate-lanceolate or ovate-elliptic, deeply cordate, with 4–8 colleters; pollinia pendent or subhorizontal (apex slightly bent towards flower axis in *Mexicania*) 16
15. Leaf blades 1–5(–7) cm long, sagittate, triangular-ovate-attenuate or suborbicular, truncate, cordate-attenuate or shortly subcordate at the base, with 2–5 colleters; pollinia horizontal or slightly bent from apex towards flower axis 18
16. Inflorescences short- or long-pedunculate, peduncles 7–35 mm long; corolla white or yellowish-green with green or reddish-purple veins; corolline corona absent; gynostegial corona cyathiform, lobed and fimbriate or peltate dark brown to black rugose or sulcate segments; pollinia with well differentiated caudicles 17
16. Inflorescences few-flowered, sessile or subsessile, peduncles 0–5 mm long; corolla brown, reddish-brown, cinnamon brown to chocolate-brown, with a fine reticulum of about similar color; corolline corona a narrow annulus around gynostegial corona; gynostegial corona of 5 laminar, cinnamon-brown, broadly to yellow round smooth staminal segments; pollinia subsessile, with slightly differentiated caudicles **Mexicania**
17. Inflorescences (10–)20–60-flowered paniculate cymes (peduncles 7–35 mm long); corolla short-campanulate, lobes white, with green veins; corona purple-pink or white, cyathiform, of two series of conspicuously lobed and fimbriate smooth segments **Callaeolepium**
17. Inflorescences 4–8-flowered umbelliform or helicoid cymes (peduncles 11–25 mm long); corolla rotate or rotate-campanulate; lobes yellow-green generally with green, reddish or orange parallel veins lengthwise; corona fleshy, of 5 black to brown peltate or subrectangular, rugose or sulcate staminal segments **Microstelma**

18. Stems prostrate, trailing or ascending, rarely small vines, with mixed pubescence, eglandular trichomes spreading or reflexed, 0.15–1.8 mm long; sometimes a xylopodium present; corona gynostegial, cyathiform or tubular, annular, with 5 short or very long ascending, erect or incurved lobes, rarely segments slightly connate at the base only; pollinia horizontal or somewhat bent from apex towards flower axis, obovoid or obovoid-reniform ... **Chthamalia**
18. Stems twining, sometimes trailing, with mixed pubescence or only eglandular trichomes, usually appressed, 0.2–0.3 mm long; never with a xylopodium; corona gynostegial, cyathiform pentagonal in outline, with 5 spreading lobes, cyathiform with undulate or entire upper margin and 5 inner appendages opposite anthers (exceeded by style-head), or of 5 almost free stalked staminal segments, deeply 3-lobed at apex, longer than style-head, with 5 inner triangular appendages; pollinia horizontal, subquadrate to ellipsoid-reniform **Pauciflora**
19. Long eglandular trichomes (5–6-celled) on conical or column-like multicellular bases, present on stems, leaves, inflorescences and follicles; style-head long-rostrate, appendage narrowly clavate, apically obtuse; whole plant turning blackish when dried **Prosthecidiscus**
19. Long eglandular trichomes usually surrounded by a narrow ring of small modified epidermal cells present on stems, leaves, inflorescence and sometimes on follicles; style-head not rostrate, or short-rostrate and apically rugose or bifid; plants usually not turning blackish when dried (but turning dark brown in some *Fischeria* species) 20
20. Axillary petiole colleters usually present; corolla lobes crisped at apex; anthers inflated dorsally, vesicular, frequently pear-shaped (in all Mexican-Mesoamerican species); follicles usually obtuse at apex, smooth or with some small conical projections, neither muricate nor winged **Fischeria**
20. Axillary petiole colleters present (in *Macrocepis*) or absent; corolla lobes marginally entire or undulated, sometimes marginally revolute but not crisped; anthers not inflated dorsally; follicles generally acute, acuminate or attenuate at apex, with smooth, muricate or winged surface 21
21. Petioles with several (ca. 3–5) digitate axillary colleters; corolla urceolate or tubular; follicles 5–7-winged (or provided with 7–9 files of conical projections in a South American species) **Macrocepis**
21. Petioles without axillary colleters; corolla rotate to campanulate or urceolate; follicles muricate or 3–5-winged, rarely smooth 22
22. Pubescence of only eglandular trichomes (short and long) on vegetative structures and inflorescence; corolline corona present 23
22. Pubescence of glandular and eglandular trichomes on vegetative structures and inflorescences; corolline corona present or absent 25
23. Stem and leaf pubescence of long eglandular trichomes 1.5–5.3 mm; corolla rotate, 36–48 mm diam., lobes spreading, ovate-orbicular or broadly deltoid; gynostegium sessile; corolline corona a shallow fleshy cup, roughly pentagonal with prominent radial angles; pollinia horizontal from the caudicles **Rotundanthus**
23. Stem and leaf pubescence of short (0.25–0.75 mm) and long (1–2.5 mm) eglandular trichomes; corolla campanulate or rotate-campanulate, 7–26 mm diam., lobes spreading to reflexed, ovate or oblong; gynostegium stipitate; corolline corona cupuliform-urceolate, shortly urceolate or tubular; pollinia pendent or horizontal from the caudicles 24
24. Corolla lobes ovate, spreading; corolline corona tubular-cyathiform, apically fimbriate; gynostegial corona with 5 horn-like staminal lobes adnate to the stipe; follicles hispid, densely prickled, with long curved conspicuous projections; plants from upper mountain cloud forest (N Guatemala-S Mexico) **Vulcanoa**
24. Corolla lobes narrowly ovate to oblong, reflexed; corolline corona apparently absent; gynostegial corona a tubular or shortly funnel-shaped structure, apically entire or dentate, not fimbriate; follicles sparingly puberulous, 5-winged or 5-costate; plants from tropical rainforest or premontane rain forest (Peru and SW Brazil to Nicaragua) **Pseudolachnostoma**
25. Anthers with radial laminar dorsal appendages; gynostegial and corolline corona (annular, entire or discontinuous) present; follicles 3–5-winged, muricate in one Mexican species, rarely smooth **Gonolobus**
25. Anthers without laminar dorsal appendages; only gynostegial corona present; follicles moderately to strongly muricate, rarely almost smooth 26
26. Leaf blade adaxial base, and interpetiolar line with fascicles of 30–50 colleters; corolla shallowly campanulate, 38–44 mm diam., with broadly elliptic or ovate-elliptic lobes; pollinia pendent, oblong-spatulate, 1.2–1.3 mm long; follicles dark brown, densely pubescent, 22–27 cm long, with long strongly curved projections **Bruceholstia**
26. Leaf blade adaxial base with 2–24 colleters, interpetiolar line with 3–4 colleters; corollas rotate to shallowly campanulate-rotate, 7–25(–40 mm) diam., with elliptic, narrowly deltoid to oblong-obovate lobes; pollinia horizontal or pendent or almost so; obovate, suborbicular, subquadrate, reniform to narrowly falciform, 0.3–0.7 mm long; follicles green or yellow, glabrous or minutely hirsute, 6–15 cm long, sparsely to densely short- or long-muricate, or with sparse inconspicuous swellings, or smooth 27
27. Corolla with arachnoid trichomes adaxially at the base; corona in one series, cyathiform, basally adnate to gynostegium, staminal corona of 5 subulate, oblong or erect-incurved apically truncate or rounded segments, resting on the anthers; interstaminal segments bifid, denticulate, cymbiform, filiform-filamentous appendaged, free or

- connate at the base, with corrugated, warty, or smooth membranes at the base; pollinia pendent; follicles 6–9 cm long, inconspicuously muricate to almost smooth (Mexico and southward) *Urostephanus*
27. Corolla glabrous or pubescent adaxially, trichomes when present not arachnoid; corona of 5 fused staminal and interstaminal segments, cup-shaped, arising near the junction of the gynostegial stipe and the corolla, of 5 staminal segments partly united in a ring (annulus) that reaches or surpasses style-head, each segment usually with two triangular teeth on the abaxial side in interstaminal position, or segments connate marginally in an undulate low ring adnate to base of corolla, with or without 5 elevated ridges adnate to the gynostegial stipe in staminal position; pollinia horizontal or almost so; follicles 6–15 cm long, conspicuously or inconspicuously muricate, or with low sparse swellings, sometimes smooth (Mexico to the United States) 28
28. Leaf blades round, obtuse or shallow-cordate at the base, with 2–4 colleters; inflorescence (1–)3–6-flowered, pedicels usually 2–5 times longer than peduncles; gynostegium stipitate, with cupulate-conical or convex style-head; follicles with dense short conical to long subcylindrical fleshy prickles (3–12 mm long) *Yucatania*
28. Leaf blades shallow to deeply cordate at the base, with (0–)2–24 colleters; inflorescence 3–40-flowered, pedicels usually as long as or shorter than peduncles; gynostegium sessile or stipitate with convex, flat or slightly concave style-head; follicles with swellings or prickles (1–15 mm long), or almost smooth 29
29. Leaf blades with 8–18(–24) colleters at the base of the upper surface; follicles usually muricate with short conical or long (2–15 mm long) narrow almost acicular prickles, or with low sparse swellings, or almost smooth; surface usually of mixed pubescence, with long eglandular trichomes and short glandular trichomes; at least minutely hirsute when mature *Tutunakanthus*
29. Leaf blades with (0–)2–6 colleters at the base of the upper surface; follicles muricate, with sparse or dense short conical or spine-like erect or antrorse prickles (ca. 1–5 mm long); surface of minutely hirsute (mixed) pubescence when young, but usually glabrescent when mature, or eventually glabrous *Odontostephana*

■ CONSPECTUS OF THE GENERA RECOGNIZED

Gonolobinae Liede in Taxon 46(2): 238. 1997 – Type: *Gonolobus* Michx.

= Gonolobeae G. Don, Gen. Hist. 4: 107, 136. 1838.

= Gonoloboideae Hook. f. in Le Maout & Decaisne, General Syst. Bot.: 554. 1873 ('*Gonolobae*').

Description. – As typical for subfamily Asclepiadoideae, almost all Gonolobinae share the possession of white latex

in all vegetative plant parts, except for *Meveampelos* from Cuba, and *Ptycanthera tarrazuana* (J.E. Jiménez & Hidalgo-Mora) Morillo from Costa Rica; in *Pherotrichis*, latex is white-dilute to clear. In many species, the latex emits an unpleasant smell. With some members of the Oxy-petalinae, the Gonolobinae share the occurrence of a golden-yellow, felty indumentum, and the occurrence of glandular trichomes (Metcalf & Chalk, 1972), a very rare feature in the subfamily. *Leaves* are almost always forming opposite pairs, in *Austrochthamalia*, frequently three leaves per node are formed. Leaf arrangement is commonly decussate, but in some genera (e.g., *Austrochthamalia* and some species of *Chthamalia*, as well as creeping species of other genera) it is pronouncedly distichous. Venation is generally pinnate-brochidodromous, and the number of pairs of the prominent lateral nerves can be characteristic in some genera. In most genera, leaf blade colleters are present at the adaxial base (missing, e.g., in *Anemotrochus*, *Orinoquia*). Inflorescences are usually one per node, and in extra-axillary position, but also terminal in some species of *Odontostephana* and apparently axillary in *Orinoquia*. In subfamily Asclepiadoideae, Gonolobinae are the only group outside Ceropegieae-Stapeliinae, in which an annular corona occurs, a highly derived corona structure (Liede & Kunze, 1993). Many Gonolobinae are easily recognizable by the extreme divergence of the anther sacs, resulting in a horizontal position of the pollinia. In about half of the genera, however, the pollinia are pendent, as typical for Asclepiadeae. Most pollinia possess sterile portions in proximal or lateral position. For many Gonolobinae, a very broad, flat style-head is characteristic. As far as known, all Gonolobinae possess the typical pod-like follicles as fruits, either single or in pairs; follicle walls are usually thick, and often ornate with folds, wings, protuberances, or prickles. With exception of *Acomosperma* Ule ex K. Schum., some species of *Matelea* s.str., *Potamoampelos* Morillo & al., and *Riparoampelos* Morillo, seeds are comose at the distal end.

Only the sporophytic chromosome number of $2n = 22$ has been counted in Gonolobinae this far (Albers & Meve, 2001; IPCN, 1979–).

Distribution. – Subtribe Gonolobinae is restricted to the Americas, with one species, *Gonolobus rostratus* (Vahl) Schult., recently introduced to West Africa (Krings, 2009).

1. *Acomosperma* K. Schum. ex Ule in Bot. Jahrb. Syst. 40(3): 406. 1908 – Type: *Acomosperma rivularis* K. Schum. ex Ule.

Description. – Suffrutescent rheophytes, multi-stemmed; latex white (fide Vásquez & al. 40081, MO). *Pubescence* mostly of 2–4-celled eglandular trichomes (0.05–0.2 mm long). *Stems* erect to subprostrate, rooting at the nodes and spreading to form dense colonies, 20–40 cm long, 2–3 mm diam., appressed-pilose, glabrous with age, internodes costate (ribbed) lengthwise. *Leaves* decussate, with petioles 0.3–0.55 cm long; blades 2.5–5 × 0.3–0.6 cm, oblong-elliptic,

cuneate toward the base, acuminate at apex, margin entire, glabrous on both faces; usually 7–9 pairs of lateral veins, with 2 colleters at the base of the upper surface. *Inflorescences* congested pedunculate cymes, 4–7-flowered; peduncles 0.9–2 cm long; bracts ovate, obtuse. *Flowers* with pedicels 0.6–2 cm long, minutely appressed-pilose. *Calyx* with lobes yellow, ascending, $2\text{--}2.7 \times 1.5\text{--}1.6$ mm, ovate, apex obtuse, abaxially appressed-puberulent with eglandular trichomes, and 1 collector per sinus. *Corolla* rotate, 12–15 mm diam., pale brown or brown-purple, faintly veined or reticulate, tube up to 2 mm long, lobes ascending, twisted or spreading, triangular-ovate, ovate to narrowly oblong or oblong-spatulate, obtuse; $2\text{--}6$ ($8\text{--}10$) $\times$ $2\text{--}2.6$ mm long, adaxially hirtellous at base of each lobe to glabrate or glabrous, abaxially hirtellous. *Corolline corona* absent. *Gynostegial corona* yellow-green or light brown, $1.7\text{--}2.5$ mm diam., thinly cyathiform (cup-shaped), undulated, adnate to stipe and ridged inside, partly hidden by the gynostegium. *Gynostegium* sessile, $0.9\text{--}1$ mm long, $1\text{--}1.4$ mm diam., stipe $0.4\text{--}0.7$ mm long, style-head slightly concave; anthers about $0.6 \times 0.6\text{--}0.65$ mm, erect, with ellipsoid locules 0.4×0.25 mm. *Pollinaria*: Pollinia pendent, ellipsoid or ellipsoid-truncate, $0.3\text{--}0.35 \times 0.19\text{--}0.22$ mm, with inner basal translucent inner area; caudicles $0.12\text{--}0.15$ mm long, articulated; corpusculum ca. 0.15×0.05 mm, oblong-subspatulate, obtuse at apex. *Follicles* one per flower, green, narrowly fusiform-cylindrical, long-attenuate towards apex, $2\text{--}3 \times 0.6\text{--}1$ cm, surface smooth, thin, with ca. 180–200 seeds per follicle. *Seeds* more or less pear-shaped in outline, $2.2\text{--}2.5 \times 1.5\text{--}1.7$ mm, with minute marginal sparse teeth, ecomose.

Distribution and ecology. – One species, *Acomosperma rivularis* Ule ex K.Schum., a rheophyte in wet rain forest, along river and rivulet margins, often on rocks in water courses, in Ecuadorian Amazonia, Peru and Bolivia, 300–1500 m.

Acomosperma rivularis K.Schum. ex Ule in Bot. Jahrb. Syst. 40(3): 406. 1908 – **Lectotype (designated here)**: Peru. Loreto, Tarapoto, “auf Felsblöcken in Flüssen, Bächen”, Oct 1902, *E. Ule 6391* (K barcode K000197407!; islectotypes: CORD barcode CORD 00003692!, G barcode G00177699!, MG barcode MG006253!).

= *Matelea rivularis* Woodson in Ann. Missouri Bot. Gard. 47(1): 80. 1960 – Holotype: Ecuador. Santiago-Zamora: near Méndez, 14 Nov 1944, *W.H. Camp E-1006* (MO barcode MO-078181!; isotypes: F barcode V0048977F!, NY barcode 00318720!).

Nomenclatural notes. – The taxonomic history of *Acomosperma rivularis* is difficult. Ule (1908: 406) ascribed genus and species to Karl Schumann (1851–1904), who, however, did not more publish the description. Ule (1908: 406) mentions one character, the ecomose seed, and thus fulfills the minimum requirement for a valid description at that time for both genus and species. The excellent specimen *Ule 6391* from Peru (Loreto), bearing the annotation “*Acomosperma rivularis* K. Sch. n.g.n.sp.” in

Schumann’s handwriting, is selected as the lectotype for the species here.

Woodson (1960) described the species under *Matelea*, but did not consider *Ule 6391*, but instead selected a specimen from Ecuador (*Camp E-1006*) as type for *M. rivularis*. Thus, *M. rivularis* Woodson constitutes a heterotypic synonym of *Acomosperma rivularis* K.Schum. ex Ule.

Notes. – Leaves edible when boiled (*Kayap 102* [MO, NY]). Flowers with slight odd, unpleasant odor (*Nee 38140* [MO, NY]). In the molecular phylogeny, the two specimens of *Acomosperma* studied form an unresolved long branch in Clade V.

Additional specimens examined. – **Bolivia**. Santa Cruz: Ichilo, Parque Nacional Amboró, 350 m, 13 Dec 1989, *Nee 38140* (MO, NY); 22 Sep 1996, *Nur Ritter & Wood 3709* (BOLV); 30 May 1998, *Nee & Bohs 49496* (MO); 19 Dec 2000, *Nee 51493* (MO, NY). **Ecuador**. Morona-Santiago: Cordillera Cutucú, 17 Nov 1944, *Camp 1211* (NY); along new road Méndez–Morona, km 55–62, 23 Aug 1989, *Van der Werff & Gudiño 11389* (MEXU, MO). Napo: Mishualli, 13–14 Aug 1979, *Holm-Nielsen 19226* (AAU); Parque Nacional Sumaco-Galeras, Cordillera Galleras, Rio Chiriyacu, 26 Oct 2005, *Homeier & Chinchero 1973* (GOET, QCA, UBT). Santiago-Zamora: near Méndez, 520–760 m, *Camp 1006* (MO). Sucumbios: Canton Gonzalo Pizarro. Río Tigre, afluyente del Río Dashiño, 19 Feb 1987, *Neil & Palacios 7638* (MO). **Peru**. Amazonas Region: Condorcanqui, 17 Nov 1972, *Kayap 102* (MO, NY). San Martín: Tarapoto, 1855, *Spruce 4121* (K, P). San Martín, 260 m, Mar 1935, *Klug 4036* (MO).

2. *Anemotrochus* Mangelsdorff, Meve & Liede in Willdenowia 46(3): 452. 2016 – Type: *Anemotrochus eggersii* (Schltr.) Mangelsdorff, Meve & Liede ($\equiv$ *Metastelma eggersii* Schltr.).

Reference and iconography. – Mangelsdorff, R.D., Meve, U. & Liede-Schumann, S. 2016. Phylogeny and circumscription of Antillean *Anemotrochus*, gen. nov., and *Tylodontia* (Apocynaceae: Asclepiadoideae: Gonolobinae). *Willdenowia* 46: 443–474. <https://doi.org/10.3372/wi.46.46311>

Description. – Prostrate herbs or twining vines, 1.5–2 m long; latex white. *Pubescence* of multicellular, eglandular, white, retrorse trichomes (ca. 0.05–0.2 mm long). *Stems* densely pubescent, with beige corky bark when mature. *Leaves* decussate, subsessile or shortly petiolate; blades small, not exceeding 1.5×0.5 cm, ovate or ovate-lanceolate, rarely widely circular, elliptic-lanceolate or obovate, membranous, bases rounded, obtuse to cuneate, margins entire, often revolute; 4–6 scarcely differentiated pairs of lateral veins; colleters absent. *Inflorescences* umbelliform cymes, with up to 6 flowers; subsessile; bracts small. *Flowers* with pedicels to 6 mm long, small (to 1.2 cm diam.). *Calyx* with lobes lanceolate, much shorter than the corolla, abaxially glabrous or with some trichomes at adaxial base; without colleters at the base. *Corolla* broadly urceolate to subcampanulate, white, cream, yellowish-green, or whitish with greenish reticulation

especially along medial line, lobes as long as the tube, ovate to linear, often twisted, adaxially pubescent along one side. *Corolline corona* of protuberances at the base of staminal corona or absent. *Gynostegial corona* with staminal corona segments laminar, half as long as the gynostegium; interstaminal corona a more or less visible sinus between staminal corona segments. *Gynostegium* sessile or atop a bulge; anther wings separated in a basal, basally centripetal part and an apical, basally centrifugal part; connective appendages ovate inflexed and adnate to top of style-head; style-head depressed conical to mushroom-shaped. *Pollinaria*: Pollinia pendent, apically attached to the caudicles, slightly furrowed, without a hyaline zone; caudicles cylindrical, distally flattened; corpusculum narrowly ovoid or elliptic. *Follicles* 1 or 2 per flower, fusiform ($2.5\text{--}3.5 \times 0.4\text{--}0.6$ cm in *A. eggersii*) occasionally with isolated, 0.4–1.4 mm-long protuberances and scattered trichomes, with ca. 15 seeds per follicle. *Seeds* ovate to obovate, winged, comose. – Fig. 1A

Distribution and ecology. – A West Indian genus of 3 or 4 species from the NW West Indies; only *Anemotrochus eggersii* (Schltr.) Mangelsdorff & al. from the Bahamas, Cuba, Jamaica and Hispaniola; in lowland, coastal vegetation.

Notes. – In the molecular phylogeny, *Anemotrochus* is well supported and also well supported as sister to *Meveampelos*. Together with *Poicilla* and *Tylodontia*, it forms the moderately to well supported West Indian Clade IV.

Anemotrochus (except for *A. viridivenius* (Alain) Mangelsdorff & al.) is easily distinguished by small flowers, and an urceolate corolla, with twisted lobes that are adaxially pubescent along one side.

3. *Atrostemma* Morillo in Pittieria 39: 198. 2015 – Type:

Atrostemma manarae (Morillo) Morillo (≡ *Matelea manarae* Morillo).

Reference and iconography. – Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae parte III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmnt.pdf>

Zorn, J. & Jacquin, N.J.F. v. 1785–1786. *Dreyhundert auseresene amerikanische Gewächse*, vol. 1. Nürnberg: auf Kosten der Raspischen Buchhandlung. – t. 85 “*Cynanchum planiflorum*”. <https://www.biodiversitylibrary.org/page/3480035>

Description. – Twining vines, 3–10 m long; latex white. *Pubescence* of glandular and short eglandular trichomes (0.2–0.4 mm long), often glabrescent or glabrous with age. *Stems* glabrescent, usually thinly corky when mature. *Leaves* decussate, petiolate; blades to 15×10 cm, broadly ovate to oblong-elliptic, coriaceous or subcoriaceous, shortly apiculate to broadly acuminate, the base acute, obtuse-rounded or broad and shortly cordate, adaxially minutely, abaxially densely and softly erect puberulent; 6–12 pairs of lateral veins, with 2–5 colletes at the base of the upper surface. *Inflorescences* umbellate or bostrychoid cymes, 3–7-flowered; pedunculate or subsessile; bracts small. *Flowers* pedicellate,

small to large (1–3.5 cm diam.). *Calyx* with lobes linear to suborbicular, strongly reflexed, abaxially puberulous; 1 colleter per sinus. *Corolla* rotate, green or yellowish-green and dark-reticulate, lobes oblong-lanceolate to obovate-elliptic. *Corolline corona* absent. *Gynostegial corona* cyathiform or annular-cyathiform, dark brown to dark purple or shiny black, fleshy, staminal segments incurved, thickly laminar or fleshy, adnate to stipe at base, interstaminal segments concave, usually puberulous abaxially. *Gynostegium* stipitate, stipe partially hidden by corolla and corona; anthers somewhat erect, obtriangular, connective appendages ovate, covering $\frac{1}{4}$ to $\frac{1}{3}$ of style-head; style-head pentagonal, concave. *Pollinaria*: Pollinia pendent, narrowly pyriform or oblongoid-pyriform, slightly concave in the external surface, usually with a hyaline zone in the proximal quarter or near the junction with the caudicles; caudicles articulated and hyaline; corpusculum sagittate. *Follicles* usually one per flower, asymmetrically oblong or boat-shaped ($9\text{--}11 \times 3\text{--}4$ cm in *A. planiflorum* (Jacq.) Morillo), apically acute or attenuate, basally obtuse, curved and oblique, glabrous, with scattered protuberances, obtusely muricate or with 5 obtuse ribs arranged longitudinally, glabrous, many-seeded. *Seeds* narrowly ovate, denticulate on the chalazal margin, comose. – Fig. 1B

Distribution and ecology. – About 10 species, distributed in Central and South America; forests and thickets, dry or humid; 100–1700 m.

Notes. – In the molecular phylogeny, *Atrostemma* is well supported and always included in Clade V, where it takes several unsupported positions. BEAST and ML analyses (Fig. 4, suppl. Fig. S1) suggest a relationship to *Pseudolachnostoma*, but without support.

Atrostemma is characterized by a combination of the abaxial leaf surface usually densely glandular-puberulous, with erect short trichomes (eglandular trichomes 0.2–0.4 mm long, gynostegial corona cyathiform or annular-cyathiform, with incurved thick laminar or fleshy staminal segments, adnate to stipe, and with concave somewhat erect, obtriangular interstaminal segments; anthers with subpendent pollinia, concave style-head, and a single, asymmetrically oblong or boat-shaped, muricate, glabrous follicle.

4. *Austrochthamalia* Morillo & Fontella in Revista Biol. Neotrop. 10(1): 3. 2013 – Type: *Austrochthamalia purpurea* (Decne.) Morillo & Fontella (≡ *Chthamalia purpurea* Decne.).

= *Brargentina* Morillo & H.A.Keller in Bonplandia (Corrientes) 25(2): 131. 2016 – Type: *Brargentina bornmuelleri* Morillo & H.A.Keller (≡ *Gyrostelma bornmuelleri* Schltr. ex Malme), **syn. nov.**

References and iconography. – Morillo, G., Fontella Pereira, J. & Barbosa, M.V.D. 2013. *Austrochthamalia* (Apocynaceae, Asclepiadoideae, Gonolobinae), un género nuevo segregado de *Chthamalia* Decne. *Revista Biol. Neotrop.* 10: 1–8. <https://doi.org/10.5216/rbn.v10i1.27827>

Fournier, E. in Martius, C.F.P. 1885. *Flora Brasiliensis*, vol. 6(4). Monachii [Munich]. – t. 92 II “*Chthamalia*

humifusa” (*Chthamalia humifusa* E.Fourn. ≡ *Austrochthamalia humifusa* (E.Fourn.) Morillo & Fontella). <https://www.biodiversitylibrary.org/page/140537>

Description. – Small, creeping or decumbent suffrutices; latex white. *Pubescence* of spreading, eglandular, uniseriate (5–8 cells) trichomes, with ornate surface, 1–1.5(–2) mm long. *Stems* developed from a xylopodium, densely pubescent when young; suberified at the base; 2 or 3 colleters at the ends on each side of the interpetiolar line. *Leaves* generally opposite-distichous, but 3-verticillate in the upper nodes of *A. bornmuelleri*, subsessile or shortly petiolate; blades small (less than 4 × 2 cm), ovate or ovate-elliptic to ovate-deltoid, narrowly obtuse at the apex, shortly cordate at the base; hairy to hirsute, with eglandular trichomes; 6–8 pairs of lateral veins; with 4–7 finger-shaped colleters at the base of the upper surface. *Inflorescences* one to three (in the upper nodes) subumbellate cymes, 2–4-flowered (1–2 flowers in simultaneous anthesis); shortly pedunculate; bracts linear, undulate. *Flowers* with pedicels to 2.2 cm; in prostrate species, partially hidden by the sandy substratum. *Calyx* with lobes oblong or lanceolate-oblong, narrowly acute to acuminate, abaxially with trichomes, 2 or 3 colleters in each sinus. *Corolla* shortly campanulate to rotate-campanulate, lobes dark purple, cream and purple, yellowish-green or light green, patent in anthesis, adaxially slightly to conspicuously verrucose, at least in apical half (absent in *A. bornmuelleri*); right margin minutely puberulous or glabrous. *Corolline corona* absent. *Gynostegial corona* partially adnate to the corolla tube, glabrous, membranous or thinly fleshy, generally cyathiform, consisting of partially or almost totally united staminal and interstaminal segments, crenulate or 2–3-lobed, with 10 radially arranged internal prominences or ribs, 2 opposite each anther. *Gynostegium* subsessile or shortly stipitate; anthers subtriangular-trapeziform, with the base narrower and inclined towards the floral axis; style-head pentagonal, slightly concave in the center. *Pollinaria*: Pollinia slightly descending or completely pendent, narrowly ovoid, ellipsoid or obpyriform, without a hyaline zone; caudicles hyaline; corpusculum sagittate. *Follicles*, as far as known, one per flower, narrowly and asymmetrically ovoid (5–8 × 2.5–4.5 cm), hairy when young, pubescent in one species, and rugose-warty with small swellings or almost smooth when adult. *Seeds* thick, ovate, warty and comose. – Fig. 1C,D

Distribution and ecology. – Five species in Central-West and Southeast Brazil, Bolivia, Paraguay and northern Argentina; in dry or very dry fields, savannas, bushes or forest margins; 150–650 m.

Notes. – In the molecular phylogeny, *Austrochthamalia* is well supported and always sister to *Ibatia* in Clade V. In the reduced dataset, with or without ITS (suppl. Figs. S4, S5), this relationship is well supported. The morphologically aberrant species *A. bornmuelleri* (Fig. 1D), which has been classified under *Gyrostelma* and *Rojasia*, and finally in its own genus *Brargentina*, is firmly embedded in the *Austrochthamalia* clade, sister to *A. teyucarensis* (Fig. 1C), and is therefore transferred to *Austrochthamalia*, despite its mostly verticillate

phyllotaxis, its subopposite to verticillate inflorescences, deviant corolla, gynostegium, and pollinarium morphology, and its almost smooth follicle surface (rugose-verrucose in the remaining species of *Austrochthamalia*).

Tephritidae have been reported to visit *Austrochthamalia teyucarensis* H.A.Keller (H.A. Keller, pers. obs.).

Austrochthamalia bornmuelleri (Schltr. ex Malme) Morillo, Liede & H.A.Keller, **comb. nov.** ≡ *Gyrostelma bornmuelleri* Schltr. ex Malme in Ark. Bot. 25A, no. 7: 12. 1933 ≡ *Rojasia bornmuelleri* (Schltr. ex Malme) Fontella, S.A. Cáceres & R.Santos in Bol. Soc. Argent. Bot. 49(3): 401. 2014 ≡ *Brargentina bornmuelleri* (Schltr. ex Malme) Morillo & H.A.Keller in Bonplandia (Corrientes) 25(2): 133. 2016 – Lectotype (designated by Fontella Pereira & al. in Bol. Soc. Argent. Bot.: 49: 401. 2014): Argentina. Misiones: Dep. Candelaria, Sta. Ana, Oct 1901, *A. de Llamas* 4866 (S No. S-R-11488 [digital image!]).

5. ***Bruceholstia*** Morillo in Pittieria 39: 207. 2015 – Type: *Bruceholstia magnifolia* (Pittier) Morillo (≡ *Gonolobus magnifolius* Pittier) = ***Bruceholstia sidifolia*** (M.Martens & Galeotti) L.O.Alvarado.

Reference and iconography. – Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae parte III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmnt.pdf>

Description. – Twining lianas 10 to 40 m long, latex white. *Pubescence* brownish or yellowish-brown, consisting of dense, short eglandular trichomes (0.1–0.3 mm long), few short glandular trichomes (0.1–0.3 mm long) and usually patent sparse long eglandular trichomes, 2–2.5 mm long, but only short eglandular ones always present. *Stems* densely pubescent, softly suberized at base when old; with many colleters at each end of interpetiolar line. *Leaves* decussate, long-petiolate; blades to 30 × 22 cm, (sub-)coriaceous, broadly ovate or elliptic, apex acuminate, base deeply cordate, densely pubescent; with 5–7 pairs of lateral veins; with fascicles of 30–50 colleters at the base of the upper surface. *Inflorescences* bostrychoid, 4–6-flowered; peduncles to 13 cm long; bracts long, lanceolate. *Flowers* pedicellate, large (to 4.5 cm diam.). *Calyx* with lobes thick, broadly elliptic, abaxially pubescent, with 1 colleter per sinus. *Corolla* rotate-campanulate, fleshy, pale orange or yellowish-green, reticulate; lobes ovate, glabrous. *Corolline corona* as a prominent circular faucal annulus (Stevens & Morales, 2009). *Gynostegial corona* fleshy, dark brown to purple, annular-cyathiform, staminal segments reniform, ligulate, adnate to the base of the anthers. *Gynostegium* sessile, scarcely surpassing the corona; anthers vertical, with semi-circular apical locules, anther wings in the form of erect to curved horns, connective appendages small, only covering margin of style-head; style-head pentagonal, flat or concave. *Pollinaria*: Pollinia pendent, oblongoid-pyriform, sideways flattened;

caudicles curved, articulate and hyaline; corpusculum sagittate. *Follicles* one per flower, large, fusiform ($22\text{--}27 \times 4.5\text{--}6$ cm), covered with long, curved processes and dark brown pubescence, with 24–84 seeds per follicle. *Seeds* narrowly ovate, entire or slightly crenulate on distal margin, comose.

Distribution and ecology. – A genus of a single species, *Bruceholstia sidifolia* (M.Martens & Galeotti) L.O.Alvarado, distributed from southern Mexico to Panama; tropical wet or rain forests; 70–1700 m.

Notes. – *Bruceholstia* was unavailable for molecular analysis.

Recognized by the large cordiform leaves, the presence of 30–50 colleters at the base of each petiole and adaxial leaf blades; dense brownish or yellowish-brown mixed pubescence; corollas fleshy, orange or yellowish-green; long-pendent pollinia, and large fusiform brown-pubescent follicles covered with long curved processes.

6. *Caa* H.A.Keller & Liede in Lilloa 57(1): 83. 2020 – Type: *Caa balansae* (Morillo & Fontella) H.A.Keller & Liede ($\equiv$ *Matelea balansae* Morillo & Fontella).

Reference and iconography. – Keller, H.A. & Liede-Schumann, S. 2020. *Caa*, a new South American genus of Gonolobinae (Apocynaceae: Asclepiadeae: Asclepiadoideae). *Lilloa* 57: 81–88. <https://doi.org/10.30550/j.lil/2020.57.1/6>

Description. – Climbing plants, 5(–8) m high; latex white. *Pubescence* of multiseptate acicular eglandular trichomes (0.3–0.7(–1) mm long) and capitate glandular trichomes. *Stems* pubescent when young, adult branches puberulous; base thin, not suberified. *Leaves* decussate, petiolate; blades to 10×3.7 cm, oblong-lanceolate, apex acuminate, base acute to cordate, obtuse to deeply cordate in juvenile specimens; petioles and veins of the abaxial face with pubescence similar to the young branches; adaxial face glabrescent except for the base that is hairy; primary vein densely and tiny puberulent, abaxial face hairy, with 9–10 pairs of prominent lateral veins; with 3 digitiform colleters at the base of the upper surface. *Inflorescences* cymose, 3–8-flowered; peduncles 0.5–1 cm long, longer than pedicels; bracts lanceolate, with trichomes. *Flowers* pedicellate; rather small (to 1.6 cm diam.). *Calyx* with lobes ovate-oblong, acuminate, with trichomes on the abaxial face, 1 colleter per sinus. *Corolla* rotate, lobes broadly ovate, apex emarginate, conspicuously reticulate and glabrous adaxially, shortly puberulous abaxially. *Corolline corona* absent. *Gynostegial corona* annular and 5-lobed; lobes patent, reddish-brown, with two small violet ridges, one on each side, next to the suture with the adjacent lobe. *Gynostegium* subsessile, ca. 1 mm diam.), anthers dorsally bilobed; style-head pentagonal, slightly concave. *Pollinaria*: Pollinia slightly ascending, convex on the outer face, internally concave; caudicles hyaline; corpusculum obtusely sagittate. *Follicles* not seen, probably aculeate or muricate, given the verrucose texture of the carpels. *Seeds* not seen. – Fig. 1E

Distribution and ecology. – A genus of a single species, *Caa balansae* (Fontella & Morillo) H.A.Keller & Liede,

in Paraguay (Caaguazú) and northern Argentina (Misiones); in forest; 400–800 m.

Notes. – In molecular phylogeny, the long branch formed by the two specimens analyzed for *Caa* is either unresolved in Clade V (suppl. Figs. S1–S3), or unsupported as sister to *Fischeria*–*Cristobalia*–*Macroscelis* (Fig. 4, suppl. Fig. S4), with the relationship to *Cristobalia*–*Macroscelis* maintained after the removal of ITS (suppl. Fig. S5).

Diptera have been observed to visit the flowers of *Caa balansae* (H.A.Keller; Fig. 1E).

7. *Callaeolepium* H.Karst., Fl. Columb. 2: 123. 1866 – Type: *Callaeolepium warscewiczii* H.Karst.

Reference and iconography. – Karsten, H. 1866. *Flora Columbiae*, vol. 2(4). Berolini [Berlin]: apud Ferdinandum Duemmlerum p. 123, t. 165 “*Callaeolepium Warscewiczii*” (*Callaeolepium warscewiczii* H.Karst.). <https://www.biodiversitylibrary.org/page/4747279>

Description. – Herbaceous vines, latex white. *Pubescence* dense, mixed, of short (0.1–0.2 mm long), and straight yellowish long eglandular trichomes (0.7–1 mm long), and dense minute dark brown glandular trichomes. *Stems* densely pubescent, slightly woody at base, with corky bark. *Leaves* decussate, petiolate, blades $5\text{--}12 \times 2.5\text{--}7$ cm, oblong-ovate or elliptic, lobate-cordate at the base, acuminate at apex, both surfaces hirsute with mixed pubescence as in stems, discolorous, 6–8 pairs of secondary veins; 5–8 colleters at the base of the upper surface. *Inflorescences* pedunculate, subumbelliform cymes, ca. (10–)20–60-flowered; peduncles 0.7–3.5 cm long, much longer than pedicels, hirsute; bracts linear-triangular, 2 mm long. *Flowers* pedicellate (pedicels 0.3–0.6 cm long); 1–1.5 cm diam. *Calyx* with lobes oblong-ovate or lanceolate ($3\text{--}3.8 \times 0.8\text{--}1.1$ mm), acuminate, abaxially hirsute with eglandular trichomes, 0.8–1 mm long; 0 or 1 colleters per sinus. *Corolla* short-campanulate, white with green veins; lobes ascending or spreading, narrow-ovate to oblong-lanceolate, acute or obtuse at apex, abaxially and adaxially glabrous or pubescent only at the base and inner corolla tube. *Corolline corona* absent. *Gynostegial corona* white or pink-purple, of 5 staminal and 5 interstaminal segments, all connate in lower half or $\frac{1}{3}$, in a cyathiform complex structure, with an outer series of 5 erect segments, connate in lower ca. 1 mm, the upper margin with a central erect, oblong long lobe (ca. 1.5–3.5 mm long), and two pairs of filiform lobes, the lateral pair erect or slightly curved, partly adnate to the inner corona; the inner series (staminal corona segments) of 5 connate segments, with one or two medial pairs of lobes (in total there are 5 long erect lobes and 20–30 small, ascending, very narrow lobes). *Gynostegium* stipitate, anthers forming a basal arch, with very short wings (ca. 0.1 mm long), locules in upper half, anther appendages rounded or narrow-deltoid, barely covering style-head margins; style-head convex and slightly bilobed. *Pollinaria*: Pollinia pendent, broadly obovoid, caudicles short and hyaline, but thin and covering proximal pollinia margins, corpusculum narrowly sagittate-ovate, obtuse at apex. *Follicles* one per flower, fusiform, truncate at the base, attenuate towards

apex, sparsely muricate, prickles broadly conical and obtuse, surface with mixed pubescence of glandular and eglandular trichomes (only immature follicles seen). *Seeds* not seen.

Distribution and ecology. – One, probably two species, endemic to Honduras and Nicaragua; humid places among semi-deciduous forest; 1000–1250 m.

Nomenclatural note. – The holotype of *Callaeolepium warscewiczii* (between Guatemala and Costa Rica, *J. Warscewicz s.n.*) was not traced and has probably been destroyed in B.

Notes. – An NCBI BLAST search (Altschul & al., 1990) placed the only available partial sequence of *Matelea warscewiczii* (H.Karst.) Woodson, KY582349 (*trnC-rpoB* IGS, 529 bp) from *Stevens & Grijalva P. 16147* (MO, from Nicaragua) firmly with taxa of Clade II, a Central/North American subclade. This single partial sequence, however, is insufficient to identify the place of the species inside the clade. It seems therefore the least nomenclaturally disruptive solution to separate the species in a monotypic *Callaeolepium*, because all other available combinations for the species (*Fimbristemma*, *Ibatia*, *Matelea*) refer to genera of Clade V and it is unlikely that a better sequence coverage will lead to a complete clade change.

Morphologically similar to *Ibatia* Decne., differing by the combination of dense and many-flowered subumbelliform inflorescences and a very complex corona with 5 long oblong lobes and 20–30 small ascending lobes in two series.

Of the material listed in TROPICOS, the specimens from Honduras conform best with the excellent plate in Karsten (1866: pl. 165) and should therefore be regarded as *Callaeolepium warscewiczii* Karst. *Stevens & Grijalva P. 16147* (MO, US) from Nicaragua probably represent a second, closely related species.

Callaeolepium warscewiczii H.Karst., Fl. Columb. 2: 123, t. 165. 1866 ≡ *Fimbristemma warscewiczii* (H.Karst) Benth. & Hook.f. ex Hemsl., Biol. Cent.-Amer., Bot. 2: 336. 1882 ≡ *Matelea warscewiczii* (H.Karst) Woodson in Ann. Missouri Bot. Gard. 28(2): 224. 1941 ≡ *Ibatia warscewiczii* (H.Karst.) Morillo in Pittieria 39: 229. 2015 – **Lectotype (designated here):** [Illustration] “*Callaeolepium Warscewiczii* Krst.” in Karsten, Fl. Columb. 2: t. 165. 1866.

= *Matelea marsdenioides* Standl. & L.O.Williams in Fieldiana, Bot. 32(4): 53. 1968 ≡ *Ibatia marsdenioides* (Standl. & L.O.Williams) Morillo in Pittieria 39: 228. 2015 – Holotype: Honduras: Depto. Morazán: matorrales húmedos, Quebrada Suyapa, aldea Suyapa, NE de Tegucigalpa, 1200 m, 19 Aug 1950, *A. Molina 3209* (F barcode V0048962F!; isotype: EAP barcode EAP113856!). Paratype, same locality and date: *P. Standley 26477* (F barcode V0533257F!, GH!, US barcode 03168693!).

8. ***Chloropetalum*** Morillo in Pittieria 39: 213. 2015 – Type: ***Chloropetalum denticulatum*** (Vahl) Morillo (≡ *Cynanchum denticulatum* Vahl).

= *Tressensia* H.A.Keller in Lilloa 54(2): 196. 2017 – Type: *Tressensia viridis* H.A.Keller & S.Cáceres.

References and iconography. – Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae parte III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmnt.pdf>

J.L. [Lindley, J.] 1827. *Gonolobus viridiflorus*. In: Edwards, S.T. (ed.), *Bot. Reg.* 13: t. 1126 (*Cynanchum denticulatum* Vahl ≡ ***Chloropetalum denticulatum*** (Vahl) Morillo). <https://www.biodiversitylibrary.org/page/62009466>

Targioni Tozzetti, O. 1829. Osservazione botaniche. *Mem. Mat. Fis. Soc. Ital. Sci. Modena, Pt. Mem. Fis.* 20: 291–313 – t. 17 (***Chloropetalum denticulatum*** (Vahl) Morillo). <https://www.biodiversitylibrary.org/page/8299888>

Description. – Suffrutescent twining vines or trailing plants, 3–5 m long with thin rhizomes; latex white. *Pubescence* of short glandular and long eglandular trichomes. *Stems* sometimes creeping and with adventitious roots, sparsely mixed pubescent in two lines to hirsute (long eglandular yellow trichomes up to 1 mm long, and short trichomes ca. 0.1 mm long, and short glandular brown trichomes) when young, sometimes glabrescent, thinly suberified or not suberified at base and slightly lenticellate when old; with 2 colleters at the ends of the interpetiolar line. *Leaves* decussate, petiole; blades 8–11 × 3.5–7 cm, ovate to ovate-oblong, apex acuminate, base cordate, glabrous to moderately pubescent; (5–) 6–8 pairs of lateral veins; with 2–6 colleters at the base of the upper surface. *Inflorescences* shortly bostrychoid, 2–14-flowered; short or long-pedunculate; bracts frequently oblong or ovate-oblong. *Flowers* pedicellate (pedicels usually longer than peduncles); medium sized to large (17–40 mm diam.). *Calyx* with lobes ovate to oblong-ovate; glabrous or pubescent abaxially, 1 colleter per sinus. *Corolla* rotate or shallow campanulate, green or yellowish-green, reticulate, lobes ovate or ovate-oblong; adaxially minutely hispidulous or almost glabrous. *Corolline corona* of interrupted thickened areas with clusters of short trichomes on the corolla tube. *Gynostegial corona* disciform or deeply 5-lobed, fleshy, adnate to base of corolla and gynostegium. *Gynostegium* sessile or shortly stipitate, anthers subtriangular (deltoid) in ventral view, horizontal or inclined towards the margin of the crown, with the external surface wider than tall, anther wings very short, connective appendages lateral and apical, hemiorbicular or deltoid barely covering the margin of the style-head; style-head flat or slightly concave. *Pollinaria*: Pollinia horizontal or slightly pendent, subtriangular or pyriform, concave on the external surface, convex on the internal surface, with a proximal elongated and narrow hyaline zone; caudicles hyaline; corpusculum sagittate. *Follicles* one or two per flower, narrowly to moderately fusiform or ovoid-fusiform (7–11 × 2.5–3.7 cm), long-acuminate, 5-costate or 5-winged, glabrous, many-seeded. *Seeds* narrowly obovoid, distally dentate, reticulate-verrucose, comose. – Fig. 1F

Distribution and ecology. – A genus of about seven species; distributed from Honduras to SE Brazil and NE

Argentina, including some of the Lesser Antilles; seasonally dry, moist riparian forests, and thickets; 0–1500 m.

Notes. – In the molecular phylogeny, *Chloropetalum* is well supported and sister to *Gonolobus* with weak to moderate support (Fig. 4, suppl. Figs. S1–S4); removal of ITS joins *Atrostemma* to *Chloropetalum*, but without support (suppl. Fig. S5). *Tressensia viridis* is placed inside the well-supported *Chloropetalum* clade, supporting its transfer to *Chloropetalum* suggested by Morillo (2023a: 47). The Central American sample of *C. denticulatum* (Hammel 9304 [DUKE] from Costa Rica) is sister to the four South American *Chloropetalum* samples, and not monophyletic with South American *C. denticulatum*.

Morphologically similar to *Gonolobus*, but distinguished by mature stems that are thinly suberized at base (except for *C. viridis*); anthers without dorsal radial appendages, and the long-acuminate medium-sized or small follicles (but long-acuminate follicles also in *G. spiranthus* Juárez-Jaimes & al.).

Chloropetalum denticulatum has been observed to be pollinated by flies (Ollerton & al., 2019).

9. *Chthamalia* Decne. in Candolle, Prodr. 8: 605. 1844 – Type (designated by Morillo & al. in Revista Biol. Neotrop. 10: 2. 2013): *Chthamalia pedunculata* Decne.

= *Tetracustelma* Baill., Hist. Pl. 10: 292. 1890 – Type: *Tetracustelma prostratum* (Cav.) Baill. (= *Cynanchum prostratum* Cav.).

= *Amphorella* Brandegees in Univ. Calif. Publ. Bot. 4: 91. 1910 – Type: *Amphorella castanea* Brandegees.

= *Edisonia* Small, Man. S.E. Fl.: 1078. 1933 – Type: *Edisonia pubiflora* (Decne.) Small (= *Chthamalia pubiflora* Decne.).

References and iconography. – McDonnell, A. 2014. Non-twining milkweed vines of Oklahoma: An overview of *Matelea biflora* and *Matelea cynanchoides* (Apocynaceae). *Oklahoma Native Pl. Rec.* 14: 67–79. <https://doi.org/10.22488/okstate.17.100106>

Alvarado-Cárdenas, L.O., Chávez-Hernández, M.G. & Castañeda-Zárate, M. 2023. Una nueva especie de *Chthamalia* (Apocynaceae; Asclepiadoideae; Gonolobae; Gonolobinae), endémica a Puebla, México. *Bot. Sci.* 101: 895–907. <https://doi.org/10.17129/botsci.3242>

Morillo, G. 2023. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte V. *Chthamalia*, *Meveampelos* gen. nov., *Phaeostemma*, *Polystemma*, *Ptycanthera*. *Mem. Fund. La Salle Ci. Nat.* 81(191): 37–90. https://saber.ucv.ve/ojs/index.php/rev_mem/article/view/27374

Cavanilles, A.J. 1791. *Icones et descriptiones plantarum*, vol. 1. Matriti [Madrid]: ex regia typographia. – t. 7 “*Cynanchum prostratum*” (*Cynanchum prostratum* Cav. = *Chthamalia prostrata* (Cav.) L.O.Alvarado & Cortez). <https://bibdigital.rjb.csic.es/idviewer/9679/83>

Description. – Herbs or suffrutices, prostrate, trailing or ascending or shortly vining, roots unusually tuberous, sometimes with xylopodia; latex white, with disagreeable smell. **Pubescence** of eglandular short or long trichomes (approx.

0.15–1.8 mm long) white or translucent, and glandular capitate (0.05–0.12 mm long) translucent, brown or almost black when dry. **Stems** usually up to 2 m long, 5–20 developed from the main root or xylopodium. **Leaves** usually distichous, sessile or short-petiolate; blades small (up to 3 × 2.3 cm), ovate or ovate-deltoid to suborbicular, obtuse to obtusely acuminate at the apex, subcordate to cordate at the base, pubescent at least on the abaxial face, 4–6(–7) pairs of lateral veins; sometimes with small axillary colleters, (0–)2–5 colleters at the base of the upper surface. Inflorescences rarely axillary or terminal, few- to many flowered; long- or short-pedunculate; bracts linear-lanceolate. **Flowers** pedicellate, 0.8–2.5 cm diam. **Calyx** with lobes ovate-elliptic or narrowly ovate, obtuse, abaxially hirsute, 1 or 2 colleters per sinus. **Corolla** narrowly campanulate, campanulate to suburceolate, creamy or purplish; lobes usually erect or suberect, oblong or lanceolate-oblong, apically obtuse, asymmetric and narrowly obtuse, or acute, longitudinally veined, adaxially glabrous and nearly smooth, abaxially pubescent. **Corolline corona** absent. **Gynostegial corona** 5-lobed; lobes connate at the base or up to $\frac{3}{4}$, often forming a short or long tube partially adnate to the gynostegium. **Gynostegium** sessile to stipitate, anthers slightly prominent on the margin of the style-head; anther wings very short, connective appendages hemi-orbicular or deltoid, barely covering the margin of the style-head; style-head slightly concave, convex or conical. **Pollinaria**: Pollinia subhorizontal, pendent or slightly inclined towards the back of the anther and towards the floral axis, subreniform to narrowly obovate-reniform, with margin of the distal half frequently winged and hyaline; caudicles articulated; corpusculum generally oblong-ovate. **Follicles** usually one per flower, broadly ovoid to fusiform (5–10 cm long), obtuse, acute or attenuate towards the apex, smooth or variously muricate, pubescent or glabrous. **Seeds** obovate, distally crenulate, comose.

Distribution and ecology. – 20 to 25 species throughout the southern United States (Florida, Georgia, Louisiana to California, Texas and Arizona) to the southwest of Mexico; in deserts, dunes, seasonally dry prairies, or deciduous forests and shrublands; (30–)1400–2500 m.

Notes. – In the molecular phylogeny, *Chthamalia* is well supported and sister to *Microstelma–Prosthecidiscus* in the Central/North American Clade III, but the relationship is weakly supported in the full dataset (Fig. 4, suppl. Figs. S1–S3), moderately supported only in the reduced dataset (suppl. Fig. S4). The species of *Chthamalia* fall into two well-supported clades, one comprising *C. biflora* (Raf.) Decne., *C. brevicoronata* (B.L.Rob.) Morillo, *C. cynanchoides* (Engelm. & A.Gray) Morillo, *C. parviflora* (Torr.) L.O.Alvarado & E.B.Cortez, and *C. pubiflora* Decne., species of low-lying areas in Florida, Texas to northeastern Mexico, and the Sonora Desert, while the second clade comprises *C. decumbens* (W.D.Stevens) L.O.Alvarado & E.B.Cortez, *C. pedunculata* Decne., *C. producta* (Torr.) L.O.Alvarado & E.B.Cortez, *C. schaffneri* (A.Gray ex Hemsl.) L.O.Alvarado & M.G.Chávez, and *C. texensis* (Correll) Morillo, species of

medium to high altitudes (1800–2500 m) of the North American cordillera.

The South American species originally described or assigned to *Chthamalia* (Decaisne, 1844; Fournier, 1885) have been transferred to *Austrochthamalia* Morillo & Fontella (Morillo & al., 2013), which is well supported in our phylogeny.

Diptera have been observed as visitors of *Chthamalia schaffneri* (Ollerton & al., 2019).

10. ***Cristobalia*** Morillo, S.A. Cáceres & H.A. Keller in *Pittieria* 40: 132. 2016 – Type: *Cristobalia bella* Morillo, H.A. Keller & S.A. Cáceres.

Reference and iconography. – Morillo, G., Cáceres, S.A. & Keller, H.A. 2016. *Cristobalia*, un nuevo género sudamericano de Gonolobinae (Apocynaceae, Asclepiadoideae, Asclepiadeae). *Pittieria* 40: 122–143. <https://ri.conicet.gov.ar/handle/11336/19589>

Malme, G.O.A. 1905. Adnotationes de nonnullis Asclepiadaceis austroamericanis. *Ark. Bot.* 4(14): 1–19. – t. 2, fig. 5 “*Pseudibatia australis*” (*Pseudibatia australis* Malme ≡ ***Cristobalia australis*** (Malme) H.A. Keller & Liede). <https://www.biodiversitylibrary.org/page/28740004>

Description. – Twining vines, (0.5–)1–5 m long, prostrate or vining or erect suffrutices; latex white. *Pubescence* of eglandular (1–4 mm long) and glandular trichomes. *Stems* densely pubescent, not corky at base. *Leaves* decussate, petiolate; petioles with axillary colleters; blades to 15 × 11.5 cm, membranous to subcoriaceous, obovate-elliptic or ovate-elliptic to deltoid-ovate, obtuse and apiculate or acuminate at apex, narrowly cordate at base, densely pubescent, with 6–8 pairs of lateral veins; with 3–10 colleters at the base of the upper surface. *Inflorescences* 3–15-flowered; subsessile or sessile, sessile (on leafless stems) in *C. australis*; bracts linear. *Flowers* pedicellate, small to medium-sized (1–2 cm diam.) *Calyx* with lobes ovate or broadly ovate, acute, hirsute on the abaxial side, longer than the corolla tube; 2 or 3 colleters per sinus. *Corolla* rotate to campanulate; lobes ovate, glabrous, adaxially green or dark pink to purple, reticulate. *Corolline corona* annular, sometimes inconspicuous, pilose. *Gynostegial corona* fleshy, yellow, reddish, purple to blackish-purple, cyathiform, slightly shorter than the gynostegium, 5-lobed, radially sinuate-lobed or flabellate, partially adnate to the corolla, radially sinuate-lobulate, with five broad cavities in interstaminal position. *Gynostegium* exserted, shortly stipitate; anthers externally concave; anther wings lamellar, curved, prominent and divergent; connective appendages hyaline, broadly triangular to deltoid, covering most of the style-head; style-head flat or slightly concave. *Pollinaria*: Pollinia reniform or asymmetric and obtusely calceolate, slightly pendent, oriented towards the posterior part of the anther; caudicles articulated, with translucent lamellar areas at the ends; corpusculum narrowly sagittate. *Follicles* 1 or 2 per flower, fusiform-ellipsoid or fusiform-ovoid (7–9 × 2.5–3.5 cm in *C. bella*, up to 10 × 3 cm in *C. hispida* (Hook. & Arn.) H.A. Keller & Liede), with numerous conical or uncinat projections, suberified at least at the apex, hirsute, many-seeded

(320–500 in *C. bella*). *Seeds* ovate-oblong, surface somewhat corrugated or smooth, distally minutely and coarsely toothed or almost entire, comose. – Fig. 1G,H

Distribution and ecology. – A genus of four species, found in southern Bolivia (Tarija), southern Brazil (Rio Grande do Sul), Paraguay (Canindeyú), northern and central Argentina, and Uruguay; rocky slopes and prairies, shrubby vegetation or temperate forests margins; 200–2670 m.

Notes. – In the molecular phylogeny, *Cristobalia* is always well supported and always moderately to well supported as sister to *Macroscepis* in Clade V.

Vegetatively similar to *Macroscepis* but differing by stems not corky at the base, subsessile or short-pedunculate inflorescence, calyx lobes not foliaceous, corolla broadly campanulate or rotate-campanulate, adaxially green or dark pink to dark purple, with reticulate lobes, corona forming five broad cavities alternate to the anthers, gynostegium exserted, and follicles muricate, with many conical to uncinat projections.

11. ***Dictyanthus*** Decne. in Candolle, Prodr. 8: 604. 1844 – Type: *Dictyanthus pavonii* Decne.

= *Tympananthe* Hassk. in Flora 30: 757. 1847 – Type: *Tympananthe suberosa* Hassk.

= *Rytidoloma* Turcz. in Bull. Soc. Imp. Naturalistes Moscou 25(2): 319. 1852 – Type: *Rytidoloma reticulatum* Turcz.

= *Pachystelma* Brandegee in Univ. Calif. Publ. Bot. 7: 330. 1920 – Type: *Pachystelma cordatum* Brandegee (≡ *Dictyanthus asper* (Mill.) W.D. Stevens), **syn. nov.**

References and iconography. – Stevens, W.D. 1988. A synopsis of *Matelea* subg. *Dictyanthus* (Apocynaceae: Asclepiadoideae). *Ann. Missouri Bot. Gard.* 75: 1533–1564. <https://doi.org/10.2307/2399300>

González-Martínez, C.A. 2019. *Dictyanthus* Decne. (Apocynaceae: Asclepiadoideae: Gonolobinae) un género casi endémico de México e ignorado en las filogenias. Thesis. Facultad de Ciencias Sistemática, UNAM, Mexico. <https://repositorio.unam.mx/contenidos/3485305>

Hooker, W.J. 1853. *Dictyanthus pavonii* Decne. In: Curtis, W. (ed.), *Bot. Mag.* 79: t. 4750. <https://www.biodiversitylibrary.org/page/467512>

Description. – Erect or trailing herbs, subshrubs, or twining vines 0.2–2.5 m long, often with a basal caudex; latex white (clear in *D. reflexiflorus* Lozada). *Pubescence* of glandular short and eglandular uncinat or straight short and/or long (1–3 mm long) trichomes. *Stems* with interpetiolar line of trichomes and colleters, usually woody and fissured-suberized at base. *Leaves* decussate, petiolate; blades ovate, 2.5–12 × 2–10.5 cm, apex acuminate or attenuate, base cordate or lobed; pubescence of eglandular uncinat or straight long and short trichomes, and short glandular trichomes on veins mainly on abaxial surface; 5–6(–7) pairs of lateral veins; 2–11 colleters at the base of the upper surface. *Inflorescences* 1- to few-flowered helicoidal cymes; sessile or pedunculate; bracts ovate, oblong to linear or lanceolate. *Flowers* shortly pedicellate; usually larger than 2 cm diam. *Calyx* with lobes

elliptic, narrow-ovate or lanceolate, glabrous to densely hairy, 1 colleter per sinus. *Corolla* campanulate, tubular or urceolate, the tube slightly longer than the lobes, usually internally convolute with the raised parts opposite to the corona lobes and sacciform between them; with a prominent ring around the corona lobes; lobes often sharply revolute. *Corolline corona* absent. *Gynostegial corona* digitately 5-lobed, adnate to the corolla tube and partly to the gynostegium. *Gynostegium* stipitate; connective appendages covering on the margin of the style-head; style-head pentagonal, concave to apiculate at apex. *Pollinaria*: Pollinia subhorizontal, obliquely flattened-obovate, concave, hyaline and sterile along upper margin; corpusculum short, flat; corpusculum sagittate. *Follicles* one per flower, fusiform (4.5–8.5(–10) × 1–3 cm), muricate with few to many thick or thin spreading or curved projections, mottled with green or white, surface usually with short straight and glandular trichomes, many-seeded. *Seeds* flattened-obovate, verrucose to rugose, with a raised, smooth or radially grooved, entire or toothed margins, comose. – Fig. 11

Distribution and ecology. – About 18–20 species from northern Mexico to Costa Rica; mainly seasonally dry forests and savannas; 0–1500(–2250) m.

Nomenclatural notes. – The identity of *Rytidoloma* and *Dictyanthus* was postulated as early as 1876 by Benth (1876: 765), with the formal transfer of the type and only species *Rytidoloma reticulatum* later conducted by Hemsley (*Dictyanthus reticulatus* (Turcz.) Benth. & Hook.f. ex Hemsl. (Hemsley, 1882: 329).

Pachystelma cordatum Brandege, type and only species of *Pachystelma*, is considered a synonym of *Matelea aspera* (Mill.) W.D.Stevens (Stevens, 1975: 397). Later, Stevens (1999: 564) transferred *M. aspera* to *Dictyanthus*, but without including *Pachystelma* in *Dictyanthus*.

Notes. – In the molecular phylogeny, in all analyses, *Dictyanthus* is well supported and also well supported as sister to *Urostephanus* in Clade II.

Dictyanthus is usually easily identified by the combination of ovate, deeply cordate to lobate leaves, spreading glandular and uncinat e glandular trichomes, a campanulate to urceolate corolla, often with internally convolute tube, and fusiform, muricate, thin-walled follicles.

Dictyanthus yucatanensis Standl. has been identified as host of *Tetraopis paradisi* Peraza, a recently described rare species of longhorn beetles (Cerambycidae; Peraza-Flores & Freitas, 2024).

12. *Fischeria* DC., Cat. Horti Pl. Monsp.: 112. 1813 – Type: *Fischeria scandens* DC.

= *Rhytidostemma* Morillo in Pittieria 37: 141. 2013 – Type: *Rhytidostemma viridis* (Moldenke) Morillo (≡ *Fischeria viridis* Moldenke).

= *Graciemoriana* Morillo in Pittieria 39: 223. 2015 – Type: *Graciemoriana graciae* (Morillo) Morillo (≡ *Fischeria graciae* (Morillo) Morillo).

References and iconography. – Morillo, G. 2025. Revisión del género *Fischeria* DC. (Apocynaceae, Asclepiadoideae).

Mem. Fund. La Salle Ci. Nat. 83(193): 47–89. https://saber.ucv.ve/ojs/index.php/rev_mem/article/view/31334

Murphy, H. 1986. A revision of the genus *Fischeria* (Asclepiadaceae). *Syst. Bot.* 11: 229–241. <https://doi.org/10.2307/2418961>

Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmnt.pdf>

Morillo, G. 2023. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte IV. *Mem. Fund. La Salle Ci. Nat.* 81(190): 45–90. http://saber.ucv.ve/ojs/index.php/rev_mem/article/view/26223

Ruiz, H. & Pavón, J. 1777. Original drawings of the Royal Botanical Expedition to the Viceroyalty of Peru: t. 1918 “*Stapelia*” (*Fischeria stellata* (Vell.) E.Fourn.). http://plantillustrations.org/illustration.php?id_illustration=282447

Delessert, J.P.B. & Candolle, A.P. de. 1846. *Icones selectae plantarum*, vol. 5. Parisiis [Paris]: apud Fortin, Masson et Sociorum. – t. 77 “*Fischeria scandens* DC.” <https://www.biodiversitylibrary.org/page/286870>

Description. – Twining vines or lianas, 3–25 m long; latex white, with disagreeable smell. *Pubescence* of short glandular translucent to dark brown (0.1–0.4 mm long) and long eglandular (1–4 mm long) yellowish or brownish trichomes, scarce in some populations, but glandular trichomes always present. *Stems* pubescent to hispid, lenticellate with age. *Leaves* decussate, (long) petiolate; petioles with axillary collaters; blades large, to 23 × 15 cm, ovate to elliptic, apically acuminate, obtuse to narrowly and shortly cordate at base; major veins are more or less pilose and dark-puberulent, the surfaces hirsute to strigose, or sometimes nearly scabrous; 7–11 pairs of lateral veins; with 2–10 collaters at the base of the upper surface (apparently no collaters in *F. graciae*). *Inflorescences* extra-axillary, at first umbelliform, later helicoid cymes with spirally arranged flowers, (3–4)12–30-flowered; sometimes only one open at a given time; usually long-pedunculate; bracts oblong-triangular or linear, small. *Flowers* pedicellate, medium-sized (17–18 mm diam. in *F. graciae*). *Calyx* with lobes ovate, oblong, or lanceolate-attenuate; abaxially pilose, puberulent or densely pubescent; with 1–3 collaters per sinus (but without collaters in *F. graciae*). *Corolla* rotate-campanulate (spreading-flat in *F. graciae*), lobes incurved, white and green, green or cream with reticulate green venation, lanceolate, ovate or triangular, often papillose along midvein or in a triangular pattern adaxially. *Corolline corona* absent. *Gynostegial corona* annular, fleshy, adnate to corolla and gynostegium, consisting of five laterally connate segments with entire basal margin, pentagonal or 5-lobed, often abaxially warty, sometimes with 5 or more lamellar, dentate-vermiform, digitate or ventricose appendages. *Gynostegium* (shortly) stipitate; anthers subtriangular, horizontal, with large locules, often without locular membrane, connective dorsally convex, ventricose or broadly lamellar (internally with spongy aerenchyma in 8 species); anther appendages

subtriangular, covering about half of the style-head (*F. graciae*) to almost absent; style-head almost flat to slightly convex, white. *Pollinaria*: Pollinia horizontal, variously reniform, with hyaline upper margin; caudicles geniculate, with hyaline margin; corpusculum (broadly) sagittate. *Follicles* one per flower, large (9–16 × 4.5–7 cm in *F. stellata*, 18–19 × 7–8 cm in *F. graciae*), obliquely ellipsoid or ovoid, with thick, woody exocarp, smooth to slightly striate or tuberculate surface, glabrous or puberulent, with hundreds of seeds (600–700 in *F. stellata*). *Seeds* ovate, winged, coarsely dentate, comose. – Fig. 1J

Distribution and ecology. – Around 17 species from southern Mexico to SE Brazil, only *Fischeria scandens* in some of the Greater Antilles (Cuba, Jamaica); wet, seasonal, or montane forests and thickets, often along forest or stream margins; 0–2000 m.

Notes. – In the molecular phylogeny, *Fischeria* is well supported in most analyses (Fig. 4, suppl. Figs S2, S4–S6), but only weakly supported by ML analysis of the full and intermediate datasets (suppl. Figs. S1, S3). In all analyses including ITS, it is weakly to moderately supported as sister to *Cristobalia–Macrosepsis* (Fig. 4, suppl. Figs. S1–S4, S6), but unsupported as sister to the remaining taxa of Clade V by the cpDNA dataset (suppl. Fig. S5).

Fischeria graciae (Morillo) Morillo (the only species of *Graciemoriana* Morillo) is firmly embedded in *Fischeria* and also shares some characteristic indels of *Fischeria*, so that it cannot be considered independent of *Fischeria*, despite its aberrant flower structure. Therefore, *Graciemoriana* was placed in synonymy of *Fischeria* by Morillo (2025: 51). Likewise, *F. viridis*, type of *Rhytidostemma* Morillo, is firmly embedded in the *Fischeria* clade, justifying the inclusion of *Rhytidostemma* in *Fischeria* by Morillo (2023a: 48).

BEAST analysis (Fig. 4) places *Fischeria scandens* from Jamaica (Krings 1407) as sister to the remaining species, and the two Central American samples (*Folsom 9364* and *McPherson 20572* from Costa Rica and Panama, respectively), as a crown clade to which the northern South American *F. graciae* and *F. cf. floresii* (Morillo) Morillo are sisters. However, this pattern is not found in the other analyses, probably due to poor sequence coverage for these samples.

Fischeria comprises large lianas, densely glandular and eglandular pubescent throughout, usually long-pedunculate, few- to many-flowered inflorescences (2–4-flowered in *F. graciae*); white, green or white and green-reticulate corollas, often (not always) with incurved apically crisped lobes; annular corona, in some species with conspicuously protruding truncate or teeth-like lobes, or with trapezoidal marginally rugose-carunculate segments, and conspicuously expanded, pear-shaped connective appendages that cover the style-head margins (in half of the species), more or less reniform horizontal pollinia, and large, generally pubescent follicles with irregular to slightly striate or slightly tuberculate surface.

One species (*Fischeria stellata*) is equipped with stinging trichomes (Medina & al., 2021).

Fischeria (F. stellata) is pollinated by a variety of Lepidoptera and several Apidae (Ollerton & al., 2019).

13. *Gonolobus* Michx., Fl. Bor.-Amer. 1: 119. 1803 ≡ *Vincetoxicum* Walter, Fl. Carol. 13: 104. 1788, nom. illeg., non Wolf 1776 – Type (designated by Perry in Rhodora 40: 283. 1938): *Gonolobus gonocarpos* (Walter) Perry (≡ *Vincetoxicum gonocarpos* Walter ≡ *Gonolobus macrophyllus* Michx., nom. illeg.).
- = *Fimbristemma* Turcz. in Bull. Soc. Imp. Naturalistes Moscou 25(2): 320. 1852 – Type: *Fimbristemma gonoloboides* Turcz.
- = *Exolobus* E.Fourn. in Martius, Fl. Bras. 6(4): 318. 1885 – Type: *Exolobus patens* (Decne.) E.Fourn. (≡ *Gonolobus patens* Decne.).
- = *Trichostelma* Baill., Hist. Pl. 10: 287. 1890 – Type: *Trichostelma ciliatum* Baill.
- “*Gonolobium* R.Hedw.”, Gen. Pl.: 132. 1806, orth. var.

References and iconography. – Krings, A. 2008. Synopsis of *Gonolobus* s.l. (Apocynaceae, Asclepiadoideae) in the United States and its territories, including lectotypification of *Lachnostoma arizonicum*. Harvard Pap. Bot. 13: 209–218. <https://www.jstor.org/stable/41761902>

Morillo, G. 2023a. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte IV. Mem. Fund. La Salle Ci. Nat. 81(190): 45–90. http://saber.ucv.ve/ojs/index.php/rev_mem/article/view/26223

Ruiz, H. & Pavón, J. 1777. Original drawings of the Royal Botanical Expedition to the Viceroyalty of Peru: t. 1929 “*Cynanchum*” (*Gonolobus parviflorus* Decne.). http://plantillustrations.org/illustration.php?id_illustration=282458

Mutis, J.C. 1783. Drawings of the Royal Botanical Expedition to the new Kingdom of Granada: t. 1398 “*Cynanchum*” (*Gonolobus antennatus* Schltr.). <https://mutis.rjb.csic.es/paginas/laminadibujo.php?lamina=2562>

— t. 1399 “*Cynanchum*” (*Gonolobus erioclodon* Benth.). <https://mutis.rjb.csic.es/paginas/laminadibujo.php?lamina=2565>

Sessé, M. & Mociño, M. 1787–1803. Drawings from the Spanish Royal Expedition to New Spain (Torner collection, Hunt Institute, Pittsburgh, U.S.A.): “*Stapelia Cordifolia* Sp.N.” (*Gonolobus uniflorus* Kunth). http://plantillustrations.org/illustration.php?id_illustration=340124

Humboldt, F.H.A. v., Bonpland, A. & Kunth, K.S. 1818. *Nova genera et species plantarum* [colored version], vol. 3. Lutetiae Parisiorum [Paris]: sumtibus Librariae Graeco-Latino-Germanicae. – t. 238 “*Gonolobus uniflorus*” (*Gonolobus uniflorus* Kunth). http://plantillustrations.org/illustration.php?id_illustration=312047

— t. 239: “*Gonolobus barbatus*” (*Gonolobus barbatus* Kunth.). http://plantillustrations.org/illustration.php?id_illustration=312048

Brown, R. 1822. *Gonolobus niger*. Bot. Mag. 55: t. 2799. <https://www.biodiversitylibrary.org/page/485150>

J.L. [Lindley, J.] 1825. *Gonolobus grandiflorus* Lindl. In: Edwards, S.T. (ed.), Bot. Reg. 13: t. 1053 (*Gonolobus*

grandiflorus (Cav.) R.Br. ex Schult.). <https://www.biodiversitylibrary.org/page/62009152>

Hooker, J.D. 1840. *Gonolobus hispidus*. *Bot. Mag.* 66: t. 3786. <https://www.biodiversitylibrary.org/page/466638>

Hooker, J.D. 1849. *Gonolobus martianus*. *Bot. Mag.* 75: t. 4472. <https://www.biodiversitylibrary.org/page/466838>

Fournier, E. in Martius, C.F.P. 1885. *Flora Brasiliensis*, vol. 6(4). Monachii [Munich]. – t. 94 “*Exolobus patens*” (*Gonolobus rotatus* (Vell.) Decne.). <https://www.biodiversitylibrary.org/page/140539>

Description. – Herbaceous or suffrutescent twining vines, 3–10 m long; latex white, rarely translucent. *Pubescence* mixed, of long (0.5–3 mm long) and short (up to 0–25 mm long), yellow or translucent trichomes, frequently mixed with glandular, short trichomes, sometimes eglandular-pubescent only, rarely almost glabrous. *Stems* pubescent when young, lenticellate, but not suberified in lower internodes. *Leaves* often deciduous, decussate, petiolate; blades membranous or coriaceous, up to 24.5 × 17.5 cm in *G. suberosus* (L.) R.Br., broadly ovate, oblong-elliptic or cordate, apices obtuse, acute, or acuminate, bases mostly cordate, but cuneate to rounded in some taxa, sparsely to densely pubescent on both sides, rarely almost glabrous; 6–11 lateral veins; with 2–8 colleters at the base of the upper surface. *Inflorescences* racemiform, paniculiform or umbelliform cymes, usually 3–5-flowered, rarely to 15-flowered; subsessile to pedunculate; bracts often linear, small. *Flowers* pedicellate, small to medium-sized (0.7–3 cm diam.). *Calyx* with lobes broadly ovate to linear, abaxially glabrous to pubescent, colleters normally 1–2 per sinus. *Corolla* rotate or subcampanulate, rarely campanulate, green or yellowish green, sometimes white or purple, often reticulate, frequently pubescent; lobes linear, lanceolate or ovate-elliptic, tightly twisted in bud. *Corolline corona* inserted in corolla tube, usually annular, sometimes interrupted, ciliate or fimbriate, or absent. *Gynostegial corona* fleshy, annular or cup-shaped, of mostly connate staminal and interstaminal parts, adnate to base of gynostegium and corolla, sometimes forming shallow to deep nectar cavities. *Gynostegium* sessile or (highly) stipitate, stipe frequently winged or costate; anthers generally almost horizontal, subtriangular; anther wings short; frequently with colored marginal appendages, lamellar, cartilaginous radially arranged, in some cases poorly differentiated or apparently absent; style-head flat, convex or slightly concave, not rostrate. *Pollinaria*: Pollinia horizontal or slightly inclined (pendent in *G. spiranthus*), oblong-obovoid to reniform; caudicles articulate; corpusculum sagittate. *Follicles* usually one, rarely two per flower, asymmetrical curved at the base, usually ovoid, ellipsoid or ventricose, smooth and (3–)4 or 5-winged, rarely smooth and wingless, sometimes inconspicuously tuberculate, usually glabrous, rarely hispidulous; many-seeded (400–1300 seeds per follicle). *Seeds* distally crenulate or denticulate, comose. – Figs. 1K,L, 2A

Distribution and ecology. – With 141 presently accepted and 13 unplaced species (WFO, snapshot Dec 2025) the largest genus of Gonolobinae, distributed in the tropics and

subtropics of the Americas from 35°N to 35°S, in seasonal dry or wet forests and thickets; 0–2850 m.

Nomenclatural note. – The nomenclatural history of *Gonolobus* was fraught with detours and errors. Walter (1788: 104) coined the illegitimate *Vincetoxicum* Walter, recognizing two species, *V. gonocarpos* Walter and *V. acanthocarpos* Walter, disregarding the earlier *Vincetoxicum* Wolf (Wolf, 1776: 130). Britton & Brown (1913: 37) selected *Vincetoxicum gonocarpos* as type for *Vincetoxicum* Walter. Michaux (1803), describing *Gonolobus* Michx., recognized six species, among them the two species described by Walter (1788). However, he (Michaux, 1803: 119) did not publish new combinations under *Gonolobus*, but created new names (*Gonolobus macrophyllus* for *Vincetoxicum gonocarpos* and *G. hirsuta* for *V. acanthocarpos*), citing the original names as synonyms and thus making the new names illegitimate. Perry (1938) recognized that *Vincetoxicum* Walter is illegitimate and corresponds to *Gonolobus* Michx., establishing *Gonolobus* as the correct name for the genus. She (Perry, 1938: 283) selected *Gonolobus macrophyllus* as the type of *Gonolobus*, the same species as Britton & Brown (1913) had selected for *Vincetoxicum* Walter. However, because the name *G. macrophyllus* is illegitimate, the correct name for the type species of *Gonolobus* is *G. gonocarpos* (Walter) Perry.

Notes. – In the molecular phylogeny, *Gonolobus* is retrieved as monophyletic, but support ranges from weak to high, depending on the analysis. In particular, two specimens of *G. stenosepalus* (Donn.Sm.) Woodson from Chiapas (Ramírez Martínez 524, Taylor 2536) are only weakly to moderately supported as sister to the better-supported remaining species in most analysis. The three specimens labelled *G. stenosepalus* are not monophyletic, and one (Ramírez Martínez 524) leaves the *Gonolobus* clade in the cpDNA analysis (suppl. Fig. S5). The sister-group relationship with *Chloropetalum* is only well supported by the reduced dataset (suppl. Fig. S4). The internal structure of *Gonolobus* retrieves three Central/North American clades, a South American *Gonolobus parviflorus* clade, a mixed Central/North American–West Indian clade, and a clade of mixed South American–West Indian species. Support for these clades is at best moderate, but they remain stable even in the cpDNA dataset. Several terminals are inserted in the tree with very long branches, which cannot be explained in all cases (e.g., *G. gritensis* Morillo) by poor sequence coverage.

Gonolobus is mainly pollinated by Diptera, Vespidae (Fig. 2A), and Apidae; but various Lepidoptera have also been observed on the flowers (H.A. Keller, pers. obs.). The species pollinated by Calliphoridae and studied in detail by Liede (1994) under “*Matelea reticulata*” represents *Gonolobus nemorosus* Decne.

14. *Himantostemma* A.Gray in Proc. Amer. Acad. Arts 20: 294. 1885 – Type: *Himantostemma pringlei* A.Gray.

Reference. – Gray, A. 1885. Contributions to the Botany of North America. *Proc. Amer. Acad. Arts* 20: 257–

310. – pp. 294–295 “*Himantostemma*”. <https://www.biodiversitylibrary.org/page/8837482>

Description. – Prostrate herbs, 30–60 cm long; latex color unknown. **Pubescence** mixed dense, of eglandular (0.2–0.35 mm) and glandular (0.05–0.1 mm) trichomes. **Stems** diffuse from a perennial caudex (fide *Gentry 4228*, MO), to 60 cm long, probably feebly voluble, slender, strongly suberose along basal parts, pubescent when young. **Leaves** decussate, petiolate, petiole about as long as the blade; blades small (2–4.5 × 1.5–3.5 cm), triangular, acute, base sagittate-cordate; shortly hirsute; 4 or 5 pairs of secondary veins; with 2–4 colleters at the base of the upper surface. **Inflorescences** usually 2-flowered; shortly pedunculate; with 3–4 bracts. **Flowers** mostly reflexed (pendent) when mature, long and slenderly pedicellate, medium-sized (about 1.2–1.5 cm diam.). **Calyx** with lobes linear-lanceolate, puberulous; 1 small colleter per sinus. **Corolla** deeply 5-lobed; lobes broad-lanceolate, strongly reflexed, abaxially greenish, adaxially light green or cream when young, brownish-purple in mature flowers, in the throat or at base conspicuously adorned with few or numerous corolline processes; processes purplish or translucent, flat, spatulate and stipitate; the lobes adaxially mostly glabrous, sparsely beset with long trichomes. **Corolline corona** absent. **Gynostegial corona** green, with a simple membranous margin, from which 10 very long narrow-linear yellowish ligules are attached by short filaments in interstaminal position and 5 short subulate ligules in staminal position, purple. **Gynostegium** shortly stipitate; anthers short, slightly dilated and angled at the top of the style-head, locules with apical opening, without connective appendages; style-head small compared to other Gonolobinae, not covering the anthers. **Pollinaria**: Pollinia pendent, narrow-obovate, hyaline in proximal margin, more than twice as long as the corpusculum; caudicles curved, very short, corpusculum narrowly sagittate. **Follicles** one per flower, 8–10.5 × 1.5–2.8 cm, gray or white with white markings, pendent, fusiform, apically acuminate, widely spaced long-echinate, almost glabrous; with about 90–100 seeds. **Seeds** broadly ovate, dark brown, comose.

Distribution and ecology. – One species, *Himantostemma pringlei* A.Gray, in the southwestern United States (Arizona), and northwestern Mexico (Baja California Sur, Sonora); deserts and dry scrubs, or along watercourses among rocky hills, in sandy-rocky or clayish-sandy soil; 0–250 m.

Notes. – In the molecular phylogeny, *Himantostemma* is well supported as sister to *Polystemma*, as suggested by Gray (1885: 294), in the Central/North American Clade II.

Morphologically unique by biflowered spreading to almost pendulous inflorescences, strongly reflexed petals and the unique corona shape of long, pendulous purple ligules.

The follicles cooked in ashes by the Seri Indians of Sonora, Mexico. The entire follicle is eaten if young or immature, otherwise only the “skin” (carpels) is eaten (Felger & Moser, 1976). It is also considered an edible plant in Baja California (Pío-León & al., 2017).

15. *Ibatia* Decne. in Candolle, Prodr. 8: 599. 1844 – Type: *Ibatia maritima* (Jacq.) Decne. (≡ *Cynanchum maritimum* Jacq.).

= *Omphalophthalma* H.Karst., Fl. Columb. 2: 119. 28 1866 – Type: *Omphalophthalma rubra* H.Karst.

= *Baclea* Baill., Dict. Bot 1: 338. 1877.

= *Amphidetes* E.Fourn. in Martius, Fl. Bras. 6(4): 213. 1885 – **Lectotype (designated here)**: *Amphidetes laciniatus* E.Fourn.

= *Gyrostelma* E.Fourn. in Martius, Fl. Bras. 6(4): 302. 1885 – Type: *Gyrostelma oxypetaloides* E.Fourn., **syn. nov.**

= *Pycnobregma* Baill., Hist. Pl. 10: 288. 1890 – Type: *Pycnobregma funckii* Baill.

= *Pseudibatia* Malme in Kongl. Svenska Vetensk. Acad. Handl., n.f., 34(7): 78. t. 1, fig. 2. 1900 – **Lectotype (designated here)**: *Pseudibatia lanosa* (E.Fourn.) Malme. (≡ *Ibatia lanosa* E.Fourn.).

References and iconography. – Morillo, G. 2012. Aportes al conocimiento de las Gonolobinae (Apocynaceae-Asclepiadoideae). *Pittieria* 36: 13–57. <http://erevistas.saber.ula.ve/index.php/pittieria/article/view/6548>

Morillo, G. & Keller, H.A. 2016. Un nuevo género y dos nuevas combinaciones en las Gonolobinae (Apocynaceae: Asclepiadaceae). *Bonplandia (Corrientes)* 25: 129–143. <https://doi.org/10.30972/bon.2521262>

Humboldt, F.H.A. v., Bonpland, A. & Kunth, K.S. 1818. *Nova genera et species plantarum* [colored version], vol. 3. Lutetiae Parisiorum [Paris]: sumtibus Librariae Graeco-Latino-Germanicae. – t. 234 “*Cynanchum fimbriatum*” (≡ *Ibatia cumanensis* (Willd. ex Schult.) Morillo). http://plantillustrations.org/illustration.php?id_illustration=312043

Edwards, S.T. 1825. *Gonolobus maritimus*. *Bot. Reg.* 11: t. 931 (*Ibatia maritima* (Jacq.) Decne.). <https://www.biodiversitylibrary.org/page/62012703>

Karsten, H. 1866. *Flora Columbiae*, vol. 2(4): Berolini [Berlin]: apud Ferdinandum Duemmlerum. – p. 119, pl. 163 “*Omphalophthalma rubra*” (*Ibatia rubra* (H.Karst.) Morillo). <https://www.biodiversitylibrary.org/page/4747275>

Fournier, E. in Martius, C.F.P. 1885. *Flora Brasiliensis*, vol. 6(4). Monachii [Munich]. – t. 87 “*Gyrostelma oxypetaloides*” (*Ibatia oxypetaloides* (E.Fourn.) Morillo, Liede & Meve). <https://www.biodiversitylibrary.org/page/140532>

Malme, G.O.A. 1900. Die Asclepiadaceen des Regnell’schen Herbars. *Kongl. Svenska Vetensk. Acad. Handl.*, N.F., 34(7): t. 2, fig. 3 “*Pseudibatia surgens* Malme” (*Ibatia diversifolia* E.Fourn.). http://plantillustrations.org/illustration.php?id_illustration=382937

Britton, N.L. & Horne, F.W. (unpub.). Popular flora of Puerto Rico, Flora Borinquena: t. 66 (*Ibatia maritima* (Jacq.) Decne.). http://plantillustrations.org/illustration.php?id_illustration=342480

Description. – Twining vines or sometimes erect subshrubs or shrubs, 2–5 m long; latex white, with unpleasant smell. **Pubescence** mixed of translucent or yellowish, glandular and eglandular trichomes (mostly 0.25–1 mm long). **Stems**

with conspicuously fissured-suberized bark when old (suberized strands to 15 mm high). *Leaves* decussate, petiolate; petioles distinctly shorter than blades, with adaxial colleters; blades membranous, ovate to suborbicular, usually (sub-)cordate at base; 6–8 pairs of secondary veins, with 2–11 colleters at the base of the upper surface. *Inflorescences* helicoid cymes, sometimes paniculate or condensed subglobose cymes, 5- to 20-flowered; shortly pedunculate, bracts small. *Flowers* (long-)pedicellate, small (1–1.5 cm diam.). *Calyx* with lobes ovate or lanceolate, longer than corolla tube; abaxially strigose or hirsute, with 1–3 colleters per sinus. *Corolla* rotate, rotate-campanulate or short-campanulate, generally white or green, sometimes purple or with reddish veins, lobes contorted in bud, ovate to oblong, adaxially almost glabrous to densely pubescent. *Corolline corona* absent. *Gynostegial corona* of partly or completely connate staminal and interstaminal segments, annular, cup-shaped or 5-lobed, the margin frequently lobed (sometimes bilobed in the apical third), sometimes puberulo-papillose. *Gynostegium* short to moderately stipitate; with the apical half generally wider than the basal one; anthers radially protruding, with conspicuous locules with dorsoapical dehiscence; connective appendages often deltoid, covering locules from dorsum of anther, but not covering style-head; anther wings shorter than body of anther; style-head concave to rostrate. *Pollinaria*: Pollinia pendent (horizontal in *I. sartago-diaboli*), pyriform or oblongoid-pyriform, usually with conspicuous prolongation or hyaline in the proximal end; caudicles short; corpusculum (sub-)sagittate. *Follicles* one or two per flower, ovoid, narrowly ovoid or ovoid-ellipsoid ($7\text{--}9 \times 1.5\text{--}3.5$ cm in southern South American species), with briefly pubescent or glabrescent exocarp (trichomes often glandular), with coniform or subcylindrical protuberances (tubercles), often covered with suber, many-seeded (ca. 160 seeds in a follicle of *I. pacifica* (Krings & Saville) Morillo, ca. 330 in a follicle of *I. maritima* (both Venezuela); 50–70 seeds in a follicle of *I. calchaquina* (C.Ezcurra & Belgrano) H.A.Keller & Liede (Argentina)). *Seeds* irregularly oblong-ovoid, flattened, with denticulate margins, comose. – Fig. 2B–D

Distribution and ecology. – About 35 species, distributed from Panama to southern Brazil, and in the West Indies (except Jamaica); in very dry and seasonally dry forests and scrubs; 0–3000 m.

Nomenclatural notes. – *Amphidetes* was published by Fournier (1885: 213) containing two species, *A. laciniatus* E.Fourn., and *A. quinquedentatus* E.Fourn., both from Rio de Janeiro, Brazil. Under Woodson's (1941) concept of a very large *Matelea*, Morillo (1984: 37) combined *A. quinquedentatus* to *M. quinquedentata* (E.Fourn.) Morillo. Fontella Pereira & al. (1989: 87) subsumed *A. laciniatus* in the synonymy of *M. quinquedentata*. Later, however, Morillo (2013: 122) included *A. laciniatus* in *Ibatia*, as *I. laciniata* (E.Fourn.) Morillo. If *A. quinquedentatus* and *A. laciniatus* are considered synonymous, *I. laciniata* is the oldest name under *Ibatia* and *A. quinquedentatus* has to be considered as its synonym.

Because of this nomenclatural history, *A. laciniatus* is selected as the type of *Amphidetes* here.

To date, no type has been named for *Pseudibatia* Malme. *Pseudibatia* counts 16 validly published names, that are, with one exception (*P. suberosa* Malme) all considered synonyms of *Cristobalia* (2), *Gonolobus* (1), *Ibatia* (9), and *Matelea* (3) species. Considering only the names Malme (1900) founded the genus on, *P. ganglinosa* (Vell.) Malme, *P. lanosa* (E.Fourn.) Malme, *P. suberosa* Malme, *P. surgens* Malme, it becomes clear that Malme's concept placed the genus very close to *Ibatia*, from which he distinguished it only by non-rostrate style-heads. Of the four species, two (*P. ganglinosa*, *P. lanosa*) are included in the molecular phylogeny, and embedded in the other *Ibatia* species analyzed. It is therefore suggested to typify *Pseudibatia* on *P. lanosa*, the species first mentioned by Malme (1900: 78) and to consider the genus a synonym of *Ibatia* Decne.

After the transfer of *Gyrostelma bornmuelleri* to *Austrochthamalia*, a single species with two varieties remained in *Gyrostelma*, *G. oxypetaloides* var. *oxypetaloides* from Minas Gerais and *G. oxypetaloides* var. *graziellae* (Fontella) Morillo & H.A.Keller from the Distrito Federal of Brazil. Both varieties are apparently rare. *Gyrostelma oxypetaloides* corresponds in all relevant characters, leaf shape, shape of the pollinarium, and in particular size and shape of corona lobes and pollinarium, with *Ibatia*, in particular with the erect Brazilian members of the genus (e.g., *I. ciliata*, E.Fourn., *I. selloana* E.Fourn.), so that it cannot be considered an independent genus and is placed in the synonymy of *Ibatia* here.

Notes. – In the molecular phylogeny, *Ibatia* (except for *I. cordata*) is well supported and weakly to well supported as sister to *Austrochthamalia*. *Ibatia cordata* from northeastern Brazil takes an unsupported or weakly supported sister-group position to the remainder of the *Ibatia* species (suppl. Figs. S1–S5), and takes an unsupported position as sister to *Austrochthamalia* in the BEAST analysis (Fig. 4) and in the analysis of the ITS dataset (suppl. Fig. S6).

Core *Ibatia* falls in two moderately to well-supported clades. A small clade, *I. ganglinosa* (Vell.) Morillo, *I. maritima*, *I. pacifica*, and *I. rubra*, distributed in northeastern Brazil and northward as far as Honduras and the Lesser Antilles, is sister to the remaining species, which range from northeastern Brazil in southwestern direction to Bolivia and central Argentina (Fig. 4, suppl. Figs. S1–S5).

Similar in general morphology to *Rojasia* but recognized by the densely yellowish or translucent pubescence throughout, the numerous axillary colleters, anthers radially protruding, with dorsoapical dehiscence, pendent pollinia with proximal hyaline margin, and follicle projections and surface often partly suberized.

Diptera have been observed as visitors of *Ibatia* (*I. demumeri* (Goes & Fontella) Morillo; Goes, 2007).

Ibatia diversifolia var. *surgens* (Malme) Morillo, Liede & Meve, **comb. nov.** = *Pseudibatia surgens* Malme in Kongl. Svenska Vetensk. Acad. Handl., n.f., 34(7): 80, t. 2, fig. 3. 1900 = *Matelea diversifolia* var. *surgens* (Malme) Morillo & Fontella in Ernstia 57: 2. 1990 – Holotype: Brazil. Mato Grosso: Cuyabá, in cerrado minus denso, loco arenoso-glareoso, parcissima, 12 Dec 1893, *Malme 1222b* (S No. S04-1675!).

Closely related to *Ibatia ganglinosa*.

Ibatia oxypetaloides (E.Fourn.) Morillo, Liede & Meve, **comb. nov.** = *Gyrostelma oxypetaloides* E.Fourn. in Martius, Fl. Bras. 6(4): 303. 1885 – Lectotype (designated by Morillo in Ernstia 24: 37. 1984): Brazil. Minas Gerais, 1816–1821, *Saint-Hilaire 1077a* (P barcode P00634356!). Morillo (1984: 37) cited the lectotype specimen as “*St. Hilaire s/n*” but it bears the pencilled number 1077a and the handwritten label of Morillo “Lectotipo *Gyrostelma oxypetaloides* E.Fourn.”

Ibatia suberosa (Malme) Morillo, Liede & Meve, **comb. nov.** = *Pseudibatia suberosa* Malme in Kongl. Svenska Vetensk. Acad. Handl., n.f., 34(7): 79. 1900 – Holotype: Brazil. Minas Gerais, Serra de Caldas, 5 Feb 1876, *C.W.H. Mosén 4283* (S No. S-R-11196!).

Ibatia suberosa is only known from the type specimen. It conforms to the general concept of erect *Ibatia* that was separated as *Pseudibatia* by Malme (1900). As this genus is placed in synonymy of *Ibatia*, a new combination for *P. suberosa* is necessary.

16. *Lachnostoma* Kunth in Humboldt & al., Nov. Gen. Sp. 3, ed. qu.: 199; ed. fol.: 155. 1819 – Type: *Lachnostoma tigrinum* Kunth.

References and iconography. – Morillo, G. 2012. Aportes al conocimiento de las Gonolobinae (Apocynaceae-Asclepiadoideae). *Pittieria* 36: 13–57. <http://erevistas.saber.ula.ve/index.php/pittieria/article/view/6548>

Morillo, G. 2020. Contribución al conocimiento del género *Lachnostoma* (Apocynaceae, Asclepiadoideae). *Pittieria* 44: 10–26. <http://erevistas.saber.ula.ve/index.php/pittieria/article/view/16971>

Mutis, J.C. 1783. Drawings of the Royal Botanical Expedition to the new Kingdom of Granada: t. 1380 “*Cynanchum*” (*Lachnostoma tigrinum*). <https://mutis.rjb.csic.es/paginas/laminadibujo.php?lamina=2526>

Description. – Twining vines 5–10 m long; latex white. *Pubescence* mainly of eglandular yellowish trichomes (0.3–2.2 mm long), but also glandular trichomes on leaf veins. *Stems* often rhizomatous, densely pubescent, thinly and inconspicuously suberized when old. *Leaves* decussate, petiolate; blades membranous to subcoriaceous, ovate to oblong-ovate, rounded or obtuse, acuminate to broad-acuminate at the apex, cordate or subcordate at base, densely pubescent on both sides; (5–)6–8 pairs of lateral veins; with 2–5 colleters at the base of the upper surface. *Inflorescences* helicoidal or

subumbelliform cymes; 5–15-flowered, moderately to long-pedunculate; bracts linear or ovate, 1–4 mm long. *Flowers* shortly to moderately pedicellate, from small to large (corolla 1–3 cm diam. when lobes extended). *Calyx* with lobes narrowly ovate to oblong, about as long as corolla tube, abaxially pubescent, 1 colleter per sinus. *Corolla* usually narrowly campanulate, with well-differentiated tube, narrow subcylindrical or expanded towards the mouth, with 5 nectar cavities alternating with corona septa; lobes, narrow-ovate to ovate-oblong, adaxially white or light green with contrasting green veins, with a thin lighter margin, or with purplish dots, or the entire surface purplish-purple; glabrous, abaxially pubescent; tube internally attached in basal $\frac{1}{3}$ to $\frac{2}{3}$ to gynostegium. *Corolline corona* absent. *Gynostegial corona* adnate to the stipe and corolla tube at least half of its length, apically bilobed-digitate, sometimes conspicuously broadened and shortly bilobed and centrally ligulate. *Gynostegium* stipitate; anthers subtriangular or subrectangular in frontoventral view, with the posterior part generally inclined towards the floral axis; anther wings very short; style-head apically plain to slightly concave. *Pollinaria*: Pollinia pendent, oblong-pyriform, with a hyaline translucent margin; corpusculum broadly sagittate. *Follicles* one per flower, narrowly ovoid or fusiform, (9–13 × 4.5–7 cm in *L. costanensis* Morillo and *L. aymardii* (Morillo) Morillo), with 5 obtuse ridges and some blunt intercostal projections, glabrous; many-seeded. *Seeds* ovate, comose. – Fig. 2E

Distribution and ecology. – About 12 species from northern Venezuela to Peru; submontane and wet montane forests; (700–)1000–3300 m.

Notes. – In all molecular analyses, *Lachnostoma* is well supported and also well supported as sister to *Phaeostemma*, which has a more eastern distribution. Only analysis of the cpDNA dataset (suppl. Fig. S5) resolves the two genera as a poorly supported trichotomy with *Peruviasclepias*.

Morphologically similar to *Phaeostemma* but lacking leaf extra-axillary colleters and presenting peduncles (incl. rachis) that are as long as or longer than the pedicels, an infundibuliform corolla, and smaller follicles with fewer seeds. According to our phylogeny, the genus is restricted to South America, while species from Central America at times attributed to *Lachnostoma* (*L. arizonicum* A.Gray [*Gonolobus*], *L. gonoloboides* Greenm. [*Gonolobus*], *L. hastulatum* A.Gray [*Pauciflora*], *L. parviflorum* Torr. [*Chthamalia*]) belong to other genera.

17. *Lhotzkyella* Rauschert in Taxon 31(3): 557. 1982 = *Pulvinaria* E.Fourn. in Martius, Fl. Bras. 6(4): 214. 1885, nom. illeg., non *Pulvinaria* Bonord., Handb. Mykol.: 272. 1851 [Fungi, Sphaeriales] – Type: *Lhotzkyella lhotzkyana* (E.Fourn.) Rauschert (= *Pulvinaria lhotzkyana* E.Fourn.).

Description. – Twining vines; latex color not known. *Pubescence* mixed of glandular and eglandular, retrorse trichomes. *Stems* with pubescence in two lines, thinly suberized at base when mature. *Leaves* decussate, petiolate;

blades narrowly ovate or oblong-ovate, apex acute, base distinctly cordate; with mixed pubescence of short glandular and eglandular trichomes (up to 0.7 mm long); pubescence denser on veins; 5 or 6 pairs of secondary veins; 3 or 4 colleters at the base of the upper surface. *Inflorescences* 4–6-flowered; shortly pedunculate; (4–5 mm long); bracts linear or lanceolate, 0.5–1 mm long. *Flowers* pedicellate, ca. 2 cm diam. *Calyx* deeply 5-lobed; lobes ovate, about as long as the corolla tube; shortly puberulent abaxially, 1 colleter per sinus. *Corolla* campanulate or suburceolate, dark purple; lobes oblong, slender, much longer than tube, tightly contorted in bud, glabrous except puberulous at adaxial base. *Corolline corona* absent. *Gynostegial corona* with staminal segments of 5 fleshy bidentate distinct elements, free from the stipe and shorter than gynostegium. *Gynostegium* stipitate, style-head disc-shaped, slightly convex, anthers ventricose, with dorso-lateral dehiscence. *Pollinaria*: Pollinia pendent, narrowly ob-ovoid, somewhat hyaline at proximal end; corpusculum sagittate. *Follicles* one per flower, narrowly ovoid, acute, pentagonal, 5-costate. *Seeds* not seen.

Distribution and ecology. – A single species, *Lhotzkyella lhotzkyana* (E.Fourn.) Rauschert, endemic to Mato Grosso, Brazil; scrubs (*cerrado*); below 500 m.

Notes. – *Lhotzkyella* was not included in the molecular phylogeny.

Distinguished from other genera in subtribe Gonolobinae by the combination of purple corolla with oblong lobes, tightly contorted in bud, stipitate gynostegium, ventricose, erect anthers, staminal corona of 5 fleshy, distinctly bilobed segments and pentagonal, 5-costate follicles. Corolla and leaf shape of *Lhotzkyella* are similar to those in species of *Oxyptalum* R.Br., but this genus has eglandular trichomes, style-head often rostrate, toothed caudicles, and smooth, or rarely, muricate follicles.

18. *Macroscepis* Kunth in Humboldt & al., Nov. Gen. Sp. 3, ed. qu.: 201. 1819 – Type: *Macroscepis obovata* Kunth. = *Schubertia* Mart., Nov. Gen. Sp. Pl. 1: 55. 1824, nom. cons. – Type: *Schubertia multiflora* Mart.

References and iconography. – Stevens, W.D. & Morales, J.F. 2009. *Macroscepis*. Pp. 732–733 in: Davidse, G., Sousa S., M., Knapp, S. & Chiang, F. (eds.), *Flora Mesoamericana*, vol. 4(1). Mexico D.F.: Universidad Nacional Autónoma de México; etc.

Morillo, G. 2013. Aportes al conocimiento de las Gonolobinae II (Asclepiadaceae, Asclepiadoideae). *Pittieria* 37: 115–154. <http://erevistas.saber.ula.ve/index.php/pittieria/article/view/6543>

Ruiz, H. & Pavón, J. 1777. Original drawings of the Royal Botanical Expedition to the Viceroyalty of Peru: t. 1932 “*Asclepias*” (*Macroscepis hirsuta* (Vahl) Schltr.). http://plantillustrations.org/illustration.php?id_illustration=282461

Mutis, J.C. 1783. Drawings of the Royal Botanical Expedition to the new Kingdom of Granada: t. 1381 “*Cynanchum*” (*Macroscepis hirsuta*). <https://mutis.rjb.csic.es/paginas/laminadibujos.php?lamina=2530>

Humboldt, F.H.A. v., Bonpland, A. & Kunth, K.S. 1818. *Nova genera et species plantarum* [colored version], vol. 3. Lutetiae Parisiorum [Paris]: sumtibus Librariae Graeco-Latino-Germanicae. – t. 233 “*Macroscepis obovata*” (*Macroscepis diademata* (Ker Gawl.) W.D.Stevens). http://plantillustrations.org/illustration.php?id_illustration=312042

Martius, C.P.F. v. 1824. *Nova genera et species plantarum*, vol. 1: t. 33 “*Schubertia multiflora*” (*Schubertia multiflora* Mart. = *Macroscepis multiflora* (Mart.) Morillo). <https://www.biodiversitylibrary.org/page/741961>

Karsten, H. 1866. *Flora Columbiae*, vol. 2(4). Berolini [Berlin]: apud Ferdinandum Duemmlerum. – pl. 161 “*Macroscepis urceolata* Krst.”. <https://www.biodiversitylibrary.org/page/4747269>

J.D.H. [Hooker, J.D.] 1885. *Macroscepis obovata*. In: Curtis, W. (ed.), *Bot. Mag.* 111: t. 6815. (*Macroscepis diademata*). <https://www.biodiversitylibrary.org/page/431609>

Hoehne, F.C. 1914. *Expedição científica Roosevelt-Rondon. Anexo n. 2. Botanica*. Rio de Janeiro. – t. 24 “*Schubertia grandiflora*” (*Schubertia grandiflora* Mart. = *Macroscepis grandiflora* (Mart.) H.A.Keller & Liede). <https://bibdigital.rjb.csic.es/idviewer/13859/113>

Description. – Suffrutescent twining vines, 5–20 m long, with fibrous roots; latex white, with unpleasant smell. *Pubescence* of yellowish or translucent long and short eglandular trichomes (1–4.5 mm long), and dark brown glandular trichomes; 2–4 leaf axillary colleters. *Stems* pubescent when young; frequently suberized at base. *Leaves* decussate, petiole; blades obovate-oblong to suborbicular, rarely oblong, up to 30 × 22 cm in *M. elliptica* N.E.Br., narrowly cordate; 6–9 pairs of secondary veins, with 2–9(–14) colleters at the base of the upper surface. *Inflorescences* often umbelliform cymes, 2- to 20-flowered; short to moderate pedunculate; bracts linear. *Flowers* small to large (1.5–4 cm diam.). *Calyx* with lobes foliaceous, occasionally fused in the lower third; ovate, ovate-lanceolate, narrowly elliptic, about as long as corolla tube; generally hirsute abaxially, usually with one (rarely 0) colleter per sinus. *Corolla* fleshy, urceolate, tubular or narrow-infundibuliform, white, green to orange, brown, or reddish brown; lobes obovate, narrow-obovate or oblong, apically obtuse or rounded-emarginate. *Corolline corona* fleshy, adnate to the adaxial base of corolla tube. *Gynostegial corona* fleshy, greenish or lilaceous, partially adnate to gynostegium and corolla tube, staminal segments apically truncate or crenulate, totally included in corolla or with apex visible, partially obturating throat, interstaminal segments forming broad nectar chambers. *Gynostegium* subsessile to stipitate, anthers with dorsoapical dehiscence, anther wings centrifugal towards the base; connective appendages short; style-head convex or concave. *Pollinaria*: Pollinia pendent, mostly oblong, triangular-oblong, oblong-elliptic, triangular-reniform, often with a hyaline external margin or with a longitudinal furrow; caudicles short, hyaline; corpusculum sagittate. *Follicles* one or two per flower, ovoid, ellipsoid or fusiform, (14–16 × 5–7 cm in *M. elliptica*) acuminate, (5–) 7-winged, rarely with 7–9 lines of short conical projections,

glabrous to hirsute, many-seeded (ca. 140 seeds in *M. diademata*, 470–530 seeds in *M. elliptica*). *Seeds* obovate, with prominent dentate margin, comose. – Fig. 2F–H

Distribution and ecology. – About 22–23 species, distributed from northern Mexico south through western South America to eastern Brazil and Northeast Argentina; dry or wet forests and thickets; 0–1600 m.

Notes. – In all analyses, *Macroscelis* is moderately to well supported and also moderately to well supported as sister of *Cristobalia* in Clade V. Except for the ITS dataset alone, all analyses retrieve *M. grandiflora* as sister to the remaining species and place the Central American specimens in the top clade. The three samples of *M. hirsuta* are not monophyletic.

Recognized by the axillary leaf collectors, the urceolate to narrow-infundibuliform corolla, fleshy gynostegial corona lobes adnate to stipe at base extending along the corolla tube for most of its length, 5 conspicuous anther chambers at base of gynostegium, pendent pollinia often with hyaline margin or with a longitudinal furrow, and (5–)7-winged follicles or with 7–9 lines of conical projections.

Lepidoptera (Nymphalidae, Noctuidae) have been observed visiting the flowers of *Macroscelis elliptica* (H.A. Keller, pers. obs.; Fig. 2G) and Sphingidae have been observed to carry pollinaria of *M. grandiflora* (Schulz, 1937; Amorim, 2012; Sazatornil & al., 2016; Amorim & al., 2022).

19. *Malinvaudia* E.Fourn. in Martius, Fl. Bras. 6(4): 312, t. 92. 1885 – Type: *Malinvaudia capillacea* E.Fourn.

Iconography. – Fournier, E. in Martius, C.F.P. 1885. *Flora Brasiliensis*, vol. 6(4). Monachii [Munich]. – t. 92 I “*Malinvaudia capillacea*” (*Malinvaudia capillacea* E.Fourn.). <https://www.biodiversitylibrary.org/page/140537>

Description. – Twining vines, size unknown; latex white. *Pubescence* of short eglandular trichomes (0.2–0.3 mm long), mainly on leaf blades, inconspicuous or absent. *Stems* puberulous, with inconspicuous interpetiolar line. *Leaves* decussate, petiolate, petioles distinctly shorter than blades; blades to 11 × 5.5 cm, narrow-ovate to oblong-lanceolate, long-acuminate, base subcordate; 11–15 pairs of secondary veins; with 2–4 collectors at the base of the upper surface. *Inflorescences* lax, helicoid cymes, 6–9-flowered, with peduncles 5–7.5 cm long, longer than subtending leaves; bracts narrowly triangular, minute. *Flowers* with pedicels 1–3 cm long, thread-like; medium-sized (1.6–2 cm diam.). *Calyx* with lobes ovate-oblong, acuminate, glabrous, with 1 collector per sinus. *Corolla* campanulate, ca. 20–22 mm diam., throat with 5 interlobular pubescent pads, lobes oblong, acuminate, conspicuously veined, adaxially proximally puberulent. *Corolline corona* absent. *Gynostegial corona* shorter than gynostegium, of 5 distinct fleshy staminal segments, these 3-dentate, central tooth shorter than lateral ones. *Gynostegium* subsessile, style-head broadly pentagonal, flat or slightly concave at top; anthers obtriangular, dorsally without appendages. *Pollinaria*: Pollinia horizontal, triangular-obovoid, inner face concave; corpusculum sagittate. *Follicles* one per flower, spindle-shaped, 5-costate. *Seeds* ovate with a denticulate apex. – Fig. 2I

Distribution and ecology. – A genus of a single species, *Malinvaudia capillacea* E.Fourn.; E Brazil and NE Argentina; in ombrophilous forest below 600 m.

Notes. – Not included in the molecular phylogeny.

Among subtribe Gonolobinae, recognized by the apically long-acuminate, 11–15-veined, cordate leaves, lax, long-pedunculate and -pedicellate, 6–9-flowered inflorescence, campanulate corollas with oblong-acuminate lobes and 5 interlobular pubescent pads, and corona of 5 distinct, 3-dentate staminal segments, and spindle-shaped, 5-costate follicles.

20. *Matelea* Aubl., Hist. Pl. Guiane: 277. 1775 – Type: *Matelea palustris* Aubl.

= *Hostea* Willd., Sp. Pl. 1(2): 1274. 1798, nom. illeg. pro *Matelea* Aubl. – Type: *Hostea viridiflora* Willd. (nom. illeg. pro *Matelea palustris* Aubl.).

= *Coelostelma* E.Fourn. in Martius, Fl. Bras. 6(4): 320. 1885 – Type: *Coelostelma refractum* E.Fourn. (= *Matelea refracta* (E.Fourn.) Morillo).

= *Peckoltia* E.Fourn. in Martius, Fl. Bras. 6(4): 310. 1885 – Type: *Peckoltia pedalis* E.Fourn.

References and iconography. – Morillo, G., Meve, U. & Liede-Schumann, S. 2023. A new species of *Matelea* (Apocynaceae, Gonolobinae) from Bolivia and an assessment of *Matelea* in Bolivia. *Novon* 31: 126–131. <https://doi.org/10.3417/2023815>

Aublet, J.B.C.F. 1775. *Histoire des plantes de la Guiane française*, vol. 3. A Londres [London], & se trouve a Paris: chez Pierre-François Didot jeune. – t. 109 “*Matelea Palustris*” (*Matelea latifolia* today is a synonym of *M. palustris*, see introduction). <https://www.biodiversitylibrary.org/page/41858938>

Delessert, J.P.B. & Candolle, A.P. de. 1846. *Icones selectae plantarum*, vol. 5. Parisiis [Paris]: apud Fortin, Masson et Sociorum. – t. 76 “*Matelea latifolia* Aubl.” (*Matelea palustris*). <https://www.biodiversitylibrary.org/page/286868>

Ruiz, H. & Pavón, J. 1777. Original drawings of the Royal Botanical Expedition to the Viceroyalty of Peru: t. 1927 “*Cynanchum pubescens*” (*Matelea ruiz-pavonii* Morillo). http://plantillustrations.org/illustration.php?id_illustration=282456

Description. – Twining herbaceous or suffrutescent vines 2–5(10) m long, or erect herbs or shrubs; latex white. *Pubescence* mostly of sparse, short glandular and eglandular trichomes (0.05–0.5(–1) mm long). *Stems* inconspicuously pubescent, often in one or two rows, glabrous and suberized at base when mature. *Leaves* decussate, shortly petiolate; blades small to medium sized (2.2 × 1.2 to 15 × 7 cm), ovate, or slenderly ovate to elliptical, apex acute to acuminate; base rounded, obtuse, acute or cuneate, rarely subcordate or truncate; 5–9(–16) pairs of lateral veins; mostly with 2–5 collectors at the base of the upper surface. *Inflorescences* helicoid cymes, (1–)3–7(–12)-flowered; shortly pedunculate, bracts small and inconspicuous. *Flowers* pedicellate; small (to 1.7 cm diam.). *Calyx* with lobes ovate, lanceolate, or oblong-ovate, small and inconspicuous, usually sparsely puberulent, often with ciliate margins, with 1 or 2 collectors per

sinus, in some species without colleters. *Corolla* rotate or short-campanulate, 5–17 mm diam., green, rarely purple or cream, usually reticulate; lobes deltoid to ovate-oblong, often spreading. *Corolline corona* absent. *Gynostegial corona* fleshy, consisting of 5 staminal and 5 interstaminal segments, fused to annular structure mostly adnate to stipe and corolla tube, often with crenulate, dentate or fimbriate thin margin; staminal corona lobes prominent, generally ridged or subtriangular and with apical ligule, reaching base of anthers; interstaminal corona lobes often distinctly differentiated, rather concave or plane. *Gynostegium* stipitate or sessile, stipe often hidden by corona, often ridged below style-head (when stipe present); anthers subhorizontal and subtriangular, dorsoventrally somewhat flattened, and with small, narrow locular cavities, and short locular membrane; style-head flat or convex, rarely rostrate. *Pollinaria*: Pollinia subhorizontal or horizontal, usually narrowly ovoid or obpyriform, with 1 concave face; caudicles articulated; corpusculum sagittate. *Follicles* usually one per flower, narrowly fusiform to narrowly ovoid (to 10 cm long), slightly 5-winged to 5-costate, sometimes smooth, with 70–200 seeds per follicle. *Seeds* narrowly ovate or elliptic, distally denticulate or crenulate, comose or ecomose. – Fig. 2J,K

Distribution and ecology. – A Neotropical genus of about 70 species distributed in South America, with few species in Mesoamerica, and one species (*Matelea squiresii* (Rusby) Morillo) extending to Trinidad; mostly in wet and riparian transitional forests; 0–2200 m.

Notes. – In the molecular phylogeny, *Matelea* s.str. is well supported and is also always in a weakly to well-supported sister-group position to the widespread *Ptycanthera* (Fig. 4, suppl. Figs. S1–S5), except for the ITS dataset, that places *Ptycanthera* inside *Matelea* (suppl. Fig. S6). The *Matelea*–*Ptycanthera* clade is weakly to well supported as sister to *Peruviasclepias*–*Phaeostemma*–*Lachnostoma* in Clade V, and these five genera are in all analyses with the full dataset sister to *Weigendia*–*Chloropetalum*–*Gonolobus*.

Internally, the genus falls into two supported clades, the first one comprising species from Bolivia and Ecuador (Bolivia: *Matelea anomala* Morillo & al., *M. neei* Morillo, *M. woodii* Morillo; Ecuador: *M. glandulosa* (Decne.) Morillo, *M. porphyrocephala* Morillo). The second clade includes species from a wide range (Brazil: *M. atrolingua* Morillo & al., *M. pedalis* (E.Fourn.) Fontella & E.A. Schwarz, *M. quindecimlobata* Farinaccio & W.D. Stevens; French Guyana: *M. palustris*; Trinidad: *M. squiresii*) but also Ecuador (*M. matezkii* Morillo, *M. pastazana* Morillo; *Matelea* sp.), highlighting Ecuador as a center of diversity for the genus.

Matelea s.str. is morphologically best defined by a combination of sparse, short, mixed indumentum (eglandular trichomes mostly 0.05–0.5 mm long) on the vegetative parts and inflorescence axis, small to medium-sized leaves, with round to cuneate and rarely subcordate or narrowly cordate bases, small, few-flowered, condensed racemiform cymes,

rotate to subcampanulate (rarely campanulate) corolla, without ocelli, gynostegial corona fused to form an annular structure that is marginally fimbriate, crenulate, dentate or subentire, and slightly 5-lobed, gynostegium subsessile to stipitate, generally with small ligules atop the stipe, anthers without dorsolateral appendages, pollinia horizontal, inversely pear-shaped to oblong-obovate, with one concave face, and follicles to 10 cm long and narrowly fusiform to narrowly ovoid, smooth, slightly 5-winged to 5-costate, with 70 to 200 seeds, ecomose in some species.

21. *Meveampelos* Morillo in Mem. Fund. La Salle Ci. Nat. 81(191): 57. 2023 – Type: *Meveampelos bicolor* (Britton & P. Wilson) Morillo.

Reference and iconography. – Morillo, G. 2023. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte V. *Chthamalia*, *Meveampelos* gen. nov., *Phaeostemma*, *Polystemma*, *Ptycanthera*. Mem. Fund. La Salle Ci. Nat. 81(191): 37–90. http://saber.ucv.ve/ojs/index.php/rev_mem/article/view/27374

Description. – Small woody climbers, ca. 1 m long, sparsely branched; latex translucent (in *M. bicolor*). *Pubescence* consisting of retrorse eglandular trichomes (0.1–0.35 mm long) and occasionally of few erect, capitate glandular trichomes. *Stems* with bifarious or ubiquitous pubescence. *Leaves* decussate, petiolate; petioles subterete (0.3–1.7 cm long); blades small (1.5–6(–8.5) × 1–3 cm), discolorous, membranous, ovate, elliptic, oblong-elliptic, to oblong-ovate, apically obtuse or acute, basally obtuse to subtruncate, with entire margin, sometimes recurved, adaxially glabrous or sparsely pubescent, pubescence denser along midrib, abaxially pubescent or glabrous; 5 or 6 pairs of lateral veins; with 2 or 3 colleters at the base of the upper surface. *Inflorescences* bostrychoid cymes, 2 or 3(–5) flowered; with peduncles to 0.7 cm long; bracts narrowly triangular, to 1.5 mm long, acute. *Flowers* fragrant, with pedicels to 0.7 cm long, small to medium-sized (to 2 cm diam.). *Calyx* with lobes ovate, lanceolate, oblong to elliptic, obtuse or acute, abaxially glabrous or with antrorse or retrorse eglandular trichomes; with 1–3 colleters per sinus. *Corolla* tubular-campanulate or subcampanulate, white, green or yellowish-green, not ocellate or reticulate; lobes ovate to deltoid, apically obtuse to rounded and slightly emarginate, patent, glabrous on both sides, shorter or longer than tube. *Corolline corona* absent. *Gynostegial corona* fleshy, consisting of 5 staminal and 5 interstaminal segments, fused in an annular structure, mostly adnate to a stipe and corolla tube, often with crenulate, dentate or fimbriate thin margin; staminal segments prominent, generally ridged or subtriangular and with an apical ligule, reaching the base of the anthers, interstaminal segments often somewhat concave or plane. *Gynostegium* usually shortly to moderately stipitate; stipe often hidden by the corona and style-head, when stipitate, stipe generally ridged; anthers subhorizontal and subtriangular, dorsoventrally somewhat flattened, with small narrow locular cavities, and short, very narrow locular membranes; anther wings very short, parallel; style-

head subpentagonal in outline, generally convex or plane, rarely conic-rostrate. *Pollinaria*: Pollinia subhorizontal, narrowly reniform, oblongoid, asymmetrically ellipsoid to narrowly obpyriform, hyaline and slightly concave at proximal margin; caudicles articulate; corpusculum broadly or narrowly sagittate, ca. $\frac{1}{3}$ the length of pollinia. *Follicles* one or two per flower, narrowly ovoid or fusiform, usually up to 10 cm long, slightly 5-winged, 5-costate or smooth, with less than 200 seeds per follicle. *Seeds* small, narrow ovate or elliptic, distally denticulate or crenulate, comose or ecomose. – Fig. 2L

Distribution and ecology. – Two species endemic to the Sierra Maestre, SE Cuba; 1100–1400 m.

Notes. – In the molecular phylogeny, *Meveampelos* is always well supported and also well supported as sister to *Anemotrochus* in the West Indian Clade IV.

Remarkable for these small climbers are the inconspicuous pubescence, bell-shaped flowers and, above all, the clear instead of milky latex (observed in *Meveampelos bicolor*).

22. ***Mexicania*** L.O.Alvarado & Lozada-Pérez in Acta Bot. Mex. 132, e2426: 4. 2025 – Type: ***Mexicania congesta*** (Decne.) L.O.Alvarado & Lozada-Pérez ($\equiv$ *Gonolobus congestus* Decne.).

Reference and iconography. – Lozada-Pérez, L. & Alvarado-Cárdenas, L.O. 2025. Un nuevo género y una nueva especie para Gonolobinae (Apocynaceae, Asclepiadoideae) de México. Acta Bot. Mex. 132: e2426. <https://doi.org/10.21829/abm132.2025.2426>

Description. – Suffrutescent, twining vines from a rhizome, with fleshy fasciculate roots; latex scant, white. *Pubescence* of short (0.5–0.7 mm) white and translucent-yellow eglandular trichomes retrorse-appressed or spreading, and brown glandular trichomes. *Stems* 1–4 m long, up to 1.5 cm diam.; inconspicuous colleters along interpetiolar line. *Leaves* decussate, petiolate, blades membranous or subcoriaceous, 5–11 $\times$ 4–7 cm, elliptic, broadly ovate to suborbicular, deeply cordate-lobate at the base, acuminate at the apex, densely pubescent, with eglandular spreading white trichomes (0.6–1.5 mm long), and minute glandular trichomes, usually denser on veins; 6 or 7 pairs of lateral veins, 3–5 colleters at the base of the upper surface. *Inflorescences* congested umbelliform cymes, (4–)8–20-flowered; peduncles 1–5 mm long, bracts linear, 4–5 mm long. *Flowers* with pedicels 4–8 mm long, spreading or ascending, 10–15 mm diam. *Calyx* campanulate, lobes longer than corolla tube, narrow-ovate to narrow-lanceolate, acuminate, abaxially pubescent, with eglandular trichomes 0.4–1.2 mm long; 1 coller per sinus. *Corolla* shortly campanulate or rotate-campanulate, 10–12 mm diam., tube short, lobes cinnamon-brown, yellowish-brown, reddish-brown, or chocolate-brown, spreading, ovate or broadly ovate, obtuse-emarginate at apex, adaxially reticulate, but veined of no contrasting color, slightly rugged, scarcely puberulent or glabrous adaxially, sparsely puberulent to glabrescent abaxially. *Corolline corona* a yellow or orange thin

pentagonal prominence surrounding base of gynostegial corona and gynostegium. *Gynostegial corona* cyathiform, inconspicuous disciform or pentagonal fleshy undulate, with 5 obtuse lobes opposite to the anthers, with thin cavities (nectaries?) below each lobe. *Gynostegium* sessile, anthers 0.7–0.8 $\times$ 0.8 mm subhorizontal, apex somewhat bent towards flower axis, with slightly bilobed outer margin, locules narrow-ovate, apical membrane small, deltate-ovate, reaching style-head apex, wings very short and inconspicuous (ca. 0.1 mm long); style-head pentagonal, 1.3–1.5 mm wide. *Pollinaria*: Pollinia slightly pendent or subhorizontal, narrowly obovate (0.2–0.35 $\times$ 0.15–0.25 mm), subsessile; caudicles translucent (0.08–0.1 mm long); corpusculum oblong (0.15–0.2 $\times$ 0.1 mm), slightly shorter than pollinia. *Follicles* one or two per flower, fusiform (4.5–6.5 $\times$ 1–2 cm), attenuate towards apex, green with white lines or areas, surface muricate, with short fleshy prickles, glabrous. *Seeds* not seen.

Distribution and ecology. – Two species (*Mexicania congesta* (Decne.) L.O.Alvarado & Lozada-Pérez, *M. guerrensis* L.O.Alvarado & Lozada-Pérez) endemic to Mexico, in Guerrero, Jalisco, México, Michoacán, Nayarit, Oaxaca, and Zacatecas; in dry deciduous forest, pine-oak forest, on dry rocky, red or lime soils; 1350–2100 m.

Notes. – In the molecular phylogeny, *Mexicania* is weakly to well supported as sister to *Himantostemma*–*Polystemma* in Clade II. However, in habit and leaf morphology, *Mexicania* is most similar to *Microstelma*. *Mexicania* differs from *Polystemma* mainly by glandular trichomes without white crystalline inclusions, staminal corona segments without filiform or digitate appendages, and densely muricate, not mottled follicles (vs. glandular trichomes with white, crystalline inclusions on stems, leaves and inflorescence, staminal corona segments each with more or less filiform or digitate appendages usually in two series, and long fusiform-cylindrical, smooth, glabrous and mottled follicles in *Polystemma*). Differing from *Microstelma* by stems with eglandular long trichomes 0.8–1.7 mm long, peduncles 1–5 mm long, flowers 10–15 mm diam., corolla lobes not conspicuously reticulate, without evident parallel veins, corolline corona an annular or pentagonal fleshy ring, gynostegial corona cinnamon brown, scarcely differentiated, subsessile pollinia, and conspicuously muricate follicles (vs. stems with eglandular long trichomes 0.2–0.7 mm long, peduncles 20–50 mm long, flowers 10–22 mm diam., corolla lobes often reticulate, with parallel veins, gynostegial corona black or brown, basally annular-scutiform, with subtriangular-rounded staminal segment, and scarcely muricate or smooth follicles in *Microstelma*).

23. ***Microstelma*** Baill. ex Morillo in Mem. Fund. La Salle Ci. Nat. 81(190): 77. 2023 – Type: ***Microstelma chrysanthum*** (Greenm.) Morillo ($\equiv$ *Gonolobus chrysanthus* Greenm.).

References and iconography. – Morillo, G. 2023. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte IV. Mem. Fund. La Salle Ci. Nat. 81(190):

45–90. http://saber.ucv.ve/ojs/index.php/rev_mem/article/view/26223

Alvarado-Cárdenas, L.O. 2024. Revisión taxonómica de *Microstelma* (Apocynaceae, Asclepiadoideae, Asclepiadeae, Gonolobinae), endémica de México, con dos especies nuevas. *Acta Bot. Mex* 131: e2327. <https://doi.org/10.21829/abm131.2024.2327>

Description. – Climbers, generally 2–3 m long; latex white. *Pubescence* mixed, with capitate glandular trichomes, 0.05–0.12 mm long, and patent to reflexed eglandular trichomes, 0.2–0.7 mm long. Stems densely pubescent. Leaves decussate, short petiolate; blades to 11 × 5.6 cm, ovate-oblong, pointed, basally cordate-lobed, densely pubescent; with 4–7 pairs of secondary veins; 3–7 colleters at the base of the upper surface. Inflorescences umbelliform or helicoid cymes, generally (2–)4–6(–8)-flowered; rachis 20–50 mm long; peduncles 2–5 cm long, bracts 1–4 mm long, oblong. *Flowers* pedicellate; pedicels slightly shorter than peduncle and rachis; medium-sized to large (1–2.2 cm). *Calyx* with lobes ovate-oblong, acute or obtuse, pubescent on the abaxial side, marginally ciliate; 1 colleter per sinus. *Corolla* rotate, yellowish, whitish-cream, orange-green, or red, mostly with green or purplish parallel veins, tube slightly shorter than the lobes; lobes sometimes asymmetric, patent, oblong, apically obtuse, adaxially glabrous, abaxially pubescent. *Corolline corona* absent. *Gynostegial corona* fleshy, black or brown, basally annular-scutiform, 5-segmented; staminal segments erect, subtriangular-rounded, obtuse, shorter than anthers. *Gynostegium* subsessile or shortly stipitate; anthers wider than tall; anther wings very short, subparallel, anther appendages short, covering style-head margin; style-head pentagonal, flat or slightly convex. *Pollinaria*: Pollinia pendent, ovoid-ellipsoid; caudicles short, upwardly curved; corpusculum narrowly oblong, curved, about $\frac{1}{2}$ to $\frac{1}{3}$ the length of the pollinia. *Follicles* one per flower (in *M. tenorioi* L.O. Alvarado), fusiform (9–11 × 2–2.5 cm long), long attenuate, with a slightly muricate or smooth surface, inconspicuously pubescent. *Seeds* not seen.

Distribution and ecology. – Four (or more) species endemic to Mexico; thorn-scrubs and at oak forests and pine-oak forest margins; 1500–2880 m.

Notes. – The three specimens of *Microstelma* are weakly supported both as genus and as sister of *Prosthecidiscus* in the Central/North American Clade III in the BEAST analysis (Fig. 4); in the analyses of the complete and the intermediate datasets they are unresolved with *Prosthecidiscus* (suppl. Figs. S1–S3). However, *Prosthecidiscus* is morphologically completely different from *Microstelma*, so that incomplete sequence data offer the only explanation for this unexpected relationship.

Microstelma inconspicuam (Brandeggee) Morillo, Liede & Meve, **comb. nov.** ≡ *Gonolobus inconspicuus* Brandeggee in Univ. Calif. Publ. Bot. 3(8): 387. 1909 ≡ *Matelea inconspicua* (Brandeggee) Woodson in Ann. Missouri Bot. Gard. 28: 222. 1941 – Holotype: Mexico. Puebla,

vicinity of San Luis Tultitlanapa: near Oaxaca, 1907–1908, *C.A. Purpus* 3403 (UC barcode UC125775!).

= *Matelea ionantha* Woodson in Ann. Missouri Bot. Gard. 37: 408. 1950 – Holotype: Mexico. Veracruz, near El Puerto, above Acultzingo, 7600–7800 ft., 13 Sep 1944, *A.J. Sharp* 44830 (MO barcode MO-344355!; isotype: MEXU barcode MEXU 00136798!), **syn. nov.**

Stevens (2009) annotated the holotype of *Matelea ionantha* with “*Matelea inconspicua* (Brandeggee) Woodson”, a view followed here; but apparently, this synonymy was never published.

24. ***Odontostephana*** Alexander in Small, Man. S.E. Fl.: 1076. 30 Nov 1933 – **Lectotype (designated here): *Odontostephana obliqua*** (Jacq.) Alexander (≡ *Cynanchum obliquum* Jacq.).

= *Cyclodon* Small, Man. S.E. Fl.: 1075. 30 Nov 1933 – Type: *Cyclodon alabamensis* (Vail) Small (≡ *Vincetoxicum alabamense* Vail), **syn. nov.**

References and iconography. – Morillo, G. 2023. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte IV. *Mem. Fund. La Salle Ci. Nat.* 81(190): 45–90. http://saber.ucv.ve/ojs/index.php/rev_mem/article/view/26223

Sims, J. 1810. *Cynanchum discolor*. In: Curtis, W. (ed.), *Bot. Mag.* 31: t. 1273 (*Cynanchum obliquum* Jacq. ≡ ***Odontostephana obliqua*** (Jacq.) Alexander). <https://www.biodiversitylibrary.org/page/473214>

Description. – Herbaceous vines, 0.5–5 m long; latex white. *Pubescence* of short eglandular trichomes (mostly up to 1 mm long) or mixed pubescence of eglandular and inconspicuous glandular trichomes white or translucent, 0.1–0.15 mm long. *Stems* 1–5, slender, hirtellous, hirsute or sparsely hirsute. *Leaves* decussate, with petioles 1–9.5 cm long, with 0–2 colleters on each side of petiole; blades (1.5–)3.5–20 × 2–18 cm, ovate, narrowly ovate, orbiculate, oblong, lanceolate or elliptic, apex acute to acuminate, base shallowly to deeply cordate, usually pubescent on both sides; 6 or 7 pairs of lateral veins; with (0–)2–4(–6) colleters at the base of the upper surface. *Inflorescences* sometimes terminal, solitary or paired, simple or compound, umbelliform or helicoid cymes, 3–40-flowered; peduncles to 6 cm long. *Flowers* with pedicels to 4 cm long, small to medium-sized (9–15(–20) mm diam.). *Calyx* with lobes narrow-ovate or lanceolate, obtuse or acute, spreading (rarely erect), abaxially pubescent, with or without colleters. *Corolla* shortly rotate-campanulate; lobes often brown, reddish-purple or greenish-purple, sometimes white, oblong to narrowly spatulate or narrow-deltoid, obtuse, occasionally reticulate, adaxially glabrous or pubescent, abaxially pubescent. *Corolline corona* absent. *Gynostegial corona* fleshy or membranous, 5-segmented, segments united in a ring or cup adnate to the corolla tube, slightly separated from the stipe (a low undulating fleshy yellow ring adnate to the stipe and not reaching half of the gynostegium in *O. reticulata* (Engelm. ex A.Gray) Morillo, Liede & Meve), basally concave, frequently equaling or slightly surpassing

the style-head; staminal segments glabrous, yellowish, pinkish, purplish or reddish-brown, free only in a small lateral-apical portion, usually toothed at the ends, erect or incurved, crested or appendiculate on the inner side *Gynostegium* subsessile to shortly stipitate (stipe to 2 mm long); anthers convex, deltoid to subquadrate, abaxially rounded and prominent below the style-head; anther wings very short, connective appendages narrowly deltoid or truncate (silvery and reflective in *O. reticulata*); style-head subpentagonal, flat, slightly convex or concave. *Pollinaria*: Pollinia horizontal, narrowly obovate to subquadrate, abaxially concave; caudicles articulate; corpusculum sagittate or narrow ellipsoid-sagittate, about $\frac{1}{3}$ the length of the pollinia. *Follicles* one or two per flower, pendent, green, narrow-ovoid or fusiform (5–9 × 1.5–3.2 cm in *O. alabamensis* (Vail) Morillo, Liede & Meve; 8–10 × 2–3 cm in *O. decipiens* Alexander, 8–15 × 1.5–2 cm in *O. reticulata*), apically acuminate, moderately muricate, with short (2–5 mm long) spine-like sparse to dense prickles, occasionally striate, minutely short-hirsute when young, but often glabrescent or glabrous when mature; rarely glabrous; many-seeded (30–40 per follicle in *O. alabamensis*, ca. 50 in *O. floridana* (Vail) Alexander). *Seeds* ovate to orbicular, rugose, margins broadly winged, distally entire or denticulate, comose. – Fig. 3A

Distribution and ecology. – Seven species, all endemic to the United States of America (from the eastern states such as the Carolinas and Florida to Texas); generally growing on sandy or clayey soils, near bodies of water (river banks and streams), in grassy savannahs, shrublands or temperate, deciduous or semi-deciduous forests, frequently on rocky soils, with *Pinus*, *Carya* and *Quercus* as trees dominant; 200–400 m.

Nomenclatural note. – Both *Odontostephana* and *Cyclodon* were published in *Manual of the southeastern Flora* (Small, 1933), distinguished by a different shape of the corona (disk-like or saucer-shaped, obscurely, if at all ridged in *Cyclodon*; cup-shaped or incurved at the tip, usually crested or appendaged on the inner side in *Odontostephana*). Because eight names have been published under *Odontostephana* and only one under *Cyclodon*, *Odontostephana* is chosen as name for the genus, to minimize nomenclatural changes.

Notes. – In all analyses (suppl. Figs. S1–S5), *Odontostephana* is well supported and also well supported as sister to *Tutunakanthus* in the Central/North American Clade II, with the exception of the BEAST analysis (Fig. 4), in which the relationship is weakly supported.

Odontostephana alabamensis (Vail) Morillo, Liede & Meve, **comb. nov.** $\equiv$ *Vincetoxicum alabamense* Vail in Bull. Torrey Bot. Club 30: 178. 1903 $\equiv$ *Cyclodon alabamensis* (Vail) Small, Man. S.E. Fl.: 1075. 1933 $\equiv$ *Matelea alabamensis* (Vail) Woodson in Ann. Missouri Bot. Gard. 28: 234. 1941 – **Lectotype (designated here)**: U.S.A., Alabama, Dale Co., sandy hillside on edge of woods, 3 Jun 1902, T.G. Harbison H6378 (NY barcode 00318828!; isolectotype: MO barcode MO-231967!).

Vail (1903: 178) gave as type information: “‘Sandy hill-sides on edge of woods,’ Dale County, Alabama, collected by T.G. Harbison, June 3 and September 5, 1902.” There are two specimens at NY fulfilling this description, *Harbison H6378* (NY barcode 00318828), duplicated at MO (barcode MO-231967) and *Harbison H6832* (NY barcode 00318827). Drapalik (1968, in schedis) selected the specimen *Harbison H6378* (NY barcode 00318828) as the lectotype of *Odontostephana alabamensis*, but this lectotypification was not published. His choice is followed here.

Odontostephana reticulata (Engelm. ex A.Gray) Morillo, Liede & Meve, **comb. nov.** $\equiv$ *Gonolobus reticulatus* Engelm. ex A.Gray in Proc. Amer. Acad. Arts 12: 75. 1876 $\equiv$ *Vincetoxicum reticulatum* (Engelm. ex A.Gray) A.Heller in Contr. Herb. Franklin Marshall Coll. [Bot. Explor. S. Texas] 1: 79. 1895 $\equiv$ *Matelea reticulata* (Engelm. ex A.Gray) Woodson in Ann. Missouri Bot. Gard. 28(2): 234. 1941 – **Lectotype (designated here)**: U.S.A., Texas, May–Oct 1849, C. Wright 543 (GH barcode 01083238!; isolectotypes: GH barcodes 01083684!, 01083237!, NY barcode 00318610!).

Gonolobus reticulatus was published as replacement name for *G. granulatus* Torr. (in Emory, Rep. U.S. Mex. Bound. 2(1): 165. 1859; non *G. granulatus* Scheele in Linnaea 21(6): 759. 1849). As stated in the protologue, Torrey (in Emory, 1859) had described a new species, but wrongly referred it to *G. granulatus* Scheele, now a variety of *G. suberosus* (L.) R.Br. (non *G. granulatus* Scheele in Linnaea 21(6): 759. 1849). As Engelmann (in Gray, 1876: 75) did not cite any specimens, the lectotype should be selected under the specimens cited by Torrey. Of these, C. Wright 543 is extant in several herbaria, and well represented online. Thus, the specimen GH barcode 01083238, that bears numerous flowers and a mature fruit, is selected as the lectotype of *G. reticulatus* Engelm. ex A.Gray here.

A wide array of Diptera have been observed to transport pollinaria of *Odontostephana* (*O. alabamensis*, *O. baldwyniana* (Sweet) Alexander, *O. carolinensis*, and *O. reticulata*; Drapalik, 1969).

25. ***Orinoquia*** Morillo in Pittieria 39: 229. 2015 – Type: ***Orinoquia yanomamica*** (Morillo) Morillo ($\equiv$ *Matelea yanomamica* Morillo).

Reference and iconography. – Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmmt.pdf>

Description. – Twining vines, probably with very long stems; latex white. *Pubescence* of golden-yellow or ferruginous-reddish, long (5–8 mm long), ubiquitously distributed, eglandular trichomes, erect, and few short translucent glandular trichomes (glandular trichomes absent in *O. brasiliensis*). *Stems* hirsute, without intra- or interpetiolar

colleters. *Leaves* decussate, petiolate; petioles 6–11 cm long; blades large (10–18 × 8–12 cm), membranous, ovate or broadly obovate-elliptic, apically abruptly acuminate, basally cordate, margins entire, densely long-ciliate, hirsute on both faces, trichomes eglandular, 3–4 mm long; hirsute on both sides; with 5–7 pairs of lateral veins; apparently without colleters. *Inflorescences* apparently axillary in the Brazilian species, umbelliform cymes, 3–10-flowered; peduncles 7–13 cm long, pendulous, pubescence as in the stems; bracts 8–15 mm long, narrowly ovate or oblong, acuminate. *Flowers* long-pedicellate; (pedicels 1–3.5 cm long), very large (4.5–6 cm diam.). *Calyx* with lobes broadly ovate or lanceolate, 6–14 mm long, brown or reddish-brown, short-acuminate, abaxially with multiseptate, patent, long (5–8 mm) eglandular trichomes or with a mixed pubescence of short (0.8–1 mm long) and long trichomes; without colleters in the sinus. *Corolla* vinaceous, rotate or rotate-campanulate; adaxial face of the tube with a ring around the corona, from which translucent lamellar trichomes are differentiated; lobes patent, ovate-oblong, obtuse or acute, veined-reticulate, adaxially conspicuously glabrous, but right side pubescent; abaxially densely pubescent. *Corolline corona* a ring of translucent trichomes surrounding the corona. *Gynostegial corona* shallowly cup-shaped, consisting of a disc internal to the corolline ring from which 15 lobes are radially differentiated; staminal lobes 10, radially disposed, bifid or paired, marginally expanded and opposite the anthers; interstaminal lobes narrow-ligulate, reflexed. *Gynostegium* sessile, strongly compressed; anthers yellow, 3–3.3 mm wide, subtriangular, anther wings horizontal, divergent, less than 1 mm long; connective appendages deltoid, covering $\frac{1}{3}$ to $\frac{1}{2}$ of style-head; style-head more or less flat, pentagonal-disciform. *Pollinaria*: Pollinia horizontal, broadly obovoid, with a proximal hyaline portion; caudicles articulated, short; corpusculum curved rhombic-ovoid or obovoid, concave-convex in lateral view. *Follicles* one per flower (in *O. brasiliensis* T.S.Cout. & L.O.Alvarado), 10 × 3.5 cm, fusiform, muricate, hirsute, projections 15–18 mm long, hirsute. *Seeds* not seen.

Distribution and ecology. – A genus of two species, *Orinoquia yanomamica*, endemic to Venezuela; rain forests, headwaters of the Orinoco River; 150–400 m; *O. brasiliensis*, from Matto Grosso, southern Brazil.

Notes. – *Orinoquia* was not included in the molecular phylogeny.

Distinguished from all known genera in the Gonolobinae by the correlation of densely yellowish pubescence of long, erect, eglandular, multiseptate, spreading trichomes, and few minute conical trichomes on stems, leaves and inflorescence, membranous broadly obovate-elliptic, basally cordate leaves, long-pedunculate, few-flowered, umbelliform cymes, with narrowly ovate, acuminate or attenuate bracts, rotate, large corollas, with a ring of translucent trichomes surrounding the gynostegial corona, broad, strongly compressed, disciform, sessile gynostegium, large broadly obovate pollinia, rhombic-ovate concave-convex corpusculum, and corona of 10 radially disposed marginally expanded

lobes, in addition to 5 oblong sulcate segments alternating with them.

26. *Pauciflora* Morillo, Liede & Meve, **gen. nov.** – Type: *Pauciflora parvifolia* (Torr.) Morillo, Liede & Meve (= *Gonolobus parvifolius* Torr.).

Diagnosis. – Suffrutescent small vines, with puberulent dense minute recurved or straight eglandular (short, 0.2–0.3 mm long) and sometimes also glandular trichomes or only eglandular trichomes on stems, 1- or 2(–4)-flowered sessile or subsessile cymes, pale yellow, yellowish-green or brown-chocolate, rotate or subcampanulate (5–12 mm in diam) corolla, with ascendent or twisted, triangular-ovate, ovate to narrowly oblong, obtuse lobes, gynostegial corona diverse, cyathiform undulate, adnate to stipe and ridged inside, subpentagonal in outline, saucer shaped and entire, or of 5 partly free stalked staminal segments 2–3-lobed at apex, subquadrate, obovoid or ellipsoid-reniform pollinia, and narrowly fusiform-cylindrical attenuate, slightly muricate, sparsely warty or almost smooth follicles. In our phylogeny sister to *Trichosacme*, but morphologically similar to *Chthamalia*. *Trichosacme* differs mainly by woolly indumentum in stems, leaves, inflorescence and follicles, corolla lobes with an apical long filiform, motile, pendent purple appendage, and narrow pollinia with an apical sterile hyaline region. *Chthamalia* differs mainly by prostrate, trailing or ascendent stems (rarely small vines), with eglandular trichomes spreading or recurved 0.15–1.8 mm long, sometimes with a xylopodium, inflorescence short- or long-pedunculate, few to many flowered, gynostegial corona annular, cyathiform or tubular, with 5 short or very long ascendent, erect or incurved lobes, rarely segments slightly connate at the base and pollinia obovoid or obovoid-reniform.

Description. – Suffrutescent, twining or trailing vines from a woody base up to 2–3 m long, latex white. *Pubescence* of dense, mixed, eglandular trichomes short (0.2–0.3 mm) retrorse-appressed or spreading, glandular trichomes present (but absent on stems of *M. parvifolia*). *Stems* 0.4–2.5(–3) long; thinly suberized and fissured when mature, densely pubescent. *Leaves* decussate, petiolate; blades subcoriaceous or subcarnose (0.6–2.5 cm long), narrowly ovate to sagittate, auriculate or obtuse at base, acuminate or acute at apex, margin usually somewhat revolute; surface mixed puberulent mainly on veins; 4–6 pairs of lateral veins; with 3–5 colleters at the base of the upper surface. *Inflorescences* cymes, 1 or 2(–4) flowered; peduncles absent or very short (to 2 mm long); bracts linear or lanceolate. *Flowers* with pedicels longer than peduncles; small or medium sized (5–12 mm diam.). *Calyx* with lobes narrowly ovate or linear, with 1 colleter per sinus. *Corolla* rotate or subcampanulate (4–9 mm long), 5–12 mm diam., pale yellow, greenish-white, yellowish-green or brown-chocolate; lobes ascending or twisted, triangular-ovate, ovate to narrowly oblong, obtuse, 2.5–6 (–10) mm long, adaxially glabrous or pubescent at base, abaxially glabrous or pubescent. *Corolline corona* absent. *Gynostegial corona* cyathiform (cup-shaped), undulate, adnate to stipe and ridged inside, subpentagonal in outline,

saucer-shaped and entire, or of 5 partly free stalked staminal segments, 2–3-lobed at apex. *Gynostegium* sessile or stipitate, style-head convex, disciform, flat or slightly concave; anther wings short (0.2 mm long), appendages deltoid. *Pollinaria*: Pollinia horizontal or subpendent, subquadrate (0.3–0.45 × 0.2–0.25 mm) to ellipsoid-reniform, with hyaline proximal margin, translator arms very short; corpusculum narrowly subsagittate (0.12–0.15 × ca. 0.08 mm). *Follicles* one per flower, narrowly fusiform-cylindrical (5–10 × 1–1.5 cm), attenuate towards apex, striate (white or gray with marron-purple lines), slightly muricate, sparsely warty or almost smooth, with fleshy conical prickles, 1–2 mm long, surface minute-puberulent to glabrate. *Seeds* narrowly ovate, comose. – Fig. 6

Distribution and ecology. – Three species in the South-west United States (Arizona, California, Texas) and northern Mexico (*Pauciflora parvifolia* in Sonora and Coahuila; *P. sagittifolia* in Nuevo León and Tamaulipas). In deserts, desert scrubs, thorn scrub, mountains and canyons, on rocky or gravelly soils; 20–1350 m.

Notes. – The three species of *Pauciflora* included in the analysis form a moderately to well-supported clade in a moderately to well-supported sister-group position to *Trichosacme lanata* in the Central/North American Clade II (Fig. 4, suppl. Figs. S1, S2).

Pauciflora hastulata (A.Gray) Morillo, Liede & Meve, **comb. nov.** ≡ *Lachnostoma hastulatum* A.Gray in Proc. Amer. Acad. Arts 11: 87. 1876 ≡ *Gonolobus hastulatus* (A. Gray) A.Gray in Proc. Amer. Acad. Arts 12: 78. 1876 ≡ *Vincetoxicum hastulatum* (A.Gray) A.Heller in Muhlenbergia 1(1): 2. 1900 ≡ *Matelea hastulata* (A.Gray) Sundell in Brittonia 43(3): 195. 1991 – **Lectotype (designated here)**: Mexico. Baja California Norte, Cañon Tantillas, 17 Sep 1875, *E. Palmer s.n.* (GH barcode 00061668!).

The collection *Palmer 227*, also from the Tantillas Mountains, and extant in LE (LE 00016208), NY (00318676) and PH (00012687) certainly represents the same species, but it is unclear whether it represents the exact same collection as the type collection and the number 227 was only added later. In the protologue, no number is indicated for the *Palmer* collection. Because of these ambiguities, lectotypification is necessary and the numbered specimens are not cited as isolectotypes here.

Pauciflora parvifolia (Torr.) Morillo, Liede & Meve, **comb. nov.** ≡ *Gonolobus parvifolius* Torr. in Emory, Rep. U.S. Mex. Bound. 2(1): 166. 1859 ≡ *Vincetoxicum parvifolium* (Torr.) A.Heller in Muhlenbergia 1(1): 2. 1900 ≡ *Matelea parvifolia* (Torr.) Woodson in Ann. Missouri Bot. Gard. 28(2): 230. 1941 – **Lectotype (designated by Sundell in Brittonia 42: 196. 1991)**: U.S.A. Texas: Rio Grande, below Mt. Carmel, Oct 1852, *C.C. Parry s.n.* (NY barcode 00318605!).

= *Gonolobus californicus* Jepson, Man. Fl. P1. Calif.: 771. 1925 – **Holotype**: U.S.A. California: Ironwood Spring, Colorado Desert, 6 Apr 1901, *T.S. Brandegees s.n.* (GH barcode 00061666!; isotype: US barcode 00111110!).

Pauciflora sagittifolia (A.Gray) Morillo, Liede & Meve, **comb. nov.** ≡ *Gonolobus sagittifolius* A.Gray in Proc. Amer. Acad. Arts 12: 77. 1876 ≡ *Vincetoxicum sagittifolium* (A.Gray) A.Heller in Muhlenbergia 1(1): 3. 1900 ≡ *Matelea sagittifolia* (A.Gray) Woodson ex Shinnars in Sida 1(6): 363. 1964 – **Lectotype (designated here)**: U.S.A. Texas: Mountain near the Limpio, *C. Wright s.n.* (GH barcode 00061667!; isolectotype: NY barcode 00318611!).

The type of *Pauciflora sagittifolia* was so far only known from a fragment in NY, and Shinnars (1964: 364) had written: “The species is evidently very rare; I have seen no specimens, but the original description is quite clear.” However, the original description by A. Gray (1876: 12) states for the type of *Gonolobus sagittifolius* “Rio Limpio, W. Texas, *Wright*. This is Dr. Torrey’s *G. parvifolius* only as respects the specimen of *Wright* referred to by him, and from which he described the follicle.” So, looking at Torrey’s (in Emory 1859: 166) description of *G. parvifolius*, he cited two specimens “Sides of hills, cañon of the Rio Grande, below Mt. Carmel, October; *Parry*. Mountain near the Limpia, western Texas, *Wright*.” The first of these two specimens today constitutes the lectotype of *P. parvifolia* (see above). Of the second, a well-preserved and rich specimen with exactly this labelling is extant in GH (00061667) and considered a syntype of *G. parvifolius* Torr. It is here selected as the lectotype of *G. sagittifolius* A.Gray.

27. ***Peruviasclepias*** Morillo in Pittieria 39: 232. 2015 – Type: ***Peruviasclepias aliciae*** (Morillo) Morillo (≡ *Matelea aliciae* Morillo).

Reference and iconography. – Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmnt.pdf>

Description. – Small herbaceous or suffrutescent plants, usually prostrate, sometimes vining up to 1.5 m long; latex white. *Pubescence* of eglandular, translucent, vermiform or curved, patent or retrorse, 0.2–0.5 mm long trichomes. *Stems* glaucous, eventually scarred because of early caducous leaves, densely villous when young. *Leaves* early deciduous (during the dry season), with thick petioles, to 2 cm long; blades to 4.5 × 3 cm, subcoriaceous-brittle to leathery-fleshy, broadly ovate to ovate-triangular, apex moderately acuminate or acute, base broadly and briefly cordate, margin somewhat wavy, ciliate; with 6 or 7 pairs of secondary veins; with 4 collectors at the abaxial base. *Inflorescences* bostrychoid cymes, 6–12(–24)-flowered; peduncles to 1.3 cm long, bracts linear or oblong. *Flowers* with pedicels to 0.7 cm long; very small (less than

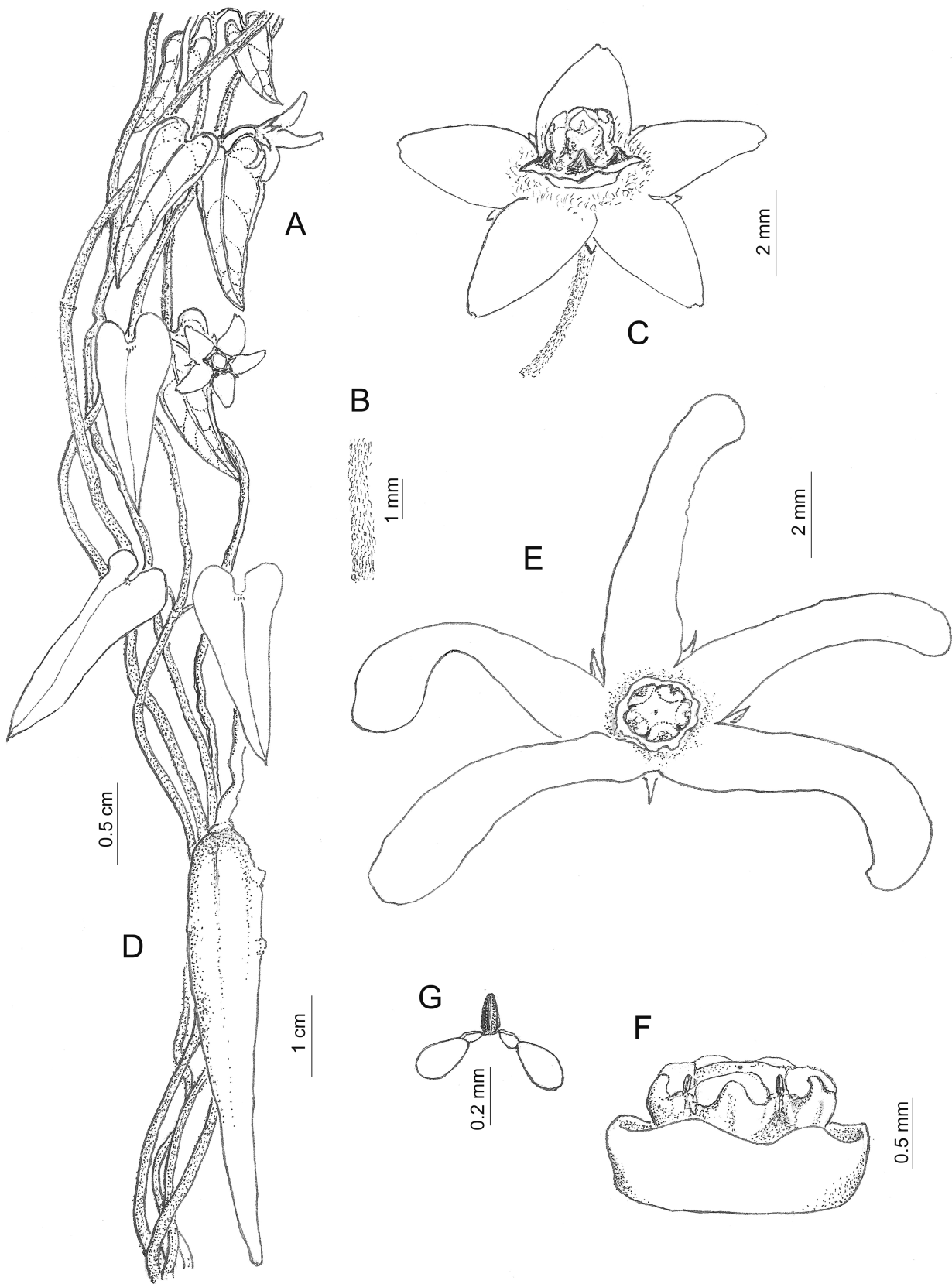


Fig. 6. *Pauciflora* gen. nov. **A–D**, *Pauciflora parvifolia*: **A**, Twining branches with flowers; **B**, Stem pubescence; **C**, Flower; **D**, Follicle; **E–G**, *Pauciflora sagittifolia*: **E**, Flower; **F**, Gynostegium and corona; **G**, Pollinarium. — **A–D** from Pringle s.n. (MO) and Reichenbacher 1747 (MO); **E–G** from J. García Márquez 19375 (MO). Drawn by Gilberto Morillo.

1 cm diam.). *Calyx* campanulate, lobes fused for about a quarter of length, oblong or oblong-lanceolate, obtuse or rounded at the apex, erect at anthesis, abaxially villous; with 1 digitiform colleter per sinus. *Corolla* short-campanulate, yellowish-green, glabrous except for 5 tufts of white erect trichomes in the throat opposite the anthers; lobes moderately reflexed or recurved, veined, narrowly or broadly ovate, with subappressed trichomes. *Corolline corona* absent. *Gynostegial corona* annular, thinly fleshy, adnate above the middle of the corolla tube. *Gynostegium* long-stipitate; anthers horizontal, anther wings short, inclined toward the stipe, connective appendages white, erect or somewhat incurved over style-head; style-head pinkish, obtusely pentagonal to star-shaped. *Pollinaria*: Pollinia horizontal or somewhat erect, small, oblongoid-pyriform, concave on the external face, with a narrow proximal hyaline zone; caudicles curved, widened; corpusculum narrowly sagittate. *Follicles* one per flower, small, arched-fusiform, largely attenuated towards the apex, narrowed towards the base, prickled with short curved processes, with scattered trichomes, many-seeded. *Seeds* ovoid, slightly reticulate-warty, crenulate on the distal margin, comose. – Fig. 3B

Distribution and ecology. – A single species, *Peruviasclepias aliciae*, endemic to the dry scrubs and deserts in western coastal side of Peru; 150–1050 m.

Notes. – In the molecular phylogeny, *Peruviasclepias* is unsupported to weakly supported as sister to *Phaeostemma*–*Lachnostoma* in Clade V (suppl. Figs. S1–S5), or to *Phaeostemma*–*Lachnostoma*–*Ptycanthera*–*Matelea* (BEAST, Fig. 4).

Peruviasclepias differs from other genera of Gonolobinae by its short, brittle, frequently prostrate stems, densely glaucovillous pubescence, early deciduous, leathery-brittle or leathery-fleshy small leaves, many-flowered inflorescences, short and narrowly campanulate corolla with fascicles of white trichomes opposite the anthers, a very narrow stipe that supports the style-head and small, arched fusiform follicles with short prickles.

28. ***Phaeostemma*** E.Fourn. in Martius, Fl. Bras. 6(4): 311. 1885 – Type: *Phaeostemma riedelii* E.Fourn.

References and iconography. – Morillo, G. 2023. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte V. *Chthamalia*, *Meveampelos* gen. nov., *Phaeostemma*, *Polystemma*, *Ptycanthera*. *Mem. Fund. La Salle Ci. Nat.* 81(191): 37–90. https://saber.ucv.ve/ojs/index.php/rev_mem/article/view/27374

Fournier, E. in Martius, C.F.P. 1885. *Flora Brasiliensis*, vol. 6(4). Monachii [Munich]. – t. 91 “*Phaeostemma Riedelii*” (*Phaeostemma riedelii*). <https://www.biodiversitylibrary.org/page/140536>

Description. – Suffrutescent twining vines up to 12 m long; with white latex. *Pubescence* of eglandular long and short trichomes (0.5–3 mm long), and glandular short trichomes (glandular trichomes scarce in some species). *Stems* hirsute, not suberized, often rhizomatous at base. *Leaves*

decussate, petiolate; blades to 20 × 12 cm, membranous to leathery, broadly ovate, elliptical to broadly oblong-obovate, short cordate at the base, apically acuminate, densely pubescent on both sides; 6 or 7 pairs of secondary veins; with 2–9 colleters at the base of the upper surface. *Inflorescences* helioid cymes (1–)2–12-flowered; shortly pedunculate; bracts linear. *Flowers* long-pedicellate, large (to 4 cm diam.). *Calyx* with lobes narrowly ovate to oblong-elliptic, about as long as corolla tube, abaxially pubescent; with 1 or 2 colleters in each sinus. *Corolla* broadly campanulate; lobes narrowly ovate to deltoid, patent to reflexed, green or yellowish-green, veined-reticulate, glabrous or pubescent on both sides; with nectariferous cavities between the corona segments. *Corolline corona* absent. *Gynostegial corona*, staminal segments fleshy, apically bifid-digitate, partly adnate to corolla tube and stipe. *Gynostegium* stipitate, anthers subtriangular, subhorizontal, radially protruding from style-head; anther wings short (0.4–0.5 mm), curved; connective appendages asymmetrically deltoid, style-head usually flat or slightly concave. *Pollinaria*: Pollinia pendent, narrowly obpyriform or oblongoid-obpyriform, concave on one side; caudicles hyaline, folded; corpusculum broadly sagittate. *Follicles* one per flower, broadly fusiform (17–19 × 6–7.5 cm in *P. riedelii*), apically acute, with 5 wings and several blunt projections; many-seeded (400–500 per follicle in *P. riedelii*). *Seeds* ovate, with denticulate or dentate chalazal end, comose. – Fig. 3C

Distribution and ecology. – A Neotropical genus of about seven species with disjunct distribution in northern South America (Venezuelan Guyana, Suriname) and SE Brazil to NE Argentina; wet, rain and montane forest; 100–700 (–1500) m.

Notes. – In the molecular phylogeny, *Phaeostemma* is always well supported and also well supported as sister to *Lachnostoma* in Clade V.

Morphologically, *Phaeostemma* is similar to *Lachnostoma*, which differs by the absence of leaf extra-axillary colleters, infundibuliform corolla, peduncle + rachis as long as or longer than pedicels.

29. ***Pherotrichis*** Decne. in Ann. Sci. Nat., Bot., sér. 2, 9: 322 (in obs.). 1838. – Type: *Pherotrichis villosa* (Schult.) Meisn. (≡ *Cynanchum villosum* Schult.)

Reference and iconography. – Lozada-Pérez, L. 2003. *Sistemática de Pherotrichis Decne. (Apocynaceae, Asclepiadoideae)*. Tesis de Maestría. México, D.F.: Universidad Nacional Autónoma de México. <http://132.248.9.195/ppt2002/0323283/0323283.pdf>

Balbis, G.B. 1804. *Miscellanea botanica. Mém. Acad. Sci. Turin, Sci. Phys.* 7: 317–386, 11 pl. – t. 4 “*Asclepias villosa*” (*Pherotrichis villosa*). <https://www.biodiversitylibrary.org/page/7475693> [reprint: <https://bibdigital.rjb.csic.es/idviewer/13239/76>]

Delessert, J.P.B. & Candolle, A.P. de. 1846. *Icones selectae plantarum*, vol. 5. Parisiis [Paris]: apud Fortin, Masson et Sociorum. – t. 78 “*Lachnostoma balbisii* Dne.”

(*Pherotrichis villosa*). <https://www.biodiversitylibrary.org/page/286872>

Description. – Perennial, erect herbs 30–60 cm high; latex translucent. *Pubescence* of long straight, eglandular trichomes (0.4–1.5 mm long), short trichomes and unicellular and multicellular glandular trichomes. *Stems* densely hirsute. *Leaves* decussate, shortly petiolate; blades ovate to elliptical (3.5–8 × 2–6 cm), apex obtuse to rounded, base obtuse; densely hirsute; 4–8 pairs of lateral veins; 3–15 colleters at the base of the upper surface. *Inflorescences* extra-axillary and axillary, one or two per node, sessile or shortly pedunculate; umbelliform; 5–15-flowered; bracts linear or linear-lanceolate, small. *Flowers* shortly pedicellate, small (4.5–7.5 mm diam.); sweetly scented (fide Hinton 1406, K). *Calyx* with lobes elliptical, densely hirsute abaxially; 1–2(–3) colleters per sinus. *Corolla* rotate, campanulate to campanulate-urceolate; lobes lanceolate, oblong, elliptical or suborbicular, abaxially with simple or mixed indumentum of glandular and non-glandular trichomes, glabrous or glabrescent, adaxially with only simple indumentum, white hairy to woolly, with long multicellular trichomes. *Corolline corona* absent. *Gynostegial corona* of 5 free laminar lobes, originating from the base of the gynostegium and attached to the base of the corolla. *Gynostegium* subsessile; connective appendages almost absent; style-head prominent, rostrate, conical or cylindrical. *Pollinaria*: Pollinia pendent or horizontal, falciform, conspicuously excavated, sterile only at junction with caudicles, apically with a crest; caudicles coiled, laterally attached to the pollinia; corpusculum ellipsoid. *Follicles* one per flower, slenderly ovate, apically attenuate, smooth. *Seeds* ovate, winged, comose.

Distribution and ecology. – A genus with about 10 species centered in Mexico, extending to the U.S. and Guatemala.

Nomenclatural notes. – Stevens (2005: 618) has given an excellent report on the confused nomenclatural history of *Pherotrichis villosa*, concluding that *P. villosa* (Schult.) Meisn. is the correct citation for the species. However, Schultes (in Roemer & Schultes 1820: 103), publishing *Cynanchum villosum* Schult., did not refer to *Asclepias villosa* Balb., a younger homonym of *A. villosa* Mill. 1768, but to *A. villosa* Willd. 1809, and Willdenow (1809: 278) finally referenced Balbis (1804), who even presented a plate clearly recognizable as *P. villosa*. So, the correct name remains *P. villosa* (Schult.) Meisn.

Notes. – In the molecular phylogeny, the four included *Pherotrichis* specimens are well supported, but weakly supported as sister to the remainder of the Central/North American Clade III, *Microstelma*–*Prosthecidiscus*–*Chthamalia*, with support increasing when incomplete samples are removed (reduced dataset, suppl. Fig. S4).

30. *Poicilla* Griseb., Cat. Pl. Cub.: 176. 1866 – Type: *Poicilla tamnifolia* Griseb.

Reference and iconography. – Krings, A. 2011. *Matelea* s.l. (Apocynaceae, Asclepiadoideae) in the West

Indies. *Syst. Bot.* 36: 730–756. <https://doi.org/10.1600/036364411X583691>

Description. – Small slender, twining vines, basally woody; latex white. *Pubescence* of eglandular, retrorse or spreading trichomes; glandular-capitate trichomes only on the veins. *Stems* densely pubescent all over. *Leaves* decussate, with petioles to 2 cm long, blades small (to 6 × 2 cm), oblong-lanceolate, apex obtuse to acute, base sagittate, densely pubescent on both sides; 4–6 pairs of lateral veins; with 2 or 3 colleters at the base of the upper surface. *Inflorescences* bostrychoid (racemiform), few-flowered; peduncles to 3 mm long; bracts not seen. *Flowers* with pedicels 4–5 mm long, small (< 1 cm diam.). *Calyx* with lobes as long as corolla tube, oblong-lanceolate to lanceolate, apically obtuse to acute, abaxially with trichomes; 1 colleter per sinus. *Corolla* sub-campanulate, (2–3.5 × 1.3–2.4 mm), greenish-purple, maroon, or chocolate; lobes ovate to deltate, apically rounded to obtuse, adaxially glabrous, abaxially with eglandular antrorse trichomes along a central line. *Corolline corona* absent. *Gynostegial corona* of fused staminal and interstaminal segments, glabrous; staminal segments cucullate-reniform, adnate to the stipe, flaring outward at the base and forming a pocket at the apex; interstaminal segments forming a narrow sinus between the staminal segments. *Gynostegium* stipitate; anthers obtusely triangular, without apical appendages; anther wings about $\frac{2}{3}$ the length of the anther; style-head flat or concave. *Pollinaria*: Pollinia pendent, ovate; caudicles curved, short; corpusculum ellipsoid. *Follicles* fusiform (4.5–7 × 1.1 cm), smooth-angled, smooth or 4 or 5-ridged, surface glabrous to naked eye, but sometimes with few trichomes. *Seeds* obovate, essentially plane, surfaces glabrous, distally dentate.

Distribution and ecology. – A genus of a single species, *Poicilla tamnifolia* Griseb., endemic to central and western Cuba; thickets, seasonally semi-deciduous, dry forests and woodlands; 0–250 m.

Notes. – In the molecular phylogeny, *Poicilla* is well supported and also well supported as sister to *Tylodontia* in the West Indian Clade IV.

Among Antillean Gonolobinae, *Poicilla* is recognized by the small, oblong-lanceolate, basally sagittate leaves, and the prominent convex and cucullate staminal corona segments without a ligule.

31. *Poicillopsis* Schltr. ex Rendle in J. Bot. 74: 343. 1936 – Type: *Poicillopsis ovatifolia* (Griseb.) Rendle (≡ *Poicilla ovatifolia* Griseb.).

References and iconography. – Krings, A. 2011. *Matelea* s.l. (Apocynaceae, Asclepiadoideae) in the West Indies. *Syst. Bot.* 36: 730–756. <https://doi.org/10.1600/036364411X583691>

Rendle, A.B. 1936. Notes on the flora of Jamaica. *J. Bot.* 74: 337–346. – p. 344, fig. 2. https://archive.bsbi.org/Journal_of_Botany_1936.pdf

Description. – Slender small twining vines; latex white. *Pubescence* mixed, of spreading, capitate glandular and retrorse eglandular trichomes (0.2–0.3 mm long). *Stems*

pubescent in one or two lines. *Leaves* decussate, with petioles to 2 cm long; small (to 3×1.5 cm), ovate, apex obtuse, base rounded, both sides nearly glabrous except for the midvein; lateral veins indistinct; with 2 colleters at the base of the upper surface. *Inflorescences* pedunculate; peduncles to 1–2 mm long; bostrychoid, 3 or 4-flowered; bracts ovate or deltoid, 0.5–0.8 mm long. *Flowers* with pedicels to 6–10 mm long, small (0.5–0.7 cm diam.). *Calyx* with lobes about as long as the corolla tube, ovate to lanceolate, apically acute to obtuse; abaxially glabrous or with a few trichomes, ciliate; with 1 colleter per sinus. *Corolla* subcampanulate, white to green [fide collectoris]; lobes ovate, apically obtuse to acute, adaxially densely pubescent, except along left margin. *Corolline corona* absent. *Gynostegial corona* of fused staminal and interstaminal segments, glabrous; staminal segments erect, obovate to suborbicular, apically rounded to emarginate, free to base, ligulate; interstaminal segments reduced to a rim between staminal segments. *Gynostegium* stipitate; anthers more or less horizontal, wings round-spatulate, divergent, anther appendages triangular-deltoid, covering most of style-head; style-head flat. *Pollinaria*: Pollinia horizontal, obovate-oblong to somewhat falcate ($0.4\text{--}0.5 \times 0.2$ mm); caudicles slightly articulated, ca. 0.12 mm long; corpusculum narrowly sagittate ($0.15\text{--}0.16 \times 0.06$ mm). *Follicles* two per flower, linear-fusiform ($3.5\text{--}4.3 \times 0.2\text{--}0.3$ cm), smooth, scarcely mixed pubescent, but essentially glabrous. *Seeds* oblong to obovate, plane, smooth on both sides, distally somewhat dentate, comose.

Distribution and ecology. – A genus of three species in Cuba and Hispaniola; 600–1400 m.

Nomenclatural note. – Schlechter (1912: 339) first published *Poicillopsis*, citing five species he considered members of the genus, but did not provide a genus diagnosis or description. Rendle (1936) validated the genus by providing a short description and selected *P. ovatifolia* (Griseb.) Schltr., that he also illustrated, as the type for *Poicillopsis*.

Notes. – *Poicillopsis* was not included in the molecular phylogeny.

Among Antillean Asclepiadoideae subtribe Gonolobinae, similar to *Ptycanthera* in leaf morphology, size (2–6 cm long) and pubescence, but differs by the ovate, adaxially densely pubescent corolla lobes (vs. linear-lanceolate and glabrous), corona lobes not swollen at base, obovate to suborbicular, as long as the gynostegium (vs. swollen, subtriangular, shorter than gynostegium), style-head flat (vs. conical or convex), and paired cylindrical-fusiform, smooth follicles (vs. single, fusiform, 5-winged).

Poicillopsis pentactina (Krings) Morillo, Liede & Meve, **comb. nov.** $\equiv$ *Matelea pentactina* Krings in Sida 21(3): 1519. 2005 – Holotype: Haïti. Les Roseaux, Massif de la Hotte western group, rocky ledge, ca. 1300 m, 16 Sep 1928, Ekman H10685 (S, n.v.; isotype: US barcode 00792544!).

Poicillopsis tuerckheimii Schltr. in Urban, Symb. Antill. 7(3): 339. 1912 $\equiv$ *Matelea constanzana* J. Jiménez Alm. in

Rhodora 62: 238. 1960 – **Lectotype (designated here)**: Dominican Republic. Constanza, 1400 m, Jul 1910, H. v. Tuerckheim 3466 (BR barcode BR0000013525477!).

The travel of Hans von Tuerckheim to Santo Domingo (Türckheim, 1911) was initiated by Ignatius Urban of Berlin, so the first set of his specimens went to B, where at least the Asclepiadoideae were destroyed during WWII. The only duplicate traced is housed in BR and selected as the lectotype of *Poicillopsis tuerckheimii* here.

32. ***Polystemma*** Decne. in Candolle, Prodr. 8: 602. 1844 – Type: ***Polystemma viridiflorum*** Decne.

$\equiv$ *Rothrockia* A. Gray in Proc. Amer. Acad. Arts 20: 295. 1885 – Type: *Rothrockia cordifolia* A. Gray.

$\equiv$ *Labidostelma* Schltr. in Bull. Herb. Boissier, sér. 2, 6: 843. 1906 – Type: *Labidostelma guatemalense* Schltr.

$\equiv$ *Microdactylon* Brandegee in Zoë 5: 252. 1908 – Type: *Microdactylon cordatum* Brandegee.

$\equiv$ *Helioestemma* Woodson in Amer. J. Bot. 22: 689. 1935 – Type: *Helioestemma molestum* Woodson, **syn. nov.**

References and iconography. – Morillo, G. 2023. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte V. *Chthamalia*, *Meveampelos* gen. nov., *Phaeostemma*, *Polystemma*, *Ptycanthera*. Mem. Fund. La Salle Ci. Nat. 81(191): 37–90. https://saber.ucv.ve/ojs/index.php/rev_mem/article/view/27374

Alvarado-Cárdenas, L.O., Pío-León, J.F., Sánchez-Sánchez, C. & Islas-Hernández, C.S. 2024. Synopsis of the genus *Polystemma* (Apocynaceae, Asclepiadoideae) and recognition of three new species. Bot. Sci. 102: 1318–1352. <https://doi.org/10.17129/botsci.3502>

Delessert, J.P.B. & Candolle, A.P. de. 1846. *Icones selectae plantarum*, vol. 5. Parisiis [Paris]: apud Fortin, Masson et Sociorum. – t. 79 “*Polystemma viridiflora* Dne.” (***Polystemma viridiflorum*** Decne.). <https://www.biodiversitylibrary.org/page/286874>

Description. – Suffrutescent, twining vines 3–5 m long, sometimes erect subshrubs; latex white. *Pubescence* mixed of short glandular trichomes with white crystalline inclusions, and long eglandular trichomes (0.4–1.3 mm long). *Stems* developed from a thickened taproot, densely pubescent, with fissured corky bark in lower internodes. *Leaves* decussate, moderately petiolate; blades ovate or broadly ovate to deltoid, basally cordate to lobed, apically acute or short-acuminate, densely pubescent on both sides; with 4–6 pairs of secondary veins; with 3–12 colleters at the base of the upper surface. *Inflorescences* bostrychoid cymes, 1–6-flowered; peduncles to 8 cm long; bracts linear or lanceolate. *Flowers* with pedicels to 2.5 cm long, small to large (1–5 cm diam.). *Calyx* tubular-campanulate, with lobes ovate, elliptical, narrow-ovate or lanceolate, acute or attenuate, densely pubescent on the abaxial side, with 1–3 colleters per sinus. *Corolla* broadly campanulate to narrowly tubular-campanulate, the tube bright purple-red, green or white, densely pubescent on the abaxial side, the lobes bright white, green, to dark brown-purple or purple-blackish, often veined-reticulate or mottled on the

adaxial side, ovate-deltoid, narrowly ovate, oblong-ovate or attenuated-caudate, obtuse, the margin patent to revolute, at least abaxially generally pubescent. *Corolline corona* absent. *Gynostegial corona* of 5 connate staminal segments, laterally united to each other and to the base of the corolla tube; lobes generally rectangular or with broadly lamellar shape, usually with acicular, fingered or filiform lateral projections or appendages (or teeth) in two series, on the margin and the back. *Gynostegium* sessile or very shortly stipitate; anthers with ovate or elliptical connective appendages attached to the style-head; style-head convex, flat or slightly concave. *Pollinaria*: Pollinia subhorizontal or pendent, reniform or obovoid, obtuse, concave in the half near the caudicles; corpusculum subsagittate to rhomboid, apically obtuse, usually half as long as pollinia. *Follicles* one per flower, fusiform-cylindrical, attenuate towards the apex, smooth, green and white or purplish brown, white mottled, many-seeded (50–100 per follicle). *Seeds* narrowly ovate, distally crenulate, comose. – Fig. 3D

Distribution and ecology. – About 27 species from northern Mexico to Costa Rica; dry deciduous forests and thorn scrubs; 200–1800 m.

Nomenclatural notes. – Cervantes & al. (2024) transferred *HelioSTEMMA molestum* Woodson, only species of *HelioSTEMMA* Woodson, to *Polystemma luridum* (Decne.) C. Cervantes & al., implicitly placing *HelioSTEMMA* in synonymy with *Polystemma*. This synonymization is formalized here.

Notes. – *Polystemma* is well supported and also well supported as sister of *Himantostemma* in the Central/North American Clade II in all analyses.

Distinguished from other Central American Gonolobinae by the combination of glandular trichomes with white, crystal-line inclusions on stems, leaves and inflorescence; corona gynostegial, of 5 connate staminal segments, each with more or less filiform or digitate appendages usually in two series; and long fusiform-cylindrical, smooth, glabrous and mottled follicles.

Polystemma cordifolium (A. Gray) McDonnell & Fishbein is considered a priority species with potential to be a new crop (Pío-León & al., 2017).

33. ***Portoricana*** Morillo, Liede & Meve, **gen. nov.** – Type: ***Portoricana variifolia*** (Schltr.) Morillo, Liede & Meve. (≡ *Matelea variifolia* Schltr.).

References and iconography. – Acevedo-Rodríguez, P. 2005. Vines and climbing plants of Puerto Rico and the Virgin Islands. *Contr. U. S. Natl. Herb.* 51: 1–483. – p. 84, fig. 29 E–H, “*Matelea sintenisii*”; I–L, “*Matelea variifolia*”. <https://www.biodiversitylibrary.org/page/380795>

Britton, N.L. & Horne, F.W. (unpub.). Popular flora of Puerto Rico, Flora Borinquena: t. 67 (*Matelea variifolia* Schltr. ≡ ***Portoricana variifolia***). http://plantillustrations.org/illustration.php?id_illustration=342481

Diagnosis. – Similar in stems, leaf and inflorescence morphology to *Meveampelos*; differing mainly by latex white, stem pubescence of eglandular retrorse trichomes,

without glandular trichomes; corolla rotate, pollinia strongly falcate or spatulate, and smooth follicles, while in *Meveampelos* latex translucent, pubescence of retrorse eglandular trichomes and few glandular trichomes, corollas subcampanulate or tubular-campanulate, pollinia narrowly reniform, oblongoid, asymmetrically ellipsoid to narrowly obpyriform, and follicles slightly 5-winged, 5-costate, or smooth.

Description. – Twining vines, 3–4 m long; latex abundant or little, white. *Pubescence* of eglandular retrorse trichomes (0.1–0.3 mm long), no glandular trichomes present. *Stems* woody at the base, pubescent in one or two lines. *Leaves* decussate, petiolate, blades ovate, lanceolate or elliptic, (2–)5–11.5 cm long, base obtuse to rounded, rarely subcordate or truncate, apex obtuse, acute or acuminate, surface glabrous on both faces, glabrous or pubescent along midvein, trichomes eglandular antrorse; abaxially glaucous in *P. sintenisii* (Schltr.) Morillo, Liede & Meve; 6–8 pairs of lateral veins; with 2–5 colleter at the base of the upper surface. *Inflorescences* short-pedunculate (0.5–4.5 mm long), racemiform cymes, 3 or 4-flowered; rachis usually pubescent, of eglandular trichomes. *Flowers* pedicellate, pedicels as long as to three times longer than peduncles, small (1–1.5 cm). *Calyx* lobes ovate, elliptic or lanceolate, obtuse at apex, abaxially glabrous or pubescent; 1 colleter per sinus. *Corolla* rotate-subcampanulate, 10–15 mm diam., lobes brown, reddish-brown or green, imbricate in bud, reticulate or not reticulate, spreading, ovate-oblong or suborbicular, obtuse or rounded at apex, margin entire, not ocellate, glabrous. *Corolline corona* a slightly raised ring or pentagon. *Gynostegial corona* of 5 fused staminal and interstaminal fleshy segments, margin subpentagonal in outline, minutely crenulate, wider than gynostegium, staminal segments convex, subtruncate at apex, reaching the base of the anthers. *Gynostegium* short-stipitate, anthers horizontal, apical membrane triangular, covering most part of style-head; style-head pentagonal in outline, flat or almost so. *Pollinaria*: pollinia horizontal, strongly falcate or spatulate (0.5–0.6 × 0.25–0.3 mm), with one concave face; caudicles articulated; corpusculum narrowly sagittate (0.1–0.15 × 0.07 mm), 3–4 times smaller than pollinia. *Follicles* (known only for *P. sintenisii*) fusiform, smooth. *Seeds* spatulate, c. 4 mm long, distally verrucose, comose. – Fig. 7

Distribution and ecology. – Two species endemic to Puerto Rico; moist forests in the cordilleras and on mogotes; at low, middle and high elevation, 300–950 m.

Notes. – The two species of *Portoricana* form a moderately to well-supported clade in Clade V, without supported relationship to another genus.

Portoricana sintenisii (Schltr.) Morillo, Liede & Meve, **comb. nov.** ≡ *Gonolobus sintenisii* Schltr. in Urban, Symb. Antill. 1(2): 288. 1899 ≡ *Vincetoxicum sintenisii* (Schltr.) Britton in Sci. Surv. Porto Rico & Virgin Islands 6: 100. 1925 ≡ *Matelea sintenisii* (Schltr.) Woodson in Ann. Missouri Bot. Gard. 28: 226. 1941 – Lectotype (designated by Krings in J. Bot. Res. Inst. Texas 2: 148. 2008): Puerto

Rico. Sierra de Luquillo, 9 Jul 1885, *P. Sintenis* 1354 (HBG, n.v.; isoelectotypes: BM barcode BM000834445!, G barcode G00013062!, GH barcode 02410007!, K barcode K000096697!, US barcode 00111132!).

Portoricana variifolia (Schltr.) Morillo, Liede & Meve, **comb. nov.** $\equiv$ *Gonolobus variifolius* Schltr. in Urban, Symb. Antill. 1(2): 286. 1899 $\equiv$ *Vincetoxicum variifolium* (Schltr.) Britton in Sci. Surv. Porto Rico & Virgin Islands 6: 100. 1925 $\equiv$ *Matelea variifolia* (Schltr.) Woodson in Ann. Missouri Bot. Gard. 28: 226. 1941 – Lectotype (designated by Krings in J. Bot. Res. Inst. Texas 2: 149. 2008): Puerto Rico. Sierra de Luquillo, in regione media montis Jiménez, in fruticetis, Jun 1885, *P. Sintenis* 1653 (NY barcode 00111058!; isoelectotypes: G barcode G00013066!, GH barcode 00444610!, M barcode M-0090055!, MO barcode MO-072502!, P barcode P00645731!, US barcode 00111137!).

$\equiv$ *Matelea borinquensis* Alain in Phytologia 61: 360. 1986 – Holotype: Puerto Rico. Cerro Pelucho, San Lorenzo, alt. 400–500 m, 8 Mar 1984, *A. & P. Liogier & L.F. Martorell* 35111 (UPR, n.v.; isotype: NY barcode 01071491!).

34. *Potamoampelos* Morillo, Liede & Meve, **gen. nov.** – Type: *Potamoampelos delascioi* (Morillo) Morillo ($\equiv$ *Matelea delascioi* Morillo).

Diagnosis. – A subaquatic vine, with glabrous to moderately pubescent branches, scarcely pubescent or almost glabrous leaves and inflorescence, without glandular trichomes; broadly urceolate-campanulate medium-sized corollas, with pink, purple-brown or burgundy red lobes, thick-fleshy cream basally pentagonal and 5-lobed gynostegial corona, lobes basally connate, rounded at the base, narrower in apical quarter, grooved interstaminal corona, glabrous, pendent, broadly reniform or irregularly pyriform small (0.35×0.32 mm) pollinia, narrowly ellipsoid-fusiform, broadly long attenuate thin-walled 4–5-costate glabrous follicles, and rose-pink, ecomose seeds. Without a clear morphological relationship to any other genus in the subtribe. Branches, leaf shape and pubescence (when present) somewhat resemble those of *Atrostemma*, which differs mainly by branches and leaves with mixed pubescence of eglandular and glandular trichomes, rotate or rotate-campanulate, green-reticulate corolla, brown to black-purple, shortly cyathiform fleshy or laminar gynostegial corona, with wide staminal segments adnate to the stipe at the

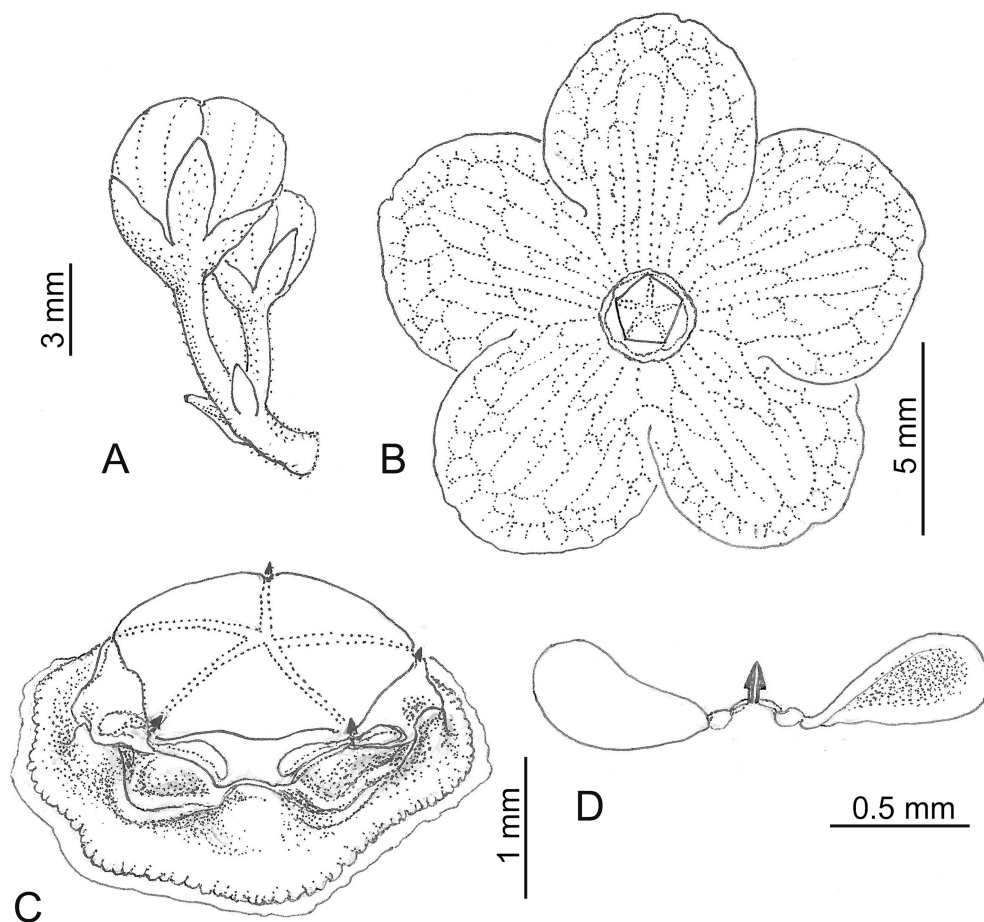


Fig. 7. *Portoricana* gen. nov. A–D, *Portoricana variifolia*: A, Young inflorescence showing bracts and calyx lobes; B, Corolla in front view; C, Gynostegium and corona in dorsolateral view; D, Pollinarium. — A–D from Taylor & al. 10544 (MO). Drawn by Gilberto Morillo.

base and interstaminal segments concave, abaxially puberulous, narrowly pyriform, oblongoid-pyriform, or obpyriform, medium sized or large (0.5–1.5 × 0.4–0.6 mm) pollinia, sparsely muricate follicles, and thin, comose, light brown seeds.

Description. – Twining subshrubs, 1.5–3 m long; latex color unknown. *Pubescence* of eglandular, 0.8–2 mm long trichomes, glandular trichomes absent. *Stems* rough and slightly suberified when adult; with 2 small colleters on the interpetiolar line on each side of the node, terminal internodes glabrous or moderately pubescent, nodes with small vegetative buds densely pubescent. *Leaves* decussate, petiolate, petioles sulcate, moderately pubescent with antrorse trichomes on margin; blades 5.5–16 × 2–7.5 cm, subcoriaceous, narrowly lanceolate to ovate-elliptic, long-acuminate, base rounded, truncate or subcordate, adaxial surface generally glabrous and sparse eglandular trichomes (0.2–0.3 mm long) on midrib and margin, abaxial surface glabrous or moderately and sparsely pubescent with antrorse eglandular trichomes (0.2–0.4 mm long), more densely pubescent on midrib; 7–9 pairs of secondary veins; with 2 small deciduous colleters at the base of the upper surface. *Inflorescences* subumbellate cymes, 2 or 3-flowered, sparsely pubescent; peduncle and rachis 0.5–2 mm long, cicatricose, bracts 0.5–1.5 mm long, narrowly ovate, acute. *Flowers* pedicellate, pedicels 1–2.5 mm long; medium-sized (11–20 mm). *Calyx* deeply 5-lobed, abaxial side glabrous or with sparse trichomes on the back and margin; with 1 colleter per sinus. *Corolla* urceolate-campanulate, tube 2.5–3.5 mm long, glabrous on both sides, lobes pink, purple-brown or burgundy red, glabrous or adaxial side with vermiform, white trichomes (1.2–1.6 mm long) on the margin or on the right half. *Corolline corona* absent. *Gynostegial corona* whitish-cream, with a basal rounded-pentagonal portion, segments shorter than gynostegium; interstaminal corona grooved. *Gynostegium* shortly stipitate, anthers horizontal, dorsally grooved, anther appendages hyaline, covering margin of style-head; style-head obtusely pentagonal, slightly convex. *Pollinaria*: pollinia pendent, broadly reniform to obpyriform, concave in upper half, caudicles widened, hyaline, corpusculum broadly sagittate, apically acute. *Follicles* one per flower, obovoid-fusiform, 4–5-sided and thinly costate longitudinally; with 40–45 seeds per follicle. *Seeds* 16–20 × 9–11 mm, oblong-ovate, brown-orange, rough-warty, margin thick, spongy, toothed or toothed-crenulate at the chalazal end, ecomose. – Figs. 3E,F, 8

Distribution and ecology. – Presently a monotypic genus, distributed from northern French Guiana to the Colombian and Brazilian Amazon; in tropical rainforests, gallery forests and mangroves. A subaquatic plant forming part of riparian vegetation, from sea level to 250 m.

Etymology. – Combination of “potamo-”, the Greek word for river, and “-ampelos”, Greek for vine.

Notes. – Not included in the molecular phylogeny.

The genus shares with the also riparian *Acomosperma* and with *Riparoampelos* the ecomose seeds, but *Acomosperma* is a small erect or prostrate suffruticose multistemmed plant,

with small leaves, rotate corollas and very small follicles with minute seeds, and *Riparoampelos* is fundamentally different in corolla, corona structure, anther shape, and pollinia orientation and size; moreover, it possesses conspicuously muricate follicles.

***Potamoampelos delascioi* (Morillo) Morillo, comb. nov.** ≡ *Matelea delascioi* Morillo in Mem. Soc. Ci. Nat. La Salle 40: 75. 1980 – Holotype: Venezuela. Terr. Delta Amacuro: Caño Atoiba, tributary of Boca Aragua, 17 Oct 1977, J. Steyermark, R. Liesner & F. Delascio 114982 (VEN barcode 134329!; isotypes: MO barcode MO-078183, NY barcode 00318713).

Diagnosis. – *Stems* with nodes 4–4.5 mm diam. *Flowers* pedicellate, pedicels 1–2.5 mm long. *Calyx* approx. 7 mm diam., lobes 2.2–3.1 × 1.1–2 mm, ovate, acuminate. *Corolla* 11–20 mm diam., tube 2.5–3.5 mm long, glabrous on both sides, lobes patent, 3.4–5 × 3.2–6 mm wide at the base, ovate-triangular to deltoid, narrowly obtuse to curved-spatulate at the apex. *Gynostegial corona* 2.7–3 mm diam., segments 1.2–1.3 mm long, apically rounded or obtuse. *Gynostegium* shortly stipitate, 1.8–2.1 mm long, 2.2–2.5 mm diam., anthers 1–1.2 × 0.6 mm. *Pollinaria*: pollinia 0.3–0.35 × 0.32–0.35 mm, caudicles 0.12–0.15 mm long, corpusculum 0.26–0.3 × 0.2–0.25 mm. *Follicles* 9–10 cm long, 2–3.2 cm diam. in central portion, 4 or 5-sided and thinly costate longitudinally, exocarp thin, acumen 1.8–2.1 cm long, glabrous, placenta thinly papery, 5–6 cm long, 7–8 mm wide, funicles short.

Additional specimens examined. – **Brazil.** Amazonas: Rio Uatumã, Munic. Itaitinga, igarapé Catitú, Mata de Igapó, cipó dentro da água, 21 Aug 1979, Cid & al. 615 (NY). **French Guiana.** Cayenne: Mangrove vegetation, Mar 2016, foto G. Léotard. **Guyana.** 1841, Schomburgk 911 (1513) (K, P). Pomeroom District: Pomeroom River, 24 Dec 1922, de La Cruz 3132 (F, MO, NY, US); Pomeroom River water-shed, Wariwaru Creek, up to 1 km from the mouth, gallery forest, 0–10 m, 14 Sep 1992, Hoffman & Roberts 2607 (MO).

The collection of Cid & al. 615, from the Brazilian Amazon, differs from the Guyanese collections in moderately pubescent adult stems and somewhat larger corollas with some long, vermiform trichomes on part of the adaxial surface.

35. ***Prosthecidiscus* Donn.Sm.** in Bot. Gaz. 25: 149. 1898 – Type: ***Prosthecidiscus guatemalensis* Donn.Sm.** (≡ *Matelea prosthecidiscus* Woodson).

Reference and iconography. – Morales, J.F. & Stevens, W.D. 2009. *Prosthecidiscus*. Pp. 424–425 in: Hammel, B.E., Grayum, M.H., Herrera, C.M. & Zamora, N. (eds.), *Manual de plantas de Costa Rica*, vol. 4(1). St. Louis: Missouri Botanical Garden Press.

Smith, J.D. 1898. Undescribed plants from Guatemala and other Central American Republics, XX. Bot. Gaz. 25: 145–157, pl. 112 “*Prosthecidiscus guatemalensis*, Donn. Sm.”. <https://www.biodiversitylibrary.org/page/29955816>

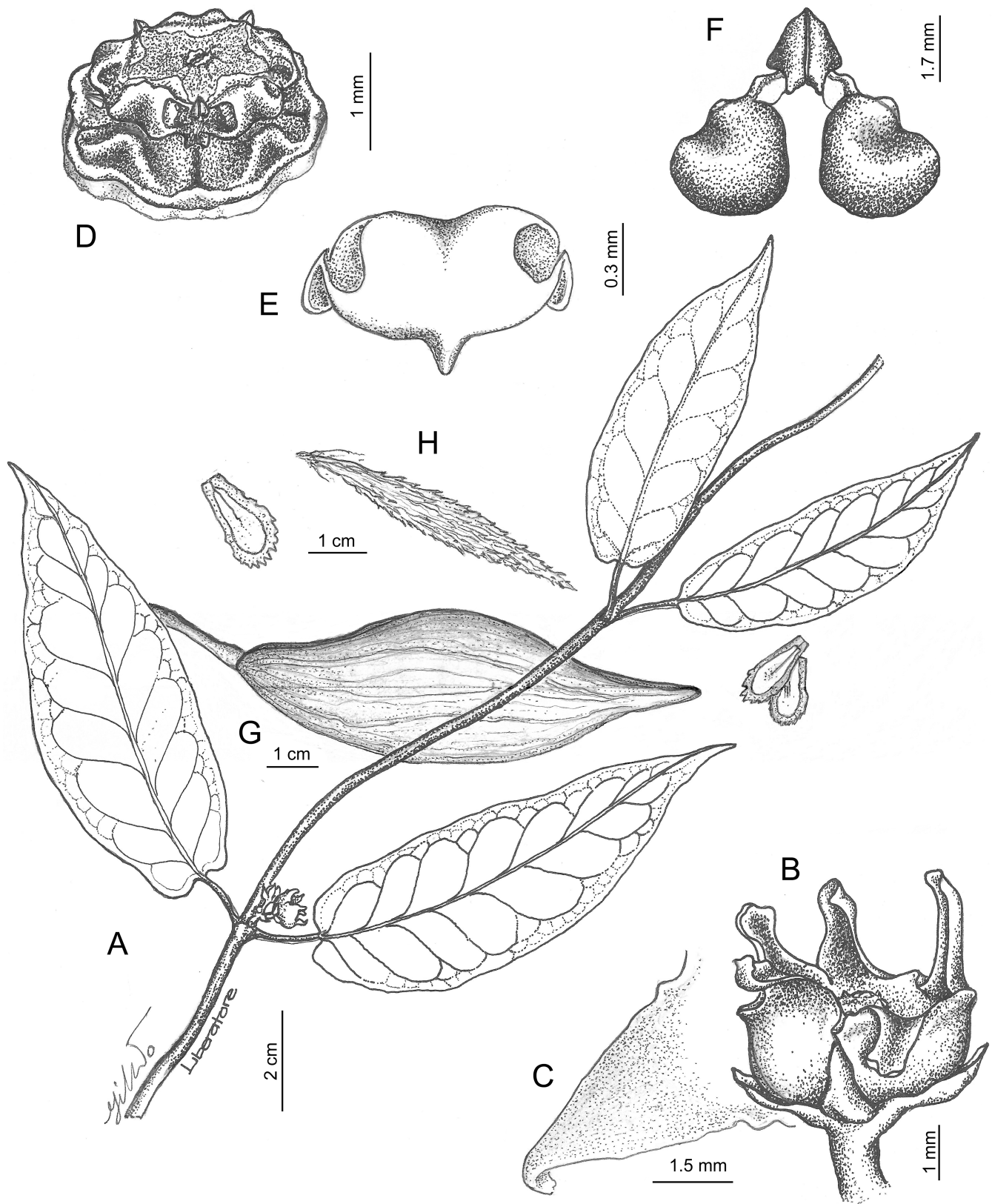


Fig. 8. *Potamoampelos* gen. nov. A–H, *Potamoampelos delascioi*: A, Twining branch with inflorescence; B, Flower in lateral view; C, Corolla lobe in adaxial view; D, Gynostegium and corona in dorsolateral view; E, Anther in front view; F, Pollinarium in front view; G, Follicle in lateral view; H, Placenta and seeds. — A, G & H from Steyermark & al. 114982 (MO, VEN); B–F from Hoffman & Robert 2607 (MO, US). Drawn by Gilberto Morillo.

Description. – Twining lianas, 8–10 m long; latex white with a strong solanaceous scent; plant turning black when drying. *Pubescence* of short glandular, spreading eglandular and long bristly trichomes (0.4–1.4 mm long) with thickened multicellular bases. *Stems* corky at base, densely pubescent. *Leaves* decussate, long-petiolate; petioles almost as long as blades; blades large (11 × 10–22 × 21 cm), suborbicular, discolorous, base cordate to rounded, lobes overlapping, apex cuspidate; adaxially sparsely setulose to glabrescent, abaxially moderate to densely puberulent; 4–6(–7) pairs of secondary veins; with 8–18 colleters at the base of the upper surface. *Inflorescences* bostrychoid cymes, 3–12-flowered; pedunculate; peduncles up to 21 cm long; bracts filiform, 3–4 mm long. *Flowers* with pedicels to 2.5 cm long, small to medium-sized (to 2 cm diam.). *Calyx* with lobes slightly longer than corolla tube, lanceolate, reflexed, abaxially densely covered with glandular trichomes, with 2–4 colleters per sinus. *Corolla* rotate, green and red or purple, lobes spreading to reflexed, 12–19 mm long, oblong-spatulate, rounded at apex, abaxially glandular-puberulous; red to purple. *Corolline corona* a faucal ring, erect, slightly extending outward. *Gynostegial corona* of an outer ring, completely adnate and enclosing the stipe, light green to light yellow, annular, inconspicuously 5-lobed at the base and 10-lobed at apex, ribbed, and of 5 staminal segments, adnate to the stipe with free, rounded apices reaching the lobules of the outer corona. *Gynostegium* stipitate; connective appendages retuse, style-head long rostrate (to 12 mm long). *Pollinaria*: Pollinia subhorizontal, asymmetrical, hyaline at the base; corpusculum oblong-sagittate. *Follicles* one (rarely two) per flower, fusiform-attenuate (4–14.5 × 2.5–3 cm), greyish green, strongly and densely muricate, projections 4–13 mm long, glandular pubescent, many-seeded. *Seeds* obovate, flat, irregularly rugose to tuberculate, winged, distally irregularly dentate, comose. – Figs. 3G,H

Distribution and ecology. – A single species, *Prosthecidiscus guatemalensis* Donn.Sm., distributed from southern Mexico to Costa Rica; seasonally dry, deciduous forests, mainly on limestone substrate; 30–1800 m.

Notes. – In the molecular phylogeny, *Prosthecidiscus* shares a weakly supported clade with *Microstelma* in the Central/North American Clade III.

Recognized among Central American Gonolobinae by all parts turning black when drying, mixed pubescence of long, eglandular trichomes, and glandular short capitate trichomes; style-head long-rostrate, with a narrowly clavate, apically obtuse appendage; and follicles fusiform-attenuate, strongly and densely muricate.

36. *Pruskortizia* Morillo in Pittieria 40: 97. 2016 – Type: *Pruskortizia macrocarpa* (Poepp.) Morillo (≡ *Fischeria macrocarpa* Poepp.).

References and iconography. – Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmnt.pdf>

Morillo, G. 2016. Validation of the genus *Pruskortizia* (Apocynaceae, Asclepiadoideae). *Pittieria* 40: 94–105. <http://erevistas.saber.ula.ve/index.php/pittieria/article/view/7947>

Description. – Twining or scrambling lianas >6 m long; latex white. *Pubescence* mixed of brown or yellowish long eglandular (1–8 mm long) and short glandular trichomes. *Stems* cylindrical, hirsute. *Leaves* decussate, with petioles to 9 cm long; blades more than 15 cm long, obovate to oblong-elliptic, acuminate at apex, obtuse or round at base; 6–8 pairs of secondary veins, with 5–8 colleters at the base of the upper surface, hidden under the dense indument. *Inflorescences* bostrychoid cymes, 3–6-flowered; subsessile; bracts linear, small. *Flowers* long-pedicellate, large (3.3–6.5 cm diam.). *Calyx* with lobes ovate or lanceolate, much shorter than the corolla, but longer than the corolla tube, densely villous; 1 colleter per sinus. *Corolla* rotate, very large, or yellowish-green, with spreading to somewhat reflexed, reticulate lobes; lobes ovate to oblong-ovate, obtuse, adaxially glabrous, abaxially pubescent, rarely glabrous. *Corolline corona* absent. *Gynostegial corona* dark purple to black, adnate to the corolla tube, with 5 staminal lobes; lobes hemidiscoidal, almost flat, with a short central ridge that gets to the base of the anthers, and minute crenulate margins. *Gynostegium* sessile; relatively small; anthers horizontal, subtriangular or subrhombic, supported by a thick ring of spongy tissue (anther ring), with outer margin radially prominent and somewhat concave, anther wings short, connective appendages thin, white, triangular to deltate, covering most of style-head; style-head almost circular, flat-convex. *Pollinaria*: Pollinia horizontal, large, oblongoid or narrowly calceolate, with a hyaline upper margin; caudicles articulate, with a hyaline membrane; corpusculum narrowly sagittate. *Follicles* one per flower, asymmetrically broadly ovoid (15–22 cm long), apically obtuse, thick-walled, tuberculate with small conical protuberances, pubescent, many-seeded. *Seeds* narrowly obovate, minutely and coarsely toothed, comose.

Distribution and ecology. – Two species distributed from Colombia to Bolivia; rain or montane wet forests; 100–2550 m.

Notes. – *Pruskortizia* was not included in the molecular phylogeny. In the Tree of Life (Baker & al., 2022) (Fig. 5A), *P. macrocarpa* (Poepp.) Morillo is sister to the remaining Gonolobinae studied, but in Bitencourt & al. (unpub. data) (Fig. 5B) it takes a position as sister to *Fischeria* in accordance with morphological similarities such as the large, asymmetrically ovoid, and many-seeded follicles.

Similar to *Fischeria*, *Gonolobus* and *Phaeostemma*, but distinguished by the densely mixed pubescence (eglandular trichomes 1–8 mm long), obovate, obovate-elliptic or oblong-elliptic leaves >15 cm long, 3–6-flowered, subsessile cymes, rotate, green or yellowish-green reticulate corollas 33–65 mm diam., a thick ring of spongy tissue (anther ring) supporting anthers, and the large, thick-walled, somewhat tuberculate, pubescent follicles.

37. *Pseudolachnostoma* Morillo in Pittieria 36: 44. 2012 – Type: *Pseudolachnostoma reflexum* (Hemsl.) Morillo (≡ *Gonolobus reflexus* Hemsl.).

Reference and iconography. – Morillo, G. 2012. Aportes al conocimiento de las Gonolobinae (Apocynaceae-Asclepiadoideae). *Pittieria* 36: 13–57. <http://revistas.saber.ula.ve/index.php/pittieria/article/view/6548>

Description. – Suffrutescent twining vines, usually 3–5 m long; latex white. *Pubescence* dense, of yellowish eglandular and glandular trichomes (0.8–2.5 mm long). *Stems* 2–4 mm thick, hirsute. *Leaves* decussate, petiolate, petioles thin; blades membranous to subcoriaceous, generally elliptic, ovate-elliptic to oblong-elliptic or ovate-oblong (up to 13 × 5.5 cm), acuminate, long-acuminate, the base broadly obtuse to rounded, pubescent on both sides; with 5–8 pairs of arched lateral veins; with 2–4 digitiform colleters at the base. *Inflorescences* extra-axillary, bostrychoid cymes, 2–12-flowered; rachis sometimes long, with conspicuous scars; subsessile or shortly pedunculate; bracts ovate. *Flowers* with pedicels 8–20 mm long; small to medium-sized (0.7–2 cm diam.). *Calyx* with strongly reflexed lobes at anthesis, narrowly ovate or oblong, abaxially pubescent (usually hirsute), usually with one digitate colleter in each sinus, sometimes absent. *Corolla* rotate or rotate-campanulate, yellowish, green or maroon, occ. veined with green, minutely hispid, lobes dextrorsely contorted in bud, oblong or oblong-obovate, obtuse-emarginate, apically asymmetrically obtuse-emarginate, strongly reflexed; adaxially minutely hispidulous, abaxially pubescent. *Corolline corona* apparently absent. *Gynostegial corona* tubular to cyathiform, adnate to corolla and stipe, subfleshy to fleshy, consisting of fused staminal and interstaminal elements, forming a thick lobed disk, staminal crown formed by slightly to moderately concave lobes, with the margin slightly bordered-prominent, or flabellate and descending towards the corolla, interstaminal corona lobes concave, semi-discoid or nearly navicular, with prominent margin, forming deep nectar chambers. *Gynostegium* long stipitate; anthers distally as high as wide or higher than wide, elevated with respect to the proximal face, furrowed (concave) vertically in the midline between loculi, this area sometimes with some erect minute trichomes, with lateral hyaline membrane; connective appendages short, barely covering the margin of the style-head; style-head pentagonal-stellate, apically concave. *Pollinaria*: Pollinia pendent, oblongoid-pyriform, slightly concave on the external face, with an elongated, proximally narrow hyaline zone, this articulated with the caudicles; caudicles widened, hyaline; corpusculum sagittate, smaller than pollinia. *Follicles* one per flower, narrowly ovoid-fusiform (9–11 × 2.5–3.5 cm in *P. quinindense* Morillo), broadly acuminate, conspicuously 5-costate. *Seeds* not seen.

Distribution and ecology. – A genus of about 12 species found in Costa Rica, Panama, Venezuela, Ecuador, Peru, and Brazil (Acre); rain and premontane forests; 200–1350 m.

Notes. – *Pseudolachnostoma* is placed in unsupported sister-group position to *Aprostemma* in Clade V by BEAST and ML analyses (Fig. 4, suppl. Fig. S1), but remains unresolved in Clade V in Bayesian analysis (suppl. Fig. S2).

Distinguished from other members of subtribe Gonolobinae by the shortly pedunculate inflorescences, corolla and calyx lobes strongly reflexed, corona shortly tubular or salverform, as long as or a bit shorter than the gynostegium, pollinia pendent from the caudicles, and follicles fusiform, 5-winged, with a long-attenuate apex.

38. *Ptycanthera* Decne. in Candolle, Prodr. 8: 606. 1844 – Type: *Ptycanthera berteroi* Decne.

= *Jacaima* Rendle in J. Bot. 74: 340. 1936 – Type: *Jacaima costata* (Urb.) Rendle (≡ *Poicilla costata* Urb.).

Reference and iconography. – Morillo, G. 2023. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte V. *Chthamalia*, *Meveampelos* gen. nov., *Phaeostemma*, *Polystemma*, *Ptycanthera*. *Mem. Fund. La Salle Ci. Nat.* 81(191): 37–90. https://saber.ucv.ve/ojs/index.php/rev_mem/article/view/27374

Description. – Slender twining, suffrutescent vines to 10 m long, roots fibrous; latex white but translucent in *P. tarazuana*. *Pubescence* of short, eglandular trichomes (0.2–0.7 mm long). *Stems* pubescent along two lines, glabrescent with age, sometimes slightly corky in lower internodes. *Leaves* mostly distichous, petiolate; blades small (often less than 8 cm long, but up to ca. 12 cm long in *P. acuminata* (Griseb.) Morillo), oblong to ovate, apex obtuse to rounded and apiculate, base obtuse to truncate; glabrous or with inconspicuous indument along the veins; 4–11 pairs of secondary veins; with 2–5(–6) colleters at the base of the upper surface. *Inflorescences* extra-axillary, bostrychoid cymes, 2–6-flowered; subsessile or shortly pedunculate; bracts deltoid, lanceolate or linear, 0.4–3 mm long. *Flowers* shortly pedicellate, small (less than 1.2 cm diam.). *Calyx* with lobes ovate or lanceolate, abaxially glabrous; with 1 colleter per sinus. *Corolla* rotate, subrotate or subcampanulate, green, rarely campanulate, lobes linear-lanceolate, obtuse, glabrous; frequently ocellated in the apical third, the ocellus made up of reflective tissue with a circular, ovate shape or elliptical shape. *Corolline corona* absent. *Gynostegial corona* fleshy, staminal segments swollen at base, subtriangular in front view, rising vertically and then connecting to the stipe below the anthers; frequently also adnate to the corolla tube. *Gynostegium* stipitate, anther wings with divergent apices; style-head conical or slightly rostrate. *Pollinaria*: Pollinia horizontal, obovate or oblong-obovate; corpusculum narrowly sagittate. *Follicles* one per flower, small (6.6–8 × 2.4–2.8 cm in *P. correllii* (Spellman) Morillo, 5.3 × 2 cm in *P. rhynchocephala* (Krings) Morillo), ovoid to subcylindrical-fusiform, longitudinally 5-sided or 5-winged (with wings frequently interrupted), glabrous or minutely pubescent. *Seeds* ovate or obovate, almost flat, distally entire or slightly denticulate, comose.

Distribution and ecology. – 18 species, most of them in the West Indian Islands, five in southern Mexico and Central America (Guatemala, Belize, Honduras, Nicaragua, and Costa Rica), one in northern Colombia and Venezuela; thickets on dry limestone hillsides, semi-deciduous woodland; 150–1500 m.

Nomenclatural notes. – Morillo (2023b: 79) synonymized the monotypic endemic genus *Jacaima* under *Ptycanthera* for morphological reasons.

Notes. – The molecular phylogeny comprises four West Indian Islands and one Mexican species (*Ptycanthera emmartinezii* (W.D.Stevens) Morillo & al.). *Ptycanthera* is moderately to well supported in all analyses (Fig. 4; suppl. Figs. S1–S6) and also moderately to well supported as sister of *Matelea* s.str. in all analyses of the combined datasets (Fig. 4; suppl. Figs. S1–S4).

Similar to *Poicillopsis* in leaf morphology, size (2–6 cm long) and pubescence, but differs by the linear-lanceolate, glabrous corolla lobes (vs. ovate and adaxially pubescent), corona lobes linear-lanceolate (vs. obovate to suborbicular, rounded to emarginate at apex, with a small internal ligule, as long as the gynostegium), conical or slightly rostrate style-head (vs. flat), and 5-winged follicles (vs. smooth).

39. *Riparoampelos* Morillo in Pittieria 39: 241. 2015 – Type: *Riparoampelos amazonica* (Morillo) Morillo (≡ *Matelea amazonica* Morillo).

Reference and iconography. – Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmnt.pdf>

Description. – Suffrutescent twining vines >10 m long; latex white, abundant. Pubescence mixed, consisting of inconspicuous glandular trichomes and longer eglandular trichomes (to 0.4 mm long). *Stems* shortly pubescent, when old glabrescent and thinly suberized. *Leaves* decussate, with petioles to 2 cm long; blades large (7–13 × 2.6–6 cm), leathery, oblong-lanceolate to obovate-elliptic, apex acuminate, base shortly and narrowly cordate, adaxially glabrous except for very small trichomes along the veins, abaxially densely puberulent with erect short (0.1–0.25 mm long) glandular and eglandular trichomes; with 7 or 8 pairs of arcuate lateral veins, impressed on the upper surface, raised on the lower part; 3 or 4 uncinatate colleters at the base of the upper surface. *Inflorescences* cymes, 2 or 3-flowered; subsessile; bracts linear. *Flowers* with pedicels to 1 cm long, medium-sized (2–2.5 cm diam.). *Calyx* with lobes ovate to narrowly ovate, shortly acuminate; abaxially pilose; with 4 or 5 colleters per sinus. *Corolla* rotate-campanulate; lobes spreading, ovate or narrowly ovate, narrowly obtuse or acute, revolute, purple, revolute, yellow with purplish margins and apex, apically with long, flat and white trichomes, abaxially densely puberulous. *Corolline corona* absent. *Gynostegial corona* fleshy, dark purple to black, staminal segments incurved, interstaminal segments broadly

concave. *Gynostegium* subsessile; anthers horizontal, dorsally concave, 2 mm wide, short wings, appendages shortly deltate, covering style-head margin; style-head slightly concave. *Pollinaria*: Pollinia horizontal, asymmetrically pear-shaped (0.8–0.9 × 0.6 mm), thinner at the margin near caudicles; caudicles short; corpusculum broadly sagittate, curved and compressed in lateral view. *Follicles* one per flower, narrowly ovoid or fusiform (7–8.6 × 2–2.6 cm), muricate, with irregular blunt-tipped projections, orange when young, green and orange-tinged when mature, with 130–140 seeds. *Seeds* rose-colored, ovate, pustulate, marginally strongly dentate, ecomose.

Distribution and ecology. – A single rheophytic species, *Riparoampelos amazonica* (Morillo) Morillo, distributed in the Amazon basin (Colombia, Venezuela, Brazil, Peru) and the Guianas; seasonally flooded forests, mainly in riparian vegetation; 100–300 m.

Notes. – *Riparoampelos* was not included in the molecular phylogeny.

This rheophyte is characterized by coriaceous lanceolate leaves with a shortly and narrowly cordate base, and densely short erect-puberulent abaxial surface, calyx with 4 or 5 colleters per sinus, sessile, few-flowered inflorescences, radiate flowers with a tuft of white trichomes on the tips of the corolla lobes, muricate follicles and thick, pustulate, marginally strongly dentate, rose-colored, ecomose seeds.

40. *Rojasia* Malme in Ark. Bot. 4(14): 10. 1905 – Type: *Rojasia gracilis* (Morong) Malme (≡ *Gothofreda gracilis* Morong).

References and iconography. – Morillo, G. & Keller, H.A. 2016. Un nuevo género y dos nuevas combinaciones en las Gonolobinae (Apocynaceae: Asclepiadaceae). *Bonplandia (Corrientes)* 25: 129–143. <https://doi.org/10.30972/bon.2521262>

Malme, G.O.A. 1905. Adnotationes de nonnullis Asclepiadaceis austroamericanis. *Ark. Bot.* 4(14): 1–19. – t. 2, fig. 4 “*Rojasia gracilis*”. <https://www.biodiversitylibrary.org/page/28740004>

Description. – Suffrutescent twining vines, 3–4 m long. *Pubescence* mixed, densely greyish-tomentose; eglandular trichomes 0.25–0.5 mm long. *Stems* pubescent, suberized at base. *Leaves* decussate, with petioles not exceeding 1 cm long; blades small (to 2.5 × 1.5 cm), ovate to triangular-deltoid, acute or obtuse and mucronate at apex, cordate at base, densely pubescent; with 4–7 pairs of lateral veins; with 4 or 5 colleters at the base of the upper surface. *Inflorescences* extra-axillary, helicoid cymes, 4- to 7-flowered; peduncles 8–11 mm long; bracts linear-lanceolate. *Flowers* with pedicels ca. 15 mm long; medium-sized (to 2 cm diam.). *Calyx* with lobes lanceolate, acute, moderately to densely pubescent abaxially, with 1 or 2 colleters per sinus. *Corolla* rotate-campanulate, (greenish-)white; lobes oblong-spatulate, erect in the basal $\frac{2}{3}$, recurved in the apical third, glabrous. *Corolline corona* absent. *Gynostegial corona* of free staminal lobes attached below the filament tube, exceeding gynostegium; lobes laminar, the apical part bifid,

erect, each branch fimbriate, apparently apically glandular. *Gynostegium* stipitate; anthers suberect; anther wings subparallel, over about $\frac{2}{3}$ of anther length; connective appendages subovate, covering the margin of the style-head; style-head flat or concave, mamillate in the center, with 5 blunt scales on top. *Pollinaria*: Pollinia pendent, curved oblong-ovate, proximally flattened and hyaline, the hyaline zone slightly exceeding the junction with the caudicles; caudicles articulate, attached to upper half of the pollinia; corpusculum narrowly and obtusely sagittate. *Follicles* one per flower, obclavate to fusiform, conspicuously muricate; projections sparse, long and slender, finely pubescent, many-seeded. *Seeds* ovate-oblong, with slightly recurved, almost entire, apical margin, very thin in lateral view, comose. – Fig. 31

Distribution and ecology. – A single species, *Rojasia gracilis* (Morong) Malme; predominantly distributed in southern South America (Argentina, Paraguay), but extending its distribution to Bolivia; dry open scrubs (*chaco*) and scrub-forest (*chaco forest*); 50–450 m.

Notes. – The two specimens of *Rojasia* included in the molecular phylogeny form a long branch in Clade V without a supported position. The cpDNA dataset places *Rojasia* in a polytomy with Clade IV and all remaining Gonolobinae (Fig. 5, suppl. Fig. S5).

Vegetatively similar to *Ibatia*, but differing by the combination of stems and leaves with dense grayish-tomentose glandular pubescence, corolla lobes oblong-spatulate, erect and apically recurved, corona of 5 free, erect, bifid segments, with each branch conspicuously fimbriate, style-head truncate or slightly concave, with 5 blunt scales at top, pollinia with a proximal hyaline zone, laterally attached to the caudicles, and follicles with long, slender and acute projections, not suberized.

41. *Rotundanthus* Morillo in Pittieria 39: 245. 2015 – Type: *Rotundanthus fulvidus* (F. Ballard) Morillo ($\equiv$ *Gonolobus fulvidus* F. Ballard).

References and iconography. – Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmnt.pdf>

Ballard, F. 1940. *Gonolobus fulvidus*. *Bot. Mag.* 163: t. 9611.

Description. – Twining liana to 9 m long; latex milky. *Pubescence* of yellowish eglandular trichomes, patent or somewhat curved, 1.5–5 mm long, without glandular trichomes. *Stems* densely villous. *Leaves* decussate, with petioles 1–2.5 cm long; blades to 16.5 × 7.7 cm oblong-lanceolate or narrowly elliptical, short and abruptly acuminate, short and narrowly cordate at base, densely hairy on both sides; with 6 or 7 pairs of prominent secondary veins; with 4–8 antrorse-uncinate, warty collectors at the base of the upper surface. *Inflorescences* helicoid cymes, 2–5-flowered, with one flower open at a time; peduncles to 1.4 cm long; bracts not seen. *Flowers* with pedicels to 3.5 cm long, large (to almost

5 cm diam.). *Calyx* with lobes narrowly lanceolate, rounded-emarginate, abaxially with yellow trichomes; with 1 colleter per sinus. *Corolla* rotate-campanulate, yellow to orange; lobes spreading, ovate, orbicular or broadly deltoid, apically rounded-emarginate, conspicuously veined, adaxially with erect trichomes in the tube, the lobes glabrous except for a few cilia along the left margin, abaxially with antrorse trichomes. *Corolline corona* absent. *Gynostegial corona* a shallow fleshy cup, roughly pentagonal with rounded angles, marginally crenulate; staminal lobes shortly ligulate. *Gynostegium* sessile; anthers horizontal, supported by a thick ring of spongy tissue (anther ring); anther wings acicular; connective appendages appressed to the style-head; style-head peltate, broad. *Pollinaria*: Pollinia horizontal, auriculate, concave-convex, somewhat hyaline on the proximal margin; caudicles articulated, hyaline and curved; corpusculum narrowly sagittate. *Follicles* one per flower, fusiform, densely muricate, yellow pubescent. *Seeds* not seen.

Distribution and ecology. – A single species, *Rotundanthus fulvidus* (Ballard) Morillo, distributed from southern Mexico to Costa Rica; wet or rain forests; below 600 m.

Notes. – *Rotundanthus* was not included in the molecular phylogeny.

Much-branched lianas, with all vegetative parts villous with yellowish eglandular trichomes (0.5–5.3 mm long); corolla more than five times the diameter of the gynostegium, rotate with wide rounded lobes; gynostegium sessile, with a peltate, very broad style-head, and densely tuberculate follicles.

42. *Suberogerens* Morillo in Pittieria 39: 249. 2015 – Type: *Suberogerens cyclophylla* (Standl.) Morillo ($\equiv$ *Vincetoxicum cyclophyllum* Standl.).

Reference and iconography. – Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmnt.pdf>

Description. – Suffrutescent twining shrubs up to 2.5 m long, with a woody and corky caudex up to 20 cm diam.; latex white. *Pubescence* of eglandular trichomes (ca. 0.05–0.3 mm long), ferruginous or translucent, more or less vermiform, with thin sculptured walls; glandular-capitate trichomes few or absent. *Stems* appressed-puberulent when young, eventually glabrous. *Leaves* early deciduous, decussate, with petioles to 13.5 cm long; blades, to 17 × 18 cm, leathery, semi-orbicular, rounded and abruptly acuminate at the apex, deeply cordate, glabrous or sparsely puberulent on both sides, trichomes 0.1–0.2 mm long, venation impressed on the upper surface, prominent on the underside, with 6 or 7 pairs of arcuate secondary veins; 6–8 narrowly conical collectors at the base of the upper surface. *Inflorescences* cymose, 2 or 3-flowered; (sub-)sessile; bracts narrowly triangular, small. *Flowers* malodorous, with pedicels to 6 mm long; medium-sized (to 2.5 cm diam.). *Calyx* with green to dark purple lobes, linear-lanceolate, long-attenuate, much longer than corolla tube, abaxially glabrous or appressed puberulent; with

1 colleter per sinus. *Corolla* rotate, fleshy, green or purple-brown, tube adaxially with a white pilose annulus surrounding the corona; lobes spreading, broadly ovate or ovate-deltoid, acute or acuminate, abaxially appressed-puberulent, except glabrous at the apex and margin. *Corolline corona* absent. *Gynostegial corona* purple, of five hemidisciform ligulate staminal lobes and erect liguliform lobes originating from the back of the anthers. *Gynostegium* subsessile; anthers horizontal, anther wings parallel, ca. 0.25 mm long, connective appendages white, covering ca. $\frac{1}{3}$ of style-head; style-head pentagonal-stellate, flat. *Pollinaria*: Pollinia horizontal, spatulate, concave on the external surface, with a proximal hyaline zone; caudicles hyaline; corpusculum narrowly sagittate. *Follicles* one per flower, fusiform (11–15 × 2.5–3 cm), arched, sparsely and widely spaced minutely muricate, tubercles with or without cork, densely gray tomentulous, many-seeded (70–80 per follicle). *Seeds* ovate, margins winged, dark brown, comose. – Fig. 3J

Distribution and ecology. – A genus of a single species, *Suberogerens cyclophylla* (Standl.) Morillo; Mexico; thorn scrubs and dry deciduous forests; 200–1350 m.

Notes. – In the molecular phylogeny, the three samples of *Suberogerens* are well supported and also well supported as sister to *Talayotea*. The *Suberogerens*–*Talayotea* Clade I changes position from sister to the Central/North American Clade III (ML and Bayesian analyses of the full and the reduced datasets, suppl. Figs. S1–S4) to sister of Clades II, III and V (ML analysis of the cpDNA dataset, suppl. Fig. S5) to sister of the Central/North American Clade II (BEAST, Fig. 4). All positions remain unsupported, though.

Characterized by thick conspicuously corky caudex, pubescence of stems, leaves, and inflorescences of appressed ferruginous more or less vermiform eglandular trichomes, with thin unsculptured walls (glandular-capitate trichomes few or absent), broadly ovate to roundly reniform leaf blades, large fleshy malodorous flowers, and fusiform follicles, with short obtuse, suberized projections. Remarkable plants with corky xylopodium and rather fleshy leaves and flowers—thus making this species interesting for succulent-plant lovers (Mostul & Cházaro, 1998).

43. *Talayotea* L.O. Alvarado in Phytoneuron 2021-62: 4. 2021 – Type: *Talayotea caudata* (A. Gray) L.O. Alvarado (≡ *Gonolobus caudatus* A. Gray).

Reference and iconography. – Alvarado-Cárdenas, L.O. 2021. *Talayotea* (Apocynaceae: Asclepiadoideae, Gonolobinae), un género nuevo y endémico de México. *Phytoneuron* 2021-62: 1–18. <https://www.phytoneuron.net/wp-content/uploads/2021/11/62PhytoN-Talayotea.pdf>

Description. – Shrubs, 50–65 cm high, with a suberified base; latex white. *Pubescence* of whitish, curved trichomes (ca. 0.1–0.3 mm long). Stems appressed puberulent to glabrous with age. *Leaves* deciduous, decussate, with petioles to 1.2 cm long; blades small (to 4.8 × 1.6 cm), coriaceous, narrowly ovate to lanceolate, apex, acute to acuminate or apiculate, base acute or truncated, margin entire to slightly

revolute, both sides glabrous to appressed-puberulent, 0–2 collectors at the base of the upper surface. Inflorescences cymose, 1–5-flowered; subsessile; bracts linear, 3–4 mm long. *Flowers* with pedicels to 4 mm long, small (to 1.5 cm diam.). *Calyx* with green lobes, sometimes with purplish-purple tints, ovate-lanceolate, acuminate apex, abaxially appressed-puberulent, with 1 colleter per sinus. *Corolla* rotate, conical in bud, brown-purple to green-purple or reddish-green; tube adaxially pilose to pubescent, rarely glabrous or glabrescent, abaxially pilose to glabrescent; lobes ovate-lanceolate, apically pointed, marginally revolute, adaxially pubescent to glabrescent, abaxially pilose to glabrescent. *Corolline corona* absent. *Gynostegial corona* cyathiform, slightly 5-lobed, fleshy, sometimes carunculate at the base, dark purple to black, with 5 staminal lobes, laminar, apically truncate and emarginate. *Gynostegium* sessile; anthers with ovate apical appendages, almost the same length as the style-head; style-head flat, with a small bilobed appendage. *Pollinaria*: Pollinia pendent; asymmetrically obpyriform, with one concave face; caudicles articulated; corpusculum sagittate. *Follicles* broadly fusiform to subglobose (4.6–6 × 1.7–2.5 cm) with sharp-pointed prickles glabrescent; trichomes white or ferruginous, appressed. *Seeds* obovate and flattened, comose.

Distribution and ecology. – Two species in Mexico; tropical deciduous forests and xeric shrublands; 370–1500 m.

Notes. – In the molecular phylogeny, *Talayotea* is sister to *Suberogerens* in Clade I. For details, see *Suberogerens*.

44. *Trichosacme* Zucc. in Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(2): 11. 1846 – Type: *Trichosacme lanata* Zucc.

References and iconography. – Alvarado-Cárdenas, L.O. & Cortez, E.B. 2022. Pasado y presente de *Trichosacme lanata* (Apocynaceae: Asclepiadoideae): Revisión de un taxón endémico y poco conocido en México. *Phytoneuron* 2022-33: 1–10. <https://www.phytoneuron.net/wp-content/uploads/2022/04/33PhytoN-Trichosacmelanata.pdf>

J.D.C [Decaisne, J.] 1856. *Trichosacme lanata* Zucc. In: Lemaire, C. (ed.), *Fl. Serres Jard. Eur.*, sér. 2, 1: 101–102, t. 1123. <https://www.biodiversitylibrary.org/page/27759192>

Description. – Shrub to 75 cm high, latex white, with disagreeable smell. *Pubescence* densely silky to woolly (eglandular trichomes ribbon-like 1.5–3 mm long). *Stems* erect or slightly prostrate, suberose at maturity, woolly, glabrescent in the mature parts. *Leaves* decussate, with petioles to 2 cm long; blades small, to 5 × 2.5 cm, herbaceous, elliptic or ovate, apex acute to slightly acuminate or rounded, base cordate to slightly obtuse, lanate on both sides, collectors absent. *Inflorescences* umbelliform, 6–10-flowered; peduncles to 3 cm long, horizontal; bracts linear, silky pubescent. *Flowers* malodorous; small (to 6 mm diam.), but seemingly larger by long appendices. *Calyx* with lobes lanceolate to narrowly elliptical, acuminate to awned, exceeding corolla tube, abaxially densely pubescent; with 1 colleter per sinus. *Corolla* rotate, fleshy, dark purple to black; lobes imbricate, ovate, apically slightly emarginate, with a long filiform, motile and pendent

appendage emerging from the midvein on the upper face; densely pilose with eglandular and articulate trichomes, alternating violet and white, abaxially pilose, adaxially hirsute, left margin glabrous. *Corolline corona* annular. *Gynostegial corona* of laterally fused lobes forming a fleshy disk not surpassing the style-head, urceolate, brown, orange or yellowish, margins smooth and wavy, with 5 staminal appendages inside the ring, laminar to slightly fleshy, rectangular, marginally wavy. *Gynostegium* almost sessile; anthers truncated obtriangular, laterally broadened to hide the extremely short anther wings, fused to underside of style-head, with membrane hiding pollinium from the top; anther wings extremely short; style-head with a central depression. *Pollinaria*: Pollinia seemingly pendent, clavate, with apical sterile hyaline region, laterally attached to the caudicles; caudicles medifixed to the corpusculum, straight, horizontal, flattened, trapezoidal; corpusculum ellipsoid. *Follicles* two per flower, erect, fusiform, apically slightly attenuate, rounded, densely white tomentose to woolly. *Seeds* elliptical, comose.

Distribution and ecology. – A genus of a single species, *Trichosacme lanata* Zucc., in the Sierra Madre of Mexico (Nuevo León, San Luis Potosí, Tamaulipas); mainly in xeric scrublands and in the remnants of the deciduous tropical forest; 230–1000 m.

Notes. – In the molecular phylogeny, *Trichosacme* is moderately to well supported as sister to *Pauciflora* in the Central/North American Clade II.

45. *Tutunakanthus* L.O.Alvarado & Díaz-Mota in Bot. Sci. (online) 104(1): 3 [of 16]. 13 Oct. 2025 – Type: *Tutunakanthus caninus* Díaz-Mota & L.O.Alvarado.

Reference and iconography. – Alvarado-Cárdenas, L.O. & Díaz-Mota, S. 2025. Un género y dos especies nuevas para Gonolobinae (Apocynaceae; Asclepiadoideae) de México. Bot. Sci. 104(1): 189–204. <https://doi.org/10.17129/botsci.3719>

Description. – Suffrutescent, twining vines 2–7 m long, latex white, with fibrous roots. *Pubescence* mixed of glandular (with brown to black apical cell), and short (0.1–0.3 mm) and long (1.5–4 mm) eglandular trichomes; eglandular trichomes on stems, leaves and inflorescence axis. *Stems* developed from a thickened taproot, densely pubescent, generally with fissured corky bark in lower internodes. *Leaves* decussate, petiolate; blades narrowly to broadly ovate (rarely suborbicular) or elliptic (5–18.5 × 3.5–15 cm in *T. gentlei* (Lundell & Standl.) Morillo, Liede & Meve; up to 20 × 15 cm in *T. velutinus* (Schltdl.) Morillo, Liede & Meve), deeply cordate-lobate at base, acuminate or acute at apex, (4–)6–9 pairs of lateral veins; with 8–18 (–24) colleters at the base of the upper surface. *Inflorescences* always one per node, congested-racemiform cymes, 3–9-flowered, pedunculate; peduncles usually longer than pedicels (5–95 mm long); bracts linear or oblong-lanceolate, 1–9 mm long. *Flowers* often long-pedicellate, small to medium-sized. *Calyx* with lobes suborbicular, ovate, elliptic, elliptic-obovate or lanceolate,

mixed pubescence of glandular and long eglandular trichomes abaxially; with 1 or 2 colleters per sinus. *Corolla* rotate or rotate-subcampanulate, 5–25 mm diam., yellowish-green, green, orange, red, purple to dark purple; lobes spreading, reflexed, ascending or twisted and falcate, ovate, triangular-ovate, ovate-lanceolate, suborbicular-obovate, obtuse or rounded, reticulate, adaxially glabrous or shortly puberulent, short mixed pubescent abaxially. *Corolline corona* a faucal annulus, inconspicuous or apparently absent in some species. *Gynostegial corona* yellow to dark purple, fleshy, of 5 connate staminal and 5 interstaminal segments; staminal segments usually in 2 series; the outer series thick, disk-shaped, rounded or pentagonal in outline, 5-lobed, shorter or almost as long as gynostegium, with entire or slightly crenate basal margin; inner corona of flat or concave ligulate lobes. *Gynostegium* subsessile or stipitate (stipe mostly 0.3–1.1 mm long); anthers more or less horizontal, rectangular in outline, wings parallel, anther appendages covering about half of style-head apex; style-head pentagonal in outline, slightly convex, flat or slightly concave at apex. *Pollinaria*: Pollinia subhorizontal (apex slightly bent towards flower axis) or horizontal, reniform or curved-obovoid (0.26 × 0.16–0.2 mm in *T. caninus*; ca. 0.3 × 0.22 mm in *T. inops* (Woodson) Díaz-Mota & L.O.Alvarado; 0.6–0.7 × 0.3 mm in *T. velutinoides* (W.D.Stevens) Morillo, Liede & Meve), or narrowly falciform, with one concave face; caudicles articulated, corpusculum sagittate or narrowly rhomboid-sagittate (ca. 0.25 × 0.1 mm in *T. velutinoides*). *Follicles* one per flower, fusiform or cylindrical-fusiform, (7–12 × 1–2 cm in *T. micranthus* (L.O.Williams) Morillo, Liede & Meve; 10 × 2 cm in *T. caninus*; 8–10 × 1.2–1.5 cm in *T. gentlei*), usually conspicuously muricate, with few sparse short conical prickles, rarely almost smooth, with moderate to dense mixed pubescence, often with sparse long eglandular trichomes and dense glandular black trichomes (pubescence remains in mature follicles); many-seeded. *Seeds* narrowly ovate, chalazal end irregularly crenulate, surface verrucose; comose. – Fig. 3K

Distribution and ecology. – About 10 species in Mexico and Central America; both at low and medium altitudes (50–2200 m), in forests and secondary vegetation derived from forests, often associated with limestone.

Notes. – The four analyzed species of *Tutunakanthus* form a well supported clade in well-supported sister-group position to *Odontostephana* in Clade II in all analyses (suppl. Figs. S1–S5) except for BEAST (Fig. 4), in which support is weak. While none of the species listed by Alvarado-Cárdenas & Díaz-Mota (2025) under *Tutunakanthus* was included in our analysis, the relationships between these species and those studied here are close enough to transfer these, and several closely related species, to *Tutunakanthus*. The only species of this group discussed by Alvarado-Cárdenas & Díaz-Mota (2025) is *T. micranthus* (L.O.Williams) Morillo & al., which they regard as similar to *Tutunakanthus* because of its flowers with ovate lobes and a patent margin, a cyathiform gynostegial corona with five concave inner corona appendages, but distinguished by its inflorescences

without long trichomes, compressed flower buds, corollas smaller than 0.5 cm diam., and stingless fruits. The last character could indeed be understood as an argument against the inclusion of the species, but the loss of a character (in this case prickles) might be secondary and cannot be counted as argument against group membership, especially as follicle ornamentation is rather diverse in *Tutunakanthus* (see description).

Tutunakanthus is similar to *Odontostephana* in pubescence and leaf morphology, but slightly different in inflorescence, flower and fruit morphology. Main differences include number of leaf blade colleters (8–18(–24) vs. 0–6 in *Odontostephana*), inflorescence always single per node, racemiform, with 3–9 flowers (vs. racemiform or umbelliform, single or paired in a node, with (1–)3–40 flowers in *Odontostephana*), and fruit ornamentation (usually conspicuously muricate with narrow, almost acicular prickles vs. moderately muricate, with short [2–5 mm long] spine-like sparse to dense prickles in *Odontostephana*) and fruit pubescence (dense and often with glandular black trichomes, present in mature follicles; vs., minutely short-hirsute when young, often glabrescent or glabrous when mature in *Odontostephana*).

Tutunakanthus falcatus (Juárez-Jaimes, G.M.Hern.-Barón & W.D.Stevens) Morillo, Liede & Meve, **comb. nov.** ≡ *Matelea falcata* Juárez-Jaimes, G.M.Hern.-Barón & W.D.Stevens in Novon 29: 113. 2021 – Holotype: Mexico. Yucatán: Mpio. Oxkutzcab, at the entrance to the Loltun caves, 60 m, 21 Apr 2012, *M. Ortiz s.n.* (MEXU barcode MEXU 01527403!; isotype: MEXU barcode MEXU 01527404!).

Tutunakanthus gentlei (Lundell & Standl.) Morillo, Liede & Meve, **comb. nov.** ≡ *Vincetoxicum gentlei* Lundell & Standl. in Publ. Field Mus. Nat. Hist., Bot. Ser. 17: 269. 1937 ≡ *Matelea gentlei* (Lundell & Standl.) Woodson in Ann. Missouri Bot. Gard. 28: 234. 1941 – Lectotype (designated by Stevens in Novon 15(4): 612. 2005): Belize. Gracie Rock, Sibun River, hillslope forest on limestone, 31 Jan 1936, *P. Gentle 1779* (MICH n.v.; isoelectotypes: A barcode 00076883, F barcode V0049056F fragment!, K barcode K000197395, MO barcode MO-712186, NY barcode 00318833, P, n.v., US, n.v.).

The suggestion to place *Tutunakanthus gentlei* in synonymy of *T. velutinus* (Carnevali & al., 2010: 80) is not followed here, because the two species differ subtly but constantly; in *T. velutinus* leaf blades have up to 8 colleters (8–12 in *T. gentlei*), corollas are larger (ca. 25 mm diam.), with lobes 8–10 mm long (corollas up to 16 mm diam. with lobes up to ca. 7 × 7.5 mm in *T. gentlei*), and follicles with sparse inconspicuous swellings and minute pubescence (conspicuously muricate with long broadly acicular prickles and mixed pubescence with long eglandular trichomes and minute glandular trichomes in *T. gentlei*).

Tutunakanthus guatemalensis (K.Schum.) Morillo, Liede & Meve, **comb. nov.** ≡ *Gonolobus guatemalensis* K. Schum. in Engler & Prantl, Nat. Pflanzenfam. 4(2): 302. 1895 ≡ *Matelea guatemalensis* (K.Schum.) Woodson in Ann. Missouri Bot. Gard. 28: 235. 1941 ≡ *Gonolobus velutinus* subsp. *calycinus* Donn.Sm. in Bot. Gaz. 13(7): 189. 1888 – Lectotype (first step designated by Stevens in Novon 15(4): 603. 2005): Guatemala. Alta Verapaz: Pansamalá, 4000 ft., Apr 1887, *H. von Tuerckheim 1124* (US); **Lectotype (second step designated here)**: (US barcode 00111138!; isoelectotypes: K barcode K000197390!, US barcode 03168677!).

Stevens (2005: 603) designated the lectotype for this species; however, there are two specimens extant in US, so that second-step lectotypification becomes necessary, choosing the richer specimen.

Tutunakanthus micranthus (L.O.Williams) Morillo, Liede & Meve, **comb. nov.** ≡ *Matelea micrantha* L.O.Williams in Fieldiana, Bot. 32(12): 184. 1970 – Holotype: Guatemala. Dept. Petén: Macanché, 28 Jan 1966, *E. Contreras 5417* (on two sheets, F barcodes V0048966F & V0048965F; isotypes: LL, n.v., NY barcode 04196041, US barcode 04165471!).

Tutunakanthus stenosepalus (Lundell) Morillo, Liede & Meve, **comb. nov.** ≡ *Matelea stenosepala* Lundell in Bull. Torrey Bot. Club 69(5): 398. 1942 – Holotype: Mexico. Quintana Roo: Cobá, 25 m, in low second growth, Jun–Jul 1938, *C.L. Lundell & A.A. Lundell 7648* (MICH barcode 1111621!; isotypes: LL barcode 00372544!, MEXU barcode MEXU 00053228!).

Tutunakanthus velutinus (Schltdl.) Morillo, Liede & Meve, **comb. nov.** ≡ *Gonolobus velutinus* Schltdl. in Linnaea 8 (5): 521. 1834 (“1833”) ≡ *Matelea velutina* (Schltdl.) Woodson in Ann. Missouri Bot. Gard. 28: 234. 1941 ≡ *Vincetoxicum velutinum* (Schltdl.) Standl. in Contr. U.S. Natl. Herb. 23(4): 1189. 1924 – **Lectotype (designated here)**: Mexico. Jalapa: prope Zoncuanla, Jun 1826, *C.J.W. Schiede* (HAL barcode HAL0098554!; isoelectotypes: BR barcode BR0000006960223!, GOET barcode GOET000293!, K barcode K000197391!).

Schlechtendal (1834: 521) did not indicate a repository of his type specimen. However, as he worked in Halle, the rich specimen HAL0098554, bearing his handwritten annotations, is the logical choice for a lectotype.

Tutunakanthus velutinoides (W.D.Stevens) Morillo, Liede & Meve, **comb. nov.** ≡ *Matelea velutinoides* W.D.Stevens in Novon 15(4): 616. 2005 – Holotype: Mexico. Chiapas: Mpio. Cintlapa, SE of Cerro Baúl on border with Oaxaca, 16 km NW of Rizo de Oro along logging road to Colonia Figaroa, 1600 m, 6 Sep 1972, *D. Breedlove 27642* (MO barcode MO-344127!).

46. *Tylodontia* Griseb., Cat. Pl. Cub.: 175. 1866 – Type: *Tylodontia cubensis* Griseb.

Reference and iconography. – Mangelsdorff, R.D., Meve, U. & Liede-Schumann, S. 2016. Phylogeny and circumscription of Antillean *Anemotrochus*, gen. nov., and *Tylodontia* (Apocynaceae: Asclepiadoideae: Gonolobinae). *Willdenowia* 46: 443–474. <https://doi.org/10.3372/wi.46.46311>

Description. – Sparsely branched herbaceous, twining vines, up to 2.5 m long; latex white. *Pubescence* of eglandular recurved trichomes 0.7–1.8 mm long. *Stems* densely pubescent. *Leaves* decussate, with petioles to 1.8 cm long; blades small, not exceeding 4.5 × 2.5 cm, ovate to lanceolate, basally rounded or slightly cordate; pilose to pubescent; 3–6 pairs of lateral veins; with 2, rarely 3 colleters at the base of the upper surface. *Inflorescences* helicoid cymes, mostly with geminiflorous partial inflorescences, sciadoid-thyrsoïdal, or with an elongated rachis, 9–70-flowered; peduncles to 1.3 cm long; bracts lanceolate to linear. *Flowers* with pedicels to 6 mm long, small (to 4 mm diam.), nectariferous. *Calyx* with lobes ovate or triangular-ovate; obtuse or acute to acuminate, abaxially glabrous or pubescent, without colleters in the sinus. *Corolla* urceolate, fleshy, 1.8–6 mm long, white, usually adaxially densely pubescent, lobes ovate to lanceolate, strongly asymmetric with the left side basally overlapping the neighboring lobe. *Corolline corona* of epipetalous lobules *Gynostegial corona* in two series, outer series of with interstaminal segments often larger, inner series of inconspicuous staminal segments fleshy, short. *Gynostegium* often stipitate; anther wings divided into a basal (mostly longer, vertically oriented) and an upper (nearly horizontal) part, connective appendages laminar, usually appressed to style-head; style-head green, with central depression. *Pollinaria*: Pollinia pendent, proximally attached to the caudicles, obliquely ovate-reniform, with a flattened zone on the upper medial side; corpusculum ovate-elliptic. *Follicles* one per flower, fusiform or narrowly oblong (9–12 × 0.6–0.75 cm in *T. fuscata* (C. Wright) Mangelsdorff, Meve & Liede), apex drawn in a long beak, glabrous, stalk bent into a 90° angle. *Seeds* pyriform, winged, comose. – Fig. 3L

Distribution and ecology. – A Cuban genus of four species; wet or rain submontane forests, in dense understory on steep, shaded banks; 200–1000 m.

Notes. – In the molecular phylogeny, *Tylodontia* is well supported and also well supported as sister to *Poicilla*. *Tylodontia*–*Poicilla* is moderately to well supported as sister to *Meveampelos*–*Anemotrochus* in the West Indian Clade IV.

Distinguished from other Antillean Gonolobinae by the combination of densely eglandular pubescent, slender stems, 1–2 m long, small (1.5–4.5 cm long) ovate to lanceolate leaves, urceolate corolla with very short lobes, and a highly complex system of fused staminal-interstaminal coronas that are folded into a corolline corona.

47. *Urostephanus* B.L.Rob. & Greenm. in Amer. J. Sci., ser. 3, 50: 159. 1895 – Type: *Urostephanus gonoloboides* B.L.Rob. & Greenm.

Reference and iconography. – González-Martínez, C.A., Lozada-Pérez, L., Olson, M.E. & Alvarado-Cárdenas, L.O. 2024. Sistemática de *Urostephanus*: Resurrección de un taxón Mesoamericano de Gonolobinae (Apocynaceae, Asclepiadoideae), con ocho nuevas combinaciones. *Acta Bot. Mex* 131: e2302. <https://doi.org/10.21829/abm131.2024.2302>

González-Martínez, C.A., Lozada-Pérez, L. & Alvarado-Cárdenas, L.O. 2023. Four new species of *Matelea* (Apocynaceae: Asclepiadoideae) endemic to Mexico. *Kew Bull.* 78: 519–531. <https://doi.org/10.1007/s12225-023-10121-z>

Description. – Herbaceous or woody vines, 50–70 cm long, with suberose base; roots fleshy and fasciculate; latex white. *Pubescence* mixed of short glandular trichomes, black, and long straight eglandular trichomes (0.5–1.5 mm long), white or yellowish. *Stems* hispid. *Leaves* decussate, petiolate; blades large, to 10 × 5 cm, ovate to elliptic, apex attenuate to acuminate, base cordate or lobate, sparsely to moderately hispid on both sides; 4–6 pairs of lateral veins; with several colleters at the base of the upper surface. *Inflorescences* sessile or very shortly pedunculate, congested, racemiform cymes, 4–7-flowered; bracts lanceolate. *Flowers* pedicellate, medium sized (about 2 cm diam.). *Calyx* with lobes slenderly lanceolate, longer than the corolla tube; abaxially with trichomes; colleters inside the lobes. *Corolla* rotate, yellow-greenish, brown-purple or reddish; tube with arachnoid pubescence or nearly glabrous; lobes triangular, ovate or lanceolate. *Corolline corona* absent. *Gynostegial corona* cyathiform, basally adnate to gynostegium, orange or purple to black; 5 staminal lobes, subulate or oblong, apically truncate or rounded, resting on the anthers (subulate, erect-curved in *U. porphyranthus* (Standl.) Gonz.-Martínez, Lozada-Pérez & L.O. Alvarado), emerging internal to the middle part of the gynostegial corona; and 5 interstaminal lobes, bifid, filiform, ligulate, linear, laminar, subulate projections, erect or patent, free or joined at the base, emerging external to the middle part of the gynostegial corona; the lobes are accompanied at the base by corrugated, warty, or smooth membranes. *Gynostegium* stipitate, anthers with connective appendages appressed to the margin of the style-head; style-head pentagonal, convex or flattened, slightly emarginate between the anthers. *Pollinaria*: Pollinia pendent, ovate to elliptic (0.3–0.35 × 0.18–0.28 mm), distally sterile and excavated at the base; caudicles lamellar (0.15–0.2 mm long); corpusculum slightly sagittate to rhombic. *Follicles* one per flower, fusiform, slightly aculeate, smooth to indistinctly and irregularly muricate. *Seeds* not seen.

Distribution and ecology. – Eight species in Central America (central Mexico to Honduras), in mountainous regions. The species of this genus grow in cloud forest, pine-oak forest, oak forest, and rarely in seasonally dry tropical forest; 1000–2400 m.

Notes. – In the molecular phylogeny, *Urostephanus* is well supported and also well supported as sister to *Diclyanthus* in Clade II in all analyses. *Urostephanus porphyranthus* from Honduras is sister to the remaining species from Guatemala and southern Mexico.

Morphologically, *Urostephanus* is recognized by almost sessile racemiform inflorescences, arachnoid trichomes in the corolla tube, a cyathiform corona with oblong staminal lobes resting on the anthers, pendent pollinia, and bifid interstaminal lobes with internal projections.

48. *Vulcanoa* Morillo in Pittieria 39: 253. 2015 – Type: *Vulcanoa steyermarkii* (Woodson) Morillo ($\equiv$ *Matelea steyermarkii* Woodson).

Reference and iconography. – Morillo, G. 2015. Aportes al conocimiento de las Gonolobinae III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2ijmnt.pdf>

Description. – Twining lianas, size and latex color not reported. Pubescence of eglandular, retrorse or spreading, 0.5–1 mm long, ferruginous trichomes. *Stems* densely ferruginous-pilose. *Leaves* decussate, with petioles to 3.3 cm long; blades to 12.5×6 cm, narrowly ovate to ovate-elliptic, apex acuminate to cuspidate, base shallowly cordate; ferruginous hispid on both sides; with 8–12 pairs of secondary veins; with 4–6 colleters at the base of the upper surface. *Inflorescences* racemiform or paniculate cymes; few-flowered; peduncles to 3 cm long, bracts linear, 1.5–2.5 mm long. *Flowers* with pedicels to 2 cm long; medium-sized (to 3 cm diam.). *Calyx* with lobes lanceolate, slightly longer than corolla tube, abaxially pilose; 0 or 1 colleters per sinus. *Corolla* briefly campanulate, white, with conspicuous green reticulation, lobes spreading, narrowly ovate, apically rounded-emarginate, adaxially hispidulous. *Corolline corona* tubular-cupuliform, apically fimbriate. *Gynostegial corona* adnate to stipe, with 5 horn-like staminal lobes. *Gynostegium* stipitate; anthers suberect, anther wings very short, connective appendages short, covering only the margin of the style-head; style-head convex. *Pollinaria*: Pollinia pendent, narrowly and asymmetrically pyriform; caudicles articulated, hyaline; corpusculum broadly sagittate. *Follicles* one per flower, fusiform (14.5×4 cm), densely muricate, with long, curved projections. *Seeds* not seen.

Distribution and ecology. – A single species, *Vulcanoa steyermarkii* (Woodson) Morillo, distributed in southern Mexico and northern Guatemala; upper montane, cloud forests, on volcanic slopes; 1700–3300(–3900) m.

Notes. – *Vulcanoa* was not included in the molecular phylogeny.

Distinguished from other Gonolobinae genera by the stipitate gynostegium with the stipe surrounded by a tubular, cupuliform, puberulent corona, with a fimbriate annulus and five horn-like lobes opposite to the anthers.

49. *Weigendia* Morillo, Liede & Meve, **gen. nov.** – Type: *Weigendia cajamarcana* Morillo, Liede & Meve.

Diagnosis. – *Weigendia* is similar in habit, stem (thin, somewhat lenticellate) and leaf morphology (blades basally cordate), indument distribution, peduncle length, flower diameter and pollinia orientation and shape to many species of

Gonolobus and *Chloropetalum*, which differ mainly by a corolline corona, a disk-shaped, conical or variously lobed annular gynostegial corona adnate to corolla tube and partly to the stipe, anthers often horizontal and subtriangular or almost so, with or without radial laminar dorsal appendages, and ovaries mostly ribbed lengthwise. In *Weigendia* there is a dense indumentum of brownish eglandular trichomes, no corolline corona, five massive, fleshy, brown, broadly cuneiform, subtruncate (and apically rugged-blisterly) staminal corona segments, developed from the base of the stipe, where they also fuse to each other; anthers are almost vertical and subrectangular, without laminar dorsal appendages, and ovaries are conspicuously muricate.

Description. – Suffrutescent twiners, length and latex color unknown. *Pubescence* more or less pilose to tomentose, of eglandular, retrorse or spreading, 0.2–1 mm long (in stems), brownish-ferruginous trichomes, apparently without glandular trichomes. *Stems* slender, length not reported, loosely lenticellate (base not seen), pilose to hirsute, trichomes brown-translucent, retrorse or spreading. *Leaves* decussate, petiolate; petioles filiform, 3–4 cm $\times$ 0.1 cm, densely pilose, trichomes 0.4–1.5 mm long translucent, spreading; blades 7–11 $\times$ 4–5 cm, green, discolorous, ovate-elliptic, basally cordate, apically acuminate, adaxially regularly hirsute to hispid, mostly on the veins, erect to spreading acute trichomes up to 0.8 mm long, abaxially pilose on veins only; 5–7 pairs of lateral veins; with 2–5 cylindrical to tapering colleters to 0.6 mm long at the base of the upper surface. *Inflorescences* one per node, racemiform cymes, 3–5(–7)-flowered, long and spreading pedunculate, peduncles 3–4 cm long, hirsute to hispid, trichomes up to 0.8 mm long, spreading, acute, brownish; bracts narrowly lanceolate, ca. 2 mm long, abaxially densely tomentose. *Flowers* pedicellate, pedicels ca. 5 mm long, conspicuously hirsute to tomentose, trichomes to 0.7 mm long, brownish. *Calyx* of free sepals; sepals deltate-lanceolate, ca. 3.5×1.4 mm, acute, abaxially densely tomentose, trichomes 0.5–1.0 mm long, spreading, brownish, without colleters in the sinus. *Corolla* rotate-subcampanulate, ca. 25 mm diam., brown, abaxially completely pilose to hispid (except for marginal regions of corolla lobes), trichomes to 1.0 mm long, spreading, brownish; tube c. 3 mm long, lobes purple-brown, deltate-lanceolate, 9–11 $\times$ 4 mm, spreading, with margins slightly recurved, adaxially smooth and glabrous except for pubescent base and shortly pilose marginal stripes with trichomes to 0.3 mm long and translucent-whitish, abaxially tomentose. *Corolline corona* absent. *Gynostegial corona* as long as gynostegium, ca. 6 mm diam., of 5 only very basally fused, massive and fleshy staminal corona lobes, brown, ascending from the base of the gynostegial stipe, lobes adnate to back of anthers, erect, broadly cuneiform, c. 2.2 mm long, apically to 3.2 mm wide, slightly notched, surface rugged and blisterly, cream. *Gynostegium* shortly stipitate, stipe ca. 1 mm long, gynostegium a flat disk; anthers almost vertical, subrectangular, c. 2×1 mm, attached diagonally at lower side of style-head; anther wings short, ca. 0.25 mm long, broadly

winged, anther appendages along complete upper margin of anther, round, entire, translucent, curved inwards; style-head ca. 3 mm diam., pentagonal, flat or slightly concave; ovaries muricate, glabrous. *Pollinaria*: Pollinia horizontal, slightly curved oblongoid-pyriform, ca. 0.5×0.3 mm, proximally sterile, flattened, pointed, concave in one face; caudicles subrectangular, ca. 0.2 mm diam., slightly concave; corpusculum broadly sagittate, 0.16×0.1 mm. *Follicles* and *seeds* not seen. — Fig. 9

Distribution and ecology. — Endemic to Peru, Depto. Cajamarca, known from the type locality only, in cloud forest remnants (post-cloud forest vegetation type) and hedges (in otherwise cultivated land), along small rivulet, at 2862 m.

Etymology. — Named after Maximilian Weigend, German botanist, professor of botany in Bonn, and specialist for the flora of Peru.

Notes. — *Weigendia cajamarcana* is weakly to well supported as sister to *Chloropetalum*–*Gonolobus* in Clade V (Fig. 4, suppl. Figs. S1–S4, S6), but loses this position without ITS (suppl. Fig. S5).

Suffrutescent twiners, with unknown latex color, hispid to hirsute, with eglandular trichomes (apparently without glandular trichomes), leaf blades up to 11×5 cm, discolorous, ovate-elliptic, basally cordate, rotate-subcampanulate, purple-brown corollas ca. 25 mm in diam., with adaxially smooth, almost glabrous lobes, abaxially with brownish

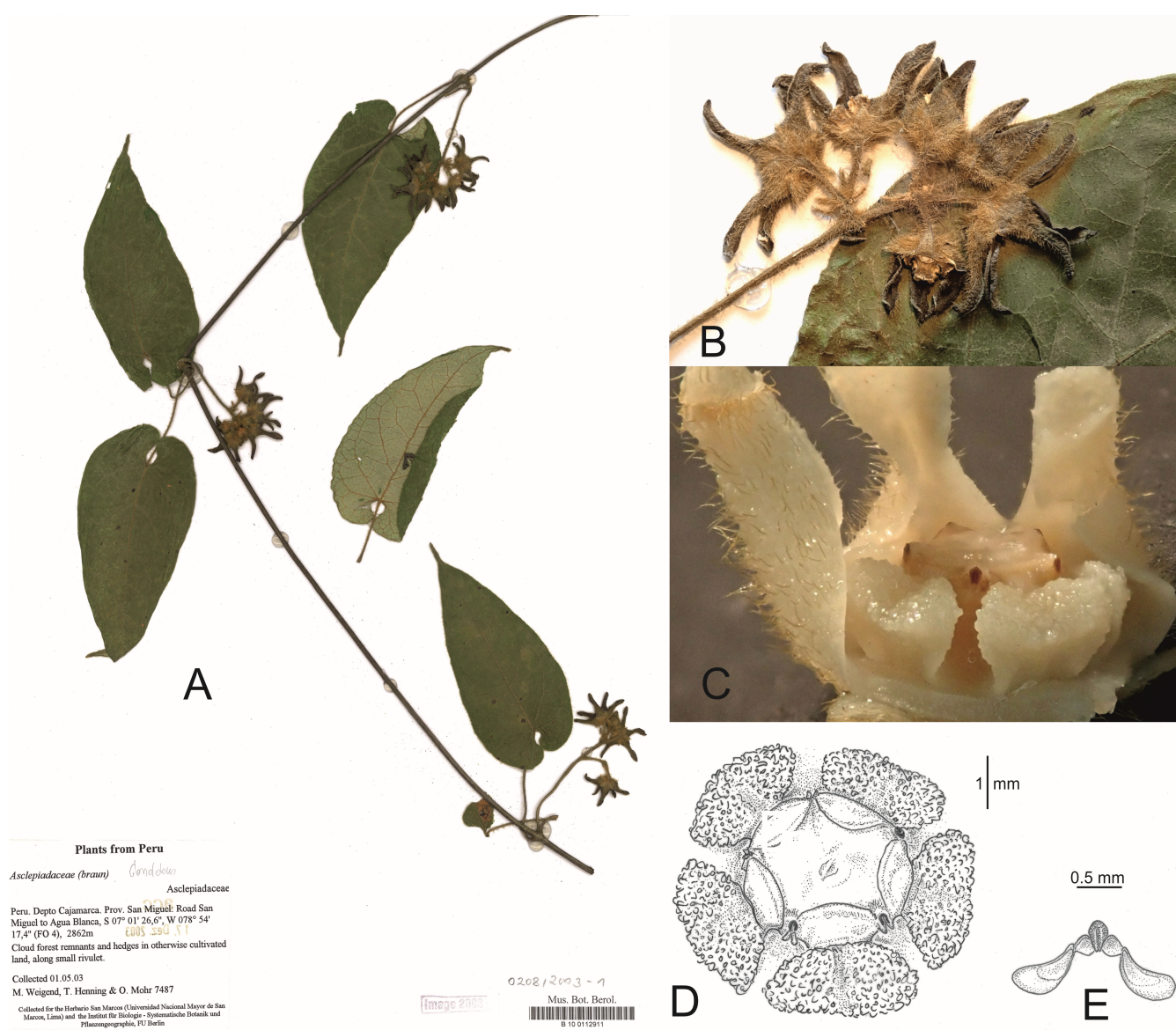


Fig. 9. *Weigendia* gen. nov. A–E, *Weigendia cajamarcana*: A, Isotype specimen (B); B, Inflorescence; C, Gynostegium and corona in lateral view (corolla partially removed); D, Gynostegium and corona in top view; E, Pollinarium in front view. — All from the isotype, *Weigend* 7487 (B). Photos and drawings by Ulrich Meve.

indument, and brown, broadly cuneiform, subtruncate erect staminal corona.

***Weigendia cajamarcana* Morillo, Liede & Meve, *sp. nov.* –**

Holotype: Peru. Dept. Cajamarca, Prov. San Miguel, rd San Miguel to Agua Blanca, cloud forest remnants and hedges in otherwise cultivated land, along small rivulet, 07.01266 78.54174W, 2862 m, 01 May 2003, M. Weigend, T. Henning & O. Mohr 7487 (HUT No. 43406!; isotypes: B barcode B 10 0112911!, USM, n.v.).

Diagnosis. – *Weigendia cajamarcana* resembles the Peruvian *Gonolobus purpureus* Morillo in habit, leaf shape, and the unusually dark-coloured corolla, but differs by being equipped with eglandular trichomes only (vs. trichomes glandular plus eglandular in *G. purpureus*), abaxially densely tomentose sepals more than 3 mm long (vs. sepals puberulous, ca. 1 mm long), rotate-campanulate and abaxially pilose corolla ca. 25 mm diam. (vs. corolla rotate, abaxially glabrous, ca. 14 mm diam.), absence of a corolline corona (vs. corolline corona present), and staminal corona lobes fleshy with surfaces rugged and blistery (vs. staminal corona lobes ligulate and smooth), and laminar dorsal anther appendages absent (vs. present).

50. *Yucatania* Morillo, Liede & Meve, *gen. nov.* – Type:

***Yucatania lanceolata* (Decne.) Morillo, Liede & Meve.**
(= *Gonolobus lanceolatus* Decne.).

Diagnosis. – Herbaceous or woody vines with slender stems 1–4 m long, usually with mixed pubescence in two lines; leaves subcoriaceous or coriaceous lanceolate, elliptic, oblong-ovate, or sometimes ovate, acute, obtuse, truncate or subcordate at the base, with 2–4 colleters at the base of the upper surface; inflorescence racemiform cymes, 1–6(–9)-flowered with short peduncles, pedicels 3–5 times longer than peduncles; corolla rotate, 8–20 mm diam., lobes ovate to triangular-ovate, obtuse-emarginate, reticulate, with dark green or brown-purple veins; staminal segments of gynostegial corona fleshy, ascending ridges, lobed and convex at base, truncate or rounded at apex and reaching base of the anthers; gynostegium stipitate, style-head convex or conical at apex; follicles with dense short conical to long subcylindrical fleshy prickles (ca. 3–12 mm long). Similar to *Tutunakanthus* and *Odontostephana*, which differ by a character combination of leaf blades shallow to deeply cordate at the base, with (0–) 2–24 colleters; inflorescence racemiform or umbelliform, 3–40-flowered, mostly with long peduncles, pedicels usually as long as or shorter than peduncles; corolla rotate to subcampanulate, gynostegium sessile or stipitate with convex, flat or slightly concave style-head, and follicles with short (2–4 mm long) or long (to 12 mm long) prickles, or with low sparse swellings, or almost smooth.

Description. – Suffrutescent, twining vines 2–4 m long; roots not thickened; latex white. *Pubescence* mixed, of glandular yellow to brown, short (0.05–0.3 mm long), reflexed

or spreading, and long yellow or white eglandular trichomes (0.7–2.5 mm long) on stems, leaves and inflorescence axis. *Stems* somewhat suberized at base, branches densely mixed pubescent, long trichomes bifarious, sometimes long trichomes scarce or absent. *Leaves* decussate, with petioles $\frac{1}{4}$ or $\frac{1}{5}$ the length of the blade, adaxially pubescent; blades coriaceous or subcoriaceous; 3–12 × 1–6 cm, oblong, elliptic, narrow-lanceolate, or ovate, rounded, truncate to subcordate at base, acuminate or acute at apex, margin planar or slightly revolute; hispid or pilose on both sides, more densely on veins and margins, sometimes almost glabrous abaxially; 6–12 pairs of secondary veins; with 2–4 colleters at the base of the upper surface. *Inflorescences* racemiform cymes, 3–6(–9)-flowered; short-pedunculate, bracts linear or deltoid-ovate, 0.5–3 mm long. *Flowers* with pedicels 3–5 times longer than peduncles; rotate, ca. 8–20 mm diam. *Calyx* with lobes obovate, ovate, elliptic or oblong-lanceolate, abaxially pubescent; 1 or 2 colleters per sinus. *Corolla* rotate or subcampanulate, 8–20 mm diam., reticulate with green, white or brown-purple spots, lobes broadly ovate to triangular-ovate, or suborbicular, obtuse-emarginate, with dark green veins, abaxially pubescent, adaxially glabrous or sparsely puberulent at base. *Corolline corona* a slightly differentiated crenulate annulus surrounding gynostegial corona. *Gynostegial corona* of 5 connate staminal and interstaminal segments; staminal segments fleshy, ascending ridges, lobed and convex at base, truncate or rounded at apex and reaching base of the anthers. *Gynostegium* stipitate, stipe subrhombic, wider at base; anthers more or less horizontal, dorsoventrally curved or slightly bilobed; convex or slightly rostrate at apex; with narrow ovate locules and hyaline locular membranes; style-head pentagonal in outline, convex or slightly conical. *Pollinaria*: Pollinia subhorizontal, obovoid-truncate, with one concave face, 0.5–0.6 × 0.25–0.3 mm, caudicles articulate, corpusculum narrowly sagittate, 0.12–0.15 × 0.05–0.08 mm. *Follicles* one per flower, fusiform-cylindrical or ovoid-fusiform, long attenuate, 7–12 × 1.5–3 cm long, with dense short conical to long subcylindrical fleshy prickles, surface short inconspicuously pubescent. *Seeds* narrowly ovate, surface minutely warty, with crenulate or denticulate chalazal end, comose. – Fig. 10

Distribution and ecology. – Three species, distributed in Belize, Guatemala, Honduras, and Mexico, with focus on the Yucatán Peninsula; pine-oak or *Ilex* cloud forest, and inundated or wet savannahs, 900–1500 m.

Notes. – In the molecular phylogeny, three species of *Yucatania* are well supported, and weakly to moderately supported in a clade with *Tutunakanthus*–*Odontostephana* in the Central/North American Clade II. *Yucatania violacea* stands between the core of *Yucatania* and *Tutunakanthus*–*Odontostephana* in the analyses of the complete dataset (suppl. Figs. S1, S2) and between *Yucatania* and *Odontostephana* in the reduced datasets and the cpDNA dataset (suppl. Figs. S3–S5), but BEAST joins it to *Yucatania* (Fig. 4). Morphologically, the species corresponds to *Yucatania*.

Yucatania campechiana (Standl.) Morillo, Liede & Meve, **comb. nov.** $\equiv$ *Vincetoxicum campechianum* Standl. in Publ. Carnegie Inst. Wash. 461: 82. 1935 $\equiv$ *Matelea campechiana* (Standl.) Woodson in Ann. Missouri Bot. Gard. 28: 234. 1941 – Holotype: Mexico. Campeche: 7 Feb

1932, *C.L. Lundell 1302* (F barcode V0049054F!; iso-type: MICH barcode 1111640!).
= *Matelea mayana* Lundell in Wrightia 5(9): 359. 1977 – Holotype: Guatemala. Dept. Petén: La Cumbre, in zapotal on top of hill, 4 km. east on Río Purula Road, *C.L. Lundell*

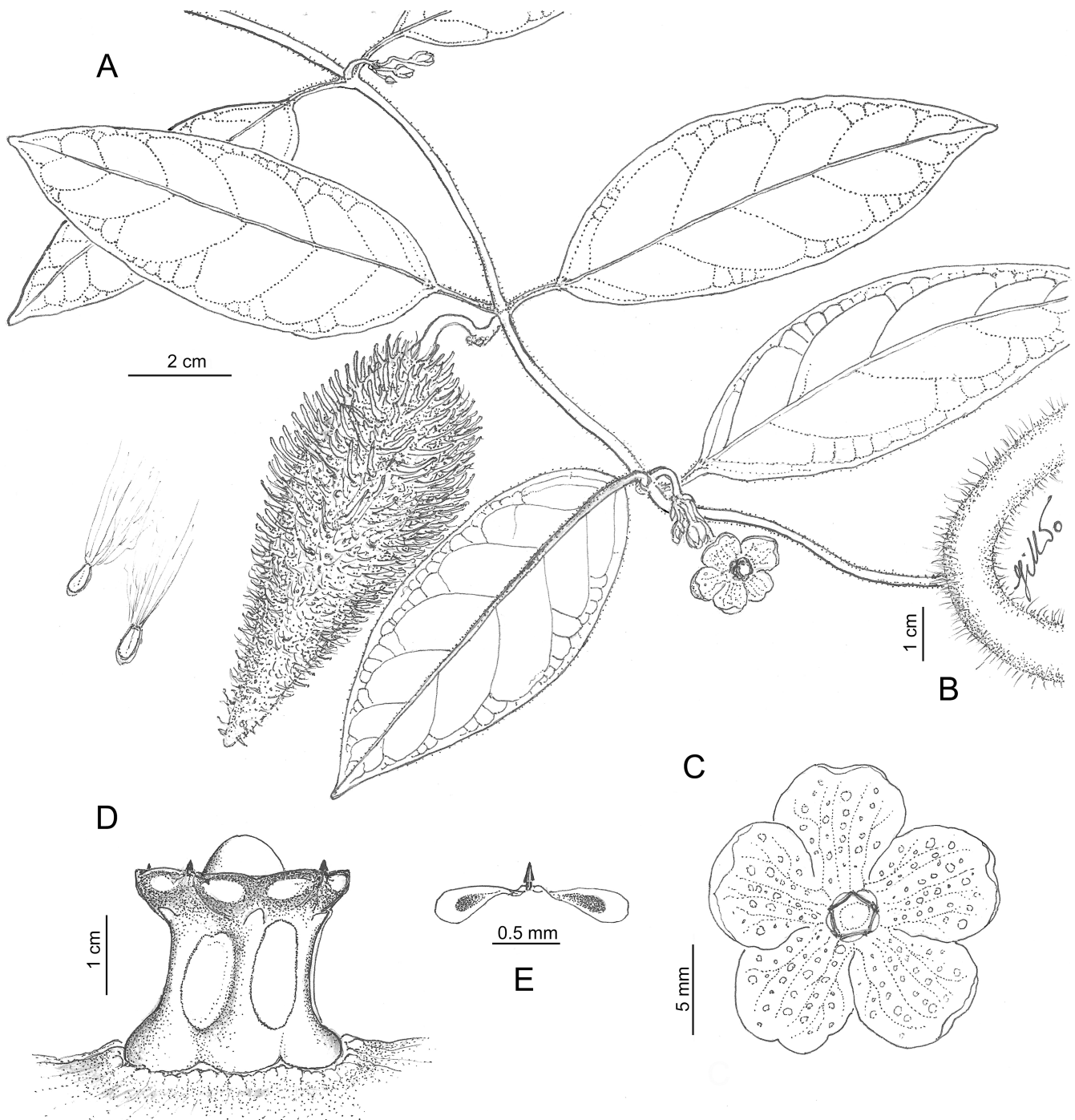


Fig. 10. *Yucatania* gen. nov. **A–D**, *Yucatania lanceolata*: **A**, Twining branch with inflorescence, follicle and seeds; **B**, Section of stem showing mixed pubescence, with long eglandular trichomes in two lines; **C**, Corolla in front view; **D**, Gynostegium and corona in lateral view and corolline corona around the base; **E**, Pollinarium in front view. — **A** & **B** from *Calzada & Anta 15489* (MEXU), **C–E** from *Tenorio & al. 13922* (MEXU, MO). Drawn by Gilberto Morillo.

& *E. Contreras* 19904 (LL barcode 00372540!; isotypes: F barcode V0048963F!, S Nos. S04-1671!, S12-13909!).

Yucatania lanceolata (Decne.) Morillo, Liede & Meve, **comb. nov.** ≡ *Gonolobus lanceolatus* Decne. in Candolle, Prodr. 8: 598. 1844 ≡ *Matelea lanceolata* (Decne.) Woodson in Ann. Missouri Bot. Gard. 28: 234. 1941 – Holotype: Mexico. Veracruz: bois près Vera-Cruz, 3000 ft., s.d., *H. Galeotti* 1518 (P barcode P00645715!; isotype; G barcode G00177210!).

Yucatania tuerckheimii (Donn.Sm.) Morillo, Liede & Meve, **comb. nov.** ≡ *Gonolobus tuerckheimii* Donn.Sm. in Bot. Gaz. 44(2): 116. 1907 ≡ *Matelea tuerckheimii* (Donn.Sm.) Woodson in Ann. Missouri Bot. Gard. 28(2): 234. 1941 – **Lectotype (designated here)**: Guatemala. Alta Verapaz: Cobán, 1320 m, Jul 1906, *H. von Tuerckheim II* 1301 (US barcode 00111135!).

Lectotypification is necessary because the protologue does not indicate the herbarium of the type specimen.

Yucatania violacea (Woodson) Morillo, Liede & Meve, **comb. nov.** ≡ *Matelea violacea* Woodson in Ann. Missouri Bot. Gard. 28: 280. 1941 – Holotype: Guatemala. San Marcos: SE slopes of Volcán de Tacaná, 22 Feb 1940, *J.A. Steyermark* 36445 (MO barcode MO-078263!; isotype: F barcode V0048970F!).

Excluded name: *Stelmagonum* Baill.

Cynanchum L., Sp. Pl.: 212. 1753 – Type: *Cynanchum acutum* L.

= *Stelmagonum* Baill., Hist. Pl. 10: 287. 1890, **syn. nov.** – Type: *Stelmagonum hahnianum* Baill.

= *Stelmagonum* Baill., Hist. Pl. 10: 287. 1890, **syn. nov.** – Type: *Stelmagonum hahnianum* Baill.

Cynanchum ligulatum (Benth.) Woodson in Ann. Missouri Bot. Gard. 28(2): 210. 1941 ≡ *Enslenia ligulata* Benth., Pl. Hartw.: 290. 1849 ≡ *Ampelamus ligulatus* (Benth.) A.Heller in Contr. Herb. Franklin Marshall Coll. 1: 79. 1895 ≡ *Mellichampia ligulata* (Benth.) Vail in Bull. Torrey Bot. Club 26(8): 425. 1899 ≡ *Roulinia ligulata* (Benth.) Pittier in Contr. U.S. Natl. Herb. 13(4): 111. 1910, nom. illeg. [*Roulinia* Decne. 1844, Apocynaceae, nom. illeg., non *Roulinia* Brongn. 1840, Asparagaceae] ≡ *Cynanchum ligulatum* (Benth.) Woodson in Ann. Missouri Bot. Gard. 28(2): 210. 1941 – Holotype: Mexico. Aguascalientes, *K.T. Hartweg* 1612 (K barcode K000197205!; isotypes: K barcode K000197206!, LD barcode 1215011!).

= *Stelmagonum hahnianum* Baill., Hist. Pl. 10: 287. 1890, **syn. nov.** – **Lectotype (designated here)**: Mexico. Guerrero: Bassin d'Acatlán, *L. Hahn* s.n. (P barcode P00644851!). https://plants.jstor.org/fsi/img/size2/alukaplant/p/phase_01/p0001/p00644851.jpg

Of the type of the genus *Stelmagonum*, *S. hahnianum*, a single specimen is found in P. It displays ovate, deeply cordate leaves, slenderly conical buds and the sketch of a corona part (“ligule”), extended in a long, slender tip. The characters match exactly the characters of *Cynanchum ligulatum* (Benth.) Woodson, a fairly frequent species in northwestern, northeastern, southwestern and central Mexico.

Therefore, *Stelmagonum hahnianum* is transferred into the synonymy of *Cynanchum ligulatum* here, reducing *Stelmagonum* to a synonym of *Cynanchum*.

The second species described under *Stelmagonum*, *S. holstonii* Vail, has been transferred to *Ibatia holstonii* (Vail) Morillo (Morillo, 2015b: 2, as ‘*holstonii*’).

■ AUTHOR CONTRIBUTIONS

SLS designed the study and organized the paper; GM provided drawings, keys and genus descriptions; UM analyzed and described *Weigendia*, added to the descriptions and provided photographs; HAK contributed material, photographs and pollinator observations, and KN contributed to data collection and did the BEAST analysis and molecular dating. All authors read the final version of the paper and contributed to the discussion.

■ ACKNOWLEDGEMENTS

We owe sincere thanks to all persons and institutions providing material for morphological and molecular study. We are also grateful to all contributors of color photographs of Gonolobinae. We thank J. Richard Abbott (Univ. of Arkansas at Monticello) for his continued support over the many years this project was running. Kanchi Ghandi (Harvard) and Nicholas Turland (Berlin) gave valuable advice on the nomenclatural status of *Acomosperma* Ule ex K.Schum. Angelika Täufer, Bayreuth, deserves gratitude for continuous laboratory support. Open Access funding enabled and organized by Projekt DEAL.

■ LITERATURE CITED

- Akaike, H. 1974. A new look at the statistical model identification. *IEEE Trans. Automatic Contr.* 19: 716–723. <https://doi.org/10.1109/TAC.1974.1100705>
- Albers, F. & Meve, U. 2001. A karyological survey of Asclepiadoideae, Periplocoideae, and Secamonoideae, and evolutionary considerations within Apocynaceae s.l. *Ann. Missouri Bot. Gard.* 88: 624–656. <https://doi.org/10.2307/3298637>
- Altschul, S.F., Gish, W., Miller, W., Myers, E.W. & Lipman, D.J. 1990. Basic local alignment search tool. *J. Molec. Biol.* 215: 403–410. [https://doi.org/10.1016/S0022-2836\(05\)80360-2](https://doi.org/10.1016/S0022-2836(05)80360-2)
- Alvarado-Cárdenas, L.O. 2021. *Talayotea* (Apocynaceae: Asclepiadoideae, Gonolobinae), un género nuevo y endémico de México. *Phytoneuron* 2021-62: 1–18. <https://www.phytoneuron.net/wp-content/uploads/2021/11/62PhytoN-Talayotea.pdf>
- Alvarado-Cárdenas, L.O. 2024. Revisión taxonómica de *Microstelma* (Apocynaceae, Asclepiadoideae, Asclepiadeae, Gonolobinae), endémica de México, con dos especies nuevas. *Acta Bot. Mex.* 131: e2327. <https://doi.org/10.21829/abm131.2024.2327>
- Alvarado-Cárdenas, L.O. & Cerchiai, I.A. 2022. A new species of *Gonolobus* (Apocynaceae, Asclepiadoideae, Gonolobinae) from

- Loja, Ecuador. *Phytotaxa* 575: 287–293. <https://doi.org/10.11646/phytotaxa.575.3.6>
- Alvarado-Cárdenas, L.O. & Díaz-Mota, S. 2025. Un género y dos especies nuevas para Gonolobinae (Apocynaceae; Asclepiadoideae) de México. *Bot. Sci.* 104(1): 189–204. <https://doi.org/10.17129/botsci.3719>
- Alvarado-Cárdenas, L.O., Chávez-Hernández, M.G. & Velasco-Macias, C.G. 2021. Ajustes taxonómicos en Apocynaceae Mexicanas. *Phytoneuron* 2021-47: 1–22. <https://www.phytoneuron.net/wp-content/uploads/2021/09/47PhytoN-ApocynaceaeTaxonomy.pdf>
- Alvarado-Cárdenas, L.O., Nuñez-Oberg, M.B. & Islas-Hernández, C.S. 2024a. New *Gonolobus* (Apocynaceae, Asclepiadoideae, Gonolobeae, Gonolobinae) for the Trans-Mexican Volcanic Belt, Puebla, Mexico. *Bot. Sci.* 102: 223–233. <https://doi.org/10.17129/botsci.3345>
- Alvarado-Cárdenas, L.O., Pío-León, J.F., Sánchez-Sánchez, C. & Islas-Hernández, C.S. 2024b. Synopsis of the genus *Polystemma* (Apocynaceae, Asclepiadoideae) and recognition of three new species. *Bot. Sci.* 102: 1318–1352. <https://doi.org/10.17129/botsci.3502>
- Amorim, F.W. 2012. *A flora esfingófila de uma floresta ombrófila densa montana no sudeste brasileiro e relações mutualísticas com a fauna de Sphingidae*. Tese (doutorado). Universidade Estadual de Campinas, Instituto de Biologia, Campinas, São Paulo, Brasil. https://bdtd.ibict.br/vufind/Record/UNICAMP-30_34e6f0ff3844af638758484bce9b1fb9
- Amorim, F.W., Marino, S., Sanz-Veiga, P.A., Ollerton, J. & Oliveira, P.E. 2022. Short flowers for long tongues: Functional specialization in a nocturnal pollination network of an asclepiad in long-tongued hawkmoths. *Biotropica* 54: 729–738. <https://doi.org/10.1111/btp.13090>
- Antonelli, A., Nylander, J.A.A., Persson, C. & Sanmartín, I. 2009. Tracing the impact of the Andean uplift on Neotropical plant evolution. *Proc. Natl. Acad. Sci. U.S.A.* 106(24): 9749–9754. <https://doi.org/10.1073/pnas.0811421106>
- Aublet, J.B.C.F. 1775. *Histoire des plantes de la Guiane française*, vol. 1. A Londres [London], & se trouve a Paris: chez Pierre-François Didot jeune. <https://doi.org/10.5962/bhl.title.674>
- Backlund, M. & Bremer, K. 1998. To be or not to be: Principles of classification and monotypic plant families. *Taxon* 47: 391–400. <https://doi.org/10.2307/1223768>
- Baker, W.J., Bailey, P., Barber, V., Barker, A., Bellot, S., Bishop, D., Botigue, L.R., Brewer, G., Carruthers, T., Clarkson, J.J., Cook, J., Cowan, R.S., Dodsworth, S., Epitawalage, N., Francoso, E., Gallego, B., Johnson, M., Kim, J.T., Leempoel, K., Maurin, O., McGinnie, C., Pokorny, L., Roy, S., Stone, M., Toledo, E., Wickett, N.J., Zuntini, A.R., Eiserhardt, W.L., Kersey, P.J., Leitch, I.J. & Forest, F. 2022. A comprehensive phylogenomic platform for exploring the angiosperm tree of life. *Syst. Biol.* 71: 301–319. <https://doi.org/10.1093/sysbio/syab035>
- Baksh-Comeau, Y.S., Maharaj, S.S., Adams, C.D., Harris, S.A., Filer, D.L. & Hawthorne, W.D. 2016. An annotated checklist of the vascular plants of Trinidad and Tobago with analysis of vegetation types and botanical ‘hotspots’. *Phytotaxa* 250: 1–431. <https://doi.org/10.11646/phytotaxa.250.1.1>
- Balbis, G.B. 1804. Miscellanea botanica. *Mém. Acad. Sci. Turin, Sci. Phys.* 7: 317–386. <https://www.biodiversitylibrary.org/page/7475637> [Reprint: <https://bibdigital.rjb.csic.es/Idurl/1/13239>]
- Bentham, G. 1876. Asclepiadeae. Pp. 728–785 in: Bentham & Hooker, *Genera plantarum*, vol. 2(2). London: Williams & Norgate. <https://doi.org/10.5962/bhl.title.747>
- Bitencourt, C., Nürk, N.M., Rapini, A., Fishbein, M., Simões, A.O., Middleton, D.J., Meve, U., Endress, M.E. & Liede-Schumann, S. 2021. Evolution of dispersal, habit, and pollination in Africa pushed Apocynaceae diversification after the Eocene–Oligocene climate transition. *Frontiers Ecol. Evol.* 9: 617. <https://doi.org/10.3389/fevo.2021.719741>
- Bouckaert, R., Vaughan, T.G., Barido-Sottani, J., Duchêne, S., Fourment, M., Gavryushkina, A., Heled, J., Jones, G., Kühnert, D., De Maio, N., Matschiner, M., Mendes, F.K., Müller, N.F., Ogilvie, H.A., du Plessis, L., Poppinga, A., Rambaut, A., Rasmussen, D., Siveroni, I., Suchard, M.A., Wu, C.-H., Xie, D., Zhang, C., Stadler, T. & Drummond, A.J. 2019. BEAST 2.5: An advanced software platform for Bayesian evolutionary analysis. *PLoS Computat. Biol.* 15(4): e1006650. <https://doi.org/10.1371/journal.pcbi.1006650>
- Britton, N.L. & Brown, A. 1913. *An illustrated Flora of the Northern United States, Canada and the British Possessions*, 2nd ed., vol. 3. New York: Charles Scribner’s sons. <https://doi.org/10.5962/bhl.title.940>
- Carnevali, G., Tapia-Munoz, J.L., Duno, R. & Ramírez-Morillo, I. 2010. *Flora ilustrada de la Península de Yucatán – Listado Florístico*. Mérida: Centro de Investigación Científica de Yucatán.
- Cervantes, C., Flores-Olvera, H., Arias, S. & Alvarado-Cárdenas, L.O. 2024. Reconsideraciones taxonómicas en especies mexicanas de *Gonolobus* (Apocynaceae-Asclepiadoideae). *Bot. Sci.* 102: 1–11. <https://doi.org/10.17129/botsci.3434>
- Chuba, D., Goyder, D.J., Chase, J.M. & Fishbein, M. 2017. Phylogenetics of the African *Asclepias* complex (Apocynaceae) based on three plastid DNA regions. *Syst. Bot.* 42: 148–159. <https://www.jstor.org/stable/44821418>
- Darriba, D., Taboada, G.L., Doallo, R. & Posada, D. 2012. jModel-Test 2: More models, new heuristics and parallel computing. *Nature Meth.* 9(8): 772. <https://doi.org/10.1038/nmeth.2109>
- Decaisne, M.J. 1844. Asclepiadaceae. Pp. 490–684 in: Candolle, A.P. de (ed.), *Prodromus systematis naturalis regni vegetabilis*, vol. 8. Parisiis [Paris]: sumptibus Fortin, Masson et Sociorum. <https://doi.org/10.5962/bhl.title.286>
- Drapalik, D.J. 1969. *A biosystematic study of the genus Matelea in the southeastern United States*. Ph.D. Thesis. University of North Carolina, Chapel Hill, U.S.A.
- Drummond, A.J. & Rambaut, A. 2007. BEAST: Bayesian evolutionary analysis by sampling trees. *B. M. C. Evol. Biol.* 7: 214. <https://doi.org/10.1186/1471-2148-7-214>
- Drummond, A.J., Suchard, M.A., Xie, D. & Rambaut, A. 2012. Bayesian phylogenetics with BEAUti and the BEAST 1.7. *Molec. Biol. Evol.* 29: 1969–1973. <https://doi.org/10.1093/molbev/mss07>
- Emory, W.H. 1859. *Report on the United States and Mexican boundary survey*, Senate ed., vol. 2(1). Washington: A.O.P. Nicholson, printer. <https://doi.org/10.5962/bhl.title.213>
- Espírito Santo, F.d.S., Rapini, A., Ribeiro, P.L., Liede-Schumann, S., Goyder, D.J. & Fontella-Pereira, J. 2019. Phylogeny of the tribe Marsdenieae (Apocynaceae), reinstatement of *Ruehssia* and the taxonomic treatment of the genus in Brazil. *Kew Bull.* 74: 30. <https://doi.org/10.1007/s12225-019-9807-4>
- Felger, R.S. & Moser, M.B. 1976. Seri Indian food plants: Desert subsistence without agriculture. *Ecol. Food Nutr.* 5: 13–27. <https://doi.org/10.1080/03670244.1976.9990441>
- Fishbein, M., Livshultz, T., Straub, S.C.K., Simões, A.O., Boute, J., McDonnell, A. & Foote, A. 2018. Evolution on the backbone: Apocynaceae phylogenomics and new perspectives on growth forms, flowers, and fruits. *Amer. J. Bot.* 105: 495–513. <https://doi.org/10.1002/ajb2.1067>
- Fontella Pereira, J., Valente, M.d.C., Harley, R. & Silva, N.M.F. 1989. Contribuição ao estudo das Asclepiadaceae Brasileiras, XXIV. Checklist preliminar do Estado da Bahia. *Rodriguésia* 67: 81–115. <https://doi.org/10.1590/2175-78601989416708>
- Fournier, E.P.N. 1885. Asclepiadaceae. Pp. 189–332, tt. 150–198 in: Martius, C.F.P.v. & Eichler, A.W. (eds.), *Flora Brasiliensis*, vol. 6(4). Lipsiae [Leipzig]: apud Frid. Fleischer. <https://doi.org/10.5962/bhl.title.454>

- Goes, M.B. 2007. Asclepiadoideae (*Apocynaceae*) no município de Santa Teresa, Espírito Santo, Brasil. Diss. de mestr., Pós-Graduação em Botânica. Museu Nacional - UFRJ, Rio de Janeiro, Brasil.
- González-Martínez, C.A., Lozada-Pérez, L., Olson, M.E. & Alvarado-Cárdenas, L.O. 2024. Sistemática de *Urostephanus*: Resurrección de un taxón Mesoamericano de Gonolobinae (Apocynaceae, Asclepiadoideae), con ocho nuevas combinaciones. *Acta Bot. Mex.* 131: e2302. <https://doi.org/10.21829/abm131.2024.2302>
- Goyder, D.J. 2006. *Rojasia* reinstated and six new names and combinations in *Matelea* (Apocynaceae-Asclepiadoideae). *Kew Bull.* 61: 31–33. <https://www.jstor.org/stable/20443243>
- Graham, A. 1963. Systematic revision of the Sucker Creek and Trout Creek Miocene Floras of Southeastern Oregon. *Amer. J. Bot.* 50: 921–936. <https://doi.org/10.1002/j.1537-2197.1963.tb06572.x>
- Gray, A. 1876. V. Contributions to the botany of North America. *Proc. Amer. Acad. Sci.* 12 (n.s. vol. 4): 51–84. <https://doi.org/10.2307/25138435>
- Gray, A. 1885. XII. Contributions to the botany of North America. *Proc. Amer. Acad. Arts* 20 (n.s. vol. 12): 257–310. <https://doi.org/10.2307/25138773>
- Guindon, S. & Gascuel, O. 2003. A simple, fast and accurate method to estimate large phylogenies by maximum-likelihood. *Syst. Biol.* 52: 696–704. <https://doi.org/10.1080/10635150390235520>
- Gutiérrez-García, T.A. & Vázquez-Domínguez, E. 2013. Consensus between genes and stones in the biogeographic and evolutionary history of Central America. *Quatern. Res.* 79: 311–324. <https://doi.org/10.1016/j.yqres.2012.12.007>
- Heled, J. & Bouckaert, R.R. 2013. Looking for trees in the forest: Summary tree from posterior samples. *B. M. C. Evol. Biol.* 13: 221. <https://doi.org/10.1186/1471-2148-13-221>
- Hemsley, W.B. 1882. Asclepiadeae [partim]. Pp. 329–338 in: Godman, F.D. & Salvin, O. (eds.), *Biología Centrali-Americana*, vol. 2. London: published for the editors by R. H. Porter, etc. <https://doi.org/10.5962/bhl.title.730>
- Hoorn, C., Wesselink, F.P., Ter Steege, H., Bermudez, M.A., Mora, A., Sevink, J., Sanmartín, I., Sanchez-Meseguer, A., Anderson, C.L., Figueiredo, J.P., Jaramillo, C.A., Riff, D., Negri, F.R., Hooghiemstra, H., Lundberg, J., Stadler, T., Särkinen, T.E. & Antonelli, A. 2010. Amazonia through time: Andean Uplift, climate change, landscape evolution, and biodiversity. *Science* 330: 927–931. <https://doi.org/10.1126/science.1194585>
- Howard, R.A. 1983. The plates of Aublet's *Histoire des plantes de la Guiane Française*. *J. Arnold Arbor.* 64(2): 255–292. <https://doi.org/10.5962/p.324743>
- Huelsenbeck, J.P. & Rannala, B. 2004. Frequentist properties of Bayesian posterior probabilities of phylogenetic trees under simple and complex substitution models. *Syst. Biol.* 53: 904–913. <https://doi.org/10.1080/10635150490522629>
- Huelsenbeck, J.P. & Ronquist, F.R. 2001. MrBayes: Bayesian inference of phylogeny. *Biometrics* 17: 754–755. <https://doi.org/10.1093/bioinformatics/17.8.754>
- IPCN 1979–. Index to Plant Chromosome Numbers. Ed. P. Goldblatt & D.E. Johnson. Missouri Botanical Garden, St. Louis. <http://legacy.tropicos.org/Project/IPCN> (accessed 18 Feb 2025)
- Iturralde-Vinent, M.A. 2006. Meso-Cenozoic Caribbean paleogeography: Implications for the historical biogeography of the region. *Int. Geol. Rev.* 48: 791–827. <https://doi.org/10.2747/0020-6814.48.9.791>
- Karsten, H. 1866. *Flora Columbiae*, vol. 2(4). Berolini [Berlin]: apud Ferdinandum Duemmlerum. <https://www.biodiversitylibrary.org/page/4747279>
- Keller, H.A. & Cáceres Moral, S.A. 2017. Nuevo género y especie de Gonolobinae (Apocynaceae, Asclepiadoideae: Asclepiadeae) de Corrientes, Argentina. *Lilloa* 54: 195–201. <https://doi.org/10.30550/j.lil/2017.54.2/9>
- Keller, H.A. & Ezcurra, C. 2021. Apocynaceae. Pp. 6–217 in: Zuloaga, F.O., Belgrano, M.J. & Zanotti, C.A. (eds), *Flora Argentina*, vol. 19(2). San Isidro: Instituto de Botánica Darwinian.
- Keller, H.A. & Liede-Schumann, S. 2020. *Caa*, a new South American genus of Gonolobinae (Apocynaceae: Asclepiadeae: Asclepiadoideae). *Lilloa* 57: 81–88. <https://doi.org/10.30550/j.lil/2020.57.1/6>
- Konno, T.U.P., Rapini, A., Goyder, D.J. & Chase, M.W. 2006. The new genus *Minaria* (Asclepiadoideae, Apocynaceae). *Taxon* 55: 421–430. <https://doi.org/10.2307/25065588>
- Krings, A. 1999. Observations on the pollination biology and flowering phenology of Texan *Matelea reticulata* (Engelm. ex A.Gray) Woods. (Asclepiadaceae). *Madroño* 46: 155–158. <https://www.jstor.org/stable/41425316>
- Krings, A. 2005. Notes on the *Matelea bayatensis-correllii-tigrina* complex (Apocynaceae: Asclepiadoideae) in the Greater Antilles and Bahamas. *Sida* 21: 1525–1533. <https://www.jstor.org/stable/41968420>
- Krings, A. 2008. Synopsis of *Gonolobus* s.l. (Apocynaceae, Asclepiadoideae) in the United States and its territories, including lectotypification of *Lachnostoma arizonicum*. *Harvard Pap. Bot.* 13: 209–218. <https://www.jstor.org/stable/41761902>
- Krings, A. 2009. Synopsis of *Gonolobus* s.s. (Apocynaceae: Asclepiadoideae) in Trinidad and Tobago. *J. Bot. Res. Inst. Texas* 3: 77–83. <https://www.jstor.org/stable/41972131>
- Krings, A. 2011. *Matelea* s.l. (Apocynaceae, Asclepiadoideae) in the West Indies. *Syst. Bot.* 36: 730–756. <https://doi.org/10.1600/036364411X583691>
- Krings, A. & Xiang, Q.Y. 2005. Taxonomy of the *Gonolobus* complex (Apocynaceae-Asclepiadoideae) in southeastern United States: ISSR evidence and parsimony analysis. *Harvard Pap. Bot.* 10: 147–159. <https://www.jstor.org/stable/41761812>
- Krings, A., Thomas, D.T. & Xiang, Q.Y. 2008. On the generic circumscription of *Gonolobus* (Apocynaceae, Asclepiadoideae): Evidence from molecules and morphology. *Syst. Bot.* 33: 403–415. <https://doi.org/10.1600/036364408784571527>
- Kunze, H. 1995. Floral morphology of some Gonolobeae (Asclepiadaceae). *Bot. Jahrb. Syst.* 117: 211–238.
- Kunze, H. 1999. Pollination ecology of two species of *Gonolobus* (Asclepiadaceae). *Flora* 194: 309–316. [https://doi.org/10.1016/S0367-2530\(17\)30919-2](https://doi.org/10.1016/S0367-2530(17)30919-2)
- Liede, S. 1994. Some observations on pollination in Mexican Asclepiadaceae. *Madroño* 41: 266–276. <https://www.jstor.org/stable/41425030>
- Liede, S. & Kunze, H. 1993. A descriptive system for corona analysis in Asclepiadaceae and Periplocaceae. *Pl. Syst. Evol.* 185: 275–284. <https://doi.org/10.1007/BF00937663>
- Liede-Schumann, S. 2024. The Apocynaceae TEN (Taxonomic Expert Network). *Taxon* 73: 1130–1139. <https://doi.org/10.1002/tax.13220>
- Liede-Schumann, S. & Meve, U. 2015. Synonymy of three South American genera in Apocynaceae, and new combinations in *Oxyptalum* and *Tassadia*. *Phytotaxa* 202: 35–44. <https://doi.org/10.11646/phytotaxa.202.1.4>
- Liede-Schumann, S. & Meve, U. 2024. Toward a revision of the genus *Orthosia* (Apocynaceae: Asclepiadoideae: Asclepiadeae). *Ann. Missouri Bot. Gard.* 109: 24–147. <https://doi.org/10.3417/2024795>
- Liede-Schumann, S., Rapini, A., Goyder, D.J. & Chase, M.W. 2005. Phylogenetics of the New World subtribes of Asclepiadeae (Apocynaceae-Asclepiadoideae): Metastelmatinae, Oxyptetalinae, and Gonolobinae. *Syst. Bot.* 30: 184–195. <https://doi.org/10.1600/0363644053661832>
- Liede-Schumann, S., Nikolaus, M., Soares e Silva, U.C., Rapini, A., Mangelsdorff, R.D. & Meve, U. 2014. Phylogenetics and biogeography of the genus *Metastelma* (Apocynaceae-Asclepiadoideae-

- Asclepiadeae: Metastelmatinae). *Syst. Bot.* 39: 594–612. <https://doi.org/10.1600/03636441X680708>
- Liede-Schumann, S., Reuss, S.J., Meve, U., Gâteblé, G., Livshultz, T., Forster, P.I., Wanntorp, L. & Rodda, M. 2022. Phylogeny of Marsdenieae (Apocynaceae, Asclepiadoideae) based on chloroplast and nuclear loci, with a conspectus of the genera. *Taxon* 71: 833–875. <https://doi.org/10.1002/tax.12713>
- Lipow, S.R. & Wyatt, R. 1998. Reproductive biology and breeding system of *Gonolobus suberosus* (Asclepiadaceae). *J. Torrey Bot. Soc.* 125: 183–193. <https://doi.org/10.2307/2997216>
- Lozada-Pérez, L. & Alvarado-Cárdenas, L.O. 2025. Un nuevo género y una nueva especie para Gonolobinae (Apocynaceae, Asclepiadoideae) de México. *Acta Bot. Mex.* 132: e2426. <https://doi.org/10.21829/abm132.2025.2426>
- Maddison, W.P. & Maddison, D.R. 2023. Mesquite: A modular system for evolutionary analysis. Version 3.81. <http://www.mesquiteproject.org/>
- Malme, G.O.A. 1900. Die Asclepiadaceen des Regnell'schen Herbars. *Kongl. Svenska Vetensk. Acad. Handl.*, n.f., 34(7): 7–102; tt. I–VIII.
- Mangelsdorff, R.D., Meve, U. & Liede-Schumann, S. 2016. Phylogeny and circumscription of Antillean *Anemotrochus*, gen. nov., and *Tyldontia* (Apocynaceae: Asclepiadoideae: Gonolobinae). *Willdenowia* 46: 443–474. <https://doi.org/10.3372/wi.46.46311>
- McDonnell, A., Parks, M. & Fishbein, M. 2018. Multilocus phylogenetics of New World milkweed vines (Apocynaceae, Asclepiadoideae, Gonolobinae). *Syst. Bot.* 43: 77–96. <https://doi.org/10.1600/03636441X697021>
- Medina, M.C., Sousa-Baena, M.S., Capelli, N.d.V., Koch, R. & Demarco, D. 2021. Stinging trichomes in Apocynaceae and their evolution in Angiosperms. *Plants (Basel)* 10: 2324. <https://doi.org/10.3390/plants10112324>
- Metcalfe, C.R. & Chalk, L. 1972. *Anatomy of the dicotyledons*, 2nd ed., vol. 2. Oxford: Clarendon Press.
- Michaux, A. 1803. *Flora boreali-americana*, vol. 1. Parisii [Paris] & Argentorati [Strasbourg]: typis Caroli Crapelet; apud fratres Levrault. <https://doi.org/10.5962/bhl.title.5088>
- Miller, M.A., Pfeiffer, W. & Schwartz, T. 2010. Creating the CIPRES Science Gateway for inference of large phylogenetic trees. Pp. 45–52 in: *Proceedings of the Gateway Computing Environments Workshop (GCE)*, New Orleans, Louisiana, 14 Nov 2010. Piscataway: IEEE. <https://doi.org/10.1109/GCE.2010.5676129>
- Morillo, G. 1984. Nuevas especies, nuevos nombres y nuevas combinaciones en *Matelea* Aubl. *Ernstia* 24: 35–39.
- Morillo, G. 2012. Aportes al conocimiento de las Gonolobinae (Apocynaceae-Asclepiadoideae). *Pittieria* 36: 13–57. <http://erevistas.saber.ula.ve/index.php/pittieria/article/view/6548>
- Morillo, G. 2013. Aportes al conocimiento de las Gonolobinae II (Apocynaceae, Asclepiadoideae). *Pittieria* 37: 115–154. <http://erevistas.saber.ula.ve/index.php/pittieria/article/view/6543>
- Morillo, G. 2015a. Aportes al conocimiento de las Gonolobinae parte III (Apocynaceae, Asclepiadoideae). *Pittieria* 39: 191–258. <https://scispace.com/pdf/aportes-al-conocimiento-de-las-gonolobinae-parte-iii-1q4l2jmnt.pdf>
- Morillo, G. 2015b. Apocynaceae. P. 2 in: Bernal, R., Gradstein, S.R. & Celis, M. (eds.), New names and new combinations for the Catalogue of the Plants and Lichens of Colombia. *Phyto-neuron* 2015-22: 1–6. <https://www.phytoneuron.net/2015PhytoNeuron/22PhytoN-CatalogueColombia.pdf>
- Morillo, G. 2023a. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte IV. *Mem. Fund. La Salle Ci. Nat.* 81(190): 45–90. http://saber.ucv.ve/ojs/index.php/rev_mem/article/view/26223
- Morillo, G. 2023b. Aportes al conocimiento de las Gonolobinae (Apocynaceae, Asclepiadoideae). Parte V. *Chthamalia*, *Meveampelos* gen. nov., *Phaeostemma*, *Polystemma*, *Ptycanthera*. *Mem. Fund. La Salle Ci. Nat.* 81(191): 37–90. https://saber.ucv.ve/ojs/index.php/rev_mem/article/view/27374
- Morillo, G. 2025. Revisión del género *Fischeria* DC. (Apocynaceae, Asclepiadoideae). *Mem. Fund. La Salle Ci. Nat.* 83(193): 47–89. https://saber.ucv.ve/ojs/index.php/rev_mem/article/view/31334
- Morillo, G. & Keller, H.A. 2016. Un nuevo género y dos nuevas combinaciones en las Gonolobinae (Apocynaceae: Asclepiadaceae). *Bonplandia (Corrientes)* 25: 129–143. <https://doi.org/10.30972/bon.2521262>
- Morillo, G., Fontella Pereira, J. & Barbosa, M.V.D. 2013. *Austrochthamalia* (Apocynaceae, Asclepiadoideae, Gonolobinae), un género nuevo segregado de *Chthamalia* Decne. *Revista Biol. Neotrop.* 10: 1–8. <https://doi.org/10.5216/rbn.v10i1.27827>
- Mostul, B.L. & Cházaro, M. 1998. *Matelea cyclophylla*: Some recent notes on a popular asclepiad caudiciform from Mexico. *Cact. Succ. J. (Los Angeles)* 70(6): 301–303.
- Nihei, S.S. & Schwarz, E.A. 2011. On the first tachinid fly (Diptera, Tachinidae) carrying Asclepiadoideae pollinaria in the Neotropical Region. *Revista Brasil. Entomol.* 55: 441–444. <https://doi.org/10.1590/S0085-56262011005000031>
- Ollerton, J., Liede-Schumann, S., Endress, M.E., Meve, U., Rech, A.R., Shuttleworth, A., Keller, H.A., Fishbein, M., Alvarado-Cárdenas, L.O., Amorim, F.W., Bernhardt, P., Celep, F., Chirango, Y., Chiriboga-Arroyo, F., Civeyrel, L., Cocucci, A., Cranmer, L., da Silva-Batista, I.C., de Jager, L., Deprá, M.S., Domingos-Melo, A., Dvorsky, C., Agostini, K., Freitas, L., Gaglianone, M.C., Galetto, L., Gilbert, M.C., González-Ramírez, I., Gorostiague, P., Goyder, D.J., Hachuy-Filho, L., Heiduk, A., Howard, A., Ionta, G.M., Islas-Hernández, S.C., Johnson, S.D., Joubert, L., Kaiser-Bunbury, C.N., Kephart, S., Kidyoo, A., Koptur, S., Koschnitzke, C., Lamborn, E., Livshultz, T., Machado, I.C., Marino, S., Mema, L., Mochizuki, K., Morellato, L.P.C., Mrisha, C.K., Muiruri, E.W., Nakahama, N., Nascimento, V.T., Nuttman, C., Oliveira, P.E., Peter, C.I., Punekar, S., Rafferty, N., Rapini, A., Ren, Z.-X., Rodríguez-Flores, C.I., Rosero, L., Sakai, S., Sazima, M., Steenhuisen, S.-L., Tan, C.-W., Torres, S., Trøjelsgaard, K., Ushimaru, A., Vieira, M.F., Wiemer, A.P., Yamashiro, T., Nadia, T.L., Queiroz, J. & Quirino, Z. 2019. The diversity and evolution of pollination systems in large plant clades: Apocynaceae as a case study. *Ann. Bot. (Oxford)* 123: 311–325. <https://doi.org/10.1093/aob/mcy127>
- Pattengale, N.D., Alipour, M., Bininda-Emonds, O.R.P., Moret, B.M.E. & Stamatakis, A. 2010. How many bootstrap replicates are necessary? *J. Computat. Biol.* 17: 337–354. <https://doi.org/10.1089/cmb.2009.0179>
- Peraza-Flores, L.N. & Freitas, J.G. 2024. A new species of *Tetraopes* Dalman (Coleoptera, Cerambycidae) from the seasonally dry tropical forest of Yucatán, Mexico. *Zootaxa* 5397: 444–448. <https://doi.org/10.11646/zootaxa.5397.3.9>
- Perry, L.M. 1938. *Gonolobus* within Gray's manual range. *Rhodora* 40: 280–287. <https://www.jstor.org/stable/23302231>
- Pío-León, J.F. & Alvarado-Cárdenas, L.O. 2023. Another remarkable new species of *Dictyanthus* (Apocynaceae, Asclepiadoideae, Asclepiadeae, Gonolobinae) with a long stylar head from México. *Phytotaxa* 632: 175–183. <https://doi.org/10.11646/phytotaxa.632.2.7>
- Pío-León, J.F., Delgado-Vargas, F., León-de la Luz, J.L. & Ortega-Rubio, A. 2017. Prioritizing wild edible plants for potential new crops based on deciduous forest traditional knowledge by a rancher community. *Bot. Sci.* 95: 47–59. <https://doi.org/10.17129/botsci.772>
- Rambaut, A. 2018. FigTree, version 1.4.0. University of Oxford. <http://tree.bio.ed.ac.uk/software/figtree/>
- Rambaut, A., Suchard, M.A., Xie, D. & Drummond, A.J. 2014. Tracer, version 1.6. <http://tree.bio.ed.ac.uk/software/tracer>
- Ramírez, N. 2004. Ecology of pollination in a tropical Venezuelan savanna. *Pl. Ecol.* 173: 171–189. <https://doi.org/10.1023/B:VEGE.0000029320.34895.7d>

- Rapini, A., Chase, M.W., Goyder, D.J. & Griffiths, J. 2003. Asclepiadeae classification: Evaluating the phylogenetic relationships of New World Asclepiadoideae (Apocynaceae). *Taxon* 52: 33–50. <https://doi.org/10.2307/3647436>
- Rendle, A.B. 1936. Notes on the flora of Jamaica. *J. Bot.* 74: 337–346. https://archive.bsbi.org/Journal_of_Botany_1936.pdf
- Roemer, J.J. & Schultes, J.A. 1820. *Systema vegetabilium*, vol. 6. Stuttgartiae [Stuttgart]: sumtibus J. G. Cottae. <https://doi.org/10.5962/bhl.title.825>
- Ronquist, F. & Huelsenbeck, J.P. 2003. MrBayes 3. Bayesian phylogenetic inference under mixed models. *Bioinformatics* 19: 1572–1574. <https://doi.org/10.1038/s41598-021-93890-6>
- Ronquist, F., Teslenko, M., Van der Mark, P., Ayres, D.L., Darling, A., Höhna, S., Larget, B., Liu, L., Suchard, M.A. & Huelsenbeck, J.P. 2012. MrBayes 3.2: Efficient Bayesian phylogenetic inference and model choice across a large model space. *Syst. Biol.* 61: 539–542. <https://doi.org/10.1093/sysbio/sys029>
- Sazatornil, F.D., Moré, M., Benitez-Vieyra, S., Cocucci, A.A., Kitching, I.J., Schlumpberger, B.O., Oliveira, P.E., Sazima, M. & Amorim, F.W. 2016. Beyond neutral and forbidden links: morphological matches and the assembly of mutualistic hawk moth-plant networks. *J. Anim. Ecol.* 85: 1586–1594. <https://doi.org/10.1111/1365-2656.12509>
- Schlechtendal, D.F.L. von 1833 (“1834”). *Plantis Mexicanis. Linnaea* 8: 513–528. <https://www.biodiversitylibrary.org/page/99406>
- Schlechter, R. 1912 (“1911–1913”). Asclepiadaceae. Pp. 338–341 in: Urban, I. (ed), *Symbolae antillanae*, vol. 7. Lipsiae [Leipzig]: Fratres Borntraeger. <https://www.biodiversitylibrary.org/page/741345>
- Schulz, A.G. 1937. Las Asclepiadaceas del territorio del Chaco. *Lilloa* 1: 347–391. <https://www.lilloa.org.ar/journals/index.php/lilloa/article/view/1397>
- Shinners, L.H. 1964. Texas Asclepiadaceae other than *Asclepias*. *Sida* 1: 358–367. <https://www.jstor.org/stable/41966253>
- Shuttleworth, A., Johnson, S.D. & Jürgens, A. 2017. Entering through the narrow gate: A morphological filter explains specialized pollination of a carrion-scented stapeliad. *Flora* 232: 92–103. <https://doi.org/10.1016/j.flora.2016.09.003>
- Small, J.K. 1933. Asclepiadales [Apocynaceae and Asclepiadaceae]. Pp. 1057–1078 in: *Manual of the Southeastern Flora*. Chapel Hill: University of North Carolina Press. <https://doi.org/10.5962/bhl.title.696>
- Stamatakis, A. 2014. RAxML version 8: A tool for phylogenetic analysis and post-analysis of large phylogenies. *Bioinformatics* 30: 1312–1313. <https://doi.org/10.1093/bioinformatics/btu033>
- Stevens, W.D. 1975. Notes on the genus *Matelea* (Apocynaceae s.l.). *Phytologia* 32: 387–406. <https://www.biodiversitylibrary.org/page/12971635>
- Stevens, W.D. 1983. New species and names in Apocynaceae, Asclepiadoideae. *Phytologia* 53: 400–405. <https://doi.org/10.5962/bhl.part.17467>
- Stevens, W.D. 1988. A synopsis of *Matelea* subg. *Dictyanthus* (Apocynaceae: Asclepiadoideae). *Ann. Missouri Bot. Gard.* 75: 1533–1564. <https://doi.org/10.2307/2399300>
- Stevens, W.D. 1999. Two new combinations in Apocynaceae, Asclepiadoideae, from Mesoamerica. *Novon* 9: 564. <https://doi.org/10.2307/3392167>
- Stevens, W.D. 2000. New and interesting milkweeds (Apocynaceae, Asclepiadoideae). *Novon* 10: 243–256. <https://doi.org/10.2307/3393108>
- Stevens, W.D. 2001. Asclepiadaceae. Pp. 234–270 in: Stevens, W.D., Ulloa Ulloa, C., Pool, A. & Montiel, O.M. (eds.), *Flora de Nicaragua*. Monographs in Systematic Botany from the Missouri Botanical Garden 85. St. Louis: Missouri Botanical Garden Press. <https://www.biodiversitylibrary.org/bibliography/197976>
- Stevens, W.D. 2005. New and interesting milkweeds. *Novon* 15: 602–619. <https://www.jstor.org/stable/3393472>
- Stevens, W.D. & Morales, J.F. 2009. Apocynaceae. Pp. 662–768 in: Davidse, G., Sousa S., M., Knapp, S. & Chiang, F. (eds.), *Flora Mesoamericana*, vol. 4(1). Mexico, D.F.: Universidad Nacional Autónoma de México; St. Louis: Missouri Botanical Garden Press; London: Natural History Museum.
- Swarupanandan, K., Mangaly, J.K., Sonny, T.K., Kishore Kumar, K. & Chand Basha, S. 1996. The subfamilial and tribal classification of the family Asclepiadaceae. *Bot. J. Linn. Soc.* 120: 327–369. <https://doi.org/10.1111/j.1095-8339.1996.tb00486.x>
- Türckheim, H. von 1911. Botanische Forschungsreise in Santo Domingo in den Jahren 1909 und 1910. *Allg. Bot. Z. Syst.* 17: 101–106 & 129–135. <https://www.biodiversitylibrary.org/page/9777026>
- Turland, N.J., Wiersema, J.H., Barrie, F.R., Gandhi, K.N., Gravendyck, J., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Klopfer, R.R., Knapp, S., Kusber, W.-H., Li, D.-Z., May, T.W., Monro, A.M., Prado, J., Price, M.J., Smith, G.F. & Zamora Señoret, J.C. 2025. *International Code of Nomenclature for algae, fungi, and plants (Madrid Code)*. Regnum Vegetabile 162. Chicago: University of Chicago Press. <https://doi.org/10.7208/chicago/9780226839479.001.0001>
- Ule, E. 1908. Die Pflanzenformationen des Amazonas-Gebietes, II. *Bot. Jahrb. Syst.* 40: 398–443. <https://www.biodiversitylibrary.org/page/42822303>
- Vail, A.M. 1903. Studies in the Asclepiadaceae - VII. A new species of *Vincetoxicum* from Alabama. *Bull. Torrey Bot. Club* 30: 178–179. <https://doi.org/10.2307/2478477>
- Walter, T. 1788. *Flora Caroliniana*. Londini [London]: sumptibus J. Fraser. <https://doi.org/10.5962/bhl.title.9458>
- Wheeler, T.J. & Kececioğlu, J.D. 2007. Multiple alignment by aligning alignments. *Bioinformatics* 23: i559–i568. <https://doi.org/10.1093/bioinformatics/btm226>
- Willdenow, C.L. von 1809. *Enumeratio plantarum horti regii botanici Berolensis*. Berolini [Berlin]: in Taberna Libraria Scholae Realis. <https://doi.org/10.5962/bhl.title.165500>
- Wolf, N.M. von 1776. *Genera plantarum: Vocabulis characteristicis definita*. Dantisci [Danzig, Gdansk]: typo Mülleri. <https://mdz-nbn-resolving.de/details:bsb10301574>
- Woodson, R.E. 1941. The North American Asclepiadaceae. *Ann. Missouri Bot. Gard.* 28: 193–244. <https://doi.org/10.2307/2394270>
- Woodson, R.E. 1960. Asclepiadaceae: *Matelea rivularis* Woodson, spec. nov. *Ann. Missouri Bot. Gard.* 47: 80. <https://www.biodiversitylibrary.org/page/16158167>
- WFO [World Flora Online] 2025. Snapshot Dec 2025. <http://www.worldfloraonline.org/>
- Zuntini, A.R., Carruthers, T., Maurin, O., Bailey, P.C., Leempoel, K., Brewer, G.E., Epitawalage, N., Francoso, E., Gallego-Paramo, B., McGinnie, C., Negrão, R., Roy, S.R., Simpson, L., ToledoRomero, E., Barber, V.M.A., Botigué, L., Clarkson, J.J., Cowan, R.S., Dodsworth, S., Johnson, M.G., Kim, J.T., Pokorny, L., Wickett, N.J., Antar, G.M., Debolt, L., Gutierrez, K., Hendriks, K.P., Hoewener, A., Hu, A.-Q., Joyce, E.M., Kikuchi, I.A.B.S., Larridon, I., Larson, D.A., deLirio, E.J., Liu, J.-X., Malakasi, P., Przelomska, N.A.S., Shah, T., Vivuel, J., Allnutt, T.R., Ameka, G.K., Andrew, R.L., Appelhans, M.S., Arista, M., Ariza, M.J., Arroyo, J., Arthan, W., Bachelier, J.B., Bailey, C.D., Barnes, H.F., Barrett, M.D., Barrett, R.L., Bayer, R.J., Bayly, M.J., Biffin, E., Biggs, N., Birch, J.L., Bogarin, D., Borosova, R., Bowles, A.M.C., Boyce, P.C., Bramley, G.L.C., Briggs, M., Broadhurst, L., Brown, G.K., Bruhl, J.J., Bruneau, A., Buerki, S., Burns, E., Byrne, M., Cable, S., Calladine, A., Callmander, M.W., Cano, A., Cantrill, D.J., Cardinal-McTeague, W.M., Carlsen, M.M., Carruthers, A.J.A., deCastroMateo, A., Chase, M.W., Chatrou, L.W., Cheek, M., Chen, S., Christenhusz, M.J.M., Christin, P.-A., Clements, M.A., Coffey, S.C., Conran, J.G.,

Cornejo, X., Couvreur, T.L.P., Cowie, I.D., Csiba, L., Darbyshire, I., Davidse, G., Davies, N.M.J., Davis, A.P., vanDijk, K., Downie, S.R., Duretto, M.F., Duvall, M.R., Edwards, S.L., Eggli, U., Erkens, R.H.J., Escudero, M., deLaEstrella, M., Fabriani, F., Fay, M.F., Ferreira, P.d., Ficinski, S.Z., Fowler, R.M., Frisby, S., Fu, L., Fulcher, T., Galbany-Casals, M., Gardner, E.M., German, D.A., Giarretta, A., Gibernau, M., Gillespie, L.J., González, C.C., Goyder, D.J., Graham, S.W., Grall, A., Green, L., Gunn, B.F., Gutiérrez, D.G., Hackel, J., Haevermans, T., Haigh, A., Hall, J.C., Hall, T., Harrison, M.J., Hatt, S.A., Hidalgo, O., Hodgkinson, T.R., Holmes, G.D., Hopkins, H.C.F., Jackson, C.J., James, S.A., Jobson, R.W., Kadereit, G., Kahandawala, I.M., Kainulainen, K., Kato, M., Kellogg, E.A., King, G.J., Klejevska, B., Klitgaard, B.B., Klopfer, R.R., Knapp, S., Koch, M.A., Leebens-Mack, J.H., Lens, F., Leon, C.J., Léveillé-Bourret, É., Lewis, G.P., Li, D.-Z., Li, L., Liede-Schumann, S., Livshultz, T., Lorence, D., Lu, M., Lu-Irving, P., Luber, J., Lucas, E.J., Luján, M., Lum, M., Macfarlane, T.D., Magdalena, C., Mansano, V.F., Masters, L.E., Mayo, S.J., McColl, K., McDonnell, A.J., McDougall, A.E., McLay, T.G.B., McPherson, H., Meneses, R.L., Merckx, V.S.F.T., Michelangeli, F.A., Mitchell, J.D., Monro, A.K., Moore, M.J., Mueller, T.L., Mummenhoff, K., Munzinger, J., Muriel, P.,

Murphy, D.J., Nargar, K., Nauheimer, L., Nge, F.J., Nyffeler, R., Orejuela, A., Ortiz, E.M., Palazzesi, L., LunaPeixoto, A.L., Pell, S.K., Pellicer, J., Penneys, D.S., Perez-Escobar, O.A., Persson, C., Pignal, M., Pillon, Y., Pirani, J.R., Plunkett, G.M., Powell, R.F., Prance, G.T., Puglisi, C., Qin, M., Rabeler, R.K., Rees, P.E.J., Renner, M., Roalson, E.H., Rodda, M., Rogers, Z.S., Rokni, S., Rutishauser, R., deSalas, M.F., Schaefer, H., Schley, R.J., Schmidt-Lebuhn, A., Shapcott, A., Al-Shehbaz, I., Shepherd, K.A., Simmons, M.P., Simões, A.O., Simões, A.R.G., Siros, M., Smidt, E.C., Smith, J.F., Snow, N., Soltis, D.E., Soltis, P.S., Soreng, R.J., Sothers, C.A., Starr, J.R., Stevens, P.F., Straub, S.C.K., Struwe, L., Taylor, J.M., Telford, I.R.H., Thornhill, A.H., Tooth, I., Trias-Blasi, A., Udovicic, F., Utteridge, T.M.A., Valle, J.C.D., Verboom, G.A., Vonow, H.P., Vorontsova, M.S., deVos, J.M., Al-Wattar, N., Waycott, M., Welker, C.A.D., White, A.J., Wieringa, J.J., Williamson, L.T., Wilson, T.C., Wong, S.Y., Woods, L.A., Woods, R., Worboys, S., Xanthos, M., Yang, Y., Zhang, Y.-X., Zhou, M.-Y., Zmarzty, S., Zuloaga, F.O., Antonelli, A.A., Bellot, S., Crayn, D.M., Grace, O.M., Kersey, P.J., Leitch, I.J., Sauquet, H., Smith, S.A., Eisehardt, W.L., Forest, F., & Baker, W.J. 2024. Phylogenomics and the rise of the angiosperms. *Nature* 629: 843–850. <https://doi.org/10.1038/s41586-024-07324-0>

Appendix 1. Voucher information and GenBank accession numbers for taxa used.

Taxon name and author, as accepted in the current paper, locality, collector and collector number, herbarium, and NCBI accession numbers for *trnT-trnL* IGS, *trnLLF*, *rps16* intron, *rpl16* intron, *trnC-rpoB* IGS, *psbA-trnH* IGS, ITS. Older published sequences have separate accession numbers for *trnL* intron and and *trnL-F* IGS, these are placed in brackets. Taxa are listed alphabetically according to subtribe. **Bold** taxon names indicate the type of the genus name, **bold** voucher information type material, and **bold** accession numbers sequences newly acquired for the present study; “—” denotes missing sequences, or, in outgroup taxa, sequences not included in the final matrix (suppl. Appendix S1).

OUTGROUPS. Diplolepineae. *Diplolepis boerhaviifolia* (Hook. & Arn.) Liede & Rapini, Chile: Coquimbo, *Liede & Conrad* 3062 (MSUN, ULM), AJ428606, (AJ428607, AJ428608), AJ699331, **PQ808489, PQ808613**, —, —; *Diplolepis nummulariifolia* (Hook. & Arn.) Liede & Rapini, Argentina: Neuquén, *Liede & Conrad* 3050 (MO, MSUN, ULM), AJ290853, (AJ290852, AJ290851), AJ699334, **PQ808490, PQ808614**, —, —; **Metastelmatinae.** *Ditassa anderssonii* Morillo, Ecuador: Loja, *Matezki SM 141* (UBT), HE611702, (HE611761, HE611800), HE611839, **PQ808491, PQ808615**, —, —; *Ditassa endoleuca* Schltr., Ecuador: Loja, *Liede & Meve* 3564 (UBT), HE611703, (HE611762, HE611801), HE611840, **PQ808492, PQ808616**, —, —; *Metastelma matthewsii* Rusby, Bolivia: Santa Cruz, *Wood & Mondaca 13598* (K, UBT), HF547085, HF547139, —, **PQ808493, PQ808617**, —, —; *Metastelma* aff. *parviflorum* R.Br., Venezuela: Falcón, *Liede & Meve* 3328 (UBT), (AJ428777, AJ428779), AJ699342, **PQ808494, PQ808618**, —, —; *Metastelma schaffneri* A.Gray, Mexico: Nayarit, *Liede & Conrad* 2962 (UBT), AJ410214, (AJ410215, AJ410216), AJ699343, **PQ808495, PQ808619**, —, —; *Metastelma* cf. *urbanianum* Schltr., Cuba: Guantánamo, *Liede & Meve* 3577 (UBT), HF547111, HF547166, HF547218, **PQ808496, PQ808620**, —, —; *Minaria grazielae* (Fontella & Marquete) T.U.P.Konno & Rapini, Brazil: Minas Gerais, *Omlor 147* (MJG), AJ410202, (AJ410203, AJ410204), AJ699339, **PQ808497, PQ808621**, —, —; *Minaria polygaloides* (Silveira) T.U.P.Konno & Rapini, Brazil: Minas Gerais, *Ribeiro PLR 263* (HUEFS), JN574716, JN574645, JN574506, **PQ808498, PQ808622**, —, —; *Vailia grandiflora* (Benth.) Morillo, Venezuela: Mérida, *Liede & Meve* 3318 (UBT), AJ290836, (AJ290837, AJ290838), AJ699337, **PQ808499, PQ808623**, —, —. **Orthosiinae.** *Jobinia latipes* (Malme) Liede & Meve, Argentina: Misiones, *Tressens & al.* 6647 (CTES, UBT), HE611706, (HE611764, HE611803), HE611843, **PQ808500, PQ808624**, —, —; *Jobinia lindbergii* E.Fourn., Argentina: Misiones, *Keller & Hildt 11694* (CTES), ON571740, ON571788, ON571839, **PQ808501, PQ808625**, —, —; *Monsanima morrenioides* (Goyder) Liede & Meve, Brazil: Bahia, *Omlor 160* (MJG), AJ428684, (AJ428685, AJ428686), AJ699348, **PQ808502, PQ808626**, —, —; *Orthosia angustifolia* (Turcz.) Liede & Meve, Mexico: Veracruz, *Reyes A-5219* (XAL), HE611712, HE611754, HE611849, **PQ808503, PQ808627**, —, —; *Orthosia boliviana* Liede & Meve, Bolivia: Santa Cruz, *Wood & Goyder 15776* (K, UBT), HE611732, (HE611786, HE611825), HE611868, **PQ808504, PQ808628**, —, —; *Orthosia congesta* (Vell.) Decne., Brazil: Rio de Janeiro, *Konno 855* (SP), HE611717, (HE611771, HE611810), HE611854, **PQ808505, PQ808629**, —, —; *Orthosia scoparia* (Nutt.) Liede & Meve, Cuba: Guantánamo, *Mangelsdorff RMC 246* (UBT), HE611728, (HE611782, HE611821), HE611864, **PQ808506, PQ808630**, —, —; *Scyphostelma ecuadorensis* (Schltr.) Liede & Meve, Ecuador: Chimbo-razo, *Liede & Meve* 3556 (UBT), HE611748, (HE611797, HE611836), HE611880, **PQ808507, PQ808631**, —, —; *Scyphostelma harlingii* (Morillo) Liede & Meve, Ecuador: Zamora-Chinchi, *Liede & Meve* 3460 (UBT), AJ704309, (AJ704308, AJ704310), AJ704311, **PQ808508, PQ808632**, —, —. **Oxypetalinae.** *Araujia sericifera* Brot., Argentina: Entre Rios, *Liede & Conrad* 3007 (ULM), AJ428792, (AJ428793, AJ428794), AJ699352, **PQ808509, PQ808633**, —, —; *Funastrum clausum* (Jacq.) Schult., Mexico: Oaxaca, *Liede & Conrad* 2599 (MO, MSUN), AJ290860, (AJ290861, AJ290862), AJ699355, **PQ808510, PQ808634**, —, —; *Funastrum gracile* (Schltr.), Argentina: Chaco, *Liede & Conrad* 3016 (UBT), AJ492146, (AJ492147, AJ492148), **PQ885510, PQ808511, PQ808634**, —, —; *Funastrum odoratum* Schltr., Mexico: Chiapas, *Liede & Conrad* 2575 (MO, MSUN), AJ290872, (AJ290873, AJ290874), **PQ885511, PQ808512, PQ808635**, —, —; *Morrenia brachystephana* Griseb., Argentina: San Juan, *Liede-Schumann & al.* 3630 (CORD), **PQ808137, PQ808222, PQ808410, PQ808513, PQ808636**, —, —; *Oxypetalum balansae* Malme, Argentina: Misiones, *Keller 12226* (CTES), **PQ808138, PQ808223, PQ808411, PQ808514, PQ808637**, —, —; *Oxypetalum capitatum* Mart, Argentina: Formosa, *Keller 14009* (CTES), **PQ885513, PQ885512, PQ885509, PQ808515, PQ808638**, —, —; *Oxypetalum coeruleum* (D.Don ex Sweet) Decne., Argentina: Buenos Aires, *Liede & Conrad s.n.* (ULM), AJ704355, (AJ704354, AJ704356), AJ704357, **PQ808516, PQ808639**, —, —; *Oxypetalum pentasetum* (Rusby) Goyder & Rapini, Bolivia: La Paz, *Liede & Conrad* 3128 (ULM), AJ704253, (AJ704252, AJ704254), AJ704255, **PQ808517**, —, —; *Oxypetalum solanoides* Hook. & Arn., Argentina: Buenos Aires, *Liede & Conrad* 3004 (MO, MSUN, ULM), AJ704359, (AJ704361, AJ704360), AJ704358, **PQ808518**, —, —; *Philibertia gilliesii* Hook. & Arn., Argentina: Mendoza, *Liede & Conrad* 3054 (MO, MSUN, ULM), AJ290896, (AJ290895, AJ290894), AJ699359, **PQ808519, PQ808640**, —, —; *Philibertia globiflora* Goyder, Bolivia: Cochabamba, *Wood 15803* (K,

UBT), AJ704235, (AJ704234, AJ704236), AJ704238, **PQ808520, PQ808641**, –; –; *Philibertia multiflora* (T.Mey.) Goyder, Bolivia: Chuquisaca, *Wood & Serano* 14466 (K, UBT), AJ704244, (AJ704243, AJ704245), AJ704246, **PQ808521, PQ808642**, –; –; *Tweedia brunonis* Hook. & Arn., Argentina: Mendoza, *Liede & Conrad* 3058 (UBT), AJ704257, (AJ704260, AJ704258), AJ704256, **PQ808522, PQ808643**, –; –; **Pentacypinae**, *Pentacypus andinus* (Ball.) Liede, Peru: Lima, *Liede & Meve* 3451 (UBT), AJ492149, (AJ492150, AJ492151), AJ699335, **PQ808487, PQ808611**, –; –; *Pentacypus lehmanni* (Schltr.) Liede, Ecuador: Loja, *Liede* 3333 (cult. Bayreuth), AJ290890, (AJ290889, AJ290888), AJ704928, **PQ808488, PQ808612**, –; –; **Tassadiinae**, *Tassadia berteriana* (Spreng.) W.D.Stevens, Bolivia: Santa Cruz, *Nee* 36277 (NY), AJ428789, (AJ428790, AJ428791), AJ699336, **PQ808523**, –; –; –; *Tassadia guianensis* Decne., Ecuador: Sucumbios, *Wolff* 528 (UBT), AJ699278, (AJ699280, AJ699279), AJ699277, **PQ808524, PQ808644**, –; –; *Tassadia obovata* Decne., Ecuador: Loja, *Matezki* 332 (UBT), AJ699282, (AJ699281, AJ699283), AJ699284, **PQ808525, PQ808645**, –; –; **Topeinae**, *Topea micrantha* (H.A.Keller) H.A.Keller, Argentina: Misiones, *Keller & Rojas* 13591 (CTES), LT960581, LT960579, LT960577, **PQ808526, PQ808646**, –; **PV963680**; *Topea patens* (H.A.Keller) H.A.Keller, Argentina: Misiones, *Keller & Rojas* 13539 (CTES), LT960582, LT960580, LT960578, **PQ808527**, –; –; –; **INGROUP**, **Gonolobinae**, *Acosmosperma rivulare* Ule ex K.Schum., Bolivia: Santa Cruz, *Nur Ritter & Wood* 3709 (BOLV), **PQ808204, PQ808284, PQ808471, PQ808528, PQ808647, PQ808776, PQ801285**; *Acosmosperma rivulare* Ule ex K.Schum., Bolivia: Santa Cruz, *Wood* 11388 (K), **PQ808205, PQ808285, PQ808472, PQ808529, PQ808648, PQ808777, PQ801286**; *Anemotrochus eggersii* (Schltr.) Mangelsdorff, Meve & Liede, Cuba: Pinar del Río, *Liede & Meve* 3592 (UBT), HF547076, HF547131, HF547185, **PQ808530, PQ808649, PQ808778, PQ801287**; *Anemotrochus eggersii* (Schltr.) Mangelsdorff, Meve & Liede, Caicos Islands: Parrot Cay, *Neil* 270 (FTG), HF547137, HF547132, HF547186, –; –; **PQ808780, PQ801289**; *Anemotrochus eggersii* (Schltr.) Mangelsdorff, Meve & Liede, Cuba: Holguín, *Mangelsdorff* RMC 387 (FR), HF547078, HF547133, HF547187, **PQ808531, PQ808650, PQ808779, PQ801288**; *Anemotrochus viridivenius* (Alain) Mangelsdorff, Meve & Liede, Dominican Republic, *Clase & al.* 5609 (JBSD), LN901501, LN901496, LN901514, –; –; **PQ808781**, –; *Anemotrochus viridivenius* (Alain) Mangelsdorff, Meve & Liede, Dominican Republic, *Veloz & al.* 836 (JBSD), –; –; EU031637), EU038890, –; –; –; *Anemotrochus yamaniguyensis* Mangelsdorff, Meve & Liede, Cuba: Holguín, *Mangelsdorff* RMC 222a (FR), LN901511, (LN901555, LN901548), LN901524, **PQ808532, PQ808651, PQ808782, PQ801290**; *Anemotrochus yamaniguyensis* Mangelsdorff, Meve & Liede, Cuba: Holguín, *Mangelsdorff* RMC 222b (FR), LN901512, (LN901556, LN901549), LN901525, **PQ808533, PQ808652, PQ808783, PQ801291**; *Anemotrochus yamaniguyensis* Mangelsdorff, Meve & Liede, Cuba: Holguín, *Mangelsdorff* RMC 357 (FR), LN901513, (LN929898, LN929899), LN901526, **PQ808534, PQ808653, PQ808784, PQ801292**; *Atrostemma manarae* (Morillo) Morillo, Venezuela: Mérida, *Manara* 3 (VEN), –; –; **PQ808303, PQ808359**, –; –; **PQ808723, PQ801234**; *Atrostemma manarae* (Morillo) Morillo, Venezuela: Mérida, *Morillo s.n.* (MER), **PQ808139, PQ808224, PQ808412**, –; –; **PQ808654, PQ808785, PQ801293**; *Atrostemma planiflorum* (Jacq.) Morillo, Venezuela: Lara, *Morillo* 14221 (MER), –; **PQ808304, PQ808360**, –; –; **PQ808724, PQ801235**; *Atrostemma planiflorum* (Jacq.) Morillo, Venezuela: Mérida, *Morillo s.n.* (MER), **PQ808140, PQ808225, PQ808413, PQ808535, PQ808655, PQ808786, PQ801294**; *Atrostemma xerophilum* Morillo, Venezuela: Lara, *Morillo* 14226 (MER), –; **PQ808305, PQ808361**, –; –; **PQ801236**; *Austrochthamalia boliviana* Morillo & Fontella, Bolivia: Santa Cruz, *Wood* 20040 (K), **PQ808141, PQ808226, PQ808414, PQ808536, PQ808656, PQ808787, PQ801295**; *Austrochthamalia boliviana* Morillo & Fontella, Bolivia: Santa Cruz, *Wood & al.* 20149 (K), –; **PQ808306, PQ808362**, –; –; **PQ808725, PQ801237**; *Austrochthamalia boliviana* Morillo & Fontella, Bolivia: Santa Cruz, *Wood* 23664 (K), **PQ808142, PQ808227, PQ808415, PQ808537, PQ808657, PQ808788, PQ801296**; *Austrochthamalia bornmuelleri* (Schltr. ex Malme) (Schltr. ex Malme) Morillo, Liede & Meve, Argentina: Misiones, *Keller & Franco* 11805 (CTES), **PQ808146, PQ808231, PQ808419, PQ808541, PQ808660, PQ808864, PQ801370**; *Austrochthamalia major* (E.Fourn.) Morillo & Fontella, Paraguay: Alto Paraná, *Liede-Schumann & al.* 3767 (CTES), **PQ808143, PQ808228, PQ808416, PQ808538, PQ808658, PQ808789, PQ801297**; *Austrochthamalia purpurea* (Decne.) Morillo & Fontella, Bolivia: Santa Cruz, *Wood* 17414 (K), **PQ808144, PQ808229, PQ808417, PQ808539**, –; **PQ808790, PQ801298**; *Austrochthamalia teyucuarensis* H.A. Keller, Argentina: Misiones, *Keller* 12323 (CTES), **PQ808145, PQ808230, PQ808418, PQ808540, PQ808659, PQ808791, PQ801299**; *Caa balansae* (Morillo & Fontella) H.A.Keller & Liede, Argentina: Misiones, *Keller & al.* 13687 (CTES), **PQ808147, LR782243, LR782251, LR782253, LR782553, PQ808792, PQ801300**; *Caa balansae* (Morillo & Fontella) H.A.Keller & Liede, Argentina: Misiones, *Keller & Rojas* 13747 (CTES), **PQ808148, LR782245, LR782252, LR782254, LR782554, PQ808793, PQ801301**; *Chloropetalum denticulatum* (Vahl) Morillo, Costa Rica: Heredia, *Hammel* 9304 (DUKE), –; –; EU031613), EU038867, –; –; –; –; *Chloropetalum denticulatum* (Vahl) Morillo, Venezuela: Dtto. Capital, *Manara* 1 (VEN), –; **PQ808307, PQ808363**, –; –; **PQ808726, PQ801238**; *Chloropetalum denticulatum* (Vahl) Morillo, Guyana: Upper Takutu-Upper Essequibo region, *Olertton & al.* 177 (UBT), –; **PQ808308, PQ808364**, –; –; **PQ808727, PQ801239**; *Chloropetalum surinamense* (Jonker) Morillo, Brazil: Pará, *Viana s.n.* (MG), –; **PQ808309, PQ808365**, –; –; **PQ808728, PQ801240**; *Chloropetalum viride* (H.A.Keller & S.A.Cáceres) Morillo (Type of *Tressensia* H.A.Keller & S.A.Cáceres), Argentina: Corrientes, *Keller & Rojas* 13606 (CTES), **PQ808220, PQ808298, PQ808485, PQ808604, PQ808717, PQ808859, PQ801364**; *Chthamalia biflora* (Raf.) Decne., U.S.A.: Texas, *Prinz* 229 (OKLA), –; –; KY58

Appendix 1. Continued.

ex Hemsl., Mexico: Oaxaca, *Fishbein* 5829 (OKLA), –, (–, KY482354), KY449031, KY582195, KY582275, –, (–, *Dictyanthus reticulatus* (Turcz.) Benth. & Hook. f. ex Hemsl., Mexico: Oaxaca, *Stevens & al.* 2311 (MSC), –, (–, EU031614), EU038868, –, (–, *Dictyanthus sepicola* (W.D.Stevens) W.D.Stevens, Mexico: Sonora, *Fishbein* 5478 (OKLA), –, (–, KY582241, KY582308, –, (–, *Fischeria calycina* aff. Decne., Venezuela (cult. Mérida), *Morillo s.n.* (MER), **PQ808156, PQ808239, PQ808427, PQ808547, PQ808665, PQ808800, PQ801308**; *Fischeria* cf. *floresii* (Morillo) Morillo, Venezuela: Mérida, *Morillo* 14192 (MER), –, **PQ808312, PQ808368**, –, (–, **PQ808731, PQ801243**; *Fischeria* cf. *floresii* (Morillo) Morillo, Venezuela: Mérida, *Morillo s.n.* (MER), **PQ808157, PQ808240, PQ808428, PQ808548, PQ808666, PQ808801, PQ801309**; *Fischeria gracieae* (Morillo) Morillo (Type of *Graciemariana* Morillo), French Guiana: Saint-Laurent-du-Maroni, *Phillippe* 26946 (NY01280141), **PQ808170, PQ808253, PQ808440, PQ808561, PQ808678, PQ808813, PQ801321**; *Fischeria panamensis* Spellman, Costa Rica: Heredia, *Folsom* 9364 (DUKE), –, (–, EU031577), EU038832, –, (–, *Fischeria scandens* DC., Jamaica, *Krings* 1407 (NCSC), –, (–, EU031578), EU038833, –, (–, *Fischeria stellata* (Vell.) E.Fourn., Argentina: Misiones, *Keller* 11952 (CTES), **PQ808158, PQ808241**, –, (–, **PQ808866, PQ801372**; *Fischeria viridis* Mold. (Type of *Rhytidostemma* Morillo), Panama: Colón, *McPherson* 20572 (MO), –, **PQ808313, PQ808369**, –, (–, **PQ808732, PQ801244**; *Fischeria* sp., Bolivia: Cochabamba, *Porcel MHP* 282 (CTES), **PQ808159, PQ808242, PQ808429, PQ808549, PQ808667, PQ808802**, –, *Gonolobus albomarginatus* (Pittier) Woodson, Costa Rica, *Taylor & Skotak* 4455 (DUKE), –, (–, EU031579), EU038834, –, (–, *Gonolobus antennatus* Schltr., Venezuela: Mérida, *Morillo s.n.* (MER), –, **PQ808314, PQ808370**, –, (–, **PQ808733**, –, *Gonolobus aristolochioides* aff. Kunth, Venezuela: Mérida, *Morillo* 14182A (MER), –, **PQ808315, PQ808371**, –, (–, **PQ808734, PQ801245**; *Gonolobus arizonicus* (A.Gray) Woodson, Mexico: Sonora, *van Devender* 2004-893 (ARIZ), –, (–, EU031580), EU038835, –, (–, *Gonolobus arizonicus* (A.Gray) Woodson, U.S.A.: Arizona, *Fishbein* 2649 (OKLA), –, (–, KY582201, KY582341, –, (–, *Gonolobus barbatus* Kunth, Mexico: Jalisco, *Conrad* 9325 (UBT), AJ704262, (AJ704261, AJ704263), AJ704264, **PQ808550, PQ808668, PQ808867, PQ801246**; *Gonolobus bibarbatus* W.D.Stevens, Mexico: Sinaloa, *Cowan* 5620 (TEX), –, (–, EU031581), EU038836, –, (–, *Gonolobus breedlovei* L.O.Williams, Mexico: Chiapas, *King* 2778 (TEX), –, (–, EU031582), EU038837, –, (–, *Gonolobus chloranthus* Schltdl., Mexico: Puebla, *Cowan & al.* 5513 (TEX), –, (–, EU031583), EU038838, –, (–, *Gonolobus* aff. *ctenophorus* (S.F. Blake) Woodson, Mexico: Jalisco, *Fishbein* 5841 (OKLA), –, (–, KY582199, KY582345, –, (–, *Gonolobus edulis* Hemsl., Costa Rica, *Bopp* 11040 (UBT), **PQ808161, PQ808244, PQ808431**, –, (–, *Gonolobus erianthus* Decne., Mexico: Querétaro, *Fishbein* 5169 (OKLA), –, (–, KY582263, KY582320, –, (–, *Gonolobus fraternus* Schltdl., Mexico: Querétaro, *Fishbein* 5164 (ARIZ), –, (–, EU031585), EU038840, KY582200, KY582347, –, (–, *Gonolobus gonocarpus* (Walter) L.M.Perry, U.S.A.: Florida, *Parks* 136 (OKLA), –, (–, KY582358), KY449032, –, (–, *Gonolobus gonoloboides* (Greenm.) Woodson, Mexico: Sonora, *Fishbein* 5164 (OKLA), –, (–, KY582202, KY582346, –, (–, *Gonolobus gonoloboides* (Greenm.) Woodson, Mexico: Sonora, *Reina* 2003-884 (ARIZ), –, (–, EU031587), EU038842, –, (–, *Gonolobus grandiflorus* (Cav.) Schult., Mexico: Michoacán, *Fishbein* 5114 (ARIZ), –, (–, EU031588), EU038843, KY582203, KY582344, –, (–, *Gonolobus grandiflorus* (Cav.) Schult., Mexico: Zacatecas, *Fishbein* 5850 (MEXU), –, **PQ808316, PQ808372**, –, (–, **PQ808735, PQ801247**; *Gonolobus grandiflorus* (Cav.) Schult., Mexico: Querétaro, *Steinmann* 1741 (ARIZ), –, **PQ808317, PQ808373**, –, (–, **PQ808736, PQ801248**; *Gonolobus grietensis* Morillo, Venezuela: Táchira, *Morillo* 14208 (MER), –, **PQ808318, PQ808374**, –, (–, **PQ808737**, –, *Gonolobus iyanolensis* Krings, Saint Lucia, *Krings* SL1 (NCSC), –, (–, EU031589), EU038844, –, (–, *Gonolobus jaliscensis* B.L.Rob. & Greenm., Mexico: Michoacán, *Fishbein* 5120_5121 (ARIZ), –, (–, EU031590), EU038845, KY582197, KY582326, –, (–, *Gonolobus jamaicensis* Rendle, Jamaica, *Krings* 1393 (NCSC), –, (–, EU031591), EU038846, –, (–, *Gonolobus lasiostomus* Decne., Venezuela: Miranda, *Morillo & Grande* 14260 (MER), –, **PQ808319, PQ808375**, –, (–, **PQ808740, PQ801250**; *Gonolobus lasiostomus* Decne., Venezuela: Caracas, *Morillo* 14259 (MER), –, **PQ808321, PQ808377**, –, (–, **PQ808739, PQ801249**; *Gonolobus aff. lasiostomus* Decne., Venezuela: Lara, *Morillo* 14225 (MER), –, **PQ808320, PQ808376**, –, (–, **PQ808738**, –, *Gonolobus* aff. *lasios-tomus* Decne., Venezuela: Lara, *Morillo* 14232 (MER), –, **PQ808322, PQ808378**, –, (–, **PQ808741**, –, *Gonolobus manarae* Morillo, Venezuela: Dto. Capital, *Manara* 2 (MER), –, **PQ808323, PQ808379**, –, (–, **PQ808742**, –, *Gonolobus niger* (Cav.) Schult., Mexico: Tamaulipas, *Mayfield & al.* 860 (TEX), –, (–, EU031592), EU038847, –, (–, *Gonolobus ophioglossa* Woodson, Panama, *Mangelsdorff RMP* 1296 (FR), LN901502, LN901497, LN901515, **PQ808552, PQ808670, PQ808804, PQ801311**; *Gonolobus parviflorus* Decne., s. loc., *Farinaccio & Monquihott* 750 (MO), –, (–, KY582196, KY582321, –, (–, *Gonolobus parviflorus* Decne., Argentina: Misiones, *Keller* 9865 (CTES), **PQ808162, PQ808245, PQ808432, PQ808553, PQ808671, PQ808805, PQ801312**; *Gonolobus parviflorus* Decne., Brazil: Minas Gerais, *Rapini* 609 (SPF), DQ026748, AY163689, DQ026712, –, (–, *Gonolobus* cf. *parviflorus* Decne., Bolivia: Cochabamba, *Porcel MHP* 316 (CTES), **PQ808163, PQ808246, PQ808433, PQ808554, PQ808672, PQ808806, PQ801313**; *Gonolobus parviflorus* Decne., Bolivia: *Porcel MHP* 393 (CTES), **PQ808160, PQ808243, PQ808430, PQ808551, PQ808669, PQ808803, PQ801310**; *Gonolobus pectinatus* Brandegee, Mexico: Puebla, *Fishbein* 5815 (OKLA), –, (–, KY582204, KY582342, –, (–, *Gonolobus pectinatus* Brandegee, Mexico: Morelos, *Morillo* 14252 (MEXU), –, **PQ808324, PQ808380**, –, (–, **PQ808743, PQ801251**; *Gonolobus pectinatus* Brandegee, Mexico: Morelos, *Morillo & al.* 14254 (MEXU), –, **PQ808325, PQ808381**, –, (–, **PQ808744, PQ801252**; *Gonolobus pectinatus* Brandegee, Mexico: Guerrero, *Prinz & Lozada* 202 (TEX), –, (–, EU031593), EU038848, –, (–, *Gonolobus rostratus* (Vahl) R.Br., Ghana (not native), *Chase* 3963 (K), –, (–, KY582205, KY582315, –, (–, *Gonolobus rostratus* (Vahl) R.Br., Argentina: Corrientes, *Keller* 13604 (CTES), **PQ808164, PQ808247, PQ808434, PQ808555, PQ808673, PQ808807, PQ801314**; *Gonolobus rostratus* (Vahl) R.Br., Argentina: Misiones, *Morillo s.n.* cult., **PQ808165, PQ808248, PQ808435, PQ808556, PQ808674, PQ808808, PQ801315**; *Gonolobus rotatus* Decne., Trinidad, *Moreau* 30645 (TRIN), –, (–, EU031594), EU038849, –, (–, *Gonolobus stapelioides* Desv. ex Ham., Jamaica, *Krings* 1395 (NCSC), –, (–, EU031595), EU038850, –, (–, *Gonolobus stenosepalus* (Donn.Sm.) Woodson, Mexico: Chiapas, *Mejía & Luna* 306 (MEXU), **PQ808168, PQ808251, PQ808438, PQ808559**, –, **PQ808811, PQ801318**; *Gonolobus stenosepalus* (Donn.Sm.) Woodson, Mexico: Chiapas, *Ramírez-Marcial & Ochoa-Gaona* 524 (MEXU), –, **PQ808326, PQ808382**, –, (–, **PQ808745, PQ801253**; *Gonolobus stenosepalus* (Donn.Sm.) Woodson, Mexico: Chiapas, *Taylor* 2536 (DUKE), –, (–, EU031596), EU038851, –, (–, *Gonolobus stephanotrichus* Griseb., Cuba: Santiago de Cuba, *Krings & al.* s.n. (NCSC), –, (–, EU031597), EU038852, –, (–, *Gonolobus stephanotrichus* Griseb., Cuba: Granma, *Liede & Meve* 3584 (UBT), **PQ808169, PQ808252, PQ808439, PQ808560, PQ808677, PQ808812, PQ801319**; *Gonolobus suberosus* (L.) R.Br., USA, *Thompson* 13-311 (US), –, **PQ808327, PQ808383**, –, (–, **PQ808746, PQ801254**; *Gonolobus suberosus* (L.) R.Br., USA, ex *Wyatt s.n.* (GA), AJ704275, (AJ704277, AJ704276), AJ704274, –, (–, **PQ801320**; *Gonolobus taylorianus* W.D.Stevens & Montie, Honduras: Colón, *Evans* 1079 (MO), –, (–, KY582264, KY582325, –, (–, *Gonolobus uniflorus* Kunth, Mexico: Michoacán, *Fishbein* 5184 (OKLA), –, (–, KY582261, KY582340, –, (–, *Gonolobus uniflorus* Kunth, Mexico: D.F., *Morillo & Juárez-Jaimes* 14258 (MEXU), –, **PQ808328, PQ808384**, –, (–, **PQ808747, PQ801255**; *Gonolobus uniflorus* Kunth, Mexico: Michoacán, *van Devender* 2003-1323 (ARIZ), –, (–, EU031601), EU038855, –, (–, *Gonolobus waitukubuliensis* Krings, Dominica, *Krings* 1386 (NCSC), –, (–, EU031602), EU038856, –, (–, *Gonolobus youroumay-nensis* Krings, St. Vincent, *Krings* 1374 (NCSC), –, (–, EU031603), EU038857, –, (–, *Gonolobus* sp. 1, Costa Rica, *Bopp* 12-2015 (UBT), **PQ808166, PQ808249, PQ808437, PQ808557, PQ808675, PQ808809, PQ801316**; *Gonolobus* sp. 2, Bolivia, *Porcel* 392 (CTES), **PQ808167, PQ808250, PQ808436, PQ808558, PQ808676, PQ808810, PQ801317**; *Himantostemma pringlei* (A.Gray) Woodson, Mexico: Baja California, *Narváez* 1111 (MEXU), **PQ808171, PQ808254, PQ808441, PQ808562, PQ808679, PQ808814, PQ801322**; *Ibatia boliviensis* (Schltr.) Morillo, Bolivia: Cochabamba, *Wood* 21234 (K), **PQ808172, PQ808300, PQ808356, PQ808563, PQ808680, PQ808815, PQ801256**; *Ibatia calchaquina* (C.Ezcurra & Belgrano) H.A.Keller & Liede, Argentina: Salta, *Keller & al.* 14096 (CTES), **PQ808173, PQ808255, PQ808442, PQ808564, PQ808681, PQ808816, PQ801323**; *Ibatia cordata* (Malme) Morillo, Brazil: Ceará, *Castro* 2735 (EAC), –, **PQ808329, PQ808385**, –, (–, **PQ808748, PQ801257**; *Ibatia diversifolia* E.Fourn. var. *surgens* (Malme) Morillo & Fontella, Bolivia: Santa Cruz, *Wood* 19924 (K), **PQ808174, PQ808256, PQ808443, PQ808565, PQ808682, PQ808817, PQ801324**; *Ibatia dummelii* H.A. Keller, Argentina: Salta, *Keller, Dummel & Ritter* 14097 (CTES), **PQ808175, PQ808257, PQ808444, PQ808566, PQ808683, PQ808818, PQ801325**; *Ibatia elliptica* (Rusby) Morillo, Bolivia: Cochabamba, *Wood* 17105 (K), –, (–, **PQ808330, PQ808386**, –, (–, **PQ808749, PQ801258**; *Ibatia fiebrigii* (Schltr.) Morillo, Argentina: Catamarca, *Keller* 14665 (CTES), **PQ808176, PQ808258, PQ808445, PQ808567, PQ808684, PQ808819, PQ801326**; *Ibatia fiebrigii* (Schltr.) Morillo, Bolivia: Santa Cruz, *Wood* 21757 (K), **PQ808177, PQ808259, PQ808446, PQ808568, PQ808685, PQ808820, PQ801327**; *Ibatia fiebrigii* (Schltr.) Morillo, Bolivia: Santa Cruz, *Wood* 21837 (K), **PQ808178, PQ808260, PQ808447, PQ808569, PQ808686, PQ808821, PQ801328**; *Ibatia friesii* (Malme)

Appendix 1. Continued.

Morillo, Argentina: Jujuy, Keller 15697 (CTES), PQ808179, PQ808261, PQ808448, PQ808570, PQ808687, PQ808822, PQ801329; *Ibatia friesii* (Malme) Morillo, Bolivia: Chuquisaca, Wood & al. 19591 (K), –, PQ808331, PQ808387, –, –, PQ808750, PQ801259; *Ibatia ganglinosa* (Vell.) Morillo, Brazil: Alagoas, Silva 200 (HUEFS), –, PQ808332, PQ808388, –, –, PQ808751, PQ801260; *Ibatia hirta* (Malme) H.A.Keller & Liede, Bolivia: Santa Cruz, Wood 16081 (K), PQ808180, PQ808262, PQ808449, PQ808571, PQ808688, PQ808823, PQ801330; *Ibatia hirta* (Malme) H.A.Keller & Liede, Bolivia: Tarija, Wood 16828 (K), PQ808181, PQ808263, PQ808450, –, –, PQ808824, PQ801331; *Ibatia lanosa* E.Fourn., Bolivia: Santa Cruz, Pozo & Villaroel 592 (K), –, PQ808333, PQ808389, –, –, PQ808752, PQ801261; *Ibatia lanosa* E.Fourn., Bolivia: Tarija, Wood 16819 (K), PQ808182, PQ808264, PQ808451, PQ808572, PQ808689, PQ808825, PQ801332; *Ibatia lanosa* E.Fourn., Bolivia: Santa Cruz, Wood 20046 (K), PQ808183, PQ808265, PQ808452, PQ808573, PQ808690, PQ808826, PQ801333; *Ibatia lanosa* E.Fourn., Bolivia: Santa Cruz, Wood 20052 (K), PQ808184, PQ808266, PQ808453, PQ808574, PQ808691, PQ808827, PQ801334; *Ibatia maritima* (Jacq.) Decne., Venezuela: Lara, Morillo 14223 (MER), –, PQ808334, –, –, PQ808753, PQ801262; *Ibatia nigra* (Decne.) Morillo, Brazil: Bahia, Konno & Sousa 820 (SP), –, PQ808335, PQ808390, –, –, PQ808754, PQ801263; *Ibatia pacifica* (Krings & Saville) Morillo, Venezuela: Mérida, Liede & Meve 3326 (UBT), PQ808185, PQ808301, PQ808357, –, –, PQ808755, PQ801264; *Ibatia pacifica* (Krings & Saville) Morillo, Venezuela: Mérida, Morillo 14184 (MER), –, PQ808336, –, –, PQ808756, –, –, *Ibatia pucara* Morillo, Bolivia: Santa Cruz, Wood & al. 21815 (K), PQ808186, PQ808267, PQ808454, PQ808575, PQ808692, PQ808868, PQ801335; *Ibatia rubra* (H.Karst.) Morillo, Aruba, Proosdij & al. 667 (NY), –, (–, EU031632), EU038885, –, –, –, *Ibatia sartago-diaboli* (Goyder) Morillo, Bolivia: Chuquisaca, Wood 21810 (K), –, PQ808337, PQ808391, –, –, PQ808757, PQ801265; *Ibatia schreiteri* (T.Meyer) Morillo, Bolivia: Tarija, Wood 27621 (K), –, PQ808338, PQ808392, –, –, PQ808758, PQ801266; *Ibatia schreiteri* (T.Meyer) Morillo, Bolivia: Santa Cruz, Wood & Goyder 16843 (K), PQ808187, PQ808268, PQ808455, PQ808576, PQ808693, PQ808828, PQ801336; *Ibatia woodii* Morillo, Bolivia: Chuquisaca, Wood & Serrano 17117 (LPB), PQ808189, PQ808270, PQ808457, PQ808578, PQ808694, PQ808830, PQ801338; *Ibatia* sp., Brazil: Goiás, Morais 1956 (JAR), PQ808188, PQ808269, PQ808456, PQ808577, –, PQ808829, PQ801337; *Lachnostoma aymardii* (Morillo) Morillo, Venezuela: Trujillo, Morillo 14216 (MER), –, PQ808339, PQ808393, –, –, PQ808759, PQ801267; *Lachnostoma bricenoi* Morillo, Venezuela: Mérida, Morillo 14190 (MER), –, PQ808341, PQ808395, –, –, PQ808761, PQ801269; *Lachnostoma bricenoi* Morillo, Venezuela: Mérida, Morillo & Briceño 14441 (MER), PQ808190, PQ808271, PQ808458, PQ808579, PQ808695, PQ808831, PQ801339; *Lachnostoma costanense* Morillo, Venezuela: Dto. Capital, Manara 4 (MER), –, PQ808340, PQ808394, –, –, PQ808760, PQ801268; *Macroscopsis diademata* (Ker Gawl.) W.D.Stevens, Guatemala, Heyne s.n. (UBT), AJ704266, (AJ704268, AJ704267), AJ704265, PQ808580, PQ808696, PQ808869, PQ801340; *Macroscopsis elliptica* N.E.Br., Argentina: Misiones, Keller 13983 (CTES), PQ808191, PQ808272, PQ808459, PQ808581, PQ808697, PQ808832, PQ801341; *Macroscopsis grandiflora* (Mart.) H.A.Keller & Liede, Argentina: Corrientes, Keller 11244 (CTES), PQ808192, PQ808273, PQ808460, PQ808582, PQ808698, PQ808833, PQ801342; *Macroscopsis grandiflora* (Mart.) H.A.Keller & Liede, Argentina: Corrientes, Liede & Conrad 3033 (MSUN, UBT, ULM), AJ428825, (AJ428826, AJ428827), AJ699364, –, –, –, PQ801343; *Macroscopsis grandiflora* (Mart.) H.A.Keller & Liede, Paraguay: Cordillera, Zardini 46970 (MO), –, (–, KY582351), KY449027, –, –, –, *Macroscopsis hirsuta* (Vahl) Schltr., Ecuador: Loja, Homeier & Laipuna 4301 (UBT), PQ808193, PQ808274, PQ808461, –, –, –, *Macroscopsis hirsuta* (Vahl) Schltr., Costa Rica: San José, Jones & Jiménez-Saa 10133 (MO), –, PQ808342, PQ808396, –, –, PQ801270; *Macroscopsis hirsuta* (Vahl) Schltr., Venezuela: Mérida, Morillo s.n. (cult.), PQ808194, PQ808275, PQ808462, PQ808583, PQ808699, PQ808834, PQ801344; *Macroscopsis mesoamericana* Morillo, Costa Rica, Blanco 4410 (CR), –, PQ808343, PQ808397, –, –, PQ808762, PQ801271; *Macroscopsis morilloana* (Fontella) Morillo, Brazil: Bahia, Konno & Sousa 823 (SP), –, PQ808344, PQ808398, –, –, PQ808763, PQ801272; *Macroscopsis* sp. 1, Mexico: Sonora, Fishbein 4092 (OKLA), –, (–, KY582367), –, KY582220, –, –, –, *Macroscopsis* sp. 2, Mexico: Querétaro, Fishbein 5165 (OKLA), –, –, –, KY582219, KY582303, –, –, *Macroscopsis* sp. 3, Brazil, Hennen & Hennen 84-228 (PUR), –, (–, EU031639), EU038892, –, –, –, *Macroscopsis* sp. 4, Colombia, Murphy & Parra 730 (DUKE), –, (–, EU031640), EU038893, –, –, –, *Matelea anomala* Morillo, Meve & Liede, Bolivia: Santa Cruz, Wood 12957 (UBT), PQ808195, PQ808276, PQ808463, PQ808584, PQ808700, PQ808835, PQ801345; *Matelea atrolingua* Morillo, Morais & Farinaccio, Brazil: Goiás, Resende 3862 (MER), PQ808196, PQ808277, PQ808464, PQ808585, –, PQ808836, –, *Matelea glandulosa* (Poepp. ex Decne.) Morillo, Ecuador: Pichincha, Liede 3499 (UBT), –, PQ808345, PQ808399, –, –, PQ808764, PQ801273; *Matelea matezkii* Morillo, Ecuador: Zamora-Chinchipe, Matezki 463 (UBT), PQ808199, PQ808302, PQ808358, PQ808588, PQ808703, PQ808765, PQ801274; *Matelea neei* Morillo, Bolivia: Santa Cruz, Nee 50495 (USZ), PQ808200, PQ808280, PQ808467, PQ808589, –, PQ808839, PQ801348; *Matelea palustris* Aubl., French Guyana: Cayenne, Ek 1950 (WAG.1657850), PQ808201, PQ808281, PQ808468, PQ808590, PQ808704, PQ808840, PQ801349; *Matelea pastazana* Morillo, Ecuador: Zamora, Liede 3305 (UBT), PQ808202, PQ808282, PQ808469, –, –, PQ808841, –, *Matelea pedalis* (E.Fourn.) Fontella & E.A.Schwarz, Brazil: Minas Gerais, Farinaccio 522 (MO), –, (–, KY582359), –, KY582237, KY582279, –, –, *Matelea pedalis* (E.Fourn.) Fontella & E.A.Schwarz, Brazil: Minas Gerais, Rapini 714 (SP), AJ704531, AY163699, AJ704530, –, –, –, *Matelea porphyrocephala* Morillo, Ecuador: Napo, Liede 3470 (UBT), –, PQ808346, PQ808400, –, –, PQ808766, PQ801275; *Matelea quindecimlobata* Farinaccio & W.D.Stevens, Brazil: Amazonas, Farinaccio 750 (MO), –, PQ808347, PQ808401, –, –, PQ808767, PQ801276; *Matelea squiresii* (Rusby) Morillo, Trinidad and Tobago: Trinidad, Morales 23276 (TRIN), PQ808207, PQ808287, PQ808474, PQ808593, PQ808707, –, PQ859646; *Matelea woodii* Morillo, Bolivia: Cochabamba, Wood 11198 (K), PQ808210, PQ808290, PQ808477, –, –, PQ808846, PQ801352; *Matelea* sp., Ecuador: Loja, Matezki s.n.(UBT), PQ808206, PQ808286, PQ808473, PQ808592, PQ808706, PQ808843, PQ801351; *Meveampelos bicolor* (Britton & P.Wilson) Morillo, Cuba: Santiago de Cuba, Krings 1410 (NCSC), –, (–, EU031606), EU038860, –, –, –, *Meveampelos bicolor* (Britton & P.Wilson) Morillo, Cuba: Gramma, Liede & Meve 3583 (UBT), LN901503, LN901498, LN901516, PQ808594, PQ808708, PQ808870, PQ801373; *Meveampelos ekmanii* (Urb.) Morillo, Cuba: Santiago de Cuba, Krings 1411 (NCSC), –, (–, EU031615), EU038869, –, –, –, *Mexicania congesta* (Decne.) L.O.Alvarado & Lozada-Pérez, Mexico: Michoacán, Steinmann 4633 (OKLA), –, –, –, KY582228, KY582276, –, –, *Microstelma chrysanthum* (Greenm.) Morillo, Mexico: Oaxaca, Fishbein 5834 (OKLA), –, –, –, KY582227, KY582307, –, –, Mexico: Oaxaca, Taylor 2384 (DUKE), –, (–, EU031607), EU038861, –, –, –, *Microstelma chrysanthum* (Greenm.) Morillo, Mexico: Michoacán, Manriquez & Tenorio 4979 (MEXU), –, PQ808349, PQ808403, –, –, PQ808769, PQ801278; *Microstelma inconspicuum* (Brandegee) Morillo, Liede & Meve, Mexico: Puebla, Panero 5804 (TEX), –, (–, EU031618), EU038872, –, –, –, *Odontostephana alabamensis* (Vail) Morillo, Liede & Meve, U.S.A.: Florida, Parks 137 (OKLA), –, –, –, KY582221, KY582306, –, –, *Odontostelmata baldwyniana* (Sweet) Woodson, U.S.A.: Missouri, Parks 188 (OKLA), –, –, –, KY582222, KY582290, –, –, *Odontostephana carolinensis* (Jacq.) Alexander, U.S.A.: Mississippi, Fishbein 5380 (OKLA), –, (–, KY582370), –, KY582225, KY582295, –, –, *Odontostephana decipiens* Alexander, U.S.A.: Arkansas, Parks 175 (OKLA), –, –, –, KY582231, KY582293, –, –, *Odontostephana floridana* (Vail) Alexander, U.S.A.: Florida, Parks 135 (OKLA), –, –, –, KY582265, KY582310, –, –, *Odontostephana obliqua* (Jacq.) Alexander, U.S.A.: Mississippi, Fishbein 4988 (OKLA), –, –, –, KY582234, KY582304, –, –, *Odontostephana reticulata* (Engelm. ex A.Gray) Morillo, Liede & Meve, U.S.A.: Texas, Krings L3 (NCSC), –, (–, EU031631), EU038884, KY582240, KY582281, –, –, *Odontostephana reticulata* (Engelm. ex A.Gray) Morillo, Liede & Meve, Mexico: Nuevo León, Villareal & Betancourt 8644 (MEXU), PQ808203, PQ808283, PQ808470, PQ808591, PQ808705, PQ808842, PQ801350; *Pauciflora hastulata* (A.Gray) Morillo, Liede & Meve, Mexico: Baja California, Fishbein 6413 (OKLA), –, (–, KY582375), –, KY582257, KY582288, –, –, *Pauciflora parvifolia* (Torr.) Morillo, Liede & Meve, U.S.A.: Texas, Rein 131 (OKLA), –, (–, KY582373), –, KY582251, KY582287, –, –, *Pauciflora* aff. *parvifolia* (Torr.) Morillo, Liede & Meve, Mexico: Sonora, Fishbein 3723 (OKLA), –, –, –, KY582213, KY582309, –, –, *Pauciflora sagittifolia* (A.Gray) Morillo, Liede & Meve, U.S.A.: Texas, Carr 28734 (MO), –, PQ808348, PQ808402, –, –, PQ808768, PQ801277; *Pauciflora sagittifolia* (A.Gray) Morillo, Liede & Meve, U.S.A.: Texas, Rein 115 (OKLA), –, (–, KY582372), KY449037, KY582207, KY582301, –, –, *Peruviasclepias aliciae* Morillo, Peru: Lambeyeque, Garcia s. n. (MER), PQ808211, PQ808291, PQ808478, PQ808595, PQ808709, PQ808847, PQ801353; *Phaeostemma riedelii* E.Fourn., Argentina: Misiones, Keller & al. 11600 (CTES), –, PQ808350, PQ808404, –, –, PQ808770, PQ801279; *Phaeostemma riedelii* E.Fourn., Argentina: Misiones, Keller s.n. (CTES), PQ808213, PQ808293, PQ808480, PQ808596, PQ808710, PQ808848, PQ801354; *Phaeostemma riedelii* E.Fourn., Brazil: Santa Catarina, Keller 15810 (CTES), PQ808212, PQ808292, PQ808479, PQ808597, –, PQ808849, PQ801355; *Pherotrichis* sp., Mexico: Sonora, Fishbein 3670 (OKLA), –, (–, KY582361), KY449029, KY582246, KY582327, –, –, *Pherotrichis* sp., Mexico: Michoacán, Fishbein 5185 (OKLA), –, –, –, KY582272, KY582332, –, –, *Pherotrichis* sp., Mexico:

Appendix 1. Continued.

Zacatecas, *Fishbein 5844* (OKLA), –, –, –, KY582317, –, –, *Pherotrichis* sp., Mexico: Guanajuato, *Fishbein 5855* (OKLA), –, –, –, KY582247, –, –, –, *Poicilla tamnifolia* Griseb., Cuba: Pinar del Río, *Krings 1414* (NCSC), –, –, EU031634, EU038887, –, –, –, *Poicilla tamnifolia* Griseb., Cuba: Pinar del Río, *Mangelsdorff RMC 125* (UBT), LN901505, LN901499, LN901518, **PQ808598, PQ808711, PQ808850, PQ801356**; *Polystemma calcicola* (Greenm.) Morillo, Mexico: Guerrero, *García-Mendoza & al. 8425* (MEXU), –, **PQ808351, PQ808405, –, PQ808771, PQ801280**; *Polystemma canisferum* McDonnell & Fishbein, Mexico: Sonora, *Fishbein 6266* (OKLA), –, –, KY582364, KY449035, KY582253, KY582294, –, –, *Polystemma cordatum* (Brandegee) L.O.Alvarado, Mexico: Oaxaca, *Calzada 21081* (MEXU), **PQ808214, PQ808294, PQ808481, PQ808599, PQ808712, PQ808851, PQ801357**; *Polystemma cordatum* (Brandegee) L.O.Alvarado, Mexico: Oaxaca, *Lira Charco & al. 1664* (MEXU), –, **PQ808352, PQ808406, –, PQ808772, PQ801281**; *Polystemma cordatum* (Brandegee) L.O.Alvarado, Mexico: Puebla, *Tenorio & Salinas 11556* (TEX), –, –, EU031608, EU038862, –, –, –, *Polystemma cordifolium* (A.Gray) McDonnell & Fishbein (type of *Rothrockia* A.Gray), Mexico: Sonora, *Stevens 1517* (MSC), –, –, EU031609, EU038863, –, –, –, *Polystemma fruticosum* (Brandegee) L.O.Alvarado & S.Islas, Mexico: Baja California Sur, *Fishbein 3953* (OKLA), –, –, –, KY582271, KY582299, –, –, *Polystemma fuscum* (Decne.) C.Cerv., S.Arias & L.O.Alvarado, Mexico: Oaxaca, *Fishbein 5832* (OKLA), –, –, –, KY582209, KY582274, –, –, *Polystemma fuscum* (Decne.) C.Cerv., S.Arias & L.O.Alvarado, Mexico: Michoacán, *Steinmann 5240* (OKLA), –, –, –, KY582229, KY582273, –, –, *Polystemma guatemalense* (Schltr.) W.D.Stevens, Mexico: Morillo, *14250* (MEXU), –, **PQ808353, PQ808407, –, PQ808773, PQ801282**; *Polystemma guatemalense* (Schltr.) W.D.Stevens, Mexico: Morelos, *Morillo & al. 14253* (MEXU), –, **PQ808354, PQ808408, –, PQ808774, PQ801283**; *Polystemma guatemalense* (Schltr.) W.D.Stevens, Mexico: Jalisco, *Steinmann & Varela 1084* (NY), –, –, EU031630, EU038883, –, –, –, *Polystemma guatemalense* (Schltr.) W.D.Stevens, Mexico: Michoacán, *Steinmann 3399* (OKLA), –, –, –, KY582353, KY449043, KY582248, KY582284, –, –, *Polystemma luridum* (Decne.) C.Cervantes, Mexico: San Luis Potosí, *Moore & al. 1232* (MEXU), **PQ808215, PQ808295, PQ808482, PQ808600, PQ808713, PQ808852, PQ801358**; *Polystemma pilosum* (Benth.) Morillo, Mexico: Oaxaca, *Fishbein 5822* (OKLA), –, –, –, KY582268, KY582280, –, –, *Polystemma pilosum* (Benth.) Morillo aff., Mexico: Jalisco, *Fishbein 5840* (OKLA), –, –, –, KY582260, KY582283, –, –, *Polystemma petiolare* (A.Gray) L.O.Alvarado & S.Islas, Mexico: Chihuahua, *Tejero-Díez 6232* (MEXU), **PQ808216, PQ808296, PQ808483, PQ808601, PQ808714, PQ808853, –, Polystemma umbellata (Brandegee) L.O.Alvarado & S.Islas, Mexico: Baja California Sur, *Fishbein 4095* (OKLA), –, –, –, KY582244, KY582282, –, –, *Polystemma viridiflorum* Decne., Mexico: Oaxaca, *Tucker 2766* (DUKE), –, –, EU031612, EU038866, –, –, –, *Polystemma viridiflorum* Decne., Nicaragua: San Jacinto, *Itlis 30876* (MO), –, –, KY582352, KY449030, KY582249, KY582291, –, –, *Portoricana sintenisii* (Schltr.) Morillo, Liede & Meve, Puerto Rico, *Krings 1405* (NCSC), –, –, EU031633, EU038886, –, –, –, *Portoricana varifolia* (Schltr.) Morillo, Liede & Meve, Puerto Rico, *Krings 1397* (NCSC), –, –, EU031636, EU038889, –, –, –, *Prosthecidium guatemalensis* Donn.Sm., Mexico: Jalisco, *Stevens & Fairhurst 1811* (DUKE), –, –, EU031627, EU038880, –, –, –, *Pseudolachnostoma reflexum* (Hemsl.) Morillo, Ecuador: Esmeraldas, *Clark 4782* (MO), –, –, –, KY582210, KY582350, –, –, *Ptycanthera correllii* (Spellman) Morillo, Liede & Meve, Bahamas, *Correll 48157* (DUKE), –, –, EU031610, EU038864, –, –, –, *Ptycanthera emmarteizii* (W.D.Stevens) Morillo, Liede & Meve, Mexico: Chiapas, *Stevens 25956* (MO), –, –, –, KY582360, –, –, –, KY582232, KY582337, –, –, *Ptycanthera nipensis* (Urb.) Morillo, Liede & Meve, Cuba: Holguín, *Krings 1412* (NCSC), –, –, EU031622, EU038876, –, –, –, *Ptycanthera nipensis* (Urb.) Morillo, Liede & Meve, Cuba: Guantánamo, *Mangelsdorff RMC 318* (FR), LN901504, (LN901550, LN901543), LN901517, **PQ808602, PQ808715, PQ808854, PQ801359**; *Ptycanthera oblongata* Schltr., Cuba: Pinar del Río, *Krings 1413* (NCSC), –, –, EU031623, EU038877, –, –, –, *Ptycanthera phainops* (Krings) Morillo, Liede & Meve, Dominican Republic, *Liogier 16617* (NY), –, –, EU031626, EU038879, –, –, –, *Rojasia gracilis* Malme, Argentina: Formosa, *Keller 14010* (CTES), **PQ808217, LR782247, LR782255, LR782257, LR782550, PQ808855, PQ801360; Rojasia gracilis Malme, Argentina: Formosa, *Keller 14012* (CTES), **PQ808218, LR782248, LR782256, LR782258, LR782555, PQ808856, PQ801361; Suberogerens cyclophylla (Standl.) Morillo, Mexico: Barad s.n. (UBT), AJ704271, (AJ704269, AJ704272), AJ704273, **PQ808603, PQ808716, PQ808857, PQ801362; Suberogerens cyclophylla (Standl.) Morillo, Mexico: Michoacán, *Fishbein 5410* (OKLA), –, –, –, KY582259, KY582330, –, –, *Suberogerens cyclophylla* (Standl.) Morillo, ex hort., *Abbott s.n.* (cult.), –, **PQ808355, PQ808409, –, PQ808775, PQ801284; Talayotea caudata (A.Gray) L.O.Alvarado, Mexico: Sonora, *Van Devender 2002-1062A* (OKLA), –, –, –, KY582226, KY582331, –, –, *Talayotea trachyantha* (Greenm.) L.O.Alvarado, Mexico: Oaxaca, *Fishbein 5823* (OKLA), –, –, –, KY582242, KY582314, –, –, Mexico: Puebla, *Stevens & al. 2300* (DUKE), –, –, EU031635, EU038888, –, –, –, *Talayotea trachyantha* (Greenm.) L.O.Alvarado, Mexico: Morelos, *Flores-Morales 108* (MEXU), **PQ808219, PQ808297, PQ808484, –, PQ808858, PQ801363; Trichosacme lanata Zucc., Mexico: Nuevo León, *Hinton & al. 23755* (TEX), –, –, EU031619, EU038873, –, –, –, *Tutunakanthus gentlei* (Lundell & Standl.) Morillo, Liede & Meve, Belize: Cayo, *Hawkins 1059* (MO), –, –, –, KY582208, KY582277, –, –, *Tutunakanthus gentlei* (Lundell & Standl.) Morillo, Liede & Meve, Belize: Cayo, *Spellman 1901* (E), **PQ963506, PQ963507, PQ963508, –, PQ963509, PQ898119; Tutunakanthus micranthus (L.O.Williams) Morillo, Liede & Meve, Mexico: Chiapas, *Stevens 25818* (MO), –, –, –, KY582357, –, KY582266, KY582316, –, –, *Tutunakanthus stenosepalus* (Lundell) Morillo, Liede & Meve, Mexico: Campeche, *Conrad 9316* (UBT), **PQ808208, PQ808288, PQ808475, –, PQ808844, –, Tutunakanthus velutinus (Schltr.) Morillo, Liede & Meve, Mexico: Oaxaca, *Baldú 209* (MEXU), **PQ808209, PQ808289, PQ808476, –, PQ808845, –, Tylodontia cf. cubensis Griseb., Cuba: Pinar del Río, *Liede & Meve 3593* (UBT), LN901506, LN901500, LN901519, **PQ808605, –, PQ801365; Tylodontia fuscula (C.Wright) Mangelsdorff, Meve & Liede, Cuba: Guantánamo, *Mangelsdorff RMC 327* (FR), LN901507, (LN901551, LN901544), LN901520, **PQ808606, PQ808718, PQ808860, PQ801366; Tylodontia stipitata Mangelsdorff, Meve & Liede, Cuba: Holguín, *Mangelsdorff RMC 332* (FR), LN901509, (LN901553, LN901546), LN901522, **PQ808607, PQ808719, PQ808861, PQ801367; Tylodontia stipitata Mangelsdorff, Meve & Liede, Cuba: Holguín, *Mangelsdorff RMC 333* (FR), LN901510, (LN901554, LN901547), LN901523, **PQ808608, PQ808720, PQ808862, PQ801368; Tylodontia urceolata (Griseb.) Mangelsdorff, Meve & Liede, Cuba: Guantánamo, *Mangelsdorff RMC 233* (FR), LN901508, (LN901552, LN901545), LN901521, **PQ808609, PQ808721, PQ808863, PQ801369; Urostephanus balrog Gonz.-Martínez, Lozada-Pérez & L.O.Alvarado, Mexico: Morelos, *Flores & Tlatilpa 123* (MEXU), –, –, OR601039, OR601044, –, –, –, *Urostephanus cornutus* Gonz.-Martínez, Lozada-Pérez & L.O.Alvarado, Mexico: Chiapas, *Stevens & Martínez 25699* (MEXU), –, MH464900/OR601040, MH464894/OR601045, KY582236, KY582313, –, –, *Urostephanus gonoloboides* B.L.Rob. & Greenm., Mexico: Oaxaca, *Cortez & Islas 4* (FCME), –, –, OR601041, OR601046, –, –, –, *Urostephanus gonoloboides* B.L.Rob. & Greenm., Mexico: Oaxaca, *Fishbein 5830* (OKLA), –, –, –, KY582233, KY582278, –, –, –, *Urostephanus gonoloboides* B.L.Rob. & Greenm., Mexico: Oaxaca, *Stevens 1349* (MSC), –, –, EU031616, EU038870, –, –, –, *Urostephanus jamesiae* Gonz.-Martínez, Lozada-Pérez & L.O.Alvarado, Mexico: Mexico, *Juárez J. & al. 762* (MEXU), –, –, OR601042, OR601047, –, –, –, *Urostephanus lokii* Gonz.-Martínez, Lozada-Pérez & L.O.Alvarado, Mexico: Chiapas, *Alvarado & al. 341* (MEXU), –, –, OR601043, OR601048, –, –, –, *Urostephanus porphyranthus* (Standl.) Gonz.-Martínez, Lozada-Pérez & L.O.Alvarado, Honduras: Francisco Morazán, *Linares 3357* (MEXU), –, MH464901, MH464895, –, –, –, *Weigendia cajamarcana* Morillo, Liede & Meve, Peru: Cajamarca, *Weigend 7487* (UBT), **PQ808221, PQ808299, PQ808486, PQ808610, PQ808722, PQ808871, PQ801374; Yucatania campechiana (Standl.) Morillo, Liede & Meve, Mexico: Campeche, *Álvarez 3639* (MEXU), **PQ808197, PQ808278, PQ808465, PQ808586, PQ808701, PQ808837, PQ801346; Yucatania lanceolata (Decne.) Morillo, Liede & Meve, Mexico: Puebla, *Ledesma 21858* (MEXU), **PQ808198, PQ808279, PQ808466, PQ808587, PQ808702, PQ808838, PQ801347; Yucatania tuerckheimii (Donn.Sm.) Morillo, Liede & Meve, Mexico: Chiapas, *Stevens 2382* (MO), –, –, KY582355, –, KY582212, KY582302, –, –, *Yucatania violacea* (Woodson) Morillo, Liede & Meve, Guatemala: Volcan San Pedro, *MacVean 720* (MO), –, –, KY582356, –, KY582245, KY582322, –, –.**********************************