

REVISION OF *GONOLOBUS* S.S.  
(APOCYNACEAE: ASCLEPIADOIDEAE) IN THE WEST INDIES

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ABSTRACT

A revision of *Gonolobus* s.s. (Apocynaceae: Asclepiadoideae: Gonolobinae) in the West Indies is provided based on recent evidence of support for the monophyly of the genus from molecular and morphological data. Ten species are recognized (eight endemic to a single island each). Keys, descriptions, and illustrations are provided for all ten species. The conservation status of each species is provisionally assessed using IUCN and NatureServe criteria. *Gonolobus stapelioides* is neotypified. Two new combinations are made in *Matelea*: **M. dictyopetala** and **M. pubescens**.

RESUMEN

Se hace una revisión *Gonolobus* s.s. (Apocynaceae: Asclepiadoideae: Gonolobinae) en las Indias Occidentales basada en pruebas recientes que soportan la monofilia del género basada en datos moleculares y morfológicos. Se reconocen diez especies (ocho endémicas de una sola isla). Se aportan claves, descripciones, e ilustraciones de las diez especies. Se evalúa el estado de conservación provisional usando los criterios de IUCN y de NatureServe. Se neotipifica *Gonolobus stapelioides*. Se hacen dos combinaciones nuevas en *Matelea*: **M. dictyopetala** y **M. pubescens**.

INTRODUCTION

About fifty species of subtribe Gonolobinae (Apocynaceae: Asclepiadoideae) occur on the islands comprised by the Greater and Lesser Antilles, the Bahamas, Trinidad and Tobago, and Aruba and the Netherland Antilles. Evidence from the chloroplast (Rapini et al. 2003; Liede-Schumann et al. 2005; Rapini et al. 2006; Krings et al. 2008) and nuclear genomes (Krings et al. 2008) supports the monophyly of the subtribe. Genera referred to the subtribe with representation in the region include *Fischeria* DC., *Gonolobus* Michx., *Matelea* Aubl. (incl. *Ibatia* Decne., *Jacaima* Rendle, *Poicilla* Griseb., *Poicillopsis* Schltr., *Ptycanthera* Decne.), *Macroscopus* Kunth, and *Metalepis* Griseb. (Fontella & Schwarz 1981a; Kunze 1995; Liede 1997; Morillo 1997; Rapini et al. 2003; Liede-Schumann et al. 2005; Rapini et al. 2006). Subtribal position has been most controversial for *Metalepis*, which some workers have also placed within a broad *Cynanchum* L. (Woodson 1941; Spellman 1975; Sundell 1981). Recent evidence places it basal to a well-supported *Metastelmatinae*-*Oxypetalinae*-*Gonolobinae* clade (Liede & Kunze 2002; Liede-Schumann et al. 2005). The last regional treatment of *Gonolobinae* is now over 100 years old (Schlechter 1899) and a number of new species have recently been described by various workers, including Britton, Krings, Liogier, Proctor, Spellman, Urban, and Woodson (see Krings 2005b, 2006, 2007). Most members of the subtribe have never been monographed (Rapini et al. 2003) and the circumscription of most genera remains poorly defined. The *Gonolobus*-*Matelea* complex in particular is in desperate need of taxonomic revision. However, the size of the complex (ca. 200–350 spp.) requires an approach focusing on smaller, more tractable subgroups. Considering the support for a monophyletic *Gonolobus* s.s. based on recent evidence from chloroplast (*trnL-F*, *rps16*) and nuclear (*LEAFY*) data (Krings et al. 2008), recent taxonomic changes in West Indian taxa (Krings 2005a–d), and that several species have been published from the area since the last comprehensive treatment over a hundred years ago (Schlechter 1899; Krings 2006, 2007), a revision of the genus in the West Indies seemed appropriate. This revision treats all ten West Indian *Gonolobinae* species referable to *Gonolobus* s.s. (i.e., characterized by the presence of laminar, dorsal anther appendages, winged follicles, and a synapomorphic guanine; Krings et al. 2008). In addition, two new combinations are made in *Matelea*: *M. dictyopetala* and *M. pubescens* (see Doubtful and excluded names).

## METHODS

This treatment is based on critical study of ca. 250 specimens of the fifty some known species in West Indian *Gonolobinae*, obtained in part through: (1) loan requests from ninety herbaria—of which sixty-five responded with either loans, digital images, or negative search results (see Acknowledgements), (2) visits to BM, BSC, DUKE, HAC, HAJB, IJ, K, UCWI, UPRRP, US, and P, and (3) forty-eight days of field work by the author in the Bahamas (Long Island), Cuba, Dominica, Jamaica, Puerto Rico, St. Lucia, and St. Vincent. The treatment is also informed by analyses of sequences of portions of the chloroplast (*trnL-F*, *rps16*) and nuclear genomes (*LEAFY*) of selected accessions (see Krings et al. 2008). The species concept employed is an amalgam of the Phylogenetic Species Concept (PSC) of Nixon and Wheeler (1990) and the Evolutionary Species Concept (ESC) as modified by Wiley (1978), namely that: a species is a lineage of ancestral-descendent populations, which have maintained their identity from other such lineages, and which are diagnosable by a unique combination of character states in comparable individuals. Although the PSC has been critiqued as a non-historical concept—and thus potentially failing to identify instances of phenotypic homoplasy (Baum & Donoghue 1995)—this critique has not been accepted universally (Luckow 1995). The concept has been useful both as theoretical definition and operational delimitation criterion. However, as the application of the PSC, and its discovery method Population Aggregation Analysis (PAA; Davis & Nixon 1992), requires study of populations, its application is limited when entities are known uniquely from a population, or worse, from a single collection (e.g., *G. absalonensis*). In the absence of complete, multi-population accessions for extant and historical species, the provisional approach taken here is to rely on observable patterns of differentiation, with the general phytomonographic assumption that these patterns are due to a variety of biological processes underlying the morphological and historical integrity of species (McDade 1995). As a result, character states of each lone populational representative were assumed fixed and together used to form a population profile for PAA. Specimens representing each distinct aggregated population profile were considered to belong to distinct species, even if represented by only single collections, if they exhibited unique, qualitative morphological character states, unknown from other population profiles. As with any hypothesis, concepts of these species are open to modification and reinterpretation in light of any new collections.

The conservation status of treated species was provisionally evaluated by applying the criteria articulated in version 3.1 of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List Categories and Criteria (IUCN 2001) and version 6.1 of the NatureServe Conservation Status Ranks (NatureServe 2006).

## RESULTS

Ten species of *Gonolobus* are recognized from the West Indies, here defined to include the Bahamas, the Greater Antilles, and the Lesser Antilles (excl. Aruba, Bonaire, Curaçao, Trinidad, and Tobago; Fig. 1). All ten species are endemic to the region. Descriptions of the species are provided following a discussion of morphology and keys to the species. Corona morphological terminology follows Liede and Kunze (1993) and Kunze (1995): Ca = faucal annulus (corolline corolla); Cd = dorsal anther appendage; Ci = interstaminal gynostegial corona; C(is) = fused staminal and interstaminal gynostegial corona; Cs = staminal gynostegial corona. Species are arranged alphabetically. IUCN criteria justifying an assigned conservation category are listed following each category. Following Franz et al. (accepted), taxon concept mapping is provided to facilitate databasing. The operators <, =, and > are used to indicate whether a given taxon concept is respectively narrower than, equal to, or broader than a previously published concept. The symbol ≠ is used to indicate the misapplication of a name to a concept. Herbarium abbreviations follow Index Herbariorum (Holmgren & Holmgren 1998–present). Book abbreviations follow TL-2 (Stafleu & Cowan 1976–1988) and journal abbreviations B-P-H (Lawrence et al. 1968) and B-P-H/S (Bridson & Smith 1991). Author abbreviations follow Brummitt and Powell (1992).

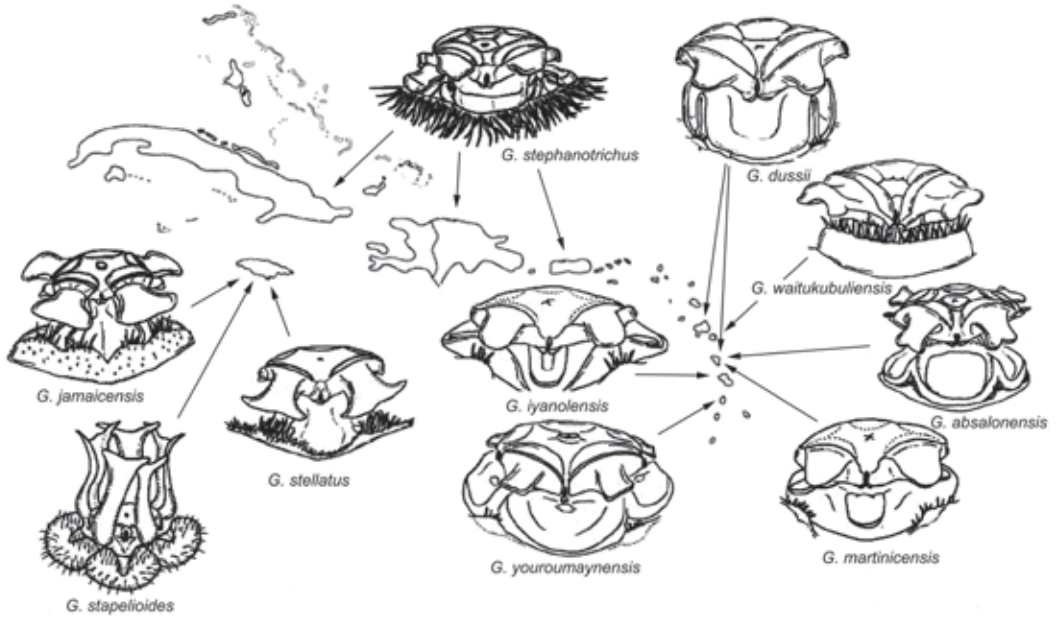


FIG. 1. Distribution of and gynostegial variation in *Gonolobus* in the West Indies.

#### TAXONOMIC HISTORY

The genus *Gonolobus* was erected by Michaux in 1803 based on a taxon from the southeastern United States—*Gonolobus suberosus* (L.) R.Br. Reveal and Barrie (1992) reviewed the complicated nomenclatural history of the type species and Klings and Xiang (2004, 2005) its taxonomy. About 318 names have been published in *Gonolobus*. Estimates of species numbers in the genus vary from 100 to 150 (Rosatti 1989; Mabberley 1997; Stevens 2001). The degree of variation is largely the result of still poorly known tropical taxa and differences regarding generic limits. Woodson (1941) considered that the genus *Gonolobus* should contain plants characterized by only long, eglandular trichomes, laminar dorsal anther appendages, and smooth, angled or winged follicles, whereas *Matelea* should contain plants characterized by glandular and eglandular trichomes, anthers lacking laminar dorsal appendages, and muricate follicles. Unconvinced that laminar dorsal anther appendages should serve as a generic character and citing examples of smooth [but not angled or winged] fruits in *Matelea*, Shinnery (1950) argued against Woodson's generic concept and later included twelve of Woodson's (1941) *Gonolobus* combinations in *Matelea* (Shinnery 1950, 1964). Drapalik (1969) essentially followed Shinnery by maintaining the type of *Gonolobus* (i.e., *G. suberosus*, syn. *G. gonocarpus* (Walter) L.M. Perry) in *Matelea*, although noting its morphological distinctness vis-à-vis other subtribal members in the southeastern United States. Taking a broader geographical perspective of generic morphology, Rosatti (1989) argued for renewed circumscription of *Gonolobus* based on the presence of laminar dorsal anther appendages. Most recently the concept of *Gonolobus* as characterized by short, capitate-glandular, short acicular, and long acicular trichomes, laminar dorsal anther appendages (typically), and smooth, winged follicles has been used by Stevens (2001). However, glandular hairs, although thought characteristic of *Matelea* by Woodson (1941), also appear without circumscriptional value in the *Gonolobus*-*Matelea* question, being present in both the type of *Gonolobus* and numerous species lacking dorsal anther appendages (Rosatti 1989). Nonetheless, the monophyly of *Gonolobus*, whether narrowly or broadly circumscribed, was supported in a recent analysis of chloroplast and nuclear data (Klings et al. 2008). Although parsimony is equivocal on

whether laminar dorsal anther appendages evolved once in the most recent common ancestor of *Gonolobus* s.l., or once in *Gonolobus* s.s. and once in the *Fimbristemma* Turcz. group within *Gonolobus* s.l. (Fig. 2), the character remains restricted to the *Gonolobus* s.l. clade within Gonolobinae. Interestingly, winged follicles appear to have arisen twice independently and can be considered synapomorphic for both *Gonolobus* s.l. (Krings et al. 2008), as well as for a mostly West Indian ocellate-petaled complex that likely includes *Matelea acuminata* (Griseb.) Woodson, *M. bayatensis* (Urb.) Woodson, *M. correllii* Spellman, *M. costata* (Urb.) Morillo, *M. nipensis* (Urb.) Woodson, *M. oblongata* (Griseb.) Woodson, *M. pusilliflora* L.O. Williams, *M. rhamnifolia* (Griseb.) Krings, and *M. tigrina* (Griseb.) Woodson. None of these latter taxa exhibit laminar dorsal anther appendages. This putative complex did not evolve within the *Gonolobus* s.l. clade and may deserve independent generic recognition. Members of the complex tend to share morphological characters apparently rare in *Gonolobus* s.l., such as reticulate, ocellate corollas.

A monophyletic *Gonolobus* s.l. can be characterized by the presence of two synapomorphic indels in *LEAFY*, as well as winged follicles (Krings et al. 2008). A monophyletic *Gonolobus* s.s. can be characterized by a synapomorphic transversion in *trnL-F* (thymine to guanine) not shared by any of 154 other Asclepiadoideae species sampled across Secamoneae, Ceropogonieae, Marsdenieae, and Asclepiadeae. The former circumscription (i.e., *Gonolobus* s.l.) essentially agrees with that of Woodson (1941), Rosatti (1989), and Stevens (2001), and stands in contrast to that of Shoiners (1950) and Drapalik (1969). To remain monophyletic however, *Gonolobus* s.l. must include the *Matelea denticulata* (Vahl) Fontella & E.A. Schwarz complex. Considering the morphological and molecular distinctions between the three lineages in the *Gonolobus* s.l. clade (Fig. 2), recognition of three separate genera currently seems preferable to me.

#### MORPHOLOGY

A discussion of the morphology of species of *Gonolobus* s.s. (hereafter simply *Gonolobus*, unless otherwise specified) is provided below. The discussion concentrates on West Indian *Gonolobus* species, but when possible provides a broader context of variation within West Indian Gonolobinae.

**Growth form.**—Species of West Indian *Gonolobus* are twining vines, as are all currently known members of West Indian Gonolobinae (Fig. 3A). Older stems may become somewhat woody, but no collection or live plant has been seen by the author that approached 1 cm or greater in diameter. Individuals may climb as high as a few meters in gaps and openings.

**Latex.**—Latex is known for the following species: *Gonolobus iyanolensis* Krings, *G. jamaicensis* Rendle, *G. stapelioides* Desv. ex Ham., *G. stellatus* Griseb., *G. stephanotrichus* Griseb., *G. waitukubuliensis* Krings, and *G. youroumaynensis* Krings. It has been primarily described as either milky or white, observations confirmed by the author in the field for *G. iyanolensis*, *G. jamaicensis*, *G. stapelioides*, *G. stephanotrichus*, *G. waitukubuliensis*, and *G. youroumaynensis*. Latex was described by collectors as watery in a single instance—a Puerto Rican collection of a young sterile vine referred to *G. stephanotrichus* (Acevedo-Rodríguez & Axelrod 7785, US!). Published studies of latex chemistry in Gonolobinae are unknown to the author, although such inquiry would likely yield interesting results based on studies of other members of Asclepiadoideae (see Uses). Latex chemistry has been applied to solving taxonomic problems in Cynanchinae (Liede et al. 1993; Liede & Kunze 2002).

**Pubescence.**—Most members of subtribe Gonolobinae, exhibit at least two distinct trichome types, but frequently more. West Indian species of *Gonolobus* exhibit four types: (1) multi-cellular, sharp, eglandular, (2) uni-cellular, sharp, eglandular, (3) uni-cellular, glandular-capitate, and (4) papillate (Fig. 3B). Papillae appear to be restricted to the adaxial surface of the corolla lobes—typically borne only on the right side of the lobes. The remaining trichome types may be found anywhere else on the stem, leaves, inflorescences, or flowers, usually in combination. Multi-cellular, sharp, eglandular trichomes found on stems are primarily retrorse to retrorse-spreading internodally, but may be appressed-ascending along a narrow ridge connecting opposite petioles. In contrast to some other members of West Indian Gonolobinae (e.g., *M. corynephora* Krings, *M. linearipetala* Alain, *M. phainops* Krings, *M. rhyngocephala* Krings, *M. torulosa* Krings), stem trichomes in West Indian *Gonolobus* are not borne in two distinct lines.

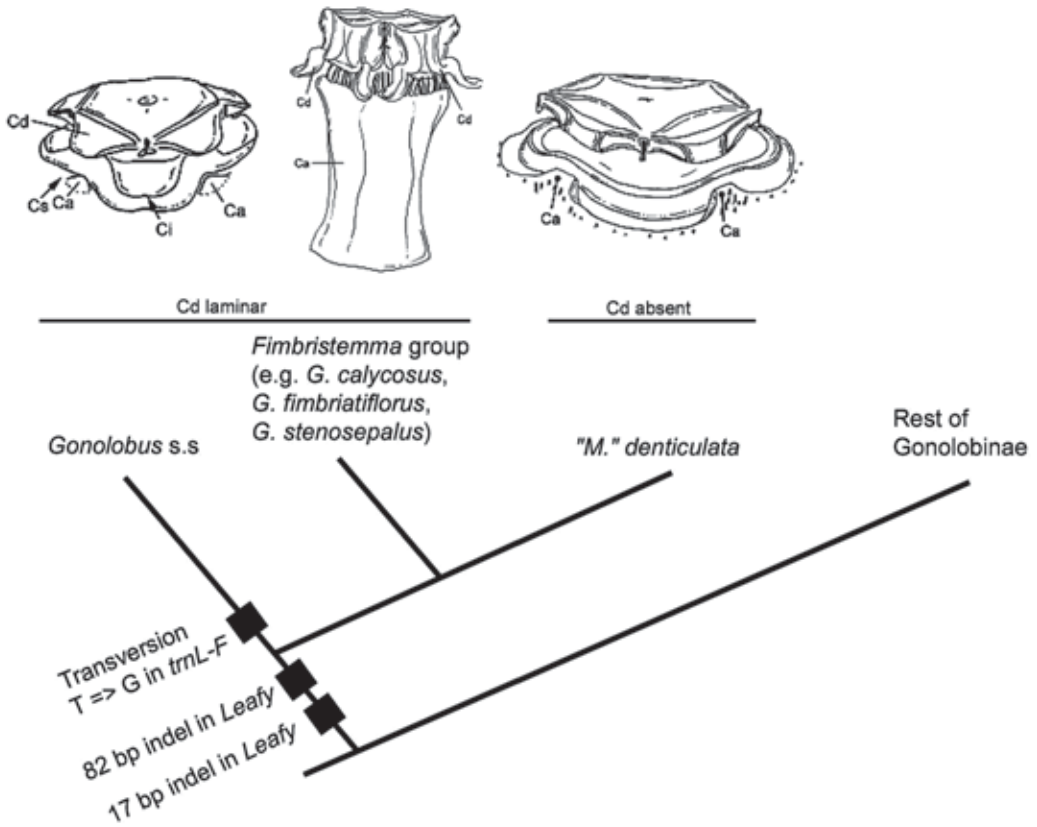


FIG. 2. Model of evolution of *Gonolobus* s.l. based on current evidence, with molecular synapomorphies mapped on branches (from Krings et al. 2008). Representative gynoecia shown are from left to right: *G. suberosus* (Walker s.n., NCSC), *G. calycosus* (Williams et al. 24759, LL), and *M. denticulata* (Dodson & Dodson 15450, NY). **Ca** = faucal annulus of corolla; **Ci** = interstaminal gynostegial corona segment; **Cd** = laminar dorsal anther appendage; **Cs** = staminal gynostegial corona segment; **G.** = *Gonolobus*; **M.** = *Matelea*.

**Leaves.**—In general, species of *Gonolobus* exhibit simple, opposite, membranous, cordate leaves, although a few taxa, such as the Jamaican *G. stellatus*, *G. jamaicensis*, and *G. stapelioides*, exhibit truncate to cuneate leaf bases (Fig. 3A & C). The leaves of *G. jamaicensis* and *G. stapelioides* tend to be coriaceous. Leaf apices vary from acute to acuminate. Leaf size and shape may be influenced by position on the stem (e.g., basal vs. terminal) and habitat (e.g., edge vs. forest interior; sun vs. shade) (Krings, pers. obs.).

**Laminar collectors.**—In West Indian *Gonolobus* species, as in all West Indian Gonolobinae, two or more collectors are borne on the adaxial midrib near the junction of the leaf base and the petiole apex (Fig. 3D). Collectors vary from deltoid to lanceoloid.

**Stipular collectors.**—In West Indian *Gonolobus* species, a single collector is borne on each side of the petiole at its extreme base (Fig. 3E). Collectors vary from deltoid to lanceoloid. Inter-petiolar (borne along a ridge or line between two opposing petioles at a node) collectors are rare and infra-petiolar (borne within the width of a petiole at its base) are apparently absent. Stipular collectors in other West Indian Gonolobinae vary in position, but frequently appear to be associated with the stem rather than the petiole.

**Inflorescences.**—Inflorescences of most West Indian Gonolobinae species, including all *Gonolobus* species in the area, are extra-axillary and racemose (umbelliform inflorescences appear to be restricted to Haitian *Matelea crispiflora* (Urb.) Jiménez). Inflorescences can be borne at nodes with immature leaves

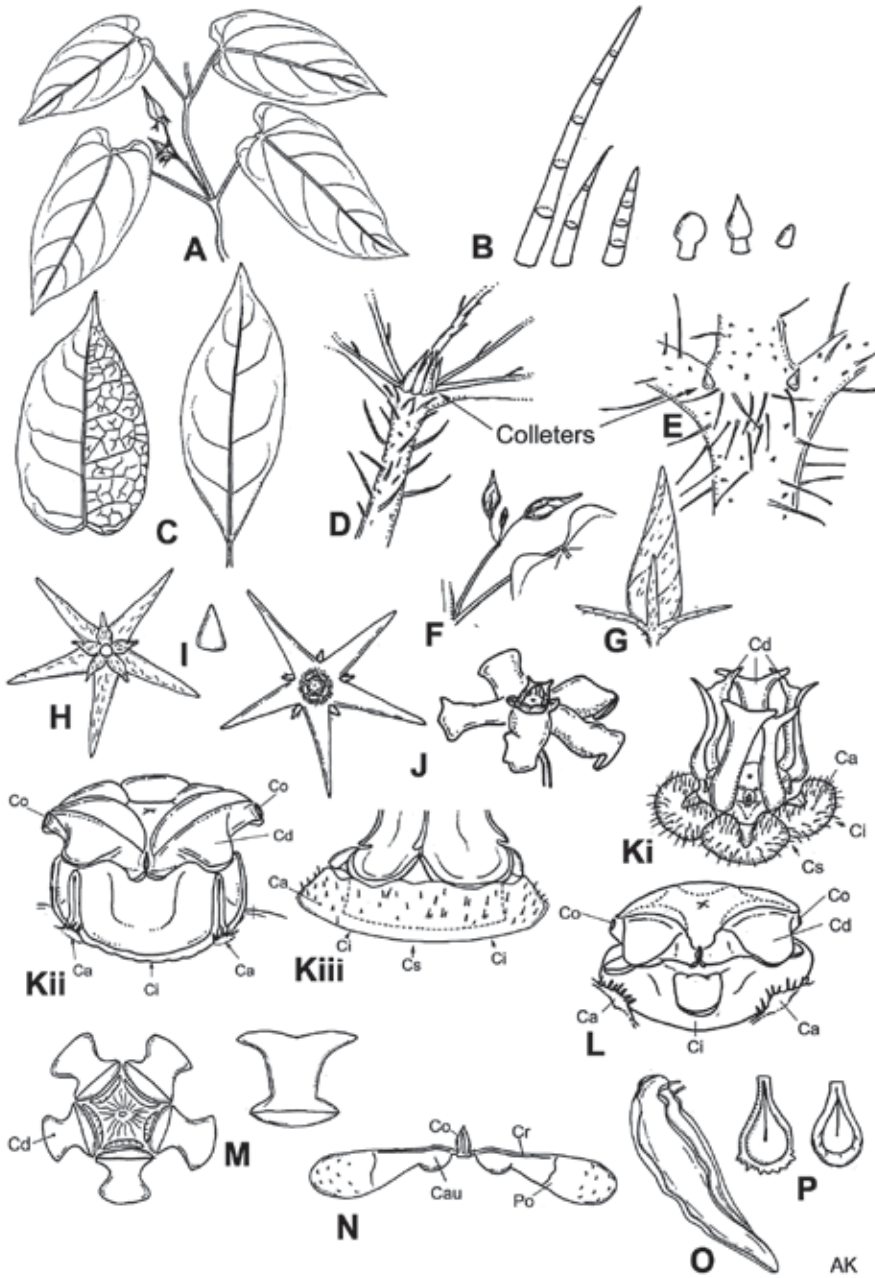


FIG. 3. Morphological characteristics and variation in *Gonolobus*. A. Twining growth form (*G. dussii*). B. Trichome variation from multicellular, sharp, eglandular (left three) to glandular capitate to papillate (rightmost) (*G. youroumaynensis*, except papillae from corolla of *G. rostratus*). C. Variation in leaf shape (cordate: *G. jamaicensis*; cuneate: *G. stellatus*). D. Laminar colleters (*G. youroumaynensis*). E. Stipular colleters (*G. youroumaynensis*). F. Inflorescence (*G. tobagensis*). G. Dextrorse flower bud (*G. tobagensis*). H. Five-parted calyx (*G. stephanotrichus*). I. Calycine colleter (*G. stephanotrichus*). J. Variation in corollas (left: *G. stephanotrichus*; right: *G. stapelioides*). Ki–iii. Variation in faucal annuli, as well as gynostegial coronas (i: *G. stapelioides*; ii: *G. dussii*; iii: *G. jamaicensis*). L. Ligulate staminal segment of gynostegial corona (*G. martinicensis*). M. Variation in laminar dorsal anther appendages (left: *G. rostratus*; right: *G. stellatus*; see also Ki–ii, L). N. Pollinarium (*G. stephanotrichus*). O. Winged follicle (*G. stephanotrichus*). P. Seeds distally dentate (*G. iyanolensis*) and entire (*G. stephanotrichus*). Ca = faucal annulus of corolla; Cau = caudicle; Ci = interstaminal gynostegial corona segment; Cd = laminar dorsal anther appendage; Co = corpusculum; Cr = crest; Cs = staminal gynostegial corona segment; Po = pollinium.

as short as 1–3 cm long. The inflorescence is indeterminate and a series of flowers are produced on lateral pedicels from a single axis, the oldest at the base and the youngest at the apex (Fig. 3F). The axis is frequently significantly contracted and may not measure more than 1 cm in some species. In West Indian *Gonolobus*, bracts are frequently borne at pedicel bases, although they tend to be small and caducous in most species. For additional a review of inflorescence structure in other members of Asclepiadoideae, see Liede and Werberling (1995).

Based on specimens of West Indian *Gonolobus* seen in the course of the present study, one to three flowers may be open at a time. No phenological studies in West Indian *Gonolobus* have been undertaken and the life span of individual flowers remains unknown. Based on prior studies in Gonolobinae (see Lipow & Wyatt 1998; Klings 1999) and informal observation, it is unlikely that individual flowers last much longer than a week. In *Gonolobus suberosus* of the southeastern United States, individual flowers were open (2–) 4.61 (–10) days ( $N = 175$ ;  $s.d. = 1.53$ ) and inflorescences had open flowers for (2–) 8.96 (–23) days ( $N = 57$ ;  $s.d. = 4.63$ ) (Lipow & Wyatt 1998).

**Aestivation.**—The flowers of West Indian *Gonolobus* species are imbricate and dextrorse in bud (Fig. 3G). Imbricate aestivation is seen also in other members of West Indian Gonolobinae, but not all other genera exhibit dextrorse buds.

**Calyces.**—Calyces of *Gonolobus* species consist of five, green sepals (Fig. 3H). Apices are generally narrowly obtuse to rounded. Adaxial surfaces are uniformly glabrous. Abaxially surfaces vary from pubescent to glabrous. Frequently, the distal pedicel pubescence (when present) creeps onto the calyx base.

**Calyxine collectors.**—West Indian *Gonolobus* species, as most members of West Indian Gonolobinae, bear 1–2 collectors in each sepal sinus (Fig. 3I). The collectors are deltoid to lanceoloid.

**Corollas.**—Corollas of West Indian Gonolobinae, including all *Gonolobus* species in the area, are 5-lobed (Fig. 3J). Corollas are generally subcampanulate to campanulate at the base with lobes spreading to reflexed. The corolla lobes of most species are planar. An exception is Jamaican *G. stapelioides*, which exhibits wavy and recurved corolla lobes. Corolla lobes of *Gonolobus* in the area slightly overlap at the base and frequently bear a minute glandular emergence in the sinus. Adaxial corolla coloration of West Indian *Gonolobus* species varies from uniformly green (most taxa) to burgundy tinged (*G. stephanotrichus*) to maroon (*G. jamaicensis*). Pubescence of the adaxial surfaces, when present, is limited to the faucal annulus and surrounding corolla lobe bases, and the right side of the corolla lobes.

**Corolline coronas: Faucal annuli.**—Faucal annuli—Ca sensu Liede and Kunze (1993), non sensu Woodson and Moore 1938 (see Kunze 1990, 1995)—are secondary annular thickenings of the tubular portion of the corolla (Fig. 3Ki–iii, L). Endress and Bruyns (2000) considered the Ca and Cc (corolline corona) of Liede and Kunze (1993) homologous, although Fishbein (2001) and Kunze (2005) explicitly rejected this hypothesis. Kunze (2005) noted that early ontogenetic stages of even taxa such as *G. lasiostemma* (Hemsl.) Woodson, which exhibits a Ca of five large fleshy lobes interstaminally (similar to Jamaican *G. stapelioides*), show a closed annular meristem at the initial stage. Faucal annuli (Ca) are distinctive in West Indian *Gonolobus* species and generally much more developed in members of this genus than in other West Indian Gonolobinae. Kunze (1995) found faucal annuli present in continental *Gonolobus* spp., as well as *Matelea lanata* (Zucc.) Woodson, and *Matelea dictyantha* Woodson, and absent in *Matelea argentinensis* (T. Mey.) Pontiroli and *Fischeria* spp. (all Gonolobinae). He also noted that outside Gonolobinae, faucal annuli were found mainly in some Stapelieae. The faucal annulus occurs immediately to the outside of the gynostegial corona (i.e., closer to the corolla lobes than the center of the flower). Annuli may be “interrupted” and reduced to a ridge opposite each corolla lobe sinus (e.g., *G. martinicensis* Decne.; Fig. 3L) or “uninterrupted” and well-developed (e.g., *G. jamaicensis*; Fig. 3Kiii). They are frequently pubescent, but not always, in contrast to the always glabrous, adjacent gynostegial coronas.

**Gynostegial coronas.**—Gynostegial coronas are quite varied in West Indian Gonolobinae (Fig. 3Ki–iii, L), but can be described conveniently in terms of staminal (Cs) and interstaminal (Ci) segments. The coronas have been interpreted as a “fusion” between the Cs and Ci (Liede & Kunze 1993), although it remains un-

clear whether the combined structure in fact represents a true fusion of disparate elements (see Endress & Bruyns 2000). In *Gonolobus*, the Cs region typically is raised and ridge-like, often meeting the lower portion of the laminar dorsal anther appendages (Cd). There are no instances of free, ligulate Cs segments as seen in other West Indian Gonolobinae taxa, such as *M. ovatifolia* (Griseb.) Woodson or *M. pentactina* Krings, or three-dimensionally complex Cs segments as seen in *M. tamnifolia* (Griseb.) Woodson and *M. oblongata*. Ci segments are single and cup-like in most West Indian *Gonolobus* species, and double (i.e., ligulate) only in *G. iyanolensis* and *G. martinicensis* (Fig. 3L). The interstaminal ligules of the double coronas of the latter two species are not positionally homologous with the staminal ligules seen in numerous species of *Matelea*, such as West Indian *M. ovatifolia* and *M. pentactina*, or continental *M. pubiflora* (Decne.) Woodson. However, some *Matelea* species, such as *M. maritima* (Jacq.) Woodson, also exhibit interstaminal ligules. In the Asclepiadoideae in general and West Indian *Gonolobus* in particular, the Ci region appears to serve as a holding cup for nectar secreted from a primary nectary on the flanks of the filaments inside the guide rail and in the stigmatic chamber (Christ & Schnepf 1985, 1988). Among West Indian *Gonolobus* species, defined secondary nectaries are evident—at least as far as can be determined from herbarium specimens—only in a few species (e.g., *G. dussii* Krings). Kunze (1995, 1999) also found defined secondary nectaries in continental *G. chloranthus* Schldl. and *G. fraternus* Schldl., as well as the gonolobinoid *Matelea reticulata* (Engelm. ex A. Gray) Woodson and *M. argentinensis*. Secondary nectaries are epithelial, consisting of enlarged epidermal cells enriched with cytoplasm (Kunze 1995). Epithelial nectaries on the filament flanks appear to be widespread in Asclepiadoideae (Christ & Schnepf 1985; Kunze 1991; Kunze 1995).

The gynostegial stipe is generally edentate, although *G. jamaicensis*, *G. stephanotrichus*, and *G. youroumaynensis* have distinct teeth or “notches”. The stipal teeth or “notches” of all three species are distinct in shape and occur in different locations. Their homology is unclear.

**Laminar dorsal anther appendages.**—Laminar dorsal anther appendages (Cd sensu Kunze 1995; Fig. 3Ki–ii, L–M) are restricted to *Gonolobus* s.l. or s.s., although it remains unclear whether they evolved once in the most recent common ancestor of the former, or once in the ancestor of the latter and in the ancestor of the *Fimbristemma* group within *Gonolobus* s.l. (Krings et al. 2008). Parsimony is equivocal on the question (Krings et al. 2008). The only other genus exhibiting dorsal anther appendages within Gonolobinae (and Asclepiadoideae, fide Kunze 1995) is *Fischeria*, but the appendages are vesicular rather than laminar (Murphy 1986; Vethacke 1994; Kunze 1995). Laminar dorsal appendages vary in shape from truncate to rounded to strongly, divergently bi-lobed. They tend to be spreading, but are conspicuously (and spectacularly) erect in mature flowers of *G. stapelioides* (Fig. 3Ki).

**Style-heads.**—Style-heads vary conspicuously in West Indian Gonolobinae, but tend to be essentially planar (varying from somewhat convex to somewhat concave) in *Gonolobus* species in the area (Fig. 3Kii, L). West Indian *Gonolobus* species also lack terminal style-head appendages, in contrast to other West Indian Gonolobinae species such as *Matelea maritima*, *M. corynephora*, *M. rhynchocephala*, and *M. torulosa* (see Krings 2006).

**Pollinaria.**—Pollinaria in Asclepiadoideae consist of a secreted corpusculum and two connected pollinia (pollen sacs; Kunze 1994). The two pollen sacs are the result of a reduction in anther locules from four in the more primitive Secamonoideae to two in the more derived Asclepiadoideae (Kunze 1996; Rapini et al. 2003; Liede-Schumann et al. 2005; Rapini et al. 2006). The pollinia are borne essentially horizontally in West Indian *Gonolobus* species—as they are in most members of the Gonolobinae—and should be considered broad, rather than long (Kunze 1995; Endress & Bruyns 2000; Fig. 3N). Only a portion of each pollinium is fertile and hyaline, sterile portions are easily visible. The corpusculum in the Gonolobinae (based on studies of *Matelea reticulata* and *M. argentinensis*) consists of solid side walls and a thick, three-layered floor (Kunze 1994). Kunze (1994) suggested that the formation of the side-walls originates in two primarily separated strands of secretion which eventually merge into one compact wall. Caudicles are present (Fig. 3N), but Kunze (1994) noted it was difficult to determine whether they are extensions of the outer flanks or new additions. He suggested the latter, based on the lack of staining with either hematoxylin or safranin, although



noting that caudicle initiation in the two *Matelea* species occurs very early in ontogeny and directly from the corpusculum, rather than apart from it.

**Follicles.**—Follicles in West Indian *Gonolobus* species (as in most continental *Gonolobus* spp. fide Stevens 2001), when known, are 5-winged (Fig. 3O), although small murications may be seen between the wings of some taxa (e.g., *G. stellatus*). Some continental species of *Gonolobus* also exhibit 4-winged (*G. albomarginatus* (Pittier) Woodson) or apparently 3-winged (*G. incerianus* W.D. Stevens & Montiel) follicles (Stevens 2001). Winged follicles are also exhibited by other members of West Indian Gonolobinae, such as *M. linearipetala*, and the putative members of an ocellate complex *M. acuminata*, *M. bayatensis*, *M. correllii*, *M. nipensis*, *M. oblongata*, *M. rhamnifolia*, and *M. tigrina*.

**Seeds.**—Seeds of West Indian *Gonolobus* species, as of most West Indian Gonolobinae, are essentially planar and pyriform in outline (distinctly plano-convex in *Matelea maritima* and *M. rubra* (H. Karst.) Spellman & Morillo). Distal margins vary from entire to dentate or crenate (Fig. 3P). Comas are translucent.

#### HABITAT

In general, West Indian *Gonolobus* species occur in small gaps or openings in mid-elevation, moist or wet forests on limestone derived soils. They are absent from high-elevation dwarf forests, coastal thickets, mangroves, marshes, or dry forests. Occurrences are infrequent to rare and likely limited by available habitat. Small gaps in minimally disturbed forests appear vital to seedling germination as vines are rarely encountered elsewhere. Changes in gap dynamics or forest condition, thus could have profound impacts on the maintenance of *Gonolobus* populations. With the exception of *G. youroumaynensis*, the species have not been found along roadside edges, where other vines (particularly *Ipomoea* L. spp. and *Dioscorea* L. spp.) are generally superior competitors and quickly form thick, tangled thickets. *Gonolobus youroumaynensis* was found along a roadside patch of vegetation in St. Vincent, although it remains unclear whether the population is competitive there or merely persistent following a colonization event. A population of *Gonolobus iyanolensis* persists on top of Gros Piton in St. Lucia among boulders.

#### POLLINATION

As there have been no pollination biology studies on West Indian *Gonolobus* species, their pollinators remain unknown. In fact, pollinators appear to be documented for only two species of *Gonolobus* range wide: *G. fraternus* (Mexico and Central America) and *G. suberosus* (United States).

Kunze (1999) studied the pollination ecology of *G. chloranthus* and *G. fraternus*, but was able to observe putative pollinators only on the latter. Pollinarium uptake was confirmed for two diptera species (Calliphoridae, Tachinidae), a bee (Apidae), and a wasp (Vespidae) (Kunze 1999). Other observed visitors included *Apis mellifera* Linnaeus (Apidae) and unidentified butterflies (Lepidoptera) (Kunze 1999). However, pollinarium removal by these could not be verified. Corpuscula were removed by the wasp and bee by their legs, and by the bee and the flies by their probosces. Foraging behavior differed among the observed species, with the wasp and bee preferring upper regions of the studied vine, and the flies, the middle and lower.

Drapalik (1969) captured small dipterans (all Chloropidae) on flowers of *G. suberosus*, but it remains unclear whether they are effective pollinators due to their size (1.5–3 mm) and lack of pollinaria on capture. Lipow and Wyatt (1998) also studied *G. suberosus*, but despite daily and nightly searches were unable to find pollinators.

*Gonolobus suberosus* appears to exhibit considerable variation in the numbers of flowers per individual plant, the number of flowers per inflorescence, and the number of inflorescences per individual plant (Lipow & Wyatt 1998). Only a small fraction of plants monitored by Lipow and Wyatt (1998)—less than 5%—were pollinated and per flower removal rate of pollen was only 0.31. This rate was less than previous reports in other asclepiads (Table 1).

Ollerton and Liede (1997) noted that subtribe Gonolobinae appears distinct in being predominantly dipteran pollinated, although this claim was based on only five *Matelea* species in the southeastern United

TABLE 1. Per flower rates of pollen removal and pollinium deposition within Asclepiadoideae (arranged by per flower rate of pollen removal).

Species	Per flower rate of pollen removal	Per flower rate of pollinium deposition	Source
<i>Asclepias exaltata</i> L.	0.23–1.38	0.39–0.66	Queller (1985); Wyatt & Shannon (1986); Broyles & Wyatt (1990, 1995)
<i>Gonolobus suberosus</i> (L.) R.Br.	0.31	0.043	Lipow & Wyatt (1998)
<i>Matelea reticulata</i> (Engelm. ex A. Gray) Woodson	0.54–0.94	--	Liede (1994); Krings (1999)
<i>Asclepias curassavica</i> L.	0.62–1.7	0.13	Wyatt (1980); Willson & Melampy (1983); Wolfe (1987)
<i>Asclepias syriaca</i> L.	0.62–1.7	--	Willson & Rathcke (1974)
<i>Asclepias quadrifolia</i> Jacq.	0.81–2.41	--	Chaplin & Walker (1982)
<i>Asclepias tuberosa</i> L.	1.64	0.71	Wyatt (1978)
<i>Funastrum pannosum</i> (Decne.) Schltr.	2.43–2.48	0.57–1.52	Kunze & Liede (1991)
<i>Funastrum clausum</i> (Jacq.) Schltr.	2.64	2.16	Kunze & Liede (1991)
<i>Asclepias solanoana</i> Woodson	2.91–4.3	1.23–1.81	Lynch (1977)

States (Drapalik 1969). The claim remains mostly true today, although knowledge from only a single additional species of *Fischeria* and *Gonolobus* each has been added (Skutch 1988; Kunze 1999). Two additional studies examined species also studied by Drapalik (1969) and found additional dipteran floral visitors (Liede 1994; Krings 1999). Kunze (1999) found flowers of *G. fraternus* polyphilic and noted that they were not specialized for a single kind of pollinator. The ASCLEPOL database ([http://www.uni-bayreuth.de/departments/planta2/research\\_wgl/pollina/as\\_pol\\_d.html](http://www.uni-bayreuth.de/departments/planta2/research_wgl/pollina/as_pol_d.html)) currently also lists pollinators for *G. argentinensis* T. Mey. (1 sp. of Calliphoridae, Diptera), but this species has most recently been recognized in *Matelea*.

#### INSECTS HOSTED

There are no published records of insects hosted by West Indian *Gonolobus* species known to the author. However, a few records of primarily dipterans and lepidopterans have been published for continental species in the genus. Castrejon-Ayala and Camino-Lavin (1991) reported *Gonolobus sorodius*, nom. nud., as host for papaya fruit fly (*Toxotrypana curvicauda* Gerstaecker)—the principal insect pest of commercial papaya (*Carica papaya* L.). Norrbom (unpubl.) suggested this plant may be *Gonolobus barbatus* Kunth. Baker et al. (1944) reported another asclep host plant of papaya fruit fly—a wild species known as *talayote* or *talayotillo* in northeastern Mexico (Santa Engracia and Cañon de Rosario). Castrejón-Ayala (1987) suggested the plant may be a species of *Gonolobus* and Landolt (1994) suggested perhaps *G. erianthus* DC. *Gonolobus salvinii* Hemsl.—commonly called *champeron* in Guatemala—may yet be another host for the papaya fruit fly (Norrbom & Muñoz, unpubl.).

Capinera (2005) reported “*Gonolobus* sp.” among hosts for the saltmarsh caterpillar (*Estigmene acrea* (Drury))—a species ranging from Canada to Central America. An unidentified species of *Gonolobus* was reported as host for *Erinnyis obscura obscura* (Fabricius)—a sphingid found in Amazonas, Brazil (Silva Motta & Xavier-Filho 2005).

There are a number of reports of *Gonolobus laevis* Michx. serving as host plant for various lepidopterans, including *Danaus gilippus* Cramer and *D. plexippus* (Linnaeus), however *G. laevis* belongs to the Cynanchinae, not Gonolobinae, and should be recognized as *Cynanchum laeve* (Michx.) Pers. (Liede & Täuber 2002).

#### SEED DISPERSAL

The follicles of known West Indian *Gonolobus* species are smooth and uniformly 5-winged, dehiscing along a solitary suture between two wings to release the comose seeds. Seeds are very light (Table 2) and can travel on slight breezes. Unfortunately, mature follicles have been documented by collections for only three

of the ten species of West Indian *Gonolobus* (Table 2). Immature follicles are known for *G. stapelioides* (see Additional specimens examined). The paucity of fruiting collections is echoed in West Indian Gonolobinae as a whole. Follicles have been collected for less than half of the estimated fifty species in the West Indies (Krigs, unpubl.). The low rate of fruit collections may be due to naturally low levels of fruit set in the subtribe (Lipow & Wyatt 1998), as well as collector habit, flowers being necessary for most species level determinations. Lipow and Wyatt (1998) suggested that low fruit set in Gonolobinae may be attributable to pollen limitation. Less than 5 % of flowers monitored were pollinated and only a single fruit matured from 352 flowers on 13 plants (Lipow & Wyatt 1998).

#### CHROMOSOMES

There are no published reports of chromosome numbers in West Indian *Gonolobus* or Gonolobinae. Previously published reports for continental Gonolobinae, including continental *Gonolobus*, show the same basic chromosome number  $x = 11$  that predominates the subfamilies Asclepiadoideae, Periplocoideae, and Scamonoideae (Albers & Meve 2001). Only 6% of 672 species surveyed in the three subfamilies by Albers and Meve (2001) were polyploid and deviations (reductions or increases in chromosome numbers) were found only in the Asclepiadoideae. No deviations within the Gonolobinae from  $2n = 22$  were found by Albers and Meve (2001), although only five species in four genera were included from the subtribe in their survey.

#### USES

As there are no published accounts of human uses of West Indian *Gonolobus* species known to the author, a survey of uses in other areas may be of interest to the reader. The Ecuadorian endemic and IUCN Vulnerable (VU) listed *Gonolobus saraguranus* Morillo has been reported to be used by the Saraguro native people as a medicinal plant (specific use unspecified), under the name *sacha angó* (Pitman 2003). Unspecified medicinal uses are also reported for *Gonolobus yucatanensis* (Woodson) W.D. Stevens, a taxon described in *Trichostelma* Baill. (Durán García et al. 1997). Standley and Williams (1969) noted that the tender, young fruits of *Gonolobus* species are commonly used as vegetables in Guatemala, and may be available in local markets under the name *cuchamper*, although this name has also been applied to the fruits of related genera. Specific uses are noted by Standley and Williams (1969) for *G. salvinii* (tender follicles eaten raw when almost mature, and cooked and eaten at almost all stages of growth) and *G. stenanthus* (Standley) Woodson (young follicles boiled or otherwise cooked with sugar to make sweetmeats or dulces). Stevens (2005) noted that “most, if not all, species of *Gonolobus* have fruits that are eaten when young, either raw or cooked.” Numerous studies have examined potential medicinal properties of latex in Asclepiadinae (*Asclepias* L.: Liggieri et al. 2004; *Calotropis* R.Br.: Rasik et al. 1999; Kumar et al. 2001; Dubey & Jagganadham 2003; Shivkar & Kumar 2003; Ahmed et al. 2004; Alencar et al. 2004; Kumar & Shivkar 2004a & b; Shivkar & Kumar 2004; Al-Mezaine et al. 2005; Arya & Kumar 2004, 2005; Iqbal et al. 2005; Pahdy & Kumar 2005; Rajesh et al. 2005; Roy et al. 2005; Sehgal & Kumar 2005; Soares et al. 2005; Choedon et al. 2006; Kumar et al. 2006; Ramos et al. 2006a & b; Sehgal et al. 2006), Metastelmatinae (*Funastrum* E. Fourn.: Morcelle et al. 2004; *Philibertia* Kunth: Sequeiros et al. 2005), and Oxypetalinae (*Araujia* Brot.: Priolo et al. 2000; Gaig et al. 2005; *Morrenia* Lindl.: Vairo Cavalli et al. 2003), but no such studies are known to the author in Gonolobinae.

#### CONSERVATION

Human disturbance disproportionately affects infrequent plant species more than common taxa as further reductions of already low population sizes may not be sustainable (Lawton 1993; Casagrandi & Gatto 2000; Hendrix & Khyll 2000; Benítez-Malvido & Martínez-Ramos 2003). West Indian *Gonolobus* species, as many other species of Asclepiadoideae (Kunze & Liede 1991), appear to be quite infrequent, if not rare, and are in need of serious survey (particularly in Cuba and the Lesser Antilles) to establish their conservation status. However, some provisional remarks are possible, based on study of collections and field observations associated with this study.

TABLE 2. Seed weight and size in West Indian *Gonolobus* species for which mature fruits have been seen by the author. Arranged from lightest to heaviest seed. Seeds obtained from a single follicle for each species.

Species	Average seed weight [N = number of seeds sampled]	Length <sup>1</sup>	Width <sup>1</sup>
<i>G. stephanotrichus</i> (Acevedo-Rodríguez 11445, UPRRP)	0.0035 g [N=10]	(7.1) 7.4 (7.8) [N=10; s.d.=0.2066]	(3.4) 4.23 (4.7) [N=10; s.d.=0.4083]
<i>G. stapelioides</i> (Bellingham 1487, BM)	0.0044 g [N=81]	(4.6) 5.0 (5.6) [N=10; s.d.=0.2914]	(2.5) 2.93 (3.5) [N=10; s.d.=0.2627]
<i>G. iyanolensis</i> (Graveson s.n., NCSC)	0.0116 g [N=26]	(8.8) 9.92 (10.5) [N=10; s.d.=0.4848]	(4.9) 5.38 (5.9) [N=10; s.d.=0.3084]

<sup>1</sup>Format for length and width measurements = (Min) Avg (Max) [number of seeds sampled; standard deviation]

The habitat requirements of West Indian *Gonolobus* species are in need of further study, but preliminary evidence suggests that most species are largely limited to small gaps or openings in mid-elevation, moist or wet forests. They appear to be poor competitors along forest edges. The combined infrequency of occurrence of individuals, poor competitive ability along edges, likely low pollination and fruit set rates (see Pollination and Seed Dispersal above), and need for small gaps or openings in specific forest community types, suggests that *Gonolobus* species may be particularly vulnerable to loss of habitat. This is of particular concern considering the high rate of island endemism among the species. Eight of the ten West Indian *Gonolobus* species are endemic to single islands (Fig. 1). *Gonolobus dussii* occurs on two islands and *G. stephanotrichus* occurs on three islands. Seven of the ten West Indian *Gonolobus* species are known from five or fewer collections or localities (Table 3). None of the remaining three species appears to be known from more than ten localities. Provisional estimates of conservation status according to the criteria outlined in Version 3.1 of the IUCN Red List Categories and Criteria (IUCN 2001) and Version 6.1 of NatureServe Conservation Status Ranks (NatureServe 2006) are provided in Table 3. Provisional estimates are based on historical collections, the number of known localities, whether taxa are known from protected areas, and inferred habitat or population changes. These estimates need to be followed by targeted survey to better establish the conservation status of the species.

#### TAXONOMIC TREATMENT

***Gonolobus*** Michx., Fl. Bor.-Amer. 1:119. 1803. TYPE: *G. macrophyllus* Michx., nom. illeg. (*Vincetoxicum gonocarpos* Walter; *Gonolobus gonocarpos* (Walter) Perry (LECTOTYPE, designated by Perry 1938) = *Gonolobus suberosus* (L.) R.Br.

Rhizomatous, perennial vines. Leaves opposite, blades simple, membranous or coriaceous, apices obtuse, acute, or acuminate, bases mostly cordate, but cuneate to rounded in some taxa; colleters present on the adaxial surface at the base of the midvein. Stipular colleters 2, one borne at the base of the petiole on each side. Inflorescences extra-axillary, racemiform. Floral aestivation imbricate, dextrorse. Sepals 5; colleters 1–2 per sinus. Corolla lobes 5, mostly uniformly colored with various shades or green to reddish or maroon, sometimes multi-colored and basally maroon or dark purplish and apically green (e.g., *G. suberosus*), not ocellate, lobes overlapping at the base, glandular emergences present in the sinuses. Faucal annulus (Ca) present, sometimes interrupted and developed only in the staminal—or rarely interstaminal (e.g., *G. stapelioides*)—position. Gynostegial corona of fused staminal (Cs) and interstaminal parts (Ci); Cs not foliolate or free, not ligulate; Ci ligulate or not. Laminar dorsal anther appendages (Cd) present, reflexed, spreading, or erect. Style-head flat to slightly concave or convex, lacking a defined protuberance or elongate terminal appendage. Pollinaria with pollinia borne horizontally or essentially so. Follicles winged. Seeds essentially plane, distally entire or dentate, comose. 100–150 species (10 spp. in the West Indies as here defined).

Perry (1938) chose *Gonolobus macrophyllus* Michx.—the first of three species listed by Michaux (loc. cit.)—as the lectotype for the genus *Gonolobus*. However, Michaux cited *Vincetoxicum gonocarpos* Walter as a

TABLE 3. Number of collections and localities, distribution, and provisional conservation status of West Indian *Gonolobus* species. Arranged by number of localities represented, then number of collections. NatureServe conservation ranks follow IUCN ranks. IUCN conservation ranks are global. Critically endangered taxa are unknown from protected areas.

Species	No. of localities	No. of collections	Distribution	Provisional conservation status
<i>G. absalonensis</i>	1	1	Martinique	Critically endangered (CR); GH NH
<i>G. martinicensis</i>	1–3	3	Martinique	Critically endangered (CR); GH NH
<i>G. youroumaynensis</i>	1–2	3	St. Vincent	Critically endangered (CR); G1 N1
<i>G. dussii</i>	5	5	Guadeloupe and Martinique	Critically endangered (CR); GH NH (both islands)
<i>G. iyanolensis</i>	2	5	St. Lucia	Endangered (EN); G1 N1
<i>G. stellatus</i>	4	4	Jamaica	Vulnerable (VU); G3 N3
<i>G. jamaicensis</i>	4	5	Jamaica	Vulnerable (VU); G3 N3
<i>G. waitukubuliensis</i>	4–8	17	Dominica	Vulnerable (VU); G3 N3
<i>G. stapelioides</i>	5–7	13	Jamaica	Least concern (LC); G4 N4
<i>G. stephanotrichus</i>	7–10	19	Greater Antilles	Least concern (LC); G4 N4 (all islands of occurrence)

GH: Possibly Extinct (species)—Missing; known from only historical occurrences but still some hope of rediscovery. G1: Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors. G3: Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors. G4: Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors. NH: Possibly Extirpated (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20–40 years. N1: Critically Imperiled—Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province. N3: Vulnerable—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation. N4: Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

synonym for his *G. macrophyllus*, rendering the latter name illegitimate. Perry (1938) proposed the combination *G. gonocarpos* as the correct name for Michaux’s *G. macrophyllus*. Recent study found the entity variously known as *G. gonocarpos* or *G. macrophyllus* conspecific with *G. suberosus* (Krings & Xiang 2004, 2005). The latter name has priority following Reveal and Barrie (1992).

Some Robert Brown names have sometimes been incorrectly dated. In 1810, a preprint of his “On the Asclepiadeae, a Natural Order of Plants separated from the Apocinae of Jussieu” was made available. This same work later appeared in the first volume of the 1811 *Memoirs of the Wernerian Natural History Society* (Stearn 1960; Stafleu & Cowan 1976; Mabberley 1985). Although sometimes incorrectly cited from the first reading of the paper in 1809, communication at public meetings does not constitute effective publication (Forster 1991; Greuter et al. 2000; McNeill et al. 2006). Names should also not be ascribed to the 1811 appearance of the *Memoirs of the Wernerian Natural History Society* but rather to the preprint released in 1810. Thus the combination *Gonolobus suberosus* (L.) R. Br. should be cited as above, rather than in Mem. Wern. Nat. Hist. Soc. 1:35 (1810). As Brown’s 1810 combination in *Asclepiadeae* is validly published (by definite association of the final epithet with the genus name), it takes priority over the Schultes combination in *Systema Vegetabilium* 6:59 (1820).

KEY TO THE SPECIES OF *GONOLOBUS* IN THE WEST INDIES

1. Corolla lobes with lateral margins revolute; faucal annulus (corolline corona or Ca) interrupted, strongly developed into two mounds opposite each corolla lobe, appearing absent opposite each corolla sinus, pubescent; laminar dorsal anther appendages erect (spreading when immature or spent), white, to 4.2 mm long, apices divergently and sharply bilobed \_\_\_\_\_ **6. *G. stapelioides***

1. Corolla lobes essentially plane, sometime reflexed, but margins not revolute; faucal annulus (corolline corona or Ca) uninterrupted or if interrupted then at most developed into a shallow ridge opposite each corolla lobe sinus; laminar dorsal anther appendages (Cd) descending or spreading, variously colored, < 2 mm long, apices rounded, truncate, slightly emarginate, or rounded-bilobed (divergently and sharply bilobed only in *G. stellatus*).
2. Faucal annulus of corolla (corolline corona or Ca) an uninterrupted ring, conspicuously raised (0.4–0.9 mm tall), pubescent along the entire rim or only opposite each corolla lobe sinus; gynostegial corona basally fused into an erect ring, obscured from view by the faucal annulus.
  3. Gynostegial stipe edentate \_\_\_\_\_ **9. G. waitukubuliensis**
  3. Gynostegial stipe dentate.
    4. Adaxial corolla lobes purple-red to maroon; gynostegial stipe teeth appearing as notches, borne on the lower portion of the column, just above the upwardly rising segment of each Cs; Jamaica \_\_\_\_\_ **4. G. jamaicensis**
    4. Adaxial corolla lobes various shades of green; gynostegial stipe teeth not appearing as notches, instead truncate, borne on the lower portion of the column, just above the upwardly rising segment of each Cs; Cuba, Hispaniola, Puerto Rico \_\_\_\_\_ **8. G. stephanotrichus**
2. Faucal annulus of corolla (corolline corona or Ca) reduced to an interrupted ridge, distinct only opposite each corolla lobe sinus, tufted pubescent to glabrate or, if uninterrupted, then very shallow, to 0.25 mm tall; gynostegial corona not basally fused into an erect ring that is obscured from view by the faucal annulus.
5. Interstaminal gynostegial corona double (i.e., a narrower upper ligulate corona lobe occurring on top of the broader lower corona).
  6. Corolla robust, base of corolla tube subcampanulate, as broad as long or broader than long; horizontal length of lower interstaminal gynostegial corona (Ci) from base of stipe to lobe apex 1.1–1.4 mm, narrow upper ligulate corona lobe of the Ci abruptly ending in a scooped out depression before reaching the stipe base, dorsally ridged \_\_\_\_\_ **3. G. iyanolensis**
  6. Corolla slender, base of corolla tube elongate-campanulate, distinctly longer than broad; horizontal length of interstaminal gynostegial corona (Ci) from base of stipe to lobe apex  $\leq$  0.7 mm, narrow upper ligulate corona lobe of the Ci ending essentially at the stipe base, dorsally plane or sometimes slightly raised into a shallow bump \_\_\_\_\_ **5. G. martinicensis**
5. Interstaminal gynostegial corona single.
  7. Gynostegial stipe with a single tooth below each anther.
    8. Faucal annulus pubescent along the entire ring; teeth of gynostegial stipe borne on lower portion of the column, just above the upwardly rising segment of the Cs \_\_\_\_\_ **8. G. stephanotrichus**
    8. Faucal annulus pubescent only in the staminal position; teeth of gynostegial stipe borne on upper portion of the column, just below the anther \_\_\_\_\_ **10. G. youroumaynensis**
  7. Gynostegial stipe edentate.
    9. Cs to 1 mm tall; interstaminal gynostegial corona (Ci) with two distinctly raised and rounded mounds; laminar dorsal anther appendages (Cd) truncate or rounded \_\_\_\_\_ **2. G. dussii**
    9. Cs < 0.3 mm tall; interstaminal gynostegial corona (Ci) smooth, lacking raised bumps; laminar dorsal anther appendages (Cd) emarginate.
      10. Leaf bases uniformly cuneate; laminar dorsal anther appendages (Cd) slightly emarginate to divergently and sharply bilobed \_\_\_\_\_ **7. G. stellatus**
      10. \_\_\_\_\_ **Leaf bases cordate; G. absaloniensis** anther append

REGIONAL KEYS TO THE SPECIES OF *GONOLOBUS*  
GREATER ANTILLES

1. Corolla lobes with margins revolute; faucal annulus (corolline corona or Ca) interrupted, strongly developed into two mounds opposite each corolla lobe, absent opposite each corolla sinus, pubescent; laminar dorsal anther appendages erect (spreading when immature or spent), white, apices divergently and sharply bilobed, to 4.2 mm long; Jamaica \_\_\_\_\_ **6. G. stapelioides**
1. Corolla lobes essentially plane, sometime reflexed, but not revolute; faucal annulus (corolline corona or Ca) uninterrupted or if interrupted then at most developed into a shallow ridge opposite each corolla lobe sinus; laminar dorsal anther appendages (Cd) descending or spreading, variously colored, apices rounded, truncate, slightly emarginate, or rounded-bilobed (divergently and sharply bilobed only in *G. stellatus*), < 2 mm long.
  2. Faucal annulus of corolla (corolline corona or Ca) an uninterrupted ring, conspicuously raised (0.4–0.9 mm tall), pubescent along the entire rim or only opposite each corolla lobe sinus; gynostegial corona basally fused into an erect ring, obscured from view by the faucal annulus.

3. Adaxial corolla lobes purple-red to maroon; gynostegial stipe teeth appearing as notches, borne on the lower portion of the column, just above the upwardly rising segment of each Cs; Jamaica \_\_\_\_\_ **4. *G. jamaicensis***
3. Adaxial corolla lobes various shades of green; gynostegial stipe teeth not appearing as notches, instead truncate, borne on the lower portion of the column, just above the upwardly rising segment of each Cs; Cuba, Hispaniola, Puerto Rico \_\_\_\_\_ **8. *G. stephanotrichus***
2. Faucal annulus of corolla (corolline corona or Ca) reduced to an interrupted ridge, distinct only opposite each corolla lobe sinus, tufted pubescent to glabrate or, if uninterrupted, then very shallow,  $\leq 0.25$  mm tall; gynostegial corona not basally fused into an erect ring that is obscured from view by the faucal annulus.
4. Leaf bases uniformly cuneate; gynostegial stipe edentate; laminar dorsal anther appendages (Cd) slightly emarginate to divergently and sharply bilobed; Jamaica \_\_\_\_\_ **7. *G. stellatus***
4. Leaf bases cordate; gynostegial stipe with a single tooth borne on lower portion of the column, just above the upwardly rising segment of each Cs; laminar dorsal anther appendages (Cd) truncate or rounded; Cuba, Hispaniola, Puerto Rico \_\_\_\_\_ **8. *G. stephanotrichus***

## LESSER ANTILLES

1. Faucal annulus of corolla (corolline corona or Ca) an uninterrupted ring, conspicuously raised (to 0.5 mm tall), pubescent along the entire rim or only opposite each corolla lobe sinus; gynostegial corona appearing densely folded apically, basally fused into a ring, obscured from view by the faucal annulus; gynostegial stipe 1–1.5 mm tall; Cd emarginate; Dominica \_\_\_\_\_ **9. *G. waitukubuliensis***
1. Faucal annulus of corolla (corolline corona or Ca) reduced to an interrupted ridge, distinct only opposite each corolla lobe sinus, tufted pubescent to glabrate or, if uninterrupted, then very shallow, mostly 0.08 mm tall, and glabrous, except to 0.16 mm tall and tufted pubescent opposite each corolla lobe sinus; gynostegial corona neither apically densely folded nor basally obscured by a faucal annulus; gynostegial stipe  $\leq 1$  mm tall; Cd rounded or truncate (emarginate in *G. absalonensis*).
2. Interstaminal gynostegial corona double (i.e., a narrower upper ligulate corona lobe occurring on top of the broader lower corona—Fig. 6E, 8E).
3. Corolla robust, base of corolla tube subcampanulate, as broad as long or broader than long; horizontal length of lower interstaminal gynostegial corona (Ci) from base of stipe to lobe apex 1.1–1.4 mm, narrow upper ligulate corona lobe of the Ci abruptly ending in a scooped out depression before reaching the stipe base, dorsally ridged; St. Lucia \_\_\_\_\_ **3. *G. iyanolensis***
3. Corolla slender, base of corolla tube elongate-campanulate, distinctly longer than broad; horizontal length of interstaminal gynostegial corona (Ci) from base of stipe to lobe apex  $\leq 0.7$  mm, narrow upper ligulate corona lobe of the Ci ending essentially at the stipe base, dorsally plane or sometimes slightly raised into a shallow bump; Martinique \_\_\_\_\_ **5. *G. martinicensis***
2. Interstaminal gynostegial corona single.
4. Gynostegial stipe with a single tooth ca. 0.2 mm long below each anther; St. Vincent \_\_\_\_\_ **10. *G. youroumaynensis***
4. Gynostegial stipe edentate.
5. Corolla lobes (10–)12–17 mm long; Cs to 1 mm tall; interstaminal gynostegial corona (Ci) with two distinctly raised and rounded mounds; laminar dorsal anther appendages (Cd) truncate or rounded; Guadeloupe and Martinique \_\_\_\_\_ **2. *G. dussii***
5. Corolla lobes 4.8–6.7 mm long; Cs  $< 0.3$  mm tall; interstaminal gynostegial corona (Ci) smooth, lacking raised bumps; laminar dorsal anther appendages (Cd) rounded bilobed; Martinique \_\_\_\_\_ **1. *G. absalonensis***

**1. *Gonolobus absalonensis*** Klings, Syst. Bot. 32:181. 2007. (**Fig. 4**). TYPE: MARTINIQUE: Absalon, Près la cascade, May 1910 (fl), Herb. d'Alleizette s.n. [4801?] (HOLOTYPE: L!).

Herbaceous perennial vines. Latex unknown, presumably white. Stems glabrate to very sparsely pubescent, both short, capitate-glandular, and longer, sharp, eglandular trichomes present, the latter retrorse internodally and antrorse-appressed along an indistinct, horizontal ridge between two opposite petioles and/or just above the node, to 0.5 mm long; nodes sparsely pubescent, gland field apparently absent. Leaf blades ovate to oblong-ovate, (3.4–)6.6–8.6 cm  $\times$  (1.3–)3.4–4.5 cm, apices abruptly acuminate with the acumen narrowly obtuse, to 0.7 cm long, bases deeply or shallowly cordate, margins entire, adaxial surface sparsely strigose, abaxial surface more densely strigose with sharp, eglandular trichomes scattered along the major and minor

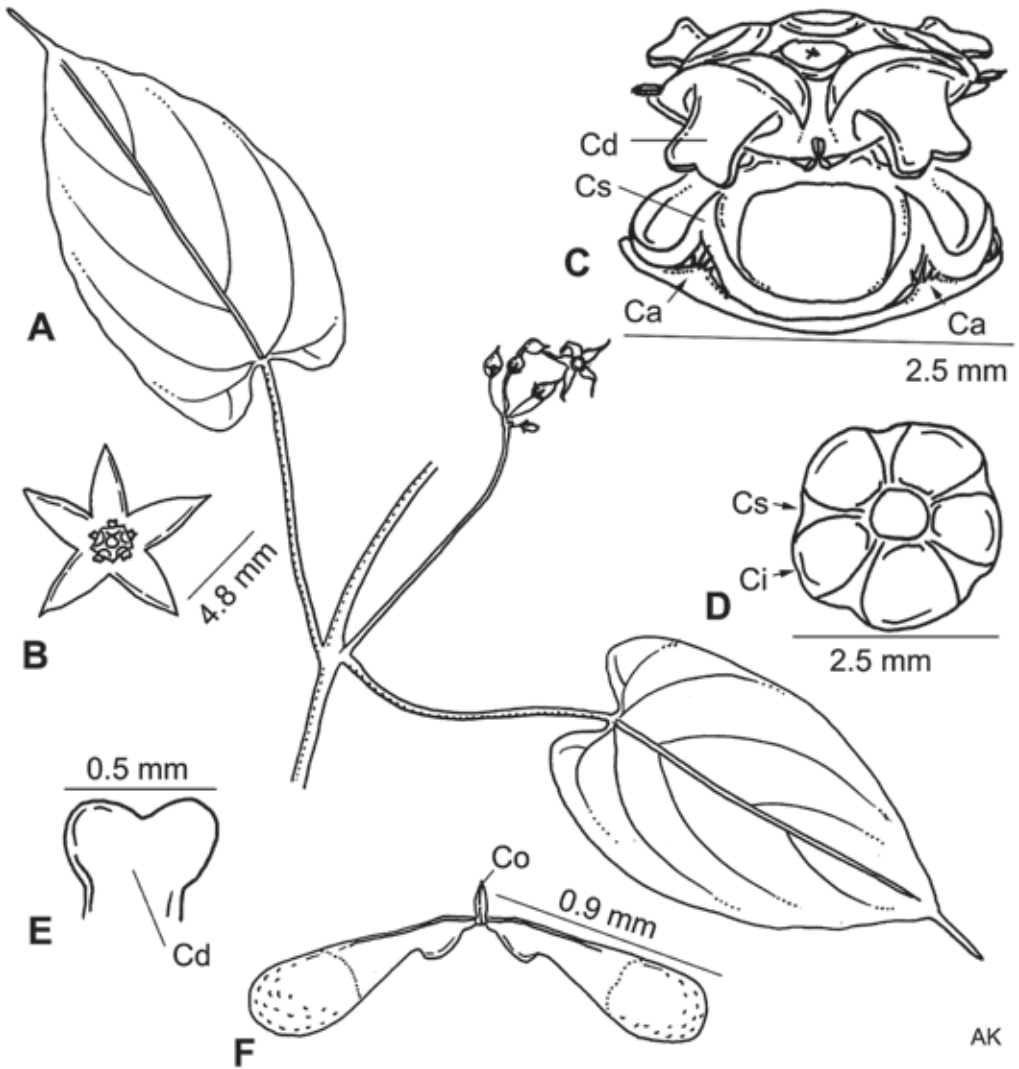


FIG. 4. *Gonolobus absalonensis*. **A**. Leaves and inflorescence. **B**. Open flower. **C**. Faucal annulus of the corolla (Ca), gynostegial corona, and style-head. **D**. Gynostegial corona of fused staminal (Cs) and interstaminal (Ci) segments (style-head removed). **E**. Laminar dorsal anther appendage (Cd). **F**. Pollinarium. Based on Herb. d'Alleizette s.n. [4801?] (L). **Ca** = faucal annulus of corolla; **Ci** = interstaminal gynostegial corona segment; **Cd** = laminar dorsal anther appendage; **Co** = corpusculum; **Cs** = staminal gynostegial corona segment.

veins, colleters 2, 0.5–0.9 mm long; petioles 3.6–5.7 cm long, glabrous or very sparsely pubescent on all sides, capitate trichomes to 0.1 mm long, sharp, eglandular trichomes ca. 0.3 mm long, antrorsely-appressed or -ascending; stipular colleters 2, ca. 0.3 mm long, one borne on each side of the petiole base. Inflorescences racemiform, peduncles 4.1–5.4 cm long, glabrate to very sparsely pubescent, capitate, as well as sharp, eglandular trichomes present, the latter antrorsely-appressed or -ascending, found primarily at the apex, ca. 0.3 mm long; pedicels 1.5–1.7 cm long, more pubescent at the apex than at the base, capitate-glandular trichomes ca. 0.05 mm long, longer, sharp, eglandular trichomes antrorsely-appressed or -ascending, ca. 0.13 mm long, bracts linear-lanceolate, ca. 0.9 mm × 0.21 mm long, caducous, adaxial surface glabrous, abaxial surface coarsely pubescent, trichomes sharp, eglandular, ca. 0.26 mm long, antrorse. Calyx lobes 5,



lanceolate, 1.95 mm × 1 mm, apices narrowly obtuse or acute, margins glabrous, abaxial surface pubescent mostly at the base, sharp, eglandular trichomes, antrorsely-ascending or -appressed, to 0.25 mm long; col-leters 1 per sinus. Corolla lobes 5, lanceolate to ovate, 4.8–6.7 mm × 2.5–2.8 mm, slightly lobed at the base, a glandular swelling frequently present in the sinus, adaxial glabrous, abaxial surface glabrous; faucal annulus (corolline corona or Ca) a shallow, uninterrupted ring, ca. 2.5 mm diam, ca. 0.08 mm tall, glabrous except where raised opposite each corolla lobe sinus, then to ca. 0.16 mm tall and short hispid; gynostegial corona of fused staminal (Cs) and interstaminal parts (Ci), single, 5-lobed, erect- or prostrate-undulating, 0.4–0.6 mm tall; anther guiderails without appendages; laminar dorsal anther appendages (Cd) 0.48–0.7 mm × 0.5–0.8 mm, emarginate; style-head ca. 3.2 mm diam, stipe 0.3–0.5 mm long, not toothed. Pollinaria: corpuscula ca. 0.18 mm long, pollinia borne horizontally, ovate, ca. 0.9 mm × 0.3 mm. Follicles unknown.

*Phenology*.—Flowering in May.

*Distribution*.—*Gonolobus absalonensis* is endemic to Martinique (Fig. 1). Its habitat is poorly known, but likely primarily middle elevation rainforest based on the requirements of most congenics in the Lesser Antilles. The type was apparently collected near a waterfall.

*Provisional conservation status*.—IUCN: Critically endangered (CR)—B1a,biii. NatureServe: GH NH.

*Taxon concept mapping*.— < *G. martinicensis* sensu Duss (1897); < *G. martinicensis* sensu Schlechter (1899); < *G. martinicensis* sensu Howard (1988); < *G. martinicensis* sensu Fournet (2002).

*Notes*.—*Gonolobus absalonensis* is the smallest-flowered Lesser Antillean *Gonolobus* species (corolla lobes reaching only to 6.7 mm) and one of three *Gonolobus* species known from Martinique. It can be distinguished from other *Gonolobus* species on Martinique by the following key:

1. Corolla lobes to 6.7 mm long, both surfaces glabrous; interstaminal gynostegial corona (Ci) single, smooth, lacking raised bumps; laminar dorsal anther appendages (Cd) emarginate \_\_\_\_\_ **1. *G. absalonensis***
1. Corolla lobes > 9.5 mm long, either or both surfaces pubescent; interstaminal gynostegial corona (Ci) double or if single, then with defined raised bumps medially; laminar dorsal anther appendages (Cd) rounded or truncate.
  2. Interstaminal gynostegial corona single \_\_\_\_\_ **2. *G. dussii***
  2. Interstaminal gynostegial corona double (i.e., a narrower upper ligulate corona lobe occurring on top of the broader lower corona) \_\_\_\_\_ **5. *G. martinicensis***

**2. *Gonolobus dussii*** Klings, Syst. Bot. 32:183. 2007. (Fig. 5). TYPE: GUADELOUPE: Chemin de la Soufrière, alt. 500 m, s.d. (fl), *Quentin* 732 (HOLOTYPE: P!; ISOTYPE: GH!).

Herbaceous perennial vines. Latex unknown, presumably white. Stems glabrate to very sparsely pubescent, both short, capitate-glandular, and longer, sharp, eglandular trichomes present, the latter retrorse internodally, and antrorse-appressed along an indistinct, horizontal ridge between two opposing petioles and/or just above the node, to 0.5 mm long; nodes pubescent or glabrous, gland field apparently absent. Leaf blades ovate to oblong-ovate, (3.3–)5.7–10.7 cm × (0.9–)2.5–6.1 cm, apices gradually acuminate with the acumen narrowly obtuse, to 2 cm long, bases deeply or shallowly cordate, margins entire, adaxial surface glabrate or sparsely strigose, abaxial surface glabrate or more densely strigose with sharp, eglandular trichomes scattered along the major and minor veins, colleters 2–3, 0.4–0.6 mm long; petioles (1.3–)2.1–5.5 cm long, glabrous or sparsely pubescent on all sides, capitate trichomes to 0.09 mm long, sharp, eglandular trichomes 0.3–0.4 mm long, mostly antrorsely appressed or ascending (some spreading and a very few retrorse); stipular colleters 2, ca. 0.3 mm long, one borne on each side of the petiole base. Inflorescences racemiform, peduncles 0.7–2.3 cm long, glabrate to very sparsely pubescent, capitate, as well as sharp, eglandular trichomes present, the latter antrorsely-appressed or -ascending, found primarily at the apex, ca. 0.3 mm long; pedicels 1.8–2.2 cm long, more pubescent at the apex than at the base, capitate-glandular trichomes ca. 0.08 mm long, longer sharp, eglandular trichomes antrorsely-appressed or -ascending, ca. 0.3 mm long, bracts linear-lanceolate, ca. 1.5 mm × 0.17 mm long, caducous, adaxial surface glabrous, abaxial surface coarsely pubescent, trichomes sharp, eglandular, ca. 0.2 mm long, antrorse. Calyx lobes 5, sublanceolate to elongate triangular (widest at or just above the base), 3.9–5.8 mm × 1–1.5 mm, apices obtuse to narrowly rounded, margins glabrous, abaxial surface coarsely pubescent at the base and variously toward the apex, trichomes antrorsely-appressed or

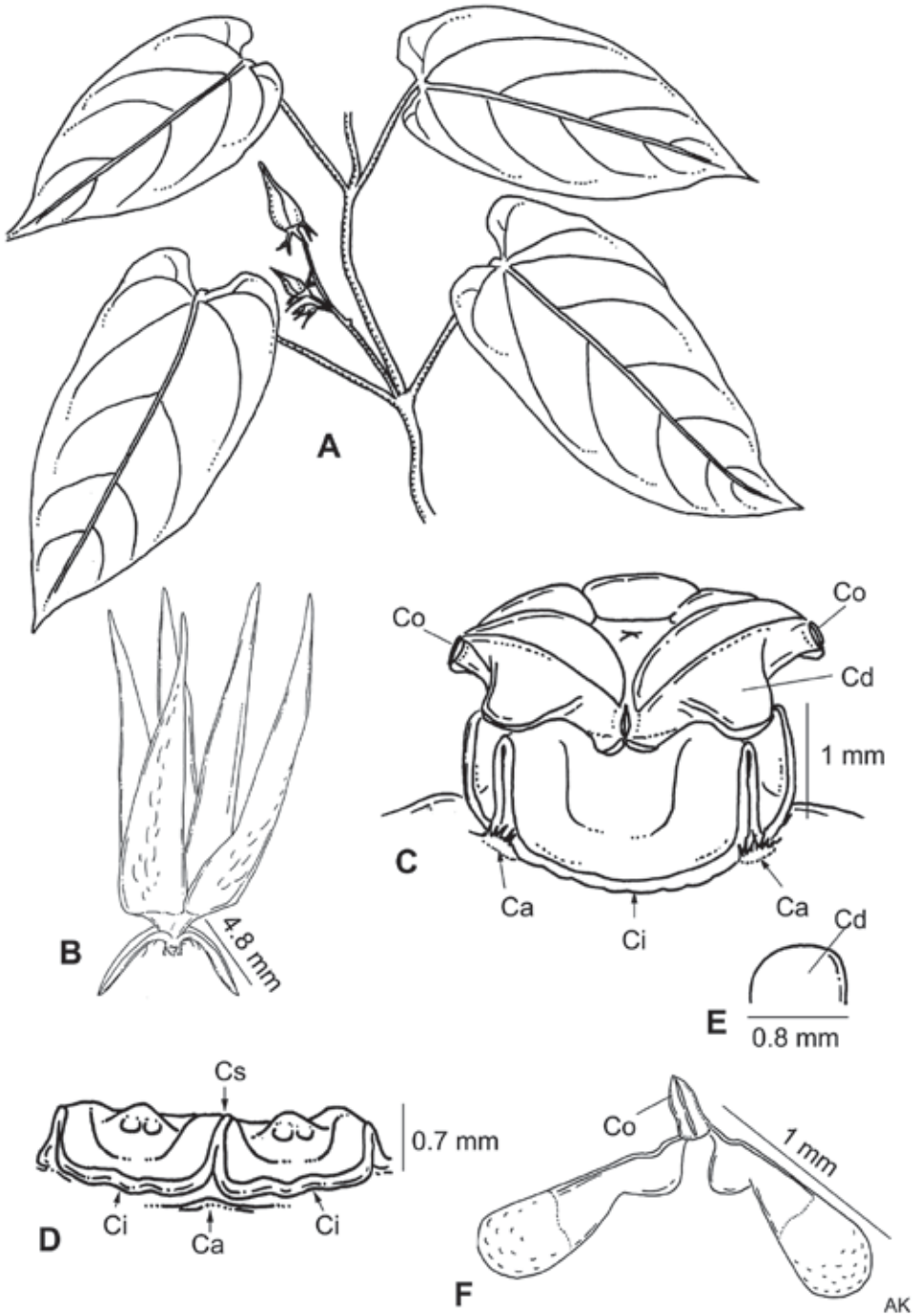


FIG. 5. *Gonolobus dussii*. A. Leaves and inflorescence. B. Flower showing coarse abaxial pubescence of the corolla lobes. C. Faucal annulus of the corolla (Ca), gynostegial corona, and style-head. D. Gynostegial corona of fused staminal (Cs) and interstaminal (Ci) segments (style-head removed). E. Laminar dorsal anther appendage (Cd). F. Pollinarium. A–B based on *Duss 3775* (NY). C and E–F based on *Duss 4565* (NY). D based on *Quentin 732* (P). Ca = faucal annulus of corolla; Ci = interstaminal gynostegial corona segment; Cd = laminar dorsal anther appendage; Co = corpusculum; Cs = staminal gynostegial corona segment.

-ascending, to 0.5 mm long; colleters 1 per sinus. Corolla lobes 5, narrowly lanceolate to elongate triangular, (10–)12–17 mm × 3.2–3.7 mm, slightly overlapping at the base, a glandular swelling frequently present in the sinus, adaxial surface glabrous, abaxial surface with coarse, sharp, eglandular trichomes, antrorsely-appressed or -ascending, particularly at the base and variously toward the apex, ca. 0.36 mm long; faucal annulus (corolline corona or Ca) interrupted, a distinctly raised ridge opposite each corolla lobe sinus, short-hispid or glabrate; gynostegial corona of fused staminal (Cs) and interstaminal parts (Ci), single, erect-undulating, two distinctly raised and rounded mounds borne in the interstaminal position; anther guiderails without appendages, laminar dorsal anther appendages (Cd) ca. 0.8 mm wide, rounded or emarginate; style-head 2.3–2.4 mm diam, stipe ca. 0.45 mm long, not toothed. Pollinaria: corpuscula 0.18–0.3 mm long, pollinia borne horizontally, ovate, ca. 0.5–1 mm × 0.25–0.35 mm. Follicles unknown.

*Phenology*.—Flowering in April, June, and October.

*Distribution*.—*Gonolobus dussii* occurs in Guadeloupe and Martinique (Fig. 1). Its habitat is not well known, but it appears to have been collected from riversides and at mid-elevations (480–500 m).

*Provisional conservation status*.—IUCN: Critically endangered (CR)—B1a,biii. NatureServe: Guadeloupe (GH NH); Martinique (GH NH).

*Taxon concept mapping*.—< *G. martinicensis* sensu Duss (1897); < *G. martinicensis* sensu Schlechter (1899); < *G. martinicensis* sensu Howard (1988); < *G. martinicensis* sensu Fournet (2002).

*Notes*.—*Gonolobus dussii* can be distinguished from *G. youroumaynensis* of St. Vincent by the short pedicel trichomes, the edentate stipe, and the adaxially glabrous corolla lobes. The gynostegial coronas of *G. absalonensis*, *G. dussii*, and *G. youroumaynensis* are most similar to each other among Lesser Antillean *Gonolobus* species, but *G. dussii* uniquely exhibits two distinctly raised and rounded mounds in the interstaminal position (Fig. 5). The mounds appear very close and near ridge-like in Martinique specimens, as well as *Duss 3775* of Guadeloupe. Additional collections are needed to determine the extent of variation in the coronas and to evaluate whether additional taxa are represented.

Additional specimens examined. **GADELOUPE**: Bord de la riviere Noire, 29 Jun 1895 (fl), *Duss 3775* (MO-fragment, NY); Pointe-Noire, 20 Oct 1895 (fl), *Duss 3714* (NY-2 sheets). **MARTINIQUE**: Environs a St. Pierre, 1884 (fl), *Duss "1862, 4565"* (NY); Pointe-Fine, près de la riviere Calabre, Apr 1900 (fl), *Duss 4565* (NY).

**3. *Gonolobus iyanolensis*** Klings, Syst. Bot. 32:185. 2007. (**Fig. 6**). TYPE: ST. LUCIA: Gros Piton, 9 Aug 1996 ["9/8/76"] (fl), *Graveson 107* (HOLOTYPE: GH!).

Herbaceous perennial vines. Latex white. Stems glabrous or glabrate, both short, capitate-glandular, and longer, sharp, eglandular trichomes present, the latter retrorse or spreading internodally, and antrorse-appressed along an indistinct, horizontal ridge between two opposing petioles, to 1.2 mm long; nodes pubescent or glabrous in age, gland field sometimes present. Leaf blades ovate to oblong-ovate, to 8 cm × 5.4 cm, apices obtuse or short-acuminate with the acumen obtuse, bases cordate, margins entire, adaxial surface glabrous, abaxial surface glabrous or with sharp, eglandular trichomes scattered along the major veins, colleters 2–4, 0.37–0.65 mm long; petioles to 6.2 cm long, glabrous or glabrate, capitate-glandular trichomes very sparse if present, sharp, eglandular trichomes near apex if present, to 0.9 mm long; stipular colleters 2, ca. 0.3 mm long, one borne on each side of the petiole base. Inflorescences racemiform, peduncles 2.1–2.8 cm long, glabrous or glabrate, sharp, eglandular hairs antrorsely-appressed or -ascending, most pronounced near apex, ca. 0.7 mm long; pedicels 2.8–3.1 cm long, glabrate, capitate-glandular trichomes scattered throughout or only near the apex, ca. 0.09 mm long, longer, sharp, eglandular hairs antrorsely-appressed or -ascending, occurring only near the apex, 0.3–0.9 mm long, bracts linear-lanceolate, ca. 2.8 mm × 0.5 mm long, caducous, adaxial surface glabrous, abaxial surface coarsely pubescent, trichomes sharp, eglandular, ca. 0.4 mm long, antrorse. Calyx lobes 5, lanceolate (widest distinctly above the base, ca. 1.5–2 mm above base), 6.1–6.6 mm × 1.6–1.8 mm, apices obtuse, margins glabrous, abaxial surface glabrous or glabrate with the few trichomes present, coarse, antrorsely-ascending or -appressed, to 0.4 mm long; colleters 1 per sinus. Corolla lobes 5, lanceolate, 10.2–17.3 mm × 2.7–4.8 mm, slightly lobed at the base, a glandular swelling frequently present in the sinus, adaxial surface pubescent along the right half, trichomes flat, ribbon-like,

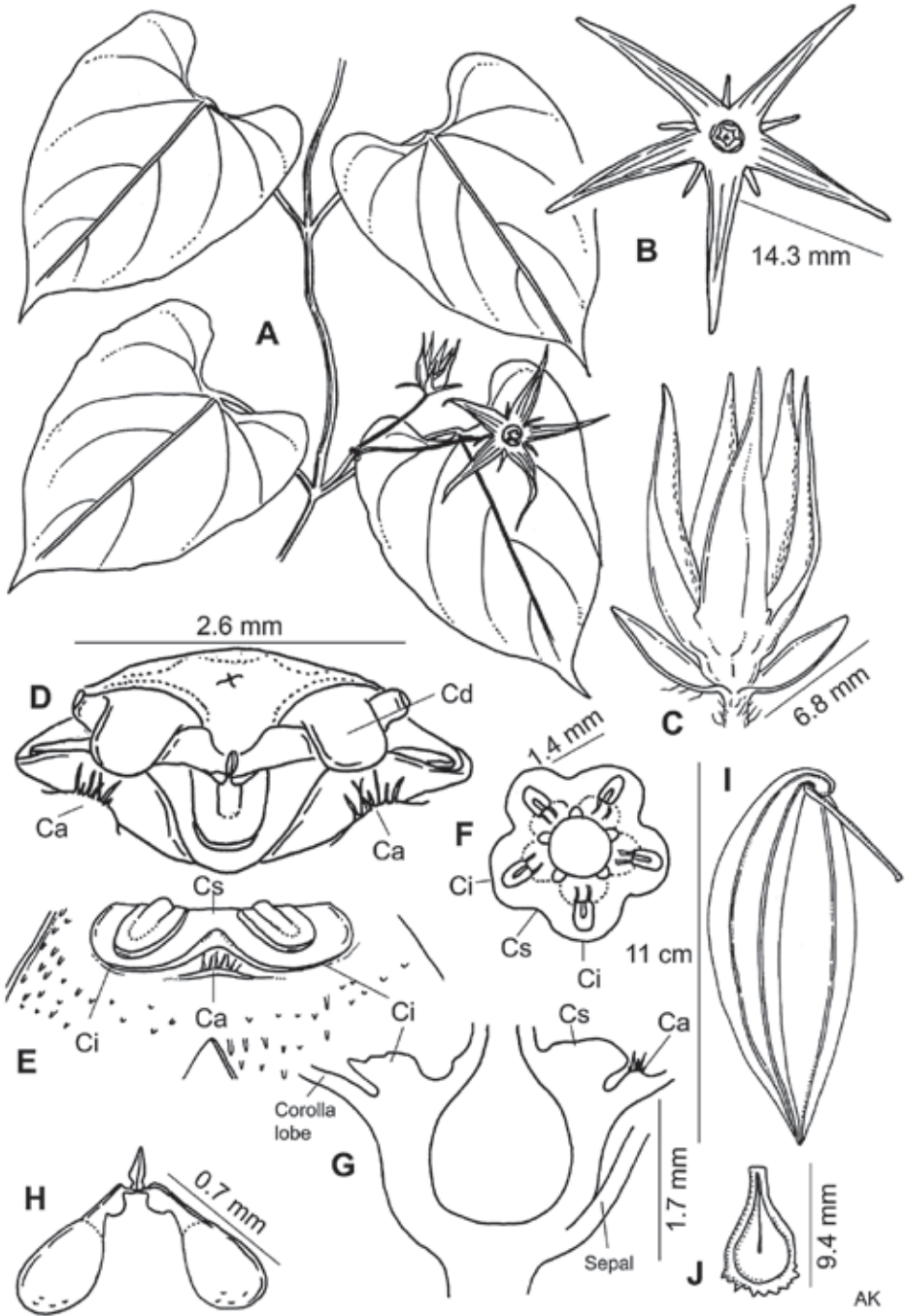


FIG. 6. *Gonolobus iyanolensis*. A. Leaves and inflorescence. B. Open flower. C. Flower showing adaxial pubescence of the corolla lobes. D. Faucal annulus of the corolla (Ca), gynostegial corona, and style-head. E. Gynostegial corona of fused staminal (Cs) and interstaminal (Ci) segments (style-head removed), showing dorsal ridge of upper ligulate corona lobe of the Ci. F. Top view of gynostegial corona (style-head removed). G. Cross-section of corolla tube showing position of corollar and gynostegial corona elements. H. Pollinarium. I. Follicle. J. Seed. A–B based on *Johnny 57 et al.* (UPRRP). C and E based on *Graveson 107* (GH). D and F–H based on *Krings 1373 et al.* (NCSC). I–J based on *Graveson s.n.* (NCSC). Ca = faucal annulus of corolla; Ci = interstaminal gynostegial corona segment; Cd = laminar dorsal anther appendage; Co = corpusculum; Cs = staminal gynostegial corona segment.

0.18–0.26 mm long, abaxial surface glabrous; faucal annulus (corolline corona or Ca) interrupted, a distinctly raised ridge, opposite each corolla lobe sinus, short hispid; gynostegial corona of fused staminal (Cs) and interstaminal parts (Ci), double, 5-lobed, prostrate, narrow upper ligulate corona lobe of the Ci appressed to the lower, abruptly ending in a scooped out depression before reaching the stipe base (horizontal length of lower interstaminal gynostegial corona (Ci) from base of stipe to lobe apex 1.1–1.4 mm), dorsally ridged; anther guiderails apparently without appendages, laminar dorsal anther appendages (Cd) 0.5–0.6 mm wide, rounded or truncate; style-head ca. 2.5 mm diam, stipe ca. 0.23 mm long, not toothed. Pollinaria: corpuscula 0.16–0.18 mm long, pollinia borne horizontally, ovate, ca. 0.5–0.7 mm × 0.25–0.35 mm. Follicles ovoid, 10–11.6 cm × 3.3–4 cm, 5-winged, appearing glabrous, but with minute papillae or capitate trichomes evident at high magnification; seeds pyriform, compressed, not plano-convex, 8.8–10.5 mm × 4.2–5.9 mm, glabrous, margins dentate, coma to 3.7 cm long.

*Phenology*.—Flowering in March, July, August, and September. Fruiting in January.

*Distribution*.—*Gonolobus iyanolensis* is apparently endemic to St. Lucia (Fig. 1), occurring in seasonal deciduous woods from 180–400 m in elevation. An established population occurs on Gros Piton. Roger Graveson (pers. comm.) noted having seen vines away from the Pitons, but that they have not established themselves well. Woodland boundaries and recent forest openings appear to be the preferred habitat.

*Provisional conservation status*.—IUCN: Endangered (EN)—B1a,b,iii. NatureServe: G1 N1.

*Taxon concept mapping*.—< *G. martinicensis* sensu Schlechter (1899); < *G. martinicensis* sensu Howard (1988).

*Notes*.—Roger Graveson (pers. comm.) noted that the collection date is incorrect on the label of his collection *Graveson 107* (GH) and should instead be 9 Aug 1996. *Gonolobus iyanolensis* is immediately recognizable among Lesser Antillean *Gonolobus* species by its double interstaminal gynostegial corona (Ci). The only other species that shares this corona type in the area is *G. martinicensis*. (Fig. 8). In contrast to the robust-flowered *G. iyanolensis*, *G. martinicensis* exhibits distinctly more slender flowers with elongate-campanulate bases (ca. 2 mm long) that are longer than wide (as wide as long or wider than long in *G. iyanolensis*) and a narrower gynostegial corona (see key). The distinct dorsal ridge of the narrow upper ligulate corona lobe of the Ci in *G. iyanolensis* has also not been seen in *G. martinicensis*, which is either plane in the homologous position or exhibits a slightly raised bump.

Additional specimens examined. **ST. LUCIA**: Chassin, edge of clearing, 7 Jan 1987 (fr), *Slane 1056* (GH); Soufrière, Gros Piton summit, facing Soufrière, 5 Jul 2005 (fl), *Johnny 57 with Samuel and Sealys* (UPRRP); Soufrière, Gros Piton summit, facing Soufrière, 13 Sep 2005 (fl), *Graveson 1248 with Smith* (UPRRP); Gros Piton, 11 Mar 2006 (fl), *Klings 1373 with Graveson and Smith* (NCSC).

**4. *Gonolobus jamaicensis*** Rendle, J. Bot. 74:345. 1936. (**Fig. 7**). TYPE: JAMAICA: near Vinegar Hill, climbing up trees to height of 20 ft, 4200 ft elev., 5 Jun 1896 (fl), *Harris 6368* (HOLOTYPE: BM!).

Herbaceous perennial vines. Latex white. Stems pubescent, both short, capitate-glandular, and longer, sharp, eglandular trichomes present, the latter spreading or retrorse internodally, and antrorse-appressed along an indistinct, horizontal ridge between two opposing petioles and/or just above the node, to 1.8 mm long; nodes pubescent, gland field apparently absent. Leaf blades elliptic to ovate, (2–)3.9–9.7 cm × (1.3–)1.8–6.6 cm, apices acuminate, acumen narrowly obtuse, to 1.1 cm long, bases cuneate, rounded, truncate, or cordate (frequently all base types present on a single individual vine), margins entire, adaxial surface glabrate, abaxial surface sparsely pubescent to glabrate, sharp, eglandular trichomes relatively dense along the major and minor veins, colleters 2, ca. 0.45 mm long; petioles 0.9–3.5 cm long, pubescent on all sides, capitate trichomes to 0.13 mm long, sharp, eglandular trichomes ca. 1.25 mm long, mostly spreading or retrorse, less dense than the capitate trichomes; stipular colleters 2, ca. 0.29 mm long, one borne on each side of the petiole base. Inflorescences racemiform, peduncles to 4.3 cm long, pubescent, capitate, as well as sharp, eglandular trichomes present, the latter spreading, retrorse, or antrorsely-ascending or -appressed, ca. 0.5 mm long; pedicels 1.2–1.4 cm long, evenly pubescent throughout, capitate-glandular trichomes ca. 0.08 mm long, longer sharp, eglandular trichomes antrorsely-appressed or -ascending, ca. 0.4 mm long, bracts linear-lanceolate, ca. 1.7 mm × 0.5 mm long, caducous, adaxial surface glabrous, abaxial surface coarsely

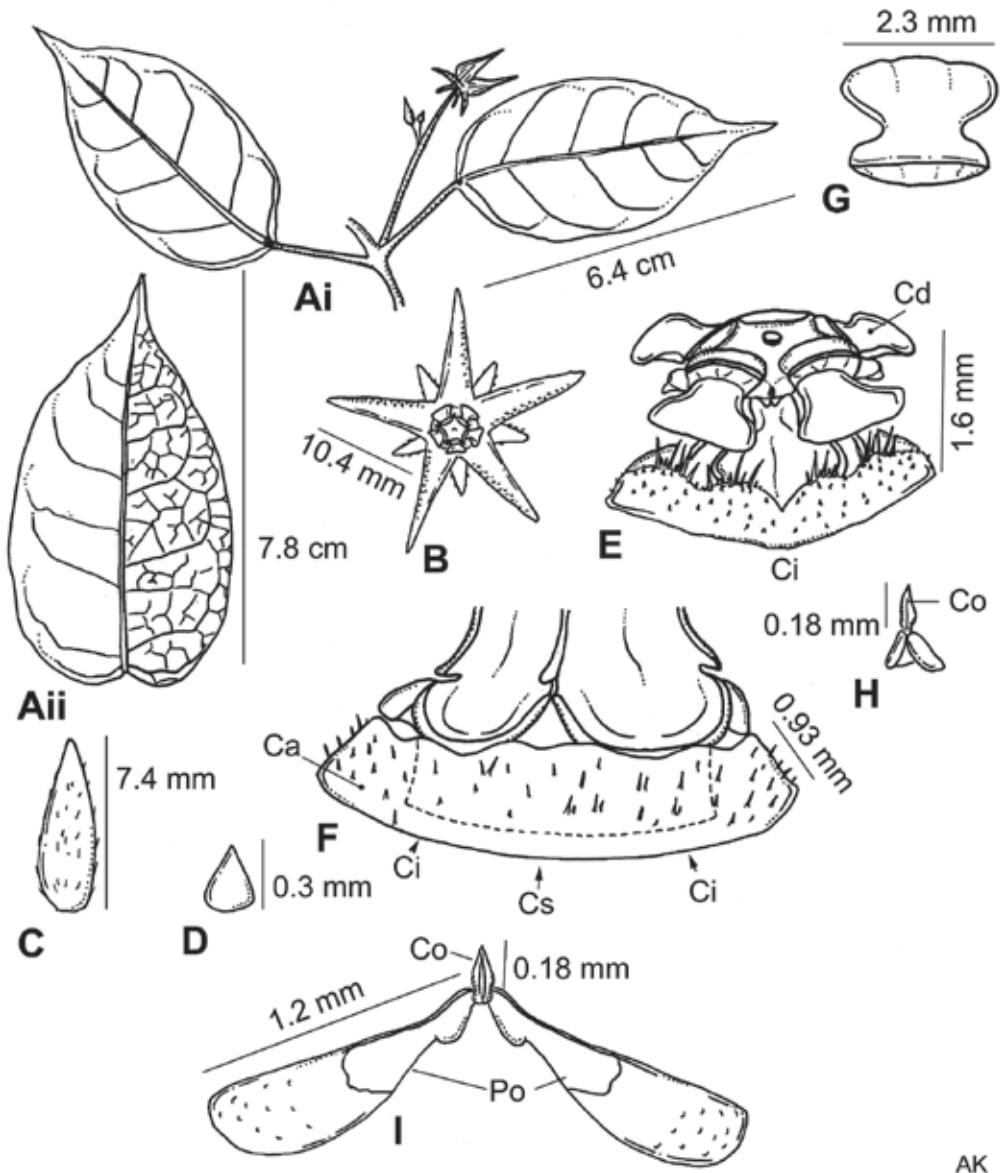


FIG. 7. *Gonolobus jamaicensis*. Ai–ii. Leaves and inflorescence. B. Open flower. C. Sepal. D. Calycine colleter. E. Faucal annulus of the corolla, gynostegial corona, and style-head. F. Detail of faucal annulus and base of gynostegial stipe. G. Lamina dorsal anther appendage. H. Corpusculum and subtending anther wings. I. Pollinarium. Ai–I based on Kelly *et al.* 10207 (TCD). Aii based on Proctor 6828 (GH). Ca = faucal annulus of corolla; Ci = interstaminal gynostegial corona segment; Cd = lamina dorsal anther appendage; Co = corpusculum; Cs = staminal gynostegial corona segment; Po = pollinium.

pubescent, trichomes sharp, eglandular, ca. 0.3 mm long, antrorse. Calyx lobes 5, lanceolate, 4.3–7.45 mm × 1.6–2.2 mm, apices obtuse, margins glabrous or sparsely ciliate, abaxial surface pubescent at the base and glabrous toward the apex, trichomes antrorsely-appressed, largest to 0.5 mm long; colleters 1 per sinus. Corolla lobes 5, lanceolate, 10–13 mm × 3.8–5 mm, slightly overlapping at the base, a glandular swelling frequently present in the sinus, adaxial surface pubescent along the right, abaxial surface glabrous; faucal

annulus (corolline corona or Ca) a continuous ring, bilobed opposite each anther, ca. 0.93 mm tall, short-pubescent and papillate throughout; gynostegial corona of fused staminal (Cs) and interstaminal parts (Ci), single, erect-undulating, interstaminal secondary nectaries apparently absent or at least not formed into conspicuous bumps or mounds; anther guiderails without appendages, laminar dorsal anther appendages (Cd), ca.  $2.3 \times 1.7$  mm, spreading, apices truncate; style-head ca. 3.3 mm diam, stipe ca. 1 mm long, dentate, teeth appearing as notches, borne on the lower portion of the column, just above the upwardly rising segment of each Cs. Pollinaria: corpuscula ca. 0.18 mm long, pollinia borne horizontally, ovate, ca. 1.2 mm  $\times$  0.3 mm. Follicles unknown.

*Phenology*.—Flowering in March and June.

*Distribution*.—*Gonolobus jamaicensis* is endemic to Jamaica. It is known only from montane rainforests from 1025–1200 m elevation.

*Provisional conservation status*.—IUCN: Vulnerable (VU)—Bla,c. NatureServe: G3 N3.

*Taxon concept mapping*.— = *G. rostratus* sensu Schlechter (1899); = *G. jamaicensis* sensu Adams (1972).

*Notes*.—*Gonolobus jamaicensis* was proposed by Rendle (loc. cit.) as a *nomen novum* for the Jamaican endemic taxon Schlechter (1899) treated as *G. rostratus* (Vahl) R.Br. Not only did Robert Brown never make the combination attributed to him (see Mem. Wernerian Nat. Hist. Soc. 1:35. 1810), but the true *Gonolobus rostratus* (Vahl) Schult. is only known from Trinidad (and perhaps South America). It is based on the type of *Cynanchum rostratum* Vahl. Because Rendle corrected a misapplication, his name—*G. jamaicensis*—is a new species name, not a *nomen novum* as he mistakenly stated. A *nomen novum* is an avowed substitute (replacement name) for a validly published but illegitimate name, the type of which would be the same as that of the name which it replaced.

Additional specimens examined. **JAMAICA**: 1886 (fl), Hart 968 (MO [2 single leaves and 2 flowers]; US); John Crow Mountains, eastern Jamaica, SE of Millbank, 17 Mar 1992 (fl), Kelly, Iremonger and REA team 10207 (TCD). **Portland Parish**: 0.5 mi N of Hardwar Gap, near the waterfall, 22 Jun 1952 (fl), Proctor 6828 (A, IJ); 0.5 mi N of Hardwar Gap, uphill from the trail above the “Waterfall,” 3 Mar 2006 (st), Krings 1393 with Suiter and Proctor (IJ, NCSC).

**5. *Gonolobus martinicensis*** Decne. in DC., Prodr. 8:595. 1844. (**Fig. 8**). TYPE: MARTINIQUE: s.d. (fl), *Plecé s.n.* (LECTOTYPE, designated by Krings 2007: P!).

“*Gonolobus scandens* (Aubl.) Urb.,” Repert. Spec. Nov. Regni Veg. 16:151. 1919, nom. illeg. (see Nicolson 1991).

Herbaceous perennial vines. Latex unknown, presumably white. Stems villous to glabrate, both short, capitate-glandular, and longer, sharp, eglandular trichomes present, the latter retrorse or spreading internodally, and antrorse-appressed along an indistinct, horizontal ridge between two opposing petioles, to 1.9 mm long; nodes pubescent or glabrous in age, gland fields sometimes present. Leaf blades ovate to oblong-ovate, to 6.4 cm  $\times$  4.9 cm, apices obtuse, gradually to abruptly acuminate with the acuminate to 1.4 cm long, bases cordate, margins entire, adaxial surface sparsely strigillose, abaxial surface pubescent along the veins, trichomes strigillose (and longer, sharp, eglandular, scattered particularly along the midvein), colleters 2, 0.7 mm long; petioles to 4 cm long, villous, capitate-glandular trichomes sparse but throughout, sharp, eglandular trichomes ubiquitous, mostly antrorse-ascending and spreading, to 1 mm long; stipular colleters 2, ca. 0.24 mm long, one borne on each side of the petiole base. Inflorescences racemiform, peduncles 1.5–2.1 cm long, villous with sharp, eglandular hairs antrorsely- or retrorsely- appressed or –ascending/-descending and spreading, ca. 0.44 mm long, capitate trichomes throughout; pedicels to 1.9 cm long, less pubescent than peduncles, capitate-glandular trichomes throughout, ca. 0.09 mm long, longer, sharp, eglandular hairs antrorsely- appressed or –ascending, throughout, though most dense at the apex, ca. 0.47 mm long, bracts linear-lanceolate, ca. 1.6 mm  $\times$  0.17 mm long, caducous, adaxial surface glabrous, abaxial surface coarsely pubescent, trichomes sharp, eglandular, ca. 0.2 mm long, antrorse. Calyx lobes 5, oblong lanceolate, 4.5–5 mm  $\times$  0.8 mm, apices obtuse or acute, margins sparsely ciliolate, abaxial surface glabrate with the few trichomes present, coarse, antrorsely-ascending or –appressed, to 0.3 mm long; colleters 1 per sinus. Corolla lobes 5, lanceolate, 9.7–11.4 mm  $\times$  2–3.5 mm, slightly lobed at the base, a glandular swelling frequently present in the sinus, adaxial surface pubescent along the right half, trichomes flat, ribbon-like, ca. 0.2 mm long, abaxial

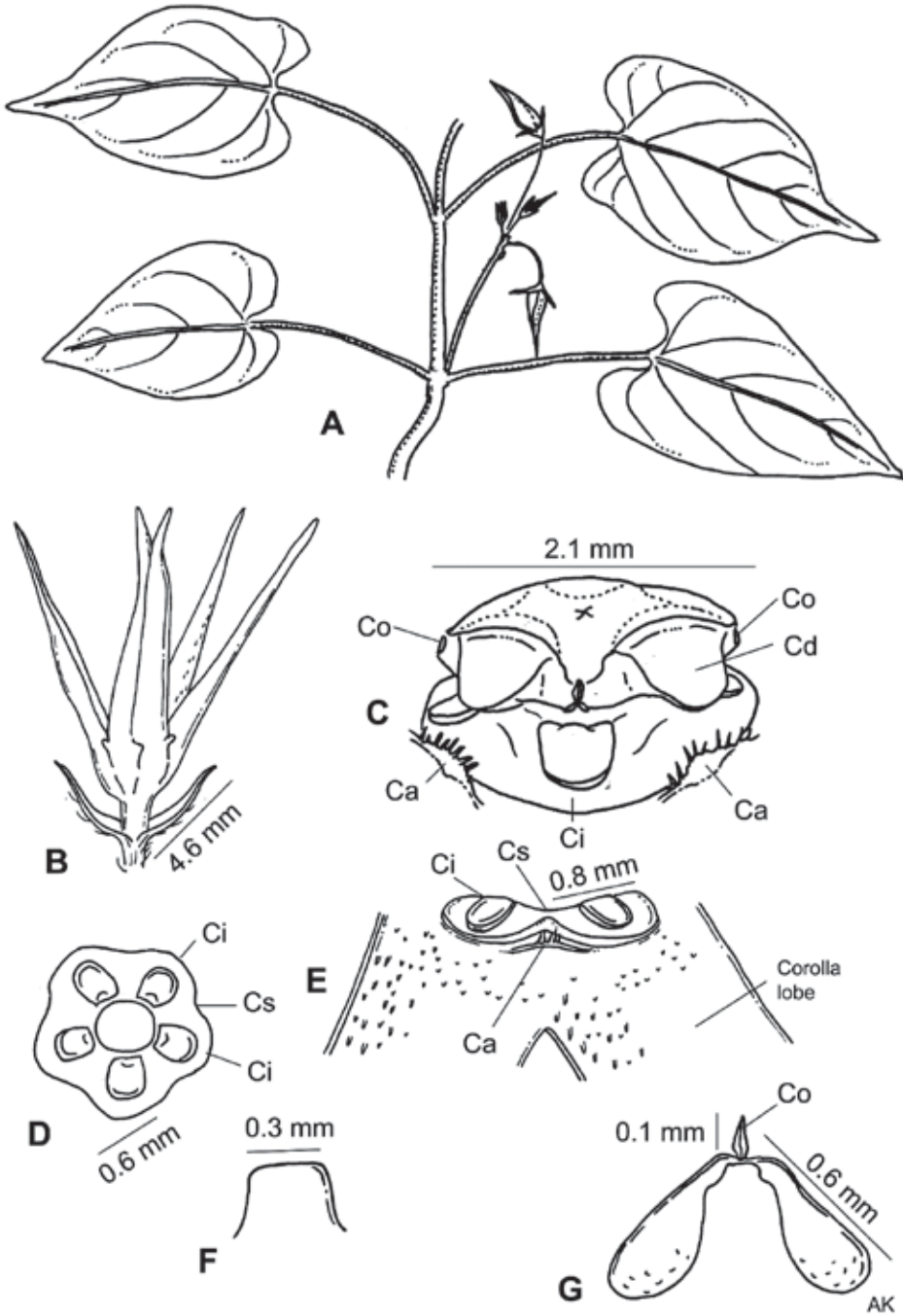


FIG. 8. *Gonolobus martinicensis*. A. Leaves and inflorescence. B. Flower showing narrow corolla tube. C. Faucal annulus (Ca), gynostegial corona, and style-head. D. Top view of gynostegial corona (style-head removed). E. Gynostegial corona of fused staminal (Cs) and interstaminal (Ci) segments (style-head removed), showing upper ligulate corona lobe of the Ci. F. Lamina dorsal anther appendage (Cd). G. Pollinarium. A based on Herb. Mart. Suppl. Nr. 63 (MO). B and E–F based on Lieber s.n. (M). C–D and G based on L.C. Rich. Herb. Guyanensi-Antillanum (P). Ca = faucal annulus of corolla; Ci = interstaminal gynostegial corona segment; Cd = laminar dorsal anther appendage; Co = corpusculum; Cs = staminal gynostegial corona segment.



surface glabrate with a few, sparse, sharp, eglandular trichomes near the base, middle, and margin along the tip; faucal annulus (corolline corona or Ca) interrupted, a distinctly raised ridge, opposite each corolla lobe sinus, short hispid; gynostegial corona of fused staminal (Cs) and interstaminal parts (Ci), double, 5-lobed, prostrate, narrow upper ligulate corona lobe of the Ci appressed to the lower, ending essentially at the stipe base (horizontal length of interstaminal gynostegial corona (Ci) from base of stipe to lobe apex  $\leq 0.7$  mm), dorsally plane or sometimes raised into a shallow bump; anther guiderails apparently without appendages, laminar dorsal anther appendages (Cd) 0.2 mm wide, rounded or truncate; style-head 1.8–2.3 mm diam, stipe ca. 0.28 mm long, not toothed. Pollinaria: corpuscula 0.1–0.15 mm long, pollinia borne horizontally, ovate, 0.45–0.6 mm  $\times$  0.24–0.26 mm. Follicles unknown.

*Phenology*.—The months of flowering are unknown.

*Distribution*.—*Gonolobus martinicensis* is apparently endemic to Martinique (Fig. 1). Its habitat is unknown, but likely primarily middle elevation rainforest based on the requirements of most congeners in the Lesser Antilles.

*Provisional conservation status*.—IUCN: Critically endangered (CR)—B1a,biii. NatureServe: GH NH.

*Taxon concept mapping*.— $< G. martinicensis$  sensu Duss (1897);  $< G. martinicensis$  sensu Schlechter (1899);  $< G. martinicensis$  sensu Howard (1988);  $G. martinicensis$  sensu Fournet (2002).

*Notes*.—*Gonolobus martinicensis* is immediately recognizable among Lesser Antillean *Gonolobus* species by its double (or ligulate) interstaminal gynostegial corona (Ci). The only other species that shares this corona type in the area is *G. iyanolensis* (Fig. 6). In contrast to the robust-flowered *G. iyanolensis*, *G. martinicensis* exhibits distinctly more slender flowers with elongate-campanulate bases (ca. 2 mm long) that are longer than wide (as wide as long or wider than long in *G. iyanolensis*) and a narrower gynostegial corona (see key). The distinct dorsal ridge of the narrow upper ligulate corona lobe of the Ci in *G. iyanolensis* has also not been seen in *G. martinicensis*, which is either plane in the homologous position or exhibits a slightly raised bump.

Additional specimens examined. **MARTINIQUE**: L.C. Rich. Herb. Guyanensi-Antillanum, s.d. (fl) (P-2 specimens [*G. caribaeus* Rich., nom. sched.]); s.d. (fl), Lieber s.n. (M).

**6. *Gonolobus stapelioides*** Desv. ex Ham., Prodr. Pl. Ind. Occid. 32. 1825. (Fig. 9). TYPE: JAMAICA. PORTLAND PARISH: 0.5 mi N of Hardwar Gap, uphill from the trail above the “Waterfall,” ca. 3900 ft, montane rainforest, vines growing over trailside shrubs and in small forest openings, population J1, 3 Mar 2006 (fl), Kings 1395 with Suiter and Proctor (NEOTYPE, here designated: P!; ISONEOTYPES: BM!, J!, NCSC!, NY!).

*Fischeria cincta* Griseb., Fl. Brit. W.I. 421. 1862.

*Gonolobus cinctus* (Griseb.) Benth. & Hook. f. ex B.D. Jacks., Index Kewensis 1:1054. 1895. TYPE: JAMAICA: *Higson s.n.* (HOLOTYPE: K!)

Herbaceous perennial vines. Latex white. Stems pubescent, both short, capitate-glandular, and longer, sharp, eglandular trichomes present, the latter retrorse internodally, and antrorse-appressed along an indistinct, horizontal ridge between two opposing petioles and/or just above the node, to 1.3 mm long; nodes pubescent, gland field apparently absent. Leaf blades elliptic to ovate, 3–9 cm  $\times$  1.2–4.5 cm, apices acute or gradually acuminate with the acumen narrowly obtuse, to 0.75 cm long, bases cuneate, rounded, or truncate (frequently all base types present on a single individual vine), margins entire, adaxial surface sparsely strigose, abaxial surface sparsely pubescent to glabrate, sharp, eglandular trichomes relatively dense along the major and minor veins, colleters 2(–3?), ca. 0.5 mm long; petioles 1–2.3 cm long, pubescent on all sides, capitate trichomes to 0.06 mm long, sharp, eglandular trichomes ca. 1.1 mm long, mostly spreading or somewhat retrorse, less dense than the capitate trichomes; stipular colleters 2, ca. 0.3 mm long, one borne on each side of the petiole base. Inflorescences racemiform, peduncles to 2.5 cm long, pubescent, capitate, as well as sharp, eglandular trichomes present, the latter spreading or retrorse, ca. 0.6 mm long; pedicels to 2.5 cm long, pubescent throughout, capitate-glandular trichomes ca. 0.05 mm long, longer sharp, eglandular trichomes spreading or antrorsely-appressed or -ascending, ca. 0.5 mm long, bracts linear-lanceolate, 2.8–3.7 mm  $\times$  0.45–0.5 mm long, caducous, adaxial surface glabrous, abaxial surface coarsely pubescent, trichomes sharp, eglandular, 0.36–0.4 mm long, antrorse. Calyx lobes 5, linear-lanceolate, 7–8.5 mm  $\times$  2–2.3 mm,

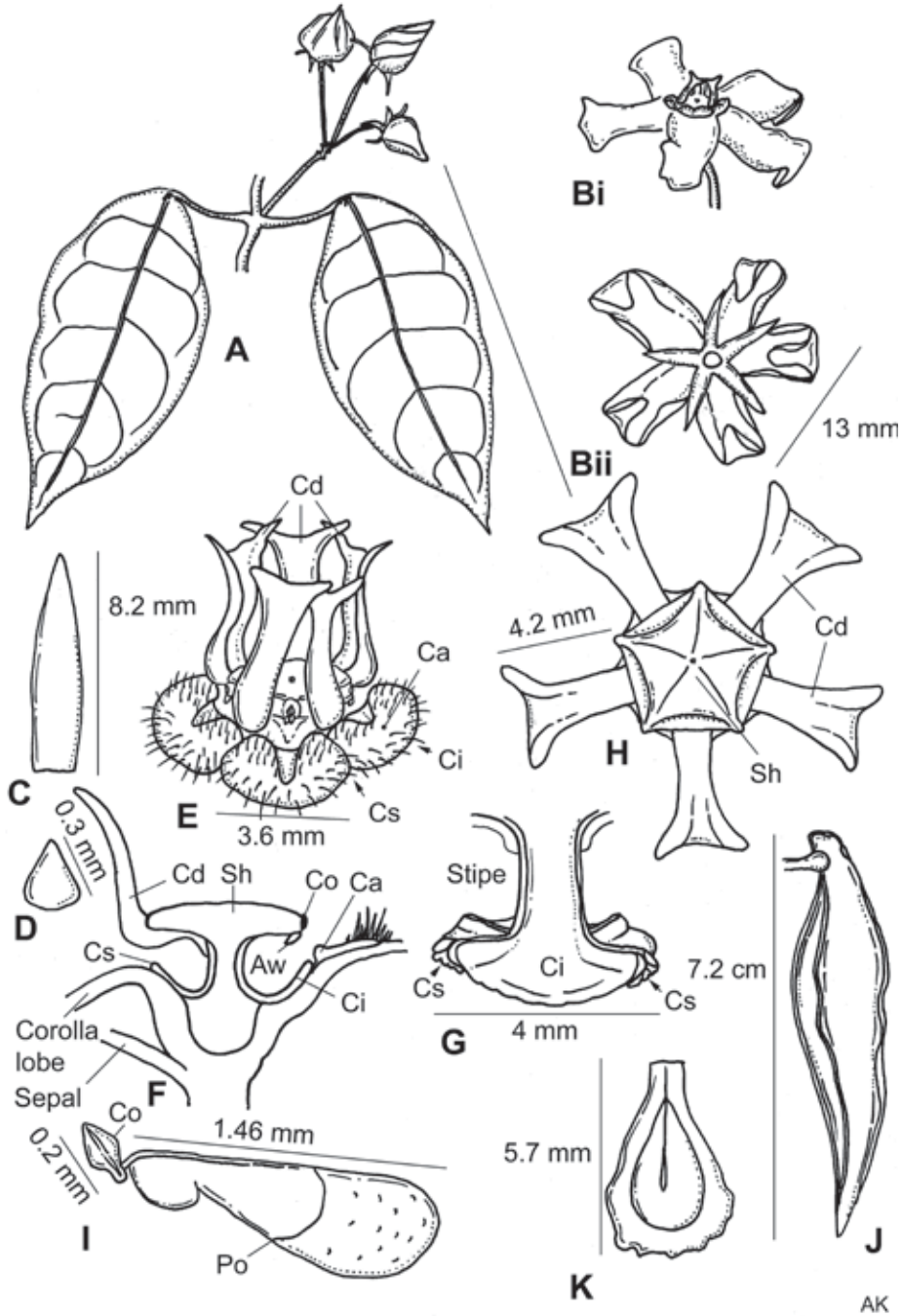


FIG. 9. *Gonolobus stapelioides*. A. Leaves and inflorescence. Bi. Open flower (adaxial view). Bii. Open flower (abaxial view). C. Sepal. D. Calycine col-leter. E. Faucal annulus of the corolla, gynostegial corona, and style-head. F. Cross-section of flower. G. Detail of gynostegial corona of fused staminal (Cs) and interstaminal (Ci) segments and stipe (style-head removed). H. Style-head and laminar dorsal anther appendages (viewed from above). I. Pollinarium. J. Follicle. K. Seed. J–K based on *Bellingham 1487* (BM), rest based on *Krings 1394* (NCSC). Aw = anther wings; Ca = faucal annulus of corolla; Ci = interstaminal gynostegial corona segment; Cd = laminar dorsal anther appendage; Co = corpusculum; Cs = staminal gynostegial corona segment; Po = pollinium; Sh = style-head.

apices acute to narrowly obtuse, margins glabrous or very sparsely ciliolate, abaxial surface weakly and finely pubescent at the base and glabrous toward the apex, trichomes antrorsely-appressed, to 0.9 mm long; colleters 1 per sinus. Corolla lobes 5, oblong-ovate, 12–15 mm × 4–6.5 mm, slightly overlapping at the base, a glandular swelling frequently present in the sinus, margins and apices strongly recurved, adaxial surface papillate-pubescent along the right, abaxial surface essentially glabrous; faucal annulus (corolline corona or Ca) interrupted, a pronounced twin-peaked thickening opposite each corolla lobe, apparently reduced opposite each corolla lobe sinus, short-hispid; gynostegial corona of fused staminal (Cs) and interstaminal parts (Ci), single, erect-undulating, interstaminal secondary nectaries apparently absent or at least not formed into conspicuous bumps or mounds; anther guiderails without appendages, laminar dorsal anther appendages (Cd) white, ca. 4–4.2 × 1.8–2 mm, erect to spreading, apices bilobed; style-head 3.6–4.8 mm diam, stipe ca. 1.6 mm long, not toothed, though with white ribs present at the base of each anther. Pollinaria: corpuscula ca. 0.2 mm long, pollinia borne horizontally, ovate, ca. 1.5 mm × 0.41 mm. Follicles fusiform, 5-winged, 1.7 × 7.2 cm. Seeds pyriform, compressed, not plano-convex, 4.6–5.7 × 2.5–3.5 mm, glabrous, margins dentate, coma to 2.4 cm long.

*Phenology*.—Flowering January through June. Fruiting in June.

*Distribution*.—*Gonolobus stapelioides* is endemic to Jamaica. It is known only from montane rainforests from 1200–1660 m elevation.

*Provisional conservation status*.—IUCN: Least concern (LC). NatureServe: G4 N4.

*Taxon concept mapping*.— = *G. stapelioides* sensu Schlechter (1899); = *G. stapelioides* sensu Adams (1972).

*Notes*.—An appropriately labeled red type folder is present at P, but was found empty during visits in 2004 and 2006. In the absence of the specimen, *G. stapelioides* is neotypified here. Schlechter (1899) noted that Hamilton (loc. cit.) likely mixed up the localities when describing *G. stapelioides* and *G. virescens* Ham. The locality of the former was given as Tobago, and that of the latter as Jamaica. However, neither entity is known by any other specimen from the respective island indicated in the protologue. In addition, Hamilton's description of ovate and acute corolla lobes would be an inaccurate description of the Jamaican entity to which Schlechter (1899) and subsequent workers have applied the name *G. stapelioides*. However, Hamilton's corolla lobe description is a very nice match of the type of *G. virescens*. Thus, it appears that while the localities were mixed up, Hamilton's protologues clearly allow association of the name *G. stapelioides* to the Jamaican entity and *G. virescens* to the Tobagoan entity as Schlechter (1899) proposed.

*Gonolobus stapelioides* is immediately recognizable by the white Cd segments that are fully vertical at maturity (Fig. 9E, F).

Additional specimens examined. **JAMAICA. Portland Parish:** Vinegar Hill, 21 Feb 1894 (fl), *Harris 5561* (MO [a single leaf and a single flower]); Vinegar Hill, "6.2.95" [1895] (fl), *Harris 5561* (BM); Hardwar Gap, 25 Feb 1964 (fl), *Adams 12705* (M, MO); Immediately N of the Grand Ridge of the Blue Mountains, between John Crow Peak and Morce's Gap, 15 May 1989 (fl), *Bellingham 1156* (BM); 0.5 mi N of Hardwar Gap, near "The Waterfall," 14 Jan 1980 (fl), *Proctor 38534* (IJ); 0.5 mi N of Hardwar Gap, uphill from the trail above the "Waterfall," 3 Mar 2006 (fl), *Klings 1394 with Suiter and Proctor* (IJ, NCSC); 0.5 mi N of Hardwar Gap, uphill from the trail above the "Waterfall," 3 Mar 2006 (fl), *Klings 1396 with Suiter and Proctor* (IJ, NCSC). **St. Andrew Parish:** Grand Ridge of the Blue Mountains, E of the summit of John Crow Peak, 30 Apr 1990 (fl), *Bellingham 1211* (BM); Grand Ridge of the Blue Mountains, immediately E of John Crow Peak, 11 Jun 1991 (fl-sheet 1; fr-sheet 2), *Bellingham 1487* (BM-2 sheets). **St. Thomas Parish:** Monkey Hill, S spur of Mossmans Peak, 16 Jun 1952 (fl), *Proctor 6803* (BM, IJ).

**7. *Gonolobus stellatus*** Griseb., Fl. Brit. W.I. 420. 1862. (Fig. 10). TYPE: JAMAICA: Manchester, Knockpatrick, Nov 18[?]? (fl), *Purdie s.n.* (HOLOTYPE: GOETI; ISOTYPES: BM!, K!).

Herbaceous perennial vines. Latex white. Stems pubescent to glabrate in age, both short, capitate-glandular, and longer, sharp, eglandular trichomes present, the latter retrorse-appressed or -spreading internodally, and antrorse-appressed along an indistinct, horizontal ridge between two opposing petioles and/or just above the node, to 1.25 mm long; nodes pubescent to glabrate, gland field apparently absent. Leaf blades elliptic to oblong-elliptic, 2.2–11.5 cm × 0.8–4.2 cm, apices acute or gradually acuminate with the acumen narrowly obtuse, to 1.4 cm long, bases cuneate, margins entire, adaxial surface sparsely strigose, abaxial

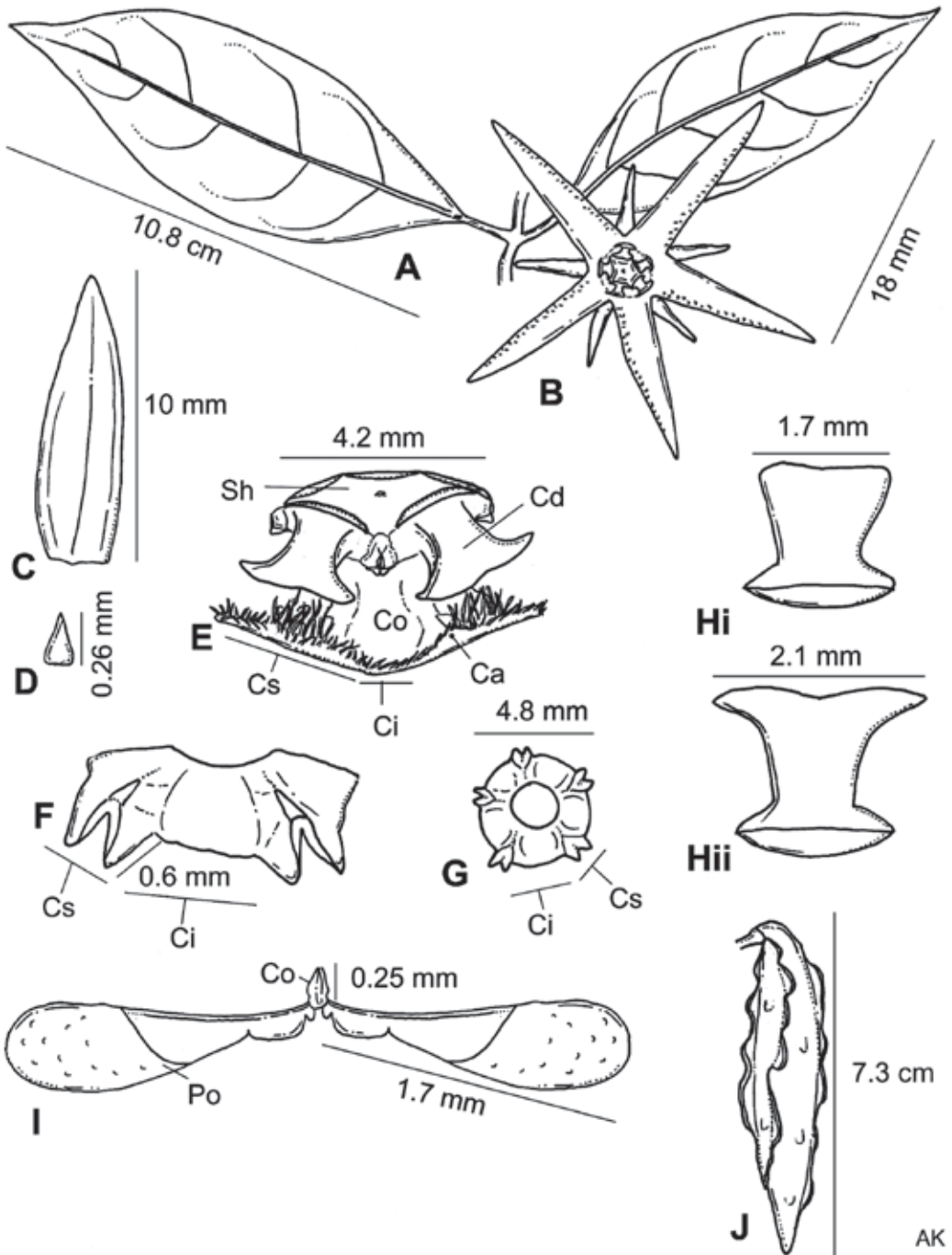


FIG. 10. *Gonolobus stellatus*. A. Leaves. B. Open flower. C. Sepal. D. Calycine colleter. E. Faucal annulus of the corolla, gynostegial corona, and style-head. F. Detail of gynostegial corona of fused staminal (Cs) and interstaminal (Ci) segments (side view). G. Detail of gynostegial corona (top view). Hi–ii. Variation in laminar dorsal anther appendages. I. Pollinarium. J. Follicle. A, C–D, and J based on *Proctor 29378* (BM). B and Hi–ii based on *Purdie s.n.* (K). E–G and I based on *Hunnewell 11032* (GH). Aw = anther wings; Ca = faucal annulus of corolla; Ci = interstaminal gynostegial corona segment; Cd = laminar dorsal anther appendage; Co = corpusculum; Cs = staminal gynostegial corona segment; Po = pollinium.

surface glabrate, trichomes sharp, eglandular, very sparsely scattered along the major and minor veins, collectors 2, 0.2–0.4 mm long; petioles 0.8–5.6 cm long, sparsely pubescent on all sides to glabrate, capitate-glandular trichomes, ca. 0.1 mm long, sharp, eglandular trichomes, ca. 0.6 mm long, antrorsely-appressed or -ascending; stipular collectors 2, ca. 0.25 mm long one borne on each side of the petiole base (rarely on the stem). Inflorescences racemiform, peduncles 0.7–3 cm long, sparsely pubescent to glabrate, capitate, as well as sharp, eglandular trichomes present, the latter antrorsely-appressed or -ascending, distributed throughout, ca. 0.8 mm long; pedicels 1.2–2.3 cm long, relatively evenly pubescent from apex to base, capitate-glandular trichomes ca 0.7 mm long, longer, sharp, eglandular trichomes antrorsely-ascending, ca. 0.26 mm long, bracts linear to linear-oblong, ca. 1.35 mm × 0.24 mm, caducous adaxial surface pubescence glabrous, abaxial surface coarsely pubescent, trichomes sharp, eglandular, ca. 0.22 mm long. Calyx lobes 5, lanceolate, 7–11 mm × 1.7–2.7 mm, apices obtuse, margins glabrous, abaxial surface very sparsely coarsely pubescent at the base, glabrous toward the apex, trichomes antrorsely appressed or -ascending, to 0.6 mm long; collectors 1–2 per sinus. Corolla lobes 5, linear-lanceolate, 15–18 mm × 4–5.3 mm, slightly lobed at the base, a glandular swelling frequently present in the sinus, adaxial surface densely strigillose, not papillate-pubescent, on the right half, abaxial surface glabrous; faucal annulus (corolline corona or Ca) interrupted, a raised bump or ridge opposite each corolla lobe sinus, pubescent; gynostegial corona of fused staminal (Cs) and interstaminal (Ci) parts, prostrate-undulating, single, secondary nectaries in interstaminal position absent; anther guiderails without appendages, laminar dorsal anther appendages (Cd) 1.7–2.1 mm wide, slightly emarginate to divergently and sharply bilobed; style-head ca. 4.3 mm diam, stipe ca. 1.7 mm long, edentate. Pollinaria: corpuscula ca. 0.25 mm long, pollinia borne horizontally, narrowly ovate, ca. 1.7 mm × 0.48 mm. Follicles (immature) fusiform, 5-winged, but with small murications between the wings, 7.1–7.3 cm × 1.6–1.7 cm. Seeds unknown.

*Phenology*.—Flowering in March and July. Fruiting in July.

*Distribution*.—Endemic to Jamaica, *G. stellatus* is known only from montane rainforests from about 390–460 m in elevation.

*Provisional conservation status*.—IUCN: Vulnerable (VU)—B1a,c. NatureServe: G3 N3.

*Taxon concept mapping*.— = *G. stellatus* sensu Schlechter (1899); = *G. stellatus* sensu Adams (1972).

Additional specimens examined. **JAMAICA. Portland Parish**: Hog House Hill study area, ca. 4 mi S of Sherwood Forest, N edge of John Crow Mtns., 1976–78 (st), *Kelly JCM 1490* (IJ); Gorge of Stony River above junction of the Macungo River, 25 Jul 1967 (fl & fr), *Proctor 29378* (BM, IJ). **St. Ann Parish**: County of Middlesex, Mt. Diablo, woods, 9 Mar 1936 (fl), *Hunnewell 11032* (GH).

**8. *Gonolobus stephanotrichus*** Griseb., *Cat. Pl. Cub.* 177. 1866. (**Fig. 11**). TYPE: CUBA: 1860–1864 (fl & fr), *Wright 2969* (LECTOTYPE, designated by Klings & Fantz 2006: GOET!-fl; SYNTYPES: BREM!, MO, GI, GH!, HAC!, KI, NY!, PI!, UCI, US!).

Herbaceous perennial vines. Latex white (rarely watery). Stems pubescent, both short, capitate-glandular, and longer, sharp, eglandular trichomes present, the latter throughout, spreading, or retrorse internodally, and antrorse-appressed along an indistinct, horizontal ridge between two opposing petioles and/or just above the node, to 1.08 mm long; nodes pubescent, gland field apparently absent. Leaf blades lanceolate, ovate, or oblong-ovate, 2–14.4 cm × 0.7–7.7 cm, apices gradually or abruptly acuminate with the acumen narrowly obtuse, to 2 cm long, bases deeply cordate, margins entire, adaxial surface sparsely but evenly strigillose to glabrate, abaxial surface sparsely but evenly strigillose, sharp, eglandular trichomes scattered along the major and minor veins, to ca. 0.58 mm long, collectors 3–4, ca. 0.4 mm long; petioles 0.9–7 cm long, evenly pubescent on all sides, some trichomes capitate, to 0.1 mm long, but mostly sharp, eglandular, antrorsely ascending or spreading, to 0.67 mm long; stipular collectors 2, ca. 0.39 mm long, one borne on each side of the petiole base (rarely on the stem). Inflorescences racemiform, peduncles 0.18–0.4 cm long, sparsely pubescent to glabrate, capitate trichomes apparently absent, sharp, eglandular trichomes sparse, antrorsely-appressed or -ascending, distributed throughout, ca. 0.4 mm long; pedicels 0.25–0.89 cm long, relatively evenly pubescent from apex to base, capitate-glandular trichomes very sparse, ca 0.07 mm long, longer, sharp, eglandular trichomes antrorsely-ascending, ca. 0.43 mm long, bracts linear-lanceolate, ca. 4.9 mm × 0.48 mm, caducous, adaxial surface glabrous, abaxial surface coarsely pubescent, trichomes sharp, eglandular,

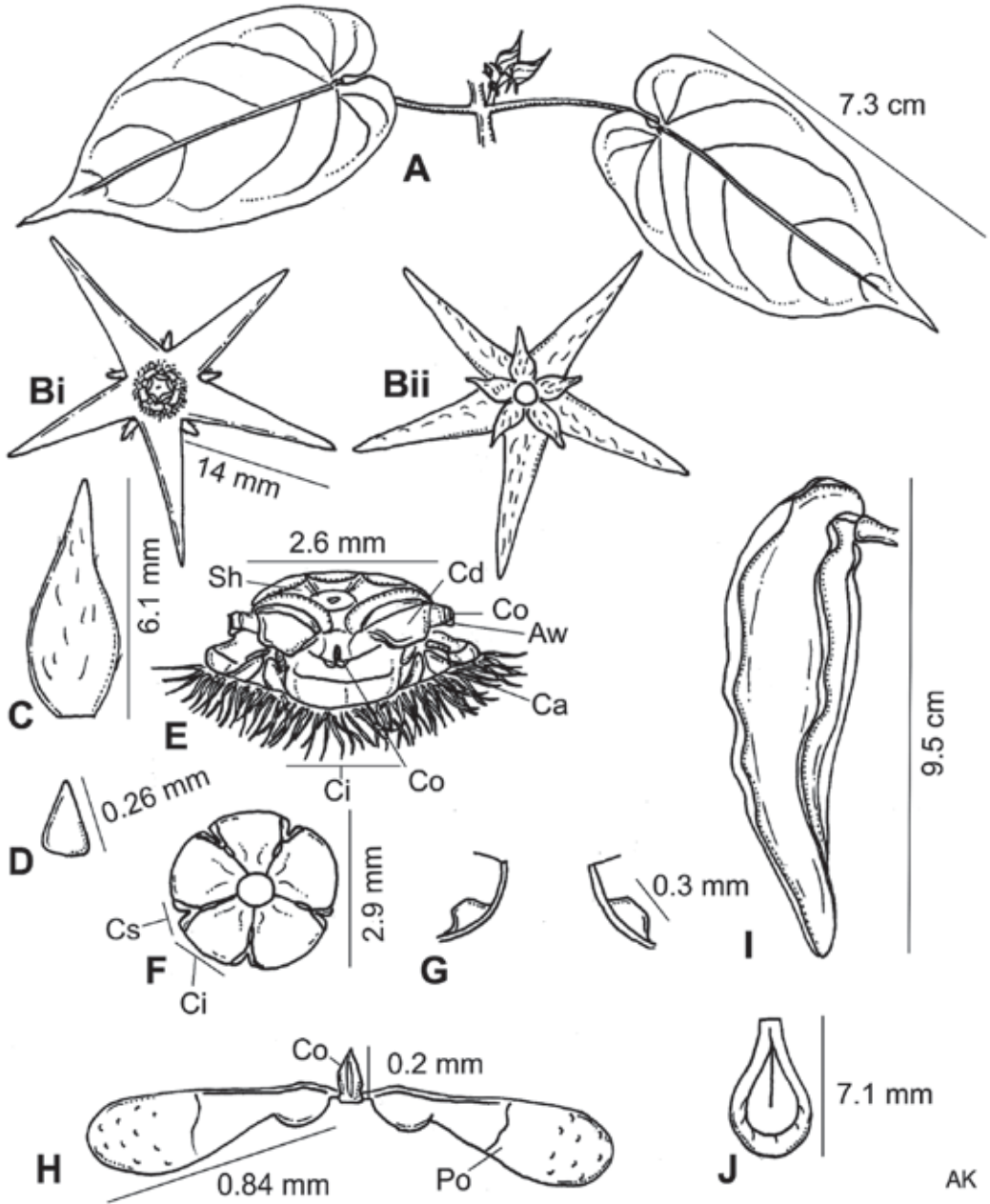


FIG. 11. *Gonolobus stephanotrichus*. A. Leaves and inflorescence. B. Open flower (adaxial view). Bii. Open flower (abaxial view). C. Sepal. D. Calycine colleter. E. Faucal annulus of the corolla, gynostegial corona, and style-head. F. Detail of gynostegial corona of fused staminal (Cs) and interstaminal (Ci) segments (top view). G. Detail of gynostegial stipe and basal tooth. H. Pollinarium. I. Follicle. J. Seed. A–D based on Wright 2969 (NY). E–H based on Acevedo-Rodriguez 10596 (US). I–J based on Acevedo-Rodriguez 11445 (US). Aw = anther wings; Ca = faucal annulus of corolla; Ci = interstaminal gynostegial corona segment; Cd = laminar dorsal anther appendage; Co = corpusculum; Cs = staminal gynostegial corona segment; Po = pollinium; Sh = style-head.

0.22–0.47 mm long, antrorse. Calyx lobes 5, lanceolate, 2.7–6.7 mm × 1.6–2 mm, apices obtuse, margins glabrous, abaxial surface sparsely but coarsely pubescent, trichomes antrorsely appressed or -ascending, to 0.4 mm long; colleters 1 per sinus. Corolla lobes 5, elongate triangular or lanceolate, 8.7–14 mm × 2.4–3.7 mm, slightly lobed at the base, a glandular swelling frequently present in the sinus, adaxial surface glabrous, abaxial surface pubescent with coarse, sharp, eglandular, antrorsely-appressed or -ascending trichomes, ca. 0.7 mm long; faucal annulus (corolline corona or Ca) annular, pubescent; gynostegial corona of fused staminal (Cs) and interstaminal (Ci) parts, prostrate-undulating, single, secondary nectaries in interstaminal position absent or at least not developed into distinct bumps or mounds; anther guiderails without appendages, laminar dorsal anther appendages (Cd) ca. 0.6 mm wide, truncate; style-head ca. 2.6 mm diam, stipe ca. 0.73 mm long, teeth not appearing as notches, instead truncate, borne individually on the lower portion of the column, just above the upwardly rising segment of each Cs. Pollinaria: corpuscula ca. 0.2 mm long, pollinia borne horizontally, narrowly ovate, ca. 0.84 mm × 0.3 mm. Follicles ovoid, 5-winged, 9.3–9.5 mm × 2.6–2.9 mm. Seeds pyriform, compressed, not plano-convex, 7–7.8 mm × 3.4–4.9 mm, glabrous, margins entire, not dentate, coma to 2.7 cm long.

*Phenology*.—Flowering in January, February, May, June, and October. Fruiting in April, November, and September.

*Distribution*.—*Gonolobus stephanotrichus* occurs in Cuba, Hispaniola, and Puerto Rico (Fig. 1). It has primarily been collected in mid-elevation (340–1100 m), moist to wet forests.

*Provisional conservation status*.—IUCN: Least concern (LC). NatureServe: Cuba (G4 N4); Dominican Republic (G4 N4); Puerto Rico (G4 N4).

*Taxon concept mapping*.—= *G. stephanotrichus* sensu Schlechter (1899); = *G. stephanotrichus* sensu Liogier (1957, 1994, 1995); = *G. stephanotrichus* sensu Acevedo-Rodríguez (2005).

*Notes*.—*Gonolobus stephanotrichus* was recently “re-discovered” from Cuba, from where it had been known only by collections sometime between 1860 and 1864 (Krings et al. 2005). Additional illustrations of *G. stephanotrichus* from Puerto Rico can be found in Acevedo-Rodríguez (2005). Readers should note however, that the gynostegium pictured in fig. 36 D should be rotated so that the Cd are opposite the corolla lobe sinuses and not opposite the corolla lobes themselves as pictured.

Additional specimens examined. **CUBA**: Cuba Orientali, 1856–1857 (fl, fr-imm), Wright 407 (GH; blue label); Cuba Orientali, 1861 [1860 on white label, but with a one marked through the zero] (fl, fr-imm), Wright 164 (S). **Santiago de Cuba**: Sierra Maestra, Parque Nacional Turquino, within 3 km of Campamento Joaquin on trail from the Alto de Naranjo, 3 June 2005 (fl-imm), Krings, Areces, and Lazcano s.n. (HAJB, NCSC); Sierra Maestra, Parque Nacional Turquino, 2–3 km downhill from Campamento Joaquin in direction of the Alto de Naranjo, 2 June 2005 (fl-imm), Krings, Areces, and Lazcano s.n. (NCSC). **DOMINICAN REPUBLIC**. **Espailat**: Cordillera Septentrional, Mora, Colonia de Jamao, 21 May 1929 (fl), Ekman H12568 (K). **Puerto Plata**: estribo sur de Isabel de Torres, 16 Oct 1976 (fl), Liogier and Liogier 25627 (JBSD). **San Cristóbal**: Cordillera Central, Loma La Humeadora, ladera este, en el nacimiento del Arroyo Derrumadero, 20 Apr 1994 (fr), Jiménez, Mejía, and Veloz 1304 (JBSD). **PUERTO RICO**. **Adjuntas**: Barrio Guilarte, Guilarte Forest Reserve, along trail, 21 Nov 1997 (fr), Romero and Nazario s.n. (UPRRP). **Arecibo**: Río Abajo State Forest Reserve, 18 Jan 1996 (st), Acevedo-Rodríguez and Axelrod 7785 (US); Río Abajo State Forest, along Igartua trail, 12 Jan 1999 (fl), Acevedo-Rodríguez 10596 (UPRRP, US); Río Abajo State Forest, 2 Feb 1999 (fl), Acevedo-Rodríguez 10814 (UPRRP, US); Río Abajo State Forest, along Igartua trail, 20 Apr 2006 (st), Krings 1390 (NCSC); Río Abajo State Forest, 20 Apr 2006 (st), Krings 1391 (NCSC); Río Abajo State Forest, 20 Apr 2006 (st), Krings 1392 (NCSC). **Orocovis**: Toro Negro Forest Recreation area, 11 Sep 2000 (fr), Acevedo-Rodríguez 11445 (UPRRP, US); Toro Negro State Forest, near uphill end of Sendero Piscina where it joins with Camino del Bolo, 21 Apr 2006 (st), Krings 1387 (NCSC); Toro Negro State Forest, Sendero Piscina, trailside, 21 Apr 2006 (st), Krings 1388 (NCSC); Toro Negro State Forest, trail beside Quebrada Doña Juana on opposite side of river from Rt 143 entrance to camping area, 21 Apr 2006 (st), Krings 1389 (NCSC).

**9. *Gonolobus waitukubuliensis*** Krings, Syst. Bot. 32:187. 2007. (Fig. 12). TYPE: DOMINICA: In sylvis ad Laudat, May 1882 (fl), Eggers 728 (HOLOTYPE: HBG!; ISOTYPES: FRI, G!, GHI!, JEI, MI, PI, WI, ZI).

Herbaceous perennial vines. Latex white. Stems glabrous or glabrate, both short, capitate-glandular, and longer, sharp, eglandular trichomes present, the latter mostly retrorse or spreading internodally, and antrorse-appressed along an indistinct, horizontal ridge between two opposing petioles and/or just above the node, to 0.64 mm long; nodes pubescent or glabrous in age, gland field sometimes present. Leaf blades ovate to oblong-ovate, (2.1–)6.7–10.4 cm × (0.9–)3.2–5.7 cm, apices gradually or abruptly acuminate with the acumen

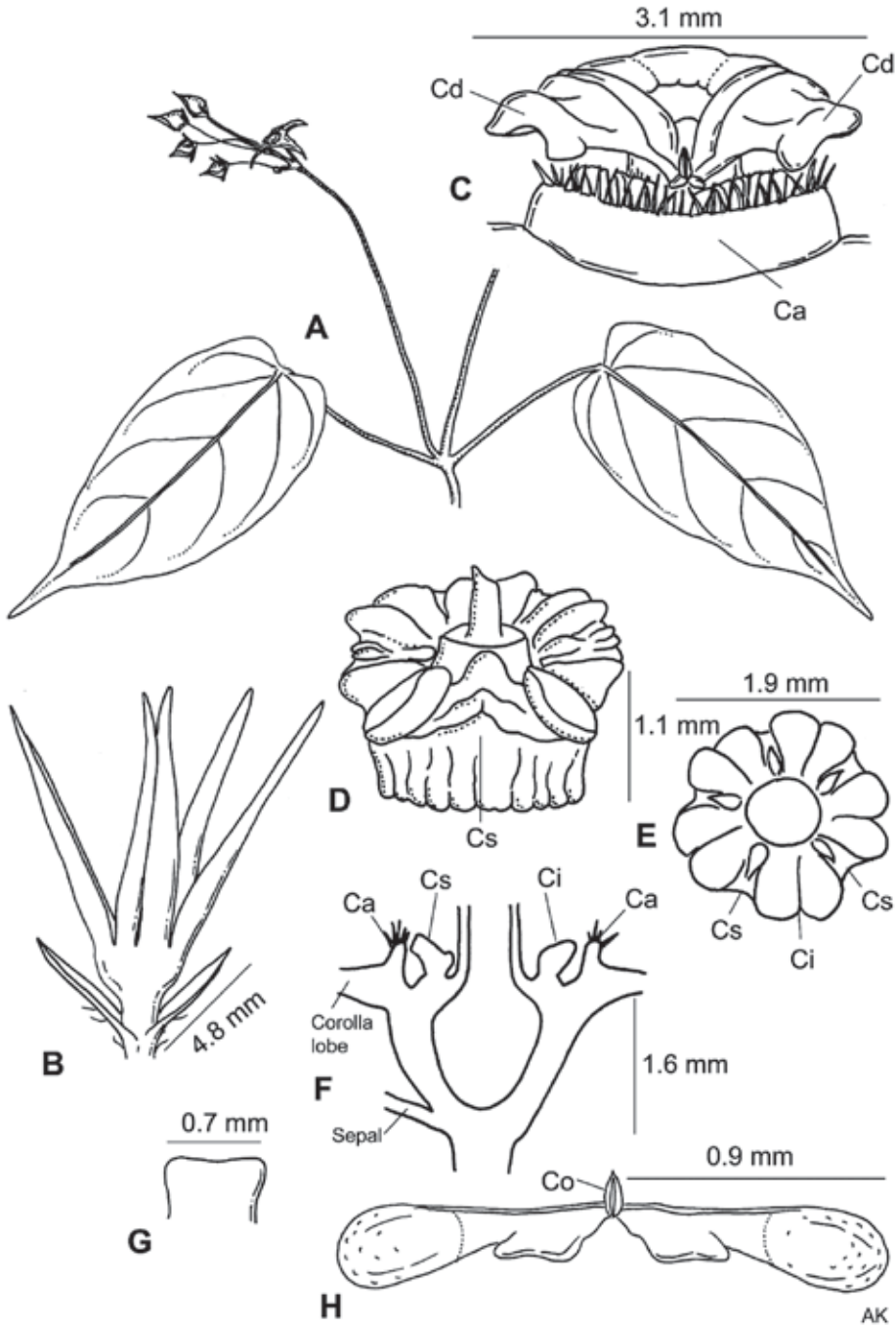


FIG. 12. *Gonolobus waitukubuliensis*. A. Leaves and inflorescence. B. Flower. C. Raised and completely circular faucal annulus of the corolla (Ca) and style-head (gynostegial corona obscured behind the Ca). D. Gynostegial corona of fused staminal (Cs) and interstaminal (Ci) segments (style-head removed). E. Top view of gynostegial corona (style-head removed). F. Cross-section of corolla tube showing position of corolla and gynostegial corona elements. G. Laminar dorsal anther appendage (Cd). H. Pollinarium. A and C based on Eggers 728 (M). B and D–H based on Webster 13505 (US). Ca = faucal annulus of corolla; Ci = interstaminal gynostegial corona segment; Cd = laminar dorsal anther appendage; Co = corpusculum; Cs = staminal gynostegial corona segment.



acute, to 1.8 cm long, bases deeply or shallowly cordate (rarely rounded, but then other leaves present with cordate bases), margins entire, adaxial surface glabrate or sparsely strigose, abaxial surface glabrate or more densely strigose with sharp, eglandular trichomes scattered along the major and minor veins, colleters 2, (0.4–)0.7–0.9 mm long; petioles (0.9–)2.2–5.4 cm long, glabrate or sparsely pubescent primarily along the adaxial side and near the apex on the abaxial side, trichomes mostly capitate, to 0.09 mm long, with some short, sharp, eglandular trichomes mixed in, 0.2–0.4 mm long; stipular colleters 2, ca. 0.3 mm long, one borne on each side of the petiole base. Inflorescences racemiform, peduncles 4.1–5.2 cm long, glabrous or very sparsely pubescent with both capitate and sharp, eglandular hairs present, the latter antrorsely-appressed or –ascending, most pronounced near apex, ca. 0.3 mm long; pedicels 1.4–3.4 cm long, pubescence pronounced at apex and essentially absent elsewhere or sparsely to densely, relatively evenly pubescent from apex to base, capitate-glandular trichomes ca. 0.08 mm long, longer, sharp, eglandular hairs antrorsely- appressed or –ascending, ca. 0.3 mm long, bracts linear-lanceolate, ca. 0.8 mm × 0.2 mm, caducous, adaxial surface glabrous, abaxial surface coarsely pubescent, trichomes sharp, eglandular, ca. 0.17 mm long, antrorse. Calyx lobes 5, sublanceolate to elongate triangular (widest at or just above the base), 2.2–5.3 mm × 0.8–1.4 mm, apices obtuse to narrowly rounded, margins glabrous, abaxial surface glabrous or pubescent primarily at the base and variously toward the apex, trichomes, if present, antrorsely-ascending or –appressed, to 0.27 mm long; colleters 1 per sinus. Corolla lobes 5, narrowly lanceolate to elongate triangular, 4.2–11.2 mm × 1.8–3.4(–3.7) mm, slightly lobed at the base, a glandular swelling frequently present in the sinus, adaxial surface glabrous, abaxial surface glabrous; faucal annulus (corolline corona or Ca) a distinctly raised ring, ca. 0.5 mm high, short-hispid along the entire rim or only opposite each corolla lobe sinus; gynostegial corona of fused staminal (Cs) and interstaminal (Ci) parts, single, fused at the base into an erect ring, 5-lobed, lobes appearing strongly folded; anther guiderails apparently without appendages, laminar dorsal anther appendages (Cd) 0.6–0.9 mm wide, emarginate or truncate; style-head 2.8–3.14 mm diam, stipe 1–1.5 mm long, not toothed. Pollinaria: corpuscula 0.14–2 mm long, pollinia borne horizontally, ovate, ca. 0.6–0.85 mm × 0.3–0.38 mm. Follicles unknown.

*Phenology*.—Flowering in March, May, June, and July.

*Distribution*.—*Gonolobus waitukubuliensis* is endemic to Dominica (Fig. 1). It has been found primarily in middle elevation rainforests (ca. 609–1067 m; 2000–3500 ft). Like most West Indian *Gonolobus* taxa, *G. waitukubuliensis* appears to require small gaps in mature forests. It does not appear to be able to compete in large gaps or roadside edges in which other vines quickly become dominant. It is rather infrequent to rare, especially in mature forests with few gaps.

*Preservation status*.—IUCN: Vulnerable (VU)—Bla,c. NatureServe: G3 N3.

*Taxon concept mapping*.—< *G. martinicensis* sensu Schlechter (1899); < *G. martinicensis* sensu Howard (1988); < *G. martinicensis* sensu Nicolson (1991).

*Notes*.—*Gonolobus waitukubuliensis* is immediately recognizable among Lesser Antillean *Gonolobus* species by the combination of a distinctly raised, completely circular faucal annulus (ca. 0.5 mm tall), an erect gynostegial corona that appears quite folded apically, and a relatively tall gynostegial stipe (1–1.5 mm). It shares with *G. absalonensis*, *G. iyanolensis*, and sometimes *G. martinicensis*, the absence of hairs from the abaxial corolla lobe surface. The trichomes of the pedicel are fine and not as long (ca. 0.3 mm) as in *G. iyanolensis* (0.3–0.9 mm).

Additional specimens examined. **DOMINICA**: Mar 1882 (fl), *Eggers s.n.* (US); July 1882 (fl), *Eggers 1100* (K); May 1882 (fl), *Eggers 1700* (MO); s.d. (fl), *Imray 263* (K); St. John/St. Peter, Hiking trail to Morne Diablotins, 3 May 2006 (st), *Krings 1375, 1376, 1377* (NCSC); St. John/St. Peter, Syndicate hiking trail, 3 May 2006 (st), *Krings 1378* (NCSC); St. John/St. Peter, Hiking trail to Morne Diablotins, 4 May 2006 (st), *Krings 1380* (NCSC); St. John/St. Peter, Hiking trail to Morne Diablotins, 4 May 2006 (st), *Krings 1381* (NCSC); St. John/St. Peter, Hiking trail to Morne Diablotins, 4 May 2006 (st), *Krings 1382, 1383, 1384* (NCSC); St. John/St. Peter, Hiking trail to Morne Diablotins, at opening in trail with westward vista of Portsmouth and Cabrits, 4 May 2006 (st), *Krings 1385* (NCSC); St. John/St. Peter, Hiking trail to Morne Diablotins, 4 May 2006 (st), *Krings 1386* (NCSC); St. Joseph, En Haut Jean, 24 Jun 1965 (fl), *Webster 13505* (BM, US).

**10. *Gonolobus youroumaynensis*** Klings, Syst. Bot. 32:191. 2007. (**Fig. 13**). TYPE: ST. VINCENT: Orange Hill Estate, roadbank in banana and pigeon pea plantations, uphill from fork in road to the Central Water and Sewage Authority water intake site, Kiss-me, 14 Mar 2006 (fl), *Krings 1374 with Springer* (HOLOTYPE: NCSC!; ISOTYPES: GHI, KI, NYI, US!, P!).

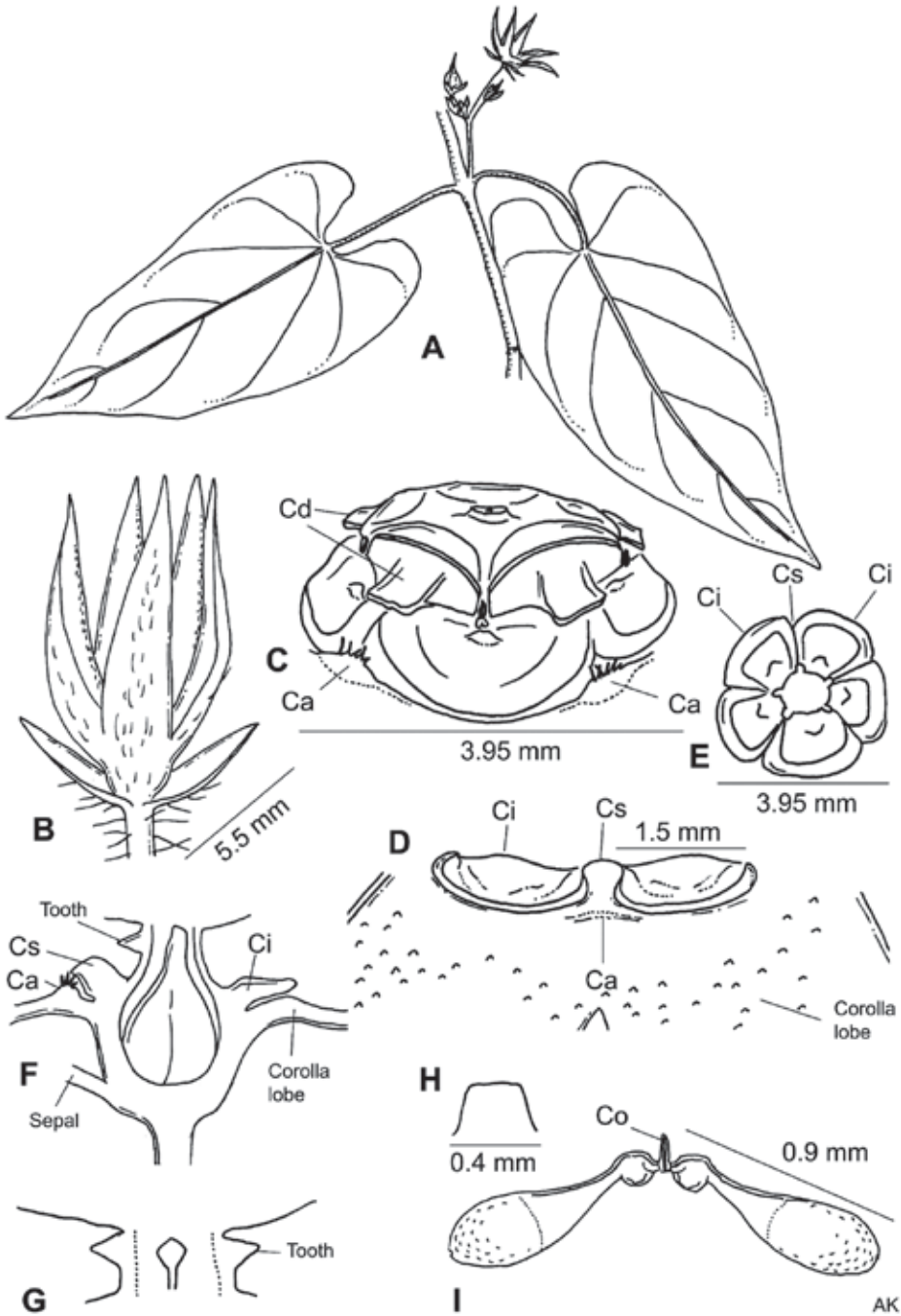


FIG. 13. *Gonolobus youroumaynensis*. A. Leaves and inflorescence. B. Flower showing coarse abaxial corolla lobe pubescence. C. Faucal annulus of the corolla (Ca), gynostegial corona, and style-head. D. Gynostegial corona of fused staminal (Cs) and interstaminal segments (Ci) (style-head removed). E. Top view of gynostegial corona (style-head removed). F. Cross-section of corolla tube showing position of corollar and gynostegial corona elements. G. Detail of teeth of the gynostegial stipe. H. Lamina dorsal anther appendage (Cd). I. Pollinarium. A–B and D based on *Howard 19584* (GH, NY, US). C and E–I based on *Krings 1374 with Springer* (NCSC). Ca = faucal annulus of corolla; Ci = interstaminal gynostegial corona segment; Cd = lamina dorsal anther appendage; Co = corpusculum; Cs = staminal gynostegial corona segment.

Herbaceous perennial vines. Latex white. Stems glabrate to pubescent, both short, capitate-glandular, and longer, sharp, eglandular trichomes present, the latter throughout, spreading, or retrorse internodally, and antrorse-appressed along an indistinct, horizontal ridge between two opposing petioles and/or just above the node, to 1.2 mm long; nodes pubescent, gland field apparently absent. Leaf blades ovate to oblong-ovate, (3.0–)5.4–9.6 cm × (1.2–)2.4–6.3 cm, apices gradually or abruptly acuminate with the acumen narrowly obtuse, to 1.5 cm long, bases deeply or shallowly cordate, margins entire, adaxial surface glabrate or sparsely strigose, abaxial surface glabrate or more densely strigose with sharp, eglandular trichomes scattered along the major and minor veins, colleters 2–4, 0.35–1 mm long; petioles (1.2–)2.7–5.3 cm long, spreading pubescent on all sides, some trichomes capitate, to 0.09 mm long, but mostly sharp, eglandular, 1–1.2 mm long; stipular colleters 2, ca. 0.26 mm long, one borne on each side of the petiole base. Inflorescences racemiform, peduncles 0.7–3.1 cm long, capitate, as well as sharp, eglandular trichomes present, the latter mostly spreading, but also some antrorsely-appressed or -ascending, distributed throughout, 0.7–0.9 mm long; pedicels 1.3–1.8 cm long, relatively evenly pubescent from apex to base, capitate-glandular trichomes ca 0.08 mm long, longer, sharp, eglandular trichomes mostly spreading, but some antrorsely-appressed or -ascending, ca. 0.9 mm long, bracts linear-lanceolate, 1.1–1.7 mm × 0.2–0.25 mm, caducous, adaxial surface glabrous, abaxial surface coarsely pubescent, trichomes sharp, eglandular, ca. 0.53 mm long, antrorse. Calyx lobes 5, sub lanceolate to elongate triangular (widest at or just above the base), 3.8–5.8 mm × 1–1.3 mm, apices obtuse to narrowly rounded, margins ciliate or glabrate, abaxial surface densely and coarsely pubescent at the base and variously toward the apex, trichomes spreading and antrorsely appressed or -ascending, to 0.8 mm long; colleters 1 per sinus. Corolla lobes 5, narrowly lanceolate to elongate triangular, (7.5–)8.7–10.1 mm × 1.9–3.1 mm, slightly lobed at the base, a glandular swelling frequently present in the sinus, adaxial surface pubescent on the right half, trichomes capitate, ca. 0.1 mm long, abaxial surface pubescent with coarse, sharp, eglandular, antrorsely-appressed or -ascending trichomes, particularly at the base and variously toward the apex, 0.36–0.5 mm long; faucal annulus (corolline corona or Ca) interrupted, a raised bump or indistinct ridge opposite each corolla lobe sinus, pubescent or glabrous; gynostegial corona of fused staminal (Cs) and interstaminal (Ci) parts, prostrate-undulating, single, a small bump borne near the base in the interstaminal position; anther guiderails without appendages, laminar dorsal anther appendages (Cd) ca. 0.5 mm wide, rounded or truncate; style-head 2.8–3.95 mm diam, stipe 0.48–0.7 mm long, bearing a single tooth ca. 0.2 mm long below each anther. Pollinaria: corpuscula 0.2–0.23 mm long, pollinia borne horizontally, ovate, 0.6–0.9 mm × 0.32–0.45 mm. Follicles unknown.

*Phenology*.—Flowering in February and March.

*Distribution*.—*Gonolobus youroumaynensis* is apparently endemic to St. Vincent (Fig. 1). It occurs on the windward side of the island at the foot of La Soufrière in the Orange Hill Estate area. Vines were found growing along the road to the water intake amidst banana and pigeon pea plantations. Vines were not found along the trail to the crater of La Soufrière. However, only a half day was spent searching this trail and they could have been overlooked.

*Provisional conservation status*.—IUCN: Critically Endangered (CR)—B1a,biii. NatureServe: G1 N1.

*Taxon concept mapping*.—< *G. martinicensis* sensu Schlechter (1899); < *G. martinicensis* sensu Howard (1988).

*Notes*.—*Gonolobus youroumaynensis* is readily recognizable among Lesser Antillean *Gonolobus* species by the combination of a single, prostrate-undulating gynostegial corona exhibiting a small bump towards the base of the Ci, a toothed stipe, and long, spreading trichomes (to 0.9 mm) found on stems, peduncles, and pedicels.

Additional specimens examined. **ST. VINCENT:** Mar 1890 (fl), *Smith and Smith* 382 (BM, E, GH, K, NY); Orange Hill Estate, 10 Feb 1980 (fl), *Howard* 19584 (BM, GH, NY, US).

#### DOUBTFUL AND EXCLUDED NAMES

The following list includes names that are excluded from *Gonolobus* s.s. based on their morphology (e.g.,

lack of laminar dorsal anther appendages), and names of uncertain status. Two new combinations are made below: *Matelea dictyopetalata* and *M. pubescens*.

*Gonolobus bakeri* Schltr., Symb. antill. 7(3):341. 1912. TYPE: CUBA: Cult. in Santiago de las Vegas, May 1907, Baker 7286 (HOLOTYPE: location unknown).

*Gonolobus bakeri* is apparently only known from the type collection, which has not been located despite query of nearly one hundred institutions known to house West Indian collections. If the specimen was at B, it may have been destroyed in WW II. The position of *G. bakeri* appears uncertain. Schlechter does not describe dorsal anther appendages in the protologue. Combined with his note that the species is “mit *G. variifolius* Schltr. [now *Matelea variifolia* (Schltr.) Woodson] am nächsten verwandt,” there is reason to believe that *G. bakeri* may better belong in *Matelea*. *Matelea variifolia* clearly lacks laminar dorsal anther appendages and also exhibits suborbicular corolla lobes. It is known only from Puerto Rico (Schlechter 1899; Acevedo-Rodríguez 2003, 2005). As the single specimen representing *G. bakeri* was cultivated in Cuba, it may be that the species is merely a pubescent form of *M. variifolia*. Among West Indian *Gonolobus* s.s. (if not the entire genus), *G. bakeri* would be the only species with suborbicular corolla lobes.

*Gonolobus bayatensis* Urb., Symb. antill. 9(3):420. 1925. TYPE: CUBA: Oriente, Bayate, 9 Oct 1914, Engström 3056 (LECTOTYPE, designated by Krings 2008: S!; ISOLECTOTYPE: NY!) = *Matelea bayatensis* (Urb.) Woodson, Ann. Missouri Bot. Gard. 28:226. 1941.

*Gonolobus bicolor* (Britton & P.Wilson) Urb., Symb. antill. 9(3):421. 1925. TYPE: CUBA: Oriente, Maestra ridge, 1300 m, Jul 1922, León 10787 (HOLOTYPE: NY!) = *Matelea bicolor* (Britton & P. Wilson) Woodson, Ann. Missouri Bot. Gard. 28:236. 1941.

*Gonolobus dictyopetalus* Urb. & Ekman, Ark. Bot. 20A(5):41. 1926. TYPE: HAITI: Massif de la Selle, Morne Cabaio, c. 1900 m, 24 Aug 1924 (fl), Ekman H1625 (LECTOTYPE: S!, designated by Krings 2008; ISOLECTOTYPE: IJ! – fragment [single leaf]) = *Matelea dictyopetalata* (Urb. & Ekman) Krings, **comb. nov.**

*Gonolobus domingensis* Alain, Moscosoa 1(3):46. 1978. TYPE: DOMINICAN REPUBLIC: Estribo sur del Isabel de Torres, Puerto Plata, alt. 750 m, 16–17 Aug 1975 (fl), Liogier & Liogier 23780 (LECTOTYPE: JBSD!, designated by Krings 2005d) = *Matelea domingensis* (Alain) Krings, Sida 21:2081. 2005.

*Gonolobus floccosus* Bertol., Opusc. Sci. 4:225. 1823. TYPE: GUADELOUPE: (HOLOTYPE: BOLO!) = *Matelea maritima* (Jacq.) Woodson, Ann. Missouri Bot. Gard. 28:222. 1941.

*Gonolobus grisebachianus* Schltr. in Urb., Symb. antill. 1(2):287. 1899. TYPE: CUBA: Wright s.n. (HOLOTYPE: location unknown) = *Matelea grisebachiana* (Schltr.) Alain, Mem. Soc. Cub. Hist. Nat. “Felipe Poey” 22:120. 1955.

*Matelea grisebachiana* is apparently known only from the type collection, which has not been located despite query of nearly one hundred institutions known to house West Indian collections. If it was at B, it may have been destroyed in WW II. Thus, the species can be placed solely based on the protologue and past treatments. Although Krings et al. (2005) maintained the taxon in *Gonolobus*, the combination in *Matelea* may be more correct based on the glabrous, reticulate corolla lobes and very narrow, linear-lanceolate leaves (0.5–0.7 cm wide)—a leaf form quite atypical for *Gonolobus*. The description of the corolla lobes as being 9 cm long, is likely a print-setting error to be corrected to 9 mm. Grisebach (1866) did not mention laminar dorsal anther appendages in his protologue for *G. tigrinus* var. *angustifolia* and, upon reconsideration, it is unclear to me whether Schlechter (1899) was referring to them or not [italics mine]: “Diese Art ist trotz ihrer habituellen Aehnlichkeit mit *G. tigrinus* Griseb. von diesem vollständig verschieden. Die Blätter sind schmaler, die Blüten grösser, die äussere Corona ganz verschieden und die Schuppen der inneren Corona viel deutlicher vom Antherenrücken abgehoben, ausserdem, von oben gesehen, in der Mitte nicht ausgerandet, sondern eher verdickt.” I am hesitant to presume the taxon extinct, as another Cuban Gonolobinae species—*G. stephanotrichus*—was recently rediscovered in the country after having been known from the island only from the type, collected between 1860 and 1864 (Krings et al. 2005).

*Gonolobus haitiensis* P.T. Li, J. South China Agric. Univ. 14:58. 1993. TYPE: HAITI: Massif du Nord, St. Louis du Nord, Morne Baron, 950 m, 20 Aug 1925, Ekman H4693 (HOLOTYPE: S!; ISOTYPES: B!, US!). = *Matelea crispiflora* (Urb.) Jiménez, Rhodora 62:238. 1960, syn. nov.

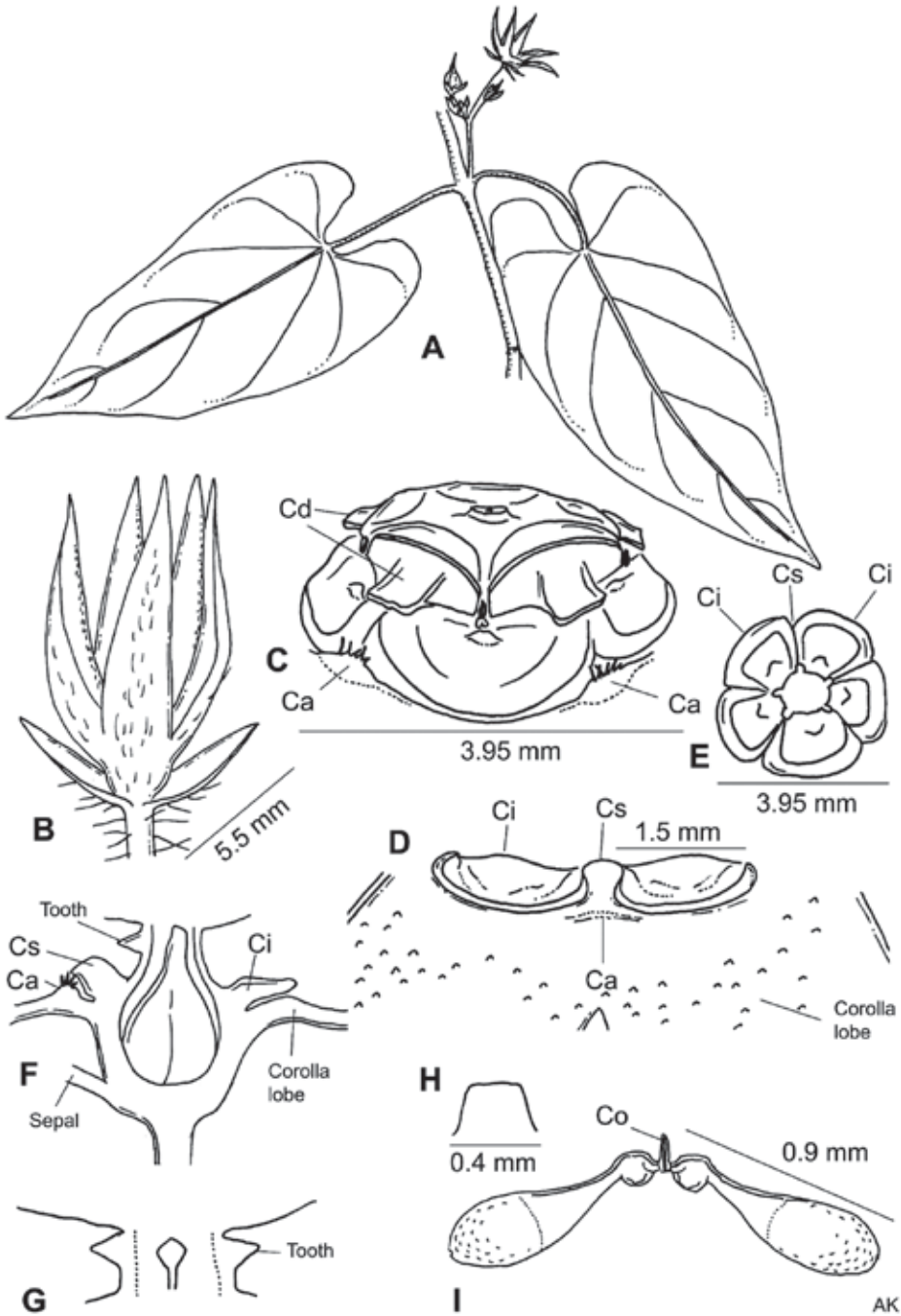


FIG. 13. *Gonolobus youroumaynensis*. A. Leaves and inflorescence. B. Flower showing coarse abaxial corolla lobe pubescence. C. Faucal annulus of the corolla (Ca), gynostegial corona, and style-head. D. Gynostegial corona of fused staminal (Cs) and interstaminal segments (Ci) (style-head removed). E. Top view of gynostegial corona (style-head removed). F. Cross-section of corolla tube showing position of corollar and gynostegial corona elements. G. Detail of teeth of the gynostegial stipe. H. Lamina dorsal anther appendage (Cd). I. Pollinarium. A–B and D based on *Howard 19584* (GH, NY, US). C and E–I based on *Krings 1374 with Springer* (NCSC). Ca = faucal annulus of corolla; Ci = interstaminal gynostegial corona segment; Cd = lamina dorsal anther appendage; Co = corpusculum; Cs = staminal gynostegial corona segment.

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*Gonolobus haitiensis* P.T. Li is a nomen novum for *Gonolobus stipitatus* Alain (Phytologia 64:345. 1988). It is here reduced to synonymy beneath *Matelea crispiflora*, as its type (*Ekman H4693*) clearly belongs with *Poicillopsis crispiflora* Urb. However, see also note for *Gonolobus membranaceus* Schltr.

*Gonolobus maritimus* (Jacq.) R.Br., Mem. Wern. Nat. Hist. Soc. 1:24. 1810. TYPE: Herbar. Du Jacquin, 2 Insulae Caribaea, s.d., De Ponthieu (LECTOTYPE, designated by Klings & Saville 2007: BM!) ≡ *Matelea maritima* (Jacq.) Woodson, Ann. Missouri Bot. Gard. 28:222. 1941.

*Gonolobus membranaceus* Schltr. in Urb., Symb. antill. 1(2):285. 1899. TYPE: HAITI: *Poiteau s.n.* (HOLOTYPE: location unknown) = *Matelea crispiflora* (Urb.) Jiménez, Rhodora 62:238. 1960.

The location of the type remains unknown. *Ekman H4693* (IJ) is labelled *Gonolobus membranaceus*. The specimen consists of mostly stem and 3–4 leaf fragments held in a fragment pocket. It appears to match *Poicillopsis crispiflora* Urb. *Gonolobus membranaceus* is likely very closely related to *Matelea haitiensis* as, based on the protologues, the two appear to differ only in the shape and apices of the leaf blades and calyx lobes. Additional collections and discovery of the type may prove them synonymous.

*Gonolobus nipensis* Urb., Symb. antill. 9(3):421. 1925. TYPE: CUBA: Oriente, Sierra de Nipe, Loma Mensura, c. 725 m, 11 Jul 1919 (fr), *Ekman 9710* (LECTOTYPE, designated by Klings 2008: S!; ISOLECTOTYPE: NY!). ≡ *Matelea nipensis* (Urb.) Woodson, Ann. Missouri Bot. Gard. 28:226. 1941.

*Gonolobus ottonis* C. Koch & Bouche, Ind. Sem. Hort. Berol. 13. 1855. TYPE: unknown.

Sometimes cited as *Gonolobus ottonis* Walp. (Ann. Bot. Syst. 5:502. 1859). However, Walpers (1859) clearly cited *G. ottonis* C. Koch & Bouche and should not be considered author of a homonym. Walpers (1859) repeated Koch and Bouche's citation: 'Ex insula Cuba reportavit Otto.' However, Schlechter (1899) thought that the specimen collected by Otto (apparently formerly at B) was from Caracas, Venezuela, not from Cuba. The location of the type is unknown.

*Gonolobus oxyanthus* Turcz., Bull. Soc. Imp. Naturalistes Moscou 25(2):318. 1852. TYPE: VENEZUELA: 1845–1852, *Funk 2* (G, n. v.; P, n. v.) fide TROPICOS.

Fide Fontella and Schwarz (1981), a synonym of *Gonolobus rostratus* (Vahl) R. Br. ex Schult. (Systema Vegetabilium 6:61. 1820). TROPICOS (23 Aug 2006) cited *Funk 2* (Venezuela) as the type, but a copy of the protologue could not be located. Specimens were not found on either of two visits to P.

*Gonolobus pauciflorus* Spreng., Syst. veg. 1:846. 1824. TYPE: HISPANIOLA: 'St. Domingue,' *Bertero s.n.* (LECTOTYPE, designated by Klings 2006: P!; ISOLECTOTYPE: G-DC [IDC microfiche Candolle Prodromus Herbarium, fiche # 1543!]). ≡ *Matelea pauciflora* (Spreng.) Woodson, Ann. Missouri Bot. Gard. 28:226. 1941.

*Gonolobus pubescens* Griseb., Fl. Brit. W.I. 420. 1862. TYPE: JAMAICA. *Macfadyen s.n.* (HOLOTYPE: GOET!; ISOTYPE: K!) ≡ *Matelea pubescens* (Griseb.) Klings, **comb. nov.**

*Gonolobus rhamnifolius* Griseb., Fl. Brit. W.I. 420. 1862. TYPE: JAMAICA, *Alexander s.n.* (HOLOTYPE: GOET!) ≡ *Matelea rhamnifolia* (Griseb.) Klings, Sida 21:1515. 2005.

*Gonolobus sintenisii* Schltr., Symb. antill. 1(2):288. 1899. TYPE: PUERTO RICO: Sierra de Luquillo, Jiménez Mts., 9 Jul 1885 (fl), *Sintenis 1354* (LECTOTYPE, designated by Klings 2008: HBG!; ISOLECTOTYPES: BM!, G!, GH!, K!, US!). ≡ *Matelea sintenisii* (Schltr.) Woodson, Ann. Missouri Bot. Gard. 28:226. 1941.

*Gonolobus stipitatus* Alain, Phytologia 64:345. 1988, nom. illeg.; non *Gonolobus stipitatus* Morillo, 1987. TYPE: HAITI: Massif du Nord, St. Louis du Nord, Morne Baron, 950 m, 20 Aug 1925, *Ekman H4693* (HOLOTYPE: S!; ISOTYPES: B!, US!) = *Matelea crispiflora* (Urb.) Jiménez, Rhodora 62:238. 1960.

See discussion under *Gonolobus haitiensis*.

*Gonolobus tigrinus* Griseb., Mem. Amer. Acad. Arts 8:520. 1863. TYPE: CUBA: Holguín, 19 Mar, *Wright 1667* (HOLOTYPE: GOET, n.v.; SYNTYPES: MO [image online!], G!, GH!, K!). ≡ *Matelea tigrina* (Griseb.) Woodson, Ann. Missouri Bot. Gard. 28:226. 1941.

*Gonolobus tigrinus* Griseb. var. *angustifolius* Griseb., Cat. pl. Cub. 177. 1866. TYPE: CUBA: *Wright s.n.* (HOLOTYPE: location unknown) = *Matelea grisebachiana* (Schltr.) Alain, Mem. Soc. Cub. Hist. Nat. "Felipe Poey" 22:120. 1955.

See *Gonolobus grisebachianus*

*Gonolobus variifolius* Schltr., Symb. antill. 1(2):286. 1899. TYPE: PUERTO RICO. Sierra de Luquillo, Jiménez mts., Jun 1885, *Sintenis 1653* (LECTOTYPE: NY!), designated by Krings 2008; ISOLECTOTYPES: G!, GH!, MO!, P!, US! ≡ *Matelea variifolia* (Schltr.) Woodson, Ann. Missouri Bot. Gard. 28:226. 1941.

*Gonolobus virescens* Desv. ex Ham., Prodr. pl. Ind. occid. 32. 1825. TYPE: "JAMAICA:" *Desvaux s.n.* (HOLOTYPE: P!).

Rendle (1936) considered *G. virescens* Desv. a *species incerta*. Schlechter (1899) noted that there was likely a label mix-up between *G. stapelioides* and *G. virescens*, and that the latter was likely collected from Tobago and not Jamaica. The morphology of the flowers of *Desvaux s.n.* (P!) places it in Marsdenieae Benth., rather than Gonolobinae.

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