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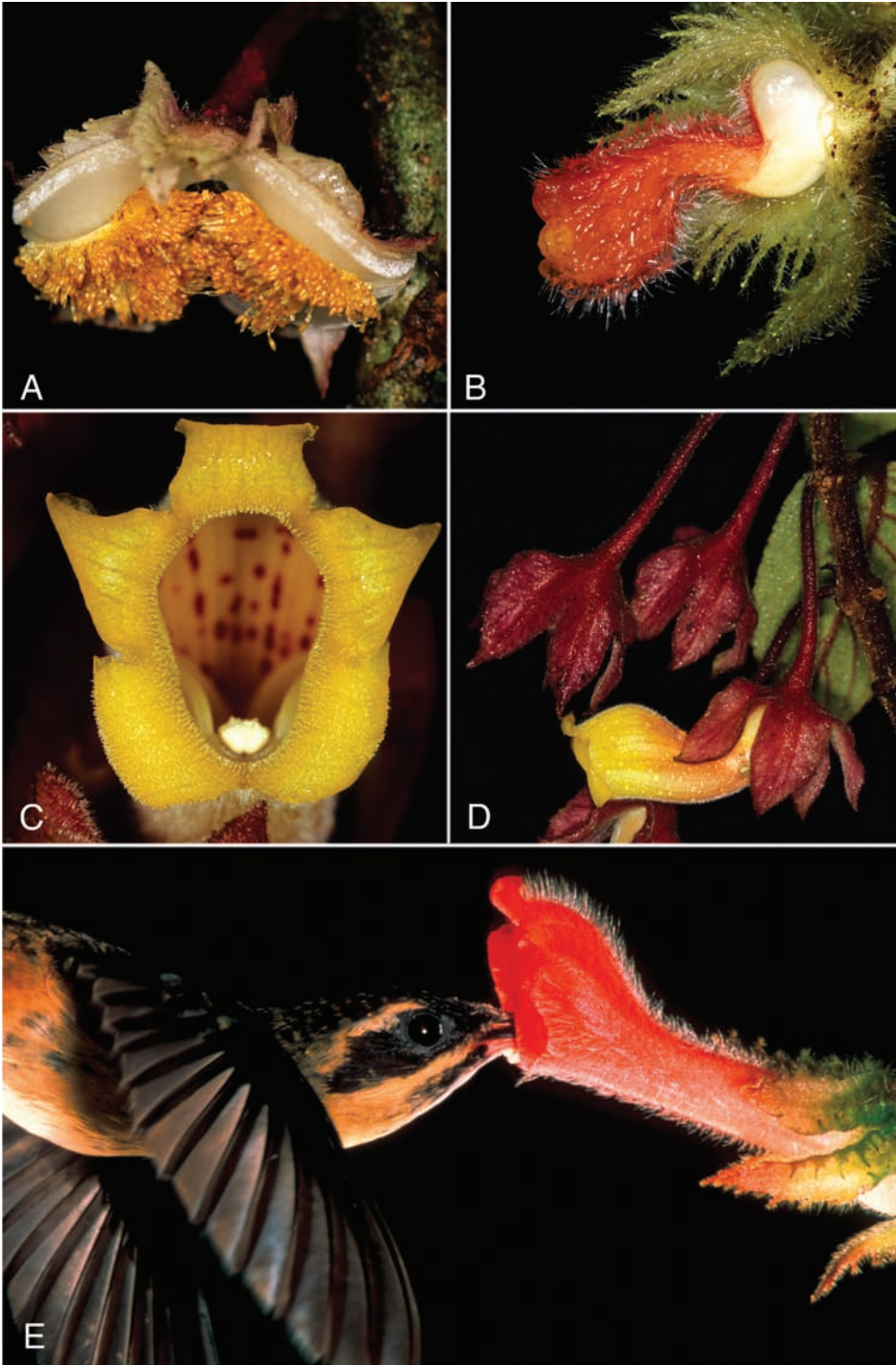
Systematics of Glossoloma (Gesneriaceae).

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Glossoloma. A. Mature fruit of *G. carpishense* (Clark *et al.* 8247). B. Non-resupinate flower of *G. anomalum* (Clark & Harris 7300). C, D. Face and lateral views of *G. altescandens* (Clark *et al.* 9025). E. Flower of *G. penduliflorum* visited by a Tawny-bellied Hermit hummingbird (*Phaethornis syrmatorphorus*).

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SYSTEMATICS OF GLOSSOLOMA (GESNERIACEAE)

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ABSTRACT. The genus *Glossoloma* (Gesneriaceae; subfamily Gesnerioideae; tribe Episcieae) comprises 27 species and occurs from southern Mexico to Panama, northwestern South America, and south to Bolivia. It ranges in elevation from sea level in the Chocó forests of northwestern South America to 3500 meters in the Andean cloud forests of Colombia and Ecuador. The center of diversity of *Glossoloma* is found in the western lowland forests in Ecuador and Colombia, where 15 species occur. The habit ranges from unbranched terrestrial subshrubs and herbs to occasionally facultative epiphytes; two species are obligate epiphytes. Nearly all species of *Glossoloma* have resupinate flowers with laterally compressed tubular corollas that are apically pouched. The generic circumscription of *Glossoloma* is based on phylogenetic analyses of morphological and molecular data from the ribosomal (nrDNA) internal transcribed spacer region (ITS) and the intergenic (*trnH-psbA*) chloroplast spacer region (details of the analyses are published separately). *Glossoloma* includes the majority of species that had been traditionally recognized as *Alloplectus*, a poorly defined genus with discordant elements currently nesting in *Columnea*, *Nematanthus*, *Drymonia*, and the resurrected genus *Crantzia*. Replacing the traditional polyphyletic concept of *Alloplectus* with a monophyletic *Glossoloma* resulted in 21 new combinations, which were published previously. Five new species are proposed: *Glossoloma anomalum*, *G. harlequinoides*, *G. pedunculatum*, *G. scandens*, and *G. subglabrum*. A lectotype is designated for *Alloplectus penduliflorus* (= *Glossoloma penduliflorum*). Full synonymies and descriptions, and a key are provided; all species are mapped, and most are illustrated.

INTRODUCTION

Glossoloma Hanst. represents a well-defined clade of 27 species in tribe Episcieae (Gesneriaceae, subfamily Gesnerioideae). The features that define *Glossoloma* are resupinate flowers; an unbranched subshrub habit with terminally clustered leaves; and corollas that are tubular, apically pouched, and appear laterally compressed. The presence of resupinate flowers is a morphological synapomorphy for *Glossoloma*, a previously unreported feature for the members of this group (Clark & Zimmer 2003; Clark et al. 2006).

Most of the species treated here as *Glossoloma* were previously classified as *Alloplectus* Mart. (Clark 2005). The exceptions are the generic type species, *G. tetragonum* and the five species newly described here (*G. anomalum*, *G. harlequinoides*, *G. pedunculatum*, *G. scandens*, and *G. subglabrum*). The recognition of *Glossoloma* as distinct from *Alloplectus* is based on recent phylogenetic analyses of morphological and sequence data from the internal transcribed spacer (ITS) region of 18S-26S nuclear ribosomal DNA and the *trnH-psbA* intergenic spacer region of chloroplast DNA (Clark et al. 2006). A preliminary analysis of limited taxon sampling (Clark & Zimmer 2003) recognized a clade of *Glossoloma* and *Alloplectus*, but there was poor support for the monophyly of these two groups. Additional information from a morphological dataset, the addition of a dataset from the cpDNA *trnH-psbA* intergenic spacer region, and greater taxon sampling support the separation of *Glossoloma* from *Alloplectus*. The generic concepts adopted here are based on an extensive taxon sampling of nearly all species traditionally assigned to *Alloplectus* (including those now recognized in *Crantzia* Scop., *Columnea* L., *Nematanthus* Schrad., *Glossoloma*, and *Drymonia* Mart.); a broad sample of 155 species from all genera of Episcieae, except the monotypic *Lampadaria* Feuillet & L. E. Skog; and an emphasis on large genera, including 37 species of *Drymonia*, 34 species of *Columnea*, 13 species of

Paradrymonia Hanst., 9 species of *Nematanthus*, and 7 species of *Nautilocalyx* Linden ex Hanst. The phylogenetic analysis in Clark et al. (2006) was used to test relationships of taxa classified as *Alloplectus* and to provide an overall tribal-level phylogeny of Episcieae, with the goal of defining and discovering monophyletic groups (see summary in Fig. 2).

Glossoloma occurs from southern Mexico to Panama, northwestern South America, and south to Bolivia (Fig. 1). It ranges in elevation from sea level in the Chocó forests of northwestern South America to 3500 meters in the Andean cloud forests of Colombia and Ecuador. The center of diversity of *Glossoloma* is in the western lowland forests in Ecuador and Colombia where 15 species occur. *Glossoloma* comprises subwoody to herbaceous perennials, which are a conspicuous component of the understory vegetation in transitional forests throughout its range.

MATERIALS AND METHODS

The present study is based on field work in Ecuador (5 years), Panama (1 month), Bolivia (1 month), Venezuela (1 month), and Peru (2 weeks). Over 300 collections were obtained with multiple duplicates deposited in 27 herbaria (AAU, BOLV, BR, COL, E, F, GH, GUAY, HA, K, LOJA, LPB, MO, NY, P, PMA, PORT, SCZ, SEL, SRP, QCA, QCNE, UC, UNA, US, USM, and VEN). Field expeditions emphasized type localities of as many previously described species as possible. Loan material was obtained from 26 herbaria (A, AAU, BM, BR, C, CAS, COL, DAV, F, G, GH, GOET, K, LE, MA, MO, MT, MTJB, NY, P, PH, QCNE, S, SEL, U, WU). Additional visits were conducted to 19 herbaria (BOLV, BM, BR, CAS, E, GUAY, HA, K, LOJA, LPB, MO, NY, P, PORT, Q, QCA, QCNE, QPLS, VEN). Over 4,000 collections were studied, annotated, databased, and cited for this revision.

Other data represented in this study include 515 vouchered tissue samples, of which 213 were extracted and used for molecular systematic studies. Additionally, 4,500 photographic slides were taken for evaluating morphological diversity and developing a morphological cladistic dataset (see Clark et al. 2006). The taxon sampling from Clark et al. (2006) included 25 of the 27 species of *Glossoloma* (*G. bicolor* and *G. cucullatum* missing). Maps were generated using ArcView GIS 3.2a (ESRI 2000).

TAXONOMIC HISTORY

Glossoloma was described by Hanstein (1854) in the introduction of his monumental work *Die Gesneraceen des Königlichen Herbariums und der Gärten zu Berlin* ["Gesneriaceae of the royal herbarium and gardens in Berlin," and a monographic overview of the family]. This work was spread out between eleven years and four separate parts (Hanstein 1854, 1856, 1859, 1865) published in the journal *Linnaea*. The overall goal of these key-stone publications was to provide a summary of the classification of the family with an emphasis on the Gesneriaceae at the herbarium (B) and the botanical garden in Berlin. Hanstein's generic concepts changed considerably throughout the eleven years that spanned these five publications. For example, *Glossoloma* was initially recognized as a genus (Hanstein 1854), but later subsumed in a broader generic circumscription of *Alloplectus* (Hanstein 1865). Further broadening the circumscription of *Alloplectus* in 1865 included combining the following three genera that were recognized in 1854: *Heintzia* Karst., *Erythranthus* Oerst., and *Calanthus* Oerst. As a result, five genera that Hanstein

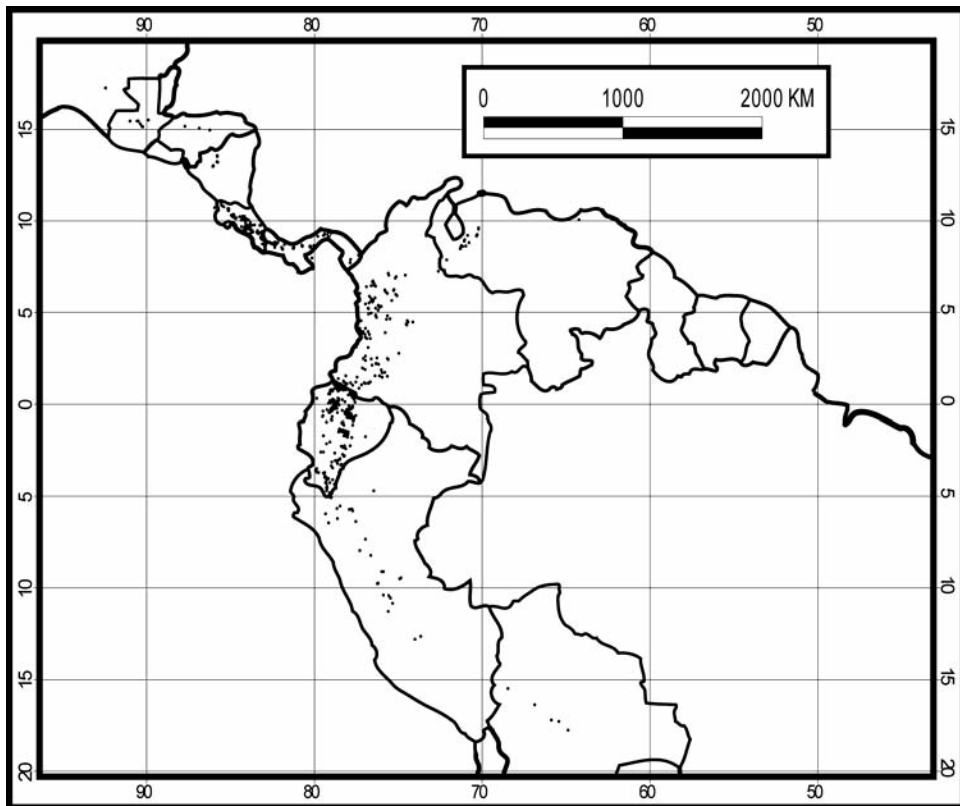


FIG. 1. Distribution of *Glossoloma* in Central and South America.

recognized in 1854 were included in *Alloplectus* in 1865. *Glossoloma*, with only one species (*G. tetragonum*), was reduced to a subgenus of *Alloplectus* (Hanstein 1865). Oersted (1858, 1861) was the only other systematist besides Hanstein (1854), who recognized *Glossoloma*.

Other than the type species (*G. tetragonum*) and the five species newly described in this revision, all species treated here as *Glossoloma* were previously assigned to *Alloplectus*. The generic concept of *Alloplectus* has a confusing history because over 140 names were attributed to this genus. The generic type species [*Alloplectus hispidus* (Kunth) Mart.] nests in a well-supported clade of five species distinct from the clade that includes the 27 species of *Glossoloma* (Clark et al. 2006). Other species of traditionally recognized “*Alloplectus*” nest in *Crantzia*, *Nematanthus*, *Columnnea*, *Cobonanthus* Wiehler, and *Drymonia*; the generic concepts recognized here are based on phylogenetic analyses that included in the taxon sampling the generic types of these genera (Clark et al. 2006). Initially, Hanstein (1854) recognized *Glossoloma* for one species (*G. tetragonum*) with tubular and broadly ampliate corollas (i.e., corollas lacking an apically constricted pouch) and *Alloplectus* for three species with apically constricted corollas (i.e., corollas with pouches often protruding or exceeding the mouth of the corolla). Hanstein (1854) recognized the following three species in his initial circumscription of *Alloplectus*: *Drymonia coccinea* (Aubl.) Wiehler, *Corytoplectus speciosus* (Poepp.) Wiehler, and *Nematanthus lanceolatus* (Poir.)

Chautems (see Clark, 2005, for the taxonomic history of *Alloplectus*). The only species included in Hanstein's initial circumscription of *Glossoloma* (Hanstein 1854) was *G. tetragonum*, the type species and basis of the clade that is recognized for the monograph presented here.

Oersted and Hanstein were developing classifications of Gesneriaceae during the same time period based on their extensive studies of herbarium and living material. Oersted traveled throughout Central America (1845–1848), and Hanstein had access to an extensive living collection at the botanical garden in Berlin. The two botanists cited each other frequently in their individual publications and in some cases cited each other's work from unpublished manuscripts. The citation of unpublished work has often caused confusion concerning the valid publication of names. For example, the name *G. tetragonum* has been incorrectly attributed to Oersted in the literature (Wiehler 1973; Skog 1999) and among determinations of herbarium specimens as "*Glossoloma tetragonum* Oersted." This confusion stems from Hanstein's (1854) citing in synonymy Oersted's herbarium name "*Nematanthus tetragonus*" and reproducing a drawing from Oersted's unpublished manuscript. The correct name for this species is *Glossoloma tetragonum* Hanstein.

GENERIC DELIMITATION AND PHYLOGENY

The Neotropical Gesneriaceae comprise two subfamilies, all Gesnerioideae and part of Coronantheroideae (Burt & Wiehler 1995; Weber 2004). Coronantheroideae contain 9 genera and 20 species, which extend from Chile to the South Pacific Islands and Australia (Wiehler 1983; Weber 2004). The phylogenetic placement of the Coronantheroideae is not resolved, and the group has also been treated as the tribe Coronanthereae and included in the subfamily Gesnerioideae (Skog & Boggan 2006). The Gesnerioideae comprise eight tribes, 62 genera, and over 1000 species, and represent nearly half the worldwide diversity of the Gesneriaceae (Skog & Boggan 2006). Other estimates of Gesnerioideae diversity range from 1500 species (Weber 2004) to 1800 species (Wiehler 1983; Burt & Wiehler 1995). Episcieae is a member of Gesnerioideae and is the most diverse tribe in the family with 22 genera and an estimated 784 species, or roughly 21% of all Gesneriaceae. *Glossoloma* is the sixth largest genus of Episcieae after *Columnea* (200+ spp.), *Drymonia* (100+ spp.), *Nautilocalyx* (60+ spp.), *Paradrymonia* (50+ spp.), and *Nematanthus* (30+ spp.).

The recognition of *Glossoloma* as distinct from *Alloplectus* and *Crantzia* promotes a more robust classification and a better understanding of Episcieae phylogeny by defining genera that represent monophyletic groups. Of the 22 genera in Episcieae, *Columnea* is the only genus that has been shown consistently to be monophyletic using morphological and molecular data (Smith 1994; Smith & Sytsma 1994a, b, c). The lack of monophyly for large genera (i.e., > 20 spp.) in Episcieae has been suggested for *Drymonia* (Smith 2000a; Clark & Zimmer 2003), *Episcia* Mart. (Smith et al. 1997), *Alloplectus* (Clark & Zimmer 2003), *Paradrymonia* (Smith & Carroll 1997; Smith 2000a; Clark & Zimmer 2003), *Codonanthe* (Mart.) Hanst. (Clark & Zimmer 2003), and *Nematanthus* (Clark & Zimmer 2003). *Nautilocalyx* includes 51 (Skog & Boggan 2006) to 80 species (Burt & Wiehler 1995), and is one of the few large (i.e., > 20 spp.) episcioid genera that has not been adequately tested for monophyly.

The traditional broadly drawn *Alloplectus* was a catchall group for taxa that are assigned here to *Glossoloma* (27 spp.), *Alloplectus* (5 spp.), *Crantzia* (4 spp.), *Nematanthus*

(1 sp.), *Columnnea* (1 sp.), and *Drymonia* (5 spp.) (see Clark 2005; Clark et al. 2006). Most characters traditionally used to define *Alloplectus*, such as a fleshy bivalved dehiscent capsule, a pendent inflorescence of a reduced pair-flowered cyme, and a haploid chromosome number of $n=9$, are symplesiomorphic characters shared with other genera, such as *Drymonia* and *Paradrymonia*. Other characters previously used to define *Alloplectus*, such as a tubular and pouched corolla, are convergent with *Nematanthus*. Thus, *Alloplectus* had become a collection of species without unifying synapomorphies and could not be maintained after other genera with distinguishing features had been discerned.

Various phylogenetic hypotheses for the position of *Glossoloma* (as “*Alloplectus*”) have been proposed in the literature. Previous studies that included species treated here as *Glossoloma* (Smith & Sytsma 1994a, b, c; Smith 1996; Smith & Carroll 1997; Smith et al. 1997; Smith & Atkinson 1998; Smith et al. 1998; Smith 2000a, b, c; Zimmer et al. 2002; Clark & Zimmer 2003; Clark et al. 2006; Smith et al. 2004) are summarized in Fig. 2. With the exception of the work of Clark et al. (2006), most previous studies focused on resolving tribal and subfamilial relationships. Plastid markers, such as *ndhF*, *trnL-F*, and *trnE-T*, used in previous analyses were adequate for addressing tribal and subfamilial relationships, but owing to the lack of intraspecific variation in these markers, relationships among genera and species were poorly supported or are in conflict (e.g., Fig. 2A–D).

Recent molecular studies published for Gesneriaceae have focused on relationships at the level of genus and above. Most previous studies relied on genes that evolve at a relatively slow rate, such as the chloroplast gene *ndhF* (Smith & Carroll 1997; Smith et al. 1997) and the chloroplast *trnL-F* and *trnE-T* spacer regions (Zimmer et al. 2002). Clark and Zimmer (2003) produced a preliminary phylogeny of traditional “*Alloplectus*” based on ITS. The circumscription of *Glossoloma* presented here is based on phylogenetic hypotheses derived from molecular (ITS and *trnH-psbA*) and morphological data (99 characters), and was presented by Clark et al. (2006). This recent study included 25 of the 27 taxa of *Glossoloma*, excluding *G. bicolor* and *G. cucullatum*.

Glossoloma can be distinguished from other genera in Episcieae by several traits, which are summarized in Table 1. Most species (23 of 27) of *Glossoloma* are unbranched terrestrial subshrubs in contrast to the branched, primarily epiphytic habit found in *Drymonia*, *Columnnea*, *Alloplectus*, and *Crantzia*. The presence of resupinate flowers, except in *G. anomalum*, is the most useful and obvious character for differentiating *Glossoloma* from other closely related genera. Two additional features that help differentiate *Glossoloma* are: 1) medially ampliate corollas with terminal pouches instead of the campanulate or medial pouches found in *Drymonia*; 2) corolla tube appearing laterally compressed (Fig. 37D; see also discussion of corolla morphology). Three of the four species of *Crantzia* have resupinate flowers, laterally compressed tubes, and medially ampliate corollas with terminal pouches. Thus, *Glossoloma* and *Crantzia* are morphologically similar, but differ by the obligate epiphytic habit in three of the four species of *Crantzia* and the primarily terrestrial habit in *Glossoloma*. The non-terrestrial species of *Glossoloma* are primarily Andean and facultative epiphytes, unlike the non-terrestrial species of *Crantzia*, which are primarily Caribbean and obligate epiphytes.

The species-level phylogeny presented here (Fig. 3) is based on phylogenetic analyses inferred from molecular (nrITS and cpDNA *trnH-psbA*) and morphological (99 characters) data presented in Clark et al. (2006). The primary objective of that paper was to address the monophyly of traditionally recognized genera and the placement of species previously recognized as *Alloplectus*. The goal was not to test hypotheses of species-level relationships within *Glossoloma*. The phylogeny of Episcieae shows a well-resolved and a strongly

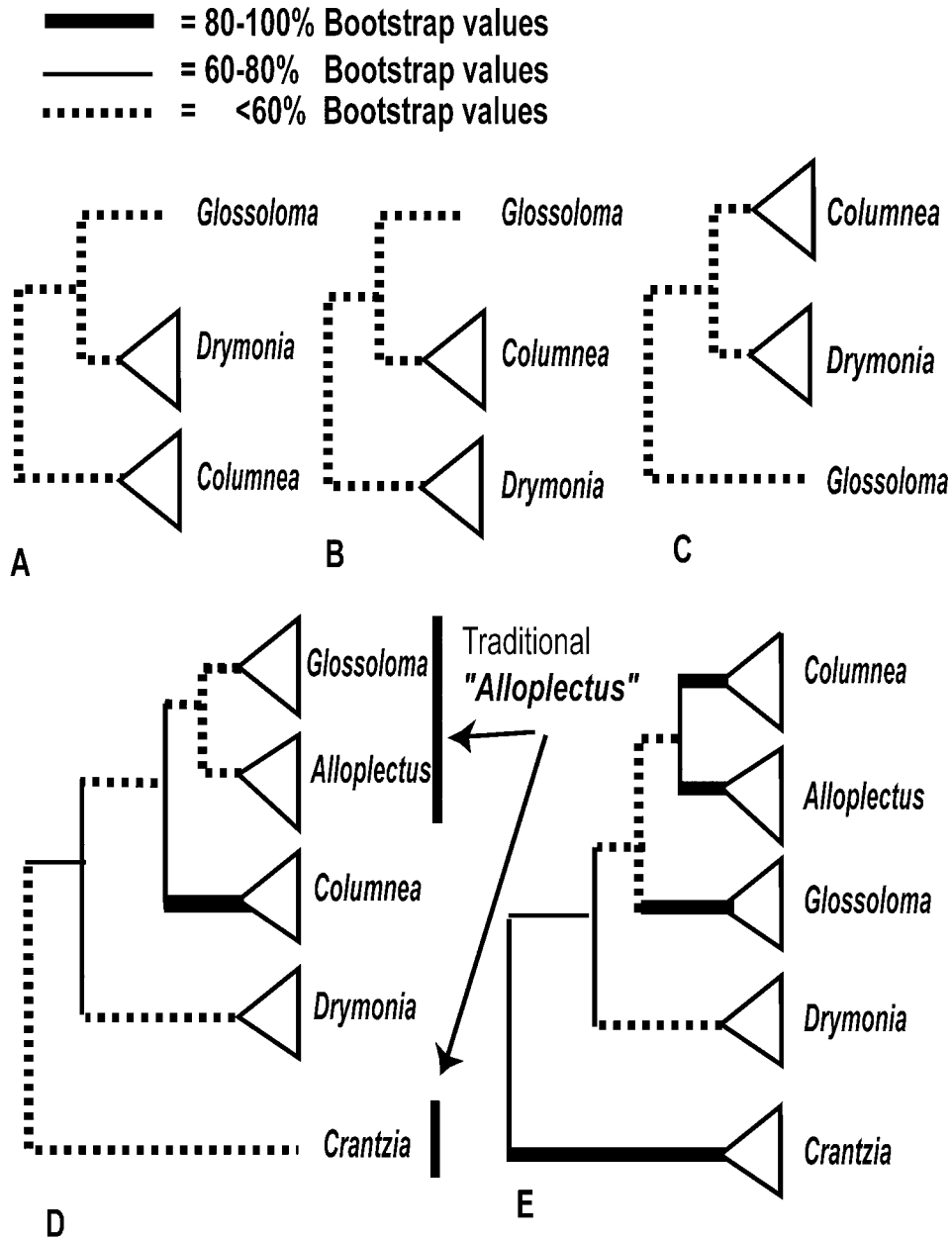


FIG. 2. Diagrammatic representation of phylogenetic hypotheses for the placement of *Glossoloma*. A. Based on molecular sequence data from *ndhF* (Smith & Carroll 1997; Smith et al. 1997) and combined analyses of the nr-ITS region (Smith 2000a). B. Based on cpDNA restriction site variation (Smith & Sytsma 1994a, b, c). C. Based on a combined analysis using cpDNA of the *trnL-F/trnE-T* regions and the ITS region (Zimmer et al. 2002). D. Based on the nrDNA ITS region (Clark & Zimmer 2003). E. Based on the ITS region, intergenic cpDNA spacer region *trnH-psbA*, and morphology (Clark et al. 2006). Other species traditionally recognized as *Alloplectus* are transferred into *Crantzia* (4 spp.), *Nematanthus* (1 sp.), and *Drymonia* (4 spp.). Triangles representing terminal taxa indicate a sample size of two or more species. Reprinted with permission from Selbyana (Clark 2005: Fig. 1).

TABLE 1. Comparison of *Alloplectus*, *Glossoloma*, *Columnnea*, *Drymonia*, and *Crantzia*.

	<i>Glossoloma</i>	<i>Alloplectus</i>	<i>Columnnea</i>	<i>Drymonia</i>	<i>Crantzia</i>
Leaves	Isophyllous	Isophyllous	Anisophyllous (rarely isophyllous)	Isophyllous	Isophyllous
Flower orientation	Resupinate (1 exception)	Not resupinate	Not resupinate	Not resupinate	Resupinate or not resupinate
Habit	Terrestrial (rarely epiphytic)	Obligate epiphyte	Facultative epiphyte or terrestrial	Epiphytic or terrestrial	Epiphytic or terrestrial
Fruit	Fleshy capsule	Fleshy capsule	Berry (rarely fleshy capsule)	Fleshy capsule or berry	Fleshy capsule
Anther dehiscence	Longitudinal	Longitudinal	Longitudinal	Poricidal and longitudinal	Longitudinal
Corolla pouch	Terminal when present	Terminal when present	Medial when present	Medial when present	Terminal when present

supported *Glossoloma* (BS=88%), but support at the species-level is weak with only three branches with bootstrap values greater than 50% (Fig. 3). Although well resolved, support for internal groups is not robust. Thus, infrageneric relationships are not yet proposed, and the species in this monograph are listed in alphabetical sequence.

MORPHOLOGY

Habit. Most species of *Glossoloma* are terrestrial woody subshrubs with an unbranched primary stem. A few species are succulent terrestrial herbs or facultative epiphytes. Only two species (*G. penduliflorum* and *G. scandens*) are obligate epiphytes with scandent stems. Most species attain heights of 1 to 1.5 meters. The tallest species seen in the field is *G. schultzei* in eastern Ecuador, which can attain a height of three meters. The species that is most variable in height is *G. ichthyoderma*, which can reach maturity at 40 cm, but can also attain a height of two meters. Most of the terrestrial subshrub species have fibrous roots and erect unbranched stems. Occasionally the stems are decumbent, as observed in many individuals of *G. chrysanthum* from a population in Venezuela, where some individuals had stems to 4 meter long with numerous erect shoots and terminally clustered leaves (Fig. 13C). Some species are described as having erect, horizontal, elongate stems, or dorsiventral stems. Elongate stems are associated with species that are obligate epiphytes. The term horizontal is associated with species growing on vertical rock faces or steep roadside embankments, where stems grow parallel to the ground instead of erect. Many of these species are facultative epiphytes and can therefore be terrestrial when young and epiphytic when older. The term dorsiventral is used to describe a two-dimensional fern-frond shaped shoot. Dorsiventral shoots are characteristic of the section *Collandra* in the genus *Columnnea*. In *Glossoloma* dorsiventral shoots are found only in *G. pycnosuzygium*.

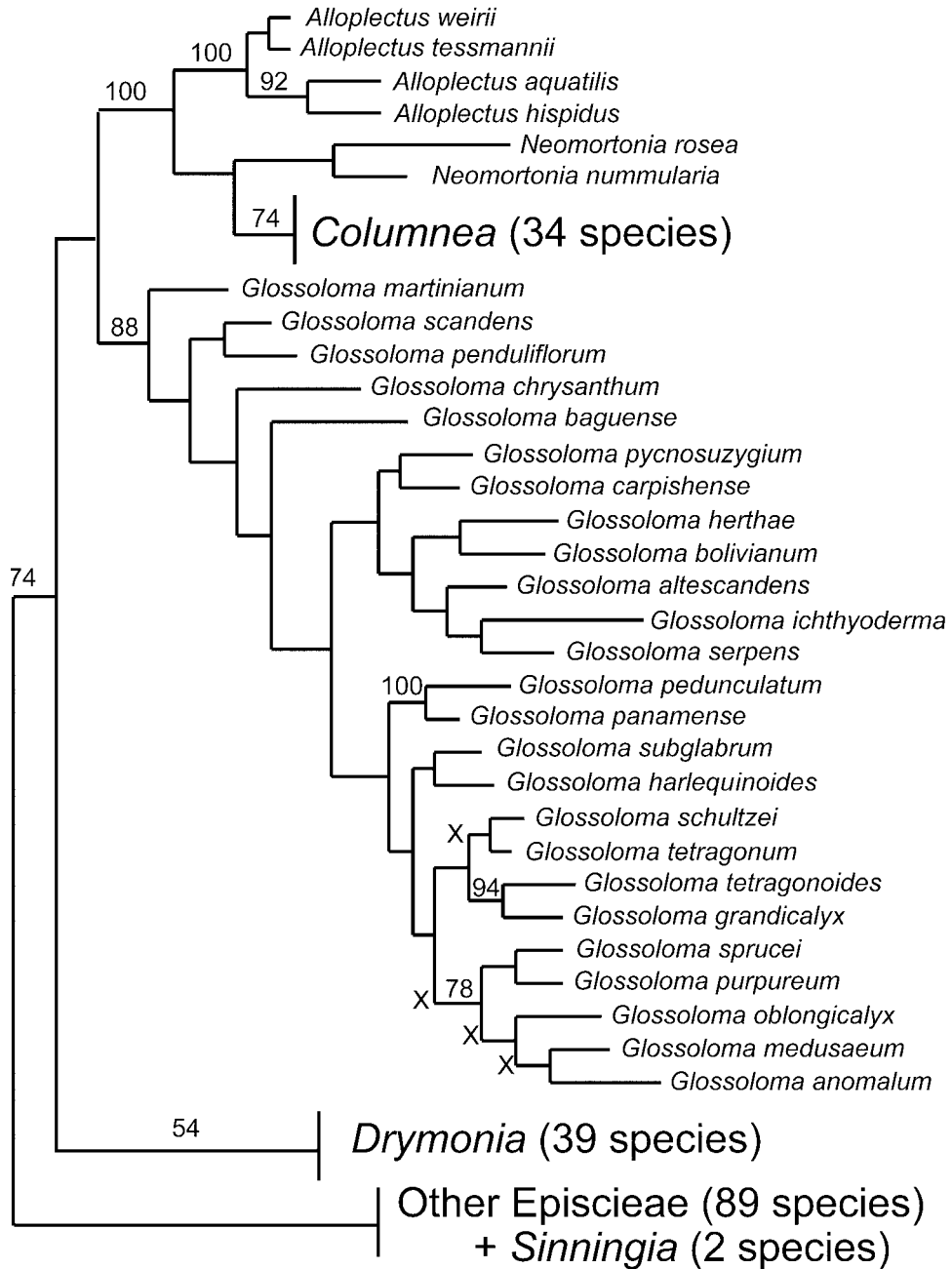


FIG. 3. Phylogeny of *Glossoloma* presented in Clark et al. (2006). Inferred from two molecular markers [the internal transcribed spacer region of 18S-26S nrDNA (ITS) and the cpDNA *trnH-psbA* intergenic spacer for 155 species] and morphological data (99 characters for 120 species) combined in a total evidence analysis. One of the 4,360 most parsimonious cladograms is shown; nodes that collapse in the strict consensus tree are indicated ("X") at the base of the branch. Bootstrap values (>50%) for nodes present in the strict consensus tree are given at the base of the branch.

Indumentum. Gesneriaceae are often recognized by their “hairy” appearance, especially the leaves. The trichomes in *Glossoloma* are nearly always abundant on immature or young parts, whether they are leaves, shoots, or flowers. This feature is especially evident on the mature regions of stems, which are nearly always glabrescent proximally and densely pilose to villous distally. Minute trichomes forming a puberulent indumentum are also common on corollas and calyces. Gland-tipped trichomes are common near the apex of the inner surface of the corolla tube. Leaf blades are nearly always pubescent on the abaxial surface and nearly glabrous on the adaxial surface. Most often, leaves have a tendency to be more pubescent on major veins, but occasionally the entire surface is uniformly pubescent. Nearly all species of *Glossoloma* are pubescent, with the exception of *G. subglabrum* and *G. bagueuse*. Occasionally, *G. subglabrum* has a sparsely puberulent indumentum on the leaves. The most densely pubescent species is *G. sprucei*, which has slender multicelled trichomes up to 7 mm long on the stems and calyces.

Leaves. The leaf arrangement in most species of *Glossoloma* is opposite and decussate. The leaves of terrestrial species are isophyllous, but epiphytic species have leaves unequal in a pair, but not markedly anisophyllous, as in *Columnnea*. The leaves of species with erect and unbranched shoots are nearly always terminally clustered. The leaves in scandent or facultative epiphytes are evenly distributed on elongate stems. The blades may be ovate, elliptic, obovate, or oblanceolate. Most species have oblong to elliptic leaves. The texture of the leaves ranges from subcoriaceous to membranaceous. Adaxial leaf surfaces are usually dull green, and abaxial surfaces range from light green to red, but leaf color is variable and inconsistent within most species and even individuals. For example, the abaxial leaf surfaces of *G. herthae* will vary from light green to red within individuals. The only species with distinctive leaf coloration is *G. purpureum*, which has dark purple abaxial leaf surfaces. The blades have 3 to 14 secondary veins per side, but this feature is variable within a species. Two species with distinctive venation are *G. altescandens*, which has the fewest number of secondary veins (3–5/side) and *G. subglabrum*, which has the most number of secondary veins (9–14/side). The length of the blade ranges from 2 cm (*G. altescandens*) to 37 cm (*G. panamense*). Most leaf blades are not curved, with the exception of falcate leaves in *G. martinianum*, *G. herthae*, and *G. altescandens*. The upper leaf surface is flat (i.e., not bullate or rugose) and glabrous to glabrescent. Petioles are always present and slightly sulcate to terete. The longest petioles are found in *G. panamense* (to 15 cm long) and the shortest in *G. altescandens* (<1 cm).

Inflorescence. The basic unit of the inflorescence in the Gesneriaceae is a pair-flowered cyme (Weber 1973, 1978, 1982; Wiehler 1983; Kvist & Skog 1992a, 1996). In *Glossoloma* and most other members of the Episcieae, the inflorescence unit is reduced to a single axillary flower. In some species, such as *G. ichthyoderma* (Fig. 20A), fascicles or synflorescences of 10 to 15 flowers are clustered in a leaf axil, but it is difficult to differentiate the number of flowers per individual synflorescence. All inflorescence units in this treatment are therefore referred to as appearing fasciculate with notes pertaining to the number of individual flowers per leaf axil. Most often, flowers occur as solitary units in the leaf axil, such as *G. penduliflorum* (Fig. 28A), but occasionally some species have up to eight individual flowers at a node, such as *G. schultzei* (Fig. 33A). One exception is *G. pendunculatum* in which the inflorescence axis is indeterminate and reaches up to 2 cm in length (Fig. 26E). This inflorescence is not homologous to the determinate inflorescence common in members of the tribe Gloxinieae and Sinningieae. The indeterminate elongate

inflorescence unit of *G. pedunculatum* is a feature that has not been reported before now, but has been observed in other genera (e.g., *Drymonia ecuadorensis* Wiehler). All species of *Glossoloma* have bracteoles subtending elongate pedicels (Fig. 33A). The persistence of the bracteoles (e.g., early vs. late caducous) is noted in the descriptions.

Pedicel. Pedicel length in *Glossoloma* ranges from 0.5 cm (*G. pycnosuzygium*) to 15 cm (*G. penduliflorum*). In species with erect stems, immature flowers are subtended by erect pedicels that then drop below the petioles at anthesis. In species with horizontal stems (i.e., obligate and most facultative epiphytes) the pedicels are stiff, horizontal, and support the flowers so that they are oriented parallel to the ground. Nearly all species of *Glossoloma* have resupinate flowers, but the pedicels themselves are not twisted. Serial cross sectioning of pedicels from the stem to the base of the calyx revealed no obvious twist in the pedicels. Additional tissue clearings and saffronin staining of pedicels were carried out to look for evidence of twisting, but none was observed (Clark, unpubl.). At present, the mechanism of resupination is unknown.

Distinctive features on many pedicels near the base of the calyx are the oval to round, dark purple structures, referred to as pedicel enations, as seen in *G. bolivianum* (Fig. 10B). These are sometimes obscured by bracts or trichomes, and appear in 18 of the 27 species of *Glossoloma*. Similar enations have been reported in *Columnnea* sect. *Pentadenia* (Smith 1994; Smith & Sytsma 1994c); Smith referred to these as glands, but because it is not apparent that they secrete any substance, they are here called enations. Smith noted that the “glands” grow more distinctive in *Columnnea strigosa* Benth. during fruit development. In *Glossoloma* the enations appear to develop or grow after anthesis and become more conspicuous in fruit. Pedicel enations are homoplastic and are common throughout the tribe Episcieae (Clark et al. 2006).

Calyx. The calyx lobes are basally connate and appear nearly free. The lobes are either valvate (Fig. 28C), imbricate (Fig. 30C), or folded in a conduplicate manner (Fig. 33B). Conduplicate folding is a term used when each lobe is appressed to an adjacent lobe and folded lengthwise with the margin curved inward, as seen in *G. schultzei* (Fig. 33B). Conduplicate folding is present in 18 of the 27 species of *Glossoloma*, and is most distinctive in *G. cucullatum* (e.g., cucullate = “hooded”), where the lobes are stiff and difficult to flatten without tearing (Fig. 14B). The folding sometimes accentuates the base of the calyx lobe to appear cordate or sagittate. In species where no folding is present, the base of the lobes appears truncate, as seen in *G. pycnosuzygium* (Fig. 30C, D).

Four of the five calyx lobes are equal in size and shape. The median sepal is smaller and narrower to accommodate the nectary gland and basal gibbosity of the corolla. Because the flowers are resupinate (except in *G. anomalum*), the median calyx lobe of *Glossoloma* is on the ventral or lower surface and is homologous to the upper surface or dorsal lobe of most other members of the Gesneriaceae. This study uses the terms upper/dorsal and lower/ventral to describe the specific features as they appear oriented on a flower, whether it is resupinate or not. Thus, the median calyx lobe on a non-resupinate flower would be on the ventral or lower surface, and the median calyx lobe on a resupinate flower would be on the dorsal or upper surface.

The margins of the calyx lobes may be entire, serrate, dentate, or fimbriate. The margins are said to be fimbriate when the individual serrations appear like a fringe of thread-like enations, as seen in *G. anomalum* (Fig. 8B, E) and *G. purpureum* (Fig. 29B, C). Fimbriae are most pronounced in *G. sprucei*; one individual serration can reach 1.5 cm in

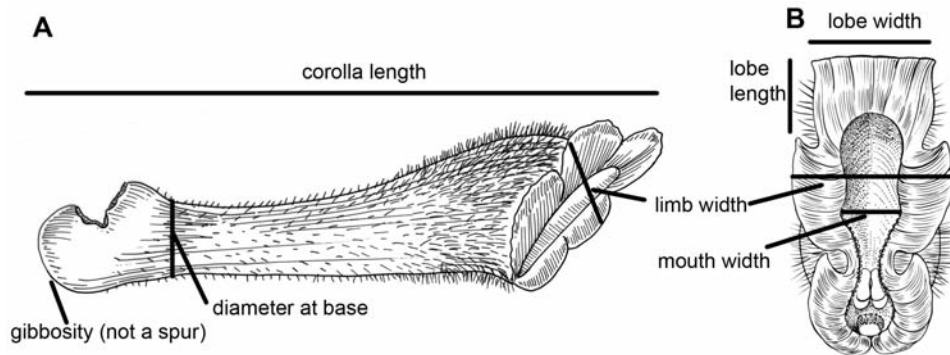


FIG. 4. Diagram of the corolla of *Glossoloma*, showing flower measurements used in this study. A. Lateral view of corolla showing basal gibbosity (not a spur); medially ampliate and oblique corolla. B. Front view of corolla showing lobe, limb, and mouth dimensions, and the appearance of being laterally compressed.

length with additional unequal serrations, which make it difficult to differentiate trichomes from serrations. The individual enations may bear trichomes, as in *G. anomalum* (Fig. 8D) or not, as in *G. purpureum* (Fig. 29B).

Corolla. The corolla is tubular, bilaterally symmetrical, and gibbous on the lower surface with five apical lobes. Most species of *Glossoloma* appear laterally compressed at the apex of the corolla tube, resulting in the width being half the length as the height, as seen in *G. subglabrum* (Fig 37D). In this study the term “mouth” describes the apex of the corolla tube without lobes, and the term “limb” describes the apex of the corolla tube with lobes (Fig. 4). A laterally compressed corolla is also a commonly found in most species of *Nematanthus*. The appearance of laterally compressed corollas is difficult to detect from herbarium specimens, which is why some descriptions and illustrations of species of *Glossoloma* do not mention this feature (e.g., Fig. 29 of *G. purpureum* in Kvist & Skog 1992b). The corolla mouth of these species is oblique or slanted when viewing the flower laterally (Fig. 4A). Species of *Glossoloma* that have non-laterally compressed (i.e., uniformly round) throats are *G. anomalum*, *G. bicolor*, *G. ichthyoderma*, and *G. martinianum*. The mouth of these species is horizontal and not oblique or slanted. There is a correlation between laterally compressed corolla tubes with zygomorphic corolla lobe arrangement (Fig. 4), and non-laterally compressed with subregular corolla lobe arrangement. The laterally compressed corollas have four nearly equal lobes, a well-developed dorsal lobe, and a non-constricted throat. In contrast, the non-laterally compressed corollas have nearly equal lobes and an apically constricted throat. Nearly all members of *Glossoloma* have a pouched region near the apex of the corolla. The pouched region is described as becoming ampliate (e.g., nearly tubular) or ventricose on the upper surface (e.g., swollen or inflated). Corollas of only four species of *Glossoloma* are described with corolla tubes ampliate or nearly tubular (*G. harlequinoides*, *G. panamense*, *G. pedunculatum*, and *G. subglabrum*). Most species of *Glossoloma* are described as having a ventricose corolla tube. This feature is often not shown in illustrations that were based on herbarium collections, as in *G. baguense* (Fig. 9D) where the tube is illustrated without a ventricose pouch. Field observations based on five collections of *G. baguense* have confirmed that this species has a significant ventricose pouch (e.g., Clark *et al.* 5700). Another notable feature for some

species of *Glossoloma* is the presence of a constricted throat; this character is pronounced in four species and evident in field and herbarium collections, as shown for *G. ichthyoderma* (Fig. 20D). Seven species are described as having slightly constricted throats; the constriction is obvious in the field, but subtle on some pressed specimens, as in *G. serpens* (Fig. 34D). Most species of *Glossoloma* do not have an apically constricted throat. Common corolla measurements and terms used in this study are shown in Fig. 4.

The corolla tube orientation relative to the calyx ranges from oblique (e.g., *G. tetragonum*) to perpendicular (e.g., *G. bolivianum*). Twelve species have an oblique corolla tube orientation relative to the calyx, and this character occurs in facultative or obligate epiphytes. Fifteen species have a perpendicular corolla tube orientation relative to the calyx, a feature found only in species with a terrestrial subshrub habit. Posture refers to how the flower is held at anthesis. Pendent flowers are more common in *Glossoloma*, and the term is used to describe flowers that are held below the petioles and usually borne on elongate pedicels. A horizontal flower posture is defined as flowers that are borne on relatively short pedicels and are held parallel to or sometimes above the petiole (e.g., *G. altescandens*, *G. baguense*, *G. martinianum*, and *G. medusaeum*).

Corolla color on the outer surface is usually uniformly red or uniformly yellow, but this may vary within or among populations. Some species (e.g., *G. grandicalyx*, *G. tetragonoides*) have a uniformly colored tube with contrasting lobes (e.g., yellow tube with red lobes). The only non-uniformly colored corolla tube is found in *G. harlequinoides*, which has an alternating red and white pattern. The inside of the corolla may be the same color as the outer surface or it may be spotted.

Nearly all corolla tubes of *Glossoloma* have trichomes throughout the inner and outer surfaces, with the exception of *G. baguense*, which is glabrous on the outside. Trichomes vary from unbranched to branched, and often more than one type is present. Most species have gland-tipped trichomes clustered on the ventral region of the inner surface of the corolla tube. Steiner (1985) suggested that the glandular trichomes inside the corolla tube of *Drymonia serrulata* (Jacq.) Mart. promote the adhesion of pollen grains to the body of pollinators (e.g., *Epicharis* bees) by secreting oil that is deposited on the anthers. This phenomenon has not been studied in *Glossoloma*, but an abundance of glandular trichomes is found near mature anthers on the ventral inner surface of the corolla.

Androecium and nectary. *Glossoloma*, like most other New World members of Gesneriaceae, has four stamens with coherent, protandrous anthers. A staminode is often present and easy to detect in the field, but difficult to see without a microscope on herbarium specimens. Anthers are held in the lower portion of the apical region of the flower during anthesis and are not exerted beyond the corolla throat. Filaments coil and pull the anthers back toward the base of the flower during later stages of flower maturity.

Filaments are connate at the base and adnate to the corolla. The connate region of the filaments form a curtain-like structure that is open at the region of the staminode (e.g., usually the dorsal side). This connate region or open sheath is referred to as a filament curtain and although poorly documented in Gesneriaceae has been studied in Acanthaceae (Manktelow 2000). A filament curtain is present on all species of *Glossoloma* and varies in length from 1 to 4 mm. The filaments are usually glabrous, although in one species (*G. penduliflorum*) glandular trichomes are present.

Pollen grains were studied in five species and very little variation was observed. Grains are typically tricolporoidate to tricolporate with minute perforations on the tectum (Fig. 5). The lumina are usually evenly spaced, but sometimes they are larger in the

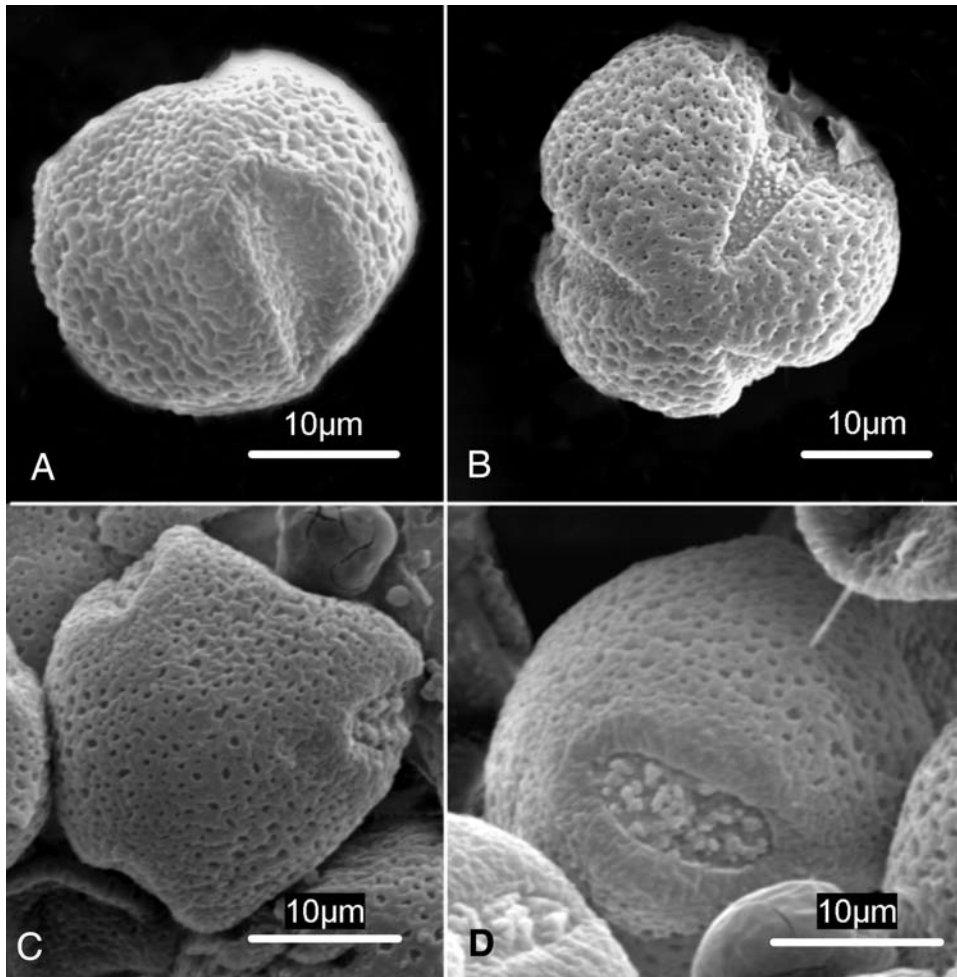


FIG. 5. SEM images of pollen grains of *Glossoloma* and *Drymonia*. A. *G. tetragonoides* (J. L. Clark 4454). B. *Drymonia collegarum* J. L. Clark & J. R. Clark (J. L. Clark 4592), note: this taxon nests in a clade of traditionally recognized “*Alloplectus*” species recently transferred to *Drymonia* (Clark 2005; Clark et al. 2006). C, D. *Glossoloma baguense* (J. L. Clark 5448).

mesocolpus. The colpi are prominent and almost span the entire polar length region. Occasionally, the colpi are shorter and less prominent, and span only 1/3–2/3 of the polar length region. Pollen grain morphology differed little between *Glossoloma* and *Drymonia*, and therefore was not explored further beyond the five species initially surveyed.

Nectaries are usually bilobed and located on the ventral surface of the flower. Some nectaries are emarginate to truncate (e.g., *G. panamense*, Fig. 25B), but this feature is difficult to evaluate on pressed specimens where the nectary is easily disfigured. Nectaries are glabrous, white, and occur within the gibbosity at the base of the corolla tube.

Gynoecium. The gynoecium is relatively uniform throughout *Glossoloma*. The ovary is densely to sparingly pilose. The style is glabrous, except in *G. pycnosuzygium*, which

has styles that are sparingly pilose. Stigmas are usually stomatomorphic, but occasionally they are weakly bilobed (e.g., *G. panamense*). The stigma and stamens do not extend beyond the throat of the corolla.

Fruit and seeds. In 22 of the 27 species in which fruits were observed, the fruit is a fleshy bivalved laterally compressed capsule that splits loculicidally. Most fruit valves are convex and fully reflexed at maturity to 180° (Fig. 25C). A second type of fruit dehiscence is described below, where fruit valves are convex but are mature when the valves reach 45° (Fig. 18C). The two reflexed carpel valves separate from the placentae and usually contrast in color from the fleshy mass of funiculi and seeds. Wiehler (1983) suggested that these “display” fruits are visual targets for seed dispersal agents, such as birds, fruit-eating bats, and possibly monkeys (Wiehler 1983). Five species of *Glossoloma* (*G. anomalum*, *G. herthae*, *G. ichthyoderma*, *G. martinianum*, and *G. medusaeum*) lack the contrasting colored valves and appear to open only slightly to 45° at maturity. These fruits are usually white, non-reflexed, and non-fleshy. The calyx is persistent in fruit and usually becomes fully reflexed when the fruit valves mature. Thus, the inside of the calyx and the reflexed valve walls of the fruit are similar in color and may add to the visual impact of the fruit.

Seeds were studied for 22 of the 27 species of *Glossoloma*. Each fruit contains numerous seeds (ca. 100–150), which are mostly ellipsoid to fusiform. The seeds range from 0.5 to 1.1 mm long and 0.2 to 0.5 mm wide. The surfaces are longitudinally striate owing to cells that are oriented spirally. Beaufort-Murphy (1983) evaluated and depicted SEM-photos of seeds of *G. cucullatum* and *G. ichthyoderma*, but few of the 50+ characters evaluated by Beaufort-Murphy differed among these two species and closely related genera (e.g., *Drymonia* and *Columnea*).

TAXONOMY

Glossoloma Hanstein, *Linnaea* 26: 191, 208, 209. 1854.—TYPE: *Glossoloma tetragonum* Hanstein.

Shrubs or suffrutescent herbs, terrestrial or epiphytic; roots fibrous, stems terete to quadrangular, erect, horizontal, or sometimes scandent. Leaves opposite, nearly equal in a pair, petiolate, elliptic to ovate or oblanceolate, entire to serrate. Flowers usually resupinate, axillary, solitary or in fascicles of 2 to 5, bracteate, peduncles rarely evident. Calyx usually colored or green, the 5 lobes nearly free, subequal, often broad, entire to strongly serrate to fimbriate, pubescent to pilose. Corolla tubular and usually ampliate, rarely hypocyrtoid, yellow or red, oblique to horizontal in the calyx, constricted or not in the throat, commonly appearing laterally compressed, gibbous at the base, often ventricose below the mouth, the 5 lobes of the limb usually small. Stamens 4, not exerted, the filaments adnate to the base of the corolla tube, and forming an open sheath, the anthers transversely oblong, coherent or becoming free, dehiscing by longitudinal slits; staminode present or absent; disc a bilobed gland, rarely single-lobed. Ovary superior, pilose, the style included. Fruit a fleshy bivalved capsule surrounded by the persistent calyx; seeds numerous, surface longitudinally striate owing to spirally oriented cells.

KEY TO THE SPECIES OF GLOSSOLOMA

NOTE: Species for which the nature of the habit is sometimes misinterpreted are keyed under both leads of couplet 2.

1. Flowers not resupinate, nectary gland on dorsal surface; calyx lobes fimbriate; corollas 1.5 to 2.5 cm long. 2. *G. anomalum*
1. Flowers resupinate, nectary gland on ventral surface; calyx lobes not fimbriate or fimbriate; corollas 2.5 to 6.0 cm long.
 2. Epiphytic subshrubs or herbs.
 3. Flowers solitary.
 4. Flowers pendent and subtended by an elongate slender pedicel 8–15 cm long. 18. *G. penduliflorum*
 4. Flowers horizontal and subtended by a stout pedicel. 1. *G. altescandens*
 3. Flowers in fascicles.
 5. Stems not scandent, elongated to 2 m.
 6. Calyx lobes broadly elliptic; leaf blades lanceolate to oblong; abaxial leaf surface densely tomentose. 13. *G. martinianum*
 6. Calyx lobes broadly ovate or rotund; leaf blades ovate to elliptic; abaxial leaf surface glabrous or pilose.
 7. Leaf blades with 3–5 lateral veins per side, 2–5 cm long. 1. *G. altescandens*
 7. Leaf blades with 6–8 lateral veins per side, 4–15 cm long.
 8. Calyx lobes 4–15 mm long.
 9. Calyx lobe arrangement imbricate; lobes rotund, 5–15 mm long.
 9. Calyx lobe arrangement valvate; lobes broadly ovate to oblong, 4–8 mm long. 20. *G. pycnosuzygium*
 8. Calyx lobes 20–25 mm long. 23. *G. serpens*
 5. Stems scandent, elongated to more than 2 m.
 10. Calyx lobes linear; calyx with five equal lobes; Ecuador and Colombia. 21. *G. scandens*
 10. Calyx lobes broadly ovate; calyx with four equal lobes, the median (ventral) lobe smaller and narrower; Venezuela. 7. *G. chrysanthum*
 2. Terrestrial subshrubs or herbs.
 11. Stems horizontal, occasionally pendent to dorsiventral on steep slopes; orientation of corolla perpendicular relative to the calyx or slightly oblique.
 12. Calyx lobes valvate to separate.
 13. Leaf blades lanceolate, abaxially densely tomentose. 13. *G. martinianum*
 13. Leaf blades ovate, abaxially pilose to puberulent. 1. *G. altescandens*
 12. Calyx lobes imbricate or conduplicate (i.e., when each lobe is appressed to an adjacent lobe and folded lengthwise with the margin curved inward).
 14. Calyx lobes conduplicate.
 15. Calyx lobes 20–25 mm long, sagittate at base; nectary a single gland. 23. *G. serpens*
 15. Calyx lobes 10–17 mm long, truncate at base; nectary two valvate glands.
 16. Spotting in corolla throat present; calyx lobe to 12 mm wide. 6. *G. carpishense*
 16. Spotting in corolla throat absent; calyx lobe to 5 mm wide. 7. *G. chrysanthum*
 14. Calyx lobes imbricate.
 17. Corolla densely pilose; Bolivia. 5. *G. bolivianum*
 17. Corolla glabrescent to sparingly pilose; Costa Rica, Panama, Colombia, Ecuador, Peru, Venezuela.
 18. Leaf blades elliptic and slightly falcate; calyx margins entire to serrulate; Colombia, Ecuador, Peru. 11. *G. herthae*
 18. Leaf blades obliquely elliptic to obovate or oblanceolate, not falcate; calyx margins serrate; Costa Rica, Panama, and Venezuela. 20. *G. pycnosuzygium*
 11. Stems erect; orientation of corolla oblique relative to the calyx.
 19. Inflorescence with a well-developed peduncle (over 1 cm long). 17. *G. pedunculatum*
 19. Inflorescence epedunculate, flowers appearing fasciculate.
 20. Calyx lobe margins fimbriate.
 21. Abaxial leaf surface dark purple. 19. *G. purpureum*
 21. Abaxial leaf surface green, occasionally greenish red.

22. Stems densely woolly distally. 24. *G. sprucei*
 22. Stems densely strigillose distally. 14. *G. medusaeum*
20. Calyx lobe margins serrate, serrulate, dentate, laciniate, or entire.
 23. Corolla tube ampliate (e.g., widening at apex and nearly uniformly tubular).
 24. Corolla tube not uniformly colored, red with white splotches; calyx lobes
 revolute. 10. *G. harlequinoides*
 24. Corolla uniformly colored, salmon to orange or red; calyx lobes valvate to
 separate.
 25. Leaf blades pubescent; apical region of stem pubescent; leaf blades with
 6–8 lateral veins per side. 16. *G. panamense*
 25. Leaf blades glabrescent; apical region of stem glabrous to glabrescent; leaf
 blades with 9–14 lateral veins per side. 25. *G. subglabrum*
23. Corolla tube ventricose (e.g., apex swollen or inflated on upper surface).
 26. Stems with an exfoliating scale-like epidermis. 12. *G. ichthyoderma*
 26. Stems lacking an exfoliating scale-like epidermis.
 27. Calyx lobe margins serrate or laciniate.
 28. Calyx lobes cucullate, the apex recurved. 8. *G. cucullatum*
 28. Calyx lobes flat, the apex not recurved.
 29. Calyx lobes to 30 mm long, margins serrate to dentate. 27. *G. tetragonum*
 29. Calyx lobes to 25 mm long, margin shallowly serrate. 26. *G. tetragonoides*
27. Calyx lobe margins entire or serrulate.
 30. Stems densely villous. 22. *G. schultzei*
 30. Stems glabrescent to sparingly pilose.
 31. Corolla not uniformly colored (combination of red and yellow).
 32. Corolla tube bright yellow with dark red lobes. 9. *G. grandicalyx*
 32. Corolla tube red with yellow patch on dorsal surface. 4. *G. bicolor*
 31. Corolla uniformly red or uniformly yellow.
 33. Calyx lobe arrangement conduplicate. 15. *G. oblongicalyx*
 33. Calyx lobe arrangement imbricate.
 34. Pedicels equal to or longer than petioles; outer surface of
 corolla glabrous. 3. *G. baguense*
 34. Pedicels shorter than petioles; outer surface of corolla
 densely pilose. 5. *G. bolivianum*

1. *Glossoloma altescandens* (Mansfeld) J. L. Clark, Selbyana 25: 197. 2005. *Alloplectus altescandens* Mansfeld, Repert. Spec. Nov. Regni Veg. 41: 148. 1936.—TYPE: PERU. Loreto: upper Río Marañón, delta of Río Santiago, tide-free non-flooded forest, 1 Oct 1924, *G. Tessmann 4182* (B, destroyed).—ECUADOR. Morona-Santiago: Cordillera Morire, San Miguel de los Cuyes, 2400–3400 m, 7 Jan 2001, *J. L. Clark & C. Morocho 5847* (neotype, designated by Clark, 2005: US!; isoneotypes: HA! K! MO! NY! QCNE! SEL!).

Subshrubs, terrestrial or epiphytic; stems erect, rarely branched, to 1.5 m tall, 4–6 mm in diameter, subwoody, internodes 2–6 cm long, subquadrangular, glabrescent proximally, pilose distally, leaf scars slightly raised from the stem surface. Leaves opposite, equal or subequal in a pair; petioles to 1 cm long, pilose; blades 2–5 cm long, 2–3.5 cm wide, ovate to elliptic, base acute, apex shortly acute, margin serrate, adaxially dark green, uniformly pilose, abaxially pale green, pilose to puberulent, more densely pilose on venation, subcoriaceous when dry, lateral veins 3–5 per side. Flowers solitary, resupinate, posture horizontal at anthesis, bracteoles not seen; pedicels 1–4.5 cm, longer than the petiole, elongating in fruit, sparingly pilose, pedicel enations absent. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward at base only,

otherwise spreading and separate, erect, nearly equal, to 15 mm long, to 8 mm wide, broadly ovate, base truncate, apex acute, margin serrate, red, abaxially pilose, adaxially pilose. Corolla to 3.4 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla perpendicular relative to calyx; base ca. 6 mm in diameter, middle amplified, becoming apically ventricose on upper surface, throat not constricted, appearing laterally compressed, ca. 10 mm wide (at mouth), outside uniformly pilose, inside mostly glabrous, with glandular trichomes at throat, red spotting sometimes present on the upper surface of throat; limb reflexed, zygomorphic, to 10 mm wide, yellow, orange, or red, with lobes nearly equal, 7–8 mm long, 7–8 mm wide, rotund, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 1.4 cm long, adnate to base of corolla tube for 5–7 mm, connate for 2–4 mm, forming an open sheath, glabrous; anthers 1.5 mm long, 2 mm wide, dehiscing by longitudinal slits; staminode present. Ovary ca. 7 mm long, ca. 6 mm in diameter, ovoid, densely pilose, style 1.8 cm long, glabrous, stigma stomatomorphic. Fruit not seen. Frontispiece; Fig. 6.

Phenology. Collected in flower during January, February, April, May, July, August, October, and December; fruits not seen.

Distribution (Fig. 7). Ecuador (Loja, Morona-Santiago, Zamora-Chinchipe) and Peru (Loreto); eastern Andean slopes in wet montane forests; 2300–3400 m.

ADDITIONAL SPECIMENS EXAMINED. **Ecuador.** LOJA: road Loja–Saraguro, 5 km N of San Lucas, *Bohlin & Bohlin 1032* (US); Loma del Oro, S of Saraguro, *Camp 693* (NY-2 sheets, S, US); pass on road to Zamora, *Dodson & Thien 684* (US); road to Cerro Toledo, 13–14 km E of main road below Yangana, *Dorr 6565* (NY, QCA); road to Fierro Acru, N of Pichig, *Dorr 6653* (NY, QCA, QCNE, US); Horta–Naque, SE of Loja, *Espinosa 967* (LOJA, US); 14 km W of Loja, *Espinosa & Espinosa 2286* (LOJA, US); Loma de Loro, 6 km S of Saraguro on road to Loja, *Harling & Andersson 21900* (US); road Loja–Saraguro, la Loma del Oro, *Jaramillo & Winnerskjold 5867* (GB, QCA, MO), *Jaramillo & Winnerskjold 5883* (AAU, QCA); road Saraguro–Loja, Km 12.4, turnoff towards Fierro Urco, Km 3.8–7.1, *Jørgensen et al. 1321* (MO, QCNE); Páramos de Saraguro, 10 km S of Saraguro, *Luteyn et al. 6646* (NY); Parque Nacional Podocarpus, above Nudo de Cajanuma around “Centro de Información,” *Madsen & Ellemann 75243* (AAU, LOJA, QCNE), *Madsen 85581* (AAU, LOJA); road Pichig–Fierro Urco, Km 11 (app. 15 km SW of Saraguro), *Madsen 85444* (AAU, LOJA, QCA, QCNE); Parque Nacional Podocarpus, S of Loja, E of Nudo de Cajanuma, *Øllgaard et al. 57862* (AAU, QCA); Cebadal, near Loja, *Poortmann 281* (P-2 sheets); Parque Nacional Podocarpus, above Nudo de Cajanuma around “Centro de Información,” *Ríos 197* (AAU); Loma del Oro, S of Saraguro *Ulloa U. 196* (AAU, QCA).—MORONA-SANTIAGO: Campamento San Miguel, road in construction Sigsig–Gualaquiza, *Harling et al. 8124* (GB, SEL).—ZAMORA-CHINCHIPE: Parroquia Palanda, Valladolid, southern slopes of the Cordillera de Sabanilla, headwaters of Río Chinchipe, Tapichalaca Reserve, Fundación Jocotoco, *Clark & Mendoza 8100* (AAU, E, MO, NY, QCA, QCNE, SEL, US), *Clark et al. 9025* (LOJA, MO, QCA, QCNE, UNA, US); Cantón Gualaquiza, Cordillera Morire, unfinished road towards San Miguel de los Cuyes, *J. L. Clark et al. 9793* (MO, SEL, US); road Loja–Zamora, Km 12 from Herradura, *Dodson & Thien 667* (US); pass between Loja and Zamora, *Clemants et al. 2271* (NY); Nudo de Sabanilla, pass on road to Yangana–Valladolid, *Harling & Andersson 21516* (GB, US), *Harling & Andersson 23736* (GB); Km 14 on road to Zamora, *Madison & Besse 7429* (SEL).

Glossoloma altescandens is distinctive by its erect subshrub habit (rarely epiphytic), terminally clustered leaves, brilliantly red calyx, and bright yellow corollas (rarely red) with strong red spotting in the throat (see frontispiece). The same suite of characters is also present in *G. martinianum*, but the leaves are lanceolate and densely tomentose in contrast to the ovate leaves with strigose pubescence in *G. altescandens*. Additionally, these species are geographically isolated (Figs. 7, 19). *Glossoloma altescandens* is restricted to the eastern Andean slopes of southern Ecuador and northern Peru at higher elevations (> 2300 m); in contrast, *G. martinianum* is more broadly distributed along the eastern Andes from northern Ecuador to northern Peru at lower elevations (<2500 m).

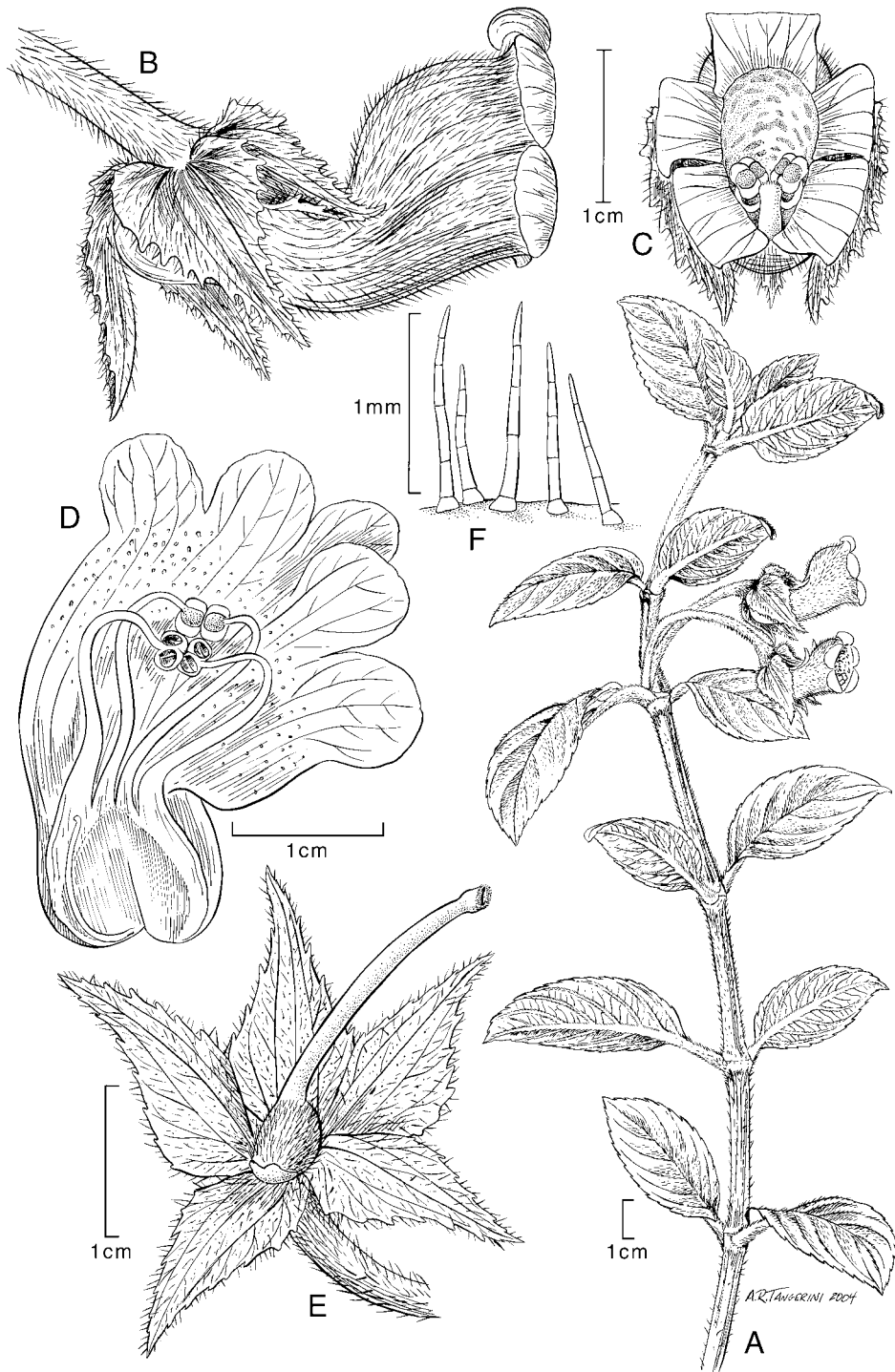


FIG. 6. *Glossoloma altescandens*. A. Habit. B. Side view of flower. C. Face view of flower. D. Corolla opened to show stamens. E. Calyx opened and corolla removed to show pistil and bilobed nectary gland. F. Trichomes on outer surface of corolla. (Based on J. L. Clark & C. Morocho 5847, neotype.)

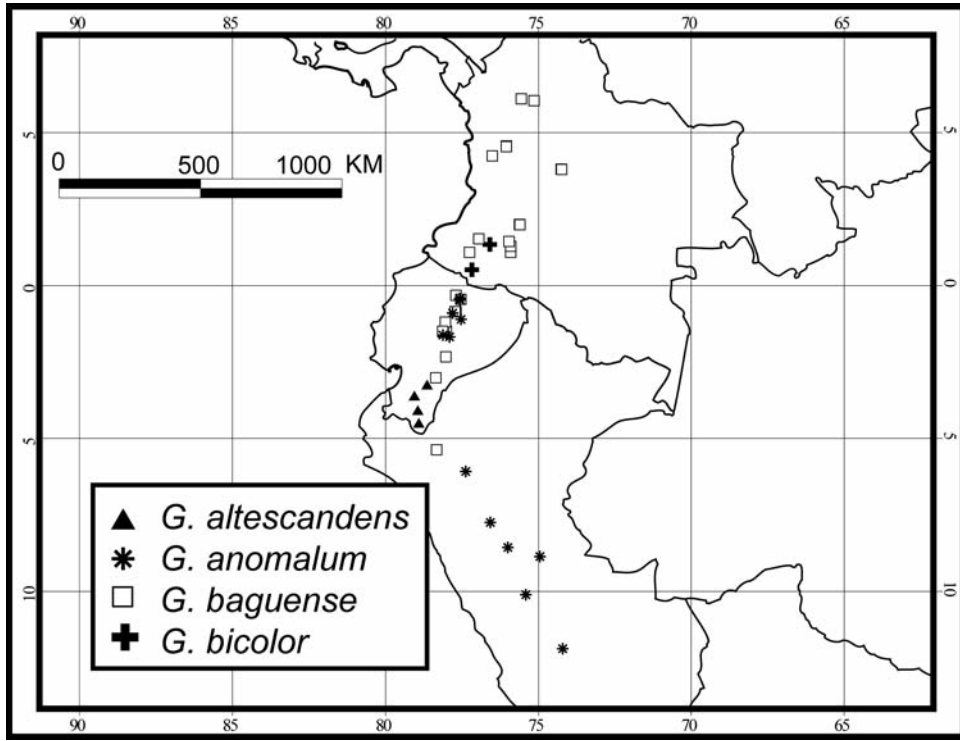


FIG. 7. Distribution of *Glossoloma altescandens*, *G. anomalum*, *G. baguense*, and *G. bicolor*.

The most abundant populations of *G. altescandens* were found in cloud forests in the Tapichala Reserve on the southeastern slopes of the Ecuadorian Andes in the province of Zamora-Chinchipe. A small population was collected in the Cordillera Morire (the “I will die ridge”) along a path leading towards the community San Miguel de Los Cuyes. A recent visit to the latter site in 2007 showed a dramatic decrease in the remaining forests, compared to a previous visit in 2003, owing to recent road building activities, and it was difficult to locate remnant populations. A third population may exist in the community-owned forest “Bosque Nativo Hushapampa” located 6 km south of Saraguro in the Loja province of Ecuador, but visits in 2003 and 2005 to locate fertile material for accurate determination were unsuccessful.

Mansfeld compared *G. altescandens* to a species he cited as “*Alloplectus tigrinus* Hemsley,” which is probably an error for *Alloplectus* (= *Crantzia*) *tigrinus* Karsten; Hemsley did not publish such a name.

It was not possible to select a neotype from the type locality of *G. altescandens*, because few collections are available for study from the Río Marañón area from the Department of Loreto in northern Peru. Loan material from 24 herbaria and visits to 18 herbaria, including a recent visit to the Universidad San Marcos herbarium (USM) in Lima, Peru, did not yield a collection from the type locality that could adequately represent Mansfeld’s description of *Alloplectus altescandens*. The specimen chosen as neotype of this species represents a taxon commonly collected throughout southern Ecuador. Future fieldwork in northern Peru will likely result in the documentation of this species from the type locality.

2. **Glossoloma anomalum** J. L. Clark, sp. nov.—TYPE: ECUADOR. Napo: Cantón Archidona, hwy between Baeza and Loreto, 3–5 km E of Tena–Baeza junction, 1100 m, 27 Feb 2003, J. L. Clark & N. Harris 7300 (holotype: QCNE!; isotypes: AAU! COL! CUZ! F! K! MO! NY! QCA! QCNE! SEL! US! USM!).

Ab omnibus congeneribus floribus non resupinatis differt.

Subshrubs, terrestrial; stems erect, unbranched, to 1.5 m tall, to 1 cm in diameter, usually woody, herbaceous when young, internodes 5–10 cm long, quadrangular, densely hirsute, leaf scars slightly raised from the stem surface. Leaves opposite, equal or subequal in a pair; petioles 3–11 cm long, pilose; blades 14–25 cm long, 7–12 cm wide, ovate to elliptic, base usually oblique, sometimes rounded, apex acute, margin serrate, adaxially pale green, pilose, abaxially pale green to yellow, pilose (especially on veins), membranous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, non-resupinate, with 1–3 flowers per axil, posture horizontal to erect at anthesis, bracteoles 10 mm long, 5 mm wide, linear; pedicels shorter than the petiole, 1–2 cm long, densely hirsute, pedicel enations present. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, nearly equal, 15 mm long, 10 mm wide, ovate, base truncate, apex acute, margin fimbriate, light yellow to green, densely hirsute. Corolla 1.5–2.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base 4 mm, middle ampliate, becoming apically ventricose on lower surface, throat slightly constricted, not appearing laterally compressed, 2–3 mm wide (at mouth), outside densely hirsute, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb reflexed, subregular, 2–4 mm wide, base white, otherwise uniformly red or uniformly yellow, lobes nearly equal, 1.5 mm long, 2 mm wide, rotund, entire. Nectary gland bilobed, on dorsal surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 1.5 cm long, adnate to base of corolla tube for ca. 3 mm, connate for 1 mm, forming an open sheath, glabrous; anthers 1.5 mm long, 2 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary ca. 6 mm long, ca. 4 mm wide, ovoid, sericeous, style 1.2 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, 1.5 cm long, 1.0 cm in diameter, ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved, valves not reflexed, reaching a 45° angle when mature. Seeds numerous, ca. 1 mm long, ca. 0.3 mm wide, ellipsoid, longitudinally striate, light red. Frontispiece; Fig. 8.

Phenology. Collected in flower during February to April, and June to December, and in fruit in May and December.

Distribution (Fig. 7). Ecuador (Napo, Pastaza, Sucumbíos, Tungurahua) and Peru (Amazonas, Ayacucho, Huánuco, San Martín, Junín); eastern Andean slopes in wet montane and premontane forests; 400–2100 m.

ADDITIONAL SPECIMENS EXAMINED. **Ecuador**. NAPO: Cantón Archidona, Reserva Ecológica Antisana, Comunidad Shamato, Km 21 on road to Shamato, Clark *et al.* 5054 (QCNE, US); Cantón Archidona, Parroquia Catundo, buffer zone of Parque Nacional Sumaco Napo Galeras, trail from the Comunidad Mushullacta towards crest of Galeras, Clark & Harris 7260 (NY, QCNE, SEL, UNA, US); 4 km W of Cosanga, Harling & Andersson 16461 (GB, US); road Baeza–Lago Agrio, Øllgaard 35689 (AAU); road to Salto San Rafael from Lago Agrio, along Río Quijos, Smith & Dunn 3418 (US).—PASTAZA: Cantón Mera, Parroquia Shell, road to Río Anzu and beyond, S of Mera, Clark *et al.* 7781 (AAU, BM, CAS, COL, E, F, K, MO, NY, QCA, QCNE, SEL, UNA, US); Mera, along Río Pindo, Harling & Andersson 17344 (GB, US); road Baños–Puyo, W of Mera, Kvist 60337 (US); Arajuno, Lugo S. 5753 (GB, US); road Puyo–Macas, ca. 15 km SE of Puyo, Lugo S. 4715 (GB, SEL, US).—SUCUMBÍOS: Reserva Ecológica Cayambe Coca, Volcán Reventador, trail between Río Quijos and refugio, Clark 4465 (QCNE, US).—TUNGURAHUA: Cantón Baños, Parroquia Río Negro, near Río Topo, Clark & Duran 6020

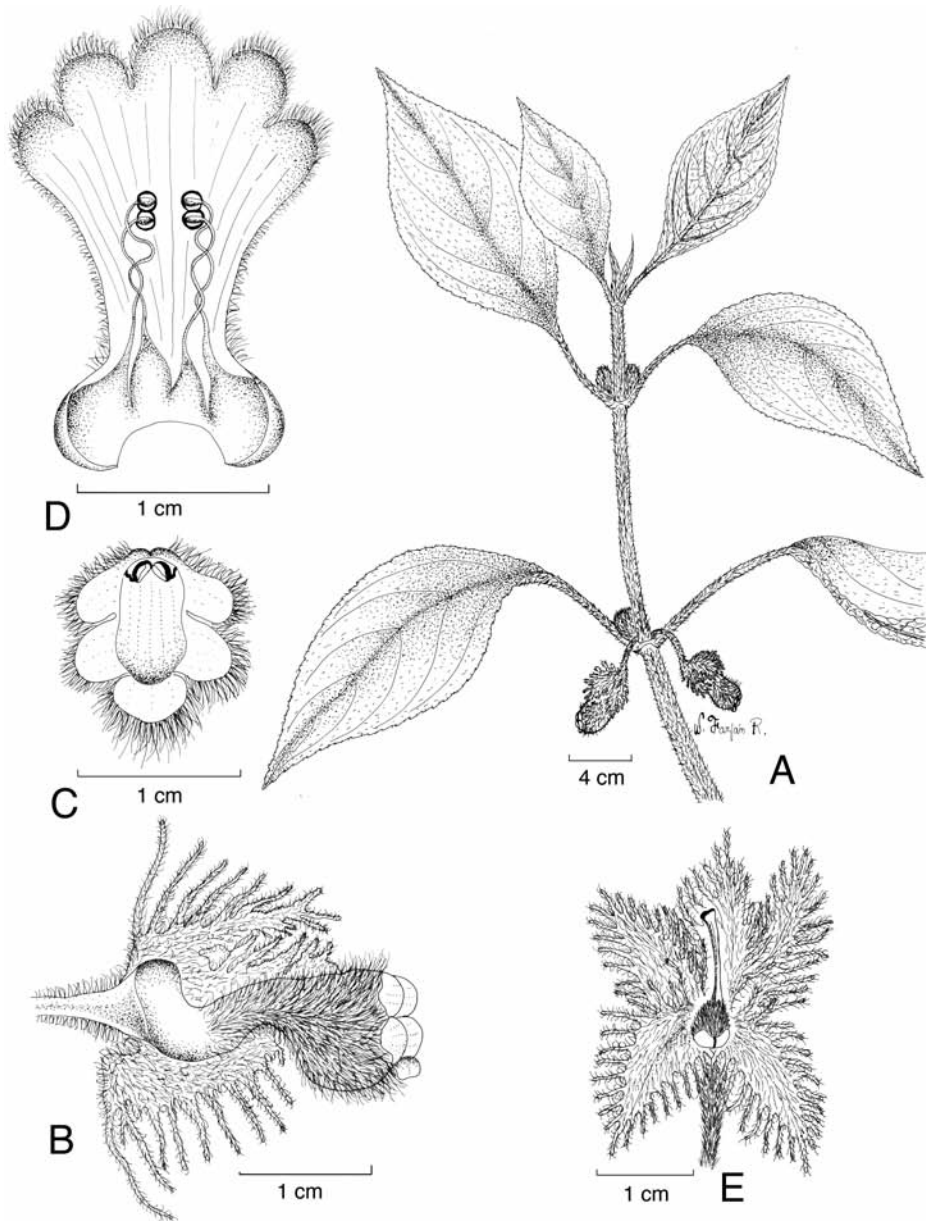


FIG. 8. *Glossoloma anomalum*. A. Habit. B. Side view of flower. C. Face view of flower. D. Corolla opened to show stamens. E. Calyx opened and corolla removed to show pistil and bilobed nectary gland. (Based on J. L. Clark & N. Harris 7300, holotype.)

(K, QCNE, SEL, UNA, US); Cantón Baños, Parroquia Río Negro, patch of forest near road Baños–Puyo, western side of Río Topo, *Clark & Katzenstein 8401* (AAU, COL, K, MO, NY, QCA, QCNE, SEL, UNA, US); road Ambato–Baños, *D’Arcy 14013* (MO, US); Cashurco, environs of Río Negro, northern side of Río Pastaza, *Lugo S. 811* (GB, SEL). **Peru.** AMAZONAS: Mendoza, *Woytkowski 8239* (MO-2 sheets, US).—AYACUCHO: Dtto. La Mar, Ayacucho, eastern Massif of Cordillera Central opposing the Cordillera Vilcabamba between Tambo San Miguel, Ayna and the Hacienda Luisiana, *Dudley 11934* (BH, NA).—HUÁNUCO: Dtto. Chinchao, San Pedro de

Carpish, forest near Carpish tunnel, trail toward Hacienda Patti, *Clark et al.* 8213 (AAU, COL, MO, SEL, US, USM); Dtto. Leoncio Prado, Hermilio Valdizán, La Divisoria, 21.8 km E of Puente Pumahuasi, Río Tulumayo, on road from Tingo María to Pucallpa, *Plowman & Schunke* V. 11715 (F, US, USM); Dtto. Pachitea, region of Pucallpa, western part of Sira Mountains and adjacent lowland, ca. 26–28 km ESE from Puerto Inca, from the beginning of the elfin forest at 1700 m along the crest to the first peak of the main range at 2250 m, *Wallnöfer* 23788 (US).—JUNÍN: Pichis trail, Eneñas, *Killip & Smith* 25783 (F, SEL, US).—SAN MARTÍN: Dtto. Mariscal Cáceres, Tocache Nuevo, Cerro de Palo Blanco, Río Tocache, *Schunke* V. 7217 (MO, US); Dtto. Mariscal Cáceres, Tocache Nuevo, Quebrada de Ishichimi, cerca a Tocache, *Schunke* V. 10058 (MO, US); Dtto. Mariscal Cáceres, Tocache Nuevo, Cerro de Palo Blanco, *Schunke* V. 10232 (MO, US), *Schunke* V. 11539 (US).

Glossoloma anomalum is distinguished from all other species by its non-resupinate flowers. This taxon represents a unique example in the Gesneriaceae as the only species with a non-resupinate flower orientation embedded in a clade of species with resupinate flower orientation (Fig. 3). For example, *Nematanthus*, *Crantzia*, and *Kohleria* Regel have resupinate and non-resupinate flowers, but the trait in these genera has not evolved as a single-species autapomorphy. Other differences that set *G. anomalum* apart from congeners are the shallow fimbriate calyx lobe margins, the densely hirsute vestiture on the stems, and an erect unbranched subshrub habit.

3. *Glossoloma baguense* (L. E. Skog) J. L. Clark, *Selbyana* 25: 198. 2005. *Alloplectus baguensis* L. E. Skog, *Opera Bot.* 92: 225. 1987.—TYPE: PERU. Amazonas: Bagua, Cordillera Colón, ca. 25 km (by trail) E of La Peca, along stream, 1894 m, 13 Aug 1978, *P. Barbour* 2973 (holotype: US!; isotypes: C! MO!).

Herbs to subshrubs, terrestrial or epiphytic; stems scandent, rarely branched, 1 m tall, 5–8 mm in diameter, subwoody, internodes usually 5–7 cm long, subquadrangular, glabrous, leaf scars raised from stem surface. Leaves opposite, equal or subequal in a pair; petioles 1.0–3.5 cm long, glabrous and occasionally verrucose; blades 6.9–18 cm long, 2.4–6.5 cm wide, elliptic to narrowly obovate, base cuneate to acute, sometimes oblique, apex acuminate, margin entire to remotely serrulate, slightly revolute, adaxially and abaxially yellowish green and glabrous, subcoriaceous when dry, lateral veins 7–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–2 flowers per node, posture horizontal at anthesis, bracteoles inconspicuous, green, margin entire, early caducous; pedicels longer than petiole, 1.6–5.5 cm long, glabrous, pedicel enations present. Calyx lobes nearly free, imbricate, erect, nearly equal, 10–18 mm long, 6–14 mm wide, ovate, base truncate, apex acute to obtuse, margin entire, usually green, rarely red, abaxially glabrous, adaxially glabrous except pilose at base. Corolla 3.5–5.0 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base 5–8 mm in diameter, middle sometimes constricted with slight bend, but usually ampliate and becoming ventricose on upper surface, throat not constricted, appearing laterally compressed, to 1.1 cm wide (at mouth), outside glabrous becoming sparingly pilose distally, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb spreading, zygomorphic, 5–8 mm wide, red, lobes nearly equal, 3–5 mm long, 4–6 mm wide, rotund, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion 2.5–4.5 cm long, adnate to base of corolla tube for 3 mm, connate for 2–4 mm, forming an open sheath, glabrous; anthers ca. 1 mm long, ca. 2 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary 6.4 mm long, 4.5 mm wide, ovoid, pilose, style ca. 4 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, 1.5 cm long, 1.3 cm in diameter, ovoid when

immature, pilose, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, ca. 1 mm long, 0.3–0.5 mm wide, elongate-fusiform. Figs. 5C, D, 9.

Phenology. Collected in flower and fruit throughout the year.

Distribution (Fig. 7). Colombia (Antioquia, Caquetá, Cauca, Cundinamarca, Huila, Nariño, Putumayo, Risaralda), Ecuador (Morona-Santiago, Napo, Tungurahua, Zamora-Chinchiipe), and Peru (Amazonas); eastern and western Andean slopes in montane and premontane forests; 1400–2700 m.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** ANTIOQUIA: Mpio. Yarumal, Vereda El Colgadero, *Lozano C. 2173* (COL); Mpio. Unión, Cerro de San Miguel, *Marulanda et al. 323* (COL); stream 19 km N of Yarumal along highway Medellín–Cartagena, ca. 2 km S of Alto de Ventanas, *Stein & Cogolla 3361* (COL, US).—CAQUETÁ: western slope of Cordillera Oriental, Quebrada del Río Hacha, below Gabinete, *Cuatrecasas 8541* (F); eastern slope of Cordillera Oriental, Quebrada de Río Hacha, below Gabinete, *Cuatrecasas 8566* (COL, US); Cordillera Oriental, 29 km SE of Guadalupe along road to Florencia, *Davidse et al. 5625* (COL); eastern slopes of Cordillera Oriental, road Guadalupe–Florencia, Km 40, *Londoño & Kvist 105* (AAU, QCA, US).—CAUCA: El Tambo, Parque Nacional Natural Munchique, road Nueva Granada, *Lozano C. et al. 6598* (COL, MA).—CHOCÓ: road Ansermanuevo–San José del Palmar, near border of Valle del Cauca, Alto del Galápagó, *Forero et al. 2186* (COL).—CUNDINAMARCA: Mpio. San Bernardo, Cordillera Oriental, Río La Chorrera, Santa Marta, *Jaramillo M. & Díaz P. 6777* (COL).—SANTANDER: La Rambla, *Schneider 835* (COL, S).—HUILA: Cordillera Oriental, Gabinete, *Cuatrecasas 8470* (COL, F, US), *Cuatrecasas 8503* (COL, F, US); Río Villalobos, confluence of Ríos Villalobos and Cauchos, *Schultes & Villarreal 5231* (GH, US).—NARIÑO: Mpio. Ipiales, road La Victoria–San Jorge, “El Hospital,” *Mora 2145* (COL, US), *Mora 2163* (US).—PUTUMAYO: valley of Sibundoy, Portachuelo, *Schultes & Villarreal 7756* (COL, US).—RISARALDA: El Cedral, road near Río Otún, *Bernal 1576* (COL); Mpio. Pereira, Finca Deilan, *Franco et al. 2800* (COL); Mpio. Pereira, between Ceylan and El Cedral, *Franco et al. 2889* (COL), *Franco et al. 2922* (COL); Mpio. Pereira, Parque Regional Ucumari, *González G. et al. 1533* (COL), *González G. et al. 1668* (COL); Mpio. Sta. Rosa, western slopes of the Cordillera Central, road Herradura Termales–el Páramo de Santa Rosa, *Idrobo et al. 9531* (COL); Mpio. Pereira, Parque Nacional Natural Ucumari, road Cedral–Manzano, *Vélez & Agudelo 474* (COL). **Ecuador.** MORONA–SANTIAGO: Parroquia 9 de Octubre, unfinished road towards Guamote, vía Macas–Guamote, *Clark & Katzenstein 8374* (QCNE, US); vía Plan de Milagro–Gualaceo, near Tinajillas, *Palacios & van der Werff 3738* (MO, QCNE).—NAPO: Cantón Archidona, Reserva Ecológica Antisana, Sector Guacamayos, trail Jumandy–La Virgen towards Río Urcusiqui, Km 30, *Clark et al. 5448* (AAU, COL, MO, QCA, QCNE, SEL, US); Codo Alto, path “Precooperativa,” Cordillera Oriental, *Jaramillo et al. 12484* (QCA); Cantón Chaco, Río Quijos, finca “La Ave Brava” de Segundo Pacheco, *Palacios 5424* (MO, QCNE); Cantón Quijos, Reserva Ecológica Antisana, Cordillera de Guacamayos, Km 100, road “Camino viejo de Herradura,” near antenas, *Vargas et al. 1698* (MO, QCNE); Cantón Tena, Parque Nacional Llanganates, road Salcedo–Tena, Km 74, Río Mulatos, *Vargas et al. 2169* (MO, QCNE); Cantón Tena, Parque Nacional Llanganates, road Salcedo–Tena, Río Mulatos, *Vargas et al. 2310* (MO, QCNE, US).—TUNGURAHUA: Cantón Baños, Parroquia Río Verde, Sector Machay, forested trail from road Baños–Puyo towards Cascada de San Miguel via San Agustín, *Clark et al. 5700* (QCNE, US); Cantón Baños, Parroquia Río Negro, near La Colonia Tigre San Jacinto, *Clark & Duran 6033* (AAU, MO, QCA, QCNE, US); Cantón Baños, Los Llanganates, Colonia México, 18 km from El Topo, *Vargas & Sandoval 364* (MO, QCNE).—ZAMORA–CHINCHIPE: Cantón Chinchiipe, Parroquia, Zumba, Finca de Sandy León, forest near Río Tarrangami, 2100–2300 m, *Clark et al. 8919* (MO, SEL, QCNE, UNA, US). **Peru.** AMAZONAS: Bagua; ca. 20 km (by trail) E of La Peca, *Barbour 2747* (MO, US); Cordillera Colón, SE of La Peca, *Barbour 3836* (MO, US, USM).

Glossoloma baguense resembles *G. herthae* (no. 11), but is distinguished from it by the evenly spaced leaves, longer pedicels, and glabrous leaves. Other characters that are useful for distinguishing *G. baguense* are elongate stems, few (1–2) flowers per axil, oblong glabrous leaves, and tubular corollas. The angulate or slight bend in the corolla (Fig. 9D) is a character limited to the collections made by Barbour at the type locality of the Bagua province in Peru. Figure 9 is reproduced from the protologue (Skog 1987), which was solely based on material from Peru. Recent collections of *G. baguense* from Colombia and Ecuador differ from the Peruvian specimens by the smooth petioles, in contrast to



FIG. 9. *Glossoloma baguense*. A. Habit. B. Detail showing node. C. Calyx. D. Flower. E. Corolla in longitudinal section showing stamens. F. Calyx opened and corolla removed to show pistil and bilobed nectary gland. (Based on: A, B, *P. Barbour* 2973, holotype; C, *P. Barbour* 3836; D, E, *P. Barbour* 2747, 3836; F, *P. Barbour* 2747.) Reprinted with permission from *Opera Botanica* (Skog 1987: Fig. 2).

verrucose petioles, and straight corollas, in contrast to the slightly bent or angulate corollas (Fig. 9D). The angulate corolla shown in the illustration from the protologue (Skog 1987) could be a result of how the flower was field-pressed and preserved on the herbarium specimen. Comparison of the specimens from Colombia, Ecuador, and Peru showed them similar enough that this species's geographic range is here greatly expanded.

4. *Glossoloma bicolor* (Kunth) J. L. Clark, *Selbyana* 25: 198. 2005. *Besleria bicolor* Kunth, *Nov. gen. sp. pl.* 2: 398 (folio), 319 (quarto). 1818 ["1817"]. *Alloplectus kunthii* G. Don, *Gen. hist.* 4: 655. 1838 ["1837"], nom. superfl. *Alloplectus bicolor* (Kunth) G. Don in Loudon, *Encycl. pl.*, new ed. 1401. 1855 [the combination also proposed by Klotzsch ex Hanstein, *Linnaea* 34: 377. 1865]. *Columnnea bicolor* (Kunth) Kuntze, *Rev. gen. pl.* 2: 472. 1891. *Crantzia bicolor* (Kunth) Fritsch, *Bot. Jahrb. Syst.* 29 (Beibl. 65): 9. 1900.—TYPE: COLOMBIA. Cauca: Villa La Erre, plains of Sacandoy between town of Almaguer and Pasto, 1829–2195 m, Nov 1801, A. Bonpland 2118 (holotype: P!, holotype fragment: F!).

Subshrubs, terrestrial; stems erect, unbranched, 1.5 m tall, 6–8 mm in diameter, subwoody, internodes 2–6 cm long, subquadrangular, glabrescent proximally, hirsute with yellowish hairs distally, leaf scars slightly raised from the stem surface. Leaves opposite, equal or subequal in a pair; petioles 2–4 cm long, pilose; blades 12–23 cm long, 4–10 cm wide, ovate, base rounded, apex acute, margin serrate, adaxially green, densely hirsute-pilose, abaxially red, pilose, subcoriaceous when dry, lateral veins 7–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 4–10 flowers per node, posture horizontal to erect at anthesis, bracteoles 5 mm long, 2 mm wide, linear; pedicels shorter than petiole, to 1 cm long, pilose, pedicel enations present. Calyx lobes nearly free, plane, erect, nearly equal, 6 mm long, 2 mm wide, linear, base truncate, apex acute, margin entire, light green, abaxially pilose, adaxially glabrous. Corolla 2 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique to perpendicular relative to calyx; base 3–4 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat constricted, not appearing laterally compressed, to 3 mm wide (at mouth), outside sparingly pilose, inside glabrous, interior spotting absent, limb reflexed, zygomorphic, to 3 mm wide, lobes nearly equal, 1 mm long, 1 mm wide, rotund, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 1.3 cm long, adnate to base of corolla tube for 3 mm, connate for 1–3 mm, forming an open sheath, glabrous; anthers ca. 1 mm long, ca. 2 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary 2.5 mm long, 2 mm wide, ovoid, pilose, style 1.4 cm long, glabrous, stigma stomatomorphic. Fruit not seen.

Phenology. Collected in flower during October.

Distribution (Fig. 7). Colombia (Nariño); western Andean slopes in montane forests; 2000–2500 m.

ADDITIONAL SPECIMEN EXAMINED. **Colombia.** NARIÑO: Mallama, "trayecto piedrancha-cabeceras," La Chorrer, Ramírez P. & Jojoa 5755 (US).

Glossoloma bicolor is unique in the genus in having small flowers (ca. 2 cm) that are dorsally red and ventrally yellow. The only other species in the genus with dorsally yellow and ventrally red flowers is *G. ichthyoderma*, which differs by the significantly larger flowers (2.5–3.2 cm). In addition, the stems of *G. ichthyoderma* have an exfoliating scale-like epidermis (Fig. 20B), unlike the glabrescent stems of *G. bicolor*.

5. **Glossoloma bolivianum** (Britton ex Rusby) J. L. Clark, *Selbyana* 25: 198. 2005. *Columnnea boliviana* Britton ex Rusby, *Mem. Torrey Bot. Club* 4: 238. 1895. *Alloplectus bolivianus* (Britton ex Rusby) Wiehler, *Phytologia* 27(5): 327. 1973.—TYPE: BOLIVIA. La Paz: Yungas, Oct 1890, *Bang 515* (holotype: NY!; isotypes: BM! E! F! GH-2 sheets! K! MANCH, MO! NY! PH! US-2 sheets! W! WU; fragment: F!; photos of MANCH and WU isotypes: US!).

Shrubs, terrestrial; stems usually erect, occasionally horizontal on vertical embankments, rarely branched, 1–2 m tall, 5–10 mm in diameter, woody, internodes 2–10 cm long, subquadrangular, glabrescent proximally, sparingly to densely pilose distally, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 2–5 cm long, strigose; blades 10–18 cm long, 5–8 cm wide, broadly ovate, rarely elliptic, base acute, apex acuminate, margin serrulate, adaxially dark green, hirsute, sometimes glabrous, abaxially yellowish green, sericeous, subcoriaceous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–2 flowers per node, posture pendent at anthesis, bracteoles 20 mm long, 5 mm wide, linear; pedicels shorter than petiole, 1–3 cm long, densely strigose, pedicel enations present. Calyx lobes imbricate, nearly free, plane, erect, 4 subequal, 10–15 mm long, 5–10 mm wide, rotund, base truncate, apex obtuse, margin serrulate, greenish yellow, abaxially hirsute, adaxially hirsute; fifth (ventral) lobe smaller and narrower, to 1 cm long, to 0.5 cm wide, elliptic-lanceolate. Corolla 2–3.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla perpendicular relative to calyx; base 5–10 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat slightly constricted, appearing laterally compressed, to 8 mm wide (at mouth), outside densely pilose, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb reflexed, zygomorphic, to 1 cm wide, yellow, lobes nearly equal, to 2 mm long, to 2.5 mm wide, rotund, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 1.0 cm long, adnate to base of corolla tube for 3 mm, connate for 2 mm, forming an open sheath, glabrous; anthers ca. 1 mm long, ca. 2 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary to 7 mm long, to 5 mm wide, ovoid, densely pilose, style ca. 1.5 cm long, glabrous, stigma stomatomorphic. Fruit not seen. Fig. 10.

Phenology. Collected in flower during January, February, and July.

Distribution (Fig. 11). Bolivia (La Paz, Cochabamba); eastern Andean slopes in montane forest; 750–2500 m.

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** COCHABAMBA: Antohuacuina, Espiritu Santo, *Buchtien 4821* (US); Carrasco, Comunidad Karawasi, Serranias Siberia, N of old hwy Santa Cruz–Cochabamba, *Clark & Rodríguez 6726* (E, LPB, MO, SEL, US); Chaparé, hwy Cochabamba–Villa Tunari, near Río San Jacinto, ca. Km 95–100, W of checkpoint, *Clark & Rodríguez 6769* (AAU, LPB, MO, SEL, US).—LA PAZ: Mapiří, *Bang 1551* (A, BM, E, F, G, GH-2 sheets, K, MO, NY-2 sheets, PH, US-2 sheets, W); Hacienda Simaco, above road to Tipuaní, *Buchtien 5562* (NY, US), *Buchtien 5563* (US); Larecaja, walk from Ingenio to Mapiří, day 4 of 5, campamento “Incapampa,” *Clark & Barrientos 6693* (AAU, E, K, LPB, MO, NY, SEL, UNA, US); near Yungas, *Rusby 1352* (NY); Mapiří, *Rusby 2488* (NY-2 sheets).—SUD YUNGAS: Huancané, San Isidro, N of Chulamaní, *Beck 8731* (LPB, US); Yungas, *Rusby 2487* (F, NY, US).

Glossoloma bolivianum is distinguished from other members of the genus by the combination of the following characters: overlapping or imbricate calyx margins (Fig. 10D) instead of conduplicate calyx margins; corollas densely pilose (Fig. 10C, D); and large (> 10

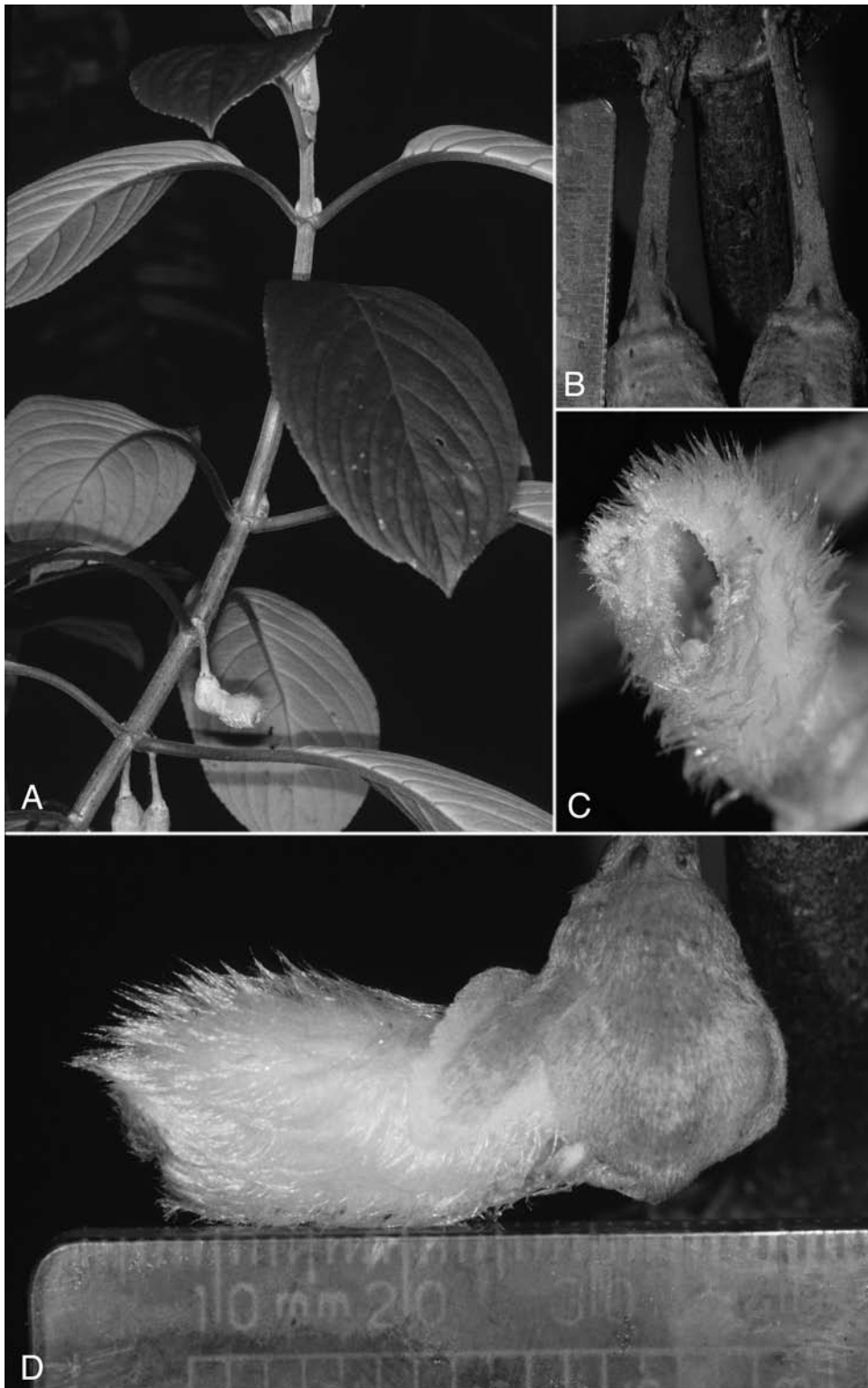


FIG. 10. *Glossoloma bolivianum*. A. Habit showing pendent posture of flower. B. Pedicel enations. C. Face view of corolla. D. Lateral view of corolla. (Photos by J. L. Clark; voucher: *J. L. Clark 6693*.)

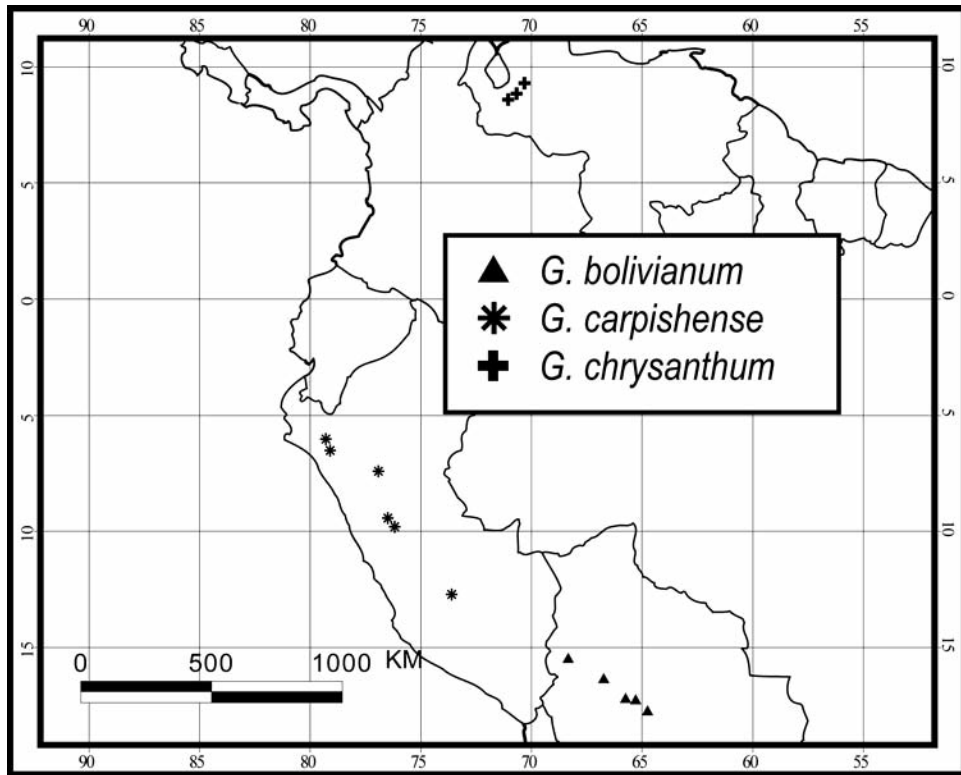


FIG. 11. Distribution of *Glossoloma bolivianum*, *G. carpishense*, and *G. chrysanthum*.

cm long) ovate leaves. Many herbaria have collections from Ecuador and Colombia annotated with this name, but recent fieldwork and the neotypification of *Glossoloma herthae* (Clark 2005) have resolved this taxonomic confusion (see *G. herthae*, no. 11, for further discussion). The geographic ranges of *G. herthae* and *G. bolivianum* do not overlap, but future fieldwork may show that these two species are sympatric in southern Peru. Both species share the unusual feature of imbricate calyx lobes, but the corollas of *G. bolivianum* are readily differentiated by their dense pilose pubescence when compared to the glabrescent to sparingly pilose corollas of *G. herthae*. The leaves of *G. bolivianum* are broadly ovate, and its habit is usually as a terrestrial shrub with erect stems, which are occasionally horizontal when growing on steep embankments. In contrast, the leaves of *G. herthae* are elliptic to slightly falcate, and the habit is usually an epiphyte growing on steep roadside embankments with pendent to horizontal stems.

6. *Glossoloma carpishense* (J. L. Clark & I. Salinas) J. L. Clark, *Selbyana* 25: 199. 2005.
Alloplectus carpishensis J. L. Clark & I. Salinas, *Novon* 15: 70. 2005.—TYPE:
 PERU. Huánuco: Dist. Chinchao, San Pedro de Carpish, above Carpish tunnel, ca.
 47 km N of Huánuco on main road to Tingo María, 09°43'14"S, 76°06'53"W,
 2770–2900 m, 1 Nov 2001, *I. Salinas* 224 (holotype: USM!; isotype: US!).

Subshrubs, terrestrial; stems usually erect or rarely horizontal on steep slopes, rarely branched, to 2 m tall, ca. 5 mm in diameter, subwoody, internodes 2–10 cm long,

subquadrangular, glabrescent proximally, densely villous distally, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 1–4 cm long, densely villous; blades 8–19 cm long, 2–5 cm wide, elliptic to oblong, base acute, apex acute, margin serrate, adaxially green, uniformly sericeous, abaxially pale green, densely sericeous (especially on veins), subcoriaceous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–4 flowers per node, posture pendent at anthesis, bracteoles 2–3 cm long, 1–2 cm wide, ovate; pedicels shorter or longer than the petiole, 1–4 cm long, densely villous, pedicel enations present. Calyx lobes conduplicate, the apex free and the base of each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, subequal, 10–17 mm long, 6–12 mm wide, ovate, base truncate, apex acuminate, margin serrate, bright red, both surfaces sparsely to densely pilose. Corolla to 4 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla perpendicular relative to calyx; base 6–8 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat constricted, appearing laterally compressed, to 1 cm wide (at mouth), outside densely pilose, inside with small glandular trichomes, red spotting present on the upper surface of the throat, limb reflexed, zygomorphic, to 1 cm wide, yellow, lobes nearly equal, to 3 mm long, to 3 mm wide, rotund, entire. Nectary gland deeply bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 1.9 cm long, adnate to base of corolla tube for 8 mm, connate for 1 mm, forming an open sheath, glabrous; anthers ca. 2 mm long, ca. 3 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary to 6 mm long, to 5 mm wide, ovoid, densely pilose, style ca. 2.5 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, 1.5 cm long, 1.5 cm wide, ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, fusiform, 1 mm long, 0.3 mm wide, longitudinally striate, dark brown. Frontispiece; Fig. 12.

Phenology. Collected in flower January through August, in fruit from June through November.

Distribution (Fig. 11). Peru (Cajamarca, Cuzco, Huánuco, San Martín); eastern Andean slopes; 2200–3000 m.

ADDITIONAL SPECIMENS EXAMINED. **Peru.** CAJAMARCA: Jaén, Sallique, Lanchal, La Cocha, *Díaz et al.* 9657 (US); Jaén, Pomahuaca, Aguas Verdes, *Díaz & Campos* 10876 (US); Chota, WNW of Huambos, *Dillon et al.* 6438 (F, US).—CUZCO: Dtto. Convención, *Dudley* 10845 (NA, US).—HUÁNUCO: Carpish Pass, 84 km from Tingo María on highway to Lima, *Allard* 21085 (BH, US); Dtto. Chinchao, Cerro Carpish, near Carpish tunnel, 45–50 km N of Huánuco near road to Tingo María, *Clark et al.* 8247 (K, MO, NY, SEL, UNA, US, USM), *Clark et al.* 8249 (AAU, CAS, COL, E, F, K, MO, NY, SEL, UNA, US, USM, VEN); Cerro Carpish, Carpish tunnel, ca. 46.6 km N of Huánuco on the road to Tingo María, *Davidson & Jones* 9196 (LAM, US); Carpish, summit between Huánuco and road to Tingo María, *Ferreyra* 2330 (MO, US-2 sheets, USM), *Ferreyra* 6848 (US-2 sheets, USM), *Ferreyra* 1229 (US, USM); Huánuco, Tingo María road, near Carpish divide above mouth of tunnel, *Gentry & Smith* 44883 (US); Carpish, above Acomayo, *Hutchison et al.* 5958 (US, USM); Carpish Divide, *Sandeman* 5172 (K); Dtto. Chinchao, summit of Carpish, *Schunke* V. 5225 (F, US); El Mirador, 15 km from Chinchao, *Schunke* V. 5246 (F, US); on grown-over disused road over Carpish Pass, above eastern end of present road (Peru 16a) tunnel, *Skog et al.* 5140 (MO, US, USM); Carpish Hills, trail to summit leaving from W-entrance, S-side of tunnel, *Stein & Todzia* 2293 (US, USM); trail from San Pedro de Carpish, 3 km E of tunnel, *Stein et al.* 3851 (US, USM).—SAN MARTÍN: Dtto. Mariscal Caceres, Parque Nacional Río Abiseo, near Gran Pajaten ruins, *Young* 1260 (F).

Glossoloma carpishense is distinguished by the combination of the following characters: densely pubescent and elliptic leaves, uniformly bright yellow corollas, and a variable

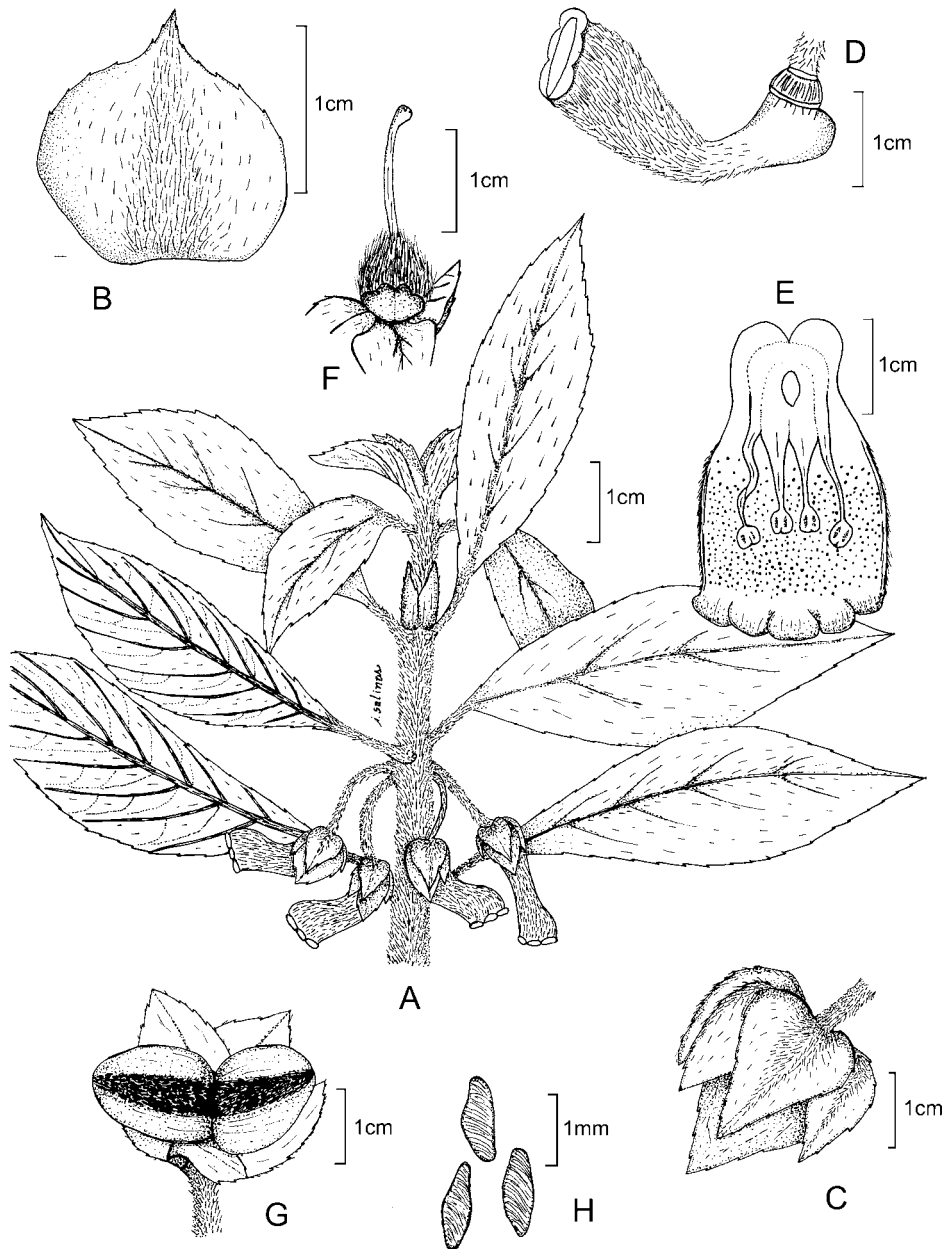


FIG. 12. *Glossoloma carpishense*. A. Habit. B. Calyx lobe. C. Calyx. D. Corolla. E. Corolla opened to show stamens. F. Calyx opened and corolla removed to show pistil and valvate nectary gland. G. Mature fruit. H. Seeds. (Based on *Salinas 224*, holotype.) Reprinted with permission from *Novon* (Clark et al. 2005: Fig. 1).

shaped nectary gland. The nectary varies from a single bilobed gland to two separate valvate glands (Fig. 12F) instead of the more common single bilobed gland found in most other species of *Glossoloma*. *Glossoloma carpishense* is often confused with the similar appearing *G. ichthyoderma*, which differs in its exfoliating scale-like epidermis (Fig. 20B) and yellow corollas with a dorsal red stripe; *G. carpishense* lacks an exfoliating epidermis, and the corollas are uniformly bright yellow. *Glossoloma carpishense* has ovate calyx lobes with an acuminate apex (Fig. 12F), which separate it from *G. serpens*, which has oblong calyx lobes with a rounded apex (Fig. 34E).

7. *Glossoloma chrysanthum* (Planchon & Linden) J. L. Clark, *Selbyana* 25: 199. 2005.

Alloplectus chrysanthus Planchon & Linden, *Fl. Serres Jard. Eur.* 8: 211. 1853.

Columnnea chrysantha (Planchon & Linden) Kuntze, *Rev. gen. pl.* 2: 472. 1891.—

TYPE: based on living plants; authentic material unknown.—VENEZUELA. Mérida: dirt road towards páramo de Mucumbis, between Torondoy and Pico Aguila, near entrance to Parque Nacional Culata, 2800–2900 m, 16 Oct 2002, *J. L. Clark & S. Yustiz 6872* (neotype, designated by Clark, 2005: VEN!; isoneotypes: MER! MO! NY! PORT! SEL! US!).

Alloplectus ornatus C. V. Morton, *Fieldiana, Bot.* 28(3): 523. 1953.—TYPE: VENEZUELA. Trujillo: La Quebrada Cortijo, in dense woods below Páramo and ridge top, by boundary line Lara–Trujillo, above Humocaró Bajo, 2600–2800 m, 6 Feb 1944, *J. A. Steyermark 55355* (holotype: US!; isotypes: F! NY! VEN!).

Subshrubs, terrestrial or epiphytic; stems scandent and often reclining on ground with ascending tips, sparingly branched, to 5 m long, 3–8 mm in diameter, subwoody, internodes 1–8 cm long, subquadrangular, pilose, leaf scars raised from stem surface, enations at base of petiole absent. Leaves opposite, equal or subequal in a pair; petioles 1.6–3 cm long, densely pilose; blades 8–16 cm long, 3–6 cm wide, elliptic to oblong, base acute, sometimes oblique, apex acuminate, margin serrate, adaxially dark green, uniformly hirsute, abaxially yellowish green, hirsute to densely pilose (especially on veins), subcoriaceous when dry, lateral veins 4–5 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–2 flowers per node, posture pendent at anthesis, bracteoles not seen; pedicels equal to or slightly longer than the petiole, to 2.5 cm long, pilose, pedicel enations present. Calyx lobes conduplicate, the apex free and the base of each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, 4 subequal, to 15 mm long, to 5 mm wide, broadly ovate, base truncate, apex acute, margin serrate, bright red, both surfaces sparsely to densely pilose. Corolla to 3.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla perpendicular relative to calyx; base ca. 5 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat constricted, appearing laterally compressed, to 8 mm wide (at mouth), outside densely pilose, inside glabrous, interior spotting absent, limb reflexed, zygomorphic, to 1 cm wide, yellow, lobes nearly equal, ca. 1 mm long, ca. 1.5 mm wide, rotund, entire. Nectary gland deeply bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 1.5 cm long, adnate to base of corolla tube for 3 mm, connate for 1 mm, forming an open sheath, glabrous; anthers ca. 1.5 mm long, ca. 2 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary to 4 mm long, to 3 mm wide, ovoid, densely pilose, style ca. 1.5 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, 1.5 cm long, 1.3 cm wide, ovoid when immature, pilose, loculicidally

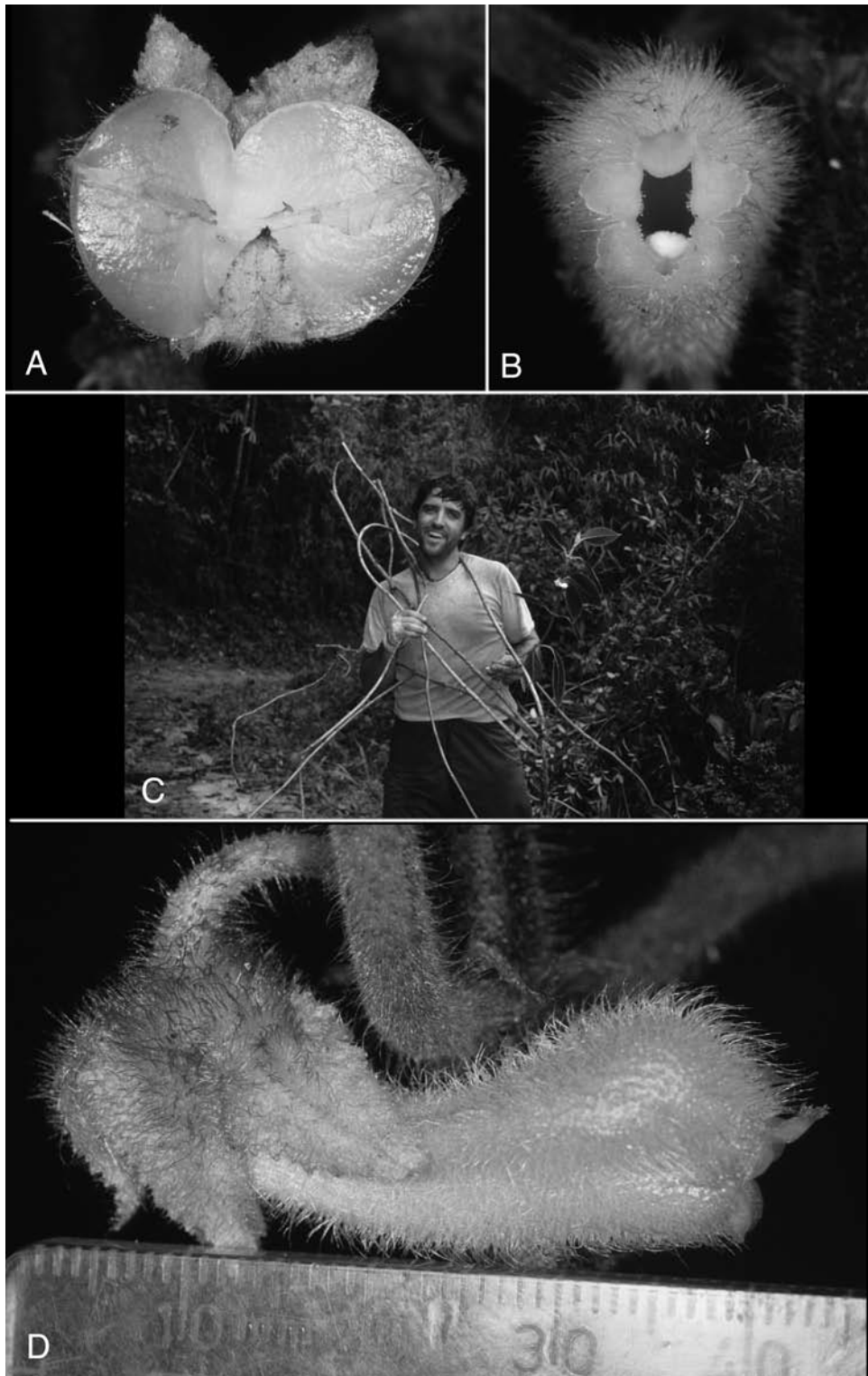


FIG. 13. *Glossoloma chrysanthum*. A. Capsular fruit with fully reflexed valves; seeds absent. B. Anterior view of corolla. C. Habit showing elongate decumbent stems (> 5 meters long) and erect shoot (ca. 1 m tall). D. Lateral view of corolla. (Photos by J. L. Clark; voucher: *J. L. Clark 6872*.)

dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, 1 mm long, 0.3 mm wide, ellipsoid, longitudinally striate, dark brown. Fig. 13.

Phenology. Collected in flower during February to April, June, July, and October, in fruit during October.

Distribution (Fig. 11) Venezuela (La Mucuy, Lara, Mérida, Trujillo); Andean slopes in montane forest; 1700–2900 m.

ADDITIONAL SPECIMENS EXAMINED. **Venezuela.** LARA: Los Llaneros, near border of Parque Nacional Dinira, Clark & Yustiz 6858 (PORT, SEL, US, VEN); Mpio. Morán, trail Humocaró–Buenos Aires (CaseRío), below Páramo Los Rosas, Liesner et al. 8016 (MO, SEL, VEN).—MÉRIDA: La Mucuy, Bernardi 397 (VEN); Mpio. San Eusebio, La Carbonera, 25 km W of Mérida, Breteler 4537 (VEN); Justo Briseño, Quebrada El Molino, Las Cuadras, Clark & Yustiz 6864 (MER, K, US, VEN); dirt road Torondoy–Pico Aguila, entrance of Parque Nacional Culata from Páramo de Mucumbis, Clark & Yustiz 6873 (VEN); Mpio. Rangel, Quebrada La Mitisús, Dorr & Barnett 5606 (NY); La Mucuy, Vareschi 556 (VEN); La Carbonera, Wiehler 72484 (SEL), Wiehler 72486 (SEL); La Carbonera–Mérida, Wiehler 72492 (SEL, US).—TRUJILLO: Mpio. Boconó, selvas nubladas de Guaramacal, 20 km E of Boconó, Aymard C. et al. 5210 (PORT); Mpio. Boconó, La Laguna Negra, main road El Batatal–Mosquey, border of Parque Nacional Guaramacal, Clark & Yustiz 6888 (US, VEN); Mpio. Boconó, Parque Nacional Guaramacal, Cuello et al. 1424 (PORT, US, VEN); Mpio. Boconó, Parque Nacional Guaramacal, road Boconó–Guaramacal, SE of Boconó, Dorr & Barnett 8004 (NY, PORT, US); Mpio. Boconó, Parque Nacional Guaramacal, road Boconó–Guaramacal, SE of Guaramacal, Dorr & Barnett 8177 (PORT, US); Mpio. Boconó, Páramo de Guaramacal, W of road summit, Dorr et al. 5008 (NY, PORT, US, VEN); Depto. Boconó, road Guaramacal–Boconó, Luteyn & Cotton 9739 (NY, PORT, US, VEN); Mpio. Boconó, Parque Nacional Guaramacal, sector vertiente norte, Stergios & Licata 19190 (PORT); Páramo de Guaramacal, van der Werff et al. 8878 (MO, PORT, US).

Glossoloma chrysanthum is distinguished from its congeners by its elongate stems that can reach 5 m in length (Fig. 13C). These elongate stems have ascending tips or erect shoots bearing terminally clustered leaves. The unusually long stems are sometimes difficult to detect, because they grow in the underbrush of thick groves. The abaxial leaf surface of *G. chrysanthum* is reddish to green, and the corolla is uniformly yellow. Herbarium specimens of this species have been incorrectly attributed to commonly collected yellow-flowered species of *Glossoloma* in Ecuador (e.g., *G. herthae*) and Bolivia (*G. bolivianum*). The short stems of *G. herthae* and *G. bolivianum* differ considerably from the elongate stems of *G. chrysanthum*. Although the flowers of *G. bolivianum*, *G. chrysanthum*, and *G. herthae* appear similar, these three species are easily differentiated by their geographic distribution, habit, and calyx lobe arrangement. The calyx lobes in *G. chrysanthum* (Fig. 13D) are conduplicate in contrast to the imbricate lobes in *G. bolivianum* (Fig. 10D) and *G. herthae* (Fig. 18B, D).

8. *Glossoloma cucullatum* (C. V. Morton) J. L. Clark, Selbyana 25: 200. 2005. *Alloplectus cucullatus* C. V. Morton, Contr. U.S. Natl. Herb. 29: 36. 1944.—TYPE: GUATEMALA. Quiché: Zona Reyna, 750–900 m, 2 Dec 1934, A. F. Skutch 1812 (holotype: US!; isotypes: A, F!).

Alloplectus cucullatus var. *substrigosus* C. V. Morton, Contr. U.S. Natl. Herb. 29: 37. 1944.—TYPE: GUATEMALA. Alta Verapaz: Pansamalá, 1150 m, Jun 1885, H. von Türckheim 733 (holotype: US!; isotypes: GH! NY! PH! US!).

Subshrubs, terrestrial; stems erect, unbranched, to 2 m tall, to 1.3 cm in diameter, succulent, becoming woody, internodes 2–10 cm long, quadrangular, glabrescent proximally, hirsute with yellowish hairs distally, leaf scars raised from stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 4–10 cm long,

sparsely pilose; blades 15–27 cm long, 6–12 cm wide, broadly ovate, base cuneate or acute, apex acuminate, margin serrate, adaxially green, uniformly pilose, abaxially pale green, uniformly pilose to densely pilose on venation, membranous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–4 flowers per node, posture pendent at anthesis, bracteoles 5 mm long, 4 mm wide, ovate; pedicels shorter than the petiole, to 2 cm long, densely pilose, pedicel enations absent. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, subequal, cucullate, to 20 mm long, to 15 mm wide, broadly ovate, base shallowly cordate, apex acute, margin laciniate, red, abaxially pilose with the midvein densely pilose, adaxially pilose near middle, otherwise glabrous. Corolla to 6 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base ca. 3 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat not constricted, appearing laterally compressed, 1.2 cm wide (at mouth), outside pilose, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb spreading, zygomorphic, ca. 1.4 cm wide, uniformly red or yellow, lobes nearly equal, ca. 3 mm long, 3–6 mm wide, rotund, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 3.5 cm long, adnate to base of corolla tube for 5 mm, connate for 1 mm, forming an open sheath, glabrous; anthers ca. 2 mm long, ca. 3 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary ca. 5 mm long, ca. 3 mm wide, ovoid, densely pilose, style 3.5 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, ca. 1.3 cm long, ca. 1 cm wide, ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, 0.5–1 mm long, ca. 0.2 mm wide, fusiform, longitudinally striate, dark red. Fig. 14.

Phenology. Collected in flower during January to March, May to October, and December, in fruit during January, July, and September.

Distribution (Fig. 15). Mexico (Chiapas, Oaxaca), Guatemala (Alta Verapaz, Baja Verapaz, Huehuetenango, Quiché), Honduras (Olancho, Yoro), Nicaragua (Managua, Matagalpa), and Costa Rica (San José); montane and premontane forest; 300–1800 m.

ADDITIONAL SPECIMENS EXAMINED. **Costa Rica.** SAN JOSÉ: La Palma, *Pittier 733* (K, BR). **Guatemala.** ALTA VERAPAZ: near Finca Sepacuite, *Cook & Griggs 261* (US), *Contreras 4807* (CAS, MO); Chapultepec Farm, on road Cobán–Sebol, *Contreras 4828* (NY); Secanquim, trail to Secayocte, *Goll 160* (US); Finca Mocca, *Johnson 166* (GH, NY, US-2 sheets); Sacté, *Kunkel 135* (BR), *Kunkel 414* (BR), *Kunkel 578* (BR); 2 km S of Jolomylix, Teleman, Panzos, Sierra de las Minas, *Martínez S. et al. 22890* (MO); 8 km al N of Taguico, road Tactic–Cahabón, *Martínez S. et al. 23439* (BM, MO); Pastizales cenagosos a la margen del Río Frío Tactic y Santa Cruz, *Molina R. & Molina 12199* (F, NY, US); between Sepacuité and Secanquim, *Pittier 319* (NY, US); mountains along road between Tactic and the divide on road to Tamahu, *Standley 90559* (F), *Standley 90619* (F, US), *Standley 91330* (F); between Finca Chimote near Rubeltein and Finca Cubilguitz, *Steyermark 44191* (F, US); Cobán, *von Türckheim 981* (BM, E, G, GH, LY-3 sheets, NY, U); Sachichá, *von Türckheim 8721* (US-2 sheets).—BAJA VERAPAZ: Cobán hwy, 3 mi S of Purulhá, *Croat 41216* (MO); dirt road, 4 miles NE of Purulhá, *Croat 41294* (MO); Km 162, 2 km S of Purulhá, *Dodson 9516* (SEL); Unión Barrios, *Lundell & Contreras 19448* (NY, US); Niño Perdido, *Lundell & Contreras 20955* (US), *Lundell & Contreras 21215* (US); 4 km S of Purulhá, road Guatemala–Cobán, near Biotopo, *Martínez S. & Téllez 13157* (MO).—HUEHUETENANGO: Cerro Huitz, between Mimanhuitz and Yulhuitz, Sierra de los Cuchumatanes, *Steyermark 48609* (F, US); vicinity of Maxbal, ca. 17 mi N of Barillas, Sierra de los Cuchumatanes, *Steyermark 48871* (F, US); Cerro Negro, 2 mi E of Las Palmas, Sierra de los Cuchumatanes, *Steyermark 51694* (F), *Seler 3278* (GH); Yalambo, *collector unknown 3218* (GH, US). **Honduras.** OLANCHO: along Río Olancho, road San Francisco–La Paz and Gualaco, 13.6 mi SW of Gualaco, ca. 0.5 mi E of main rd, *Croat & Hannon 64250* (MO, US); below La Muralla Visitor Center, 8 km NNW of La Unión, *D'Arcy 18135* (EAP, MO, US).—YORO: Río Pijol Valley, 7 km SE of Nueva Esperanza, *Liesner 26628* (BM, EAP, MO, TEFH, US). **Mexico.** CHIAPAS: Mpio. Trinitaria, E of Laguna Tzikaw, Monte

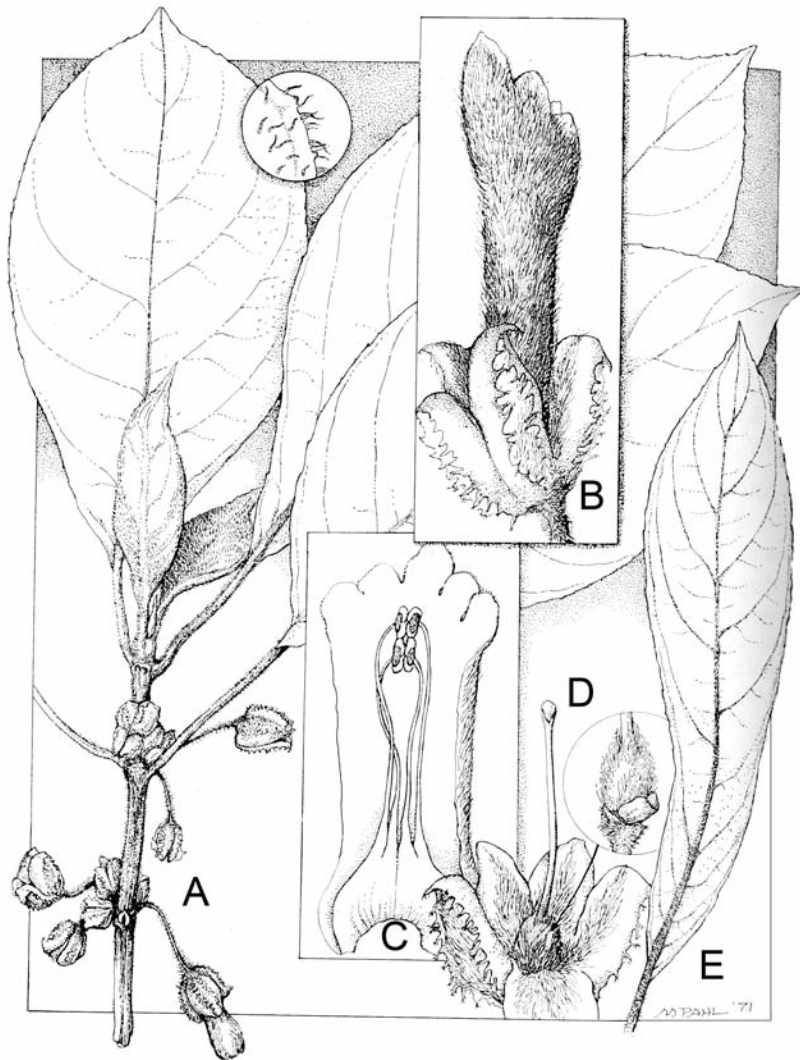


FIG. 14. *Glossoloma cucullatum*. A. Habit. B. Lateral view of flower. C. Corolla opened to show stamens and filament curtain. D. Calyx opened and corolla removed to show pistil; insert showing nectary gland. E. Detail of leaf. Reprinted with permission from *Fieldiana, Bot.* (Gibson 1974: Fig. 45).

Bello National Park, *Breedlove* 35210 (DS, MO), *Breedlove & Dressler* 29595 (DS), *Breedlove & Smith* 32273 (DS); Mpio Trinitaria, 4 km E of Laguna Tsiskaw, near Dos Lagos, *Breedlove* 38769 (DS); Mpio. Trinitaria, E of Laguna Tzikaw, Monte Bello National Park, *Breedlove* 48744 (CAS); Mpio. Peltalcingo, steep slope of Ahk'ul-bal Nab above Peltalcingo, *Breedlove* 49914 (CAS); Mpio Trinitaria, 15 km ENE of Dos Lagos, above Santa Elena, *Breedlove* 52273 (CAS), *Breedlove* 56542 (CAS), *Breedlove & Almeda* 57523 (CAS), *Breedlove* 58447 (CAS); Mpio. Trinitaria, Ejido Cuauhtémoc Km 17, *Méndez G. et al.* 7821 (BM, CAS, MO); near Tumbala, *Nelson* 3352 (GH, US), *Roviroso* 1005 (PH); Mpio. Trinitaria, 3.5 km E of Tzisco, Lagunas de Montebello-Bonampak, *Téllez & Villaseñor* 6614 (MEXU, MO); Mpio. Trinitaria, Ejido Cuauhtémoc, Km 17, *Ton* 7821 (MO).—OAXACA: Mpio. Sta. María Chimalapa, Distr. Juchitán, Colonia Chimalapa, Km 23 from road Matías Romero-Acayucan, *García P.* 545 (F). **Nicaragua.** JINOTEGA: Hacienda La Palestina, 10 km E of Jinotega, *Grijalva & Araquistain* 211 (US); Cordillera Jinotega, N of town of Jinotega, *McGillivray* 70 (SEL, US); Flor de Liz, W of Cerro Kilambé, *Moreno* 7437 (MO); Kilambé, "Paricutín," 4 km del SE of Cerro Kilambé, *Moreno*

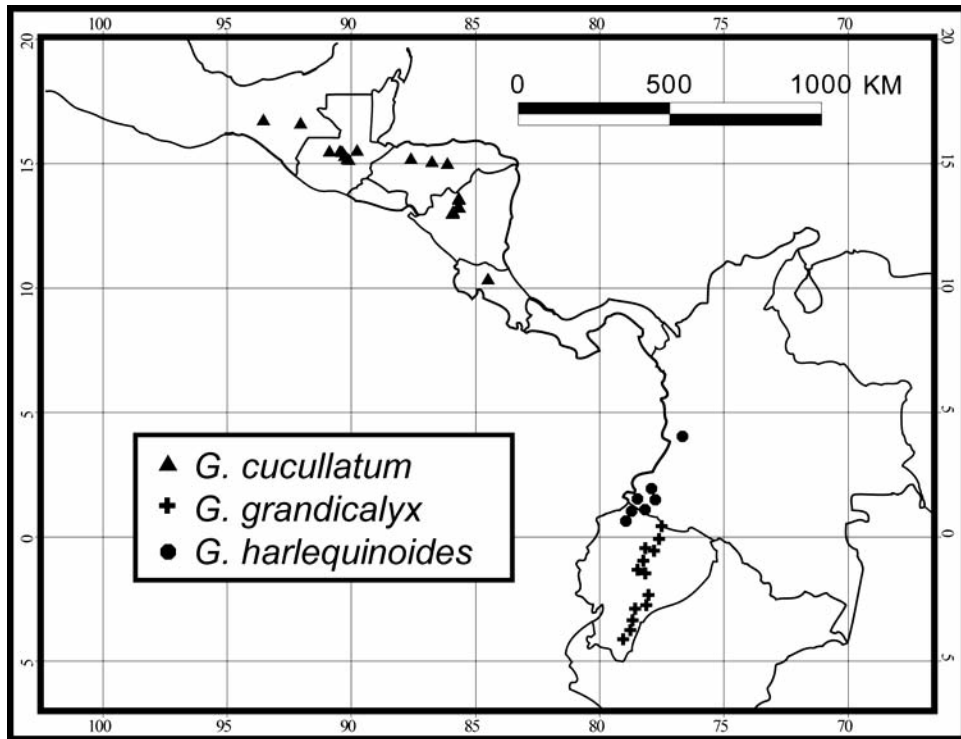


FIG. 15. Distribution of *Glossoloma cucullatum*, *G. grandicalyx*, and *G. harlequinoides*.

7489 (MO); Kilambé, "Filas el Portal," NE of Cerro Kilambé, *Moreno et al. 7607* (MO); Flor de Liz, W of Cerro Kilambé, *Moreno 7437* (MO); Kilambé, "Paricutín," 4 km del SE of Cerro Kilambé, *Moreno 7489* (MO); Kilambé, "Filas el Portal," NE of Cerro Kilambé, *Moreno et al. 7607* (MO); road Matagalpa–Jinotega, Km 145–144, 1.9 km after entrance of Aranjuez, *Moreno 1118* (US); Macizos de Peñas Blancas, 1 km E of San Marcos, *Neill 252* (MO, US); eastern face of Macizo Kilambé, *Sandino 212* (MO, US); Macizos de Peñas Blancas, trail between Finca of Socorro Mejía and Finca de Luis Manzanares, *Stevens 11331* (MO, US); Hwy 3, 1 km NW of La Fundadora entrance, unnamed peak ca. 500 m W of hwy, *Stevens & Henrich 20421* (NY, US).—MANAGUA: without locality, *Heller 10002* (F).—MATAGALPA: 13 km N of Matagalpa, Highway 3 to Jinotega, *Croat 43126* (MO, US); ridge between Cerro Bravo and Cerro Picacho, mountains N of Hotel Selva Negra, *Davidse et al. 30470* (MO, US); Santa María de Ostuma, Cordillera Central de Nicaragua, *Heller 12* (F); between El Triunfo and Fuente Pura, NE of Santa María de Ostuma, *Molina R. 20389* (EAP-2 sheets, F, NY, US); El Picacho E of Santa María de Ostuma, Cordillera Dariense, *Molina R. & Molina 30536* (F, MO, NY, PMA); headquarters of Río Gusanera, above cliffs of Peñas Blancas, El Cielo, *Neill 368* (MO, US), *Neill 375* (MO, US); Cordillera Dariense, Hacienda Santa María de Ostuma, 10 km N of Matagalpa, *Neill 2311* (MO); Macizos de Peñas Blancas, SE side, drainage of Quebrada El Quebradon, slopes N and W of hacienda San Martín, *Stevens et al. 21061* (US); NW slope of Cerro El Picacho, *Stevens & Moreno 22134* (US); Sta. María de Ostuma, Cordillera Central de Nicaragua between Matagalpa and Jinotega, *Williams et al. 24626* (EAP, F); Disparate de Poder, Sta. María de Ostuma, Cordillera Central de Nicaragua, *Williams et al. 27639* (C, EAP, F-2 sheets, G, NY); road to La Fundadora, ca. 5 km N of Sta. María de Ostuma, Cordillera Central de Nicaragua, *Williams et al. 27739* (EAP, F).

Glossoloma cucullatum is distinguished from its congeners by the cucullate (hooded) calyx lobes (Fig. 14B) with a laciniate margin. This species most closely resembles *G. tetragonum*, which has plane calyx lobes with a serrate margin. These two species are also geographically isolated; *G. tetragonum* occurs primarily in Costa Rica and reaches its

southern limit in Colombia (Fig. 39), whereas *G. cucullatum* occurs primarily in Guatemala, Honduras, and Nicaragua, and reaches its northern limit in Mexico (Fig. 15).

9. *Glossoloma grandicalyx* (J. L. Clark & L. E. Skog) J. L. Clark, *Selbyana* 25: 202. 2005. *Alloplectus grandicalyx* J. L. Clark & L. E. Skog, *Novon* 12: 173. 2002.—TYPE: ECUADOR. Napo: Cantón Archidona, Reserva Ecológica Antisana, Sector Guacamayos, Sendero Jumandy–La Virgen (Km 30), path that follows potential oil pipeline, 00°38'S, 77°49'W, 1700–1800 m, 1 May 1998, *J. L. Clark, E. Narváez & T. Pauchi 5449* (holotype: QCNE!; isotypes: AAU! COL! E! MO! QCA! SRP! US!).

Herbs to subshrubs, terrestrial; stems erect, unbranched, to 1.5 m tall, 1 cm in diameter, succulent, becoming woody, internodes 3–15 cm long, quadrangular, glabrescent proximally, pilose distally, leaf scars raised from stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 3–8 cm long, sparsely to densely pilose; blades 8–22 cm long, 4–10 cm wide, bullate, elliptic, base acute, apex acuminate, margin serrulate, adaxially green, glabrous, abaxially all green, all red, or green with red tinge, sparsely to densely pilose, coriaceous when dry, lateral veins 4–5 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–4 flowers per node, posture pendent at anthesis, bracteoles 15–30 mm long, 10–15 mm wide, ovate; pedicels longer than the petiole, 4–9 cm long, pilose, pedicel enations absent. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, 4 equal, 3–4 cm long, 2–3 cm wide, ovate, base cordate, apex obtuse, margin serrate, red, both surfaces sparsely to densely pilose; fifth (ventral) lobe smaller and narrower, to 3 cm long, to 1.5 cm wide, broadly oblong. Corolla 4.0–7.0 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla slightly oblique relative to calyx; base ca. 7 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat not constricted, appearing laterally compressed, to 1.1 cm wide (at mouth), outside sparsely pilose at base, becoming densely pilose distally, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb spreading, zygomorphic, to 1.5 cm wide, bright yellow with dark red lobes, lobes nearly equal, 3–5 mm long, 3–8 mm wide, rotund, entire. Nectary gland single-lobed, bilobed, or multilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 3 cm long, adnate to base of corolla tube for ca. 3 mm, connate for 1 mm, forming an open sheath, glabrous; anthers ca. 1.5 mm long, ca. 3.5 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary ca. 6 mm long, ca. 4 mm wide, ovoid, woolly, style 4 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, ca. 1.5 cm long, ca. 1 cm wide, ovoid when immature, woolly, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, 0.8–1.1 mm long, 0.3 mm wide, fusiform, longitudinally striate, dark brown. Fig. 16.

Phenology. Collected in flower during January to May, July, August, November, and December, in fruit during May.

Distribution (Fig. 15). Ecuador (Carchi, Morona-Santiago, Napo, Orellana, Sucumbíos, Tungurahua, and Zamora-Chinchipe); montane forests on the eastern slopes of the Ecuadorian Andes; 1500–2500 m.

ADDITIONAL SPECIMENS EXAMINED. **Ecuador.** PROVINCE UNKNOWN: E of the Andes, *Pearce 427* (K).—CARCHI: road Tulcán–Tufiño to Maldonado, sector la Pradera, *Jaramillo 9140* (QCA).—MORONA-SANTIAGO:

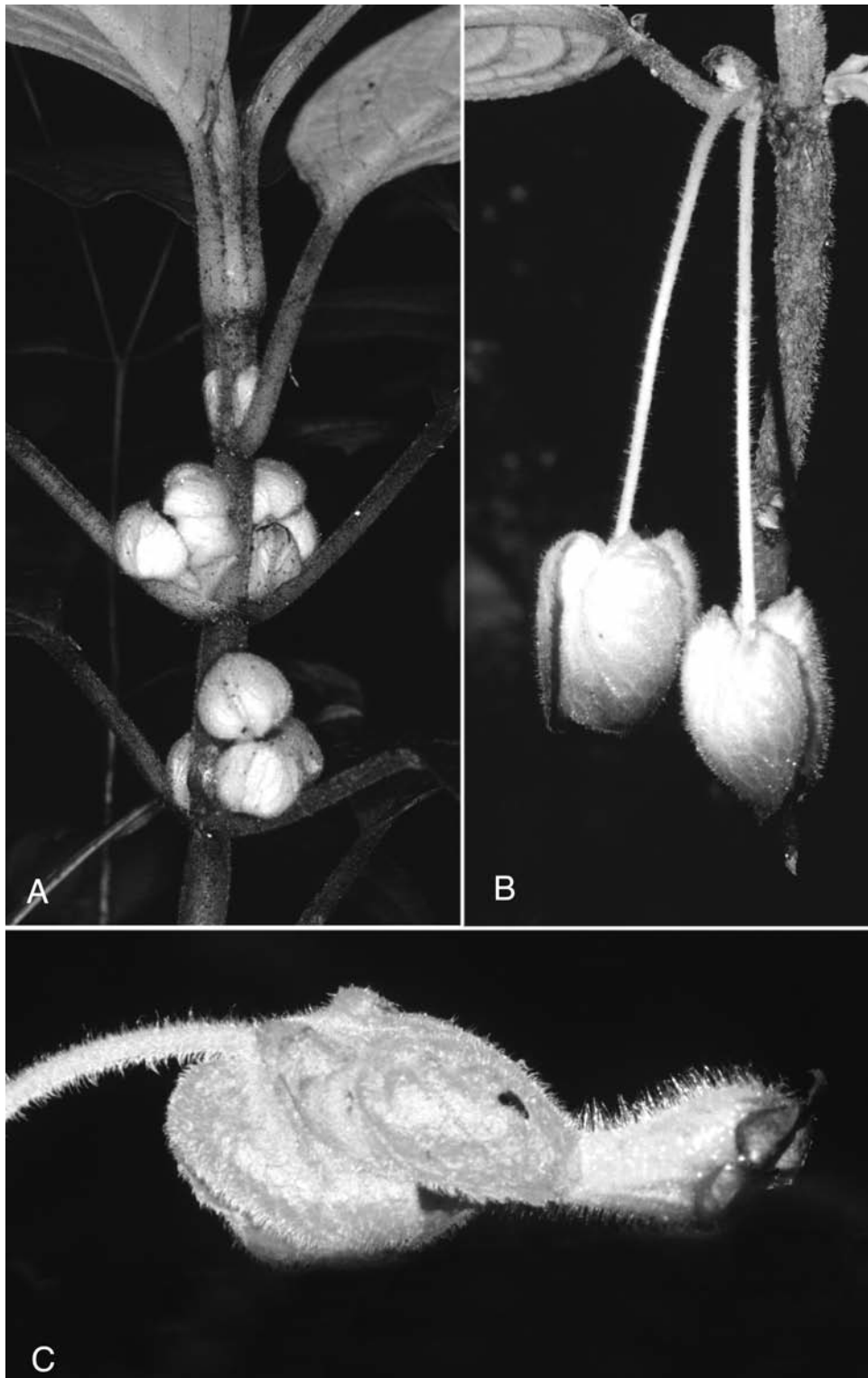


FIG. 16. *Glossoloma grandicalyx*. A. Immature flowers in axillary fascicle. B. Flowers post-anthesis. C. Mature flower. (Photos by J. L. Clark; vouchers: A, *J. L. Clark* 6656; B, *J. L. Clark* 5449, holotype; C, *J. L. Clark* 5939.)

Cantón Limón Indanza, “Agua Rica,” road Limón–Gualaceo, *Clark et al. 5939* (AAU, COL, HA, K, MO, NY, QCA, QCNE, SEL, US); Cantón Limón–Indanza, Cordillera del Cóndor, trail from camp #1 to camp #2 towards crest of Cordillera del Cóndor, ca. 10–15 km SSE of Comunidad Warints, *Clark & Jost 6956* (LOJA, MO, QCNE, SEL, UNA, US), *Clark & Jost 6983* (QCNE, US), *Clark & Jost 7006* (MO, QCNE, UNA, US); San Juan Bosco, road between San Juan Bosco and El Pangui, 2–3 km S of San Juan Bosco, *Clark et al. 9894* (QCNE, UNA, US); Tumbes, 17–18 km N of Gualaquiza on road to Indanza, *Harling & Andersson 24217* (GB, QCA, US), *Harling & Andersson 24222* (GB, US); Cantón Limón Indanza, Cordillera de Huaracayo, E of Cordillera del Cóndor and Río Coangos, ridge E of Shuar village Tinkimints, *Jost et al. 3019* (MO, QCNE); western slopes of Cordillera de Cutucú, trail Logroño–Yaupi, *Madison et al. 3368* (SEL); Cantón Limón Indanza, Cordillera de Huaracayo, E of Río Cosangos, western slopes of Cerro Ijiach Naint, Río Yangunts, below Cascada Tuna, *Manzanares et al. 7269* (QCNE); Cantón Limón Indanza, Cordillera de Huaracayo, E of Cordillera del Cóndor and Río Coangos, Cerro Ijiach Naint, flat-topped sandstone mountain, east of Shuar village of Tinkimints, *Neill & Manzanares 13126* (MO, QCNE, US); Cantón Zamora, near Nambija, along road to gold mine, ca. 20 km E of Zamora, Cordillera de Nanguipa, *Neill et al. 13816* (LOJA, MO, QCNE); Cantón Morona, Asociación Shuar Sevilla, Comunidad Angel Ruby, on Cordillera next to road Angel Ruby–Trans Cutucú, *Suñin et al. 1169* (MO, QCNE).—NAPO: Quijos, Sierra Azul, Agrícola Industrial Río Aragón, road towards San Fernando, *Alvarez & Viteri 216* (MO, QCNE); Quijos, Sierra Azul, Agrícola Industrial Río Aragón, Campamento Aragón, Río Colorado, *Alvarez et al. 294* (MO, QCNE); Quijos, Parroquia Baeza, comunidad Santa Lucía de Bermejo, *Alvarez et al. 867* (MO, QCNE, US); Cantón Quijos, Parroquia de Baeza, comunidad de Santa Lucía de Bermejo, Río Bermejo, *Alvarez & Romero 1094* (MO, QCNE, SEL, US); Cosanga, trail E of town, *Boeke & McElroy 429* (GH, NY, SEL, US); Cantón Quijos, Cuenca del Río Cosanga, *Cerón M. et al. 33633* (QAP), *Cerón M. et al. 33687* (QAP); Cantón Quijos, Parroquia Cosanga, Yanayacu Biological Station and Center for Creative Studies, 5 km W of Cosanga on the road Las Cancheras, *Clark & Greeney 5774* (QCNE, US); between Tena and Papallacta, *D’Arcy 14089* (MO, US); road Baeza–Tena, S slope of Cordillera de Guacamayos above Jondachi, *Harling & Andersson 19501* (GB, US); road Baeza–Tena, Km 33, Cordillera de Huacamayos, *Jørgensen et al. 61269* (AAU); Cantón Quijos, 1.5–2 km N of Cosanga, *Kirkbride & Chamba R. 4191* (Q, U, US); road cut, SE of El Carmelo, *Luer et al. 6305* (SEL); road Baeza–Tena, 1–5 km SE of Cosanga, *Luteyn & Lebrón-Luteyn 5669* (CAS, K, MO, NY, QCA, SEL, US); Baeza, *Maas et al. 3019* (QCA, U); Cantón El Chaco, Proyecto Hidroeléctrico Coca, Punto ST3, Río Quijos, ca. 10 km S of Reventador, *Palacios 5931* (MO, QCNE, US); Cantón El Chaco, sitio Tres Cruces, towards El Mirador, *Palacios 6896* (MO, QCNE, US); Cuyuja, along banks of Río Quijos, SW of Quito–Baeza road, *Sobel & Strudwick 2520* (NY); ridge above Río San Juan Grande, ca. 9.5 km NW of El Chaco, *Ståhl et al. 2199* (QCA); southern slopes of Cordillera de Guacamayos, ca. 5 km below pass, *Stein 2647* (MO, US); road Papallacta–Baeza, upper part of “Y,” *Valencia et al. 2880* (AAU, F); Cantón Tena, Parque Nacional Llanganates, mountains NW of Río Mulatos, Río Sápala, *Vargas et al. 2455* (MO, QCNE, US); Quijos, Reserva Ecológica Antisana, Cordillera de los Guacamayos, between El Mirador and La Virgen, Arco pipeline, *Vargas & Narváez 3181* (US); Quijos, Reserva Ecológica Antisana, Cordillera de los Guacamayos, sector Oriental, Arco pipeline, between El Mirador and La Virgen, *Vargas & Narváez 3576* (MO, QCNE, US).—ORELLANA: Cantón Archidona, Sumaco Napo–Galeras National Park, Volcán Sumaco, between small crater lake and Pacto Sumaco, *Clark 2282* (QCNE, SEL, US).—SUCUMBÍOS: Cantón Bonita, Cerro El Ortigo, *Cerón M. et al. 38703* (QAP); Reserva Ecológica Cayambe Coca, Volcán Reventador, trail Río Quijos–Refugio, *Clark 4448* (QCNE, US); Campo de Sebunday, *Dalström 1675* (SEL).—TUNGURAHUA: Cantón Baños, Parroquia Río Verde, Sector Machay, forested trail from Baños–Puyo road towards Cascada de San Miguel via San Agustín, *Clark et al. 5719* (K, QCNE, SEL, US); hacienda San Antonio, 4 km up Río Ulba canyon from Ulba, 2 km E of Baños, *Stein 2929* (AAU, MO, NY, QCNE, US); Cantón Baños, Los Llanganates, Colonia México, 18 km from El Topo, *Vargas & Sandoval 380* (MO, QCNE, US).—ZAMORA-CHINCHIPE: W of Zamora, *Hart 1172* (A); Romerillo, trail at limit of Parque Nacional Podocarpus, *Madsen & Knudsen 86839* (AAU, LOJA, QCA, QCNE); Zamora-Saravandal, *Poortmann 383* (P).

Glossoloma grandicalyx is distinguished from *G. tetragonoides* and other members of the genus by the combination of broadly ovate calyx lobes (Fig. 16B), corollas with the tube bright yellow and the lobes dark maroon (Fig. 16C), an erect unbranched primary shoot (Fig. 16A), and pilose indumentum on the leaves, calyx lobes, and stems. On further study, some of the paratypes that were listed for *G. grandicalyx* in the protologue (Clark & Skog 2002) have been found to represent *G. oblongicalyx* (e.g., *J. Cuatrecasas 8553*, *Londoño & Kvist 99*, *Stein 3730*, *Ewan 16693*, *Gentry & Shupp 26626*). The two species are readily separated geographically and morphologically. *Glossoloma oblongicalyx* is

restricted to the Chocó floristic region of southwestern Colombia and northwestern Ecuador and the eastern cordillera of Colombia (Fig. 23), and thus not sympatric with *G. grandicalyx*. *Glossoloma grandicalyx* differs from *G. oblongicalyx* in the following characters: pedicels longer than the petioles (Fig. 16B), and calyx lobes that cover two-thirds of the corolla tube (Fig. 16C) and are sparsely to densely pilose. Some characters that are difficult to see on herbarium collections but apparent in the field include the bright yellow corolla tubes with dark red lobes and the tendency for the leaf blades to be bullate adaxially. Most other similar species of *Glossoloma* will have a lighter red or yellow corolla and non-bullate leaves (e.g., many populations of *G. tetragonoides* from the Napo and Tungurahua provinces of Ecuador). Most species of *Glossoloma* have a single or two-lobed nectary gland, whereas *G. grandicalyx* sometimes has a multi-lobed nectary gland.

Glossoloma grandicalyx is sympatric with *G. tetragonoides* along the eastern Andes of Ecuador, although the latter is more abundant at lower elevations and the former is more abundant at higher elevations.

10. *Glossoloma harlequinoides* J. L. Clark, sp. nov.—TYPE: ECUADOR. Esmeraldas: Cantón San Lorenzo, Parroq. Alto Tambo, small patch of forest along San Lorenzo—Ibarra hwy, 37 road-km NW of Lita, 25 air(direct)-km NW of Lita, 450 m, 26 Mar 2003, J. L. Clark, R. Hall & F. Nicolalde 7562 (holotype: QCNE!; isotypes: AAU! BM! CAS! COL! E! F! K! MO! NY! QCA! SEL! UNA! US!).

G. panamensis simile sed corollis bicoloribus differt.

Subshrubs, usually terrestrial, rarely epiphytic; stems erect, unbranched, to 2 m tall, to 1 cm in diameter, woody, internodes 3–10 cm long, subquadrangular, glabrescent proximally, sparingly pilose distally, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, equal in a pair; petioles 2–9 cm long, glabrous; blades 10–27 cm long, 5–10 cm wide, elliptic to oblong, base acute, apex acute to acuminate, margin serrate, adaxially green, sparingly sericeous, abaxially uniformly green to green with red tinge, tomentose, coriaceous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–4 flowers per node, posture pendent at anthesis, bracteoles 10 mm long, 5 mm wide, broadly ovate; pedicels shorter than the petiole, 1.5–3.0 cm long, densely pilose, pedicel enations present. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, nearly equal, 2.5 cm long, 1.5 cm wide, broadly ovate, base truncate, apex rounded, margin lacinate to serrate, green or red, abaxially densely pilose, adaxially sparingly pilose to densely pilose near middle. Corolla 5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla slightly oblique relative to calyx; base 5–8 mm in diameter, middle slightly ampliate to uniformly tubular, throat not constricted, appearing laterally compressed, 7–9 mm wide (at mouth), outside densely pilose, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb reflexed, zygomorphic, to 9 mm wide, red alternating with white splotches, lobes nearly equal, 5 mm long, 8 mm wide, rotund, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 2.7 cm long, adnate to base of corolla tube for ca. 2 mm, connate for 4 mm, forming an open sheath, glabrous; anthers ca. 1.5 mm long, ca. 2 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary 6 mm long, 4 mm wide, ovoid, pilose, style 2.5 cm long, glabrous, stigma stomatophytic. Fruit a fleshy capsule, pendent when ripe, ca. 1.7 cm long, ca. 1.5 cm wide, ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved, valves reflexed,

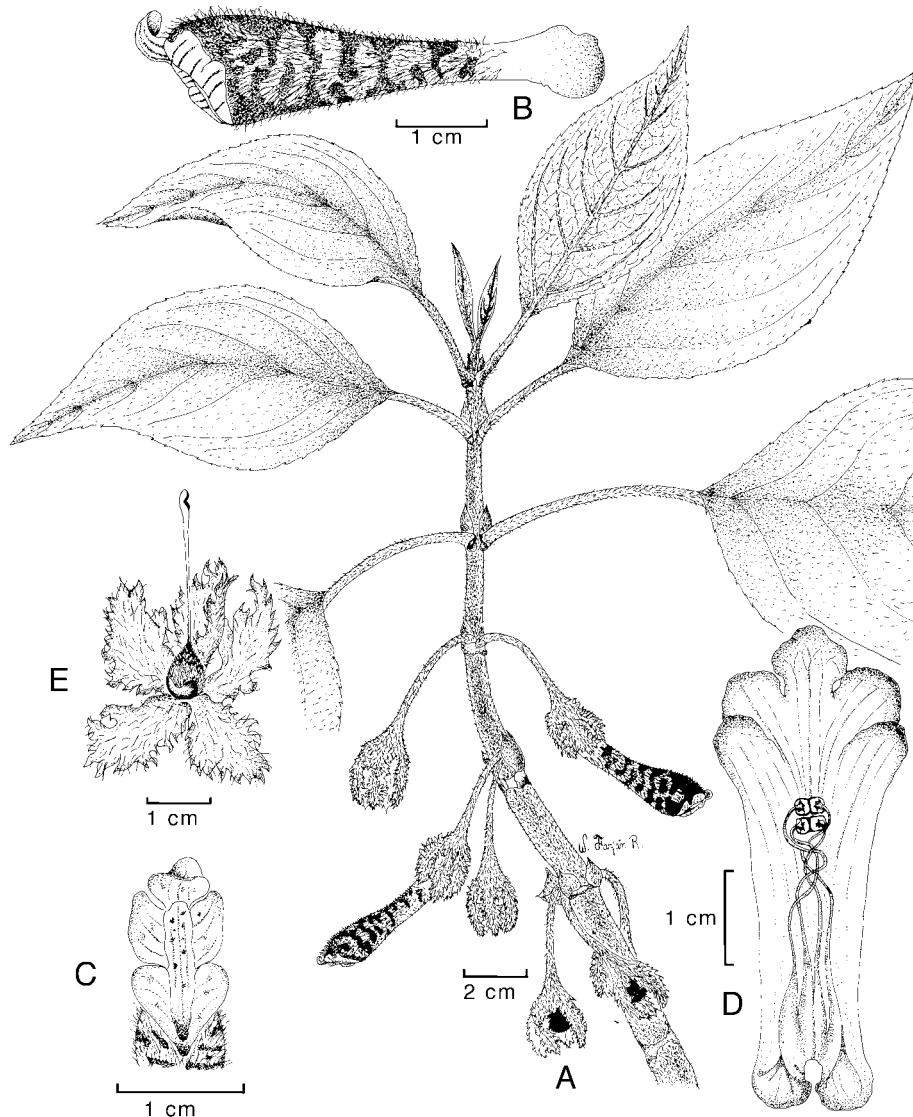


FIG. 17. *Glossoloma harlequinoides*. A. Habit. B. Side view of corolla. C. Face view of flower. D. Corolla opened to show stamens. E. Calyx opened and corolla removed to show pistil and bilobed nectary gland. (Based on: A–D, J. L. Clark 7157; E, J. L. Clark et al. 7472.)

reaching a 180° angle when mature. Seeds numerous, 1 mm long, 0.4 mm wide, ellipsoid, longitudinally striate, light brown. Fig. 17.

Phenology. Collected in flower from January through September, in fruit during February, March, July, September, and November.

Distribution (Fig. 15). Colombia (Nariño, Valle del Cauca) and Ecuador (Carchi, Esmeraldas); montane and premontane forests of western Andean slopes; 200–1800 m.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** NARIÑO: Mpio. Tumaco, 80 km from Tumaco on road to Pasto, *Balick et al. 1663* (US); Mpio. Barbacoas, Km 3 on road Junín–Barbacoas, *Benavides 8177* (US); Mpio. Barbacoas, Correg. Altaquer, El Sábalo, *Bellow & Parra 92* (US); 10 km before El Guayacana, E of Tumaco, *León 1504* (U, US); Mpio. Barbacoas, Correg. Santander (Buenavista) to Barbacoas, slope of Río Telembi, *García Barriga 13148* (COL, US); Mpio. Barbacoas, Correg. Santander (Buenavista) a Barbacoas, slopes of Río Telembi, *García Barriga 13172* (COL); between Junín and El Diviso, road Tumaco, *Londoño et al. 505* (US); 10 km from Guayacana, road Tumaco–Junín, *Londoño et al. 510* (US); Mpio. Barbacoas, Correg. Diviso, road El Diviso–Tumaco, Km 27 km, Altaquer, *Lozano C. et al. 6927* (COL, NY).—VALLE DEL CAUCA: Río Chanco, road Aguabonita towards the headwaters of Río Chanco, *Ruíz et al. 90* (COL); from Campo Alegre towards Corporación Valle del Cauca trail, *Smith et al. 1336* (COL, SEL, US). **Ecuador.** CARCHI: Cantón Tulcán; Parroquia Chical, Reserva Etnica Awá, Centro [Comunidad] Gualpí Medio, *Aulestia & Grijalva 1196* (SEL, QCNE, US); N of San Marcos, *Barfod 41446* (AAU, QCNE, US); Cantón Tulcán, Parroquia Chical, Sector Gualpí Medio, Reserva Etnica Awá, Río Canumbí, *Grijalva et al. 573* (MO, QCNE); Reserva Etnica y Forestal Awá, San Marcos, *Jørgensen et al. 65210* (AAU); Cantón Tulcán, Parroquia El Chical, Reserva Etnica Awá, Centro [Comunidad] San Marcos, *Méndez et al. 325* (MO, QCNE); Cantón Tulcán, Reserva Etnica Awá, Centro [Comunidad] Gualpí Medio, *Quelal et al. 616* (MO, QCNE, SEL, US); Cantón Tulcán, Reserva Etnica Awá, comunidad Gualpí Medio, *Quelal et al. 715* (MO, QCNE); Cantón Tulcán, Parroquia Maldonado, Reserva Indígena Awá, Centro [Comunidad] San Marcos, 25 km NW of Chical, *Rubio et al. 888* (MO, QCNE, US); San Marcos, *Thompson et al. 794* (CM, US); Cantón Tulcán, Parroquia Tobar Donoso, Sector Sabalera, Reserva Indígena Awá, *Tipaz et al. 1700* (MO, QCNE).—ESMERALDAS: Cantón San Lorenzo, Reserva Etnica Awá, Parroquia Alto Tambo, Centro [Comunidad] La Unión, valley of Río Mira, *Aulestia & Aulestia 1296* (MO, QCNE, US); Cantón San Lorenzo, Parroquia: Alta Tambo, Awá Indigenous Territory, Centro [Comunidad] Río Bogotá, biological research station, 2 km S of road Lita–San Lorenzo, near Quebrada Pambilar, *Clark et al. 7100* (QCNE, US); Cantón San Lorenzo, Parroquia Alta Tambo, Awá Indigenous Territory, Centro [Comunidad] Río Bogotá, biological research station, 2 km S of road Lita–San Lorenzo, near Quebrada Pambilar, *Clark 7157* (E, MO, QCA, QCNE, SEL, US); Cantón San Lorenzo, Parroquia Alto Tambo, patch of forest along road Lita–Alto Tambo, *Clark et al. 7472* (CUZ, QCNE, US); Cantón San Lorenzo, Parroquia Alto Tambo, forest along road San Lorenzo–Ibarra, 16 km NW of Lita, *Clark et al. 7576* (QCNE, UNA, US); Reserva Cotacachi-Cayapas, 1 km from Río Tigre towards interior, *Cornejo & Bonifaz 6576* (GUAY, US); road Lita–San Lorenzo, 4 km E of El Durango, 17.3 km W of Alto Tambo, *Croat et al. 82546* (US); road Lita–Alto Tambo, Km 5–18, *Dodson et al. 16843* (MO, QCNE); near Alto Tambo, NW of Lita, *Dunn 9504132* (US); NW of Lita, near Alto Tambo, *Dunn s.n.* (US); Cantón San Lorenzo, Reserva Indígena Awá, Valley of Río Mira, 10 km W of Alto Tambo, Centro [Comunidad] La Unión, *Rubio et al. 1169* (MO, QCNE, US).

Glossoloma harlequinoides is distinguished from all other species of *Glossoloma* by the irregular colored patches on the corolla tube (Fig. 17B). Some members of the genus have corolla lobes that contrast in color with the corolla tube (e.g., uniformly yellow tube with red lobes, as in *G. grandicalyx* and *G. tetragonoides*), but *G. harlequinoides* is the only species to have a corolla tube with a patchy color pattern. The corolla tube of *G. harlequinoides* has a color pattern of red alternating with white that gives it a painted-like appearance to which the epithet refers (i.e., fancifully varied in color).

- 11. *Glossoloma herthae*** (Mansfeld) J. L. Clark, *Selbyana* 25: 202. 2005. *Alloplectus herthae* Mansfeld, *Notizbl. Bot. Gart. Berlin-Dahlem* 14: 38. 1938.—TYPE: ECUADOR. Pichincha. “San Carlos” [= San Carlos de los Colorados], 120 m, 8 Sep 1935, *H. Schultze-Rhönhof 1903* (holotype: B, destroyed).—ECUADOR. Pichincha: along old road between Santo Domingo–Quito (via Chiriboga), 1400–1600 m, 28 Oct 1995, *P. Mendoza-T. et al. 618* (neotype, designated by Clark, 2005: QCNE!; isoneotypes: AAU! CAS! COL! E! F! GB! MO! NY! QCA! SRP! US!). *Besleria horizontalis* C. V. Morton, *Contr. U.S. Natl. Herb.* 38(4): 145. 1968.—TYPE: PERU. Cuzco: Convención, alturas de Pintobamba, 2700 m, 4 Mar 1943, *C. Vargas C. 3252* (holotype: US!; isotype: US!).

Herbs to subshrubs, epiphytic; stems horizontal, sparingly branched, to 2 m tall, 3–8 mm in diameter, subwoody, internodes 2–5 cm long, subquadrangular, glabrescent proximally, sericeous distally, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 1–3 cm long, sericeous; blades 8–15 cm long, 2.5–4.5 cm wide, elliptic, base acute, usually oblique, apex acuminate, margin serrulate, adaxially dark green, glabrous, abaxially usually reddish with green veins, sometimes uniformly green, puberulous, subcoriaceous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–5 flowers per node, posture pendent at anthesis, bracteoles 10 mm long, 5 mm wide, linear; pedicels shorter than the petiole, 1–2.5 cm long, sparingly sericeous, pedicel enations present. Calyx lobes imbricate, nearly free, plane, erect, nearly equal, 5–15 mm long, 4–7 mm wide, rotund, base truncate, apex obtuse, margin entire, yellow or reddish orange, abaxially sparsely sericeous, adaxially glabrous. Corolla 3.0–5.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla perpendicular relative to calyx; base ca. 5 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat slightly constricted, appearing laterally compressed, to 5–10 mm wide (at mouth), outside glabrous or pilose, inside glabrous, red spotting sometimes present on the upper surface of throat, limb reflexed, zygomorphic, to 1.1 cm wide, usually yellow, sometimes reddish orange, lobes nearly equal, ca. 2 mm long, ca. 3 mm wide, rotund, entire. Nectary gland single-lobed, on ventral surface of ovary, glabrous. Filaments twisted after anthesis, free portion 1.5–2.0 cm long, adnate to base of corolla tube for ca. 2 mm, connate for 1 m, forming an open sheath, glabrous; anthers ca. 1.5 mm long, ca. 2 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary to 4 mm long, to 3 mm wide, ovoid, pilose, style ca. 3 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, ca. 1.5 cm long, ca. 1 cm wide, ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved, valves not reflexed, reaching a 45° angle when mature. Seeds numerous, ca. 1 mm long, ca. 0.5 mm wide, fusiform, longitudinally striate, dark red. Fig. 18.

Phenology. Collected in flower throughout the year, in fruit during January, March to May, July, and November.

Distribution (Fig. 19). Colombia (Antioquia, Cauca, Cundinamarca, Huila, Nariño, Norte de Santander, Putumayo, Tolima, Valle del Cauca); Ecuador (Carchi, Chimborazo, Cotopaxi, Imbabura, Loja, Pichincha, Zamora-Chinchipe); and Peru (Cajamarca and Cuzco); premontane and montane forests; 200–2800 m.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** ANTIOQUIA: *Luer et al.* 8900 (SEL); Mpio. Nariño, Paraje Paramitos, *Uribe U.* 2146 (COL, US); Mpio. Guatapé, ca. 8 km NNE of Guatapé, Vereda Santa Rita, Finca Montepinar, *Zarucchi* 4395 (COL, US); Mpio. Sonsón; 11 km from road Sonsón–Nariño, 25 km from Nariño, *Zarucchi et al.* 5183 (COL, MO).—NARIÑO: Paramitos, *Uribe U.* 2145 (US); Río Caldera, *Daniel* 4465 (US); near Medellín, Tamesis, *Toro* 946 (NY); near Medellín, Dairo, Chocó, *Toro* 1154 (NY), *Toro* 1171 (NY).—CAUCA: road La Plata, Puracé al Alto de San Rafael, *García Barriga & Hawkes* 12868 (COL); western slopes of Cordillera Occidental, W of Tambo, *Haught* 5218 (COL, MO, US).—CUNDINAMARCA: Fusagasugá, *André* 159 (NY); Mpio. Anolaima, road Anolaima–Cachipay, *Barriga* 9003 (COL); Mpio. San Francisco, Vereda Sabaneta, Quebrada Sananeta, *Hirschel* 279 (COL); Mpio. San Francisco, Vereda Sabaneta, *Uribe U.* 4799 (COL, US).—HUILA: Mpio. La Plata, Vereda Agua Bonita, Finca Merenberg, 100 km E of Popoyán, *Croat* 51902 (MO), *Díaz P. et al.* 556 (COL), *Polania* 35 (COL), *von Sneidern* 2691 (S).—NARIÑO: Armada, *André* 3454 (K); Mpio. Ricaurte, Reserva Natural La Planada, *Amaya M.* 262 (COL), *Amaya M.* 314 (COL-2 sheets); Las Cruces, Ricaurte, *Benavides* 1466 (MO, US); Reserva Natural La Planada, 7 km from Chucunés, *Benavides* 8857 (MO), *Benavides* 9030 (MO); Trayecto La Planada–San Isidro, *Benavides* 11024 (US), *Benavides* 11204 (US); Mpio. Barbacoas, Corregimiento Santander (Buenavista) to Barbacoas, slope of Río Telembi, *García Barriga* 13178



FIG. 18. *Glossoloma herthae*. A. Habit. B. Calyx lobes showing imbricate arrangement. C. Mature fruits. D. Lateral view flower. (Photos by J. L. Clark; vouchers: A, B, D, *J. L. Clark & Folleco 8500*; C, *J. L. Clark et al. 7355*.)

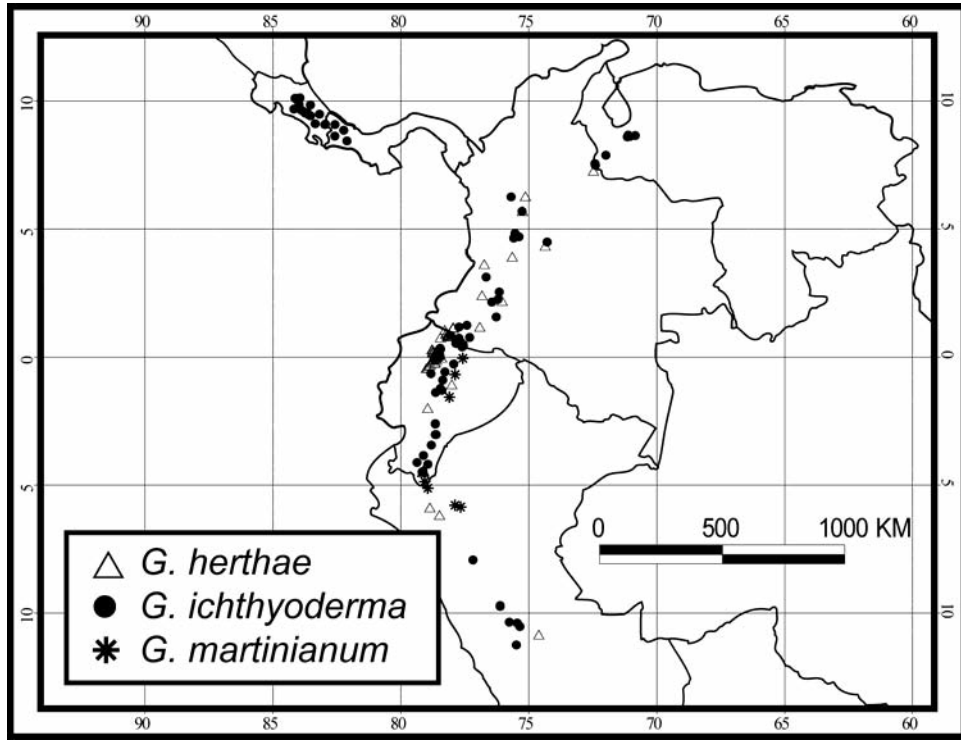


FIG. 19. Distribution of *Glossoloma herthae*, *G. ichthyoderma*, and *G. martinianum*.

(COL, US); Finca La Planada, near Chucunes, *Gentry et al. 30633* (MO, US); La Planada, Salazar Finca 7 km above Ricaurte, *Gentry et al. 35003* (COL, MO); Mpio. Barbacoas, Chucunes, via La Planada, 1 km before Reserva Natural La Planada, *Lozano C. et al. 6869* (COL); Mpio. Ipiales, road La Victoria–San Jorge, El Hospital, *Mora 2153* (COL); La Planada Nature Reserve, Ricaurte, *Restrepo et al. 475* (US), *Restrepo 690* (US); Mpio. Ricaurte, Reserva Natural La Planada, *Restrepo 761* (US); Mpio. Ricaurte, Cartagena, riverbank of Río Guiza, *Soejarto 962* (GH, MO, SEL); Mpio. Ricaurte, *von Sneider 529* (A, S), *von Sneider 537* (S), *von Sneider 564* (S).—NORTE DE SANTANDER: Cordillera Oriental, región Sarare, between Alto del Loro and Alto de Santa Inés, *Cuatrecasas et al. 12497* (COL, GH, US-2sheets); Cordillera Oriental, región Sarare, valley of Río Margua, City of Río Negro, N slope between El Amparo and La Mesa, *Cuatrecasas 12860* (F, US).—PUTUMAYO: Valle de Sibundoy, 2 km N of Sibundoy, *Chindoy B. 121* (COL, US).—TOLIMA: Mpio. Roncesvalles, Cordillera Central, towards Páramo de Normandía, near Río Cucuana, *Camargo G. 7485* (COL); Mpio. Roncesvalles, Cordillera Central, San José de Las Hermosas, *Camargo G. 7656* (COL).—VALLE DEL CAUCA: Yatacué, Alto Anchicaya, near CVC hydroelectric plant headquarters, valley of Río Dagua (tributary of Anchicaya), *Gentry & Monsalve 48263* (MO); Mpio. El Cairo, western slopes of Cordillera Occidental, Las Amarillas, near base of Cerro del Inglés, Serranía de los Paraguas, *Silverstone–Sopkin et al. 3975* (CUVC, MO, US). **Ecuador.** PROVINCE UNKNOWN: *André 1513* (K); *Sodiro s.n.* (Q); *Sodiro 119* (Q); “Carmen,” *Tate 490* (US).—CARCHI: environs of Maldonado, 90 km W of Tulcán, *Balslev 1956* (AAU, US, NY, QCA, QCNE); Maldonado–Tulcán, *Besse et al. 2268* (SEL); Mirador de Golondrinas, between village of Las Juntas and la Cabaña del Corazón, *Clark et al. 2415* (MO, QCNE, SRP, US); Bosque Protector Mirador de Golondrinas, between the village Las Juntas and la Cabaña del Corazón, *Clark et al. 2421* (QCNE, SRP, US); trail E of la Cabaña del Corazón, *Clark & Dunn 2436* (QCNE, SRP, US); trail SW of La Cabaña del Corazón, *Clark & Dunn 2442* (QCNE, SRP, US); Cantón Tulcán, Parroquia Chical, trail from the village of Quinyal towards Gualpí (near border of the Reserva Awá), *Clark & Mejia 6325* (AAU, K, MO, QCA, QCNE, SEL, UNA, US); Cantón Espejo, Parroquia Guatal, Mirador de las Golondrinas (Fundación Golondrinas), Santa Rosa (El Rosal), *Clark et al. 8422* (COL, MO, QCNE, SEL, UNA, US); trail from Santa Rosa (El Rosal) towards Las Juntas, *Clark & Folleco 8500* (AAU,

COL, E, MO, QCA, QCNE, SEL, UNA, US); 2.8 km W of Maldonado on road to Chical, *Dorr & Barnett 6066* (NY, QCA, QCNE, US); Cantón Maldonado, Quebrada Naranjo, *Dorr & Barnett 6088* (NY, QCA), *Gentry & Shupp 26607* (AAU, MO, SEL), *Harling & Andersson 12270* (GB, SEL), *Harling & Andersson 12272* (GB, SEL), *Holm-Nielsen et al. 5993* (AAU, NY, S); tributary of Río Verde, above Untal (along road to Chical), S of Cerro Golondrinas, *Hoover & Wormley 1448* (MO), *Hoover & Wormley 1475* (MO, US); tributary of Río Verde, above Untal (along road to Chical), *Hoover & Wormley 1506* (MO), *Hoover & Wormley 1508* (MO, QCA), *Hoover & Wormley 1567* (MO, QCA); tributary of Río Verde, above Untal (along road to Chical) and partly ascending “Cerro obsura,” *Hoover & Wormley 1647* (MO, QCA), *Luer et al. 3402* (SEL), *Madison et al. 4415* (SEL); environs of Chical, 12 km below Maldonado on the Río San Juan, *Madison et al. 4835* (F, QCA, SEL), *Madison et al. 4915* (SEL); Cantón Mira, El Carmen, road to Chical, *Palacios et al. 9696* (MO, QCNE); Cantón Mira, El Carmen, Cerro Golondrinas, *Tirado et al. 1227* (MO, QCNE); El Corazón, *Vargas 171* (MO, QCNE, US); Maldonado, 1 km downstream from village, *Werling & Leth-Nissen 172* (F, NY, QCA); near Maldonado, *van der Werff 10724* (MO, QCNE); Cantón Maldonado, 1 km downstream from village, *Werling & Leth-Nissen 230* (QCA), *Werling & Leth-Nissen 327* (QCA).—CHIMBORAZO: between Bucay and Hacienda “Rosa Mercedes,” *Acosta Solís 5269* (F); near Hacienda Rosa Mercedes, *Acosta Solís 5299* (US).—COTOPAXI: Cantón Pilalo, road to summit of Cerro Puchuato, *Cerón M. & Villavicencio 2797* (MO, QAP, QCNE, US); Cantón Sigchos, Parroquia San Francisco de las Pampas, Bosque Integral Otonga, *Clark & Muñoz 6103* (AAU, COL, MO, NY, QCA, QCNE, SRP, US); Cantón Sigchos, Parroquia San Francisco de las Pampas, Bosque Integral Otonga, *Clark & Muñoz 6147* (QCNE, US); Cantón Sigchos, Parroquia San Francisco de las Pampas, *Clark et al. 6170* (AAU, COL, F, MO, NY, QCA, QCNE, SRP, US); Bosque Protector Otonga, *Freiberg 96057* (QCA).—IMBABURA: Cantón Cotacachi, Parroquia García Moreno, Cordillera de Toisán, Cerro de la Plata, Bosque Protector Los Cedros, trail from comunidad El Chontal to Los Cedros, *Clark et al. 7355* (COL, MO, NY, QCNE, SEL, US); Los Cedros Biological Reserve, trail in the valley of the Río Magdalena, near Saguangal (in the valley of the Río Guayllabamba), *Freiberg 96001* (QCA); vicinity of the Río Verde, ca. 5 km SW of the village Mani, Río Cachaco, *Sperling 5056* (QCA).—LOJA: Nudo de Sabanilla, *Harling et al. 20505* (GB, US); road Yangana–Valladolid, ca. 8 km S of Yangana, *Øllgaard et al. 58451* (AAU).—PICHINCHA: Guaruma, Km 38 from on road from Saloya, *Acosta Solís 11016* (F); Mindo, *André 1501* (K, NY), *André 1505* (K), *Asplund 18215* (S), *Asplund 9694* (S); Cantón Quito, old road from Santo Domingo to Quito, *Dunn 56* (US); road Chillogallo–Chiriboga, Km 36, *Balslev 2113* (QCA); 11 km E of Tandapi along Río Toache, *Besse et al. 727* (SEL, US); trail/route Tandayapa–Nanegalito, Fundación Maquipucuna, *Billiet & Jadin 6705* (BR, MO); road Nono–Nanegal, 15 km W of Nono, *Boeke 2335* (NY, US), *Bohlin et al. 1136* (GB); Cantón Quito, hacienda Verde Cocha, Cerro Pugsí, *Caranqui et al. 261* (QCNE, US); Cantón Quito, Reserva Orquideológica El Pahuma, road Calacalí–Los Bancos, Km 22, *Cedeño et al. 5* (US); Parroquia Calacalí, Reserva Geobotánica Pululahua, road bordering Pondona, *Cerón M. et al. 1865* (MO, QAP, QCNE, US); Cantón Los Bancos, Parroquia Mindo, Bosque Protector Mindo, *Cerón M. & Avila 25435* (QAP); road Quito–Nanegalito, Bosque Protector Pahuma, *Cerón M. & Freire 32371* (QAP); Parroquia San José de Minas, Río Cambugan and Loma Paso Alto, *Cerón M. et al. 36817* (QAP); Cantón Los Bancos, Bosque Protector San Francisco, Sector la Chorrer, between Río Chalhuyacu and Río Tigre, *Cerón M. & Sarabia 42825* (QAP, US); trail Lloa–Mindó, between Hacienda Las Palmas and the confluence of Río Cristal and Río Cinto, *Cerón M. et al. 45134* (QAP); Parroquia Lloa, Cuenca del Río Cinto, between Río Blanco and Río Cristal, *Cerón M. et al. 47648* (QAP); Cantón Quito, La Playa, ca. 5 km W of Mindó via the Lloa to Mindó trail, *Clark & Clark 3919* (MO, QCNE, US); Cantón Quito, Cordillera de los Yumbos, trail La Victoria–Chiriboga, *Clark & Nazzaro 4598* (AAU, COL, MO, QCA, QCNE, US); Cantón Quito, Parroquia Nono, El Pahuma Orchid Reserve, 17 km east of Nanegalito, trail from “La Guardia del Oso” to “Sendero de Los Yumbos,” *Clark et al. 7677* (AAU, MO, NY, QCNE, SEL, UNA, US); Cantón Quito, Mindó Loma Cloud Forest Reserve, 3 km past main entrance to Mindó on road Calacalí–La Independencia *Clark et al. 9783* (QCNE, UNA, SEL, US); Cantón San Miguel de los Bancos, road Nanegalito–Mindó, Km 16.5, SSW of Nanegalito, *Croat 82769* (QCNE, US); road Quito–Santo Domingo de los Colorados, Km 80–87, *Dodson & Thien 1229* (BH, UC, US, WIS); old road Quito–Santo Domingo, Km 87–84, *Dodson & Gentry 9736* (MO, QCNE, SEL); old road from Quito to Santo Domingo, Km 70, *Dodson & Dodson 11850* (MO, Q, QCNE, SEL), *Fagerlind & Wibom 1917* (S); Nanegalito, 2 km along road to Nanegal, between road and Río Alamví, *Filskov et al. 37071* (AAU, QCA); Reserva Geobotánica Pululahua, western slopes of Loma Pondoña, *Gavilanes et al. 219* (QCNE); road Pacto–Nuevo Azuay, 5 km N of Esperanza, *Holm-Nielsen et al. 24547* (AAU, K, QCA, US); road Pacto–Nuevo Azuay, at Río Guayllabamba, *Holm-Nielsen et al. 24575* (AAU, QCA, US); road Chillogallo–Santo Domingo, below Chiriboga, 16 km from the new road, *Holm-Nielsen et al. 24833* (AAU, K, QCA, US); road Tandayapa–Puerto Quito, ca. 20 km W of Tandayapa, *Luteyn & Lebrón-Luteyn 6776* (NY); old road Quito–Santo Domingo, 12–15 km NE of turn off to old road from junction with new road near Alluriquín, *Luteyn et al. 8747* (NY, QCA); old road Alluriquín–Quito, Km 22, *Maas & Cobb 4812* (SEL, U-2 sheets); Reserva Maquipucuna, along trail

from lodge to forest, *Mendoza T. et al. 506* (AAU, COL, E, GB, MO, NY, QCA, QCNE, SRP, US); road San Juan–Chiriboga, Km 33 from Quito, *Oldeman 3444* (QCA), *Sauleda et al. 3993* (SEL); from Quito to Nanegalito to Pacto, *Smith 1952* (AAU, QCA, QCNE, SEL, US); monte Pichincha and Corazón [via Quito–Santo Domingo], *Sodiro 119* (Q), *Sparre 14029* (S); road Aloag–Santo Domingo, Tandapi (M. Cornejo Astorga), at the confluence between Río Tandapi with Río Pilatón, *Sparre 14379* (S, US); Cantón Quito, Reserva Orquideológica El Pahuma, road Calacalí–Los Bancos, Km 22, *Suin et al. 423* (QCNE, US); Cantón Quito, Nanegal, Maquipucuna Biological Reserve, *Tipaz & Quelal 195* (MO, QCNE, SEL, US); Cantón Quito, Reserva Maquipucuna, between Hacienda Esparragos and Cerro de Sosa, ca. 5 km SE of Nanegal, *Webster & Ríos 27546* (DAV, QCA-2 sheets, QCNE); Parroquia Nanegal, Reserva Maquipucuna, trail to Cerro Sosa, *Webster et al. 27864* (QCNE); Parroquia Nanegalito, Maquipucuna region, western slopes of Cerro Negro, 2–3 km E of Nanegalito, *Webster et al. 28048* (DAV, QCNE); Parroquia Nanegal, Maquipucuna area, Cerro Sta. Lucia (Cerro Campaña), ca. 6 km E of Nanegal, *Webster et al. 28326* (DAV, QCNE), *Webster et al. 28384* (DAV); Cantón Quito, Parroquia Nanegal, Bosque Protector Maquipucuna, *Webster & Delprete 29384* (DAV, QCNE); Cantón Quito, Parroquia Nanegal, Cerro Campaña, 5–6 km E of Nanegal, ridge between Quebrada Cariyacu and Quebrada Loreto, *Webster & Paradise 30018* (DAV, QCNE), *Webster et al. 30381* (DAV); Cantón Quito, Cerro Monte Cristi, SE of Nanegalito, *Webster et al. 30570* (QCNE, US); road from Quito to Lloa–Mindó hwy, Hacienda Pedregal, *Zak & Jaramillo 2150* (MO, US); road Quito–Nono–Tandayapa–Puerto Quito, between Nono and Tandayapa, *Zak & Jaramillo 3037* (MO, US); road Quito–San Juan–Chiriboga–Empalme, *Zak 1208* (AAU, MO, QCA, US); road Quito–San Juan–Chiriboga–Empalme, Km 59 and 15 km NW of hwy, *Zak 1293* (AAU, G, GH, MO, NY, PMA, QCA, US).—ZAMORA-CHINCHIPE: Palanda, Parroquia Valladolid, southern slopes of the Cordillera de Sabanilla (headwaters of Río Chinchipe), Tapichalaca Reserve (Fundación Jocotoco), *Clark & Clark 8061* (COL, K, NY, QCNE, SEL, US), *Harling & Andersson 23669* (GB); Cerro Cóndor, *Poortmann 298* (P); road Loja–Zumba, S side of pass Nudo de Sabanilla, *Stein & D'Alessandro 2748* (AAU, MO, NY, QCNE, US); western side of Río Valladolid, *Steyermark 54689* (F). **Ecuador/Colombia.** Zumba, *André 1502* (K); San Pablo, *André 1503* (K); *Lehmann 1205* (K, NY), *Lehmann 1257* (K, NY). **Peru.** CAJAMARCA: Dtto. Cutervo, San Andrés de Cutervo, road San Andrés–Santo Tomás, *Díaz S. & Osorez 2546* (MO); Dtto. Cutervo, San Andrés de Cutervo, road San Andrés–Santo Tomás, Km 15–20, *Díaz & Beltrán 3338* (US, USM); Dtto. Cutervo, Gruta San Andrés, *Llatas Q. & Suárez C. 2757* (F); Dtto. Cutervo, Parque Nacional de Cutervo, San Andrés de Cutervo, *Smith & Díaz 1652* (F, SEL, US).—Cuzco: “Pillahuata,” Cerro de Cusilluyoc, *Pennell 13976* (GH, NY).

Glossoloma herthae closely resembles *G. bolivianum* and *G. pycnosuzygium*, but differs in its elliptic leaves, which are occasionally falcate. Other characters that are useful for distinguishing *G. herthae* are the epiphytic habit with non-scandent horizontal stems and imbricate calyx lobes (Fig. 18B) with an entire margin. See *G. bolivianum* (no. 5) and *G. pycnosuzygium* (no. 20) for further discussion.

Glossoloma herthae is most commonly collected on the western Andean slopes of northern Ecuador and southern Colombia; its range extends to the eastern Andean slopes of southern Peru and the western Andean slopes of Colombia.

12. *Glossoloma ichthyoderma* (Hanstein) J. L. Clark, Selbyana 25: 202. 2005. *Alloplectus ichthyoderma* Hanstein, Linnaea 34: 372. 1865. *Columnnea ichthyoderma* (Hanstein) Kuntze, Rev. gen. pl. 2: 472. 1891. *Crantzia ichthyoderma* (Hanstein) Fritsch in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 168. 1894.—TYPE: COSTA RICA. Without locality, *H. Wendland 833* (holotype: GOET!).

Alloplectus meridensis Klotzsch ex Hanstein, Linnaea 34: 372. 1865. *Columnnea meridensis* (Klotzsch ex Hanstein) Kuntze, Rev. gen. pl. 2: 472. 1891.—TYPE: VENEZUELA. Mérida. *J. Moritz 1132* [“1032”] (holotype: B, destroyed; lectotype, designated by Clark, 2005: G!; isotypes: BM, BR! L, P!).

Alloplectus ruacophilus J. Donnell Smith, Bot. Gaz. (Crawfordsville) 54: 238. 1912.—TYPE: COSTA RICA. Heredia: Volcán de Barba, 2500–2700 m, Feb 1890, *A. Tonduz 10997* (lectotype, designated by Skog, 1978: US!; isolectotype: BR! U!).

Crantzia varehana Cuatrecasas, Trab. Mus. Nac. Ci. Nat., Ser. Bot. 29: 13. 1935.
Alloplectus varelanus (Cuatrecasas) Cuatrecasas, Trab. Mus. Nac. Ci. Nat., Ser. Bot. 33: 120. 1936.—TYPE: COLOMBIA. Tolima: Ibagué, 2600 m, 12 May 1932, *J. Cuatrecasas 2047* (holotype: MA, photo: US!).

Alloplectus ichthyoderma var. *pallidus* C. V. Morton, Publ. Field Mus. Nat. Hist., Bot. Ser. 18: 1145. 1938.—TYPE: COSTA RICA. San José: Las Nubes, 1500–1900 m, 20–22 Mar 1924, *P. C. Standley 38793* (holotype: US!).

Alloplectus ichthyoderma forma *rubescens* C. V. Morton, Publ. Field Mus. Nat. Hist., Bot. Ser. 18: 1145. 1938.—TYPE: COSTA RICA. Cartago: Santa Clara, 1950 m, 20 Jul 1923, *W. R. Maxon & A. D. Harvey 8195* (holotype: US!).

Herbs to shrubs, terrestrial; stems erect, usually unbranched, to 2 m tall, to 1.5 cm in diameter, woody, succulent when young, internodes 2–10 cm long, quadrangular, glabrescent proximally, densely woolly distally, epidermis peeling off in scales, leaf scars raised from stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 2–4 cm long, sparsely to densely woolly; blades 7–22 cm long, 3–12 cm wide, elliptic to oblong to obovate, base cuneate to acute, occasionally oblique, apex acute to acuminate, margin denticulate to serrate, adaxially green, strigose, abaxially much lighter green or rarely reddish, strigose, coriaceous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 5–15 flowers per node, posture pendent at anthesis, bracteoles 30 mm long, 15 mm wide, oblong; pedicels shorter than the petiole, 0.5–2.0 cm long, pilose, pedicel enations present. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, 4 subequal, 15–20 mm long, 6–15 mm wide, broadly ovate, base truncate, apex obtuse to acuminate, margin serrate to lacinate, red, green, or green with red margins, abaxially densely sericeous, especially towards the midvein, adaxially sparsely sericeous; fifth (ventral) lobe smaller and narrower, to 2 cm long, to 1.4 cm wide, broadly oblong. Corolla 2.5–3.2 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base ca. 7 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat constricted, not appearing laterally compressed, ca. 5 mm wide (at mouth), outside densely sericeous, inside sparsely sericeous, with glandular trichomes at throat, interior spotting absent, limb spreading, subregular, ca. 8 mm wide, uniformly yellow or uniformly red, rarely yellow with patch of red on dorsal surface, often red with patch of yellow on dorsal surface, lobes nearly equal, ca. 1.5 mm long, ca. 2 mm wide, rotund, spreading, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments curved after anthesis, free portion to 1.5 cm long, adnate to base of corolla tube for ca. 4 mm, connate for 2 mm, forming an open sheath, glabrous; anthers 1.5 mm long, 2 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary ca. 6 mm long, ca. 4 mm wide, ovoid, densely tomentose, style 1–1.5 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, 1.4 cm long, 1.0 cm wide, globose to ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved, valves not reflexed, reaching a 45° angle when mature. Seeds numerous, ca. 1 mm long, ca. 0.2 mm wide, ellipsoid, longitudinally striate, yellow. Fig. 20.

Phenology. Collected in flower and fruit throughout the year.

Distribution (Fig. 19). Widespread and commonly collected in western Panama (Chiriquí, Bocas del Toro), Costa Rica, Colombia, and Ecuador (> 500 collections data-based); less commonly collected in Peru (Amazonas, Cajamarca, Cuzco, Huánuco, Junín, Loreto, Pasco, Puno, San Martín) and Venezuela (Anzoátegui, Barinas, Mérida, Monagas,

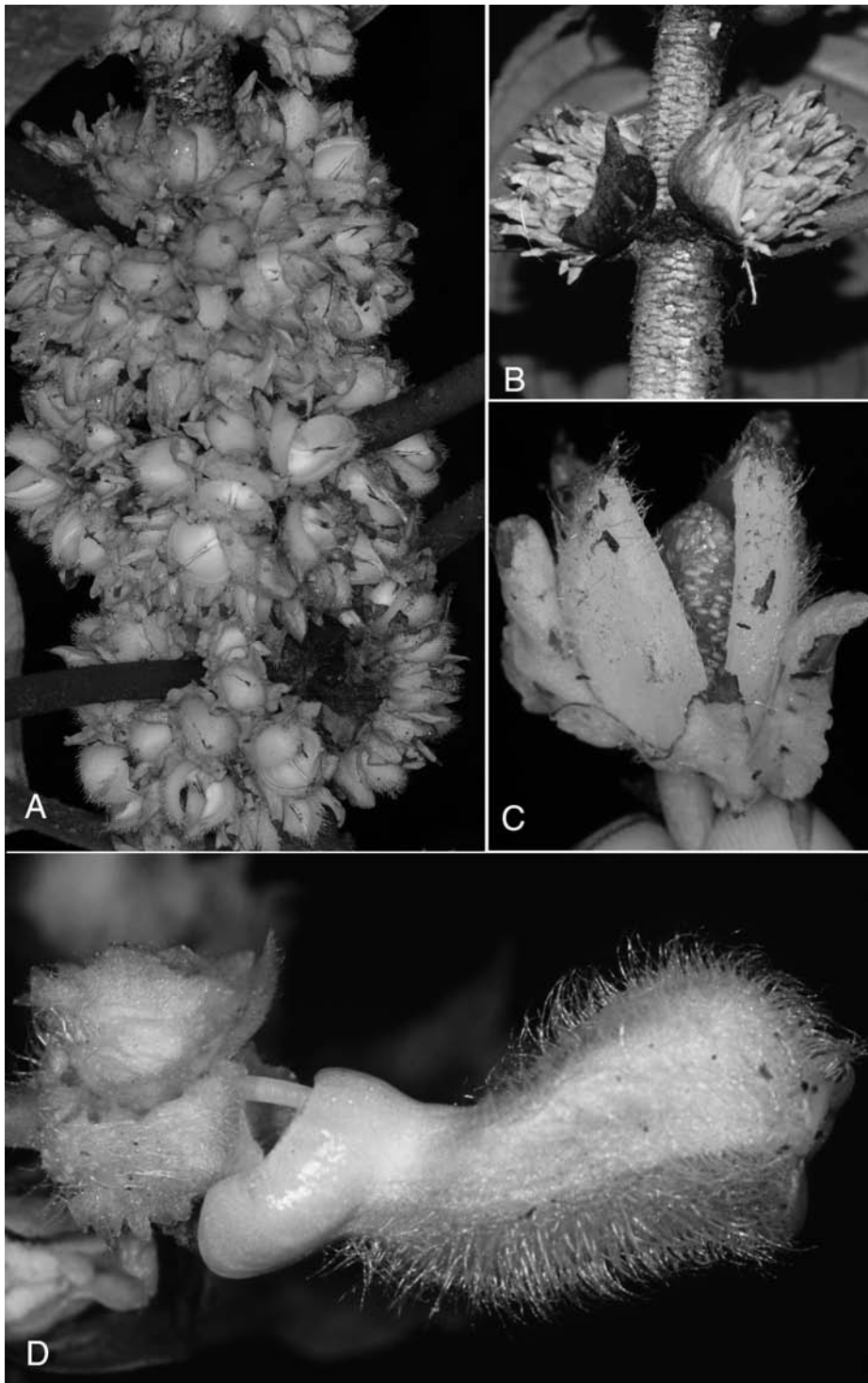


FIG. 20. *Glossoloma ichthyoderma*. A. Stem showing axillary fascicles of fruits. B. Stems showing exfoliating scale-like epidermis and bracteoles subtending axillary fascicles of flowers. C. Mature fruit. D. Flower. (Photos by J. L. Clark; vouchers: A, C, *J. L. Clark* 9836; B, *J. L. Clark et al.* 5626; D, *J. L. Clark et al.* 7746.)

Sucre, Táchira); shaded primary and secondary premontane and montane forests; 200–3500 m.

ADDITIONAL SPECIMENS EXAMINED. **Costa Rica.** PROVINCE UNKNOWN: *Buchanan* 450 (US).—ALAJUELA: *Cruz* 87 (F, GH); Palmira, *A. Smith* 381 (F); Palmira, Cantón Alfaro Ruiz, *A. Smith* 1414 (F, NY).—CARTAGO: La Carpintera, *Allen* 629 (A, F, MO), *Almeda et al.* 2133 (CAS); SE facing slopes of Volcán Irazú, ca. 7–8 km beyond entrance to Parque Nacional, 5 km beyond turnoff to Hacienda Coliblanco, *Almeda & Nakai* 3779 (CAS, US); SE slope of Cerro de la Muerte, Cordillera de Talamanca, along Interamerican hwy, *Croat* 35387 (MO, US), *Davidse & Pohl* 700 (MO, NY), *Döbbeler et al. s.n.* (GZU); Cantón Guarco, Reserva Forestal Río Macho, Cuenca del Reventazón, Estación Ojo de Agua, Reserva Forestal Río Macho, Sendero La Quebrada, *Gamboa R.* 981 (US); ridge heading northward from continental divide E of Quebrada Siberia, ca. 2 km E of Villa Mills, Cordillera de Talamanca, *Grayum & Dickie* 6570 (US), *Jiménez et al.* 182 (F, MO); La Esperanza del Guarco, N of Hwy Interamericana, Km 61.5, *Kappelle* 312 (U), *Kappelle & Widmer* 2469 (F); Parque Nacional Chirripó-Cam. Indios, *Kappelle & Monge* 4392 (U); finca along Hwy Interamericana, ca. 20 km SE by road from El Empalme, *Lellingner & White* 1139 (F, US); Cordillera de Talamanca, Km 67 of Pan-American Hwy, *McDaniel* 6750 (IBE, MO); 9.2 miles S of Empalme on Pan American Hwy, *McDiarmid s.n.* (US); along Inter-American hwy, S of Cartago, Cordillera de Talamanca, Km 69, *Meerow et al.* 1171 (SEL, U, US); Cordillera de Talamanca, Cerro de la Muerte, road between Km 60 and 77, La Trinidad, *Molina R. et al.* 17867 (NY, F); Cantón Guarco, Distr. San Isidro, Río Macho, Altos del Roble, *Mora* 584 (K); Cantón Guarco, Reserva Forestal Los Santos, Cuenca del Reventazón, Salsipuedes, *Morales* 6219 (US); forest of the Carpintera, *Pittier & Durand* 102 (BR); Volcán Turrialba, *Pittier* 7530 (F, GH, K, MO, US-2 sheets); Volcán Turrialba, *Pittier* 13093 (K, US); La Chonta, *Schnell* 817 (F, US), *Schubert et al.* 714 (GH); Cerro de La Carpintera *Standley* 34350 (US), *Standley* 34382 (US), *Standley* 34399 (US), *Standley* 35695 (US); “Roble Grazu,” *Tonduz* 4307 (BR); Cordillera de Talamanca, Cerro Las Vueltas, *Williams* 16111 (US); Cordillera de Talamanca, near El Copéy, *Williams* 16412 (F); near “El Jardín,” Cerro de la Muerte, Cordillera de Talamanca, *Williams* 20144 (US), *Williams* 20172 (US); vicinity of La Congreja, ca. 10 km S of El Tejar, Cordillera de Talamanca, *Williams* 24186 (F, NY); near La Sierra, ca. 25 km S of Cartago, Cordillera de Talamanca, *Williams* 28021 (F, U), *Williams* 28085 (EAP, F, MO), *Williams* 28208 (F).—CARTAGO: Carpintera, *Stork* 1353 (F).—CARTAGO/SAN JOSÉ: ca. 12.5 km SE of El Empalme on the Cordillera de Talamanca, *Almeda et al.* 4230 (CAS, US); *Burger & Barringer* 11549 (F); Cordillera de Talamanca, ridge of the continental divide between Cerro Cuerici and the Interamerican hwy at Nivel, *Davidse* 24895 (MO, US).—HEREDIA: Parque Nacional Braulio Carrillo, Estación Barva, *Apu* 84 (MO); Limón, *Barbour* 1024 (F), *Burger et al.* 11468 (F); Cantón Talamanca, *Chacón* 577 (K, MO, US); Cordillera de Talamanca, headwaters of unnamed western branch of Río Teribe, between Río Sini & continental divide at Cerro Beko, *Davidse et al.* 25772 (MO, US); Cordillera de Talamanca, Atlantic slope, Valle Silencio, N of Cerro Hoffman, *Davidse et al.* 28693 (MO); Cordillera de Talamanca, Atlantic slope, unnamed cordillera between the Río Terbi and the Río Siní, *Davidse et al.* 29019 (MO, US); Cordillera de Talamanca, Atlantic slope, Kamuk massif, ridge between the Río Tararia and the NE-most Kamuk Páramo, *Davidse & Herrera* 29249 (MO); Cantón Talamanca, Parque Nacional Cordillera de Talamanca, Cordillera de Talamanca, Quebrada Kuisa, trail between Ujarrás and San José Cabécar, *Fernández* 646 (US); Parque Nacional Chirripo, path from Agua Potable to Chirripo, *Garwood et al.* 1360 (NY); Cantón Barva, Distr. San José de la Montaña, Volcán Barva, path and forest between park office and crater, *Gay* 1510 (K); Cantón Talamanca, Distr. Bratsi, Sabanas de Durika, confluence of Río Uk and Río Kuk, *Herrera* 3744 (MO, US); Talamanca, Cordillera de Talamanca, Parque Nacional Cordillera de Talamanca, trail “Quebrada Kuisa” towards Río Lori, *Herrera* 5877 (US); Cantón Talamanca, Distr. Bratsi, Flanco SE Cerro Biricuacua, Río Dapari, between Ujarras and San José Cabécar, *Herrera* 6251 (K); Parque Nacional Braulio Carrillo, Volcán Barba, *Rivera* 17 (GB); Cantón Heredia, Distr. Varablanca, Volcán Barva, *Rivera* 77 (MO); near Los Cartagos, *Skutch* 5465 (F, US); forest of Rancho Flores, *Tonduz* 2164 (BR-2 sheets); near Los Cartagos, *Uitley & Uitley* 2009 (F), *Uitley et al.* 3725 (CAS, F); Parque Nacional Braulio Carrillo, Estación Barva, *Varela* 68 (US); near Cariblanco, Río Sarapiquí, *Williams* 16436 (EAP, F, GH, US).—PUNTARENAS: Cantón Coto Brus, Distr. Sabalito, Las Mellizas, near Costa Rica-Panama border, between Cerros Pando and Nubes, *Chacón* 315 (INB, MO, US); Cordillera de Talamanca, upper slopes of Cerro Echandi, *Davidse et al.* 23974 (MO, US); Cantón Buenos Aires, Parque Nacional La Amistad, Cuenca Térraba-Sierpe, Puesto Trés Colinas, trail from Casa Tipo A, *Gamboa R. & Picado* 579 (MO); Cantón Coto Brus, Z.P. Las Tablas, Cuenca Térraba-Sierpe, trail Cerro Echandi following embankment of Quebrada Buru, *Gamboa R.* 1702 (US); Cantón Coto Brus, Reserva de la Biosfera La Amistad, Estación Biológica Las Alturas de Cotón, *Kress & Calderón* 3893 (US); Cantón Coto Brus, Biosphere Reserva La Amistad, close to Las Alturas de Cotón Biological Station, *Kress & Romo* 4610 (US); Cantón Coto Brus, Z.P. Las Tablas, Cuenca Térraba-Sierpe, Zona Protectora Las Tablas, Pila, sitio Tablas, Sierra, *Navarro & Picado* 625 (US), *Raven* 20927 (DS, F).—SAN JOSÉ: Cantón de Pérez Zeledón, Cuenca Térraba-Sierpe, Estación

Santa Elena, sendero El Llano, *Alfaro et al. 1111* (US); Ojo de Agua, road towards Providencia de Dota, *Chacón & Sánchez 13* (K, MO); Cantón Pérez Zeledón, Distr. Páramo, Cerro de la Muerte, *Delprete 5064* (MO); Cantón Pérez Zeledón, Parque Nacional Chirripó, Cordillera de Talamanca, trail Cerro Chirripó, near border of Parque Llano Bonito, *Gamboa R. et al. 495* (MO); W of El Empalme, *Grant & Rundell 9201659* (US); Parque Nacional Chirripó–Monte Sin Fé, *Kappelle & Monge 3813* (U); Trinidad de Dota, 0.5 km S of Interamerican Hwy, Km 64–65, *Kappelle 1268* (U), *Kappelle & Monge 3972* (U); Interamerican Hwy, Km 77, towards Providencia in the Talamanca, *Jacobs & Murphy 2041* (F, PMA); Interamerican Hwy, *New s.n.* (US); Pérez Zeledón, Río Nuevo. R.F. Los Santos, Cerro Lira, *Ruiz et al. 486* (K); Cerro de La Muerte, ca. 50 km from San José, *Skog 1314* (US); Las Nubes, *Standley 38363* (US), *Standley 38732* (US); near Finca La Cima, above Los Lotes, N of El Copé, *Standley 42706* (US), *Standley 42779* (US), *Standley 42796* (US), *Stork 4579* (EAP, NY, UC); La Estrella a Copé, *Valerio 992* (F); near Villa Mills, Cordillera de Talamanca, *Williams 19875* (US); N of San Isidro del General, Cordillera de Talamanca, *Williams 20018* (F, US).—SAN JOSÉ/CARTAGO: *Burger & Stolze 5206* (F, GH, S); ca. 22 km SE of Empalme, along the Interamerican Hwy, *Burger & Liesner 6498* (F, NY), *Utley & Utley 836* (F). **Panama.** BOCAS DEL TORO: Valle de Silencio, *Antonio 1590* (MO, US); Cordillera de Talamanca, 2–5 airline km NW of the peak of Cerro Echandi, near international Costa Rica–Panama border, *Davidse et al. 25126* (MO, US); trail to “La Laguna,” *Montenegro et al. 1271* (PMA, SCZ).—CHIRIQUÍ: vicinity of Cerro Punta, *Allen 3528* (BM, BR, E, EAP, F, GH, K, MO, MU, NSW, NY, U, US); trail Bajo Mono–Robalo, western slopes of Cerro Horqueta, *Allen 4826* (EAP, MO, US); Cerro Copé, eastern spur of Chiriquí Volcano, *Allen 4873* (EAP, MO, US); summit and SW-face of Cerro Copé, *Allen 4906* (EAP, MO, US); ca. 8 km W of Cerro Punta in the vicinity of Las Nubes, *Almeda & Nakai 3482* (CAS, US); ca. 5–8 km beyond Cerro Punta on the trail extending from Guadalupe to Boquete, *Almeda & Nakai 3554* (CAS, US); Cerro Pata de Macho, ca. 5 mi NE of Boquete, trail to continental divide leading to finca Serrano, *Antonio 2653* (MO, US); Cerro Punta, *Blaisdell 371* (IBE); Las Nubes, 5.5 km NW of Río Chiriquí Viejo, W of Cerro Punta, *Busey 664* (DUKE, GH, L, MO, NA, NY, TENN, US); Las Nubes, 5.5 km NW of Río Chiriquí Viejo, W of Cerro Punta, *Busey 684* (F, MO); Boquete, Parque Internacional La Amistad, SE slopes and summit of Cerro Pate Macho, trail from Río Palo Alto, 4 km NE of Boquete, *Clark 8703* (COL, PMA, SCZ, SEL, UNA, US); Boquete, Parque Nacional Volcán Barú, Sendero Los Quetzales, trail Bajo Chorro–Cerro Punta, *Clark 8728* (AAU, CAS, COL, E, F, K, MO, NY, PMA, SCZ, SEL, UNA, US); area of Respingo, *Correa A. et al. 4613* (MO, PMA, US); Camino Valle Libre, Parque Internacional la Amistad, *Correa A. et al. 9914* (SCZ); Distr. Bugaba, Camino Valle Libre, Parque Internacional de la Amistad, *Correa A. et al. 9939* (PMA); slopes of Las Cumbres near Cerro Punta, *Croat 13740* (MO, NY, PMA, US); road from Cerro Punta to Quebrada Iglesia, *Croat & Porter 16163* (MO, PMA, US); above Cerro Punta, *D’Arcy 5349* (AAU, GH, MO); trail above saddle of Cerro Respingo and Cerro Pavón ridge, Pavón, *D’Arcy et al. 12892* (MO, US); ridge above Bajo Chorro, *D’Arcy 11064* (MO, US); Bajo Chorro, Boquete District, *Davidson 207* (A, F, GH, MO, US); Distr. Boquete, Volcán Chiriquí, *Davidson 1024* (A, F, MO, US); road to ridge, Guadalupe, above Cerro Punta, *Folsom 6037* (MO, US); road to Bajo Grande, Cerro Punta, *Folsom 4014* (MO, US); above Guadeloupe, *Folsom et al. 7114* (MEXU, MO, NY, TEFH, US); mountain slope above Guadeloupe, edge of Cerro Punta, *Folsom et al. 7995* (US); Distr. Renacimiento, Jurutungo, near Cerro Pando, from Los Quetzales towards El Monumento, *Galdames et al. 3342* (PMA, SCZ, US); Distr. Renacimiento, Jurutungo, ridge near border towards summit of Cerro Pando, *Galdames et al. 3435* (PMA, SCZ); slopes of Cerro Punta, *Gentry 5864* (AAU-2 sheets, MO, PMA, SEL); ridge ca. 5 km NE of town of Cerro Punta, *Grayum 6472* (MO, US); trail above Cerro Punta to Boquete, *Hamilton & Stockwell 3368* (MO, US); 7 km NW of Cerro Punta, Las Nubes region, *Hammel 1398* (AAU, MO, US); 6 km E of Cerro Punta, Paso de Respingo, *Hammel 1538* (MO, US); E of Cerro Punta on road to Paso Respingo, *Hammel et al. 6667* (MO, US); 7.5 mi from bridge over Río Chiriquí Viejo on road to Río Sereno, *Hammel et al. 6849* (MO, US); Alto Pin Pineda, end of road, entrance to Cerro Punta, *Hammel et al. 6974* (MO, PMA); vicinity of Las Nubes, 2.7 mi NW of Río Chiriquí Viejo, W of Cerro Punta, *Liesner 297* (MO, SEL, U, US); above Guadalupe, ca. 2 km N of Cerro Punta, *Maas 4859* (K, U, US); Cerro Punta, 2.5 km SE of town, *Mori & Kallunki 5645* (GH, MO, US); Bajo Grande, 1–3 km E of town of Cerro Punta, *Nee 10014* (MO, US); Guadalupe Arriba, above Cerro Punta, *Nevers & Charnley 6050* (MO, PMA); Cerro Pate Macho, *Nevers & McPherson 6844* (MO, PMA, US); Cuesta de las Palmas, southern slope of Cerro de La Horqueta, *Pittier s.n.* (US); vicinity of Cerro Punta, *Ridgway & Solis 2411* (GH, MO, US); Finca Alfaro, Guadalupe, *Rincón & Rincón 129* (PMA, US); trail to Alta Respinga, above town of Cerro Punta, *Skog & D’Arcy 4005* (MO, US); along trail to Alta Respinga, above town of Cerro Punta, *Skog & D’Arcy 4026* (E, MO, P, PE, PMA, POM, US); 3.7 km along road through Bajo Grande from bridge NE of Cerro Punta, *Sytisma & Stevens 2082* (MO, US), *Sytisma & Stevens 2187* (MO, US); 6 mi above Cerro Punta on the Boquete Trail, *Tyson 7166* (PMA-2 sheets, IBE, NA); Distr. Bugaba, Cerro Punta, *van der Werff & Herrera 6240* (MO, US), *van der Werff & Herrera 6282* (MO, US); Bugaba, Santa Clara, *van der Werff & Herrera 7274* (MO, PMA, US), *Wilbur et al. 11921* (F, DUKE, MEXU, MICH-2 sheets, MO, NY); E of Guadeloupe, Río Chiriquí Viejo, ca. 2 mi NE of Cerro

Punta, Ridge of Cerro Respinga, *Wilbur et al. 13089* (DUKE, F, MO); trail from Bajo Grande, *Wilbur et al. 15145* (DS, DUKE, F, MICH, MO); Casita Alta to Cerro Copéte, *Woodson & Schery 359* (GH, MO, US). **Venezuela.** PROVINCE UNKNOWN: Montezepa, *Tanner et al. 126* (MO); Perico, *Funck & Schlim 538* (BR); Sierra Nevada, La Mucuy, on the slopes of the Sierra Nevada near Mérida, *C. E. Smith 3528* (US).—ANZOÁTEGUI: Mpio. Freites, Cerro Peonía, above Los Pajaritos, 31 airline km NE of Bergantín and N of Mundo Nuevo, Serranía de Turimiquire; slopes, upper ridges and top of mountain, *Davidse & González 19836* (VEN, U, US-2 sheets); Mpio. Freites, Serranía de Turimiquire, Cerro Peonía, *Pipoly et al. 6422* (NY, PORT, US).—BARINAS/MÉRIDA: trail Carrizal–Micarache, along the Quebrada de Micarache, Parque Nacional Sierra Nevada, *Dorr et al. 5758* (NY, PORT, US, VEN).—MÉRIDA: near San Eusebio, *Andrews 770* (NY-2 sheets); La Mucuy, *Aristeguieta 4908* (MO, NY, VEN); La Trampa, *Bernardi 3143* (G); ca. 35 km W of Mérida, La Carbonera, San Eusebio, *Bruijn 1379* (K, MO, NY, U, VEN); Distr. Libertador, Mpio. Tabay, La Mucuy, Parque Nacional Sierra Nevada, towards Laguna Coromoto, *Castillo 1934* (MO, US, VEN); Distr. Libertador, trail to Laguna el Suero from La Mucuy, Parque Nacional Sierra Nevada, E of Tabay, *Dorr & Barnett 5194* (NY, PORT, US, VEN), *Funck et al. 1511* (BM, BR, MPU, P-2 sheets); Tabay, Mucunutan, road towards El Toro, *Gehriger 582* (US, VEN); Páramo de Aricagua, *Jahn 1015* (US, VEN), *Jahn 1016* (GH, US, VEN), *Luteyn et al. 6205* (MO, SEL); between La India and El Morro, *Madríz 440* (VEN); Parque Nacional Sierra Nevada, 13 km NE of Mérida, *Meier & Carrero 872* (US); Sierra de la Culata, N of Mérida, N of Monterrey, headwaters of Río Mucujún, summit between Quebrada El Arado and Quebrada El Robo, *Meier et al. 7378* (US); Distr. Libertador, Parque Nacional Simón Bolívar, La Mucuy, Laguna Coromoto, *Pipoly & Aymard 6572* (NY, PORT); Distr. Sucre, Mpio. Estanques, Los Aserruchos, towards Páramo de las Colorados (El Ramal), *Ruíz-Terán & López F. 469* (US), *Ruíz-Terán 702* (MERF), *Ruíz-Terán et al. 12191* (MERF); Distr. Arzobispo Chacón, Mpio. Libertad, 'meridional' slope of Páramo de Mijara, 15 km NNE of Aldea Chacanta, *Ruíz-Terán & López F. 1508* (US), *Ruíz-Terán et al. 1935* (MERF); Distr. Libertador, Sierra de Culata, 18 km NE of Mérida, *Pipoly et al. 6500* (PORT, US); Distr. Libertador, El Portachuelo, crossing hwy between El Morro and Aricagua, near Páramo de Don Pedro, *Ruíz-Terán & López F. 8750* (US); Distr. Libertador, 'meridional' slope of Páramo de Aricagua, E of Case Río Mocomboco, *Ruíz-Terán & López F. 10519* (US); Distr. Rangel, borders of road to Hato Las Escaleras and bridge above Quebrada la Escazes, *Ruíz-Terán et al. 16158* (US), *Schlim 1511* (P); City of Mérida, Santa Rosa, behind La Hechicera of University Los Andes, *J. F. Smith 1182* (US); near summit of Cerro San Isidro, above La Carbonera, *Steyermark 56023* (US); along Quebrada Cuesta del Barro and Mesa del Trapiche, tributary to Río Capurí, between Canagua and el Molino, *Steyermark 56469* (US, VEN).—MONAGAS: Cerro Negro, above Sabana de las Piedras, NW of Caripe, *Steyermark 62121* (US, VEN); Distr. Libertador, San Javier valley, along trail from fence near Pasqual Soreano's house, toward Monterrey, along Quebrada La Cueste, *Weitzman et al. 49* (GH, NY, VEN); La Carbonera, *Wiehler 72490* (F, US).—SUCRE: Cerro Turumiquire, between La Trinidad and zone of cloud forest, *Steyermark 62506* (US).—TÁCHIRA: Distr. Junín, between Bramón y La Delicias, *Bono 4554* (FI); Páramo de Taima, *Charpin & Jacquemoud 13245* (US); valley of Río Tachira, Quebrada of El Reposo, *Cuatrecasas et al. 28342* (AAU, US); Distr. Junín: southern slopes of Cerro San Isidro, N of El Reposo, above Hacienda Bella Vista, Quebrada Agua Caliente, *Davidse & González 22200* (MO, U, VEN); below Páramo de Tama, *Luteyn et al. 5988* (SEL, VEN); near and bordering Quebrada de Palmar, at foot of Páramo de Tama, 2 km above Betania and 7 km above Villapaéz, *Steyermark 57269* (US), *Steyermark 57245* (US); below Páramo de Tamo, near Colombia-Venezuela border, *Steyermark et al. 98374* (US, VEN); slopes below Páramo de Tama, near Colombia-Venezuela border, above Betania and Tama, near Quebrada Buena Vista, *Steyermark & Dunsterville 98811* (VEN); between Zumbador and Queniquea, *Steyermark 105039* (SEL, US-2 sheets, VEN); Páramo el Cobre, *Steyermark et al. 101037* (NY, US, VEN); Quebrada Agua Azul, S of El Reposo, 14 km SE of Delicias, *Steyermark et al. 118429* (SEL, VEN); Quebrada La Lejía, S of Quebrada Agua Azul, 15–16 km SE of Delicias, *Steyermark et al. 118585* (MO, VEN); Quebrada las Copas, *Steyermark et al. 100845* (NY, US, VEN). **Colombia.** DEPARTMENT UNKNOWN: Tequendama, *André 1530* (K); Quindío (Cauca), *André 2381* (K, NY); *Baja 50* (BR); *Funck & Schlim 1688* (BR); New Grenade, *Goudot s.n.* (P); between Volcancito and Bognia, *Holton 27* (K); Bucaramanga (road to Cucata), *Sandeman 6098* (K); *Triana s.n.* (BM).—ANTIOQUIA: La Sierra, 18 km N of Medellín, *Archer 1556* (US); Páramo de Sonsón, *Daniel 3451* (US); road between La Zarza–Alto del Gallinazo, *Escobar et al. 6466* (HUA, US); Mpio. Bello, Correg. San Félix, Cerro San Félix, *Fonnegra et al. 3721* (MO); road Medellín–San Pedro, San Felix, via de ascenso al alto Los Baldíos, *Galeano & Bernal 222* (COL); Páramo de Sonsón, *Garganta 2086* (US); Mpio. Yarumal, Vereda El Colgadero, *Lozano C. 2171* (COL), *Patin s.n.* (K); Mpio. Sonsón, Páramo de Sonsón, *Orozco et al. 1315* (NY); La Ceja, Monte Capiro, *Uribe U. 1936* (U, US); Mpio. Medellín, road to Cerro del Padre Amaya, 9.1 km road Medellín–Santa Fé de Antioquia, *Zarucchi & Brant 5358* (US); Mpio. Sonsón; Km 11, road Sonsón–Nariño (25 km from Nariño), *Zarucchi et al. 6208* (MO, US).—BOYACÁ: Mpio. Pajarito, Km 80, between Sogamoso and Pajarito, *Bernal M. & Chavarro 328* (COL); Mpio. Duitama, Correg. El Carmen, vereda Santa Elena, finca La Sierra, *Betancur et al. 4260* (COL, US); near upper crossing of Quebrada

Chorro Grande on N side of Arcabuco range and Duitama road, *Langenheim 3623* (COL, UC, US); Mpio. Chinavita, Cerro Mamapacha, road from Vereda El Valle to páramo, Km 7 from Valle, *Stancik 1566* (COL).—CALDAS: near Acueducto, ca. 7 km NE of Manizales, *Breteler 4468* (U, US); Manizales, Cordillera Central, el Zancudo, *Fraume et al. 367* (US); Manizales, *Sandeman 5676* (K).—CAUCA: western slopes of the Cordillera Central, city of Río Palo, Quebrada de Santo Domingo, encampment of ‘Quineros,’ *Cuatrecasas 19212* (F-2 sheets, K, MO, NY, US); eastern slopes of the Cordillera Central, region of Moscopan, valley of Río San José, between Aguabonita and Candelaria, *Cuatrecasas 23576* (US); eastern slopes of the Cordillera Central, valley of Río San José, la Chorrera de Candelaria, *Cuatrecasas 23620* (US); Popayán, Páramo de Almaguer, *Espinal T. et al. 3205* (BH); hwy Puracé (slope of Cauca), *García Barriga & Hawkes 12793* (US), *García Barriga & Hawkes 12808* (US); road from Timbío to Veinte de Julio, Km 55, *Maas & Plowman 2067* (GH, U); El Tambo, Parque Nacional Natural Munchique, road la Romelia–Cerro Santana, *González et al. 3124* (COL); Cordillera Central, Paletara, 35 km SSE of Popayán, *Granger 252* (US); Macizo Colombiano, near La Hoyola, *Idrobo et al. 3573* (COL, P); road Popayán–San Agustín, Parque Nacional Natural del Pueracé, near entrance and guards’ building, *Londoño & Kvist 88* (COL, US); Mpio. Coconuco, Valle de Paletara, Parque Nacional Natural del Pueracé, *Lozano C. 3491* (COL); Mpio. Puracé, Parque Nacional Natural del Pueracé, *Lozano C. et al. 4500* (COL); ca. 37 km E of Totoro, *Luteyn et al. 10148* (US); Canaan, Mt. Puracé, Cordillera Central, *Pennell 6608* (PH); Paletará, Cordillera Central, NE of Llano, *Pennell 6956* (PH), *Pennell 7003* (PH); San José, San Antonio, Cordillera Occidental, *Pennell 7337* (PH), *Pennell 7578* (GH, PH, US), *Pennell 7649* (PH); La Gallera, Micay valley, Cordillera Occidental, near Río Joaquín, *Pennell 7859* (PH); road El Tambo–20 de Julio, ca. Km 55, *Plowman & Vaughan 5308* (GH, SEL, K); El Tambo, road Santa Ana, Km 8–9, old road to Micay, Parque Nacional Natural del Pueracé, *Ruiz et al. 263* (MA); Cordillera Occidental, Carpinterías, between los cerros de Munchique and Altamira, *Pérez Arbeláez & Cuatrecasas 6163* (COL, US); road Tóez–Tacueyó, Km 50, *Rangel 2595* (COL); Popayán, Páramo de Almaguer, *von Sneider 310* (S), *von Sneider 653* (S), *von Sneider 654* (S), *von Sneider 689* (S), *von Sneider 2634* (S), *von Sneider 4328* (S); Popayán, Almaguer, *Triana 2481* (P); Popayán, Páramo de Almaguer, *Triana 4163* (BM); Parque Nacional Munchique, El Tambo, vereda La Romelia, Quebrada Charco Azul, *Velayos et al. 6940* (MA, COL).—CUNDINAMARCA: Fusagasugá, *André 1591* (K); Bogotá, *Ariste-Joseph 222* (US); SW of Bogotá on road between Sibaté and San Miguel, Km 33–34, *Barclay et al. 3346* (NA, US); Sibaté, La Aguadita, *Fernández Casas 6674* (MO), *García Barriga et al. 10425* (COL); between Pacho and Río Negro, hwy and environs, *García Barriga 10751* (US); Mpio. Fusagasugá, hwy to Girardot, western slopes of the Cordillera Oriental, between “La Aguadita” and “Aguabuena,” *García Barriga 10775* (US); western slopes of the Cordillera Oriental, between San Miguel and Aguadita, *García Barriga 12078* (US); San Miguel, hwy Fusagasugá, *García Barriga 12673* (US); Fusagasugá, hwy between Aguacalara and la Aguadita, *García Barriga 16124* (US), *García Barriga et al. 18885* (GH); El Cesar, N of border between Santander del Norte and Cesar, between Abrego and las jurisdicciones (Cerro de Oroque), *García Barriga & Jaramillo-Mejía 19890* (GH, US), *García Barriga & Jaramillo-Mejía 19864* (COL, U, US); Cordillera Oriental, 3 km SW of Charquita, 25 km WSW of Bogotá, *Grant 9024* (NA, US-2 sheets); San Miguel, near Sibaté, *Hawkes & García-Barriga 29* (K, US); Bogotá to Melgar, *Heath 67* (K); Mpio. Sibaté, Alto de San Miguel, *Huertas & Camargo 5909* (COL); road Bogotá–Fusagasugá, between San Miguel and Agua Bonita, *Idrobo 2301* (AAU); Granda Hacienda “El Soche,” *Idrobo 5445* (COL); above La Esperanza, *Ojeada s.n.* (COL); Vereda Agua Bonita, alrededores de la Casa de la Virgen, Alto de San Miguel, *Orozco & Linares 1759* (COL); above Fusagasugá, *Pérez Arbeláez & Cuatrecasas 6623* (US); Guasca, veneda La Concepción, finca del Dr. Serrato, *Sánchez et al. 1426* (COL); Cordillera Oriental, 1 km N of Sibaté, 25 km SW by W of Bogotá, *St. John 20529* (US); Cerros de San Miguel, SW of la Sabana de Bogotá, *Uribe U. et al. 2590* (US); Sibaté, alto de Paloquemado, *Uribe U. 3747* (NY), *Tracey 5* (K); La Mesa, *Tracey 275* (K); Fusagasugá, *Tracey 358* (K); Boquerón, between Facatativá and La Florida, *Uribe U. 2655* (U); forests of El Ermitaño, below Salto de Tequendama, *Uribe U. 3283* (COL); Mpio. Calera, eastern slopes of the Cordillera Oriental, road to Mundo Nuevo, *Uribe U. 5848* (US); Cordillera Oriental, by Monteredondo by Guayabetal, *Vogel 10* (US).—HUILA: *Bohs 1637* (GH); Commissary of Caqueta, above dividing line of the Cordillera Oriental, Gabinete, *Cuatrecasas 8423* (US); around Merenberg road from Popayán, *D’Arcy et al. 15572* (MO, US); Paletará, *Fernández P. 8815* (COL); Cordillera Oriental, ridge between drainages of Río Guarapas and Río Guachicas, below main ridge of Cordillera Oriental, above Palestina, *Fosberg 19980* (US), *Gentry et al. 47714* (MO); Finca Merenberg, E of Volcán Puracé, near Cauca border, *Gentry et al. 53968* (MO, US); Mpio. Neiva, vereda La Plata, drainage of Río Las Ceibas, Quebrada Perú, *Llanos & Gerardino 2825* (COL); Mpio. San José de Isnos, Vereda El Marmol, Parque Nacional de Puracé, *Lozano C. 3305* (COL); Mpio. La Plata, Vereda Arrabal, Turbera de páramo, *Lozano C. et al. 4350* (COL, WIS); Mpio. Argentina, Finca Merenberg, *Orozco et al. 2625* (COL); Belén, finca de Merenberg, *Rangel 2435* (COL); “Balsillas” on Río Balsillas, *Rusby & Pennell 773* (GH, US), *Rusby et al. 664* (GH); Cordillera Oriental, E of Neiva, *Rusby & Pennell 904* (GH, US); Commissary of Caqueta, above dividing line of the Cordillera Oriental, Gabinete, *Rusby et al. 923* (GH, NY), *Rusby & Pennell*

906 (NY); Río Villalobos, region of the confluence of Río Villalobos and Río Cauchos, *Schultes & Villarreal* 5207 (GH, US), *von Sneider* 2632 (S), *von Sneider* 2633 (S); Gabinete mountain pass by Resina, Cordillera Oriental between Altamira and Florencia, *Vogel* 121 (US).—META: Llanos Orientales, Santa Isabel, between Restrepo and Cumaral, *García Barriga* 5011 (AAU, S); El Calvario, *Linares et al.* 2140 (COL); Mpio. Quetame, Inspección de Policía de Guayabetal, hwy to Calvario, *Lozano C.* 4031 (COL).—NARIÑO: vicinity of Funes, Cordillera Oriental, near Río Téllez, *Ewan* 16500 (MO, US); Cordillera Occidental, headwaters of Quebrada/Río del Cristo, 4 km NE from summit of Volcán Gualcala, 18 km NE of Piedrancha, *Fosberg* 21153 (US); hwy from Ipiales to La Victoria, Páramo de la Cortadera, Km 23–25, *García Barriga & Hawkes* 13087 (US); Mpio. Sandomá, Quebrada Santa Rosa, *Ramírez P.* 4633 (US).—NORTE DE SANTANDER: Cordillera Oriental, Alto del Venado, between Samaria and Toledo, *Cuatrecasas et al.* 12825 (GH, US); Eastern Cordillera, road from Pamplona to Toledo, crossing the divide between Río la Teja and Río Mesme, *Killip & Smith* 19851 (GH, US), *Killip & Smith* 19979 (GH, US); Eastern Cordillera, Pica-Pica, valley above Tapata (N of Toledo), *Killip & Smith* 20033 (GH, US); Eastern Cordillera, Páramo del Hatico, en route from Toledo to Pamplona, *Killip & Smith* 20617 (GH, US); Mpio. Herrán, Parque Natural Nacional Tama, Sector Orocué, towards El Alto del Pesebre, *Lozano C. et al.* 5517 (COL, US); Mpio. Herrán, Parque Natural Nacional Tama, Sector Orocué, hacia el Alto del Pesebre, *Lozano C. et al.* 5537 (US); Ocaña, Mesarica, *Schlim* 148 (US); Ocaña, near Santa Marta, *Schlim* 538 (BM, K, P); Pamplona, *Schlim* 1087 (BR).—PUTUMAYO: Mpio. Sibundoy, Km. 40, road Pasto–Sibundoy, *Benavides* 6268 (US); Valle de Sibundoy, 2.5 km NE Sibundoy, *Bristol* 356 (GH, US), *Bristol* 808 (GH), *Cuatrecasas* 11599 (COL), *Foster & Foster* 2003 (A); Mpio. Sibundoy, between San Francisco and Río Blanco, *Hernández et al.* 401 (US); between La Depresión and San Francisco, Km 75, *López-Palacios & Idrobo* 3814 (COL, US); Laguna de la Cocha, *Schultes s.n.* (US); Valle de Sibundoy, Portachuelo, *Schultes & Villarreal* 7752 (US).—QUINDÍO: Mpio. Salento, Bosque de la Cascada, *Amaya M. & Smith* 571 (COL, US); Mpio. Salento, *Amaya M. & Smith* 576 (COL); Mpio. Pijao, sector Río Azul, Hacienda Maizopolis, *Arbeláez S. et al.* 653 (US); Mpio. Finlandia, hwy Roble–Morro Azul, *Arbeláez S. et al.* 1039 (US); western slopes of Central Cordillera, secondary road toward Salento from Armenia–Cajamarca road, *Londoño & Kvist* 52 (AAU, COL, US); Mpio. Pijao, vereda Río Gris Alto, Finca El Jardín, *López* 103 (COL); Mpio. Salento, vereda cocora, below Nevado del Quindío, *Luteyn et al.* 12960 (US); St. José, *Triana* 4163 (BM); Mpio. Salento, “Via a toche,” *Vargas* 3776 (COL, US); Mpio. Genova, camino Finca Las Mirlas–Servia, *Vélez et al.* 1297 (COL); Mpio. Genova, vereda San Juan Alto, Finca La Caucasia, *Vélez et al.* 5025 (COL).—RISARALDA: Mpio. Pereira, Parque Regional Ucumari, El Cedral, road near edge of Río Otún, *Bernal* 1578 (COL); Mpio. Pereira, Parque Regional Ucumari, La Pastora, left margin of Río Otún, *Bernal* 1586 (COL); Mpio. Pereira, Parque Regional Ucumari, ca. 22 km ESE of Pereira, trail to Ucumari, *Luteyn & Rangel* 13096 (US); Mpio. Santa Rosa de Cabal, E of Termas de Sta. Rosa, *Wolf* 54 (COL).—SANTANDER: Mpio. Bucaramanga, via Bucaramanga–Berlín, between El Diviso and La Corcova, *Alonso et al.* 11668 (COL); forest above La Corcoba, *Barkley & Valderama* 35271 (COL, GH), *Barkley et al.* 38266 (GH); Eastern Cordillera, western slope of Páramo Rico, *Killip & Smith* 17223 (US); Eastern Cordillera, vicinity of La Baja, *Killip & Smith* 17860 (COL, GH, US, W); Eastern Cordillera, vicinity of La Baja, *Killip & Smith* 18349 (A, GH, US, W).—TOLIMA: Mpio. Roncesvalles, Cordillera Central, embankment of river towards San José de Las Hermosas, *Camargo G.* 7668 (COL); Río Saldana, *Core* 1609 (US); Río Tolima, *Goudot* 8 (P); Mariquita, *Linden* 963 (BR, P); Ibagué, Cuenca del Río Toche, Quebrada Olivales, Hacienda Normandía, 10 km S of Parque Nacional Natural Los Nevados, *Sánchez P.* 318 (COL), *von Sneider* 3116 (S).—VALLE DEL CAUCA: eastern slopes of the Cordillera Occidental, valley of Río Calí, right bank of Río Pichinde, in la Palma, *Cuatrecasas* 21674 (US); above Finca La Mesita, W of Villa Colombia, eastern slopes of the Cordillera Occidental, *Gentry et al.* 40905 (MO); Cordillera Occidental, basin of Río Cali, city of Peñas Blancas, *López Figueiras* 8314 (US), *López Figueiras* 8317 (US), *López Figueiras* 8347 (US), *López Figueiras* 8394 (US); Reserva Natural “Hato Viejo,” Parque Nacional Farallones de Cali, eastern slope of the Cordillera Occidental, *Schmitt* 47 (FMB); Las Amarillas, near the base of Cerro del Ingles, Serranía de los Paraguas, eastern slopes of the Cordillera Occidental, *Silverstone-Sopkin et al.* 3980 (US); Finca El Duluvia, road Buga–El Placer, 33 km E of Hotel Guadalajara (Buga), western slopes of the Cordillera Central, *Silverstone-Sopkin & Giraldo* 6463 (MO). **Ecuador.** PROVINCE UNKNOWN: “Huacapamba” [=Huagrampamba?], *Poortmann* 216 (P-2 sheets); Yaranamaca, Cordillera Occidental, *André* 4585 (K-2 sheets).—AZUAY: *Harling et al.* 8453 (GB, SEL).—CAÑAR: above Rivera on road to Pindilig, *Harling & Andersson* 23014 (GB, US); between Rivera and Pindilig, *Holm-Nielsen et al.* 29265 (AAU, K); N slopes of Cerro Gatel, E part of Cerro Yanguán, above Rivera, 16–17 km by road from Taday, *Molau et al.* 2880 (AAU, GB).—CARCHI: Bosque Protector Guanderas, Quebrada el Mirador, *Cerón M.* 28465 (QAP); Cantón Huaca, Estación Biológica Guandera, La Loma El Corazón, 11 km NE from the community San Gabriel, *Clark* 1729 (QCNE, US); 10 km E of La Estrellita on road to El Carmelo, *Dorr & Barnett* 6157 (CAS, QCNE, US); road San Gabriel-La Paz, 10 km SW of San Gabriel, *Freire F.* 1397 (NY), *Harling & Andersson* 12422 (GB); above La Esperanza, 5 km W of El Carmelo on road to Tulcán, *Lojtnan et al.* 12071 (AAU); Cantón

Tulcán, Estación Biológica Guandera, northern border with Páramo, *Mora et al.* 355 (QCNE-2 sheets); road Tulcán–Maldonado, *Øllgaard 61514* (AAU); E of colonia Huaquena, sector/Loma Corazón, *Palacios & van der Werff 3911* (AAU, MO, QCNE, US); Cantón Montufar, Loma El Corazón (Bretaña), SE of Huaca, E of Colonia Huaqueña, Río Minas, *Palacios et al.* 6963 (MO, QCNE, US); Cantón Tulcán, Reserva Guandera, ca. 6 km E of Fernández Salvador, *Webster et al.* 32097 (DAV, QCNE).—CHIMBORAZO: Cantón Río Chanchan, ca. 5 km N of Huigra, *Camp 3343* (US).—COTOPAXI: Cantón Sigchos, western slopes of Los Ilinizas, Cerro Azul, Cerro de los Amarillos y las Peñas Blancas, over Río Corazón, *Cerón M.* 25397 (QAP); Salcedo, Los Llanganates, Carretera Salcedo–Tena, Km 60, Rancho La Poderosa, 4 km from Río Mulatos, *Vargas & Sandoval 455* (QCNE).—IMBABURA: road Cotacachi–San Luis de La Delicia–Apuela, San Luis de La Delicia, *Freire F.* 474 (GB); Cantón Cotacachi, Tablachupa, Apuela, Finca Jorge Vaca, *Gudiño & Cuamacás 1945* (MO, QCNE, US); road Otavalo–Hacienda Perugachi, near Quiahincha, NW slope of Pomas Blancas, near fabrica Cemento Selvalegre, *Jaramillo et al.* 1810 (AAU, QCNE-2 sheets); road Otavalo–Hacienda Perugachi, near Quiahincha, NW slope of Pomas Blancas, near fabrica Cemento Selvalegre, *Jaramillo et al.* 1879 (AAU, QCNE); road Cotacachi–Apuela, Hacienda Tablachupa, *Jørgensen 61609* (AAU).—LOJA: Zamora–Huaico (SE Loja), *Espinosa 2263* (LOJA, US), *Harling et al.* 13505 (GB, SEL); road Loja–Zamora, Km 9, *Lewis 3231* (LOJA, QCNE); road Loja–Saraguro, Km 17, *Øllgaard & Feil 91107* (AAU); Parque Nacional Podocarpus, above San Pedro de Vilcabamba (5 km E of village), Quebrada Romerillo, *Pedersen 104152* (LOJA); La Cofradía, road Loja–Saraguro, Km 30, *Pedersen et al.* 104233 (LOJA), *Poortmann 266* (P-2 sheets).—MORONA-SANTIAGO: Cantón Limón Indanza, road Gualaceo–Plan de Milagro, Río San Francisco, near road Zapote–Chacras, *Clark et al.* 5894 (AAU, COL, HA, MO, NY, QCNE, US); Cantón Limón Indanza, road Gualaceo–Plan de Milagro, “Tinajillas,” *Clark et al.* 5901 (HA, NY, QCA, QCNE, US); Cantón Limón Indanza, “Zapote,” road from Plan de Milagro (Morona-Santiago) to Gualaceo (Azuay), *Clark et al.* 5995 (AAU, HA, QCNE, US); Cantón Limón Indanza, road Gualaceo–Plan de Milagro, Cordillera Zapote Naida, *Clark et al.* 9836 (MO, QCNE, SEL, US, UNA); San Miguel, *Harling et al.* 8079 (GB, SEL, US), *Harling et al.* 8136 (GB); Cordillera de Cutucú, road Patuca–Morona, Km 20, “Piantza,” *Harling & Ståhl 26967* (QCA); eastern slopes of Páramos Matanga, ca. 30–40 km S of Sigsig along road towards Gualaquiza, *Luteyn & Cotton 11192* (QCNE, US).—NAPO: Cantón Quijos, Sierra Azul (Agrícola Industrial Río Aragón), Campamento Estero Chico, *Alvarez & Viteri 223* (QCNE), *Alvarez et al.* 501 (MO, QCNE); Playón de San Francisco, El Mirador, *Boeke & Jaramillo A.* 2741 (CAS, AAU); between Cuyuja and Papallacta, 10 km E of Papallacta on road to Baeza, *Holm-Nielsen et al.* 6831 (AAU, S); Cantón Archidona, Challuayacu, road Hollín–Loreto, Km 25–31, *Hurtado 1168* (MO, QCNE), *Jaramillo 5319* (AAU, GB, K, MO); near Colombian border, from Santa Bárbara and E of Sibundoy, *Kvist et al.* 60269 (US); Cantón El Chaco; Río Oyacachi, main trail between Oyacachi and El Chaco, near confluence of Río Chalpi and Río Oyacachi, *Clark et al.* 3616 (AAU, COL, E, MO, QCNE, US); Cantón El Chaco, Río Oyacachi, main trail between Oyacachi and El Chaco, near confluence of Río Chalpi and Río Oyacachi, *Clark et al.* 3643 (QCNE, US), *Clark et al.* 3647 (US); Cantón Quijos, Parroquia Cuyuja, between the town of Cuyuja and the confluence of Río Tablón and Río Quijos, northern border of Reserva Ecológica Antisana, *Clark et al.* 5621 (US), *Clark et al.* 5626 (AAU, COL, MO, NY, QCNE, US); Guagra Urcu, the pass between Río Borja and Río Suno, *Holm-Nielsen et al.* 27303 (AAU, MO, K); Guagra Urcu, below Loma Jaramillo, SW of the pass, between Río Borja and Río Suno, *Holm-Nielsen et al.* 27398 (AAU, MO); Guagra Urcu, SW of summit, *Holm-Nielsen et al.* 27513 (AAU, K, MO); S to SE of El Playón de San Francisco, slopes of Cerro Mirador, *Holm-Nielsen et al.* 29755 (AAU), *Holm-Nielsen et al.* 29797 (AAU, K), *Holm-Nielsen et al.* 29859 (AAU); slopes of Guagra Urcu, hill above Río Borja, *Holm-Nielsen et al.* 26928 (AAU), *Holm-Nielsen et al.* 29932 (AAU); hwy Papallacta–Baeza, *Huttel 740* (QCNE); Logma Playa, Km 17 from Cosanga, *Jaramillo et al.* 12175 (COL, MO, NY); Km 40 from El Carmelo on road towards La Bonita, ca. 0.5 km below La Alegria, *Lojtnant et al.* 11932 (AAU); hwy Papallacta–Baeza hwy, between Cuyuja and Papallacta, *Palacios 2578* (MO, QCNE, US); Cantón Quijos, road Cuyuja–Papallacta, *Palacios 12268* (MO, QCNE); Paso de Guamaní, Río Chalpi, at the bridge of road Papallacta–Baeza, *Sparre 15884* (AAU, S); Cantón Quijos, Reserva Ecológica Antisana, Cordillera de Guacamayos, Ruta oleoducto ARCO, Km 100, old road to Herradura, near antennas, *Vargas et al.* 1677 (QCNE, US); Cantón Quijos, confluence of Río Blanco and Río Verde, near Río Quijos, *Vargas et al.* 1770 (QCNE).—SUCUMBÍOS: Cantón Sucumbíos, 3 km SW of the village of La Bonita, *Aguirre et al.* 10 (US); Cantón Sucumbíos, Bellavista–Valle Negro, *Aguirre et al.* 301 (US), *Aguirre et al.* 310 (US); the end of the road Salcedo–Napó, near junction of Río Langoa and Río Mulatos, *Brandtbyge 42187* (AAU); Tulcán–La Bonita, Km 65.4, *Dodson et al.* 18485 (QCNE); upper slopes of Guagra Urcu, hill above upper Río Borja, *Holm-Nielsen et al.* 27104 (AAU); upper slopes of Guagra Urcu, *Holm-Nielsen et al.* 27156 (AAU), *Holm-Nielsen et al.* 27184 (AAU); Camino Mirador, *Jaramillo & Boeke 267* (AAU); road to Cerro el Mirador, *Jaramillo & Boeke 630* (QCNE); Parque Nacional Llanganates, road Salcedo–Tena, Km 74, Río Mulatos, *Vargas et al.* 2182 (QCNE, US).—NAPO/PASTAZA: *Boeke et al.* 391 (SEL); ENE of Cayambe Mountain, Oriente trail, *Cazalet & Pennington 5607* (K, UC, US).—PICHINCHA: Reserva Geobotánica Pululahua, road from

hospital, Sincholahuá, *Cerón M. 1376* (MO, QAP, QCNE, US); Reserva Geobotánica Pululahua, road near water tanks, *Cerón M. & Benavidez 1780* (MO, QAP, QCNE, US); Reserva Geobotánica Pululahua, road to Lulubamba, *Cerón M. 2568* (AAU, MO, QAP, QCNE, US); Reserva Geobotánica del Pululahua, ridgeline of Cerro Padre-Rumi, *Cerón M. et al. 33756* (QAP); Cantón Quito, Parroquia Nono, Hacienda Yanacocha, Cerro Pugsí, trail to Río Mindo, *Cuascota et al. 361* (QCNE, US); Cantón Quito, Hacienda Verdecocha, Cerro Pugsí, *Ramírez H. et al. 154* (QCNE); Cantón Quito, Sector Alaspungo, road Nono-Tandayapa, "Camino de los Yumbos," *Valenzuela et al. 770* (MO); Cantón Quito, Hacienda Tanlahua, 10 km N of San Antonio de Pichincha, Loma Monte Redondo, *Vargas et al. 253* (QCNE, US).—TUNGURAHUA: Cantón Baños, Río Vascun Valley, northern slopes of Volcán Tungurahua, *Clark et al. 7706* (QCNE, SEL, UNA, US); Cantón Baños, Comunidad Viscaya, 7 airline km SW of Baños, 10–11 road-km SW of hwy, *Clark et al. 7746* (COL, E, NY, QCA, QCNE, SEL, UNA, US); Chaupi, *Dodson & Thien 1840* (US, WIS); road El Triunfo-Los Llanganates, near "El Playón del Río Muyo," *Freire F. 1225* (NY, SEL, US); Patate, Loso Llanganates, Tres Cruces, 3 km from Triunfo, confluence of Río Saladero, Río Tres Cruces and Río Muyo, *Vargas & Sandoval 277* (QCNE, US).—ZAMORA-CHINCHIPE: E of El Pan, Cordillera Oriental, *Acosta Solís 5042* (US), *Acosta Solís 5046* (US); Playón de San Francisco-El Mirador trail, *Boeke & Jaramillo A. 2378* (US); Cantón Palanda, Parroquia Valladolid, southern slopes of the Cordillera de Sabanilla (headwaters of Río Chinchipe), Tapichalaca Reserve (Fundación Jocotoco), trail from main lodge towards antenna/main hwy, *Clark & Mendoza 8082* (E, QCNE, SEL, UNA, US); Cantón Palanda, Parroquia Valladolid, southern slopes of the Cordillera de Sabanilla (headwaters of Río Chinchipe), Tapichalaca Reserve (Fundación Jocotoco), *Clark & Mendoza 8083* (QCNE, US); Cantón Palanda, Parroquia Valladolid, southern slopes of the Cordillera de Sabanilla (headwaters of Río Chinchipe), Tapichalaca Reserve (Fundación Jocotoco), *Clark & Mendoza 8148* (QCNE, US); southern slope of Nudo de Sabanilla, horse trail to Valladolid, *Harling et al. 20473* (GB, US); pass on road Loja-Zamora, *Harling & Andersson 21965* (GB, QCA, US); Nudo de Sabanilla-Valladolid, horse trail to Caserío Quebrada Honda, *Harling & Ståhl 26321* (GB); road Loja-Zamora, Km 17, *Holm-Nielsen et al. 3559* (AAU, F, MO, S, U, US); Parque Nacional Podocarpus, road Loja-Zamora, E of Cerro Yanococha, path to Zamora, *Madsen 75573* (AAU, LOJA); border of Parque Nacional Podocarpus, road Loja-Zamora, E of pass, *Madsen 87079* (AAU, K, LOJA, MO, QCNE); Parque Nacional Podocarpus, road Yangana-Valladolid, Nudo de Sabanilla, *Øllgaard et al. 58383* (AAU); road Loja-Zamora, "carretera antigua," Km 17–36, *Romoleroux & Luteyn 1390* (AAU). **Peru.** PROVINCE UNKNOWN: "Jambrabamba," *Mathews 1540* (E-2 sheets, K-2 sheets); *Ruiz & Pavón s.n.* (MA), *Vidal-Sénége s.n.* (P).—AMAZONAS: Chachapoyas, eastern slopes of Calla-Calla, near Km 415–418 of road Leimebamba-Balsas, *Wurdack 1730* (US).—CAJAMARCA: Chota, WNW of Huambos, *Dillon et al. 6435* (F); Cutervo, Gruta Salomon, San Andres, *López et al. 6631* (US).—CUZCO: "Pillahuata," Cerro Cusilluyoc, *Pennell 13963* (PH).—HUÁNUCO: Carpish, *Acleto 155* (US, USM); Dtto. Chinchao, San Pedro de Carpish, forest on northern side of Carpish tunnel, *Clark et al. 8185* (AAU, COL, MO, NY, SEL, UNA, US, USM); Dtto. Chinchao, San Pedro de Carpish, forest west of Carpish tunnel, *Clark et al. 8240* (AAU, MO, NY, SEL, UNA, US, USM); Carpish, between Chinchao and Huánuco, *Ferreira 12787* (US, USM); Carpish, summit between Huánuco and Tingó María, *Ferreira 6848* (US-2 sheets); Dtto. Carpish, Río San Pedro de Carpish, *Salinas 271* (US); Dtto. Chinchao, summit of Carpish, *Schunke V. 5230* (F, US); overgrown road at Carpish pass, above eastern end of present road (Peru 16a) tunnel, *Skog et al. 5139* (E, F, US, USM).—JUNÍN: San Juan, near Huacapistana, Río Tanma, *Ferreira 11312* (USM); Huacapistana and above, *Sandeman 273* (K), *Sandeman 275* (BM).—LORETO: Pasco, *Gentry & Smith 35991* (MO), *Sandeman s.n.* (K).—PASCO: Dtto. Oxapampa, Río San Alberto, Abra Esperanza, *Foster et al. 10283* (USM); Dtto. Oxapampa, Pajonal, 24 km from Oxapampa, *D. Smith 2542* (US, USM); Dtto. Oxapampa, 4–5 km N of Mallampampa, *D. Smith 5789* (MO, USM); Distr. Oxapampa, trail to summit of Cordillera Yanachaga via Río San Daniel, *D. Smith 7802* (MO, USM).—PUNO: Dtto. Carabaya, trail from Santa Domingo to Chabuca mine, *Metcalf 30663* (UC).—SAN MARTÍN: Dtto. Huallaga, valley of Río Apisoncho, 30 km above Jucusbamba, *Hamilton & Holligan 1070* (K); Dtto. Huallaga, valley of Río Apisoncho, 30 km above Jucusbamba, *Hamilton & Holligan 1121* (K); Mariscal Cáceres, Gran Pajatén ruins, *Young 4186* (USM).

Glossoloma ichthyoderma is distinguished from other members of the genus by an exfoliating scale-like epidermis (Fig. 20B), uniformly round throat, and apically constricted corolla tube (Fig. 20D). The exfoliating epidermis in *G. ichthyoderma* is a unique feature for the genus, and it is found in only a few other species in Episcieae (e.g., *Columnnea spathulata* Mansf). The specific epithet is derived from this unique feature because of the resemblance of the stem's surface to fish scales. On rare occasions the exfoliating epidermis is absent, and the stem surface is glabrescent to densely woolly. The corolla throat of *G. ichthyoderma* is uniformly round in contrast to the more common laterally compressed

(Fig. 4B) shape found in other species. Uniformly round throats are found only in three other species: *G. anomalum*, *G. bicolor*, and *G. martinianum*. The corolla of *G. ichthyoderma* is apically constricted, which gives the pouch the appearance of being medial on the corolla tube (Fig. 20D). Non-constricted corollas result in the pouch appearing more terminal, as in *G. grandicalyx* (Fig. 16C). The corolla tube is usually dorsally yellow and ventrally red (Fig. 20D), but coloration is variable. Photographs of recent collections have documented corolla tube colors that range from uniformly yellow to uniformly red to red with yellow patches on the ventral surface. Most members of *Glossoloma* have uniformly colored corollas, except for *G. bicolor*, *G. harlequinoides* (Fig. 17B), and *G. grandicalyx* (Fig. 16C).

In the protologue for *Alloplectus meridensis* (Hanstein 1865), the type collection is given as “*Moritz 1032*,” a typographical error for *Moritz 1132*. The lectotype (G) and isotypes (BM, BR, P) are labeled with the field collection number “1132.”

13. *Glossoloma martinianum* (J. F. Smith) J. L. Clark, *Selbyana* 25: 203. 2005. *Alloplectus martinianus* J. F. Smith, *Novon* 9: 4191. 1999.—TYPE: ECUADOR. Napo: road from Baeza to Tena, 5 km S of Baeza, 26 Jun 1983, *J. Bohlin & M. Bohlin 698* (holotype: US!; isotype: GB).

Subshrubs, usually epiphytic, sometimes terrestrial; stems erect, sparingly branched, 1.5 m long, 5–10 mm in diameter, woody, internodes 2–5 cm long, terete, densely villous, leaf scars raised from stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 0.5–2.0 cm long, densely villous; blades 5–14 cm long, 1–3.3 cm wide, narrowly lanceolate, base cuneate, apex acute, margin serrate, adaxially dark green, densely tomentose, abaxially usually dark purple, sometimes dark green with purple veins, densely tomentose, coriaceous when dry, lateral veins 5–7 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 2–5 flowers per node, posture horizontal at anthesis, bracteoles ca. 3 mm long, 1–1.3 mm wide, lanceolate; pedicels shorter than the petiole, 0.5–1.0 cm long, densely tomentose, pedicel enations absent. Calyx lobes nearly free, plane, usually completely separate, sometimes slightly valvate, erect, nearly equal, 8–17 mm long, 2–5 mm wide, broadly elliptic, base truncate, apex acute, margin entire to serrulate, light green, both surfaces densely tomentose; fifth (ventral) lobe smaller and narrower, to 2.5 cm long, 0.3 cm wide, broadly ovate to lanceolate. Corolla 1.4–2.0 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla slightly oblique relative to calyx; base ca. 5 mm, middle ampliate, becoming apically ventricose on upper surface, throat slightly constricted, appearing laterally compressed, ca. 9 mm wide (at mouth), outside densely tomentose, inside glabrous, red spotting present on the upper surface of throat, limb spreading, subregular, ca. 9 mm wide, yellow, lobes nearly equal, rotund, spreading, ca. 1 mm long, ca. 1.5 mm wide, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments curved after anthesis, free portion to 1.5 cm long, adnate to base of corolla tube for ca. 2 mm, connate for 3 mm, forming an open sheath, glabrous; anthers ca. 2 mm long, ca. 2 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary ca. 3 mm long, ca. 2 mm wide, ovoid, tomentose, style 1 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, 6–10 mm long and wide, globose when immature, villous, loculicidally dehiscent, becoming bivalved, valves not reflexed, reaching a 45° angle when mature. Seeds numerous, ca. 0.8 mm long, ca. 0.2 mm wide, fusiform, longitudinally striate, reddish brown to black. Fig. 21.

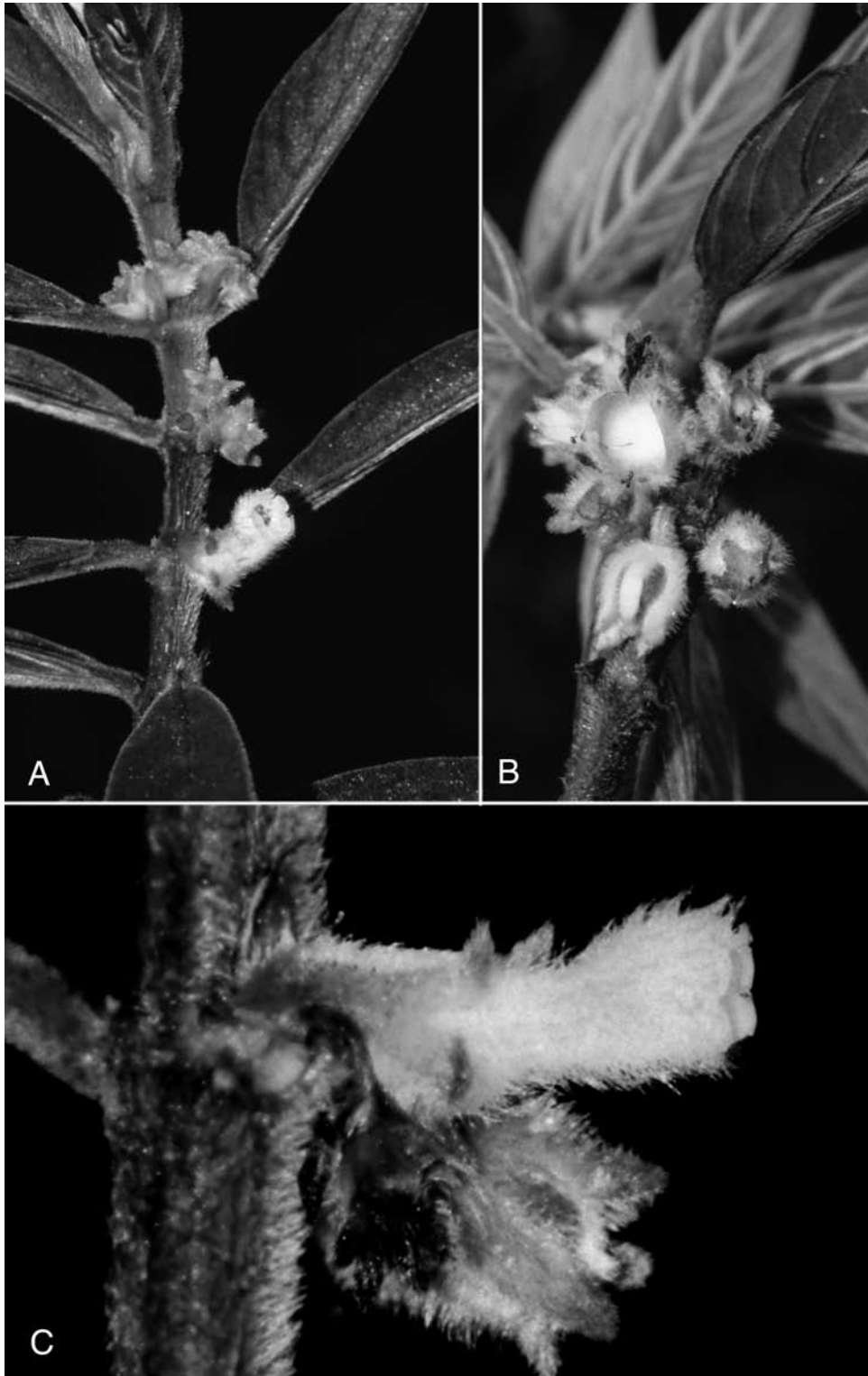


FIG. 21. *Glossoloma martinianum*. A. Habit. B. Mature fruits. C. Lateral view of flower. (Photos by J. L. Clark; voucher: J. L. Clark & V. Durán 6043.)

Phenology. Collected in flower throughout the year, in fruit during March to May and August to November.

Distribution (Fig. 19). Eastern slopes of the Ecuadorian Andes (Sucumbíos, Napo, Morona-Santiago, Zamora-Chinchipe, and Tungurahua) and the northeastern slopes of the Peruvian Andes (Amazonas, Cajamarca, and San Martín); in wet montane forests; 1200–2500 m.

ADDITIONAL SPECIMENS EXAMINED. **Ecuador.** MORONA-SANTIAGO: Cantón Macas, Laguna de Sardinayacu, *Cerón M. 48598* (QAP).—NAPO: Cantón Quijos, Sierra Azul, Agrícola Industrial Río Aragón, *Alvarez et al. 396* (QCNE, US); Cantón Quijos, Parroquia Baeza, comunidad Santa Lucía de Bermejo, *Alvarez et al. 969* (QCNE); environs of Baeza, *Besse et al. 1156* (SEL); Cantón El Chaco, between Río San Juan Chico, Río San Juan Grande and Río Oyacachi, western border of Reserva Ecológica Cayambe-Coca, *Cerón M. & Suárez 35281* (QAP); Cantón Quijos, Parroquia Cosanga, Yanayacu Biological Station and Center for Creative Studies, 5 km W of Cosanga from the road Las Cancheras, *Clark & Greeney 5791* (COL, MO, QCA, QCNE, SRP, US); junction of road Baeza–Lago Agrio with Río Azuela, *Dwyer & MacBryde 9636* (US); 23 km E of El Chaco, road Quito–Lago Agrio, *Gentry 12590* (NY, US); Río Panteor, SW of Borja, *Holm-Nielsen et al. 26710* (AAU, QCA); Chaco, *Huttel 1634* (QCA, QCNE); 11 km E of El Logma Playa, 17 km from the road to Cosanga, *Jaramillo et al. 12142* (QCA-2 sheets); trail to Volcán Reventador, *Jaramillo et al. 13131* (QCA); 2.5 km N of Cosanga, *Kirkbride & Chamba 4168* (NY, Q, US); Cosanga, 20 km S of Baeza, *Maas et al. 3008* (QCA, SEL, U); 16.5 km NNE of Santa Rosa, road Baeza–Lago Agrio, *MacBryde 747* (US); Cantón Quijos, Baeza, Río Machángara, *Palacios & Freire 5002* (MO, QCNE, SEL, US).—SUCUMBÍOS: Reserva Ecológica Cayambe Coca, Volcán Reventador, trail from Río Quijos to Refugio, *Clark 4445* (QCNE, US).—TUNGURAHUA: Cantón Baños, Parroquia Río Negra, near La Colonia Tigre San Jacinto, *Clark & Duran 6043* (AAU, COL, K, MO, NY, QCA, QCNE, SEL, SRP, US). **Peru.** AMAZONAS: Ditto. San Martín, *van der Werff et al. 16711* (US).—CAJAMARCA: Ditto. San Ignacio, San José de Lourdes, Santo Tomás, *Campos & Corrales 3793* (US); Ditto. San Ignacio, San José de Lourdes, localidad Estrella del Oriente, “Cerro del Oso,” *Campos & Díaz 4395* (US); Ditto. San Ignacio, San José de Lourdes, road towards Cerro Picorana, *Campos et al. 5511* (US); Ditto. San Ignacio, San José de Lourdes, base del Cerro Picorana, *Díaz & Fernández 10172* (US).—SAN MARTÍN: Ditto. Ríoja; 100 km from Ríoja on road to Pomacocha (Florida), Km 384, *Stein & Todzia 2191* (US, USM).

Glossoloma martinianum is distinguished from other members of the genus by narrowly lanceolate leaves with dense tomentose pubescence, densely villous short corollas, fruit dehiscence angle, and an occasional reticulate epidermal pattern on the adaxial leaf surface. The bivalved fruits open at a 45° angle (Fig. 21B) compared to the fully reflexed dehiscent capsules present in most other congeners. Many early collections of *G. martinianum* were annotated as belonging to the superficially similar *Columnea formosa* (C. V. Morton) C. V. Morton from which it differs by having longer pedicels and a capsule instead of an indehiscent berry. The presence of a berry is one of the few unambiguous morphological synapomorphies for the genus *Columnea*, and until a mature fruit was observed the generic placement of this species was dubious (Smith 1999).

14. *Glossoloma medusaeum* (L. E. Skog) J. L. Clark, *Selbyana* 25: 203. 2005. *Alloplectus medusaeus* L. E. Skog, *Ann. Missouri Bot. Gard.* 65: 797. 1979.—TYPE: PANAMA. Chiriquí: slopes of La Popa, above Boquete, 1600 m, 5 Aug 1972, *W. G. D’Arcy & J. J. D’Arcy 6398* (holotype: US!; isotypes: MO-2 sheets! SEL!).

Herbs to subshrubs, usually terrestrial, sometimes epiphytic; stems usually erect, sometimes scandent, unbranched, to 2 m tall, to 1 cm in diameter, usually woody, herbaceous when young, internodes 2–5 cm long, subquadrangular, glabrescent proximally, densely strigillose distally, leaf scars raised from stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 3.0–10.5 cm long,

strigillose; blades 20–28 cm long, 6–11 cm wide, elongate-elliptic or narrowly obovate, base cuneate, apex acuminate, margin serrate, adaxially green, sparsely strigillose, abaxially pink to dark red, strigillose, membranous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–6 flowers per node, posture horizontal at anthesis, bracteoles ca. 10 mm long, ca. 5 mm wide, elliptic; pedicels shorter than the petiole, 0.7–3.0 cm long, strigillose, pedicel enations present. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, 4 subequal, 10–25 mm long, 6–10 mm wide, lanceolate to ovate, base truncate, apex acute, margin fimbriate, the teeth to 5 mm long, green to yellow or reddish, abaxially strigillose to pilose, adaxially strigose to densely pilose (especially at base). Corolla 2.5–3.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base ca. 5 mm, middle ampliate, becoming apically ventricose on upper surface, throat slightly constricted, appearing laterally compressed, 6–8 mm wide (at mouth), outside densely pilose, inside mostly glabrous, with glandular trichomes at throat, red spotting sometimes present on the upper surface of throat, limb spreading, zygomorphic, ca. 9 mm wide, pale yellow to red, lobes nearly equal, ca. 2 mm long, ca. 2 mm wide, rotund, spreading, entire. Nectary gland bilobed or single-lobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 2 cm long, adnate to base of corolla tube for ca. 3 mm, connate for 1 mm, forming an open sheath, glabrous; anthers ca. 1 mm long, ca. 2 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary ca. 6 mm long, ca. 5 mm wide, subglobose, densely pilose, style ca. 1.5 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, globose when immature, ca. 1.2 cm long, ca. 1.0 cm wide, densely pilose, loculicidally dehiscent, becoming bivalved, valves not reflexed, reaching a 45° angle when mature. Seeds numerous, ca. 1 mm long, ca. 0.3 mm wide, fusiform, longitudinally striate, yellow. Fig. 22.

Phenology. Collected in flower during January to August and October to December, in fruit during January, February, April, June, July, August, October, November, and December.

Distribution (Fig. 23). Central America (Costa Rica, Panama) and the eastern and western slopes of the northern Andes of South America (Colombia, Ecuador, northern Peru); in montane forests; 300–2000 m.

ADDITIONAL SPECIMENS EXAMINED. **Costa Rica.** CARTAGO: *Burger & Liesner 6779* (BM, F, MO, NY); vicinity of Orosí, *Standley 39740* (US).—PUNTARENAS: along Río Coto Brus, near Cotán, 23 km N of La Unión, *Croat 26683* (MO); foothills of the Cordillera de Talamanca, NW of Las Alturas, along Río Bella Vista, *Davidse 24329* (MO, PMA, US). **Panama.** BOCAS DEL TORO: trail Robalo, northern slopes of Cerro Horqueta, *Allen 4993* (EAP, MO, US); vicinity of Cerro Colorado, mine above San Felix, along trails N of road along continental divide, *McPherson 12038* (US).—CHIRIQUÍ: Cerro Colorado, *Antonio 4879* (MO, PMA, US); Dist. Gualaca, Corregimiento Hornito, Reserva Forestal Fortuna (Smithsonian Tropical Research Institute), Sendero Tres de Noviembre, headwaters of Quebrada Honda, *Clark & Espinosa 8602* (AAU, CAS, COL, E, F, K, MO, NY, PMA, SCZ, SEL, UNA, US); Boquete, Parque Internacional La Amistad, SE slopes and summit of Cerro Pate Macho, trail from Río Palo Alto, 4 km NE of Boquete, *Clark 8714* (AAU, COL, K, MO, NY, PMA, SCZ, SEL, UNA, US); Monte Rey, above Boquete, *Croat & Porter 15673* (US); Cerro Fortuna, *Dressler 5393* (PMA, SEL); 3.5 mi NE of Boquete, end of road along Río Palo Alto, *Hammel 5716* (MO, US); Cerro Colorado, 50 km N of San Felix on the continental divide, *Mori & Dressler 7813* (IBE, MO); Cerro Colorado, 35.6 km on road from Río San Felix bridge, *Sullivan 384* (MO).—CHIRIQUÍ/BOCAS DEL TORO: Reserva Forestal Fortuna (Smithsonian Tropical Research Institute), trail W of main highway along continental divide, *Clark & Espinosa 8560* (PMA, SCZ, SEL, US); Dist. Nole Duima, Corregimiento Chami, road to Cerro Colorado, 43–45 km N of San Felix, *Clark & Morale 8691* (AAU, CAS, COL, E, F, K, MO, NY, PMA, SCZ, SEL, UNA, US); Dist. Nole Duima, Corregimiento Chami, road to Cerro Colorado, 43–45 km N of San Felix, *Clark & Morale 8696* (PMA, US); road

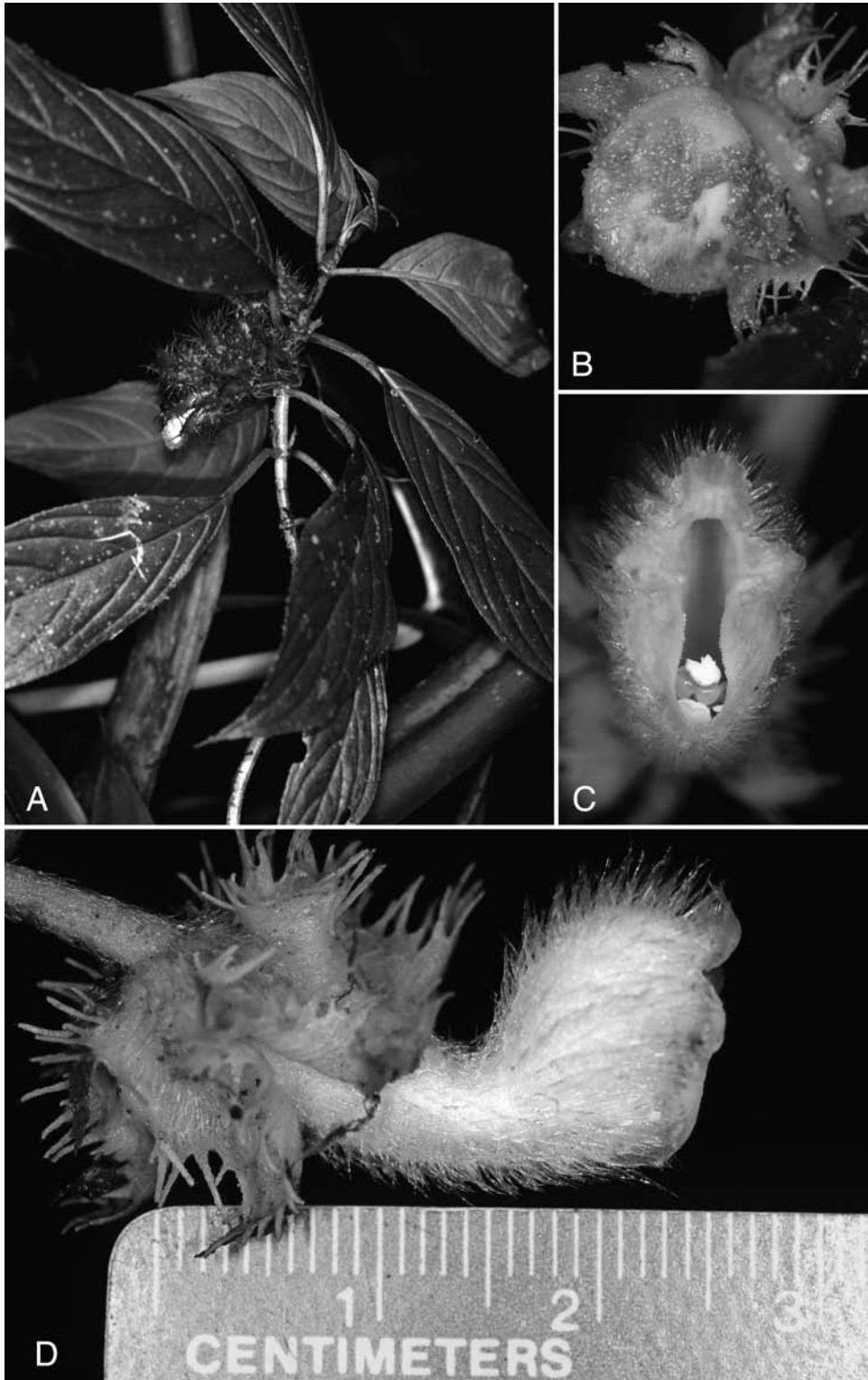


FIG. 22. *Glossoloma medusaeum*. A. Habit. B. Mature fruit. C. Face view of corolla. D. Lateral view of flower. (Photos by J. L. Clark; vouchers: A, *J. L. Clark* 6043; B–D, *J. L. Clark & J. Morale* 8691.)

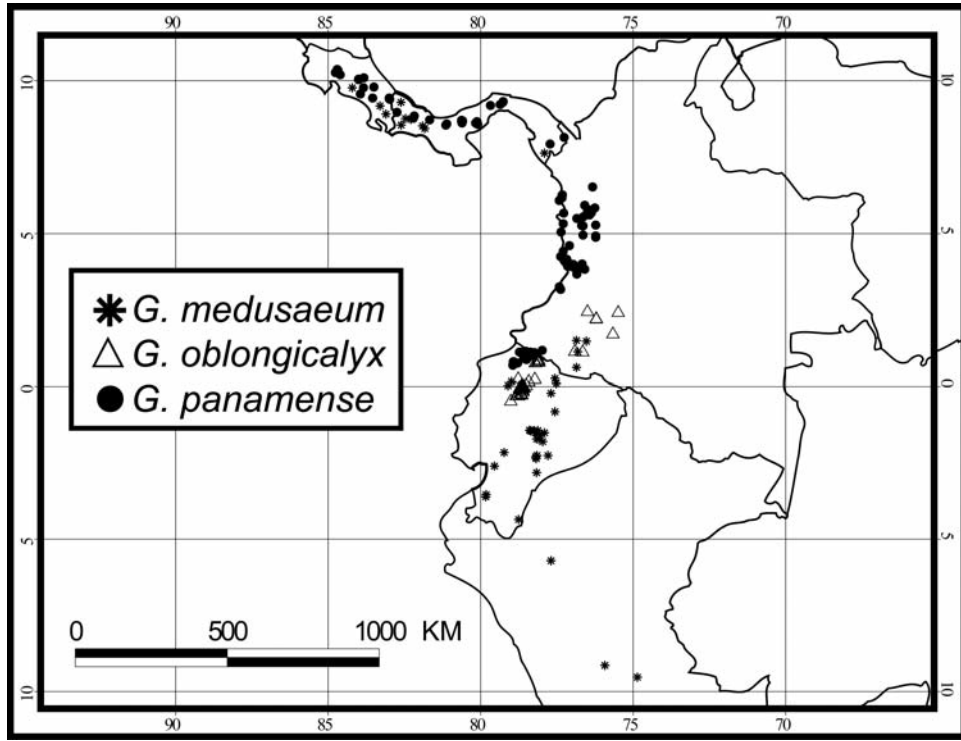


FIG. 23. Distribution of *Glossoloma medusaeum*, *G. oblongicalyx*, and *G. panamense*.

along ridge, last stream before rising to antenna, *Folsom et al.* 4776 (MO, PMA, US); southern slopes of Cerro Pate Macho, along Río Palo Alto, *Knapp et al.* 2038 (MO, PMA, US); trail up Cerro Pate Macho, *Stein et al.* 1176 (MO, US).—COCLÉ: El Valle, end of road leading to Hotel Turístico, *Folsom* 3119 (MO).—DARIÉN: *Folsom* 4386 (MO); Cerro Pirre, valley between Pirre and next most southerly peak sloping hillside, *Folsom* 4496 (MO-2 sheets, US).

Colombia. CAUCA: Mpio. Santa Rosa, Serranía de los Churubelos, Bota Cauca, La Piedra, *González* 744 (COL).—META: NE extent of Cordillera La Macarena, macizo Renijifo, *Idrobo & Schultes* 1063 (COL, GH, U, US).—NARIÑO: environs of Puerto Limón, *Mora* 1066 (COL).—PUTUMAYO: Mpio. Mocoa, Corregimiento San Antonio, vereda Alto Campucana, Finca Mariposa, *Fernández A. et al.* 10719 (COL, NY, US), *Fernández A. et al.* 11008 (COL), *Fernández A. et al.* 11312 (COL); Mocoa, *Vogel* 320 (US). **Ecuador.** AZUAY: Cantón Cuenca, Bosque Protector Molleturo Mullopungo, 2 km E of the village of Mantareal, *Clark et al.* 2493 (QCNE, SEL, US); between Río Blanco and Río Norcay, road Chacanceo–Molleturo, *Steyermark* 52822 (US); ridge between Mirador (Buena Vista), above Río Gamolotal, N of and across Río Norcay from Molleturo, *Steyermark* 52902 (F).—BOLÍVAR: Hacienda Changuil, La 16, *Cornejo & Bonifaz* 4353 (K, US).—CARCHI: Cantón Tulcán, Parroquia Chical, trail from the village of Quinyal towards Gualpi, near border of the Reserva Awá, *Clark & Mejía* 6290 (QCNE, US).—EL ORO: Cantón Piñas, border of Reserva Ecológica Buenaventura; 11 air-km N of “Entrada la Virgen” on road towards Virón, *Clark et al.* 7990 (AAU, K, MO, NY, QCA, QCNE, SEL, UNA, US); Hacienda Daucay, Bosque del Perezoso, *Cornejo & Bonifaz* 467 (US); 10 km W of Piñas, road Piñas–Machala, *Dodson et al.* 8451 (SEL); 11 km W of Piñas, road to Sta. Rosa, *Dodson et al.* 9140 (MO, SEL).—LOJA: Parroquia Mercadillo, *Cerón M.* 23253 (QAP).—MORONA–SANTIAGO: near Méndez, Yucal region; above Río Paute, ca. 5 km W of Méndez, *Camp* 939 (NY); Cantón Macas, Río Upano, trail to Las Lagunas de Sardinayacu, *Cerón M. et al.* 31610 (QAP); Cantón Palora, confluence of Río Llushin Grande and Río Chico, Parque Nacional Sangay, *Cerón M. et al.* 32573 (QAP); Cantón Palora, Parroquia 16 de Agosto, hwy Macas–Puyo, turnoff towards town of Palora, *Clark & Katzenstein* 8335 (QCA, QCNE, SEL, UNA, US); trail Macas–Arapicos, La Punta, 10 km N of Macas, *Harling & Andersson* 12979 (GB, SEL); N of Macas, border of Parque Nacional Sangay, *Kvist* 60429

(US); near Macas, E of Río Upano, E of village Sevilla Don Bosque, *Kvist 60448* (US); Puerto Santana, 5–6 km SW of Shell-Mera, *Lugo S. 458* (AAU, GB, SEL, US); Macuma, 50 km NE of Macas, *Lugo S. 3637* (GB, SEL); Cordillera de Cutucú, 25 km SE of Logroño, *Madison & Coleman 2609* (SEL); Cordillera de Cutucú, western slopes, along a trail from Logroño to Yaupi, *Madison et al. 3224* (SEL), *Madison et al. 3463* (SEL); Río Macuma, near Cerro Macuma, *McElroy 42* (QCA); Cantón Morona, Bosque Domono, 12 km W of Macas, *Padilla et al. 3056* (QCNE); trail from Mutintz to Tunants, SW of Makuma, *Ståhl 1723* (QCNE).—NAPO: bridge at Río Jondachi, between Archidona and Cotundo, *Davis 437* (GH, SEL); Cantón Archidona, Parque Nacional Sumaco Napo-Galeras, Faldas de Galeras, Bloque 19, *Freire & Cerda 353* (QCNE); Cerro Antisana, Forest Shingupino, between Río Napo and Río Tena, 8 km SE of Tena, *Grubb et al. 1577* (K), *Harling 3721* (S); Reserva Ecológica Cayambe-Coca, Río Due, hwy Lago Agrió–Quito, Km 65, road from Herradura to Chuscuyacu, *Jaramillo & Coello 3083* (AAU, QCA-2 sheets); Salto San Rafael, along Río Quijos, *Smith & Dunn 3424* (AAU, E, GB, MO, QCA, QCNE, SRP, US, WU).—NAPO/PASTAZA: near Canelos, *Mexia 6860* (CAS, NA, US); environs of Puyo, near Río Grande, *Wiehler 7173* (SEL).—PASTAZA: Shell Mera, Río Pastaza, *Barclay 4835* (COL); Cantón Pastaza, Estación Experimental Pastaza, Km 32, hwy Puyo–Macas, Río Pacayacu, *Caranqui et al. 381* (QCNE); Cantón Mera, Parroquia Shell, road to Río Anzu and beyond (S of the town Mera), trail heading north from road, *Clark et al. 7793* (QCNE, US); road Puyo–Ambato, 4 km W of Mera, *Croat 49730* (MO, US); road Puyo–Diez de Agosto and Arajuno, 18 km NE of hwy Puyo–Macas, 8.2 km NE of Diez de Agosto, *Croat 59057* (MO); Río Topo, *Dodson & Thien 2086* (US); Tarqui, 5 km S of Puyo, *Harling & Andersson 17056* (GB, US); Mera, *Harling et al. 9970* (GB, SEL); Puento Santana, 20 km along Río Pastaza, SSE of Shell-Mera, *Holm-Nielsen & Jeppesen 513* (AAU, US); hwy Baños–Puyo, Km 38, *Jørgensen & Laegaard 56465* (AAU); hwy Baños–Puyo, W of Mera, *Kvist 60336* (AAU, US); Puerto Sarayacu, at Río Bobonaza, *Lugo S. 1716* (AAU, GB, SEL); 10–20 km N of Canelos, *Lugo S. 4589* (GB, S, SEL); road Puyo–Macas, *Lugo S. 4714* (GB, K, SEL, U, US, WIS); road Puyo–Puerto Napo, ca. 12 km N of Puyo, *Lugo S. 4731* (F, GB, SEL); 11.4 km E of Topo, *MacBryde 146* (US); between Mera and Río Negro, 27 km from Puyo on road to Baños, 1 km N of road, *Molau et al. 2473* (AAU, GB).—PICHINCHA: 20 km W of Santo Domingo de los Colorados, *Cazalet & Pennington 5298* (K, NY, UC, US); Cantón Quito, Reserva Río Guaycuyacu, near confluence of Río Guaycuyacu and Río Guayabamba, *Clark et al. 4973* (AAU, COL, E, MO, QCA, QCNE, SRP, US); Reserva Forestal ENDESA, Río Silanche, Corporación Forestal Juan Manuel Durini, Km 113 from the hwy Quito–Puerto Quito, 10 km N of hwy, *Jaramillo 6981* (AAU-2 sheets, GB, K, NY); Jaramillo 8206 (AAU, QCA), *Jaramillo 7403* (QCA); Cantón Quito, Reserva Río Guaycuyacu, near confluence of Río Guaycuyacu and Río Guayabamba, *Mendoza T. et al. 533* (AAU, COL, NY, QCA, QCNE, SEL, US).—SUCUMBÍOS: Alto Río Aguarico, Río Cingual, Canyon above Chingual Bridge, on road Bonito–Tulcán, above Puerto Libre, *Aguinda et al. 898* (QCNE); NW of the Cascada San Rafael, *Jaramillo et al. 13149* (NY).—TUNGURAHUA: Cantón Baños, Parroquia Río Negro, near Río Topo, *Clark & Durán 6018* (AAU, COL, F, GH, K, MO, NY, QCA, QCNE, US); Cantón Baños, Hotel “El Otro Lado,” Río Verde (tributary of Río Pastaza), near El Pailon del Diablo, *Clark & Rea 8018* (COL, E, QCA, QCNE, SEL, UNA, US); Cantón Baños, Parroquia Río Negro, forest near hwy Baños–Puyo, western side of Río Topo, *Clark & Katzenstein 8405* (QCNE, US); hwy Ambato–Baños, *D’Arcy 14011* (MO); hwy Baños–Puyo, Río Pastaza, *Kvist et al. 60321* (US); Colonia México, environs of El Topo, ca. 10 km NW of Mera, *Lugo S. 651* (GB, NY, S, SEL); Cashurco, Río Negro, *Lugo S. 799* (GB, K, SEL, US); environs of Río Margarjitas, trail to Canelos trail, *Penland & Summers 136* (F, GH, US).—ZAMORA-CHINCHIPE: Cantón Nangaritzá, Parroquia Zurmi, Comunidad Centro Shaime (along Río Nangaritzá), 2–4 km NW of Centro Shaime, *Clark et al. 6482* (K, MO, QCA, QCNE, SEL, UNA, US). **Peru.** AMAZONAS: Condorcanqui, Falso Paquisha, Cordillera del Cóndor, *Baldeón M. 580* (USM).—HUÁNUCO: Prov. Leoncio Prado, Dto. Hermilio Valdizán, La Divisoria, hwy Pucallpa, *Schunke V. 11380* (IBE, US); Prov. Pachitea, region of Pucallpa, western part of Sire Mountains and adjacent lowland, from ca. 20–24 km SE of Puerto Inca, crest of the mountain range going E from the Campamento Oro to the Campamento Sira and continuing to NNE to the beginning of the cloud forest at 1050 m, next to campamento Pato Rojo, *Wallnöfer 19388* (US).—SAN MARTÍN: Dto. Rioja; Pardo Miguel, Centro Poblado Aguas Verdes, Camp 1, *Sánchez Vega et al. 9476* (F).

Glossoloma medusaeum is one of four terrestrial subshrub species with fimbriate calyx margins (Fig. 22D). It differs from the other three (*G. purpureum*, *G. anomalum*, *G. sprucei*) in its glabrescent leaves, stems, and calyx lobes. The stems and calyces of *G. sprucei* are densely villous (Fig. 35C); the calyx lobes are broadly ovate and more deeply fimbriate (Fig. 35). In South America, where *G. medusaeum* and *G. sprucei* are sympatric, the two species can be differentiated by flower color. The corolla of *G. sprucei* is yellow and that of *G. medusaeum* red; however, populations of *G. medusaeum* in Central America

have corollas that are uniformly yellow. *Glossoloma anomalum* is distinguished from *G. medusaeum* by smaller corollas (ca. 1.5 cm long) and non-resupinate flowers (Fig. 8). *Glossoloma purpureum* is easily differentiated from all other congeners by the abaxial uniformly bright purple leaf coloration.

- 15. *Glossoloma oblongicalyx*** (J. L. Clark & L. E. Skog) J. L. Clark, *Selbyana* 25: 204. 2005. *Alloplectus oblongicalyx* J. L. Clark & L. E. Skog, *Novon* 15: 74. 2005.—
TYPE: ECUADOR. Pichincha: Cantón Quito, trail between Lloa and Mindo, 30 km W of Lloa, 00°11'S, 78°41'W, 1800 m, 12 Feb 1997, J. L. Clark & C. S. Clark 3903 (holotype: QCNE!; isotypes: AAU! MO! NY! US!).

Herbs to subshrubs, terrestrial; stems erect, unbranched, to 3 m tall, to 1 cm in diameter, usually woody, succulent when young, internodes 5–10 cm long, terete to quadrangular, glabrescent or glabrous, sometimes sparsely pubescent, leaf scars raised from stem surface, enations at base of petiole present. Leaves opposite, usually equal in a pair; petioles 5–12 cm long, sparsely to densely pilose; blades 12–22 cm long, 8–15 cm wide, elliptic, base acute to rounded, apex acute to obtuse, margin serrate or serrulate, adaxially green, sparsely strigose, abaxially all green to all red, sparsely to densely pilose, coriaceous when dry, lateral veins 5–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, with 3–5 resupinate flowers per node, posture pendent at anthesis, bracteoles ca. 20 mm long, 8 mm wide, ovate; pedicels shorter than the petiole, 3–5 cm long, pilose, pedicel enations present. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, 4 equal, 4–5 cm long, 2–3 cm wide, oblong, base cordate, apex obtuse, margin serrulate or entire, all green, all red, or mostly red with greenish white base, both surfaces sparsely pilose; fifth (ventral) lobe smaller and narrower, 3–4 cm long, 0.5–1 cm wide, oblong. Corolla 5–6.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base 0.5–1 cm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat not constricted, appearing laterally compressed, 13 mm wide (at mouth), usually uniformly dark red, sometimes appearing orange to vermillion, outside sparsely sericeous becoming densely sericeous distally, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb reflexed, zygomorphic, to 1.5 cm wide, usually dark red, sometimes appearing orange to vermilion, lobes nearly equal, 4–5 mm long, 4.5 mm wide, rotund, spreading, slightly recurved, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 2.5 cm long, adnate to base of corolla tube for ca. 4 mm, connate for 1 mm, forming an open sheath, glabrous; anthers ca. 1 mm long, ca. 3 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary ca. 5 mm long, ca. 4 mm wide, ovoid, densely pilose, style 3–4 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, ca. 2 cm long, ca. 1.3 cm wide, ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved. Seeds numerous, 0.9 mm long, 0.3 mm wide, fusiform, longitudinally striate, brownish red. Fig. 24.

Phenology. Flowering and fruiting throughout the year.

Distribution (Fig. 23). Ecuador and southern Colombia; 1400–3200 m.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** CAQUETÁ: Cordillera Oriental, road Guadalupe–Florencia, Km 14, *Londoño & Kvist 99* (COL, QCA, US); eastern slopes of the Cordillera Oriental, Quebrada Río Hacha, below Gabinete, *Cuatrecasas 8553* (COL, US).—CAUCA: western slopes of the Cordillera Central, región de

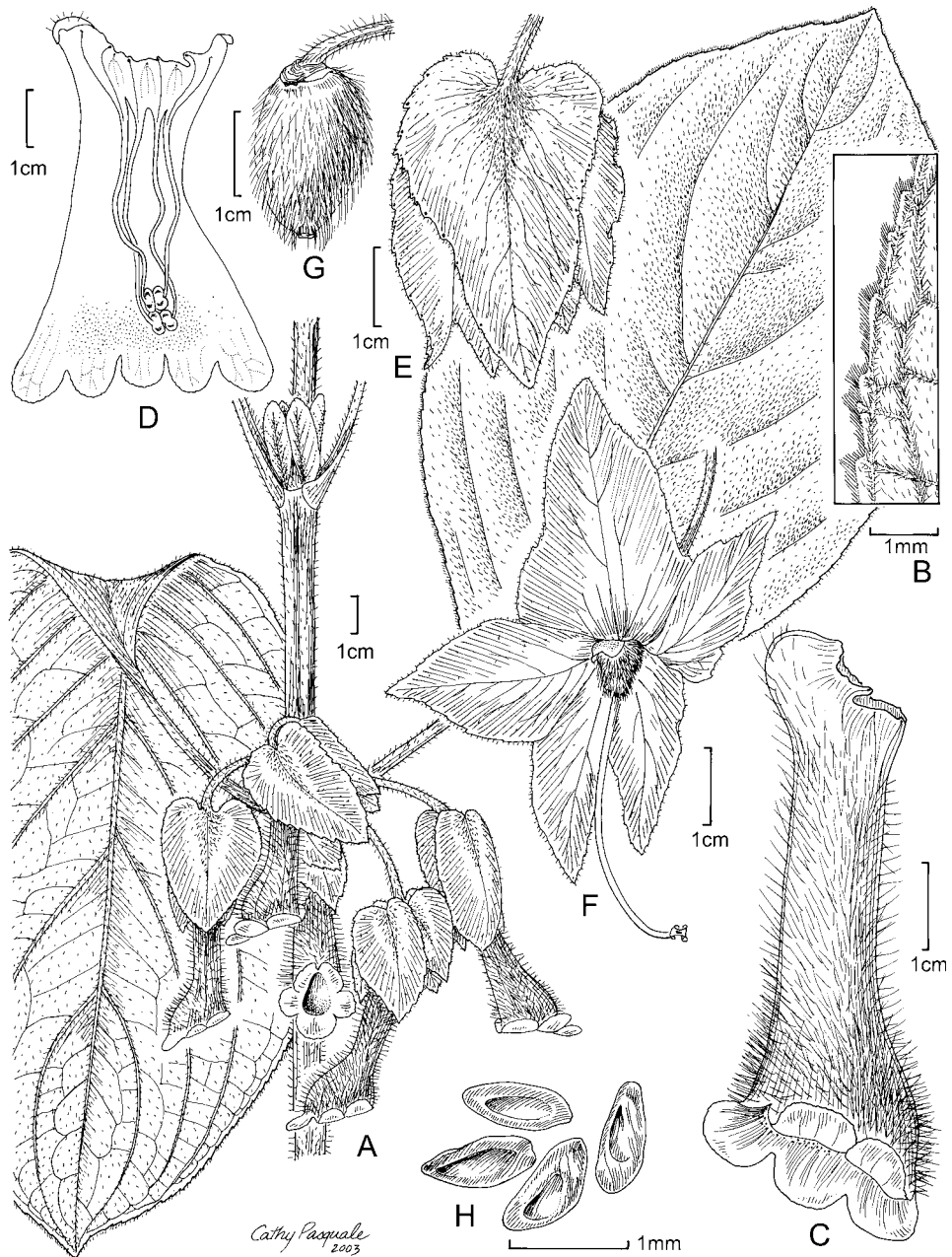


FIG. 24. *Glossoloma oblongicalyx*. A. Habit. B. Abaxial leaf pubescence. C. Corolla. D. Corolla opened to show stamens. E. Calyx. F. Calyx opened and corolla removed to show pistil and bilobed nectary gland. G. Immature fruit. H. Seeds. (Based on: A, Zak & Jaramillo 2311; B, Webster & Castro 30250; C, D, G, H, Luteyn et al. 8819; E, F, J. L. Clark & S. G. Clark 4588). Reprinted with permission from Novon (Clark et al. 2005: Fig. 3).

Moscopán, Hoya del Río San José, Aguabonita, *Cuatrecasas* 23491 (US); Mpio. Santa Rosa, Finca Teresa (El Cajón), 2 km above Quebrada San Antonio, near Cerro La Vieja, *Rubiano & Moreno* 507 (COL).—HUILA: western slopes of Cordillera Oriental, below Gabinete, ravine above San Andrés, *Cuatrecasas* 8620 (COL, US); Mpio. La Plata, eastern slope of Cordillera Central, Finca Merenberg, route towards Agua Bonita, *Díaz P. et al.* 729 (COL); Mpio. La Plata, eastern slope of the Cordillera Central, Finca Merenberg, Cauca border E of Leticia, *Gentry et al.* 47657 (MO, US); Mpio. San José de Isnos, route towards El Hornito, *Lozano* 3361 (COL); confluence of Río Villalobos and Río Cauchos, *Schultes & Villarreal* 5204 (COL, GH, US); La Plata, *von Sneiderm* 2631 (A, NY, S); Mpio. La Plata, eastern slope of Cordillera Central, Finca Merenberg, Km 101 of road La Plata–Popayán, *Stein* 3730 (COL, K, MO, US).—PUTUMAYO: Valle de Sibundoy, 1.5 km E Sibundoy, *Bristol* 366 (COL, GH, US); eastern slopes of Cordillera Oriental, between Sachamates and San Francisco de Sibundoy, *Cuatrecasas* 11460 (COL, US); eastern slopes of Cordillera Oriental, Río Mocoa drainage, between Sachamate and San Antonio, *Ewan* 16693 (MO, US); Mpio. Sibundoy, between San Francisco and Río Blanco, vía a Mocoa, *E. Hernández et al.* 401 (US); Mpio. Sibundoy, between San Francisco and Río Blanco, vía a Mocoa, *E. Hernández et al.* 404 (US); road San Francisco–Mocoa, Km 92 from Pasto, sitio Los Monos, *Plowman & Davis* 4332 (COL); Sibundoy, hill N of valley, *Schultes & Villarreal* 7475 (COL, US); valley of Sibundoy, *Schultes & Villarreal* 7667 (COL, US). **Ecuador.** PROVINCE UNKNOWN: from the forest of the Andes, 7000 ft elevation, *Jameson s.n.* (P).—CARCHI: Km 25, Maldonado–Tulcán, *Besse et al.* 2244 (SEL); Cantón Espejo, Parroquia Guatal, Mirador de las Golondrinas (Fundación Golondrinas), trail from El Corazón towards La Cortadera (2 km NE of refugio), *Clark & Folleco* 8470 (AAU, COL, E, K, MO, NY, QCA, QCNE, SEL, UNA, US); Cantón Mira, Parroquia Jijón y Camaño, unfinished road from El Carmen towards Chical, Agua Amarilla, *Clark & Folleco* 8509 (AAU, E, MO, QCA, QCNE, SEL, UNA, US), *Clark & Folleco* 8510 (QCNE, SEL, US); 12 km E of Maldonado on road to Tulcán, *Gentry & Shupp* 26626 (MO, SEL); road Tulcán–Maldonado, ca. 13 km SE of Maldonado, *Harling & Andersson* 12336 (GB, SEL, US); forest and ridge area above Río Verde and ridge flanking Cerro Golondrinas, *Hoover* 2354 (MO); road Tulcán–Maldonado, ca. 13 km SE of Maldonado *Jørgensen* 61539 (QCA); 78–82 km W of Tulcán, *Luteyn & Cotton* 10900 (QCA, QCNE, US); near Maldonado, *Luer et al.* 3374 (SEL); Cantón Mira, N of El Carmen on road to Chical, *Palacios et al.* 9841 (MO, QCNE, SEL); Cantón Mira, El Carmen, Cerro Golondrinas, *Tirado et al.* 1245 (QCNE); above Maldonado, *van der Werff & Gudiño* 10808 (MO, QCNE, US), *van der Werff & Gudiño* 10855 (MO, QCNE, US).—COTOPAXI: Cantón Sigchos, Parroquia San Francisco de las Pampas, Bosque Integral Otonga, *Clark & Muñoz* 6141 (QCNE, SEL, US), *Nowicki & Mutke* 1455 (QCA).—IMBABURA: Cantón Cotacachi, Parroquia García Moreno, Cordillera de Toisán, Cerro de la Plata, Bosque Protector Los Cedros, *Clark et al.* 7410 (QCNE, SEL, UNA, US); Cantón Cotacachi, Parroquia García Moreno, Cordillera de Toisán, Cerro de la Plata, Bosque Protector Los Cedros, Sendero Camino del Oso, *Clark et al.* 7444 (QCNE, SEL, UNA, US); Cantón Cotacachi, Parroquia García Moreno, Cordillera de Toisán, Cerro de la Plata, Bosque Protector Los Cedros, *Clark et al.* 7445 (NY, QCNE, US); Cantón Cotacachi, Plaza Gutiérrez, Sector Tabla Chupa, *Gudiño & Tipaz* 1181 (QCNE); road Otavalo–Selva Alegre, *Palacios & van der Werff* 10558 (MO, QCNE, US).—MANABÍ: Carmen, *Tate* 472 (US).—PICHINCHA: Niebly and Quitobaya, *André* 1511 (K); Mindo, *André* 1512 (K); Finca Bella Vista, road Quito–Puerto, Km 62, *Bergmann & Pedersen* 97839 (AAU); Cantón Quito, Bellavista Lodge, next to Mindo Nambillo Reserve, ca. 6 km S of Tandayapa, *Bergmann & Pedersen* 97842 (AAU); Cantón Quito, Hacienda Verde Cocha, Cerro Pugsí, *Caranqui et al.* 264 (MO, QCNE); Cantón Quito, Hacienda Verdecocha, Cerro Pugsí–Nono, *Caranqui et al.* 268 (US); Cantón Quito, Bellavista Lodge, next to Mindo Nambillo Reserve, ca. 10 km S of Tandayapa, *Clark et al.* 3531 (QCNE, SEL, US); Cantón Quito, Bellavista Lodge, next to Mindo Nambillo Reserve, ca. 6 km S of Tandayapa, *Clark et al.* 3821 (QCNE, SEL, US); Cantón Quito, Cordillera de los Yumbos, overgrown path between La Victoria and Chiriboga, *Clark & Nazzaro* 4588 (AAU, CAS, COL, E, K, MO, NY, QCA, QCNE, SEL, UNA, US); Cantón Quito, Cordillera de los Yumbos, overgrown path between La Victoria and Chiriboga, *Clark & Nazzaro* 4594 (MO, QCA, QCNE, US); Parroquia Calacalí, Reserva Geobotánica del Pululahua, Sta. Rita, La Escuela, *Cerón et al.* 4762 (MO, QCNE, US); Cantón Quito, trail from Lloa to Mindo, S of Río Cinto, *Clark* 4489 (US); Cantón Quito, old hwy between Quito and Santo Domingo (via Chiriboga), *Clark et al.* 7612 (QCNE, US); Cantón Quito, Parroquia Nono, El Pahuma Orchid Reserve, 17 km E of Nanegalito, *Clark et al.* 7654 (COL, QCNE, SEL, UNA, US); Cantón Quito, Parroquia Nono, El Pahuma Orchid Reserve, 17 km E of Nanegalito, trail towards Sendero de Los Yumbos, *Clark et al.* 7687 (AAU, CAS, COL, E, F, K, MO, NY, QCA, QCNE, SEL, UNA, US); Cantón Quito, road Nono–Nanegal, 11.7 km NW of Tandayapa, *Croat* 49339 (MO, US); Cantón Quito, road between Calicali and Nanegalito, 24.6 km W of Mitad del Mundo, 16.8 km W of Calicali, 14 km E of bridge at junction of road to Tandayapa and Nanegalito, *Croat* 72867 (QCNE); Cantón Quito, Parroquia Nono, Reserva Orquideológica El Pahuma, road Calacalí–Nanegalito, Km 30, *Freire & Cerón* 1281 (MO, QCNE); hwy Quito–Nono–Pacto, between Nono and Tandayapa, *Holm-Nielsen* 16144 (QCA); Cantón Quito, road Quito–Chiriboga, between Km 75 and 85, *Jaramillo & Zak* 2311 (MO, NY, US); Cantón

Quito, road Lloa–Mindó, between Km 30 and 34, *Jaramillo & Zak 2112* (GH, K, MO, NY, US); Cantón Quito, road Lloa–Mindó, between Km 30 and 34, *Jaramillo & Zak 2115* (COL, GH, K, MO, NY, US); Santa Rosa, between Los Bancos and Tandayapa, *Jaramillo 6811* (GB-2 sheets); cloud forest remnants below Lloa, *Luer et al. 4369* (SEL); below Nono, embankment along stream above fork in road to Mindó, *Luer et al. 4712* (SEL); old road Quito–Nono road, ca. 12–14 km WNW of Nono, *Luteyn et al. 8819* (CAS, NY, QCA, QCNE, US); old road Quito–Nono, ca. 9 km S of Tandayapa towards Mindó, *Luteyn et al. 8835* (NY); old road Santo Domingo–Chiriboga, *Mendoza T. et al. 625* (QCA, QCNE, US); Cantón Quito, Reserva Orquideológica El Pahuma, hwy Calacalí–Los Bancos, Km 22, *Mantuano et al. 24* (MO); Cantón Quito, Cerro el Castillo, Línea del Oleoducto de Crudos Pesados, *Mantuano et al. 79* (MO, QCNE); 32.2 km W from Cotocollao, E near bridge across Río Alambi, *MacBryde 100* (QCA, US); Nebly, Quito, *Sodiro s.n.* (P); selvas del Monte Corazón and Atacazo, *Sodiro 119* (Q); road Nono–Nanegal, Km 43–45, Río Alambi, *Sparre 19334* (QCA, S); Cantón Quito, Parroquia Nanegal, Bosque Protector Maquipucuna, Montañas de Maquipucuna, Cerro Sosa and ridge adjacent to Cerro Montecristi, *Webster et al. 28939* (DAV, QCNE, US); Cantón Quito, Parroquia Nanegal, Bosque Protector Maquipucuna, Montañas de Maquipucuna, ridge of Cerro Sosa, *Webster et al. 29155* (DAV, QCNE); Cantón Quito, Parroquia Nanegal, Bosque Protector Maquipucuna, Montañas de Maquipucuna, rain forest on main ridge of Cerro Sosa, *Webster et al. 29158* (DAV, QCNE, US); Cantón Quito, Río Pichán, *Webster et al. 30107* (DAV, QCNE, US); Cantón Quito, Bosque Protector Maquipucuna, above Río Pichán, 7.5 km airline SE of Nanegalito, *Webster & Castro 30250* (DAV, QCNE, US); Cantón Quito, Parroquia Nanegalito, western slopes of Cerro Negro, 2.5–3 km airline NE of Nanegalito, *Webster et al. 30479* (DAV, US); Cantón Quito, Parroquia Nanegal, Bosque Protector Maquipucuna, slopes of Cerro Monte Cristi, *Webster et al. 30577* (DAV, QCNE, US); Cantón Quito, Parroquia Nono, El Pahuma Orchid Reserve, *Webster et al. 31605* (QCNE); Valle de Lloa y Palmira, southern flanks of Volcán Pichincha, 20–29 km from the hwy Quito–Lloa–Mindó, *Zak 1067* (AAU, F, GB); Cantón Quito, hwy San Juan–Chiriboga–Empalme, sector Guajalito, Km 55, *Zak 1228* (AAU, MO, NY, PMA, US); Cantón Quito, road San Juan–Chiriboga, Km 55, sector Guajalito, *Zak 1231* (US).

Glossoloma oblongicalyx is distinguished from other members of the genus by the combination of uniformly colored corollas, an erect unbranched habit, conspicuously oblong calyx lobes, and pedicels that are shorter than the petioles. *Glossoloma oblongicalyx* resembles *G. grandicalyx*; some of the paratypes cited for *G. grandicalyx* (see that species, no. 9) are here assigned to *G. oblongicalyx* (Clark et al. 2005). The oblong calyx lobes and shorter pedicels of *G. oblongicalyx* (Fig. 24) are the most consistent characters for separating it from *G. grandicalyx*. The color of the calyx lobes in *G. oblongicalyx* is variable and ranges from greenish white to uniformly red. The color of the leaves also varies from green to red. Many herbarium collections of *G. oblongicalyx* were originally determined as *G. tetragonoides* or *G. tetragonum*. *Glossoloma oblongicalyx* differs in having larger and oblong calyx lobes in contrast to smaller and more ovate calyx lobes of *G. tetragonoides*. The calyx lobe margin of *G. oblongicalyx* is serrulate or entire in contrast to the deeply serrate margins of *G. tetragonum*. The geographic ranges of these two species overlap in Colombia, but *G. tetragonum* is more common in Central America (Fig. 39) and *G. oblongicalyx* is more common in Ecuador and eastern Colombia (Fig. 23). *Glossoloma oblongicalyx* has been collected in the northwestern Andean slopes of Ecuador and southern Colombia from 1400 to 3200 m. Although recorded from the eastern Andean slopes in Colombia (Cordillera Oriental), it has not yet been found on the adjacent eastern slopes in Ecuador.

16. *Glossoloma panamense* (C. V. Morton) J. L. Clark, *Selbyana* 25: 204. 2005. *Alloplectus panamensis* C. V. Morton, *Ann. Missouri Bot. Gard.* 29: 36. 1942.—TYPE: PANAMA. Coclé: hills N of El Valle de Antón, 1000 m, 14 Jul 1940, *P. H. Allen 2189* (holotype: US!; isotypes: MO! S!).

Herbs to subshrubs terrestrial, rarely epiphytic; stems erect, unbranched, to 2.5 m tall, to 2.0 cm in diameter, woody, internodes 5–11 cm long, subquadrangular, glabrescent

proximally, densely yellow-hirsute distally, leaf scars raised from stem surface, enations at base of petiole present. Leaves opposite, usually equal in a pair; petioles 8–15 cm long, hirsute; blades chartaceous when dry, ovate to elliptic-ovate, 10.5–37.0 cm long, 6.2–20 cm wide, base acute to rounded or truncate, apex acuminate to acute, margin serrate or serrulate, adaxially dark green to dull reddish, pilose to strigose, abaxially lighter green or coppery to maroon with prominent green veins, densely to sparingly pilose, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–4 flowers per node, posture pendent at anthesis, bracteoles ovate, ca. 1–15 mm long, 5–7 mm wide; pedicels shorter than the petiole, 2–3 cm long, densely pilose-hirsute, pedicel enations present. Calyx lobes nearly free, usually valvate, sometimes completely separate, erect, nearly equal, 15–20 mm long, 5–10 mm wide, oblong, base truncate, apex acute, margin glandular-serrate to laciniate, dark red, abaxially sparsely to densely yellow or reddish pilose-villous, adaxially sparsely to densely yellow or reddish pilose. Corolla 3.5–5.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base ca. 5 mm in diameter, middle slightly ampliate to uniformly tubular, throat not constricted, appearing laterally compressed, to 1.1 cm wide (at mouth), outside pilose-villous, becoming densely pilose-villous distally, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb reflexed, zygomorphic, ca. 1.5 cm wide, salmon to orange or red, lobes nearly equal, recurved, 3–4 mm long, ca. 5 mm wide, rotund, entire. Nectary gland bilobed or single-lobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 3 cm long, adnate to base of corolla tube for ca. 4 mm, connate for 1 mm, forming an open sheath, glabrous; anthers 1–2 mm long, 2.5–3 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary ca. 5 mm long, ca. 4 mm wide, ovoid, pilose, style ca. 3 cm long, glabrous, stigma stomatomorphic, sometimes bilobed. Fruit a fleshy capsule, pendent when ripe, ca. 2 cm long, ca. 1.8 cm wide, ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, ca. 1 mm long, ca. 0.2 mm wide, fusiform, longitudinally striate, yellow. Fig. 25.

Phenology. Collected in flower throughout the year, also in fruit, except for June and July.

Distribution (Fig. 23). Central America (Costa Rica and Panama) and northern South America (western Colombia and northwestern Ecuador); premontane and montane wet forests; sea level to 2000 m.

ADDITIONAL SPECIMENS EXAMINED. **Costa Rica.** CARTAGO: Turrialba, Tayutic, Jicotea, headwaters of Río Jicotea, *Herrera 7990* (K); Cantón Paraíso, Parque Nacional Tapantí, Valle del Reventazón, Sector Quebrada Segunda, *Mora 419* (BM).—LIMÓN: Cantón Talamanca, Dist. Bratsí, ridge between Río Sukut and Río Uren, road to Purisquí, *Chacón 103* (MO); Cantón Talamanca, Dist. Bratsí, Crorina, camino a Amubri, Quebrada Crori y Quebrada Lumbeta, *Chacón 180* (F, MO).—PUNTARENAS: near Laguna, San Vito de Java, *Schubert 1239* (NA). **Panama.** BOCAS DEL TORO: road from Fortuna dam to Chiriquí Grande, 10 mi from continental divide, *Churchill 5928* (MO, PMA, US); road to Rambala, *Correa A. et al. 9866* (PMA); road from Fortuna Lake to Chiriquí Grande, 8 km N of continental divide, *Hampshire & Whiteford 505* (BM); Cerro Bonyic, above Quebrada Lugrón, *Kirkbride & Duke 645* (MO, NY); Fish Creek Mts, environs of Chiriquí Lagoon, *von Wedel 2308* (MO, US-2 sheets).—COCLÉ: hills N of El Valle de Antón, *Allen 2166* (US); El Valle de Antón, north hills, *Allen 3555* (EAP, G, GH, MO, US); Alto Calvario, 5.3 m above El Copé, above sawmill, on continental divide, *Antonio 3043* (MO); El Copé: trail from park guard house to stream, *Aranda et al. 2850* (BM, PMA, US); Dist. La Pintada, Corregimiento El Arino, Parque Nacional Omar Torrijos, 6–10 km NNW from El Copé, main trail from abandoned sawmill to the Comunidad La Rica, *Clark 8638* (AAU, COL, E, K, MO, PMA, SCZ, SEL, UNA, US); Dist. La Pintada, Corregimiento El Arino, Parque Nacional Omar Torrijos, 6–10 km NNW from El Copé, main trail from abandoned sawmill to the Comunidad La Rica, *Clark 8612* (AAU, CAS, COL, E, F, K, MO, NY, PMA, SCZ, SEL, UNA, US); Distr. Antón, Corregimiento El Valle, environs of Altos de la Mesa and Monumento Natural

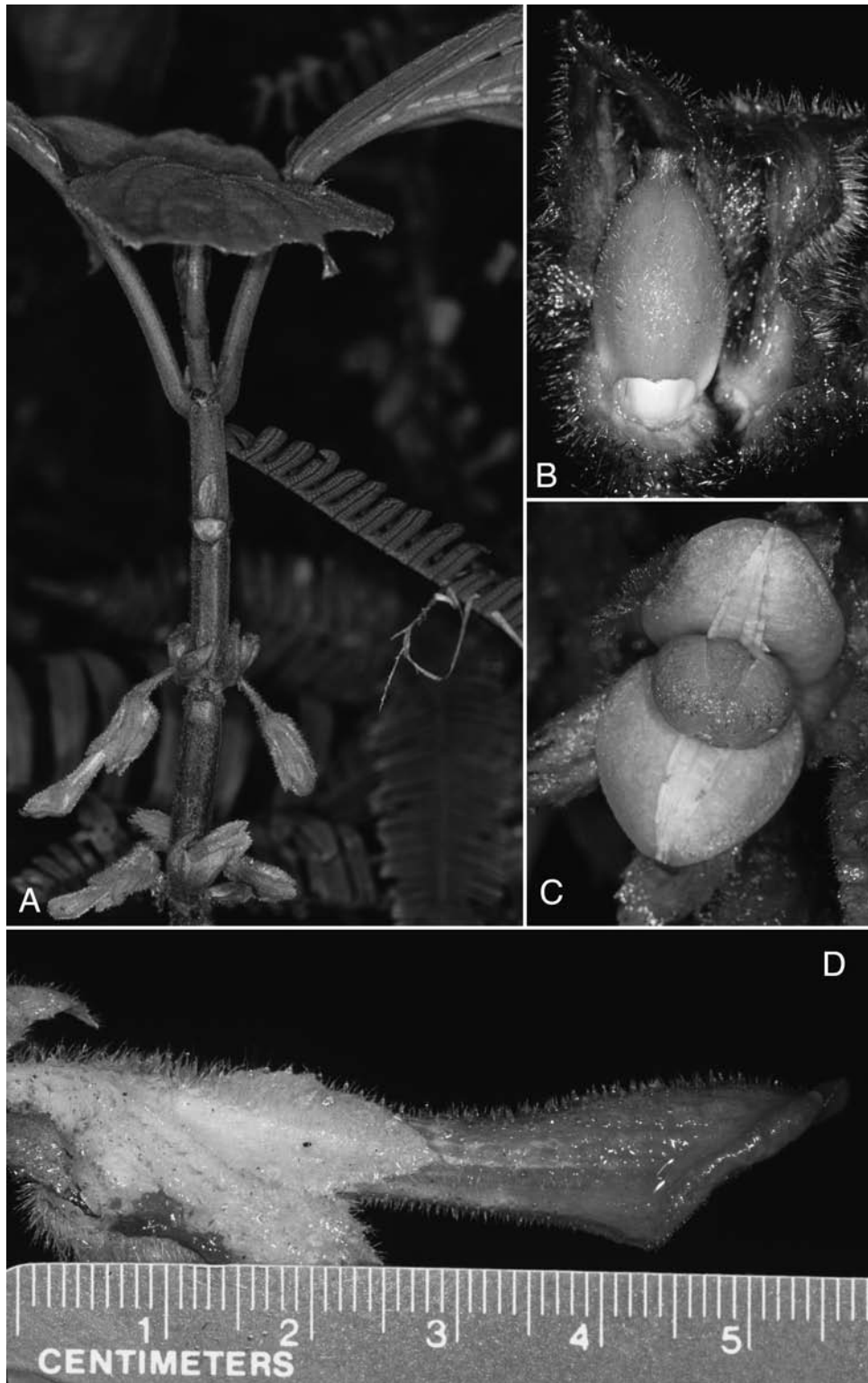


FIG. 25. *Glossoloma panamense*. A. Habit. B. Nectary gland. C. Mature fleshy capsule. D. Lateral view of flower. (Photos by J. L. Clark; vouchers: A, C, *J. L. Clark* 8612; B, *J. L. Clark* 7158; D, *J. L. Clark* 8638.)

Cerro Gaital, *Clark 8775* (PMA, SCZ, SEL, UNA, US); U.S. Army Tropical Test Center, Fort Clayton, Canal Zone, *Correa A. 56* (DUKE, FSU, SCZ); La Mesa, above El Valle de Antón, *Croat 14387* (MO); La Mesa, above El Valle de Antón, road to Cerro Pilón, *Croat 25391* (MO, NY); along road past Furlong's Finca, N of Cerro Pilón, *Croat 37552* (MO); Atlantic slope near the continental divide, along lumber road, N of El Copé, 9.4 km above El Copé, *Croat 44646* (MO); vicinity of La Mesa, N of El Valle de Antón, along gravel road to water reservoirs, *Croat 67118* (MO, PMA, US); El Valle de Antón, near Finca Macarenita at La Mesa, *Croat & Zhu 77672* (US); El Petroso, *D'Arcy 11326* (MO, US); environs between Cano Blanco del Norte, Cano Sucio and Chorro del Río Tifé, *Davidse & Hamilton 23511* (MO, PMA, US); hills of El Valle de Antón, *Dressler 2956* (US); slopes of Cerro Pilón near El Valle, *Duke 12065* (MO, REED); El Valle, *Duke 13171* (MO, OS); Cerro Pilón, El Valle, *Duke 14967* (NY); foothills of Cerro Pilón, near El Valle, *Duke & Correa 14699* (MO); Cerro Caracoral, *Duke & Dwyer 15121* (NY); La Mesa, El Valle, *Dwyer & Duke 8274* (MO); Cerro Gaital Caracoral, *Dwyer & Correa 8845* (F, MO); woods adjacent to chicken farm, La Mesa, above El Valle, *Dwyer & Nee 11922* (MO, PMA-2 sheets, SEL); La Mesa, above El Valle, *Dwyer & Nee 11925* (MO); El Copé, El Potroso, Atlantic slope of Alto Calvario, *Folsom & Lantz 1885* (MO, PMA, US); 7 km N of El Copé de Veraguas, lumber camp at 900 m, continental divide at 1300 m, *Folsom 1206* (MO); summit at Alto Calvario, *Folsom & Robinson 2425* (MO, US); La Mesa at El Valle de Antón, 6.4 km along road to La Mesa from the El Valle, *Folsom & Butcher 2795* (MO, US); Cerro Pirre, near triangulation marker at the summit of Pirre, *Folsom 4338* (MO); path leading toward Alto Calvario from La Junta to Alto Calvario, *Folsom 5918* (MO, US); 7 km N of Copé, environs of sawmill at Alto Calvario, *Folsom & Mauseth 7860* (US); vicinity of La Mesa, N of El Valle, *Gentry 6859* (MO, PMA, SEL); La Mesa, above El Valle de Antón, *Grayum & Evans 9897* (MO, PMA); near continental divide, along lumber road, 8.4 km above El Copé, *Hammel 939* (AAU, MO, SD); El Copé, on slope and ridge W of sawmill, *Hammel 2406* (MO); *Kirkbride 1081* (MO); foothills and summit of Cerro Caracoral, near La Mesa, N of El Valle de Antón, *Knapp 1067* (MO); Atlantic slope of the continental divide near Whiskey sawmill, above El Copé, *Knapp & Dressler 3435* (MO, US); trail from Cano Sucio to the waterfall of the Río Tife, base of Cerro Tife, *Knapp 3773* (MO, US); hills N of El Valle de Antón, E slope and ridges leading to Cerro Gaital, *Knapp 5775* (MO, PMA, US); slopes and summit of Cerro Gaital, N of El Valle, *Knapp et al. 5985* (MO, US); Cerro Pilón, *Lallathin 5068* (MO), *Lallathin 6004* (MO); mountains N of El Valle de Antón, *Lewis et al. 1730* (GH, MO); Cerro Pilón, *Liesner 772* (MO); near sawmill, 8 km N of El Copé, 28 km NW of Penonomé, *Maas et al. 2776* (U-2 sheets); near El Valle de Antón, *McPherson 7629* (MO); Cerro Gaital, above El Valle, *Miller et al. 793* (MO, US, WIS); along Atlantic side of continental divide, above sawmill above El Copé, *Miller et al. 830* (MO, US); El Copé, cerca del aserradero, *Montenegro 1472* (PMA, US); La Mesa, 4 km N of El Valle, *Nee & Hale 9653* (MO); El Copé, continental divide, above Barrigón and sawmill, road Caballo-Coclesito, *Pena 438* (SCZ); foot of Cerro Pilón, above El Valle de Antón, *Porter et al. 4356* (MO); foot of Cerro Pilón, above El Valle de Antón, *Porter et al. 4455* (COL, UC), *Porter et al. 4485* (MO, SCZ); La Mesa, 2–4 km NW of El Valle de Antón, *Skog & Butcher 4127* (MO, US); El Petroso, at Riviera's sawmill, 7 km beyond El Copé, *Skog et al. 4196* (MO, US); near abandoned sawmill 6–7 km NNW from El Copé toward Alto Calvario, trail to Río Blanco, *Skog et al. 7653* (AAU, CAS, COL, MEXU, MO, SEL, US); along road from village of El Valle to La Mesa, *Spellman et al. 554* (AAU, MO, SEL); continental divide, SW of La Mesa at end of logging road, *Stein & Hamilton 967* (MO); La Mesa, 2 km W of Cerro Pilón, *Sullivan 496* (MO-2 sheets); above El Potroso sawmill at continental divide, *Sytsma 1784* (MEXU, MO, US); between Río Blanco and Cano Sucio, *Sytsma et al. 2481* (MO, US); trail between Río Blanco and the continental divide, N of El Copé and El Petroso sawmill, *Sytsma et al. 2598* (MO, US); ca. 1 km E of Quebrada Amarillo in La Mesa, 2.5 km N of El Valle, *Sytsma et al. 3581* (MO); NE slopes of Cerro Caracoral, N rim of El Valle, *Sytsma 3737* (MO); NE slopes of Cerro Caracoral, N rim of El Valle, *Sytsma 3801* (MO, US); continental divide, 4 mi past Llano Grande, road to Cascajal, NW of Penonome, *Sytsma 3901* (MO, US); NE slopes of Cerro Caracoral, N rim of El Valle, *Sytsma et al. 4330* (MO, US); La Mesa road N of El Valle, *Sytsma et al. 4349* (MO, US); 4 mi past Llano Grande on road to Cascajal, ca. 2 km W along continental divide, *Sytsma et al. 4419* (MO, NY, US); above El Potroso sawmill at continental divide, N of El Cope, *Sytsma & Andersson 4611* (MO, US); foot of Cerro Pilón, above El Valle de Antón, *Weaver et al. 1636* (DAV, DUKE); inside the crater of El Valle de Antón, below the north rim, *Wilbur et al. 11151* (DUKE, MO); La Mesa, in crater of El Vallé de Antón, ca. 3 km N of El Vallé de Antón, *Wilbur et al. 15621* (DUKE-2 sheets, MO).—COLÓN: S approach of Cerro Bruja from Río Escandaloso, *Hammel 3124* (MO); Salamanca, *Lezcano 46* (PMA).—DARIÉN: Parque Nacional del Darién, near gold mine at head waters of N branch of Río Pucuro, slopes of Cerro Tacarcuna, ca. 6 km N of Cerro Mali, *Nevers 8522* (MO).—PANAMÁ: Cerro Jefe, ca. 29 km from Tocumen airport, 12 km NE of Cerro Azul, *Almeda & Nakai 3467* (CAS, US); trail to summit of Cerro Pelado, *Antonio 1065* (MO, US); Campo Tres, 5 km NE of Altos de Pacora, *Busey 814* (SEL, US); summit of Cerro Jefe and forests along road beyond summit, *Hayden 1007* (MO, UC); Cerro Brewster, on San Blas border, *McPherson 7552* (MO); near summit of Cerro Jefe, *Skog et al. 7641* (CAS, SEL, US).—SAN BLAS: El Valle de Antón, near the waterfall where Quebrada Amarillo

intersects the road above Vado, *Nevers et al. 3504* (MO, PMA, US); Cerro Brewster, headwaters of Río Cagandí, *Nevers et al. 5483* (MO, PMA).—VERAGUAS: beyond Río Tres Brazos, steep descent 11 km beyond Santa Fé, *Croat 25651* (MO); valley of Río Dos Bocas along road between Escuela Agrícola Alto Piedra and Calovebora, 15.6 km NW of Santa Fé, *Croat 27660* (MO); vicinity of Santa Fé, along dirt road from Santa Fé to Río San Luis, beyond Escuela Agrícola Alto Piedra, 9 mi N of school, *Croat 66950* (PMA, US); vicinity of continental divide, third branch of Río Santa María to drop-off to lowlands, 12–15 NW of Santa Fé, *Dressler 4826* (PMA, SEL); shoulder of Cerro Tuti, *Folsom et al. 3378* (MO); trail from Coquyito mine down to Río Barrera, junction with Río Concepción, *Hammel 5232* (MO); trail on ridge to summit of Cerro Tute, Cordillera de Tute, 1 km past Escuela Agrícola Altos de Piedras, W of Santa Fé, *Knapp & Sytsma 2652* (MO); 5 mi W of Santa Fé on road past Escuela Agrícola Alto Piedra, on Pacific side of continental divide, *Liesner 872* (US); 11 km from Escuela Agrícola Alto Piedra, along Río dos Bocas, Atlantic slope, *Mori & Kallunki 3090* (MO, US); 16 km NW of Santa Fé, on road to Calovebora, Panama Hwy 35, *Mori & Kallunki 6110* (AAU, MO, US); along road to Escuela Agrícola Alto Piedra, 3–4 km by road W of Santa Fé, *Nee 11310* (MO, US).

Colombia. ANTIOQUIA: Mpio. Frontino, Corregimiento Nutibara, Vereda La Blanquita, *Fonnegra et al. 3620* (MO, US); Mpio. Urrao, Vereda Calles, Río Calles, Parque Nacional Natural Las Orquídeas, *Fonnegra et al. 5532* (CAS, COL); trail from Encarnación to Parque Nacional de los Orquídeas, western slope of Cordillera Occidental, *Gentry & Rentería A. 24546* (COL, MO); Mpio. Frontino, Vereda Venados, Parque Nacional Natural Las Orquídeas, La Gurrucha, *Pipoly et al. 18343* (MO).—CAUCA: Río Naya, near El Pastico, *Gentry & Juncosa 40652* (COL, MO, US); forests of Coteje on Río Timbiquí, *Lehmann 8893* (A, GH, K, L, NY, W); western slopes of Cordillera Occidental, road from El Tamo to 20 de Julio, *Plowman & Vaughan 5325* (COL); Mpio. López de Micay, Vereda San Isidro, *Rubiano 384* (COL); El Tambo, La costa, *von Sneidern 834* (S).—CHOCÓ: Mpio. Bahía Solano, Corregimiento El Valle, hwy Bahía Solano–El Valle, *Amaya M. & Kvist 382* (US); Mpio. Nuquí, Corregimiento Coquí, *Amaya M. & Kvist 411* (US); Mpio. Tadó, Resguardo Indígena Botebara (=selva de bejucos), S of Río San Juan, *Amaya M. & Smith 546* (COL, US); Mpio. Quibdó, sector Puente de Cabi, road to Istmina, *Arias et al. 112* (COL, MO); Mpio. Quibdó, Quebrada La Platina, road to Medellín, *Arias et al. 142* (MO), *Arias et al. 144* (COL); Mpio. Tadó, sitio Marmolejo, forest near Quebrada Marmolejo, road Santa Cecilia–Tadó, western slopes of the Cordillera Occidental, headwaters of Río San Juan, *Betancur et al. 2969* (COL); Mpio. Quibdó, road Jardín–Pacurita, *Casas C. 8* (MO), *Cogollo 2063* (MO); road Bolívar–Quibdó, 23 mi W of Bolívar, S bank of Río Atrato, *Croat & Cogollo 52050* (MO); road Bolívar–Quibdó, 44.8 mi W of Bolívar, *Croat & Cogollo 52132* (MO); road Quibdó–Istmina, 6.6 km S of Quibdó, *Croat & Cogollo 52143* (COL, MO); Serranía de Baudó, along road between Las Animas and Río Pato, along valley of Río Animas, 5 km from beginning of road, *Croat 56045* (MO, US); road Quibdó–Medellín, Km 179, 20 km E of Tutunendo, *Croat 56294* (COL-2 sheets, MO, US); road San José del Palmar–Cartago, Vereda La Bella, between San José del Palmar and turnoff to El Cairo, *Croat 56688* (MO); Mpio. Quibdó, road from Bolívar, 97 km E of Quibdó, Km 155, *Croat 57298* (MO, U, US); Km 226 on the road from Quibdó to Munquirri, *Cuatrecasas & Llano 24025* (COL, F, US); Mpio. Buenaventura, Corregimiento San Cipriano, Reserva Natural de Escalerete, Sector Oriental, *Devia A. et al. 3549* (COL); Mpio. Istmina, headwaters of Río San Juan, foothills of Cerros La Mojarrá, *Espina et al. 1142* (MO); Mpio. Pizarro, road Pie de Pepe–Puerto Meluk, Km 21–24, *Espina 1912* (MO); Costa del Pacífico, Nuquí, *Fernández 222* (COL, US); Mpio. Tadó, Corregimiento Marmolejo, 15 km after Guaratú on road Santa Cecilia–Tadó, *Fernández A. et al. 8774* (COL, US); Mpio. Tadó, Quebrada Marmolejo, 20 km after Santa Cecilia from the road to Tadó, *Fernández A. et al. 9217* (COL); environs of Río Pichimá, Comunidad Indígena Waunana, *Forero 621* (MO); Río Mutatá, *Forero & Gentry 727* (COL, MA, MO, US); hwy Medellín–Quibdó, environs of Bolívar, Km 171, Río la Playa, *Forero et al. 1081* (MA, MO, US); hwy San José del Palmar–Curundo, La Carmelita, environs of San José del Palmar, *Forero et al. 2096* (COL, US); Mpio. Quibdó, hwy Quibdó–Tutunendo, 15 km from Quibdó, *Forero & Jaramillo 2573* (MO, US); valley of Río San Juan, small hill opposite Palestina, *Forero et al. 4077* (MO, US), *Forero et al. 4082* (MA, MO, US); valley of Río San Juan, environs of Docordo, *Forero et al. 4348* (MO, US); valley of Río San Juan, Quebrada Mancamo, tributary of Río Tamana, *Forero et al. 5060* (MO, US); Mpio. Istmina, Quebrada Raspadura, between Raspadura and Quibdó, delineation of valley of Río Atrato and valley of Río San Juan, *Forero & Jaramillo 5322* (MA, MO, US); hwy Panamericana, between Río San Pablo and Río Pato, *Forero et al. 5781* (MO, US); Chaparraido, near Tutunendo, *Forero et al. 5816* (MO, US); hwy Tutunendo–El Carmen, near “El 12,” Río Atrato, *Forero et al. 5929* (COL), *Forero et al. 6019* (MO); Mpio. San José del Palmar, valley of Río Torito, tributary of Río Habita, Finca Los Guadauales, *Forero et al. 6226* (MO, US); Mpio. San José del Palmar, hoyá del Río Torito, *Forero et al. 7533* (COL, MO, US); Río San Juan, foothills of Cerro de la Mojarrá, ca. 30 min via boat from Istmina, *Forero et al. 9475* (COL, MO); Mpio. Quibdó, carretera Yutoj–Lloró, *Forero et al. 9653* (COL, MO); area of Baudó, right bank of Río Baudó, about 16 km upstream of estuary, about 100 m above estuary of Quebrada Birudó, at foot of hill “Loma Los Chorito,” *Fuchs & Zanella 783* (K); area of Baudó, right bank of Río Baudó, ca. 19 km upstream of estuary, ca. 700 m upstream

of sawmill Porquera, opposite estuary of Quebrada Canalete, *Fuchs & Zanella 828* (K); area of Baudó, right bank of Río Baudó, ca. 16 km upstream of estuary, ca. 100 m above Quebrada Birudo, *Fuchs & Zanella 21783* (K, MO, NY, S, US), *Fuchs & Zanella 21828* (COL, K, MA, MO, P, S, US); Mpio. Nuquí, Quebrada Chaquí, *Galeano et al. 4371* (COL); between Carmen de Atrato and Tutunendo, hwy from Bolívar to Quibdó, Km 52–70, valle del Alto Atrato, *García Barriga 11145* (COL, US); Villaconto, environs of Río Quito and Río Paimado, *García Barriga 11176* (COL, US); Mpio. Quibdó, road Quibdó–Yuto, Río Cabí, *García-Cossio 6* (COL, MO, NY, US); Mpio. Quibdó; road Quibdó–Medellín, between El Veinte and La Playa, *García-Cossio 134* (MO); hills behind Bahía Solano (Puerto Mutis), *Gentry & Forero 7214* (MO, SEL); Río Mutatá, tributary of Río El Valle, between base of Alto de Buey and mouth of river, *Gentry & Fallen 17296* (COL, MO, US); Mpio. Quibdó, 28 km E of Tutunendo, road Quibdó–Medellín, *Gentry & Fallen 17527* (COL, NY, US); Quebrada Peña Negra, 8 km W of road Quibdó–Istmina, Hwy Panamericana, *Gentry & Rentería A. 23933* (MO, US); road Quibdó–Tutunendo, ca. 3 km W of Tutunendo, *Gentry et al. 30169* (COL-2 sheets); road Quibdó–Tutunendo, ca. 4 km W. of Tutunendo, *Gentry et al. 30256* (COL, MO); road Quibdó–Bolívar, between Tutunendo and El Codé, *Gentry & Brand 36698* (MO); Nuquí–Panguia, Punta Chicui, *Gómez et al. 406* (MO); Mpio. Tadó, Marmolejo, *González 2375* (COL); road Bahía Solano–Valle, *Haught 5518* (US); between Condota and Anagoya, *Idrobo 1820* (COL); Mpio. Quibdó, Quebrada La Platina, *Idrobo & Cuatrecasas 2693* (COL, GH, US); hwy El Carmen–Quibdó, *Juncosa 521* (MO, US); hwy between Bolívar and Quibdó, *Juncosa 1152* (MO, US); hills above junction of Río Capa and Río Mumbu, upriver from Lloro, *Juncosa 1451* (MO, US); Mecana, N of Bahía Solano, Quebrada la Platanilla, N of Río Mecana, *Juncosa 1865* (MO, US); near junction of Río Condoto and Río San Juan, *Killip 35671* (COL, US); Bahía Solano, along Quebrada Jellita, *Killip & García 33509* (BM, COL, MO, NY, US-2 sheets); Río Mutatá, ca. 3 km above its junction with Río El Valle, NW of Alto del Buey, *Lellinger & Sota 164* (COL, US); Mpio. Quibdó, road to San José de Purré, *López T. 6* (MO); Mpio. Tadó, vereda Gingaraba, *Lozano C. et al. 6109* (COL); Mpio. Tadó, vereda Gingaraba, *Lozano C. et al. 6233* (COL); Bahía Solano, paraje Juna, *Meluk-Aluma s.n.* (COL, PMA); Mpio. Quibdó, road Yuto–Lloro, *Mosquera G. 13* (MO); Mpio. Tadó, Hwy Animas–Panamericana, *Pino 22* (COL); 12 km from Quibdó, road to Tutunendo, *Prance 27978* (US); Guayabal, *Rentería 2482* (MO); San José del Palmar, environs of village and river, *Silverstone-Sopkin 394* (CUVC, MO, US); Mpio. Quibdó, La Platina, *Uribe U. 3130* (COL, US); Bahía Solano, *Warner & White 45* (GH, MO).—NARIÑO: Mpio. Barbacoas, Corregimiento Altaquer, Sitio El Barro, *Fernández et al. 12393* (COL); Finca La Planada, near Chucunes, Cordillera Occidental, *Gentry et al. 30560* (COL, MO); 6 km beyond El Guayacana, E of Tumaco, *León et al. 1540* (U, US).—QUINDÍO: Mpio. Salento, forests of Molino, *Vargas 3821* (COL).—RISARALDA: Mpio. Mistrató, Corregimiento Puerto de Oro, road Pisonés–Geguadas (=Río Mistrató), *Fernández A. et al. 9085* (COL, US).—VALLE DEL CAUCA: Mpio. Buenaventura, Sabaletas, along road Río Sabaletas, *Acevedo R. & Siaca 6741* (MO, NY, US), *Croat 69355* (MO); Mpio. Buenaventura, environs of Bajo Calima, along road Buenaventura–Malaga, Km 31.5, *Croat & Watt 70265* (MO); Bajo Calima, road Buenaventura–Malaga, Km 51.3, *Croat & Watt 70357* (MO); Pacific coast, Río Nayo, Puerto Merizalde, *Cuatrecasas 14104* (F-2 sheets); Río Calima, between La Esperanza and Bellavista, *Cuatrecasas 16785* (F, US); western slopes of Cordillera Occidental, valley of Río Dagua, Córdoba, *Cuatrecasas 19818* (F); western slopes of Cordillera Occidental, valley of Río Anchicaya, near bridge of Aguaclara, *Cuatrecasas 22084* (F, US); Campamento Bajo Calima, *Echeverry E. 2590* (COL); Río Anchicaya, near CVC Hydroelectric Plant, *Gentry 35663* (COL, MO, US); Bajo Calima, ca. 15 km N of Buenaventura, Concesión Cartón de Colombia, *Gentry et al. 40349* (COL, MO, US); Río Naya, upriver from Puerto Merizalde, *Gentry & Juncosa 40663* (COL, MO); Yatacué, CVC camp at Anchicaya, *Gentry & Juncosa 40752* (COL, MO); Córdoba, *Killip & García 33428* (US); valley of Río Digua, between La Elsa and Río Blanco, *Killip 34782* (US); Sabaletas, hwy Buenaventura–Cali, Km 29, *Killip & Cuatrecasas 38794* (US), *Killip & Cuatrecasas 38815* (F, US); Córdoba, Dagua Valley, *Killip 5129* (NY, US); Anchicayá, *Køie 4860* (C); Colonia Agrícola el Tatabro, Buenaventura, *Londoño & Kvist 656* (US); Bajo Calima, Concesión Pulpapel/Buenaventura, hwy Canalete, *Monsalve B. 1858* (MO, US), *Monsalve B. 2032* (MO, US), *Monsalve B. 2096* (MO, US); Bajo Calima, Concesión Pulpapel/Buenaventura, Hwy Nacional, *Monsalve B. 3199* (MO, NY); Mpio. Buenaventura, community of San Isidro, *Rooden et al. 704* (U, US); Cordillera Occidental, road from Cali to Buenaventura, environs of Km 52, *Schultes & Villarreal 7291* (US-2 sheets); trail from Campo Alegre to area controlled by Corporación Valle del Cauca, *Smith et al. 1308* (COL, US, SEL); Cordillera Occidental by Anchicaya, between Buenaventura & Cali, *Vogel 119* (US-2 sheets); Bajo Calima, Concesión Pulpapel, *van der Werff & Monsalve 9665* (MO). **Ecuador.** CARCHI: San Marcos Valley, *Barfod et al. 48870* (AAU); Cantón Tulcán, Parroquia Maldonado, Reserva Indígena Awá, Centro San Marcos, 25 km NW of Chical, *Rubio et al. 1059* (MO, QCNE, US); Cantón Tulcán, Parroquia Maldonado, Reserva Indígena Awá, Centro Gualpi Alto, *Rubio et al. 1693* (US); Cantón Tulcán, Parroquia Tobar Donoso, sector Sabalera, Reserva Indígena Awá, *Tipaz et al. 1313* (MO, QCNE).—ESMERALDAS: Cantón San Lorenzo, Parroquia Mataje, Reserva Etnica Awá, Centro Mataje, *Aulestia et al. 584* (MO, QCNE, US); Cantón San Lorenzo, Parroquia Mataje, Reserva Etnica Awá,

Centro Mataje, *Aulestia et al.* 612 (MO, QCNE); Zapallo Grande, along Río Cayapa, *Barfod et al.* 48120 (AAU); San José, Km 321, railroad Ibarra–San Lorenzo, *Boom* 1345 (QCNE); Cantón San Lorenzo, Parroquia Alta Tambo, Reserva Étnica Awá, Centro Río Bogotá, future biological research station, 2 km S of road Lita–San Lorenzo, environs of Quebrada Pambilar, *Clark* 7158 (AAU, BM, CAS, COL, E, F, K, MO, NY, QCA, QCNE, SEL, UNA, US); Cantón San Lorenzo, Parroquia Alto Tambo, road Lita–Alto Tambo, *Clark et al.* 7476 (QCNE, US); Cantón San Lorenzo, Parroquia Alto Tambo, patch of forest along Hwy San Lorenzo–Ibarra, 54 road-km NW of Lita, *Clark et al.* 7569 (QCNE, US); Cantón San Lorenzo, Parroquia Alto Tambo, Finca Bufalito (Empresa Golden Land), 10–15 km NW of Lita, *Clark & Hall* 7583 (QCNE, SEL, US), *Harling* 4666 (S); Cerro de Río Bravo de Cayapas, *Holm-Nielsen et al.* 25548 (AAU); trail to Río Mataje, Awá encampment from Río Palaví encampment, *Hoover et al.* 3936 (MO, US); Ventanas, railroad Quito–San Lorenzo, Km 319, *Játiva & Epling* 793 (S-2 sheets, UC); Río Cayapa, Zapallo Grande, 1 km upriver from village, *Kvist & Asanza* 40846 (AAU, QCNE); near Lita, railroad Ibarra–San Lorenzo, *Madison et al.* 5073 (SEL); Cantón Lorenzo, Parroquia Ricaurte, Reserva Indígena Awá, Centro Balsareño, Río Palabí, *Rubio & Quelal* 1326 (MO, QCNE, US); Cantón San Miguel, Río Cayapas, Sector Loma Linda, *Tipaz et al.* 2263 (MO, QCNE); Cantón Eloy Alfaro, environs of Río Cayapas, Comuna de Loma Linda, *Yáñez et al.* 1616 (QCNE).—PICHINCHA: *Harling & Andersson* 23232 (GB); Cantón Quito, Reserva Orquideológica El Pahuma, road Calacalí–Los Bancos, Km 22, *Rojas et al.* 393 (MO).

Glossoloma panamense is distinguished from its congeners by lanceolate calyx lobes (Fig. 25D); pilose indumentum on the leaves, stems, and calyx (Fig. 25A); and corollas that are uniformly ampliate (Fig. 25D) instead of pouched. A uniformly tubular corolla (i.e., not ventricose or pouched) is common in other genera of Gesneriaceae, such as *Columnnea*, but is otherwise unusual in *Glossoloma*. The only other species in *Glossoloma* with a uniformly ampliate corolla tube are *G. subglabrum* (Fig. 37), *G. harlequinoides* (Fig. 17), and *G. pedunculatum* (Fig. 28).

17. *Glossoloma pedunculatum* J. L. Clark, sp. nov.—TYPE: PANAMA. Chiriquí: Distr. Gualaca, Correg. Hornito, Reserva Forestal Fortuna (Smithsonian Tropical Research Institute), sendero Alemán (near Quebrada Alemán), 08°42'46"N, 82°14'55"W, 1300 m, 28 Jul 2003, *J. L. Clark* 8580 (holotype: PMA!; isotypes: AAU! CAS! COL! E! F! K! MO! NY! SCZ! SEL! UNA! US!).

G. panamensi simile sed bracteis persistentibus oblongisque, inflorescentibus pedunculatis differt.

Subshrubs, terrestrial; stems erect, unbranched, to 2 m tall, to 1 cm in diameter, usually woody, succulent when young, internodes 2–10 cm long, subquadrangular, glabrescent proximally, densely brownish hirsute distally, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, equal in a pair; petioles 2–10 cm long, sparsely pilose; blades 14–33 cm long, 5–15 cm wide, oblong to elliptic, base rounded, apex acuminate to acute, margin serrate, adaxially light green, sericeous, abaxially uniformly green to reddish green, puberulous, coriaceous when dry, lateral veins 6–9 per side. Inflorescence a congested cyme, peduncle to 2 cm long, appearing raceme-like, with 2–5 resupinate flowers per inflorescence, posture pendent at anthesis, bracteoles 2 cm long, 1.5 cm wide, oblong; pedicels shorter than the petiole, to 1.5 cm long, densely pilose, pedicel enations present. Calyx lobes nearly free, valvate to involute, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, nearly equal, 14–18 mm long, 5–8 mm wide, broadly ovate, base truncate, apex acute, margin serrate, all green to greenish maroon, abaxially densely pilose, adaxially sericeous. Corolla to 3.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla perpendicular relative to calyx; base 5 mm in diameter, middle uniformly tubular, slightly ventricose on upper surface, throat not constricted, not appearing laterally compressed, 6–8 mm wide (at

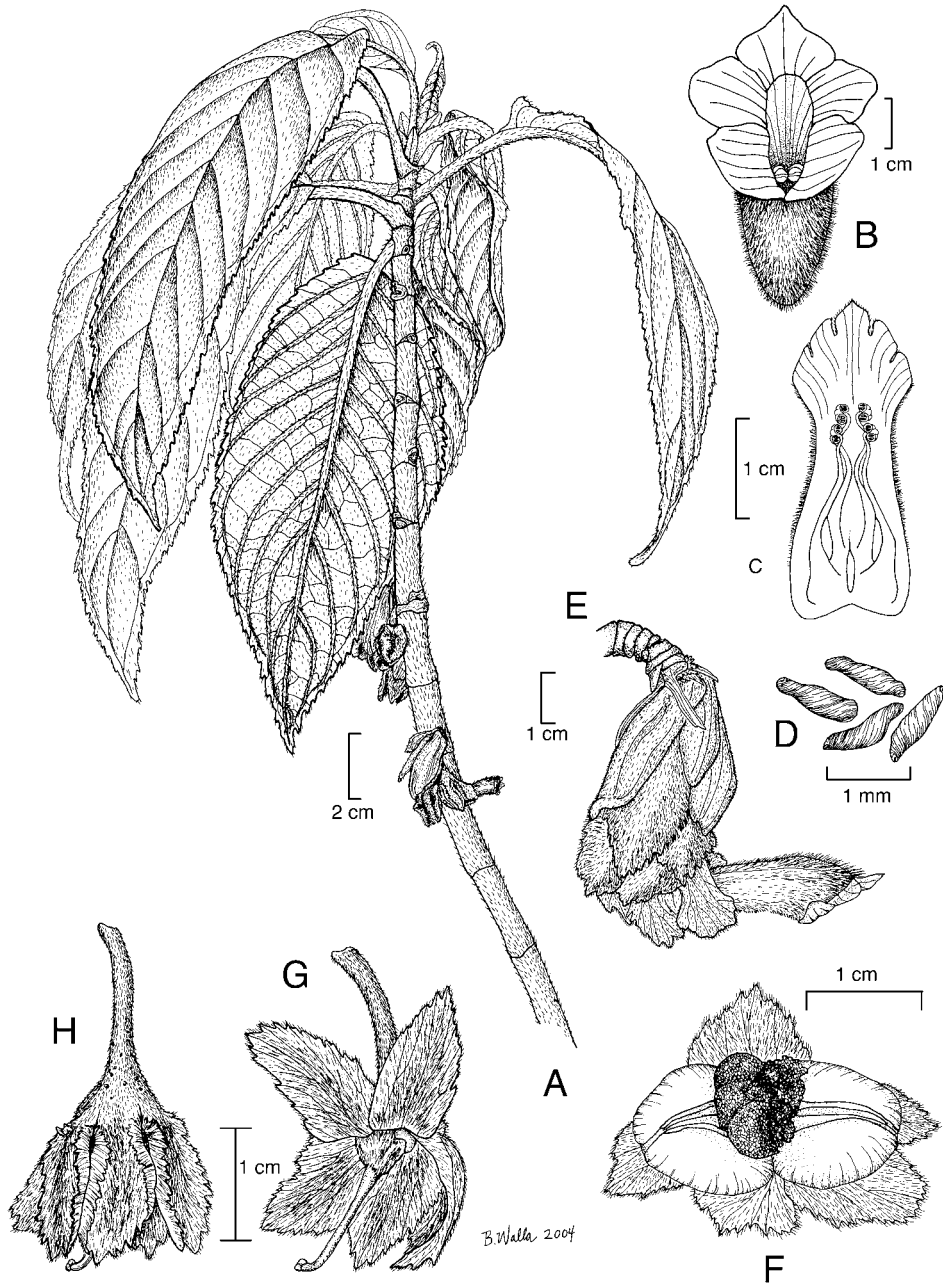


FIG. 26. *Glossoloma pedunculatum*. A. Habit. B. Face view of corolla. C. Corolla opened to show stamens. D. Seeds. E. Inflorescence with well-developed peduncle and persistent bracteoles. F. Mature fruit with reflexed valves. G. Calyx opened and corolla removed to show bilobed nectary gland and pistil. H. Calyx. (Based on *J. L. Clark 8580*, holotype.)

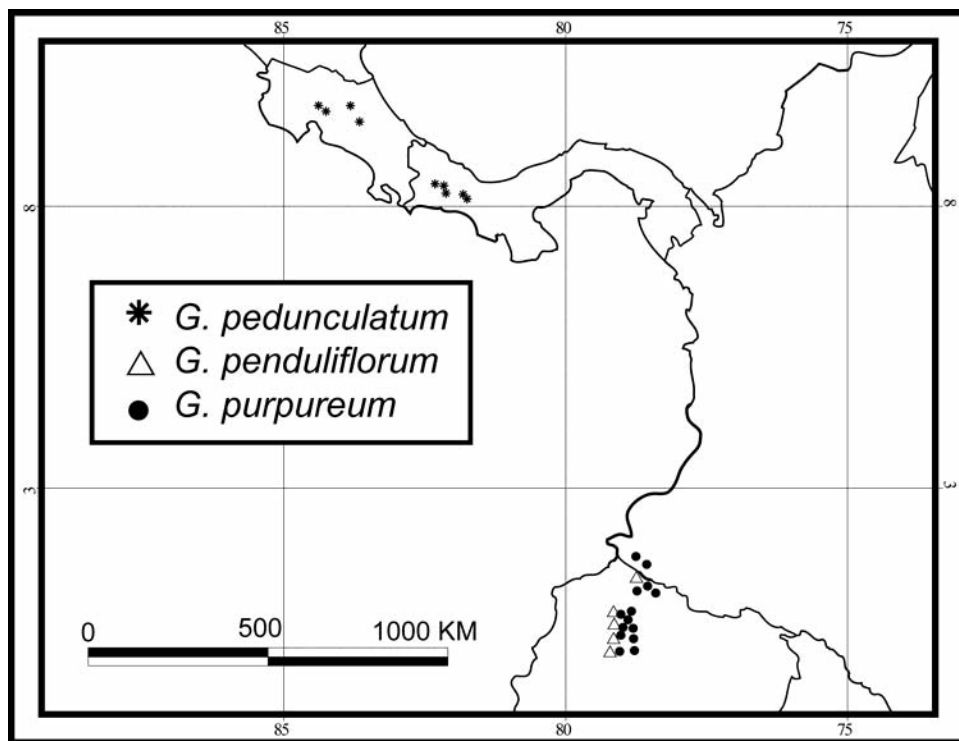


FIG. 27. Distribution of *Glossoloma pedunculatum*, *G. penduliflorum*, and *G. purpureum*.

mouth), outside pilose, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb reflexed, zygomorphic, ca. 1 cm wide, light red, lobes nearly equal, 4 mm long, 5 mm wide, rotund, recurved, entire. Nectary gland shallowly bilobed to truncate, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 1.5 cm long, adnate to base of corolla tube for ca. 4 mm, connate for 1 mm, forming an open sheath, glabrous; anthers 1–2 mm long, 2.5–3 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary ca. 6 mm long, ca. 3 mm wide, ovoid, pilose, style 1.4 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, ca. 1.4 cm long, ca. 1.5 cm wide, ovoid when immature, sparsely pilose, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, ca. 1 mm long, ca. 0.5 mm wide, ellipsoid, longitudinally striate, yellow. Frontispiece; Fig. 26.

Phenology. Flowering from May through August, February, and December, in fruit in July to September.

Distribution (Fig. 27). Western Panama in the Cordillera Central (Chiriquí, and Bocas del Toro) and Costa Rica (Alajuela, Heredia, and Cartago); 700–1700 m.

ADDITIONAL SPECIMENS EXAMINED. **Costa Rica.** ALAJUELA: Reserva Biológica Monteverde, Quebrada Celeste, Río Peñas Blancas, *Bello & Villegas 1462* (US); along road from San Ramón N toward Balsa, 16.7 km N of bridge over Volio and 7.5 km N of bridge over Río Balsa, *Stevens 13896* (MO, US).—CARTAGO: Tapantí Hydroelectric Project between Km 7 and 12, S of bridge over the Río Grande de Orosi at Tapantí, *Utley 3427* (F).—HEREDIA: La Palma, Río Bajo de Honduras, Braulio Carrillo National Park, *Garwood et al. 379* (BM).

Panama. BOCAS DEL TORO: Cerro Colorado, ca. 6.5 mi W of Chamé, *Croat 69145* (MO).—CHIRIQUÍ: Dist. Nole Duima, Correg. Chami, Cerro Colorado, 35–50 km N of San Felix, *Antonio 4898* (MO, US); Cerro Colorado, Mina de Cobre, 15 m beyond camp, *Besse et al. 2407* (SEL); Dist. Gualaca, Correg. Hornito, Reserva Forestal Fortuna (Smithsonian Tropical Research Institute), *Clark 8557* (AAU, COL, E, PMA, SCZ, SEL, UNA, US); Dist. Gualaca, Correg. Hornito, Reserva Forestal Fortuna (Smithsonian Tropical Research Institute), *Clark 8580* (PMA, SCZ, US); Dist. Nole Duima, Correg. Chami, Cerro Colorado, 35–50 km N of San Felix, *Clark & Morale 8672* (K, NY, PMA, SCZ, SEL, UNA, US); Gualaca–Chiriquí Grande, 8.0 mi beyond Los Planes de Hornito, 6.9 mi beyond road turnoff to Caldera, *Croat 67886* (MO); Bajo Mono, Boquete, Cordillera Central, road towards Culebra, trail to lake, *Cuevas 1181* (PMA, SCZ, US); Dist. Nole Duima, Correg. Chami, Cerro Colorado, 35–50 km N of San Felix, *Dressler 5605* (PMA, SEL, US); Cerro Colorado, road along ridge, 11.2 km from main road to Escopéta, *Folsom 4885* (MO, US); Dist. Nole Duima, Correg. Chami, road along continental divide on top of ridge leading to Cerro Colorado, *Folsom & Mauseth 8445* (US); 1 km N of Fortuna Lake, *Hampshire & Whiteford 297* (BM, PMA, US).

Glossoloma pedunculatum is distinguished by the presence of a well-developed peduncle, persistent purple-tinged oblong bracteoles (Fig. 26E), and a large robust shrubby habit. This species resembles *G. panamense* in habit and the lanceolate calyx lobes, but *G. pedunculatum* is readily differentiated by the presence of obvious peduncles. The peduncles are derived from an indeterminate branching structure that subtends a terminal cluster of flowers. Most members of the tribe Episcieae appear to have axillary flowers subtended by well-developed pedicels and lack peduncles. Many species included in Episcieae appear epedunculate; however, inflorescences of Gesneriaceae are derived from a reduced pair-flowered cyme (Weber 1973, 1982, 1995, 2004; Wiehler 1983). Thus, long peduncles are not only unique for the genus *Glossoloma*, but are also unusual for the tribe Episcieae. One notable exception is *Drymonia coccinea* (Aubl.) Wiehler, which has elongate peduncles that reach 10 cm. It was noted by Kriebel (2006) that the peduncle of some individuals are reduced at flowering stage but elongate in fruit to 2.7 cm. The oblong and persistent bracteoles that cover the calyx lobes are also an unusual feature that helps to differentiate this species from other members of *Glossoloma*.

18. *Glossoloma penduliflorum* (M. Freiberg) J. L. Clark, Selbyana 25: 205. 2005. *Alloplectus penduliflorus* M. Freiberg, Phytion 37: 133. 1997.—TYPE: ECUADOR. Imbabura: Cantón Sigchos, Los Cedros Biological Reserve, 1200–1500 m, 27 Jun 1996, *M. Freiberg 96210* (holotype: QCA, not located (see discussion); lectotype, here designated: ULM!; isotypes: ULM-2 sheets!).

Epiphyte; stems scandent, rarely branched, growing 2–5 m above ground, 3–5 mm in diameter, woody, internodes 3–12 cm long, terete, glabrescent proximally, densely pilose-villous distally, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, nearly equal in a pair; petioles 1.5–3.0 cm long, densely pilose-villous; blades 7.5–10.5 cm long, 3–5 cm wide, ovate to elliptic-ovate, base obtuse to rounded, apex acute, margin serrate to denticulate, adaxially dark green, strigose, abaxially pale green, pilose, membranous when dry, lateral veins 6–8 per side. Flowers solitary, resupinate, posture pendent at anthesis, bracteoles absent; pedicels longer than the petiole, 8–15 cm long, densely pilose-villous, pedicel enations absent. Calyx lobes nearly free, usually separate, sometimes slightly valvate, erect, 4 equal, to 30 mm long, 5–8 mm wide, narrowly oblong, base truncate, apex acute, margin fimbriate, the teeth to 5 mm long, green, abaxially densely pilose, adaxially densely pilose; fifth (ventral) lobe smaller and narrower, to 3 cm long, to 0.4 cm wide, broadly oblong. Corolla 5.5–6.0 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to

calyx; base ca. 1 cm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat not constricted, appearing laterally compressed, to 2.3 cm wide (at mouth), outside pilose, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb reflexed, zygomorphic, ca. 2.3 cm wide, mostly brick-red, base white, lobes nearly equal, ca. 5 mm long, ca. 9 mm wide, rotund, entire. Nectary gland usually bilobed, sometimes trilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 3.5 cm long, adnate to base of corolla tube for ca. 5 mm, connate for 1 mm, forming an open sheath, sparingly pilose with some glandular trichomes; anthers ca. 1.5 mm long, ca. 3 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary ca. 6 mm long, ca. 5 mm wide, ovoid, densely pilose, style 3.2 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent, ca. 1.2 cm long, ca. 1.0 cm wide, ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved when mature. Seeds numerous, ca. 1 mm long, ca. 0.3 mm wide, fusiform, longitudinally striate, brown. Fig. 28.

Phenology. Collected in flower in January, March, May, June, September, and December, in fruit in January.

Distribution (Fig. 27). Eastern slopes of the Ecuadorian Andes (Carchi, Cotopaxi, Esmeraldas, Imbabura, and Pichincha); montane and premontane forests; 900–1900 m.

ADDITIONAL SPECIMENS EXAMINED. **Ecuador.** CARCHI: environs of Chical, 12 km below Maldonado on the Río San Juan, *Madison et al.* 4449 (SEL).—COTOPAXI: Cantón Sigchos, Parroquia San Francisco de las Pampas, Bosque Integral Otonga, *Clark & Muñoz* 6115 (AAU, COL, F, MO, NY, QCA, QCNE, US); Cantón Sigchos, Parroquia San Francisco de las Pampas, Bosque Integral Otonga, *Clark & Muñoz* 6122 (AAU, COL, K, MO, NY, QCA, QCNE, SEL, UNA, US); San Francisco de las Pampas, Bosque Integral Otonga, *Freiberg* 96288 (QCA).—ESMERALDAS: Cantón San Lorenzo, Parroquia Alto Tambo, 4–8 km W of El Cristal, *Clark et al.* 10268 (MO, QCNE, SEL).—IMBABURA: Cantón Cotacachi, Parroquia García Moreno, Cordillera de Toisán, Cerro de la Plata, Bosque Protector Los Cedros, Sendero Observatorio (SW of lodge), *Clark et al.* 7405 (AAU, COL, MO, NY, QCA, QCNE, SEL, UNA, US).—PICHINCHA: Saloya, descenso W of Cordillera Occidental, *Acosta Solís* 5819 (F); Parroquia Pacto–Gualca, road towards Buenos Aires, *Aimacaña & Guzmán* 347 (QAP); Cantón Quito, Parroquia Nanegalito, headwaters of Río Pachijal, Sector Rancho Buitrón, *Cerón M.* 38338 (QAP); Cantón Los Bancos, Bosque Protector San Francisco, Sector la Chorrera, between Río Chalhuayacu and Río Tigre, *Cerón M. & Sarabia* 42795 (QAP, US); road El Paraíso–Saguangal, 11 km from El Paraíso, *Øllgaard et al.* 37632 (AAU).

Glossoloma penduliflorum is distinguished from other members of the genus by pendent flowers subtended by an elongate pedicel, 8–15 cm long (Fig. 28A), and an obligate epiphytic habit; most species of *Glossoloma* are primarily erect unbranched terrestrial shrubs. Those species that are epiphytic (e.g., *G. herthae* and *G. bolivianum*) can be differentiated from *G. penduliflorum* by their non-elongate and non-scandent stems, except the scandent *G. scandens*, which is easily differentiated from *G. penduliflorum* by short pedicels and nearly sessile flowers.

In the protologue of *G. penduliflorum* (Freiberg 1997) the holotype is cited as *Freiberg* 96210 at QCA and isotypes deposited at QCNE and ULM. Yet, the collection annotated at QCA as the holotype by Freiberg is his field collection 96288. As of 2007, neither a specimen of *Freiberg* 96210 has been found at QCA, nor are there any known Freiberg collections at QCNE. It is likely that two of the three specimens comprising *Freiberg* 96210 (annotated as isotypes) at ULM have not yet been distributed to QCA and QCNE. This inconsistency was brought to the attention of ULM and M. Freiberg in 2003. Therefore, one of the three collections at ULM is selected here as the lectotype.

Glossoloma penduliflorum is listed by the IUCN Red List Categories and Criteria as Vulnerable D2 in the *Libro rojo de las plantas endémicas del Ecuador 2000* (Clark & Skog 2000). The designation criteria for Vulnerable D2 means that the species is known only

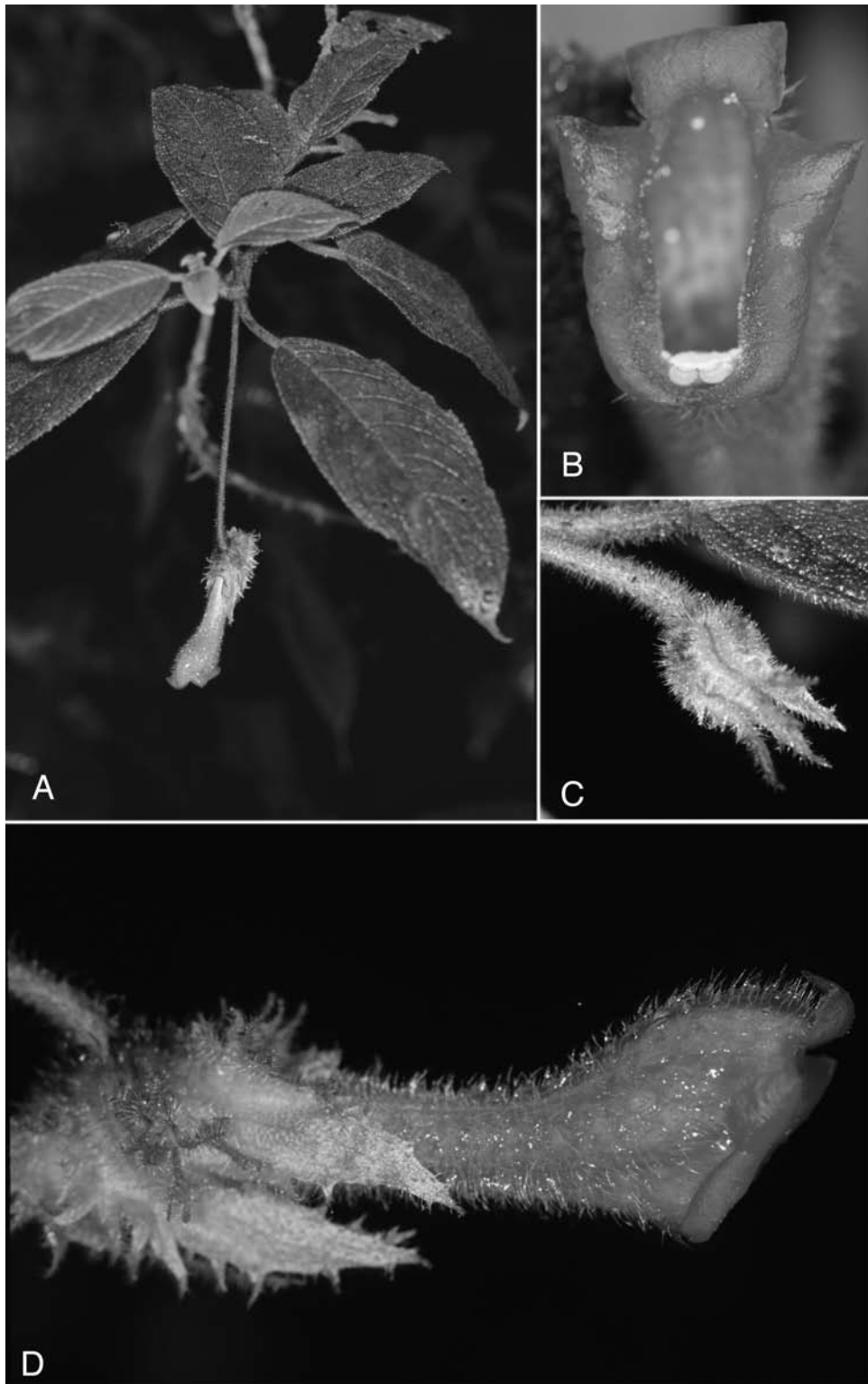


FIG. 28. *Glossoloma penduliflorum*. A. Habit. B. Face view of flower. C. Immature calyx. D. Lateral view of flower. (Photos by J. L. Clark; voucher: *J. L. Clark et al.* 7405.)

from a very restricted area (typically less than 20 km²). All species with this designation may become Critically Endangered or even Extinct in a very short time period. Only two populations of *G. penduliflorum* are well known, but a third population was discovered during a 2008 collecting expedition in the northern limits of the Esmeraldas province of Ecuador (Clark *et al.* 10268).

19. *Glossoloma purpureum* (L. P. Kvist & L. E. Skog) J. L. Clark, Selbyana 25: 205. 2005. *Alloplectus purpureus* L.P. Kvist & L. E. Skog, Brittonia 44: 475. 1992.—
TYPE: ECUADOR. Pichincha: Quito Cantón, road El Paraíso–Saguangal, Km 11, 00°12'N, 78°46'W, 1200 m, 2 May 1982, B. Øllgaard *et al.* 37673 (holotype: AAU!).

Subshrubs, terrestrial, rarely epiphytic; stems erect, unbranched, to 2 m tall, 4–8 mm in diameter, subwoody, internodes 1–9 cm long, subquadrangular, glabrescent proximally, densely pilose-villous distally, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 1.0–2.5 cm long, strigose; blades 7–15 cm long, 2.5–6.0 cm wide, oblong-lanceolate, base acute-cuneate, apex acuminate, margin serrate to denticulate, adaxially dark green, glabrous or sparsely pilose, abaxially dark purple, sparsely puberulent and pilose to villous at veins, membranous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–2 flowers per node, posture pendent at anthesis, bracteoles 5–10 mm long, 3–5 mm wide, ovate-lanceolate to triangular; pedicels longer than the petiole, 1.5–4.0 cm long, pilose, pedicel enations absent. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, 4 equal, 25–35 mm long, 3–12 mm wide, broadly ovate, base truncate, apex acute, margin fimbriate, the teeth to 1.5 cm long and ca. 0.3 cm wide, green, abaxially glabrescent to pilose, adaxially sparingly pilose; fifth (ventral) lobe smaller and narrower, to 3.5 cm long, to 0.4 cm wide, broadly oblong. Corolla 3.7–5.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base ca. 8 mm, middle ampliate, becoming apically ventricose on upper surface, throat not constricted, appearing laterally compressed, ca. 1.3 cm wide (at mouth), outside sparingly pilose becoming densely pilose distally, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb reflexed, zygomorphic, ca. 1.3 cm wide, bright yellow, lobes nearly equal, 2–3 mm long, 3–5 mm wide, rotund, upper lobe more erect, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion 3.0–3.5 cm long, adnate to base of corolla tube for ca. 6 mm, connate for 2 mm, forming an open sheath, glabrous; anthers ca. 1.5 mm long, ca. 2.5 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary ca. 8 mm long, ca. 9 mm wide, ovoid, densely sericeous, style 2.5–3.0 cm long, glabrous, stigma crateriform-capitate. Fruit a fleshy capsule, pendent, ca. 1.4 cm long, ca. 1.0 cm wide, ovoid when immature, sericeous, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, 0.8 cm long, 0.3 mm wide, ellipsoid, longitudinally striate, yellow. Fig. 29.

Phenology. Flowering throughout the year; collected in fruit in February to April.

Distribution (Fig. 27). Eastern slopes of the Ecuadorian Andes (Carchi, Cotopaxi, Imbabura, and Pichincha) and Colombia (Nariño); montane and premontane forests; 900–2000 m.



FIG. 29. *Glossoloma purpureum*. A. Habit. B. Calyx. C. Flower. D. Corolla opened to show stamens. E. Calyx and corolla removed to show pistil and bilobed nectary gland (and detail of stigma). F. Immature fruit. G. Seeds. (Based on: A, B. Øllgaard *et al.* 37673, holotype; B, F, G, H. Balslev 1991; C–E, M. T. Madison *et al.* 4655.) Reprinted with permission from *Brittonia* (Kvist & Skog 1992b: Fig. 1).

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** DEPARTMENT UNKNOWN: Montaña Barbaocoas (Tuquerres), *Karsten s.n.* (W).—NARIÑO: junction of Río San Juan and Río Puelmambi, *Ewan 16040* (AAU, BM, MO, US); Ricaurte, *von Sneidern s.n.* (S); Mpio. Barbaocoas, Guaiguer, *Triana 2500[a]* (G, P). **Ecuador.** PROVINCE UNKNOWN: *Sodiro 19* (P).—CARCHI: Chical, *Barfod et al. 48591* (AAU, QCA, QCNE); Cantón Espejo, Bosque Protector Mirador de Golondrinas, between the village Las Juntas and la Cabaña del Corazón, *Clark et al. 2417* (AAU, COL, QCNE, SRP, US); Cantón Espejo, Bosque Protector Mirador de Golondrinas, between the village Las Juntas and La Cabaña del Corazón, *Clark & Dunn 2464* (MO, QCNE, SRP, US); Cantón Tulcán, Parroquia Chical, trail from the village of Chical towards Cristal, Río Blanca via the Cordillera Gualchán, 6–8 km SW of Chical, *Clark et al. 6349* (QCA, QCNE, SEL, US); Cantón Tulcán, Parroquia Chical, trail from the village of Quinyal towards Gualpi, near border of the Reserva Awá, *Clark & Mejia 6322* (QCNE, US); Cantón Espejo, Parroquia Guatal, Mirador de las Golondrinas (Fundación Golondrinas), Santa Rosa (El Rosal), *Clark et al. 8429* (QCNE, SEL, UNA, US); Comunidad Maldonado, Reserva Las Golondrinas, *Delprete 6409* (NY); environs of Chical, W of Maldonado, trail to Peñas Blancas, *Gentry & Shupp 26403* (AAU, MO, SEL); between Chical and Peñas Blancas, valley of Río San Juan on Colombian border, *Gentry & Shupp 26481* (MO, SEL), *Harling & Andersson 12271* (GB); environs of Chical, 12 km below Maldonado on the Río San Juan, *Madison et al. 4655* (AAU, F, QCA, SEL); Maldonado, 1 km downstream from village, *Werling & Leth-Nissen 155* (F, NY).—COTOPAXI: Cantón Sigchos, Parroquia San Francisco de las Pampas, trail near entrance of Bosque Integral Otonga, *Clark & Muñoz 6100* (AAU, COL, MO, NY, QCA, QCNE, SEL, US).—IMBABURA: Descanso a Intag, *Acosta Solís 8498* (F); Cantón Ibarra, Parroquia Lita, Comunidad San Francisco, next to Río Verde, 13 air-km south of Lita, *Clark et al. 7524* (QCNE, US); Cantón Cotacachi, Parroquia García Moreno, Cordillera de Toisán, Cerro de la Plata, Bosque Protector Los Cedros, trail towards the community El Chontal and Bosque Protector Los Cedros, *Clark et al. 7364* (AAU, COL, MO, NY, QCA, QCNE, SEL, UNA, US); near García Moreno, *Drew 532* (US).—PICHINCHA: Cantón Los Bancos, Parroquia Mindo, Bosque Protector Mindo, *Cerón M. & Avila 25463* (QAP); Parroquia San José de Minas, Río Cambugán and Loma Paso Alto, *Cerón M. et al. 36804* (QAP); headwaters of Río Cambugán, Cerro Paso Alto, *Cerón M. & Gallo 37053* (QAP); Cantón Quito, Parroquia Nanegalito, headwaters of Río Pachijal, Sector Rancho Buitrón, *Cerón M. 38140* (QAP); Finca San Carlos, Hacienda La Florida, border of Río Cinto, *Cerón M. et al. 47987* (QAP); Mindo, Quebrada Armada, *André 3314* (K-2 sheets, NY); Cantón Quito, La Playa, ca. 5 km W of Mindo via trail Lloa–Mindo, *Clark & Clark 3918* (COL, QCNE, US); Cantón Quito, walk from Lloa to Mindo, forest between Hacienda Pacay and main bridge to Mindo (S side of Río Cinto), *Clark 4509* (AAU, COL, MO, QCA, QCNE, US); Cantón Quito, Parroquia Nanegalito, Finca Kayalami, S of Cartegena; 2–3 air-km SE of Nanegalito, *Clark et al. 7075* (E, NY, QCA, QCNE, SEL, UNA, US); between Nono and Mindo, *Fagerlind & Wibom s.n.* (S); 11 km W of Tandapi, trail along Chictoa River, tributary of Río Pilatón, *Gentry et al. 12076* (MO, QCNE, US), *Harling & Andersson 11579* (GB); Tandayapa, *Heilborn 755* (S, NY); road Pacto–Nuevo Azuay, 5 km N of Esperanza, *Holm-Nielsen et al. 24534* (AAU), *Holm-Nielsen et al. 24544* (AAU); Reserva Maquipucuna, trail from lodge to forest, *Mendoza T. et al. 507* (AAU, COL, E, GB, MO, QCA, QCNE, US); Cantón Quito, Mindo, western slopes of Andes, near town of Mindo, *Neill & Asanza 10343* (MO, QCNE, SEL); road El Paraíso–Saguangal, 11 km from El Paraíso, *Øllgaard et al. 37608* (AAU), *Øllgaard et al. 37627* (AAU, QCA), *Øllgaard et al. 37837* (AAU); Nanegal to Nanegalito, *van der Werff et al. 12261* (MO, QCNE, US); Cantón Quito, Reserva Maquipucuna, trail along the Umachaca River, near Hacienda El Carmen, *Webster et al. 27021* (DAV, QCA); Cantón Quito, Parroquia Nanegal, ca. 1 km NW of Santa Marianitas, *Webster & Cutter 28685* (QCNE, US); Cantón Quito, Parroquia Nanegal, Bosque Protector Maquipucuna, *Webster & Zurinsky 29309* (AAU, QCNE, US); Cantón Quito, Reserva Maquipucuna, Cerro Palo Seco, eastern peak, 3 air-km ENE from Nanegal, *Webster et al. 27503* (DAV, QCA); Cantón Quito, Parroquia Nanegal, Reserva Maquipucuna, El Pacchal, S slopes of Cerro Campana, 4–5 air-km SE of Nanegal, *Webster et al. 27904* (DAV, QCNE), *Webster et al. 27976* (DAV, QCNE); Cantón Quito, Parroquia Nanegal, along Río Umachaca, near Hacienda El Carmen, *Webster et al. 28775* (AAU, QCNE, US); Cantón Quito, Bosque Protector Maquipucuna, E side of Río Tulambi, *Webster et al. 30264* (QCNE, US), *Webster et al. 30427* (DAV); hwy Quito–Aloag–Santo Domingo, 15 km S of road Pampas–Argentinas, *Zak & Jaramillo 3456* (MO).

Glossoloma purpureum has long-fimbriate calyx margins, lanceolate leaves, adaxially dark green and abaxially dark purple, and an unbranched shrubby terrestrial habit. The dark purple abaxial leaf surface is a reliable character and is even present on young foliage. Fimbriate calyx margins are also found in *G. sprucei*, *G. anomalum*, and *G. medusaeum*. *Glossoloma sprucei* differs in its distinctive ovate calyx lobes, densely villous yellowish brown pubescence, and large (up to 27 × 20 cm) ovate leaf blades. *Glossoloma anomalum* is distinguished from *G. purpureum* by the presence of non-resupinate flowers (Fig. 8) and

hispid trichomes throughout. *Glossoloma medusaeum* tends to have more flowers (3+) in the leaf axils compared to the few flowers per axil in *G. purpureum* (1–3).

- 20. *Glossoloma pycnosuzygium*** (J. Donnell Smith) J. L. Clark, *Selbyana* 25: 205. 2005. *Besleria pycnosuzygia* J. Donnell Smith, *Bot. Gaz.* 52: 53. 1911. *Alloplectus pycnosuzygius* (J. Donnell Smith) C. V. Morton, *Fieldiana, Bot.* 28: 522. 1953.—TYPE: COSTA RICA. San José: forests at La Palma, 1459 m, 8 Sep 1898, A. Tonduz 12545 (lectotype, designated by Clark, 2005: US!; isolectotypes: US-5 sheets!). *Alloplectus glabrescens* C. V. Morton, *Fieldiana, Bot.* 28: 522. 1953.—TYPE: VENEZUELA. Mérida: north of Torondoy, along Quebrada Molino, in woods above Las Cuadras, 1820–2255 m, 27 Mar 1944, J. A. Steyermark 55818 (holotype: US!; isotype: F!).

Shrubs, epiphytic; stems dorsiventral, rarely branched, to 2.5 m tall, 5–8 mm in diameter, woody, internodes 1.5–7.6 cm long, terete, glabrescent proximally, strigillose distally, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, nearly equal in a pair; petioles to 2 cm long, puberulent; blades 5.4–19.8 cm long, 1.6–7.2 cm wide, obliquely elliptic to obovate or oblanceolate, base acute to truncate, apex acuminate, margin usually entire, rarely serrulate, adaxially green, glabrous, abaxially pale green, usually glabrous, rarely sparsely pubescent on prominent veins, subcoriaceous when dry, lateral veins 5–7 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–6 flowers per node, posture pendent at anthesis, bracteoles oblong, 4–5 mm long, 3–4 mm wide; pedicels shorter than the petiole, 0.6–1.4 cm long, strigillose, pedicel enations present. Calyx lobes imbricate, nearly free, imbricate, erect, nearly equal, 4–8 mm long, 3–4 mm wide, broadly ovate to oblong, base truncate, apex acute, margin crenulate to entire, red or green, abaxially puberulous, adaxially glabrous, white-pilose at base. Corolla 1.0–2.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla perpendicular relative to calyx; base 3–4 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat slightly constricted, appearing laterally compressed, to 1.1 cm wide (at mouth), outside densely pilose or sericeous, inside sparingly pilose, sometimes with glandular trichomes apically, red spotting sometimes present on the upper surface of throat, limb reflexed, subregular, ca. 1.1 cm wide, appearing pink, from white pilose or sericeous hairs covering the red surface, lobes nearly equal, 2–3 mm long, 2–3 mm wide, rotund, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 1.2 cm long, adnate to base of corolla tube for ca. 3 mm, connate for 1 mm, forming an open sheath, glabrous; anthers ca. 1 mm long, ca. 2 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary ca. 3.5 mm long, ca. 3 mm wide, ovoid, villous, style ca. 1.5 cm long, sparsely pubescent, stigma stomatomorphic. Fruit a fleshy capsule, pendent, ca. 7 mm long, ca. 6 mm wide, ovoid when immature, villous, loculicidally dehiscent, becoming bivalved when mature, reddish to white. Seeds numerous, 0.8 cm long, 0.3 mm wide, ellipsoid, longitudinally striate, brownish red. Fig. 30.

Phenology. Flowering in January, March, July to October, and December, in fruit in September and October.

Distribution (Fig. 31). Costa Rica (San José and Cartago), Panama (Chiriquí and Bocas del Toro), and Venezuela (Mérida and Carabobo); montane forests; 1300–2200 m.

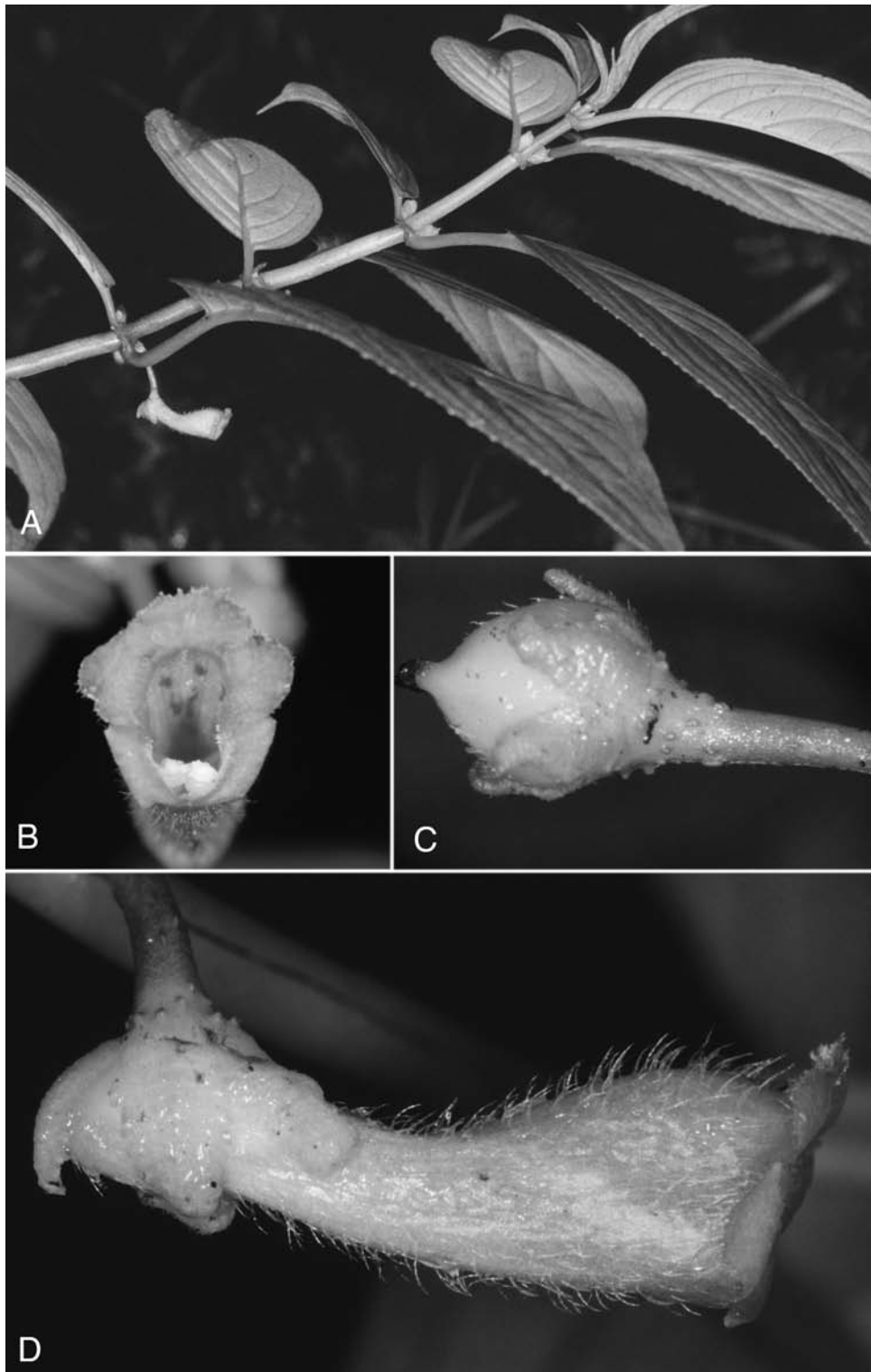


FIG. 30. *Glossoloma pycnosuzygium*. A. Habit. B. Face view of flower. C. Immature fruit. D. Lateral view of flower. (Photos by J. L. Clark; voucher: J. L. Clark & S. Yustiz 6861.)

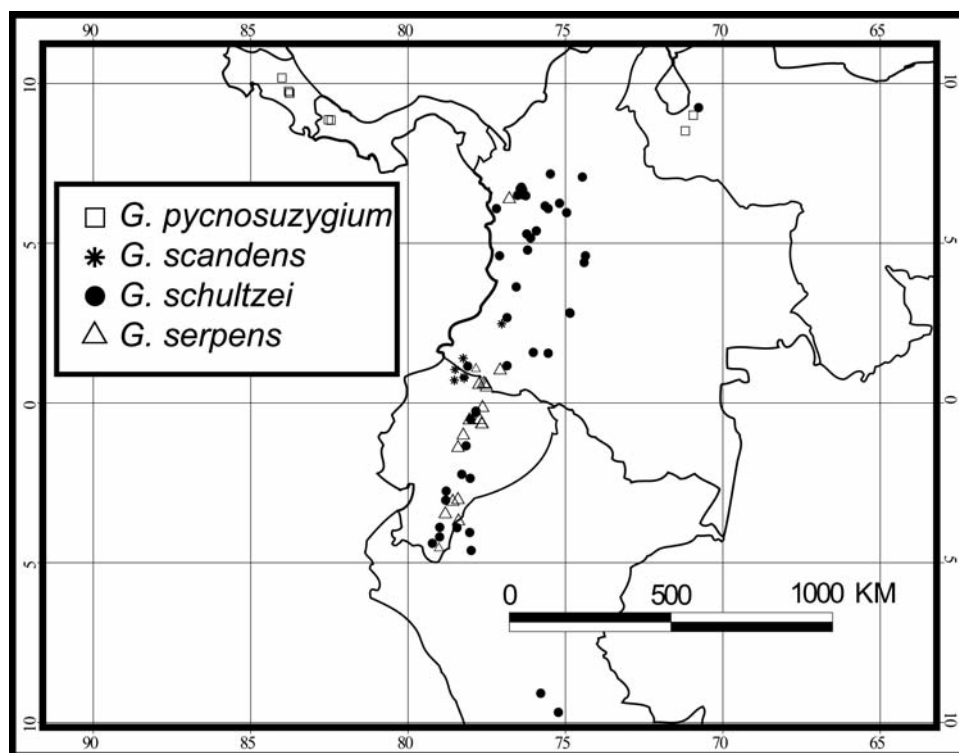


FIG. 31. Distribution of *Glossoloma pycnosuzygium*, *G. scandens*, *G. schultzei*, and *G. serpens*.

ADDITIONAL SPECIMENS EXAMINED. **Costa Rica.** CARTAGO: near Río Villegas, valley of Río Grande de Orosi, *Lent 1862* (F, NY).—SAN JOSÉ: Palma, *Brade 2208* (BR); old road to Limón, 7.4 km N of San Jerónimo at La Palma, *Hill et al. 17753* (US); along road that leads down from Alta La Palma to the Río Hondura, ca. 15 km NE of Santa Domingo, *Taylor 17870* (F, US); forests and environs of La Palma, *Tonduz 12548* (US-2 sheets); between Alto de La Palma and Bajo de Hondura, *Utley & Utley 611* (F); La Hondura de San José, *Valerio 741* (F). **Panama.** BOCAS DEL TORO: Robalo trail, northern slopes of Cerro Horqueta, *Allen 4996* (BR, EAP, F, G, GH, K, MO, NY, P, S-2 sheets, U, US-2 sheets); trail to La Laguna, Boquete, *Montenegro et al. 1296* (PMA-2 sheets, SCZ).—CHIRIQUÍ: environs of Bajo Chorro, *Woodson & Schery 683* (MO).

Venezuela. CARABOBO: *Pittier 8957* (GH).—MÉRIDA: Justo Briseño, Quebrado El Molino (near Las Cuadras), *Clark & Yustiz 6861* (NY, MER, PORT, SEL, UNA, US, VEN).

Glossoloma pycnosuzygium is characterized by horizontal to dorsiventral stems, obliquely elliptic to obovate or oblanceolate leaves, a uniformly red corolla that is held nearly perpendicular relative to the calyx, and imbricate calyx lobes. It is distinguished from other species in the genus by the relatively small calyx lobes (4 × 3 mm) that are imbricate in flower but spreading in fruit. Also distinctive is the lack of trichomes on the leaf surfaces. This species resembles *G. herthae*, because both have a similar scandent habit and imbricate calyx lobes. These two species are geographically isolated; *G. pycnosuzygium* occurs in Costa Rica, Panama, and Venezuela, and *G. herthae* in Colombia, Ecuador, and Peru. They are also easily differentiated by corolla size, in *G. pycnosuzygium* 1.0–2.5 cm long and in *G. herthae* ca. 4–5 cm long.

The disjunct distribution of *G. pycnosuzygium* in Central and South America is

unusual for Gesneriaceae. A similar disjunct pattern has been documented for *Columnnea oerstediana* Klotzsch ex Oerst. and *Columnnea calotricha* Donn. Sm. Future fieldwork will likely discover populations in many of the unexplored and relatively poorly known areas of Colombia.

21. *Glossoloma scandens* J. L. Clark, sp. nov.—TYPE: ECUADOR. Carchi: Cantón Tulcán, Parroq. Chical, trail along Río Blanco via the Cordillera Gualchán, 6–8 km SW of Chical on trail towards Cristal, 00°53'49"N, 78°07'03"W, 1200–1800 m, 7 Dec 2001, J. L. Clark, O. Mejía & E. Díaz 6356 (holotype: QCNE!; isotypes: AAU! COL! K! NY! QCA! SEL! US!).

G. herthae simile sed lobis calycis fere aequalibus subliberisque, corollis minoribus (usque 2.5 cm vs. 3.6 cm) differt.

Obligate epiphyte; stems elongate, scandent, frequently branched, to more than 2.0 m long, slender, 4–8 mm in diameter, woody, internodes 2–6 cm long, terete, glabrescent proximally, puberulous distally, leaf scars slightly raised from the stem surface. Leaves opposite, nearly equal in a pair; petioles 1–2.5 cm long, puberulous; blades 4–14 cm long, 1.5–3.5 cm wide, elliptic to oblong, base acute, apex acuminate, margin serrate, adaxially light green, glabrous, abaxially green to light red, puberulous, membranous when dry, lateral veins 6–9 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–3 flowers per node, pendent at anthesis, bracteoles 2–6 mm long, 1 mm wide, linear; pedicels equal to or shorter than the petiole, to 1 cm long, sericeous, pedicel enations absent. Calyx lobes nearly free, valvate to spreading, erect, equal, 12 mm long, 4 mm wide, linear, base truncate, apex acute, margin dentate-serrate, green to red, abaxially sparingly pilose, adaxially pilose. Corolla to 2.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla nearly perpendicular relative to calyx; base 5 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat not constricted, appearing laterally compressed, 10 mm wide (at mouth), outside glabrous at base, becoming sparingly to densely hirsute distally, inside mostly glabrous, with glandular trichomes at throat, interior spotting absent, limb reflexed, zygomorphic, to 1 cm wide, red (Ecuador) or yellow (Colombia), lobes nearly equal, 2 mm long, 3 mm wide, rotund, entire. Nectary gland emarginate to truncate, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 1.3 cm long, connate at base for 3 mm, adnate to base of corolla tube for ca. 2 mm, glabrous; anthers 1 mm long, 1.5 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary ca. 4 mm long, ca. 3 mm wide, ovoid, densely pilose, style ca. 1.3 cm long, glabrous, stigma stomatomorphic. Fruit not seen. Fig. 32.

Phenology. Flowering in February, March, May, July, November, and December.

Distribution (Fig. 31). Eastern Andes of Colombia (Cauca and Nariño) and Ecuador (Carchi, Esmeraldas, and Imbabura); shaded areas of montane forests; 900–1700 m.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** DEPARTMENT UNKNOWN: Cordillera Teca, *Goudot 7* (P).—CAUCA: Mpio. El Tambo, Parque Nacional Munchique, Cordillera Occidental, below the Refugio de la Gallera (from Km 81), *Lozano C. et al. 6511* (COL).—NARIÑO: Trayecto Pielapi–La Planada, *Benavides 10137* (MO, US); Pielapi, valley of Río Pielapi, *Gentry et al. 63697* (MO); near Ecuador border, along trail above San Juan River near Maldonado, *Hoover 1037* (MO-2 sheets, US). **Ecuador.** CARCHI: Cantón Tulcán, Parroquia Chical, trail from the village of Quynal towards Gualpi, near border of the Reserva Awa, *Clark & Mejía 6311* (AAU, COL, E, MO, NY, QCA, QCNE, SEL, US); trail beginning above Rafael Quindi Finca, above Untal (along road to Chical) and partly ascending Cerro Obsura, 0.6 km from finca, *Hoover & Wormley 1476* (MO); trail beginning

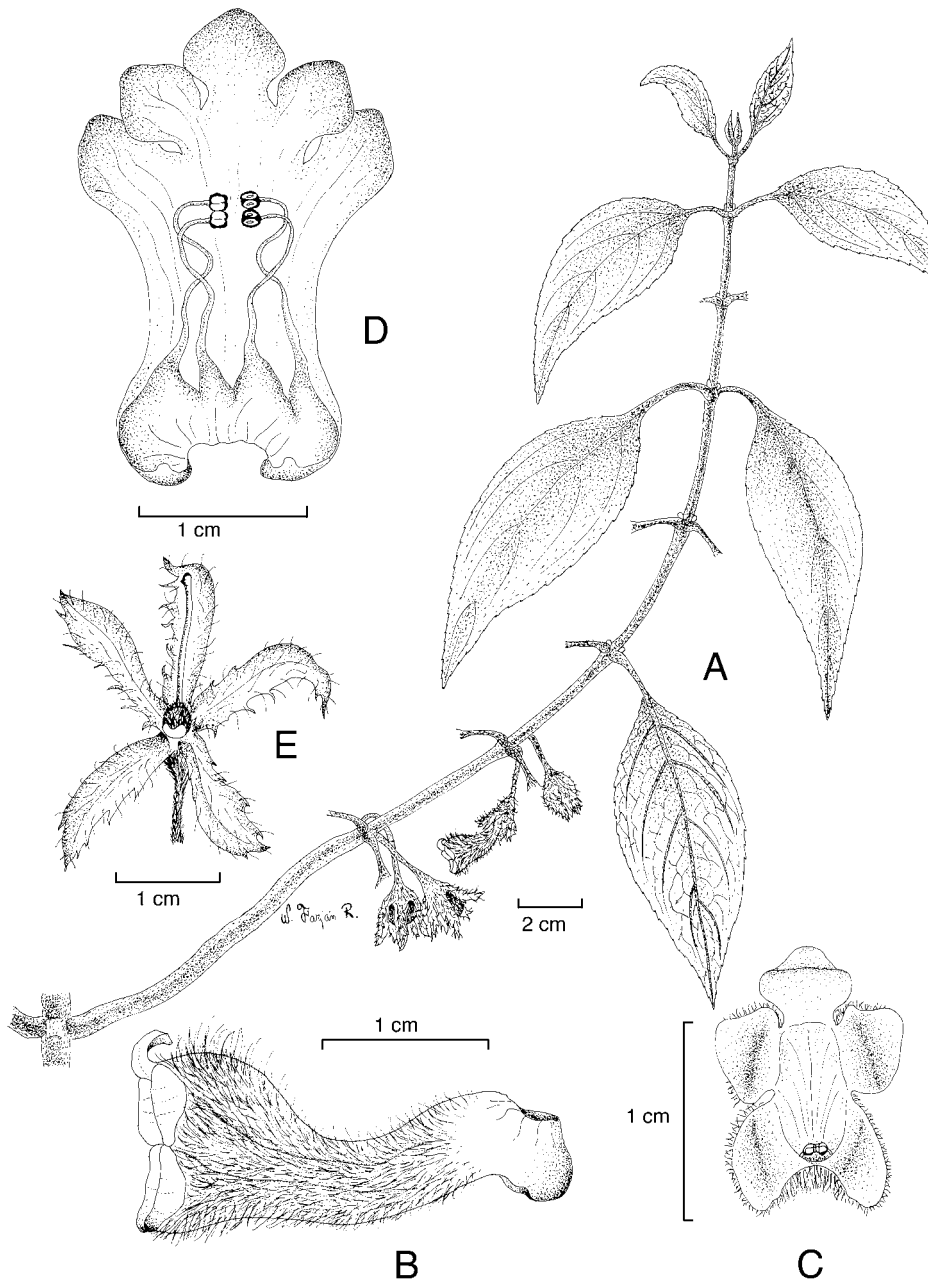


FIG. 32. *Glossoloma scandens*. A. Habit. B. Side view of corolla. C. Face view of flower. D. Corolla opened to show stamens. E. Calyx opened and corolla removed to show pistil and bilobed nectary gland. (Based on J. L. Clark et al. 7510.)

above Rafael Quindi Finca, above Untal (along road to Chical) and partly ascending Cerro Obsura, 0.6 km from finca, *Hoover & Wormley 1659* (QCA), *Hoover & Wormley 1660* (MO); environs of Chical, 12 km below Maldonado on the Río San Juan, *Madison et al. 4524* (F, SEL).—ESMERALDAS: Cantón San Lorenzo, Parroquia Alto Tambo, 4–8 km W of El Cristal, *Clark et al. 10324* (MO, QCNE, SEL).—IMBABURA: Cantón Ibarra, Parroquia Lita, comunidad San Francisco, next to Río Verde, 13 air-km S of Lita, *Clark et al. 7510* (AAU, CAS, COL, CUZ, E, F, K, MO, NY, QCA, QCNE, SEL, UNA, US).

Glossoloma scandens is distinguished from its congeners by the nearly actinomorphic calyx. The calyx lobes themselves are also distinct in their valvate to spreading arrangement. *Glossoloma scandens* is an obligate epiphyte and is usually found growing 1–2 meters above the ground. The obligate epiphytic habit is known in only one other member of the genus, *G. penduliflorum*, but *G. scandens* is easily differentiated by smaller flowers (2.5 cm long) and pedicels less than 1 cm long; in *G. penduliflorum* the flowers are 5.5–6.0 cm long and the pedicels 8–15 cm long. These two species grow sympatrically and have been collected on the same day in the environs of the town of El Cristal in the Esmeraldas province in northwestern Ecuador (*Clark 10268, 10325*).

22. *Glossoloma schultzei* (Mansfeld) J. L. Clark, *Selbyana* 25: 206. 2005. *Alloplectus schultzei* Mansfeld, *Repert. Spec. Nov. Regni Veg.* 36: 124. 1934.—TYPE: COLOMBIA. Cundinamarca: Bergurwald bei [mountain jungle near] Aguadita [5 km NE of Fusagasugá], 12 Apr 1925, A. *Schultze 212* (holotype: B, destroyed).—TYPE: COLOMBIA. Cundinamarca: mountains W of Salto de Tequendama, laguna de Catarnica, S of Santandercito, 2000 m, 31 Oct 1959, L. *Uribe U. 3414* (neotype, designated by Clark, 2005: US!).

Subshrubs, terrestrial; stems erect, usually unbranched, sometimes sparingly branched, to 3 m tall, to 1.5 cm in diameter, woody, internodes 2–10 cm long, subquadran-gular, glabrescent proximally, densely brownish yellow villous distally, leaf scars raised from stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 5–15 cm long, densely to sparsely brownish yellow villous; blades 18–33 cm long, 9–18 cm wide, ovate, base usually cordate, sometimes rounded, apex acute, margin sharply serrulate to denticulate, adaxially green, mostly puberulous and sparingly strigose, abaxially green, mostly puberulous, strigose on prominent veins, subcoriaceous when dry, lateral veins 7–9 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 2–10 flowers per node, posture pendent at anthesis, bracteoles 20–35 mm long, 10–20 mm wide, ovate; pedicels shorter than the petiole, 2–6 cm long, sparsely villous with erect hairs, pedicel enations present. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, 4 equal, 20–35 mm long, 10–18 mm wide, ovate, base cordate, apex acute, margin serrate, mostly red, sometimes appearing white at base from the densely villous pubescence, abaxially sparingly to more densely villous at base, adaxially sparingly to more densely villous at base; fifth (ventral) lobe smaller and narrower, to 2.0 cm long, to 1.0 cm wide, ovate. Corolla 4–5.5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base 6–9 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat not constricted, appearing laterally compressed, 1.4–1.6 cm wide (at mouth), outside glabrous at base, sparingly to densely pilose, inside mostly glabrous, becoming glandular apically, red spotting sometimes present on the upper surface of throat, limb reflexed, zygomorphic, to 1 cm wide, usually red, sometimes red-orange, base white, lobes nearly equal, ca. 4 mm long, ca. 5 mm wide, rotund,

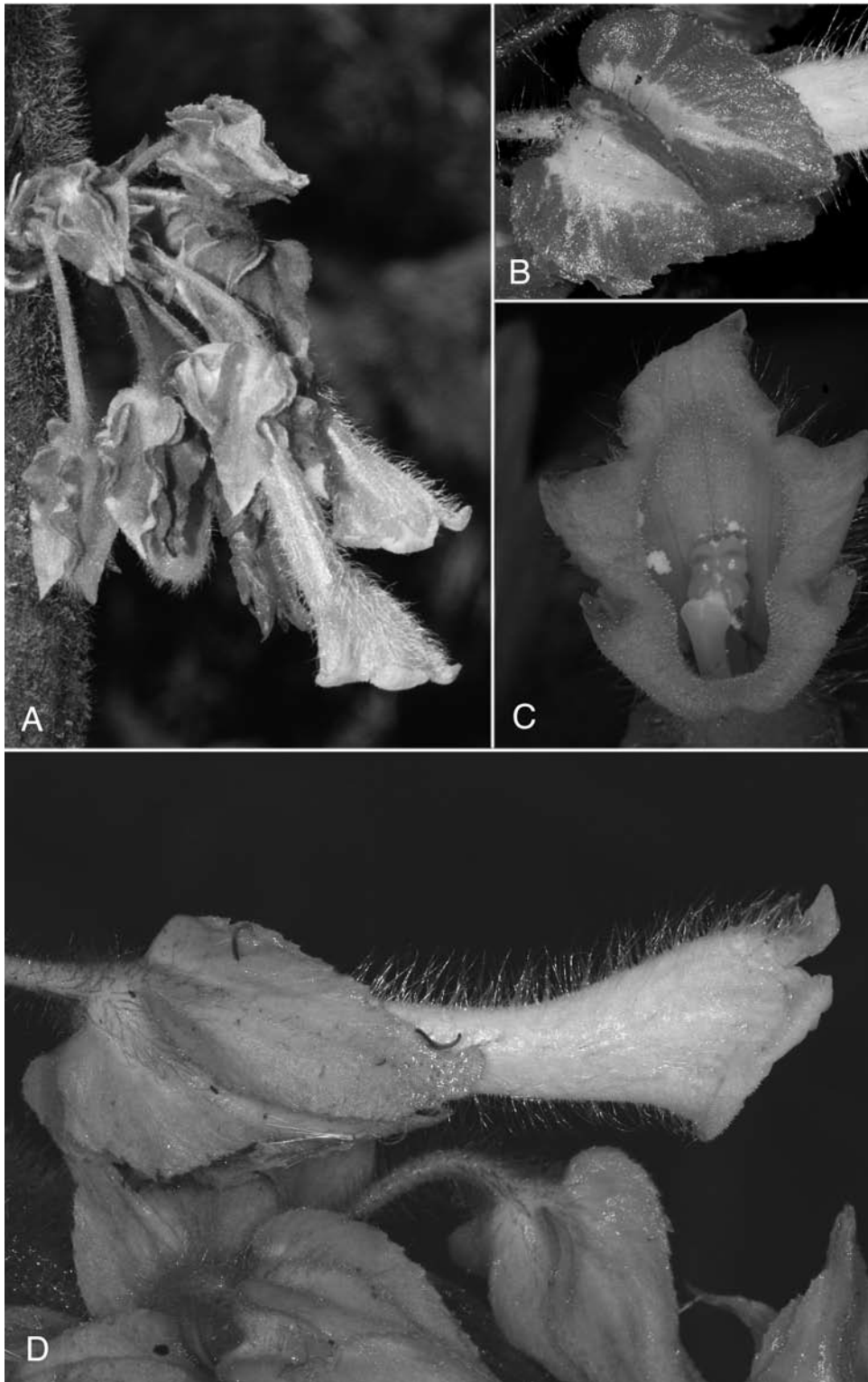


FIG. 33. *Glossoloma schultzei*. A. Cluster of axillary flowers subtended by a bracteole. B. Calyx. C. Face view of corolla. D. Lateral view of flower. (Photos by J. L. Clark; vouchers: A, J. L. Clark *et al.* 5993; B, J. L. Clark & J. Rea 8038; C, D, J. L. Clark 9851)

entire. Nectary gland usually bilobed, sometimes single-lobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 3 cm long, adnate to base of corolla tube for ca. 5 mm, connate for 1 mm, forming an open sheath, glabrous; anthers 2 mm long, 3 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary ca. 6 mm long, ca. 4 mm wide, ovoid, puberulous, style to 2.7 cm long, glabrous, stigma stomatoporphic. Fruit a fleshy capsule, pendent, ca. 1.3 cm long, ca. 1.4 wide, ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, 1 mm long, 0.3 mm wide, fusiform, longitudinally striate, brownish red. Fig. 33.

Phenology. Flowering throughout the year; collected in fruit in February to May, July to September, and November.

Distribution (Fig. 31). Andes of Peru, Ecuador, Colombia, and Venezuela; montane and premontane forests; sea level to 2500 m.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** DEPARTMENT UNKNOWN: Río Nembí, *André 3353* (K); *Mutis 923* (MA); *White 8* (K).—ANTIOQUIA: Mpio. Frontino, Corregimiento Nutibara, región Murrí, road towards La Blanquita, *Acevedo R. et al. 1183* (NY, US); Mpio. Guatapé, *Arias G. et al. 76* (MO); Mpio. Frontino, road to Murrí, 15.0 km W of Nutibara, Altos de Cuevas, ca. 1 km S of road, *Brant & Martínez A. 1354* (COL, MO, US); Mpio. Yarumal, 2 km before Ventanas, road to Vereda Alegre, *Callejas et al. 2484* (NY); Mpio. Frontino, Parque Nacional de Las Orquídeas, Finca la Guadalupe, Quebrada Horacio, tributary of Río Venados, *Callejas et al. 2922* (NY, US); Mpio. San Luis, Vereda Araca, Sector el Tulipán, *Cárdenas et al. 2444* (MO); Mpio. Urrao, Parque Nacional Natural Las Orquídeas, *Cárdenas et al. 3203* (MO); Los Alpes, near Río Negro, *Daniel 1803* (F, US), *Daniel 1264* (F); Río Caldera, *Daniel 4493* (US); Jerico, *Daniel & Tomas 2447* (US); Mpio. Guatapé, trail to Santa Rita, Finca Montepinar, *Escobar et al. 6784* (NY); Mpio. Frontino, Corregimiento Nutibara, Alto de Cuevas, Quebrada del Oso, *Fonnegra et al. 3488* (MO); Mpio. San Francisco, Corregimiento Aquitania, Finca La Ilusión, *Fonnegra et al. 4152* (COL, MO, PORT, US); Mpio. Urrao, Vereda Calles, Río Calles, Parque Nacional Natural Las Orquídeas, *Fonnegra et al. 5532* (US); Mpio. San Luis, Ecoparque El Castellón, *Fonnegra et al. 5750* (MO); Mpio. Cocorná, Vereda La Roca, hwy Medellín–Bogotá, Km 62, Quebrada de La Roca, *Galeano & Bernal 195* (COL), *Galeano & Bernal 196* (COL); Mpio. Frontino, Corregimiento Murrí, road Nutibara–La Blanquita, ca. 9 km below Cordillera Oriental, *Galeano & Bernal 473* (COL); trail from Encarnación to Parque Nacional de los Orquídeas, western slope of the Cordillera Occidental, *Gentry & Rentería A. 24552* (COL-2 sheets, MO, US); Mpio. Sonson, Región Río Verde, Hacienda La Soledad, headwaters of Quebrada Curubital, *Gutiérrez 35572* (UC); between León and Villa Arteaga, *Johnson & Barkley 120* (US); Mpio. Caldas, along Río Medellín, below Alto de Morrogil, *Juncosa 1950* (MO, U, US); between Río Guapa and León, *Landa et al. 122* (US); Mpio. Enviagado, above Barrio El Salado, near Quebrada La Miel, *López A. 166* (MO), *Luer et al. 9011* (SEL); Mpio. Yarumal, Alto de Ventanas, ca. 1–6 km along rd to El Cedro, ca. 22 km N of Yarumal, *Luteyn & Escobar 13193* (US), *Luteyn & Escobar 13214* (NY); Mpio. Frontino, road between Nutibara and La Blanquita, region of Murrí, ca. 9 km below and W of highpoint on road, from Nutibara, *MacDougal et al. 3726* (MO, US); Mpio. Frontino, environs of Murrí, ca. 13 road-km from Nutibara, *McPherson 13402* (MO); between Valdivia and Yarumal, *Metcalf & Cuatrecasas 30114* (UC); Mpio. San Luis, towards la Vereda Manizales, *Orozco et al. 510* (COL); Mpio. Urrao, Parque Nacional Natural Las Orquídeas, Quebrada Honda, Vereda Calles, *Pipoly et al. 16606* (MO); Mpio. Urrao, Parque Nacional Natural Las Orquídeas, Vereda Calles, road towards La Encarnación, *Pipoly et al. 17109* (MO); Mpio. Urrao, Parque Nacional Natural Las Orquídeas, Vereda Calles, Alto de Palmitas, *Pipoly et al. 17608* (MO); Mpio. Urrao, Parque Nacional Natural Las Orquídeas, Vereda Calles, Alto de Palmitas, *Pipoly et al. 17645* (MO); road from Caldera to San Luis, *Romero C. 1516* (COL); Mpio. Frontino, Corregimiento Nutibara, headwaters of Río Cuevas, *Sánchez, E. et al. 124* (MEDEL); 19 km N of Yarumal along Hwy Medellín–Cartagena, ca. 2 km S of Alto de Ventanas, *Stein & Cogollo 3364* (COL, MO); vicinity of Medellín, Dauro, Chocó, *Toro 1148* (NY); vicinity of Medellín, Salgar, *Toro 1258* (NY); environs of San Juan, *Uribe U. 2611* (COL); forest near Paramitos, *Uribe U. 1882* (COL, US); Mpio. Nariño, Paraje Paramitos, *Uribe U. 2147* (COL, US); Santuario, Hwy Medellín–Bogotá, *Uribe U. 6765* (COL-2 sheets); Mpio. Frontino, Km 22 of road Nutibara–Murrí, *Zarucchi et al. 5511* (NY); Mpio. Frontino, Km 18.5 of road Nutibara–Murrí, *Zarucchi et al. 5549* (COL, US); Mpio. Frontino, Km 13–18 on road Nutibara–La Blanquita, region of Murrí, Alto de Cuevas, *Zarucchi et al. 7144* (COL, US).—BOYACÁ: Mpio. Duitama, trail from El Carmen to Virolín, vicinity of the Comunidad Tao, *Fernández A. 12226* (COL); environs of Mt. Chapón, extreme western part of department, NW of Bogotá, *Lawrance 72* (A, F, G, GH, MO, US); environs of El Humbo, 130 mi N of Bogotá, *Lawrance 632*

(A, F-2 sheets, K, S); road Duitama–Charalá, Km 10, *Londoño & Kvist 801* (US).—CALDAS: Manizales, Cordillera Central, Montealeán, *Fraume et al. 195* (US); Manizales, Cordillera Central, Montealeán, *Fraume et al. 571* (US); Río Santa Rita, Salento, Cordillera Central, *Killip & Hazen 8975* (PH); Pueblo Rico, western slopes of the Cordillera Occidental, *von Sneider 5252* (F, US), *von Sneider 5377* (S), *von Sneider 5469* (F).—CAQUETÁ: western slopes of the Cordillera Oriental, tributary of Río Hacha, Cajón de Pulido, *Cuatrecasas 8746* (COL, F, US); Mpio. San Vicente de Caguán, Cuenca del Río Pato, *Mendoza & Betancur 4766* (FMB); Mpio. San Vicente de Caguán, headwaters of Río Pato, *Mendoza & Betancur 5112* (FMB).—CAUCA: Cordillera Oriental, Río Dauriau, *Dryander 2095* (US); Santander de Quilichao, Río Chiquito, *Fernández 2797* (COL); Parque Nacional Munchique, El Tambo, trail La Romelia, road from Nueva Granada, *González 2969* (COL, MA); Cordillera Occidental, La Gallera, Micay Valley, *Killip 7958* (PH), *Killip 8010* (PH); forest and environs of Río Huangubio, Popayán, *Lehmann s.n.* (K), *Lehmann 681* (K, NY), *Lehmann 8251* (K); Parque Nacional Munchique, 1–12 km into park beyond its entrance, *Luteyn et al. 10260* (COL, NY, US); Cuesta de Tocota, road Buenaventura–Cali, Cordillera Oriental, *Pittier 715* (US); Parque Nacional Munchique, El Tambo, vereda La Romelia, *Ruíz et al. 171* (COL, MA); Parque Nacional Munchique, El Tambo, vereda La Romelia, La Gallera, *Ruíz et al. 321* (MA); El Tambo, forests of La Costa, *von Sneider 466* (NY, S), *von Sneider 468* (S), *von Sneider 489* (S), *von Sneider 851* (S), *von Sneider 852* (S), *von Sneider 989* (S), *von Sneider 1011* (S); Parque Nacional Munchique, El Tambo, trail La Romelia, Quebrada Charco Azul, *Velayos et al. 6958* (COL, MA).—CHOCÓ: Quebrada San Pichí, *Barbosa 6514* (MO); Alto de Guaduas, near Carmen, *Core 343* (US); hwy Ansermanuevo–San José del Palmar, boundary with Valle del Cauca and Alto del Galápago, *Forero et al. 2048* (COL, MO, US); Carretera Ansermanuevo–San José del Palmar, limite con el Valle del Cauca, Alto del Galápago, *Forero et al. 2151* (MO, US); Ansermanuevo–San José del Palmar hwy, limite con el Valle del Cauca, Alto del Galápago, *Forero et al. 2893* (MO, US); Mpio. San José del Palmar, *Forero et al. 3401* (COL, MO, US); Emisora La Sirena, 3 km W of La Mansa, top of Cordillera Occidental, *Gentry & Rentería A. 24202* (COL, MO); trail from Encarnación to Parque Nacional de los Orchúideas, top of Cordillera Occidental, *Gentry & Rentería A. 24659* (COL, MO); road Quibdó–Tutunendo, ca. 4 km W of Tutunendo, *Gentry et al. 30256* (US); Mpio. San José del Palmar, between Cairo and San José del Palmar, *Kress & Echeverry 2602* (US); hwy Ansermanuevo–San José del Palmar, Km 55, *Lozano C. & Díaz 3156* (COL); Km 55 on road Ansermanuevo–San José del Palmar, *Lozano C. & Díaz 3225* (COL); Mpio. San José del Palmar, Alto de Galápago, *Lozano C. et al. 4898* (COL); Hwy to Quibdó, between Carmen de Atrato and Río Toro, *Uribe U. 3148* (COL, US).—CUNDINAMARCA: Albán, *Amortegui 263* (US); Mpio. Albán, La Mería, *Forero 182* (COL); El Cesar, N of boundary between Santander del Norte and Cesar, between Abrego and Cerro de Oroque, *García Barriga & Jaramillo M. 19881* (COL, US); western slopes of the Cordillera Oriental, Boquerón de La Aguadita, *Idrobo & Hernández 1656* (COL); Canoas, S of Tequendama, *La Salle 428* (P); Santandercito, La Rambla, *Schneider 834* (COL, S); Fusagasugá, *Tracey 357* (K); Bogotá, S of Tequendama, El Salto de Tequendama, *Triana 2502* (G, P-2 sheets); Pacho, Hacienda Patasía, environs of Cerro Traga–Arepas, *Uribe U. 1649* (COL-2 sheets); Santandercito, La Rambla, *von Sneider 834* (S).—HUILA: near Alto del Consuelo, Canbaña Las Brisas, Parque Nacional Cueva de Los Guácharos, *Barbosa 15444* (COL); western slopes of the Cordillera Oriental, below Gabinete, Abra de San Andrés, *Cuatrecasas 8651* (COL, US-2 sheets); Río Villalobos, vicinity of Río Suazita, *Schultes et al. 5151* (GH).—META: road from Herradura, between Guayabetal and Acacías, Río Manzanares, *García Barriga 15396* (COL).—NARIÑO: San Antonio, *Alston 8575* (BM, COL, US); Reserva Natural La Planada, *Benavides 11201* (US); La Planada, 7 km above Chucunes on road between Tuquerres and Ricaurte, above building “La Posada,” *Croat 69555* (MO, US); La Planada, trail to El Hondón, 6–12 km SW of La Planada, *Gentry et al. 60399* (MO, US); Reserva Natural La Planada, Ricaurte, *Restrepo 793* (US); vicinity of Barbacoas, Chutucol, *Triana 2490* (P).—PUTUMAYO: western slopes of the Cordillera, between Sachamates and San Francisco de Sibundoy, *Cuatrecasas 11459* (COL, F, US).—QUINDÍO: Mpio. Calarca, environs of Vista Hermosa, road towards Quebrada Negra, *Arbeláez S. et al. 2279* (COL).—RISARALDA: Mpio. Santuario, Quebrada Risaralda, *Amaya M. & Smith 511* (COL, US); Mpio. Santuario, Quebrada Risaralda, *Amaya M. & Smith 521* (US); Mpio. Pueblo Rico, Corregimiento Santa Cecilia, 13 km from the road Santa Cecilia–Pueblo Rico, Quebrada Pionda, western slopes of the Cordillera Occidental, headwaters of the Río San Juan, *Betancur et al. 3048* (COL); Mpio. Mistrató, Corregimiento San Antonio del Chamí, road Mistrató–San Antonio, western slopes of the Cordillera Occidental, *Betancur et al. 3358* (COL, US); Mpio. Mistrató, Alto Paramillo de Mampay, *Camargo G. & Londoño 7375* (COL); Mpio. Mistrató, Corregimiento Puerto de Oro, road Pisones–Geguadas, Río Mistrató, *Fernández A. et al. 9081* (COL, US); Mpio. Mistrató, between Corregimiento Geguadas y Puerto de Oro, Selva de Pisones, *Fernández A. et al. 9664* (MO, NY, US); Mpio. Mistrató, Corregimiento San Antonio de Chamí, road between San Antonio de Chamí and Mistrató, *Fernández A. et al. 9868* (COL); Mpio. Mistrató, Corregimiento Puerto de Oro, Chirrincha, Río Aguita, *Forero et al. 3592* (COL); Mpio. Mistrató, 12 km NE of Cabecera Municipal, *Galeano et al. 2542* (COL, MO, NY, US); Mpio. Mistrató, towards San Antonio del Chamí, environs of Quebrada Sutú and Quebrada Empalados, *Lozano*

C. et al. 6378 (COL).—SANTANDER: Mpio. Virolín, *Alonso et al. 6205* (COL); Mpio. Gámbita, *Arrieta & Castillo 32* (COL); Mpio. Gámbita, environs of Guausa, *Cardenas & Oliveros 182* (COL); Mpio. Charalá, Corregimiento Virolín, Río Luisito, *Díaz P. 1413* (AAU, COL); Mpio. Charalá, Corregimiento Virolín, *Díaz P. 3394* (COL), *Rodríguez & Rojas 34* (COL); Mpio. Gámbita, La Cantera, *Silva et al. 26* (COL); Mpio. Charalá, Corregimiento Virolín, environs of El Reloj, road to El Olival, *Valbuena & Harker 21* (COL).—TOLIMA: Monte Tauro, *Echeverry 4848* (COL); El Fresno, Alto del Aguila, *García Barriga 8238* (US); Mpio. Sta. Isabel, Finca La Cima, western slopes of the Cordillera Central, *Idrobo et al. 10658* (COL); road to Santa Isabel, *Londoño & Kvist 61* (COL, US); Libano, *Pennell 3406* (GH, MO, NY, US).—VALLE DEL CAUCA: Mpio. Dagua, Corregimiento El Carmen, *Amaya M. & Smith 580* (COL); Mpio. Queremal, old road to Buenaventura, *Amaya M. & Smith 611* (COL, US), *André 2558* (K); ridge of the Cordillera Oriental, road from Cali to Buenaventura, Km 18 and Km 20, entrance of Finca Zingara, *Cabrera R. & van der Werff 15797* (MO); eastern slopes of the Cordillera Occidental, valley of Río Cali, between Puente de los Cárpatos and La Margarita, *Cuatrecasas 18483* (F); western slopes of the Cordillera Occidental, valley of Río Digua, Quebrada San Juan, below Queremal, *Cuatrecasas 22716* (F-2 sheets, US); ridge of Cordillera Occidental, environs of Las Brisas, Monte El Tabor, *Cuatrecasas 22307* (F); western slopes of the Cordillera Occidental, valley of Río Digua, Quebrada del San Juan, from Queremal to Toparaguita, *Cuatrecasas 23809* (F-2 sheets, US); base of eastern slopes of the Cordillera Occidental, near Las Mesitas, above Villa Colombia, Quebrada Pital, *Cuatrecasas et al. 26881* (US-3 sheets); Cerro al Mar, *Dryander 2431* (US); Cali, Peñas Blancas, Cordillera Occidental, *Figueroa P. 877* (US); Queremal, road to Buenaventura, *García Barriga 18843* (COL); bosque de San Antonio, W of Cali, near television tower, *Gentry et al. 48113* (COL, MO, US); El Silencio, Hacienda Himalaya, Cordillera Occidental, W of Yumbo, *Gentry et al. 65450* (MO); Mpio. Cali, hwy Cali–Buenaventura, Km 18, detour to Dapa, Finca Zingara, *Giraldo 20* (MO); Mpio. Cali, hwy Cali–Buenaventura, Km 18, detour to Dapa, Finca Zingara, *Giraldo 67* (US); San Antonio, W of Cali, near summit of the Cordillera Occidental, *Killip & García 33920* (COL, US); El Silencio, Yanaconas, *Killip & García 33797* (US-2 sheets); above Cali, *Lehmann s.n.* (K); old road Cali–Buenaventura, Km 51, *Londoño & Kvist 186* (AAU); Cordillera Occidental, river basin of Río Cali, vicinity of Peñas Blancas, *López F. 8157* (US); Cordillera Occidental, river basin of Río Cali, vicinity of Peñas Blancas, *López F. 8188* (US); Cordillera Occidental, river basin of Río Cali, vicinity of Peñas Blancas *López F. 8310* (US); near Queremal, *Maas & Plowman 1897* (F, GH, U); 4 km NW of San Antonio, *Miller & Miller 11* (US); Mpio. Andalucía, environs of Altaflor, *Monsalve B. 90* (MO); Cali, Villa Carmelo, *Murphy 385* (COL, MO, US); Darién, along road to Campo Alegre, *Murphy 460* (COL, MO, US); La Cumbre, Cordillera Occidental, *Pennell 5712* (GH, PH); Cordillera Occidental, La Cumbre, *Pennell 5872* (PH); Mpio. Restrepo, environs of Román, Río Grande, towards the road Pavas–Restrepo, *Ramos et al. 2577* (US); Río Bravo, NW of Darién, Valle, *Robinson 102* (COL, K, US); Mpio. Calima, El Chanco, environs of Campamento CVC, Río Calima, *Rutíz et al. 8* (COL); above Cali, *Sandeman 138* (K, OXF); Mpio. Cali, San Antonio, Cerro La Horqueta, eastern slopes of the Cordillera Occidental, hwy Cali–Buenaventura, Km 17, *Silverstone-Sopkin & Rodríguez 2092* (CUVC, MO, US-2 sheets); Mpio. El Cairo, Cerro del Ingles, Cordillera Occidental, Serranía de los Paraguas, *Silverstone-Sopkin et al. 2723* (CUVC, US); Mpio. El Cairo, Cerro del Ingles, Cordillera Occidental, Serranía de los Paraguas, Cordillera Occidental *Silverstone-Sopkin et al. 3884* (US). **Ecuador.** AZUAY: hwy Cuenca–Cola de San Pablo, trail Guarumales–Méndez, *Boeke & Loyola 1045* (NY, SEL, US), *Boeke et al. 1945* (US).—MORONA-SANTIAGO: Cantón Limón Indanza, main road between Gualaceo and Plan de Milagro, environs of Cerro Bosco, *Clark et al. 5915* (AAU, B, COL, F, GH, K, MO, NY, P, QCA, QCNE, SRP, US, VEN, WU); Cantón Limón Indanza, environs of Zapote, road from Plan de Milagro to Gualaceo, *Clark et al. 5993* (AAU, HA, NY, QCA, QCNE, US); Cantón Morona, Parroquia 9 de Octubre, unfinished road towards Guamote (vía Macs–Guamote), *Clark & Katzenstein 8389* (MO, NY, QCNE, SEL, UNA, US); Cantón San Juan Bosco, road San Juan Bosco–Santiago de Panantza, *Clark et al. 9851* (MO, QCNE, SEL, UNA); road Gualaquiza–Indanza, ca. km 20 between Túmbez and Tucumbatza, *Harling & Andersson 24387* (GB); new road from Macas to Guamote, *Hirtz et al. 3153* (MO); General la Plaza Gutiérrez (Limón), *Kvist 60418* (US); Cantón Zamora, near Nambija, along road to gold mining area, ca. 20 km E of Zamora, Cordillera de Nanguipa, *Neill et al. 13844* (QCNE); Cantón Morona, Parroquia 9 de Octubre, unfinished road towards Guamote, road from Plan del Milagro to 10–15 km past San Juan Bosco, *Smith 2086* (QCNE, US); Cantón Morona, Asociación Shuar Sevilla, Comunidad Angel Ruby, ridge of the Cordillera and road Angel Ruby–TransCutucú, *Suin et al. 1183* (QCNE).—NAPO: Cantón El Chaco, between Río San Juan Chico, Río San Juan Grande and Río Oyacachi, western boundary of the Reserva Ecológica Cayambe–Coca, *Cerón M. & Suárez 35251* (QAP); road N from El Chaco, road Quito–Lago Agrio, 20 km E of Baeza, *Gentry & Miller 54988* (AAU, MO, NY, US); Cerro Antisana, 5 mi NE of Borja, *Grubb et al. 1170* (K, NY); road between Baeza and Lago Agrio, 39 km NE of road to Tena, 19.7 km NE of El Chaco, 141 km SW of Lago Agrio, *Croat 58531* (MO, QCA); *Lojmant et al. 11929* (AAU).—PASTAZA: 5 km W of Río Negro, *Dodson & Thien 1907* (US, WIS).—TUNGURAHUA: Cantón Baños, Parroquia Río Negro, environs of La Colonia Tigre San Jacinto, *Clark & Duran*

6039 (AAU, COL, F, K, MO, NY, QCA, QCNE, SEL, SRP, US-2 sheets, VEN); Cantón Baños, Hotel El Otro Lado, Río Verde, tributary of Río Pastaza, near El Pailón del Diablo, *Clark & Rea 8038* (COL, E, MO, NY, QCNE, SEL, US); Cantón Baños, Parroquia Los Llanganates, Colonia México, 18 km from El Topo, *Vargas & Sandoval 356* (QCNE).—ZAMORA-CHINCHIPE: Cantón Palanda, Parroquia Valladolid, southern slopes of the Cordillera de Sabanilla (headwaters of Río Chinchipe), Reserva Tapichalaca (Fundación Jocotoco), trail to Valladolid via Quebrada Honda, *Clark & Mendoza 8165* (QCNE, SEL, US); 10 km S of Zamora on road parallel to Río Jamboé, *Harling & Andersson 24030* (GB); Romerillos Alto, road to San Luis, 26.4 km from Zamora, *Lozano & Øllgaard 898* (LOJA); old road Loja–Zamora, Km 40, along small tributary to Río El Retorno, *Pedersen et al. 104039* (LOJA); along Río Valladolid, environs of Tambo Valladolid, *Steyermark 54674* (F). **Peru.** AMAZONAS: Prov. Condorcanqui, Cordillera del Cóndor, army checkpoint Alfonso Ugarte (PV 3), headwaters of Río Comainas, tributary W of Río Cenepa, *Beltrán & Foster 917* (F, USM); Prov. Chachapoyas, Rodríguez de Mendoza, Cochamal, environs of Tinas, Montaña de Yanamonte, *Díaz et al. 4517* (USM).—CUZCO: Prov. Paucartambo, road Paucartambo–Manu (Hwy 26B), Km 141, between Pillahuata and Pilcopata, Manu National Park, *Skog & Skog 5200* (AAU, SEL, US, USM).—HUÁNUCO: *Bonpland 1861* (P); *Ridoutt s.n.* (US, USM); Prov. Leoncio Prado, *Skog et al. 5116* (SEL, US, USM). **Venezuela.** BOLÍVAR: Sororopan-tepui, *Steyermark 60176* (F, US).—MÉRIDA: Carobobo, *Funck & Schlim 543* (BM, G-2 sheets, OXF, P-2 sheets).—TRUJILLO/MÉRIDA: *Linden 255* (P).—TRUJILLO: above Escuque, between Escuque and La Mesa de San Pedro, *Steyermark 104740* (MO, NY, US-3 sheets); Escuque, *Wiehler 72464* (SEL, US).

Glossoloma schultzei is characterized by a shrubby robust unbranched habit; dense, brownish yellow, villous indument on the stems and young leaves; and large subcoriaceous leaves (33 × 18 cm). It is often confused with other sympatric shrubby species (e.g., *G. grandicalyx*, *G. panamense*, and *G. tetragonoides*), and can be differentiated by the dense pubescence on the stems and the axillary fascicles of 4–10 flowers subtended by relatively short pedicels (2–4 cm). Other subshrubs that are confused with *G. schultzei* have fewer flowers per fascicle and longer pedicels (> than 3 cm).

Glossoloma schultzei is most commonly collected in Colombia where it occurs in the eastern, western, and central Cordilleras. In Ecuador it has been collected in all of the provinces that flank the eastern Andean slopes. It is infrequently recorded from Peru (Amazonas, Cuzco, and Huánuco) and Venezuela (Bolívar, Mérida, and Trujillo).

23. *Glossoloma serpens* (J. L. Clark & L. E. Skog) J. L. Clark, *Selbyana* 25: 206. 2005.

Alloplectus serpens J. L. Clark & L. E. Skog, *Novon* 15: 76. 2005.—TYPE: ECUADOR. Morona-Santiago: Cantón Limón-Indanza, main road between Gualaceo and Plan de Milagro, ‘Tinajillas,’ cow pasture and patches of montane forest, 03°00′19″N, 78°36′36″W, 2800 m, 10 Jan 2001, *J. L. Clark, F. Sánchez & L. Jost 5904* (holotype: QCNE!; isotypes: AAU! COL! E! F! HA! K! MO! NY! QCA! SEL! US!).

Subshrubs, epiphytic; stems horizontal, rarely branched, to 2 m long, 3–5 mm in diameter, woody, internodes 3–11 cm long, subquadrangular, glabrescent proximally, densely hirsute distally, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 1–5 cm long, densely yellow pilose; blades 4–15 cm long, 3–10 cm wide, ovate, base acute to rounded, occasionally oblique, apex acute, margin serrate to crenate, adaxially green, sparsely pilose, abaxially uniformly pale green to uniformly red, sparsely to densely pilose (especially on veins), membranous when dry, lateral veins 5–7 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–3 flowers per node, posture pendent at anthesis, bracteoles 1–2 cm long, 0.5–1.0 cm wide, ovate; pedicels shorter to longer than the petiole, 1–3.5 cm long, densely pilose, pedicel enations present. Calyx lobes conduplicate, the apex free and the base of each appressed to adjacent lobe, folded lengthwise with

the margin curved inward, erect, subequal, 20–25 mm long and wide, broadly ovate, base sagittate, apex rounded, margin serrate, red, abaxially sparingly pilose with the midvein densely pilose, adaxially pilose. Corolla 2–4 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla perpendicular relative to calyx; base 9–11 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat slightly constricted, appearing laterally compressed, to 0.5 cm wide (at mouth), outside glabrous at base, otherwise densely pilose, inside mostly glabrous, becoming glandular apically, red spotting present on the upper surface of throat, limb reflexed, zygomorphic, ca. 0.5 cm wide, usually yellow, sometimes red, lobes nearly equal, ca. 5 mm long, ca. 3 mm wide, rotund, entire. Nectary gland single to shallowly bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 1.9 cm long, adnate to base of corolla tube for ca. 7 mm, connate for 1 mm, forming an open sheath, glabrous; anthers 1.3 mm long, 2.6 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary ca. 5 mm long, ca. 4 mm wide, ovoid, densely pilose, style to 2.4 cm long, glabrous, stigma stomatomorphic. Mature fruit not seen. Fig. 34.

Phenology. Flowering throughout the year, collections of mature flowers dating from January to March, May, and December.

Distribution (Fig. 31). Eastern Andean slopes of Ecuador (Carchi, Morona-Santiago, Napo, Sucumbíos, Zamora-Chinchiipe, and Tungurahua) and the southern Andes of Colombia (Antioquia, Nariño, and Putumayo); montane and premontane forests; 1500–3200 m.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** ANTIOQUIA: Mpio. Urrao, Corregimiento Encarnación, El Río, environs of Páramo de Frontino, *Callejas et al.* 7810 (US).—NARIÑO: Reserva Natural La Planada, 7 km from Chucunés, *Benavides* 8989 (MO, US).—PUTUMAYO: edge of the La Cocha Lagoon, Quebrada de Santa, *Cuatrecasas* 11827 (COL, F, US). **Ecuador.** CARCHI: 17.5 km E of Santa Bárbara, road Tulcán–Alegría via Caramelos and Santa Bárbara, *Dodson & Gentry* 12124 (MO, QCNE, SEL); between Santa Bárbara and La Bonita, 50 km from take-off on the Pan American Hwy, S of Tulcán, *Molau et al.* 2626 (GB).—MORONA-SANTIAGO: Cantón Limón Indanza, main road between Gualaceo and Plan de Milagro, *Clark et al.* 5900 (AAU, CAS, COL, E, F, HA, K, MO, NY, QCNE, SEL, UNA, US); road from Guatacea to General La Plaza Gutiérrez *Clark et al.* 5996 (AAU, E, HA, QCA, QCNE, SEL, UNA, US); road Gualaceo–Limón, Km 35.5, *Jørgensen et al.* 92879 (AAU, QCNE); road Guatacea–General la Plaza Gutiérrez, *Kvist* 60415 (US); road Guatacea–General la Plaza Gutiérrez, *Kvist* 60416 (US); eastern slopes of Matanga Paramo, ca. 30–40 km S of Sigsig along road towards Gualaquiza, *Luteyn & Cotton* 11191 (QCNE, US); E of pass on road Gualaceo–El Limón, *van der Werff & Palacios* 10434 (MO, QCNE).—NAPO: road Santa Bárbara–La Bonita, Km 2, *Balslev et al.* 2571 (NY); Cantón Archidona, Parque Nacional Sumaco Napo–Galeras, summit crater of Volcán Sumaco, *Clark* 2262 (QCNE, US); Cantón Archidona, Parque Nacional Sumaco Napo–Galeras, summit crater of Volcán Sumaco, *Clark* 2264 (QCNE, US); Cantón Quijos, Parroquia Cuyujúa, northern border of Reserva Ecológica Antisana, between the town of Cuyujúa and the confluence of Río Tablón and Río Quijos, *Clark et al.* 5627 (AAU, E, MO, NY, QCA, QCNE, SEL, US); between Santa Bárbara and La Bonita, *Harling & Andersson* 12510 (GB, SEL, US); Guagra Urcu, small hill SE of summit, *Holm-Nielsen et al.* 27633 (AAU, MO); Cantón Sucumbíos, Playón de San Francisco, road Sta. Bárbara–La Bonita, *Jaramillo* 9328 (GB); Santa Bárbara, border of the provinces Carchi and Napo, *Kvist et al.* 60234 (US); Cantón Archidona, Parque Nacional Sumaco Napo–Galeras, S of Volcán Sumaco crater, *Lojtnant & Molau* 13118 (AAU, GB); Río Victoria, 1.1 km E of Cuyujúa, *MacBryde & Dwyer* 1274 (MO, US); Los Llanganates, road Salcedo–Tena, Km 60, Rancho La Poderosa, Río Mulatos, *Vargas* 450 (QCNE, US); Los Llanganates, road Salcedo–Tena, Km 60, Rancho La Poderosa, 4 km below Río Mulatos, *Vargas* 452 (QCNE, US).—SUCUMBÍOS: eastern slopes of Volcán Reventador, Reserva Ecológica Cayambe Coca, *Clark* 4428 (QCNE, US).—TUNGURAHUA: Cantón Baños, Comunidad Viscaya, 7 air-km SW of Baños; 10–11 road-km SW of main highway, *Clark et al.* 7743 (AAU, BM, CAS, COL, E, F, K, MO, NY, QCA, QCNE, SEL, UNA, US).—ZAMORA-CHINCHIPE: above Valladolid on road to Yangana, *Harling & Andersson* 21391 (GB, US); El Pangui, Cordillera del Cóndor, near military base Cóndor Mirador, *Montenegro* 154 (QCNE, US).

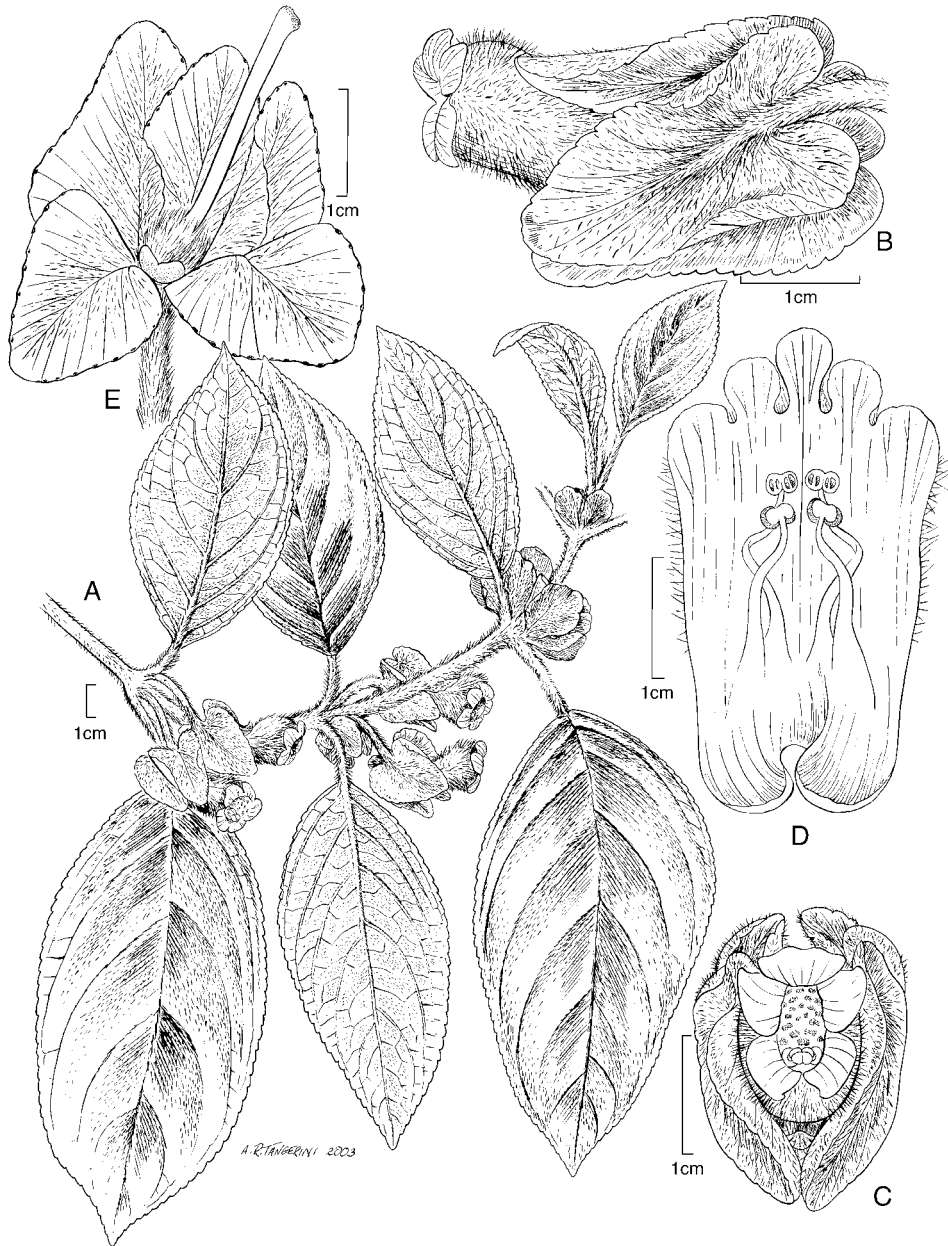


FIG. 34. *Glossoloma serpens*. A. Habit. B. Side view of flower. C. Face view of flower. D. Corolla opened to show stamens. E. Calyx opened and corolla removed to show pistil and bilobed nectary gland. (Based on: A–D, J. L. Clark et al. 5627; E, J. L. Clark et al. 5900). Reprinted with permission from *Novon* (Clark et al. 2005: Fig. 4).

Glossoloma serpens is characterized by an epiphytic habit, stems that are horizontal and not climbing, stout pedicels (1–3.5 cm long), and densely pilose corollas. This species is often collected on steep roadside embankments, where the nearly horizontal stems protrude like a serpent, hence the epithet. *Glossoloma serpens* is sometimes confused with *G. carpishense*, which differs in its ovate calyx lobes with an acuminate apex (Fig. 12); those of *G. serpens* are oblong with a rounded apex (Fig. 34). See also the discussion of *G. carpishense* (no. 6).

24. *Glossoloma sprucei* (Kuntze) J. L. Clark, Selbyana 25: 206. 2005. *Columnnea sprucei* Kuntze, Revis. gen. pl. 2: 471. 1891. *Crantzia sprucei* (Kuntze) Fritsch in Engler & Prantl, Nat. Pflanzenfam. 4(3b): 168. 1894. *Alloplectus sprucei* (Kuntze) Wiehler, Phytologia 27: 327. 1973. —TYPE: ECUADOR. Bolívar: El Limón on road from Guaranda to western lowlands, at the base of the mountain Chimborazo, ca. 900 m, Jun 1860, R. Spruce 6216 (holotype: K!; isotypes: BM! W; photo of W isotype: US!).

Herbs to subshrubs, terrestrial, rarely epiphytic; stems erect, unbranched, to 1 m tall, to 1 cm in diameter, subwoody, internodes 2–9 cm long, terete, glabrescent proximally, densely yellowish green woolly distally, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 5–15 cm long, strigose to pilose; blades 12–27 cm long, 8–20 cm wide, ovate, base rounded, apex acute, margin serrate, adaxially green, pilose, abaxially pale green, pilose, more pilose on venation, membranous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–4 flowers per node, posture pendent at anthesis, bracteoles broadly ovate, 15 mm long, 5 mm wide; pedicels shorter than the petiole, 1–2 cm long, densely pilose, pedicel enations absent. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, 4 equal, to 25 mm long, to 10 mm wide, broadly ovate, base truncate, apex attenuate, margins long-fimbriate with trichomes along border of enations, the teeth to 1.5 cm long and ca. 0.2 cm wide, greenish yellow or red, abaxially densely pilose, adaxially pilose; fifth (ventral) lobe smaller and narrower, to 1.5 cm long, 0.2–0.4 cm wide, lanceolate. Corolla to 6 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base ca. 6 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat not constricted, appearing laterally compressed, to 1 cm wide (at mouth), outside glabrous at base, densely pilose distally, inside mostly glabrous, becoming glandular apically, red spotting present on the upper surface of throat, limb reflexed, zygomorphic, ca. 1.3 cm wide, usually yellow to orange-yellow, rarely red, lobes nearly equal, 6 mm long, 5 mm wide, rotund, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 3 cm long, adnate to base of corolla tube for ca. 7 mm, connate for 1 mm, forming an open sheath, glabrous; anthers 2 mm long, 3 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary ca. 6 mm long, ca. 4 mm wide, ovoid, pilose, style 3.5 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent, ca. 1.5 cm long, ca. 1.4 cm wide, ovoid when immature, sparingly pilose, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, 0.9 mm long, 0.3 mm wide, fusiform, longitudinally striate, brownish red. Fig. 35.

Phenology. Collected in flower from January to November, in fruit in January, March, May, July, August, and November.

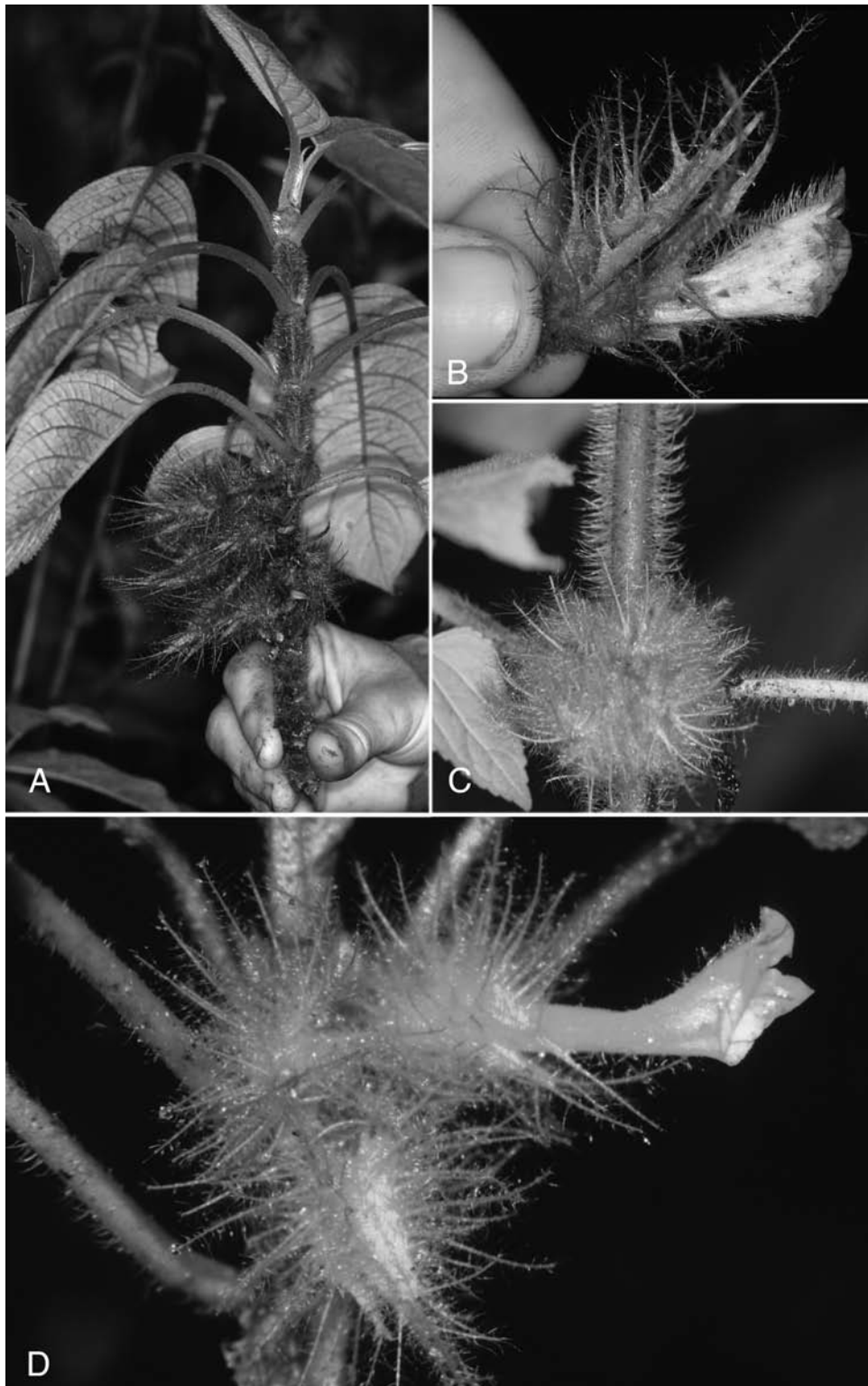


FIG. 35. *Glossoloma sprucei*. A. Habit. B. Lateral view of flower. C. Stem and immature calyces showing densely villous pubescence. D. Lateral view of flower. (Photos by J. L. Clark; vouchers: A, B, J. L. Clark & R. Hall 7581; C, J. L. Clark et al. 7488; D, J. L. Clark & A. Muñoz 6093.)

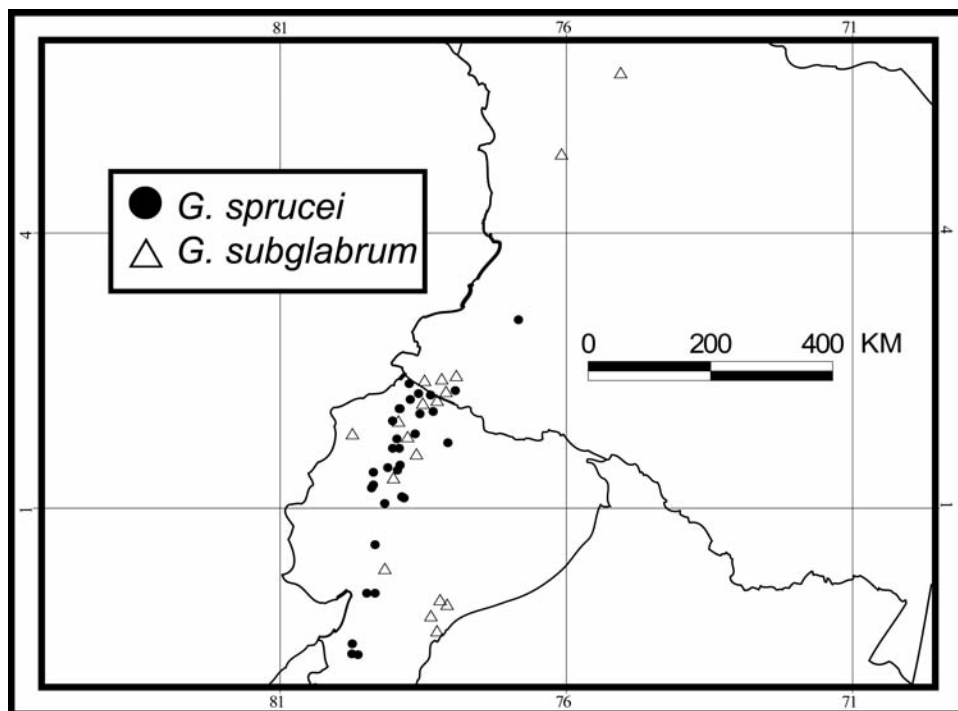


FIG. 36. Distribution of *Glossoloma sprucei* and *G. subglabrum* in Ecuador and Colombia.

Distribution (Fig. 36). *Glossoloma sprucei* is most commonly collected in Ecuador in the Northwestern lowlands and the eastern Andean slopes of Ecuador (Azuay, Bolívar, Carchi, Cotopaxi, Pichincha, El Oro, Esmeraldas, Imbabura, Los Ríos) and western Colombia (Cauca, Nariño); near streams, in shaded forests and shaded disturbed areas in montane and premontane forests; sea level to 1900 m.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** DEPARTMENT UNKNOWN: *Triana* 4163 (COL).—CAUCA: El Tambo, La Costa, *von Sneider* 761 (S), *von Sneider* 889 (S).—NARIÑO: Barbacoas, El Sabalo, *Bellow & Parra* 139 (US); Mpio. Ricaurte, environs Ricaurte, along Río Imbí, ca. 2–3 km above Ecopétrol Campamento Palmar, 3 km NW of Ricaurte, trail to Ramos (indigenous settlement), *Croat* 71510 (MO); Mpio. Barbacoas, Corregimiento Altaquer, Sitio El Barro, road Altaquer towards La Reserva Los Colibres, *Lozano C. et al.* 6827 (COL); above Ricaurte, *Luer et al.* 4570 (SEL); Mpio. Tumaco, La Guacayana, *Romero-Castañeda* 2915 (COL); Mpio. Barbacoas, Guaiguer, *Triana* 2500[b] (BM); near La Guyacana between El Divisio and Tumaco (Río Pí-anulpi), *Vogel* 34 (US-2 sheets). **Ecuador.** PROVINCE UNKNOWN: *Sodi* 119 (P).—AZUAY: Cantón Cuenca, Parroquia Molleturo, Cooperativo Luchadores del Litoral (El Sillado), *Castellanos* 254 (QCNE); Cantón Cuenca, Bosque Protector Molleturo Mullopungo, near the village, Manta Real and forest ca. 2 km E, *Clark et al.* 2496 (MO, QCNE, SRP, US); between Río Blanco and Río Norcay on road between Chacanceo and Molleturo, *Steyermark* 52821 (F).—AZUAY/CAÑAR: Manta Real, Río Patul, S of the road La Troncal–Zhud, between Zhucay and Río Patul, E of the village Manta Real, *Foster & Mitsui* 13469 (F).—CARCHI: trail from Gualpi Alto to S, 2 km from Gualpi Alto, *Barfod & Skov* 60015 (AAU, NY); Cantón Tulcán, Parroquia Chical, trail from the village of Chical towards Cristal, along Río Blanca via the Cordillera Gualchan, 6–8 km SW of Chical, *Clark et al.* 6358 (QCNE, US); environs of Chical, W of Maldonado, trail to Peñas Blancas, *Gentry & Shupp* 26404 (AAU, MO-2 sheets, SEL); trail above Rafael Quindí's finca, above Untal, along road to Chical and partly ascending Cerro Obsura, *Hoover & Wormley* 1666 (MO); trail from Rafael Quindí's farm, above Río Verde, *Hoover & Wormley* 1704 (MO); Gualpi Chico, *Hoover et al.* 2496 (MO); SE trail, Gualpi Chico area near Awa encampment, *Hoover et al.*

2718 (MO); near encampment in Gualpi Chico area of Awa Reserve, *Hoover et al.* 2861 (MO); SE trail, Gualpi Chico area near Awa encampment, *Hoover et al.* 2718 (MO); NW of Awa, Gualpi Chico area, *Hoover et al.* 3557 (MO); trail from Chical to Pailón to San Marcos, *Kvist et al.* 48656 (AAU, QCNE); San Marcos Valley, *Kvist & Nissen* 48795 (AAU, US); 12 km W of Maldonado, Chical, along Río San Juan, *Madison et al.* 4733 (F, SEL); El Pailón, ca. 45 km below Maldonado, trail to Tobar Donoso, *Madison & Besse* 7154 (SEL); above San Marcos de Los Coaiqueres, trail towards Gualpi Bajo, *Øllgaard et al.* 57383 (AAU, MO); above San Marcos de los Coaiqueres, trail towards Gualpi Bajo, *Øllgaard et al.* 57463 (AAU); Cantón Tulcán, Chical, Reserva Etnica Awa, Centro Camumbí, *Quelal et al.* 181 (QCNE), *Quelal et al.* 141 (MO, QCNE, US); Cantón Tulcán, Reserva Etnica Awa, Centro Gualpi Medio, *Quelal et al.* 588 (QCNE), *Quelal et al.* 706 (MO, QCNE); Cantón Tulcán, Reserva Indígena Awa, *Rubio et al.* 1691 (MO, QCNE, US); Cantón Tulcán, Reserva Indígena Awá, Centro El Baboso, 8 km N of Lita, *Rubio et al.* 2159 (F, MO, QCNE, SEL, US); Cantón Tulcán, Parroquia Tobar Donoso, sector Sabalera, Reserva Indígena Awa, *Tipaz et al.* 1707 (SEL); Cantón Tulcán, Parroquia Tobar Donoso, Reserva Indígena Awa, Centro El Baboso, *Tipaz et al.* 1960 (MO, QCNE, SEL), *Tipaz et al.* 2008 (MO, QCNE, SEL).—COTOPAXI: Cantón Sigchos, Parroquia San Francisco de las Pampas, propiedad de Cesar Tapia, *Clark et al.* 6174 (QCNE, US), *Clark et al.* 6175 (US); Tenefuerste, Río Pilalo, Km 52–53, road Quevedo–Latacunga, *Dodson & Dodson* 12916 (MO, SEL); road Quevedo–Latacunga, Km 46 from Quevedo, *Holm-Nielsen et al.* 2998 (AAU, S); Cantón Pajili, León, Hacienda Solento, near Santa Rosa, *Mexia* 6724 (NA, UC, US); Río Guapara, 20 km NW of El Corazón, *Sparre* 17161 (S); Río Guapara, ca. 20 km NW of El Corazón, *Sparre* 17346 (S).—EL ORO: Cantón Piñas, Parroquia Moromoro, Reserva Ecológica Buenaventura, remnant patch of forest S of Entrada la Virgen, *Clark et al.* 7948 (BM, QCNE, SEL, US); NE of Cerro Azul, *Cornejo & Bonifaz* 3779 (US); 10 km W of Piñas along road Piñas–Machala, *Dodson et al.* 8440 (SEL); trail to Sambotambo, following headwaters of Río Moromoro, S to Buenaventura at and along hwy to Portovelo, *Steyermark* 54224 (F).—ESMERALDAS: Guadual, *Acosta Solís* 12439 (F); Cantón San Lorenzo, Reserva Etnica Awá, Centro Guadualito, *Aulestia et al.* 128 (QCNE, US); Cantón San Lorenzo, Parroquia Mataje, Reserva Etnica Awa, Centro Mataje, *Aulestia et al.* 618 (MO, QCNE, US); Cantón San Lorenzo, Reserva Etnica Awa, Parroquia Alto Tambo, Centro de la Unión, cañón del Río Mira, *Aulestia & Aulestia* 1532 (MO, QCNE); Río Zapallo Grande, tributary of Río Cayapa, *Barfod* 41081 (AAU, MO, QCNE, US); Zapallo Grande, along Río Cayapa, *Barfod et al.* 48082 (AAU); Bravito entre Estero Mongón y Estero Sabaleta, *Bonifaz & Cornejo* 3837 (US); Cantón San Lorenzo, Centro Guadualito, *Cerón M. et al.* 31387 (QAP); Cantón San Lorenzo, Parroquia Alta Tambo, Awa Indigenous Territory, Centro Río Bogotá, future biological research station, 2 km S of hwy Lita–San Lorenzo, near Quebrada Pambilar, *Clark et al.* 7128 (K, QCNE, SEL, UNA, US); Cantón San Lorenzo, Parroquia Alto Tambo, Comunidad El Cristal, 8–10 km S of hwy San Lorenzo–Ibarra, *Clark et al.* 7535 (E, NY, QCNE, SEL, US); Cantón San Lorenzo, Parroquia Alto Tambo, remnant patch of forest between Lita and Alto Tambo, *Clark et al.* 7473 (QCNE, US); Cantón San Lorenzo, Parroquia Alto Tambo, remnant patch of forest along hwy San Lorenzo–Ibarra, 25 air-km NW of Lita, *Clark et al.* 7564 (AAU, MO, NY, QCA, QCNE, SEL, UNA, US); Cantón San Lorenzo, Parroquia Alto Tambo, Finca Bufalito (Empresa Golden Land), 10–15 km NW of Lita, *Clark & Hall* 7581 (AAU, BM, CAS, COL, E, F, K, MO, NY, QCA, QCNE, SEL, UNA, US); hwy Lita–San Lorenzo, 14.2 km W of Río Lita Bridge, below Lita, *Croat et al.* 82128 (QCNE), *Croat et al.* 82330 (QCNE); hwy Lita–San Lorenzo, 4.7 km W of Río Chuchubí, *Croat et al.* 82686 (QCNE); hwy San Lorenzo–Mataje, 7.5 km N of Gasolinera San Lorenzo, 0.4 km W of hwy Lita–San Lorenzo, *Croat et al.* 83847 (QCNE); NW of Lita, road to San Lorenzo, *Dunn s.n.* (US), *Hirtz* 3626 (SEL); trail from Awa encampment at the Río Palavi to Awa encampment at Mataje, *Hoover et al.* 3299 (US); stream entering from N, ca. 300 m downstream from Río Palaví, Awa encampment, *Hoover et al.* 4061 (MO); 200 m from Awa encampment on the eastern bank of Palavica, *Hoover et al.* 3175 (MO), *Hoover et al.* 3922 (MO); railroad Quito–San Lorenzo, Km 319, Ventanas, *Játiva & Epling* 785 (NY, S, UC, US); Reserva Etnica y Forestal Awa, Mataje, *Jørgensen et al.* 65300 (AAU); Río Cayapa, Zapallo Grande, 500 m upstream from village, *Kvist & Asanza* 40342 (AAU, QCNE), *Kvist & Asanza* 40764 (AAU), *Kvist & Asanza* 40844 (AAU, QCNE); environs of Lita, railroad Ibarra–San Lorenzo, *Madison et al.* 4986 (F, SEL); Cantón San Lorenzo, Campamento Proyecto Forestal Centro Mataje del Territorio Awa, *Miranda et al.* 131 (QCNE); Cantón San Lorenzo, Territorio Indígena Awa, Mataje village, environs of Awa forestry camp, *Neill et al.* 12505 (QCNE, US); 5 km from Lita, recently built road to San Lorenzo, Río Mira, *Palacios* 4365 (MO, QCNE); Cantón San Lorenzo, 32 km W of Lita, road to San Lorenzo, *Rubio & Quelal* 742 (MO, QCNE, US); San Lorenzo; “Proyecto NO,” at the end of new road (Km 14), *Sparre* 18142 (NY, S); Eloy Alfaro, Parroquia Luis Vargas Torres, Reserva Ecológica Cotacachi-Cayapas, Río Santiago, Estero Pote, *Tipaz et al.* 569 (MO, QCNE, US); Cantón San Lorenzo, San Francisco, Recinto Durango, Property of Demetrio Paez, 1 km E of road Lita–San Lorenzo, *Valenzuela & Freire* 478 (US); Eloy Alfaro; Río Santiago, Playa de Oro, *Wittmann & Arroyo* 15 (QCNE); Eloy Alfaro; Río Santiago, Playa de Oro, *Wittmann* 74 (QCNE).—ESMERALDAS/IMBABURA: road Lita–Ibarra, near Lita, *Lawesson et al.* 43955 (AAU, QCNE).—IMBABURA: Cantón Cotacachi, Parroquia García Moreno, Cordillera de Toisán, Cerro de la Plata, Bosque Protector Los Cedros, main trail from the Comunidad El Chontal to Los Cedros, *Clark et al.* 7363 (AAU,

COL, MO, NY, QCA, QCNE, SEL, UNA, US); Cantón Ibarra, Parroquia Lita, Comunidad San Francisco, near Río Verde, 13 air-km S of Lita, *Clark et al. 7488* (QCA, QCNE, SEL, UNA, US); Parroquia García Moreno, Cooperative Nueva Fé, Río Cajones, near the union of Río Tortuga and tributary of Río Guayllabamba, *Cerón M. et al. 42246* (QAP); in valley of Río Meta, along border of Carchi province, between Ibarra and Lita, 12 km E of Lita, *Croat 38987* (MO); railroad to Lita, *D'Arcy 14861* (MO); Lita, *Maas & Cobb 4695* (SEL, U); Cantón Ibarra, Lita, *Palacios 12252* (MO).—Los Ríos: Hacienda Clementina on Río Pita, Cerro Mombe, *Asplund 5535* (AAU, F, S); Centro Científico Río Palenque, along trails W of laboratory and in vicinity of laboratory clearing, *Croat 38683* (MO); Río Palenque Biological Station, *Dodson 5022* (SEL-3 sheets); Río Palenque, 47 km S of Santo Domingo de los Colorados, *Dwyer 10302* (MO, US); Centro Científico Río Palenque, halfway between Quevedo and Santo Domingo, *Gentry & Dodson 17994* (AAU, GB, MO, RSPC, SEL); Hacienda Clementina, Samama, *Harling 534* (S); environs of Centro Científico Río Palenque, between river and Hwy Panamericana-Santo Domingo de los Colorados, Km 54, N of Quevedo, half-way between Quevedo and Santo Domingo, *Illis & Illis 51* (WIS), *Lojnant & Molau 15782* (AAU); Clementina, *Fagerlind & Wibom 2629* (S); Cantón Quevedo, Parroquia Centinela-La Pirámide, road Santo Domingo de los Colorados-Quevedo, entrance to Patricia Pilar, Km 41, *Quelal & Tipaz 181* (MO, SEL, US).—PICHINCHA: Santo Domingo de Los Colorados, *Acosta Solís 10891* (F); 20 km W of Santo Domingo de los Colorados, *Cazalet & Pennington 5070* (K, NY); Cantón Santo Domingo, Parroquia Alluriquín, La Unión del Toachi, *Clark & Muñoz 6093* (AAU, MO, QCNE, SEL, US); Cantón Quito, Reserva Río Guaycuyacu, near confluence of Río Guaycuyacu and Río Guayabamba, *Clark 8280* (QCNE, US); environs of Quito, *Couthouy s.n.* (GH); Tinalandia, property of Hotel Tinalandia, 9.6 km E of Santo Domingo de los Colorados, S of hwy to Aloag and Quito, above Río Toachi, *Croat 55690* (MO); Reserva Endesa, 9 km N of km 113 on hwy Quito-Puerto Quito, *Croat & Rodríguez 61460* (MO, QCNE, SEL, US); along road between Pacto and Nuevo Azuay, 2.3 km N of Paraíso, 15.3 km N of Pacto, *Croat 61622* (MO, US); along Río Verde, 3 km SE of Santo Domingo de los Colorados, *Dodson & Duke 7715* (MO, SEL); Santa Domingo de los Colorados, *Fagerlind & Wibom 1676* (S); near Santo Domingo de los Colorados, *Fagerlind & Wibom 1747* (S), *Harling & Andersson 23092* (GB); Reserva Forestal ENDESA, Río Silanche, Corporación Forestal Juan Manuel Durini, hwy Quito-Puerto Quito, Km 113, 10 km N of hwy, *Jaramillo 6399* (AAU); Reserva Forestal ENDESA, Río Silanche, Corporación Forestal Juan Manuel Durini, hwy Quito-Puerto Quito, Km 113, 10 km N of hwy, *Jaramillo 6789* (AAU); along Río Toachi, near Santa Domingo, *Játiva & Epling 340* (UC); Colorado community Congoma Grande, road Santa Domingo-Puerto Limón, Km 23, *Kvist 40706* (AAU); SE of Santo Domingo, along road to Puerto Limón, *Kvist & Nissen 49052* (AAU); road Quito-Esmeraldas-Pachijal, Km 104, *Mendoza T. et al. 528* (AAU, QCA, QCNE, US); Santo Domingo de los Colorados, Rancho Brahman, ca. 10 km NW of town, on road to Esmeraldas, *Sparre 14079* (S); hwy Quito-Aloag-Santo Domingo de los Colorados, Km 94, 10 km S hwy, *Zak 1540* (AAU-2 sheets, US).

Glossoloma sprucei is distinguished from its congeners by the following characters: broadly ovate leaf blades with a cordate base, fimbriate calyx margins, resupinate flowers, and an unbranched terrestrial habit. Three other species of *Glossoloma* with fimbriate calyx lobes are *G. medusaeum*, *G. purpureum*, and *G. anomalum*. The first two are also similar to *G. sprucei* in having resupinate flowers, but differ in their elliptic to oblong leaves. The flowers of *G. anomalum* are not resupinate (Fig. 8), and the corollas are shorter (< 2.5 cm long) than those of *G. sprucei* (to 6 cm; Fig. 35).

The sheet of *Spruce 6216* at K is the only duplicate of the type collection of *G. sprucei* that is annotated by Kuntze and is therefore considered the holotype.

25. *Glossoloma subglabrum* J. L. Clark, sp. nov.—TYPE: ECUADOR. Carchi: Cantón Espejo, Parroquia Guatal, Mirador de las Golondrinas (Fundación Golondrinas), trail from Santa Rosa (El Rosal) to the refugio at El Corazón, 00°23'09"S, 78°10'01"W, 1600–2000 m, 5 Jul 2003, *J. L. Clark, S. G. Clark, E. Folleco & B. Syka 8448* (holotype: US!; isotypes: AAU! COL! E! K! MO! NY! QCA! QCNE! SEL! UNA!).

G. panamensi simile sed foliis subglabris et venis numerosis (9–14 vs. 6–8) valde differt.

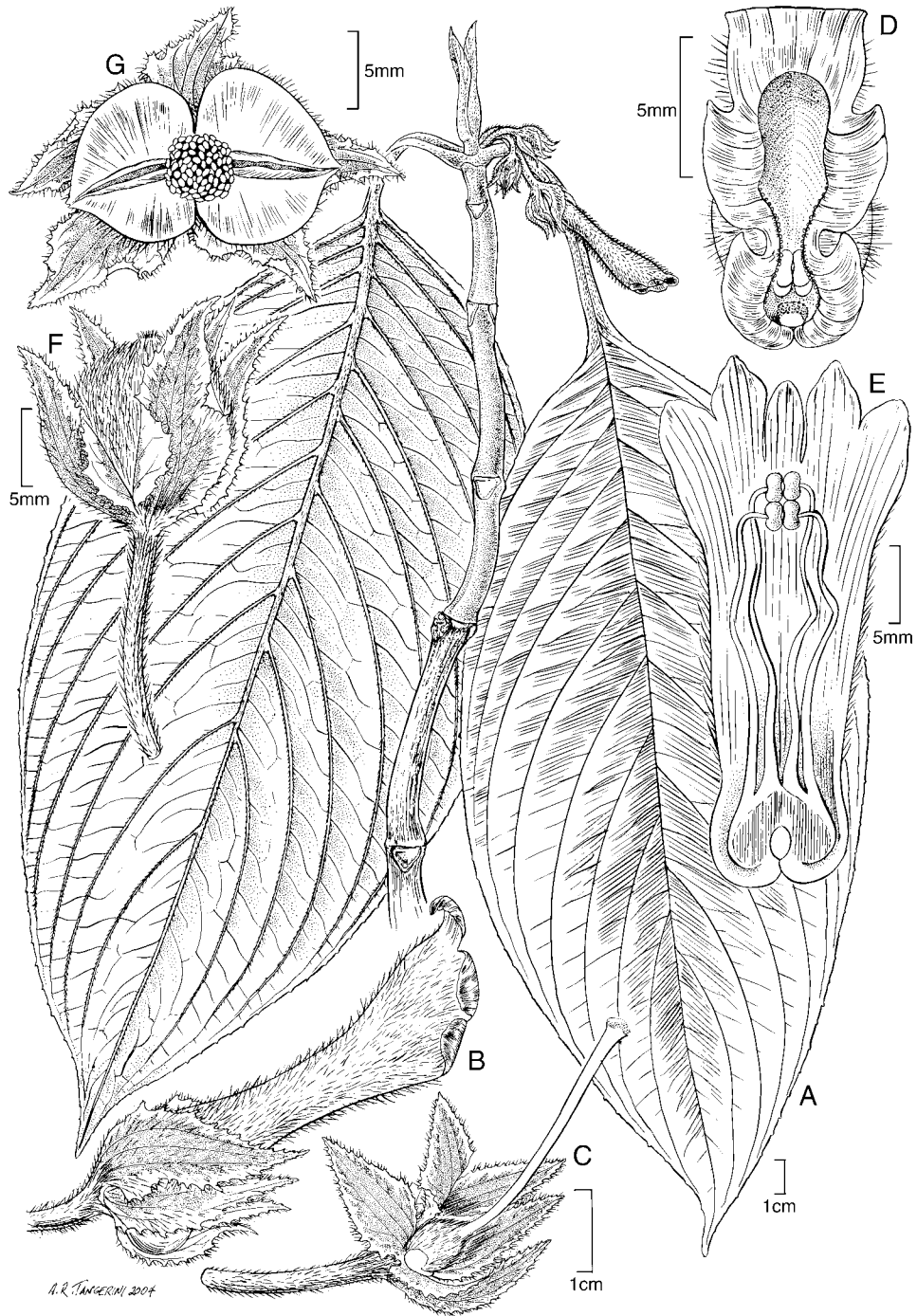


FIG. 37. *Glossoloma subglabrum*. A. Habit. B. Side view of flower. C. Calyx opened and corolla removed to show bilobed nectary gland and pistil. D. Face view of flower. E. Corolla opened to show stamens. F. Immature fruit. G. Mature fruit. (Based on *J. L. Clark et al. 8448*, holotype).

Subshrubs, terrestrial; stems erect, unbranched, to 2 m tall, to 1.5 cm in diameter, woody, internodes 3–13 cm long, subquadrangular, glabrous, leaf scars slightly raised from the stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 3–10 cm long, puberulous; blades 18–30 cm long, 10–19 cm wide, ovate to oblong, base rounded, apex acute, margin serrulate, adaxially dark green, glabrous, abaxially pale green, occasionally with red tinge, glabrous, sometimes puberulous on venation, subcoriaceous when dry, lateral veins 9–14 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–4 flowers per node, posture pendent at anthesis, bracteoles 15–20 mm long, 5 mm wide, lanceolate; pedicels shorter than the petiole, 1–2.5 cm long, glabrous to pilose, pedicel enations present. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, occasionally plane and valvate, erect, nearly equal, to 20 mm long, to 6 mm wide, broadly oblong to ovate, base truncate, apex acute, margin serrate, light red to maroon, abaxially villous, adaxially pilose. Corolla to 5 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base ca. 5 mm in diameter, middle slightly ampliate to uniformly tubular, throat not constricted, appearing laterally compressed, 6–8 mm wide, outside glabrous at base, sparingly to densely pilose distally, inside mostly glabrous, becoming glandular apically, interior spotting absent, limb reflexed, zygomorphic, to 1 cm wide, uniformly red, lobes nearly equal, 4 mm long, 6 mm wide, rotund, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 2 cm long, adnate to base of corolla tube for ca. 5 mm, connate for 1 mm, forming an open sheath, glabrous; anthers 1 mm long, 1.5 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary ca. 6 mm long, ca. 4 mm wide, ovoid, densely pilose, style 3 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent, ca. 2 cm long, ca. 1.5 cm wide, ovoid when immature, sparingly pilose, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, 1 mm long, 0.3 mm wide, fusiform, longitudinally striate, brownish red. Fig. 37.

Phenology. Collected in flower throughout the year, in fruit in August, September, and December.

Distribution (Fig. 36). Eastern and western slopes of the Ecuadorian Andes, and the Cordillera Oriental (Chocó, Nariño, Risaralda, and Valle del Cauca) and Cordillera Central (Antioquia) of Colombia; shaded primary and disturbed moist to pluvial wet forests; 200–2000 m.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** ANTIOQUIA: Mpio. Amalfi, 10–20 km W of Amalfi, road to Medellín, *Daly & Escobar 6092* (US); Mpio. de Frontino, Corregimiento Nutibara, headwaters of Río Cuevas, *Sánchez et al. 1545* (COL).—CHOCÓ: Mpio. San José del Palmar, headwaters of Río Torito, tributary of Río Habita, western slopes of the Cordillera Occidental, *Forero et al. 7341* (COL, MO); Mpio. de San José del Palmar, Cerro al SO de la población, *Forero et al. 3402* (COL, MO, US-2 sheets).—NARIÑO: *Agudelo et al. 2961* (COL); Mpio. Ricaurte, Reserva Natural La Planada, *Amaya M. 218* (COL), *Amaya M. 284* (COL); Mpio. Barbacoas, Corregimiento Altaquer, headwaters of El Barro, Reserva Natural Río Ñambi, western slopes of the Cordillera Occidental, Río Ñambi, *Betancur et al. 4505* (COL); Mpio. Barbacoas, Corregimiento Altaquer, environs of El Barro, Reserva Natural Río Ñambi, *Franco et al. 4722* (COL); Mpio. Barbacoas, Corregimiento Altaquer, environs of El Barro, Reserva Natural Río Ñambi, western slopes of the Cordillera Occidental, Río Ñambi, *Franco et al. 5162* (COL); Barbacoas, Corregimiento Santander (Buenavista) to Barbacoas, headwaters of Río Telembí, *García Barriga 13195* (COL, US); La Planada, Finca Salazar, 7 km above Ricaurte, *Gentry et al. 35008* (COL, MO, US); Mpio. Barbacoas, Corregimiento Altaquer, El Barro, road from Altaquer towards La Reserva Los Colibres, *Lozano C. et al. 6807* (COL), *Restrepo 538* (US), *Restrepo 683* (US), *Stiles 567* (COL).—RISARALDA: Mpio. Mistrató, Corregimiento Jegüadas, road from Río Mastrató to Puerto de Oro, road Pisones-

Río Currumay, *Franco et al. 3419* (COL).—VALLE DEL CAUCA: Mpio. Dagua, Corregimiento Carmen, *Amaya M. & Smith 581* (COL); Mpio. Queremal, old road to Buenaventura, *Amaya M. & Smith 612* (COL); western slopes of the Cordillera Occidental, headwaters of Río Sanquiniñí, La Laguna, *Cuatrecasas 15503* (F, US). **Ecuador.** BOLÍVAR: Hacienda Changuil, La 47, *Cornejo & Bonifaz 4252* (US).—CARCHI: Cantón Tulcán, Parroquia Chical, Reserva Etnica y Forestal Awa, Centro Gualpi Medio, *Aulestia & Grijalva 1093* (QCNE, US), *Rubio et al. 1555* (QCNE, US); Cantón Espejo, Bosque Protector Mirador de Golondrinas, trail SW of La Cabaña del Corazón, *Clark & Dunn 2439* (COL, E, MO, QCNE, SEL, UNA, US); Cantón Tulcán, Parroquia Chical, trail from Quinyal towards Gualpi, near the border of Reserva Etnica y Forestal Awa, *Clark & Mejia 6300* (QCNE, SEL, US); Cantón Tulcán, Parroquia Chical, path from Chical to Cristal, environs of Río Blanca and the Cordillera Gualchan, ca. 6–8 km SW of Chical, *Clark et al. 6363* (E, MO, NY, QCA, QCNE, UNA, US); Cantón Espejo, Parroquia Guatal, Mirador de las Golondrinas (Fundación Golondrinas), Santa Rosa (El Rosal), *Clark et al. 8417* (QCNE, SEL, UNA, US); Cantón Espejo, Parroquia Guatal, Mirador de las Golondrinas (Fundación Golondrinas), trail from Santa Rosa (El Rosal) to the refugio at El Corazón, *Clark et al. 8434* (QCNE, SEL, UNA, US); Cantón Mira, Parroquia Jijon y Camaño, unfinished road from El Carmen towards Chical, Agua Amarilla, *Clark & Folleco 8511* (QCNE, SEL, US); Maldonado, Quebrada Naranjo, *Dorr & Barnett 6092* (CAS, QCNE, S, US); Río Blanco drainage, above Chical tributary of Río San Juan, *Gentry & Shupp 26506* (MO); environs of Río Verde, *Hoover 2071* (MO); Río Verde, past stream and waterfall entering from SW and continuing beyond principal drainage stream of Cerro Golondrinas, *Hoover 2206* (MO); environs of Gualpi Chico, northern trail on border of Reserva Etnica y Forestal Awá, *Hoover et al. 2480* (US); environs of Gualpi Chico, NW of Reserva Etnica y Forestal Awa, *Hoover et al. 3552* (MO); embankments along Río Verde, *Hoover 2003* (MO), *Hoover 2005* (MO); SE trail, Centro Gualpi Chicó, Reserva Etnica y Forestal Awa, *Hoover et al. 2711* (MO); trail to Pailón encampment, Centro Gualpi Chico, Reserva Etnica y Forestal Awa, *Hoover et al. 3606* (MO, US); Reserva Etnica y Forestal Awa, Centro San Marcos, *Jørgensen et al. 65162* (AAU), *Jørgensen et al. 65217* (AAU); vicinity of Maldonado, *Madison 3975* (SEL); El Pailón, ca. 45 km below Maldonado, trail to Tobar Donoso, *Madison & Besse 7200* (SEL); above San Marcos de los Coaiqueres, trail towards Gualpi Bajo, *Øllgaard et al. 57233* (AAU, MO, NY); Cantón Espejo, Parroquia El Gualtal, slopes of Cerro Golondrina Hembra, *Palacios & Clark 12608* (QCNE); Cantón Tulcán, Parroquia Chical, Reserva Etnica y Forestal Awa, Camumbí, *Quelal 146* (QCNE, US); Cantón Tulcán, Parroquia Tobar Donoso, Reserva Indígena Awa, Centro El Baboso, *Tipaz et al. 1888* (SEL); Cantón Tulcán, Parroquia Tobar Donoso, Reserva Etnica y Forestal Awa, Centro El Baboso, *Tipaz et al. 244* (MO); border area between the provinces of Carchi and Esmeraldas, ca. 20 km past Lita on road Lita–Alto Tambo, *van der Werff et al. 11858* (QCNE, SEL, US).—COTOPAXI: Cantón Sigchos, Parroquia San Francisco de las Pampas, Bosque Integral Otonga, *Clark & Muñoz 6118* (AAU, E, MO, NY, QCA, QCNE, SEL, US).—ESMERALDAS: Cantón Quininde, Bilsa Biological Station, Mache Mountains, 35 km W of Quinindé, 5 km W of Santa Isabel, *Clark et al. 2867* (E, MO, QCNE, SEL, UNA, US); Cantón Quinindé, NE corner of Bilsa Biological Station, Reserva Ecológica Mache-Chindul, 35 km W of Quinindé, Río Cube, *Clark et al. 4625* (QCNE, US); Cantón San Lorenzo, Parroquia Alto Tambo, small patch of forest along hwy San Lorenzo–Ibarra, 26 road-km NW of Lita, *Clark et al. 7550* (QCNE, US); Cantón San Lorenzo, Parroquia Alto Tambo, Hwy San Lorenzo–Ibarra, 16 road-km NW of Lita, *Clark et al. 7580* (QCNE, US); Reserva Cotacachi–Cayapas, 1 km from Río Tigre, *Cornejo & Bonifaz 6565* (GUAY, US); Bilsa Biological Station, trail Rana Roja, *Mendoza T. et al. 570* (US); NW of Lita, Km 18–40, *Romoleroux 1330* (AAU).—IMBABURA: Cantón Cotacachi, Parroquia García Moreno, Cordillera de Toisán, Cerro de la Plata, Bosque Protector Los Cedros, Sendero Camino del Oso, *Clark et al. 7409* (COL, QCNE, SEL, UNA, US), *Clark et al. 7411* (QCNE, US); Cantón Ibarra, Parroquia Lita, Comunidad San Francisco, next to Río Verde, 13 air-km S of Lita, *Clark et al. 7523* (MO, QCNE, SEL, UNA, US).—LOS RÍOS: environs of Centinela Ridge, 12.5 km E of Patricia Pilar, *Hansen et al. 7776* (SEL).—MORONA-SANTIAGO: Cantón Limón Indanza, Parroquia Chiviaza, road from Limón (Gral Leonidas Plaza Gutiérrez) to Santa Susana de Chiviaza, *Clark et al. 5961* (AAU, COL, E, HA, MO, QCA, QCNE, SEL, UNA, US); Cantón Limón–Indanza, Cordillera del Cóndor, trail from the Comunidad Warints towards ridge of the Cordillera del Cóndor, *Clark et al. 6922* (LOJA, MO, QCNE, SEL, US); Vieja Cordillera de Cutucú, road Patuca–Santiago, E of the Río Namangoza, Km 48, *Dorr & Barnett 5873* (NY, QCNE); Cordillera de Cutucú, new road Patuca–Morona, Km 30–35, Piantza, *Harling & Ståhl 2967* (GB); Cordillera de Cutucú, 25 km SE of Logroño, *Madison & Coleman 2557* (SEL); Cordillera de Cutucú, road Méndez–Morona, *van der Werff & Palacios 10329* (QCNE, SEL, US).—PICHINCHA: Valle de Saloya, *Acosta Solís 5768* (US); Cantón Quito, Parroquia Nono, El Pahuma Orchid Reserve, 17 km E of Nanegalito, *Clark et al. 7632* (QCNE, US).

Glossoloma subglabrum is distinctive in its nearly glabrous stems and leaves, which separate it from the similar *G. panamense*; the latter has pilose stems and hispid leaves,

and is only rarely collected where the two species overlap, in the Chocó floristic region of northwestern Ecuador and southwestern Colombia.

26. *Glossoloma tetragonoides* (Mansfeld) J. L. Clark, *Selbyana* 25: 207. 2005. *Alloplectus tetragonoides* Mansfeld, *Biblioth. Bot.* 116: 144. 1937.—TYPE: ECUADOR. Tungurahua: area of Río Pastaza and Río Topo, 01°23'09"S, 78°10'01"W, 1200 m, 12 Sep 1933, *L. Diels 1002* (B, destroyed).—ECUADOR. Tungurahua: Cantón Baños, Parroquia Río Negro, near Río Topo, 1400 m, 17 Jan 2001, *J. L. Clark & V. Duran 6000* (neotype, designated by Clark & Skog, 2002: QCNE!; isoneotypes: AAU! COL! E! F! K! MO! NY! QCA! S! SEL! US!).

Herbs to subshrubs, terrestrial; stems erect, unbranched, to 2 m tall, 1 cm in diameter, succulent, becoming woody, internodes 3–12 cm long, subquadrangular, usually glabrescent, sometimes sparsely pubescent distally, leaf scars raised from stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 2–12 cm long, sparsely to densely pilose; blades 9–39 cm long, 3.5–24 cm wide, usually elliptic, sometimes ovate, base acute, apex acute, margin shallowly serrate, adaxially green, sparsely pilose, abaxially all green, all red, or green with red tinge, sparsely to densely pilose (especially on young foliage), subcoriaceous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–4 flowers per node, posture pendent at anthesis, bracteoles 3 cm long, 1.5 cm wide, broadly ovate; pedicels shorter than the petiole, 1–5 cm long, glabrous to pilose, pedicel enations absent. Calyx lobes nearly free, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, 4 equal, 1.5–2.5 cm long, 1.0–2.0 cm wide, ovate, base truncate to slightly cordate, apex acute to acuminate, margin serrate, all green, all red, red with green margins, or green with red margins, abaxially sparsely pilose to hirsute, midvein especially pilose, adaxially glabrous except pilose at base; fifth (ventral) lobe smaller and narrower, to 25 mm long, to 18 mm wide, narrowly oblong. Corolla 2.5–6.0 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base 3–5 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat appearing laterally compressed, 1.0–1.5 cm wide (at mouth), outside sparsely pilose, becoming more pilose distally, inside mostly glabrous, becoming glandular apically, interior spotting absent, limb spreading, zygomorphic, 1.5 to 2.0 cm wide, red, yellow, or yellow with red lobes, lobes nearly equal, 3.0–4.5 mm long, 5–8 mm wide, round, entire. Nectary gland bilobed or single-lobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 3 cm long, adnate to base of corolla tube for 4 mm, connate for 1 mm, forming an open sheath, glabrous; anthers ca. 2.0 mm long, ca. 2.5 mm wide, dehiscent by longitudinal slits; staminode absent. Ovary ca. 7 mm long, ca. 5 mm wide, ovoid, densely pilose, style 5 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, ca. 1.3 cm long, ca. 1 cm wide, ovoid when immature, pilose, loculicidally dehiscent, becoming bivalved, valves reflexed, reaching a 180° angle when mature. Seeds numerous, ca. 1 mm long, ca. 0.2 mm wide, fusiform, longitudinally striate, yellow. Fig. 38.

Phenology. Collected in flower throughout the year, in fruit in January, February, August, and September.

Distribution (Fig. 39). Eastern Andean (Pastaza, Tungurahua, Napo, Morona-Santiago) to western Andean slopes of Ecuador (Pichincha, Esmeraldas), western slopes of the Colombian Cordillera Occidental (Nariño, Chocó) and the Cordillera Central

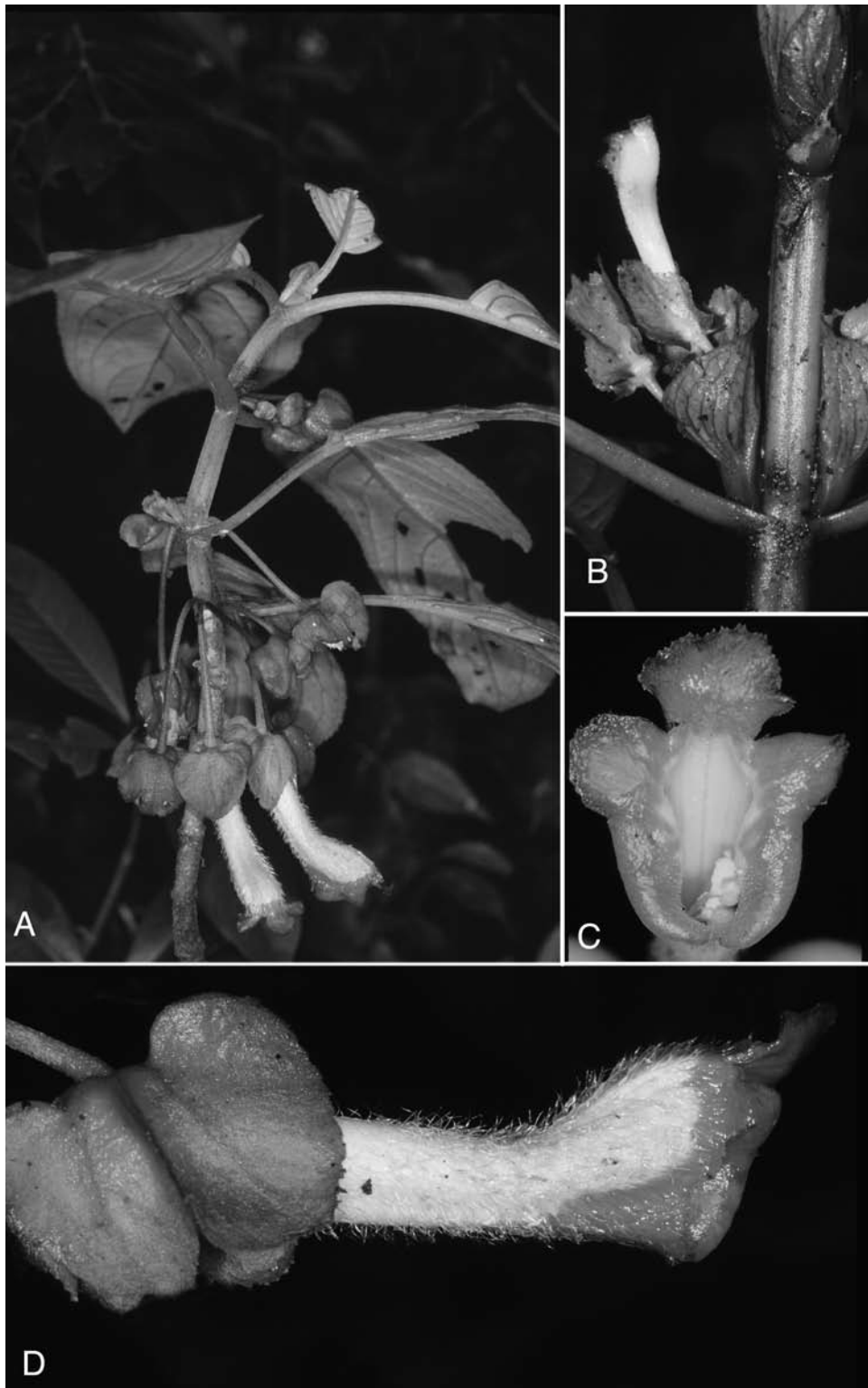


FIG. 38. *Glossoloma tetragonoides*. A. Habit. B. Immature flower showing resupinate orientation in early stage. C. Face view of flower. D. Lateral view of flower. (Photos by J. L. Clark; vouchers: A, C, D, *J. L. Clark & N. Harris* 7262; B, *J. L. Clark et al.* 5696.)

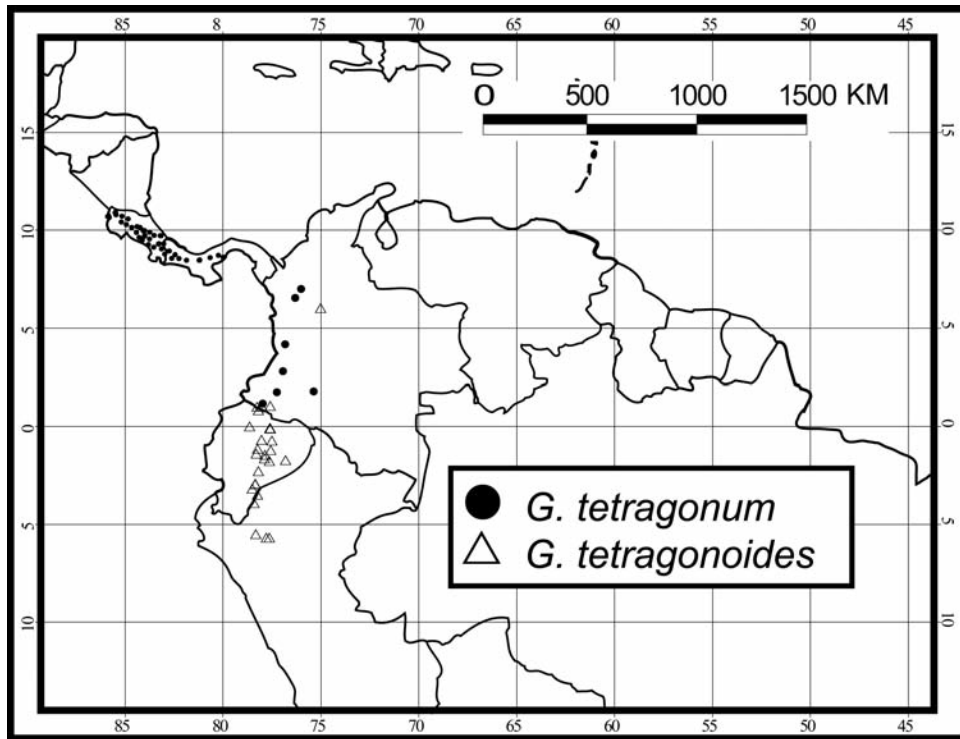


FIG. 39. Distribution of *Glossoloma tetragonum* and *G. tetragonoides*.

(Putumayo, Antioquia), and northern Peru (Amazonas); shady areas of primary and disturbed montane, premontane, and pluvial forests; 300–2500 m.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** ANTIOQUIA: Mpio. San Luis, Piedra del Castrillón, eastern slopes of the Cordillera Central, *Betancur et al.* 666 (F, MO, US); Mpio. San Luis, Piedra de Castrillón, 3–4 hrs on foot S of town, *Daly & Betancur* 5873 (COL, US); Mpio. Jardín, road Jardín–Ventanas–Río Sucio, ca. 19.3 km SSE of Jardín, border with Caldas, *Luteyn & Escobar* 12752 (US).—CAQUETA: roadside near Río Hacha, *Orozco et al.* 2843 (COL).—CAUCA: road Mocoa–Pitalito, Sitio Sajonia, western slopes of the Cordillera Oriental, *Betancur B. et al.* 5538 (COL, US).—CUNDINAMARCA: “Riode,” *André* 4607 (K-2 sheets); Pacho, Hacienda Patasia, *García Barriga* 12536 (US).—NARIÑO: La Planada, trail to El Hondón, 6–12 km SW of La Planada, *Gentry et al.* 60390 (LPB, MO, US); La Planada, *Snow* 21 (K).—PUTUMAYO: Valle de Sibundoy, 1 km NE of Sibundoy, *Bristol* 341 (GH); road Pasto–Mocoa via mountain, El Silencio, *Kennedy* 210 (US); between San Francisco de Sibundoy and the headwaters of Río Minchoy, 20 m from bridge, *Londoño & Lozano* 225 (US). **Ecuador.** PROVINCE UNKNOWN: E of the Andes, *Pearce* 420 (K); *Sodiño* 119 (Q).—AZUAY: Cantón Paute, Parroquia Palmas, Sector Amaluisa, hwy Paute–Guarumales, environs of Pica Guarumales–Méndez, Finca de Sr. Absalón Bravo, *Jaramillo & Widderskjold* 5603 (QCA).—CARCHI: Cantón Mira, El Carmen, Cerro Golondrinas, *Tirado et al.* 1258 (QCNE, US).—IMBABURA: Cordillera Oriental, Agua Caliente, E of Volcán Cayambe, *Drew* 373 (US).—LOJA: Vilcabamba, Reserva El Bosque, *Vivar C. et al.* 4364 (AAU, LOJA, QCNE).—MORONA-SANTIAGO: Cantón Limón Indanza, Parroquia Chiviaza, road from Limón (Gral Leonidas Plaza Gutiérrez) to Santa Susana de Chiviaza, *Clark et al.* 5971 (MO, QCNE, SEL, US); Cantón Morona, Parroquia 9 de Octubre, unfinished road towards Guamote, via Macas–Guamote, *Clark & Katzenstein* 8377 (COL, E, K, QCA, QCNE, SEL, US); Descanso, Valle de Calagras, 11 km E of San Juan Bosco, *Dodson et al.* 10485 (SEL); Cordillera del Cóndor, Cuangos, 20 km E of Gualaquiza, near disputed Peru-Ecuador border, *Gentry* 80029 (MO, QCNE, US-2 sheets); road Limón–Gualaceo, Km 16, *Harling & Andersson* 24602 (S); along new road between Limón and Gualaquiza, near Río Calagras, *Luer et al.* 5495 (SEL); Cantón Limón Indanza, road Chiriaza–La Punta, *Manzanares et al.*

7337 (QCNE); Cordillera Cutucú, above Río Tzontza, *Prieto 12* (NY); road Gualaquiza–Limón (Gral Leonidas Plaza Gutiérrez), ca. 10 km S of San Juan Bosco, *Stein 2806* (US).—NAPO: Cantón Archidona, southern slopes of Volcán Sumaco, road Hollín–Loreto, Km 31, Comuna Challua Yacu, *Alvarado 134* (QCNE, US); Cantón Quijos, Parroquia Baeza, Comunidad Santa Lucía de Bermejo, *Alvarez et al. 964* (QCNE); Cantón Quijos, Parroquia Baeza, Comunidad Santa Lucía de Bermejo, *Alvarez et al. 967* (QCNE); Cantón Quijos, Sierra Azul (Agrícola Industrial Río Aragón), Cordillera de Guacamayos, *Alvarez et al. 1274* (QCNE); Cantón Quijos, Sierra Azul (Agrícola Industrial Río Aragón), trail from Estero Chico towards Cordillera de Guacamayos, *Alvarez et al. 1293* (QCNE); Cantón Archidona, Parque Nacional Sumaco Napo–Galeras, Cordillera de Galeras, *Alvarez et al. 1583* (MO, QCNE, US); Cantón Archidona, Parque Nacional Sumaco Napo–Galeras, Cordillera de Galeras, environs of trail to Huamaní, *Alvarez 1846* (QCNE, US); Cantón Archidona, Comunidad Pacto Sumaco, *Alvarez et al. 1906* (QCNE); road Baeza–Tena, Km 22, past Cossanga, *Borchsenius 117* (QCA); road Hollín–Loreto–Coca, Comunidad Chaluyacu, Km 25, southern slopes of Volcán Sumaco, *Cerón M. et al. 5773* (MO, QAP, QCNE, US); Cantón Archidona, road Hollín–Loreto, Km 25, environs of Challua Yacu, slopes of Volcán Sumaco, *Cerón M. & Hurtado 6531* (MO, QAP, QCNE, US); Cantón Quijos, headwaters of Río Cosanga, *Cerón M. et al. 33707* (QAP); Cantón Archidona, Parque Nacional Sumaco Napo–Galeras, base of Volcán Sumaco, between Pacto Sumaco and main road to Loreto, *Clark 2317* (NY, QCNE, SEL, US); Cantón Archidona, Parque Nacional Sumaco Napo–Galeras, Volcán Sumaco, between small crater lake and Pacto Sumaco, *Clark 2290* (QCNE, US); Cantón Archidona, Reserva Ecológica Antisana, Comunidad Shamato, ca. Km 21 towards Shamato, *Clark et al. 5012* (QCNE, US), *Clark et al. 5033* (AAU, COL, E, MO, QCA, QCNE, SEL, US); Cantón Quijos, Parroquia Cosanga, Yanayacu Biological Station and Center for Creative Studies, 5 km W of Cosanga from the Las Cancheras road, *Clark & Greeney 5789* (NY, QCNE, US); Cantón Archidona, Parroquia Catundo, buffer zone of Parque Nacional Sumaco Napo–Galeras, trail from the Comunidad Mushullacta towards crest of Galeras, *Clark & Harris 7262* (AAU, BM, CAS, COL, E, F, K, MO, NY, QCA, QCNE, SEL, UNA, US); Cantón Archidona, road Baeza–Loreto, ca. 3–5 km E of the junction with the road Tena–Baeza, *Clark & Harris 7285* (COL, MO, QCA, QCNE, SEL, US); Cantón Archidona, Parque Nacional Sumaco Napo–Galeras, slopes of Volcán Sumaco, *Freire & Cerda 398* (QCNE, MO); road Quito–Baeza–Archidona, 36 km after Baeza, *Freire et al. 939* (F, NY, QCA); Cantón Archidona, road Hollín–Loreto, *Delprete et al. 6204* (NY); junction of road Baeza–Lago Agrio with Río Azuela, *Dwyer & MacBryde 9637* (US); Cerro Antisana, E of Borja, *Grubb 1064* (K); ravine, 5 km NW of Borja, *Holm-Nielsen et al. 26430* (NY, QCA); Guagra Urcu, pass between Río Borja and Río Suno, *Holm-Nielsen et al. 27312* (AAU, MO); road Baeza–Tena, Cosanga, *Harling & Andersson 16226* (GB, US); road Baeza–Tena, southern slope of Cordillera de Guacamayos, above Jondachi, *Harling & Andersson 16340* (GB, US); Bermejo oil fields, off road from Baeza to Lago Agrio, *Hirtz et al. 2715* (MO); Cantón Archidona, road Hollín–Loreto, Km 25, Comunidad Challua Yacu, southern slopes of Volcán Sumaco, *Hurtado et al. 1260* (QCNE, US); Cantón Archidona, road Hollín–Loreto, Km 17, environs of Río Hollín, *Hurtado & Shiguango 1621* (QCNE, US); Cantón Archidona, road Hollín–Loreto, Km 17, near Río Hollín, *Hurtado & Shiguango 1648* (MO, QCNE); Hwy Hollín–Loreto, Km 25, Centro Challuyacu, trail near environs of Guagua Sumaco, *Hurtado & Alvarado 1138* (US); Cantón Archidona, southern slopes of Volcán Sumaco, road Hollín–Loreto, Km 45, new road to Galeras, Huamaní, *Hurtado 2740* (MO, QCNE); Cantón Quijos, ca. 1.5 km NE of Cosanga, *Kirkbride & Chamba 4022* (Q, US); Cantón Archidona, Estación Biológica Jatún Sacha, 8 km E of Misahualli, *Manzanares et al. 5166* (QCNE); eastern upper slopes of Cordillera de Guacamayos, 11–13 km S of Cosanga on the road Baeza–Tena, *Molau & Eriksen 2143* (GB, QCA, US); road Hollín–Loreto, 32 km, 3–4 km S of road, *Moran & Rohrbach 5134* (QCNE, US); southern slopes of Volcán Sumaco, road Hollín–Loreto, Km 25, near Comunidad Chalua Yacu, *Neill & Asanza 8882* (QCNE, US); road Baeza–Lago Agrio, 140 km from Lago Agrio, pass S of Río Salado, *Øllgaard et al. 35730* (AAU, US); Cerro Guacamayos, Baeza, *Øllgaard et al. 35831* (AAU, US); Cantón Archidona, faldas al sur del Volcán Sumaco, carretera Hollín–Loreto, Km 31, comuna Challua Yacu, *Palacios 4079* (QCNE, US); Cantón El Chaco, Proyecto Hidroeléctrico Coca, Punto ST3, ca. 10 km al S de Volcán Reventador, *Palacios 5810*, *Palacios 5829* (QCNE, SEL); Cantón El Chaco, Proyecto Hidroeléctrico Coca, Punto ST3, ca. 10 km al S de Volcán Reventador, *Palacios 5829* (QCNE, US); Cantón El Chaco, embankment of Río Quijos, ca. 10 km S of Volcán Reventador, *Palacios 5958* (QCNE, US); Salto San Rafael, along Río Quijos, *Smith & Dunn 3417* (US); road Baeza–Tena, several km S of pass before reaching Sarayacu, *Sobel & Strudwick 2418* (NY, US); trail to Volcán Reventador from road Lago Agrio–Baeza, Km 100, *Stein 3072* (MO, QCNE, US); Cantón Tena, Parque Nacional Llanganates, road Salcedo–Tena, Km 74, embankment of Río Mulatos, *Vargas et al. 2200* (MO, QCNE); Cantón Quijos, Reserva Ecológica Antisana, Río Aliso, 8 km SW of Cosanga, *Vargas et al. 2907* (QCNE); Cantón Quijos, Reserva Ecológica Antisana, Río Aliso, 8 km al SW of Cosanga, *Vargas et al. 3046* (QCNE, US); Cantón Quijos, Reserva Ecológica Antisana, Cordillera de los Guacamayos, between El Mirador and La Virgen, *Vargas & Narváez 3191* (MO, QCNE); road Hollín–Loreto–Coca, embankment of Río Hollín, *Zak & Jaramillo 3131* (GH, MO, NY, PMA, US).—NAPO/PASTAZA: environs of Puyo, *Skutch 4469* (A, K,

MO, NY, US).—PASTAZA: El Potrero, *Baker et al.* 5491 (QCNE); Cantón Palora, environs of Palora, *Cerón M. et al.* 35805 (QAP); Cantón Palora, environs of Palora, *Cerón M. et al.* 35810 (QAP); Cantón Mera, Parroquia Shell, road to Río Anzu and beyond, S of the town of Mera, *Clark et al.* 7759 (COL, NY, QCA, QCNE, SEL, UNA, US); Cantón Mera, remnant patch of forest N of the town of Shell, *Clark & Mailloux* 7856 (COL, K, QCA, QCNE, SEL, US); Cantón Puyo, Parroquia Veracruz, La Esperanza (Siguin), Finca Salina (de Hilda Pérez), Km 14 on the road Puyo–Macas, *Clark & Katzenstein* 8295 (E, QCNE, SEL, UNA, US); Shell, *Cornejo & Bonifaz* 1534 (GUAY); unfinished road to Tarabita and portage over Río Pastaza, ca. 3 km from the turnoff from road Puyo–Mera, *Croat* 49691 (MO, US); road Puyo–Macas, Km 19, S of Puyo, *Croat* 50541 (MO, US); road between Puyo, Diez de Agosto and Arajuno, 18 km NE of road Puyo–Macas, 8.2 km NE of Diez de Agosto, *Croat* 59023 (K, MO-2 sheets, NY, US); Cantón Pastaza, between Shell and Mera, 5.3 km NW Shell, unfinished road, 1.1 km N of hwy, *Croat* 73434 (MO, QCNE, SEL, US); embankment of Río Topo, *Dodson & Thien* 2074 (UC, US, WIS); Hacienda San Agustín, 3 km NW of Mera, *Dodson & Hirtz* 15348 (MO, QCNE); Cantón Pastaza, Pozo Petrolero, Corrientes de UNOCAL, 35 km SW of Curaray, *Gudiño* 775 (LOJA, QCNE, US); Colonia Játiva, ca. 7 km N of Mera, *Harling* 16936 (GB, US); road Baños–Puyo, Km 38, *Jørgensen & Laegaard* 56456 (MO, NY, QCNE); road Baños–Puyo, 5 km W of Mera, *Kvist* 60334 (US); environs of Colonia Játiva, ca. 15 km N of Mera, *Lugo S.* 96 (GB, SEL, US); Veracruz (Indillama), *Lugo S.* 1092 (GB, SEL); Mera, Río Pastaza, *Lugo S.* 1127 (GB, NY, SEL); Colonia 24 de Mayo, unfinished road from hwy Puyo–Puerto Napo, 15–20 km NE of Puyo, *Lugo S.* 2472 (GB, NY, SEL); Canelos, *Lugo S.* 4503 (GB, K, SEL, US, WIS); 11.4 km E of Topo, *MacBryde* 147 (MO); 5 km NE of Mera, road to Río Anzu, *Neill et al.* 5887 (QCNE, US); environs of Mera, *Plowman & Davis* 4495 (GH, SEL); Cantón Pastaza, Fátima, Centro Tecnológico de Recursos Amazónicos, *Valenzuela et al.* 398 (QCNE, US).—SUCUMBÍOS: road between Baeza and Nuevo Loja (Lago Agrio), along slope above road and Río Aguariño, 67 km E of Baeza, 2.7 km W of Río Azuela, *Croat* 72484 (QCNE, US); Reserva Ecológica Cayambe Coca, Volcán Reventador, trail between Río Quijos and Refugio, *Clark* 4449 (AAU, COL, QCA, QCNE, SEL, US); Reserva Ecológica Cayambe Coca, Volcán Reventador, trail between Río Quijos and Refugio, *Clark* 4454 (AAU, COL, E, K, MO, NY, QCA, QCNE, SEL, US); El Reventador, Río Reventador, *Jaramillo & Grijalva* 12898 (NY); 2.5 km NNE of Río Reventador on road Baeza–Lago Agrio, *MacBryde* 1474 (MO, US-2 sheets); Gonzalo Pizarro, Reserva Ecológica Cayambe-Coca, parte baja del sendero Volcán Reventador, *Vargas et al.* 3974 (QCNE, US); Gonzalo Pizarro, Reserva Ecológica Cayambe-Coca, parte baja del sendero Volcán Reventador, *Vargas et al.* 3991 (QCNE).—TUNGURAHUA: road Baños–Mera, ca. 30 km from Mera, *Læssøe* 43296 (QCNE); Cantón Baños, Parroquia Río Verde, environs of Machay, forested trail from road Baños–Puyo towards Cascada de San Miguel via San Agustín, *Clark et al.* 5696 (AAU, CAS, COL, E, K, MO, NY, QCA, QCNE, SRP, UNA, US); Cantón Baños, remnant patch of forest near road Shell–Baños, environs of Río Negro, *Clark & Mailloux* 7858 (QCNE, US); Cantón Baños, remnant patch of forest near road Shell–Baños, environs of Río Negro, *Clark & Mailloux* 7857 (QCNE, US); Cantón Baños, Parroquia Río Negro, remnant patch of forest near road Baños–Puyo, western side of Río Topo, *Clark & Katzenstein* 8400 (COL, K, NY, QCA, QCNE, SEL, UNA, US); roadside between Ambato and Baños, *D’Arcy* 14009 (MO, NY, US); between Ambato and Baños, *D’Arcy* 14017 (MO, US); northern slopes of Volcán Tungurahua, 5 km W of Baños, *Dodson & Thien* 977 (MO, US-2 sheets); valley of Río Pastaza, between Baños and Cashurco, E of Baños, *Hitchcock* 21849 (GH, US); valley of Río Pastaza, between Baños and Cashurco, E of Baños, *Hitchcock* 21812 (US); E of Río Negro, 28 km from Baños on road to Puyo, *Molau & Öhman* 1292 (GB, S); Cantón Baños, Parque Nacional Llanganates, Cordillera Sacha Llanganates, above Río Zuñac, *Neill et al.* 13403 (QCNE); between Río Mapoto and Río Margaritas, *Penland & Summers* 186 (GH, US); Río Negro, bridge at the W entrance to village, *Sparre* 17659 (NY, S); trail up hillside, E of Río Topo, ca. 29 km E of Baños on hwy Baños–Puyo, *Stein* 2971 (MO, QCNE, US); Cantón Baños, Los Llanganates, Colonia México, 18 km from Topo, *Vargas & Sandoval* 330 (QCNE, US).—ZAMORA-CHINCHIPE: 10 km E of Paquisha, *Harling & Andersson* 24095 (S, US). **Peru.** AMAZONAS: Prov. Condorcanqui, Cordillera del Cóndor, Puesto Vigilancia Alfonso Ugarte, headwaters of Río Comainas, tributary W of Río Cenepa, *Beltrán & Foster* 756 (USM); environs of San Martín border, *van der Werff et al.* 16641 (US); Dist. Bagua, Aramango, Catarata Numparket, *Vásquez et al.* 27290 (US); Dist. Bongara, Bosque de Protección Alto Mayo, *Vásquez* 27660 (US).

Glossoloma tetragonoides is highly variable and often confused with other species. The undersurface of the leaves can be uniformly green to green with a reddish tinge to uniformly red. Calyces can be green or red, and corollas completely yellow, completely red, or yellow with red lobes. It is common to find individuals with green calyces and yellow corollas with red lobes growing sympatrically with individuals that have uniformly red corollas. The most useful character in differentiating *G. tetragonoides* from similar

species, such as *G. tetragonum* and *G. grandicalyx*, is its smaller calyx (1.5–2.5 cm long) with lobes having serrate margins (Fig. 38D). The calyx of *G. tetragonum* is up to 3.0 cm long and lobe margins are dentate (Fig. 40E); that of *G. grandicalyx* is up to 4 cm long.

27. *Glossoloma tetragonum* Hanstein, *Linnaea* 26: 208. 1854. *Alloplectus tetragonus* (Hanstein) Hanstein, *Linnaea* 34: 368. 1865. *Columnnea tetragona* (Hanstein) Kuntze, *Revis. gen. pl.* 2: 472. 1891. *Crantzia tetragona* (Hanstein) Fritsch in Engler & Prantl, *Nat. Pflanzenfam.* 4(3b): 168. 1894.—TYPE: Figure 49 in Hanstein, *Linnaea* 26: 208. 1854.

Alloplectus ichthyoderma var. *hirsutululus* C. V. Morton, *Publ. Field Mus. Nat. Hist., Bot. Ser.* 18: 1145. 1938.—TYPE: COSTA RICA. Cartago: Atirro, 600 m, Apr 1896, *J. Donnell Smith 6715* (holotype: US!; isotypes: BM! GH! K! US!).

Alloplectus simulatus C. V. Morton, *Ann. Missouri Bot. Gard.* 29: 37. 1942.—TYPE: PANAMA. Chiriquí: vicinity of Bajo Mona and Quebrada Chiquero, 1500 m, 18 Jul 1940, *R. E. Woodson & R. W. Schery 537* (holotype: US!; isotypes: GH, MO!; photo of GH isotype: US!).

Alloplectus fraternus C. V. Morton, *Proc. Biol. Soc. Wash.* 69: 193. 1956.—TYPE: PANAMA. Chiriquí: flat areas on the slopes of Volcán de Chiriquí Viejo and along Río Chiriquí Viejo, 1200 m, 20 Apr 1935, *Allen 1000* (holotype: MO!, fragment: US!; isotypes: BM! BR! F! G! U!).

Herbs to subshrubs, terrestrial; stems erect, unbranched, to 2 m tall, to 1.5 cm in diameter, succulent, becoming woody, internodes 2–15 cm long, subquadrangular, glabrescent proximally, hirsute with yellowish hairs distally, leaf scars raised from stem surface, enations at base of petiole present. Leaves opposite, equal or subequal in a pair; petioles 5–13 cm long, sparsely to densely pilose; blades 14–25 cm long, 4–11 cm wide, narrowly elliptic to oblong, base cuneate or acute, apex acute, margin serrate or serrulate, adaxially green, sparsely pilose especially on the veins, abaxially pale green, strigose or hirsute, subcoriaceous when dry, lateral veins 6–8 per side. Inflorescence not pedunculate, flowers appearing fasciculate, resupinate, with 1–4 flowers per node, posture pendent at anthesis, bracteoles ca. 10 mm long, 5 mm wide, broadly ovate; pedicels shorter than the petiole, 2–5 cm long, pilose, pedicel enations absent. Calyx lobes connate briefly at base, each appressed to adjacent lobe, folded lengthwise with the margin curved inward, erect, subequal, to 30 mm long, to 25 mm wide, broadly ovate, base cordate, apex acute to acuminate, margin dentate to serrate, all green, all red, orange, or green with red margins, abaxially hirsute with the midvein especially densely pilose, adaxially hirsute to glabrous. Corolla 3.5–6.0 cm long, tubular, gibbous basally on lower surface, spur absent, long axis of corolla oblique relative to calyx; base ca. 4 mm in diameter, middle ampliate, becoming apically ventricose on upper surface, throat not constricted, appearing laterally compressed, 1.5 cm wide (at mouth), outside pilose, inside glabrous, interior spotting absent, limb spreading, zygomorphic, ca. 1.5 cm wide, red or appearing orange or yellow from dense yellow hairs, lobes nearly equal, ca. 3 mm long, 3–6 mm wide, rotund, entire. Nectary gland bilobed, on ventral surface of ovary, glabrous. Filaments coiling after anthesis, free portion to 3 cm long, adnate to base of corolla tube for 5 mm, connate for 1 mm, forming an open sheath, glabrous; anthers ca. 2 mm long, ca. 3 mm wide, dehiscing by longitudinal slits; staminode absent. Ovary ca. 6 mm long, ca. 4 mm wide, ovoid, densely pilose, style 3 cm long, glabrous, stigma stomatomorphic. Fruit a fleshy capsule, pendent when ripe, ca. 1.3 cm long, ca. 1 cm wide, ovoid when immature, pilose, loculicidally dehiscent,

becoming bivalved. Seeds numerous, 0.5–1 mm long, ca. 0.2 mm wide, fusiform, longitudinally striate, dark brown. Fig. 40.

Phenology. Collected in flower and fruit throughout the year.

Distribution (Fig. 39). Southern Costa Rica, Panama, and Colombia (Antioquia, Valle del Cauca, Nariño, Huila, and Cauca); shaded primary and disturbed, moist to pluvial wet forests; 100–2000 m.

ADDITIONAL SPECIMENS EXAMINED. **Costa Rica.** ALAJUELA: Cantón San Ramón, Dist. Peñas Blancas, Río Peñas Blancas, Quebrada Gata, Los Pérez, *Bello et al.* 2198 (MO); near San Ramón, *Brenes* 4994 (F, NY); *Brenes* 5701 (F); upper drainage of the Río Peñas Blancas, below the Monteverde Cloud Forest Nature Reserve, *Burger et al.* 10759 (AAU, F-3 sheets, NY, PMA); near the falls of the Río La Paz and along the road to Puerto Viejo, *Burger et al.* 11831 (F, MO); upper Río Sarapiquí, near Cariblanco and along the road to Colonia Virgen del Socorro, *Burger et al.* 11905 (F); Cantón Upala, Parque Nacional Guanacaste, Cordillera de Guanacaste, Estación San Ramón, Dos Ríos, environs of La Campana, *Espinoza et al.* 877 (US); Volcán Arenal, trail from observatory to summit of Cerro Chato, *Funk et al.* 10701 (US), *Gómez L.* 9796 (F), *Gómez L.* 11065 (F); San Carlos, Peñas Blancas, *Haber & Bello* 1939 (MO); Cantón San Ramón, Dist. Peñas Blancas, Monteverde Cloud Forest Reserve, continental divide, Senderos Chomogo and Pantanoso, *Haber* 9322 (MO); Reserva Forestal de San Ramón, Río San Lorenzito, *Herrera et al.* 326 (MO, US); Peñas Blancas, 3.5–5 km ESE of Monteverde, *Kennedy & Guindon* 3757 (F); Parque Nacional Santa María, ca. 1 km W of eastern park boundary, *Liesner* 5196 (MO); 15 air-km NW of San Ramón, Cerro Azahar, headwaters of Río San Pedro, *Liesner et al.* 15467 (MO, WIS); 15 air-km NW of San Ramón, Cerro Azahar, headwaters of Río San Pedro, 9 road-km NW of San Ramón to Piedades Norte, *Liesner et al.* 15566 (MEXU, MO, US, WIS); Virgen del Socorro, *Luer et al.* 4171 (SEL); forest above San Jerónimo, *Luer et al.* 4223 (SEL); Monteverde Cloud Forest Reserve, Sendero Brillante, *Penneys* 1513 (US); La Peña de Zarcero, Cantón Alfaro Ruíz, A. *Smith* 1065 (F-2 sheets); Cantón Alfaro, Ruiz Bella Vista de Zarcero, A. *Smith* 1594 (MO, NY); San Ramón Forest Reserve, Río San Lorencito, *Solís* 21 (F, MO); Viento Fresco, *Standley & Torres* 47822 (US), *Standley & Torres* 47969 (US); Cariblanco, *Wendland* 953 (GOET).—ALAJUELA/PUNTARENAS: Monteverde Cloud Forest Nature Reserve, Cordillera de Tilarán, Cerros Centinelas, *Grayum & Sleeper* 3836 (MO, US); Monteverde, *Snow* 2 (F).—CARTAGO: ca. 10 km S of Tapantí along the new road on the eastern slope above Río Grande de Orosi, *Burger & Stolze* 5654 (F, GH, S); ca. 15 km S of Tapantí, new road on the eastern slope above Río Grande de Orosi, near concrete bridge, *Burger & Liesner* 6846 (F); ca. 10 km S of Tapantí along the new road on the eastern slope above the Río Grande de Orosi, *Burger & Burger* 7584 (F, NY); ca. 15 km S of Tapantí along the new road on the eastern slope above the Río Grande de Orosi, *Burger & Gentry* 9191 (AAU, F, NY); Cantón Jiménez, *Cascante et al.* 925 (F); Tapantí Hydroelectric Reserve along Río Grande de Orosi, 4.5 km beyond small bridge which crosses the river inside reserve, along road to diversion dam, *Croat* 36119 (MO); Tapantí Hydroelectric Reserve, trail along Río Dos Amigos, *Croat* 36202 (MO-2 sheets); along road Raiz de Huila, SE of Platanillo (Tsipiri), *Croat* 36704 (MO); along road Raiz de Huila, SE of Platanillo (Tsipiri), *Croat* 36739 (MO); 2 km E of Muñeco, *Davidse & Pohl* 1679 (F, MO); Tapantí Reserve, *Gómez* 18748 (MO-2 sheets, VEN); Tapantí Reserve, *Gómez* 19220 (MO, US, VEN); stream embankment, Tapantí, *Gómez* 2327 (F); near entrance to Refugio Nacional de Fauna Silvestre Tapantí, near Orosi, *Grant & Skotak* 9101506 (US); environs of Quebrada Casa Blanca, Tapantí, *Grayum* 3930 (MO); forest along tributary of Río Grande de Orosi, 1 km upstream from confluence of Quebrada Salto, Tapantí, *Grayum* 5086 (MO); between Río Navarro and Río Sombrero, *Jiménez M.* 1657 (F); Paraíso, Orosi, Tapantí, embankment of Río Grande de Orosi, *Kala* 4 (K); roadside, 3 km S of Tres Equis, *Lent* 537 (F, MO, NCU); hillside overlooking Río Grande de Orosi, ca. 3 km SE of Tapantí, *Lent* 820 (F, U); N of Juan Viñas, *León* 146 (F); N of Juan Viñas, El Retiro, *León* 162 (F); 12 air-km S of Turrialba, 4 km SE of Pejibaye along Río Gato, *Liesner* 14376 (MO, US); ca. 6 air-km S of Cartago, Quebrada Cangreja, 3 km S of Hwy Panamericana, *Liesner & Judziewicz* 14475 (MO, WIS); Volcán Turrialba, *Pittier* 7512 (BM, GH, K, US-2 sheets); Turrialba, *Pittier* 13222 (G-7 sheets, K, US); Monumento Nacional Guayabo Turrialba, Santa Teresita, environs of Río Guayabo, Río Lajas, and Río Torito, *Rivera* 1725 (K); El Muñeco, S of Navarro, *Standley* 33434 (US), *Standley* 33623 (US); La Estrella, *Standley* 39431 (US); environs of Orosi, *Standley* 39669 (US), *Standley* 39721 (US), *Standley* 39739 (US); environs of Pejivalle, *Standley & Valerio* 47111 (US); El Muñeco, Río Navarro, *Standley & Torres* 50899 (US), *Standley & Torres* 50966 (US), *Standley & Torres* 51374 (US), *Standley & Torres* 51380 (F, US); Santa Clara Hills, *Stork* 2584 (F); valley of the Grande del Orosi, Tapantí to 7 km S, ca. 20 km SW of Cartago, *Tryon & Tryon* 7110 (GH); Tapantí Hydroelectric Project, ca. 7–12 km SE of Orosi, slopes above Río Grande de Orosi, *Utley & Utley* 2489 (F); Tapantí Hydroelectric Project, S of Orosi, *Utley & Utley* 2100 (AAU); El Retiro (Santa Cruz de Turrialba), *Valerio R.* 1249 (F); Monumento Nacional Guayabo, Turrialba, *Vargas* 1459 (K); SW slopes of Volcán Turrialba, between

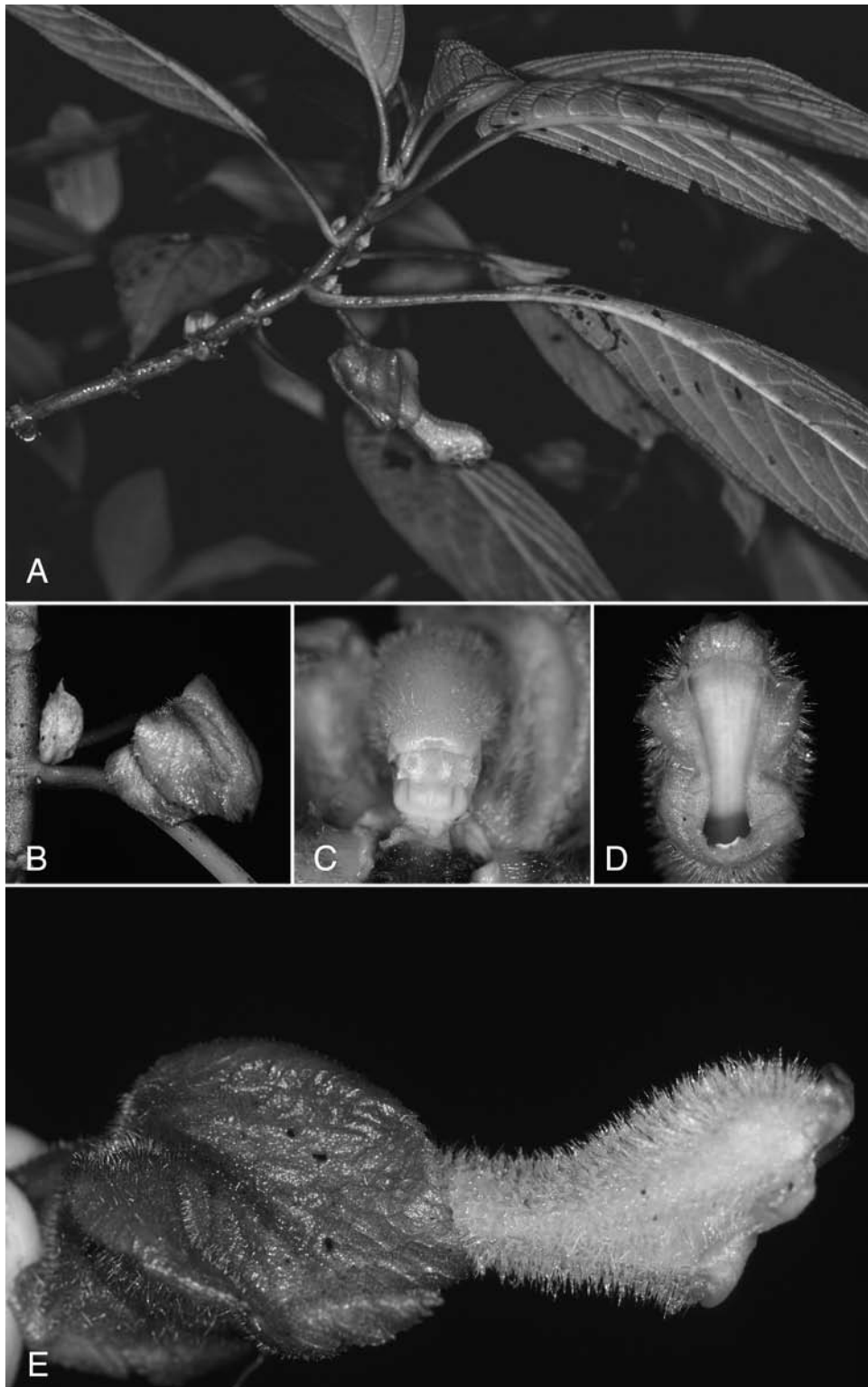


FIG. 40. *Glossoloma tetragonum*. A. Habit. B. Immature flower. C. Nectary gland. D. Face view of flower. E. Lateral view of flower. (Photos by J. L. Clark; vouchers: A–E, J. L. Clark 8547.)

La Pastora and La Central, *Williams 19785* (F, NY, US).—GUANACASTE: Parque Rincón de la Vieja, Liberia, ridge from Mirador to Volcán Santa María, *Herrera 1434* (MO, US); Cantón La Cruz, Parque Nacional Guanacaste, Cordillera de Guanacaste, Estación Pitilla, *Moraga 395* (US).—HEREDIA: 7.5 km N of Vara Blanca, vicinity of Río La Paz Grande, *Croat 36002* (MO); Vara Blanca, *Lee 6324* (BH); 7.1 km N of Vara Blanca, Hwy 9, *Luteyn 602* (F, MO); Vara Blanca de Sarapiquí, N slope of the Cordillera Central, between Volcán Poas and Volcán Barba, *Skutch 3608* (A, MO, US); Yerba Buena, NE of San Isidro, *Standley & Valerio 49775* (US); Cerro de las Caricias, N of San Isidro, *Standley & Valerio 51978* (US); Cantón Sarapiquí, Horquetas, Estación El Plástico, Sendero Tigre and Atajo, *Vargas et al. 1690* (K).—LIMÓN: Cantón Limón, Dist. Matama, El Progreso, Cabeceras de Río Aguas Zarcas, Fila Matama, *Herrera & Chacón 2858* (US); Cantón Limón, Dist. Valle La Estrella, Cerro Muchilla, Fila Matama, *Robles et al. 2720* (MO).—PUNTARENAS: Cantón Coto Brus, Parque Internacional La Amistad, Cordillera de Talamanca, Estación Pittier, Sendero Altamira, *Alfaro et al. 10* (BM, US); Monteverde, Monteverde Reserve, environs of TV towers, *Bello 3050* (MO); ca. 5 km NE of Finca La Cruces, San Vito de Java, *Burch 4508* (F, MO, USF); forested slopes E of Las Cruces, 5–6 km S of San Vito, environs of propiedad de Robert Wilson, *Burger & Matta 4391* (F, GH, MO, S, WIS); along Río Coto Brus, near Coton, 23 km N of La Unión, *Croat 26623* (MO); foothills of the Cordillera de Talamanca, NW of Las Alturas, along Río Bella Vista, *Davidse 24299* (MO, US); foothills of the Cordillera de Talamanca, environs of Tres Colinas, *Davidse et al. 25670* (MO, US); near División, *Dryer 315* (F); Monteverde Cloud Forest Reserve (Reserva Bosque Nuboso de Montverde), Pacific slope of continental divide, *Feinsinger & Pounds 428* (F), *Feinsinger & Pounds 440* (MO); Monteverde, Monteverde Cloud Forest Reserve, Pacific slope of continental divide, Pantanos trail, *Feinsinger & Pounds 442* (US); Cantón Coto Brus, Cuenca Térraba–Sierpa, Zona Protectora Las Tablas, Finca La Neblina, finca de William Gamboa, *Gamboa R. 1099* (US); Cantón Coto Brus, Cuenca Térraba–Sierpe, Estación Biológica Las Alturas, trail to Cerro Echandi, *Gamboa R. 1899* (US); Monteverde, road to TV tower, *Haber 2358* (MO); Reserva Biológica Monteverde, Sendero Brillante, *Haber & Bello 2454* (MO); between Agua Buena and San Vito de Java, *Jiménez M. 2486* (F); Cantón Coto Brus, Reserva de La Biosfera de la Amistad, near Estación Biológica Las Alturas de Cotón, trail from station to Echandi, *Kress & Kennedy 4324* (US); Las Cruces, along Río Jaba, *Meerow et al. 2012* (SEL-2 sheets); forest above Finca de Wilson, 6 km S of San Vito de Java, *Raven 20879* (DS, F); Cantón Coto Brus, Zona Protectora Las Tablas, Cuenca Térraba–Sierpe, Surá, 7 km NW of Progreso, *Navarro & Picado 578* (US); above Quaker settlement at Monteverde, *Utley & Utley 2372* (F); 5 km S of San Vito, *Wilbur 14464* (F).—PUNTARENAS/ALAJUELA: on and near the continental divide, 2–5 km E and SE of Monteverde, *Burger & Gentry 8629* (AAU, F, MO, PMA, U); Monteverde Nature Reserve, *Burger & Baker 9732* (F, MO, PMA, U); environs of Monteverde Nature Reserve, *Lawton 1013* (F).—SAN JOSÉ: off road between Alto La Palma and Bajo la Hondura, *Almeda 3886* (CAS, US); Parque Nacional Braulio Carrillo, between Bajo La Hondura and Río Sucio, *Barringer & Gómez L. 2706* (F); steep wet slopes below La Palma, Río Claro, upper Río La Hondura, trail to Guápiles, *Burger 3934* (BM, F, MO); valley of the Río Hondura, below La Palma, NE of San Jerónimo, *Burger & Stolze 4901* (F); La Palma area, NE of San Jerónimo, above La Hondura Valley, *Burger & Stolze 5304* (F, NY); Río La Hondura drainage, below La Palma, NE of San Jerónimo, *Burger & Burger 7642* (F-2 sheets, MO, PMA); along Río Clara Valley (Bajo La Hondura), below La Palma, NE of San Jerónimo, *Burger et al. 9373* (F, U); above Alfombra along the road from San Isidro del General to Dominical, *Burger & Baker 10080* (F); La Palma area, NE of San Jerónimo, above the Hondura Valley, *Burger & Antonio 11057* (F); Reserva Forestal Juan Castro Blanco, slopes of Cerros Volcán Viejo, 4 km NW of Bajos del Toro, *Chavarría et al. 616* (MO); ca. 1 mi beyond divide between San Isidro del General and coastal town of Dominical, *Croat 35296* (MO, US); Cordillera de Talamanca, Pacific slopes of Cerro Chirripó, *Davidse & Pohl 1670* (MO, NY); Pérez Zeledón, Tinamaste, Fila Tinamaste, *Estrada 899* (F, K, MO); Parque Nacional Braulio Carrillo, Estación La Montura, *Gómez et al. 20870* (MO, US-2 sheets); Parque Nacional Braulio Carrillo, from La Montura to Los Chorrillos, *Gómez et al. 20910* (MO, US); Tarrazú, San Lorenzo, Cerro Toro, *Gutiérrez et al. 47* (F); Cantón Pérez Zeledón, Dist. Barú, Fila Tinamastes, road Dominical–San Isidro, *Hammel 19543* (INB, MO); Reserva Forestal Juan Castro Blanco, *Jiménez et al. 616* (F, MO); between San Isidro del General and División, *Jiménez M. 879* (BM, F); below Bajo La Hondura, Río La Hondura drainage, *Kennedy 1682* (MO); woods near Quebrada Grande, 3 km NW of Casajal, *Lent 2314* (F-2 sheets, NY); vicinity of La Palma, on the road to La Hondura, *Maxon & Harvey 8019* (US); La Palma, Pacific slope, *Pittier 10166* (US, W); Botanical Garden, Las Cruces, San Vito de Coto Brus, *Sánchez V. et al. 302* (MO, US); vicinity of El General, *Skutch 3032* (US); La Palma, *Standley 33142* (US); La Hondura, *Standley 36142* (US), *Standley 37608* (US); 3 km NW of Casajal, near union of the Río Casajal and Río Bajo Maquina, *Taylor & Taylor 11300* (MO); along hillside above Río Hondura at Baja La Hondura, *Taylor 17954* (NY, US); Parque Nacional Braulio Carrillo, La Montura, *Todzia et al. 1974* (NY); La Palma, *Tonduz 12590* (US-2 sheets); Alto de la Palma, ca. 6 km N of San Jerónimo, *Utley & Utley 631* (F), *Utley & Utley 1406* (F); N of San Isidro del General, Cordillera de Talamanca, *Williams 19982* (US). **Panama.** BOCAS DEL TORO: Sendero Robalo, northern slopes of Cerro Horqueta, *Allen 4981* (EAP, G, MO, US); Hwy Fortuna–Chiriquí Grande, 2.2

miles N of continental divide, 6.3 miles N of bridge over Fortuna lake, *Croat & Grayum 60388* (MO, US); N of Boquete, *Dunn 9907066* (BM, COL, CR, MEXU, MO, SRP, US); forest near headwaters of Río Culebra, ca. 5 km ENE of Cerro Pate Macho, *Hammel 6144* (MO); trail between Chiriquí and Quebrada Gutiérrez and eastern slopes of La Zorra, headwaters of Río Mali, *Kirkbride & Duke 717* (MO, NY); vicinity of Fortuna Dam, trail along continental divide, *McPherson 12283* (MO).—CHIRIQUÍ: road to Fortuna Dam, N of Gualaca, 22.7 mi beyond the bridge over Río Estí, *Antonio 2805* (MO); along road between Gualaca and the Fortuna dam site 7.9 mi beyond (NW of) los Planes de Hornito, *Antonio 4141* (MO, US, NY); vicinity of Gualaca, ca. 7.8 mi from Planes de Hornito, La Fortuna, on road to dam site, *Antonio 5205* (MEXU, MO, US); Cerro Colorado, Mina de Cobre, *Besse et al. 2409* (SEL, US); Fortuna Dam, along Quebrada Bonito to E of road, *Churchill et al. 4747* (MO, US), *Churchill et al. 4873* (MO, PMA-2 sheets); Dist. Gualaca, Corregimiento Hornito, Reserva Forestal Fortuna (Smithsonian Tropical Research Institute), trail to Toma de Agua, *Clark 8547* (AAU, CAS, COL, E, K, MO, NY, PMA, SCZ, SEL, UNA, US); Dist. Boquete, Parque Internacional La Amistad, SE slopes and summit of Cerro Pate Macho, trail from Río Palo Alto, 4 km NE of Boquete, *Clark 8716* (K, PMA, SCZ, SEL, UNA, US); road toward Finca Landau, NE of Fortuna camp (dam site), *Correa A. et al. 2129* (US); trail to Soledad, SW of encampment of Fortuna, environs of Finca Pitti, *Correa A. et al. 2194* (PMA); SW of Fortuna camp (Hornito), environs of Finca Pitti, *Correa A. et al. 2432* (US); SW of Fortuna camp, dam site, from Finca Pitti up to Filo del Cerro Fortuna, *Correa A. et al. 2718* (US); Palo Santo, 3 mi N of Volcán, *Croat 13572* (MO-2 sheets, NY); La Fortuna Hydroelectric Project, *Hammel 2020* (MO); NW side of Cerro Pando, *Croat 15917* (MO, SEL); 1 mi E of Cañas Gordas, near Costa Rica border on road to Volcán, *Croat 22314* (F, MO-2 sheets, NA); vicinity of Cerro Colorado Copper Mine, 28 mi above San Felix, 9–10 mi above turnoff to Escopéta, *Croat 33207* (MO, SCZ); along the road to the Fortuna Dam site, N of Gualaca, 22.7 mi beyond the bridge over the Río Estí, *Croat 48660* (MO); along road between Gualaca and the Fortuna dam site 7.9 mi beyond (NW of) los Planes de Hornito *Croat 49917* (MO, US); along road between Gualaca and Fortuna dam site, 10 mi NW of los Planes de Hornito, *Croat 50086* (MO, US); Gualaca–Chiriquí Grande, 0.3 mi N of continental divide, *Croat 74919* (MO); road from Nueva California and Río Serano, ca. 9 mi from Río Chiriquí Viejo, *D’Arcy et al. 12995* (MO); 2.5 km from Questa Piedra, along road to Río Monte, *Folsom 3985* (MO, NY, US); E of the Fortuna main campsite, *Folsom & Dressler 5313* (MO, US); Fortuna Hydroelectric Project, slopes of watershed, SE of dam, near Aoki camp, *Folsom et al. 8211* (US); Dist. San Felix, Camarca Gnobe Buglé, Km 10–16, between Hato Chamí and Hato Ratón, *Galdames et al. 4666* (PMA); valle superior del Río Chiriquí, *Gordón & Him 47* (MO, PMA); along Río Colorado, *Hamilton & Stockwell 3455* (MO, US); trail W from Fortuna Dam camp to La Fortuna, *Hampshire & Whitefoord 21* (BM, PMA, US); headwaters of Río Chevo, Finca Ojoda Agua, *Knapp 1439* (E, MO); forest behind Vivero Forestal, 9 km N of Los Planes de Hornito, IRHE Fortuna Hydroelectric Project, *Knapp & Hammel 4093* (MO, US-2 sheets); forest behind Vivero Forestal, 12 km N of Los Planes de Hornito, IRHE Fortuna Hydroelectric Project, *Knapp 4955* (MO, PMA, US); Fortuna Dam, above Gualaca, ca. 8 km past dam on road towards Chiriquí Grande, *McPherson 6681* (MO, PMA, US); E of Fortuna dam, *Mendoza 316* (US); Fortuna, Quebrada Arena, *Valdespino et al. 642* (PMA, US); Dist. Boquete, Fortuna dam site, *van der Werff & Hardevald 6636* (MO, US), *van der Werff & Hardevald 6895* (MO); Dist. Boquete, Fortuna dam site, trail following continental divide, *van der Werff & Hardevald 6710* (MO, US); Dist. Bugaba, Santa Clara, *van der Werff & Herrera 7090* (MO, US).—CHIRIQUÍ/BOCAS DEL TORO: Cordillera Central, trocha 3 de Noviembre, *Correa A. et al. 9841* (PMA, SCZ).—COCLÉ: Dist. La Pintada, Corregimiento El Arino, Parque Nacional Omar Torrijos, 6–7 km NNW from El Copé, main trail from visitor center to abandoned sawmill, *Clark 8622* (SCZ, SEL, UNA, US); near sawmill of El Copé, ca. 8 km N of El Copé, *Dressler 5684* (PMA, US); around Rivera Sawmill, 7 km N of El Copé, road to summit, *Folsom et al. 5698* (MO); above El Potroso sawmill at continental divide, *Sytsma 1793* (MO).—COLÓN: headwaters of Río Boquerón, near fork with Río Nombre de Diosito, *Hammel 3941* (MO).—PANAMÁ: Cerro Campana, *Allen 2412* (US); Sendero Cerro Campana, *Correa A. & Montenegro 10051* (PMA); near summit of Cerro Campana, *Croat 22813* (MO, NA, NY-2 sheets); Cerro Campana, trail to summit, *Croat 25241* (MO, US); Cerro Campana area, above Motel Su Lin, *Dwyer & Kirkbride 7841* (COL, F, GH, K, MO, NY, PMA, UC, US); Dist. Capira, Cerro Campana, *Galdames et al. 1820* (PMA, SCZ); Cerro Campana, *Hamilton et al. 1160* (MO, US); Cerro Campana, trail to summit, *Hammel 3774* (MO, US); trail to Cerro Campana, Finca Collin, *Kirkbride & Hayden 280* (MO-2 sheets, SCZ, NY); Parque Nacional Cerro Campana, 2 km N of Hwy 707, *Stein & Hamilton 1094* (MO); Cerro Campana, trail leading to cross, *Sytsma 2925* (MO, US); Cerro Campana area, summit and upper area, *Witherspoon & Witherspoon 8451* (MO, PMA, US).—VERAGUAS: Río Segundo Braso, 8 km beyond Escuela Agrícola, Alto Piedra, beyond Santa Fé, *Croat 25545* (MO, PMA, SEL); Valley of Río Dos Bocas, along road between Escuela Agrícola Alto Piedra and Calovebora, 15.6 km NW of Santa Fé, *Croat 27687* (MO); environs of Escuela Alto de Piedras, ca. 5 mi beyond Sta. Fé on road to Calovebora, *D’Arcy 15033* (MO); 15–20 km NW of Santa Fé, between Escuela Agrícola Alto Piedra & continental divide, *Dressler 4726* (F, MO, PMA, SEL); near Santa Fé, *Dunn 9907084* (BM, COL, CR, MEXU, MO, US); base of Cerro Tuti, 6.5 km outside of Santa Fé,

Folsom 3012 (MO-2 sheets, NY, US); along road between Santa Fé and Río Calovebora, 1.8 mi beyond Escuela Agrícola Alto Piedra, *Folsom & Croat 34259* (MO); Dist. Santa Fé, environs of Río Primer Brazo de Ulabá, *Galdames et al. 3126* (PMA, US); Dist. Santa Fé, environs of Río Primer Brazo de Ulabá *Galdames et al. 3153* (COL, PMA, US); 4–5 mi N of Santa Fé, *Gentry 2980* (MO); past Escuela Agrícola on road to Calovebora, *Hamilton et al. 1270* (MO, US); 2–5 km NW of Santa Fé on road to Río Calovebora, *Hernández et al. 751* (BM, MO, US); Río Segundo Brazo, *Maas & Dressler 1675* (SEL, U); NW of Santa Fé, 2.7 km from Escuela Agrícola Alto de Piedra, on road to Calovebora, *Mori & Kallunki 5342* (MO, US); NW of Santa Fé, 8.8 km from Escuela Agrícola Alto de Piedra, Pacific slope, *Mori & Kallunki 6188* (AAU, MO, US).

Colombia. DEPARTMENT UNKNOWN: Zarcando *Goudot s.n.* (P).—ANTIOQUIA: Parque Nacional Natural Las Orquídeas, sector Venados, margen derecha del Río Venados, *Cogollo et al. 2976* (COL); Parque Nacional Natural Las Orquídeas, road from Calles towards Venados, Quebrada La Crespa, *Cogollo et al. 3972* (COL); Mpio. Frontino, environs of Venados, Parque Nacional Natural las Orquídeas, La Gurrucha, *Pipoly et al. 18470* (MO, NY, US).—CAUCA: *von Sneidern 477* (S).—CHOCÓ: Barbacoas, *Triana 4163* (BM).—HUILA: *von Sneidern 2638* (S); *von Sneidern 2639* (S).—NARIÑO: La Planada Natural Reserve, Ricaurte, *Restrepo 790* (US).—VALLE DEL CAUCA: along old road between Cali and Buenaventura, 28 km beyond junction with hwy, 20 km W of Villate Borrero Ayerbe and 7 km W of El Salado, *Croat 38628* (MO); western slopes of the Cordillera Occidental, Río Digua, tributary of Río San Juan, above Queremal, Las Colonias, *Cuatrecasas 23895* (F); Río Bravo, NW of Darién, *Robinson 67* (K, US); Alta Flor, Calima Gorge, *Robinson 403* (K, US).

Glossoloma tetragonum is distinguished by its unfolded and plane calyx lobes with a serrate margin. The similar and partly sympatric *G. cucullatum* has hooded or cucullate calyx lobes. The ranges of these two species overlap only in northern Costa Rica.

Glossoloma tetragonum is morphologically diverse. The calyx lobes range from oblong to ovate (Fig. 40B, E). The leaves vary from uniformly green to green with a reddish tinge to uniformly red. A few populations of *G. tetragonum* are distinctive and may merit subspecies delineation upon further study. A population (3–5 collections) on the Pacific slopes of the Cordillera de Guanacaste in northwestern Costa Rica is distinctive in having narrowly oblong calyx lobes. Initially, this seemed to be a consistent character for populations of this region, but there is a gradation between narrowly oblong to ovate calyx lobes within some populations and sometimes within individuals. For example, *Herrera 1434* (US) from the Volcán Santa María in the Parque Rincón de La Vieja has both narrowly oblong and ovate calyx lobes on the same individual. Another population (3+ collections) from Antioquia, Colombia, has uniformly red leaves that are narrowly oblong and calyx margins that are entire. A third population (10+ collections) from Veraguas in Panama has narrowly oblong leaves that are uniformly green abaxially and green calyces. Since these characters are usually variable over the full range, the populations noted here are not separated taxonomically.

Hanstein (1854) published *Glossoloma* as a new genus, containing one species, *G. tetragonum*, in the first part of his account of the family Gesneriaceae; in synonymy he cited the unpublished name *Nematanthus tetragonus* Oerst. and provided an accompanying illustration of two flowers. In a subsequent detailed treatment of the tribe Beslerieae, Hanstein (1865) transferred this species to *Alloplectus*; from his remarks it is evident that at the time that he published *Glossoloma*, he relied on Oersted's unpublished manuscript from which he drew the brief description in the protologue and copied the images of the two flowers. Oersted's description and plate were based on one of his collections from Costa Rica, *Oersted 9275* (now at C), which is therefore the holotype. Although Hanstein is usually credited with the genus *Glossoloma*, the species *G. tetragonum* has been attributed to Oersted on herbarium labels and by some authors (Wiehler 1973; Skog 1979), including Hanstein (1865) when he proposed the combination *Alloplectus tetragonus*. Oersted (1861) indeed provided the first full description for the species; however, according to

Article 42.1 of the Code (McNeill et al. 2006) the names of a genus and a species are validly published simultaneously, if the genus is at that time monotypic.

EXCLUDED NAME

Besleria solitaria C. V. Morton ex Espinosa, Gesneriaceae in *Estudios Botánicos en el Sur del Ecuador* 2: 76. 1949 [Herbarium Universitatis Loxensis, Loja, Ecuador], nomen nudum [*Glossoloma altescandens*].

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| 7. <i>G. chrysanthum</i> | 21. <i>G. scandens</i> |
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| 11. <i>G. herthae</i> | 25. <i>G. subglabrum</i> |
| 12. <i>G. ichthyoderma</i> | 26. <i>G. tetragonoides</i> |
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