

Novelties in *Cynanchum* L., sensu Woodson, in Mesoamerica

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ABSTRACT. Eleven species and one genus from Mesoamerica are described as new and four new combinations are provided for taxa previously included in *Cynanchum* (Apocynaceae, Asclepiadoideae) from Mesoamerica. *Liedea* is newly described to accommodate *L. filisepala*. *Cynanchum surrubriflorum*, *Metastelma brachymischum*, *M. thalamosiphon*, *M. thysanotum*, *M. triodontum*, *M. yucatanense*, *Orthosia cynanchoides*, *O. extra-axillaris*, *O. ramosa*, *O. smaragdina*, and *O. stipitata* are described. Combinations are provided for *Orthosia glaberrima*, *O. misera*, and *O. rubens*.

Key words: Apocynaceae, Asclepiadoideae, *Cynanchum*, *Liedea*, *Metastelma*, *Orthosia*, Mesoamerica.

Fishbein and Stevens (2005 this issue) discuss the rationale and consequences of the disarticulation of Woodson's (1941) concept of New World *Cynanchum* L. Although the process is now well under way, there are still many uncertainties in the generic circumscriptions. In providing names for an upcoming volume of *Flora Mesoamericana*, I mirror the approach of Rapini (2002) for South American taxa, in gradually realigning the species into genera that better reflect our current understanding of relationships but without breaking the bonds of traditional morphology.

***Cynanchum* L.**, Sp. Pl. 1: 212. 1753. TYPE: *Cynanchum acutum* L.

It now seems clear that, in the New World, *Cynanchum* is represented only by *Cynanchum* subgen. *Mellichampia* Woodson (e.g., Rapini et al., 2003), a group of about 15 species ranging through North and South America. This new species fits easily into that group.

1. *Cynanchum surrubriflorum* W. D. Stevens, sp. nov. TYPE: Mexico. Tabasco: Macuspana, Falda del Cerro de Macuspana, al E de la planta de Cal, Km 2.2 de la carretera, 75 m, 17 June 1979, C. Cowan 2326 (holotype, MO; isotypes MO, TEX). Figure 1.

Cynancho jaliscano affinis sed antheris angustioribus alis brevioribus caudiculis brevioribus differt.

Twining vines, lower stems and base unknown, latex white; young stems tomentulose at the nodes and in 1 line on the internodes, trichomes 0.1–0.2 mm long, recurved, ferrugineous, internodes 8–9 cm. Leaves opposite, apparently without pseudostipules, blades ovate, 8.4–12.5 × 4.6–5.8 cm, apex acuminate, base shallowly lobate, sinus to 0.6 mm deep, glabrous or with a few scattered trichomes on the veins, lateral nerves 4 or 5 pairs, middle veins 40°–50° to midrib, colleter 3 to 5; petioles 4.5–6.1 cm, tomentulose on adaxial surface. Inflorescence extra-axillary, 1 per node, racemiform, many-flowered, tomentulose on 1 side, peduncle 1.2–5.4 cm, axis to 5 cm, pedicel 6.8–8 mm, bracts 0.4–1.5 × 0.2–0.5 mm, deltate to lanceolate; calyx with 1 colleter below each sinus within, lobes elliptic with obtuse tips, 1.7–2.3 × 0.6–1 mm, glabrous or inconspicuously tomentulose at base abaxially, ciliolate, trichomes ca. 0.2 mm long, glabrous inside, green with a purple tint; flower buds conical, somewhat apiculate; corolla rotate or slightly campanulate, glabrous, white with a pink tint, tube 0.2–0.6 mm long, lobes lanceolate, with 2 submarginal fleshy ridges, tips rounded, nearly truncate, erect then spreading from above the middle, 3.1–5 × 1.3–1.7 mm; gynostegium with stipe 0.3–0.4 mm long (from base to inflated anther back), ribbed, corona borne at base of stipe, tube 0.2–0.4 mm long, the 5 free lobes laminar, trilobulate, 4–5.2 mm long, body of each lobe elliptic, 1.6–2 × 0.8–1.3 mm, lateral lobules ca. 0.4 mm long, central lobule narrowly deltate, nearly linear, twisted, terminal anther appendages ovate-retuse, 0.5–0.7 × 0.8–0.9 mm, inclined toward style apex, white, anthers T-shaped in outline, 0.8–1 × 1 mm, guide rails rounded, vertical, ca. 0.2 mm long; pollinaria pendent, corpusculum 0.1–0.19 × 0.11–0.13 mm, ellipsoid or subsagittate, dark red-brown, translators 0.31–0.33 × 0.06 mm, horizontal, slightly flattened, slightly geniculate, red-brown, pollinia 0.73–0.74 × 0.15–0.21 mm, narrowly ob-ovoid; style apex 1.5–1.8 mm wide, slightly convex, densely papillate. Follicles and seeds unknown.



Figure 1. *Cynanchum surrubriflorum* W. D. Stevens. Photograph of branch and opened flower of Cowan 2326 (holotype, MO).

This new species is most closely related to *Cynanchum jaliscanum* (Vail) Woodson, with which it shares a stipitate gynostegium, short guide rails, and long, horizontal, pigmented translators. When Sundell (1981) treated *Cynanchum jaliscanum*, there were available for study only the three orig-

inal syntype collections from Mexico, two from Jalisco and one from Veracruz, and one additional collection from Nayarit. There are now 16 collections available, not counting the Veracruz collection, and all range from Nayarit to Michoacán at 770–1400 m elevation, making the Veracruz collection, *Botteri*

s.n., relatively more anomalous than it might have seemed to Sundell. On closer examination, the Veracruz collection, with the ambiguous locality "Orizaba," generally matches a collection from lowland Tabasco, the type designated here for *Cynanchum surrubriflorum*. In addition to the difference in elevation, as far as known, and obvious geographical distinction, and it is rare for non-weedy milkweeds to occur on both sides of Mexico, *Cynanchum surrubriflorum* differs from *C. jaliscanum* in its shorter corolla tube, 0.2–0.6 mm versus 0.6–2 mm, shorter gynostegium stipe, 0.3–0.4 mm versus 0.4–0.8 mm, narrower corona lobes, 0.8–1.3 mm versus 1.3–1.9 mm, narrower anthers, 1.0 mm versus 1.3–1.9 mm, shorter guide rails, 0.2 mm versus 0.3–0.5 mm, and shorter translators, 0.31–0.33 mm versus 0.53–0.64 mm. While most of the differences are not individually dramatic, the totality suggests recognition of the east coast lowland species as distinct from the west coast upland species, *Cynanchum jaliscanum*, and the two are relatively easily distinguished from the other species of *Cynanchum*.

Paratype. MEXICO. **Veracruz:** Orizaba, 1850–1874. *M. Botteri s.n.* (GH, NY).

Liedea W. D. Stevens, gen. nov. TYPE: *Liedea filisepala* (Standley) W. D. Stevens.

A *Cynancho* sect. *Microphyllum* Liede inflorescentiis pedunculatis paniculiformibus caulibus aequabiliter pubescentibus recedit.

Twining perennial vines with sympodial branching, apparently woody but not corky below, latex white; stems uniformly pubescent with multicellular trichomes of uniform length. Leaves opposite, without pseudostipules, small, ovate, petiolate. Inflorescence extra-axillary, 1 per node, pedunculate, cymose, fundamentally paniculiform but with some axes reduced to produce apparently racemiform inflorescences with 4 flowers and 1 axis per inflorescence node or all axes reduced and nearly umbelliform. Calyx connate at base, with colleters below sinuses within; corolla campanulate, glabrous within, aestivation imbricate and dextrorse; gynostegium short-stipitate, corona borne on gynostegium stipe, laminar, connate below, briefly 5- or 10-lobed distally; anther connectives dorsally thickened and convex, terminal appendages appressed to style apex; pollinia pendent, uniformly fertile, translators delicate, round in section, without appendages, corpuscula triangular in outline; style apex shallowly convex, smooth. Follicles apparently single, fusiform, symmetrical, thin-walled, smooth; seeds elongate, cucullate, with an entire wing, surface smooth, comose.

1. **Liedea filisepala** (Standley) W. D. Stevens, comb. nov. Basionym: *Metastelma filisepalum* Standley, Publ. Field Mus. Nat. Hist., Bot. Ser. 18: 956. 1938. *Cynanchum filisepalum* (Standley) L. O. Williams, Fieldiana, Bot. 32: 36. 1968. TYPE: Costa Rica. Alajuela: entre San Ramón y La Palma de San Ramón, 30 June 1928, A. Brenes 6179 (holotype, F).

Liede (1997) placed *Cynanchum filisepalum*, from Costa Rica and Ecuador, in *Cynanchum* sect. *Microphyllum* Liede, along with nine high-altitude northern Andean species. This section was defined primarily by the "dichasial" branching pattern, unbearded corollas, and single follicles. The molecular study of Liede and Täuber (2002) suggests that Woodson's (1941) concept of New World *Cynanchum* is untenable and that *Cynanchum* sect. *Microphyllum* can no longer be included in the current concept of the genus *Cynanchum*. At the generic level, the name available for *Cynanchum* sect. *Microphyllum* is *Scyphostelma* Baillon (Liede & Meve, 2004). However, it seems clear to this author that *Cynanchum filisepalum* does not belong with the other nine species in *Scyphostelma* and *Liedea* is here described as new with but one species, although the generic description is prepared to accommodate several apparently undescribed species from northern South America.

The sympodial branching pattern of *Liedea*, and the remaining species of *Cynanchum* sect. *Microphyllum*, is shared with many species of the related genera *Ditassa* R. Brown, *Orthosia* Decaisne, *Stenomeria* Turczaninow, and *Tassadia* Decaisne. This branching pattern is characterized by twining, indeterminate, more or less sterile shoots with long internodes and more or less non-twining, determinate, fertile, lateral branches with short internodes and distichous leaves; in the extreme, especially in *Stenomeria* and *Tassadia*, the lateral branches become leafless and appear to be inflorescences. *Liedea* differs from the remainder of *Cynanchum* sect. *Microphyllum* in inflorescence structure, stem indumentum, and habit. The other nine species have sessile, fasciculate inflorescences, while those of *Liedea* are pedunculate and paniculiform. The typical milkweed racemiform inflorescence, as for example in *Cynanchum* sect. *Mellichampia* Sundell, has two flowers and one continuing axis at each node, while a paniculiform inflorescence has one flower and two axes, or even three axes and no flowers, at each node. *Liedea* has three or four flowers and one axis at each node, but on close examination one or two of the flowers are borne on reduced axes; thus it is a paniculiform inflores-

cence with the general appearance of a racemiform one. *Liedea* has stems that are uniformly pubescent, while the species of *Cynanchum* sect. *Microphyllum* that I have been able to examine have the indumentum confined to one or two lines. *Liedea filisepala* seems to be a high-climbing liana in cloud forest at 1000–1500 m in Costa Rica (e.g., *A. Skutch* 3165, MO), Panama (e.g., *N. Hensold* 1018, MO), and Ecuador (e.g., *A. Gentry* & *G. Shupp* 26377, MO), while the other species of *Cynanchum* sect. *Microphyllum* seem to be low herbs or shrubs in open vegetation at 2300–4200 m in the northern Andes from Venezuela to Peru.

Metastelma R. Brown, *Asclepiadeae* 41. 1810.
TYPE: *Metastelma parviflorum* (Swartz) R. Brown ex Schultes.

Metastelma, as represented by the type, is relatively easily circumscribed in North America, Central America, the Caribbean, and northern South America, and has been accepted in most modern floristic treatments. The inclusion of a disjunct group of species from southern South America, however, is more problematical and has led some authors, e.g., Rapini (2002), Rapini et al. (2003), and Liede-Schumann et al. (2005), to question the genus as a whole. Five new species of *Metastelma* in the sense of the type species are described below.

1. *Metastelma brachymischum* W. D. Stevens, sp. nov. TYPE: Mexico, Chiapas: El Sumidero, 22 km N of Tuxtla Gutiérrez, 1350 m, 19 Aug. 1972, *D. Breedlove* 27183 (holotype, MO). Figure 2.

A speciebus *Metastelmatis* stipitibus brevibus et coronis laminaribus terminalibus haec lobis coronae integris trichomatibus corollae longioribus inflorescentiae brevioribus distinguenda.

Twining vines, woody and corky below, cork brown, latex unknown, underground parts unknown; young stems puberulent on 1 side with recurved white trichomes 0.1–0.2 mm long, internodes 1–3 cm. Leaves opposite, without pseudostipules, blades elliptic to ovate, 2.3–4.1 × 0.7–1.2 cm, apex acute to acuminate, apiculate, base obtuse to rounded, adaxially glabrous except inconspicuously puberulent on midrib and margin, abaxially glabrous, lateral nerves 10 to 12 pairs, middle veins 40–45° to midrib, collaters 0 to 2; petioles 2–4 mm, puberulent on adaxial margin. Inflorescence extra-axillary, 1 per node, sometimes aggregated on short leafless shoots, congested-racemiform, 10- to 20-flowered, peduncle 0.5–1 mm,

puberulent on 1 side, axis to 3 mm, thickened by a tight spiral of pedicel bases, pedicel 0.5–1 mm, puberulent on 1 side, sulcate when dry, bracts 0.2–0.4 × 0.1–0.3 mm, ovate; calyx with 1 colleter below each sinus within, lobes ovate with rounded tips, 0.7–0.8 × 0.6–0.7 mm, puberulent at base abaxially, ciliolate, glabrous inside, green to purple with scarious margins; corolla campanulate, white, tube 0.8–1 mm long, glabrous, lobes lanceolate with acute tips, erect, 1.7–1.8 × 0.9–1 mm, abaxially glabrous, adaxially with marginal trichomes erect, white, unicellular, 0.3–0.5 mm long distally, becoming 0.15–0.2 mm long proximally, not reaching base of lobes, and with center trichomes dense, retrorse, translucent, unicellular, 0.25–0.35 mm long; gynostegium with stipe 0.4–0.5 × 0.5–0.7 mm, broadly winged, corona lobes borne at or near top of stipe, lanceolate with attenuate tips, laminar, loosely appressed to anthers and meeting over style apex, free part 0.8–1 × 0.2–0.4 mm, terminal anther appendages ovate, 0.3–0.35 × 0.3–0.4 mm, erect or inclined toward style apex, white, anthers quadrate in outline, 0.3–0.4 × 0.5–0.55 mm, guide rails straight, at ca. 45° to gynostegium axis, salient at base, ca. 0.25 mm long; pollinaria pendent, corpusculum 0.17–0.19 × 0.06–0.07 mm, obovoid, pale brown, translators 0.06–0.09 mm, flattened, bent at middle, pollinia 0.17–0.19 × 0.07–0.09 mm, obovoid with a narrow neck; style apex 0.6–0.8 mm wide, strongly convex, ca. twice the height of corpuscula. Follicles and seeds unknown.

Metastelma brachymischum is not obviously related to any other species in the genus. It shares the general shape of the pollinaria and corona with the rather polymorphic and widespread *Metastelma schlechtendalii* Decaisne, but that species has a proportionally shorter corolla tube (about a quarter of the total corolla length vs. about half), corolla lobes with a pair of submarginal fleshy ridges, shorter corolla trichomes (center trichomes 0.05–0.12 mm vs. 0.25–0.35 mm), a nearly flat style apex, and longer inflorescences (1–15 mm vs. 1–3 mm), among other characters. The guide rails of this new species are similar to those of *Metastelma chiapense* A. Gray, *M. liesnerianum* (L. O. Williams) Liede, *M. longicoronatum* (L. O. Williams) Liede, and *M. thalamosiphon* W. D. Stevens, described below, but each of those species is different in a variety of characters. Liede and Meve (2004) cite a duplicate of the holotype of *Metastelma brachymischum*, *Breedlove* 27183 (TEX), under *Metastelma longicoronatum*, which is also endemic to Chiapas at similar elevations, but that species has 3-lobulate rather than entire corona lobes, a rare char-

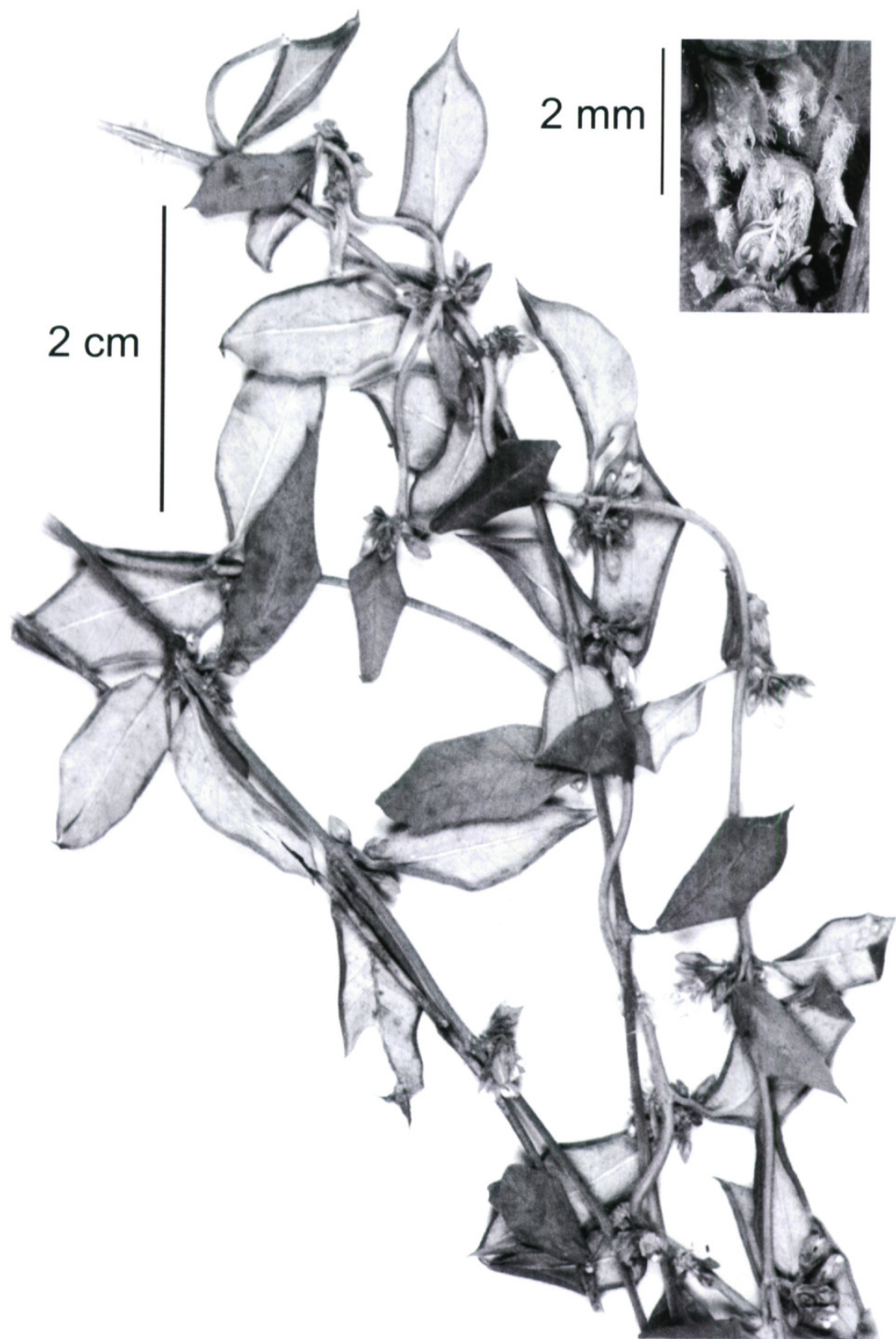


Figure 2. *Metastelma brachymischum* W. D. Stevens. Photograph of branch and opened flower of *Breedlove 14010* (F).

acter shared only with *Metastelma triodontum* (described below) among North and Central American species of *Metastelma*, in addition to other differences; perhaps the Breedlove collection is mixed. The same authors cite a duplicate of the paratype,

Breedlove 14010 (TEX), as *Metastelma barbigerum* var. *liesnerianum* (L. O. Williams) Liede & Meve, but that concept is described below as *M. thalamosiphon*.

Metastelma brachymischum has been collected

only in the vicinity of El Sumidero, in seasonal evergreen forest on limestone, at 1200–1350 m elevation, and flowering in August and October.

Paratype. MEXICO. **Chiapas:** 17 km N of Tuxtla Gutiérrez along road to El Sumidero, *D. Breedlove 14010* (F).

2. *Metastelma thalamosiphon* W. D. Stevens, sp. nov. TYPE: Belize. Western Hwy., 12.5 mi. W of Belize, 10 Aug. 1970, *J. Wiley 193* (holotype, MO). Figure 3.

A *Metastelmate liesneriano* trichomatibus marginalibus albis loborum corollae longitudine trichomatibus medianis translucidis aequantes et lobis coronae basi adnatis corollae recedit.

Twining vines, woody and corky below, cork pale brown, latex white, roots fibrous; young stems puberulent in a broad band, sometimes with a thin line of trichomes on opposite side, trichomes white, recurved, 0.2–0.4 mm long, internodes 0.5–5 cm. Leaves opposite, without pseudostipules, blades mostly elliptic, sometimes somewhat ovate or obovate, 1.9–3.7 × 0.8–1.3 cm, apex acute to rounded or emarginate, apiculate, base obtuse to rounded or rarely subcordate, adaxially sparsely puberulent on midrib and margin, abaxially glabrous, lateral nerves 6 to 10 pairs, middle veins 30°–65° to midrib, colleters 0 to 4; petioles 2.2–4 mm, puberulent on adaxial margin. Inflorescence extra-axillary, 1 per node or sometimes with a subsidiary inflorescence on a short axillary shoot, congested-racemiform or more commonly congested-paniculiform, 5- to 14-flowered, peduncle 0–1.6 mm, puberulent in 1 line, axis to 1 mm, pedicel 1–2.2 mm, glabrous to sparsely puberulent, in 1 line or generally, bracts 0.25–0.5 × 0.2–0.3 mm, ovate; calyx with 0 to 2 colleters below each sinus within, lobes ovate with rounded tips, 0.9–1.2 × 0.6–0.9 mm, sparsely puberulent abaxially, especially at base, glabrous adaxially, green to purple with scarious margins; corolla campanulate, white or tinted pink outside, tube 0.8–1 mm long, glabrous, lobes lanceolate with acute tips, erect or tips somewhat reflexed, 2–2.3 × 0.8–1 mm, abaxially glabrous, adaxially with marginal trichomes erect, white, unicellular, 0.3–0.4 mm long, covering the distal third to three-quarters of the margin, and with center trichomes erect or retrorse, translucent, unicellular, 0.2–0.4 mm long, covering the distal half to the entire center of the lobes; gynostegium with stipe 0.2–0.4 × 0.6–0.7 mm, ovoid, corona lobe bases covering the length of the stipe, corona lobes acicular with broad, keeled bases adnate to the corolla tube up to nearly the same height as the attachment to the stipe, tips acute, erect or somewhat recurved, free

part 0.8–1 × 0.15–0.2 mm, slightly exceeding style apex, terminal anther appendages ovate, 0.3–0.4 × 0.2–0.35 mm, erect or somewhat inclined over style apex, white, anthers quadrate to trapezoidal, 0.3–0.5 × 0.4–0.65 mm, guide rails straight, salient at base, 0.25–0.3 mm long; pollinaria pendent, corpusculum 0.15–0.19 × 0.08–0.1 mm, subsagittate, pale brown, translators 0.06–0.09 mm, thin, round in cross section, somewhat geniculate, pollinia 0.19–0.23 × 0.07–0.1 mm, narrowly obovoid, proximally thin and sterile; style apex 0.5–0.6 mm wide, shallowly conical. Follicle 1, fusiform-attenuate, 4.2–6 × 0.2–0.3 cm, glabrous, seeds ca. 18; seeds obovate, cucullate, ca. 3.8 × 1.8 mm, reddish brown, margin 0.1–0.2 mm, irregularly dentate on distal third, concave side tuberculate, convex side sparsely tuberculate near margin, coma 1.5–2 cm, tawny.

Liede and Meve (2004) described and provided an excellent illustration of this new species as *Metastelma barbigerum* var. *liesnerianum* (L. O. Williams) Liede & Meve. *Metastelma liesnerianum* (L. O. Williams) Liede, as I recognize the taxon, was originally based upon a single collection from Guanacaste, Costa Rica, and apparently Liede and Meve saw only a photograph of the type and no other Costa Rican material and based their description and illustration on material from Belize and southern Mexico. I have now studied seven additional collections of *Metastelma liesnerianum*, all from Guanacaste, and find that it is amply distinct from the plants from Belize and southern Mexico. Notwithstanding the highly unlikely disjunction, spanning the well-collected countries of Nicaragua, El Salvador, Honduras, and Guatemala, the characters distinguishing the two species, or for that matter almost any species of *Metastelma*, are not particularly visible on photographs. The most readily obvious difference between the two species is in the corolla lobe pubescence; *Metastelma liesnerianum* has the white, marginal trichomes of the corolla 0.05–0.1 mm long and the central, translucent trichomes 0.4–0.5 mm long, distinctly contrasting in length, while in *M. thalamosiphon* the marginal trichomes are 0.3–0.4 mm long and the medial trichomes are 0.2–0.4 mm long, the central trichomes always equal to or shorter than the marginal trichomes and more or less concealed by them. Somewhat less obvious, but even more compelling, the corona lobes of *Metastelma thalamosiphon* are broadly keeled at the base, with the keels adnate to the corolla tube; the broad bases of the corona lobes, adnate to about the same level on the stipe and the corolla tube partition the corolla tube into

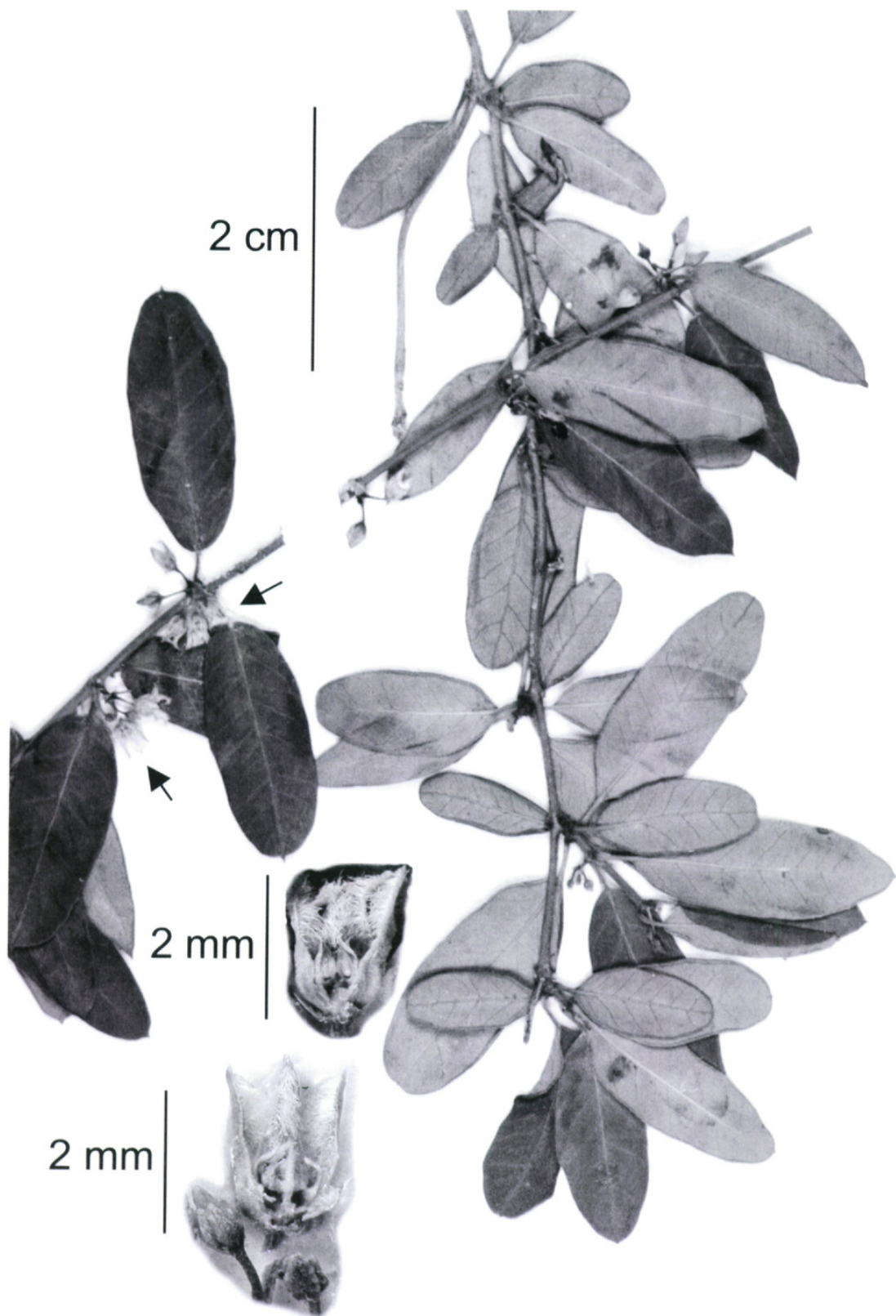


Figure 3. *Metastelma thamosiphon* W. D. Stevens. Photograph of branches and opened flowers of *Cabrera & Cabrera 11860* (MO).

5 chambers (see Liede & Meve, 2004, p. 44, fig. 4-e'). In *Metastelma liesnerianum* the corona lobes are entirely free from the corolla and the corolla tube is not chambered.

Metastelma thamosiphon grows in seasonally inundated savannas at 0 to 220 m elevation. It has been most commonly collected in Belize and adjacent Mexico. Twelve additional collections cited

by Liede and Meve (2004) under *Metastelma barbigerrum* var. *liesnerianum*, not examined in this study, may be found to pertain to this species and provide the logical addition of Petén, Guatemala, to the range. The species seems to flower throughout the year.

Paratypes. MEXICO. **Campeche:** 6 km al E de Silvictuc sobre la carr. Francisco Escárcega–Chetumal, *E. Cabrera C. & H. de Cabrera 10964* (MO); 8 km al SE de Conhuas sobre el camino al Centro Ceremonial de Calakmul, *E. Cabrera C. & H. de Cabrera 11860* (MO); 10 km al SE de Sabancuy sobre el camino Escárcega–Ciudad del Carmen, *E. Cabrera C. & H. de Cabrera 11869* (MO); Km 29, al S de la entrada a Calakmul, *E. Madrid N., E. Lira, E. Martínez S., D. Alvarez M. & S. Ramírez A. 531* (MO); 9 km al SE de Dos Naciones, camino a El Civalito, *E. Martínez S., D. Alvarez M. & S. Ramírez A. 31430* (MO); Km 31 de Calakmul, *E. Martínez S., D. Alvarez M. & S. Ramírez A. 31681* (MO). **Chiapas:** W of Catazaja on road to Villahermosa, *D. Breedlove & G. Davidse 55307* (MO); Aguacate, *E. Matuda 3765* (F). **Tabasco:** 17 km al NE de Ciudad del Carmen sobre la carr. a Champotón, Isla del Carmen, *E. Cabrera C. & H. de Cabrera 15072* (F, MO). **Quintana Roo:** 20 km al NO de Felipe Carillo Puerto sobre el camino a Vigía Chico, *E. Cabrera C. & H. de Cabrera 4040* (MO). **Yucatan:** 3 km al O de Tabí sobre el camino Yaxcabá–Sotuta, *E. Cabrera C. & H. de Cabrera 10737* (MO). BELIZE. Salt Creek Estate, Mi. 18 Northern Hwy., *L. Dieckman 153a* (MO); Hattieville, *J. Dwyer 10402* (MO), *J. Dwyer & R. Pippen 10093* (MO); 12.5 mi. NW of Belize, Northern Hwy., *J. Dwyer 10706* (F, MO); Mi. 11, Northern Hwy., *J. Dwyer 10937* (MO), *A. Gentry 7640* (MO); Mi. 19, Northern Hwy., *J. Dwyer & R. Liesner 12011* (F, MO); Mi. 5 3/4 Northern Hwy., *J. Dwyer 12774* (MO, NY); Baumgartner's Ridge Lagoon Plantation, Mi. 11 1/2 Northern Hwy., *J. Dwyer 13074* (MO); Hector Creek, *P. Gentle 1508* (MO, NY); 12 mi. W of Belize, *S. McDaniel 13082* (MO); 1 mi. W of jct. w/ road to Ferguson Bank, 8 mi. E of Hattieville, along Hector Creek Road, *P. Sorensen 7081* (F, MO); 1–2 mi. S of Gales Point, *G. Proctor 36545* (MO); along New Northern Hwy. at jct. w/ road to Crooked Tree, *R. Worthington 24077* (MO).

3. *Metastelma thysanotum* W. D. Stevens, sp. nov. TYPE: El Salvador. Ahuachapán: San Benito, en el bautizadero, 850 m, 26 July 1995, *M. Sandoval & E. Sandoval 96* (holotype, MO; isotypes, B, EAP, LAGU). Figure 4.

Species haec *Metastelmati sepicola* indumento corollae similis, a *M. pedunculare* forma loborum coronae similis, ab utroque lobis coronae longioribus distincta.

Twining vines, woody and corky below, cork pale brown, latex white, underground parts unknown; young stems glabrous or internodes with a thin line of recurved white trichomes ca. 0.1 mm long, internodes 2–11 cm. Leaves opposite, without pseudostipules, blades lanceolate to elliptic, 2.1–6.2 × 0.6–1.6 cm, apex acute to attenuate, apiculate, base acute to rounded, adaxially glabrous or sparsely puberulent on midrib and margin, abaxi-

ally glabrous, lateral nerves 11 to 15 pairs, middle veins 40°–55° to midrib, colleters 0 to 2; petioles 3.5–10 mm, puberulent on adaxial margin. Inflorescence extra-axillary, 1 per node or sometimes with a subsidiary inflorescence on a short axillary shoot, congested-racemiform, 4- to 20-flowered, peduncle 5–16 mm, glabrous or puberulent in 1 line, axis to 3 mm, thickened, pedicel 1.5–3.5 mm, glabrous or puberulent in 1 line, bracts 0.35–0.6 × ca. 0.3 mm, deltate; calyx with 1 colleter below each sinus within, lobes ovate with rounded tips, 0.6–0.9 × 0.3–0.6 mm, sparsely puberulent abaxially, glabrous adaxially, green to purple with scarious margins; corolla campanulate, white to pale yellowish green, tube 0.7–1 mm long, somewhat saccate below lobes, glabrous, lobes ovate with acute tips, erect, 0.8–1.3 × 0.4–0.8 mm, with 2 submarginal fleshy ridges, abaxially glabrous, adaxially with a thin, submarginal line of erect, white, unicellular trichomes 0.05–0.1 mm long, center and immediate margins of lobes glabrous; gynostegium with stipe 0.5–0.6 × 0.3–0.5 mm, narrowly winged, corona lobes borne at top of stipe, ligulate with rounded tips, keeled at the base, appressed to anthers and arching over top of style, tips overlapping above style apex, free part 0.5–0.7 × 0.1–0.2 mm, terminal anther appendages nearly circular, 0.15–0.25 mm diam., appressed to margin of style apex, white, anthers rectangular, 0.18–0.25 × 0.35–0.55 mm, guide rails rounded, widest at center, 0.13–0.25 mm long; pollinaria pendent, corpusculum 0.07–0.13 × 0.04–0.05 mm, ellipsoid, pale brown, translators 0.05–0.08 mm, thin, round in cross section, strongly sigmoid, pollinia 0.12–0.15 × 0.05–0.08 mm, narrowly obovoid, proximally thin and sterile; style apex 0.5–0.7 mm wide, slightly umbonate in center. Follicle 1, fusiform-attenuate, ca. 4.7 × 0.5 cm, glabrous; seeds unknown.

This new species was treated as “*Metastelma* sp. B” in *Flora de Nicaragua* (Stevens et al., 2001). Liede and Meve (2004) placed *Metastelma sepicola* Pittier, endemic to Costa Rica, into the synonymy of *M. pedunculare* Decaisne, endemic to Guatemala, stating that the two “show no constant differing characters.” They also studied one of the paratypes of *Metastelma thysanotum*, *Molina 23080*, and while noting some differences, decided that more material was needed to make a decision. As recognized here, *Metastelma sepicola* consistently differs from *M. pedunculare* in having the inner face of the corolla lobes with a thin line of submarginal, erect, white trichomes (“verrucose trichomes” of Liede & Meve, 2004, p. 34) while the center of the



Figure 4. *Metastelma thysanotum* W. D. Stevens. Photograph of branch and opened flower of Sandoval & Román 1365 (MO).

lobes are glabrous and *M. pedunculare* has no sub-marginal line of trichomes, but the center of the lobes are covered with retrorse, nearly translucent trichomes (“smooth, hispid, downwardly directed trichomes” of Liede & Meve, 2004, p. 34). Furthermore, the corona lobes of *Metastelma sepicola*

are markedly spatulate, much broader at the tip, while those of *M. pedunculare* are ligulate or even slightly narrowed at the tip. *Metastelma thysanotum* has exactly the corolla indumentum of *M. sepicola*, but the corona lobes are ligulate, as in *M. pedunculare*. However, both *Metastelma sepicola* and *M.*

pedunculare have corona lobes that are shorter than to nearly equaling the level of the style apex, while in *M. thysanotum* the corona lobes are longer than, loosely appressed to, and more or less reaching the opposite side of the top of the style apex, crossing at the center. Somewhat less obviously, there are also consistent size differences: *Metastelma thysanotum* has corolla lobes 0.8–1.3 mm long and gynostegium stipes 0.5–0.6 mm long, *M. pedunculare* has corolla lobes 1.7–2.1 mm long and stipes 0.9–1.1 mm long, and *M. sepicola* has corolla lobes 1.5–1.8 mm long and stipes 0.7–1.1 mm long. All three of these species, as well as *Metastelma stenomeris* (Standley & Steyermark) W. D. Stevens, have inflorescences that tend to flower longer than most species of *Metastelma*, and can produce thickened axes covered with pedicel scars; *Molina 23080*, the one specimen of *Metastelma thysanotum* examined by Liede and Meve (2004), is not unusual in this regard, but does have numerous inflorescences aggregated on short, leafless shoots, and perhaps is diseased.

Metastelma thysanotum is found on volcanic soils from southwestern Guatemala through El Salvador to north-central Nicaragua, and will probably be discovered in southern Honduras. It has been found between 350 and 1600 m elevation and probably flowers year-round, although it has been most frequently collected with flowers between July and September.

Paratypes. GUATEMALA. **Chimaltenango:** Alameda, *J. Johnston 1022* (F). **Sacatepéquez:** 4 km NW of San Miguel Dueñas on road to Acatenango, *M. Nee, D. Atha & J. J. Castillo M. 47244* (MO, NY). **Sololá:** Santo Tomás, *J. Cuj 7977* (MO, UVAL). EL SALVADOR. **Ahuachapán:** along road between San Francisco Menéndez and Tacuba, *T. Croat 42148* (MO), *42170* (MO); San Francisco Menéndez, El Corozo, *J. Rosales 1195* (B, BM, LAGU, MO); San Benito, *E. Sandoval & F. Chinchilla 481* (B, LAGU, MO), *E. Sandoval & A. Román 1365* (B, LAGU, MO), *E. Sandoval 1689* (B, EAP, LAGU, MO); P.N. El Imposible, *A. Sermeño 1167* (LAGU, MO), *R. Toledo 23* (B, LAGU, MO), *R. Villacorta, R. Toledo & R. López 878* (B, LAGU, MO). **Santa Ana:** El Pinalito, *E. Montalvo, J. González & R. Villacorta 6328* (LAGU, MO). NICARAGUA. **Estelí:** Estanzuela Creek, 8 km W of Estelí, *A. Molina R. 23080* (F, MO, NY). **Matagalpa:** 3 km al SE de Esquipulas, *P. Moreno 25352* (MO).

- 4. *Metastelma triodontum*** W. D. Stevens, sp. nov. TYPE: Guatemala. Huehuetenango: above La Libertad, Cerro Pueblo Viejo, 1900 m, 20 Aug. 1942, *J. Steyermark 50999* (holotype, MO; isotype, F). Figure 5.

Speciebus corona trilobata cum *Metastelmate longicoronato* congruens, sed differt floribus minoribus indumento corollae alis antherae curvatis.

Twining vines, woody and corky below, cork brown, latex unknown, underground parts unknown; young stems puberulent on 1 side with recurved white trichomes 0.15–0.2 mm long, internodes 1–3 cm. Leaves opposite, without pseudostipules, blades narrowly elliptic, 2–2.5 × 0.4–0.8 cm, apex acute, apiculate, base acute, adaxially glabrous except puberulent on midrib and margin, abaxially glabrous or with a few trichomes along midrib, lateral nerves 4 to 6 pairs, middle veins 50°–60° to midrib, colleters 0 to 2; petioles 1.5–2.5 mm, puberulent on adaxial margin. Inflorescence extra-axillary, 1 per node, congested-racemiform, 4- to 6-flowered, peduncle 1.5–3.5 mm, puberulent on 1 side, pedicel 1–2 mm, puberulent on 1 side, bracts 0.4–0.7 × 0.3–0.5 mm, ovate; calyx with 1 colleter below each sinus within, lobes ovate with rounded tips, 0.6–0.7 × 0.35–0.4 mm, puberulent at base and margin abaxially, adaxially glabrous, purple with scarious margins; corolla campanulate, white, tube 0.5–0.6 mm long, abaxially glabrous, adaxially with trichomes of lobes continuing into top of tube, lobes lanceolate with acute tips, patent, 1–1.1 × 0.5–0.6 mm, abaxially glabrous, adaxially with broad margins and distal half covered with erect, white, unicellular trichomes, 0.1–0.15 mm long, center trichomes restricted to a narrow strip in basal half, dense, retrorse, translucent, unicellular, 0.1–0.15 mm long; gynostegium with stipe 0.15–0.2 × 0.4–0.5 mm, broadly winged, corona lobes borne at top of stipe, 3-lobed, laminar, free part ca. 0.65 × 0.4 mm, central lobule narrowly deltate, bent sharply over style apex, lateral lobules small, borne near middle, deltate, terminal anther appendages ovate, ca. 0.2 × 0.2 mm, appressed to style apex, white, anthers rectangular in outline, ca. 0.3 × 0.4 mm, guide rails nearly vertical at top, curving outward toward base, ca. 0.3 mm long; pollinaria pendent, corpusculum ca. 0.14 × 0.05 mm, subsagittate, brown, translators ca. 0.04 mm, round, bent at middle, pollinia ca. 0.16 × 0.05 mm, asymmetrically ellipsoid; style apex ca. 0.5 mm wide, nearly flat with small umbo. Foli- cles and seeds unknown.

Among the Mesoamerican species of *Metastelma*, only this new species and *Metastelma longicoronatum* (L. O. Williams) Liede have 3-lobulate corona lobes. The flowers of *Metastelma longicoronatum* are larger overall (2.4–2.9 mm vs. 1.5–1.7 mm long) and most notably the corona lobes are longer (1.4–1.9 mm vs. 0.65 mm), have their lateral lobules at the base rather than the middle and curving upward rather than straight, and have their central lobules erect and only slightly arching over the



Figure 5. *Metastelma triodontum* W. D. Stevens. Photograph of branch and opened flower of *Steyermark 50999* (isotype, F).

style apex rather than bent sharply over the style apex. *Metastelma longicoronatum* also has longer inflorescences, leaves with more secondary veins, and guide rails that are straight and at about 45° to the gynostegium axis rather than nearly vertical

at the top and gradually flaring outward. A few other species have flowers in the size range of *Metastelma triodontum*, but all have entire corona lobes and other differences. The indumentum of the corolla lobes, with the white, marginal trichomes cov-

ering most of the lobes and the translucent, central trichomes restricted to a narrow line in the basal half, seems especially distinct.

Metastelma triodontum is known only from the type collection from Guatemala.

5. *Metastelma yucatanense* W. D. Stevens, sp. nov. TYPE: Mexico. Quintana Roo: directly W of Puerto Morelos, 5 m, 4 May 1982, *G. Davidse, M. Sousa S., A. Chater & E. Cabrera C.* 20050 (holotype, MO; isotype, MEXU). Figure 6.

Species haec a *Metastelma palmeri* differt stipite brevior et a corona occulta alis antherae rectis et basi non curvatis.

Twining vines, herbaceous, without cork, latex white, underground parts unknown; young stems glabrous or internodes with a thin line of recurved white trichomes 0.1–0.3 mm long, internodes 2–5 cm. Leaves opposite, without pseudostipules, blades elliptic to ovate, 1.1–2.8 × 0.4–0.9 cm, apex acuminate to rounded, apiculate, base obtuse to rounded, adaxially glabrous except inconspicuously puberulent on midrib and margin, abaxially glabrous, lateral nerves 5 to 8 pairs, more or less inconspicuous, middle veins 30°–55° to midrib, colleters 0 to 2; petioles 1.5–5 mm, puberulent on adaxial margin. Inflorescence extra-axillary, 1 per node or sometimes with a subsidiary inflorescence on a short axillary shoot, congested-racemiform, 7- to 16-flowered, peduncle 1–4.5 mm, glabrous or puberulent in 1 line, axis to 2.5 mm, pedicel 2.5–4.5 mm, bracts 0.2–0.7 × 0.2–0.4 mm, ovate; calyx with 0 to 3 colleters below each sinus within, lobes ovate with rounded tips, 0.6–1.1 × 0.4–0.7 mm, sparsely puberulent at base abaxially and sometimes on margin, adaxially glabrous, green to purple with scarious margins; corolla shallowly campanulate, white to cream, tube 0.4–0.6 mm long, glabrous or with adaxial marginal trichomes of lobes extending into top of tube, lobes lanceolate with rounded tips, spreading, 1.4–2.3 × 0.6–0.9 mm, with 2 submarginal fleshy ridges, abaxially glabrous, adaxially with margins covered with erect, white, unicellular trichomes, 0.1–0.3 mm long distally, becoming 0.05–0.1 mm long proximally, center trichomes absent or, when present, retrorse, yellowish translucent, unicellular, 0.1–0.2 mm long; gynostegium with bulbous stipe 0.2–0.4 × 0.5–0.7 mm, broadly winged with bases of corona lobes that cover the entire stipe, corona lobes lanceolate with attenuate tips, keeled at the base, erect or somewhat sigmoid, free part 0.5–1.1 × 0.2–0.3 mm, terminal anther appendages nearly circular, 0.25–0.35

mm diam., appressed to margin of style apex, white, anthers trapezoidal, 0.4–0.5 × 0.45–0.55 mm, guide rails straight, ± tangential to anther body, radially salient at top and somewhat inclined toward the axis below, 0.35–0.55 mm long; pollinaria pendent, corpusculum 0.09–0.17 × 0.06–0.11 mm, ovoid to ellipsoid, brown, translators 0.05–0.09 mm, thin but dilated distally, round in cross section, sigmoid to geniculate, pollinia 0.18–0.23 × 0.06–0.1 mm, ellipsoid or somewhat ovoid or ob-ovoid; style apex 0.55–0.7 mm wide, convex. Follicle 1, fusiform-attenuate, 4.4–4.8 × 0.15–0.2 cm, glabrous, seeds ca. 14; seeds obovate, nearly elliptical, flat or cucullate, 3.8–4 × 1.4–1.6 mm, reddish brown, margin 0.1–0.2 mm, inconspicuous, finely and inconspicuously undulate, concave side tuberculate, convex side verrucate near margin, coma 2–3 cm, tawny.

Metastelma yucatanense shares the general shape of the corona with *M. palmeri* S. Watson, but that species, which in my concept ranges from Texas to Puebla and perhaps Oaxaca, at 400–2300 m elevation, differs in a number of characters. The corolla lobes of *Metastelma palmeri* are generally covered with uniformly short white trichomes (0.02–0.1 mm) and the translucent trichomes are restricted to a basal triangle, while the white trichomes of *M. yucatanense* form a discrete marginal band and are longer at the tips of the lobes (0.1–0.3 mm) and become gradually shorter toward the base of the lobes; *M. palmeri* has a distinct stipe with the corona lobes attached at the top, while this new species has a somewhat shorter, and bulbous, stipe that is completely covered by the broadly keeled bases of the corona lobes; *M. palmeri* has the guide rails more vertically and more radially oriented with a prominent radial projection at the base, while the new species has guide rails that are somewhat inclined under the anther body, more tangentially oriented, and are straight, with no basal projection. *Metastelma turneri* Liede & Meve shares the pattern of corolla indumentum with this new species, but is restricted to northeastern Mexico, is more robust and pubescent, and has shorter guide rails (0.2–0.25 mm) that tilt away from the anther body, among other differences. The follicles of this new species are distinctively thin and the seeds are small for the genus. The single Guatemalan collection (*Contreras 9336*) is the only one cited by Liede and Meve (2004), and they tentatively assign it to *Metastelma palmeri*. While it clearly is not *Metastelma palmeri*, this specimen represents the low extremes of most measurements

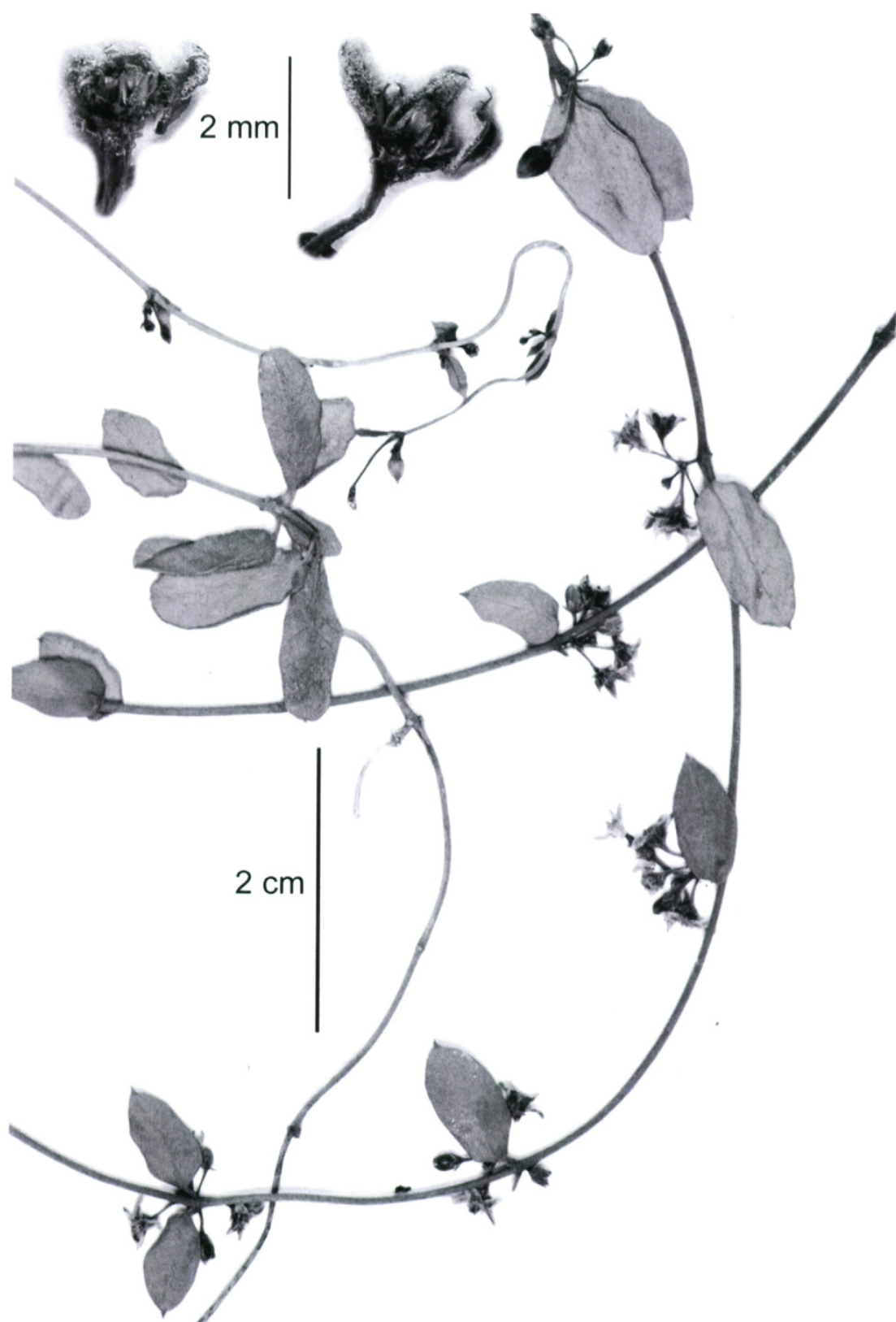


Figure 6. *Metastelma yucatanense* W. D. Stevens. Photograph of branches and opened flowers of *Cabrera & Cabrera* 6487 (MO).

of *M. yucatanense* and is somewhat disjunct from the other collections.

Metastelma yucatanense is primarily a coastal species but has been found somewhat inland, up to

about 65 m elevation, and apparently flowers year-round.

Paratypes. MEXICO. **Quintana Roo:** 10 km al N de Puerto Morelos, camino a Punta Caracol, *E. Cabrera C. &*

H. de Cabrera 3139 (MO); 15 km al N de Punta Sam, *E. Cabrera* C. & *H. de Cabrera* 6487 (MO); camino a Nizuc, *P. Moreno* 101 (MEXU); Punta Sam, 5 km al N de Puerto Juárez, *H. Quero*, *H. Flores* & *R. Grether* 2884 (ENCB, MO), *O. Téllez V.* & *E. Cabrera* C. 1545 (MO); Isla Holbox, *V. Rico-Gray* & *I. Espejel* 181 (F); Puerto Morelos, *P. Moreno* 312 (MEXU), *M. Sousa S.*, *O. Téllez V.* & *E. Cabrera* C. 10793 (MO). **Yucatán:** 10 km al N de Telchak Pueblo, carr. Motul-Telchak Puerto, *E. Cabrera* C. & *H. de Cabrera* 9674 (MO); above Calcehtok, *S. Darwin* 2317 (MO); 8.5 km al N de Dzemul camino a Xtampu, *R. Durán* & *M. Méndez* 2869 (MO). GUATEMALA. **Izabal:** Cadenas (Puerto Méndez), Sarstun River, *E. Contreras* 9336 (MO).

Orthosia Decaisne in A. DC., Prodr. 8: 526. 1844.
TYPE: *Orthosia congesta* (Vellozo) Decaisne (lectotype, designated by A. A. Bullock, Kew Bull. 13: 98. 1958).

Liede (1997) first pointed out that some North American species of *Cynanchum*, sensu Woodson, belonged to the genus *Orthosia*, previously only known from southern South America. In her analysis of *Orthosia* and the related genera, the inflorescences were described as axillary or extra-axillary, simple and sciadioidal. While the inflorescence description is basically correct in a descriptive sense, it is instructive to understand their development. Typical inflorescences of Asclepiadoideae are either terminal or extra-axillary, apparently developmentally terminal, but pushed aside by the emerging shoot, and one per node. Many species of *Orthosia* have these apparently axillary inflorescences, two per node, that are congested-racemiform or congested-paniculiform. Other species, clearly related in other regards, have both axillary and extra-axillary inflorescences or even exclusively extra-axillary inflorescences. *Orthosia glaberrima*, validated below, is especially informative in understanding the origin of this inflorescence type, having axillary, extra-axillary, and even terminal inflorescences, sometimes more than one kind at a node, and most unusual, the apparently axillary inflorescences often revert to being vegetative shoots, leaving a cluster of pedicel scars at the base of lateral shoots. Clearly, the axillary inflorescences of *Orthosia*, as is the case with the related *Tassadia* (Stevens, 2002), are actually condensed axillary branches with one, then racemiform, or more, then paniculiform, terminal or extra-axillary true inflorescences. Only Mesoamerican species of *Orthosia* are considered here; five species are described as new and three new combinations are provided.

1. *Orthosia cynanchoides* W. D. Stevens, sp. nov. TYPE: Mexico. Chiapas: Rodeo, near Siltepec, 2800 m, 1 Aug. 1941, *E. Matuda* 4562 (holotype, MO; isotypes, F, MEXU). Figure 7.

Inter species *Orthosiae* inflorescentiis solitariis et axillaribus et extra-axillaribus tubo corollae brevi tubo corollae brevi lobis corollae brevibus arcuatis gynostegio cylindrico brevistipitato poliniis ellipsoideis dimidio minor quam corpusculis differt.

Twining vines, woody and corky below, latex and underground parts unknown; young stems puberulent in a broad band, trichomes erect, 0.2–0.25 mm long, white, internodes 2–13 cm. Leaves opposite, persistent, without pseudostipules, blades lanceolate, 2.1–3.2 × 0.4–0.6 cm, apex acute to attenuate, apiculate or not, base obtuse to rounded, adaxially puberulent on midrib and margin, sparsely puberulent on basal half of surface, abaxially glabrous or with a few trichomes along midrib, lateral nerves 3 to 4 pairs, inconspicuous, middle veins 55°–60° to midrib, colleters 2; petiole 2–3 mm, densely puberulent along adaxial margin. Inflorescence axillary or extra-axillary, 1 per node, congested-racemiform, nearly umbelliform, 2 to 4 flowers open at a time, peduncle 0–2.5 mm, puberulent on 1 side, pedicel 3–3.5 mm, puberulent except 1 line glabrous, bracts lanceolate, 0.5–0.7 × 0.1–0.2 mm, purple; calyx without colleters, lobes elliptic with rounded tips, 0.7–0.8 × 0.5–0.6 mm, appressed-puberulent outside, glabrous inside, erect to ascending, purple; corolla shallowly campanulate, nearly rotate, glabrous, white, tube 0.5–0.6 mm long, lobes elliptic with rounded tips, 4–4.2 × 2–2.2 mm, spreading; gynostegium cylindrical, with stipe ca. 0.3 mm, corona of 5 lobes connate at base, borne at base of the stipe, tube ca. 0.1 mm long, lobes lanceolate, somewhat shouldered toward the rounded tip, ca. 0.8 × 0.45 mm, center of lobe adnate to stipe, then arching outward toward corolla tube and then back toward gynostegium, with the tips touching the center of the anther backs, terminal anther appendages ovate, ca. 0.3 × 0.3 mm, arching over and nearly covering style apex; anthers rectangular, ca. 0.7 × 0.5 mm, guide rails vertical, slightly bowed outward at center, ca. 0.7 mm long; pollinaria pendent, corpusculum ellipsoid, ca. 0.21 × 0.09 mm, brown, translators ca. 0.06 mm, thin, round in cross section, strongly sigmoid, pollinia ellipsoid, ca. 0.13 × 0.08 mm; style apex flat, ca. 0.6 mm wide. Immature follicles 2, divergent 180°, fusiform-attenuate, to 41 × 2 mm, smooth, sparsely puberulent, mature follicles and seeds unknown.

The single collection of this species, from near Siltepec and probably from cloud forest, was distributed as *Metastelma angustifolium* Turczaninow, a species of *Orthosia* from north and central Mexico that also passes under the name *Cynanchum kun-*



Figure 7. *Orthosia cynanchoides* W. D. Stevens. Photograph of branches and opened flower of *Matuda* 4562 (isotype, F).

thii (Decaisne) Standley. *Orthosia cynanchoides* is superficially similar to this species, but the latter differs in many details, including having a conical gynostegium and corona lobes larger than, and

completely covering, the anthers. Among the species of *Orthosia* with both apparently axillary and extra-axillary inflorescences, *O. cynanchoides* stands out in having both the corolla and the corona

divided nearly to the base and the corona lobes relatively short and strongly curved.

2. *Orthosia extra-axillaris* W. D. Stevens, sp. nov. TYPE: Costa Rica. San José: Cordillera de Talamanca, W ridge of Cerros Cuericí, 3160 m, 9°34'N, 83°40'W, 15 Sep. 1983, G. Davidse 24730 (holotype, MO; isotype, CR). Figure 3.

Inter species *Orthosiae* inflorescentiis solitariis extra-axillaribus tubo coronae longo campanulato lobis coronae latis gynostegio cylindrico brevistipitato poliniis asymmetricis corpusculum fere aequantibus differt.

Twining herbaceous vines, latex white, underground parts unknown; young stems puberulent in a narrow to broad band, trichomes erect to somewhat reflexed, 0.2–0.4 mm long, white, internodes 1–13 cm. Leaves opposite, persistent, without pseudostipules, blades lanceolate, 2.5–4 × 0.5–1 cm, apex attenuate, apiculate or not, base acute, adaxially puberulent on midrib and margin, abaxially glabrous or puberulent on midrib, lateral nerves 4 to 6 pairs, middle veins 40°–50° to midrib, colleters 2; petiole 2–6 mm, puberulent along adaxial margin. Inflorescence extra-axillary, 1 per node, congested-racemiform or congested-paniculiform, 2 to 9 flowers open at a time, peduncle 0–4 mm, puberulent on 1 side, pedicel 2.5–5.5 mm, puberulent in 1 line, bracts lanceolate, 0.7–1.2 × 0.4–0.6 mm, green or purple; calyx with 0 to 2 colleters below each sinus within, lobes ovate with acute to rounded tips, 1.1–1.8 × 0.7–0.8 mm, with a few trichomes at base and margin outside, glabrous inside, ascending, green or purple; corolla shallowly campanulate, nearly rotate, glabrous, white or outside tinted with yellow, green, pink, or purple, tube 0.8–1 mm long, lobes ovate with rounded tips, 1.9–2.5 × 1.2–1.7 mm, ascending; gynostegium cylindrical, with stipe 0.1–0.3 mm, corona of 5 lobes connate at base, borne at the base of the stipe, tube 0.3–0.5 mm long, campanulate, lobes lanceolate, somewhat to strongly shouldered toward the rounded tip, 1–1.8 × 0.8–1.2 mm, erect, somewhat shorter to somewhat longer than the gynostegium, terminal anther appendages ovate, 0.35–0.5 × 0.25–0.5 mm, arching over and nearly covering style apex; anthers rectangular, 0.65–0.8 × 0.5–0.7 mm, guide rails vertical, straight, 0.65–0.8 mm long; pollinaria pendent, corpusculum ellipsoid to subsagittate, 0.19–0.25 × 0.08–0.13 mm, red-brown, translators 0.03–0.06 mm, thin, dilated at tip or not, round in cross section, straight to geniculate, pollinia ellipsoid, reniform or angularly obovoid, 0.14–0.18 × 0.09–0.11 mm; style apex convex,

0.6–1 mm wide. Immature follicles 2, divergent 180°, fusiform-attenuate, to 38 × 3 mm, smooth, sparsely puberulent at base, mature follicles and seeds unknown.

This species shares the general appearance of *Orthosia cynanchoides*, especially in the narrow, relatively coriaceous, persistent leaves and relatively large, nearly rotate corollas. However, *Orthosia extra-axillaris*, compared to *O. cynanchoides*, has corolla lobes about twice as long as the tube, rather than about eight times longer, and a corona with a longer, campanulate tube free from the stipe and larger lobes. The shapes of the corona lobes and of the pollinia are unusually variable but many other characters hold this small group of specimens together. The inflorescences are always of the typical extra-axillary sort and one per node, apparently the only *Orthosia* from North America without at least some axillary inflorescences. This Costa Rican endemic has been found in cloud forests between 2300 and 3160 m elevation and has been collected with flowers between June and October.

Paratypes. COSTA RICA. **Cartago:** 14 km SE of El Empalme, F. Almeda, R. Wilbur & T. Daniel 3101 (MO); **Heredia:** P.N. Braulio Carillo, Sendero Cerro Guararí, G. Rivera 107 (MO); P.N. Braulio Carillo, Estación Barva, G. Varela 103 (MO). **San José:** Estación Cuericí, sendero a La Piedra, 5 km E de Villa Mills, B. Gamboa R. 758 (MO).

3. *Orthosia glaberrima* (Woodson) W. D. Stevens, comb. nov. Basionym: *Metastelma glaberrimum* Woodson, in Woodson & Seibert, Ann. Missouri Bot. Gard. 24: 200. 1937. TYPE: Panamá. Chiriquí: valley of Río Chiriquí Viejo, near Monte Lirio, 5500 ft., 11 July 1935, R. Seibert 300 (holotype, MO).

This species was treated as *Cynanchum sepium* (Decaisne) Standley in the *Flora of Guatemala* (Standley & Williams, 1969) and *Cynanchum glaberrimum* (Woodson) L. O. Williams in the *Flora of Panama* (Spellman, 1975). The species of *Orthosia* sometimes known as *Cynanchum sepium* is actually rare and endemic to a small area in the mountains east of Oaxaca, Mexico, in the district of Ixtlán, while *O. glaberrima* is common in the mountains from Chiapas to the Panama-Costa Rica border. *Metastelma pallidum* Rusby from Colombia is obviously related, and would provide an older epithet, but has a dense, yellowish indumentum not seen in the Mesoamerican collections, and is not considered synonymous.

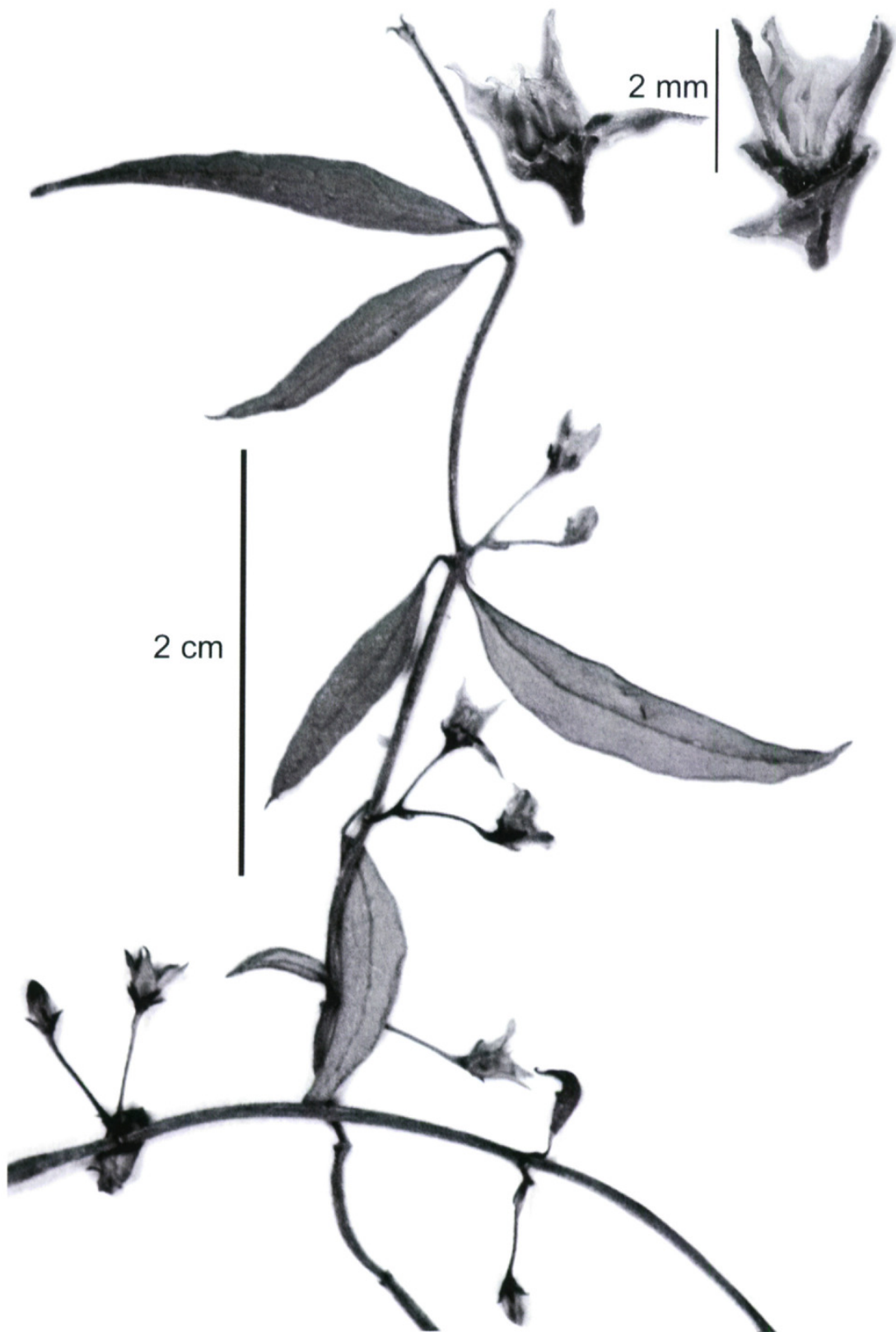


Figure 8. *Orthosia extra-axillaris* W. D. Stevens. Photograph of branches and opened flowers of *Almeda et al.* 3101 (MO).

4. ***Orthosia misera*** (L. O. Williams) W. D. Stevens, comb. nov. Basionym: *Cynanchum miserum* L. O. Williams, Fieldiana, Bot. 32: 38. 1968. TYPE: Guatemala. Alta Verapaz: Pan-

samalá, 3800 ft., July 1887, *H. Von Tuerckheim* 1290 (holotype, US; isotypes, F, GH).

This species was treated as *Cynanchum miserum*

in the *Flora of Guatemala* (Standley & Williams, 1969). It is most similar to *Orthosia ramosa*, described and compared below. *Orthosia misera* is among the species of *Orthosia* completely leafless at maturity. It is found in cloud forests from Chiapas to Honduras.

- 5. *Orthosia ramosa*** W. D. Stevens, sp. nov.
TYPE: Honduras. Ocotepeque: vic. of El Portillo, Cordillera de Merendón, 2000 m, 31 Aug. 1975, A. Molina R. & A. Molina 30910 (holotype, MO; isotypes, EAP, F). Figure 9.

Inter species *Orthosiae* inflorescentiis solitariis vel geminatis axillaribus tubo corollae longo tubo coronae brevibus lobis coronae brevibus arcuatis gynostegio brevistipitato dorsis antherarum vesiculatis poliniis anguste obovoideis longis differt.

Twining or scandent vines, woody and corky below, latex white, underground parts unknown; young stems puberulent in an inconspicuous line, trichomes erect to reflexed, ca. 0.1 mm long, white, internodes 2–11 cm. Leaves opposite, caducous, without pseudostipules, when present on young shoots, blades linear to narrowly lanceolate, 1.1–3 × 0.1–0.3 cm, apex acute to attenuate, base obtuse to rounded, adaxially inconspicuously puberulent on midrib and margin, abaxially glabrous, lateral nerves ca. 15 pairs, inconspicuous, middle veins ca. 60° to midrib, colleters 2; petiole 1–3 mm, puberulent along adaxial margin. Inflorescence axillary, 1 or 2 per node, congested-racemiform, 2 to 4 flowers open at a time, peduncle 0–2 mm, puberulent on 1 side, pedicel 2–3.5 mm, glabrous or with a few scattered trichomes, bracts ovate, ca. 0.2 × 0.2 mm, green; calyx with 0 to 1 colleters below each sinus within, lobes ovate with rounded tips, 0.6–0.7 × 0.5–0.55 mm, with a few trichomes at base outside, glabrous inside, erect to ascending, green; corolla campanulate, nearly tubular, glabrous, white, tube 1.2–1.6 mm long, lobes ovate with rounded tips, 0.5–0.6 × 0.5–0.6 mm, erect; gynostegium with anther backs inflated, broadest in the center and tapering toward tip and base, with stipe 0.45–0.5 mm, narrowed in middle and 5-ribbed, corona of 5 lobes connate at base, borne at the base of the stipe, tube ca. 0.05 mm long, lobes deltate with rounded tips, 0.25–0.3 × 0.15–0.3 mm, arching outward toward corolla tube and then back toward gynostegium, with the tips touching the center of the stipe, terminal anther appendages ovate, 0.1–0.2 × 0.1–0.2 mm, arching over style apex; anthers rectangular in outline, 0.25 × 0.4–0.45 mm, guide rails somewhat tilted in at the top, straight, ca. 0.25 mm long; pollinaria pendent, corpusculum subsagittate, 0.10–0.11 × 0.05–0.06

mm, pale brown, translators 0.06–0.09 mm, thin, round in cross section, geniculate, pollinia narrowly obovoid, 0.13–0.14 × 0.05–0.06 mm; style flat or slightly convex, 0.4–0.5 mm wide. Follicles and seeds unknown.

This new species corresponds in superficial appearance to *Orthosia misera*, and both share pollinaria with long, geniculate translators and narrowly obovoid pollinia that are longer than the corpuscula. However, *Orthosia misera* has a more open campanulate corolla, a shorter stipe (ca. 0.3 mm), and straight, erect corona lobes that are as large as, and completely cover, the anthers. *Orthosia ramosa* is found in pine-oak and cloud forests in Honduras, between 1600 and 2200 m elevation, and is known to flower in May and August.

Paratypes. HONDURAS. **Cortés:** trail from Cerro Cantiles to Cerro Jilisco, T. Hawkins 671 (EAP, MO). **Lempira:** Montaña de Celaque, SE part of massif, trail from Gracias to top of mtn, G. Davidse & R. Zúñiga 34697 (EAP, MO).

- 6. *Orthosia rubens*** (L. O. Williams) W. D. Stevens, comb. nov. Basionym: *Cynanchum rubens* L. O. Williams, Fieldiana, Bot. 32: 39. 1968. TYPE: Guatemala. Chimaltenango: Santa Elena, 2400–2700 m, 27 July 1933, A. Skutch 503 (holotype, US; isotype [fragment of holotype], F).

This species was treated as *Cynanchum rubens* in the *Flora of Guatemala* (Standley & Williams, 1969) and is endemic to Guatemalan cloud forests. It is the only Mesoamerican *Orthosia* with more than a hint of red on the corolla.

- 7. *Orthosia smaragdina*** W. D. Stevens, sp. nov.
TYPE: Guatemala. San Marcos: Finca Armenia, San Rafael Pie de la Cuesta to Carrizal, past Finca Africa, 1300–1600 m, 9 to 12 Aug. 1980, J. Dwyer 15327 (holotype, MO). Figure 10.

Inter species *Orthosiae* inflorescentiis solitariis vel geminatis axillaribus tubo corollae longo tubo coronae longo partim obtengenti gynostegium lobis coronae longis gynostegio cylindrico poliniis ellipsoideis minor quam corpusculis differt.

Twining vines, woody and corky below, latex and underground parts unknown; young stems glabrous or with a few trichomes at the nodes, trichomes erect, ca. 0.1 mm long, white, internodes 2–5 cm. Leaves opposite, persistent, without pseudostipules, blades lanceolate, 4–6 × 1.2–1.7 cm, apex acute, apiculate, base obtuse to rounded, adaxially puberulent on midrib and

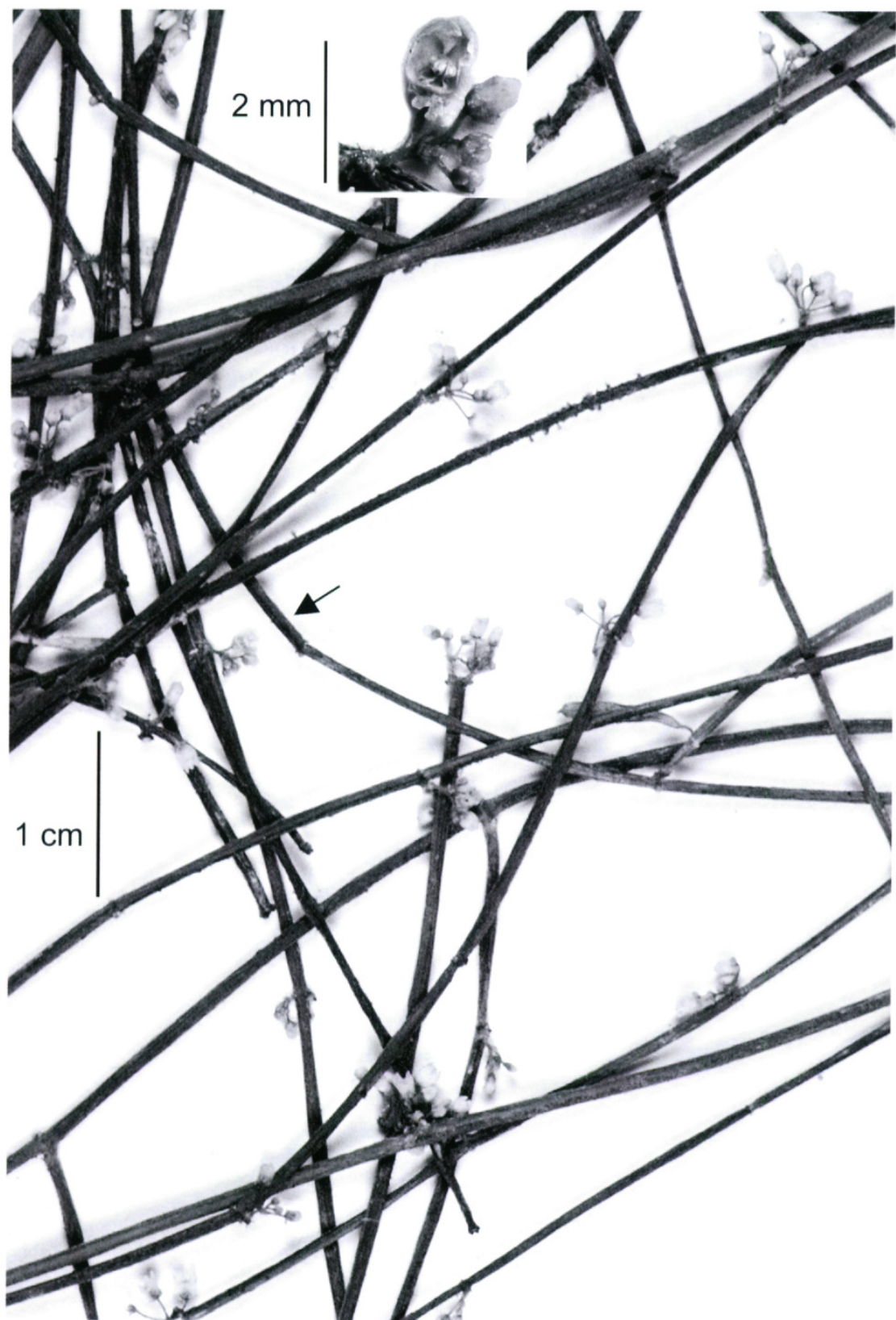


Figure 9. *Orthosia ramosa* W. D. Stevens. Photograph of branches and opened flowers of *Molina & Molina 30910* (isotype, F).

margin, abaxially puberulent on base of midrib, lateral nerves 7 to 9 pairs, middle veins ca. 55° to midrib, colleters 2; petiole 5–6 mm, sparsely puberulent along adaxial margin. Inflorescence

axillary, 1 or 2 per node, congested-racemiform, sessile, 3 flowers open at a time, pedicel 3.5–4.2 mm, sparsely puberulent, bracts ovate, 0.3–0.5 × 0.2–0.3 mm, green; calyx without colleters,

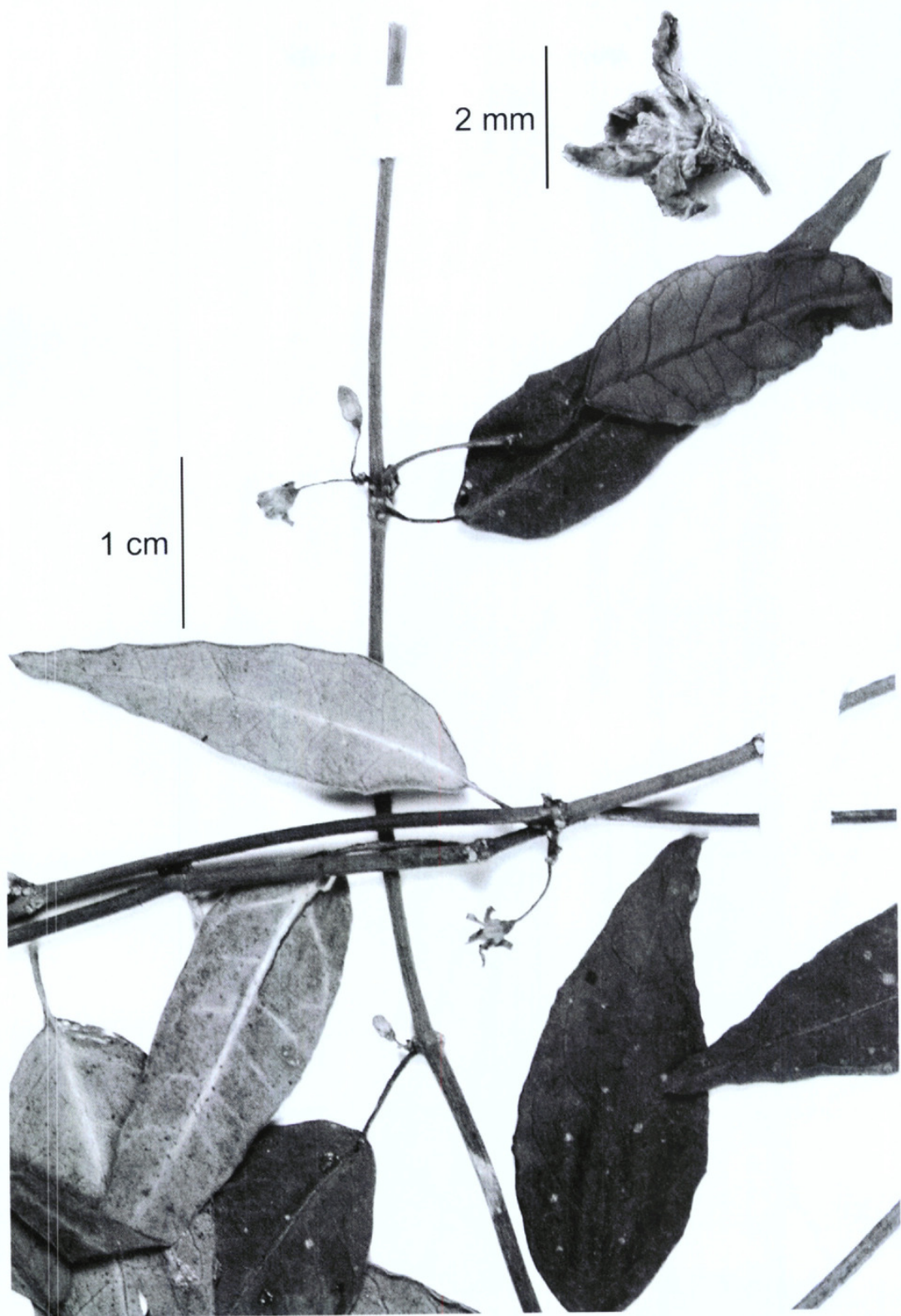


Figure 10. *Orthosia smaragdina* W. D. Stevens. Photograph of branches and opened flower of *Dwyer 15327* (holotype, MO).

lobes ovate with rounded tips, ca. 0.7×0.7 mm, appressed-puberulent outside, glabrous inside, erect, green; corolla campanulate, 5-fluted, glabrous, green, tube ca. 1.4 mm long, lobes elliptic with rounded tips, ca. 2×0.8 mm, erect; gynostegium cylindrical, sessile, corona of 5 lobes con-

nate at base, borne at the base of the gynostegium, tube ca. 0.5 mm long, clasping around the lower third of the gynostegium, lobes narrowly deltate with acute or slightly bifid tips, ca. 1.5×0.7 mm, erect, exceeding the gynostegium, terminal anther appendages semicircular, ca. $0.3 \times$

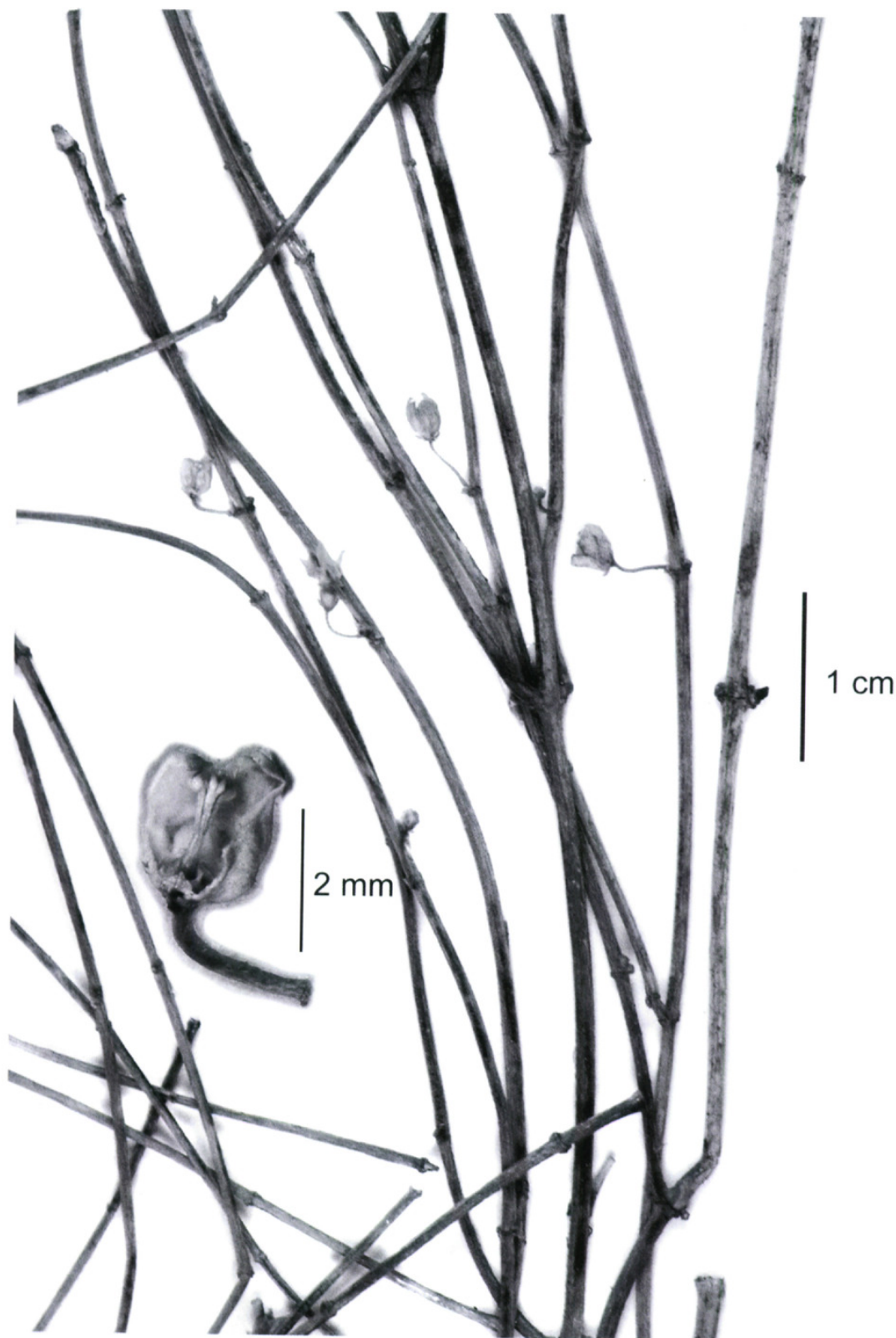


Figure 11. *Orthosia stipitata* W. D. Stevens. Photograph of branches and opened flower of Hampshire *et al.* 466 (holotype, MO).

0.3 mm, arching over style apex; anthers rectangular or slightly trapezoidal in outline, ca. 1.2 × 0.55 mm, guide rails vertical, bowed inward, narrowest a little above the middle and slightly flared at base, ca. 1.1 mm long; pollinaria pen-

dent, corpusculum ellipsoid, ca. 0.16 × 0.11 mm, pale brown, translators ca. 0.05 mm, thin, round in cross section, straight, pollinia ellipsoid, ca. 0.11 × 0.09 mm; style flat, ca. 0.6 mm wide. Follicles and seeds unknown.

This distinctive species, known only from the type, has relatively large leaves and flowers, described by the collector as emerald-green. This is the only Mesoamerican species of *Orthosia* with a tubular corona tightly clasping around the lower part of the cylindrical gynostegium; pollinators must probe the narrow gap between the gynostegium and the corona tube to access the opening at the base of the guide rails. The translators are short and straight and the pollinia are symmetrical and smaller than the corpuscula.

- 8. *Orthosia stipitata*** W. D. Stevens, sp. nov.
TYPE: Mexico, Chiapas: El Triunfo Reserve, 2100 m, 15°39'N, 92°50'W, 19 Feb. 1990, R. J. Hampshire, P. J. Stafford, A. Reyes G., M. Heath & A. Long 466 (holotype, MO; isotypes, BM, MEXU). Figure 11.

Inter species *Orthosiae* inflorescentiis solitariis vel geminatis axillaribus tubo corollae longo tubo coronae brevi lobis coronae brevibus arcuatis gynostegio conico longistipitato dorsis antherarum vesiculatis poliniis anguste ellipsoideis longis differt.

Twining or scandent vines, latex and basal parts unknown; young stems puberulent in a fine line, trichomes erect, ca. 0.1 mm long, white, internodes 3–5 cm. Leaves opposite, caducous, without pseudostipules. Inflorescence axillary, 1 or 2 per node, congested-racemiform, sessile, 1 to 2 flowers open at a time, pedicel 3.5–4 mm, puberulent, mostly in 1 line, bracts deltate, 0.3–0.5 × 0.3 mm, green; calyx with 1 to 3 colleters below each sinus within, lobes ovate with rounded tips, 0.8–0.9 × 0.7–0.8 mm, appressed-puberulent outside, especially on midrib, glabrous inside, ascending, green; corolla campanulate, glabrous, white, tube ca. 1.5 mm long, lobes ovate with rounded tips, 1.6–1.7 × 1–1.1 mm, erect; gynostegium conical, anther backs inflated, stipe ca. 1.4 mm, narrowed in middle, corona of 5 lobes connate at base, borne at the base of the stipe, tube ca. 0.1 mm long, lobes deltate with acute tips, ca. 0.6 × 0.4 mm, arching outward toward corolla tube and then back toward gynostegium, with the tips touching the stipe about a quarter of the way up, terminal anther appendages ovate, ca. 0.25 × 0.25 mm, arching over style apex; anthers trapezoidal in outline, ca. 0.35 × 0.5 mm, guide rails ca. 45° from vertical, straight, ca. 0.25 mm long; pollinaria pendent, corpusculum ellipsoid, ca. 0.17 × 0.08 mm, red-brown, translators ca. 0.05 mm, thin, round in cross section, straight, pollinia narrowly ellipsoid, ca. 0.23 × 0.05 mm;

style flat, 0.6 mm wide. Follicles and seeds unknown.

This new species, known only from the type, collected in cloud forest in Chiapas, Mexico, shares the caducous leaves, inflated anther backs, coronal structure and size, and general pollinaria characteristics with *Orthosia ramosa*, but has corolla lobes about as long as the tube, instead of half as long, a stipe about three times longer than that of *O. ramosa* and a more strongly conical gynostegium.

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