Rubiacearum Americanarum Magna Hama Pars XV. New Species and Two New Combinations in *Notopleura* (Psychotrieae) from Central and South America

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ABSTRACT. *Notopleura* (Bentham & Hooker f.) Bremekamp is a Neotropical genus of about 100 species that was formerly included in *Psychotria*, but differs from that in its low succulent habit, stipules with a single usually glandular interpetiolar appendage, and terminal or often pseudoaxillary inflorescences. *Notopleura* is widely distributed in wet habitats and includes two subgenera: subgenus *Notopleura*, which comprises terrestrial, usually unbranched plants and includes most of the species in the genus, and subgenus *Viscogoga*, which comprises epiphytic, usually branched plants. In subgenus *Notopleura* here the new combination *N. madida* (Standley) C. M. Taylor is made based on *Psychotria madida* Standley of Ecuador, and 21 new species are described and illustrated: *N. amicitiae* C. M. Taylor of eastern Costa Rica and western Panama, which has been confused with *N. aggregata* (Standley) C. M. Taylor; *N. biloba* C. M. Taylor of northwestern Colombia, which has been confused with *N. macropodantha* (Standley) C. M. Taylor; *N. bryophila* C. M. Taylor of montane Ecuador, which has been confused with *N. marginata* (Bentham) Bullock; *N. capitata* C. M. Taylor, found from Nicaragua to Panama and previously confused with *N. aggregata*; *N. corniculata* C. M. Taylor of western Colombia and Ecuador, which has been confused with *N. anomothyrsa* (K. Schumann & Donnell Smith) C. M. Taylor; *N. corymbosa* C. M. Taylor of Ecuador, which has been confused with *N. micayensis* (Standley) Bremekamp; *N. costaricensis* C. M. Taylor of montane Costa Rica, which has been confused with *N. aggregata*; *N. hurtadoi* C. M. Taylor of Ecuador, which has been confused with *N. leucantha* (K. Krause) C. M. Taylor; *N. hypolaevis* C. M. Taylor of Ecuador, which has been confused with *N. uliginosa* (Swartz) Bremekamp; *N. longiflora* C. M. Taylor of northwestern Colombia, which has been confused with *N. macropodantha*; *N. montana* C. M. Taylor of montane Costa Rica to Venezuela and Peru, which has been confused with *N. macrophylla* (Ruiz & Pavón) C. M. Taylor; *N. multinervia* C. M. Taylor of montane western Panama, which has been confused with *N. aggregata*; *N. obtusa* C. M. Taylor of Ecuador and northern Peru, which has been confused with *N. aequatoriana* C. M. Taylor; *N. pacorana* C. M. Taylor of central Panama, which has been confused with *N. panamensis* (Dwyer) C. M. Taylor; *N. parvifolia* C. M. Taylor of western Panama, which has been confused with *N. aggregata*; *N. penduliflora* C. M. Taylor of western Panama, which has been confused with *N. plagiantha* (Standley) C. M. Taylor; *N. sanblasensis* C. M. Taylor of central Panama, which has also been confused with *N. panamensis*; *N. spiciformis* C. M. Taylor of western Colombia and Ecuador, which has been confused with *N. longipedunculoides* (C. M. Taylor) C. M. Taylor; *N. torrana* C. M. Taylor of western Panama, which has been confused with *N. macropodantha*; *N. tubulistipula* C. M. Taylor of Ecuador, which has again been confused with *N. aggregata*; and *N. zarucchiana* C. M. Taylor of montane Colombia, which has also been confused with *N. macropodantha*. Also in subgenus *Notopleura*, the correct names and their authorship are discussed for the species *N. longipedunculoides* (the formal new combination made here), *N. longissima* Bremekamp, and *N. micayensis*. In subgenus *Viscagoga* five new species are described and illustrated: *N. bahiensis* C. M. Taylor, which is similar to *N. multiramosa* (Steyermark) C. M. Taylor; *N. cocleensis* C. M. Taylor from western Panama, which has been confused with *N. guadalupensis* (DC.) C. M. Taylor; *N. elegans* C. M. Taylor from Costa Rica and western Panama, which has also been confused with *N. guadalupensis*; *N. episcandens* C. M. Taylor & Lorence from eastern Panama, which has been confused with *N. maxonii* (Standley) C. M. Taylor; and *N. vargasiana* C. M. Taylor from Ecuador, which again has been confused with *N. guadalupensis*.

Key words: Neotropics, *Notopleura*, Psychotrieae, Rubiaceae.

The genus *Notopleura* (Bentham & Hooker f.)

Bremekamp comprises a group of about 100 species of succulent Neotropical herbs and subshrubs that were previously included in *Psychotria* subg. *Heteropsychotria* Steyermark (Taylor, 2001a). *Notopleura* is distinguished by its herbaceous or suffrutescent, succulent habit; its stipules that are united around the stem into a reduced to well-developed sheath with a single, usually glandular, interpetiolar appendage of varied form that is inserted below the top of that sheath; its inflorescences that are terminal or pseudoaxillary; its corollas with valvate aestivation; and its succulent drupaceous fruits with 2 to 6 pyrenes. Additionally, its pyrenes have a unique pattern of dehiscence, with two long marginal slits and often also one shorter medial ventral slit (Piesschaert, 2001). The term "pseudoaxillary" is used here to designate inflorescences produced in a terminal position developmentally on a stem that grows sympodially, from an apparently axillary bud, so the inflorescence is found in only one axil at each node. This inflorescence position is sometimes called lateral or axillary, and is considered by some other workers to represent an axillary inflorescence arrangement with the consistent suppression of the inflorescence in one axil at each node. No conclusive evidence has been offered to support either interpretation. If the pseudoaxillary inflorescences of *Notopleura* are in fact truly axillary with a consistent asymmetric suppression of growth, this inflorescence arrangement would be very different from the terminal and sometimes overtopped, apparently lateral inflorescences that are also found in this genus, rather than easily derived from it. In either case the pseudoaxillary inflorescence arrangement is distinctive and easily seen on the plants.

Notopleura was first separated from *Psychotria* L. by Bremekamp (1934) in his work on the Rubiaceae of Surinam. Bremekamp here recognized a number of small genera instead of a comprehensive *Psychotria*, and his views on this group were not adopted by subsequent authors working on the Neotropical flora. *Notopleura* has only recently been separated from *Psychotria* in its current circumscription, with its position supported by molecular (Nepokroeff et al., 1999; Andersson & Rova, 1999) and morphological (Taylor, 1996) data. An overview of the morphology of the genus, its separation into two subgenera, and a key to its then 73 species were presented by Taylor (2001a), with 18 species newly described there. Subgenus *Notopleura* comprises terrestrial, usually unbranched plants and includes most of the species in the genus; subgenus *Viscogoga* (Baillon) C. M. Taylor comprises epiphytic, usually branched plants. Both of these are found generally throughout the range of the genus.

The present article results from study of *Notopleura* for several projects, including *Flora Mesoamericana* and the *Flora of Ecuador*, and adds to *Notopleura* one previously described species (i.e., a new combination) and 26 newly described species from eight countries. Additionally, several of the combinations published by Taylor (2001a) were inaccurate and are here corrected. The species discussed below are organized by subgenus, and within each subgenus the species are arranged alphabetically. The figures group together species that are similar morphologically to each other.

The proportion of newly described species of *Notopleura*, 44 of 100 species including those described here and by Taylor (2001a; Appendix 1), is relatively high even among Neotropical Rubiaceae. *Notopleura* has been poorly known scientifically due to its concentration of species in wet premontane forests, which are not well explored; its generally low herbaceous habit, which excludes it from many floristic studies that focus on woody plants; its succulent tissues, which do not preserve well in dried specimens; and its often unbranched habit, which means usually only one or two fertile specimens can be made from a single plant so if the plants are rare, little material is collected.

Species Groups

No classification below the level of subgenus has yet been proposed for *Notopleura*, although there appear to be several well-marked species groups within subgenus *Notopleura*. Some of these are outlined below; no doubt further study will reveal additional groups.

The *Notopleura siggersiana* group

One well-marked group of similar species is the "*Notopleura siggersiana* group," which is characterized by fruits that are red at maturity and pyrenes that are smooth on the dorsal (i.e., abaxial) surface. Additionally, dried specimens of the species in this group often have a clear green color and a distinctive pattern of the higher-order venation, with numerous short intersecondary veins usually clearly evident at least on the lower leaf surfaces. As in other Psychotrieae, there is marked variation in the inflorescences in this group from capitate (e.g., *N. pyramidata* C. M. Taylor) to lax and branched to several orders (e.g., *N. pilosula* C. M. Taylor). This group is found from southern Mexico to Bolivia and includes *N. siggersiana* (Standley) C. M. Taylor, *N. parasiggersiana* C. M. Taylor,

N. congesta C. M. Taylor, *N. hondurensis* C. M. Taylor, *N. palestinae* (Standley ex Steyermark) C. M. Taylor, *N. pilosula*, *N. pyramidata*, *N. scarlatina* C. M. Taylor, and *N. cundinamarcana* C. M. Taylor.

THE *NOTOPLEURA ULIGINOSA* GROUP

Another group of *Notopleura* species is characterized by pyrenes that are strongly dorsiventrally flattened and have their central dorsal ridge and margins markedly thickened. This "*Notopleura uliginosa* group" is also characterized by fruits that turn orange or red as they develop and then finally black at maturity, and also has leaves that are markedly discolorous and usually brown abaxially when dry. This group comprises *N. uliginosa*, *N. agostinii* (Steyermark) C. M. Taylor, *N. fernandezii* (Steyermark) C. M. Taylor, and *N. patria* (Steyermark) C. M. Taylor. These species are found in the central and northern mountains of Venezuela except for *N. uliginosa*, which is found from Mexico to the northern coast of South America and throughout the Antilles.

THE *NOTOPLEURA AGGREGATA* GROUP

The "*Notopleura aggregata* group" has pyrenes similar in form to those of *N. uliginosa*, but its fruits are white at maturity and its leaves usually are green when dry. This group includes *N. aggregata*, *N. tonduzii* (Standley) C. M. Taylor, and several species described in this article: *N. capitata*, *N. costaricensis*, *N. multinervia*, *N. parvifolia*, and *N. tubulistipula*. These species are all found in southern Central America and adjacent northwestern Colombia.

THE *NOTOPLEURA MACROPODANTHA* GROUP

Several *Notopleura* species from the Andes of Colombia share a relatively low habit, relatively small leaves, relatively well-developed calyx limbs, and pyrenes that are smooth dorsally. This "*Notopleura macropodantha* group" is most diverse in montane and premontane forests in the Cordillera Occidental, and known largely through the collections of the active botanists in Medellín and Cali, Colombia. This group includes *N. macropodantha*, *N. lanosa* C. M. Taylor, *N. biloba*, *N. longiflora*, *N. torrana*, and *N. zarucchiana* (the last four species are described in this article). Several of these species are notable for their leaf venation, with the secondary veins extending to unite with the margins, which are usually strongly thickened; several other species have the leaf margins thickened but the secondary veins not visible. Additionally, some of these species are notable for the pubescence on their adaxial leaf surfaces. These trichomes are developed and often arranged in small clusters. Inflorescence arrangement in this group varies widely, from densely capitate (e.g., *N. lanosa*) to laxly branched (e.g., *N. zarucchiana*). Stipule form also varies widely among species in this group: those of *N. lanosa* have a well-developed sheath without any interpetiolar appendage; those of *N. torrana*, *N. longiflora*, and *N. zarucchiana* have their interpetiolar portions narrowed and triangular, and in the latter two species also glandular; and the laminar stipules of *N. macropodantha* and *N. biloba* are deeply divided into two narrow, relatively long lobes. These last two stipule forms are not known in any other species of *Notopleura*.

Notopleura (Bentham & Hooker f.) Bremekamp, Rec. Trav. Bot. Néerl. 31: 289. 1934. *Psychotria* sect. *Notopleura* Bentham & Hooker f., Gen. Pl. 2: 124. 1874. TYPE: *Notopleura marginata* (Bentham) Bullock.

I. Notopleura subg. **Notopleura.**

This subgenus comprises 85 species (including the 21 newly described in this article), which are recognizable by their terrestrial, usually unbranched habit, pseudoaxillary inflorescences, and pyrenes two per fruit. Stipule form varies widely in this group; all the stipule forms known from *Notopleura* are found in this subgenus. Species of subgenus *Notopleura* are found generally throughout the range of the genus, except they are so far unknown in eastern Brazil.

I. 1. Notopleura amicitiae C. M. Taylor, sp. nov. TYPE: Panama. Chiriquí: Hartman [sic] finca, near Cerro Pando, 8°52′N, 82°45′W, 2000–2200 m, 22 Aug. 1982, *C. Hamilton, H. Stockwell & A. Aiello 855* (holotype, MO-3610955). Figure 1C, D.

Haec species a *Notopleura tolimensi* floribus in glomerulos multifloros densos dispositis, limbo calycino 1–1.2 mm longo atque appendicibus stipularibus interpetiolaribus cum foliis persistentibus distinguitur.

Succulent, erect, terrestrial herbs or soft shrubs to 2 m tall, unbranched; stems glabrous. *Leaves* narrowly elliptic to oblanceolate, 12–23.5 × 2.5–4.5 cm, at apex acute to somewhat acuminate, at base acute to attenuate, drying membranaceous to papyraceous, adaxially glabrous, abaxially glabrous or puberulous to glabrescent and often paler; secondary veins 10 to 15 pairs, weakly brochidodromous, adaxially venation plane, abaxially costa and sec-

ondary veins prominulous and remaining venation plane and invisible or usually intersecondaries and reticulated tertiary venation visible; margins plane; *petioles* 0.5–2.5 cm long; *stipules* glabrous, sheath 1–1.5 mm long, truncate to triangular, generally persisting with leaves, with interpetiolar appendage triangular to ovate, 3–4 mm long, inserted just above medially, generally persisting with leaves, somewhat flattened, acute to shortly bifid, marginally winged. *Inflorescences* pseudoaxillary, paniculate, densely puberulous, ascending, green; peduncles 1.5–7.5 cm long; branched portion pyramidal to rounded-corymbiform, 1.5–3.5 × 2–5 cm, with secondary axes developed at (1)2 nodes, 2 or 3 per node, usually branched to 1, 2, or more orders, axes terminating in floral glomerules; bracts narrowly triangular, acute, those subtending secondary axes 2–6 mm long, those subtending flowers 1.5–3 mm long; *flowers* sessile or subsessile in glomerules of 5 to 11; hypanthium turbinate, ca. 1 mm long, glabrous; *calyx limb* glabrous or puberulous, 1–1.2 mm long, 5-lobed for 1/4–1/3, lobes narrowly triangular; *corolla* funnelform, white, externally puberulous, internally glabrous except sparsely hirtellous near middle of tube, tube ca. 5 mm long, lobes 5, ca. 2 mm long, narrowly triangular, abaxially with a rounded appendage to 0.3 mm high; *anthers* in short-styled form ca. 1.5 mm long, exserted; *stigmas* 2, linear, in short-styled form ca. 1.5 mm long, situated just above middle of corolla tube. *Infructescences* similar to inflorescences; *fruits* globose, ca. 5 × 4 mm, white, glabrous, sessile; *pyrenes* 2, hemispherical in cross section, dorsally with 3 to 4 rounded longitudinal ridges.

Habitat, distribution, and phenology. In wet forest at 1300 to 2200 m, eastern Costa Rica and western Panama; collected in flower in February, March, May, July, August, and October, and in fruit often concurrently, August through October.

Notopleura amicitiae is distinguished by its relatively narrow leaves, its inflorescences with the flowers arranged in separated glomerules, its corolla lobes with short rounded abaxial appendages, and its pyrenes that are hemispherical in cross section and longitudinally 3- to 4-ridged. It is similar to *N. aggregata* and *N. tolimensis* (Wernham) C. M. Taylor; *N. aggregata* differs from *N. amicitiae* in its relatively broader leaves, 4–12.5 cm wide, its interpetiolar stipule appendages 4–11 mm long, its corolla lobes with abaxial appendages 0.5–1 mm long, and its pyrenes that are strongly dorsiventrally flattened; *N. tolimensis* differs from this new species in its flowers separated along the inflorescence axes individually or in glomerules of 2 to 5, its calyx limb 0.5–0.8 mm long, and its caducous interpetiolar stipule appendages. The specific epithet refers to the geographic distribution of this new species, in and around the binational Parque da la Amistad (i.e., Friendship Park). This new species is distylous, but the long-styled form is represented in the material studied only by flower buds, so measurements of these immature parts are not included in the description above.

Paratypes. COSTA RICA. **Puntarenas:** Cordillera de Talamanca, area around Río Canasta, 9.5 airline km [sic] NW of Agua Caliente, between Cerro Frantzius and Cerro Pittier, *Davidse et al. 28445* (MO); Coto Brus, Zona Protectora Las Tablas, Cuenca Térraba-Sierpe, Finca La Neblina, Finca de William Gamboa, *Gamboa 1129* (MO); upper Río Burú, *L. D. Gómez et al. 21749* (MO); Coto Brus, Reserva de la Biósfera de la Amistad, cerca Estación Biológica Las Alturas de Coton, *Kress & Prinzie 94–4588* (MO); Coto Brus, cuenca Térraba–Sierpe, pie Quijada Diablo, *E. Navarro V. 723* (MO). PANAMA. **Chiriquí:** near Costa Rican border, 13 km by road S of Río Sereno, Finca Hartmann, *Hensold 1019* (MO, PMA); headwaters of Río Chevo, Finca Ojo de Agua, *Knapp 1445* (MO); lower slopes of Cerro Pelota, *Knapp 1498* (MO); Santa Clara region, 27 km NW of El Hato del Volcán, on coffee finca of Rattibor Hartman [sic] called Ojo de Agua, *Mori & Bolten 7195* (MO); dtto. Bugaba, Santa Clara, Hartmann's Finca, *van der Werff & Herrera 7083* (MO, PMA), *7095* (MO).

I. 2. Notopleura biloba C. M. Taylor, sp. nov. TYPE: Colombia. Chocó: San José del Palmar, Cerro del Torrá, vertiente nororiental, abajo del helipuerto, 1860–1870 m, 5 Jan. 1984, *F. [sic; P.] A. Silverstone-Sopkin, N. Paz, A. Duque & H. Bayona 1540* (holotype, CUVC-10879; isotypes, COL-277624, CUVC-10880, MO-3250071, MO-4342380). Figure 2D, E.

Haec species a *Notopleura macropodantha* foliorum marginibus valde incrassatis venis secundariis non manifestis atque bracteis floralibus et limbo calycino bene evolutis, a *N. torrana* stipulis laminaribus in lobulos duos angustos bene evolutos desinentibus distinguitur.

Succulent, terrestrial or sometimes epiphytic, erect or sometimes clambering herbs; stems to 0.5 m long, densely hirtellous sometimes becoming glabrescent. *Leaves* lanceolate, 2.5–7.5 × 0.6–2.2 cm, at apex acute to acuminate, at base obtuse to cuneate, drying papyraceous, adaxially glabrous, abaxially drying paler and glabrous or sparsely hirtellous; secondary veins not visible, adaxially venation plane, abaxially costa prominulous and remaining venation invisible and plane; margins markedly thickened; *petioles* 2–6 mm long, densely hirtellous to glabrescent; *stipules* glabrous, laminar, persisting with leaves, unlobed basal portion broadly triangular, 2–3 mm long, terminating in 2 lobes

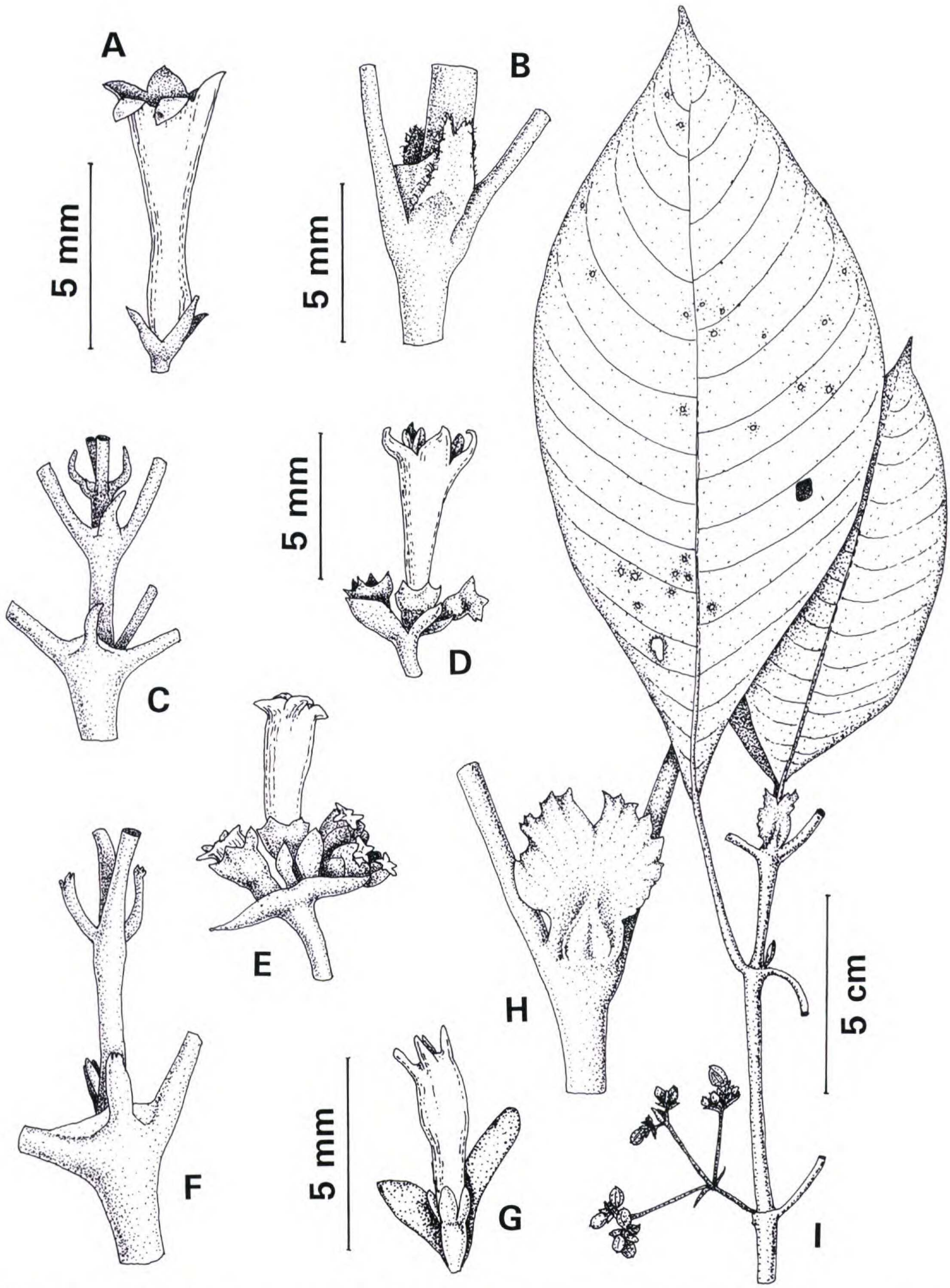

Figure 1. A, B, *Notopleura tubulistipula* C. M. Taylor, based on *Palacios et al. 2550* (MO). —A. Flower at anthesis. —B. Stem node with stipule and basal portions of petioles. C, D, *Notopleura amicitiae* C. M. Taylor, based on *Hensold 1019* (MO). —C. Stem portion with three nodes and basal portions of petioles. —D. Portion of inflorescence with a flower at anthesis and two older flowers from which the corollas have fallen. E, F, *Notopleura multinervia* C. M. Taylor. —E. Portion of inflorescence with one well-developed flower bud and three younger flower buds; based on *Croat & Grayum 60047* (MO). —F. Stem portion with two nodes with stipules and basal portions of petioles; based on *Knapp*

2–4 mm long, narrowly triangular to linear, closely set or sometimes fused for 1/3, persistent. *Inflorescences* pseudoaxillary, subcapitate to congested-cymose, hirtellous; peduncles 0.5–2.5 cm long; heads or cymes rounded-corymbiform, 8–10 × 10–25 mm, secondary axes absent or 1 pair; bracts narrowly triangular to lanceolate, 5–10 mm long, acute to acuminate, glabrous, entire; *flowers* not seen, reportedly white. *Fruits* narrowly ellipsoid, ca. 3.5 × 2.5 mm, glabrous, white, subsessile in glomerules to pedicellate in dichotomous cymules of 2 to 3, with pedicels to 2 mm long, with persistent calyx limb 3–4 mm long, glabrous, lobed nearly to base, lobes 5, narrowly triangular, acute to acuminate, entire; *pyrenes* 2, hemispherical in cross section, dorsally smooth.

Habitat, distribution, and phenology. In wet forest at 1630 to 2140 m, west-central Colombia; collected in fruit in January and August.

Notopleura biloba is distinguished by its leaves with the margins markedly thickened and the secondary veins and higher-order venation not visible, its persistent laminar stipules with two well-developed narrow lobes, its subcapitate to congested-cymose, corymbiform inflorescences, its well-developed bracts and calyx lobes, and its relatively small narrow pyrenes. The specific epithet refers to the stipule morphology, which is unusual in *Notopleura* but similar to that of *N. macropodantha*. *Notopleura biloba* is similar in general aspect to both *N. macropodantha* and *N. torrana*; *N. macropodantha* differs from *N. biloba* in its leaves with the secondary veins visible on the lower (i.e., abaxial) surface, calyx limb ca. 2 mm long, and range in the northern Cordillera Oriental of Colombia, while *N. torrana* differs from this new species in its leaves drying chartaceous, its stipules that have a triangular sheath with a succulent conical appendage inserted near the middle of the sheath, its capitate inflorescences, and its calyx limb 2–2.5 mm long. *Notopleura biloba* and *N. torrana* are sympatric and apparently closely related to each other. *Notopleura biloba* is included in the "*Notopleura macropodantha* group" discussed in the introductory portion of this article.

Paratypes. COLOMBIA. **Chocó:** San José del Palmar, El Corcovado, finca Ayaconas, *Franco et al. 1601* (COL, MO); San José del Palmar, Río Negro, Cerro del Torrá, vertiente oriental del Río Negro, abajo del helipuerto, *J. E. Ramos et al. 1060* (CUVC, MO); Cerro del Torrá, vertiente nordeste, abajo de pista de helicópteros, *Silverstone[-Sopkin] 1338* (COL, CUVC); Cerro del Torrá, vertiente nororiental, *Silverstone-Sopkin et al. 1717* (COL, CUVC).

I. 3. Notopleura bryophila C. M. Taylor, sp. nov. TYPE: Ecuador. Loja: Cogradia, Saraguro–Loja, Km 40.2, 3°49′S, 79°18′W, 2580 m, 9 Dec. 1994, *P. M. Jørgensen, C. Ulloa, H. Vargas & P. Lozano 1380* (holotype, QCNE; isotype, MO-5006169). Figure 3D, E.

Haec species a *Notopleura marginata* stipularum vagina bene evoluta appendicem interpetiolarem succulentam conicam gerente, pedunculo 0.5–5.5 cm longo internodium caulinum non excedente atque pyrenarum marginibus et porcis dorsalibus tribus acutis distinguitur.

Erect, terrestrial, succulent herbs or soft shrubs to 1 m tall, unbranched; stems glabrous. *Leaves* elliptic to elliptic-oblong or ovate, 9–17.5 × 4–7.5 cm, at apex acute to somewhat acuminate, at base cuneate to obtuse, drying membranaceous to papyraceous, adaxially puberulous to glabrescent, abaxially concolorous and densely puberulous; secondary veins 11 to 13 pairs, looping to interconnect, submarginal veins well marked and very close to margins, adaxially venation plane, abaxially costa prominent, secondary veins prominulous, and remaining venation plane and not at all visible or often intersecondary veins developed and visible; margins plane, entire; *petioles* 0.8–4.5 cm long, puberulous to glabrescent; *stipules* glabrous, sheath truncate to rounded, 1.5–2 mm long, persistent on distalmost 2 to 3 nodes, with interpetiolar appendage inserted above medially, conical, 1–3 mm long, succulent, divergent, entire to shortly bifid, caducous. *Inflorescences* pseudoaxillary, ascending, paniculate, green, densely puberulous to hirtellous; peduncles 0.5–5.5 cm long, shorter than or equal to the next stem internode; branched portion rounded-corymbiform, 1.5–4 × 1.6–6.5 cm, with 1 to 2 pairs of secondary axes, these 2 per node, dichasially branched; bracts triangular to ovate or lanceolate, acute, entire, those subtending secondary axes 2–4 mm long, those subtending flowers 1–2 mm long; *flowers* subsessile in loose glomerules of 2 to 5; hypanthium cylindrical, ca. 1 mm long, glabrous to densely puberulous; *calyx limb* densely puberulous, 1–1.2 mm long, 5-lobed for 1/4–1/2, lobes triangular, entire; *corolla* slenderly funnel-

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& Vodicka 5612 (MO). G–I, *Notopleura costaricensis* C. M. Taylor. —G. Flower bud with two bracts; based on *Lawton 995* (F). —H. Stem node with stipule and basal portions of petioles; based on *Dryer 191* (F). —I. Stem with leaves and infructescence; based on *Burger & Baker 9704* (F). C, F, H to same scale as B; E to same scale as D.

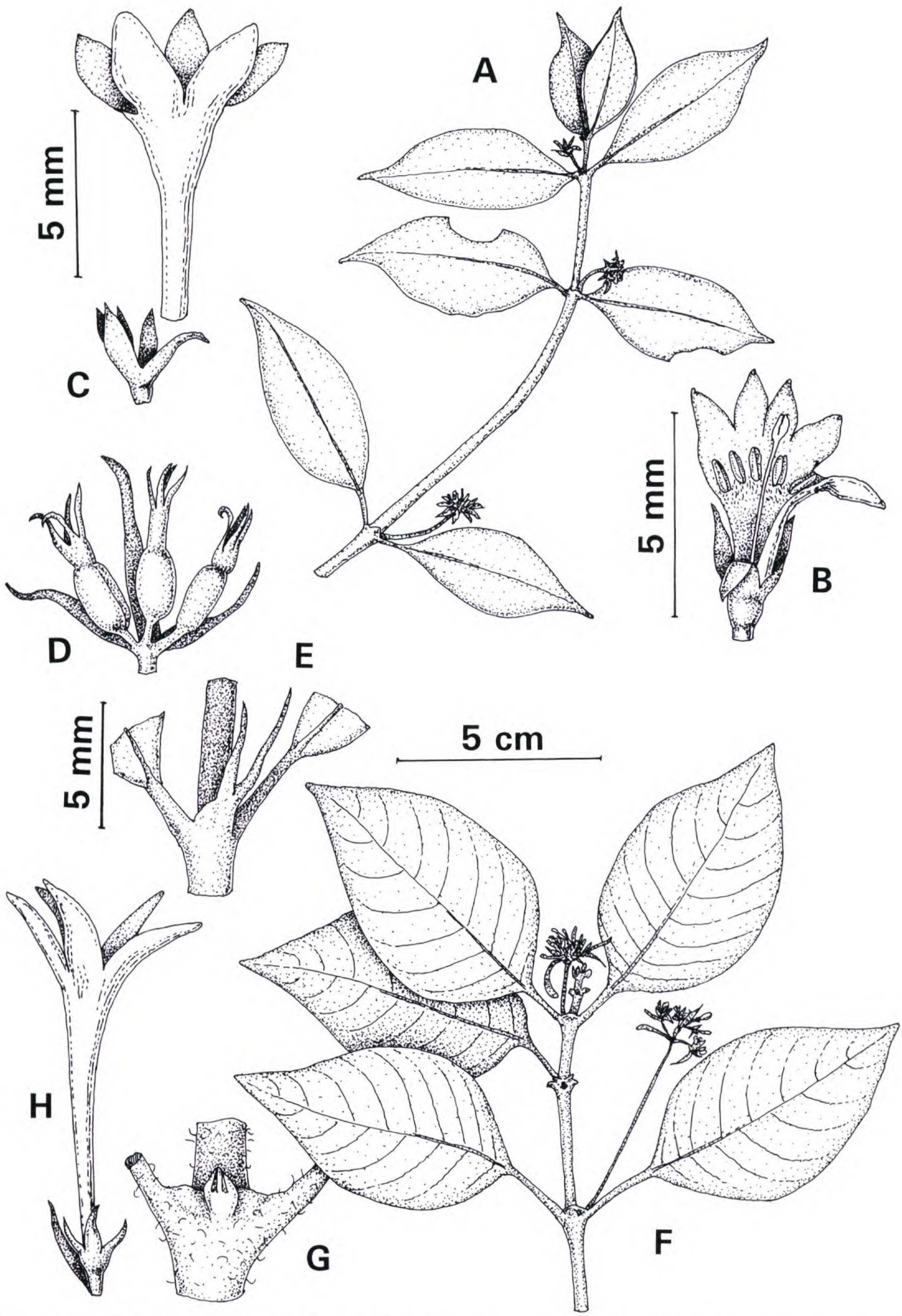

Figure 2. A, B, *Notopleura torrana* C. M. Taylor, based on *Silverstone-Sopkin et al. 4395* (MO). —A. Stem with leaves and inflorescences. —B. Flower at anthesis, partially dissected. —C. *Notopleura longiflora* C. M. Taylor, flower at anthesis, partially dissected; based on *Rodriguez & Giraldo 698* (JAUM). D, E, *Notopleura biloba* C. M. Taylor, based

form, yellow in bud apparently becoming white at anthesis, externally glabrous to puberulous, internally apparently glabrous, tube 5–6 mm long, lobes 5, 1–2 mm long, triangular, dorsally smooth; *anthers* ca. 0.8 mm long, situated near middle of tube; *stigmas* 2, ca. 0.8 mm long, situated in corolla throat. *Infructescences* similar to inflorescences or occasionally with axes becoming monochasial and elongated; *fruits* ellipsoid, 6 × 5–5.5 mm, white or possibly blue, glabrous, subsessile; *pyrenes* 2, in cross section hemispherical, dorsally with three sharp longitudinal ridges and margins sharp and divergent.

Habitat, distribution, and phenology. In montane wet forest at 2500 to 3200 m, central to southern Ecuador; collected in flower and fruit in July and September though December.

Notopleura bryophila is distinguished by its relatively small leaves, stipules with a well-developed sheath bearing a conical, succulent, interpetiolar appendage, peduncles 0.5–5.5 cm long and nearly always equal to or shorter than the accompanying distal stem internode, rounded-corymbiform inflorescences, and pyrenes with three sharp dorsal ridges and the margins acute. The species epithet refers to the habitat of this species, in high, wet, cloudy forest and also honors bryologist Robert E. Magill, a native of Texas and director of the Division of Research of the Missouri Botanical Garden, who greatly facilitated this work on *Notopleura*. *Notopleura bryophila* is similar to *N. marginata* (Bentham) Bullock (= *Psychotria hartwegiana* Standley); *N. marginata* differs from *N. bryophila* in its leaf margins that are plane to often crisped, stipules with a rounded erose interpetiolar lamina, peduncles 3.5–10 cm long and nearly always markedly longer than the accompanying distal stem internode, corollas that are orange or yellow in bud becoming yellow throughout or sometimes white on the tube at anthesis, and pyrenes that are dorsiventrally flattened with the margins rounded and dorsally smooth or with one or rarely three low rounded longitudinal ridges. These are the only two species of *Notopleura* for which flower colors other than white have been regularly noted. The fruits are described as white on all but one collection: the label of *Wiggins 11034* describes them as "china blue." A very few other Neotropical Rubiaceae species do have fruits that may be white or blue, with each color borne on a different plant [e.g., *Gonzalagunia spicata* (Lamarck) Gómez, Puerto Rico, Liogier, 1997, pers. obs.].

Paratypes. ECUADOR. **Azuay:** Sevilla de Oro, *Harling 1365* (S). **Bolívar:** Urcu-corral, Chillanes, *Acosta S. 6606* (F); ca. 10 km S of Chillanes, *Larsen et al. 45493* (AAU); West Cordillera above Balsapampa, *Rimbach 243* (F); Western Cordillera between Chimbo and Balsapampa, *Rimbach 582* (S). **Carchi:** high ridge across Río La Plata from Tambo La Palma, *Steere 8094* (F). **Chimborazo:** Pallatanga, comunidad Jesús del Gran Poder, from Panza Redonda on main highway, 2 km S on cobble road, ca. 4 km NE of Pallatanga, *J. L. Clark et al. 1390* (MO, QCNE); Pagma, *Wiggins 11034* (F, US). **Imbabura:** Cordillera Occidental, Azabí, *Acosta S. 14683* (F); Cotacachi, Tablachupa, Apuela, Finca de Jorge Vaca, *E. Gudiño & Cuamacás 1952* (MO); Cotacachi–Apuela road, Hacienda Tablachupa, *P. M. Jørgensen 61608* (AAU); Fila de Moinala, above Río Asabí, *Steere 8192* (F). **Pichincha:** Reserva Geobotánica Pululahua, camino a Lulumbamba, *C. E. Cerón 2565* (MO); in Pichincha prope Verdecocha, *Sodiro 84/33* [B destroyed, photo (Rockefeller neg. #475) F, MO]; Bosque Protector Pasochoa, 30 km SO de Quito, *J. F. Naranjo O. 58* (MO); Quito, Hacienda Tanlahua, 10 km N de San Antonio de Pichincha, Loma Monte Redondo, *H. Vargas et al. 254* (MO, QCNE). **Zamora–Chinchipe:** Campanas, al E de El Pan, Cordillera Oriental, *Acosta S. 5018* (F); Parque Nacional "Podocarpus," around pass on road Loja–Zamora, *Madsen 86974* (AAU); Km 16, road Loja–Zamora, *Sparre 16501* (S).

I. 4. Notopleura capitata C. M. Taylor, sp. nov. TYPE: Costa Rica. Heredia: Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, common in cacao forest along West River Road, ca. 100 m, 8 Apr. 1982, *B. Hammel 11624* (holotype, MO-3222891; isotype, DUKE). Figure 4E, F.

Haec species a congeneris appendicibus stipularibus divergentibus conicis succulentis, inflorescentia capitata sessili subsessilive, limbo calycino 1.5–2.5 mm longo, lobulis corollinis dorsaliter laevibus vel incrassationem usque ad 0.5 mm longam gerentibus, fructu albo atque pyrenarum valde dorsiventraliter complanatarum carina marginibusque valde incrassatis distinguitur.

Succulent, terrestrial, erect herbs or soft shrubs to 3 m tall, unbranched; stems glabrous or puberulous becoming glabrescent. *Leaves* elliptic to obovate, 16–35 × 5.5–16 cm, at apex acute to shortly acuminate, at base acute to obtuse, drying papyraceous to membranaceous, adaxially glabrous,

←

on *Silverstone-Sopkin et al. 1714* (MO). —D. Portion of inflorescence with three dry fruits. —E. Stem node with stipule and basal portions of leaves. F–H, *Notopleura zarucchiana* C. M. Taylor. —F. Stem with leaves and two inflorescences; based on *Callejas & Roldán 10511* (MO). —G. Stem node with stipule and basal portions of petioles; based on *Callejas et al. 6311* (HUA). —H. Flower at anthesis; based on *Callejas et al. 6311* (HUA). D, E, G, H to same scale.

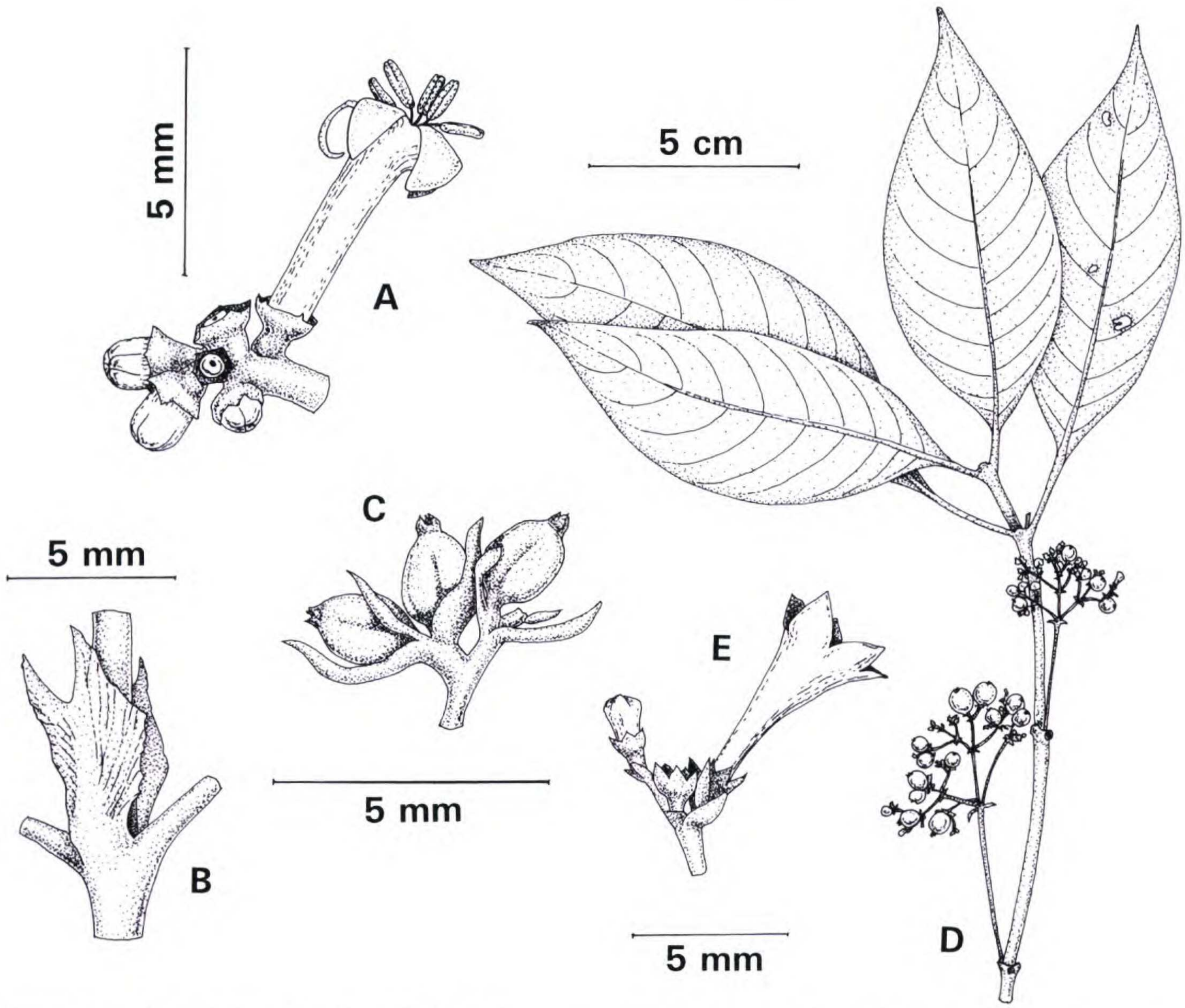

Figure 3. —A. *Notopleura hypolaevis* C. M. Taylor, portion of inflorescence with one flower at anthesis, three young flower buds, and two old flowers from which corollas have fallen; based on *Ståhl et al. 2907* (GB). B, C, *Notopleura corymbosa* C. M. Taylor. —B. Stem node with stipule and basal portions of petioles; based on *Smith & Dunn 3428* (MO). —C. Portion of infructescence with three dry fruits; based on *Øllgaard et al. 35706* (AAU). D, E, *Notopleura bryophila* C. M. Taylor. —D. Stem with leaves and infructescences; based on *Jørgensen et al. 1380* (MO). —E. Portion of inflorescence with one flower at anthesis, one young flower bud, and one old flower from which the corolla has fallen; based on *Gudiño & Cuamacás 1952* (MO).

abaxially paler and glabrous or puberulous becoming glabrescent; secondary veins 10 to 17 pairs, not looping to interconnect or often doing so near apex, adaxially costa plane or prominulous and remaining venation plane, costa and secondary veins often whitened, abaxially costa prominent, secondary veins prominulous, and remaining venation plane and invisible; *petioles* 1.5–6.5 cm long, glabrous or densely puberulous to glabrescent; *stipules* glabrous, united around stem or to petioles into a sheath 1–3 mm long, rounded to truncate, generally persisting with leaves, with an interpetiolar appendage 3–4 mm long, medially inserted, conical, succulent, divergent, triangular, flattened, marginally winged with wings 0.5–1 mm wide, hyaline, entire. *Inflorescences* pseudoaxillary, capitate, green, ascending to deflexed, puberulous; peduncles 1–12 mm long; heads 1 per axil, subglobose, 1–2 cm diam.; bracts ovate to lanceolate or triangular, 2–7 mm long, acute to obtuse, entire; *flowers* sessile; hypanthium turbinate-cylindrical, ca. 0.8 mm long, glabrous; *calyx limb* glabrous to puberulous, 1.5–2.5 mm long, lobed for 2/3 to nearly completely, lobes 5, deltoid to narrowly triangular and acute, entire to ciliolate; *corolla* tubular to slenderly infundibuliform, white, externally glabrous to puberulous, internally glabrous except hirtellous at stamen insertion, tube ca. 5 mm long, lobes 5, ca. 2 mm long, narrowly triangular, dorsally smooth or with 1 linear to conical appendage to 0.5 mm long; *anthers* ca. 1 mm long, positioned in upper part of corolla tube, included; *stigmas* 2,

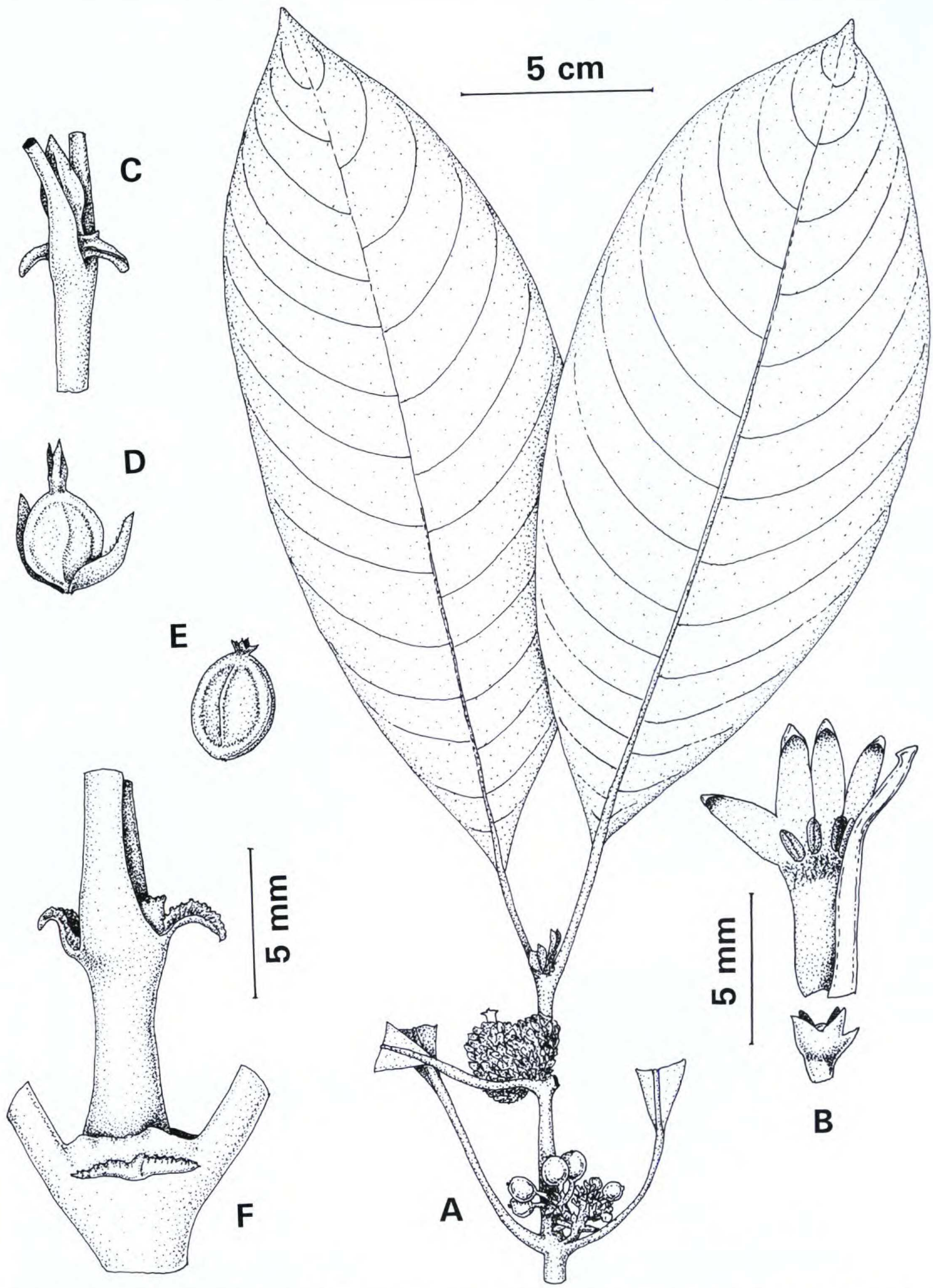

Figure 4. A, B, *Notopleura hurtadoi* C. M. Taylor. —A. Stem with leaves, inflorescences, and infructescences; based on *Hurtado & Alvarado 2132* (MO). —B. Flower at anthesis, partially dissected; based on *Alvarado 5* (MO). C, D, *Notopleura sanblasensis* C. M. Taylor, based on *Herrera & González 1334* (MO). —C. Stem node with stipule and basal portions of petioles. —D. Dry fruit with two bracts. E, F, *Notopleura capitata* C. M. Taylor. —E. Dry fruit; based on *Davidse 24332* (MO). —F. Stem portion with two nodes with stipules and basal portions of petioles; based on *Hammel 11624* (MO). C, D, E, F to same scale.

linear, exserted. *Infructescences* similar to inflorescences or becoming laxer, 6–10 cm diam., occasionally to rounded-corymbiform with axes developed at least shortly; *fruits* ellipsoid, 5–6 × 4.5–5 mm, white, glabrous, sometimes with stipes to 1 mm long; *pyrenes* 2, strongly dorsiventrally flattened, dorsally with 1 thickened central ridge and markedly thickened margins.

Habitat, distribution, and phenology. In wet forest at 10 to 1700 m on Caribbean slopes from Nicaragua to eastern Panama, and sometimes extending over the Continental Divide to the western mountain slopes; collected in flower February through July and October, in fruit in February, April, June through August, and October.

Notopleura capitata is distinguished by its combination of stipules with succulent, conical, divergent appendages, capitate sessile or subsessile inflorescences, calyx limbs 1.5–2.5 mm long, corollas with the lobes dorsally smooth or with a thickening to 0.5 mm long, white fruits, and strongly dorsiventrally flattened pyrenes with the keel and margins markedly thickened. The species epithet refers to the inflorescence arrangement. In some plants the infructescences later expand markedly, with the internodes of the axes becoming as much as 5 mm long between each fruit (e.g., *MacDougal 1015*). This new species was included in the original circumscription of *N. tonduzii* by Standey, and more recently has been included in the circumscription of *N. aggregata* by Dwyer (1980), Burger and Taylor (1993), and Taylor (1991, 2001a, 2001b). However, with closer study the capitate inflorescence arrangement can be seen to be correlated with other characters such as the calyx length, and these features do not intergrade with any other species of *Notopleura*. *Notopleura aggregata* and *N. tonduzii* both differ from *N. capitata* in their inflorescences with clearly developed, branching axes (i.e., while in flower). Also similar to *N. capitata* is *N. panamensis*; *N. panamensis* differs from *N. capitata* in its longer calyx lobes, 3.5–4.5 mm long, and its corolla lobes with linear dorsal appendages 3–4 mm long. *Notopleura capitata* is also similar to *N. pacorana* and *N. sanblasensis*, both described later in this article; the distinctions between *N. capitata* and these last species are discussed under their respective treatments. *Notopleura capitata* is included in the "*Notopleura aggregata* group" discussed in the introductory part of this article.

Although the flowers studied were not adequately preserved for confirmation of this aspect, Beach noted for two collections from La Selva (*Beach 1348, 1349*) that this species is distylous.

Paratypes. COSTA RICA. **Alajuela:** San Carlos, Peñas Blancas, *Haber & Bello 1941* (MO); 15 km NNW of San Ramón by road, 2.5 km N of Balsa on road to San Lorenzo, *Liesner & Judziewicz 14742* (MO); 13 km W of Fortuna on road to the Arenal Dam, near crossing of Río Tabacón, *Liesner et al. 15242* (MO). **Cartago:** Tapantí Hydroelectric Reserve along Río Dos Amigos, *Croat 36193* (MO); Tapantí Hydroelectric Project, 4–10 km beyond entrance to project, *Utley & Utley 5186* (MO). **Guanacaste:** Liberia, siguiendo el camino entre Nueva Zelandia (Quebrada Grande) y Dos Ríos Upala, San Gabriel, *G. Herrera et al. 2906* (MO). **Heredia:** Sarapiquí, zona protectora de San Carlos, Finca La Selva, the OTS biological Station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, near Puerto Viejo de Sarapiquí, *Beach 1348* (MO), *1349* (MO), *Faivre 12* (INB, MO), *Folsom 8727* (DUKE, MO), *Hammel 7933* (DUKE, MO), *Hammel & Trainer 13243* (DUKE, MO), *MacDougal 1015* (DUKE, MO), *McDowell 151* (DUKE, MO), *Opler 827* (MO). **Limón:** along Río Reventazón below farmhouse, Finca Castilla, *Dodge & Goerger 9404* (MO); Cerro Tortuguero, ladera NO, pendientes pronunciadas 4 km al N de Tortuguero, rumbo a la Barra del Colorado, *R. Robles 2122* (CR, MO). **Puntarenas:** foothills of the Cordillera de Talamanca, along Río Bella Vista, NW of Las Alturas, *Davidse 24332* (MO); Monte Verde [sic] area, valley of Río San Luis just S of Monte Verde, *Hammel & Haber 13919* (MO); Monteverde, Nuboso [trail], *Koptur SK-414* (MO). NICARAGUA. **Zelaya:** ca. 6.3 km S of bridge at Colonia Yolaina and ca. 0.8 km S of ridge Serranías de Yolaina on road to Colonia Manantiales (Colonia Somoza), *Stevens 6414* (MO). PANAMA. **Bocas del Toro:** along road between Gualaca and Chiriquí Grande, 6.6 mi. N of middle of bridge over Fortuna Lake, *Croat 66720* (MO, PMA); along oleoducto road between Continental Divide and Chiriquí Grande, *Hammel 13694* (MO); Cana–Cuasi Trail (Camp 2), Chepijana District, *Terry & Terry 1425* (MO). **San Blas:** trail from Río Esadi to Cerro Banega, *de Nevers & Herrera 6657* (MO, PMA).

I. 5. Notopleura corniculata C. M. Taylor, sp. nov. TYPE: Ecuador. Pichincha: road Santo Domingo–Quito, Cornejo Astorga (Tandapi), 1800 m, 7–10 May 1968, *G. Harling, G. Storm & B. Ström 9397* (holotype, GB; isotype, US). Figure 5A, B.

Haec species a *Notopleura anomothyrsa* lobulis corollinis appendices abaxiales triangulares vel anguste triangulares complanatas interdum alatas 1–2 mm longas gerentibus atque pyrenarum dorsiventraliter complanatarum carina centrali ac marginibus incrassatis distinguitur.

Succulent, terrestrial herbs or soft shrubs to 1.5 m tall, erect, unbranched; stems glabrous. *Leaves* elliptic to elliptic-oblong or elliptic-ovate, 11.5–30 × 5–12 cm, at apex acute or usually acuminate with a slender tip, at base acute to obtuse, drying papyraceous to membranaceous, adaxially glabrous, abaxially paler and densely puberulous to glabrescent; secondary veins 15 to 18 pairs, looping to interconnect in well-developed submarginal veins, adaxially venation plane, abaxially costa prominent, secondary veins prominulous, and high-

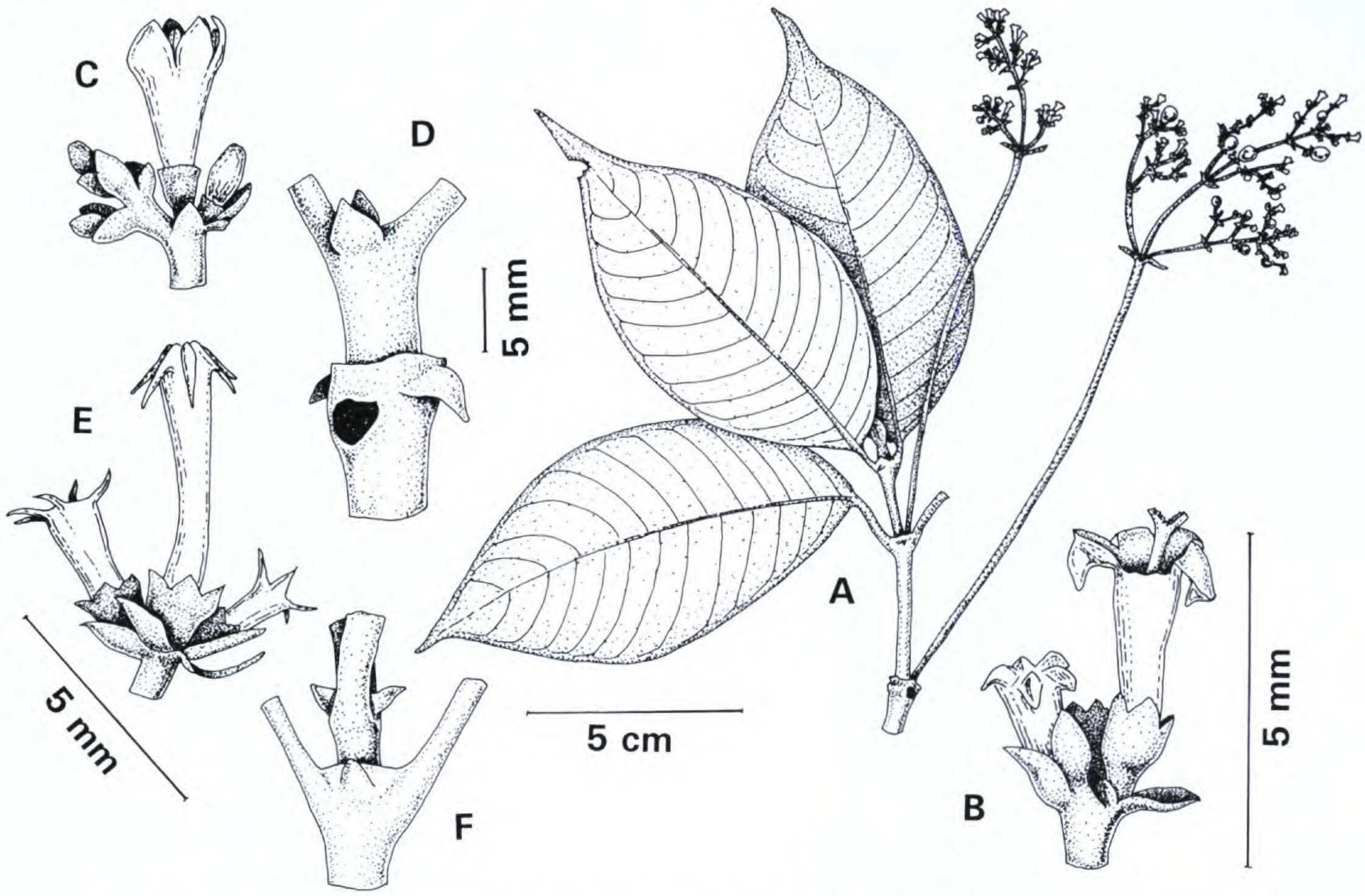

Figure 5. A, B, *Notopleura corniculata* C. M. Taylor, based on *Harling et al. 9397* (US). —A. Stem with leaves, inflorescence with only flowers, and inflorescence with flowers and developing fruits. —B. Portion of inflorescence with one flower at anthesis, one young flower bud, and (in back) one old flower from which the corolla has fallen. C, D, *Notopleura montana* C. M. Taylor; based on *Croat 50798* (MO). —C. Portion of inflorescence with one well-developed flower bud, with its lobes partially spread, and one younger flower bud. —D. Stem portion with two nodes and basal portions of petioles. E, F, *Notopleura spiciformis* C. M. Taylor, based on *van der Werff et al. 12081* (MO). —E. Portion of inflorescence with one well-developed flower bud and several younger buds. —F. Stem portion with two nodes and basal portions of petioles. C, E to same scale; D, F to same scale.

er-order venation plane and invisible or sometimes intersecondary veins visible; margins plane; *petioles* 1.5–5 cm long, glabrous to puberulous; *stipules* glabrous, with sheath 1–1.5 mm long, truncate, persistent on distalmost 2 to 3 nodes, with one interpetiolar appendage 2–2.5 mm long, medially inserted, conical, succulent, divergent, acute, caducous. *Inflorescences* pseudoaxillary, paniculate, green, ascending, densely puberulous to hirtellous; peduncles 7–18 cm long; branched portion cylindrical to narrowly pyramidal, 3.5–15 × 3–12 cm, branched to several degrees, with secondary axes produced at 3 to 4 nodes, 2 per node, with tertiary axes dichasially branched; bracts narrowly triangular, acute, entire, those subtending secondary axes 3–5 mm long, those subtending flowers 0.5–1.5 mm long; *flowers* sessile or subsessile in glomerules of 2 to 3; hypanthium turbinate to cylindrical, ca. 0.8 mm long, glabrous; *calyx limb* glabrous, 0.8–1 mm long, 5-lobed shallowly or for as much as 1/3 its length; *corolla* salverform, white, externally glabrous except sometimes puberulous on tube portion, internally glabrous except hirtellous at stamen attachment, tube 3–5 mm long, lobes 5, deltoid, 1–1.2 mm long, abaxially with an appendage 1–2 mm long, triangular to narrowly so, apparently flattened and winged; *anthers* in long-styled form ca. 1 mm long, included, situated above middle of corolla tube, in short-styled form not seen; *stigmas* 2, in long-styled form ca. 0.8 mm long and exserted, in short-styled form ca. 1.2 mm long, included, situated just above middle of corolla tube. *Infructescences* similar to inflorescences or with axes more expanded; *fruits* ellipsoid to orbicular, 4–6 × 4–6 mm, white, glabrous; *pyrenes* 2, markedly dorsiventrally flattened, dorsally with 1 central ridge, this sharp to flattened or furrowed (i.e., appearing as 2 closely set narrow central ridges), margins thickened, rounded to sharp.

Habitat, distribution, and phenology. In wet premontane and montane forests, Andean southern Colombia to central Ecuador at 1300 to 2200 m; collected in flower in February, March, May, July, October, and December, in fruit in February, May, and July.

Notopleura corniculata is similar in its general aspect to *N. anomothyrsa*, but *N. anomothyrsa* is distinguished from *N. corniculata* by its corolla lobes each with a conical, rounded, abaxial appendage ca. 0.5 mm long, peduncles 1.5–13 cm long, and pyrenes dorsally with 3 to 5 equally developed longitudinal ridges. The epithet of this new species refers to the appendages or "horns" on the corolla lobes, which are easily mistaken for the corolla lobes themselves. These structures are found in other Andean Rubiaceae (e.g., *Palicourea corniculata* C. M. Taylor, *P. cornigera* C. M. Taylor; Taylor, 1997), and their function is at present unknown. Occasional immature pyrenes have three evident longitudinal ridges, but the two lateral ridges diminish and eventually disappear as the pyrene matures.

Paratypes. COLOMBIA. **Nariño:** Ricaurte, Reserva Natural La Planada, bosque Santa Rosa, *C. Restrepo 572* (MO). ECUADOR. **Carchi:** Norte del Carmen, camino a Chical, *W. Palacios et al. 9782* (MO, QCNE). **Cotopaxi:** San Francisco de Las Pampas, Reserva La Otonga, Montaña Las Nubes, *Delprete et al. 6240* (NY). **Pichincha:** Quito, Chiriboga, en la carretera vieja Quito–Santo Domingo, Reserva Forestal La Favorita, cerca al Río Saloya, *C. E. Cerón et al. 7917* (MO), *Croat 72161* (MO); 1 km above Tandapi on Quito–Santo Domingo road, *Harling & Andersson 23238* (GB); road Chiriboga–Santo Domingo, Km 2, *Persson & Gustafsson 83* (GB), Km 15, *Persson & Gustafsson 98* (GB, MO); along road near Nanegal, *van der Werff et al. 12318* (MO).

I. 6. Notopleura corymbosa C. M. Taylor, sp. nov. TYPE: Ecuador. Zamora–Chinchipe: Zamora, Parque Nacional "Podocarpus," guardería en Río Bombuscaro, 970 m, 23 Jan. 1995, *W. Palacios & M. Tirado 13216* (holotype, QCNE; isotype, MO-5568184). Figure 3B, C.

Haec species a *Notopleura micayensi* stipulis laminaribus marginibus integris, limbo calycino 1–1.2 mm longo atque pyrenis marginibus laevibus vel leviter incrassatis distinguitur.

Erect, terrestrial, succulent herbs to 1.5 m tall, unbranched; stems glabrous. *Leaves* elliptic to obovate, 16–26 × 8–11 cm, at apex acute to usually shortly acuminate, at base cuneate to obtuse, drying papyraceous to membranaceous, adaxially glabrous, abaxially paler and puberulous to glabrescent; secondary veins 11 to 14 pairs, not looping to interconnect, adaxially venation plane, abaxially costa prominent, secondary veins prominulous, and remaining venation plane and invisible; margins plane; *petioles* 4–6 cm long; *stipules* glabrous, with sheath 0.5–2 mm long, truncate, persisting on distalmost 3 to 5 nodes, with interpetiolar appendage expanded, laminar, inserted near base of sheath or medially, elliptic to ovate, 6–20 mm long, caducous, drying papyraceous or chartaceous, bilobed for 1/3–1/2, lobes acute to rounded, sinus rounded, margins entire to a little irregular. *Inflorescences* and *flowers* not seen. *Infructescences* pseudoaxillary, usually borne with lower leaves, paniculate, purple, glabrous, ascending; peduncles 0.3–0.8 cm long; branched portion rounded-corymbiform, 2–3 × 5–5.5 cm, with developed secondary axes at 1 to 2 nodes, these 2 per node, branched to one or more additional orders, terminating in glomerules or cymules; bracts entire, acute, those subtending secondary axes lanceolate, 4–14 mm long, those subtending fruits linear to narrowly triangular, lanceolate, or narrowly elliptic, 5–6 mm long; *fruits* ellipsoid, ca. 5 × 3 mm, white, glabrous, sessile or subsessile in glomerules or dichasial cymules of 3 to 7, with persistent calyx limb 1–1.2 mm long, glabrescent, 5-lobed for 3/4 or more, lobes narrowly triangular, acute; *pyrenes* 2, dorsiventrally strongly flattened, dorsally smooth or with 1 rounded to sharp, central, longitudinal ridge, margins smooth to a little thickened and rounded.

Habitat, distribution, and phenology. In wet premontane forest at 970 to 1400 m in the eastern slopes of Ecuador; collected in fruit in January, April, and May.

Notopleura corymbosa is similar to *N. micayensis* and *N. thesceloantha* (Steyermark) C. M. Taylor in its expanded laminar stipules, short peduncles, inflorescences that are congested to subcapitate and have few secondary axes but well-developed bracts, white fruits, and pyrenes that are dorsiventrally flattened and dorsally have one central ridge. *Notopleura corymbosa* has been confused with both of these species previously; *N. micayensis* differs from *N. corymbosa* in its stipules that are strongly erose to fimbriate but not evidently bilobed or sometimes divided but only up to 1/4, its calyx limbs ca. 2 mm long, and its pyrenes with the margins markedly thickened; *N. thesceloantha* differs from *N. corymbosa* in its floral bracts 8–14 mm long, its calyx limbs ca. 4 mm long, and its distribution in lowland forests at 60–300 m in Ecuador. The specific epithet of this new species refers to the shape of the infructescences.

Paratypes. ECUADOR. **Pastaza:** Mera, *Harling 3142* (S); S of Shell-Mera, *Steere & Camp 8313* (F). **Sucumbíos:** road Baeza–Lago Agrio, *B. Øllgaard et al. 35706* (AAU); Salto San Rafael, along Río Quijos, *J. F. Smith & Dunn 3428* (MO); San Rafael, ca. 48 km NE of El Chaco, *Ståhl et al. 2433* (AAU, GB).

I. 7. Notopleura costaricensis C. M. Taylor, sp. nov. TYPE: Costa Rica. Puntarenas & Alajuela: in and around the Monteverde Nature reserve, mostly on the Pacific watershed, 10°18′N, 84°47′W, 1450–1640 m, 31 Oct. & 2 Nov. 1975, *W. Burger & R. Baker 9704* (holotype, F-1884792). Figure 1G–I.

Haec species a congeneris laminis stipularibus interpetiolaribus erosis bene evolutis, inflorescentiae axe secundario evoluto in florem desinente, bracteis floralibus bene evolutis, floribus sessilibus in glomerulos dispositis, limbo calycino 1.2–1.5 mm longo, lobulis corollinis appendices abaxiales lineares bene evolutas gerentibus, fructu albo atque pyrenis dorsaliter 4- vel 5-porcatis distinguitur.

Herbs or soft shrubs to 2 m tall, terrestrial, succulent, erect, unbranched; stems glabrous. *Leaves* elliptic, 13.5–23 × 6.5–10.5 cm, at apex acute to usually shortly acuminate, at base acute to cuneate, adaxially glabrous, abaxially pale and densely puberulous becoming glabrescent, drying membranaceous to papyraceous; secondary veins 14 to 19 pairs, looping to interconnect, adaxially venation plane or sometimes costa a little thickened, abaxially costa prominulous to prominent, secondary veins prominulous, and remaining venation plane and invisible or rarely intersecondary veins visible; margins plane; *petioles* 1.5–6 cm long, densely puberulous to glabrous; *stipules* glabrous, with sheath markedly reduced, with well-developed interpetiolar lamina inserted terminally on sheath, ovate to elliptic, 10–16 mm long, persistent on distalmost 2 to 3 nodes, erose to laciniate and often shortly bifid to bilobed for 1/3. *Inflorescences* pseudoaxillary, paniculate (often rather congested when young), green, puberulous to glabrescent; peduncles 0.5–4 cm long; branched portion rounded-corymibiform, 1.5–3 × 2–5 cm, with 1 to 2 pairs of secondary axes, these each terminating in 1 glomerule or less often 3 closely grouped glomerules; bracts elliptic to ovate or oblanceolate, 2–4 mm long, acute to obtuse or rounded, entire; *flowers* sessile in subglobose glomerules of 5 to 9; hypanthium turbinate, ca. 1 mm long, glabrous; *calyx limb* glabrous, 1.2–1.5 mm long, deeply 5-lobed, lobes ligulate or oblanceolate to lanceolate, obtuse, entire to ciliolate; *corolla* funnelform, white, externally and internally glabrous, tube ca. 4 mm long, lobes 5, ca. 1 mm long, with a linear abaxial appendage ca. 1 mm long; *anthers* not seen; *stigmas* 2, linear, 0.5–1 mm long, apparently situated in corolla throat. *Infructescences* similar to inflorescences; *fruits* ellipsoid to oblanceolate, ca. 5 × 3 mm, white, glabrous, with stipes to 1 mm long; *pyrenes* 2, dorsiventrally flattened, dorsally with 4 to 5 rounded longitudinal ridges, margins rounded.

Distribution, habitat, and phenology. In wet premontane and montane forest, in Tilarán and Talamanaca ranges in Costa Rica at 1000 to 2300 m; collected in flower in February, March, June, September, and December, in fruit in October and November.

Notopleura costaricensis is distinguished by its combination of stipules with well-developed erose laminas, inflorescences with the secondary axes developed and terminating in one to three glomerules of sessile flowers, well-developed bracts, calyx limbs 1.2–1.5 mm long, corolla lobes with well-developed, linear, abaxial appendages, white fruits, and pyrenes dorsally with 4 to 5 ridges. The specific epithet refers to its geographic distribution. It has previously been confused with *N. aggregata* and *N. tonduzii*, both of which are sympatric but have stipules with a well-developed sheath bearing a medial, conical, short appendage and pyrenes that dorsally have only one central ridge and the margins markedly thickened. *Notopleura costaricensis* has also been confused with *N. dukei* (Dwyer) C. M. Taylor, but *N. dukei* has 9 to 13 pairs of secondary leaf veins and peduncles 2.5–9 cm long. *Notopleura capitata* is included in the "*Notopleura aggregata* group" discussed in the introductory part of this article.

Paratypes. COSTA RICA. **Alajuela–Guanacaste–Puntarenas:** in and around the Monteverde Nature reserve, mostly on the Pacific watershed, *Lawton 995* (F). **Alajuela–Puntarenas:** Monteverde, Cordillera de Tilarán, *Dryer 191* (F). **Cartago:** mountains above Platanillo, *Wilbur & Stone 8647* (DUKE). **Puntarenas:** Monte Verde [sic] Reserve, along Sendero Nuboso, *Hammel 13860* (DUKE); Osa, Fila Costeña, Fila Cruces, cabeceras del Río Piedras Blancas, Cerro Anguciana, faldas al O, *Hammel et al. 19223* (F); above Wilson's Finca, 6 km S of San Vito de Java, *Raven 20894* (F), *21790* (F). **San José:** Pérez Seledón, Carretera Interamericana Km 115–116, *Hammel et al. 18051* (CR, F), Km 110, S of División, *Hammel & Hammel 18532* (INB, MO).

I. 8. Notopleura hurtadoi C. M. Taylor, sp. nov. TYPE: Ecuador. Napo: cantón Archidona, faldas al S del volcán Sumaco, carretera Hollín–Loreto, Km 50, comuna Huahua Sumaco, 00°43′S, 77°34′W, 18–21 May 1989, *F. Hurtado & A. Alvarado 2132* (holotype, MO-5017089). Figure 4A, B.

Haec species a *Notopleura leucantha* foliorum costa adaxialiter plana, bracteis floralibus obtusis usque rotundatis, limbo calycino 1–2 mm longo atque lobulis corollinis ca. 2.5 mm longis appendices dorsales conicas ca. 1.5 mm longas gerentibus distinguitur.

Terrestrial, succulent herbs or low shrubs to 1.5 m tall, unbranched or perhaps little-branched; stems glabrous. *Leaves* elliptic, 11–30 × 4.5–13 cm, at apex acute to usually shortly acuminate, at base cuneate to obtuse, drying papyraceous, adaxially glabrous, abaxially paler and glabrous; secondary veins 11 to 14 pairs, not looping to interconnect, adaxially venation plane, abaxially costa prominent, secondary veins prominulous, and higher-order venation invisible or tertiary venation visible and plane to thickened; *petioles* 2–7 cm long, glabrous; *stipules* glabrous, united around stem or to petioles into a sheath 1–2 mm long, broadly triangular, persistent on apical 3 to 4 nodes, with an interpetiolar appendage 1.5–2 mm long, stout, conical, succulent, divergent to recurved, inserted above medially, entire, glandular adaxially, caducous. *Inflorescences* pseudoaxillary, capitate, glabrous, ascending; peduncles 1 per axil, 1–10 mm long; heads 1 per peduncle, globose to weakly 3-lobed, 1–3 × 2–3 cm; bracts green, glabrous, entire, those external to inflorescence lanceolate to ovate, 6–10 mm long, acute, those subtending flowers oblanceolate, 5–8 mm long, obtuse to rounded, entire to ciliolate, usually falcate, usually hyaline in basal part and dark green in apical part; *flowers* sessile; hypanthium turbinate, ca. 1 mm long, glabrous; *calyx limb* glabrous, 1–2 mm long, lobed for ca. 1/2, lobes 5, irregularly deltoid to narrowly triangular and acuminate, usually unequal by 100% on a single flower, entire to a little erose; *corolla* white to cream, salverform, externally glabrous, internally glabrous except hirtellous at stamen insertion, tube ca. 6 mm long, lobes 5, ca. 2.5 mm long, narrowly triangular, dorsally with a stout conical appendage ca. 1.5 mm long, papillose to puberulous; *anthers* ca. 1.5 mm long, situated in corolla throat, included; *stigmas* 2, ca. 1.2 mm long, linear, situated with or just above anthers. *Infructescences* becoming more expanded than inflorescences, to 3 × 4 cm, sometimes with 1 pair of short secondary axes visible; *fruits* ovoid to ellipsoid, 6 × 5–6 mm, glabrous, red, with stipes to 5 mm long; *pyrenes* 2, strongly dorsiventrally flattened, with 1 sharp central ridge and margins somewhat thickened.

Habitat, distribution, and phenology. In wet forest at 580 to 1230 m on eastern Andean slopes in central and southern Ecuador; collected in flower in April, May, October, and November, in fruit in April, May, and October.

Notopleura hurtadoi is distinguished by its combination of stipules with an interpetiolar sheath bearing a medial conical appendage, capitate inflorescences, oblanceolate, rounded to obtuse floral bracts, corolla lobes with well-developed dorsal appendages, red fruits, and strongly dorsiventally flattened pyrenes. It is similar to *N. leucantha*; *N. leucantha* differs from *N. hurtadoi* in its leaves with the costa prominulous adaxially, acute floral bracts, calyx limb ca. 0.2 mm long, and corolla lobes ca. 1.5 mm long and smooth dorsally. Similarly to several species of *Notopleura*, *N. leucantha* has red fruits that become black at maturity and then are quickly removed by frugivores, and it is very possible that the mature fruits of *N. hurtadoi* are also black at maturity but have not yet been seen by collectors. The species epithet honors Fernando Hurtado, an Ecuadorian botanist working at QCNE who has contributed significantly to our knowledge of the Ecuadorian flora through his excellent plant specimens.

Paratypes. ECUADOR. **Morona–Santiago:** 2–4 km N of Arapicos, *H. Lugo S. 5944* (GB). **Napo:** Archidona, falda al S del volcán Sumaco, carretera Hollín–Loreto, Km 40, Huamaní, *A. Alvarado 5* (MO); Loreto, faldas del volcán Sumaco, al O de Avila Viejo, bloque 19, línea sísmica 8, Compañía Triton, *E. Freire & Cereda 98* (MO, QCNE); carretera Hollín–Loreto, Km 40–50, alrededores de la comunidad Huamaní y del Río Pucuno, *F. Hurtado 854* (MO); carretera Hollín–Loreto Km 25, centro Challuayacu, en trocha hacia la zona del Guagua Sumaco, *F. Hurtado & Alvarado 900* (MO); Archidona, carretera Hollín–Loreto Km 50, comunidad Huahua Sumaco, *F. Hurtado et al. 2017* (MO). **Pastaza:** Mera, *Asplund 18660* (S); 3.5 km N of Puyo, *Fagerlind & Wibom 1071* (S); pozo petrolero "Moretococha" de Arco, 75 km al E de Puyo, *E. Gudiño et al. 997* (MO, QCNE); Canelos, along path to Vera Cruz, *Harling 3255* (S).

I. 9. Notopleura hypolaevis C. M. Taylor, sp. nov. TYPE: Ecuador. Morona–Santiago: near Plan de Milagro on road to Indanza, 1650 m, 3°01′S, 78°29′W, 15 July 1996, *B. Ståhl & J. T. Knudsen 2877* (holotype, GB-182294). Figure 3A.

Haec species a *Notopleura uliginosa* foliorum venatione abaxialiter non manifesta, a *N. iridescente* inflorescentia pluriramosa distinguitur.

Terrestrial, erect, succulent herbs or soft shrubs to 1.5 m tall, unbranched; stems glabrous. *Leaves* elliptic to ovate or narrowly elliptic, 12–23 × 2.8–8.5 cm, at apex acute to acuminate, at base acute to cuneate or obtuse, drying papyraceous and discolorous, glabrous on both surfaces; secondary veins not visible or 10 to 14 pairs and barely discernible, plane on both surfaces; margins plane; *petioles* 1.8–2.5 cm long; *stipules* glabrous, sheath 1.5–2 mm long, broadly rounded, caducous, with interpetiolar appendage conical to triangular and flattened, 1.5–2.5 mm long, acute to shortly bifid, caducous, inserted medially. *Inflorescences* pseu-

doaxillary, paniculate, glabrous, ascending to spreading, pale yellow; peduncles 2–5.5 cm long; branched portion pyramidal to cylindrical, 2.5–5 × 2.5–5 cm, with developed secondary axes produced at 2 nodes, 2 or usually 3 per node, branched to several orders, first dichotomously once, then dichasially, then distally monochasially; bracts deltoid, 0.5–1.2 mm long, entire; *flowers* sessile, borne singly or in glomerules or congested dichotomous cymules of 2 to 5, later individual flowers and/or glomerules becoming separated by prolongation of axes; hypanthium turbinate, ca. 0.5 mm long, glabrous; *calyx limb* 0.8–1 mm long, glabrous, sinuate to 5-denticulate, entire; *corolla* in bud funnelform, cream, externally glabrous, tube to 3.5 mm long, lobes 5, to 1 mm long, abaxially smooth; *anthers* and *stigmas* not seen. *Infructescences* similar to inflorescences, with higher-order axes becoming prolonged and monochasial; *fruits* ellipsoid, ca. 7 × 6 mm, becoming orange then black, glabrous; pyrenes 2, dorsiventrally flattened, dorsally with 1 central, sharp, well-developed ridge with concave sides, margins thickened, sharp.

Habitat, distribution, and phenology. In wet premontane forest of southern Ecuador at 1000 to 1700 m; collected in flower in August, in fruit in July.

Notopleura hypolaevis is distinguished by its leaves with the secondary veins barely or usually not visible abaxially, its stipules with a well-developed sheath bearing a conical interpetiolar appendage, its paniculate pedunculate inflorescences, and its fruits that become orange then black. The specific epithet refers to the smooth, usually unveined abaxial leaf surface. *Notopleura hypolaevis* is similar to *N. iridescens* C. M. Taylor, which is sympatric, and to *N. uliginosa* of the Antilles, Central America, and Caribbean South America. *Notopleura uliginosa* differs from this new species in its leaves with the secondary veins visible and prominulous abaxially and its flowers pedicellate at anthesis; *N. iridescens* differs from this new species in its capitate to subcapitate inflorescences and stipitate fruits. The collection from the Cordillera de Cutucú (*H. Jorgensen CuJ-42*) has relatively narrower leaves but appears to be conspecific with the Ståhl collections.

Paratypes. ECUADOR. **Morona–Santiago:** eastern slope and crest of main Cordillera Cutucú, *H. Jorgensen CuJ-42* (NY); trail between 28 de Febrero and Kenkuim, *Ståhl et al. 2907* (AAU, GB).

I. 10. Notopleura longiflora C. M. Taylor, sp. nov. TYPE: Colombia. Antioquia: Medellín, San José de la Montaña, cuchilla Las Baldias, microcuenca La Iguaná, 6°20′02″N, 75°39′06″W, 2320–2850 m, 7 May 1997, *W. Rodríguez & F. Giraldo 698* (holotype, JAUM-25146). Figure 2C.

Haec species a congeneris foliorum venis secundariis cum marginibus incrassatis conjunctis et venatione tertiaria abaxialiter manifesta, inflorescentia congesta subcapitatave, bracteis floralibus 8–15 mm longis, calycis limbo 5–7.5 mm longo atque corollae glabrae tubo 12.5–14 mm longo distinguitur.

Terrestrial, succulent herbs or low shrubs to 0.4 m tall, unbranched or perhaps little-branched; stems densely hirtellous becoming glabrescent with age. *Leaves* elliptic to lanceolate, 3.5–7.5 × 1.5–2.5 cm, at apex acute, at base cuneate, drying papyraceous, adaxially glabrous, abaxially paler and glabrous except puberulous or hirtellous on costa and secondary veins; secondary veins 8 to 10 pairs, extending to and clearly united with margins, adaxially venation plane, abaxially costa prominent, secondary veins prominulous, and tertiary venation reticulated and thickened; margins markedly thickened, entire or shortly winged; *petioles* 3–12 mm long, hirtellous; *stipules* glabrous, persistent, interpetiolar, broadly triangular, 1–2 mm long, at apex obtuse to acute, with 1 glandular appendage 0.5–1 mm long, caducous. *Inflorescences* pseudoaxillary, capitate to subcapitate, hirtellous, ascending; peduncles 1 per axil, 2.5–4.5 cm long; heads 1 per peduncle, subhemispherical, 1–1.5 × 1.5–2.5 cm (not including corollas); bracts glabrous, narrowly triangular, 8–15 mm long, acute; *flowers* subsessile in glomerules or congested cymules of 2 to 5; hypanthium turbinate, ca. 0.8 mm long, glabrous; *calyx limb* glabrous, 5–7.5 mm long, divided nearly to base, lobes 5, narrowly triangular, acute; *corolla* infundibuliform, white, externally glabrous to sparsely puberulous, internally glabrous, tube 12.5–14 mm long, lobes 5, 3.5–6.5 mm long, lanceolate to ligulate, dorsally smooth; anthers ca. 1.5 mm long, situated just above middle of corolla tube; *stigmas* ca. 1 mm long, situated in corolla throat. *Infructescences* and *fruits* not seen.

Habitat, distribution, and phenology. In wet montane forest at 2800 to 2900 m, in the Cordillera Central of northwestern Colombia; collected in flower in February, May, and July.

Notopleura longiflora is distinguished by the combination of its distinctive leaf venation with the secondary veins uniting with the thickened margins and the tertiary venation visible abaxially, its con-

gested to subcapitate inflorescences, its well-developed bracts, its relatively long calyx limb, and its relatively long glabrous corollas. The corollas are apparently the longest in the genus; the species epithet refers to this characteristic. This new species is similar to *N. zarucchiana* (described later in this article); their distinctions are discussed under this second species. Also similar to *N. longiflora* is *N. macropodantha* of the northern Cordillera Oriental of the Andes, in northeastern Colombia; *N. macropodantha* differs from this new species in its calyx limb ca. 2 mm long, corolla tubes 3–4 mm long, and corolla lobes ca. 1.5 mm long. *Notopleura longiflora* is included in the "*Notopleura macropodantha* group" discussed in the introductory part of this article.

Paratypes. COLOMBIA. **Antioquia:** Medellín, San Cristóbal, Cerro del Padre Amaya, microcuenca Iguaná, *F. Giraldo et al. 1720* (JAUM), *W. Rodríguez & Duque 1034* (JAUM).

I. 11. Notopleura longipedunculoides (C. M. Taylor) C. M. Taylor, comb. nov. Basionym: *Psychotria longipedunculoides* C. M. Taylor, Fieldiana, Bot. n.s. 33: 257. 1993, nom. nov. *Psychotria longipedunculata* Dwyer, Ann. Missouri Bot. Gard. 67: 389. 1980, nom. illeg., not *Psychotria longipedunculata* (Gardner) Müller Argoviensis, Fl. Bras. 6(5): 237. 1881. TYPE: Panama. Veraguas: valley of Río Dos Bocas, 15.6 km NW of Santa Fé, road between Escuela Agrícola Alto Piedra and Calovébora, 450–550 m, 31 Aug. 1974, *T. B. Croat 27621* (holotype, MO-2203532).

Taylor (2001a) previously attempted to name this species in *Notopleura*, but mistakenly based the combination on the illegitimate name *Psychotria longipedunculata* Dwyer. The legitimate name *P. longipedunculoides* C. M. Taylor should have been used instead, as done here.

I. 12. Notopleura longissima Bremekamp, Rec. Trav. Bot. Néerl. 31: 290. 1934. *Psychotria longissima* Standley, Publ. Field Columbian Mus., Bot. Ser. 7: 102. 1930, nom. illeg., not *Psychotria longissima* Quisumbing & E. D. Merrill, Philipp. J. Sci. 37: 206. 1928. TYPE: Colombia. Valle: Córdoba, 80–100 m, 6–8 May 1922, *E. P. Killip 5134* (holotype, US-1140557; isotypes, GH not seen, NY not seen).

Taylor (2001a) incorrectly published a combination in *Notopleura* based on *Psychotria longissima* Standley, but this species was previously named in *Notopleura* by Bremekamp. Standley's *Psychotria* name is an illegimate later homonym and thus cannot be a basionym for a combination, so Bremekamp provided a new name for this species in *Notopleura* rather than a combination.

I. 13. Notopleura madida (Standley) C. M. Taylor, comb. nov. Basionym: *Psychotria madida* Standley, Publ. Field Columbian Mus., Bot. Ser. 7(2): 226. 1931. TYPE: Ecuador. Chimborazo: Huigra, mostly on the Hacienda de Licay, 3 Sep. 1918, *J. N. Rose & G. Rose 22507* (holotype, US-1022160 not seen, photo F neg. #66727; isotype, F-587094).

This species was not included in *Notopleura* by Taylor (2001a) because its identity was then unclear. With more material now available it can be seen to be a distinct species of *Notopleura*. *Notopleura madida* is distinguished by it stipules with a conical interpetiolar appendage ca. 1 mm long, pseudoaxillary rounded-corymbiform inflorescences, bracts 1.5–6 mm long, calyx limbs 2.2–3 mm long, white fruits, and dorsiventrally flattened pyrenes. It is similar in general aspect to *N. corymbosa*; *N. corymbosa* differs from *N. madida* in its stipule with the interpetiolar appendage laminar and larger, 6–20 mm long. *Notopleura madida* is only known from Chimborazo Province, Ecuador.

I. 14. Notopleura micayensis (Standley) Bremekamp, Rec. Trav. Bot. Néerl. 31: 290. 1934. *Psychotria micayensis* Standley, Publ. Field Columbian Mus., Bot. Ser. 7: 105. 1930. TYPE: Colombia. Cauca: La Gallera, Micay Valley, 1200–1500 m, 20–30 June 1922, *E. P. Killip 7760* (holotype, US-1140625).

Taylor (2001a) incorrectly attempted to make this combination again, but it was previously published by Bremekamp.

I. 15. Notopleura montana C. M. Taylor, sp. nov. TYPE: Colombia. Valle del Cauca: Cordillera Occidental, hoya del Río Calima, El Cairo, entre Darién y Mediacanoa, 1650–1750 m, 7 Jan. 1943, *J. Cuatrecasas 13944* (holotype, F-1244588). Figure 5C, D.

Haec species a congeneris appendicibus stipularibus interpetiolaribus conicis succulentis, inflorescentia cymosa pedunculo bene evoluto insidente atque pyrenarum dorsiventraliter complanatarum marginibus et costa abaxiali centrali bene evolutis distinguitur.

Terrestrial, erect, succulent herbs or soft shrubs to 2(5) m tall, unbranched; stems glabrous. *Leaves* elliptic to narrowly elliptic, obovate, or elliptic-oblong, 18–35 × 7–16 cm, at apex deltoid to usually

acuminate, at base obtuse to usually acute or attenuate, drying papyraceous to membranaceous, glabrous on both surfaces, often paler abaxially; secondary veins 14 to 20 pairs, looping to interconnect at least in distal half of blade, with submarginal vein usually well-developed, adaxially venation plane, abaxially costa prominent, secondary veins prominulous, and remaining venation plane and invisible; margins plane; *petioles* 1.5–6 cm long; *stipules* glabrous, sheath 3–4 mm long, truncate to broadly rounded, usually persistent and becoming dry and indurated, interpetiolar appendage conical to deltoid, 3–5 mm long, succulent, divergent, inserted medially, acute, caducous, abaxially glandular. *Inflorescences* pseudoaxillary, paniculate, ascending, green, puberulous to glabrescent; peduncles 7.5–22 cm long, those of lower nodes markedly longer than those of upper nodes; branched portion cylindrical, 5–14 × 2.5–10 cm, with developed secondary axes at 3 to 4 nodes, 2 per node, dichasially branched to several higher orders; bracts deltoid to ovate, entire, those subtending secondary axes 1–4 mm long, those subtending flowers or glomerules 0.5–1 mm long; *flowers* sessile, borne along inflorescence axes singly or in glomerules of 2 to 3; hypanthium turbinate, ca. 0.8 mm long, glabrous; *calyx limb* 0.3–0.8 mm long, glabrous to puberulous, sinuate to irregularly denticulate; *corolla* salverform, white, externally glabrous, internally not seen, tube ca. 4.5 mm long, lobes 5, 1.2–1.5 mm long, narrowly triangular, abaxially smooth or with appendage up to 0.3 mm long, rounded; *anthers* not seen; *stigmas* 2, linear, ca. 0.8 mm long, exserted. *Infructescences* similar to inflorescences; *fruits* ellipsoid to orbicular, 4–6 × 5–5.5 mm, white, glabrescent, sessile; *pyrenes* 2, strongly dorsiventrally flattened, dorsally with 1 central, sharp, well-developed ridge, margins markedly thickened, rounded to rather sharp.

Habitat, distribution, and phenology. In wet forest at 850 to 1950 m, in montane regions of eastern Costa Rica and adjacent western Panama, and in the Andean Cordillera from central western Colombia to Venezuela and central Peru; collected in flower in January, in fruit in January and March through October.

Notopleura montana is distinguished by its leaves with the tertiary and higher-order venation not visible, its conical succulent interpetiolar stipule appendages, its well-developed peduncles, its cylindrical inflorescences with the axes dichasially branched and the flowers borne along them individually or in small glomerules, its reduced calyx limbs, its white fruits, and its pyrenes that are markedly dorsiventrally flattened and dorsally have only one sharp ridge and thickened margins. *Notopleura montana* has been confused previously with *N. macrophylla*; *N. macrophylla* differs from this new species in its leaves with the reticulated tertiary and often higher-order venation visible, its peduncles 1–7 cm long, and its pyrenes that are triangular to umbonate in cross section with the central ridge rounded. One collection from Peru (*Schunke 5925*, F) is in fact a mixture of these two species, with leaves and an inflorescence of *N. montana* mounted together with two separated inflorescences of *N. macrophylla*. The specific epithet refers to the distribution of this species in exclusively premontane and montane forests.

Only one mature corolla has been seen, on the holotype. This was not dissected, so consequently the pattern of internal corolla pubescence and the size and position at anthesis of the apparently included anthers are unknown. Although this species is widely distributed, it has been collected with frequency only in Valle Department in western Colombia; this pattern may be due to the rarity of this species through most of its range, or to the rather good level of exploration in Valle Department.

Paratypes. COLOMBIA. **Putumayo:** Mocoa, San Antonio, vereda Alto Campucana, Finca La Mariposa, *J. L. Fernández et al. 10759* (GB, NY), *11040* (MO). **Quindío:** Bremen, 15 km N of Armenia, *Gentry et al. 65319* (MO). **Valle:** Reserva Natural de Yotoco de la Universidad Nacional, Cordillera Occidental, vertiente oriental, Km 18 de la carretera Buga–Madroñal, *Bay 312* (MO), *Devia 1086* (MO), *3008* (MO), *Silverstone-Sopkin & Paz 7538* (CUVC, MO); along old highway between Cali and Buenaventura, 28 km beyond junction with new highway (20 km W of village of Borrero Ayerbe and 7 km W of El Salado), *Croat 38624* (MO); Yotoco, Cordillera Occidental, eastern slopes, along highway between Dapa and Loboquerrero at Parque Yotoco, *Croat 70728* (MO); along road betwen Queremal and Anchicayá, 2 km W of Queremal, *Croat & Gaskin 79647* (MO); "El Topacio," dentro del Parque Nacional Natural Los Farallones de Cali, *S. Sarria 5T* (MO). COSTA RICA. **Puntarenas:** above coffee fincas along Río Coto Brus, near Coton, 23 km W of La Unión (on Panama border), *Croat 26590* (MO); foothills of the Cordillera de Talamanca, along Río Bella Vista, NW of Las Alturas, *Davidse 24330* (MO); Coto Brus, Reserva de la Biósfera de La Amistad, ca. Estación Biológica Las Alturas de Cotón, *Kress & Dew 94–4082* (MO). **San José:** vicinity of El General, *Skutch 2741* (MO). ECUADOR. Without province: Napo–Pastaza [probably now Sucumbíos], zone of Sofía, valley of Río Chingual, *Steere 8343* (F). **Morona–Santiago:** ridge between Ríos Itzintza and Chupiasa, Cordillera Cutucú, *Camp E-1290* (US); along road from Gualaquiza to Zamora ca. 3 km S of Río Bomboiza, *Croat 50798* (MO); road Limón (General Plaza)–Macas, ca. Km 20 from Limón, *Harling & Andersson 12851* (MO). **Napo:** Archidona, comunidad de Pacto Sumaco, sector suroccidental, *A. Alvarez et al. 1954* (MO, QCNE); Archidona, Reserva Ecológica Antisana, comunidad Shamato, entrada por Km 21–Shamato, *J. L. Clark et al. 5138* (MO); Quijos

River region below Baeza, ca. 10 km NW of Chaco, *Ownbey 2664* (F); ridge above Río San Juan Grande, ca. 9.5 km (by road) NW of El Chaco, *Ståhl et al. 2198* (GB). PANAMA. **Chiriquí:** on NW side of Cerro Pando cloud forest, *Croat 15959* (MO). PERU. **Pasco:** Oxapampa, Río El Tunqui ca. 50 km from Oxapampa, *D. N. Smith et al. 1721A* (MO); Palmazú, *D. N. Smith 8547* (MO). **San Martín:** Lamas, San Juan Pacayzapa, al E de puente (carretera a Moyobamba), *Schunke 5925* (F). VENEZUELA. **Yaracuy:** depto. Urachiche, a lo largo de la carretera entre Buenos Aires y Guamales, parte occidental de la Sierra de Aroa, al N de Urachice, *Steyermark et al. 114094* (F).

I. 16. Notopleura multinervia C. M. Taylor, sp. nov. TYPE: Panama. Chiriquí: along road between Gualaca and the Fortuna Dam site, at 10.1 m; [sic; mi] NW of Los Planes de Hornito, 1300 m, 8 Apr. 1980, *T. Antonio 4061* (holotype, MO-2783578). Figure 1E, F.

Haec species a *Notopleura aggregata* et *N. tonduzii* foliorum venis secundariis pluribus, bracteis floralibus brevioribus atque tubo corollino ca. 4 mm longo distinguitur.

Succulent, erect, terrestrial herbs or soft shrubs to 1.5(3) m tall, unbranched; stems glabrous. *Leaves* elliptic-oblong to elliptic, oblanceolate, or ovate, 14.5–22 × 5–9 cm, at apex acuminate, at base acute to obtuse, drying papyraceous, on both surfaces glabrous, abaxially sometimes paler; secondary veins 16 to 26 pairs, looping to interconnect, abaxially venation plane or costa prominulous, abaxially costa prominent, secondary veins prominulous, and remaining venation plane and invisible or often intersecondaries visible; margins plane; *petioles* 1–4.5 cm long; *stipules* glabrous, sheath 1–1.5 mm long, truncate, persistent, with an interpetiolar appendage inserted medially, ligulate to triangular or oblanceolate, 4–8 mm long, divergent to ascending, succulent, flattened, acute to fimbriate with segments linear and apparently glandular, margins winged, hyaline. *Inflorescences* pseudoaxillary, paniculate, green, puberulous, spreading to deflexed; peduncles 0.5–2 cm long; branched portion pyramidal, 3–5 × 4–6 cm, with secondary axes developed at 2 to 3 nodes, 2 per node, spreading usually at more than 90°, branched to 1 or rarely 2 more order(s), axes terminating in floral glomerules; bracts acute, entire, those subtending secondary axes triangular to ovate, 1–6 mm long, those subtending flowers narrowly triangular to lanceolate or ovate, 1–2 mm long; *flowers* sessile in glomerules of 3 to 9; hypanthium turbinate, 0.8–1 mm long, glabrous; *calyx limb* puberulous, ca. 0.8 mm long, 5-lobed for 1/3–1/2, lobes triangular; *corolla* salverform, white, externally glabrous, internally glabrous except hirtellous at stamen insertion, tube ca. 4 mm long, lobes 5, ca. 2 mm long, abaxially with an appendage 0.5–0.8 mm long, conical to rounded; *anthers* ca. 0.8 mm long, positioned in corolla throat; *stigmas* 2, linear, ca. 1 mm long, positioned in corolla throat. *Infructescences* similar to inflorescences; *fruits* ellipsoid, 6–7 × 5.5–6 mm, white, glabrous, sessile; *pyrenes* 2, dorsiventrally markedly flattened, dorsally with 1 sharp, central, longitudinal ridge, sometimes also with 2 weaker lateral ridges, margins thickened and usually sharp.

Habitat, distribution, and phenology. In wet forest at 1000 to 1700 m in western Panama; collected in flower March through June, in fruit in February, March, June, August, September, and November.

Notopleura multinervia is similar to *N. aggregata*, *N. tonduzii*, and *N. parvifolia* (this last is described later in this article). *Notopleura multinervia* differs from these in its more numerous secondary leaf veins with usually well-developed intersecondary veins, its shorter floral bracts, and its corolla tubes ca. 4 mm long. *Notopleura aggregata* differs from *N. multinervia* in its secondary leaf veins 9 to 16 pairs, its peduncles 1–13 cm long with the secondary axes ascending at less than 90° with relation to the primary axis, its floral bracts 2–3 mm long, its calyx limbs 1–2 mm long, and its corolla tubes ca. 5 mm long; *N. tonduzii* differs from *N. multinervia* in its secondary leaf veins 10 to 16 pairs, its floral bracts 1.5–3 mm long, its corolla tubes ca. 3 mm long, its inflorescences with the secondary axes usually as well-developed as the primary axis (vs. shorter than it in *N. multinervia*), and its corolla lobes with abaxial appendages ca. 0.3 mm long; *N. parvifolia* differs from *N. multinervia* in its calyx limbs 1–1.8 mm long with narrowly triangular to linear lobes, its corolla lobes ca. 1.5 mm long with abaxial appendages 1–1.5 mm long, and its inflorescences that are smaller and more congested. This new species was first recognized as a distinct taxon by John D. Dwyer, who annotated its specimens as a subspecies of *N. macrophylla* with the epithet "*multinervia*" but never published the name. Unlike most species of *Notopleura*, the specimens studied of *N. multinervia* all bear either flowers or nearly to fully mature fruits, but not both stages concurrently on the same plant. *Notopleura multinervia* is included in the "*Notopleura aggregata* group" discussed in the introductory part of this article.

Paratypes. PANAMA. **Bocas del Toro/Chiriquí Border**: Continental Divide above Quebrada Arena, carretera de oleoducto, IRHE Fortuna Hydroelectric Project, *Knapp & Vodicka 5669* (MO). **Chiriquí:** vicinity of Gualaca ca. 8.5 mi. from Planes de Hornito, La Fortuna on road to damsite, *Antonio 5098* (MO); Fortuna Dam area,

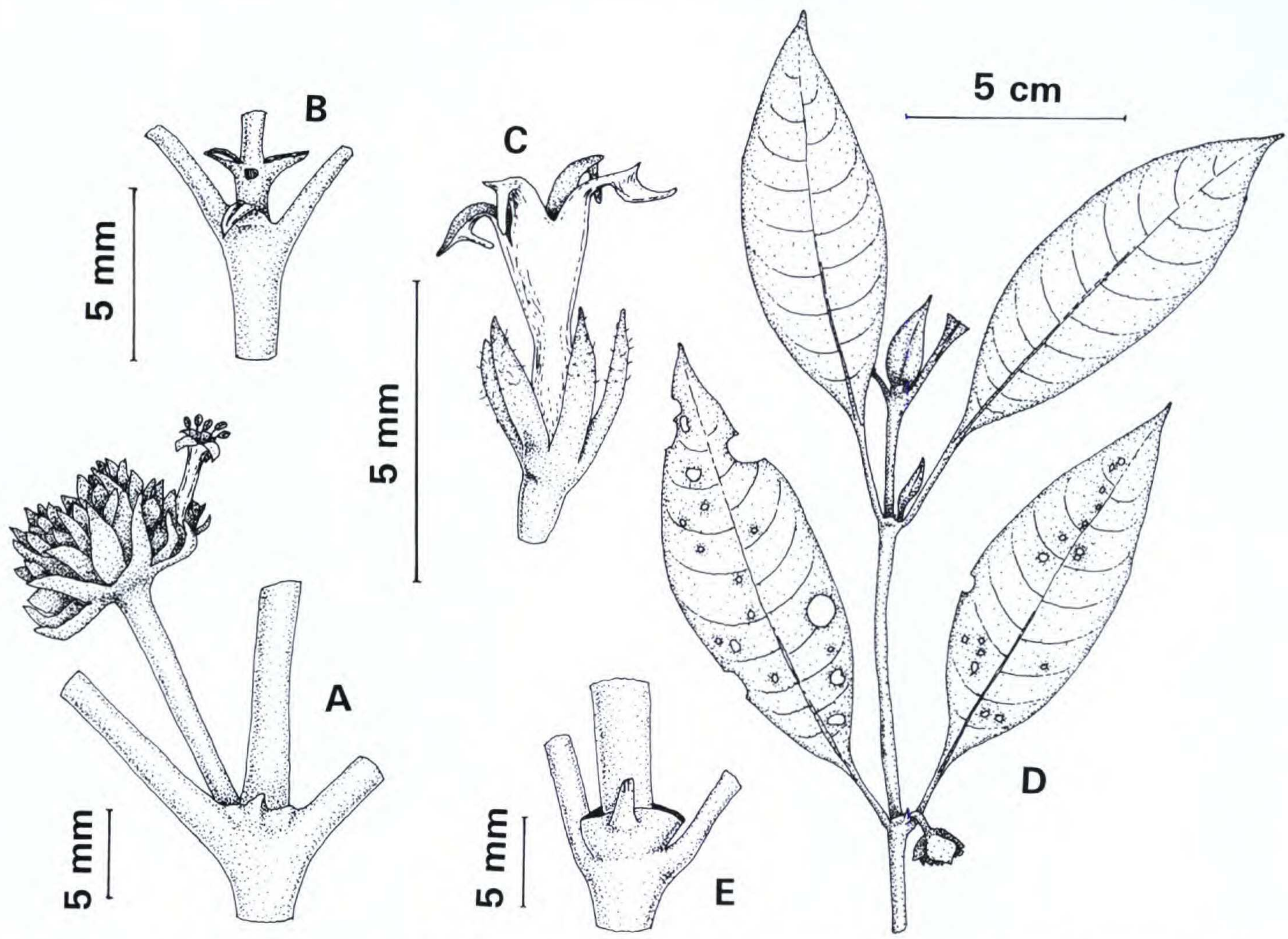

Figure 6. —A. *Notopleura obtusa* C. M. Taylor, stem node with inflorescence and basal portions of petioles; based on *Lugo S. 4168* (MO). B, C, *Notopleura pacorana* C. M. Taylor; based on *de Nevers et al. 5525* (MO). —B. Stem portion with two nodes and basal portions of petioles. —C. Flower at anthesis. D, E, *Notopleura penduliflora* C. M. Taylor; based on *Hammel & Krager 3925* (MO). —D. Stem with leaves and inflorescence. —E. Stem node with basal portions of petioles.

along Quebrada Bonito to E of road, *Churchill et al. 4732* (MO), between Quebrada Los Chorros and Quebrada Hondo, to N of reservoir, *Churchill & Churchill 6182* (MO); along road to Fortuna Dam Site, N of Gualaca, 22.7 mi. beyond the bridge over the Río Esti, 11.8 mi. N of Los Planes de Hornito, 10.7 mi. N of junction to tunnel, *Croat 48642* (MO); along road from Gualaca to Fortuna dam site, 5.9 mi. NW of Los Planes de Hornito, *Croat 49894* (MO), 7.9 mi. NW, *Croat 49922* (MO); along road between Fortuna Lake and Chiriquí Grande, 4.5–5 km N of dam over Fortuna Lake, *Croat & Grayum 60047* (MO); along highway between Gualaca and Chiriquí Grande, along boundary trail between Bocas del Toro and Chiriquí Provinces, *Croat 66833* (MO); Gualaca–Chiriquí Grande, 8.4 mi. beyond Los Planes de Hornito, 7.3 mi. beyond turnoff to Caldera, *Croat 67860* (MO); Fortuna Dam site, *Folsom et al. 5407* (MO, PMA), *5488* (MO); near Fortuna Dam, *Hampshire & Whitefoord 213* (MO, PMA); forest behind Vivero Forestal, 9 km N of Los Planes de Hornito, IRHE Fortuna Hydroelectric Project, *Knapp et al. 4100* (MO), 12 km N, *Knapp 4964* (MO), *Knapp & Vodicka 5536* (MO), 8 km N, *Knapp 4992* (MO), 10 km N, *Knapp & Vodicka 5612* (MO); vicinity of Fortuna Dam, along trail near Río Hornito, *McPherson 9895* (MO); Boquete, Fortuna dam site, Continental Divide, *van der Werff & van Hardeveld 6771* (MO). **Veraguas:** Cerro Tute, ca. 10 km NW of Santa Fe, *Mori et al. 7582* (MO).

I. 17. Notopleura obtusa C. M. Taylor, sp. nov. TYPE: Ecuador. Pastaza: Río Challuna, ca. 15 km N of Puerto Sarayacu, 16 Oct. 1974, *H. Lugo S. 4168* (holotype, GB; isotypes, MO-4903139, US). Figure 6A.

Haec species a *Notopleura aequatoriana* inflorescentia capitata, foliis deltoideis obtusisve usque rotundatis truncatisve atque lobulis corollinis processus conicos 0.5–0.8 mm longos gerentibus distinguitur.

Rather succulent, terrestrial herbs or subshrubs to 0.8(2) m tall; stems glabrous to densely hirtellous. *Leaves* elliptic to obovate, 7.5–15.5(19) × 4–7(9) cm, at apex deltoid or obtuse to rounded or truncate, at base cuneate to obtuse, drying papyraceous, adaxially glabrous, abaxially paler and sparsely strigillose to densely hirtellous; secondary veins 6 to 12 pairs, not looping to interconnect, adaxially costa plane to prominulous and remaining venation plane, abaxially costa prominent, secondary veins prominulous, and remaining venation plane and invisible; *petioles* 1–3.5 cm long, gla-

brous to densely hirtellous; *stipules* glabrous to hirtellous, united around stem into a continuous sheath 1–2 mm long, truncate, interpetiolar portion with 1 appendage, this conical to pyramidal, 1–2 mm long, inserted medially, divergent, this and the sheath persistent or deciduous. *Inflorescences* pseudoaxillary, capitate, glabrous to densely hirtellous, ascending; peduncles 0.3–2 cm long; heads 1 per axil, subglobose to hemispherical, 1–1.5 × 1.2–1.5 cm; bracts 6–8 mm long, those external to capitula narrowly triangular to deltoid, acute, those subtending flowers narrowly elliptic to oblanceolate, acute to rounded; *flowers* sessile; hypanthium not seen; *calyx limb* glabrous, ca. 0.5 mm long, entire or lobed to 1/2, lobes triangular; *corolla* infundibuliform, white, externally glabrous, internally glabrous except densely hirtellous in upper (distal) half, tube ca. 6 mm long, lobes 5, ca. 1.5 mm long, deltoid, abaxially with an appendage 0.5–0.8 mm long, conical, inserted medially; *anthers* ca. 1 mm long, exserted; *stigmas* not seen. *Infructescences* similar to inflorescences or sometimes more open, to 2 × 3.5 cm with 1 pair of secondary axes; *fruits* ellipsoid, ca. 5 × 5 mm, glabrous, red; *pyrenes* 2, dorsiventrally flattened, dorsally with 1 well-developed, sharp central ridge and 2 smaller lateral ridges.

Distribution, habitat, and phenology. In wet forest at 200 to 1285 m, Amazonian central Ecuador to northeastern Peru; collected in flower in July through October, and December, in fruit in April, May, and July through December.

Notopleura obtusa is distinguished by the combination of is leaves deltoid or obtuse to usually rounded or truncate at the apex, its stipules with the pyramidal to conical interpetiolar appendage inserted medially on the sheath, its capitate inflorescences with peduncles 0.3–2 cm long, and its corollas with relatively well-developed projections on the abaxial surfaces of the lobes. These corolla lobe appendages give the tops of the flower buds a "five-horned" appearance, and are easily mistaken for the corolla lobes themselves. The specific epithet refers to the most frequent shape of the leaf apices, which is unusual (though not unique) in *Notopleura*. This new species is similar to *N. aequatoriana*; *N. aequatoriana* differs from this new species in its leaves obtuse to acute at the apex, its inflorescences that are sometimes capitate but more often branched with 1 to 2 pairs of developed secondary axes, its peduncles 3.5–10 cm long, and its corolla lobes that are dorsally smooth or with a thickening to only ca. 0.3 mm high. The fruits of *N. obtusa* are described as red on all specimens seen, though it is possible that as in several other *Notopleura* species, they finally turn black when fully mature.

Paratypes. ECUADOR. **Napo:** Archidona, Reserva Ecológica Antisana, comunidad Shamato, entrada por Km 21- [sic] Shamato, *J. L. Clark et al. 5128* (MO, QCNE); along new road from Pangayacu to Loreto, 10.6 km E of main N–S road between Baeza and Tena (departing main road 23.7 km N of Archidona), *Croat 58794* (MO); Parque Nacional Yasuní, pozo petrolero Daimi I, Conoco, *F. Hurtado et al. 28* (MO); 2 km S of Coca, Reserva Florística El Chuncho, *Persson 131* (GB); Aguarico, Reserva Etnica Huaorani, carretera y oleducto de Maxus en construcción, Km 92–96, al N del Río Yasuní, *M. Aulestia & Gonti 2089* (MO, QCNE); Aguarico, Reserva Etnica Huaorani, Maxus road and pipeline construction project, Km 99–100, *Pitman 467* (MO, QCNE). **Pastaza:** Pastaza, pozo petrolero "Masaramu" de Unocal, 40 km al NE de Montalvo, *Espinoza 172* (MO, QCNE); village of Molino, 45 min. by small plane from Puyo on Bobonaza River, *King et al. 1051* (NY); Río Zupayacu, ca. 7 km E of Puerto Sarayacu, *H. Lugo S. 4083* (GB, US); Río Capahuari, ca. 12 km N of Puerto Sarayacu, *H. Lugo S. 4101* (GB, MO, US); Río Curiacu, ca. 8 km W of Puerto Sarayacu, *H. Lugo S. 4232* (GB); road Puyo–Macas (under construction), 31 km from Puyo, *Øllgaard & Balslev 9043* (NY). PERU. **Amazonas:** valle del Río Santiago, ca. 65 km N of Pinglo, Quebrada Caterpiza, 2–3 km atrás de la comunidad de Caterpiza, *Huashikat 1429* (MO). **Loreto:** Maynas, near villa Nueva, Borro Indian village on upper Río Yaguasyacu, tributary of Río Ampiyacu, *Gentry & Revilla 20446* (MO); Loreto, Valseca–Rudolpho, Río Corrientes between Quebrada Platanoyacu and mouth of Río Macusari, *McDaniel & Barcos 11062* (MO).

I. 18. Notopleura pacorana C. M. Taylor, sp. nov. TYPE: Panama. Panamá–San Blas: trail from end of road past Los Altos de Pacora region of Cerro Jefe on to Cerro Brewster, 9°17′N, 79°17′W, 600–800 m, 20–25 Apr. 1985, *B. Hammel & G. de Nevers 13566* (holotype, MO-3842303). Figure 6B, C.

Haec species a congeneris foliis satis parvis, stipulis vaginantibus appendicem interpetiolarem conicam succulentam gerentibus, inflorescentia capitata, lobulis corollinis dorsaliter appendiculatis atque fructu albo satis parvo distinguitur.

Terrestrial, succulent, erect herbs or soft shrubs to 1.5 m tall, unbranched; stems puberulous to glabrescent. *Leaves* elliptic to elliptic-oblong or oblanceolate, 9.5–15 × 4–8 cm, at apex acute to shortly acuminate, at base acute to cuneate, drying papyraceous to chartaceous, adaxially glabrous, abaxially somewhat paler and densely puberulous to pilosulous at least on secondary veins, becoming glabrescent with age; secondary veins 7 to 10 pairs, not looping to interconnect, adaxially costa prominulous and remaining venation plane, adaxially costa prominent, secondary veins prominulous, and

remaining venation plane and usually invisible; *petioles* 1–4.5 cm long, hirtellous or pilosulous to glabrescent; *stipules* puberulous to glabrescent, 2–3 mm long, interpetiolar, broadly triangular, persistent on distalmost 2 to 3 nodes, with a conical, succulent, divergent appendage 2–3 mm long, entire to shortly bifid, glandular at apex, caducous. *Inflorescences* pseudoaxillary, capitate, moderately to densely hirtellous or pilosulous, ascending to deflexed, green; peduncles 0–5 mm long; heads 1 per axil, subglobose, 8–15 mm diam.; bracts oblanceolate to ligulate or triangular, 2.5–5 mm long, acute to obtuse or rounded, flat or sometimes somewhat cucullate; *flowers* sessile; hypanthium turbinate, ca. 1 mm long, glabrous; *calyx limb* densely pilosulous to hirtellous, 1.5–3 mm long, lobed for ca. 3/4, lobes 5, narrowly triangular, acute; *corolla* salverform, white, externally and internally glabrous, tube ca. 4 mm long, lobes 5, narrowly triangular, ca. 2 mm long, acute, dorsally with 1 linear appendage ca. 1 mm long, puberulous; *anthers* ca. 1 mm long, situated in corolla throat; *stigmas* 2, linear, ca. 1 mm long, situated just above anthers. *Infructescences* similar to inflorescences; *fruits* ellipsoid, 4–4.5 × 3.5 mm, white, glabrous; *pyrenes* 2, strongly dorsiventrally flattened, dorsally with 1 sharp central ridge and margins not or only slightly thickened.

Habitat, distribution, and phenology. In wet forest at 600 to 850 m, Caribbean slopes of central Panama; collected in flower in February, April, and May, in fruit in April and October.

Notopleura pacorana is distinguished by its relatively small leaves, sheathing stipules with a succulent conical interpetiolar appendage, capitate inflorescences, dorsally appendaged corolla lobes, and relatively small white fruits. It is known only from a relatively small region in Caribbean central Panama; the specific epithet refers to this range. This new species is similar to *N. panamensis* and *N. capitata* (decribed above). *Notopleura panamensis* differs from *N. pacorana* in its leaves 20–30 cm long with 13 to 22 pairs of secondary veins, its calyx limbs 3.5–4.5 mm long, and its fruits ca. 7 × 5 mm; *N. capitata* differs from *N. pacorana* in its leaves 16–35 cm long with 10 to 17 pairs of secondary veins and its fruits 5–6 × 4.5–5 mm.

Paratypes. PANAMA. **Panamá:** road to Altos de Pacora, near schoolhouse, *Mori & Kallunki 2366* (MO); 5–10 km NE of Altos de Pacora, on trail at end of road, *Mori & Kallunki 6048* (MO); Cerro Jefe, 6 km past Cerro Azul on road to Altos Pacora, *Sytsma & D'Arcy 3677* (MO, PMA). **San Blas:** Cerro Brewster, *de Nevers et al. 5525* (MO).

I. 19. Notopleura parvifolia C. M. Taylor, sp. nov. TYPE: Panama. Coclé: El Copé, on Continental Divide above town, 8°38′N, 80°38′W, 700–900 m, 27–29 Apr. 1985, *B. Hammel 13678* (holotype, MO-3616173).

Haec species a *Notopleura aggregata* inflorescentia fasciculata sessili vel perbreve pedunculata atque foliis pro medio satis parvis distinguitur.

Erect, succulent, terrestrial herbs or soft shrubs to 1.5 m tall, unbranched; stems glabrous or puberulous to glabrescent. *Leaves* elliptic-oblong to oblanceolate, 10–24 × 3–8 cm, at apex acute to usually acuminate, at base acute to obtuse, drying papyraceous, adaxially glabrous, abaxially glabrous or densely puberulous to glabrescent and often somewhat paler; secondary veins 10 to 16 pairs, looping to interconnect at least in distal part of blade, adaxially venation plane, abaxially costa and secondary veins prominulous and remaining venation plane and invisible except intersecondaries usually developed and visible; margins plane; *petioles* 1–4.5 cm long; *stipules* with sheath 1–3 mm long, truncate, glabrous, persistent with leaves, with interpetiolar appendage narrowly ligulate to oblanceolate, 4–5 mm long, inserted medially, ascending, glabrous to usually puberulous, flattened, usually persisting at least on distalmost 3 to 5 nodes, at apex rounded to acute, bilobed shortly or to 1/3, lobes narrowly triangular to linear, apparently glandular at least at apex. *Inflorescences* pseudoaxillary, congested-paniculate to subcapitate, green, spreading to deflexed, densely puberulous; peduncles 0–1 cm long; flowering portion subcapitate, 0.5–1 cm diam., subglobose or somewhat trilobed, or sometimes branched, fasciculate to pyramidal, to 2.5 × 5 cm, with developed secondary axes present at 1 node, 2 per node, the axes terminating in glomerules or congested cymules; bracts entire, acute, those subtending secondary axes or glomerules triangular, 3–5 mm long, those subtending flowers narrowly triangular, 2–3 mm long; *flowers* sessile in glomerules of 5 to 15; hypanthium turbinate, ca. 0.8 mm long, glabrous to densely puberulous; *calyx limb* 1–1.8 mm long, glabrous to densely puberulous, 5-lobed for 2/3–3/4, lobes narrowly triangular to linear, acute; *corollas* salverform, white, externally glabrous to densely puberulous, internally glabrous except apparently hirtellous near middle, tube ca. 4 mm long, lobes 5, ca. 1.5 mm long, narrowly triangular, abaxially with appendage linear, 1–1.5 mm long; *anthers* ca. 1 mm long, exserted; *stigmas* 2, linear, ca. 1 mm long, exserted. *Infructescences* similar to inflorescences; *fruits* ellipsoid, 5–7 × 4–5.5 mm, white, glabrous, sessile; *pyrenes*

2, dorsiventrally flattened, dorsally with one sharp, central, longitudinal ridge, margins rounded to rather sharp.

Habitat, distribution, and phenology. In wet forest at 400 to 1400 m throughout Panama, and likely also in adjacent Colombia though not yet known from there; collected in flower March through July, in fruit in March and June through November.

Notopleura parvifolia is a species similar to *N. aggregata*, but *N. aggregata* differs from this new species by its inflorescences that are branched with peduncles 2.2–13 cm long and its leaves 12–32 × 4–12.5 cm. The specific epithet refers to the smaller leaf size of this new species. *Notopleura multinervia*, described above, is also similar to *N. parvifolia*; their distinctions are discussed under *N. multinervia*. *Notopleura parvifolia* is included in the "*Notopleura aggregata* group" discussed in the introductory portion of this article.

Paratypes. PANAMA. **Chiriquí:** end of road past Palo Alto to Bocas, *Hammel 6524* (MO). **Coclé:** El Copé on Pacific side 1/2 hour walk from sawmill, *Antonio 2170* (MO); Cerro Pilón (above El Valle de Antón), *Croat 14532* (MO), *Dwyer & Lallathin 8957* (MO); Alto Calvario, above El Copé, ca. 6 km N of El Copé, Atlantic slope along trail which leads W off old lumber trail which leads down to Las Ricas, Limón, and San Juan, *Croat 68731* (MO); top of ridge N of El Copey [sic; Copé], El Petroso, *D'Arcy 11315* (MO); Cerro Gaital Caracoral, *Dwyer & Correa 8977* (MO, PMA); New Works at Rivera sawmill, Alto Calvario, 7 km N of El Copé, *Folsom 3156* (MO), *4949* (MO), *Folsom & Collins 6448* (MO, PMA); 3-mountain ridge above El Valle, 8°40′N, 80°10′W, *Hamilton et al. 4134* (MO); El Copé on slope and ridge W of sawmill, *Hammel 2411* (MO); El Copé, on Continental Divide above town, *Hammel 13647* (MO); foothills and summit of Cerro Caracoral near La Mesa, N of El Valle de Anton, *Knapp 1154* (MO, PMA); N of El Valle, E slopes and ridges leading to Cerro Gaital, *Knapp 5332* (MO, PMA), *5774* (MO); La Mesa, 2 km W of Cerro Pilón, *Sullivan 545* (MO); above El Potroso sawmill at Continental Divide N of El Copé, *Sytsma & Andersson 4557* (MO). **Darién:** 0–1 mi. E of Tres Bocas along shortest headwater of Río Coasi, *Kirkbride & Duke 1182* (MO). **Panamá:** El Llano–Cartí Road, 10–12 km from El Llano, *Maas & Dressler 1703* (MO). **Veraguas:** valley of Río Dos Bocas along road between Escuela Agrícola Alto Piedra and Calovébora, 15.6 km NW of Santa Fe, *Croat 27620* (MO); 0.6 mi. beyond Escuela Agrícola Alto Piedra, *Croat & Folsom 34018* (MO); Alto de Piedra, vicinity of Santa Fe along ridge which extends to summit from edge of a plantation along road less than 1 km from Escuela Agrícola Alto de Piedra, on road to N going to Río San Luis, *Croat 66976* (MO); vicinity of Santa Fe, along road between Alto Piedra and Calovebora, 0.5 mi. N of Alto Piedra on slopes of Cerro Tute, Parque Nacional Cerro Tute, *Croat & Zhu 76879* (MO); 6.4 km outside of Santa Fe on road that passes the agricultural school, *Folsom 2961* (MO); Cerro Tute ridge up from former Escuela Agrícola, Santa Fe, *Hamilton & Dressler 3023* (MO); W of Alto de Piedras W of Santa Fé, *Hammel 4633* (MO); ridge of Cordillera de Tute, along trail to Cerro Tute, 3–4 km past Escuela Agrícola Alto de Piedra, just W of Santa Fe, *Knapp & Kress 4356* (MO, PMA); NW of Santa Fe, 10.8 km from Escuela Agrícola Alto de Piedra on road to Calovebora, *Mori 6724* (MO); ca. 15 km NW of Santa Fe, on road to Calovebora (Panama Hwy. 35) near Continental Divide, *Mori & Bolten 7668* (MO).

I. 20. Notopleura penduliflora C. M. Taylor, sp. nov. TYPE: Panama. Veraguas: Cerro Tute, ridge up from former Escuela Agrícola, Santa Fé, 08°35′N, 81°05′W, 800–1100 m, 15 July 1983, *C. Hamilton & K. Krager 3925* (holotype, MO-3646500; isotype, MO-4390373). Figure 6D, E.

Haec species a *Notopleura plagiantha* vagina stipulari bene evoluta appendicem interpetiolarem centralem conicam usque subcomplanatam gerente distinguitur.

Terrestrial, succulent, erect herbs or soft shrubs to 2 m tall, unbranched; stems glabrous. *Leaves* lanceolate to elliptic-oblanceolate, 7.5–15.5 × 2.5–4.5 cm, at apex acute to acuminate, at base acute to cuneate, drying papyraceous, adaxially glabrous, abaxially paler and glabrous or sparsely puberulous; secondary veins 8 to 11 pairs, not looping to interconnect, adaxially venation plane or costa sometimes thickened, abaxially costa prominent, secondary veins visible but plane, and remaining venation plane and not visible; *petioles* 0.6–2.5 cm long, glabrous; *stipules* glabrous, united around stem into a continuous sheath 1.5–3 mm long, truncate to rounded, deciduous with leaves, interpetiolarly with a succulent conical to triangular appendage 2–4 mm long, rather flattened, shortly fimbriate at apex, ascending, caducous, inserted medially or at base of sheath. *Inflorescences* pseudoaxillary, capitate to subcapitate, glabrous, strongly deflexed to pendulous, purple; peduncles 0.5–1 cm long; heads 1 per axil, cupuliform to hemispherical, 0.6–1 × 1–3 cm; external bracts 2, lanceolate to triangular, 10–15 mm long, acute to acuminate, remaining bracts triangular to ovate or linear, 6–10 mm long, acute, entire to ciliolate; *flowers* sessile; hypanthium not seen; *calyx limb* glabrous to puberulous, 3.5–4 mm long, lobed for ca. 3/4, lobes 5, narrowly triangular, acute to acuminate, ciliolate; *corolla* infundibuliform, white, externally glabrous, internally not seen, tube ca. 6 mm long, lobes 5, triangular, ca. 2 mm long, dorsally smooth; *anthers* not seen; *stigmas* 2, linear, ca. 1.5 mm long, situated in corolla throat. *Infructescences* similar to inflorescences; *fruits* obovoid, ca. 5 × 3.5 mm, glabrous, color not noted, with stipe to 1 mm long; *pyrenes* 2, hemispherical in cross section, with 3 to 4 weakly developed longitudinal ridges.

Habitat, distribution, and phenology. In wet and premontane forests at 600 to 1200 m in western Panama; collected in flower in March, June, and July, in fruit in July.

Notopleura pendulifora is distinguished by its stipules with well-developed sheaths bearing a conical to rather flattened interpetiolar appendage, its capitate nodding inflorescences with the two most external bracts better developed than the others, its calyx limbs 3.5–4 mm long, and its range in western Panama. The specific epithet refers to the nodding orientation of the inflorescences. This new species is similar to *N. plagiantha*; *N. plagiantha* differs from this new species in its stipules with the sheathing portion reduced or essentially absent and the appendage inserted terminally on the sheath and enlarged into a bilobed to erose lamina, and also in its erect to somewhat deflexed inflorescences with the bracts generally all equal in size.

Paratypes. PANAMA. **Veraguas:** Santa Fé, Serranía de Tute, *Galdames et al. 3074* (MO, PMA, SCZ); above Primero Brazo del Río Santa María, N of Escuela Agrícola Alto de Piedra, just W of Santa Fé, *Knapp & Dressler 5369* (MO); on Caribbean slope above Río Primero Brazo 5 mi. NW of Santa Fe, *Liesner 974* (MO, NY).

I. 21. Notopleura sanblasensis C. M. Taylor, sp. nov. TYPE: Panama. Panamá–San Blas: trail from end of road past Los Altos de Pacora region of Cerro Jefe on to Cerro Brewster, 9°17′N, 79°17′W, 20–25 Apr. 1985, *B. Hammel & G. de Nevers 13595* (holotype, MO-3616163). Figure 4C, D.

Haec species a *Notopleura capitata* foliorum venis secundariis 10- ad 12-jugatis atque limbo calycino 4.5–5.5 mm longo distinguitur.

Succulent, terrestrial, erect herbs or soft shrubs to 1.5 m tall, unbranched; stems glabrous. *Leaves* elliptic to obovate, 10–26 × 6.5–15 cm, at apex shortly acuminate with tips 5–15 mm long, at base cuneate to acute and often attenuate, drying membranaceous to papyraceous, adaxially glabrous, abaxially paler and glabrous; secondary veins 10 to 12 pairs, not looping to interconnect, adaxially venation plane or costa sometimes thickened, abaxially costa prominent, secondary veins prominulous, and remaining venation plane and invisible or rarely intersecondary veins visible; *petioles* 2–6.5 cm long, glabrous; *stipules* glabrous, shortly united around stem or to petioles, 1–3 mm long, rounded to triangular, caducous or persistent on distalmost 2 to 3 nodes, with 1 divergent, conical appendage 2–4 mm long, glabrous, caducous, entire, inserted medially to apically. *Inflorescences* pseudoaxillary, capitate, puberulous to hirtellous, deflexed to pendulous, pale green to white; peduncles 3–10 mm long; heads 1 per axil, hemispherical to subglobose, 1–1.5 cm diam.; bracts acute, entire, those external to the inflorescence lanceolate to ovate, 6–10 mm long, those subtending flowers narrowly triangular to linear, 4–8 mm long; *flowers* sessile to subsessile; hypanthium turbinate, ca. 0.8 mm long, glabrous; *calyx limb* glabrous, 4.5–5.5 mm long, divided nearly to base, lobes 5, narrowly triangular, acute, often falcate, entire; *corolla, anthers,* and *stigmas* not seen. *Infructescences* similar to inflorescences or becoming purple; *fruits* ellipsoid, 5–7 × 4–5 mm, glabrous, white, with stipes to 2 mm long; pyrenes 2, strongly dorsiventrally flattened, with 1 sharp central ridge and markedly thickened margins.

Habitat, distribution, and phenology. In wet forest at 200 to 800 m on Caribbean slopes in eastern Panama; collected in fruit in March, August, and December.

Notopleura sanblasensis is distinguished by the combination of its sheathing stipules with a succulent divergent appendage on each side, its capitate, shortly pedunculate inflorescences with acute bracts, its calyx limbs 4.5–5.5 mm long and divided nearly to the base into relatively narrow lobes, its white fruits, and its strongly dorsiventrally flattened pyrenes with the keel and margins thickened. The specific epithet refers to the geographic distribution, which is apparently limited to the San Blas region. This new species is similar to *N. capitata*, described above; *N. capitata* differs from *N. sanblasensis* by its 10 to 17 pairs of secondary leaf veins that often loop to interconnect at least in the distal part of the leaf blade and its calyx limbs 1.5–2.5 mm long.

Paratypes. PANAMA. **San Blas:** mountains above Puerto Obaldía, *Gentry 1492A* (MO); Cordillera de San Blas, límite San Blas, trocha de Masargandi, *H. Herrera & González 1334* (MO); caminando por el filo desde una quebrada del Río Diablo hacia la Cordillera de Ibedón, *Herrera et al. 1488* (MO, PMA); trail from El Llano to Cartí–Tupile, *Kennedy 2578* (MO).

I. 22. Notopleura spiciformis C. M. Taylor, sp. nov. TYPE: Ecuador. Esmeraldas: San Lorenzo, Reserva Etnica Awá, Centro Guadualito, 1°15′N, 78°40′W, 80 m, 20–29 July 1992, *C. Aulestia, G. Tipaz, L. Delgado & G. Lao 20* (holotype, QCNE; isotype, MO-4890101). Figure 5E, F.

Haec species a congeneris vagina stipulari bene evoluta appendicem interpetiolarem succulentam bene evolutam gerente, pedunculo satis longo ut videtur in quoque caule solitario, inflorescentiae axe congesto satis brevi, corollae infundibuliformis lobulis abaxialiter incrassatis, fructu

albo atque pyrenarum dorsiventraliter complanatarum porcis dorsalibus longitudinalibus 3 ad 5 distinguitur.

Erect, terrestrial, succulent herbs or soft shrubs to 3 m tall, unbranched; stems glabrous to puberulous. *Leaves* elliptic, 12–26 × 5–9.5 cm, at apex obtuse to usually acute or somewhat acuminate, at base acute to cuneate, drying membranaceous to papyraceous, adaxially glabrous to puberulous, abaxially puberulous to glabrescent and usually paler; secondary veins 10 to 23 pairs, loosely to markedly looping to interconnect at least in distal part of blade, adaxially costa prominent and remaining venation plane, abaxially costa prominent, secondary veins prominulous, and remaining venation plane and invisible or intersecondary veins frequently well-developed; margins entire, plane; *petioles* 1–4 cm long, glabrous to puberulous; *stipules* glabrous, sheath 2–3 mm long, truncate to broadly rounded, caducous, interpetiolarly with a succulent, divergent appendage 2.5–4 mm long, inserted medially or above medially, conical, caducous, at apex glandular and 3–4-fimbriate. *Inflorescences* pseudoaxillary and apparently 1 per stem, green, ascending, densely puberulous to hirtellous; peduncles 6–16 cm long, flexuous; branched portion cylindrical-spiciform to subglobose, 1.5–3.5 × 1.5–2.5 cm, secondary axes 2 to 3 pairs, relatively short, terminating in congested dichotomous cymules; bracts entire, those subtending primary axes narrowly triangular to narrowly ligulate, 3.5–10 mm long, those subtending flowers deltoid to ovate, 1.5–2.5 mm long; *flowers* sessile or subsessile in glomerules of 3 to 7; hypanthium turbinate, ca. 1 mm long, densely puberulous; *calyx limb* densely puberulous, 0.8–1.2 mm long, 5-lobed for 1/4–1/2 its length, lobes triangular; *corolla* slenderly funnelform, white, externally densely puberulous, internally glabrous except hirtellous at stamen attachment, tube ca. 3.5 mm long, lobes 5, ca. 2 mm long, narrowly ligulate, acute, abaxially with a linear appendage ca. 1 mm long; *anthers* ca. 1.2 mm long, situated just above middle of corolla tube; *stigmas* 2, ca. 1 mm long, exserted. *Infructescences* similar to inflorescences or sometimes with axes becoming developed and monochasial; *fruits* obovoid, 6–7 × 4–4.5 mm long, glabrous, white; *pyrenes* 2, dorsiventrally flattened, dorsally with 3 to 5 rounded longitudinal ridges and margins thickened and similar to ridges.

Habitat, distribution, and phenology. In wet forest at 0 to 1150 m, western Colombia to northwestern Ecuador; collected in flower in July and September through November, in fruit in February, April, and November.

Notopleura spiciformis is distinguished by the combination of its stipules with a well-developed sheath bearing a well-developed, succulent, interpetiolar appendage; its relatively long peduncles that are apparently solitary on each stem; its congested, relatively short secondary inflorescence axes; its funnelform corollas with the lobes with a linear abaxial appendage; its white fruits; and its pyrenes that are dorsiventrally flattened and dorsally have 3 to 5 longitudinal ridges. The specific epithet refers to the form of the inflorescences of most specimens. This new species is similar to *N. anomothyrsa* and *N. longipedunculoides*. In particular these species all share well-developed peduncles, generally cylindrical-spiciform inflorescences, and dorsiventrally flattened pyrenes with 3 to 5 low dorsal ridges. However, *N. anomothyrsa* differs from *N. spiciformis* in having several peduncles per stem, relatively more elongated and branched inflorescence axes, and corolla lobes that abaxially have only a short thickenening, up to 0.5 mm long; *N. longipedunculoides* differs from *N. spiciformis* in its stipules with expanded, ovate to elliptic or oblong, interpetiolar laminas 5–20 mm long.

Paratypes. COLOMBIA. **Chocó:** Nóvita, ladera N del Cerro Torrá, Alto del Oso, *E. Forero et al. 3267* (COL, MO); hoya del Río San Juan, alrededores de Docordó, *E. Forero et al. 4319* (COL, MO); región del Río Pichimá, comunidad indígena Waunana, *L. Forero 653* (COL, MO), *683* (COL, MO). **Nariño:** Ricaurte, vicinity of Ricaurte, along Río Imbí, ca. 2–3 km above Ecopetrol Campamento Palmar, located 3 km NW of Ricaurte along trail to Ramos, *Croat 71572* (MO); just N of Pimbí, 15 km E of Barbacoas, *Fosberg 21225* (US)., **Valle del Cauca:** Buenaventura, Córdoba, San Cipriano, Reserva Natural Río Escalerete, *C. M. Taylor et al. 12139* (MO, TULV). ECUADOR. **Carchi:** trail along plain above Tobar Donoso and to Río Guape, *Hoover 1184* (MO); border area between Carchi and Esmeraldas, ca. 7 km past Lita on road Lita–Alto Tambo, *van der Werff et al. 12081* (MO). **Esmeraldas:** San José, Km 321 along railroad from Ibarra to San Lorenzo, *Boom 1317* (MO); San Lorenzo, Reserva Indígena Awá, parroquia Ricaurte, comunidad Balsareño, Río Palabí, *D. Rubio & Quelal 1454* (MO, QCNE).

I. 23. Notopleura torrana C. M. Taylor, sp. nov. TYPE: Colombia. Chocó: San José del Palmar, Cerro del Torrá, vertiente oriental, mesa abajo de la cumbre, 2500–2550 m, 14 Aug. 1988, *P. A. Silverstone-Sopkin, N. Paz, R. T. González, J. E. Ramos, L. H. Ramos & A. Henao 4395* (holotype, CUVC-23463; isotypes, F-2131010, MO-4342394). Figure 2A, B.

Haec species a congeneris foliorum marginibus valde incrassatis ac venis secundariis non vel vix manifestis, stipulis triangularibus, inflorescentia pedunculata capitata subcapitatave, bracteis floralibus bene evolutis atque limbo calycino 2–2.5 mm longo distinguitur.

Creeping or climbing, terrestrial, succulent herbs; stems to 1.2 m long, glabrous to densely papillose-puberulous. *Leaves* lance-elliptic to elliptic-oblanceolate, 3–5.5 × 1–3 cm, at apex acute to acuminate, at base cuneate to obtuse, drying chartaceous, adaxially glabrous, abaxially markedly paler and glabrous; secondary veins not visible or infrequently weakly visible adaxially, 5 to 8 pairs, extending to unite with margins, adaxially venation plane, abaxially venation plane or costa sometimes prominulous; margins markedly thickened; *petioles* 2–15 mm long, glabrous to densely puberulous; *stipules* glabrous, interpetiolar, triangular to broadly triangular, 1.5–2.5 mm long, persistent, at apex acute and glandular. *Inflorescences* pseudoaxillary, capitate or subcapitate; peduncles 3–22 mm long, densely puberulous to hirtellous; heads 1 per leaf axil, hemispherical, 8–12 mm diam.; bracts triangular to lanceolate, 4–6 mm long, acute to acuminate, glabrous; *flowers* sessile; hypanthium turbinate to cupuliform, ca. 0.8 mm long, glabrous; *calyx limb* glabrous, 2–2.5 mm long, lobed nearly to base, lobes 5, narrowly triangular, acute, entire; *corolla* infundibuliform, white, externally glabrous, internally glabrous except hirtellous at stamen insertion, tube ca. 4 mm long, lobes 5, ca. 2 mm long, lanceolate to triangular, dorsally smooth; *anthers* ca. 1 mm long, situated in upper part of corolla throat; *stigmas* 2, linear, ca. 0.8 mm long, shortly exserted. *Infructescences* similar to inflorescences; *fruits* narrowly ellipsoid, ca. 4.5 × 2 mm, white, glabrous; *pyrenes* 2, hemispherical in cross section, dorsally smooth.

Habitat, distribution, and phenology. In wet montane forest at 2400–2550 m on the Cerro del Torrá and Cerro del Inglés in the Cordillera Occidental of the Andes in central Colombia; collected in flower January, August, and December, in fruit in August.

Notopleura torrana is distinguished by the combination of its leaves with the margins markedly thickened and the secondary veins invisible or only very weakly visible, its triangular stipules, its capitate or subcapitate pedunculate inflorescences with well-developed bracts, and its calyx limbs 2–2.5 mm long. This new species is similar to *N. macropodantha* of the Cordillera Oriental of northeastern Colombia, and has been confused with this species (e.g., Silverstone-Sopkin & Ramos-Pérez, 1995). However, *N. macropodantha* differs from this new species in its leaves with the secondary veins clearly visible and not extending to the margins, and its bilobed stipule appendages. *Notopleura torrana* is also similar to the sympatric species *N. biloba* (described previously in this article); *N. biloba* differs from *N. torrana* in its stipules that are flattened and laminar in form with two well-developed, usually persistent, non-glandular lobes, along with its subcapitate to shortly branched inflorescences. The species epithet refers to the type locality. The Cerro del Torrá is a relatively isolated massif in the Chocó biogeographic region and has an unusual flora (Silverstone-Sopkin & Ramos-Pérez, 1995). *Notopleura torrana* is included in the "*Notopleura macropodantha* group" discussed in the introductory part of this article.

Paratypes. COLOMBIA. **Chocó:** San José del Palmar, Cerro del Torrá, vertiente nororiental, plan grande abajo de la cumbre, *Silverstone-Sopkin et al. 1782* (CUVC, MO). **Valle del Cauca:** El Cairo, Cerro del Inglés (Cordillera Occidental, Serranía de los Paraguas, a 1 hora en jeep de El Cairo), *Silverstone-Sopkin et al. 2786* (CUVC, MO).

I. 24. Notopleura tubulistipula C. M. Taylor, sp. nov. TYPE: Ecuador. Cotopaxi: carretera Latacunga–Zumbahua–Pilaló, 00°58′S, 78°53′W, 2800–3100 m, 22 May 1988, *W. Palacios, D. Neill & C. Cerón 2550* (holotype, MO-5568185). Figure 1A, B.

Haec species a *Notopleura aggregata* vagina stipulari tubulari bene evoluta appendicem interpetiolarem laminarem leviter usque profunde bilobam gerente, limbo calycino ca. 4 mm longo atque tubo corollino ca. 14 mm longo distinguitur.

Erect, succulent, terrestrial herbs or soft shrubs to 1 m tall, unbranched; stems glabrous. *Leaves* elliptic to elliptic-oblong or oblanceolate, 10–18 × 5–6 cm, at apex acute to shortly acuminate, at base cuneate to obtuse, drying papyraceous to membranaceous, adaxially glabrous, abaxially paler and densely hirtellous to glabrescent or usually remaining hirtellous on principal veins; secondary veins 12 to 15 pairs, looping to interconnect in well-developed submarginal veins, adaxially venation plane, abaxially costa prominent, secondary veins prominulous, and remaining venation plane and not visible or occasionally with short intersecondaries visible; margins plane; *petioles* 1.5–4 cm long; *stipules* with sheaths tubular, 3–7 mm long, glabrous, truncate, persisting on distalmost 2 to 3 nodes, with interpetiolar appendage laminar, oblong to ligulate or ovate, 3–6 mm long, hirtellous to glabrous, ciliolate with the projections apparently sometimes glandular, caducous, drying membranaceous, bilobed shortly or up to 3/4, inserted medially on the sheath then extending downward on each side, the line of insertion forming a "V." *Inflorescences* pseudoaxillary, borne with and below the leaves, paniculate, ascending, green, puberulous to glabrescent;

peduncles 3–9 cm long; branched portion pyramidal, 3–5 × 3–6 cm, with developed secondary axes produced at 1 node, 2 per node, terminating in glomerules or congested cymules; bracts entire, acute, those subtending secondary axes narrowly triangular to lanceolate, 3–10 mm long, those subtending flowers ovate, 5–7 mm long; *flowers* sessile or subsessile in glomerules or congested cymules of 3 to 7; hypanthium turbinate, ca. 0.8 mm long, glabrous to hirtellous; *calyx limb* ca. 4 mm long, glabrous, 5-lobed for 3/4 or more, lobes narrowly triangular, acute, ciliolate; *corolla* slenderly funnelform, white to yellow, externally glabrous, internally glabrous except hirtellous near middle, tube ca. 14 mm long, lobes 5, ca. 2 mm long, triangular, abaxially smooth or a little thickened; *anthers* ca. 1.5 mm long, included, situated a little below top of corolla tube; *stigmas* 2, linear, 1.5–2 mm long, included, situated by or just below anthers. *Infructescences* similar to inflorescences; *fruits* ellipsoid to subglobose, 6–7 × 4.5–5 mm, white, hirtellous to glabrous, sessile or subsessile; *pyrenes* 2, dorsiventrally strongly flattened, dorsally with 1 sharp, central, longitudinal ridge and often also with 2 lateral, similar but smaller ridges, margins thickened, rounded to somewhat sharp.

Habitat, distribution, and phenology. In wet montane forest at 2300 to 3020 m in Andean Ecuador; collected in flower in March, May, September, and December, in fruit in March and May.

Notopleura tubulistipula is distinguished by its stipules with the sheaths well-developed and the interpetiolar appendages laminar and shortly to deeply bilobed, its relatively well-developed bracts, its calyx limbs ca. 4 mm long, its corolla tubes ca. 14 mm long, its white fruits, and its dorsiventrally flattened pyrenes with 1 or 3 dorsal ridges. The stipules are distinctive in their combination of well-developed tubular sheaths with the delicate, laminar, usually deeply bilobed interpetiolar appendage; the specific epithet refers to the tubular stipule sheath. *Notopleura tubulistipula* is similar in general aspect to *N. biloba*, *N. macropodantha*, and *N. longiflora* of Andean Colombia. All of these Colombian species differ from *N. tubulistipula* in their stipule sheaths that are 2.5 mm long or shorter, triangular, and interpetiolar or united to the petioles. The few flowers studied appear to be monomorphic, with both stigmas and anthers included. *Notopleura tubulistipula* is included in the "*Notopleura aggregata* group" discussed in the introductory part of this article.

Paratypes. ECUADOR. **Cotopaxi:** Cordillera Occidental, Pilaló, *Acosta S. 14752* (F). **Napo:** Quijos, Sierra Azul (Agrícola Industrial Río Aragón), *A. Alvarez et al. 385* (MO, QCNE); Archidona, Sumaco Napo-Galeras National Park, Sumaco Mountain, *J. L. Clark 2243* (MO, QCNE); Reserva Ecológica Cayambe-Coca, 5 km de Cuyuja, camino a Quito, *Gavilanes & Castellanos 609* (AAU); upper slopes and summit of Guagra Urcu, *Holm-Nielsen et al. 27167* (AAU), *Holm-Nielsen et al. 27237* (AAU), *Holm-Nielsen et al. 27470* (AAU), *Holm-Nielsen et al. 27605* (AAU); upper Río Suno, near Guagra Urcu, *Holm-Nielsen et al. 27503* (AAU), *Holm-Nielsen et al. 27532* (AAU), *Holm-Nielsen et al. 27551* (AAU). **Pichincha:** Cerro Pugsi, NW slope of Volcán Pichincha, *Bleiweiss 1136* (NY); Tandacato, *Heilborn 496* (S). **Tungurahua:** Cordillera de Llanganates, valley of Río Sangarinas (Desaguadero), *Asplund 9792* (S).

I. 25. Notopleura zarucchiana C. M. Taylor, sp. nov. TYPE: Colombia. Antioquia: Sonsón, Los Cristos, sitios "Páramo de Sonsón" y "Monumento," sobre la cuchilla "Comadrejal," 10 km SE de Sonsón en la vía al Nariño, 05°38′N, 75°15′W, 2500–2740 m, 17 Aug. 1992, *R. Callejas & F. J. Roldán 10511* (holotype, HUA-83070). Figure 2F–H.

Haec species a congeneris foliorum venis secundariis cum marginibus incrassatis conjunctis ac venatione tertiaria abaxialiter manifesta, inflorescentia cymosa congesta, calycis limbo 2–3.5 mm longo atque corollae extus hirtellae tubo 10–12 mm longo distinguitur.

Succulent, terrestrial herbs or soft shrubs to 0.8 m tall, unbranched or apparently little-branched; stems densely hirtellous. *Leaves* lanceolate to ovate, 3.5–7 × 1.5–4 cm, at apex acute, at base cuneate to obtuse or subtruncate, drying papyraceous to chartaceous, adaxially densely pilosulous to subfloccose, abaxially paler and glabrous except strigillose to hirtellous on principal veins; secondary veins 6 to 10 pairs, extending to unite with margins, adaxially venation plane, abaxially costa prominent, secondary veins prominulous, and reticulated tertiary venation visible and often thickened; margins markedly thickened, narrowly winged; *petioles* 3–22 mm long, densely hirtellous; *stipules* glabrous, interpetiolar or shortly united around stem, broadly triangular, 2–3 mm long, succulent, persistent, at apex with 2–5 linear glands 0.3–1 mm long, caducous. *Inflorescences* pseudoaxillary, congested-cymose, hirtellous, ascending; peduncles 1.5–4 cm long; branched portion rounded-corymbiform to hemispherical, 1–1.5 × 0.8–2.5 cm (without corollas), with 1 pair of short secondary axes; bracts narrowly triangular, 6–15 mm long, acute, glabrous; pedicels 0–1 mm long; *flowers* subsessile to shortly pedicellate in glomerules or congested cymules; hypanthium turbinate, ca. 1 mm long, glabrous; *calyx limb* glabrous, 2–3.5 mm long, divided for 2/3–3/4, lobes 4 to 5, narrowly triangular, acute; *corolla* infundibuliform, white, externally

sparsely to moderately hirtellous, internally glabrous, tube 10–12 mm long, lobes 4 or 5, 3.5–5 mm long, ligulate, dorsally smooth; *anthers* ca. 1.2 mm long, situated just above middle of corolla tube; *stigmas* ca. 0.8 mm long, situated in corolla throat. *Infructescences* and *fruits* not seen.

Habitat, distribution, and phenology. In wet premontane and montane forests at 1700 to 3300 m in the Cordilleras Occidental, Central, and Oriental of Colombia; collected in flower February through June and August.

Notopleura zarucchiana is distinguished by the combination of its leaves with the secondary veins uniting with the thickened margins and the tertiary venation visible abaxially, its congested-cymose inflorescences, its calyx limbs 2–3.5 mm long, its externally hirtellous corollas, and its corolla tubes 10–12 mm long. The species epithet honors James L. Zarucchi, an American botanist who among other accomplishments has documented the Colombian flora with excellent specimens. Several other montane Colombian species of *Notopleura* also have thickened leaf margins, notably *N. macropodantha*, but only *N. longiflora* (described above) also has similarly long corollas. *Notopleura longiflora* differs from *N. zarucchiana* in its calyx limbs 5–7.5 mm long and corollas externally glabrous to sparsely puberulous with tubes 12.5–14 mm long; *N. macropodantha* differs from *N. zarucchiana* in its adaxially glabrous leaves with the secondary veins not extending all the way to the margins, its stipules with two well-developed lobes, its corolla tubes 3–4 mm long, and its corolla lobes ca. 1.5 mm long. *Notopleura zarucchiana* is included in the "*Notopleura macropodantha* group" discussed in the introductory part of this article.

Paratypes. COLOMBIA. **Antioquia:** Sonsón, San Pablo, vía Sonsón-Nariño, 13.3 km SE de Sonsón, *Callejas et al. 6311* (HUA); along old camino "Páramo de Sonsón" along or near carretera between Sonsón and Nariño, *Core 741* (US); 10 km al E de Sonsón, *Scolnik et al. 19An237* (US). **Cundinamarca:** subida al Alto de Tibre, *F. O. Zuloaga 4045* (COL). **Risaralda:** Santuario, Las Colonias, 200 m abajo del "Reposo," Macizo de Tamaná, *J. H. Torres et al. 1574* (COL p.p., plant "B").

II. Notopleura subg. **Viscagoga** (Baillon) C. M. Taylor, Ann. Missouri Bot. Gard. 88: 511. 2001. *Uragoga* sect. *Viscagoga* Baillon, Adansonia 12: 227. 1879. *Psychotria* ser. *Viscagoga* (Baillon) Steyermark, Mem. New York Bot. Gard. 23: 566. 1972. TYPE: *Notopleura guadalupensis* (DC.) C. M. Taylor.

This subgenus comprises 15 species (including the 5 described in this article), which are recognizable by their epiphytic, usually branched habit, terminal and sometimes also pseudoaxillary inflorescences, and pyrenes 2 to 6. Plants of subgenus *Viscagoga* have stipules with a truncate sheath and one to several short glandular interpetiolar appendages, or in a few species these are apparently lacking. Species of subgenus *Viscagoga* are found generally throughout the range of *Notopleura*, which is expanded here with the discovery of *N. bahiensis* C. M. Taylor.

II. 1. Notopleura bahiensis C. M. Taylor, sp. nov. TYPE: Brazil. Bahia: Uruçuca, Parque Estadual Serra do Condurú, trail to summit of Cerro do Condurú, Southern Bahian Wet Forest, 14°29′S, 39°06′W, 210 m, 28 Sep. 2001, *W. W. Thomas, J. Jardim, S. Sant'Ana & F. Junchum 12166* (holotype, CEPEC; isotypes, MO-5568186, NY).

Haec species a *Notopleura multiramosa* fructus pyrenis 4 ad 6 atque distributione disjuncta orientali-brasiliensi distinguitur.

Succulent suffrutescent herbs, epiphytic, to 2 m tall; stems glabrous. *Leaves* elliptic to lance-elliptic or oblanceolate, 3–9.5 × 1–3.5 cm, at apex acute, at base acute to obtuse, glabrous, when dry subcoriaceous; secondary and higher-order venation not visible; *petioles* 3–7 mm long; *stipules* glabrous, united around stem into a truncate tubular sheath 1.5–2.5 mm long, near base of interpetiolar portion with a conical appendage 0.5–1 mm long, at apex this glandular, sheath generally persistent, appendage generally persistent but becoming dry and indurated. *Inflorescences* terminal, glabrous or with higher-order axes sometimes puberulous, cymose, color not noted; peduncles 0.8–1.2 cm long; branched portion 1.5–4 × 2–6 cm, rounded-corymbiform, with secondary axes 1 to 2 pairs; bracts deltoid, 0.3–1 mm long; pedicels 0.5–2 mm long; *flowers* pedicellate in dichasial cymules of 3(5); hypanthium ellipsoid, ca. 1 mm long, densely puberulous; *calyx limb* densely puberulous, 0.3–0.5 mm long, truncate; *corolla* in bud externally puberulous, mature *corolla, anthers,* and *stigmas* not seen. *Fruits* ellipsoid to subglobose, ca. 4 × 4 mm, glabrescent, orange; *pyrenes* 4, dorsally smooth.

Habitat, distribution, and phenology. In wet forests in Bahia, eastern Brazil, at 500 to 760 m; collected in flower bud in June, in fruit in March, May, and September.

Notopleura bahiensis is apparently disjunct in its distribution from other *Notopleura* species; the species epithet refers to its geographic distribution. The species of *Notopleura* with the geographical

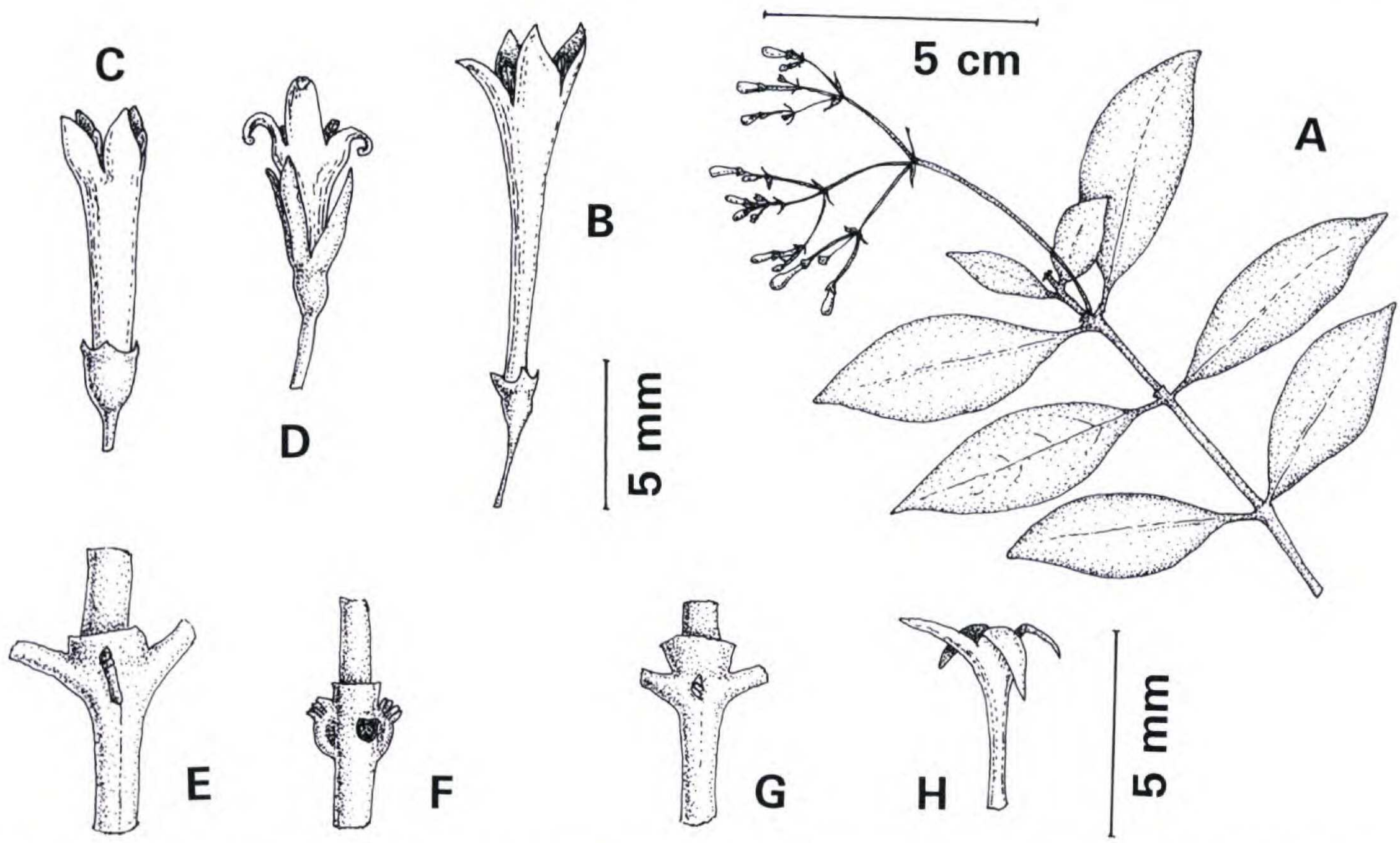

Figure 7. New species of *Notopleura* subg. *Viscagoga*. A, B, *Notopleura elegans* C. M. Taylor. —A. Stem with leaves and inflorescence; based on *Boyle 928* (MO). —B. Flower; based on *Lent 2056* (MO). —C. *Notopleura vargasiana* C. M. Taylor, flower; based on *Werner 275* (MO). D–F, *Notopleura cocleensis* C. M. Taylor. —D. Flower; based on *Knapp et al. 5999* (MO). —E. Stem node (same node as in F) with stipule and basal portions of petioles, interpetiolar view; based on *Croat 37446* (MO). —F. Same stem node as in E, intrapetiolar view with petiole removed. G, H, *Notopleura episcandens* C. M. Taylor & D. H. Lorence; based on *Knapp et al. 4506* (MO). —G. Stem node with basal portions of petioles. —H. Corolla. C, D, E, F, G, H to same scale.

range closest to this new species is *N. multiramosa* of the Guianas, which is similar to *N. bahiensis* in general aspect and in having truncate calyx limbs. In addition to their geographical separation, *N. multiramosa* differs morphologically from *N. bahiensis* in its fruits with consistently two pyrenes. There may be differences in floral morphology as well, but the flowers of both species are poorly known. The fruits are described on a few collections as orange, but it is possible that these later become red then black at maturity as in several other epiphytic species of *Notopleura*.

Paratypes. BRAZIL. **Bahia:** São José da Vitória, ca. 9 km na estrada S. José–Una, ramal a dereita ca. 3 km adentro, *A. M. de Carvalho et al. 6499* (NY); Rod. Rio Branco a Una, *R. S. Pinheiro 1349* (US); estrada São José, Una, Km 8, ramal a dereita a partir de São José, *A. M. Amorim et al. 1689* (MO); Una, riberão das Palmeiras, Serra Javi, ramal com entrada no km 11 da rodovia São José/Una, lado S a 9 km âte cima da Serra, 9 km por ar SE São José, *L. A. Mattos da Silva & Judziewicz 4154* (US); Uruçuca, 7.4 km N of Serra Grande on road to Itacaré, Fazenda Lagoa do Conjunto Fazenda Santa Cruz, *W. W. Thomas et al. 10907* (MO, NY).

II. 2. Notopleura cocleensis C. M. Taylor, sp. nov. TYPE: Panama. Coclé: slopes and summit of Cerro Gaital, N of El Valle, 8°40′N, 80°07′W, 1000–1400 m, 10 July 1982, *S. Knapp, J. Mallet & R. Dressler 5999* (holotype, MO-3032258). Figure 7D–F.

Haec species a congeneris foliorum ellipticorum 1.2–4.5 × 0.5–2 cm venis secundariis non manifestis, pedunculo 0.5–1.2 cm longo, stipularum appendicibus glandularibus pluribus 0.5–1 mm longis, calycis limbo 1.5–3 mm longo, corollae tubo ca. 3 mm longo ac lobulis ca. 1.5 mm longo atque fructu nigro distinguitur.

Epiphytic, succulent suffrutescent herbs or shrubs to 0.3 m tall; stems glabrous. *Leaves* elliptic to elliptic-oblong, 1.2–4.5 × 0.5–2 cm, at apex acute and shortly apiculate, at base acute to cuneate, glabrous, when dry coriaceous, slightly to markedly discolorous; secondary veins not or almost not evident; *petioles* 2–4 mm long, winged for most or all of their length; *stipules* glabrous, united around stem into a tubular truncate sheath 0.8–1.5 mm long, interpetiolar portion near base with a medial cartilaginous rib terminating at middle of sheath in a group of

caducous, glandular appendages 0.5–1 mm long. *Inflorescences* terminal and pseudoaxillary, glabrous, paniculate; peduncles 0.5–1.2 cm long; branched portion 1 × 1.5–2.5 cm, corymbiform, with secondary axes 1(2) pair, bracts 1.5–7 mm long, linear, acute, those subtending flowers 1.5–3 mm long; pedicels 1.5–3 mm long; *flowers* pedicellate in cymules of 3 to 5; hypanthium ellipsoid, ca. 0.8 mm long, glabrous; *calyx limb* 1.5–3.5 mm long, glabrous, red, deeply lobed, lobes 4, ligulate, acute to acuminate; *corolla* funnelform, white to pink, externally glabrous, internally glabrous except hirtellous in a ring situated near middle of tube, tube ca. 3 mm long, lobes 4, triangular, ca. 1.5 mm long, dorsally smooth; *anthers* ca. 1 mm long, partially exserted; *stigmas* ca. 1 mm long, exserted. *Fruits* subglobose, ca. 4.5 mm diam., glabrous, red then black; *pyrenes* 4, dorsally smooth or usually with a weak central ridge.

Habitat, distribution, and phenology. Western Panama, in wet forest and cloud forest at 800 to 1400 m, collected in flower in March, July, and December, in fruit in March and July.

Notopleura cocleensis is known only from Coclé Province, Panamá, and the specific epithet refers to this distribution. It is similar to *N. maxonii*, *N. elegans* (described below), *N. guadalupensis*, and *N. episcandens* (described below). *Notopleura maxonii* is sympatric with *N. cocleensis*, and can be distinguished from it by its calyx limb 0.8–1 mm long and its leaves 0.7–2.5 × 0.2–0.8 cm; *N. elegans* is also sympatric with *N. cocleensis*, and can be distinguished from it by its calyx limbs 0.8–1.8 mm long and corolla tubes 6–10 mm long; *N. episcandens* from eastern Panama can be distinguished from *N. cocleensis* by its ovate to elliptic-lanceolate leaves and solitary triangular interpetiolar appendages; and *N. guadalupensis* is sympatric with *N. cocleensis* and can be distinguished from it by its ovate to lanceolate leaves and calyx limbs 0.5–0.8 mm long.

Paratypes. PANAMA. **Coclé:** La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón, *Croat 37446* (MO); 3-mountain ridge above El Valle, *C. Hamilton et al. 4148* (MO); foothills and summit of Cerro Caracol, near La Mesa N of El Valle de Antón, *Knapp 1114* (MO); Cerro Caracol, *Kirkbride 1108A* (MO p.p., plant labeled B); divide SW of La Mesa at end of logging road, *Stein & Hamilton 1009* (MO); ridge from summit of Cerro Carocoral [sic; Caracol] to summit of Cerro Gaital, N rim of El Valle, *Sytsma 3826* (MO).

II. 3. Notopleura elegans C. M. Taylor, sp. nov. TYPE: Costa Rica. Heredia: Parque Nacional Braulio Carillo, sendero de transecto, on flat portion of ridge during descent from Cerro las Marías to old road from San Rafael, Vara Blanca to Refugio at 2070 m, 10°10′07″N, 84°06′48″W, 2210–2240 m, 5 June 1992, *B. Boyle 928* (holotype, MO-3294927; isotypes, CR, INB). Figure 7A, B.

Haec species a *Notopleura guadalupensi* limbo calycino 0.8–1.8 mm longo atque tubo corollino 6–10 mm longo distinguitur.

Epiphytic, succulent shrubs and suffrutescent herbs to 1 m tall; stems glabrous. *Leaves* elliptic, 1.2–5.2 × 0.7–2.8 cm, at apex acute to somewhat acuminate, at base acute to cuneate, glabrous, when dry chartaceous to subcoriaceous, slightly to markedly discolorous; secondary veins not evident; *petioles* 2–8 mm long; stipules glabrous, united around the stem into a truncate, tubular sheath 1–1.5 mm long, interpetiolar portion with 1 to 2 triangular, caducous, glandular appendices 0.5–1 mm long. *Inflorescences* terminal and pseudoaxillary, glabrous, paniculate, pink to red; peduncles (1.5)2–4.5 cm long; branched portion 2–4 × 2–5 cm, corymbiform to broadly triangular, with secondary axes 1 to 3 pairs; bracts linear, 1–6 mm, acute, those subtending flowers 1–3 mm long; pedicels 1–5 mm long; *flowers* pedicellate in cymules of 2 to 3; hypanthium ellipsoid, ca. 1 mm long, glabrous; *calyx limb* 0.8–1.8 mm long, glabrous, lobed for 1/2–deeply, lobes 4, triangular, acute; *corolla* slenderly funnelform, white sometimes tinged with blue, externally and internally glabrous, tube 6–10 mm long, lobes 4, 1.5–2.5 mm long, triangular, dorsally smooth; *anthers* ca. 1.2 mm long, partially exserted; *stigmas* ca. 0.2 mm long, exserted. *Fruits* subglobose, ca. 4 mm diam., glabrous, orange to red; *pyrenes* 4, dorsally smooth.

Habitat, distribution, and phenology. Northern Costa Rica and western Panama, in wet forest, oak forest, and cloud forest at 900 to 2482 m; collected in flower in January, March, and May through October, in fruit in January, March, April, June, July, and September through November.

Notopleura elegans is similar to *N. guadalupensis*, *N. cocleensis*, *N. pithecobia* (Standley) C. M. Taylor, and *N. vargasiana* (described below). *Notopleura guadalupensis* and *N. pithecobia* differ from *N. elegans* in their shorter calyx limbs, 0.5–1 mm long, and shorter corolla tubes, ca. 3 mm long; *N. cocleensis* differs from *N. elegans* in its calyx limbs 1.5–3 mm long and its corolla tubes ca. 3 mm long. The distinctions between *N. elegans* and

N. vargasiana are discussed under this latter species, below. The specific epithet of this new species refers to the graceful inflorescences with relatively well-developed pedicels and corollas.

Paratypes. COSTA RICA. **Alajuela:** near Quebrada Desengaño, 1 km E of Vara Blanca, *Lent 2056* (MO). **Cartago:** near and along crest of ridge S of Alto Patillos (and a continuation of the latter), ca. 6 km SE of Tapantí, *Grayum & Herrera 7717* (MO). **Guanacaste:** Estación Cacao, Parque Nacional Guanacaste, *R. Espinoza 77* (MO); trail to Cerro Cacao from Estación Biológica Cacao, *Short et al. 85* (BM). **Heredia:** N end of Cerros Las Marías, N slope of Volcán Barva, *Grayum 7282* (MO); headwaters of Río Santo Domingo, ca. 3 km E of San Rafael de Vara Blanca, N slope of Volcán Barba, *Grayum 7336* (BM). **Limón:** Talamanca, Quebrada Kuisa, trail up of camp [sic], ca. 500 m, Cordillera de Talamanca, *Bittner 1801* (MO). **Puntarenas:** Monteverde Reserve, Nuboso Trail, *Haber 510* (MO), *Haber ex Bello 2232* (MO); Monteverde Reserve, *Haber 533* (MO); Monteverde Reserve, Sendero San Luis, *Haber & Bello 2495* (MO); Monteverde Cloud Forest Reserve, road to TV towers, Pacific slope, *Haber ex Bello & Lierheimer 4466* (MO); Monteverde, upper valley and ridges of Veracruz river valley S of Monteverde Reserve, Pacific drainage, *Haber ex Bello & Lierheimer 4525* (MO); Cerro Ojo de Agua, Monteverde, *Haber & Bello 6604* (MO); Puntarenas, Monteverde, Río Guacimal valley at Lindora Electric Plant, *Haber ex Cruz 10673* (MO); Coto Brus, Zona Protectora Las Tablas, cuenca Térraba-Sierpe, *E. Navarro V. 478* (MO), *J. Quesada et al. 1764* (MO). PANAMA. **Bocas del Toro:** NE of Cerro Pate Macho, *Knapp et al. 2164* (MO). **Chiriquí:** Cerro Pata de Macho [sic], ca. 5 mi. NE of Boquete, trail to Continental Divide leading to Finca Serrano (Francisco Serrano: Pacific slope), *Antonio 2650* (MO); Renacimiento, cima de Cerro Pando y alrededores, *J. Aranda et al. 3350* (MO, PMA); Cerro Pate Macho, along the Continental Divide, on trail which leads to Finca Serrano, NE of Boquete, *Croat 48541* (MO); between Palo Alto and top of Ridge (divide) near Cerro Pate Macho, above Río Palo Alto, NE of Boquete, *D'Arcy et al. 12641* (MO); Renacimiento, Jurutungo, filo entre La Quijada del Diablo y la cima de Cerro Pando, *Galdames 3407* (MO, PMA, SCZ); E slopes of Cerro Pando, *Knapp 1640* (MO); vicinity of Cerro Punta, above Guadalupe, slopes above STRI cabin, *McPherson 9422* (MO); Cerro Pando, on the Continental Divide and the Panama–Costa Rica border, ca. 16 km NW of El Hato del Volcán, *Mori & Bolten 7321* (MO); Bugaba, Cerro Punta, *van der Werff & Herrera 6335* (BM).

II. 4. Notopleura episcandens C. M. Taylor & Lorence, sp. nov. TYPE: Panama. Panamá: amongst ridges S of Ipetí 5 hours walk from Chocó village, Serranía de Maje, 8°45′N, 77°30′W, 450–600 m, 1 Apr. 1982, *S. Knapp, R. Foster, J. Mallet & M. Huft 4506* (holotype, MO-3689783; isotype, PTBG-2647). Figure 7G, H.

Haec species a *Notopleura maxonii* limbo calycino 1.8–3 mm longo, stipularum utroque latere appendice glandulari solitario caduco triangulari 0.3–0.8 mm longo atque foliis in sicco plerumque concoloribus distinguitur.

Epiphytic, scandent, succulent suffrutescent herbs; stems to 0.5 m tall, glabrous. *Leaves* ovate to elliptic-lanceolate, 0.6–1.8 × 0.4–1 cm, at base obtuse to rounded, at apex acute to usually acuminate and apiculate, on both surfaces glabrous, when dry chartaceous, generally concolorous; secondary veins not evident; *petioles* 1.5–3 mm long; *stipules* glabrous, united around stem into a tubular continuous sheath, this 0.5–1 mm long, truncate or separating into 2 intrapetiolar segments, in middle of base of each interpetiolar side bearing 1 glandular appendage, this triangular, caducous. *Inflorescences* terminal and pseudoaxillary, cymose, glabrous; peduncle 1.5–4 mm long; branched portion pyramidal, 4–10 × 4–15 mm (not including corollas); secondary axes 1 pair; bracts triangular-subulate, 0.3–2 mm long; pedicels 0.5–3 mm long; *flowers* pedicellate in cymules of 2 to 5; hypanthium obconic, 0.5–0.8 mm long; calyx limb 1.8–3 mm long, deeply lobed, lobes 4, subequal to unequal on an individual flower, acute to acuminate; *corolla, anthers,* and *stigmas* not seen. *Fruits* ellipsoid to obovoid, 3.5–5 × 3.5–5 mm, glabrous, black; *pyrenes* 4, dorsally (abaxially) smooth.

Habitat, distribution, and phenology. In wet forests of eastern Panama at 400 to 700 m, collected in fruit in March, April, and December.

Notopleura episcandens is distinguished by its combination of relatively small leaves, reduced inflorescences, and well-developed calyx limb. It is similar to *N. maxonii*; *N. maxonii* can be distinguished from *N. episcandens* by its calyx limb 0.8–1 mm long and its leaves that are acute to cuneate at the base and generally markedly discolorous when dry. This species was first recognized by John D. Dwyer, who annotated specimens as an undescribed species of *Psychotria* with the epithet "*episcandens*" but never published this name.

Paratype. PANAMA. **Panamá:** area surrounding Rancho Chorro, mountains above Torti Arriba, Canazas mountain chain, *Folsom et al. 6672* (MO).

II. 5. Notopleura vargasiana C. M. Taylor, sp. nov. TYPE: Ecuador. Napo: Cantón Quijos, Reserva Ecológica Antisana, Cordillera de los Guacamayos, cruce del oleoducto de la compañía ARCO, entre Río Vinillos y El Mirador, 00°38′S, 77°51′W, 3–5 Jan. 1999, *H. Vargas, E. Narváez & F. Mamallacta 3294* (holotype, QCNE; isotype, MO-5568187). Figure 7C.

Haec species a *Notopleura guadalupensi* calycis limbo 1–1.3 mm longo atque corollae tubo ca. 5 mm longo ac lobulis ca. 2 mm longis distinguitur.

Succulent shrubs or suffrutescent herbs, epi-

phytic, height not noted; stems glabrous. *Leaves* elliptic to lanceolate, 1.1–4 × 0.6–1.6 cm, at apex acute, at base cuneate to obtuse, glabrous, when dry coriaceous and slightly to usually markedly discolorous; secondary and higher-order venation not visible; *petioles* 2–5 mm long; *stipules* glabrous, united around stem into a truncate tubular sheath 1.5–3 mm long, near base of interpetiolar portion with 1 to 3 linear to triangular appendices 0.5–1.5 mm long, these caducous, sheath caducous or persistent on 2 to 3 most distal nodes. *Inflorescences* terminal and pseudoaxillary, glabrous, paniculate; peduncles 1.3–2.5 cm long; branched portion 2–3.5 × 4–8 cm, corymbiform-rounded, with secondary axes 1 to 3 pairs; bracts linear to triangular, 0.5–3 mm long, acute, those subtending flowers 0.5–1.5 mm long; pedicels 0.5–1.2 mm long; *flowers* pedicellate in cymules of 2 to 3; hypanthium turbinate, ca. 1 mm long, glabrous; *calyx limb* 1–1.3 mm long, glabrous, lobed for 1/4–1/2, lobes triangular, acute; *corolla* in bud slenderly funnelform, white, externally glabrous, internally glabrous except sparsely hirtellous near middle of tube, tube to 5 mm long, lobes 4, to 2 mm long, dorsally smooth; *anthers* and *stigmas* not seen. *Fruits* obovoid, ca. 4 × 4 mm, glabrous, red; *pyrenes* 3 to 4, dorsally smooth.

Habitat, distribution, and phenology. Eastern mountains of Ecuador, in wet forest at 1350 to 2280 m; collected in flower bud in January and July, in fruit in December.

Notopleura vargasiana is similar to *N. guadalupensis* and *N. elegans* (described above). *Notopleura guadalupensis* in Panama and Colombia differs from *N. vargasiana* in its calyx limb 0.5–0.8 mm long, its corolla tubes ca. 3 mm long, its corolla lobes ca. 1 mm long, and its pyrenes 2 per fruit. *Notopleura elegans* differs from *N. vargasiana* in its calyx limbs 0.8–1.8 mm long and more deeply lobed, for 1/2 to completely, and its corolla tubes 6–10 mm long. The species epithet commemorates Homero Vargas, an Ecuadorian botanist who collected the type specimen. The fruits of *N. vargasiana* are described as red on the relatively few collections studied, but they may then quickly mature to black as in several other species of *Notopleura*.

Paratypes. ECUADOR. **Morona–Santiago:** Gualaquiza, Cordillera del Cóndor, ridgetop above Banderas, near disputed Ecuador–Peru border, *Gentry 80021* (MO); Campamento Archupalla, Cordillera del Cóndor, 15 km E of Gualaquiza, *Gentry 80321* (MO); vertiente occidental de la Cordillera del Cóndor, arriba del valle del Río Quimi, *T. Montenegro et al. 114* (MO, QCNE). **Napo:** Cordillera de Huacamayos, Km 33 Baeza–Tena road, *P. M. Jørgensen et al. 61262* (AAU); Quijos, Reserva Ecológica Antisana, Cordillera de los Guacamayos, entre El Mirador y La Virgen, oleoducto de la Compañía Arco, *H. Vargas & Narváez 3195* (MO, QCNE). **Zamora–Chinchipe:** W of Tikimints, valley or Río Coangas, *Berry & Neill 7653* (MO, QCNE); Cordillera del Cóndor, arriba del valle del Río Quimi, *Caranqui et al. 190* (MO, QCNE); Cordillera del Cóndor, cerca al destacamento militar Cóndor Mirador, en la frontera Ecuador–Perú, *E. Freire et al. 4350* (MO), *G. Pabón et al. 334* (MO); Estación Científica San Francisco, ca. Km 30 on road Loja–Zamora, *Werner 275* (MO), *Wolff 163* (MO), *Wolff 164* (MO).

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Appendix 1. List of the species of *Notopleura* by subgenus. Asterisks indicate names of species newly described in this article, except in the case of *N. madida*, which is a new combination. Daggers indicate clarifications of correct authorship noted in this article.

Subgenus Notopleura

Notopleura acuta C. M. Taylor
Notopleura aequatoriana C. M. Taylor
Notopleura aggregata (Standley) C. M. Taylor
Notopleura agostinii (Steyermark) C. M. Taylor
Notopleura albens C. M. Taylor
Notopleura amicitiae C. M. Taylor*
Notopleura aneurophylla (Standley) C. M. Taylor
Notopleura aneurophylloides (Steyermark) C. M. Taylor
Notopleura angustissima (Standley) C. M. Taylor
Notopleura anomothyrsa (K. Schumann & Donnell Smith) C. M. Taylor
Notopleura araguensis (Steyermark) C. M. Taylor
Notopleura biloba C. M. Taylor*
Notopleura bryophila C. M. Taylor*
Notopleura callejasii C. M. Taylor
Notopleura camponutans (Dwyer & M. V. Hayden) C. M. Taylor
Notopleura capacifolia (Dwyer) C. M. Taylor
Notopleura capitata C. M. Taylor*
Notopleura chapensis (Steyermark) C. M. Taylor
Notopleura cincinalis C. M. Taylor
Notopleura congesta C. M. Taylor
Notopleura corniculata C. M. Taylor*
Notopleura corymbosa C. M. Taylor*
Notopleura costaricensis C. M. Taylor*
Notopleura cundinamarcana C. M. Taylor
Notopleura decurrens (Steyermark) C. M. Taylor
Notopleura discolor (Grisebach) C. M. Taylor
Notopleura dukei (Dwyer) C. M. Taylor
Notopleura fernandezii (Steyermark) C. M. Taylor
Notopleura hondurensis C. M. Taylor
Notopleura humensis (Steyermark) C. M. Taylor
Notopleura hurtadoi C. M. Taylor*
Notopleura hypolaevis C. M. Taylor*
Notopleura iridescens C. M. Taylor
Notopleura lanosa C. M. Taylor
Notopleura lateralis (Steyermark) C. M. Taylor
Notopleura lateriflora (Standley) C. M. Taylor
Notopleura latistipula (Dwyer) C. M. Taylor
Notopleura leucantha (K. Krause) C. M. Taylor
Notopleura longiflora C. M. Taylor*
Notopleura longipedunculoides (C. M. Taylor) C. M. Taylor†
Notopleura longissima Bremekamp†
Notopleura macrophylla (Ruiz & Pavón) C. M. Taylor
Notopleura macropodantha (Standley) C. M. Taylor
Notopleura madida (Standley) C. M. Taylor*
Notopleura marginata (Bentham) Bullock
Notopleura micayensis (Standley) Bremekamp†
Notopleura microbracteata (Steyermark) C. M. Taylor
Notopleura montana C. M. Taylor*
Notopleura multinervia C. M. Taylor*
Notopleura nepokroeffiae (Standley ex Steyermark) C. M. Taylor
Notopleura obtusa C. M. Taylor*
Notopleura pacorana C. M. Taylor*
Notopleura palestinae (Standley ex Steyermark) C. M. Taylor
Notopleura panamensis (Dwyer) C. M. Taylor
Notopleura parasiggersiana C. M. Taylor
Notopleura parvifolia C. M. Taylor*
Notopleura patria (Standley & Steyermark) C. M. Taylor
Notopleura penduliflora C. M. Taylor*
Notopleura perparva (Dwyer) C. M. Taylor
Notopleura pilosula C. M. Taylor
Notopleura plagiantha (Standley) C. M. Taylor
Notopleura polyphlebia (Donnell Smith) C. M. Taylor
Notopleura pyramidata C. M. Taylor
Notopleura sanblasensis C. M. Taylor*
Notopleura saulensis (Steyermark) C. M. Taylor
Notopleura scarlatina C. M. Taylor
Notopleura siggersiana (Standley) C. M. Taylor
Notopleura spiciformis C. M. Taylor*
Notopleura standleyana (Steyermark) C. M. Taylor
Notopleura steyermarkiana C. M. Taylor
Notopleura subimbricata (Steyermark) C. M. Taylor
Notopleura submarginalis C. M. Taylor
Notopleura sucrensis (Steyermark) C. M. Taylor
Notopleura tapajozensis (Standley) Bremekamp
Notopleura terepaimensis (Steyermark) C. M. Taylor
Notopleura thesceloantha (Steyermark) C. M. Taylor
Notopleura tolimensis (Wernham) C. M. Taylor
Notopleura tonduzii (Standley) C. M. Taylor
Notopleura torrana C. M. Taylor*
Notopleura triaxillaris C. M. Taylor
Notopleura tubulistipula C. M. Taylor*
Notopleura uberta (Standley & Steyermark) C. M. Taylor
Notopleura uliginosa (Swartz) Bremekamp
Notopleura wilburiana (Dwyer) C. M. Taylor
Notopleura zarucchiana C. M. Taylor*

Subgenus Viscagoga

Notopleura aligera (Steyermark) C. M. Taylor
Notopleura bahiensis C. M. Taylor*
Notopleura cocleensis C. M. Taylor*
Notopleura crassa (Bentham) C. M. Taylor
Notopleura elegans C. M. Taylor*
Notopleura epiphytica (K. Krause) C. M. Taylor
Notopleura episcandens C. M. Taylor*
Notopleura guadalupensis (DC.) C. M. Taylor
Notopleura maxonii (Standley) C. M. Taylor
Notopleura merumensis (Steyermark) C. M. Taylor
Notopleura multiramosa (Steyermark) C. M. Taylor
Notopleura peperomiae (Standley) C. M. Taylor
Notopleura perpapillifera (Steyermark) C. M. Taylor
Notopleura pithecobia (Standley) C. M. Taylor
Notopleura vargasiana C. M. Taylor*