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PROCEEDINGS OF THE CALIFORNIA ACADEMY OF SCIENCESNovelties and Nomenclatural Adjustments in the Neotropical
Genus *Clidemia* (Melastomataceae: Miconiaceae)

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A new combination (*Clidemia quinquerria* based on *Melastoma quinquerria*) and 11 new species of *Clidemia* (*C. inopinata* from Mexico, Guatemala, and Honduras; *C. rodriguezii* from Costa Rica; *C. davidsei* from Costa Rica and Nicaragua; *C. allenii*, *C. coloradensis*, and *C. lanuginosa* from Costa Rica and Panama; *C. falsomii*, *C. pectinata*, *C. tenebrosa*, and *C. ventricosa* from Panama; and *C. evanescens* from Costa Rica, Panama, and Colombia) are proposed for the neotropical flora. Descriptions, diagnostic illustrations, distributional and phenological notes, and comparisons with probable relatives, are also provided together with a list of the species of *Clidemia* that have formicaria developed on the petioles, leaves, or at the branchlet nodes.

RESUMEN

Una nueva combinación (*Clidemia quinquerria* basada en *Melastoma quinquerria*) y once especies nuevas de *Clidemia* (*C. inopinata* de México, Guatemala, y Honduras; *C. rodriguezii* de Costa Rica; *C. davidsei* de Costa Rica y Nicaragua; *C. allenii*, *C. coloradensis*, y *C. lanuginosa* de Costa Rica y Panamá; *C. falsomii*, *C. pectinata*, *C. tenebrosa*, y *C. ventricosa* de Panamá; y *C. evanescens* de Costa Rica, Panamá, y Colombia) se proponen para la flora neotropical. Se proveen descripciones, ilustraciones, notas sobre distribución y fenología, y discusiones sobre las afinidades entre las especies. Además se presenta una lista de las especies de *Clidemia* con formicarios desarrollados en los peciolos, hojas, o en los nudos de las ramitas.

Clidemia D. Don, a berry-fruited genus of suffrutescent herbs or shrubs (rarely scandent or epiphytic) with over 180 species, ranges throughout tropical America. Among genera of the neotropical tribe Miconieae, *Clidemia* is closely related to and separated from *Miconia* only by the lateral or pseudolateral inflorescences. The Miconieae, as currently understood, consist of some 30 genera and over 1850 species. Because of its large size, definitive circumscription of the tribe and its constituent genera remain unresolved pending molecular data. This is also true of the current infragenetic classifications for the larger genera (i.e., *Clidemia*, *Ossaea* DC., *Leandra* Raddi, and *Miconia* Ruiz and Pavón). *Clidemia*, for example, has been divided into five sections based on characters such as floral merosity, occurrence of foliar dimorphism, production of formicaria, and persistence or dehiscence of calyx lobes following anthesis (Cogniaux 1888). The value of these characters in defining natural groupings is highly suspect but there are no published studies evaluating their taxonomic significance using modern techniques. Some of the sections of *Clidemia* have been accorded generic status in the past. Judd (1989) has recently resurrected one of these, *Sagana*, for those species with truly axillary inflorescences and 4-merous flowers that lack an

androecial fringe. He notes, however, that *Sagraea* has no apomorphic characters that can be used to distinguish it from other genera in the Miconiaceae. Judd (1989) has also proposed the genus *Pentossaea* W. Judd for seven species with axillary 5 (-6)-merous flowers and triangular apically acute petals. The diversity of Mesosamerican species attributable to *Clidemia* complicates the issue of recognizing generic segregates because there are species in the region with axillary inflorescences and 5-merous flowers that lack an androecial fringe (*C. davidsei* Almeda, *C. folsomii* Almeda, *C. monticola* Standl., *C. oblonga* Gleason, and *C. tenebrosa* Almeda); those with 4-merous flowers that have both axillary and pseudolateral inflorescences (*C. evanescens* Almeda); and those with 4-merous flowers, axillary inflorescences, and triangular apically acute petals [*C. sessiliflora* (Naudin) Cogn.]. Homoplasy and character reversals appear to have been recurrent themes in diversification of the Miconiaceae. Because of this and until other data can be brought to bear on the identification of monophyletic groups within the tribe, I see no defensible way of recognizing generic segregates or proposing new genera to accommodate the many character permutations exhibited by the diverse assemblage of taxa in this generic plexus.

In the course of preparing an account of the Melastomataceae for Flora Mesoamericana, I therefore have adopted a conservative approach. The 11 new species and one new combination proposed here have all been included in a broadly defined *Clidemia*. This approach is practical based on available information but it sheds little light on phylogenetic reality and underscores the considerable limitations in our current understanding of lineages within the Miconiaceae.

Clidemia was last treated for all of Mexico and Central America by Gleason (1939) who recognized 47 species for the region. Gleason's account was prepared before many areas in the region received any sustained systematic inventory of vascular plants. Many of the names used by Gleason are being relegated to synonymy and a few will be transferred to the genus *Miconia*. Including the taxa proposed here, I recognize 68 species of *Clidemia* in Mexico and Central America, 66 of which occur in the Mesosamerican region (i.e., Chiapas, Tabasco, and the Yucatan Peninsula south to the Panama/Colombia border). Fifty-five of the 66 Mesosamerican species occur in Costa Rica and Panama which, like *Miconia* (Almeda, 2000), makes these two countries the biodiversity stronghold for Mesosamerican species of *Clidemia*.

SPECIES DESCRIPTIONS

Clidemia allenii Almeda, sp. nov.

(Fig. 1)

TYPE.—COSTA RICA: **Puntarenas:** Cantón de Osa, Golfo Dulce Area in the vicinity of Esquinas Experiment Station at sea level, 16 Apr. 1949, *P.H. Allen 5205* (holotype: CAS!; isotypes: AAU!, CRI, INBI, MEXU!, MO!, US!).

Ramuli teretes sicut petioli laminae subtus inflorescentia hypanthiaque pilis laevibus erectis dense vel modice armati et pilis stellatis modice vel sparse intermixtis. Lamina 6–23 × 4–10 cm elliptica apice acuminata vel attenuata basi rotundata et asymmetrica, 5–7-pinnervata. Inflorescentia primum terminalis demum lateralis pauciramosa; flores 5-meri, bracteolis 1–6 × 0.25–0.5 mm, lobis interioribus 0.25 × 1.5 mm triangularibus vel late deltoides, dentibus exterioribus setosis 2–4 mm eminentibus. Stamina isomorpha glabra, antherarum thecae 1.5–2 × 0.5 mm oblongae poro ventraliter inclinato; connectivum nec prolongatum nec appendiculatum. Ovarium 5-loculare et ½ inferum apice glabro vel sparse setuloso.

Shrub or small tree 1.5–5 m tall. Internodes terete; upper branches, inflorescences, pedicels, hypanthia, and exterior calyx teeth moderately to copiously covered with smooth spreading hairs 1.5–3 mm long, sometimes underlain with a sparse to moderate understorey of sessile stellate and

stipitate-stellate hairs. Leaves of a pair ± equal to somewhat unequal in size; petioles 2–12 mm long; blades 6–23 × 4–10 cm, membranaceous, elliptic varying to elliptic-ovate; apex acuminate to attenuate, base oblique and mostly rounded, margin essentially entire and ciliate varying to obscurely denticulate distally, 5–7-pinnerved with the innermost pair of primary veins diverging from the median vein 0.7–1.5 cm above the blade base, moderately covered adaxially with spreading simple hairs 1–2.5 mm long to nearly glabrous, moderately to sparingly covered abaxially with spreading simple hairs 1–3 mm long on the median vein and innermost primaries (especially toward the base) and sparsely underlain with deciduous sessile stellate and stipitate-stellate hairs varying to glabrate. Inflorescence 4–9 cm long; a pseudolateral modified dichasium sometimes divaricately branched from the base; bracts and bracteoles 1–6 × 0.25–0.5 mm, subulate to narrowly triangular, sparingly beset with smooth spreading hairs. Pedicels 0.5–1 mm long. Hypanthia (at anthesis), 4 mm long upward to the torus (vascular ring), cupulate to campanulate. Calyx tube 0.5 mm long; the calyx lobes 0.25 × 1.5 mm, ± rounded-triangular, hyaline and typically obscured by the copious indument; calyx teeth 5, 2–4 mm long, linear to subulate. Petals 5 in number, 4.5–5 × 1–2 mm, glabrous, pink or reportedly white in one population (*de Nevers 7207*), oblong to oblong-obovate. Stamens 10, isomorphic; filaments glabrous, 2–2.5 mm long; anthers 1.5–2 mm long, and 0.5 mm wide, yellow, linear-oblong, ± truncate at the apex with a ventrally inclined pore that is somewhat bent toward the dorsal side of the anther; connective conspicuously thickened dorsally and becoming dark when dry but neither prolonged nor modified. Ovary ½ inferior, 5-locular, apex elevated into a low ringlike collar with or without smooth hairs that surround the stylar scar. Style straight, 7 mm long, glabrous; stigma punctiform. Berry 5 × 5 mm, purple-black at maturity. Seeds 0.5 mm long, ± triangular in profile view, angulate and somewhat mucronulate to papillate on the convex face.

PHENOLOGY.—Flowering material has been collected in February, April, and December; fruiting collections made in April, June, and December.

DISTRIBUTION.—An understorey shrub or tree of primary forests in the Golfo Dulce region of southern Costa Rica from near Rincon on the Osa Peninsula east to vicinity of Chacaria with one known outlying population on the Santa Rita ridge in north-central Panama from sea level to 350m.

PARATYPES.—COSTA RICA: **Puntarenas:** Cantón de Osa, Bosque primario a la par de la Carretera Interamericana, 3 km. N de Chacaria, 08°59'00"N, 83°28'00"W, 28 June 1991, *Nepokroff & Hammel 722* (CAS, CR, WIS); Cantón de Rancho Quemado, Fila Cantón de Osa, Bosque primario, Rincon, 8°46'N, 83°38'W, 7 Apr. 1990, *Quesada 591* (INB, MO), between Golfo Dulce and Rio Terraba, Dec. (w/out exact date) 1947, *Skutch 5394* (US), PANAMA: **Colón:** Santa Rita Ridge, Km 21.2, 9°20'N, 79°45'W, 24 Feb. 1986, *de Nevers 7207* (CAS).

DISCUSSION.—*Clidemia allenii* has basally oblique pinnerved leaf blades (Fig. 1A); a prevalently reddish indument of smooth spreading hairs on upper branches, leaf blades, inflorescences, hypanthia, and calyx teeth; hyaline calyx lobes; and a mucronulate to papillate seed coat. It is variable in foliar size like other rain forest species of *Clidemia* and it also exhibits much variation in pubescence. All collections cited here have varying amounts of sessile-stellate or stipitate-stellate hairs as an understorey on upper branches, petioles, primary elevated foliar veins, pedicels, and hypanthia. *Quesada 591* from Rincon on the Osa Peninsula of Costa Rica has nearly glabrous adaxial foliar surfaces and the indument of spreading hairs on abaxial leaf surfaces is also unusually sparse but the understorey of stellate hairs on the elevated primary veins of abaxial foliar surfaces is especially dense. All other collections studied have a copious cover of spreading smooth hairs with a much sparser understorey of stellate hairs. The single cited collection from Panama is reportedly a tree to 5 m with white flowers whereas the other Costa Rican collections are described as a shrub to nearly 3 m with pink flowers. In all other diagnostic features the collections from these

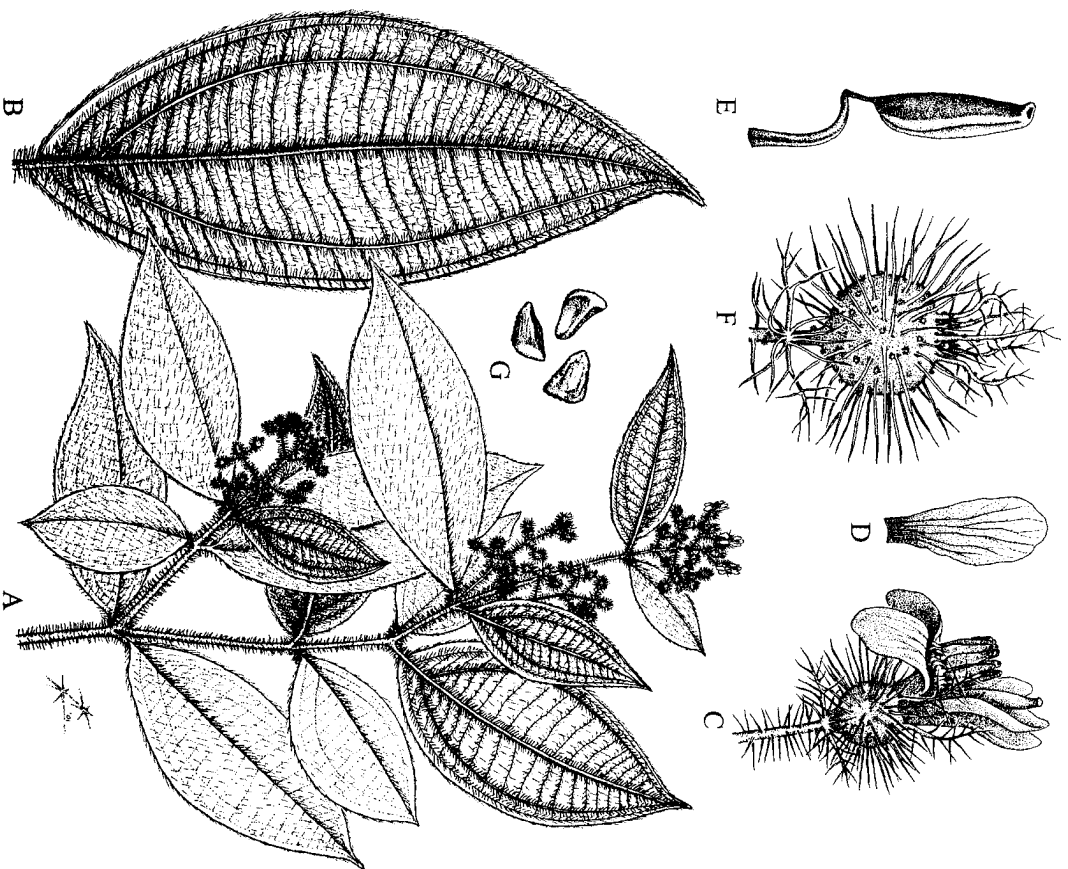


FIGURE 1. *Clidemia allenii* Almeda. A, habit, $\times 1/4$; B, representative leaf (abaxial surface), $\times 2/3$; C, flower (at anthesis), $\times 5$; D, petal (adaxial surface), $\times 5$; E, stamen (profile view), $\times 12$; F, mature berry, $\times 4$; G, seeds, $\times 20$. (A–F from the holotype.)

two countries are a close match and clearly conspecific.

Among congeners in Central America, *C. allenii* resembles *C. costaricensis* Cogn. & Gleason and *C. petiolaris* (Schtdl. & Cham.) Schtdl. ex Trana. All three species have pseudolateral inflo-

rescences that are not paired at a node, a copious indument of smooth spreading hairs, unappended anther connectives, and a 5-locular ovary. In *C. costaricensis*, however, the mature leaf blades are not oblique at the base, the anther pores are dorsally (vs. ventrally) inclined, the ovary is completely inferior (vs. $3/4$ -inferior), and the seed coat is smooth. The widespread *C. petiolaris* differs from *C. allenii* in having (3–)5-nerved (vs. 5–7-plinerved) leaf blades, an understory indument of sparsely and caducously appressed to incurved glandular hairs (vs. stellate hairs), petals that are consistently white, and anther connectives that are prolonged 0.25 mm dorso-basally.

ETYMOLOGY— This species is named for the late Paul H. Allen (1911–1963) who devoted a lifetime to the study of tropical American plants. Allen is best known for his pioneering book, *The Rain Forests of Golfo Dulce* (Allen 1956), which describes the region in southern Costa Rica where he collected the type of this species.

Clidemia coloradensis Almeda, sp. nov.

(Fig. 2)

TYPE.— COSTA RICA: Limón: Almirante, Cerro Chiqui. Subiendo desde la base por el flanco norte, $09^{\circ}43'40''N$, $83^{\circ}18'30''W$, 1700 m, 18 Aug. 1995, G. Herrera & W. Gamboa 8591 (holotype: CASI, isotype: CR).

Ramuli teretes sicut foliorum venae primariae subtus inflorescentiaque dense strigosi pilis laevibus ca. 1–3 mm longis et dense persistenterque lanuginosa pilis gracillimis longis laxis intermixtis. Lamina 10–20 \times 3.1–8.6 cm elliptica vel elliptico-obovata vel elliptico-oblonga apice acuta vel acuminata basi rotundata-obtusa vel subcordata, 5–7-nervata vel 5–7-plinervata. Inflorescentia primum terminalis demum lateralis; flores 5-meri, bracteolis 0.5–1 \times 0.25–1 mm, lobis interioribus 0.75–1 \times 1 mm orbiculatis, dentibus exterioribus subulatis 0.5–1.5 mm eminentibus. Stamina isomorphica glabra, antherarum thecae 1.5–2 \times 0.5 mm oblongae poro dorsaliiter inclinatio; connectivum nec prolongatum nec appendiculatum. Ovarium 5-loculare et omnino inferum apice glabro.

Monopodial shrub to 1 m tall. Internodes terete, the uppermost branches, inflorescence rachis and elevated primary veins on abaxial leaf surfaces copiously covered with smooth appressed tan or white hairs 1–3 mm long intermixed with or replaced by a lanate indument of dense woolly hairs. Leaves of a pair \pm equal or slightly unequal in size; petioles 0.4–0.9 cm long; blades 10–20 \times 3.1–8.6 cm, subcoriaceous and \pm brittle when dry, elliptic to elliptic-ovate varying to elliptic-oblong, apex acute to acuminate, base obtuse to rounded or subcordate, margin ciliate, entire to inconspicuously crenulate, 5–7-nerved or if -plinerved then the innermost pair of primary veins diverging from the median vein 0.4–1.4 cm above the blade base, glabrous adaxially, the abaxial secondary veins sparsely to moderately covered with wrinkled woolly hairs mostly 0.5–1 mm long that are essentially replaced by minute glandular hairs on the actual surface. Inflorescence 3–12 cm long, a terminal pedunculate modified dichasium (sometimes appearing umbelliform) becoming pseudolateral with elongation of lateral branches; bracteoles 0.5–1 \times 0.25–1 mm, triangular to triangular-ovate, apiculate and tipped with a trichome, \pm concave on the adaxial surface. Pedicels (at anthesis) 0.5–1 mm long. Hypanthia 2.5 \times 1.5 mm (at anthesis) campanulate but often becoming suburceolate and constricted apically into a short neck when in young fruit, moderately covered with minute \pm appressed glandular hairs and a caducous mixture of lanate hairs about 0.25 mm long. Calyx tube obsolete, the calyx lobes 0.75–1 \times 1 mm, semicircular to \pm oblong, hyaline when dry but not obscured by the calyx teeth; calyx teeth 5 in number, 0.5–1.5 mm long, subulate to narrowly triangular, tipped with a smooth hair and sometimes with 1 to 3 other smooth appressed hairs on or at the base of each tooth. Petals 5 in number, 6–8 \times 2–3 mm, glabrous, reportedly pink or magenta, oblong-obovate. Stamens 10, isomorphic; filaments 2 mm long, glabrous, linear-oblong;

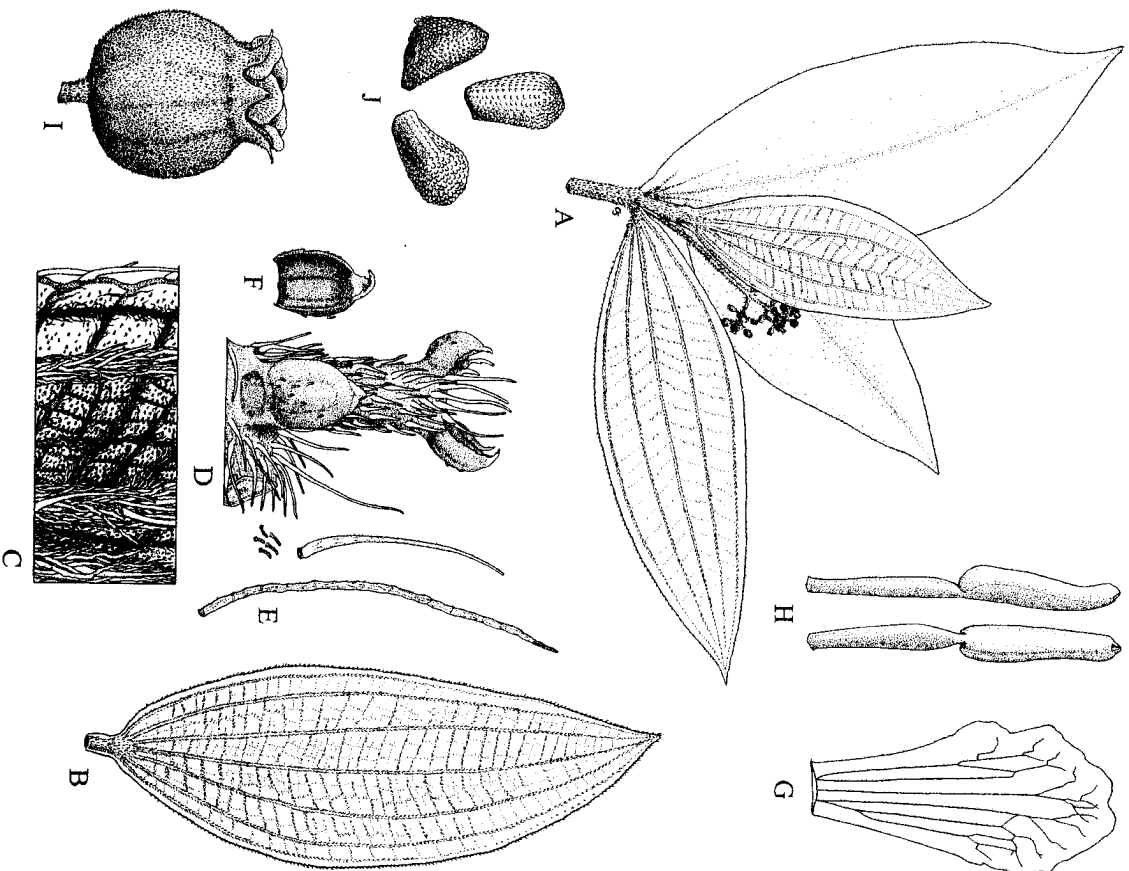


FIGURE 2. *Clidemia coloradensis* Almeida. A, habit, $\times \frac{1}{2}$; B, representative leaf (abaxial surface), $\times \frac{1}{2}$; C, enlargement of abaxial foliar surface, \times ca. 3; D, portion of inflorescence rachis showing bracts and bracteoles, \times ca. 12; E, smooth appressed hairs of abaxial leaf surface, \times ca. 20; F, bracteole, \times ca. 12; G, petal, \times ca. 7; H, stamens, profile view (left) and dorsal view (right), \times ca. 12; I, berry, \times ca. 4; J, seeds, \times 32. (A–F, I and J from Almeida *et al.* 6437; B from Folsom & Collins 1814; G and H from Croat 37253.)

ALMEDA: NEOTROPICAL GENUS *CLIDEMIA*

95

anthers 1.5–2 \times 0.5 mm, linear-oblong, yellow with a dorsally inclined apical pore; connective neither prolonged below the thecae nor appendaged. Ovary completely inferior, 5-locular, apex glabrous. Style 5–5.5 mm long, \pm straight, glabrous; stigma capitate. Berry 5–8 \times 6–7 mm when dry, turning pink then blue-purple when ripe. Seeds 0.5 mm long, \pm triangular in profile view and \pm obovoid in dorsal view, testa tuberculate.

PHENOLOGY.—Collected in flower during July and August, in fruit from January through April.

DISTRIBUTION.—Locally common in primary cloud forests from southeastern Costa Rica to western Panama at 700–1700 m.

PARATYPES.—COSTA RICA: Cartago: Turrialba. Moravia, Cerro Tigre. Sigüiendo por la quebrada inominada, bajando hasta Lago Ayil, 09°53'40"N, 83°22'55"W, 28 Mar. 1996, *Kuss* 49 (CAS, CR), PANAMA. **Bocas del Toro:** Edwin Fabrega Dam and Reserve in Fortuna along the Continental Divide Trail, 12.9 km N of Sitio de Presa (Dam site) offices above the Dam, 08°45'04"N, 82°15'04"W, 7 Feb. 1996, *Almeda et al.* 7538 (CAS, PMA). **Bocas del Toro/Chiriquí border:** windswept cloud forest on slopes and valleys of the Cerro Colorado region, 27 Jan. 1989, *Almeda et al.* 6437 (CAS, MO, PMA, US). **Chiriquí:** Cerro Colorado, 11.2 km along ridge road from main road to Escopeta, 16 Aug. 1977, *Folsom* 4879 (MO). **Chiriquí:** Cerro Colorado, along road to copper mine, 34.1 km beyond bridge over Río San Felix near town of San Felix, 15 July 1976, *Croat* 37253 (CAS); Cerro Colorado top, Bocas Road, 17–18 Feb. 1977, *Folsom* & *Collins* 1814 (CAS); between Pinolz and Divide on Chiriquí side, Caldera Trail, mostly mossy forest above the oak forest, 19 Apr. 1961, *Kirkbride* & *Duke* 860A (MO); between Quebrada Hondo and divide on Caldera Trail, 20 Apr. 1968, *Kirkbride* & *Duke* 954 (MO, 2 sheets).

DISCUSSION.—The slender or little-branched habit of *Clidemia coloradensis* and its deep forest habitat are typical of many formicarial species of this genus in the Mesoamerican region. *Clidemia coloradensis*, however, never appears to produce formicaria (ant domatia) of any kind. This species appears to flower during the rainy season which may account for the fact that few good flowering collections have been available for study.

Clidemia coloradensis is readily recognized by a distinctive combination of characters. The indument on upper internodes, the inflorescence axis, and elevated veins on abaxial foliar surfaces consists of smooth appressed hairs (1–3 mm long) intermixed with densely matted woolly hairs. The inflorescence is a long-pedunculate modified cluster of dichasia with ultimate units that often appear umbelliform. The calyx teeth are shorter than or only slightly exceeding the calyx lobes (Fig. 2I), the anther pores are dorsally inclined (Fig. 2H), the stigma is capitate, and the seed coat is tuberculate (Fig. 2J). The apiculate bracteoles that are concave on the adaxial side are also distinctive (Fig. 2F). Because of its distinctiveness, no close relatives in any part of the American tropics are evident at this time.

ETYMOLOGY.—The specific epithet is derived from Cerro Colorado in western Panama where most of the fertile material of this species has been collected.

Clidemia dawidsei Almeda, sp. nov.
(Fig. 3)

TYPE.—COSTA RICA. **Puntarenas:** Cordillera de Talamanca; area around Río Canasta, 9.5 air-line km NW of Agua Caliente, between Cerro Frantizans and Cerro Pitter; elev. 1500–1600 m, 9°02'N, 82°59'W, 6 Sep. 1984, *G. Dawidse et al.* 28374 (holotype: CASI, isotypes: BM, CR, MO, PMA).

Ramuli teretes sicut petioli foliorum venae primariae subus inflorescentia hypanthiague

dense vel modice setosi (pilis 0.5–1 mm longis pro parte glanduliferis) et sparse cum pilis stellatis obtusi. Lamina 6.5–16.5 × 3–8.5 cm ovata vel elliptico-ovata apice acuminata basi rotundata vel obtusa, 5–7-plinervata. Inflorescentiae pauciflorae in foliorum superiorum axillis oppositae; flores 5-meri, bracteolis 0.5–1.5 × 0.25–0.5 mm; calycis tubus 0–0.25 mm. Lobis 1.5–2 × 0.5 mm subulatis, dentibus exterioribus obsolete. Stamina isomorphica glabra, antherarum thecae 1 × 0.4 mm oblongae poro dorsaliiter inclinato; connectivum nec prolongatum nec appendiculatum. Ovarium 5-loculare et omnino inferum apicem versus sparsuscule glandulis vel palliulo stellatis armatum.

Lax shrub 1–3 m tall, the terete upper internodes, petioles, elevated primary veins of abaxial foliar surfaces, inflorescence, and hypanthia copiously to moderately covered with smooth (gland-tipped in part) spreading hairs 0.5–1 mm long with a ground layer of sessile stellate hairs. Leaves of a pair equal to somewhat unequal in size; petioles 1.3–5 (–6.2) cm long; blades 6.5–13.3 (–16.5) × 3–6.5 (–8.5) cm, chartaceous and brittle when dry, ovate to elliptic-ovate, apex acuminate, base rounded to obtuse, margin entire to inconspicuously denticulate, 5–7-plinerved with the innermost pair of primary veins diverging from the median vein 3–7 mm above the blade base, the adaxial surface moderately covered with spreading smooth hairs and some glandular hairs 0.5–1 mm long intermixed with a scattering of stellate hairs on the actual surface and a concentration of stellate hairs on the impressed primaries toward the blade base, the secondary and higher order veins of the abaxial surface beset with smooth spreading hairs 0.5 mm long, the understory consisting of a very sparse scattering of stellulate hairs or the understory indument lacking. Inflorescence 1.5–2 cm long, axillary dichasia branched from the base or short-pedunculate and commonly paired at a node; bracteoles 0.5–1.5 × 0.25–0.50 mm, narrowly elliptic to oblong, apiculate and tipped with a short hair (otherwise glabrous). Pedicels (at anthesis) 0.5 mm long. Hypanthia 1–2 × 1.5 mm (at anthesis), campanulate to suburoeolate. Calyx tube 0.25 mm long or obsolete, the calyx lobes 1.5–2 × 0.5 mm, subulate, beset with smooth spreading hairs like the hypanthium, calyx teeth lacking. Petals 5 in number, 2.5–4 × 0.5–1.5 mm, glabrous, white, ± oblong. Stamens 10, isomorphous, filaments 1.5 mm long, glabrous; anthers 1 × 0.4 mm, oblong, yellow with a dorsally inclined apical pore; connective thickened dorsally but neither prolonged below the thecae nor appendaged. Ovary 5-locular, completely inferior, apex sparsely and deciduously glandular or stellulate-puberulent, elevated into a low truncate cone at anthesis but becoming ± flat or rounded on maturing berries. Style 3 mm long, glabrous; stigma truncate to capitate. Berry 4–5 × 4–5 mm when dry, blue-black or purple-black when ripe. Seeds 0.5 mm long, obovoid, testa ± smooth.

PHENOLOGY.—Collected in flower during January, March, July and August, and in October; in fruit from August through October, January and March.

DISTRIBUTION.—Local and uncommon in cloud forests, river and lake margins, and forest clearings in southern Costa Rica with one outlying population in north-central Nicaragua at 1100–1750 m. The elevation on a single collection (*Williams et al.* 28572) is given as 3200 m. I suspect this report may be erroneous and should be regarded with suspicion until this species is re-collected at that elevation again.

PARATYPES.—NICARAGUA: *Jinotega*: Las Alturas de Kilambé, 13°37'N, 85°40'W, 26 Mar. 1981, *Moreno & Sandino 7568* (CAS). COSTA RICA: *Puntarenas*: Zona Protectora Las Tablas, slopes of Cerro Chai along Rio Bellavista drainage on trail to Cerro Echantí, 15 Feb. 1991, *Almeida et al.* 6637 (CAS, CR, MO); Fincas Las Alturas, NW of the Lechería, 17 Feb. 1991, *Almeida et al.* 6706 (CAS, CR); above coffee fincas along Río Coto Brus, near Cotoon, 23 km N of La Unión on the Panama border, 9 Aug. 1974, *Croat 26604* (CAS, US); foothills of the Cordillera de Talamanca,

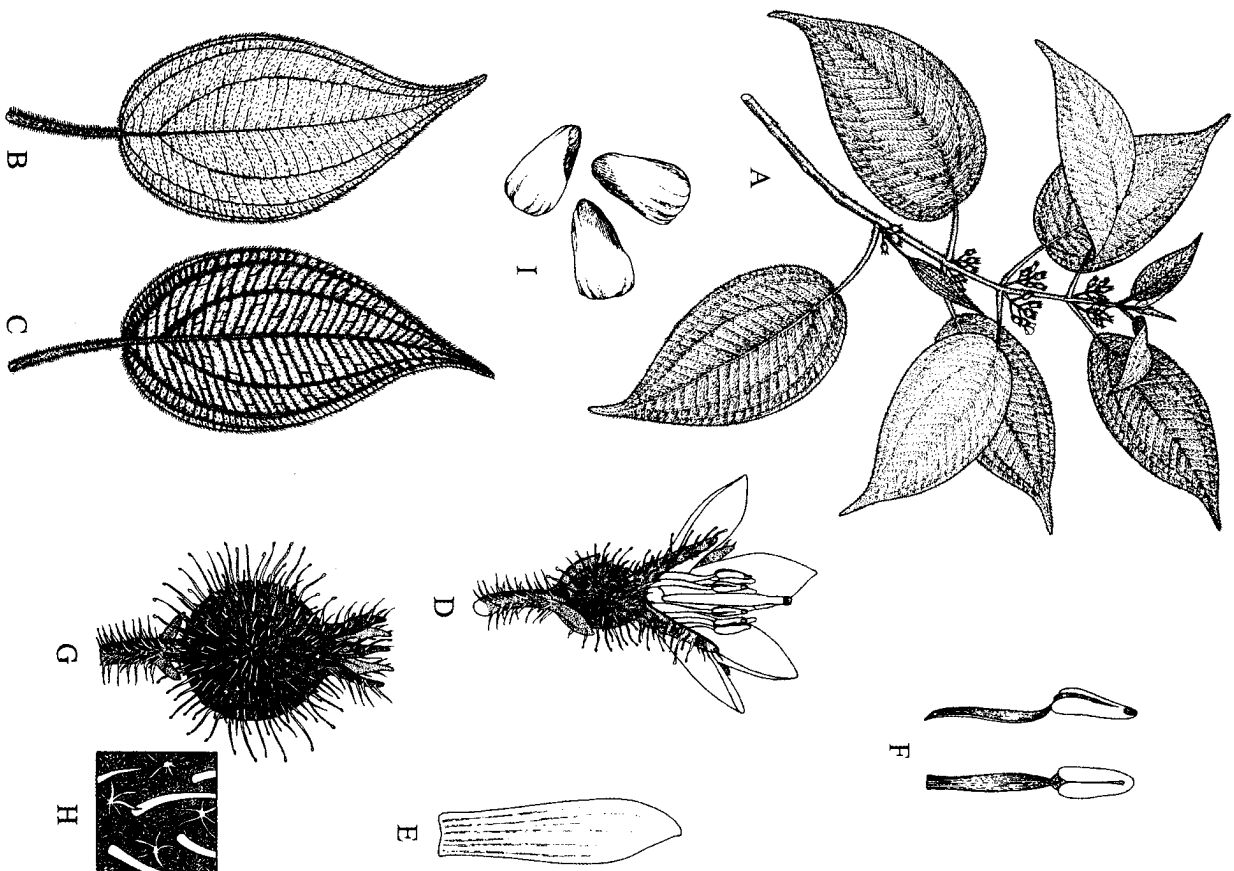


FIGURE 3. *Clidemia daniseti* Almeida. A, habit, × 1/4; B, representative leaf (adaxial surface), × 3/4; C, representative leaf (abaxial surface), × 1/4; D, flower (at anthesis), × ca. 10; E, petal, × ca. 11; F, stamens, 1/4 dorsal view (left) and ventral view (right); G, berry, × 5; H, enlargement of berry surface, × ca. 9; I, seeds, × 30. (A–I from *Schneid 1046*.)

lower montane forest along the Río Bellavista, NW of Las Alturas, ca. 8°57'N, 82°51'W, 30 Aug. 1983, *Davide* 24318 (CAS, CR, MO); cloud forest above Wilson's finca, 6 km S of San Vito de Java, 14 Aug. 1967, *Raven* 21763 (MO); cloud forest above Wilson's finca, 6 km S of San Vito de Java, 17 Aug. 1967, *Raven* 21843 (CR, DUKE, MO); vicinity of Finca Las Cruces, San Vito de Java, 22–25 Aug. 1968, *Schnell* 1046 (US); just S of San Vito de Java, W of Cruces for ca. 3 km along the road running along the Fila Cruces, 19 May 1984, *Taylor* 3456 (DUKE); cloud forest near lake on ridge SW of Las Cruces, 21 July 1977, *Webster* 21985 (CAS, DAV); cloud forest on ridge, 5 km S of San Vito, 11 May 1971, *Wilbur* 14456 (DUKE). *San José*: on Panamerican highway N of San Isidro del General, 15 Oct. 1965, *Schnell* 175 (US); Cordillera de Talamanca, about 25 km N of San Isidro del General along Panamerican highway, 29 Jan. 1965, *Williams* et al. 28572 (US).

DISCUSSION.—This species, which was first collected in 1965, is easily recognized by its indument of spreading hairs (gland-tipped in part) with a ground layer of stellate hairs (Fig. 3H), axillary dichasia that are commonly paired at a node (Fig. 3A), absence of exterior calyx teeth (Fig. 3G), inferior ovary, and smooth seed coat (Fig. 3I). Collections of *C. davidsei* examined for this study have been variously identified as *C. denata* D. Don, *C. costaricensis* Cogn. & Gleason, and *C. petiolaris* (Schltdl. & Cham.) Schltdl. ex Triana. It is most like *C. denata* in general aspect and foliar size. In *C. denata* the inflorescence is pseudolateral, the calyx consists of a truncate rim that is obscured and exceeded in length by subulate exterior teeth, and the adaxial surface of the torus (vascular ring at the apex of the hypanthium) is adorned with 10 fimbriate scales that are absent in *C. davidsei*. The ovary of *C. denata* is 5-locular like that of *C. davidsei* but it is 1/2-inferior (vs. completely inferior) and its seed coat is rugulate or granulate (vs. essentially smooth). Both *C. costaricensis* and *C. petiolaris* differ most notably from *C. davidsei* in having pseudolateral inflorescences that are never paired at a node and a calyx that is clearly differentiated into lobes and exterior teeth.

Costa Rican material of *C. davidsei*, which was all collected in the southwestern area of the country, is morphologically homogeneous. The single cited collection from Nicaragua, however, was puzzling and not placed in the recent treatment that I prepared for *Flora de Nicaragua* (Almeda 2001). It has slightly longer eglandular cauline trichomes (to 2 mm), longer petioles (to 6.2 cm), and larger leaf blades (16.5 × 8–8.5 cm) than the Costa Rica populations. In all other details it appears to be a good match for *C. davidsei* and is tentatively assigned to this species. Its status will require further consideration when better material comes to light.

ETYMOLOGY.—This species is named for Gerrit Davide (b. 1942), collector of the type, authority on the systematics of Poaceae, and a founding editor of the ambitious *Flora Mesoamericana* project.

Clidemia evanescens Almeda, sp. nov.
(Fig. 4)

TYPE.—PANAMA. Coclé: forested slopes above El Copé along abandoned road leading to the Continental Divide, elev. 700–850 m, 25 Feb. 1988, *F. Almeda et al.* 5933 (holotype: CAS!; isotypes: AAU!, INB!, MO!, MEXU!, NY!, PMA!, US!).

Ramuli teretes sicut petioli foliorum venae primariae subtus inflorescentia hypanthiaque dense pilis asperis induti. Lamina 9–27 × 3.4–14.5 cm elliptica vel elliptico-ovata apice gradatum acuminate vel caudato-acuminata basi obtusa vel rotundata, 3–5-nervata. Inflorescentia primum terminalis demum lateralis pauciramosa vel in foliorum superiorum axillis. Flores 4-meri, bracteolis 1.5–3 × 1–2 mm, calycis lobis interioribus 2–2.5 × 1.5 mm triangularibus, dentibus exterioribus 0.5–1.5 mm eminentibus. Stamina isomorphica glabra, antherarum thecae 1.5 × 0.5 mm oblongae poro dorsaliere inclinatio; connectivum vix (0.1 mm) prolongatum, dente dorso-basali 0.5 mm glandis

dulis 0.1 mm longis marginato. Ovarium 4-loculare et omnino superiorum apice dense glandulis inconspicuis induto.

Shrub 0.5–4 m tall with the terete upper internodes, petioles, elevated primary and secondary veins on abaxial foliar surfaces, inflorescence rachis, bracteoles, hypanthia, and calyx lobes moderately to copiously covered with asperous-headed hairs. Leaves of a pair ± equal to somewhat unequal in length; petioles 1.5–4.7 cm long; blades 9–27 × 3.4–14.5 cm, subcoriaceous when dry, elliptic to elliptic-ovate, apex gradually acuminate to caudate-acuminate, base obtuse to rounded, margin essentially entire, 3–5-nerved, the secondary and higher order veins moderately to copiously beset with minute glands. Inflorescence 1–2.5 cm long, typically an axillary cluster of dichasia with branching initiated at the node or terminal with both lateral buds at a node elongating and overtopping the inflorescence; bracts and bracteoles 1.5–3 mm long and 1–2 mm wide at the base, triangular. Flowers 4-merous on pedicels 0.5–1 mm long that are obscured by subtending bracts and bracteoles. Hypanthia (at anthesis) subcylindric to narrowly campanulate. Calyx tube obsolete, the calyx lobes 2–2.5 × 1.5 mm, triangular, typically reflexed, calyx teeth 0.5–1.5 mm long, subulate. Petals 1.5–2 × 0.5–1 mm, glabrous, white, oblong, conspicuously reflexed at anthesis and early caducous. Stamens isomorphic; filaments 1.5 mm long, glabrous; anthers 1.5 × 0.5 mm, yellow or white, linear-oblong, ± truncate to somewhat emarginate at the apex with a dorsally inclined pore; connective prolonged dorso-basally into a deflexed gland-edged appendage 0.5 mm long. Ovary 4-locular, completely superior but tightly enveloped by the hypanthium, apex consisting of a shallow bowl-like depression with a slightly raised perimeter, copiously but inconspicuously glandular-puberulent. Style 6 mm long, glabrous; stigma punctiform to truncate. Berry 6 × 6 mm, bright orange at maturity, prominently 8-costate. Seeds 0.5 mm long, ± triangular in outline with an irregularly rugose testa and a foot-like projection at the narrow end.

PHENOLOGY.—Flowering and fruiting intermittently throughout the year.

DISTRIBUTION.—Primary and secondary rain forests and cloud forests from north-central Costa Rica disjunctly to western Panama, and southwestern Colombia from 850–1900 m.

PARATYPES.—COSTA RICA. **Alajuela:** Reserva Biológica Monteverde, Río Peñas Blancas, Finca de Jesús Rojas, 10°18'N, 84°44'W, 4 Dec. 1989, *Bello* 1540 (CAS, CR); Upala, Bijagua, El Pilon, subiendo por la margen derecha del Río El Roble hasta al Volcán Tenorio, 10°41'N, 85°00'20"W, 9 July 1988, *Herrera et al.* 2037 (CAS, CR). PANAMA: Coclé. Alto Calvario above El Copé, ca. 6 km N of El Copé, Atlantic slope, along trail through forest W of old lumber trail leading to Las Ricas, Limón and San Juan, 8°39'N, 80°36'W, 23 June 1988, *Croat* 68793 (CAS); El Copé, Division continental arriba de Barrigón y el aserradero viejo, Camino de caballo a Coelestio, 27 Apr. 1992, *Peña et al.* 469 (CAS, PMA). **Comarca de San Blas:** Cerro Brewer, 9°18'N, 79°16'W, 21 Apr. 1985, *de Nevers et al.* 5452 (CAS). **Chiriquí:** Cerro Habá, vicinity of peak, 78°49'W, 9°23'N, 19 Dec. 1980, *Systema et al.* 2694 (CAS). **Chiriquí:** Edwin Fábrega Dam and Reserve in Fortuna, Quebrada Arena, 8°45'N, 82°05'W, 15 Jan. 1989, *Almeda et al.* 6217 (CAS); Guacale-Chiriquí Grande, 4.8 mi. beyond IRHE facilities at the Dam, 4 mi. N of bridge over Bayano Lake, 8°46'N, 82°16'W, 23 Sept. 1987, *Croat* 68018 (CAS, MO). **Verraguas:** along trail to summit of Cerro Tute about 1/2 mile above the Escuela Agricultura Alto Piedra near Santa Fé, 29 Jan. 1989, *Almeda et al.* 6490 (CAS, MO, PMA). **COLOMBIA:** **Nariño:** Reserva Natural La Planada, municipio de Ricuarte, 18 Nov. 1993, *Restrepo* 776 (US); La Planada Biological Reserve, ca. 7 km S of Chucuncé, along trail to Palapal beyond Quebrada La Calledita, 01°10'N, 77°55'W, 8 Aug. 1990, *Luteyn & Syba* 13943 (CAS, NY).

DISCUSSION.—Among the 4-merous species of *Clidemia* that lack formicaria, *C. evanescens* is a standout because of its densely packed indument of roughened or asperous-headed hairs, conspicuously 8-ribbed hypanthia (Fig. 4H), small oblong petals (Fig. 4D, F), deflexed gland-edged

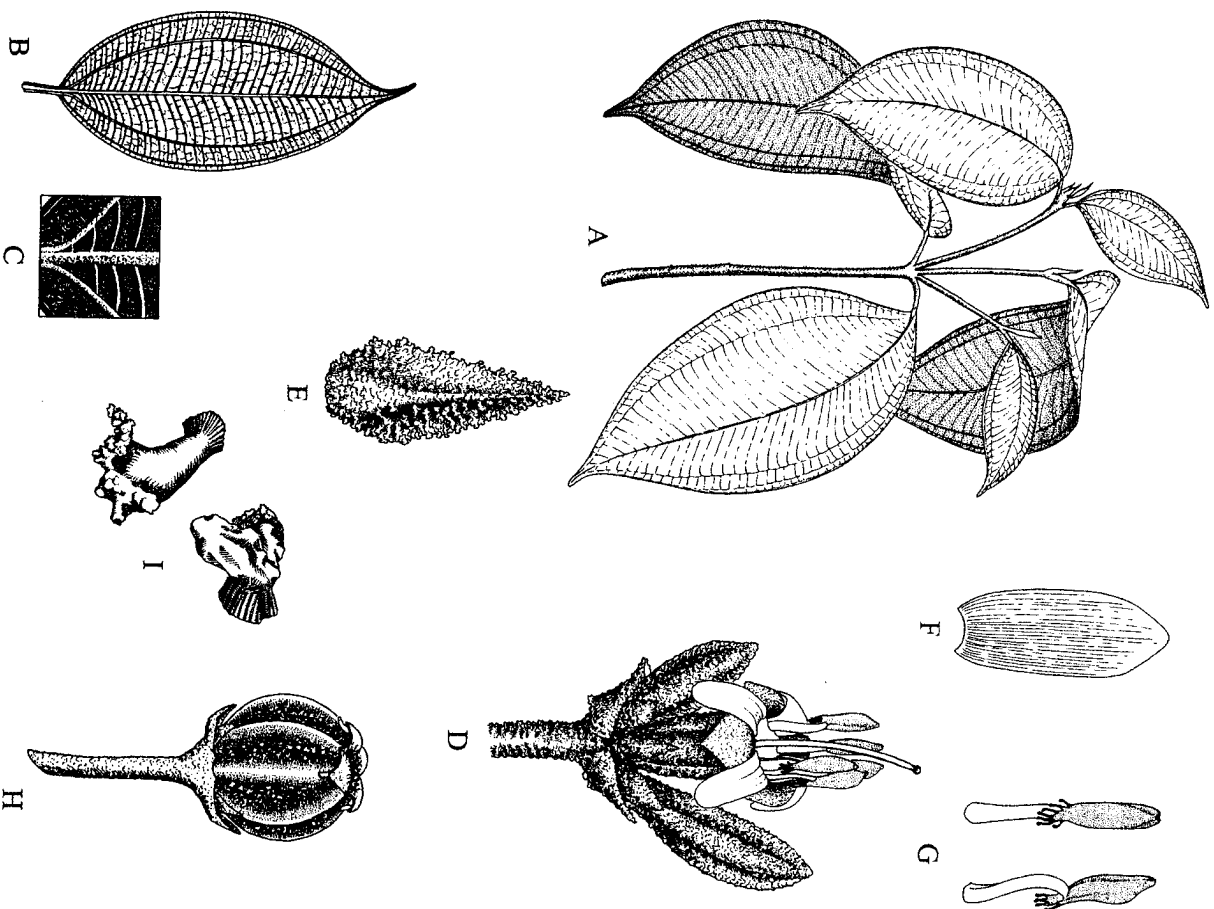


FIGURE 4. *Clidemia evanescens* Almeda. A, habit, \times ca. $\frac{1}{2}$; B, representative leaf (abaxial surface), \times $\frac{1}{4}$; C, enlargement of abaxial foliar surface (midvein and innermost pair of primary veins), \times ca. 2; D, portion of inflorescence (simple dichasium with flower at anthesis), \times ca. 5; E, bracteole, \times ca. 18; F, petal (adaxial surface), \times ca. 14; G, stamens, dorsal view (left) and profile view (right), \times ca. 10; H, berry, \times 4; I, seeds, \times ca. 48. (A–I from Almeda et al. 5933.)

dorso-basal staminal appendages (Fig. 4G), completely superior ovary, and berries that are orange (vs. blue-purple) at maturity. The inflorescence position of this species is variable. It is typically an axillary cluster of dichasia with branching initiated at the vegetative node but at times it can be terminal with both lateral buds at a vegetative node elongating and overtopping the inflorescence.

Among congeners, *C. evanescens*, is most like *C. densiflora* (Standl.) Gleason and it seems likely that these two species are closely related. The latter also has 4-merous flowers, linear-oblong petals, anther connectives that are dorso-basally prolonged into a glandular appendage, and berries that are orange at maturity. In *C. densiflora*, the flowers are sessile (vs. pedicellate) and mostly fasciculate, the merely roughened hypanthial hairs are spreading but not tightly packed to conceal the actual surface as they are in *C. evanescens*. In addition to these differences, *C. densiflora* has modally smaller leaf blades [7–14(–18) \times 2.5–5.5(–9) cm vs. 9–27 \times 3.4–15 cm] and shorter petals (0.3–0.8 cm vs. 1.5–4.7 cm).

ETYMOLOGY.—The specific epithet for this species is from the Latin word *evanescens*, meaning quickly disappearing or fading, in reference to the petals that fall away from the flowers quickly at anthesis.

***Clidemia folsomii* Almeda, sp. nov.**

(Fig. 5)

TYPE.—PANAMA: Veraguas: along trail to summit of Cerro Tute about $\frac{1}{2}$ mile above the Escuela Agricultura Alto Piedra near Santa Fé, 29 Feb. 1989, F. Almeda et al. 6488 (holotype: CASI; isotypes: AAUJ, CASI, INBI, MEXUJ, MOJ, PMAJ).

Ramuli teretes sicut petioli laminae supra et subtus inflorescentia hypanthiague pilis laevibus plerumque 1–2.5 mm longis pro parte glanduliferis modice obsiti et pilis stellatis modice vel sparse internerviis. Lamina plerumque ad petioli apicem vesiculifera: vesiculae 3.5–7.5 cm longae oblongae; lamina 11–26.5 \times 7.5–21 cm cordata vel ovata apice caudato-acuminata 7–9-nervata vel 7–9-pinnervata. Inflorescentia in foliorum superiorum axillis multiflorae; flores 5-meri bracteolis 0.5–1 \times 0.25 mm; calycis tubus 1 mm altus, lobis interioribus 1.5 \times 1.5 mm triangularibus, dentibus exterioribus subulatis setosis 1.5 mm eminentibus. Stamina isomorphica glabra, antherarum thecae 1–1.5 \times 0.5 mm oblongae vel subulatae poro dorsalter inclinato; connectivo non prolongato basi dorsalter appendice hebeti ca. 0.2 mm longo descendenti armatum. Ovarium 5-loculare et omnino inferum apice modice glanduloso-puberulo.

Little-branched subshrub 1–2 m tall with terete internodes. Uppermost internodes, petioles, adaxial foliar surfaces, elevated primary veins on abaxial foliar surfaces, inflorescence rachis, bracts, bracteoles, pedicels, hypanthia, and calyx teeth moderately covered with smooth (mostly gland-tipped) spreading hairs 1–2.5 mm long with an understorey of sessile or stipitate-stellate hairs. Leaves of a pair somewhat unequal in size, otherwise identical in all details and consistently bearing paired elongate formicaria 3.5–7.5 cm long extending from the blade base onto the upper portions of the petiole. Petioles 4–10 cm long, blades 11–26.5 \times 7.5–21 cm, membranaceous and brittle when dry, cordate varying to ovate, apex caudate-acuminate, base broadly cordate, margin denticulate to crenulate (at least distally) varying to subentire, 7–9-nerved or -pinnerved with the innermost primary pair diverging up to 2 cm above the blade base, the secondary and higher order veins moderately covered with \pm sessile or subsessile stellate hairs. Inflorescence 6–13 cm long, axillary, laxly branched paniculiform dichasia typically paired at a node; bracteoles 0.5–1 mm long and 0.25

mm wide at the middle, linear-oblong. Flowers 5-merous, subsessile or on pedicels to 1 mm long. Hypanthia (at anthesis) urceolate. Calyx tube ca. 1 mm long, the calyx lobes 1.5×1.5 mm, broadly triangular, collectively spreading and bowl-like; calyx teeth 1.5 mm long, subulate, exceeding and obscuring the calyx lobes. Petals $3.4\text{--}4.5 \times 1.5\text{--}2.5$ mm, glabrous, translucent white, pink, or white tinged with pink or purple, narrowly obovate to oblong. Stamens isomorphic; filaments 2 mm long, glabrous; anthers $1\text{--}1.5 \times 0.5$ mm, white, \pm oblong to \pm subulate in ventral view, emarginate at the apex with a dorsally inclined pore; connective thickened dorsally and prolonged dorso-basally into a blunt spur ca. 0.2 mm long. Ovary 5-locular, completely inferior; apex elevated into a low \pm truncate dome surrounding the stylar scar, minutely glandular-puberulent like the adaxial vascular ring of the hypanthium. Style 5-6 mm long, glabrous; stigma punctiform to truncate. Berry 6×6 mm, blue at maturity. Seeds 0.5 mm long, obovoid to \pm triangular in outline with a verruculose to rugulate testa.

PHENOLOGY.—Flowering and fruiting from November through June.

DISTRIBUTION.—Cloud forests, elfin forests, and stream banks in western Panama from 800 to 1300 m.

PARATYPES.—PANAMA: Chiriquí: vicinity of Fortuna Dam along trail from highway near Forestry Nursery, down to Río Homito, $8^{\circ}45'N$, $82^{\circ}15'W$, 27 Apr. 1988, *McPherson 12510* (CAS); distrito Boquete, Fortuna Dam site, 7 Feb. 1985, *von der Werff & van Handel 6607* (CAS). COCÉ: Cerro Gaital, east slope and ridges leading to the summit, $8^{\circ}40'N$, $80^{\circ}07'W$, 24 Feb. 1988, *Almeida et al. 5899* (AAU, CAS, INB, MEXU, MO, PMA); Alto Calvario, cloud forest above sawmill on continental divide, 5.2 miles above El Copé, 6 Dec. 1979, *Croat 49152* (CAS); Alto Calvario above El Copé, ca. 6 km N of El Copé, along trail which leads down to Las Ricas, Limón and San Juan, 22 June 1988, *Croat 68742* (CAS); Continental Divide above El Copé, $8^{\circ}38'N$, $80^{\circ}39'W$, 27 Nov. 1985, *de Nevers et al. 6407* (CAS); Cerro Gaital, elfin forest, $8^{\circ}37'N$, $80^{\circ}6'W$, 26 Nov. 1984, *de Nevers & Chanley 4388* (CAS); mountains N of El Valle de Anton, 28 May 1967, *Lewis et al. 1771* (MO); El Copé, División continental arriba de Barrigón y el aserradero viejo, camino de caballo a Coclesito, 27 Apr. 1992, *Peña et al. 467* (PMA); hills just N of El Valle, 14 Aug. 1971, *Wiehler & Dressler 71287* (US-2 sheets). PANAMA: Cerro Campana near the FSU field station trail up the mountain, 9 Aug. 1970, *Kennedy & Luteyn 435* (CAS, DUKE, US). VERAGUAS: trail to Reserva Biológica Serranía de Tule and the summit of Cerro Tule about 0.7 km beyond the Escuela Agrícola Río Piedra just outside Santa Fé, 18 Feb. 1996, *Almeida et al. 7614* (CAS, PMA); 6.4 km outside Santa Fé on the road that passes the agriculture school, 5 May 1977, *Folsom 2955* (CAS); Cerro Tule, along ridge trail towards summit, $08^{\circ}30'N$, $81^{\circ}07'W$, 21 Mar. 1987, *McPherson 10743* (CAS).

DISCUSSION.—*Clidemia folsomii* is one of nearly 30 taxa (see Appendix 1) in the genus *Clidemia* that produce formicaria or domatia to shelter ants. In *Clidemia*, these formicaria consist of paired inflated pouch-like outgrowths borne at the branch nodes, at the base of the leaf blade, on the petioles, or extending along a portion of the petiole and leaf blade. The ants that inhabit these domatia presumably defend the plants from herbivore attack but the exact nature of the symbiotic relationship has not been studied for the majority of *Clidemia* species (Benson 1985). Ants collected in the formicaria of one population of this species (*Almeida 5899*) were identified as *Solenopsis* sp. (subgenus *Diplophorram*) by P.S. Ward. According to Ward, the ants collected in these domatia were probably nesting opportunistically; there are a number of generalist, arboreal ant species in this subgenus.

The size, shape, and placement of formicaria typically provide diagnostic features of taxonomic importance. The formicaria of *C. folsomii*, for example are elongate, produced at the very base of the leaf blade, and extend onto the distal half of the petiole (Fig. 5A, B). This together with the

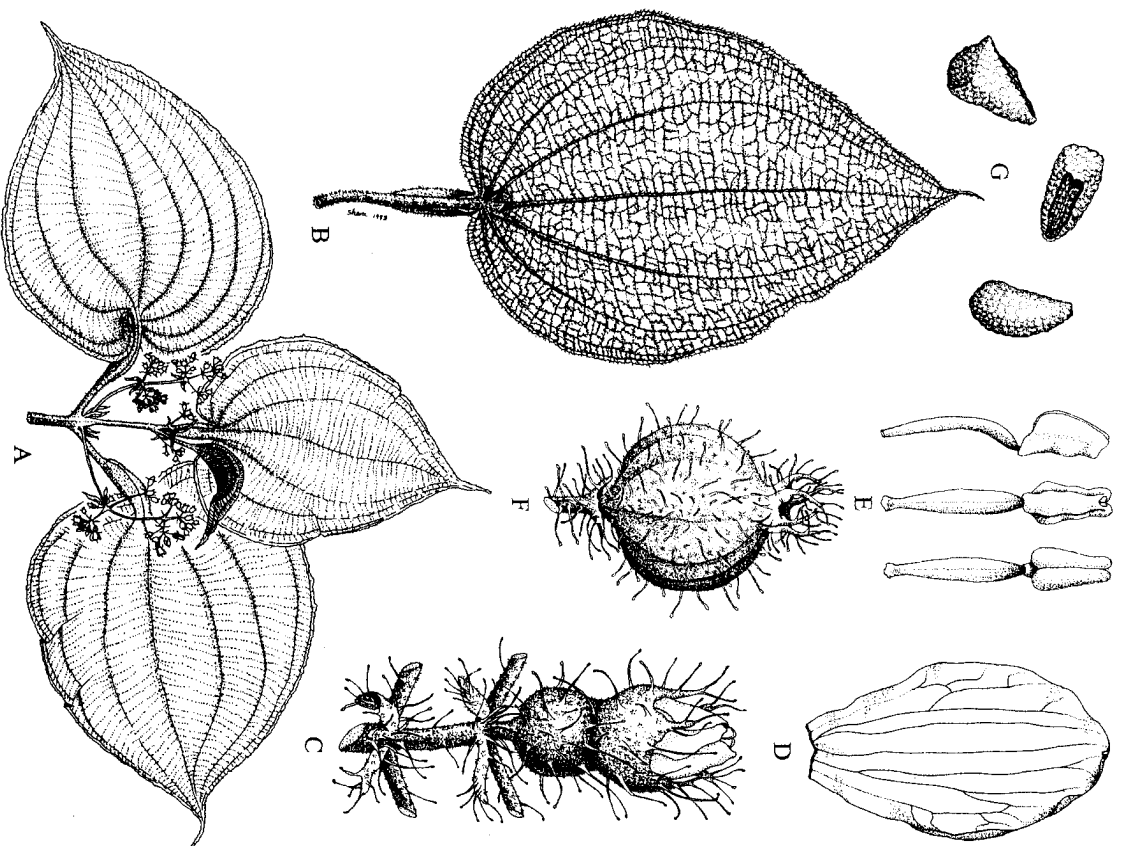


Figure 5. *Clidemia folsomii* Almeida. A, habit, $\times 1/4$; B, representative leaf (abaxial surface), \times ca. $1/2$; C, flower bud, \times ca. 5; D, petal, $\times 12$; E, stamens, profile view (left), dorsal view (middle), and ventral view (right), \times ca. 12; F, berry, $\times 6$; G, seeds, $\times 36$. (A–F from Almeida et al. 6488; G from Almeida et al. 5899.)

large cordate leaf blades (Fig. 5B), axillary, paired, and laxly branched dichasia at each node (Fig. 5A), indument of spreading (mostly gland-tipped) hairs with an understorey of stellate hairs, and well-developed calyx teeth (Fig. 5F) make this species unmistakable among congeners.

Morphologically, *Clidemia folsomii* does not appear to be particularly close to any of the other formal species in the genus. It is superficially most like *C. plumosa* (Desr.) DC., a non-formal species of Jamaica, Hispaniola and St. Thomas. Both species have elongate petioles, large cordate or ovate leaf blades, paired laxly branched dichasia at the upper nodes, a copious indument of spreading hairs, and elongate setose calyx teeth. In *C. plumosa*, the conspicuous pubescence consists of hairs that are eglandular (vs. mostly gland-tipped), the understorey indument consists of small glands that look granular (vs. stellate hairs), and the flowers are 4-merous (vs. 5-merous).

ETYMOLOGY.—This species is named for James P. Folsom (b. 1950), student of neotropical Orchidaceae and veteran collector of Panamanian plants who first collected fertile material of this species in 1977.

Clidemia inopinata Almeida, sp. nov.
(Fig. 6)

TYPE.—MEXICO: Chiapas: Municipio La Trinitaria, Ejido Cuauhtemoc, Km 25, 20 Aug. 1984, Méndez Ton 7868 (holotype: CAS!, isotype: MEXU!).

Ranuli rotundato-quadrangulati sicut petioli inflorescentiaque pilis laevibus erectis vel reflexis 2–8 mm longis. Lamina 7–24.5 × 4.2–13.5 cm ovata vel ovato-oblonga apice acuminate basi obtusa vel rotundata, supra modice longo-setosa pilis gracilibus laevibus 1–4 mm longis, subtus in nervis primariis et secundariis dense longo-setosa in nervulis superficique modice vel sparse glandulosa, 5–7-nervata. Inflorescentia primum terminalis demum lateralis; flores 5-meri, bracteolis 3.5–8 × 2–3 mm. Calycis lobi interiores 0.75–1 × 0.75–1 mm suborbiculares, dentibus exterioribus 3 mm longis subulatis vel oblongis apice setiferis. Stamina isomorphica glabra, antherarum thecae 2.5 × 0.5 mm oblongae poro dorsali inclinati; connectivum nec prolongatum nec appendiculatum. Ovarium 5-loculare et ¾ inferum apice conico sparsissime glanduloso-puberulo.

Shrub 1–2 m tall. Internodes rounded-quadrate; uppermost branches, petioles, and inflorescence axes copiously hirsute with spreading to somewhat reflexed smooth hairs 2–8 mm long. Leaves of a pair ± equal to unequal in size; petioles 1.1–8 cm long; blades 7–24.5 × 4.2–13.5 cm, ovate to ovate-oblong, apex acuminate, base obtuse to broadly rounded, margin denticulate to serrulate and ciliate, 5–7-nerved, uniformly setose adaxially with smooth spreading hairs 1–4 mm long, the abaxial surface also copiously beset with spreading smooth hairs 1–3 mm long on the elevated primaries and higher order veins but only the primary and secondary veins sparingly underlain with minute deciduous glands. Inflorescence 4–9 cm long, a pseudolateral modified dichasium openly and divaricately branched from the base; bracts and bracteoles 3.5–8 × 2–3 mm, persistent, lanceolate to elliptic-lanceolate, glabrous on both surfaces with hirsute-ciliate margins. Pedicels 1–2 mm at anthesis lengthening to 3–4 mm on the infructescence. Hypanthia oblong to subcylindric, 4 mm long from the base to the torus (vascular ring), copiously covered with smooth spreading hairs 3–8 mm long underlain with a sparse cover of minute and inconspicuous entire to subentire; calyx teeth 5 in number, 3 mm long or 4.5–6 mm long including the terminal hair, linear-oblong to subulate, beset with an indument like the hypanthium. Petals 5 in number, 5–7 × 2.5 mm, glabrous, white, oblong to oblong-obovate. Stamens 10, isomorphic; filaments glabrous, 2 mm long; anthers 2.5 × 0.5 mm, white, linear-oblong, ± emarginate at the apex with a dorsally inclined pore; connective conspicuously thickened dorsally and barely prolonged below the anther

sacs and unappendaged. Ovary ¾-inferior, 5-locular, apex elevated into a low truncate ± crateriform cone with one or few spreading hairs and/or few minute glandular hairs. Style 5 mm long, straight, glabrous; stigma capitate when receptive. Berry 6–8 × 4–5 mm, red to purple when mature. Seeds ca. 0.4 mm long, ovoid, the testa uniformly asperulate.

PHENOLOGY.—Flowering collections have been made from December through July; fruiting collections from April through January.

DISTRIBUTION.—Understorey shrub of primary and secondary forests, forest margins, clearings, and disturbed sites near rivers from southeastern Mexico (Veracruz) disjunctly south through Guatemala to Honduras from 180–1230 m.

PARATYPES.—MEXICO: Chiapas: municipio of La Trinitaria, 10 km east northeast of Dos Lagos above Santa Elena, 19 Dec. 1980, *Breedlove 48832* (CAS); 15 km east-northeast of Dos Lagos above Santa Elena, 29 Dec. 1981, *Breedlove 56636* (CAS); municipio La Trinitaria, 10 km east-northeast of Dos Lagos above Santa Elena, 19 Jan. 1982, *Breedlove & Almeida 57505* (CAS); municipio La Trinitaria, km 25, camino Lagos de Monteblanco-Acayal, 3 May 1985, *Espejo et al. 1660* (MEXU). Oaxaca: municipio Santa María Chimalapa, San Antonio Nuevo Paraíso, 13 May 1995, *Torres 669* (CAS); municipio Sta. María Chimalapa, ca. 15 km ESE de Sta. María, 16°52'N, 94°34'30"W, 28 May 1987, *Hernández 2520* (US); "Río Ulupari", 8 km al E de San Bartolomé Ayautla, carretera Huautla-Jalapa de Díaz, Distr. Teotitlán, 20 July 1982, *Torres et al. 855* (CAS, MEXU); municipio Matías Romero, 7.2 km al O de Esmeralda, en la terracería La Laguna-Sarabia, luego 2.6 km al S por camino, 9 Mar. 1982, *Wendt et al. 3640* (CAS, US). Tabasco: municipio Huimanguillo, camino del ejido villa de Guadalupe a la torre microondas, 6 Nov. 1994, *Guadarrama et al. 4132* (MEXU). Veracruz: municipio Catemaco, lado NE de Lago Catemaco en Cerros al E de Coyama, 26 Oct. 1971, *Beaman 5180* (CAS, MEXU); Bastonal-Sierra Santa Marta road, ca. 14 km E of Lago Catemaco, 29 May 1981, *Gentry et al. 32431* (CAS, MO); 11 km S de Tehanca, Camino a Bastonal, 26 Apr. 1982, *Ibarra 96* (CAS); municipio Hidalgotitlán, campamento La Laguna, along Río Las Cuevas and nearby pastures, 17°16'N, 94°31'W, 6 Mar. 1984, *Veyda 390* (CAS, F. XAL); municipio Hidalgotitlán, desde el Poblado 6 al sur por la brecha y la traveda al horcajo oriental del Río Cuevas, 17°15'N, 94°30'W, 17 July 1980, *Wendt et al. 2603* (CAS, US). GUATEMALA. Alta Verapaz: Chapultepec Farm, km 62 of Cobán-Sebol Road, 25 May 1964, *Comterras 4801* (CAS, LL); 7 miles up road to Oxec along road which turns off Highway 7E between Tucurú and El Estor ca. 6 km NE of Panzós, 20 July 1977, *Croat 41649* (CAS, MO); 2 km al S de Jolomylix, Telemán, Panzós, Sierra de las Minas, 20 July 1988, *Martínez et al. 22958* (CAS, MEXU). Izabal: Montañas del Mico, 7–8 km W of Santo Tomás de Castilla on road to microwave tower, 19 Aug. 1988, *Sevens et al. 25598* (MEXU). HONDURAS. Atlántida: southern boundary of Lancelilla Valley (Near Tela), on ridge separating Lancelilla watershed from that to the SW of San Francisco, halfway to Cerro Peña Blanca, 15°41'30"N, 87°28'30"W, 9 Nov. 1988, *MacDougal et al. 3416* (CAS, MO). Comayagua: margins of Lake Yojoa near Pito Solo, 9 Aug. 1948, *Williams & Molina 14622* (MO). Yoro: along road from San José de Texiguat to Campo Nuevo in Cordillera Nombre de Dios, ca. 28 km SW of Tela-La Ceiba hwy. (#13), ca. 15°29'N, 87°27'W, 27 Apr. 2000, *Daniel & Arague 9496* (CAS, EAP); slopes above E part of San José in the Río León Valley, between Río Texiguat and Río Guán Guán, slopes of Cordillera de Nombre de Dios, 6 Nov. 1988, *MacDougal et al. 3283* (CAS, MO).

DISCUSSION.—Diagnostic characters of *C. inopinata* include the openly and divaricately branched inflorescence (Fig. 6A), the conspicuous and persistent bracteoles (Fig. 6C), the deeply pigmented (blackish) hypanthia that are copiously covered with smooth spreading hairs (Fig. 6F) underlain with a sparse cover of minute inconspicuous glands, the white anther thecae, and the uniformly asperulate seed coat (Fig. 6G). *Clidemia fulva* Gleason has an aspect that is very reminis-

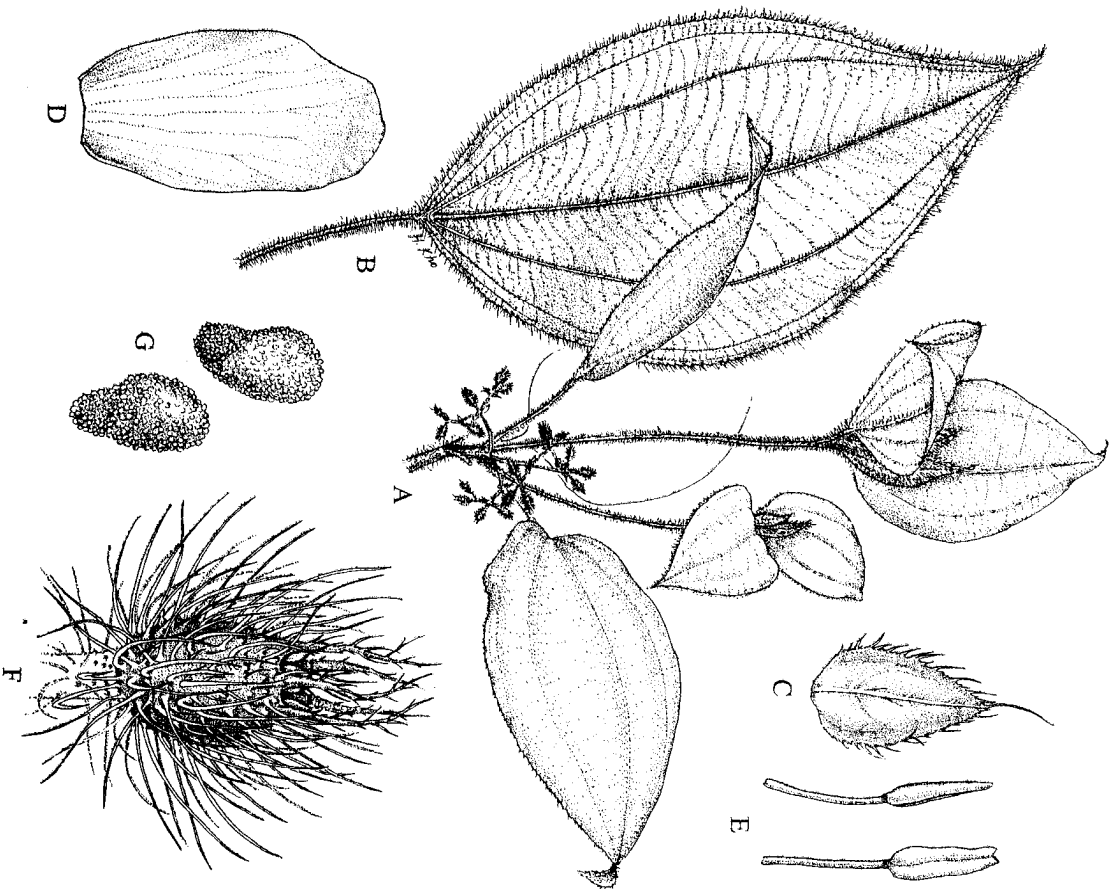


FIGURE 6. *Clidemia inopinata* Almeda. A, habit, $\times \frac{1}{2}$; B, representative leaf (abaxial surface), $\times \frac{1}{2}$; C, bracteole, $\times 6$; D, petal (adaxial surface), $\times 8$; E, stamens, profile view (left) and ventral view (right), \times ca. 7; F, berry, \times ca. 9; G, I, seeds, \times ca. 56; (A from *Breedlove & Almeda* 57505; B from the holotype; D, E and G from *Breedlove* 56636; C and F from *Breedlove* 48832.)

cent of *C. inopinata* and the latter has typically been identified as the former. Both species share similar inflorescence architecture with persistent bracts and bracteoles, a copious indument of smooth spreading hairs, elongate calyx teeth, and white petals and anther thecae. In *C. fulva*, however, the leaf base is often unequal (vs. never unequal), pedicels on the infructescence are 4–8 mm long (vs. 3–4 mm), hypanthial hairs are 2.5–4 mm long (vs. 3–8 mm), the seeds are 0.75 mm long (vs. 0.4 mm), and the seed coat is smooth (vs. uniformly asperulate).

Clidemia fulva also has a more limited geographic and elevational distribution than *C. inopinata*. It occurs in Chiapas, Mexico, and in a limited region of adjacent Guatemala (Alta Verapaz, Izabal, and Peten) at elevations of 200–500 m.

ETYMOLOGY.—The epithet for this species is derived from the Latin word *inopinusus*, unexpected, alluding to the fact that it has long gone unrecognized under the name of a closely related species.

Clidemia lanuginosa Almeda, sp. nov.

(Fig. 7)

TYPE.—PANAMA: **Bocas del Toro.** Fortuna Dam area along continental divide trail bordering Chiriquí Province, 08°45'04"N, 82°15'04"W, elev. 1200–1300 m, 10 Mar. 1988, *F. Almeda et al.* 6070 (holotype: CASI; isotypes: INBI, MOI, PMAI).

Ramuli teretes sicut petioli inflorescentiaque modice pilis laevibus vel usque ad 3–5 mm obstiti et dense persistenterque lanuginosa pilis gracillimis laxis internixtus. Lamina 8.5–22 \times 5–12.5 cm ovata vel ovato-elliptica apice acuminata basi rotundata supra modice setosa pilis laevibus 3–6 mm longis, subtus in venis setosa et modice setulosa pilis caduco-glanduliferis, 7–9-plinervata; fornicaria ca. 2–5.5 cm longa in laminarum basibus omnino immersa. Inflorescentia primum terminalis demum lateralis; flores 4 (–5)-meri, bracteolis 1–2 \times 0.25 mm. Calycis lobi interiores 0.25 \times 0.5–0.75 mm suborbiculares, dentibus exterioribus 0.5–4 mm longis subulatis apice setiferis. Stamina isomorphica glabra, antherarum thecae 1.75–2 \times 0.2 mm subulatae poro dorsali ter inclinato; connectivo nec prolongatum nec appendiculatum. Ovarium (3–) 4 (–5)-loculare et omnino inferum apice glabro.

Little-branched subshrub 0.5–2 m tall, the terete upper internodes, petioles, and inflorescence rachis moderately covered with smooth spreading hairs 3–5 mm long with a dense understorey of deciduous appressed somewhat woolly (often gland-tipped and crisped) hairs. Leaves of a pair equal to unequal in size, otherwise identical in all details and consistently bearing paired elongate inflated fornicaria 2–5.5 cm long on the adaxial base of the blade; petioles 0.5–4 cm long; blades 8.5–22 \times 5–12.5 cm, membranaceous and brittle when dry, ovate to ovate-elliptic, apex acuminate, base broadly rounded, margin subentire to denticulate, 7–9-plinerved, the paired primary veins arising at successive points above the blade base with the inner-uppermost primaries diverging from the median vein 2–4.5 cm above the blade base, the adaxial surface moderately and uniformly covered with smooth spreading hairs 3–6 mm long, the primary and higher order veins on the abaxial surface beset with smooth spreading hairs 2–5 mm long and an understorey of minute deciduous glandular hairs. Inflorescence 2–8 cm long, a paniculiform dichasium that is initially terminal but then becomes pseudolateral with growth and elongation of lateral branches; bracteoles 1–2 mm long (including terminal hair) and 0.25 mm wide, subulate to oblong-subulate, sparingly beset with minute glandular hairs on the abaxial surface. Flowers 4 (–5)-merous on pedicels 0.5–1 mm long. Hypanthia (at anthesis) cylindrical-campamulate, sparsely covered with smooth spreading hairs 1–3 mm long and an understorey of appressed glandular hairs. Calyx tube obsolete, the calyx lobes 0.25 \times 0.5–0.75 mm, semicircular to rounded-triangular, tardily deciduous; hyaline,

deciduously glandular-puberulent abaxially and glandular-ciliolate at the margins; calyx teeth 0.5–4 mm (excluding apical hair), subulate, sparingly beset with smooth spreading hairs 2 mm long and an understorey of minute glandular hairs. Petals 2–4 × 1 mm, glabrous, white or pink, oblong to oblong-obovate. Stamens isomorphic; filaments 1.75–2 mm long, glabrous; anthers 1.75–2 × 0.2 mm, yellow, subulate with a dorsally inclined pore; connective thickened dorsally but not prolonged below the thecae and unappendaged. Ovary (3–) 4 (–5)-locular, completely inferior; apex elevated into a short cone (0.25 mm) and vaguely lobulate collar at anthesis that disappears on mature fruits. Style 4 mm long, glabrous; stigma punctiform to truncate. Berry 2.5–3 × 2.5–4 mm, blue at maturity. Seeds 0.5 mm long, triangular, the convex face somewhat angular with a densely tuberculate testa.

PHENOLOGY.—Flowering material has been collected from February through November; fruiting specimens have been collected in March, June, July, September, and November.

DISTRIBUTION.—Local and uncommon, often in deep shade of cloud forests and rain forests from southeastern Costa Rica to Panama (Bocas del Toro east to Darién) at 300–1450 m.

PARATYPES.—COSTA RICA: Limón: Cantón de Talamanca, R.I. Talamanca, Cordillera de Talamanca, Alto Urén, 9°27'00"N, 82°59'30"W, 24 Sep. 1994, *Gallardo & Lépez 281*, (INB); Cantón de Talamanca, R.I. Talamanca, Cordillera de Talamanca, Alto Urén, 9°21'35"N, 82°59'45"W, 13 Sep. 1992, *Gallardo 88* (INB); Reserva Indígena Talamanca, Sukuti, desembocadura del Río Sukuti en el Río Urén, camino al sureste, hacia Purisquí, 9°23'30"N, 82°58'00"W, 7 July 1989, *Hammel et al. 17571* (CAS, CR, INB, MO). PANAMA: Bocas del Toro: above Chiriquí Grande on a side road about 10 miles below the Continental Divide about 2 1/2 miles east on that road, 8°55'N, 82°10'W, 19 Jan. 1989, *Almeida et al. 6334* (CAS, PMA); road from Fortuna Dam to Chiriquí Grande, 10 miles from Continental Divide, 8°51'N, 82°10'W, 2 Aug. 1984, *Churchill 5933* (CAS); Oleoducto Road, near Continental Divide: Fortuna Dam area, 8°48'N, 82°12'W, 5 Feb. 1984, *Churchill et al. 4494* (CAS); después de la División Continental, en la carretera que va de Fortuna a Chiriquí Grande, 27 Aug. 1993, *Correa et al. 9854* (PMA); along road between Fortuna Dam and Chiriquí Grande, 7.3 mi. N of bridge over Fortuna Dam, 3.2 mi. N of Continental Divide, 8°45'N, 82°15'W, 10 Mar. 1985, *Croal & Grayum 60220* (CAS); road from Fortuna Dam to Chiriquí Grande, 3.1 mi. N of Continental Divide, 8°50'N, 82°15'W, 10 Mar. 1985, *McPherson 6770* (CAS); Edwin Fabrega Dam and Reserve in Fortuna. Trail to the hydrological station on the Río Hornito between Quebrada Nelson and Quebrada Mono, 7 Feb. 1996, *Almeida et al. 7521* (CAS, CR, MO, PMA); along road between Gualaca and Fortuna Dam, at 8.3 mi. NW of Los Planes de Hornito, 9 Apr. 1980, *Antonio 4150* (CAS); Fortuna, camino de Quebrada Bonita. Hacia el este del Río Chiriquí, 7 Apr. 1987, *Valdespino et al. 563* (CAS, PMA); Fortuna, plots 5–8 de Jaime Caveller, frente al vivero del IRHE, 26 Apr. 1988, *Valdespino et al. 846* (CAS, PMA). CHIRIQUÍ: S. O. del campamento de Fortuna (Hornito), sitio de presa subiendo hasta la finca Pitúí, bordeando el bosque y regresando por el lado S del campamento, 14 Aug. 1976, *Correa et al. 2424* (US); Fortuna Dam area, around creek to . of road drawing into Río Hornito S of reservoir, 8°43'N, 82°14'W, 14 June 1984, *Churchill 5375* (CAS); Fortuna Dam area, on Kaolin hill, just N of reservoir, 31 July 1984, *D'Arcy et al. 15902* (US). Darién: trocha Río Frio hacia la cima más allá de Rancho Tuque (3 horas de camino), 22 Sep. 1989, *Aranda et al. 949* (CAS, PMA). Veraguas: Distrito de Santa Fé, Serranía de Tute, 8°33'N, 81°07'W, 5 July 1996, *Aranda et al. 2653* (CAS, PMA); in forest below summit of Cerro Arizona (Cerro Tute) above Santa Fé, 22 Apr. 1980, *Hammel & Kress 8569* (CAS); ridge east of Cerro Tute, NW of Santa Fé, 25 Oct. 1975, *Kennedy & Dressler 5203* (US); about 20 km NW of Santa Fé near the Continental Divide, 29 Mar. 1975, *Kennedy & Dressler 3417* (US); trail to Cerro Tute, above Escuela Agrícola Alto de Piedra, just W of Santa Fé, 8°32'N, 81°07'W, 5 June 1982, *Knapp and Dressler 5417* (CAS).

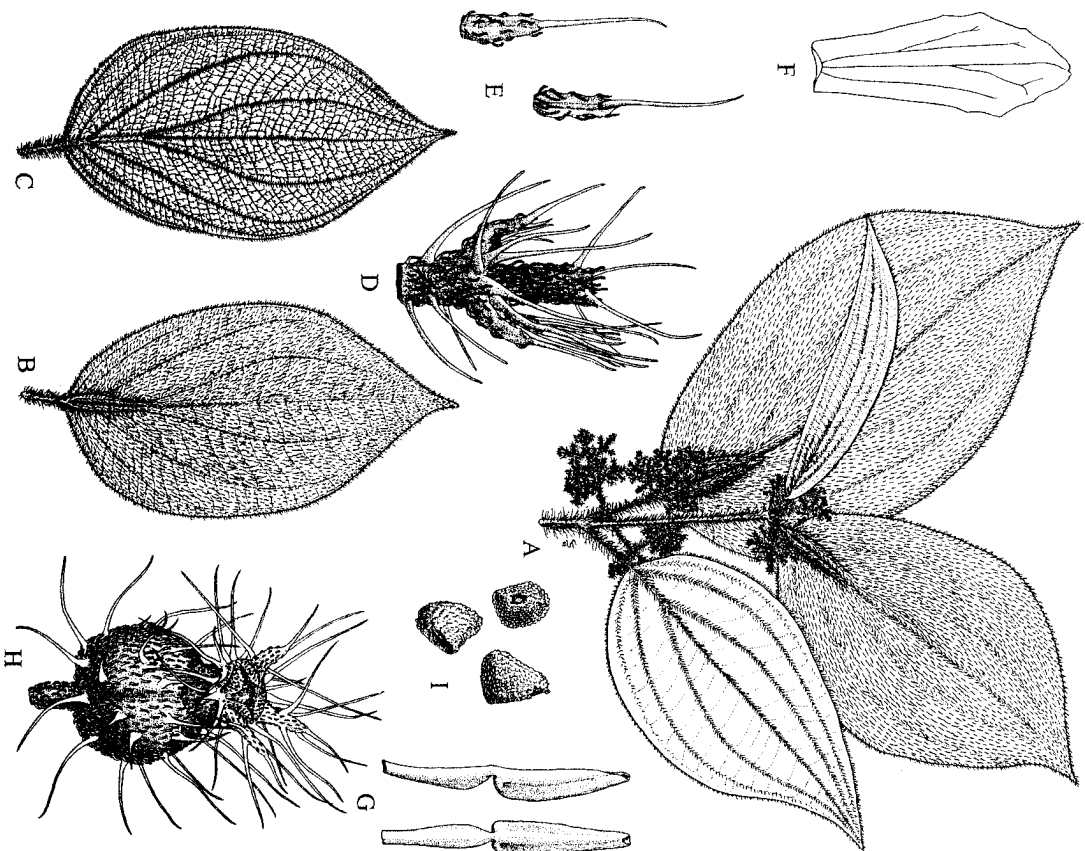


Figure 7. *Clidemia lanuginosa* Almeida. A, habit, \times ca. $1/2$; B, representative leaf (abaxial surface), $\times 1/2$; C, representative leaf (adaxial surface), $\times 1/2$; D, portion of inflorescence rachis, $\times 9$; E, bracteoles, $\times 17$; F, petal (adaxial surface), $\times 14$; G, stamens, profile view (left) and dorsal view (right), $\times 11$; H, berry, \times ca. 9 ; I, seeds, ca. 56 . (A–G from Almeida et al. 6070; H from Churchill 5375; I from D'Arcy et al. 15902.)

DISCUSSION.—*Clidemia lanuginosa* is readily recognized by its 7–9-plinerved leaf blades with paired primary veins arising at successive points above the blade base (Fig. 7C), didymous formicaria (Fig. 7B) restricted to the adaxial base of the blade, and oblong, glandular-puberulent bracteoles that are tipped with a prominent apical hair (Fig. 7E). The indument on upper internodes, petioles, and the inflorescence is also distinctive. It consists of smooth spreading hairs 3–5 mm long with a dense understorey of deciduous appressed woolly (often gland-tipped) and somewhat crisped hairs.

Clidemia lanuginosa is variable in characters that are typically constant in many other congeners. For example, the calyx lobes are persistent on some collections but tardily deciduous on others. Floral merosity and ovary locale number are also variable. The isomerous flowers of this species are typically 4-merous with a 4-locular ovary but the flowers on inflorescences of individual plants in populations from both Costa Rica and Panama can be prevalently 4-merous with some that are 5-merous, and the ovary can vary from 3- to 5-locular. None of this variation appears to correlate with other vegetative or reproductive features.

Several collections from Cerro Tute, Panama, stand out because they have flowers that are consistently 5-merous with shorter calyx lobes and formicaria that occupy the blade base and about half of the distal portion of the petiole. These anomalous collections may represent a distinctive taxon; they are here excluded from the circumscription of *C. lanuginosa* pending additional study.

ETYMOLOGY.—The specific epithet is derived from the Latin word, *lanuginosus*: woolly, to emphasize the copious understorey of woolly hairs on upper internodes, petioles, and the inflorescence rachis.

***Clidemia pectinata* Almeida, sp. nov.**
(Fig. 8)

TYPE.—PANAMA. **Bocas del Toro:** along oleoducto road between continental divide and Chiriquí Grande, 21 miles S of Chiriquí Grande, 8°50–55'N, 82°9–15'W, elev. 850 m, 3 May 1985, *Hammel 13748* (holotype: MO!).

Ramuli teretes sicut folia supra hypanthiaque glabri. Petioli 7–14.3 cm longi dense setosi pilis laevibus 4–9 mm longis. Lamina 20–20.5 × 10–13 cm ovato-elliptica apice breviter hebeti-acuminata vel hebeti-acuto basi rotundata, subtus sparse glanduloso-setulosa altoqui glabra, 7-plinervata. Inflorescentia primum terminalis demum lateralis. Pedunculus ad 18 cm longus cum pedicellis nodice pilis glanduliferis inconspicuis obsitus; flores 5-meri; bracteolae 1–2 mm longae. Calycis tubus ca. 0.1 mm longus, lobis interioribus 0.5 × 1 mm oblongis, dentibus exterioribus 0.5 mm longis triangularibus. Stamina isomorphica glabra, antherarum thecae 2 × 0.25 mm oblongae poro dorsalius inclinatis; connectivum nec prolongatum nec appendiculatum. Ovarium 5-loculare ¾ inferum apice glabro.

Shrub to 1.5 m tall with terete glabrous internodes, the nodes of uppermost branches and vegetative buds deciduously setose with smooth spreading hairs 2–6 mm long. Leaves of a pair essentially equal in size; petioles 7–14.3 cm long, glabrous on the abaxial surface but densely setose on the adaxial surface with smooth spreading hairs 4–9 mm long that appear pectinate (one-sided) and directed adaxially when dry; blades chartaceous and brittle when dry, 20–20.5 × 10–13 cm, entire but coarsely ciliate, ovate-elliptic, apex short-acuminate to acute, base broadly rounded, 7-plinerved, glabrous adaxially, the abaxial surface appearing glabrous but actually minutely and somewhat deciduously glandular-papillose. Inflorescence a pseudolateral, pedulous and long-pedunculate (to 18 cm long) corymbiform-umbelliform cluster of dichasia (3–4 cm long including secondary peduncles); the primary peduncle deciduously setose with smooth hairs 0.75–2 cm long; the

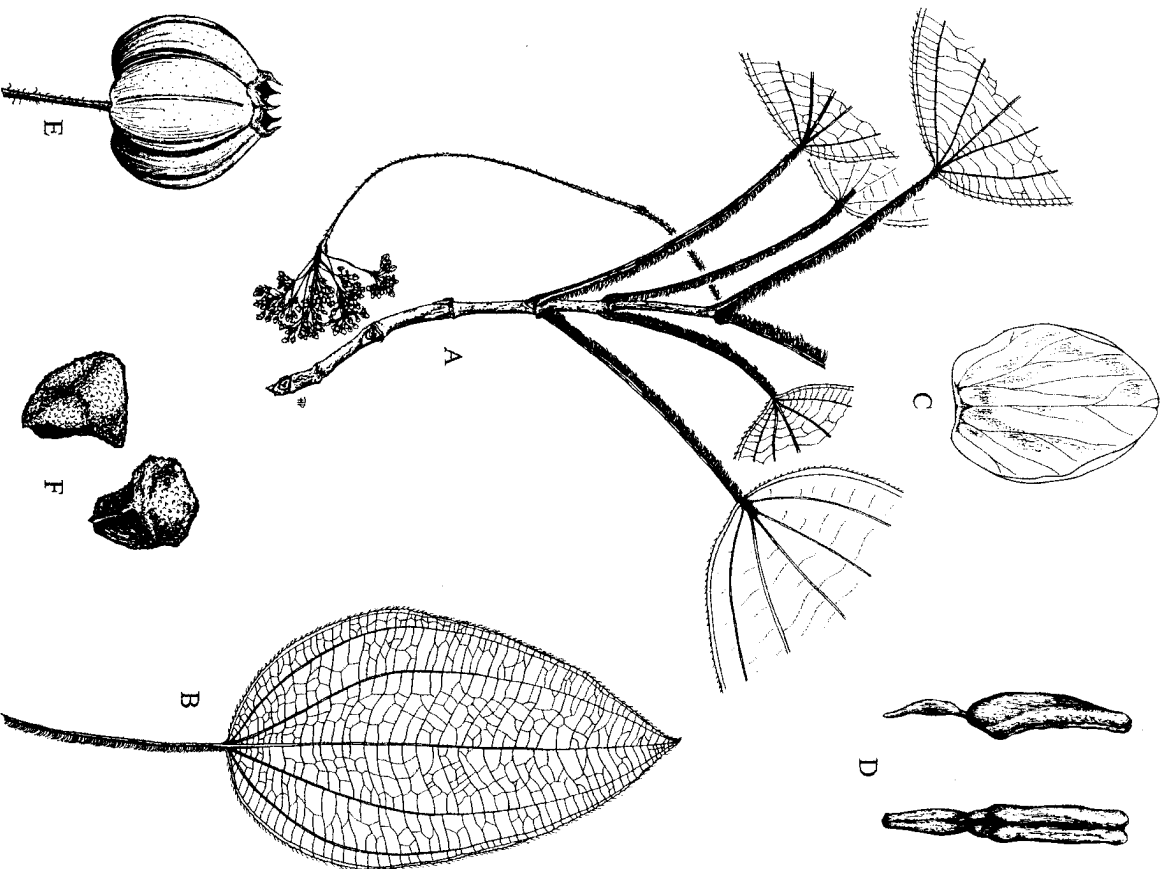


Figure 8. *Clidemia pectinata* Almeida. A, habit, ca. ½; B, representative leaf (abaxial surface), × ½; C, petal (adaxial surface), × 11; D, stamens, profile view (left) and ventral view (right), × 12; E, berry, × 4; F, seeds, × ca. 34. (A–D from the holotype; E and F from *Correa et al.* 9855.)

secondary peduncles, pedicels, and very young hypanthia sparsely to moderately beset with minute inconspicuous glands; bracts and bracteoles 1–2 mm long (including apical hair) and 0.25–0.5 mm wide, subulate, essentially glabrous. Flowers 5-merous on pedicels 1–2 mm long. Hypanthia (at anthesis) narrowly campanulate, beset with minute glandular hairs when young but essentially glabrous at maturity. Calyx tube ca. 0.1 mm long; the calyx lobes 0.5 × 1 mm, obovate, hyaline and phic; filaments 1.5 mm long, glabrous, abruptly constricted distally just below the thecae; anthers 2 mm long, ca. 0.25 mm wide, oblong, truncate apically with a dorsally inclined pore; connective thickened dorsally but neither prolonged nor appendaged below the thecae. Ovary 5-locular, %-stigma truncate. Berry 4 × 5 mm, reddish-purple and conspicuously lobed at maturity. Seeds 0.5–0.75 mm long, bluntly triangular and angular with a densely tuberculate testa.

PHENOLOGY.—Only two collections of the species are known; the May collection is in mature bud, the August collection is in mature fruit.

DISTRIBUTION.—Evidently local and rare in rain forests along stream banks on the Caribbean versant of western Panama in the region extending from Fortuna to Chiriquí Grande at 600–850 m. **PARATYPE.**—PANAMA. Bocas del Toro: después de la División Continental en la carretera que va de Fortuna a Chiriquí Grande, 27 Aug. 1993. *Correa et al.* 9855 (CAS, PMA, SCZ).

DISCUSSION.—*Clidemia pectinata* is perhaps the rarest and surely one of the most distinctive species of *Clidemia*. The combination of glabrous internodes (Fig. 8A), adaxial leaf blades, and mature hypanthia (Fig. 8E), pectinately pubescent petioles (Fig. 8B), and pendent long-pedunculate inflorescences (Fig. 8A) are unknown in any other species of *Clidemia*. The limited material available for study has precluded an assessment of variation and I was unable to relocate even sterile individuals of this species during field work in Panama in early 1996. Measurements of floral parts were taken on large but unexpanded flower buds of the holotype so even the size of most floral organs are likely to be larger when material is collected with expanded flowers.

ETYMOLOGY.—The epithet for this species is derived from the Latin word, *pectinatus*, i.e., with narrow close-set divisions like a comb. This refers to the posture and density of the petiolar hairs that are one-sided and directed adaxially when dry.

***Clidemia quinquenervia* (Mill.) Almeda, comb. nov.**

BASIONYM: *Melastoma quinquenervium* Mill., Gard. Dict. ed. 8, sp. 15, 1768. *Ocroleptura quinquenervia* (Mill.) Thana, Trans. Linn. Soc. London 28:145, 1871. *Ossaea quinquenervia* (Mill.) Cogn., DC. Monogr. Phan. 7:1064, 1891. Type: Exact locality not legible. *Herb. Miller s.n.* (holotype: BM!).

Clidemia ? decurrens Beurl., Bid. Portobello Flora. Kongl. Vetensk. Acad. Handl. 40:127, 1854, syn. nov. Type: Panama. Porto Bello, in silvis ad viam versus Panama, Apr. 1826. *Bilberg 280* (holotype: S, photo: MO!).

Ossaea diversifolia (Bonpl.) Cogn., Bull. Acad. Roy. Sci. Belgique Ser. 3, 14:968, 1887. **Basionym:** *Melastoma diversifolium* Humb. & Bonpl., Melast. 138, t. 59, 1816. Type: Colombia. Río Magdalena, Bonpland 1617 (holotype: P.; isotypes: P. 3 sheets, US!).
For additional synonymy see Wurdack (1971:128).

Shrub 0.5–2 (–6) m, the terete upper internodes and branchlets, petioles, primary abaxial leaf veins, and inflorescence axes covered with a dense indument of stipitate or subsessile clavate asperous-headed hairs. Leaves of a pair somewhat unequal in size, blades 10–24 × 5–15 cm, broadly elliptic to ovate, 5–7 (–9)-pinnerved, abruptly narrowed at the base and narrowly decurrent along the petiole, apex obtuse, acute, or short-acuminate, the margins ciliate-denticulate, moderately to sparsely setulose or glabrate adaxially, sparsely and deciduously stellulate-furfuraceous and

resinous-glandular on the secondary, higher order veins and blade surface abaxially. Inflorescence 2–4 cm long, a modified dichasium mostly divaricately branched from the base; flowers 5-merous on pedicels 0.25–0.5 mm long; the bracteoles mostly 0.5 mm long, subulate, persistent. Hypanthium bluntly 10-cosate, deciduously resinous-glandular; occasionally with a sparse admixture of spreading simple hairs. Calyx vaguely undulate, ca. 0.25 mm long but concealed by the setulose exterior teeth that are 0.5–1 mm long. Petals 0.75–1.25 × 0.75–1 mm, obovate-oblong, densely papillose-furfuraceous on both surfaces with a projecting infra-apical, abaxial tooth. Filaments 1–1.5 mm long, anthers 1.5–2 mm long, yellow with a truncate to ventrally inclined apical pore; connective prolonged dorso-basally into a gland-edged spur ca. 0.25 mm long. Ovary 5-locular, completely inferior; apex somewhat depressed, minutely and deciduously resinous-glandular puberulent; berry 4–5 × 2.5 mm when dry, compressed, initially white to pink-purple but turning blue-black. Seeds 0.5 mm long, the testa smooth.

PHENOLOGY.—Flowering and fruiting throughout the year.

DISTRIBUTION.—Uncommon to locally common in gallery forests, semideciduous forests, rain forest margins, river or stream banks, pasture margins, and disturbed sites, often in deep or partial shade from Honduras south through southern Central America to Colombia, Venezuela, and Ecuador at 0–700(–1400) m.

REPRESENTATIVE SPECIMENS EXAMINED.—HONDURAS: **Gracias a Dios:** Ahuas Bita, 200 km SO de Puerto Lempira, orilla del Río Wanki, Coco o Segovia, 5–13 May 1985. *Nelson & Cruz 9345* (CAS). NICARAGUA: **Jinotega:** Macizos de Penas Blancas, 5 May 1976. *Neill 249* (CAS). Zelaya: Sector de Negro Wás, entre El Empalme y Rosita, ca. 13°45' N, 84°25' W, 5 Sep. 1984. *Oritz 2123* (CAS). COSTA RICA: **Cartago:** Aitiro, 1894 (w/out exact date), *Domell Smith 4775* (US). Heredia: La Selva, near Puerto Viejo, 21 May 1972. *Opler 826* (US). Limón. Ca. 5.5 km W of Limón off road to Siquirres, 27 July 1977. *Almeda et al.* 3261 (CAS, CR); ca. 7 km SSW of Home Creek on the road to Britón, 26 July 1977. *Almeda et al.* 3256 (CAS, CR). **Puntarenas:** Cantón de Golfito, P. N. Corcovado, Peninsula de Osa, Estación Sirena, Sendero a Río Claro, 14 Oct. 1993. *Aguilar 2529* (CAS, INB, MO); disturbed sites above Golfito along the road to the television tower, 16 July 1977. *Almeda et al.* 3094 (CAS, CR). Reserva Absoluta Cabo Blanco, Estación Cabo Blanco, 9°35' N, 85°06' W, 4 Nov. 1991. *Chanarría 305* (CAS, INB, MO); Punta Cathedral, ca. 7 km SE of Quepos, 9°22.5' N, 84°09' W, 20 Aug. 1985. *Graym & Sleeper 5896* (CAS, CR, MO); Nicoya Peninsula, canyons and ridges toward Punta Georgia, Punta Blanca trail, 23 Aug. 1995. *Sanders et al.* 17706 (CAS, UCR); Reserva Biológica Carara, Sendero Quebrada Bonita-Bijagual, 9°46'10" N, 84°33'50" W, 8 Dec. 1989. *Zarriña & Jiménez 18* (CAS, CR, INB). San José: Zona Protectora El Rodeo Ciudad Colón, 9°54' N, 84°16' W. *Varela 241* (CAS, INB, MO). PANAMA: **Bocas del Toro:** Rodeo Ciudad Colón, 28 Jan. 1921. *Carteton 87* (US); Changuinola to 5 miles S at junction of Río Lanchinola and Terebe, 17–19 Dec. 1966. *Lewis et al.* 833 (F, MO, PMA). **Canal Area:** Madden Forest (Parque Nacional Soberanía), Las Cruces Trail, 3.6 mi N of Gamboa road turn-off, 23 July 1994. *Croat & Zhu 77060* (CAS, MO, PMA); Barro Colorado Island, Bat Cave, 18 Sep. 1982. *Schmalzel & Schupp 955* (CAS, MO). **Chiriquí:** vicinity of Puerto Armuelles, 28–31 July 1940, *Woodson & Schery 855* (MO). Cocle: forest on hills above road 18 km past Sardindilla on way to Nombre de Dios, 2 Aug. 1974. *Croat 26096* (MO). **Colón:** north of Diamante, ridge NW of abandoned mine on Quebrada de la Mina, 9°24' N, 79°35' W, 11 Jan. 1984. *Churchill & de Newers 4216* (CAS, MO, PMA); 1–2 km from the Portobelo Highway up the Río Guanche, 9°30' N, 79°40' W, 17 Feb. 1982. *Knapp 3641* (CAS). **Comarca de San Blas:** Aligandi area along trail from ocean to waterfall on river, 7 Oct. 1978. *Hammel & D'Arcy 4989* (CAS, MO, PMA). **Darien:** de la estación de Cruce Mono hasta la quebrada Ipeleisa (límite del parque), 28 Aug. 1990. *Aranda et al.* 1517 (CAS, PMA); trail between Boca de Cupe and Río Piedras on the trail to Paca and Cana, 27 June

1959, *Stern et al.* 733 (US). Los Santos/Verguás border: mountains of S Azuero Peninsula near proposed route of road from El Cortezo to Arenas, 0.5 km SW of El Cortezo, 29 Oct. 1978, *Hammel 546/1* (CAS, MO, PMA). **Panama:** area around Tortí Arriba, 31 Aug. 1977, *Folsom 5153* (CAS, MO, PMA); hills S of Guacuco, 8 km E of Ipéti, 78°20'W, 8°55'N, 18 Sep. 1982, *Hamilton & D'Arcy 1353* (CAS). **Verguás:** Dio. De Montijo, Isla de Coiba, campamento de La Salina, subda hacia Río Negro, 21 Oct. 1995, *Martin & Ballesteros MB1345* (CAS, PMA). **COLOMBIA:** **Antioquia:** Quebrada Isatis, east of Turbo, 8 July 1946, *Haugh 4946* (US). Bolívar: Boca Vereda, Río Simu, 13–14 Feb. 1918, *Pennell 4227* (US). **Chocó:** Río Ciego, 17 June 1967, *Duke 13290* (US); Corregimiento San Francisco, Vereda Coquitul, Sitio "El Paramo, Quebrada Zardí, 8°23'N, 77°07'W, 22 May 1989, *Benaur et al. 1191* (US). **Cundinamarca:** San Antonio, 14 June 1948, *Haugh 6241* (CAS). **Magdalena:** Parque Nacional Tayrona, along mule trail from Pueblito to Calabazo, ca. 11°19'N, 73°58'W, 26 Oct. 1972, *Kirkbride 2565* (US). **Tolima:** Mariquita, 10 Nov. 1938, *Haugh 2429* (DS). **VENEZUELA:** **Portuguesa:** Distr. Guanare, 17 km NW of Tucupido by road, N slope of fila Las Palmas, 69°57'W, 9°01'N, 30 Oct. 1982, *Davidse et al. 21455* (CAS, MO, US). **Zulia:** Dio. Mara, cuenca del Río Guasare, alrededores del Destacamento Guasare No. 1 (La Yolanda), 10°52'10"N, 72°29'30"W, 9 Nov. 1982, *Burtt et al. 11977* (CAS). **ECUADOR:** **Napo:** Río Napo between Coca (Puerto Francisco de Orellana) and Armenia Vieja, 15 Nov. 1974, *Harling & Andersson 11986* (US). **Pastaza:** Río Pastaza, between Destacamento Chitboga and Apache Entza, ca. 76°55'–77°08'W, 2°20'–32'S, 24 July 1980, *Ollgaard et al. 35173* (CAS).

DISCUSSION.—It is surprising that the generic placement of this species has not been adjusted until now since it was first proposed as a new species in 1768. It was described as *Clidemia?* *decurrens* Benth. in 1854 (see citation above) but students of neotropical Melastomataceae subsequently relegated Benth's name to the synonymy of *Oclopaura quinquenervia* or *Ossaaca quinquenervia* without comment (Triana 1871; Cogniaux 1891; Wurdack 1980). Gleason (1939) makes no mention of it in his regional revision of *Clidemia*.

Among congeners, *C. quinquenervia* is closely allied to the rare Costa Rican endemic, *C. coronata* Gleason. Both species share a similar indument of asperous-headed hairs, densely papillose-furfuraceous petals, a completely inferior 5-locular ovary, and a smooth seed coat. Important distinctions between these species can be found in readily observed vegetative characters. In *C. coronata* the leaves are 5–7-nerved (vs. 5–9-pinnerved), the blades are ciliate and ± entire (vs. ciliate-denticulate) and the blade base is not decurrent on the petiole (vs. conspicuously so). Although both species also have anther connectives that are prolonged dorso-basally into appendages, the appendages on *C. coronata* are rounded and entire whereas those on *C. quinquenervia* are spur-like and gland-edged.

Clidemia rodriguezii Almeida, sp. nov.

(Fig. 9)

TYPE.—COSTA RICA: **Cartago:** Cantón de Paraiso, Cuenca del Reventazón. Oroquí. Entrada a Tausito, aprox. 3 km después del cruce hacia la Estación Tapantí, 9°46'20"N, 83°47'10"W, 1400–1600 m, 15 Apr. 1998, A. Rodríguez et al. 3239 (holotype: INB!; isotypes: CAS!, CR!, MO!, NY!, US!).

Ramuli quadrangulati; internodi alatis demum carinatis, nodis tumidis et carinatis. Petioli 6.3–12 cm longi; lamina 6–23 × 11.7–16.2 cm ovata vel subcordata apice acuminate basi rotundata, 7–9-nervata, nervi subtus in axillis domatis instructi. Inflorescentia lateralis in ramulis infra folia plerumque orbata 1–1.5 cm longa multiflora; flores 4-meri, bracteolis 1.5–2 × 0.25–0.5 mm. Calycis tubus 1 mm longus, lobis interioribus 0.5 × 1 mm ovato-triangularibus, dentibus exterioribus 2 × 1 mm oblongis. Stamina isomorphica glabra, antherarum thecae 2 × 0.25 mm subulatae

poro ventraliter inclinato; connectivum nec prolongatum nec appendiculatum. Ovarium 4-loculare et omnino inferum glabrum.

Shrub 0.4–1.5 m tall, the glabrous cauline internodes thick and quadrate, distinctly alate when young becoming carinate with age with opposing faces 0.8–1.2 cm wide, the nodes bearing prominent expanded (0.25–0.75 mm) interpetiolar ridges. Very young nodes, vegetative buds, and young petioles (adaxial surface) copiously setose with smooth early deciduous hairs 0.5–1 mm long. Leaves of a pair equal to somewhat unequal, otherwise identical, bearing two pairs of vesicular domatia (2–4 mm long) on the abaxial blade base where the primary veins diverge from one another; petioles 6.3–12 cm long; blades 16–23 × 11.7–16.2 cm, chartaceous and brittle when dry, ovate to subcordate, apex acuminate, base broadly rounded, margin ciliate-serrulate, 7–9-nerved, glabrous on the adaxial surface at maturity or with remnant tufts of smooth hairs along basal portions of the impressed primary veins, essentially glabrous abaxially. Inflorescence 1–1.5 cm long, a congested cluster of axillary dichasia, typically paired at each node below the leaves; rachis nodes persistently setose with flexuous hairs 0.5–1 mm long, the internodes glabrate and the pedicels copiously beset with minute stellulate or branched hairs; bracteoles 1.5–2 × 0.25–0.5 mm, oblong to narrowly triangular, glabrous except for a short terminal hair. Flowers 4-merous on pedicels 1.5–2 mm long. Hypanthia (at anthesis) suburceolate with a cylindrical distal neck about 1 mm long, copiously stellulate-puberulent with an occasional scattering of smooth spreading flexuous hairs. Calyx tube 1 mm long, the calyx lobes 0.5 × 1 mm, ovate-triangular, fleshy, glabrous, erect and concealed by the calyx teeth; calyx teeth 2 × 1 mm, oblong, glabrous, widely spreading at anthesis and in fruit. Petals 2 × 0.75 mm, glabrous, white, oblong. Stamens isomorphic; filaments 2.5 mm long, glabrous; anthers 2 mm long, 0.25 mm wide, white, subulate with a ventrally inclined pore; connective somewhat thickened dorsally but neither prolonged nor appendaged below the thecae. Ovary 4-locular, completely inferior, apex glabrous and smooth. Style 5 mm long, glabrous; stigma punctiform. Berry 3–5 × 3–5 mm, purple at maturity. Seeds 0.5 mm long, ovoid to obovoid with a vaguely rugose testa.

PHENOLOGY.—Flowering material has been collected in April and August; fruiting specimens in March, April, and August.

DISTRIBUTION.—Rare and local in central and southeastern Costa Rica where it is known from the lower northern slopes of the Fila Matama, vicinity of Tapantí National Park, and the Paritá Valley north of Quepos at 700–1600 m.

PARATYPES.—COSTA RICA: **Limón:** Almirante, Fila divisoria entre la Cuenca superior del Río Xichiani y la cuenca superior del Río Boyei, 09°45'50"N, 83°19'45"W, 12 Aug. 1995, *Herrera 8446* (CAS, CR). **San José:** Cantón de Tarrazú, Faja Costeña del Valle de Paritá en el camino a Quepos, Fila San Isidro, luego del cruce a San Isidro, 09°33'25"N, 84°04'48"W, 26 Mar. 1995, *Morales & Ureña 3767* (CAS, INB).

DISCUSSION.—This little-collected species is characterized by a combination of many unusual characters. The uppermost internodes are quadrate, winged, and quite thick with opposing faces 0.8–1.2 cm wide (Fig. 9A). The nodes have prominent expanded interpetiolar ridges (Fig. 9A). The 4-merous flowers are borne in axillary congested dichasia that are typically paired at a node (Fig. 9A). The hypanthia are constricted distally into a conspicuous neck (Fig. 9F). The exterior calyx teeth are foliaceous, adnate to and conceal the actual calyx lobes (Fig. 9C). Two pairs of vesicular domatia are produced at the abaxial blade base where the primary veins diverge from one another (Fig. 9B) but these are unusually small when compared to other domatia-bearing species in the genus.

In leaf shape and inflorescence architecture, *C. rodriguezii* is similar to and may be most closely related to *C. discolor* (Triana) Cogn., another species with 4-merous flowers and a 4-locular

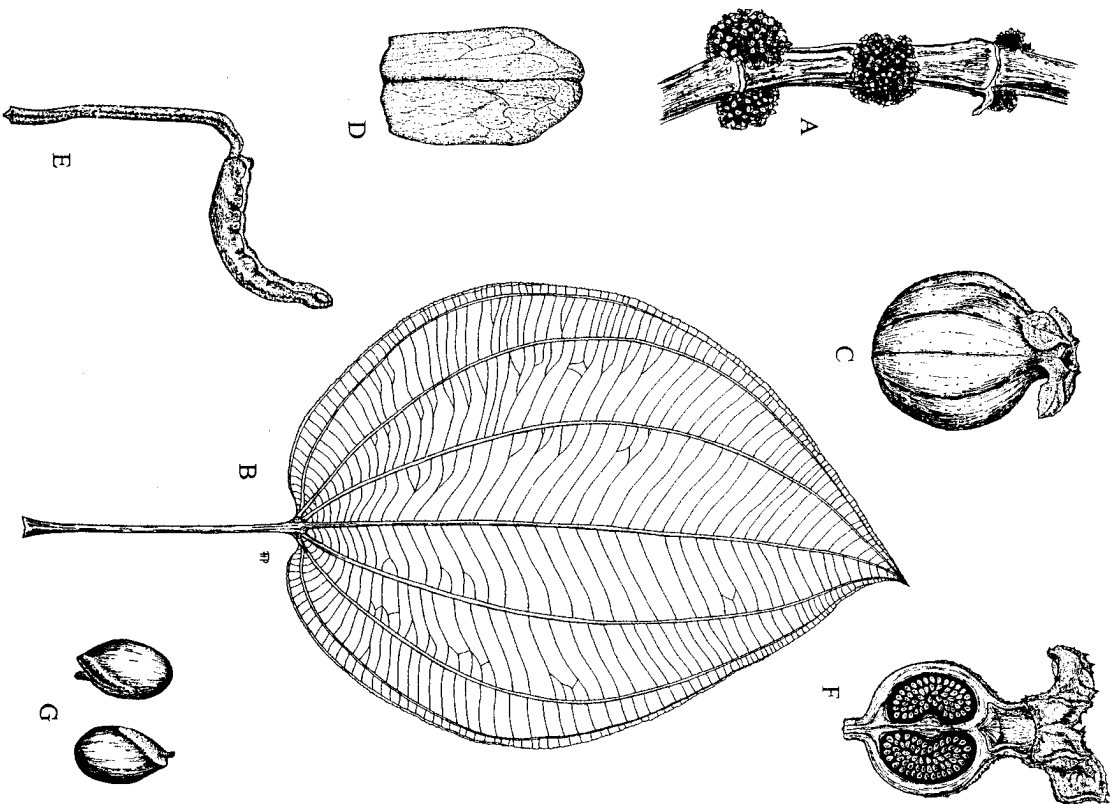


FIGURE 9. *Clidemia rodriguezii* Almeda. A, naturally defoliated branch with inflorescences, \times ca. 1; B, representative leaf (abaxial surface), \times $\frac{1}{4}$; C, berry, \times ca. 7; D, petal, \times 17; E, stamen (profile view), \times ca. 17; F, immature berry (longitudinal section), \times ca. 10; G, seeds, \times ca. 32. (A–G from Rodriguez et al. 3239.)

ovary that is completely inferior. The latter has slender unwinged upper internodes that are rounded or rounded-quadrate and lack prominent interpetiolar ridges. The leaf blades of *C. discolor* also lack vesicular domatia at the abaxial base and the internodes of the inflorescence rachis are farinose-furfuraceous with an admixture of clavate glands (vs. glabrate to minutely stellulate).

Clidemia rodriguezii is also reminiscent of *C. epiphytica* (Triana) Cogn. Both species have 4-merous flowers, a 4-locular completely inferior ovary, and foliaceous calyx teeth that are adnate to and obscure the calyx lobes. The latter differs most notably in being a climbing vine with distinctly dimorphic leaf blades at each node that lack vesicular domatia.

ETYMOLOGY.—This species is named for Alexander Rodriguez G. (b. 1972), student of Costa Rican Asteraceae and collector of the type series. His collections were accompanied by excellent pickled material of flowers and fruits that facilitated the study and illustration of this species.

Clidemia tenebrosa Almeda, sp. nov.

(Fig. 10)

TYPE.—PANAMA: Coeló: forested slopes above El Copé along abandoned road leading to the Continental Divide, 8°38'N, 80°38'W, 700–850 m, 24 Jan. 1989, *F. Almeda et al.* 6392 (holotype: CAS!; isotypes: MO!, PMA!).

Ramuli primum obtuse sulcato-quadrangulati demum teretes sicut petioli folia inflorescentia hypanthiaque pilis laevibus (pro parte glanduliferis) dense induti. Lamina 22–44.5 \times 10–16.5 cm elliptica vel ovato-elliptica apice gradatimque acuminate basi late acuta vel obtusa, subtus in venis primariis secundariisque sparse pilis glanduliferis induti et sparse vel sparsissime stellato-puberula, 7–9-plinervata; petioli liberi 2.5–5.5 cm longi; fornicata 4–7 cm longa ad superiorum apices evoluta et in laminarum bases immersa. Inflorescentiae multiflorae in foliorum superiorum axillis oppositis; flores 5-meri, bracteolis 1.5–2 \times 0.25 mm; calycis tubus ca 0.5 mm, lobis interioribus 0.75–1 \times 1–1.5 mm triangulatis, dentibus exterioribus 4–5 mm longis subulatis. Stamina isomorphica glabra, antherarum thecae 1.5 \times 0.5 mm oblongae vel subulatae poro paulo dorsaliter inclinato; connectivum nec prolongatum nec appendiculatum. Ovarium 5-loculare et omnino inferum apice modice glanduloso-puberulo.

Monopodial or sparingly branched shrub 1–3 m tall with rounded-quadrate internodes. Upper internodes, petioles, both leaf surfaces, inflorescence rachis, pedicels, hypanthia and calyx teeth copiously covered with smooth (gland-tipped in part) spreading hairs 1.5–3 mm long. Leaves of a pair essentially equal in size and consistently bearing paired elongate fornicata 4–7 cm long extending from the adaxial blade base onto the distal portions of the petiole; petioles 3–8 cm long; blades 22–44.5 \times 10–16.5 cm, chartaceous, flexuous when fresh and very brittle when dry, elliptic to ovate-elliptic, apex gradually acuminate, base rounded to obtuse, margin inconspicuously denticulate, 7–9-plinerved with the innermost pair of primary veins diverging from the median vein 2–3 cm above the blade base, the primary and higher order veins sparsely beset with a ground layer of minute glands sometimes sparingly intermixed with minute stellate hairs. Inflorescence 2–3.5 cm long, axillary congested dichasia that are paired at a node, the rachis, pedicels and hypanthia sparsely to moderately beset with a ground cover of tardily deciduous glands and stellulate hairs; bracteoles 1.5–2 \times 0.25 mm (including the apical hair), subulate, inconspicuous and obscured by the surrounding indument of spreading hairs. Flowers 5-merous on pedicels 0.5–1 mm long. Hypanthia (at anthesis) subcylindric. Calyx tube ca. 0.5 mm long, the calyx lobes 0.75–1 \times 1–1.5 mm, triangular, glandular-puberulent adaxially and along the margins; calyx teeth 4–5 mm long, subulate, greatly exceeding and obscuring abaxial surface of the calyx lobes. Petals 4–5 \times 2–3.5 mm, glabrous, translucent white, obovate to oblong. Stamens isomorphic; filaments 2.5–3 mm

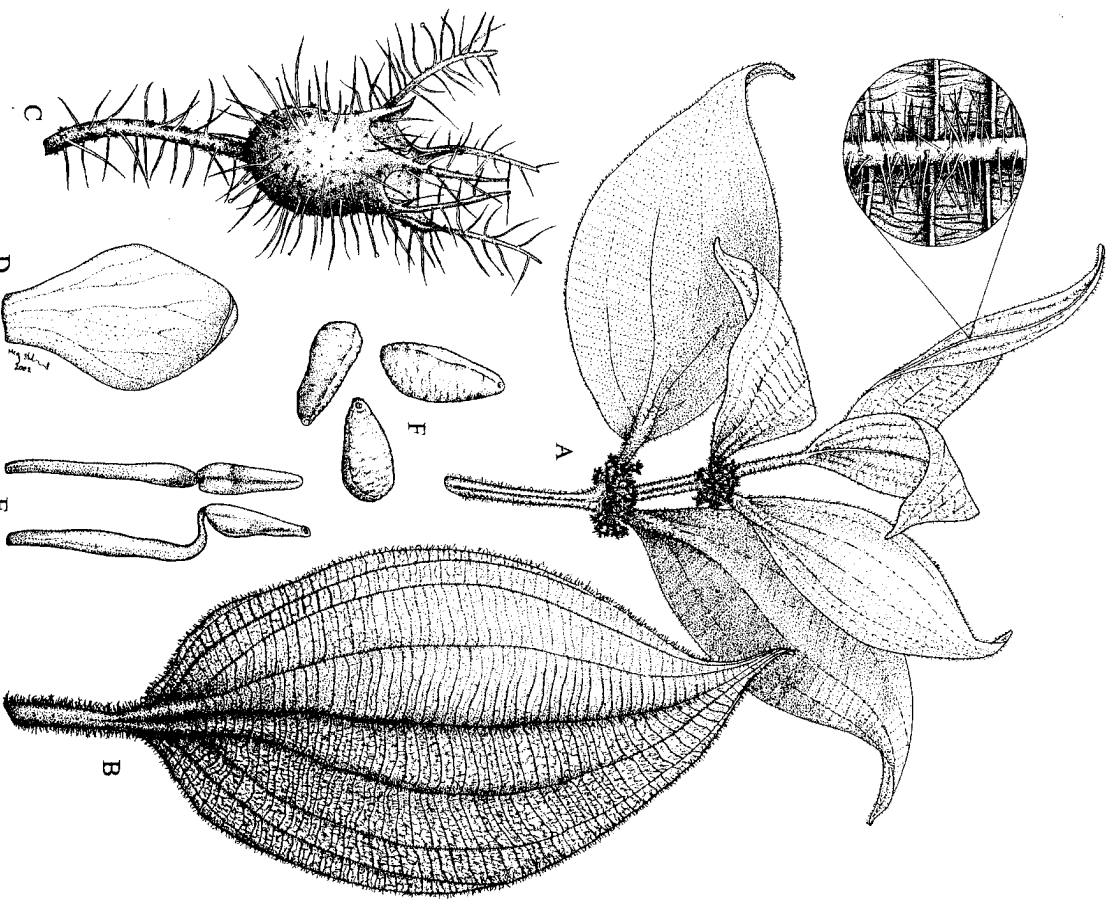


FIGURE 10. *Clidemia tenebrosa* Almeda. A, habit, $\times \frac{1}{2}$; B, representative leaf (adaxial surface), \times ca. $\frac{1}{2}$; C, immature berry, $\times 5$; D, petal (adaxial surface), $\times 8$; E, stamens, ventral view (left) and profile view (right), $\times 12$; F, seeds, \times ca. 38. (A and B from Knapp 3734; C from Almeda et al. 6392; D and E from Croat 67552; F from Almeda et al. 7657.)

long, glabrous; anthers 1.5 mm long, 0.5 mm wide, white, linear-oblong to subulate, truncate at the apex with a somewhat dorsally inclined pore; connective somewhat thickened dorsally but neither prolonged nor appendaged below the thecae. Ovary 5-locular, completely inferior, apex somewhat crateriform at anthesis, minutely glandular puberulent like the adaxial vascular ring of the hypanthium. Style glabrous, 6 mm long; stigma capitate. Berry 6 \times 5 mm, blue at maturity. Seeds 0.5 mm long, obovoid with a smooth to vaguely rugulate testa.

PHENOLOGY.—Flowering material has been collected from January through March, July, September, and December; fruiting collections have been gathered in January, February, July, September, and December.

DISTRIBUTION.—Cloud forests of west-central Panama at 200–1100 m, typically in deep shade.

PARATYPES.—PANAMA: Coole: forested slopes above El Copé along abandoned road leading to the Continental Divide, 25 Feb. 1988, Almeda et al. 5935 (CAS); about 7–10.5 km beyond El Copé in Omar Torrijos National Park along end of rocky trail to Río Blanco and Limón beyond Alto Calvario, 21 Feb. 1996, Almeda et al. 7657 (CAS, MO, PMA); vicinity of La Mesa, N of El Valle de Anton, along N slope of Cerro Gatil, 8°37'N, 80°08'W, 14 Jul. 1987, Croat 67286 (CAS); Alto Calvario along summit of Continental Divide, 5.5 mi. N of El Copé, 8°39'N, 80°36'W, 13 Sep. 1987, Croat 67552 (CAS); area between Caño Blanco del Norte, Caño Sucio and Chorro del Río Tife, 3 Feb. 1983, Daviase & Hamilton 23514 (CAS); Atlantic drainage near Continental Divide at sawmill above El Copé, 7 Mar. 1982, Hammel & Trainer 11314 (CAS); trail from Río Blanco del Norte to Caño Sucio, 8°44'N, 81°40'W, 21 Feb. 1982, Knapp 3734 (CAS); between Caño Sucio and waterfall at base of Cerro Tife, ca. 4 hr. hike, 8°38'N, 80°36'W, 13 Dec. 1980, Sysma et al. 2557 (CAS). PANAMA: Cerro Campana near the FSU field station trail up the mountain, 9 Aug. 1970, Kennedy & Lucey 435 (CAS, US); Altos de Campana, sendero del Tigre, 11 July 1998, Montenegro & Galdames 1979 (CAS).

DISCUSSION.—*Clidemia tenebrosa* is like *C. collina*, *C. falsomii*, and *C. mymacina* in having 5-merous flowers and formicaria positioned at the base of the blade but extending on to a portion of the petiole. Among these species, *C. tenebrosa* most closely resembles *C. collina*. Both species have plierveid leaf blades with at least the innermost pair of primary veins diverging from the midvein well above the blade base on the abaxial surface and a short inflorescence axis that is obscured by the dense indument. In *C. collina*, however, the leaf blades are prevalently ovate varying to ovate-elliptic and mostly 9.5–21 cm long (vs. prevalently elliptic varying to ovate-elliptic and 22–44.5 cm long), the inflorescence is pseudolateral but not paired at a node (vs. axillary and paired at a node), the understory indument on hypanthia is lacking or sparingly covered with minute deciduous glands (vs. a sparse to moderate cover of minute stellulate hairs and a scattering of minute glands), the anther thecae are yellow (vs. white), and the seed coat is densely tuberculate (vs. smooth to vaguely rugulate). The flowers and fruits of *C. tenebrosa* and other congeners with congested copiously hairy inflorescences are difficult to study once they are pressed and dried. This coupled with the highly fugacious nature of floral parts and brittleness of the inflorescence rachis typically make for specimens that are incomplete. To facilitate the preparation of specimens that are adequate for study, collectors should make every effort to preserve reproductive structures in a liquid medium in the field.

ETYMOLOGY.—The epithet for this species is derived from the Latin word, *tenebrosus*, dark, gloomy, or of shaded places, alluding to its shaded forest habitat.

Citadema ventricosa Almeida, sp. nov.

(Fig. 11)

TYPE.—PANAMA: Comarca de San Blas: El Llano-Carri road, 19.1 km from Interamerican Hwy., 9°19'N, 78°55'W, elev. 350 m, 5 Mar. 1985, *G. de Nevers et al.* 4963 (holotype: CAS!; isotypes: CAS!, INB, KUNA, MEXU, MO, PMA).

Ranuli teretes sicut foliorum venae primariae subtus inflorescentia hypanthiaque pilis laevibus plerumque 3–7 cm longis induti. Lamina 11–23.5 × 4.1–8.5 cm ovato-elliptica vel ovata apice attenuata vel acuta basi rotundata, 5–7-nervata vel 5–7-plinervata; formicaria 1–2 cm longa ad petiolorum apices evoluta et raro in laminarum bases immersus. Inflorescentia primum terminalis demum lateralis; flores 5-meri, bracteolis 3.5–4.5 × 0.25–0.5 mm; calycis tubus 1 mm, lobis interioribus 0.5–0.75 × 1 mm triangularibus vel orbiculatis, dentibus exterioribus 2.5–3.5 mm longis subulatis. Stamina isomorphica glabra, antherarum thecae 3–4.2 × 0.5 mm subulatae poro dorsali ter inclinato; connectivum nec prolongatum nec appendiculatum. Ovarium 5-loculare et 2/3 inferum apice modice glandulosum-puberulo.

Sparsingly branched shrub 0.5–1 m tall. The terete upper internodes, abaxial surface of petioles, and elevated primary veins on abaxial foliar surfaces copiously covered with appressed smooth hairs 3–7 cm long. Leaves of a pair equal to somewhat unequal in size; petioles 1–4 cm long with bulbous paired formicaria 1–2 cm long borne distally and sometimes barely extending onto the blade; the adaxial surface of the petioles and formicaria setose with spreading hairs 0.6–1.7 cm long; blades 11–23.5 × 4.1–8.5 cm, chartaceous, brittle when dry, oblong-ovate to elliptic-ovate, apex attenuate to acute, base rounded, margin entire, 5–7-nerved or if plinervate then the innermost pair of primary veins diverging from the median vein 0.5 cm above the blade base, the higher order veins and actual surface inconspicuously beset with scattered minute glands or nearly glabrous. Inflorescence 1.5–2 cm long; a pseudolateral congested modified dichasium, the rachis, hypanthia, and calyx teeth moderately setose with widely spreading hairs 0.4–1 cm long underlain by a scattering of very minute inconspicuous glands; bracts and bracteoles 3.5–4.5 × 0.25–0.5 mm (including the apical hair), subulate to oblong-subulate, inconspicuous and obscured by the surrounding setose indument. Flowers 5-merous on minutely glandular-puberulent pedicels 1–2 mm long. Hypanthia subrotundate at anthesis, prolonged distally into a cylindrical neck 1 mm long above the ovary apex and below the vascular ring. Calyx tube 1 mm long, the calyx lobes 0.5–0.75 × 1 mm, rounded-triangular to semicircular; glandular-puberulent along the margins; calyx teeth 2.5–3.5 mm long (excluding the apical hair), greatly exceeding and somewhat obscuring abaxial surfaces of the calyx lobes, oblong to subulate. Petals 8 × 2.5 mm, glabrous, pink or reportedly yellowish with a tinge of purple at the tip (*Nees 10474*), oblong to narrowly obovate. Stamens isomorphic; filaments 3–3.5 mm long; glabrous, abruptly constricted at the junction with the thecae; anthers 3–4.2 × 0.5 mm, yellow, subulate with a dorsally inclined pore; connective thickened and somewhat ridged dorso-basally but neither prolonged nor appendaged below the thecae. Ovary 5-locular, 2/3-inferior, apex prolonged into a deciduously glandular truncate cone 1 mm long at anthesis. Style 9–9.5 mm long, glabrous, straight; stigma subcapitate to truncate. Berry 6–7 × 6–8 mm when dry, purple at maturity. Seeds 0.5 mm long, bluntly triangular in outline with a minutely asperulate testa.

PHENOLOGY.—The single known flowering collection was made in March; fruiting specimens have been collected from August through October.

DISTRIBUTION.—Local and uncommon in low rainforests of north-central Panama, often in deep shade along creeks and in the vicinity of streams at 300–400 m.

PARATYPES.—PANAMA: Comarca de San Blas: El Llano-Carri road, 18 km from Interamerican Hwy., 9°19'N, 78°55'W, 7 Sept. 1984, *de Nevers 3877* (CAS); Nusagandi, El Llano-

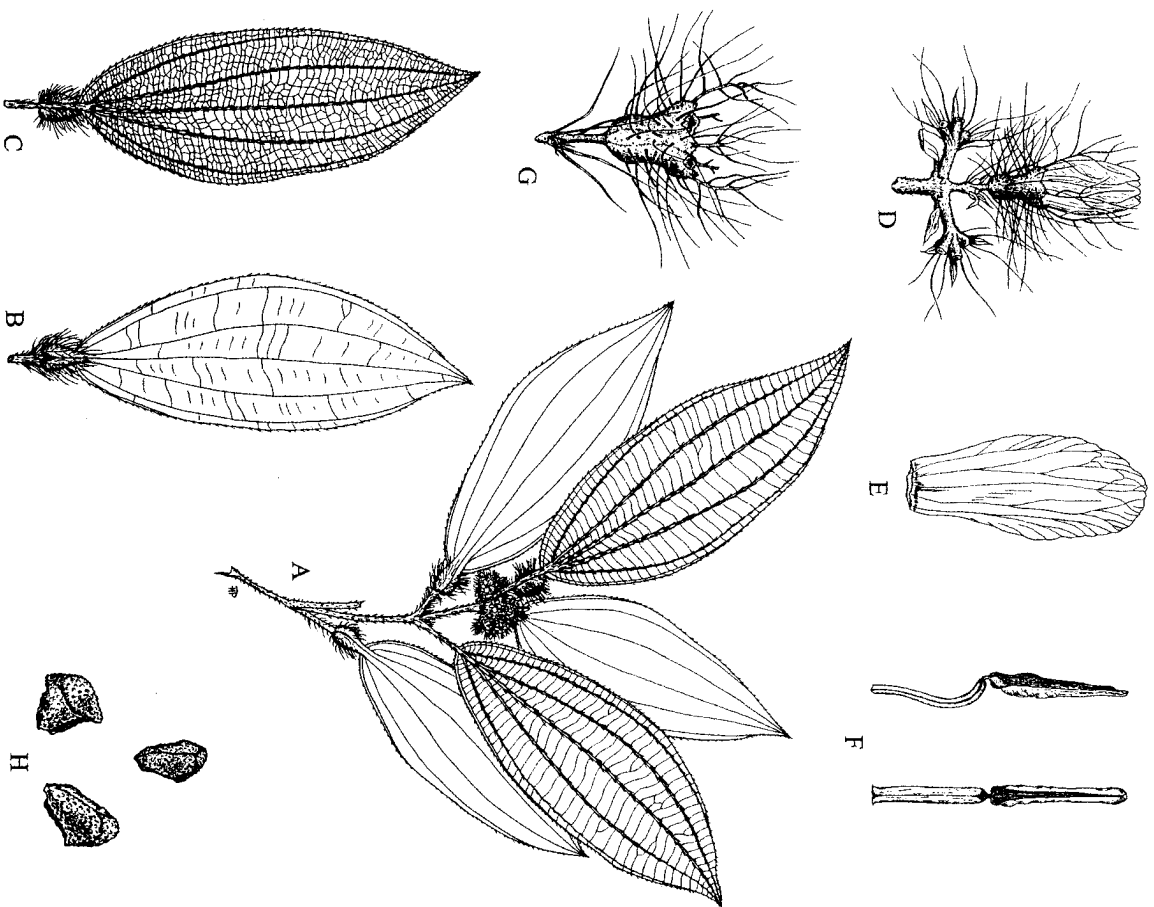


Figure 11. *Citadema ventricosa* Almeida. A, habit, × ca. 1/5; B, representative leaf (adaxial surface), × 1/5; C, representative leaf (abaxial surface), × 1/5; D, flower (just prior to anthesis), × 2; E, petal (adaxial surface), × 5; F, stamens, profile view (left) and dorsal view (right), × 6; G, young fruiting hypanthium, × 2; H, seeds, × ca. 26. (A–G from *de Nevers et al.* 4963; H from *Folsom et al.* 6182.)

Carti road, along a creek on the Atlantic slope, 9°19'N, 78°15'W, 10 Aug. 1984, *de Nevers* & *Gonzales 3673* (CAS); El Llano-Cartí road, headwaters of Atlantic drainage, 9°19'N, 78°55'W, 29 Aug. 1984, *de Nevers* & *Gonzales 3784* (CAS); El Llano-Cartí road, 9°19'N, 78°55'W, 1 June 1985, *de Nevers* & *Herrera 5821* (CAS). **Panamá:** road from El Llano to Cartí, 12.4 km N of Panamerican Hwy., 31 Oct. 1977, *Folsom et al. 6182* (CAS); wet forest along El Llano-Cartí road, 12 km N of Panamerican Hwy., 11 Mar. 1974, *Nee 10474* (MO, US).

DISCUSSION.—*Clidemia ventricosa* can be recognized by its glabrous adaxial foliar surfaces, mostly petiolar fornicaria (Fig. 11B) that sometimes barely extend on to the blade base, smooth appressed hairs on the upper internodes, abaxial surface of the petioles, and elevated primary veins on abaxial foliar surfaces (Fig. 11C), pseudolateral congested dichasia (Fig. 11A), and widely spreading hairs on the inflorescence rachis, hypanthium, and calyx teeth (Fig. 11C). Among the Central American species of *Clidemia* with 5-merous flowers, only *C. laurina* and some populations of *C. pubescens* have petiolar fornicaria like *C. ventricosa*. Both of these species are easily distinguished from *C. ventricosa* by their spreading or retrorse hairs on upper internodes and spreading hairs on elevated primary veins on the abaxial foliar surfaces.

ETYMOLOGY.—The epithet for this species is derived from the Latin word, *ventricosa*, swollen, in reference to the conspicuously bulbous ant domatia at the distal end of each petiole.

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- ALMEDA, NEOTROPICAL GENUS *CLIDEMIA* 123

Appendix I

Species of *Clidemia* known to produce pouch-like ant domatia (formicaria) on some or all leaves, petioles, or branchlets nodes, and their geographic distributions.

- C. acosae* Wurdack — Ecuador
C. avangamensis Wurdack — Guyana
C. allardi Wurdack var. *allardi* — Colombia, Ecuador, Peru
C. allardi Wurdack var. *maranomensis* Wurdack — Ecuador, Peru, Brazil
C. ciliata D. Don var. *elata* (Pittier) Uribe — Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Peru
C. ciliata D. Don var. *vesticulata* (Triana) Uribe — Venezuela, Colombia
C. collina Gleason — Panama
C. crenulata Gleason — Belize, Guatemala, Honduras, Costa Rica, Nicaragua, Colombia, Ecuador
C. foliosa Gleason — Peru
C. folsomii Almeida — Panama
C. heterophylla (Desf.) Gleason — Colombia, Ecuador, Peru
C. heptamera Wurdack — Venezuela, Guyana
C. inobsepia Wurdack — Colombia, Ecuador
C. juruensis (Pilger) Gleason — Venezuela, Brazil, Peru
C. killipii Gleason — Colombia
C. lanuginosa Almeida — Costa Rica, Panama
C. myrmeecina Gleason — Panama, Colombia
C. neblinae Wurdack — Venezuela
C. pilosa D. Don — Venezuela, Colombia, Ecuador, Peru
C. pubescens Gleason — Costa Rica, Panama
C. rodriguezii Almeida — Costa Rica (NB. The vesicular domatia of this species may be acarodomatia).
C. setosa (Triana) Gleason — Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, Panama
C. spectabilis Gleason — Nicaragua, Costa Rica, Panama
C. sprucei Gleason — Ecuador, Peru
C. taurina Gleason — Costa Rica, Panama
C. tenebrosa Almeida — Panama
C. tococoides (DC.) Gleason — Venezuela, Brazil, Colombia
C. ventricosa Almeida — Panama

Phylogenetic Systematics of *Okenia*, *Sakishimania*, *Hopkinsiella* and *Hopkinsia* (Nudibranchia: Goniodorididae) with Descriptions of New Species from the Tropical Indo-Pacific

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The anatomy of eight species of *Okenia*, four species traditionally placed in *Hopkinsia* and one species of *Sakishimania* was examined. The descriptions of previously described species, *Okenia pellucida*, *O. japonica*, *Hopkinsia rosacea*, *H. plana*, *H. pilosa*, *H. nakamotoensis* and *Sakishimania kondoi* were expanded from prior morphological studies. Six new species of *Okenia* are described from the Indo-Pacific tropics. *Okenia brunneomaculata* is described from specimens collected from Indonesia and the Philippines. *Okenia purpurorhinea* is known only from Okinawa in the Ryukyu Islands. *Okenia kendi* is described from specimens from Indonesia and the Philippines. *Okenia virginiae* is described from South Africa and is also known from Oman. *Okenia lambai* is described from the Philippines. *Okenia lilik* is described based on specimens from Papua New Guinea and the Philippines.

Preliminary phylogenetic studies reveal several important aspects about the relationships of these taxa. Collectively, these taxa appear to form a monophyletic clade. *Okenia mediterranea* is the most basal taxon in the present analysis and is the sister group to all of the other taxa. *Hopkinsia*, *Sakishimania* and *Hopkinsiella* are nested within *Okenia* in the analysis presented. The characteristics employed to distinguish *Sakishimania* and *Hopkinsiella* from *Hopkinsia* are not distinctly different or represent autapomorphies or symplesiomorphies. *Hopkinsia*, when *Sakishimania* and *Hopkinsiella* are included, constitutes a monophyletic taxon. However, maintenance of *Hopkinsia* as a distinct taxon renders *Okenia* paraphyletic. On this basis, *Hopkinsia*, *Hopkinsiella* and *Sakishimania* are considered as synonyms of *Okenia* to preserve the monophyly of this oldest taxon.

The Indo-Pacific Goniodorididae consist of species that have been placed in the genera *Arcula* Loven, 1846; *Goniadoris* Forbes and Goodrir. 1839; *Goniodoridella* Pruvot-Fol, 1933; *Hopkinsia* MacFarland, 1905; *Hopkinsiella* Baba, 1938; *Murphydoris* Sigurdsson, 1991; *Okenia* Menke, 1830; *Sakishimania* Hamatani, 2001; *Spahrta* Risbec, 1928 and *Trapania* Pruvot-Fol, 1931. These taxa have been sporadically studied for the last 100 years with additional species described in a wide variety of faunistic and systematic treatments. Recently, Rudman's (1987) monographic study of Indo-Pacific species of *Trapania* has significantly added to our knowledge of Indo-Pacific Goniodorididae. Few taxonomic studies have focused on the distinctions between the genera *Okenia*, *Hopkinsiella*, *Hopkinsia* and *Sakishimania*. Bouchet and Ortea (1983) revised the systematic distinctions between the former three genera and concluded that *Okenia* and *Hopkinsia* represent distinct genera, whereas *Hopkinsiella* is regarded as junior synonym of *Hopkinsia*. Most recently, Hamatani (2001) described two new species from Japan, a species of *Hopkinsia* and a member of a new genus, *Sakishimania*.