

REVISION OF *PHYLLANTHUS* SECTION *PITYROCLADUS*

Grady L. Webster

Herbarium, Section of Plant Biology, University of California, Davis, CA 95616

Abstract: This revision of the recently described section *Pityrocladus* (*Phyllanthus* subgenus *Emblica*) includes 11 neotropical species, of which four are described as new: ***Phyllanthus cajamarcensis*, *P. frontinoensis*, *P. mcphersonii*, and *P. vanderwerfii***. The revision provides keys to distinguish the species, descriptions, citations of specimens, and distribution maps, as well as discussions of relationships between the species and between section *Pityrocladus* and other sections of *Phyllanthus* subgenera *Conami* and *Emblica*.

Keywords: Euphorbiaceae, *Phyllanthus*, subgenus *Emblica*, section *Pityrocladus*, Colombia, Ecuador.

Phyllanthus section *Pityrocladus* G. L. Webster was recently described (Webster, 2002) to provide a systematic home for a number of neotropical species that had been widely scattered in previous treatments. Müller Argoviensis (1866) assigned *P. symphoricarpoides* Kunth to section *Hemiphyllanthus* because of its unlobed styles, and Pax and Hoffmann (1931) transferred it to *Glochidion* because of this single (misleading) character. At the same time, he placed *P. sponiifolius* Müll. Arg. in his “Series I” of section *Euphyllanthus*, associated with a variety of neotropical species referable to subgenera *Conami* and *Xylophyla* (as well as species now placed in *Flueggea* and *Jablonskia*!). He referred *P. ruscifolius* Müll. Arg. to section *Paraphyllanthus* adjacent to the Mexican species *P. galeottianus* Baill., a species very different in habit. Pax (1899), on describing *P. popayanensis* Pax, related it to *P. graveolens* Kunth, of section *Nothoclema*, subgenus *Conami*—somewhat closer to the mark.

These mistaken assignments may be explained not by the “incompetence” of these distinguished botanists, but rather by the rampant homoplasy in both vegetative and floral characters in neotropical *Phyllanthus*. The key to unravelling the Gordian knot of relationships has turned out to be pollen morphology, as noted by Webster (1957), Punt (1962, 1987), and Webster and Carpenter (2002). The

subprolate or spheroidal 4- or 5-colporate pollen grains of *P. ruscifolius* and *P. symphoricarpoides*, illustrated by Webster and Carpenter (2002) resemble those of the paleotropical *P. emblica* L., and justify inclusion of sect. *Pityrocladus* in subgenus *Emblica*. However, in vegetative characters species of sect. *Pityrocladus* (e.g., *P. sponiifolius* and *P. vanderwerffii*) appear most similar to species of sect. *Hylaeanthus* G. L. Webster, in subgenus *Conami*, rather than to the other neotropical section of subgenus *Emblica* (section *Micorglochidion* Müll. Arg.). In fact, for botanists determining incomplete herbarium specimens from western South America, the most reliable character is the elevation where the plant was collected: above 1000 m for section *Pityrocladus* and below 1000 m for section *Hylaeanthus*! For this reason, the following key is provided for distinguishing specimens of woody *Phyllanthus* from the Andean and Amazonian regions of South America.

Phyllanthus* section *Pityrocladus G. L. Webster, Novon 12: 291. 2002. Type: *Phyllanthus symphoricarpoides* Kunth in H. B. K.

Monoecious (rarely dioecious) arborescent shrubs, often scandent; branches and branchlets scabridulous or papillate to hirtellous or scurfy (rarely glabrous); deciduous branchlets pinnatifid, with ca. 10—50 leaves; leaf blades chartaceous, eglandular, veins often prominulous abaxially, glabrous to scabridulous or hirtellous abaxially; stipules entire, ± lanceolate and persistent. Flowers pedicellate (rarely sessile), in axillary unisexual or bisexual glomerules or brachyblasts. Staminate sepals 5 or 6 (and then ± biseriata), entire, discrete; disk segments 5, discoidal to cuboid; stamens 2—5 (rarely to 7), filaments connate (very rarely free); anthers muticous, dehiscing horizontally or obliquely; pollen grains subprolate, 4- or 5-colporate, colpi unbordered, monorate, exine reticulate. Pistillate sepals 5 or 6, discrete; disk crateriform or dissected; ovary 3-locular; styles free, spreading to erect, sometimes basally connate, entire to bifid. Fruits capsular or indehiscent; seeds trigonous, smooth.

KEY TO THE SPECIES

1. Leaf venation eucamptodromous (veins running to margin); pistillode flowers solitary at each node (except *P. sponiifolius*).
2. Leaf blades glabrous (except sometimes the proximal part of midrib adaxially).
3. Leaf blades strongly inequilateral at base, abaxially with straight veins separated by pale epidermal stripes; stipules blunt. *P. cuatrecasanus*
3. Leaf blades at most slightly inequilateral at base, lacking abaxial intervenal pale stripes.
4. Styles bifid halfway or more, spreading.
 5. Leaf blades acute or acuminate; petioles scabridulous; staminate pedicel > 1 mm long; stamens 2 or 3.
 6. Fruiting pedicel 7—8 mm long, fruiting sepals 3—3.3 mm long; leaf blades ovate-lanceolate, 1.5—2.5 cm long, 0.8—1.2 cm broad *P. cajamarcensis*
 6. Fruiting pedicel not over 2 mm long; fruiting sepals 1—2 mm long; leaf blades linear to oblong, 0.2—0.8 mm broad.
 7. Monoecious; stamens mostly 2; leaf blade epidermis not alveolate beneath. *P. valerii*
 7. Dioecious; stamens mostly 3; leaf blade epidermis minutely alveolate beneath. *P. weberbaueri*
 5. Leaf blades rounded or very obtuse at tip; petiole glabrous; staminate pedicel < 1 mm long; stamens 2. *P. frontinoensis*
4. Styles erect, unlobed, emarginate, or bifid less than 1/3; veinlets of leaf blade prominulous abaxially.
8. Styles free; sepals usually 5; pistillate flowers solitary at each node.
 9. Leaf blades oblong-elliptic, 1.5—2 cm long, obtuse or rounded at apex; tertiary veinlets strongly percurrent abaxially; staminate brachyblasts bifurcate; stamens 3—6; pistillate pedicels glabrous; styles entire or emarginate, 0.5—1.3 mm long. *P. symphoricarpoides*
 9. Leaf blades ovate to lanceolate, acuminate; tertiary veinlets weakly percurrent abaxially;

staminate brachyblasts abbreviated, not bifurcate; pistillate pedicel ±

scabridulous; styles c. 0.5 mm long, bifid c. 1/3.

P. mcphersonii

8. Styles connate; sepals 6; pistillate flowers 3-5 or more per node.

P. sponiifolius

1. Leaf venation brochiodromous (veins forming loops within margins); pistillate flowers 2—4 per node.

P. vanderwerffii

1. PHYLLANTHUS VALERII. Standl., Field Mus. Bot. 18: 619. 1937; Burger & Huft, Fieldiana Bot. n.s. 36: 147, fig. 9. 1995. TYPE: COSTA RICA. Heredia, Yerba Buena, NE of San Isidro, 2,000 m, *P. C. Standley & M. Valerio 49814* (HOLOTYPE: F; ISOTYPE: US!).

MONOECIOUS SHRUB 1—5 m high; deciduous branchlets 10—35 cm long, 0.7—1 mm in diameter, minutely scurfy or scabridulous, with mostly 30 to 60 leaves. LEAF BLADES oblong, obtuse and minutely apiculate at apex, obtuse to rounded and sometimes slightly at base, glabrous, 1.5—3 cm long, 0.5—1.2 cm broad, with 5 to 10 ascending lateral veins, eucamptodromous; stipules attenuate-acuminate, 2—4 mm long. STAMINATE FLOWERS in bracteate brachyblasts 2—3 mm long; pedicel 1—2 (–4.5) mm long; sepals 5, elliptic to orbicular, 1—1.5 mm long; disk segments 5, 0.2—0.25 mm in diameter; stamens 2 (rarely 3), staminal column 0.3—0.7 mm high; anthers dehiscing horizontally, androecium 0.5—0.7 mm across. PISTILLATE FLOWERS solitary at distal axils of branchlet; fruiting pedicel (1-) 2—4 mm long; sepals 5, oblong, 1—2 mm long; disk ± dissected into lobes or segments 0.25—0.3 long and broad; styles bifid, spreading, 0.6—1.0 mm long. FRUIT capsular, (2.5-) 3.2—3.6 mm in diameter; columella 1.5 mm long; seeds trigonous, smooth (finely striate-punctulate), 1.6—2. mm long.

DISTRIBUTION AND HABITAT: Montane rain forests, Costa Rica, 1400—2000 m; apparently disjunct in Andean rain forests in Bolivia at c. 2100 m.

SPECIMENS EXAMINED: **BOLIVIA. La Paz:** Prov. Murillo, Valle de Zongo, arriba de Jarca, 2100 m, 31 May 1980, *Beck 3608* (DAV); Prov. Nor Yungas, 16,2 km SW of Yolosa jct., toward Unduavi, c. 2100 m, 12 Nov. 1976, *Davidson 4975* (DAV, MO). **COSTA RICA. Cartago:** Tapantí Hydroelectric

Reserve trail, along Río Dos Amigos, 1600—1700 m, 223 June 1976, *Croat 36212* (DAV); ridge on E side of Río Grande de Orosi, 6 km upstream from Tapantí, 9°43' N, 83°47' W, 1500—1800 m, 24 Nov. 1984, *Grayum et al. 4534* (DAV); above Río Grande de Orosi, 10—20 km SE of bridge at Tapantí, 1400—1900 m, 13 Dec. 1974, *Wilbur & Luteyn 18031* (DAV). **Heredia:** Alto de Roble, above San Raphael Uvita, 1900—2000 m, *Huft & Barringer 2035* (MO). **Puntarenas:** Monteverde, El Brillante, 1500—1580 m, 1 Sept. 1977, *Dryer 1099* (MO).

The disjunction between the Costa Rican populations is remarkable; one would expect the Bolivian specimens to have a closer resemblance to the Peruvian collections here treated as *P. weberbaueri*. The Bolivian specimens differ from the Costa Rican ones in having the veins totally obscure adaxially, and in apparently having smaller seeds, but sampling is quite inadequate.

2. **Phyllanthus weberbaueri** G. L. Webster, sp. nov., ab *P. valerii* differt plantis dioicis, ramis furfuraceo-tomentosis, flores purpureis.

TYPE: PERU. Dpto. Cuzco: Prov. Paucartambo, E slope of Andes above Cosñipata, 2600—2700 m, Apr. 1914, *A. Weberbauer 6932* (HOLOTYPE: GH!).

DISTRIBUTION: Peruvian Andes, 2100-2700 m.

DIOECIOUS CLAMBERING SHRUB, branches terete, smooth and glabrous; deciduous branchlets mostly 10—25 cm. long, with (25) 40—70 leaves. LEAF BLADES oblong, narrowed to an apiculate tip, equilateral and rounded at base, 1—1.5 cm long, 0.2—0.5 cm broad, glabrous except for proximal part of midrib adaxially; veins mostly 8—10, obscure adaxially, arching and somewhat prominulous abaxially; veinlets not evident; abaxial epidermis minutely alveolate-reticulate; petiole 0.5—1 mm long, scabridulous; stipules oblong-lanceolate, attenuate-acuminate, 2—4 mm long. STAMINATE FLOWERS in unbranched racemoid bracteate axillary brachyblasts 1—2 mm long; pedicel 1.2—1.7 mm long; sepals 5, obovate to broadly elliptic, 1.3—1.7 mm long, 0.8—1.7 mm broad; disk segments flat, roundish, 0.25—0.3 mm in

diameter; stamens (2) 3, staminal column 0.7—0.8 mm high; anthers dehiscing horizontally, androecium 0.6—0.7 mm in diameter. PISTILLATE FLOWERS solitary at distal axils; pedicel terete, smooth and glabrous, 1.5—2 mm long; sepals 5, elliptic, c. 1 mm long; styles spreading, bifid, c. 0.5 mm long. FRUITS capsular; seeds trigonous, smooth, 1.8 mm long.

ADDITIONAL SPECIMEN EXAMINED: **PERU. Cuzco:** Prov. Paucartambo, above Cosñipata, 2100—2200 m, 19 May 1914, *Weberbauer 6968* (GH); Pillohuata, c. 3000 m, 3 July 1948, *Velarde 1248* (US)..

Phyllanthus weberbaueri, named in honor of the distinguished Peruvian botanist August Weberbauer (1871—1948), is closely related to *P. valerii*, but clearly differs in its dioecious flower production and tomentose stems; furthermore, the purplish flower color of the Peruvian plants appears to be unique in the section.

3. *Phyllanthus cajamarcensis* G. L. Webster, sp. nov.

TYPE. PERU. Dpto. Cajamarca, Prov. San Ignacio, San José de Lourdes, alrededores de Camaná, 5°01' S, 78°54' W, 1850 m, 22 Mar. 1997, *J. Campos & S. Corvaes 3611* (DAV).

MONOECIOUS SHRUB 2—3 m high; branches subglabrous (obscurely scabridulous); deciduous branchlets 10—30 cm long, 0.6—0.7 mm in diameter, subterete (slightly alate-decurrent), scurfy, with 20—40 leaves. LEAF BLADES ovate-lanceolate, acuminate, 1.5—2.5 cm long, 0.8—1.2 cm broad, with 8—12 arching lateral veins prominulous on abaxial surface, glabrous except for proximal part of midrib on adaxial surface; petiole 1—2 mm long, scabridulous; stipules lanceolate, acuminate, 1.5—2 mm long. STAMINATE FLOWERS in axillary glomerules, perianth greenish-yellow or reddish; pedicel 0.5—1.5 mm long; sepals 5, suborbicular, 0.8—1.2 mm long and broad; stamens 3, staminal column 0.5 mm high; anthers dehiscing horizontally, androecium 0.7—0.8 mm in diameter. PISTILLATE FLOWERS solitary; fruiting pedicel angular, glabrous, 7—8 mm long;

sepals 5, in fruit 3—3.3 mm long, 1.7—2.2 mm broad; disk cupular, c. 1.5 mm broad; styles bifid, spreading, c. 0.7 mm long. FRUIT capsular; seeds punctulate, 1.8—2.3 mm long.

DISTRIBUTION AND HABITAT: Peruvian Andes, primary montane cloud forest, 1350—1850 (-3000 ?) m.

ADDITIONAL SPECIMENS EXAMINED: **PERU. Cajamarca:** Prov. San Ignacio Huarango, Quebradas La Juntas, 5°18'30" S, 78°43' W, 1350 m, 23 June 1997, *Campos & Nuñez 4260* (DAV); Tabaconas, La Bermejo, 5°21' S, 79°21' W, 1600—1700 m, 19 Nov. 1997, *Campos & Cano 470* (DAV).

Phyllanthus cajamarcensis appears to belong to a species group with bifid styles that includes *P. valerii* and *P. weberbaueri*, but differs in its androecium of 3 stamens, much larger fruiting sepals, and especially its much longer angular fruiting pedicels. At the same time, it somewhat resembles *P. mcphersonii*, which however has smaller erect styles and larger leaves with abaxially prominulous veins.

4. *Phyllanthus frontinoensis* G. L. Webster, sp. nov.

TYPE: COLOMBIA. Antioquia: Mpio. Frontino, Murri region, 15 km by road from Nutibara, 6°40' N, 76°20' W, 1500—1850 m, 12 Dec. 1988, *G. McPherson, F. J. Roldán & I. Castaño 13487* (HOLOTYPE: MO 046311989!; ISOTYPES, DAV, HUA!).

MONOECIOUS SHRUB, sometimes scarcely woody, 0.5—1 m high; branches terete, glabrous; decisuous branchlets 8—25 cm long, 0.4—0.8 mm in diameter, scabridulous or scurfy, with 20—60 leaves. LEAF BLADES obovate, rounded and apiculate at apex, cuneate at base, glabrous, 1.5—3 cm long, 0.7—1.5 mm broad; veins slightly arching, eucamptodromous, 8—12 on a side, midrib raised abaxially, veinlets not prominulous; petiole c. 1.5 mm long, glabrous; stipules lanceolate, 1.2—2 mm long. STAMINATE FLOWERS 3-5 in bracteate brachyblasts 1—1.5 mm long, perianth whitish or greenish; pedicel 0.5—0.7 mm long;

sepals 5, suborbicular or broader than long, 0.7—0.8 mm long, 0.8—1.2 mm broad; disk segments 5, c. 0.2 mm in diameter; stamens 2, staminal column 0.3—0.4 mm high; anthers dehiscing horizontally, androecium 0.3—0.4 mm in diameter. PISTILLATE FLOWERS solitary at distal axils; pedicel in fruit 1.2—1.7 mm long; sepals 5, elliptic or suborbicular, 1—1.3 mm long and broad; disk c. 1 mm in diameter, deeply 5-lobed; styles bifid, spreading, 0.4—0.5 mm long. FRUITS capsular; columella 1—1.3 mm long; seeds smooth, 1.4—1.6 mm long.

DISTRIBUTION AND HABITAT: Montane rain forests or cloud forests, Western Cordillera of Colombian Andes, 1500—2000 m.

ADDITIONAL SPECIMENS EXAMINED: **COLOMBIA. Antioquia:** Mpio. Frontino, Corregimiento Nutibara, Vereda Alto da Cuevas, Quebrada del Oso, 1900—2000 m, 23 May 1991, *Fonnegra 3569* (HUA); cuenca alta del Río Cuevas, 1780 m, *Sánchez et al. 1569* (MO).

Phyllanthus frontinoensis is very distinct from the other species of sect. *Pityrocladus* with bifid styles. It is very distinctive in the leaves with rounded tips and prominulous veinlets, as well as the total lack of indumentum, even on the petioles. It appears to be a narrow endemic of the Colombian Andes in municipio Frontino.

5. *PHYLLANTHUS POPAYANENSIS* Pax, Bot. Jahrb. 26: 503. 1899. TYPE: Colombia, Prov. Cauca, Páramo de Guanacas, central Andes of Popayán, 2000—2600 m, Jan.—Mar., *F. C. Lehmann 4708* (LECTOTYPE [designated by Webster, 2002]: K!).

DIOECIOUS SHRUB; branches hirtellous, glabrescent; deciduous branchlets zigzag, 5—10 cm long, 0.6—1 mm in diameter, sparsely hirsutulous, with 5-11 leaves. LEAF BLADES elliptic, acute or breviacuminate, cuneate at base, 2—4.5 cm long, 0.7—1.5 cm broad, glabrous above and copiously hirtue abaxially; veins eucamptodromous, straight and oblique, impressed adaxially and prominently raised abaxially; petiole 1—2 mm long, hirtellous; stipules lanceolate, acuminate, 3—4 mm long, deciduous.

STAMINATE FLOWERS in axillary glomerules; pedicel c. 2 mm long; sepals 5, elliptic, 1.2—1.5 mm long, 0.8—1.4 mm broad; disk segments 5, massive, 0.3—0.4 mm in diameter; stamens 2 or 3, staminal column 0.7—0.8 mm long, androecium 0.7 mm in diameter. PISTILLATE FLOWERS solitary; pedicel 2—4 mm long in fruit; sepals 5, 1.8—2.4 mm long; disk 5-lobed or angled, 1.5 mm in diameter; styles unlobed or emarginate at tip, c. 0.8—0.9 mm long, apically \pm contorted. FRUITS not seen; seeds smooth, 1.9 mm long.

ADDITIONAL SPECIMENS EXAMINED: **COLOMBIA. Cauca:** above Carpenteria, E slope of W Cordillera, 2500 m, 23 Apr. 1939, *Alston 8228* (US); west Andes of Popayn, 2800—3100 m, *Lehmann 8526* (K).

In herbarium collections, *Phyllanthus popayanensis* has been commonly mistaken for *P. symphoricarpoides*, even though the two species are very dissimilar. The closest relative of *P. popayanensis* appears to be *P. ruscifolius*, with which it shares the copious indumentum on the abaxial leaf surfaces. However, *P. popayanensis* is easily distinguished by the branchlets with a much smaller number of larger leaves.

6. PHYLLANTHUS RUSCIFOLIUS Müll. Arg., DC. Prodr. 15(2): 358. 1866. TYPE: COLOMBIA. “in adscensu occidentali Andium provinciae Canta s. Cuenca alt. 5000 ped.,” *Tiana 3659* (P).

DIOECIOUS SHRUB; branches prostrate or sometimes scandent, densely hirtellous; deciduous branchlets 8—25 cm long, 0.5—1 mm in diameter, terete, hirtellous, with 20—75 leaves. LEAF BLADES ovate, acute, obtuse to rounded at base, 0.7—1.8 mm long, 0.5—1 mm broad; adaxially glabrous with deeply incised veins; veins 8—10 per side, straight, eucamptodromous, abaxially hirsutulous; petiole 0.5—1 mm long, glabrous; stipules lanceolate, 1.5—2 mm long. STAMINATE FLOWERS in small axillary glomerules; pedicel 0.5—1 mm long; sepals 5, broadly elliptic, 1—1.5 mm long; disk segments 5, orbicular, c. 0.3 mm in diameter; stamens 2 (rarely 3), staminal column 0.5—0.7 mm high; anthers dehiscing horizontally, androecium c. 0.7 mm in diameter. PISTILLATE FLOWERS solitary at distal axils of branchlet; pedicel in fruit glabrous, 3—4 mm long; sepals ovate, in fruit 2—2.5 mm long; disk slightly

angled, 1—1.5 mm in diameter; styles free, spreading, bifid, c. 1 mm long. FRUITS capsular, 3.3—3.4 mm in diameter; seeds smooth, 1.5—1.6 mm long.

DISTRIBUTION AND HABITAT: Cordillera Occidental of Colombian Andes, in cloud forests and extending to subpáramo, 1900—2500 m.

ADDITIONAL SPECIMENS EXAMINED: **COLOMBIA. Antioquia:** Mpio. Frontino, between Nutibara and Murri, 2000—2200 m, 17 Sept. 1986, *Bernal et al. 1257* (HUA). **Cauca:** Mpio. El Tambo, Parque Nacional Munchique, 2 km W of summit, 2°30'38" N, 76°58'38" W, 2500 m, 29 July 1997, *Croat & Gaskin 80037* (MO); Carpinterías, entre los cerros de Munchique y Altamira, 2450—2500 m, 25 July 1939, *Pérez Arbeláez & Cuatrecasas 6182* (US). **Chocó:** Mpio. San José del Palmar, 55 km from Ansermanuevo to San José, 1700—1950 m, 19 Mar. 1980, *Lozano & Díaz 3175* (COL). **Valle del Cauca:** Mpio. Cali, Peñablanca, 2300 m, 10 V 1940, *Figueroa 868* (US); San Antonio, 1900—2350 m, 26 Feb., 2 Mar., 1939, *Killip & García 33673* (US); Mpio. Dagua, road to San Antonio tower, km 16, 2000—2195 m, 8 Mar. 1979, *J. Luteyn & M. Lebrón-Luteyn 6972* (NY); Quebrada de Juntas, 2100 m, 22 July-23 Sept. 1946, *Cuatrecasas 21631* (U); Mares, 1880 m, 22 June 1944, *Killip et al. 39181* (US); El Silencio, Yanaconas, 1900—2200 m, 28 Feb. 1939, *Killip & García 33832* (US).

Phyllanthus ruscifolius appears to be restricted to the Western Cordillera in Colombia, even though Ecuadorian plants have been confused with it. Its small ovate leaves with adaxially deeply incised veins are suggestive of *P. cuatrecasanus*, but it differs strongly in its leaf blades symmetrical at base, with abaxial indumentum.

7. *Phyllanthus mcphersonii* G. L. Webster, sp. nov.

TYPE. COLOMBIA. Prov. Antioquia, Mpio. Urrao, tail to Finca La Quince, 6°30' N, 76°10' W, 2500—2800 m, 21 Nov. 1988, *G. M. McPherson, F. J. Roldán, & J. Betancur 13246* (HOLOTYPE: DAV).

MONOECIOUS SCANDENT SHRUB c. 2 m high; branches terete or angled, scabridulous scurfy; deciduous branchlets 20—30 cm long, terete, scurfy, 0.8—1.1 mm thick, with 20—40 leaves. LEAF BLADES ovate-oblong, 3—5.5 cm long, 1—2 cm broad, acuminate, cuneate to rounded at base, with mostly 10—12 slightly prominulous veins; petiole scabridulous, 1—1.5 mm long; stipules acuminate-attenuate, 1.5—2.5 mm lon. STAMINATE FLOWERS 1—3 in axillary glomerules, often associated with a pistillate flower; pedicel 4—5 mm long; sepals 5 or 6, broadly elliptic, 1.3—1.7 mm long, 1.5—2 mm broad; stamens 3 (rarely 4); staminal column c. 0.5 mm high; anthers dehiscing horizontally, androecium 0.6—0.9 mm across. PISTILLATE FLOWERS solitary at distal branchlet nodes; pedicel sparsely hirtellous or scurfy, 2—3 mm long in fruit; sepals 5, obovate-oblong, 1.5—2 mm long; disk annular or lobed, to 1 mm broad; styles erect, free, apically bifid (less than 1/3 the length), c. 0.5 mm long. FRUITS capsular, 3.8—4 mm in diameter; seeds smooth, 1.7—2 mm long.

ADDITIONAL SPECIMENS EXAMINED: **COLOMBIA. Antioquia:** Mpio. Jardín, Alto de Ventana, 15 km SW of Jardín, 5°30' N, 75°50' W, 2400—2800 m, *Callejas et al. 3936* (HUA); Mpio. La Unión, 32.5 km N of Sonsón, 5°52' N, 75°18' W, 2300 m, *Zarucchi et al. 6588* (DAV).

Phyllanthus mcphersonii is named in honor of Gordon McPherson, an insightful student of the systematics of Euphorbiaceae who made a significant number of collections of *Phyllanthus* in Colombia and Panama. The species resembles *P. symphoricarpoides* in its erect shallowly bifid or emarginate styles, but can be distinguished by its larger, more ovate, pointed leaf blades and androecium usually of fewer anthers..

8. PHYLLANTHUS CUATRECASANUS G. L. Webster, *Novon* 12: 292, fig. 1. 2002. TYPE: **COLOMBIA. Caqueta:** Quebrada del Río Hacha, abajo de Gabinete, 2100—2250 m, 23 Mar. 1940, *J. Cuatrecasas 8533* (HOLOTYPE: US!). . .

DIOECIOUS SHRUB; deciduous branchlets terete, copiously hirtellous, 8—14 cm long, 0.4—0.7 mm in diameter, with 20 to 50 leaves. LEAF BLADES elliptic, abruptly acute, inequilateral at base, glabrous, 1—1.2 cm long, 0.4–0.7 cm broad, abaxially minutely alveolate-reticulate; veins straight, distinctly prominulous, green and contrasting with the pale intervenal epidermis; petiole glabrous, c. 0.7 mm long; stipules oblong, blunt at tip, 1—1.2 mm long. STAMINATE FLOWERS 2 to 5 on axillary brachyblasts c. 1—2 mm long; pedicel 1.3—1.5 mm long; sepals 5, elliptic, 1.3—1.6 mm long, 0.8—1.4 mm broad; disk segments 5, elliptic, 0.2—0.25 mm broad; stamens 2, staminal column 0.5—0.6 mm high; anthers < 0.5 mm long, dehiscing obliquely. PISTILLATE FLOWERS and fruits unknown.

With its many small ovate leaves crowded on long branchlets, *P. cuatrecasanus* appears strikingly similar in aspect to *P. ruscifolius*. However, it is very distinct in its inequilateral leaf base and lack of foliar indumentum.

9. PHYLLANTHUS SYMPHORICARPOIDES Kunth in H. B. K., Nov. Gen. Sp. 2: 114. 1817; Müll. Arg., DC. Prodr. 15(2): 324. 1866. *Glochidion symphoricarpoides* (Kunth) Pax & K. Hoffm., Nat. Pflanzenfam. ed. 2, 19c: 58. 1931. TYPE: ECUADOR: Loxa [Loja], *Humboldt* (HOLOTYPE: B, Herb. Willdenow 17976!).

MONOECIOUS ARBORESCENT SHRUB, often scandent, 0.5—4 m high; branches terete, lenticellate, glabrous or scabridulous; deciduous branchlets 10—25 cm long, 0.4—1.2 mm in diameter, subterete, decurrent- arinate, with 20 to 40 leaves. LEAF BLADES mostly elliptic-oblong, obtuse to rounded and apiculate at apex, cuneate to rounded at base, 1.5—2.5 cm long, 0.5—1.3 cm broad; glabrous or scabridulous on proximal part of midrib adaxially; veins 10—15, slightly oblique and arching, eucamptodromous, usually rather obscure adaxially, but with veinlets distinctly prominulous abaxially; margins often somewhat thickened and revolute; petiole 1—2 mm long, scabridulous; stipules oblong-lanceolate, 2—4 (-5) mm long. STAMINATE FLOWERS 3—5 in bifurcate bracteate brachyblasts 1—2.5 mm long; pedicel 3—8 mm long; sepals 5 (less commonly 6), oblong or obovate to suborbicular, 1.5—2 mm long, 1—2 mm broad; disk segments 5, typically massive and cuboid, 0.3—0.5 mm in diameter; stamens mostly 3 or 4 (rarely 2 or 5—7); staminal column 0.5—0.8 mm high; anthers dehiscing ± horizontally,

androecium 0.7—0.8 mm across, sometimes biseriolate. PISTILLATE FLOWERS solitary at distal axils; pedicel 2—4 mm long in fruit; sepals 5 (rarely 6), oblong or elliptic, 1.5—2.5 mm long; disk 5-lobed or segmented, segments 0.3—0.5 mm in diameter; styles erect, unlobed or emarginate, often contorted, 0.5—1 (-1.3) mm long. FRUITS capsular but sometimes succulent in earlier development; pedicel in fruit (2-) 3—5 mm long, somewhat angled and clavate distally; columella 1—1.5 mm long; seeds trigonous, smooth, seeds 1.5—1.9 mm long.

DISTRIBUTION AND HABITAT: Andes of Colombia and Ecuador, in montane rain forests and cloud forest, 1500—2800 m.

REPRESENTATIVE SPECIMENS EXAMINED: **COLOMBIA. Antioquia:** Mpio. Medellin, Cerro de Padre Amaya, 2500—2600 m, 6°19' N, 75°41' W, *Agudelo & Betancur 63* (HUA), *Zarucchi & Echeverry 4639* (HUA), *Zarucchi & Escobar 6680* (COL, DAV); El Boquerón, 2500 m, *Uribe Uribe 2260* (COL); Santa Elena, 1500—2000 m, 1 Jan. 1931, *Archer* (US); Mpio. Peque, Alto de Poal, 7°02'07" N, 75°58'27" W, 2500—2780 m, *Benítez et al. 142* (COL); Mpio. San Carlos, Piedras Blancas, 2000 m, 6 Sept. 1969, *Soejarto 2112* (HUA); Mpio. San Pedro, 4—5 km N of San Pedro towards Entreríos, 6°29' N, 75°33' W, 2340—2350 m, 28 Sept. 1987, 7 May 1988, *Zarucchi & Roldán 5863*(MO), *Zarucchi & Echeverri 6308* (DAV); Mpio. Sonsón, subpáramo de Sonsón, 2800 m, 30 Oct. 1948, *Molina & Barkley 18A317* (US); 4km SE of Sonsón, Quebrada El Padre Sánchez, 5°39' N, 75°18' W, 2500 m, *Callejas & Roldán 10496* (HUA); 10 km SE of Sonsó towards Nariño, 2600—2700 m, *McPherson & Roldán 13073* (DAV, MO); Mpio. Urrao, 19—21 km NE of Urrao, 2560—2682 m, 7 Apr. 1979, *J. L. & M. L. Luteyn 7262* (DAV); 6°24' N, 76°02' W, 2710 m, *MacDougal et al. 4260* (DAV). **Cauca:** Mpio. El Tambo, Parque Nacional Munchique, vereda La Romelia, 2°32' N, 76°57' W, 2570 m, 20 Mar. 1993, *Velayos et al. MV 6934* (COL); San Antonio, between Cali and Juntos del Dagua, 1500 m, *Triana* (P). **Huila:** Mpio. La Plata, La Plata, 2°23' N, 75°53' W, 2600 m, 18 Mar. 1939, *Kjell von Sneidern 2383* (MO); Mpio. Pitalito, km 28—32 along road, Pitalito-Mocoa divide, 1°40' N, 76°15' W, 2100—2240 m, 29 Apr. 1979, *J. L. Luteyn et al. 7555* (NY). **Risaralda:** Mpio. Santuario, vereda La Colonias, 5°10' N, 75°58' W, 2740 m, *Torres et al.* (COL). **Valle del Cauca:** Mpio. Cali, Quebrada Honda, arriba La Glorieta, 2100-2250 m, 1 Sept. 1944, *Cuatrecasas*

18421 (U, US); Mpio. Dagua, San Antonio, 1500 m, *Triana* (P); Mpio. El Cairo (?), 17 km W of La Carbonera, 1850 m, *Forero et al. 3551* (MO). **ECUADOR. Azuay:** Guarumales-Méndez trail, 1525 m, 16 Feb. 1977, *Boeke & Loyala 1030* (MO, QCA). **Pichincha:** Cantón Quito, below Chiriboga, 0°15' S, 78°47' W, 2000 m, 13 Aug. 1980, *Holm-Nielsen et al. 24761* (AAU); Bosque Protector Maquipucuna, Auca, 2450 m, *Webster & Castro 32834* (DAV).

Phyllanthus symphoricarpoides is probably the commonest and most widespread species of section *Pityrocladus* in the Colombian Andes. It has been mistaken in herbaria for a number of other species, especially *P. popayanensis*; however, it bears little resemblance to that species, which differs strongly in leaf shape and indumentum. There is considerable morphological variation in populations of *P. symphoricarpoides*, especially in stamen number; the commonest number observed is 3, but androecia with 4 anthers are also common, and 5 to 6 (or rarely 7) anthers are occasionally observed.

10. PHYLLANTHUS SPONIFOLIUS Müll. Arg., *Linnaea* 32: 25. 1863; DC. *Prodr.* 15(2): 378. 1866. TYPE: Ecuador, 1860, *L. Fraser* (HOLOTYPE: G!).

DIOECIOUS OR SUBDIOECIOUS SCANDENT SHRUB 1—4 m high; branches ± arching, smooth and glabrous; deciduous branchlets 10—40 cm long, with 8 to 20 leaves; axes subterete, scurfy or scabridulous, 0.7—2 mm in diameter. LEAF BLADES elliptic-lanceolate, 4—12 cm long, 2—4 cm in diameter, rather abruptly acuminate (acumen 0.5—1.5 cm long), rounded to truncate or subcordate at base, glabrous adaxially except proximal part of midrib, scabridulous or hirtellous on veins abaxially; major veins 5 to 7, obliquely ascending, eucamptodromous, usually incised adaxially and occasionally bullate, distinctly prominulous abaxially; veinlet reticulum prominulous; margins slightly thickened, sometimes reflexed; petiole 2—4 mm long, scabridulous or hirtellous; stipules lanceolate, 1—2 mm long, deciduous. FLOWERS of each plant usually of a single sex; in occasional ambisexual plants, staminate and pistillate flowers on separate branchlets. STAMINATE FLOWERS 10—30 in dense axillary clusters (contracted brachyblasts); pedicel 2.5—7 mm long; sepals 6, biseriate, oblong or elliptic, 1—1.5 mm long; disk segments 6, 0.2—0.3 mm in diameter; stamens 3, staminal column 0.3—0.7 mm high; anthers dehiscent

horizontally, androecium 0.7—0.9 mm in diameter. PISTILLATE FLOWERS 3—5 (-10) per node; pedicel hirtellous, (2-) 5—10 (-14) mm long in fruit; se[al]s 5 (rarely 6), often scabridulous or hirtellous, obovate, 1—1.8 mm long in fruit; disk dissected into 5 segments; styles unlobed, erect, connate, 0.7—1 mm long. FRUITS capsular, 2.6—3.3 mm in diameter; columella 1—1.2 mm long; seeds trigonous, smooth (obscurely punctulate), 1.5—1.6 mm long.

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DISTRIBUTION AND HABITAT: Montane rain forests and cloud forests, often riparian, Colombian and Ecuadorian Andes, 1400—2200 m.

REPRESENTATIVE SPECIMENS EXAMINED: **COLOMBIA. Antioquia:** Mpio. Jardín, c. 15 km SSE of Jardín, Alto de Ventanas, 5°31' N, 75°48' W, 2700—2790 m, *Zarucchi et al. 6958* (HUA, MO). **Putumayo:** San Francisco to Mocoa, 2500—3500 m, *Schultes & Cabrera 22545* (GH). **ECUADOR:** **Azuay:** Gualacea, 2430 m, *Steyermark 53653* (AAU, photograph). **Carchi:** Cerro Golondrinas, above Río Verde, 0°52' N, 78°07'45", 1900 m, *Hoover 2127* (QCA); Río Oyacachi, between Oyacachi and El Chaco, 0°15' S, 77°56' W, 24 Dec. 1996, *Clark et al. 3639* (US). **Napo:** Cantón El Chaco, 10 km S of Reventador, 0°8-11' S, 77°30-39' W, 1450-1500 m, *Palacios 5794, 6019* (DAV, MO, QCNE); Cantón Quijos, Borja, Faldas a Huagrahurco, 1680 m, *Jaramillo et al. 12248* (QCA); Cosanga, *Davis 345* (GH); Hacienda Guacamayos, 0°36' S, 77°51' W, 1900 m, *Palacios & Freire 5065* (DAV, MO); Cordillera de los Guacamayos, 1750—2040 m, *Jaramillo 4096, 10103* (QCA); 36 km S of Baeza, *Romoleroux et al. 494* (QCA); Parroquia Cosanga, between Río Aliso and Río Cosanga, *Jaramillo et al. 12074* (QCA); Sierra Axul Field Station, confluence of Río Aragón and Río Colorado, 0°40' S, 77°55' W, 2200 m, *Stähl 2086* (QCA). **Pastaza:** Cantón Pastaza, Río Tigüino, 1°15' S, 75°55' W, 320 m, *Rubio 109* (DAV). **Pichincha:** Cantón Quito, Parroquia Nanegal, Bosque Protector Maquipucuna, c. 5 km SE of Nanegal, 0°7.5-8' N, 78°38' W, 1250—1800 m, *Webster et al. 28743, 29279, 29977, 31162* (DAV, QCNE). **Tungurahua:** Río Verde, *Harling et al. 10177* (AAU, photograph).

Phyllanthus sponiifolius is by far the commonest species of section *Pityrocladus* in Ecuador, but is rare in Colombia. It is most often confused, however, with *P. attenuatus* Miq., a species of section

Hylaeanthus. Both species have similar ovate-lanceolate leaves with a prominent acumen. Unfortunately, both species are dioecious, and both produce several pistillate flowers per node, so distinguishing pistillate specimens can be difficult. However, pistillate collections of *P. sponiifolius* can readily be distinguished by its densely scabridulous branchlet axes, scalariform prominulous veinlets on the abaxial leaf face, and capsular furits, in contrast with the glabrous branchlet axes, areolate-branching veinlets, and drupaceous fruits of *P. attenuatus*. Staminate collections can be distinguished by the same vegetative characters, and glomerules in *P. sponiifolius* tend to be less massive (c. 1 mm high) than in *P. attenuatus* (1.5—2 mm high). In contrast to *P. attenuatus*, individual plants of *P. sponiifolius* can be ambisexual (but then the staminate and pistillate flowers do not occur on the same branchlet).

SPECIES INCERTAE SEDIS

11. *Phyllanthus vanderwerfii* G. L. Webster, sp. nov.

TYPE: VENEZUELA. Barinas: Dto. Bolívar, cloud forest near feldspar mine between La Soledad and Santo Domingo, 8°51' N, 71°35' W, 1300 m, 24 Nov. 1984, *H. van der Werff & F. Ortega 6130* (HOLOTYPE: MO!; ISOTYPE: DAV!).

MONOECIOUS TREE 20—25 m high; branches spreading, terete, nearly glabrous (sparsely and minutely scabridulous); deciduous branchlets 25—35 cm long, 1.2—1.5 mm in diameter, terete, narrowly wing-angled, minutely scabridulous-scurfy, with 25 to 35 leaves. LEAF BLADES oblong-elliptic, acuminate, obtuse or rounded at base, 4—6 cm long, 1.5—2 cm broad, adaxially scabridulous on proximal part of midrib, abaxially scurfy-scabridulous on midrib and veins; abaxial epidermis minutely reticulate; veins 5 to 8, arching, incised adaxially, prominulous abaxially, brochidodromous. STAMINATE FLOWERS on brachyblasts c. 3 mm long at proximal axils of branchlet; pedicel ± winged, 2—5 mm long; sepals 5 or 6, elliptic, carinate abaxially, 1—1.5 mm long, 0.6—1.3 mm broad; disk segments 5 or 6, massive, c. 0.3 mm in diameter; stamens 3, staminal column 0.4—0.7 mm long, anthers dehiscing horizontally, androecium 0.5—0.7 mm in diameter. PISTILLATE FLOWERS 2 to 4 per axil at distal nodes; pedicel winged or angled,

hirtellous, 2.5—3.5 mm long in fruit; sepals obovate to ovate, c.1--1.2 mm long, 0.5—1.2 mm broad; disk dissected into 5 segments; styles erect, unlobed (subcapitate), 0.2—0.5 mm long. FRUITS capsular, veins obscure; columella 1.4—1.5 mm long; seeds trigonous, plump, 1.3—1.4 mm long.

Phyllanthus vanderwerffii is named in honor of Henk van der Werff, authority on Lauraceae and plant collector in many areas of Andean America. Although it resembles *Phyllanthus sponiifolius* in gross morphology, *P. vanderwerffii* differs fundamentally from that species, and all other species of section *Pityrocladus*, in its brochidromous leaf venation. It is notable that it has multiple flowers in its pistillate glomerules, as in *P. sponiifolius* and *P. attenuatus* of section *Hylaeanthus*. Since leaf venation in section *Hylaeanthus* is brochidromous, this suggests—along with the arboreal habit-- that *P. vanderwerffii* might belong in that section instead of within section *Pityrocladus*. Arguing against such an assignment is the abaxial leaf pubescence of *P. vanderwerffii*, which is unknown in section *Hylaeanthus* (Webster, 2002). Unfortunately, it has not been possible to examine the pollen grains of *P. vanderwerffii*, which would be decisive because of the palynological difference between the two sections (Webster and Carpenter, 2002). For the present, the systematic position of *P. vanderwerffii* must be regarded as uncertain.