NEW SPECIES OF *PODANDROGYNE* (CLEOMACEAE) IV. TWO SPECIES FROM WESTERN ECUADOR AND WESTERN COLOMBIA

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Abstract. Two new species of *Podandrogyne*, *P. flammea*, endemic to Pacific coastal and western Andean Ecuador and Colombia, and *P. websteri*, restricted to four northern provinces of Ecuador but found mostly in Pichincha, are described and illustrated. These taxa are generally distinguished by flower and fruit size and leaf blade number and texture. A general likeness suggests affinity to the species cluster represented by *P. glabra*.

Keywords: Cleomaceae, Colombia, Ecuador, new species, *Podandrogyne*

The only comprehensive account of *Podandrogyne* Ducke (Cleomaceae) is the outdated provisional synopsis by Woodson (1948), and regional lists remain incomplete for countries like Colombia and Ecuador, well-known centers of astounding biodiversity and endemism (Groombridge, 1992; Davis et al., 1997; Jørgensen and León-Yánez, 1999; Bernal et al., 2015), where the highest concentrations of *Podandrogyne* taxa occur. In Colombia there are at least 21 species and in Ecuador as many as 14 species, the majority of which grow in primary or secondary, tropical to subtropical rainforests on the slopes of the Andes except for three species: *P. glabra* Ducke in lowland Amazonia, *P. trichopus* (Benth.) Iltis & Cochrane in the Pacific coastal lowlands, and *P. brevipedunculata* Cochrane on the lower western Andean slopes and adjoining lowlands.

Since 1979, as part of a taxonomic revision of *Podandrogyne*, the first author has been distinguishing *P. flammea* from *P. glabra* and two unpublished, seemingly distinct, close allies from Colombia. However, he found the former species disquietingly difficult to characterize, owing not only to the amount of variability accommodated by included material but also to an unresolved situation involving additional, ambiguous collections resulting from ongoing collecting in northern Ecuador. Eventually, having seen several populations of *P. flammea* in the field and having studied pertinent specimens in GUAY, co-author Cornejo realized that still another, quite similar but subtly distinct population, described below as *P. websteri*, was involved. In the spring of 2002, he sent the first author a short description based on two collections of the latter entity, bringing together the most important traits allowing its description and helping solve the existing taxonomic problems.

Podandrogyne flammea Cochrane, *sp. nov.* TYPE: ECUADOR. Guayas: Cordillera Chongón-Colonche, Bosque Protector Loma Alta, bosque de garúa muy húmedo premontano estación seca, secundario, 600 m, 22 December 1996 (fl, y fr, fr), *X. Cornejo & C. Bonifaz 5488* (Holotype: WIS [barcode v0402832WIS]; Isotypes: AAU [2], COL, GUAY, K, MO [2], QCNE [2], US, WIS [2]). Fig. 1, 2, 5.

Herba robusta, frutex vel arbor parva. Folia 1–5-foliolata, foliolis formis et amplitudinibus variantibus, glaberrima vel subtus basi et ad nervos sparsim vel manifeste pilosula. Flores flammei, in racemum subelongatum densum multiflorum dispositi; pedicelli gracillimi (9–)14–28(–32) mm. Sepala 2–6 mm. Petala 7–12 mm. Flores pistillatos: ovarium anguste oblongum, 6–8 mm vel anguste ovoideo-oblongum, 4–5 mm, gynophoro dimidio breviore quam androgynophoro. Flores staminatos: filamenta 5–17 mm, androgynophoris (12–)15–25(–32) mm. Capsulae oblongae ad anguste oblongae, raro subcylindraceae, 2–8 cm, rostro brevi ad manifesto ca. 2–8 mm. Semina reniformo-obovoidea, 3–4 × 2.3–3.2 mm.

Erect or rarely scandent, unbranched or few-branched *herbs*, *shrubs*, or *treelets* 1–4 m tall, glabrous or less often youngest shoots, lower leaf surfaces, and, more permanently, petioles, petiolules, and veins beneath irregularly scurfy-pilosulous or even shaggy-pilose; hairs (if present) bent, twisted, or rarely matted, mostly 0.3–0.9 mm but sometimes as short as 0.1–0.2 or as long as 0.6–1.9 mm. *Leaves* 1–5 (mostly 3)-foliolate, at least some on typical plants generally compound; petioles 1–28 cm; blades elliptic to narrowly elliptic, the larger 7–30 × 2–13 cm, obtuse to cuneate at base, acuminate to caudate, if 1-foliolate shaped as above or very rarely ovate-elliptic or ovate with rounded to subcordate bases, if compound on a short to long petiolule (central one 2–13, rarely up to 21 mm), commonly glabrous on both sides or lower surface scaberulous or thinly (blades) to moderately (veins) pilose, with 11–19(8–17 in Prov. Carchi) main lateral veins on each side. *Racemes* mostly erect, 7–29 cm (rarely to 63 cm in Carchi), 6–12 cm thick (seldom secund, then 4–8 cm), conspicuously many flowered and usually dense, ebracteate altogether or lowest 1 or 2 pedicels (6–8 pedicels in one collection) subtended by a large (9–15 × 2–4 cm) to small (1–8 × 0.5–4.0 cm),

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1-foliolate leaf (bract) and upper pedicels by a short, stiff, gland-tipped hair or row of such hairs 0.05–0.50 mm, in pubescent collections these accompanied by minute curly hairs; peduncle 1–7 cm, rachis often brownish maroon or dark purple, up to 25 cm (rarely to 40 cm or more in Carchi), bearing at any one time 0–20 open flowers and ca. 55–310 buds (0–25 buds in fruit or when very old or up to only 113 buds in Carchi), usually not greatly elongating but producing a total of 110–390(–465) flowers (including pedicel scars). *Flowers* monosymmetric, with deep red to bright scarlet or orange pedicels and sepals and paler gynophore-androgynophore axes; pedicels horizontally divergent to slightly declined, 15–28(–33) mm or seldom 9–14 mm. *Sepals* ovate-oblong or ovate-triangular, (2–)3–6 × 1–2 mm, basally connate for 0.7–2.0 mm (ca. 20–50[–60]% of their length), narrowly acute, apiculate. *Petals* bright red to orange, seldom orangish yellow to yellow, commonly yellowish orange at base grading to red-orange toward apex, drying pinkish red or more often pale yellow suffused with a pinkish hue, upper pair narrowly oblong, ca. 0.5–2.0 mm shorter than the obliquely and narrowly oblong-elliptic lower pair, 7–12 × 2–3(–4) mm, exceeding the sepals by 5–9 mm, sessile, obtuse at apex. *Disk* a ± fleshy gland, light yellow, broadly depressed-obovoid in face view (*fide* fluid-preserved flower), almost disk-like but expanded adaxially, grooved on top opposite the petals, concave on the side facing the androgynophore, abaxially reduced to a filmlike band of tissue sometimes contracted into a minute lobe when dried, summit on upper side forming an undulate rim or in dried material shrinking into 3 alternipetalous lobes or ridges, 1.0–2.7 (high) × 1.1–3.3 mm (across), 0.7–2.1 mm thick (side view), not particularly conspicuous in fruit. *Pistillate flowers*: ovary either narrowly oblong to oblong-lanceoloid (and terete?), 6–8 mm, 2 mm thick, or oblong to narrowly oblong-ovoid and compressed, 4–5(–6) × 1–2 mm, glabrous or sometimes minutely papillose to scabridulous-puberulent; stigma 0.5–0.9 mm diam. (1.3 mm in a fluid-preserved flower), essentially sessile (style ≤ 1 mm); gynophore 5–10 mm, glabrous; androgynophore 15–19 mm. *Staminate flowers*: stamens inserted high up on a prominent androgynophore (12–)15–25(–32) mm; filaments red to pink, distally yellow, subequal, (5–)7–17 mm, upper and median pairs subverticillate, arising 0.6–3.7 mm above the insertion of lowest pair; anthers gray and (on side away from line of dehiscence) green, (1.8–)2.2–3.6 mm, pollen yellow. *Capsules* 0–17, light green to yellow, narrowly oblong to subcylindric, 2–7(–8) cm, 4–10 mm thick (in one fluid-preserved collection ± laterally compressed, 11–13 mm wide and 8–9 mm thick), often cuneate at base and acute to almost or quite rounded at apex; style (0–3 mm) and stigma (0.5–1.7 mm diam.) forming merely a depressed cap < 1 mm or more often with the short, tapered apices of the valves an apiculus or beak 2–7(–8) mm; gynophore (5–)8–17 mm; androgynophore 12–24 mm; pedicel declined or deflexed, 9–21(–28) mm, androgynophore-gynophore axis and silique pendant from it. *Seeds* presumably black (dark brown when dried), 11–(ca.)107 per capsule, obovoid- to suborbicular-reniform, a little irregular due to close packing, 3–4 × 2.2–3.2 mm, 1.8–2.3 mm thick, slightly compressed but hardly beveled, essentially smooth (sometimes very faintly and uniformly rugulose).

Distribution, ecology, and phenology: known primarily from Ecuador from the province of Loja (reaching its southern limit at 04°05'S) to the province of Carchi, reappearing at an apparently disjunct station on the border between the departments of El Valle and Chocó, Colombia (*Dugand & Jaramillo 3023*), in mature lowland tropical and subtropical forests (including premontane, lower montane, and "cloud" forests) along the western slopes of the Andes at elevations of 430–1760(–2200) m, and on the isolated hills of the coastal ranges at elevations of 280–600 m. More fieldwork in poorly collected forests of Colombia presumably will result in the discovery of additional populations. Flowering and probably also fruiting throughout the year.

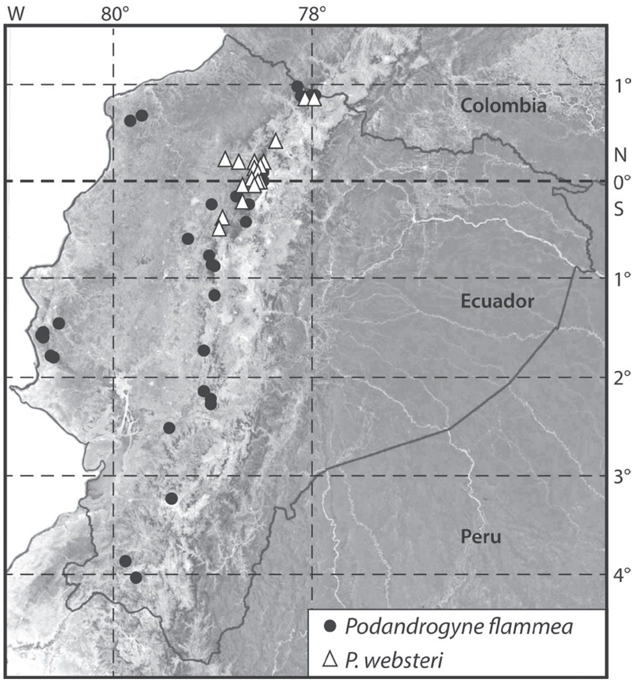

FIGURE 1. The distributions of *Podandrogyne flammea* and *P. websteri*. A single Colombian station is not shown (see text).

Additional specimens examined: COLOMBIA. Department uncertain [probably Valle del Cauca]: Cordillera Occidental, western slope near the dividing line between Valle and Chocó, north of Albán, 17 August 1941, *A. Dugand & R. Jaramillo 3023* (COL). ECUADOR. Province uncertain [Cotopaxi?]: "prp. Pangoa, R. Riofrio [sic, for Pangua?]," August 1891 [?, as ".891."], *A. Sodiro 67* (B [photos GH, US, WIS]). Azuay: road from Jesús María to Molleturo, near Azuay-Guayas border, 16 July 1977, *J. D. Boeke & H. Loyola 2168* (WIS [2]); Bosque Protector Molleturo Mullopungo, along main road near the village, ca. 2 km east, 12 April 1996, *J. L. Clark et al. 2470* (MO, QCNE); SE and E side of Río Norcay across from Molleturo, 6 June 1943, *J. A. Steyermark 52853* (F). Bolívar:

Sta. Rosa de Agua Clara, 12 January 1996, *X. Cornejo & C. Bonifaz 4709* (GUAY, WIS); [E of] Balsapampa [also spelled Balzapamba], 19 May 1968, *G. Harling et al. 9661* (GB, WIS). Cañar: km 110 from Durán, 15 January 1962, *C. H. Dodson & L. B. Thien 2093* (SEL, WIS); between Quillallpa and Kirpud, 25 October 1952, *F. Fagerlind & G. Wibom 717* (S). Carchi: km 20, Maldonado-Tulcán [road], 25 November 1985, *L. Besse et al. 2278* (WIS), *2283* (WIS); S side of upper Río Blanco, Cerro Golondrinas, 6 February 1993, *B. Boyle & A. Boyle 1486* (WIS); trail from Rafael Quindís mountain finca above Río Verde, 27 November 1987, *W. S. Hoover & S. Wormley 1764* (MO); approaching headwaters of Río Verde at base of Cerro Golondrinas, 30 November 1987, *W. S. Hoover 2096* (MO), *2108* (MO); Río Verde "...beyond principal drainage stream of large Cerro Golondrinas into drainage streams of medium Golondrinas mountains," 1 December 1987, *W. S. Hoover 2152* (MO), *2174* (MO); N bank of Quebrada Mongon, 19 January 1988, *W. S. Hoover et al. 2951* (MO); trail NW of Awá encampment to Rodrigues Finca, Gualpi-Chico area, 21 January 1988, *W. S. Hoover et al. 3486* (MO); north of Carmen, road to Chical, 10 February 1992, *W. Palacios et al. 9806* (QCNE, WIS). Cotopaxi: km 52–53 between Quevedo and Latacunga at Tenefuerste, Río Pilaló, 29 October 1981, *C. H. Dodson & P. M. Dodson 11998* (MO, SEL, WIS); *idem*, 12 June 1983, *C. H. Dodson et al. 13920* (MO, SEL); *idem*, 9 April 1984, *C. Dodson et al. 14206* (MO); Cantón La Maná, Reserva Ecológica Los Ilinizas, Cord. Tilinche, Cerro Tilipulo, 24 July 2003, *P. Silverstone-Sopkin et al. 9418* (MO, WIS); *idem*, 25 July 2003, *P. Silverstone-Sopkin et al. 9490* (MO, WIS). Esmeraldas: Reserva Mache-Chindul, Cuchilla de Bunca, 28 April 2003, *X. Cornejo & C. Bonifaz 7739* (AAU, GUAY, MO, QCA, QCNE [2], US [2], WIS [4]); Fila de Bilsa, 7 km E of San José de Bilsa, ca. 80 km due SW of Esmeraldas, 29 January 1991, *A. Gentry et al. 72873* (MO). Guayas: Cordillera Chongón-Colonche, Bosque Protector Loma Alta, 1 July 1996, *C. Bonifaz et al. 3433* (GUAY [topotype], WIS [topotype]); Guayaquil water-supply intake near Bucay, 28 September 1939, *O. Haught 2884* (BKL [photos GB, S, WIS, UC], F, US). Loja: Cantón Catacocha, Hda. "La Hamaca," El Almendral, 16 April 1944, *M. Acosta Solís 7889* (F); [Cordillera de] Chinchanza, June 1882, *E. André 477* (K). Los Ríos: La Corina, 20 km E of Patricia Pilar, 6 km E of La Centinela, 29 September 1979, *A. Gentry & G. Schupp 26668* (MO, SEL). Manabí: [Cordillera de Chongón,] San Sebastián-La Mocora, Parque Nacional Machalilla, 9 January 1994, *X. Cornejo & C. Bonifaz 1298* (GUAY); *idem*, 21 January 1991, *A. Gentry et al. 72505* (MO); *idem*, 24 March 1993, *B. Øllgaard et al. 100786* (AAU); San Sebastián, vic. Agua Blanca, ca. 15 km [sic] from Puerto López, 20–22 November 1987, *F. Hekker & W. H. A. Hekking 10251* (AAU [2]). Pichincha: Canchacoto [Canzacoto], 21 June 1876, *E. André 3774* (K); Chiriboga, 19 August 1955, *E. Asplund 17402* (S); SW of Chiriboga, km 82–84 from Quito on old road to Santo Domingo, 8 July 1979, *B. Løjtnant & U. Molau 15666* (AAU); Guanacilla, September 1883 [as "9.83"], *P. L. Sodiro 68* (B [photos GH, NY, US, WIS]).

The leaves of *Podandrogyne flammea* are variable as to leaflet number, shape, and pubescence. Although multifoliolate on most specimens, they are primarily 1-foliolate on those from the province of Carchi. There is no obvious correlation between the presence or amount of pubescence and altitudinal or geographical distribution. The blades are typically elliptic or narrowly elliptic and up to 11 cm wide, but a few individual blades on certain specimens are wider. *Sodiro 67* has large and perhaps atypical 1-foliolate leaves that are ovate to ovate-elliptic and up to 13 cm wide with obtuse to subcordate bases. Its solitary, separately mounted fruit, missing the pedicel and distal end, is cylindrical, more than 6 cm long and only 4 mm thick, and thus also atypical. However, the inflorescence has the correct shape, dimensions, and floral density for *P. flammea*.

When well developed, the showy inflorescences are usually up to about 30 cm and eventually produce close to 400 or more flowers. Except in *Acosta Solís 7889* and *Fagerlind & Wibom 717* (in which they are as short as in *Podandrogyne glabra*), the pedicels are long, so that buds, even young ones toward the apex, stand well out from the rachis, conferring a dome shape to the summit of the inflorescence (Fig. 2B). The same is true for *P. websteri* (Fig. 3A–D) and *P. pubescens* Aspl., but in *P. glabra* and other unpublished Colombian allies the pedicels are short; their inflorescences narrow toward the tip, retaining a more conical shape. Material from the province of Manabí differs in having slightly smaller flowers (sepals 2–3 mm, petals 6–8 mm) and fruits that are uniform in diameter and rounded at both ends rather than being somewhat narrowed toward each end. One specimen, *Silverstone-Sopkin 9490* (WIS), exhibits alternating zones of functionally pistillate and functionally staminate flowers, an exceedingly rare condition in the normally androgynous *Podandrogyne*, which must be analogous to the cyclical sterility frequently observed in *Tarenaya hassleriana* (Chodat) Iltis.

Local populations from the province of Carchi deserve further discussion (see also under *Podandrogyne websteri*, below). The leaves are mostly 1-foliolate, yet their blades, like the inflorescences, most often resemble those of *P. flammea* but sometimes resemble *P. websteri*. The flowers and especially the fruits of the Carchi plants match well those of *P. flammea* except that the perianths (like those from Manabí) average just slightly smaller (petals 7–10 mm vs. 8–12 mm in all other collections) and the stamens a little shorter (proximal and median filaments 5–14 mm vs. 9–17 mm). However, inflorescences and fruits (when available) are almost always too robust for *P. websteri*. Inflorescence axes are variable in angle of divergence, length, and diameter, often diverging from the bulk of the material representing *P. flammea*, and they are less densely flowered. They sometimes have relatively long rachises that may be slender and curved or sinuous instead of strong and straight, and at least occasionally they even dangle instead of being erect. However, these peculiarities are neither expressed in all specimens nor always evident in herbarium material. The only plants described in field notes as being scandent (*sub Boyle & Boyle 1486*) were found along the upper Río Blanco, Cerro Golondrinas.

In summary, the inclusion of collections from Carchi has expanded the definition of *Podandrogyne flammea*. To also embrace such specimens as *Hoover 2096* and *Hoover et al. 2951*, which have particularly elongate, slender rachises reaching 41 and 60 cm (the latter flexuous and sharply bent at the tip) and producing a total of 415 and 465 small flowers, respectively, would be more problematic were it not for the fact that other collections from along the same stretch of the Río Verde and the nearby Quebrada Mongon, both at the base of Cerro Golondrinas, have rachises that possess acceptable architecture and dimensions for *P. flammea*. In their inflorescences and relatively small and narrow leaves these two collections exhibit morphological similarity to the recently described, poorly known *P. nutibarana* Cochrane (Cochrane, 2016) from the department of Antioquia, Colombia. Inflorescences of the latter species are generally longer and less densely flowered; the petals average larger (8–14 vs. 6–11 mm); and the fruits are wider, scarcely or barely beaked, and, so far as known, borne on pedicels and androgynophores that are longer than any on specimens of *P. flammea* from Carchi. Even though most collections lack fruits and fruiting collections often lack open flowers, there is scarcely sufficient evidence at this time to justify giving taxonomic recognition to the indistinct, albeit geographically marginal, Carchi population.

Podandrogyne websteri Cochrane & Cornejo, *sp. nov.* TYPE: ECUADOR. Pichincha: Quito-Tandayapa road, 1838 m, shrub to 2 m, flower bright orange, anthers green, fruit yellow-green, seeds black-purple, 14 May 1989 (fl, fr), *J. Smith 1926* (Holotype: WIS [barcode v0402835WIS]; Isotypes: AAU, MO, QCA, QCNE [not seen]). Fig. 1, 3–5.

Herba, frutex vel arbor parva usque ad 4 m, admodum omnino glaber (petiolis et surculis juvenissimus villosulis excepto). Folia 1-foliolata vel aliquando 3-foliolata, foliolis plerumque parvis crassiusculis. Flores aurantiaci ad rubro-aurantiaci vel lutei, in racemum corymbosum densum multiflorum dispositi, pedunculo brevi et rhachi non elongato; pedicelli (9–)12–20 mm. Florae parvae, sepala 2–4 mm et petala 5–7 (flores pistillatos) vel 7–10 (staminatos) mm. Flores pistillatos: ovarium anguste ovoideum vel anguste ovoideo-oblongum, 2–3 mm, breviter glanduloso-puberulum, gynophoro dimidio longiore quam androgynophoro. Flores staminatos: filamenta 5–14 mm, androgynophoris 12–19 mm. Capsulae ovoideae, ellipsoideae, vel anguste oblongae, 0.5–3.0 cm, in rostra brevia (ca. 1–5 mm) contractae. Semina reniformo-obovoideae, 3.2–4.4 × 2.7–3.4 mm, laevia.

Erect, unbranched or sparsely branched *herbs* to *shrubs* 0.5–3.0 or *treelets* 4 m tall, glabrous except for youngest shoots, petioles, and midveins beneath, hairs (if present) 0.1–0.6 mm, rather stiff, incurved or crinkled and glandular; stems apparently woody at least at base but all collected material herbaceous, a little hairy at the very beginning but soon glabrous. *Leaves* 1-foliolate or infrequently some lower or occasionally higher on the plant 3-foliolate; petioles 1–16 cm, pilosulous, hairs incurved-curly and glandular, glabrate; blades elliptic to narrowly elliptic, (1–)5–25(–30) × 1.5–11.0(–13.0) cm, obtuse to broadly cuneate at base, attenuate to caudate, if 3-foliolate, of similar shape and size but relatively large, on petiolules 8 or 2–3 mm (central or lateral blades, respectively), firmly membranous to generally chartaceous, essentially glabrous on both sides to sparsely pilosulous beneath chiefly along the veins, with 9–14 main lateral veins either side of the midrib. *Racemes* erect, corymbiform and ± short, 3–8(–9) cm, 5–8 cm thick, densely many-flowered; lowest 1 or 2 (rarely 3) flowers usually subtended by a 1-foliolate, leaflike bract, blade elliptic or narrowly elliptic to narrowly oblong-elliptic or the smallest lanceolate to subulate, 1–12 × ca. 0.5–3.0 cm, petiole to 8(–11) mm, remaining flowers appearing ebracteate but each pedicel subtended by a dense cluster (lower flowers on selected specimens) to sparse row of 1–9, buff-colored to yellow-brown, tiny, mostly curly or bent hairs, central 1–3 of these (especially in pistillate flowers) longer (0.4–1.9 mm), straighter, and stiffer than the others; peduncle only (0.5–)1.0–2.5(–3.5) cm, rachis dark purple, (1.5–)2.5–9.5 cm, with 0–(ca.)24 (or more?) open flowers or 0–13(–20) fruits and 0–145 buds present at any one time (depending on age of the inflorescence), hardly elongated but eventually producing a total of up to ca. 273(–340) flowers (including pedicel-scars). *Flowers* monosymmetric, with orange to greenish-yellow pedicels and sepals and similarly colored but paler androgynophores and filaments; pedicels horizontally divergent to slightly declined, 8–16 (pistillate flowers) or 12–20(–23) (staminate) mm, minutely granulose-papillate. *Sepals* orange, ovate-oblong or ovate-triangular, 2–4 × 1–2 mm, basally connate for 0.4–1.4 mm (ca. 10–40% of their length), narrowly acute, often minutely apiculate. *Petals* vivid orange to red-orange, yellow-orange, or yellow, drying pinkish red or more often pale yellow with suffusion of pink, upper pair narrowly oblong, ca. 0.5–1.5 mm shorter than the obliquely and narrowly oblong-elliptic lower pair, 5–7 (pistillate flowers) or 5–10 (staminate) × 2–4 mm, exceeding the sepals by 2–5(–6) mm, essentially sessile (short, cuneate base ca. 0.5 or 1 mm in upper and lower petals, respectively), obtuse at apex. *Disk* ± fleshy, adaxially expanded into 3 alternipetalous, pointed lobes (these forming a barely undulate rim in dried material), sunken across the top when dried, concave on the side facing the androgynophore, abaxially nearly obsolete, consisting of a filmlike band of tissue (sometimes contracted into a minute lobe when dried), 1.0–2.1 × 1.5–2.3 mm, 0.7–1.4 mm thick (side view), not particularly conspicuous when dried. *Pistillate flowers*: ovary narrowly ovoid to narrowly ovoid-oblong, somewhat compressed, 2–3(–4) × 1 mm, puberulent; style 0.5–1.1 mm; stigma 0.5–0.9 mm diam.; apiculus (style + stigma) 1–2 mm; gynophore green, 4–6 mm (very rarely 9 mm), virtually glabrous (sparsely and very minutely scabridulous-puberulent); androgynophore pinkish red, 8–12 mm. *Staminate flowers*: stamens well-exserted, filaments red or orange, subequal, 5–14 mm, the 2 upper pairs subverticillate, inserted 1.3–2.7 mm beyond the lowest 2 stamens, one or both members of the distal pair sometimes notably reduced, then only 1–5 mm; anthers gray and (on side away from line of dehiscence) green, 2.2–2.8(–3.1) mm, pollen violet; androgynophore 12–20 mm. *Capsules* 0–20, yellow to greenish yellow or

FIGURE 2. *Podandrogyne flammea*. **A**, habit; **B**, inflorescence; **C**, flowers, pistillate below, staminate above (lowest one in each case from fluid-preserved material); **D**, close-up of rachis, showing bases of pedicels and subtending bracteal hairs; **E–G**, representative infructescences, E showing dehisced fruits with curled repla. A from *Cornejo & Bonifaz 5488* (holotype, WIS); B photograph taken on Centinela Ridge, Los Ríos, by A. H. Gentry; C pistillate from *Silverstone-Sopkin et al. 9490* (WIS), staminate from *Cornejo & Bonifaz 5488* (holotype, WIS); D from *Løjtnant & Molau 15666* (AAU); E from *Cornejo & Bonifaz 5488* (isotype, WIS); F from *Dodson et al. 13920* (MO); G from *Palacios et al. 9806* (QCNE).

light green, variable in shape and size, ovoid (obliquely ovoid if very small), ellipsoid, oblong, or narrowly oblong, the bodies 0.5–4.0 cm, 2–10(–12) mm thick, base obtuse to rounded, acuminate into a beak 2–6 mm; style (beyond apices of tapered valves) 1–3 mm; stigma subcapitate, 0.5–1.1 mm diam.; gynophore 8–16 mm; androgynophore 9–13 mm (very rarely to 16 mm); pedicel 8–18 mm, deflexed, the gynophore and frequently silicle-like capsule pendant from it. *Seeds* 1–48 per capsule, purple-black (brown when dried), obovoid-reniform, a little irregular due to close packing in the capsule, 3.2–4.7 × 2.7–3.4 mm, 1.6–2.5 mm thick, slightly compressed but not beveled, smooth.

Distribution, ecology, and phenology: restricted to western Andean slopes from the central portion of the province of Pichincha north to very near the international border with Colombia, in secondary to primary, premontane, lower montane, and montane rainforests, often on slopes or banks along rivers, at elevations of (600–)1600–2200 m; apparently not weedy. Cited as a "dominant or abundant plant" in montane cloud forests of the Maquipucuna area (Webster and Rhode, 2001). Flowering throughout the year; fruiting March to October (probably throughout the year).

Eponymy: named in honor of Grady L. Webster, distinguished plant systematist and lecturer and important plant collector in various areas of the world, especially Ecuador, who made more than half of the collections that led us to distinguish this new species.

Additional specimens examined.—LOCATION UNKNOWN [presumably Ecuador]: "Temperate forests of the Andes," s.d. [ca. 1820–1860], *W. Jameson s.n.* (E [photo WIS]). ECUADOR. Carchi: Cantón Mira, Cerro Golondrinas, El Carmen, 18–25 August 1994, *M. Tirado et al. 1174* (MO, WIS); Reserva Golondrinas, El Corazón, path to La Cortadera and El Mirador, 23 January 2004, *H. Vargas et al. 4310* (MO, QCNE). Cotopaxi: Parr. San Francisco de Las Pampas, Reserva La Otonga, 9 September 1992, *P. Delprete et al. 6220* (NY); Cantón Sigchos, Reserva Ecológica Los Ilinizas, ca. 4 km before Saguambi, via Triunfo Grande-Las Pampas, 13 August 2003, *J. E. Ramos et al. 7337* (MO, WIS). Imbabura: Cantón Cotacachi, Hda. La Florida, 28 August 1992, *A. Álvarez & R. Castro 636* (MO, QCNE). Pichincha: 10 km from Pachijal, NE of El Paraíso, banks of Río Pachijal, 15 June 1997, *F. D. Brown 048* (QCA); Reserva Orquideológica Pahuma, 25 August 2007, *C. E. Cerón & C. I. Reyes 60601* (MO [photo WIS]); along road and trail from Maquipucuna Lodge to Ecolodge Santa Lucia, 2 km N of Maquipucuna entrance, 15 March 2006, *T. B. Croat et al. 95953* (MO); Bellavista Cloud Forest, along road from Tandayapa to Mindo, 7.2 "m" [sic] S of Tandayapa, 27 March 2006, *T. B. Croat et al. 97413* (MO); Calacalí-Los Bancos road, km 22, Reserva Orquideológica El Pahuma, 19 October 1999, *T. Delgado y Grupo Post-grado MO-QCNE 15* (MO, WIS); *idem*, *F. Nicolalde y Grupo Post-grado MO-QCNE 333* (MO, QCNE), *350* (MO); between Nono and Tandayapa, Quito-Nono-Pacto road, 24 March 1979, *L. Holm-Nielsen 16150* (AAU); Nono-Pacto-Río Yacuambi road, 5–10 km above Nanegalito, 21 July 1980, *L. Holm-Neilsen et al. 24444* (AAU); km 59 of the old Quito-Santo Domingo de Los Colorados road, Estación Cientifica Río Guajalito, 23 June 1985, *J. Jaramillo & V. Zak 7827* (MO, WIS); *idem*, 5 March 1987, *V. Zak 1794* (MO, WIS); 16.5 km W of Calacalí along new road to Nanegalito, Río Pachán valley, 15 February 1988, *U. Molau & B. Eriksen 3050* (AAU, GB, QCA); 16 km from Calacalí on road to Nanegalito, 26 April 1995, *B. Ståhl 1348* (QCA); along Río Alambre, Hda. Guarumus, 10 km NW of Nono, 9 May 1943, *J. A. Steyermark 52654* (F); Parcela Permanente, Reserva Biológica Maquipucuna, 10 km N of Nanegalito, 17 May 1991, *G. Tipaz 140* (MO, QCNE); Cerro de Sosa, Reserva Biológica Maquipucuna, 6 km airline distance SE of Nanegal, 17 September 1989, *G. L. Webster & G. Goodstein 27676* (DAV); *idem*, 3 July 1991, *G. L. Webster et al. 28691* (DAV, QCNE, WIS); *idem*, 3 July 1991, *G. L. Webster et al. 28707* (AAU [2], DAV [2], QCNE); *idem*, 20 November 1998, *G. L. Webster et al. 32958* (DAV); Cerro Sta. Lucia (Cerro Campana), Maquipucuna area, 6 km airline distance E of Nanegal, 20 July 1990, *G. L. Webster & B. Bonning 28330* (DAV, QCNE, WIS); *idem*, 7 January 1995, *G. L. Webster et al. 31078* (DAV); slopes above Río Pichán, Bosque Protector Maquipucuna, 7.5 km airline distance SE of Nanegalito, 1 September 1993, *G. L. Webster et al. 30118* (DAV); *idem*, 1 September 1993, *G. L. Webster et al. 30217* (DAV, QCNE); Quebrada Santa Rosa, steep slopes SW of Río Pichán, 10 km airline distance WSW of Calacalí, 12 January 1995, *G. L. Webster & J. Cooper 31184* (DAV); *idem*, 24 June 1996, *Webster et al. 31829* (DAV, QCNE); along Río Umachaca, river trail, Bosque Protector Maquipucuna, 17 June 1996, *G. L. Webster et al. 31559* (DAV, QCNE); Reserva El Pahuma, trail to waterfall, 18 June 1996, *G. L. Webster & A. del Hierro 31570* (DAV, QCNE); 11 km by road W of Pacto, 17 November 1998, *G. L. Webster et al. 32872* (DAV); La Vuelta Brava zone, Nanegalito-Armenia-Loma de San José road, 9 December 1987, *V. Zak & J. Jaramillo 3237* (WIS).

Podandrogyne websteri grows on the same western slopes in the same kind of forests as *P. flammea*, and the two species closely approach or overlap one another morphologically and geographically. The differences separating them are both qualitative and quantitative and, although not great, are usually correlated. Their geographic ranges approach one another really closely only in the Los Ilinizas and Cerro Golondrinas reserves. Morphological differentiation in combination with local distribution, embedded as it is within the collective range, supports the description of *P. websteri* as a new species.

The earliest specimen seen, collected by Jameson in the 1800s, lacks data; subsequent collections were not made until 1943, then 1979. Nearly all of the collections were made during the 1980s, by various collectors representing Scandinavian herbaria, and the 1990s, mostly by G. L. Webster and his students of the University of California–Davis; both groups have contributed significantly to our knowledge of the rainforests of this part of Ecuador.

The leaves of *Podandrogyne websteri* are all or mostly 1-foliolate, seldom in part 3-foliolate, and have shorter petioles and generally decidedly smaller, thicker-textured blades with more prominent secondary veins than those of *P. flammea*, in which the leaves are generally 3-foliolate,

FIGURE 3. *Podandrogyne websteri*. **A–B**, habits with inflorescences in pistillate phase (A missing distal end of rachis); **C–D**, habits with inflorescences in late (C) and early (D) staminate phase; **E**, flowers, pistillate below, staminate above; **F**, close-up of rachis, showing pedicellar scars and patchy distribution of hairs. A from *Webster et al. 31829* (QCNE); B from *Webster et al. 30217* (DAV); C from *Nicolalde & Grupo de Post-Grado 350* (MO); D from *Webster et al. 31559* (QCNE); E pistillate from *Webster et al. 30217* (DAV), staminate from *Smith 1926* (holotype, WIS); F from *Delgado y Grupo Post-grado MO-QCNE 15* (WIS).

FIGURE 4. *Podandrogyne websteri*. **A–D**, representative infructescences, D with dehisced fruits; **E**, seeds. A from *Webster & del Hierro 31570* (DAV); B from *Webster et al. 28691* (DAV); C from *Zak 1794* (WIS); D from *Nicolalde & Grupo de Post-Grado 333* (QCNE); E from *Nicolalde & Grupo de Post-Grado 333* (MO).

sometimes partly 1- or 5-foliolate, and membranous. The inflorescences in *P. websteri* tend to be more strongly corymbiform from the outset, and they are smaller and less showy, as are the flowers themselves. The staminate flowers in the two species are quite similar, overlapping as they do in androgynophore, filament, and anther lengths, but the pistillate flowers differ, those of *P. websteri* having smaller ovaries (2.0–3.5 mm instead of 3.5–8.0 mm) and shorter gynophores (4–6 vs. 6–10 mm) and androgynophores (8–12 vs. 15–18 mm). The same trends are evident in the fruits, which in *P. websteri* can be similar in shape but on average are smaller and invariably stylose-beaked (Fig. 4A–C, 5), whereas in *P. flammea* they vary from lacking even a nubbin to being apiculate or shortly beaked (Fig. 2F–G, 5). The scatter diagram (Fig. 5) shows that there is a strong association between fruit shape and androgynophore length. A complete sample of each of the two species grouped them into distinct clusters and emphasized that, apart from shape, *P. websteri* does not show much variation with respect to fruit characters.

The close morphological similarity between *Podandrogyne websteri* and *P. flammea* means that occasional collections, especially if lacking pistillate flowers or fruits, can be difficult to identify. For example, both sheets of *Molau*

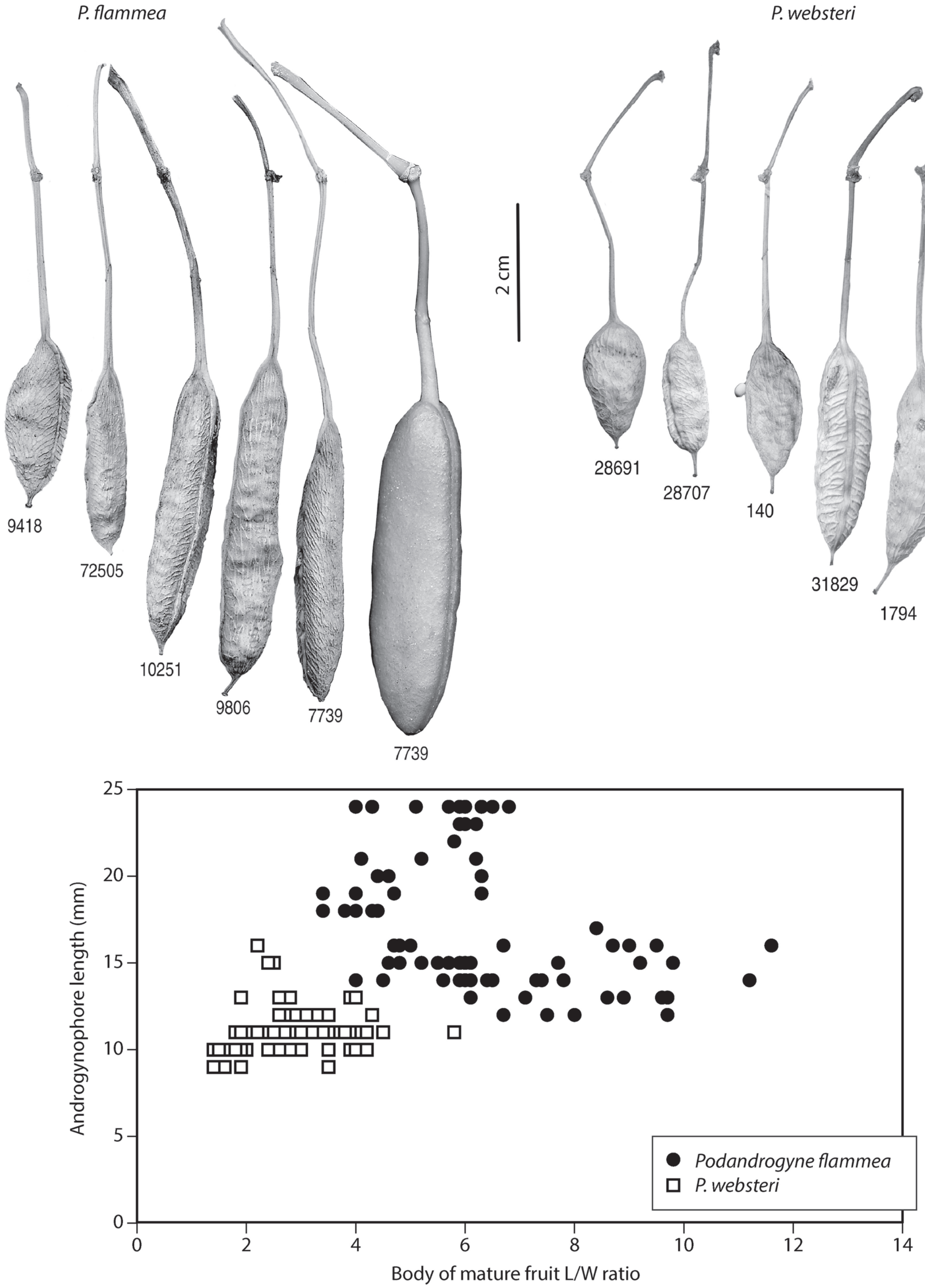

FIGURE 5. Morphological variation in fruits of *Podandrogyne flammea* (upper left) and *P. websteri* (upper right). Each fruit obtained from a different dried herbarium collection (number cited) except the largest one of *P. flammea*, which came from fluid-preserved material and was one of the largest fruits in the population. The scatter diagram illustrates the correlation of fruit length/width (if ± compressed) or length/thickness (if terete) and androgynophore length in the two species. Total morphological variation shown: *P. flammea*: 82 fruits/12 collections; *P. websteri*: 89 fruits/12 collections. (Due to overlapping values, only 128 data points appear in the diagram.)

and Eriksen 3050 have fairly robust inflorescences, large leaf blades that are closer to membranous than coriaceous, and large staminate flowers; overall, they have the gestalt of *Podandrogyne flammea*. All dimensions, however, overlap the largest extremes of *P. websteri*, and *3050*, which is also a good match for *Webster et al. 32872*, now succeeds the latter collection as the most robust representative of *P. websteri*. Furthermore, several other collections taken from the same short stretch of highway as *3050* have all been identified as the latter species. Judging by leaf characters and rachis length, the sheet of *Jaramillo & Zak 7827* at WIS and the right-hand stem on the sheet of *Delgado and Grupo Post-Grado 15* at MO seem closest to *P. flammea*, but the axillary shoot on the otherwise old, leafless, left-hand branch on the Delgado specimen has narrower, thicker leaves and a modest inflorescence, thus not only resembling *P. websteri* but also suggesting that what material is chosen for collection can confound specimen identification. Be that as it may, duplicate specimens of these two collections (*7827* and *15*) and others from the same reserves are clearly *P. websteri*. Leaves on the WIS specimen of *Tirado et al. 1174* have blades that are large, thin-textured, and pubescent, matching in size and indumentum those of *Harling et al. 9661* and *Palacios 9806* better than those typical of *P. websteri*. However, the leaves on the MO sheet numbered *1174* are typical of *P. websteri* in every way, as are the fruits on both the MO and WIS sheets. From a vegetative standpoint, the WIS sheets of *1174* and *9806* could easily be duplicates of one another, but the fruits on all sheets of *9806*, like *1174* also taken from the vicinity of El Carmen, province of Carchi, are indisputably those of *P. flammea*. Annotation decisions in these cases mean not only that leaves on specimens from Carchi are extremely variable but also that both species occur in the protected Cerro Golondrinas forest. Moreover, they raise the question of whether plants from Carchi represent a recently speciated, unstable complex of plants in which the geographical structuring of morphological variation in the *P. flammea–P. websteri* species pair is somewhat blurred.

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