

NOVELTIES IN MESOAMERICAN MISTLETOES (LORANTHACEAE AND VISCACEAE)¹

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ABSTRACT

Five new species of Loranthaceae (*Cladocolea primaria*, *Psittacanthus angustifolius*, *P. minor*, *P. pinicola*, and *Struthanthus subtilis*) and seven new species of Viscaceae (*Dendrophthora davidsei*, *D. talamancana*, *Phoradendron fasciculatum*, *P. molinae*, *P. nitens*, *P. tardispicum*, and *P. zelayanum*) are described from Mesoamerica. The new combination *Psittacanthus rhynchanthus* (Bentham) Kuijt (including the var. *wurdackii* (Rizzini) Kuijt) is proposed for what has usually been called *P. calyculatus* (DC.) G. Don in Mesoamerica. The latter name is now restricted to a different species endemic to Mexico.

The following novelties result from recent studies in connection with the Flora de Nicaragua and Flora Mesoamericana.

1. *Cladocolea primaria* Kuijt, sp. nov. TYPE: Panama. Panamá: Cerro Jefe, 2 km along road to Altos de Pacora from junction with road to peak, low cloud forest, 800 m, *Sytsma & Knapp 4797* (holotype, MO; isotype, LEA). Figures 1, 2.

Plantae glabrae, paucè ramosae; rami quasi teretes, saepe lenticellis insignibus ornati, recti sat rigidique. Folia bina, aliquantum coriacea, laminae late lanceolatae vel ovatae, obtusae vel leviter apiculatae; costa insignis, petioli ad 15 mm longi. Flores pallide flavi, bisexuales. Inflorescentia solitaria, determinata, subtus triadis 3- vel 4-paribus, supra pari singulo, tunc pari uno monadum ebracteolarum et denique flore terminali sequentibus; triadae basales ad axillas aggregatae; inflorescentiae paribus nonnullis foliorum squamiformium, crassorum, fuscorum suffultae. Flores 4-partiti; petala dimorpha, 2–2.5 mm longa; antherae perparvae, sessiles ad petala breviora, filamentis brevissimis insertae ad longiora; ovarium 1.5 × 1 mm; stylus rectus, stigma capitatum. Fructus 6 × 4 mm, ruber, obscure violascens, ellipsoideus.

Plants sparsely branched, twining, glabrous. Stems terete or slightly 4-ridged, often with conspicuous lenticels when older, straight and rather rigid, with occasional epicortical roots. Leaves paired, somewhat leathery, the blades broadly lanceolate to ovate, venation inconspicuous, the apex mostly blunt or slightly apiculate; midrib conspicuous and running into apex; petioles stout, to 15 mm long. Inflorescences subtended by several pairs of thick, brown scale leaves, solitary in leaf axils, determinate, with 3 or 4 pairs of

triads below and a pair above, followed by a pair of ebracteolate monads and a terminal flower, the 4 basal triads crowded in the leaf axil. Flowers bisexual, pale yellow, 4-partite; petals dimorphic, 2–2.5 mm long; anthers very small, sessile on the shorter petals and with very short filaments on the longer ones; ovary 1.5 × 1 mm; style more or less straight, the capitate stigma reaching the petal tips. Fruit 6 × 4 mm, red, becoming dark purple, elliptic in outline; calyx-ulus inconspicuous; embryo dicotylous, slender, the haustorial pole scarcely expanded.

Additional specimens examined. PANAMA. PANAMÁ: Cerro Jefe, *Clusia* forest near radio tower, 900 m, *D'Arcy & Hamilton 14817* (LEA, MO); in forest near road to Cerro Jefe near junction with road to Altos de Pacora, *Mori & Kallunki 72763* (LEA, MO); Cerro Jefe, 6.6 mi. above Goofy Lake, disturbed cloud forest, 850–900 m, *Sytsma et al. 2839* (LEA, MO).

Cladocolea primaria presents considerable difficulties in generic assignment. When I monographed *Cladocolea* (Kuijt, 1975), I proposed the notion that *Struthanthus* is polyphyletic, at least many species being derived from a number of independent sources within *Cladocolea*. Thus I spoke of connecting bridges, these in some cases characterized by species pairs, one member of which was placed in *Cladocolea*, the other in *Struthanthus*. With some very minor exceptions, this left *Cladocolea* as a genus with determinate spikes of monads, the flowers 4-, 5-, or 6-partite, and either bisexual or the species dioecious. *Struthanthus* remained a strictly dioecious genus (with the solitary exception of the highly aberrant *S. panamensis*, which has bisexual flowers and

¹ Acknowledgments are due to Dr. Karel U. Kramer, Zürich, for the Latin descriptions, and to the Natural Sciences and Engineering Research Council of Canada for continuing financial support.

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FIGURE 1. *Cladocolea primaria* Kuijt (Sytsma & Knapp 4797). Pendent branch.

bracteolate monads), its inflorescence made up of mostly triads. The inflorescence of *Struthanthus* is generally indeterminate, but in a few species it also bears two or four monads at the tip, followed by a truly terminal flower.

Cladocolea primaria presents a predicament from which there is no completely satisfactory escape, for placement in either genus leads to the need of significant modification of that generic concept. As a species of *Struthanthus* it would be the first four-partite species, and the second one with bisexual flowers. If placed in *Clado-*

colea, however, it is the first species which is truly triadic. I feel that placement in *Cladocolea* is more acceptable, although I cannot deny an element of arbitrariness in this regard. I continue to hold the view that union of the two genera would tend to obscure the complex relationships between them, and that these difficulties concern very few species. In fact, if the evolutionary relationships are as I have proposed, such difficult intermediate species would be expected.

Viewed in the above context, *C. primaria* is closely related to *C. lenticellata* (Diels) Kuijt

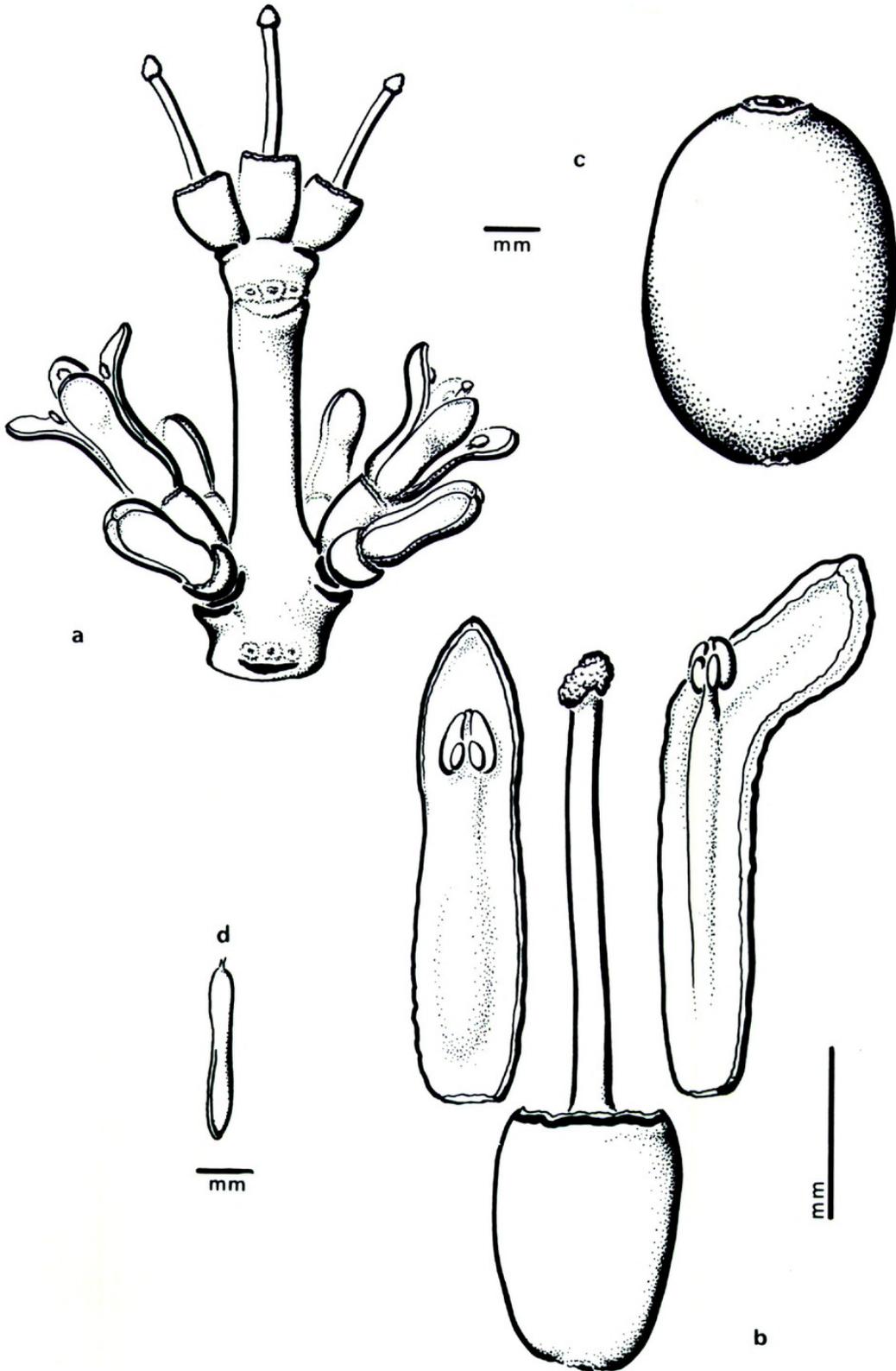


FIGURE 2. *Cladocolea primaria* Kuijt (Sytsma & Knapp 4797).—a. Inflorescence, the upper triads removed.—b. Flower dissection.—c. Mature fruit.—d. Embryo.

(which it greatly resembles superficially) and *C. roraimensis* (Steyerm.) Kuijt, while in *Struthanthus* it is especially *S. leptostachyus* (Kunth) G. Don and *S. polystachyus* (Ruiz & Pavon) Blume that are related. Our species represents the second *Cladocolea* reported for Panama and seems to be limited to the Cerro Jefe area.

2. ***Dendrophthora davidsei* Kuijt, sp. nov.** TYPE: Costa Rica. Limón: Cordillera de Talamanca, Atlantic slope, unnamed cordillera between the Río Terbi and the Río Siní, 2,400–2,750 m, elfin forest edge, *Davidse et al.* 28990 (holotype, MO). Figure 3.

Planta ad circ. 15 cm alta, monoeca, erecta, olivacea, parvifoliata; cataphylla basalia nulla vel irregularia, appendices basales in plano medio. Folia (ob)lanceolata, succulenta, ad 9×2 mm, acuta. Flores feminei ad partes superiores internodium fertilium, plerumque quam masculi subtus inserti haud plures. Spicae solitariae, axillares terminalisque, pedunculo circ. 7 mm longo incluso ad 5 cm longae; internodia fertilia 2 vel 3, raro 4; flores uniseriati, ad 20 pro bractea fertili. Fructus albus, ellipsoideus ad globosus, 1.5 mm diam., petalis patentibus.

Plants monoecious, to ca. 15 cm high, erect, olive green, small-leaved; basal cataphylls absent throughout in some individuals, irregularly present in others; basal appendages oriented in median plane; young parts often with sparse, stiff, white bristlelike hairs. Leaves (ob)lanceolate, succulent, to 9×2 mm, acute. Spikes solitary and axillary as well as terminal, to 5 cm long including the peduncle ca. 7 mm long; fertile internodes 2 or 3, rarely 4. Flowers uniseriate, to 20 per fertile bract; female flowers in the upper part of the fertile internodes, not generally outnumbering the male flowers below. Fruit white, ellipsoid to globose, 1.5 mm diam.; petals spreading.

Additional specimens examined. COSTA RICA. LIMÓN: Cordillera de Talamanca, Atlantic slope, Valle de Silencio, along the Río Terbi, 0.5–1.5 airline km W of the Costa Rican-Panamanian border, 2,300–2,400 m, *Davidse et al.* 28755a (MO). HEREDIA: open road side, 1 km N of San Rafael de Vara Blanca, 1,900 m, *Lent* 3826 (F).

Dendrophthora davidsei is the sixth known Mesoamerican species of subgenus *Dendrophthora*, counting *D. talamancana* described concurrently in this paper. The others are *D. guatemalensis* Standley, *D. mexicana* Kuijt, *D. squamigera* (Benth.) Kuntze, and *D. terminalis* Kuijt. No serious confusion is possible with those

species. The closest relative of *D. davidsei*, however, is *D. paucifolia* (Rusby) Kuijt, which ranges from Bolivia to Venezuela. The major difference between *D. davidsei* and *D. paucifolia* is that the vegetative branches of the latter invariably have a prominent pair of basal cataphylls placed high above the leaf axil (see Fig. 39 in Kuijt, 1986a). This is not seen in any of the ten individuals present in the two Davidse collections, but basal cataphylls are present on some (not all) vegetative laterals of the Lent specimen. The latter looks extremely slender but appears to belong to the present species. A second and apparently consistent difference is that leaf size in *D. paucifolia* dwindles upwardly until the uppermost lateral spikes are subtended by leaf scales; even though perhaps a slight diminution takes place in *D. davidsei*, none of the leaves on the main stem ever reach scale size. The relationship of the two species is certainly very close, but separation appears justified.

Terminal inflorescences were not seen in the type but are represented in the otherwise identical collection *Davidse et al.* 28755a. In the type, as shown in Figure 3a, the tips of the larger branches have remained static, giving the impression of buds with crowded small leaves. Such shoot tips undoubtedly will expand into new systems of inflorescences, and perhaps mark a seasonal change. In fact, in the third collection, *Lent* 3826, there are some branches where such a new expansion seems to have taken place, demarcated from the older portion by several pairs of very small leaves.

3. ***Dendrophthora talamancana* Kuijt, sp. nov.** TYPE: Costa Rica. Limón: Cordillera de Talamanca, Atlantic slope, Valle de Silencio, along the Río Terbi, 0.5–1.5 airline km W of the Costa Rican-Panamanian border, 2,300–2,400 m, *Davidse et al.* 28755b (holotype, MO). Figure 4.

Planta tenuis, monoeca, erecta, ramosissima, circ. 30 cm alta, ad basem squamata; caules inflorescentias gerentes haud ultra 1 mm crassi. Cataphylla basalia omnino carentia, appendices basales positione media. Spicae solitariae, axillares, ad 15 mm longae, internodio fertili uno. Flores uniseriati, floribus usque ad 6 supra quamque bracteam fertilem, masculi irregulariter dispersi et femineis multo pauciores; bacca alba, 2 mm diam., ovoidea, sepalis clausis.

Plants monoecious, ca. 30 cm high, profusely branched, slender, erect, squamate to the base. Inflorescence-bearing stems 1 mm or less in

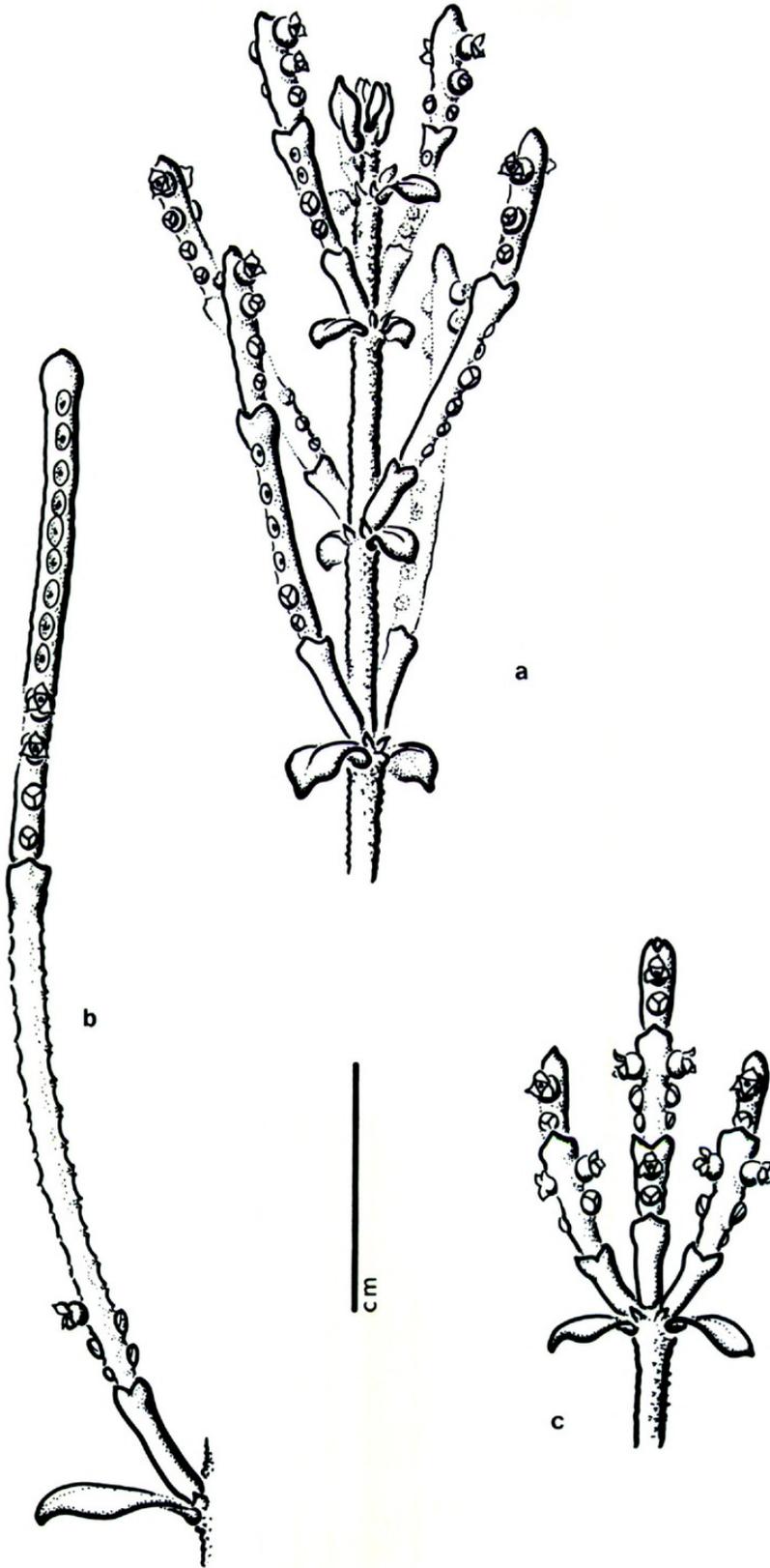


FIGURE 3. *Dendrophthora davidsei* Kuijt.—a. Habit (Davidse et al. 28990).—b. Same collection, old inflorescence.—c. Terminal portion of compound inflorescence (Davidse et al. 28755a).

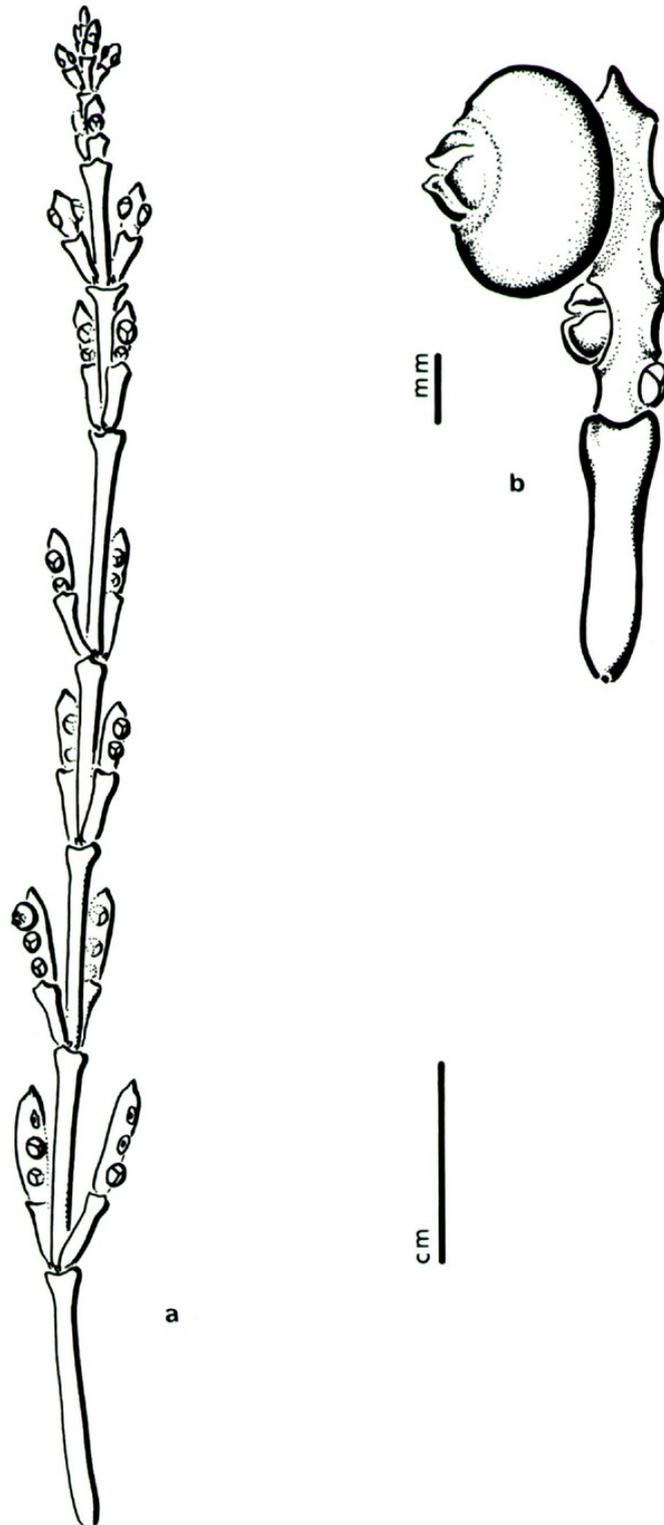


FIGURE 4. *Dendrophthora talamancana* Kuijt (Davidse et al. 28755b).—a. Habit.—b. Fruiting inflorescence.

thickness; basal cataphylls absent throughout, the basal appendages in a median orientation. Spikes solitary, axillary only, to 15 mm long, the single fertile internode slightly longer than the peduncle, the apex acute. Flowers uniseriate, to 6 flowers above each fertile bract; male flowers irreg-

ularly distributed and much outnumbered by the female flowers. Berry white, 2 mm diam., ovoid; sepals closed.

This distinctive plant represents the third completely squamate Mesoamerican species of *Dendrophthora*, the others being *D. squamigera*

(Benth.) Kuntze and *D. terminalis* Kuijt. It differs from the former in its extremely fine, much-branched stems and short fertile internodes, and from the latter in its size, blunt scale leaves, and lack of terminal spikes. It is conceivable that the unusually slender *Friedrichsthal s.n.* specimen from Guatemala, as cited in Kuijt (1961), will turn out to be this species. I know of no similar South American plants.

4. ***Phoradendron fasciculatum* Kuijt, sp. nov.**

TYPE: Panama. Chiriquí: Jaramillo Arriba, near Boquete, trail to Río Palo Alto, 1,100 m, near paved road, hyperparasitic on *Phoradendron undulatum* Eichl., in turn parasitic on *Psidium guajava*, Churchill & Kuijt 5106 (holotype, MO; isotypes, BM, CR, EAP, MEXU, NY, LEA, PMA). Figure 5.

Plantae erectae, glabrae, basi rami 4–6 e pulvino communi orientes; internodia vetustiora bicarinata, novella praecipue statu sicco leviter quadrangularia, ad 10 cm longa; rami laterales paribus cataphyllarum singulis. Rami solum novelli foliosi. Folia carnosae, 8 × 5 mm, apice rotundata, mox decidua. Monoeca; spicae paribus cataphyllorum sterilium vel nullis; internodia fertilia 5 vel 6. Flores masculi 1–3 ad apicem areae floriferae supra bracteam fertilem, feminei usque ad 12 pro bractea et iis suppositae, bi- vel triseriati. Fructus late ovoideus, 3 mm diam.; petalis inconspicuis, clausis.

Plants monoecious, erect, glabrous, fascicled from the base with 4–6 stems from a common cushion. Stems usually lacking basal cataphylls; internodes 2-keeled when older, somewhat quadrangular when young, especially when dry, to 10 cm long, stout; lateral branches with 1 pair of basal cataphylls ca. 4 mm above base, spreading when dry. Leaves fleshy, soon deciduous, 8 × 5 mm, the apex rounded, sides parallel, the base clasping. Spikes with 1 pair of sterile cataphylls or without, 5–6 fertile internodes sometimes proliferating terminally into a second series of younger fertile internodes. Male flowers 1–3 at the tip of the flower area above each fertile bract, the female flowers to 12 per bract below them, bi- or triseriate. Fruit broadly ovoid, 3 mm diam., the petals very small, inconspicuous, more or less closed.

This distinctive species undoubtedly belongs to the *P. dipterum* group of species, in which hyperparasitism is the rule. *Phoradendron fasciculatum* is no exception, in that all plants seen of the type collection were growing on *P. undulatum* Eichler. It is impossible to tell at this

time whether this cluster of species is obligately hyperparasitic; plants growing near the base of a primary host may easily be mistaken for being parasitic directly on the host tree. Another feature apparently held in common by these various species is that several stems originate from a basal cushion, as illustrated in Figure 5a (arrow). I add a comparable illustration of a small plant of *Phoradendron dipterum* Eichler from Nicaragua (Fig. 6), which happens to be parasitic on a leaf, the host again being a *Phoradendron*. A clear basal cushion is visible (arrow). A third example is *Phoradendron aequatoris* Urban from Ecuador (Kuijt, 1986a, fig. 2), which also has basal sprouting and is parasitic on a *Phoradendron*. That this is not axillary branching from the nodes of a much shortened base is demonstrated by the usual lack of basal cataphylls, in contrast to what occurs elsewhere in the plant.

The explanation of the basal cushion almost certainly lies in the original haustorial disk of the seedling. It has recently been shown in an unrelated species of Viscaceae, *Viscum minimum* Harvey, that the margin of the haustorial disk regularly produces aerial shoots (Kuijt, 1986b). The same is true for *Viscum album* L. (Tubef, 1923), and for *Ixocactus hutchisonii* Kuijt of Loranthaceae (Kuijt, 1987). In *Phoradendron*, this feature would appear to have some taxonomic constancy in the group of species under discussion.

Additional specimen examined. COLOMBIA. ANTIOQUÍA: highway between Uramita and Cañasgordas, on *Phoradendron piperoides* (H.B.K.) Trel., Barkley & Gutierrez 535457 (US).

5. ***Phoradendron molinae* Kuijt, sp. nov.** TYPE:

Nicaragua. Madriz: cut over cloud forest area on Volcán Somoto, 10 km S of Somoto, 1,400 m, Williams & Molina 20270 (holotype, US; isotype, F). Figure 7.

Internodia compressa carinataque, ad 6 cm longa; rami laterales paribus cataphyllorum basium valde inferis singulis. Folia ad 10 × 4.5 cm; lamina tenuis, ovata, basi in petiolum insignem, cuneiformem, fere ad 1.5 cm longum abrupte contracta. Inflorescentia feminea solitaria, pari cataphyllorum sterilium praesente vel carente; pedunculus statu fructifero circ. 3 mm longus; spica fructifera circ. 3 cm longa, internodiis fertilibus 2 vel 3, floribus pro bractea fertili tribus, insertis paulum supra medium internodii. Fructus ovoideus, laevis, 3 × 2 mm, petala clausa.

Plants dioecious (only the female seen), stems with compressed, keeled internodes to 6 cm long, basal cataphylls one very low pair on lateral

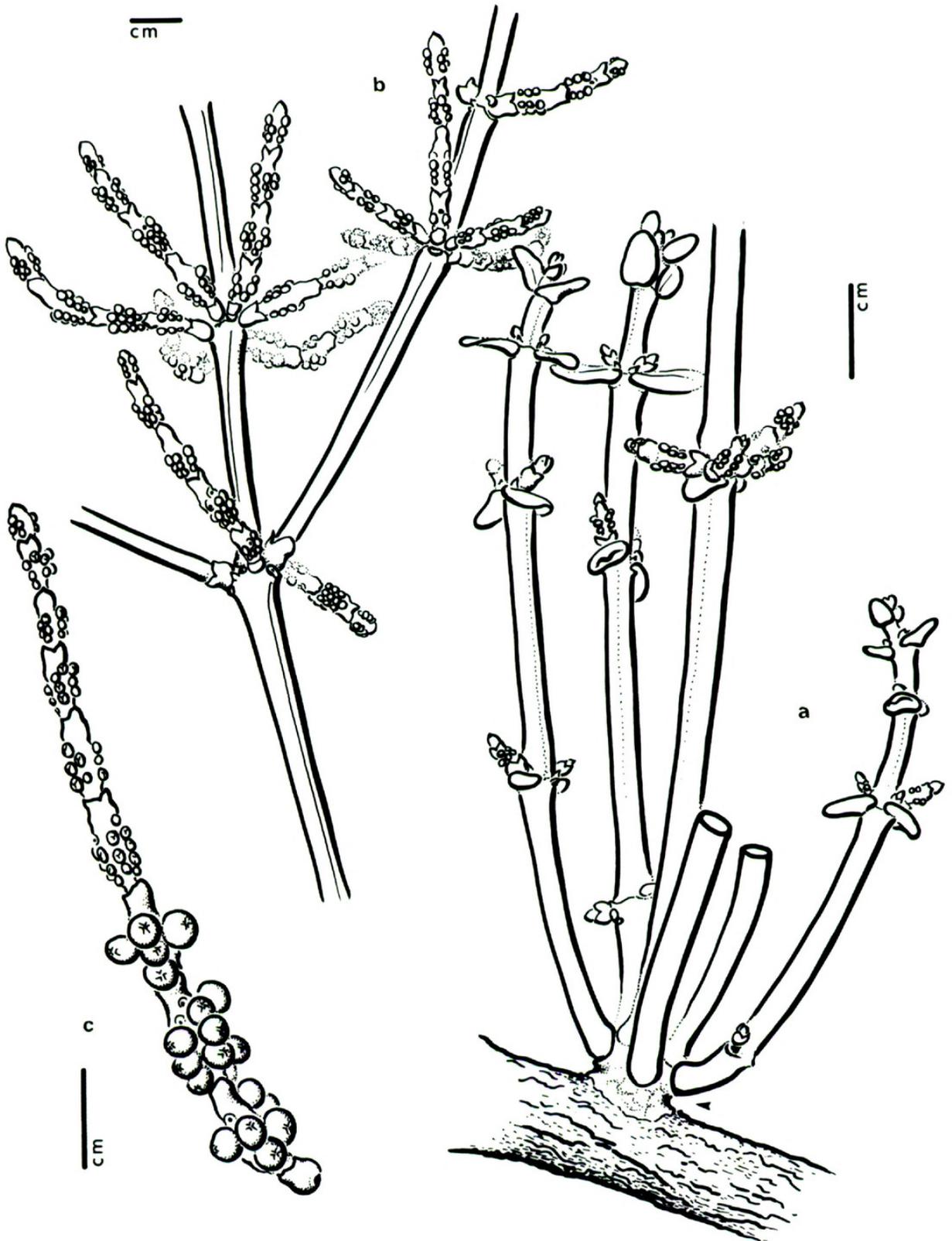


FIGURE 5. *Phoradendron fasciculatum* Kuijt (Churchill & Kuijt 5106).—a. Base of young plant, showing sprouting from basal cushion (arrow).—b. Habit of older plant.—c. Older inflorescence, the basal portion in fruit, the terminal portion proliferated and in flower.

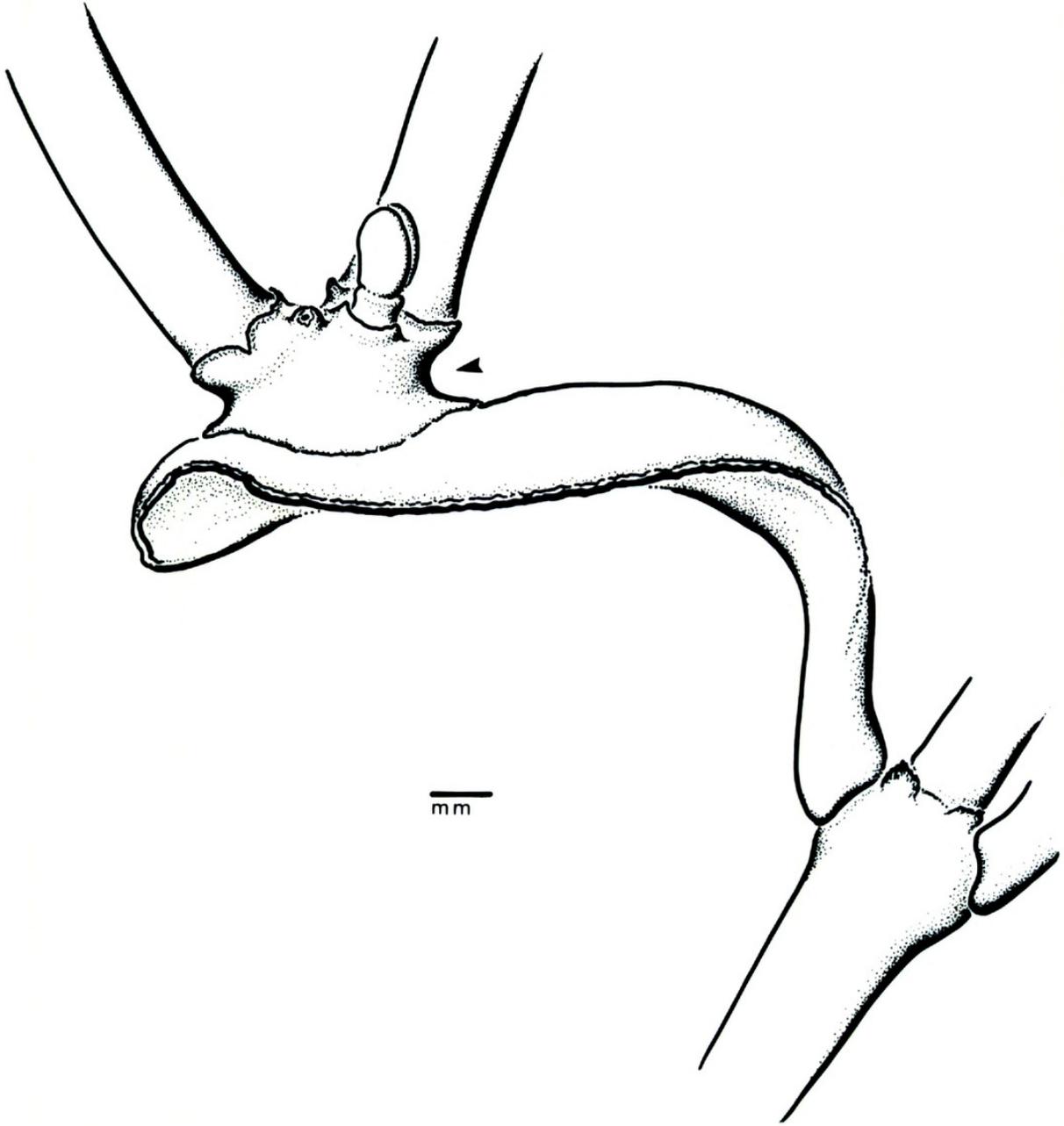


FIGURE 6. *Phoradendron dipterum* Eichler parasitic on *Phoradendron* sp., Nicaragua (Stevens & Montiel 17931, LEA). The hyperparasite is sprouting from a basal cushion (arrow) attached to a leaf of the primary host.

branches. Leaves to 10×4.5 cm; blade thin, more or less palmately veined, ovate, the base abruptly contracted into conspicuous, cuneiform petiole to nearly 1.5 cm long. Female inflorescence solitary, less than 2 cm long, often with a sterile pair of cataphylls; peduncle ca. 3 mm long in fruit; fruiting spike ca. 3 cm long, with 2–3 fertile internodes and 3 flowers per fertile bract just above the middle of the internode. Fruit ovoid, smooth, 3×2 mm; petals closed.

6. *Phoradendron nitens* Kuijt, sp. nov. TYPE: Costa Rica. Cartago: east side of continental

divide between Tres Rios and Cartago, on Euphorbiaceae, *Kuijt 2465* (holotype, CR; isotype, UBC). Figure 19 in Kuijt (1964) and Figure 5 in Kuijt (1986a).

Planta magna, monoeca, carnosa, ramificatione saepe furcata; innovationes laterales cataphyllis basalibus magnis binis. Ramuli novelli aliquantum compressi, demum teretes. Folia usque ad 15×7 cm vel ultra, statu vivo crassa et nitentia, rigida, obovata vel fere elliptica, basi angustata vel abrupte contracta; petiolus validissimus, planus, ad 6 mm latus. Flores masculi rarissimi, inferiores seriatim dispositi; spica ad 4 cm longa, cataphyllis nullis, internodia fertilia 3 vel 4, flo-



FIGURE 7. *Phoradendron molinae* Kuijt (Williams & Molina 20270).—a. Habit.—b. Fruiting inflorescence.—c. Basal cataphylls.

res pro bractea 6–9, biseriati. Fructus flavus, 3×1.5 mm, ellipsoideus; petala clausa.

Plants fleshy, monoecious, the branching mostly forked, where percurrent perhaps with a pair of intercalary cataphylls. Lateral shoots with

a large pair of basal cataphylls just above the axil; stems somewhat compressed when young, becoming terete. Leaves to 15×7 cm or larger, thick and shiny when fresh, rigid, obovate to nearly elliptical; base tapering or abruptly con-

tracted; petiole very stout and flat, to 6 mm wide. Spike to 4 cm long, lacking cataphylls, fertile internodes 3–4, with flowers 6–9 per bract, biserial; male flowers very rare, lowest in series. Fruit yellow, 3×1.5 mm, ellipsoid; petals closed.

Additional specimens examined. NICARAGUA. ZELAYA: Municipio de Siuna, Río El Bambú, arriba, 200–400 m, *Ortiz 1665* (HNMN, MO); Rosa Grande, Río Labú (río abajo), 300 m, *Ortiz 1031* (HNMN, MO); Cerro Waylawas (Peñas Blancas), 5 km al S de Wany, costado oeste del cerro, on Crescentia, *Grijalva & Burgos 1665* (HNMN, MO); Municipio de Rama, camino desde “Santa Julia” hasta “La Palmera,” 60–95 m, *Robledo 680* (HNMN, MO). (Also see the specimens listed under *Phoradendron obliquum* (Presl) Eichler in Kuijt, 1964).

This species, which in Mesoamerica has been erroneously referred to *Phoradendron obliquum* (Presl) Eichler, is often extremely difficult to separate from vigorous specimens of *P. robustissimum* Eichler if only herbarium material is available. In the fresh condition, its usually larger shiny leaves and yellowish berries contrast sharply with those of the latter species. *Phoradendron robustissimum* is also strictly dioecious, but the rarity of male flowers in *P. nitens* can be very misleading. *Phoradendron obliquum* is presently placed in synonymy under *Dendrophthora obliqua* (Presl) Wiens (Kuijt, 1986a).

The species is now known from Panama, Costa Rica (Kuijt, 1964), and Nicaragua, and has been reported recently from Ecuador (Kuijt, 1986a, as *Phoradendron* #5, fig. 5). We may thus anticipate that it will be found in Colombia.

7. *Phoradendron tardispicum* Kuijt, sp. nov.

TYPE: Panama. Chiriquí: bridge over Río San Felix, on Panama Hwy., 50 m, on *Ficus* along river directly S of bridge, *Churchill & Kuijt 5107* (holotype, MO; isotypes, BM, LEA, MEXU, PMA). Figure 8.

Plantae dioeca (pistillatae solum visae), vivae obscure virides, glabrae. Caules deinde teretes; internodia recta, 5–9 cm longa. Cataphylla basalia plerumque par unum vel paria dua, valde inconspicua. Cataphylla intercalaria praesentia, paria singula paribus foliorum interspersa sed ad caules irregulariter distributa, ad internodia nonnulla carentia. Folia amplexicaulia, cordata, viva nitida, usque ad 7.5×6 cm, margine undulata, venatione pinnata. Inflorescentiae sat graciles, 6–8 cm longae, fere omnes ad internodia vetustiora defoliata, aliquot pro nodo, spica quaque paribus duobus cataphyllorum sterilium basalium internodiisque fertilibus circ. 7; flores biseriali, ad 10 pro bractea fertili. Fructus ovoideus, luteo-viridis, 3 mm longus, petalis clausis.

Plants dioecious (only the female seen), bright, dark green when fresh, glabrous, 1–2 m diam., somewhat pendulous. Upper part of internode slightly flattened when young, soon becoming terete; internodes straight, 5–9 cm long. Basal cataphylls mostly 1 or 2 pairs, very inconspicuous, if 1 pair present nearly axillary, if 2 pairs present the second pair to 20 mm above axil, rarely to 4 pairs. Intercalary cataphylls present, one pair between successive pairs of foliage leaves but irregularly distributed along the branch, absent from some internodes, always inconspicuous. Leaves amplexicaul, cordate, shiny when fresh, to 7.5×6 cm, rather thin; margin undulate; venation pinnate but obscure. Inflorescences rather slender, 6–8 cm long, nearly all on older, leafless internodes, several per node, rarely one in axils of intercalary cataphylls; spike with 2 pairs of sterile basal cataphylls less than 5 mm above base, followed by ca. 7 fertile internodes. Flowers biserial, to 10 per fertile bract, yellowish green, each fertile internode with stalk and flowerless tip 2–4 mm long. Fruit ovoid, yellowish green, 3 mm long, the petals closed.

This is a remarkable species for its irregularly distributed intercalary cataphylls and for late development of inflorescences. It is difficult to see what known species might be related. As far as I am aware, only in *Phoradendron paradoxum* Urban from Venezuela do intercalary cataphylls alternate in occurrence, but there this pattern seems to be regular (Trelease, 1916). That species and the closely related *P. fendlerianum* Eichler, however, have triseriate flowers and long-petioled leaves and do not seem closely related. In the newly described *P. balslevii* Kuijt from Ecuador (Kuijt, 1986a), a similar irregularity exists, but there 0–3 cataphylls may be present on an “internode”; nor does this species seem to be closely related to *P. tardispicum*.

8. *Phoradendron zelayanum* Kuijt, sp. nov. TYPE:

Nicaragua. Zelaya: N of abandoned airstrip near Alamikamba, along tributary of Caño Alamikamba, 10 m, gallery forest among savanna, on *Symphonia globulifera* L.f., *Stevens 21717* (holotype, MO; isotypes, HNMN, LEA). Figure 9.

Planta monoeca, dichotoma, apice abortivo. Caules teretes; innovationes laterales cataphyllis infra positibus binis. Folia late ovata vel orbicularia, lamina ad 8×8 cm, palmato-venosa; petiolus validus, planus, supra expansus. Inflorescentia cataphyllis sterilibus nullis; in-



FIGURE 8. *Phoradendron tardispicum* Kujit (Churchill & Kujit 5107).—a. Habit.—b. Inflorescence.

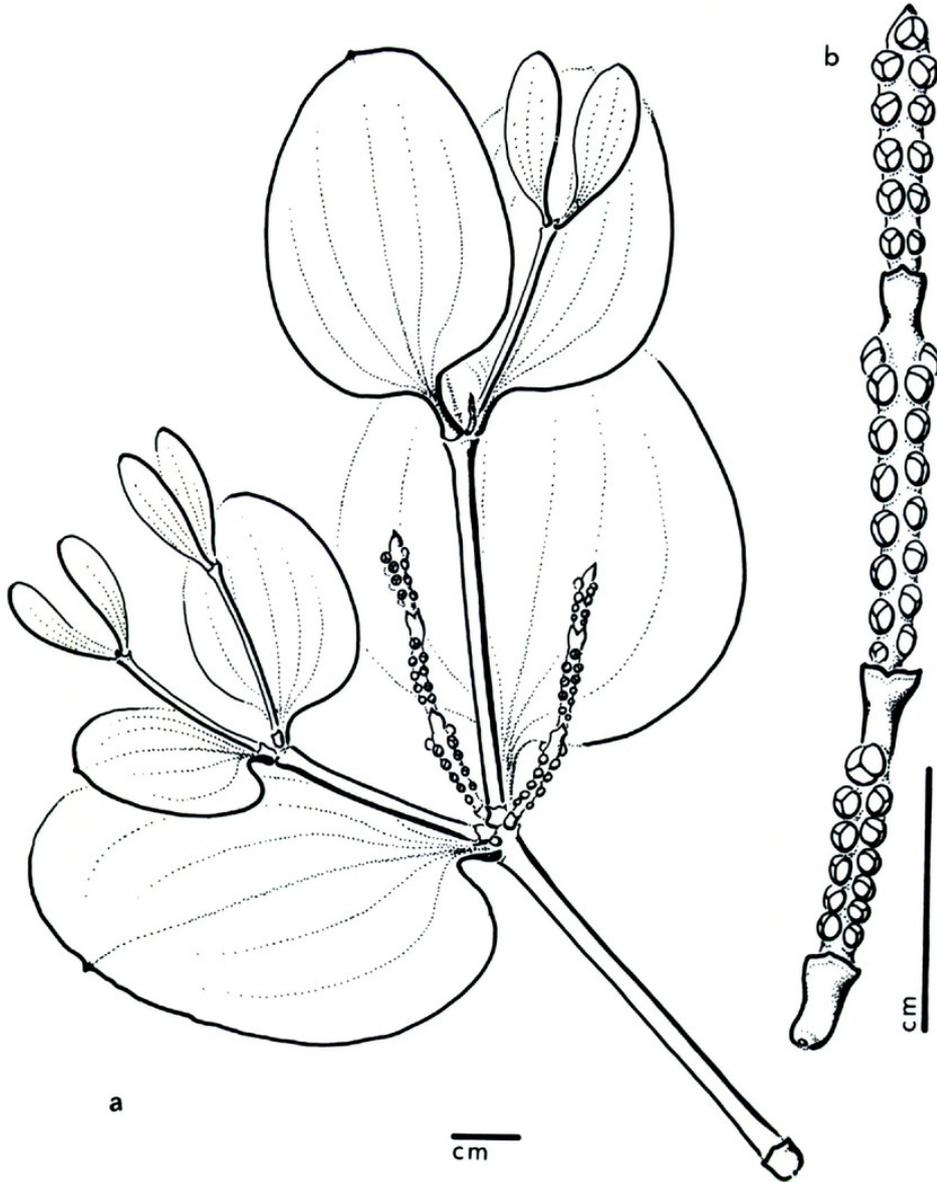


FIGURE 9. *Phoradendron zelayanum* Kuijt (Stevens 21717).—a. Habit.—b. Inflorescence.

ternodia fertilia tria; flores 13–15 pro bractea fertili, biseriati; spica 4 cm longa; spicae hermaphroditae.

Plants monoecious, forking, the apex aborting, the inflorescences and young shoots dull golden-yellow. Stems terete, stout; internodes to 8 cm long; the lateral shoots with one low pair of cataphylls. Leaves broadly ovate to orbicular; blade to 8×8 cm, with 5 or 7 very conspicuous palmate veins running far towards the apex; petiole stout, ca. 8 mm long, flat and expanding distally. Inflorescences bisexual, lacking sterile cataphylls, the peduncle 3 mm long, this followed by 3 fertile internodes each with 13–15 biseriate flowers per fertile bract, the entire spike 4 cm long.

9. *Psittacanthus angustifolius* Kuijt, sp. nov.

TYPE: Nicaragua. Madriz: 0.5 km al S de San José de Cusmapa, 1,200 m, parasitando en un *Pinus*, Moreno 24419 (holotype, MO; isotype, HNMN, LEA). Figure 10.

Caules acute quadrangulares. Folia bina, anguste falcata, tenua, venatione pinnata; lamina ad 17×2.5 cm, basi acuta, apice graciliter attenuata, petiolus ad 5 mm longus. Inflorescentia terminalis, e triadis 4 vel 6 consistens. Pedunculi triaderum circ. 1 cm longi, inferiores bracteis foliaceis ad 2 cm longis; pedicelli cupula terminali notabili. Petala aurantiaca, 7.5–8 cm longa; alabastrum rectum vel aliquantum curvatum. Ligulae et pili staminum nulli, sed apices petalorum crista centrali, carnosa liguliformi ornati. Stamina dimorpha, 5 cm longa, antherae 6 mm longae. Stigma antheras superans, capitatum.



FIGURE 10. *Psittacanthus angustifolius* (Moreno 24419).—a. Habit.—b. Tip of petal.

Stems sharply quadrangular. Leaves paired, narrowly falcate, thin; the blade to 17×2.5 cm, venation pinnate, the base acute, the apex slenderly attenuate; petiole to 5 mm long. Inflorescences terminal, consisting of 4 or 6 triads; triad peduncles ca. 1 cm long, the lowest ones with foliaceous bracts to 2 cm long; pedicels 1.5 cm long, with conspicuous terminal cupule, the calyculus smooth. Bud stout, more or less straight or somewhat curved; base and tip 5 and 4 mm wide, respectively, the latter blunt. Petals orange, 7.5–8 cm long; inner part of flower hairless, the petal base 5 mm wide, without ligule; petal apices 4 mm wide, blunt, each with a fleshy, ligule-like median crest extending inwards. Stamens dimorphic; filaments attached at ca. 2.5 cm above petal base, 5 cm long; anthers 6 mm long. Ovary 5×6.5 mm. Stigma placed above anthers, very small, capitate. Fruit unknown.

Additional specimen examined. Same data as type, Soza et al. 155 (HNMN, MO).

This is an extremely distinctive species, known from what is essentially a single collection. Whether the species is restricted to *Pinus*, as apparently is *Psittacanthus pinicola*, can only be shown by further fieldwork. The two species cannot be confused, as *P. pinicola* is dyadic and has irregularly whorled, blunt, more leathery leaves. The type locality suggests that the species may well be present in neighboring Honduras.

10. ***Psittacanthus minor* Kujit, sp. nov.** TYPE: Nicaragua. Matagalpa: SW slopes of Cerro El Pilón and adjacent Laguna Tecomapa, roadside, low thorn scrub and pastures on rocky slopes, on ant acacia, Stevens 9466 (holotype, MO; isotypes, HNMN, LEA). Figure 11.

Plantae parva, caulibus teretibus, foliis binis. Folia tenua; lamina ad 5.5×3.5 cm, ovata, utraque extremitate obtusa vel fere; petiolus 3–5 mm longus. Inflorescentia terminalis, paribus triadarum 4–6. Petala circ. 3.7 cm longa, rubro-aurantiaca; area ligulae paulum distincta. Alabastrum rectum, basi haud dilatatum, calyculus laevis. Stamina dimorpha; antherae 3 mm longae, series duae vix imbricantes; filamenta circ. 16 mm longa; stylus petalis fere aequilongus; stigma aegre distinguendum.

Stems terete, phyllotaxy paired. Leaves thin, the blade to 5.5×3.5 cm, ovate, the apex and base obtuse or nearly so; venation more or less palmate; petiole 3–5 mm long. Inflorescences terminal, consisting of 4–6 pairs of triads on peduncles ca. 12 mm; pedicels 10 mm long. Buds

straight, not dilated at base. Petals ca. 3.7 cm long, red-orange; ligular area weakly differentiated. Stamens dimorphic; the anthers 3 mm long, dorsifixed, the 2 series scarcely overlapping, the filaments attached ca. 21 mm above the base, some 16 mm long. Ovary more or less cylindrical, 4×2 mm; style nearly as long as the petals; stigma weakly differentiated; calyculus smooth. Fruits ovoid, 1.5×1 cm, with conspicuous calyculus, blackish.

Additional specimens examined. NICARAGUA. MATAGALPA: Puertas Viejas, 2 km al N sobre la Carretera Panamericana, "San Vicente," 600 m, on *Acacia*, Moreno 18288 (HNMN, LEA, MO); same, San Juanillo, 8 km al SE de Ciudad Dario, 500 m, on Fabaceae, Grijalva 2618 (HNMN, LEA, MO); same, Entrada Paso de Carretera, quebrada, 460–480 m, on Bignoniaceae, Moreno 16698 (HNMN, LEA, MO). MANAGUA: camino Dario-Presa Santa Barbara, 8 km al NW de Ciudad Dario, on Leguminosae, Grijalva 2693 (HNMN, LEA, MO).

Psittacanthus minor is closely related to *P. mayanus* Standley & Steyerl., which appears to be limited to the Yucatán region, has quadrangular stems, and fruits which are about half as large as those of *P. minor*. *Psittacanthus mayanus* is much smaller in general.

11. ***Psittacanthus pinicola* Kujit, sp. nov.** TYPE: Belize. Belize: Manatee Pine Ridge, on pine, 1931–32, Gentle 82 (holotype, GH; isotype, MO). Figures 12, 13.

Caulis plus minusve teretes; folia symmetrica, ter verticillata, ad 11×2.5 cm, anguste elliptica vel lanceolata, apice rotundata, basi in petiolum circ. 5 mm longum angustata. Inflorescentiae laterales, ad nodos, umbellulas e dyadis 2 vel 3 formantes. Petala circ. 4 cm longa, rubra, apice luteo-viridescencia, medio aurantiaca, basi ligula prominente; alabastrum supra aliquantum curvatum, circum ovarium ad latitudinem circ. 5 mm dilatatum, ad apicem tenuissimum, leviter curvatum, circ. 1.5 mm latum angustatum; calyculus laevis. Stamina dimorpha; antherae dorsifixae, dorso paulo pilosae. Ovarium plus minusve cylindricum, 4.5 mm longum; stylus longus, basi aliquantum torsus; stigma ellipsoideum, subtiliter papillosum. Fructus ellipsoideus, calyculo inconspicuo, 13×5 mm, saturate purpureus.

Stems more or less terete, becoming coarsely fissured and blackish when old; leaves symmetrical, in (often somewhat irregular) whorls of 3, to 11×2.5 cm, narrowly elliptical to lanceolate; apex rounded; base tapering into petiole ca. 5 mm long. Inflorescences lateral, axillary, often also on older, leafless stems, each being an umbel of 2 or 3 dyads; inflorescence peduncle to 13 mm long; dyad peduncles and floral pedicels 5–7 mm

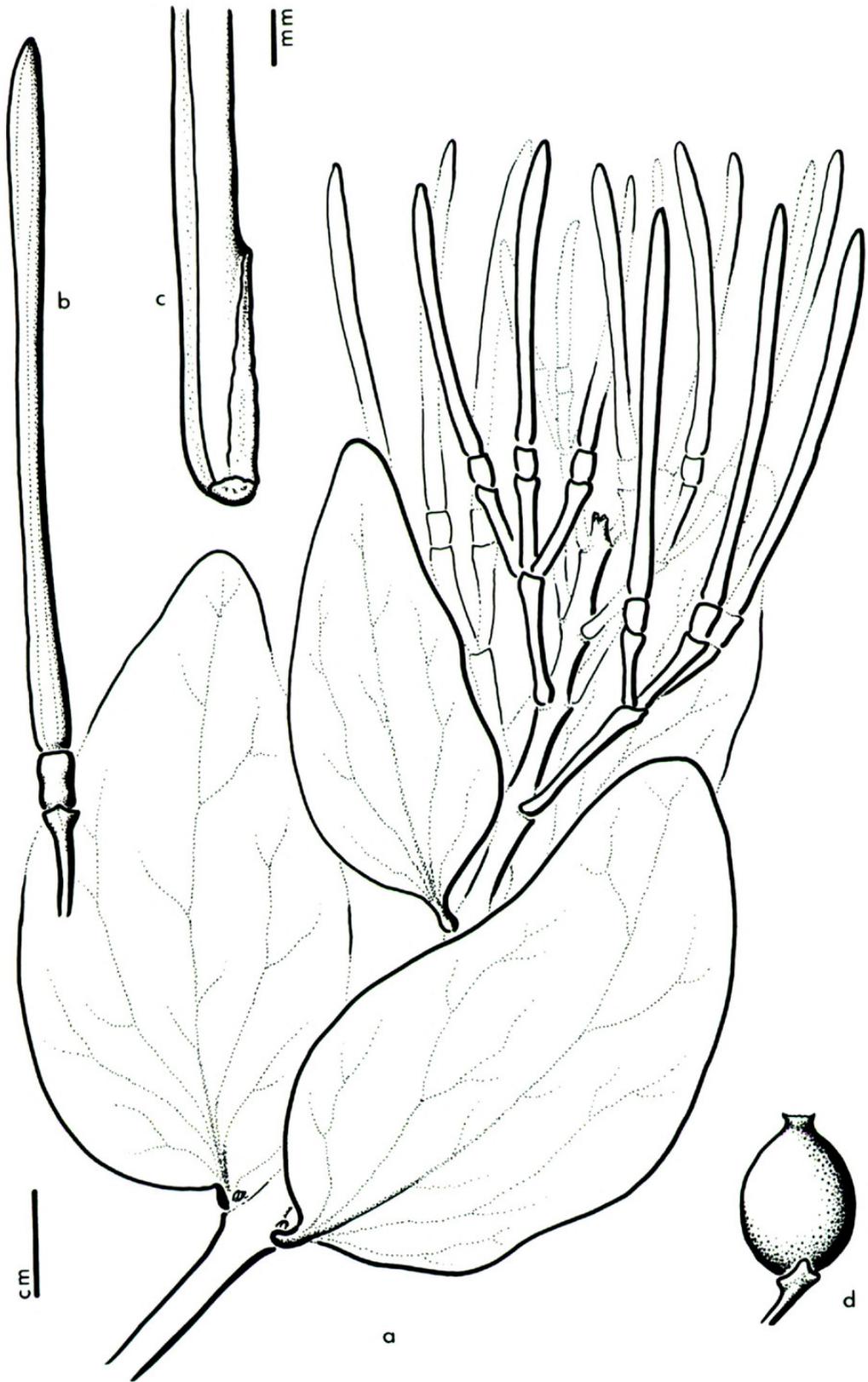


FIGURE 11. *Psittacanthus minor* Kuijt (Stevens 9466).—a. Habit, with immature inflorescence.—b. Mature bud.—c. Base of petal.—d. Fruit (Moreno 18288).

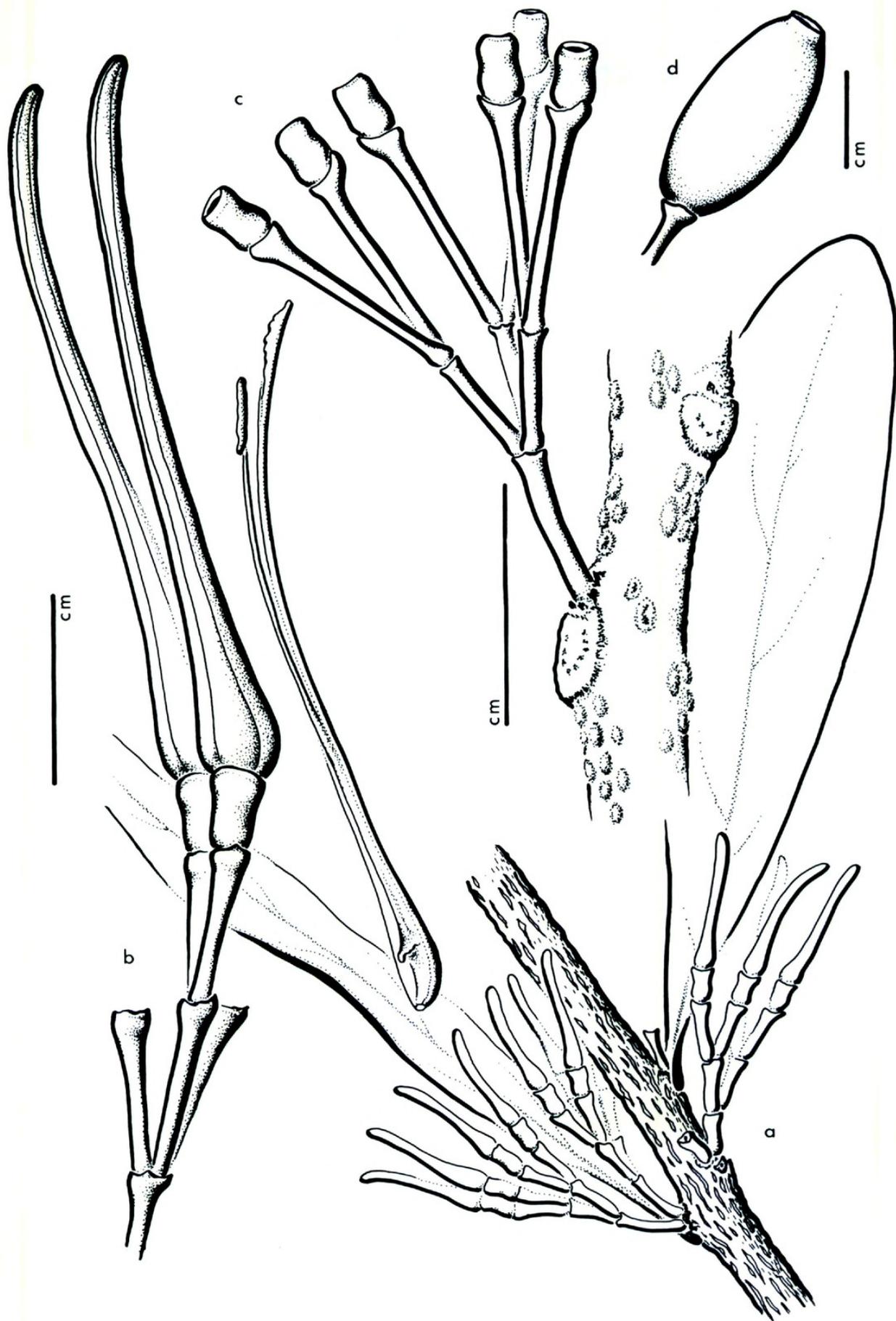


FIGURE 12. *Psittacanthus pinicola* Kuijt.—a. Habit with immature inflorescences (*Pipoly* 4013).—b. Same collection, portion of inflorescence with mature buds, a single petal shown separately.—c. Complete inflorescence just after anthesis (*Gentle* 82).—d. Mature fruit (*Stevens* 7600).

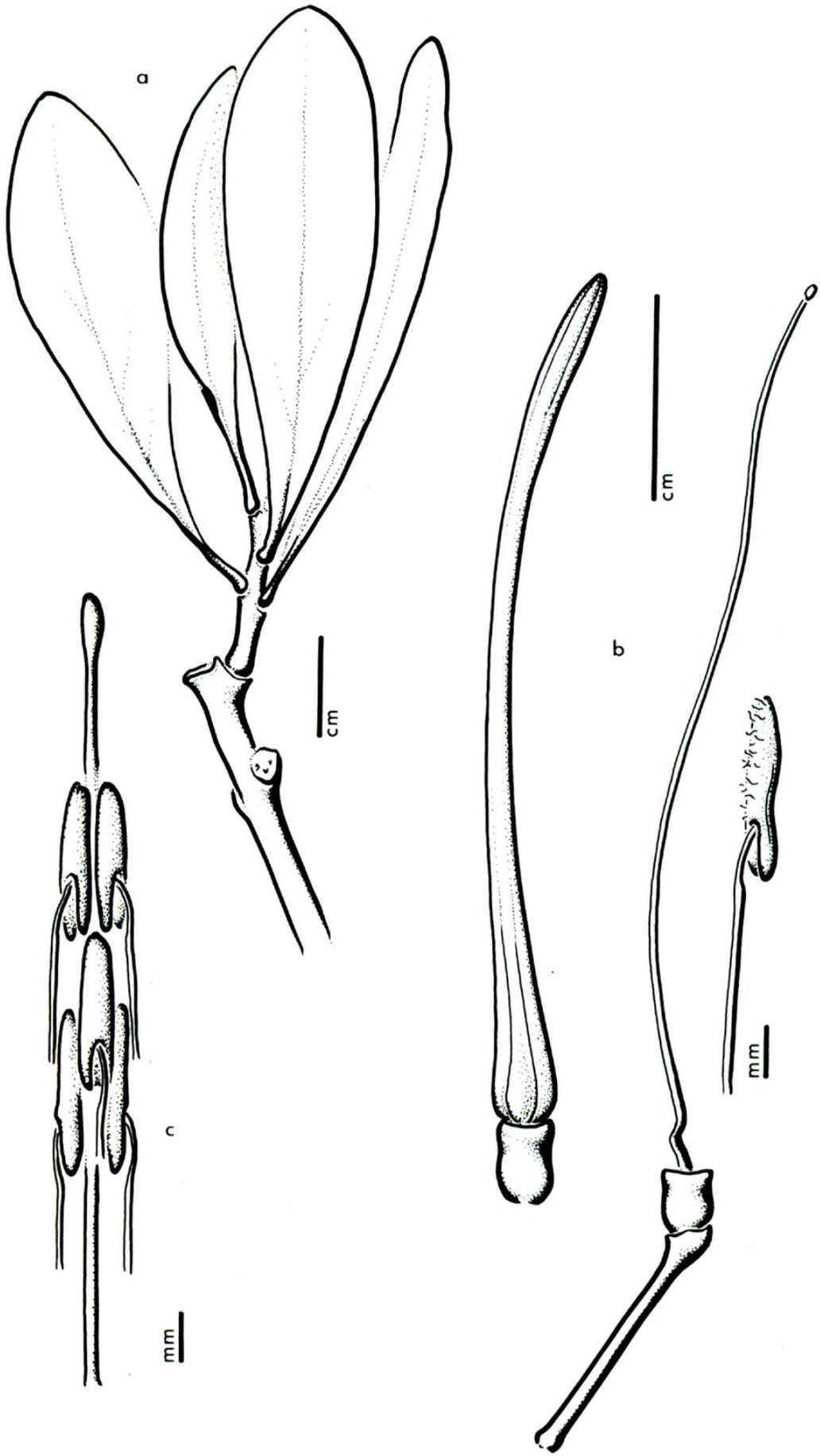


FIGURE 13. *Psittacanthus pinicola* (Gentle 82).—a. Leafy innovation.—b. Mature flower, the style and anther shown separately to the right.—c. Relative positions of anthers and style.

long, the latter scarcely expanded at the tip. Petals ca. 4 cm long, red with yellow-green tip, orange in the middle, prominently ligulate at the base. Buds somewhat curved above, inflated at the ovary to a width of nearly 5 mm, tapering to a very slender, slightly curved tip ca. 1.5 mm wide. Stamens dimorphic, sometimes apparently nearly trimorphic (Fig. 13c); filaments of the longer type attached 1.5 cm above the base, 1.5 cm long; anthers 3–4 mm long, dorsifixed, sparsely pubescent on back. Ovary more or less cylindrical, green, 4.5 mm long, 2 mm diam. below, expanding slightly above; calyculus smooth. Style 4.6 cm long more or less straight, but the base somewhat twisted; stigma ellipsoid, finely papillate. Fruit ellipsoid, with inconspicuous calyculus, 13 × 5 mm, "deep purple."

Additional specimens examined. BELIZE. BELIZE: western highway, Mile 30, beside track, on pine, *Whitefoord 2442* (MO); same, The Place, on pine, *Whitefoord 2562* (MO). DISTR. UNKNOWN: P. Cayo, in roadside park on ridge area overlooking 1,000 ft. falls, in area of *Pinus caribea*, Mountain Pine Ridge area, *Huston 615* (MO). NICARAGUA. ZELAYA: Río Troncera at junction with carretera between Waspam and Puerto Cabezas, elevation less than 200 m, poorly developed gallery forest in savanna, on *Pinus caribea*, *Pipoly 4013* (HNMN, LEA, MO); near Tala Has and Puente Mango (over Río Kisalaya), 40–60 m, pine savanna, on *Pinus caribea*, *Stevens 7600* (LEA, MO); Comarca del Cabo, Kornuk Creek above Puente Pozo Azul, old bridge, *Robbins 5831* (LEA, MO). NUEVA SEGOVIA: El Jícaro, 7 km sobre la carretera a Murra entrada al Quebracho, 600–620 m, on pine, *Moreno 8305* (HNMN, LEA, MO).

Other dyadic species north of Panama are *P. sonora* (Watson) Kuijt, *P. palmeri* (Watson) Barlow & Wiens, *P. nudus* (Molina) Kuijt & Feuer, and *P. ramiflorus* (DC.) G. Don. *Psittacanthus pinicola* is similar to the last species but seems more closely related to *P. dichrous* (Martius) Martius (see Eichler, 1868, especially Pl. 5). Not only inflorescence structure and general appearance indicate this affinity, but even the peculiar curvature of the stylar base is seen in both.

12. ***Psittacanthus rhynchanthus*** (Bentham) Kuijt, comb. nov. *Loranthus rhynchanthus* Bentham, Bot. Voy. Sulphur 102–103. 1845. TYPE: "Dr. Sinclair," Tiger Island (Honduras, Bay of Fonseca) (K). Figure 14d–f.

Psittacanthus chrismarii Urban, Bot. Jahrb. 24: 331. 1897. TYPE (here designated): Costa Rica. Forêts de Nicoya, *Tonduz 13706* (holotype, US; isotypes, CR, GH).

Psittacanthus calyculatus auct., non (DC.) G. Don, Gen.

Syst. 3: 415. 1834. TYPE: Mexico. Cuernavaca: *Berlandier 1150* (G-DC).

An attractive *Psittacanthus* in which the buds are distinctively curved and beaked occurs throughout Mesoamerica, at low elevations from southern Mexico to Venezuela. In the past, this species has been called *P. calyculatus* (DC.) G. Don or, earlier, *P. chrismarii* Urban. After studying the types of both *Loranthus rhynchanthus* Bentham and *L. calyculatus* DC., I conclude that these are two distinct species. Consequently, the name *P. rhynchanthus* must be applied to the wide-ranging species mentioned above. True *P. calyculatus* seems limited to Mexico, the type originating from the area of Cuernavaca, further collections having been seen from Puebla and Morelia.

Notwithstanding their general similarity, the two species may be consistently separated mostly on the basis of floral features. The mature, unopened bud of *Psittacanthus calyculatus* is very nearly straight and has a rather blunt tip; that of *P. rhynchanthus* shows a distinctive curvature in the distal portion, the apex being sharply acute, and more beaklike. *Psittacanthus rhynchanthus* has smooth pollen sacs behind which are borne long, conspicuous, reddish stamen hairs; the pollen sacs of *P. calyculatus* are distinctly lobed, and stamen hairs are lacking. Furthermore, the stylar base in *P. rhynchanthus* bears low protuberances, and each adjacent petal base shows a ligule consisting of a low, V-shaped ridge; the stylar base in *P. calyculatus* is smooth, and ligules are absent. Leaves of *P. calyculatus* tend to be smaller (to 8 × 4 cm), mostly less than twice as long as wide, and approximately symmetrical, while those of *P. rhynchanthus* are usually larger (to 12 × 4 cm), more than twice as long as wide, and strikingly falcate.

In Venezuela, at least some individuals of the latter species have extremely narrow leaves; these plants belong to *Psittacanthus rhynchanthus* var. *wurdackii* (Rizzini) Kuijt, comb. nov. (*P. calyculatus* (DC.) G. Don var. *wurdackii* Rizzini, *Rodriguésia* 41: 15. 1976). I have not yet encountered the species from the Caribbean lowlands of Colombia, but it would be surprising if it were not present there.

13. ***Struthanthus subtilis*** Kuijt, sp. nov. TYPE: Panama. Coclé: near continental divide along lumbering road, 2.2 km beyond sawmill in forest above El Copé, 900 m, *Hammel 998*

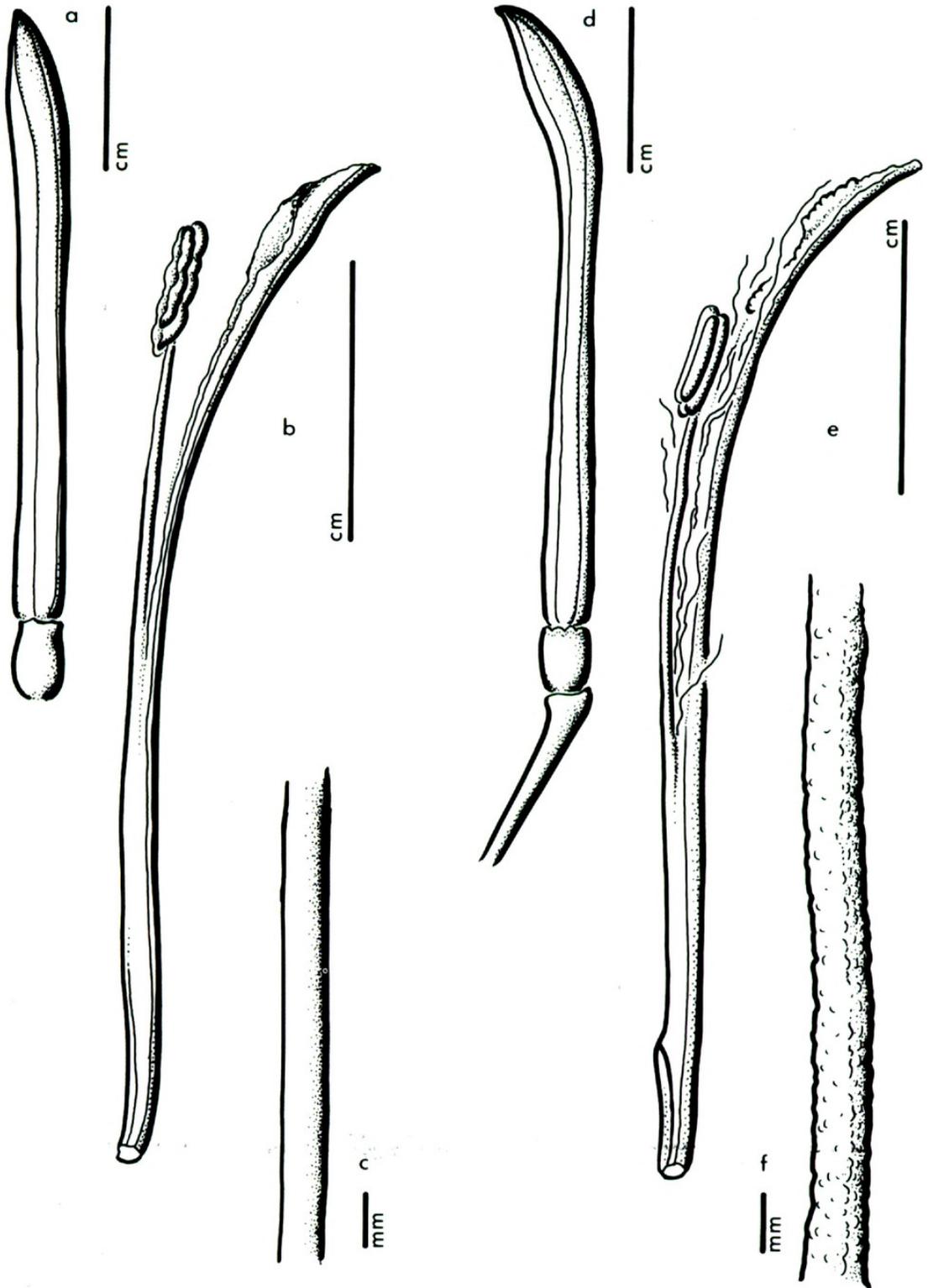


FIGURE 14. *Psittacanthus calyculatus* (DC.) G. Don (a-c; Mexico, Puebla, slopes of Popocatepetl, *Ugent et al. 1359*, WIS) and *P. rhynchanthus* (Bentham) Kuijt (d-f; Nicaragua, Managua, Cuatro Esquinas, *Moreno 4400*, LEA).—a, d. Mature buds.—b, e. Petals.—c, f. Stylar bases.

(holotype, MO; isotypes, LEA, PMA). Figure 15.

Plantae inconspicuae, subtiles; caulis gracilis, plus minusve teres. Folia tenua; venatio manifesta, pinnata;

lamina anguste lanceolata ad late ovata, 4–12 cm longa, 2–6 cm lata, apice caudiformis, petiolus circ. 3×1 mm. Inflorescentiae singulae, axillares, bracteis triadaram 2 vel 4 constitutentes; pedunculus communis ad 8 mm longus, triadaram ad 5 mm, uterque 0.5 mm

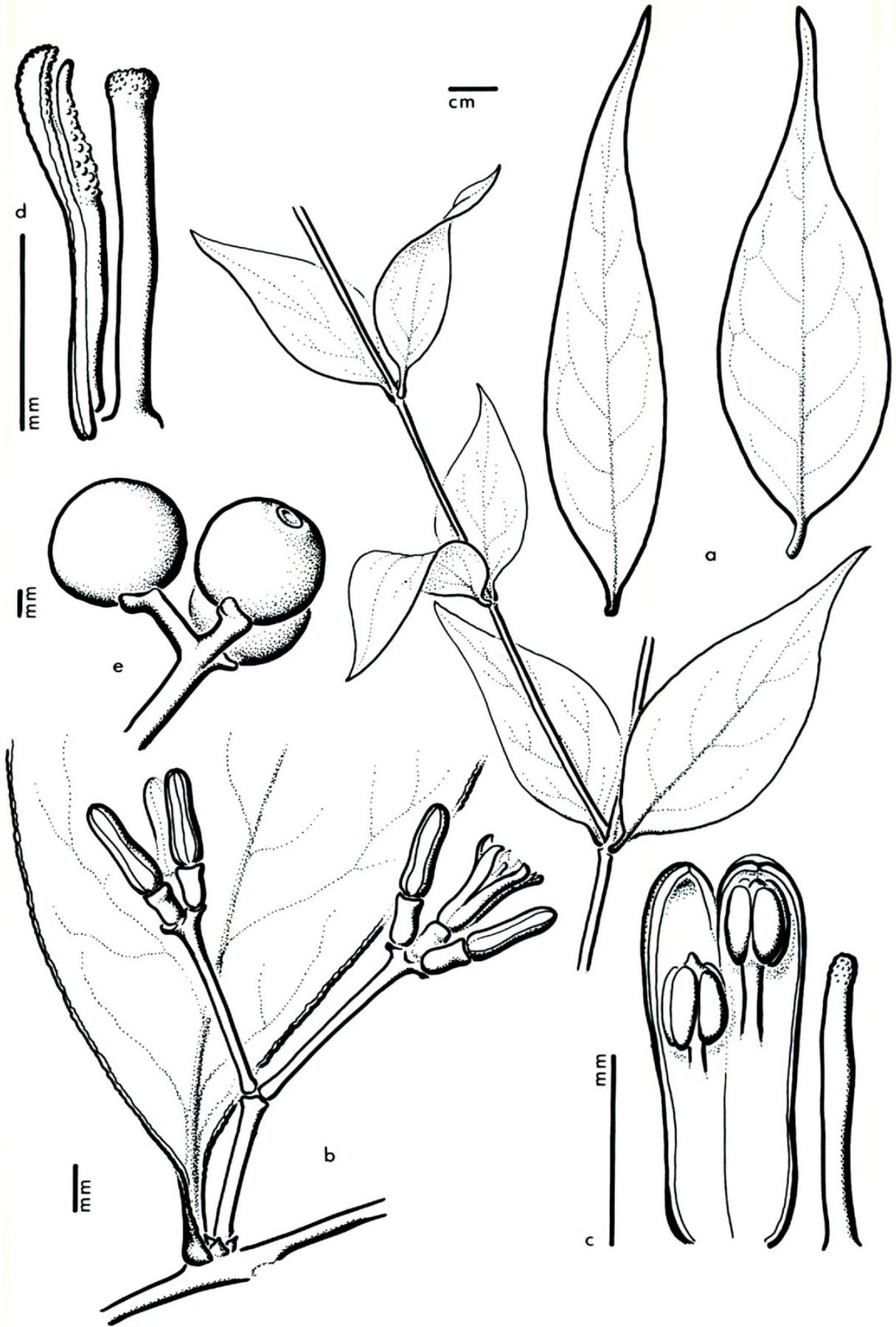


FIGURE 15. *Struthanthus subtilis* Kuijt.—a. Leafy shoot (Croat 49004) and leaves (Croat 44584).—b. Inflorescence (Folsom & Lantz 1894).—c. Same collection, petals and style, male flower.—d. Same collection, petals and style, female flower.—e. Mature fruits (Hammel 998).

vel minus crassus; flores laterales anthesi pedicellis 0.5 mm longis; bracteae bracterolaeque minutae, caducae; petala 2–2.5 mm longa; stigma cristis indistinctis papillois 6. Fructus aurantiacus, subglobosus, 5 mm diam., calyculo inconspicuo; pedicelli fructuum lateralium ad 3 mm elongati.

Plants inconspicuous, rather delicate, branched. Stems slender, more or less terete; stem roots occasional, thin. Leaves thin, blade narrowly lanceolate to broadly ovate, always with caudate tip, 2–6 × 4–12 cm, the evident venation pinnate; petiole ca. 3 × 1 mm. Inflorescences pale green, solitary in leaf axils, subtended by 4 minute, probably caducous bracts, consisting of a raceme of 2 or 4 triads; inflorescence peduncle to 8 mm long; triad peduncles to 5 mm, both 0.5 mm or less thick. Lateral flowers on pedicels 0.5 mm long at anthesis; bracts and bracteoles minute, caducous. Petals 2–2.5 mm long. Stamens dimorphic; upper portion of sterile stamens papillate; anthers 0.4 mm long; style 2 mm long, the stigma with 6 indistinct papillate crests. Fruits orange, nearly spherical, 5 mm diam.; calyculus inconspicuous; pedicels of lateral fruits elongated to 3 mm.

Additional specimens examined. PANAMA. COCLÉ: near continental divide along lumbering road, 1.5 mi. N of El Copé, *Croat 44584* (CR, LEA, MO); El Copé–El Potroso, Atlantic slope of Alto Calvario, 700–850 m, *Folsom & Lantz 1894* (LEA, MO, PMA); along road from La Pintada to El Copé by way of Piedras Gordas, sawmill above El Copé, cloud forest, 100 m, *Hammel 2640* (LEA, MO); along road between Llano Grande and Coclesito (N of Pintada), 4 mi. N of Llano Grande, 600 m, *Antonio 3575* (LEA, MO); trail from Caño Blanco del Norte to continental divide N of El Copé, on *Hedyosmum*, 400 m, *Davidse & Hamilton 23654* (BM, LEA, MEXU, MO, PMA); El Copé, Atlantic side, 1,200 m, *Antonio 1153* (LEA, MO); between continental divide above El Copé and El Potroso sawmill and the Río Blanco to the north, 330 m, *Sytsma et al. 2409* (EAP, LEA, MO); El Copé, along gravel road to

the right before sawmill, 800 m, *Antonio 2207* (LEA, MO, NY, PMA); Alto Calvario cloud forest, 5.3 km above El Copé, continental divide, above sawmill, 930 m, *Antonio 3044* (LEA, MO, PMA); above El Potroso sawmill at continental divide, 1,200–1,300 m, *Sytsma 1820* (LEA, MO). VERAGUAS: along Santa Fé–Calovebora road beyond Escuela Agrícola Alto Piedra, along first major stream, 3 mi. from fork in road at school, 700 m, *Croat 49004* (LEA, MO).

This species was previously listed as *S. aff. dichotrianthus* Eichler (Kuijt, 1978). *Struthanthus dichotrianthus* (and *S. phyllyraeoides* (Kunth) Blume) are indeed related to *S. subtilis*, as is *S. quercicola* (Cham. & Schlecht.) Blume of western Panama to Mexico, but the extreme slenderness and small racemes of our plant, the leaf size, and especially the consistently caudate to acuminate leaf apex, leave little doubt that this is a distinct species. *Struthanthus subtilis* appears to be endemic to the Coclé–Veraguas region.

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