

Revision of *Ticorea* Aubl. (Rutaceae, Galipeinae)

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Kallunki, J. A. (The New York Botanical Garden, Bronx, NY 10458-5126, U.S.A.). Revision of *Ticorea* Aubl. (Rutaceae, Galipeinae). *Brittonia* 50: 500–513. 1998.—*Ticorea* comprises five species, which occur in the Guianas, throughout the Amazonian basin, and on the lower eastern slopes of the Andes in Ecuador, Peru, and Bolivia. Two of the five are described here as new: *T. diandra*, from eastern Ecuador and adjacent Peru, and *T. froesii*, from Maranhão and Pará, Brazil.

Key words: *Ticorea*, Rutaceae, South America.

Ticorea Aubl. is one of 27 genera in the neotropical subtribe Galipeinae Kallunki (previously known as Cuspariinae Engl., an illegitimate name; see Kallunki & Pirani, 1998). The genus comprises five species occurring in the Guianas, the Amazonian basin, and the lower eastern slopes of the Andes in Ecuador, Peru, and Bolivia. They are shrubs or small trees in the understory of moist forests.

Engler (1931) distinguished *Ticorea* from the other genera of the subtribe by its actinomorphic flower, tubular corolla, and fully fertile androecium (five fertile stamens and no staminodes). With the discovery of the specimens with only two fertile stamens here described as *T. diandra*, the last character no longer holds true. The genus, nevertheless, is quite distinct.

The combination of characters particular to the genus comprises 1) a tubular corolla formed by coherent petals and adherent staminal filaments, 2) a full complement of five fertile stamens (in all but *T. diandra*), 3) anthers that (in all but *T. diandra*) are sterile at base above their point of attachment to the filament and appendaged below this point (Figs. 1F, 2G), 4) a disc pubescent on the rim, and 5) the usual presence of domatia in the axils of secondary veins on the abaxial surface of the leaflets.

Morphology

Terminology used to describe two-dimensional shapes is that of Hickey (1979).

LEAVES AND INFLORESCENCES

Sterile specimens of *Ticorea* can be distinguished by the trifoliate petiolate leaves of which the leaflets bear on the abaxial surface domatia in the axils of the secondary veins (Fig. 1B) and dark, glandular punctae. No other genus in the subtribe is known to have such domatia. Specimens of *Ticorea* often cannot be identified to species with certainty on the basis of vegetative or fruiting characters alone. Many specimens of *T. longiflora*, however, can be distinguished by vegetative characters (see discussion of that species).

The inflorescence is produced in a lateral (but apparently not axillary) position near the apex of the stem and appears terminal until it is overtopped by continued growth of the stem. This positioning of the inflorescence occurs also in other genera of the subtribe, such as *Angostura* and some species of *Conchocarpus* (Kallunki & Pirani, 1998). The partial inflorescences (i.e., the elements attached to the primary axis of the inflorescence; Weberling, 1989) are cymose and usually attached in a group at the apex of a relatively long peduncle (Fig. 1C). Only in *T. diandra* are they attached alternately to a developed primary rachis (Fig. 2A). Each partial inflorescence is dichasial at the first node and either dichasial or monochasial at higher nodes. The ultimate branches are usually secund.

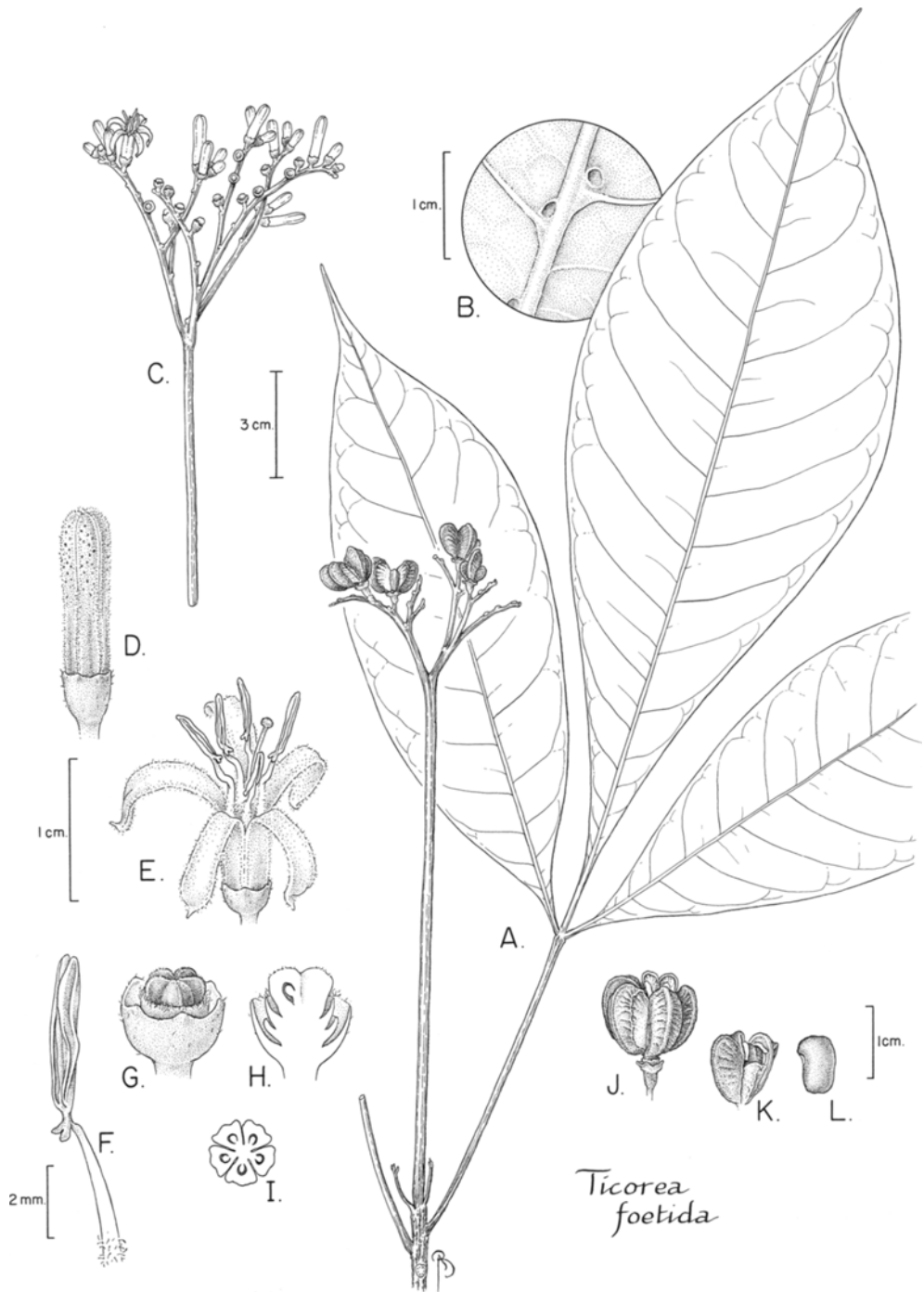


FIG. 1. *Ticorea foetida*. **A.** Apex of branch with leaf and infructescence. **B.** Detail of abaxial surface of leaf, showing domatia. **C.** Apex of inflorescence. **D.** Floral bud. **E.** Mature flower. **F.** Apex of filament with anther. **G.** Calyx, disc, and developing ovary. **H.** Longitudinal section of calyx, corolla base, disc, and carpels. **I.** Cross-section of ovary. **J.** Fruit. **K.** Dehiscent mericarp, with glimpse of bony endocarp and seed. **L.** Seed. (A–C, Mori et al. 15376; D–I, Loizeau & Loizeau 620; J, Mori & Pennington 17934; K, L, Mori & Hartley 18459.)

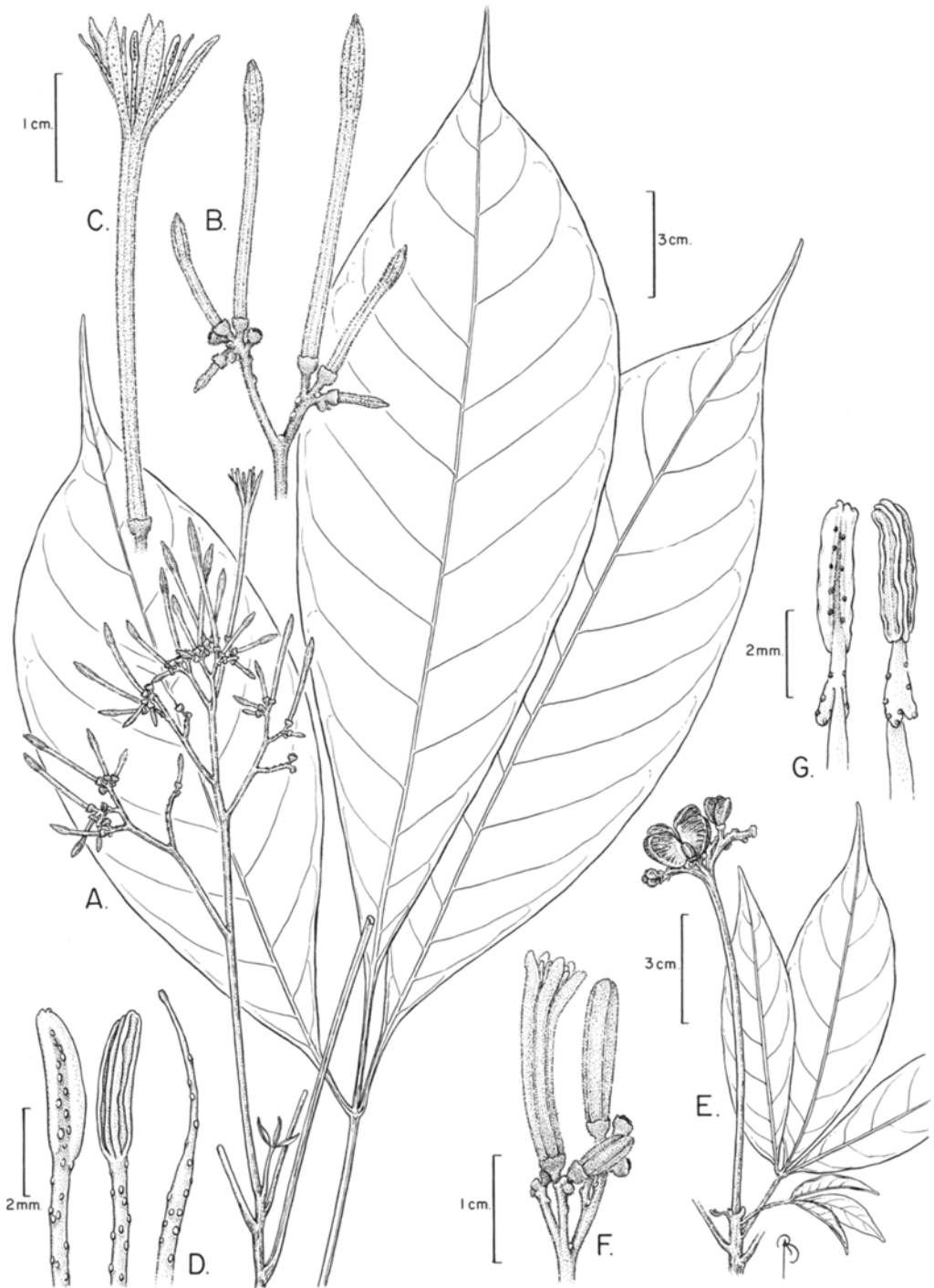


FIG. 2. **A–D.** *Ticorea diandra*. **A.** Leaf and apex of stem with petiole bases and inflorescence. **B.** Apex of partial inflorescence. **C.** Flower. **D.** Apex of stamen, ab- and adaxial views, and of staminode. **E–G.** *Ticorea froesii*. **E.** Apex of branch with infructescence. **F.** Apex of inflorescence. **G.** Apex of stamen, ab- and adaxial views. (A–D, Lugo S. 3761; E, Fróes 34493; F, G, Fróes 20255.)

FLOWERS

The corolla is formed by coherent petals, which can be separated quite easily, and is pubescent with short, variously bent, often yellowish hairs. That of *T. tubiflora* is usually subglabrous on the lobes and sparsely pubescent only on the tube and margins of the lobes.

In some species the floral buds are rounded or obtuse (Fig. 1D) and the apices of the petals are inflexed, while in others the floral buds are pointed (Fig. 2B) and the petals are not inflexed. The inflexion of the petals of the former group is still present in mature flowers.

The stamens are the most distinctive characteristic of the genus. The anthers are exserted from the corolla tube. The exserted part of the filament and the connective of the anther are glandular-punctate. The anther is sterile at the base above its point of attachment to the filament and below that point bears an entire or bifid appendage (Figs. 1F, 2G). The stamens of *T. diandra*, of which only two are fertile, despite the lack of an appendage, are obviously similar to those of the other species (Fig. 2D).

The rim of the cupular disc of *Ticorea*, unlike that of other Galipeinae, is pubescent (Fig. 1G). The carpels are connate axially in flower but separate as the mericarps develop. Each mericarp opens along its ventral suture, and the cartilaginous endocarp twists as it dries and helps to eject the seed. This mode of dehiscence is common to the subtribe.

The seeds are smooth and dull. The testa is papery and tears upon dissection, like that of only a few other genera of the subtribe (e.g., *Raputia*, *Adiscanthus*, *Spiranthera*, and some species of *Conchocarpus*); the testa of most other genera contains a dark crusty layer that causes the testa to fracture when dissected.

The embryo is of the type most prevalent in the subtribe: The radicle is apical and curved toward the axis, and the orbicular cotyledons are conduplicate and plicate.

Generic Relationships

The relationships of *Ticorea*, like those of most genera of the Galipeinae, are dif-

ficult to determine. The 27 genera are defined by unique combinations of character states of a limited number of characters, of which any single state occurs in more than one genus. Characters vary independently, and similar states apparently have arisen independently and through reversals. Observations of any one character will suggest a relationship of a given genus to one set of genera with which it shares a character state, while observations of a different character may suggest its relationship to a different set of genera.

It seems unlikely that *Ticorea* is related to the group of seven genera with generally opposite leaves and overlapping sepals to which *Raputia* belongs (Kallunki, 1994) or to the group of three genera with large, valvate calyces to which *Erythrochiton* belongs (Kallunki, 1992). Although Engler's key (1931) groups *Ticorea* with six other genera with actinomorphic flowers and a fully fertile androecium, it is also unlikely that *Ticorea* is closely related to these. The anthers of these other six genera, unlike those of *Ticorea*, are unmodified—i.e., they are not sterile above their attachment to the filament and they bear no appendages. Other than in *Ticorea*, basally sterile and appendaged anthers are found only in genera with a partially sterile androecium, i.e., only two fertile anthers.

The exclusion of the 16 genera in these three groups as closest relatives leaves nine genera to consider. Of these, six have free carpels, and three (*Rauia*, *Galipea*, and *Neoraputia*), like *Ticorea*, have connate carpels and may be more closely related, even though *Ticorea* differs from these three by its papery (vs. crustaceous) testa. *Rauia* may be excluded as closest relative because it differs by its unmodified anthers, perforate (vs. reticulate) exine, and plano-convex (vs. conduplicate and plicate) cotyledons. While anthers of all but one species of *Neoraputia* are appendaged but not sterile at base, those of *Galipea* and *N. trifoliata* (Engl.) Emmerich, like those of *Ticorea*, are both sterile and appendaged. The carpels of *Neoraputia* and *Galipea*, unlike those of *Ticorea*, are connate laterally as well as axially. A clear choice of the nearest relative cannot be made in light of known characters.

Taxonomy

TICOREA Aubl., Hist. Pl. Guiane 2: 689. 1775. TYPE: *T. foetida* Aubl.

Ozophyllum Schreb., Gen. Pl. 2: 452. 1791, illegitimate substitute for *Ticorea*.

Warmingia Engl. in Mart., Fl. Bras. 12(2): 86 (name only), 92 (its use retracted). 1874.

Shrub or tree 1.5–15 m. *Leaves* alternate, 3(–4)-foliolate, petiolate; blade entire, chartaceous, dark-glandular-punctate abaxially, often with domatia on abaxial surface in axils of secondary veins. *Inflorescence* a relatively long-pedunculate, variably branched, usually rounded and shortened thyrses, produced laterally near apex of twig, the partial inflorescences 2–4, usually closely proximate at apex of the peduncle, rarely (in *T. diandra*) alternate along a primary rachis, dichasial at first node, dichasial or monochasial at higher nodes, the ultimate branches often secund. *Calyx* subentire or ± dentate, persistent in fruit, the lobes quincuncial in bud. *Corolla* tubular, actinomorphic, white, greenish in bud, ± pubescent without, tomentulose within, especially in the tube, the petals (4–)5, linear, tightly or weakly coherent in a straight tube, the lobes imbricate in bud, recurved at anthesis. *Androecium* of (4–)5 fertile stamens or rarely (in *T. diandra* and an odd individual of *T. tubiflora*) of 2 fertile stamens and 3 staminodes; filaments flattened, free from or coherent to each other, tightly or weakly adherent to the corolla tube by abaxial woolly pubescence, free and glandular-punctate above; anthers free, glabrous, usually each with a sterile base above its attachment to filament and with a symmetric, entire or notched appendage at base (in *T. diandra*, appendage lacking), the connective glandular-punctate; pollen grains 6-short-colporate, oblate-spheroidal, very large (sensu Erdtman, 1971), the exine reticulate (Morton & Kallunki, 1993: fig. 10F–I). *Disc* cupular, pubescent on rim. *Ovary* of (4–)5 carpels free laterally, connate axially and basally; style 1, glabrous; stigma capitate, ultimately exerted from the corolla tube. *Fruit* of 1–5 mericarps, at maturity free except at base, each with a dorsal ridge and often with two lateral ridges along the line of confluence with adjacent carpels, trans-

versely ridged on intervening surfaces, rounded dorsally. *Seed* 1 per carpel, oblong, smooth, glabrous, the testa papery. *Embryo* curved, the radicle apical, the cotyledons rounded, conduplicate, plicate, subequal, stiff, glandular-punctate.

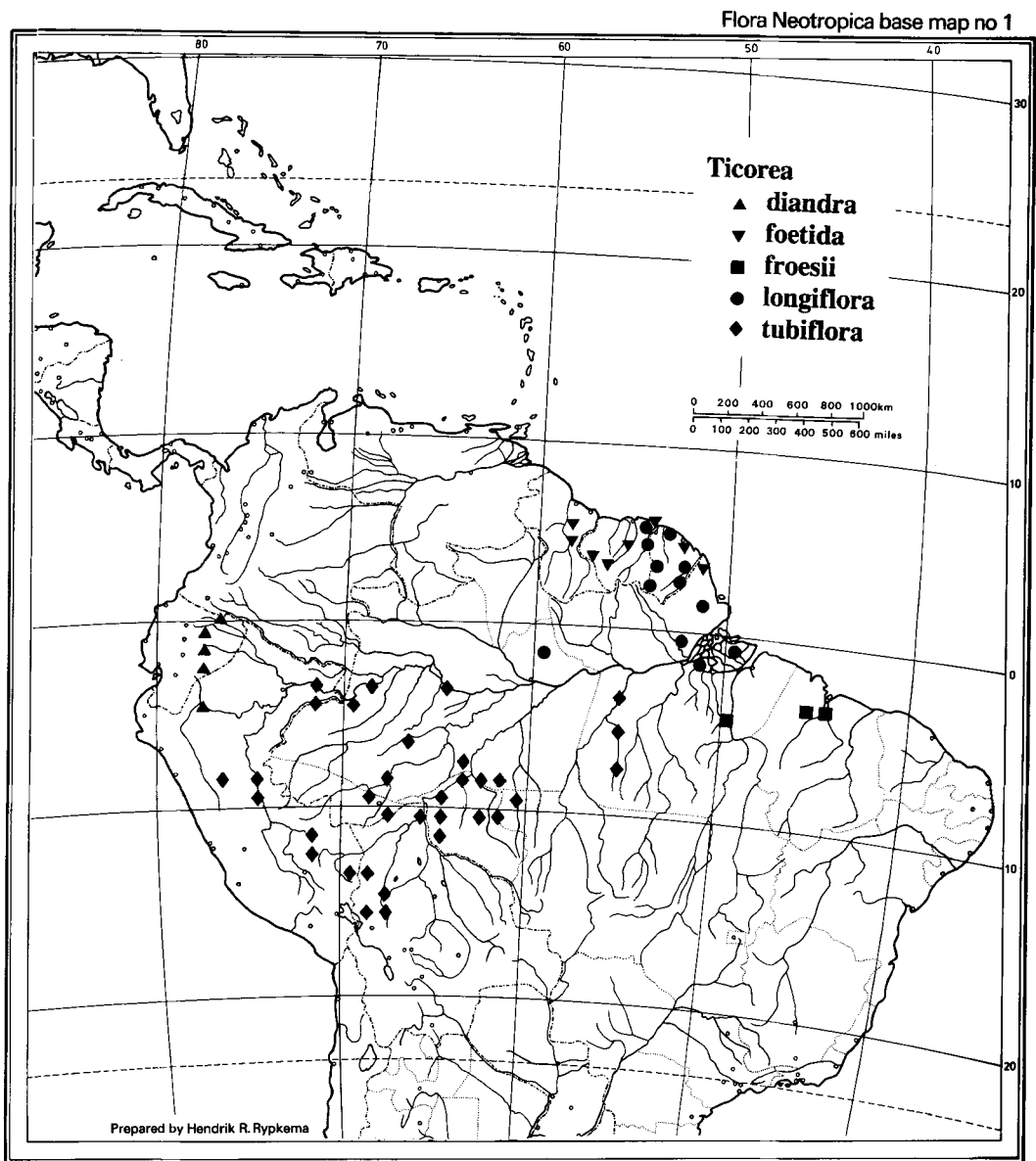
This genus of five species occurs in the Guianas, throughout the Amazonian basin, and on the lower eastern slopes of the Andes in Ecuador, Peru, and Bolivia (Fig. 3).

Key to the species of *Ticorea*

1. Corolla 48.2–68 mm long, the tube 3–6 times longer than the lobes; filaments coherent into a tube.
 2. Fertile stamens 2, the anther lacking a basal appendage and not appearing to have a sterile base, the sac 2.8–4 mm long; calyx subentire; floral buds acute or apiculate; base of lateral leaflet-blades acute or short-acuminate both basiscopically (on the side directed toward the base of the leaf) and acroscopically (on the side directed toward the apex of the leaf) (Ecuador; Peru).
..... *T. diandra*
 2. Fertile stamens (4–)5, the anther bearing a basal appendage and sterile above it at base, the sac 1.8–2.5 mm long; calyx obviously dentate; floral buds rounded or obtuse; base of lateral leaflet-blades rounded or obtuse basiscopically and acute acroscopically (Suriname, French Guiana, Brazil north of the Amazon River).
..... *T. longiflora*
1. Mature corolla 17–42 mm long, the tube 0.8–2.3 times longer than the lobes; filaments free from each other.
 3. Floral buds apiculate or acute; fruit glabrous; corolla somewhat mealy-pubescent at base but subglabrous on the lobes; calyx 0.7–1.7 mm long (Brazil south of the Amazon River; Peru; Bolivia).
..... *T. tubiflora*
 3. Floral buds rounded or obtuse; fruit with sparse erect hairs, glabrescent; corolla densely pubescent; calyx (1–)1.5–3.9(–5.3) mm long.
 4. Corolla 17–22 mm long (the Guianas; Amapá, Brazil).
..... *T. foetida*
 4. Corolla 29–37 mm long (Maranhão and Pará, Brazil).
..... *T. froesii*

Ticorea diandra Kallunki, sp. nov. (Fig. 2A–D)

TYPE: ECUADOR. Morona-Santiago: Vicinity of Macuma, path Macuma–Río Cusutca, ca. 50 km NE of Macas, 27 Mar 1973 (fl), *H. Lugo* S. 3761 (HOLOTYPE: GB; ISOTYPE: US).



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FIG. 3. Distributions of the species of *Ticorea*.

Corolla elongata *T. longiflorae* similis, a congeneribus staminibus fertilibus duobus (nec quinque) et antherarum appendice basali deficienti differt.

Tree to 6 m tall, the indument on petioles and peduncles not visible to the naked eye, composed of erect, usually curved trichomes (the longest 0.1 mm). *Leaflet-blade* acuminate at apex, essentially glabrous (with scattered trichomes to 0.1 mm long on midrib

and margin), with domatia in axils of secondary veins, these with circular or elongate openings, visible to the naked eye, the terminal blade elliptic or oblanceolate, 9.8–28 × 3.6–10 cm, cuneate or short-acuminate at base, with 8–10 secondary veins per side, its petiolule 1–3.8 cm long, the lateral blades elliptic or oblanceolate, 12–24.5 × 4.6–8.2 cm, asymmetric at base (usually unequally acute

or short-acuminate both basiscopically and acroscopically), with 6–8 secondary veins per side, their petiolules 0.5–1.2 cm long; petiole 5.5–16 cm long. *Inflorescence* 11–25 cm long including a peduncle 7.5–16.8 cm long, the internodes of primary rachis developed, the partial inflorescences alternate on primary rachis, stalked, dichasial at first node, dichasial or monochasial at higher nodes, the secondary axis 10–30 mm long; pedicels 1–2 mm long. *Calyx* subentire or shallowly dentate, ca. 1.5 mm long, sparsely or densely pubescent with short, \pm erect trichomes without, glabrous within. *Corolla* apiculate or acute in bud, 5-merous, 48.2–58 mm long at anthesis, densely mealy appressed-pubescent without, white or green, the tube formed by coherent petals 36–45 mm long, 1.8–2.1 mm wide just above the calyx, 3–3.7 times longer than the lobes, these 11–15 \times 1.5–1.8 mm, acute and not inflexed at apex. *Androecium* of 2 fertile stamens and 3 staminodes; filaments 40–55 mm long, strongly coherent for \pm the length of the corolla tube, sparsely pubescent adaxially within the tube, the free part of fertile stamens 4.2–11 mm long, that of staminodes 7–13 mm long; anther lacking an appendage, and, therefore, a sterile base not identifiable, the fertile portion 2.8–4 \times 0.7–0.8 mm. *Disc* ca. 0.7 mm high, slightly shorter than the ovary. *Carpels* 1–1.2 mm high, glabrous but becoming pubescent with short, erect hairs soon after anthesis; style 41–50 mm long. *Fruiting mericarps* ca. 14 \times 10 mm, pubescent with short, erect hairs. *Seed* not known.

Distribution (Fig. 3) and *ecology*.—Amazonian Ecuador and Peru, premontane wet forest, at elevations of 250–1050 m; flowering in March and July, fruiting in September.

Ticorea diandra is unique in the genus in its androecium of two fertile stamens and its lack of basal anther appendages. It shares with *T. tubiflora*, which also occurs in Peru, anther sacs of similar length, the comparatively long petiolule of the terminal leaflet, and apiculate or acute floral buds; but differs from it not only by its two (vs. five) fertile stamens but also by its pubescent (vs. glabrous) fruit and longer, densely pubescent corolla, of which the tube is 3–3.7 (vs. 1.1–1.8) times longer than the lobes.

There are two collections from Dept. Loreto, Peru, that do not belong clearly to *T.*

diandra even though the androecium of each contains only two fertile stamens. The specimens of *Killip & Smith 28971* (F, NY; from near Yurimaguas) are in very young bud. The anthers lack appendages, and the inflorescence of one of the two sheets has an elongated primary rachis—characters that place it with *T. diandra*. The calyx and corolla are subglabrous, however, like those of *T. tubiflora*.

The specimens of *Davis et al. 841* (F-2 sheets, NY; Río Ampiyacu, near Pucaurquillo) are in much older bud. The longest corolla present is 45 mm—at this stage, longer than those of *T. tubiflora* and shorter than those of *T. diandra*. Its anthers are appendaged and its calyx and corolla are subglabrous like those of *T. tubiflora*. The inflorescences are elongate but the branching is irregular; the lower partial inflorescences are separated by internodes and, thus, alternately attached to the rachis (like those of *T. diandra*), but upper ones sometimes seem to arise in threes or fours at the same level on the rachis (more like those of *T. tubiflora*).

The combination of characters in these two collections may indicate that *T. diandra* would be better recognized as a variety of *T. tubiflora*, but because the other specimens of *T. diandra* cited here are distinct, I chose to recognize them as a species.

Additional specimens examined: ECUADOR. **Napo:** Loreto, 2 km SE of 10 de Agosto, Pasohurco, Bloque 19, línea sísmica 22, Helipuerto 1, Compañía Triton, 00°45'S, 77°31'W, 31 Mar 1996 (fl), *Freire & Cerda 331* (NY); Sucumbios, Lago Agrio Cantón, vía Lago Agrio–San Miguel, Km 10, 00°07'N, 76°50'W, 30 Jul 96 (fl), *Palacios 13905* (NY). **Pastaza:** Pastaza Cantón, edge of plateau on S side of Río Arajuno, above river canyon, proposed ARCO oil pipeline route, Km 16, 01°20'S, 77°49'W, 7 Sep 1997 (fr), *Neill et al. 10958* (NY).

PERU. **Loreto:** Marañon River, Pongo de Manseriche, ca. 77°30'W, 1924 (fl), *Tessmann 4806* (G).

TICOREA FOETIDA Aubl., *Hist. Pl. Guiane* 2: 689, 4: t. 277. 1775. *Ozophyllum foetidum* (Aubl.) Raeusch., *Nomencl. Bot.*, ed. 3, 191. 1797. *O. trifoliatum* Willd., *Sp. Pl.* 3: 585. 1801 [1803], illegitimate substitute for *T. foetida*. TYPE: FRENCH GUIANA. “Cayenne” [on herbarium specimen], “Caux” [in protologue], *F. Aublet s.n.* (HOLOTYPE: P?–n.v.; ISOTYPE: BM). (Fig. 1)

T. pedicellata DC., *Mém. Mus. Hist. Nat. Paris* 9: 145, t. 8. 1822. TYPE: FRENCH GUIANA. Cayenne, J.

Martin s.n. (HOLOTYPE: n.v.; ISOTYPES: B ex P, destroyed, BM, photo of B sheet from F negative 12485 at NY).

Shrub or tree 1.5–14 m tall, 2–6 cm dbh, the indument on petioles and peduncles not visible to the naked eye, composed of erect or ascending, \pm straight trichomes (the longest ca. 0.1 mm). *Leaflet-blade* acuminate (rarely rounded) at apex, glabrous (sometimes bearing scattered, erect or ascending trichomes to 0.13 mm long on abaxial surface of midrib), usually with domatia in axils of secondary veins, these usually with circular openings, usually visible to the naked eye, the terminal blade usually elliptic or narrow-obovate, 11–30 \times 4.7–11 cm, cuneate or decurrent at base, with 7–13 secondary veins per side, its petiolule 0.2–1.4 cm long, the lateral blades usually elliptic, 6.8–26.5 \times 2.4–10.5 cm, asymmetric at base (usually acute basiscopically and \pm decurrent acroscopically), with 5–9 secondary veins per side, their petiolules 0.1–0.6 cm long; petiole 4.5–18.5 cm long. *Inflorescence* 16–35 cm long including a peduncle 13.5–31 cm long, the internodes of primary rachis not developed, the partial inflorescences borne at apex of peduncle, stalked, dichasial at first node, monochasial at higher nodes, the secondary axis 3–32 mm long; pedicels (0.3–)1.5–4.5 mm long (3.5–7 mm in *FDBG 5529* and *Pires & Westra 48850*). *Calyx* usually shallowly dentate (with reflexed lobes longer than tube in *FDBG 5529*), (1–)1.5–3.9 mm long (4–5.3 mm in *FDBG 5529*), sparsely appressed-pubescent without, more densely so or glabrous within. *Corolla* rounded at apex in bud, 5-merous, 17–22 mm long at anthesis, mealy appressed-pubescent especially toward base without, white, the tube formed by coherent petals 9–10 mm long, 2.8–3.8 mm wide just above the calyx, 0.8–1.6 times longer than the lobes, these ca. 12 \times 2–2.2 mm wide, inflexed at apex. *Androecium* of 5 fertile stamens; filaments 13–17 mm long, free from each other and adherent to the corolla tube, essentially glabrous adaxially, the free part 3.5–6 mm long; anther including sterile base and appendage 4.6–6.7 mm long, the fertile portion 4–5.3 \times 0.5–1.5 mm, the basal sterile portion 0.25–1 mm long, the appendage 0.5–0.8 mm long, the notch 0.15–0.65 mm deep. *Disc* 1–1.4 mm high, slightly shorter than or

equal to the ovary. *Carpels* ca. 1.5 mm high, glabrous but becoming \pm pubescent after anthesis; style 18–20 mm long. *Fruiting mericarps* 10–14 \times 7–10 mm (15–17 \times 11–12 mm in *FDBG 5529* and *Pires & Westra 48850*), sparsely strigulose and glabrescent except for adjacent lateral surfaces. *Seed* 9–10.2 \times 6.7–7 mm.

Distribution (Fig. 3) and *ecology*.—Guyana, Suriname, French Guiana, and Amapá, Brazil; in moist forest on non-flooded ground (terra firme) and infrequently in secondary forest, at elevations to 470 m; flowering in August and from December through March, fruiting from March through December.

The duplicate of the type collection of *T. pedicellata* received on loan from BM bears only an infructescence from which the fruiting mericarps have fallen. In the photograph of the duplicate once held at B, only a similar naked inflorescence is visible; the packet on the sheet appears to contain fruits, but these cannot be seen in the photo. Additional duplicates of the collection were sought from G and P but were not included in the loans received from these herbaria. Because the characters used by de Candolle to distinguish *T. pedicellata* from *T. foetida* (i.e., number of flowers in the inflorescence and length of pedicel) fall within the range of these characters in *T. foetida*, and because nothing in the illustration in the protologue would exclude it, I am recognizing *T. pedicellata* as a synonym of *T. foetida*.

The collection from Brazil (*Pires & Westra 48850*) and that from Guyana (*FDBG 5529*), both in fruit, differ from the others of *T. foetida*; the fruiting carpels of both are larger (15–17 \times 11–12 mm vs. 10–14 \times 7–10 mm) and the fruiting pedicels of both tend to be longer (3.5–7 mm vs. 0.3–4.5 mm). Furthermore, the calyx of *FDBG 5529* is longer overall and its lobes are longer than the tube and reflexed. Because these two specimens, at least in the absence of flowers, otherwise resemble *T. foetida*, they are included in this species.

Additional specimens examined: GUYANA. Slope of Mabura Hill, 5°20'N, 58°10'W, 26 Feb 1995 (fl, fr), *Ek et al. 1150* (NY); 90 mi Bartica–Potaro Rd., 30 Oct 1947 (fr), *FDBG 5529 (F-2730)* (NY, US); Iwokrama Rain Forest Reserve, Karupukari, 30 mi SW on Karupukari/Annai Rd., 04°20'N, 58°48'W, 24 Mar 1997 (fl), *Mori et al. 24565* (NY).

SURINAME. In Bakhuis mountains between Kabalebo and Coppename Rivers, track from Kabalebo airstrip to S [acc. to map on sheet ca. 57°10'W, 4°20'N], 19 Dec 1964 (fr), *Florschütz & Maas 2444* (NY); 9 km N of Lucie Rivier, 12 km W of Oost Rivier, 3°36–41'N, 56°30–34'W, 1 Aug 1963 (fl, fr), *Irwin et al. 54543* (MO, NY, U, US); Bronsberg, rd. to Mazaroni, 16 Mar 1972 (fl), *Koster/LBB 13030* (MO, NY); Brownsberg, 21 Sep 1967 (st), *Lindeman 12090* (U); Brownsberg, trail to Irene falls, 8 Nov 1974 (fr), *Maas et al. 2306* (K, NY).

FRENCH GUIANA. Commune de Saül, Région de Saül, path from Eaux Claires, km 3, 53°13'W, 3°37'N, 13 Oct 1992 (fr), *Bordenave 313* (NY); Saül, La Fumée trail, 3 Dec 1982 (fr), *Feuillel 495* (CAY–2 sheets), Bélizon rd. at 3 km, 5 Dec 1982 (fl), *Feuillel 504* (CAY); Montagne de Kaw, Plateau, 24 Jan 1983 (fl), *Feuillel 568* (CAY–2 sheets, NY); Regina Region, E plateau of Montagne Tortue, 11 km WNW of Approuague River, 4°18'N, 52°22'W, 14 Jun 1988 (fr), *Feuillel 9999* (U); Saül, 18 Oct 1984 (fr), *de Foresta 665* (CAY–2 sheets, NY), Bélizon rd., km 0.6, 3 Mar 1977 (fl), *de Granville 2795* (CAY–2 sheets, NY), along Bélizon rd. at km 1, 24 Mar 1981 (fl), *de Granville 4451*, (CAY–2 sheets), Bélizon rd., 3°37'N, 53°12'W, 9 Feb 1987 (fl), *Loizeau & Loizeau 620* (CAY); without locality, *Martin s.n.* (BM–2 sheets, K); Saül, Jul 1977 (fr), *Moretti 745* (CAY–4 sheets), La Fumée Oeste, 3°37'N, 53°12'W, 25 Mar 1983 (bud), *Mori et al. 15376* (MO, NY), 8 May 1986 (fr), *Mori & Pennington 17934* (NY), 14 Jul 1987 (fr), *Mori & Hartley 18459* (NY), 10 Jun 1988 (fr), *Mori & Gracie 18849* (CAY, NY), on Montagne-Boeuf-Mort, 7 Feb 1966 (fl), *Oldeman 1985* (CAY–2 sheets, NY, U), Montagne La Fumée trail, at km 0.3, 25 Feb 1972 (fl), *Oldeman B.4293* (CAY–2 sheets).

BRAZIL. Amapá: Rio Oiapoque, summit of Mt. Carupina, 3°33'N, 51°37'W, 15 Oct 1960 (fr), *Pires & Westra 48850* (F, K, NY, US).

Ticorea froesii Kallunki, sp. nov. (Fig. 2E–G)

TYPE: BRAZIL. Maranhão: Rio Pindaré, Monção, Jun 1944 (fl, fr), *R. L. Fröes 20255* (HOLOTYPE: NY; ISOTYPES: K, US).

Corollae pube densa *T. foetidae* similis, sed ab ea corollae longitudine majori distinguenda.

Shrub or tree 4–8 m tall, the indument on petioles and peduncles not visible to the naked eye, composed of erect or ascending, straight or curved trichomes (the longest ca. 0.2 mm). *Leaflet-blade* acuminate at apex, glabrous (sometimes bearing scattered, erect trichomes to 0.12 mm long on abaxial surface of midrib), with domatia in axils of secondary veins, these with circular or crescent-shaped openings, usually visible to the naked eye, the terminal blade usually narrow-obovate, 14.7–24[28] × 5–10.6[12.7] cm, acute at base, with 7–9 secondary veins

per side, its petiolule 0.2–1.4[2.2] cm long, the lateral blades usually elliptic, 6.5–21 × 2.2–7.2 cm, asymmetric at base (usually acute basiscopically and short-decurrent acropically), with 4–7 secondary veins per side, their petiolules 0.2–1 cm long; petiole (2.9–)5.7–13.5[20] cm long. *Inflorescence* 9–12.5[18–24.3] cm long including a peduncle 4–12.5[17–23.3] cm long, the internodes of primary rachis not developed, the partial inflorescences borne at apex of peduncle, short-stalked, dichasial at first node, type of branching at higher nodes not apparent, the ultimate branches in fruit secund, the secondary axis 2–5 mm long (to 10 mm in fruit); pedicels 0–1 mm long. *Calyx* shallowly dentate, [1.8–2] 2.2–4 mm long, pubescent without, glabrous within. *Corolla* rounded or obtuse in bud [sometimes apiculate in *Silva & Bahia 3092*], 5-merous, 29–33[37] mm long at anthesis, mealy appressed-pubescent without, the tube formed by coherent petals 20–23 mm long, [2]2.3–2.7 mm wide just above the calyx, [1.2]2.2–2.3 times longer than the lobes, these 9–10[16] × 2.3–3.4[3.5–4.2] mm wide, most inflexed at apex. *Androe-cium* of 5 fertile stamens; filaments 23–25[28] mm long, free from each other and adherent to the corolla tube, glabrous or sparsely villous adaxially, the free part 3–5[10] mm long; anther including sterile base and appendage 5.2–5.5[6.1] mm long, the fertile portion 3.5–4[4.4] × 0.6–0.7[1] mm, the basal sterile portion 0.7–1.3 mm long, the appendage 0.5–0.7[0.8] mm long, the notch ca. 0.2 mm deep. *Disc* 0.5–0.7 mm high, slightly shorter than the ovary. *Carpels* 0.7–1 mm high, glabrous but becoming pubescent after anthesis; style ca. 22 mm long. *Fruiting mericarps* 8.5–12 × 7.5–12 mm, with short erect trichomes, glabrescent except for adjacent lateral surfaces. *Seed* unknown.

Distribution (Fig. 3) and *ecology*.—Maranhão and Pará, Brazil; flooded or non-flooded (terra firme) forest; flowering in May, June, and December, fruiting in June and July.

Measurements of some characters of the rather poorly preserved, moldy specimen (*Silva & Bahia 3092*) from eastern Pará (from a site now flooded by the Tucuruí

dam) fall outside the ranges of these characters of the specimens from Maranhão (and sometimes within the ranges of those of *T. foetida*). These measurements are presented in brackets in the description. Because the one mature flower of *Silva & Bahia 3092* had been dissected previous to my seeing it, the aberrant measurements of the corolla tube and lobes given in the description may be incorrect. The specimen is aberrant also because it has both obtuse and apiculate buds. Despite its differences from the Maranhão specimens and its similarities to *T. foetida*, I have included *Silva & Bahia 3092* with the Maranhão specimens because of its long corolla (37 mm) and geographic provenance.

The collections from both Maranhão and Pará resemble *T. foetida* because their corollas are densely pubescent, but differ from it because their corollas are longer (29–37 mm vs. 17–22 mm). The Maranhão collections are distinguished further from that species by their shorter inflorescences and generally shorter anthers, whereas *Silva & Bahia 3092* resembles *T. foetida* in the lengths of inflorescences and anthers.

The inclusion of *Silva & Bahia 3092* in *T. froesii* with the Maranhão collections reduces the differences between this species and *T. foetida* to the longer corolla alone. Additional collections of *Ticorea* from Amapá, northeastern Pará, and Maranhão (where *Ticorea* has not been collected but may occur) may show that the collections recognized here as *T. froesii* represent southern variants of *T. foetida* with longer corollas.

Additional specimens examined: BRAZIL. Maranhão: Rio Pindaré, Vila de Monção-Rapoza, 15 Dec 1937 (fl), *Frões 11659* (K, MO, NY); Maracaçumé, 15 Jul 1958 (fr), *Frões 34493* (US). Pará: Rio Tocantins, Jacunda, Jatobal, 16 May 1977 (fl), *Silva & Bahia 3092* (F).

TICOREA LONGIFLORA DC., Mém. Mus. Hist. Nat. Paris 9: 146, t. 9. 1822. TYPE: FRENCH GUIANA. Cayenne, *J. Martin s.n.* (HOLOTYPE: P?–n.v.; ISOTYPE: B ex P, destroyed, photo from F negative 12484 at NY).

Shrub or tree 1.5–12 m tall, to 33 cm dbh, the bark pale, the indument on petioles and peduncles frequently visible to the na-

ked eye, composed usually of at least some erect or ascending, \pm straight trichomes (the longest 0.3–1 mm) and often also of shorter, \pm curled trichomes, rarely only of the latter and then indument not visible to the naked eye. *Leaflet-blade* acuminate at apex, usually pubescent on margin and midrib, sometimes also with scattered trichomes on secondary and lower order veins on abaxial surface, usually without domatia in axils of secondary veins, these when present with shallow, crescent-shaped openings, usually not visible to the naked eye, the terminal blade usually elliptic, 11.1–27.2 \times 3.6–16.1 cm, usually acute (rarely cuneate) at base, with 6–11 secondary veins per side, its petiolule 0.7–2.9 cm long, the lateral blades often elliptic, 6.7–24.7 \times 2.1–11.6 cm, asymmetric at base (usually rounded or obtuse basiscopically and acute acroscopically), with 5–10 secondary veins per side, their petiolules 0.2–1 cm long; petiole 4.7–15.9 cm long. *Inflorescence* 7.5–21.5 cm long including a peduncle 7–20 cm long, the internodes of primary rachis not developed, the partial inflorescences borne at apex of peduncle, stalked, dichasial at first node, dichasial or monochasial at higher nodes (as many as four levels observed), the secondary axis 3–65 mm long; pedicels 1.5–4 mm long. *Calyx* distinctly dentate, 0.8–2 mm long, pubescent with short, appressed or erect trichomes without, glabrous within. *Corolla* rounded or obtuse in bud, 5-merous, 50–68 mm long at anthesis, pubescent with curved appressed trichomes and some straight erect trichomes without, white, the tube formed by coherent petals 40–54 mm long, 1.7–3 mm wide just above the calyx, 3.6–6 times longer than the lobes, these 8–12.5 \times 1.5–2.5 mm, inflexed at apex. *Androecium* of 5 fertile stamens (in *Lima 587* of 4 fertile stamens and 1 staminode); filaments 45.5–54 mm long, coherent for the length of and tightly adherent to the corolla tube, glabrous or sparsely villous adaxially within the corolla tube, the free part 3–6 mm long; anther including sterile base and appendage 3.3–5 mm long, the fertile portion 1.8–2.1 \times 0.7–1.1 mm, the basal sterile portion 0.8–1.8 mm long, the appendage 0.1–0.6 mm long, entire or slightly notched. *Disc* 1–1.1 mm high,

slightly shorter than the ovary. *Carpels* ca. 1.1 mm high, glabrous but becoming \pm pubescent after anthesis; style 55–58 mm long. *Fruiting mericarps* 11–12 \times ca. 10 mm, glabrous or minutely erect-pubescent and glabrescent except for adjacent lateral surfaces. *Seed* (mature not seen).

Distribution (Fig. 3) and *ecology*.—Suriname, French Guiana, and Brazil north of the Amazon River; in non-flooded (terra firme) or flooded forest, infrequently in old secondary forest, on clay or sandy soil, at elevations to 600 m in French Guiana; flowering from July through April, fruiting from March through May.

Ticorea longiflora and *T. foetida*, which overlap geographically, can be distinguished quite easily by vegetative characters. The lateral leaflets of *T. longiflora* are usually rounded or obtuse basiscopically and acute acroscopically, while those of *T. foetida* are usually acute basiscopically and \pm decurrent acroscopically. Furthermore, the petiole and peduncle of many (but not all) specimens of *T. longiflora* bear an indumentum of spreading hairs that are visible to the naked eye. The hairs of *T. foetida* are much shorter and visible only with magnification. The leaves of *T. longiflora* are usually devoid of domatia, which, when present, are shallow, crescent-shaped and not particularly noticeable. The leaves of *T. foetida*, however, usually bear domatia, which are circular and visible to the naked eye. Many specimens of *T. longiflora* have a yellowish cast to the inflorescence, due not only to the color of the hairs but sometimes also to what appears to be a dried exudate of the glands on the calyx, ovary, and corolla. These specimens also cause a yellow stain where they contact the mounting paper.

Common names.—French Guiana: yapukuliwa (Wayāpi) (*Grenand 741–930*), kwikwasiwiune (Palikour) (*Grenand 1838*, *Jacquemin 2289*).

Additional specimens examined: SURINAME. Marowijne River, Pedrosoengoe falls, 24 Nov 1918 (bud), *Gonggrijp 4166* (U); near Albina, 17 Dec 1971 (fl), *Maas & Maas 534* (F, NY, US).

FRENCH GUIANA. Crique Serpent (Rive Gauche) Maroni, 7 May 1952 (fr), *Guyane Francaise-Service Forestier 6163* (CAY–3 sheets); Awara-soela–Djan

kiiki, 3°25'N, 54°01'W, 15 May 1986 (st), *Fleury 246* (CAY, NY, US); Parcelle Pala [acc. to map on label ca. 2°30'N, 54°58'W], 9 Feb 1975 (fl), *Grenand 741–930* (CAY); St. Georges de l'Oyapock, Crique Gabaret, 5 Feb 1979 (fl), *Grenand 1838* (CAY); Crique Gabaret, village of Payuyu, 5 Feb 1979 (fl), *Jacquemin 2289* (CAY); without locality, 1833 (fl), *M. Leprieur 269* (G); margins of Maroni River, 1862 (fl), *M. Mélinon s.n.* (US); left bank of the Approuague at 600 m above Saut Grand Machicou, 1 Feb 1967 (fl), *Oldeman B-917* (CAY–2 sheets, NY, US); Fleuve Oyapock, on the crique Armontabo at about 16,400 km above its jct., 2 Mar 1968 (fl), *Oldeman B-1471* (CAY–2 sheets, NY, U); Fleuve Oyapock, crique Armontabo, at Saut Bace, 3 Jul 1969 (fl), *Oldeman T.275* (CAY–2 sheets, P); mouth of the Yaroupi, affluent of the Oyapock, 11 May 1970 (fr), *Oldeman B-3182* (NY); St. Georges de l'Oyapock, Crique Patawa, 8 Mar 1985 (fl), *Prevost 1789* (CAY–2 sheets, NY–2 sheets); Haut Maroni (Itany), Antecum-Pata (Malavate), 21 Apr 1975 (fr), *Sastre et al. 3875* (CAY–3 sheets); Grand Santi, 19 Mar 1984 (fl, fr), *Sauvain 56* (CAY, NY); Godebert, Dec 1919 (fl), *Wachenheim 59* (K).

BRAZIL. **Amapá:** Margin of BR-156, Ilhina do Igarapé Agua Branca, 26 Apr 1982 (fl, fr), *N. A. Rosa et al. 4261* (INPA). **Amazonas:** Mun. Pres. Figueredo, Rio Uatumã, between the mouth of rio Pitinga and Igarapé Arraia, 1°–2°S, 59°–60°W, 19 Mar 1986 (fl), *Cid Ferreira et al. 6858* (INPA–2 sheets, NY, US); rd. to hydroelectric station, above dam, left side of rio Uatumã, 28 Oct 1983 (fl), *J. Lima 587* (INPA); Rio Uatumã, 23 Feb 1978 (fl), *Ivo et al. 3453* (INPA). **Pará:** Rio Mocoões, 2 km upriver from Anajás, 00°57'S, 49°56'W, 13 Nov 1987 (fl), *H. Beck et al. 498* (NY); Gurupá, 26 Jan 1916 (fl), *Ducke MG-15998* (BM, G, RB, US), 24 Feb 1923 (fl), *Ducke RB-17740* (K, RB, US); Rio Jarí, Monte Dourado, 5 Feb 1968 (fl), *E. Oliveira 4107* (NY); Rio Cururu, 10 km above mouth, 0°37'S, 50°10'W, 14 Nov 1987 (fl), *Prance et al. 30457* (NY); Rio Anajás, Ilhado Marajó, 49°55'W, 0°59'S, 2 Nov 1987 (fl), *Rabelo et al. 3714* (NY); rd. between Gurupá and Xingú sawmill, 6 Feb 1979 (fl), *Silva & Rosário 5018* (F–2 sheets, NY); Ilha do Marajó, Rio Anajás, ca. 2 km downstream from city of Anajás, 26 Oct 1984 (fl), *Sobel et al. 4809* (NY, US).

TICOREA TUBIFLORA (A. C. Sm.) Gereau

Galipea tubiflora A. C. Sm., Bull. Torrey Bot. Club 60: 357. 1933. *Ticorea tubiflora* (A. C. Sm.) Gereau, Candollea 45: 371. 1990. TYPE: BRAZIL. Mato Grosso [Rondônia]: Angustura, source of the Jatuaraha River, Machado River region, Dec 1931 (fl, fr), *B. A. Krukoff 1538* (HOLOTYPE: NY; ISOTYPE: MO).

Shrub or tree 1.5–15 m tall, to 40 cm dbh, the indument on petioles and peduncles absent or if present not visible to the naked eye, composed of scattered, erect or ascending, usually curved trichomes (the longest 0.05–0.15 mm). *Leaflet-blade* acuminate at apex, essentially glabrous (sometimes with scattered trichomes to 0.18 mm

long on midrib and margin), usually with domatia in axils of secondary veins, these usually with circular or elongate openings, rarely with shallow, crescent-shaped openings, sometimes visible to the naked eye, the terminal blade usually elliptic, (9.3–)14.5–30.2 × 3.2–11.3 cm, usually acute (rarely cuneate) at base, with (6–)9–14 secondary veins per side, its petiolule 0.6–3.5 cm long, the lateral blades usually elliptic, (5.8–)12.5–28 × (2.3–)4.6–9.4 cm, asymmetric at base (usually acute, but unequally so, both basiscopically and acroscopically), with 5–11 secondary veins per side, their petiolules 0.2–1.4 cm long; petiole 3–17 cm long. *Inflorescence* 7.5–21.5 cm long including a peduncle 4.5–19.2 cm long, the internodes of primary rachis not developed, the partial inflorescences attached at apex of peduncle, usually sessile, sometimes stalked, dichasial at first node, dichasial or monochasial at higher nodes, the secondary axis 0–45 mm long; pedicels 1–3.5 mm long. *Calyx* subentire or shallowly 4- or 5-dentate, 0.7–1.7 mm long, subglabrous or sparsely appressed-puberulent without, glabrous within. *Corolla* almost always apiculate in bud, 4- or 5-merous, (25–)31–42 mm long at anthesis, usually mealy appressed-pubescent toward base and at margins of lobes and subglabrous on surface of lobes without, white, greenish in bud, the tube formed by coherent petals 20–22 mm long, 1.8–2 mm wide just above the calyx, 1.1–1.8 times longer than the lobes, these 12–20 × 2–3 mm, acute and not inflexed at apex. *Androecium* of 4 or 5 (rarely 2) fertile stamens; filaments 25–34 mm long, free from each other and adherent to the corolla tube, glabrous or villose adaxially within the corolla tube, the free part 7–8 mm long; anther including sterile base and appendage 4–6.5 mm long, the fertile portion 2.5–4 × 0.6–0.8 mm, the basal sterile portion 0.6–1.5 mm long, the appendage 0.4–1.1 mm long, the notch 0.3–1 mm deep. *Disc* 0.6–0.7 mm high, slightly shorter than the ovary. *Carpels* 4 or 5, 0.9–1 mm high, glabrous; style 29.5–35 mm long. *Fruiting mericarps* 10–15 × 9–12 mm, glabrous, sometimes minutely appressed-pubescent on adjacent lateral surfaces. *Seed* 8.5–10 × 6.5–8 mm.

Distribution (Fig. 3) and *ecology*.—Amazonian Brazil (south of the Amazon River) and Amazonian Peru and Bolivia; in Brazil, in non-flooded (terra firme) or flooded forest on clay soil, infrequently in secondary forest, in Peru and Bolivia in upland forest, often on slopes, at elevations to 1000 m, one (*Schunke 1357*) from dry tropical forest at 300–400 m in Peru; flowering in December and January, fruiting from March through December.

Most specimens of *T. tubiflora* had been identified as *T. longiflora*, perhaps because its narrow corolla tube (1.5–2 mm wide) was similar to that of *T. longiflora* (1.7–3 mm) rather than that of *T. foetida* (2.8–3.8 mm). *Ticorea tubiflora* is distinguished easily from *T. longiflora*, however, not only by the characters noted in the key but also by its apiculate (vs. rounded or obtuse) floral buds and the bilaterally acute (vs. usually basiscopically rounded or obtuse) base of the lateral leaflets. The corolla of *T. tubiflora* generally is less pubescent than that of any other species and appears glabrous. The corollas of the specimens from Pará and of some from the southeastern corner of Amazonas are more densely pubescent than those of specimens from further west, but not as pubescent as those of *T. foetida* or *T. froesii*. Its fruits are also glabrous from the start, not variously pubescent and then glabrescent as those of the other species. *Schunke 3319*, from Peru, is the only specimen to exhibit rounded rather than pointed floral buds and inflexed petal apices. Its corolla is the smallest one measured, but it may not be fully mature.

Common name.—Brazil: guararupanguí (*Janssen 726*).

Additional specimens examined: PERU. **Huánuco**: Prov. Pachitea: Dtto. Honoría, Bosque Nacional de Iparia, along the Río Pachitea, 1 km above village of Tournavista ca. 20 km above confluence with the Río Ucayali, 16 Dec 1966 (fl), *Schunke V. 1357* (F, G, NY, US), 14 Mar 1967 (fl), *Schunke V. 1768* (F, US); Dtto. Puerto Inca, Bosque Nacional de Iparia, along the Río Pachitea, near the village of Puerto Inca (about 85 km in linear distance from confluence with the Río Ucayali, 21 Dec 1968 (fl, fr), *Schunke V. 2913* (F, NY, US). **Loreto**: Prov. Maynas, near Brilla Nueva, Borro Indian village on upper Río Yaguasyacu, tributary of Río Ampiyacu, 8 Nov 1977 (fl), *Gentry & Revilla 20399* (F, MO). **Madre de Dios**: Pantiacolla, Serranía across Río Alto Madre de Dios from Shintuya, 28 Oct

1979 (fr), *Gentry et al.* 27299 (U); Prov. Manu, km 139 on rd. between Cabo de Hornos and Shintuya, 27 Aug 1974 (fr), *Foster et al.* 4008 (F); Prov. Manu, Parque Nacional Manu, Río Manu, Río Sotileja, 71°55'W, 11°40'S, 2 Oct 1986 (fl), *Foster et al.* 11590 (F), 9 Oct 1986 (fr), *Foster* 11715 (F, MO, NY), Pakitsa station, 71°16'W, 11°56'S, 13 Sep 1989 (fr), *Foster* 13180 (F, NY), 30 Sep 1987 (fr), *Sobrevilla et al.* 1805 (F). **Puno:** Prov. Carabaya, Hda. Palmera, 1 Mar 1965 (fl), *Vargas C.* 16141 (US). **San Martín:** Prov. Mariscal Cáceres, Dto. Tocache Nuevo, 10 Aug 1969 (fr), *Schunke V.* 3319 (F, G, NY, US).

BRAZIL. Acre: Estrada Sena Madureira, Manuel Urbano km 6, 8 Sep 1978 (fl), *J. Lima et al.* 145 (INPA-2 sheets); km 16 from Rio Branco on Rio Branco-Brasília road, 20 Oct 1980 (fl), *Lowrie et al.* 594 (MO, NY, R, RB, US); vic. of km 7, rd. Sena Madureira to Rio Branco, 30 Sep 1968 (fl), *Prance et al.* 7696 (K, NY, US). **Amazonas:** Mun. unspecified: South Santo Antônio, 6 Mar 1968 (fr), *Boyan* 297 (INPA), São Paulo de Olivença, 27 Jan 1937 (fl, fr), *Ducke* 399 (F, K, MO, NY, R, US), Esperança, mouth of the Javary, 22 Oct 1942 (fl), *Ducke* 1053 (K, MO, NY, US), Tabatinga, trail NE from Colombian border at Letícia, 13 Mar 1977 (fl, fr), *Gentry & Daly* 18246 (INPA-2 sheets, MO), behind Boca do Acre airstrip, N bank of Rio Purus, 20 Sep 1966 (fl), *Prance et al.* 2444 (F, INPA, K, NY, MO, R), Rio Cunhuá at Deni Indian village, 6°43'S, 66°47'W, 28 Nov 1971 (fl), *Prance et al.* 16464 (INPA, US); Mun. Humaitá: BR 230 Estrada Transamazônica, 153 km from Humaitá on Estrada do Estanho, 153 km on this rd. at Mineração Igarapé Preto, ca. 8°55'S, 61°15'W, 20 Apr 1985 (fl), *Henderson et al.* 270 (INPA, NY), BR 230 Estrada Transamazônica, 19 km W of Humaitá, ca. 7°30'S, 63°10'W, 13 May 1985 (fl), *Henderson et al.* 446 (F, INPA, NY, US), indigenous reserve of the Tenharin, BR 230, km 139, 7°31'S, 63°10'W, 26 Oct 198[?] (sterile), *Janssen* 726 (M), rd. Humaitá to Labrea, km 58, between Rios Ipixuna and Itaparana, 25 Nov 1966 (fl, fr), *Prance et al.* 3304 (F, INPA, K, NY, US); Estirão do Equador, Rio Javari, 22 Oct 1976 (fl), *Prance et al.* 24022 (F, INPA, K, NY, US); Mun. Tefé: rio Solimões, entrance of lago Tefé, Santa Missões, 16 Oct 1982 (fr), *Amaral et al.* 116 (INPA, MO, NY, RB, US). **Mato Grosso:** Aripuanã, 14 Jul 1976 (fr), *Gomes & Miranda* 39 (INPA), 23 Jul 1976 (fl), *Gomes & Miranda* 85 (INPA); R. Juruena, near airstrip, 28 Jun 1977 (fr), *Rosa & Santos* 2192 (INPA-2 sheets, MG, MO, NY, RB). **Pará:** Boa Vista on the Tapajós River, May-Jun 1929 (bud), *Dahlgren & Sella* 161 (F, US); Barra do Rio Juruena, 30 Dec 1951 (post-fl), *Pires* 3676 (US); BR 163, Cuiabá-Santarém Hwy., km 953, 14 Nov 1977 (fl), *Prance et al.* 25382 (INPA, K, MO, NY), km 1129, vic. of Igarapé Natal, 16 Nov 1977 (fl, fr), *Prance et al.* 25486 (INPA, MO, NY, R, US); Mun. Itaituba, Santarém-Cuiabá road, BR 163, km 1009, 7°40'S, 55°15'W, 14 May 1983 (fl, fr), *M. N. Silva et al.* 324 (INPA, NY, US). **Rondônia:** Rio dos Pacaás Novos, above the first cachoeira between river and base of the Serra dos Pacaás Novos, 22 Mar 1978 (fl, fr), *Anderson et al.* 12231 (INPA-2 sheets, NY, US); Mun. de Ji-Paraná, BR 364, Cuiabá-Porto Velho road, km 353, 48 km from Ji-Paraná, 10°11'S, 61°62'W, 26

Jun 1984 (fl), *Cid et al.* 4823 (F, INPA, NY, US); Sub-base Proj. RADAM, SC-28-VD—Ponto 62, 14 Sep 1975 (fr), *Cordeiro* 781 (US); Porto Velho, 15 Sep 1975 (fl, fr), *Mota & Coelho* 151 (INPA); between Jaciparaná and Rio Madeira, 26 Jun 1968 (fl), *Prance et al.* 5223 (INPA, NY, US); 1-2 km N of Ribeirão, along rd. to Abunã, 31 Jul 1968 (fl), *Prance et al.* 6651 (INPA, NY, US); Serra dos Tres Irmãos, opposite Muntumparaná, 29 Nov 1968 (fr), *Prance et al.* 8978 (INPA, MO, NY, U, US); rd. from São Luis to Maloca Tuparí, source of the rio Branco (Territ. Guaporé), 1-29 Apr 1948 (fl), *Scolnik & Luti* 721 (US).

BOLIVIA. Beni: Prov. Ballivián: S of Misión Fatima, going up from the río Chimané, 24 May 1988 (fr), *S. G. Beck et al.* 16423 (NY), Serranía Pilon Lajas, hwy. between Yucumo and Quiquibe, km 20 from Yucumo going to La Paz, 15°15'S, 67°00'W, 1 Jul 1991 (fl, fr), *Killeen et al.* 2965 (NY). **La Paz:** Prov. Abel Iturralde, Río Enlatagua, ca. 5 km NW of Río Madidi jct., 20 May 1990 (fr), *Gentry et al.* 70227 (NY); Prov. Larecaja, Tui (near Mapiro), on left bank of Río Mapiro, 12-30 Sep 1939 (fr), *Krukoff* 10755 (F, G, K, MO, NY, US).

Excluded Names

- Ticorea aculeata* Blanco, Fl. Filip., ed. 1, 85. 1837. = *Leea aculeata* Blume, Bijdr. 197. 1825.
T. bracteata (Nees & Mart.) A. St.-Hil. ex DC., Prodr. 1: 730. 1824. = *Angostura bracteata* (Nees & Mart.) Kallunki, Kew Bull. 53(2): 263. 1998.
T. febrifuga A. St.-Hil., Mém. Mus. Hist. Nat. Paris 10: 292. 1823 [1824]. = *Galipea jasminiflora* var. *febrifuga* (A. St.-Hil.) Engl. in Mart., Fl. Bras. 12(2): 98. 1874.
T. jasminiflora A. St.-Hil., Bull. Sci. Soc. Philom. Paris, Sér. 3, 10: 132. 1823. = *Galipea jasminiflora* (A. St.-Hil.) Engl. in Mart., Fl. Bras. 12(2): 97. 1874.
T. nitida K. Presl, Symb. Bot. 1(2): 28, t. 17. 1831. = *Galipea* sp.
T. simplicifolia (Nees & Mart.) A. St.-Hil. ex DC., Prodr. 1: 730. 1824. = *Galipea simplicifolia* (Nees & Mart.) Engl. in Mart., Fl. Bras. 12(2): 98. 1874.
T. unifoliolata T. S. Elias, Ann. Missouri Bot. Gard. 66: 146. 1979. = *Conchocarpus guyanensis* (Pulle) Kallunki & Pirani, Kew Bull. 53: 300. 1998.

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Numerical List of Taxa

1. *Ticorea diandra* Kallunki
2. *T. foetida* Aubl.
3. *T. froesii* Kallunki
4. *T. longiflora* DC.
5. *T. tubiflora* (A. C. Smith) Gereau

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