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A revision of the genus Triplaris (Polygonaceae)

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The neotropical genus *Triplaris* Loefl. ex L. is revised. A total of 73 taxa had previously been described. In the present revision 17 species, 1 subspecies, and 1 variety are recognized. A new combination *Triplaris melaenodendron* (Bertol.) Standl. & Steyerm. ssp. *colombiana* (Meisner) Brandbyge is made, and a new variety *T. setosa* Rusby var. *woytkowski* Brandbyge is proposed. Keys based on both pistillate and staminate specimens are presented.

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Introduction

Several regional treatments of the genus *Triplaris* Loefl. ex L. (Standley 1936; Standley & Steyermark 1946; Duke 1960), have pointed to the urgent need of a critical revision of the genus. This fact and the author's exciting, though painful experiences collecting these plants in Ecuador initiated the work on this revision.

Approximately 2000 herbarium specimens from the following herbaria have been studied: AAU, B, BM, C, F, G, GB, K, M, MA, MO, NY, P, QCA, PH, RB, S, UC, US, and W. Herbarium acronyms according to Holmgren et al. (1981). Visits to K and BM helped to solve some of the problems with the typification of the oldest described species.

Taxonomic history

The genus *Triplaris* was established by Loefling, one of Linnaeus' best pupils who died in Venezuela in 1756. The name was published posthumously by Linnaeus (Loefling 1758), but no species was described and no specimen cited. Linnaeus (1759) described the genus and gave the trivial epithet "americana" to the specimen, on which he based his description. The identity and typification of *Triplaris americana* L. remained a mystery until it was elucidated by Dugand (1960). Several *T. americana*'s with different authors have been cited in the literature. In most of these later homonyms the authors did nothing more than cite the Linnean epithet and extend his description.

Jacquin (1763) described *Triplaris pyramidalis*. In 1827 Weigelt (in sched.) in his exsiccate of plants from Surinam described the genus *Blochmannia*, and on the same printed label is the name *Blochmannia weigeltiana* Rchb. without a separate description. Chamisso (1833) described three species: *Triplaris brasiliana*, *T. caracassana*, and *T. surinamensis*. Bertoloni (1840) described *Vellasquezia melaenodendron* from Guatemala. Standley and Steyermark (1943) made the new combination *Triplaris melaenodendron*. Meyer (1840) published the descriptions of five new species proposed by Fischer and Meyer. Weddell (1849) described eight new species and presented a key to the fourteen species known to him. Meisner (1855) in Martius' Flora Brasiliensis recognized thirteen species, of which one was new. In de Candolles' Prodromus (Meisner 1856) he published the only monograph existing of the genus. In this he recognized twentyfive species, of which one was new. Bentham in Bentham and Hooker (1880) gave a description of the genus and mentioned, that the about 25 species could probably be reduced to 10. The most important descriptions made later than 1850 are Rusby's (1896, 1900, 1927) from Bolivia. In this century the genus has been treated on a regional scale by Eyma (1934), in Flora of Surinam, Standley (1936), in Flora of Peru, Standley and

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Steyermark (1946), in Flora of Guatemala, and Duke (1960), in Flora of Panama.

The Colombian botanist A. Dugand seems to have been working intensively with *Triplaris* in a certain period to judge from his annotations on herbarium sheets from several institutions including NY, US, K, and BM. He published but two small papers (Dugand 1952, 1960). Brandbyge (1984) published three new species.

Triplaris is a rather uniform genus. The only attempt to subdivide it was made by Meisner (1855, 1856), who recognized two groups, *Platypetalæ* and *Stenopetalæ*. *Platypetalæ* consisted of species with inner perianth segments free from the perianth tube and basally broadened, while *Stenopetalæ* consisted of species with lanceolate to linear or subulate inner perianth segments adnate to the perianth tube and not basally broadened. My observations are consistent with Meisner's subdivision. The generic delimitation between *Triplaris* and *Ruprechtia* was discussed in detail by Brandbyge and Øllgaard (1984). The 73 names described till now have been reduced to seventeen species with one subspecies and one variety.

Fig. 1. General habit of *Triplaris* exemplified by *Triplaris weigeltiana* on Rio Cuyabeno, Ecuador.

Morphology

Habit

All species of *Triplaris* are fast growing, small to medium-sized or occasionally tall trees (Fig. 1). Small buttresses have been observed in *T. dugandii*. A record of 2 m high buttresses in *T. weigeltiana* from Brazil needs verification. The trunk is straight, slender and ramified in the upper third only, and the crown is pyramidal in shape. Vegetative reproduction by suckers occurs frequently. Trees, which have been cut, often regenerate with many shoots from the stump. Like other species growing in riverine habitats *T. weigeltiana* has been observed to regenerate from fallen trunks by sending up vertical side branches, which quickly attain the size of individual trees. In all species recognized in the present study the hollow branches and twigs are inhabited by ants, presumably all belonging to the genus *Pseudomyrmex*. However, in specimens of *T. cumingiana* from coastal Ecuador, no ants were observed.

Stipules

The stipules are deciduous, up to 32 cm long cylindrical organs. In the young stage they are completely closed and enclosing the apical shoot, later they are fissured down in the full length and shed, leaving only a ring-like scar on the twig. The structure of the stipules is not fundamentally different from the intrapetiolar stipules of *Ficus* and *Magnolia*, so this term has been used in the descriptions below.

The stipules are pilose to velutinous or strigose outside and glabrous inside. The indumentum might have a diagnostic value, but as the stipules are known from a few species only, this character has not been used to distinguish between species in the present study. The stipules enclosing the inflorescences in the bud stage are usually smaller and more scarious than the stipules enclosing the leaves.

Inflorescences

Triplaris is strictly dioecious. The inflorescences are terminal or axillary pleiothyrsi, which are big and very conspicuous at the time of fruiting.

The staminate flowers are sessile or subsessile, and so the part-inflorescences appear spike-like. Each inflorescence usually has a short flowerless main axis, from which branching originates in various ways. The inflorescence is open i.e. not terminated by a flower. The part-inflorescences are dichasia, but monochasia (scorpioid cymes) are also found. The part-inflorescences are 3–7 flowered and always subtended by a small and sometimes inconspicuous bract. The two bracteoles are fused into an ovate, acuminate organ, which is split down on the abaxial side at anthesis. This interpretation

of the bracteoles is in accordance with Gross (1913: 311). Duke (1960) used the term ochreola for the bracteole.

The pistillate inflorescences are fundamentally built like the staminate ones, but the part-inflorescences are always 1-flowered. The flowers are short-pedicellate and the pedicels are elongated during the development of the fruits.

Flowers

The differences between the staminate and pistillate flowers are very pronounced. The staminate flowers consist of two whorls of slightly unequal perianth segments. The 3 outer segments are ovate, obtuse and the 3 inner lanceolate to linear-lanceolate. The basal half of the segments is connate into an infundibular-campanulate tube. The length of the staminate flowers ranges from 2 to 7 mm, with the shortest (2 to 3 mm) found in *T. americana* and *T. dugandii*, and the longest (7 mm) in *T. longifolia*.

Apart from the size-difference just mentioned all size classes in between are found, so size as well as indumentum of the flowers are not useful taxonomically. The nine stamens ranges from 3 to 8.5 mm long, and the filaments are adnate to the tube in their basal half. The anthers are biloculur and introrse. The stamens are slightly projecting beyond the perianth at anthesis. Pistillodes are absent from the staminate flowers.

The pistillate flowers consist of 6 perianth segments in two strongly dissimilar series. The outer 3 are connate basally, forming an urceolate-campanulate to globose tube. The free parts are lanceolate, apically acute, spreading. In fruit the free parts are enlarged into conspicuous oblanceolate, red to purple wings. The 3 inner perianth segments are smaller, linear to ovate, free from or partly adnate basally to the tube. The form of the inner perianth segments of the pistillate flowers and their adnation to the tube constitute the best diagnostic characters at species level. Rudimentary staminodia arising from the disc at the base of the gynoecium are occasionally present.

The ovary is trigonous, and the 3 styles have papillose-verrucose stigmatic tissue extending about halfway down the inner surfaces. The achenes are triquetrous to trialate or rarely terete, without or with a beak formed by the persistent style bases and the apical extension of the achene, lustrous, glabrous or occasionally verrucose or punctate. The achenes present some taxonomic characters of minor importance.

Ecology

Habitat

Triplaris is a lowland genus. Altitudinally it ranges from sea level to about 2000 m, but most of the species are found at elevations lower than 1000 m. Only *T. efistulifera*, *T. vestita*, and *T. cumingiana* have been recorded from elevations higher than 1000 m. Most species are restricted to wet and relatively open habitats like riverside forests, gallery forests and in the Amazon region, Várzea forests. Extra-Amazonian species like *T. purdiei*, *T. caracassana*, *T. melaenodendron*, and *T. cumingiana* have been recorded from dry thickets and dry deciduous forest. All the species are pioneers of forest clearings, and they are important components in all stages of secondary successions.

Pollination

The only data available on pollination in *Triplaris* are the observations of Bawa and Opler (1975). The inflorescences were seen visited by bees of the subfamily Meliponinae, a group of opportunistic flower visitors. From the observations it was concluded that the flowers were insect pollinated. Both female and male flowers were reported to produce nectar. Duke (1960) indicated that *Triplaris* is wind pollinated by stating: "The genus, like so many dioecious amentiferous groups, is badly complicated by specific intergradations." The fact that the male trees have many flowers per inflorescence, which produce much pollen, and the fact that the trees usually grow in rather open habitats with short distances between the two sexes suggests that possibilities for wind pollination are present. It cannot be excluded that both anemogamy and entomogamy play a role in pollination.

The female biased sex ratio among flowering individuals in populations of *Triplaris* observed by several collectors was studied by Melampy and Howe (1977). Their conclusion was, that sex-dependent mortality was the basis for the female bias. Other possible explanations that were discussed but not tested were gamete selection and agamospermy.

Dispersal

The winged fruits are obviously wind dispersed. Standley (1937) gave the following description: "When it falls from the tree it descends slowly, like a parachute, whirling about and often coming to rest at some distance from the tree." Dispersal for very long distances is not very probable because of the relatively large size of the fruits. For rapid colonization of open or opened habitats, however, this dispersal syndrome with many medium-sized wind dispersed fruits seems to have great advantages. No exact data on dispersal, germination and seedling establishment have been recorded.

Distribution

From the distribution maps (Figs 7–10) it appears that the genus ranges from Oaxaca in Mexico in the north (about 17° N lat.) to the state of Paraná in Brazil in the south (about 22° S lat.). On the South American contin-

ent it ranges from Prov. Guayas in Ecuador (about 81° W long.) to the State of Alagoas in Brazil (about 36° W long.).

13 of the 17 species of *Triplaris* recognized in the present study are found in the southwestern phytogeographic region of the Amazon (Prance 1977). Of the 13 species only 4 are found outside this region (Fig. 6). Considering the apparently rather narrow distributions of some of the species within the region, the western part of this region must be considered as a center of endemism.

Taxonomy

Triplaris Loefl. ex L.

Loefling 1758: 256; Linnaeus 1759: 881; Aublet 1775: 910; H.B.K. 1818:182; Schomburgk 1838: 264; Meyer 1840: 13; Meisner 1855: 47; Meisner 1856: 171; Bentham & Hooker 1880: 104; Dammer 1891: 34; Eyma 1934: 67; Standley 1937: 467; Standley & Steyermark 1946: 136; Lemée 1955: 558; Duke 1960: 353. – Type species: *Triplaris americana* L.

Synonyms:
Blochmannia Weigelt, in sched. in Weigelt, Pl. Sur. exsicc. 1827; Reichenbach 1828: 163. – Type species: *Blochmannia weigeltiana* Rchb.

Vellasquezia Bertoloni 1840: 39. – Type species: *Vellasquezia melaenodendron* Bertol.

Dioecious trees; bark often peeling off; twigs striate. Leaves alternate, petiolate; stipules intrapetiolar, to 32 cm, deciduous, pilose to tomentose, internally glabrous, leaving a ring-like scar on the twigs; blades entire, oblong or lanceolate to ovate, acute to acuminate, the base acute to rounded or slightly oblique, glabrous or tomentose to strigose, beneath glandular punctate. Inflorescence axillary or terminal, enclosed in a deciduous spathe-like stipule, tomentose, with racemose main axis and cymose, lateral part-inflorescences; bracts small, ovate, acute; bracteoles ovate, acute to acuminate, fissured to the base abaxially. Staminate flowers 3–5(–7) in each part-inflorescence, sessile or subsessile; perianth segments 6, subequal, ovate, obtuse or lanceolate, pilose or strigose, the base forming a pilose or strigose tube; stamens 9, exceeding the perianth segments, adnate to the tube, anthers introrse, bilocular. Pistillate flowers one in each part-inflorescence, pedicellate; outer perianth segments basally connate forming an urceolate-campanulate to globose tube, the lobes lanceolate, acute, spreading, enlarged into wings in fruit; inner perianth segments smaller, linear to ovate, free or partially adnate to the tube; ovary trigonous; styles 3, the stigmas extending halfway down their adaxial surfaces; achenes enclosed in the perianth tube, trialate to rarely terete, with or without a beak.

Notes to keys and descriptions

Two keys are presented here. One is based on specimens with staminate flowers, and one on pistillate specimens with fully developed fruits. As the best differential characters are confined to the fruting perianths the second key is far the most applicable. However, many staminate specimens in the material, which was studied for this revision, may justify a separate key to staminate material though male specimens of *T. efistulifera, T. moyobambensis*, and *T. physocalyx* have not been available for the study.

Leaf characters apply to mature leaves on fertile shoots. Leaves from juvenile plants or suckers, and leaves from just below the inflorescences are often very different in shape and especially in indumentum from mature leaves. Not all differential characters, which are used in the keys, are included in the descriptions.

For the reasons mentioned above, a pistillate specimen has been chosen as lectotype in cases where both a pistillate and a staminate specimen were cited in the original description, provided that the pistillate specimen was not very poor in comparison with the staminate specimen. All the type specimens cited have been studied.

In the specimen citation below staminate specimens are indicated with (m), pistillate specimens with (f).

A complete list of specimens studied will be available on request to the author.

Key to staminate specimens of Triplaris

1. Twigs with strigose-hispid, ferrugineous hairs up to 6 mm long, papillose where the hairs have fallen off 2
1. Twigs never with strigose-hispid, ferrugineous hairs up to 6 mm long 3
2. Inflorescence axis glabrous to puberulous; leaf-blades oblong, glabrous beneath except for the strigose-hispid midrib ..... 11. *T. poeppigiana*
2. Inflorescence axis densely tomentose; leaf-blades lanceolate, densely strigose beneath . 12. *T. setosa*
3. Perianths 2–3 mm long; filaments 3–4 mm long . 4
3. Perianths 5–7 mm long; filaments 5–8 mm long . 5
4. Twigs glabrous or pilose; leaf-blades ovate to oblong ..... 1. *T. americana*
4. Twigs densely golden brown tomentose to velutinous; leaf-blades oblong to elliptic-oblong ..... 2. *T. dugandii*
5. Petioles 20–40 mm long; bracteoles 7–8 mm long ..... 8. *T. longifolia*
5. Petioles (4–)8–17(–22) mm long; bracteoloes 3–6 mm long 6
6. Number of lateral veins 13–18, never exceeding 20 7
6. Number of lateral veins more than 20, occasionally down to 18 9
7. Twigs brownish; leaf-blades oblong to oblanceolate ..... 7. *T. peruviana*

7. Twigs grey or occasionally light greyish-brown; leaf-blades ovate to ovate-oblong 8
8. Twigs shortly hispid-pilose, papillose where the hairs have fallen off; petioles 4–6 mm long..... ..... 9. *T. purdiei*
8. Twigs glabrous or occasionally pilose; petioles 9–12 mm long..... 10. *T. gardneriana*
9. Twigs densely golden tomentose .... 14. *T. vestita*
9. Twigs glabrous to appressedly yellowish brown puberulous 10
10. Inflorescence axis and bracteoles glabrous .... 13. *T. punctata*
10. Inflorescence axis puberulous to tomentose; bracteoles pilose-strigose 11
11. Leaf-blades ovate to ovate-oblong or ovate-elliptic; 15–20(–25) pairs of lateral veins .... 16. *T. melaenodendron*
11. Leaf-blades oblong to oblong-elliptic or oblong-lanceolate..... 12
12. Leaf-blades beneath with tomentose-velutinous midrib and axils between midrib and lateral veins; inflorescence axis puberulous .. 15. *T. weigeltiana*
12. Leaf-blades beneath with sparsely strigose midrib; inflorescence axis strigose-tomentose 13
13. Individual branches of the inflorescence up to 12 cm long; bracteoles 5 mm long .... 4. *T. caracassana*
13. Individual branches of the inflorescence up to 25 cm long; bracteoles 3–4 mm long.. 17. *T. cumingiana*

Key to fruiting specimens of Triplaris

1. Petals not basally adnate to the fruiting perianth tube or occasionally very shortly (1 mm) adnate 2
1. Petals basally adnate to the fruting perianth tube for 2–9 mm..... 6
2. Achene medially sulcate; petals usually shorter than the achene..... 1. *T. americana*
2. Achene not medially sulcate; petals usually longer than the achene..... 3
3. Twigs with dense tomentose to velutinous golden brown indumentum; fruiting perianth tube only slightly longer than broad ..... 2. *T. dugandii*
3. Twigs glabrous; fruiting perianth tube 1.5–2 times longer than broad..... 4
4. Petals linear, 2 mm broad; leaf-blades 14–20 cm long..... 3. *T. efistulifera*
4. Petals lanceolate to elliptic, more or less abruptly tapering into a long acuminate to caudate apex; petals more than 3 mm broad; leaf-blades 20–35 cm long 5
5. Leaf-blades oblong to elliptic, basally acute, slightly attenuate; (20–) 25–27 pairs of lateral veins .... 4. *T. caracassana*
5. Leaf-blades ovate to ovate-oblong, basally rounded to cordate, slightly oblique; 30–37 pairs of lateral veins ..... 5. *T. moyobambensis*
6. Wings of the fruting perianth only half as long as the tube..... 6. *T. physocalyx*
6. Wings of the fruiting perianth at least 1.5 times longer than the tube..... 7
7. The fruiting perianth tube with conspicuous ovate lobes between the bases of the wings..... ..... 7. *T. peruviana*
7. The fruiting perianth tubes without lobes between the bases of the wings 8
8. Twigs with long strigose-hispid hairs up to 6 mm long, papillose where the hairs have fallen off .. 9
8. Twigs never with strigose-hispid hairs up to 6 mm long..... 10
9. Inflorescence axis glabrous to puberulous; fruting perianth tube narrowly urceolate, twice as long as broad; achene with a short beak..... ..... 11. *T. poeppigiana*
9. Inflorescence axis densely tomentose; fruiting perianth tube broadly campanulate, as long as or only slightly longer than broad; achene abruptly narrowing into a 2–3 mm long beak ..... 12. *T. setosa*
10. Achene with a beak up to 4 mm long; fruiting perianth tube as broad as long ..... 13. *T. punctata*
10. Achene without beak or with a short beak never more than 2 mm long; fruiting perianth tube always longer than broad..... 11
11. twigs densely yellowish brown to golden tomentose ..... 14. *T. vestita*
11. Twigs glabrous or occasionally appressedly puberulous to shortly hispid-pilose 12
12. Fruiting perianth tube outside glabrous except for three longitudinal lines of whitish strigose hairs; petioles 20–40 mm long..... 8. *T. longifolia*
12. Fruiting perianth tube evenly sericeous-pilose to pilose outside; petioles 5–20 mm long 13
13. Leaf-blades ovate to ovate-elliptic or ovate-oblong; lateral veins 13–17(–25)..... 14
13. Leaf-blades oblong to oblong-lanceolate or oblong-elliptic; lateral veins 20–28(–32)..... 16
14. Leaf-blades 15–35 × 8–18(–22) cm; twigs reddish brown to greyish brown, never grey..... ..... 16. *T. melaenodendron*
14. Leaf-blades (8–)14–20(–23) × (4–)7–10(–12) cm; twigs grey or occasionally greyish brown 15
15. Twigs pilose to shortly hispid-pilose, papillose where the hairs have fallen off; petioles 4–6 mm long, appressedly strigose especially beneath .... 9. *T. purdiei*
15. Twigs glabrous or occasionally tomentose-pilose; petioles 9–12 mm long, glabrous or occasionally sparsely pilose..... 10. *T. gardneriana*
16. Inflorescence axis glabrous or minutely puberulous; fruiting perianth (3.0–)3.5–4.5 cm long .... 15. *T. weigeltiana*
16. Inflorescence axis yellowish grey to olivaceous tomentose; fruiting perianth (4.0–)5.0–6.0(–8.0) cm long..... 17. *T. cumingiana*

1. Triplaris americana L.

Triplaris americana Linnaeus 1759: 881; H.B.K. 1817: 182; Schomburgk 1838: 264; Dugand 1960: 388; Duke 1960: 357. – Type: Herb. Linn. No. 108–1 ex Spencer Savage Cat. A microfiche of the type has been studied.
Triplaris pyramidalis Jacquin 1763: t. 173, f. 5; Meyer 1840: 15; Meisner 1856: 178; Dugand 1952: 4. – Type: Non designatus.
Triplaris brasiliana Chamisso 1833: 139; Meyer 1840: 14; Meisner 1855: 48; Meisner 1856: 174. – Type: Sellow, Lhotzky s.n. Habitat in prov. Minas Geraës. N.v.
Triplaris schomburgkiana Bentham 1845: 628; Meisner 1855: 48; Meisner 1856: 172. – Type: Schomburgk 1 coll. (s.n.) (f,m). British Guyana. (Lectotype, K, here designated).
Triplaris felipensis Weddell 1849: 263; Meisner 1856: 173. – Type: Funck. et Schlim. 657(f). Venezuela, prov. de S. Felipe. Jun. 1846. (Lectotype, P, here designated; isolectotype W).
Triplaris noli-tangere Weddell 1849: 264; Meisner 1855: 49; Meisner 1856: 177. – Type: M.H. Alg. Weddell 1848. Cat. propr. No. 3378(f). Brazil, prov. de Mato Grosso. Jul. and Aug. 1845 (Lectotype, P, here designated).
Ruprechtia martii Meisner 1855: 58; Meisner 1856: 182. – Type: "Mart. Sine sched. propria in Herb. Acad. Reg. Monac. Brazilia provinc. Bahia, in sylvis inundatis ad fl. Itahype". A photo of the type from M has been studied.
Triplaris pavonii Meisner 1856: 172; Standley 1937: 466. – Type: "In Peruvia? (Pavon! Shuttlew.)." Material, collected by Ruiz and Pavon, from MA, BM, F, most likely to be the specimens on which Meisner's description is based, has been studied.
Triplaris formicosa S. Moore 1895: 444; Pl. 28. Fig. 5–6. – Type: Moore 301(f). Brazil, Mato Grosso, Santa Cruz. Sep. 1891 or 1892. (Lectotype, BM, here designated; isolectotypes NY, F (fragment)).
Triplaris estriata Kuntze 1898: 271. – Type: Kuntze s.n. Bolivia, Sierra de Santa Cruz. (Lectotype, NY, here designated).
Triplaris guanaiensis Rusby 1896: 111. – Type: Bang 1600(f). Bolivia, vic. Guanai. Jul. 1892. (Lectotype, US 796900, here designated; isolectotypes US, MO, GH, NY, C, PH). Paratype: Bang 1601(m) (US, MO, GH, NY, C, PH).
Triplaris boliviana Rusby 1900: 130. – Type: Rusby 1243(m). Bolivia, junction of Rivers Beni and Madre de Dios. Aug. 1886. (Lectotype, US 42385, here designated; isolectotypes, US, NY, F, GH).
Triplaris euryphylla Blake 1919: 239. – Type: Curran 5(f). Colombia, San Martín de Loba and vicinity, Lands of Loba, Department of Bolivar. Apr. or May 1916. (Lectotype, US 537171, here designated; isolectotype, GH). Paratype: Curran 4(m) US, F (fragment).
Triplaris laxa Blake 1919: 240. – Type: Curran 20(f). Colombia, San Martín de Loba and vicinity, Lands of Loba, Department of Bolivar. Apr. or May 1916. (Lectotype, US 537185, here designated; GH, F (fragment)).
Triplaris williamsii Rusby 1927: 235. – Type: Williams 672(f). Bolivia, San Buena Ventura. Nov. 14. 1901. (Lectotype, K, here designated; isolectotype, NY). Paratype: White 958(m) (MO). Bolivia. Huachi, midway between Meguilla and San Buena Ventura. Aug. 14. 1921.

Trees, (5–)10–20(–30) m tall to 30 cm in diameter. Bark mottled grey, smooth. Twigs light brown to brown, striate, glabrous or occasionally pilose-tomentose. Stipules 10–12 cm long, appressedly golden pilose especially apically. Petioles 10–25(–40) × 4–8 mm, rather stout, canaliculate, glabrous or brownish puberulous to pilose beneath; leaf-blades ovate to oblong, 2–2.5 times as long as broad, (15–)25–35(–40) × (7–)10–16(–20) cm, apically abruptly acuminate, basally rounded to acute slightly attenuate, glabrous above, beneath glabrous to brownish tomentose to velutinous along the midrib and lateral veins, 20–30 pairs of lateral veins. Axes of staminate inflorescences densely greyish-yellow to light brownish-yellow velutinous of up to 3 mm long hairs, individual branches up to 30 cm long. Bracts inconspicuous. Bracteoles 3 mm long, densely pilose-strigose outside, glabrous inside. Perianths 2–2.5 mm long, basally connate for 0.5 mm; anthers 0.5–0.75 mm long. Axes of pistillate inflorescences densely greyish-yellow to light brownish-yellow velutinous of up to 3 mm long hairs, individual branches up to 35 cm long. Bracts 1.5 mm long, acute, appressedly pilose-strigose. Bracteoles 3–6(–9) mm long, appressedly pilose-velutinous outside, glabrous inside. Pedicels of fruiting perianths 2–4(–6) mm long, pilose-tomentose. Fruiting perianths (2.5–)3.0–4.0(–5.0) cm long, the oblong-urceolate tubes (6–)8–12(–15) × 4–9 mm, outside and inside with soft patent pilose hairs; wings 2–2.5 times as long as the tubes, 20–35 × 4–9 mm, oblong to oblanceolate, apically rounded or sparsely and appressedly puberulous; petals (4–)6–8(–10) × (0.5–)1–2(–6) mm, narrowly ovate to lanceolate or obovate, somewhat chartaceous with distinct veins, occasionally with sparse whitish, appressed hairs, not adnate to the calyx tube or occasionally basally clawed and for 1–1.5 mm adnate to the tube. Achenes, slightly trigonous to terete basally, 6–10 × 4–6 mm, medially more or less prominently sulcate, petals fitting in the sulcus, olivaceous to brown, lustrous, glabrous, without beak; styles 3–4 mm long. – Fig. 2A, B,C.

Distribution. Triplaris americana is the most widespread species within the genus. It ranges from southern Panama (Prov. Darien) to southeastern Brazil (Goyaz and Paraná) (Fig. 7).

Ecology. Várzea forest, riverside forest, and gallery forest in areas with dryer vegetation types. Also common in secondary forest. Alt. 200–1000 m.

Notes. This species is characterized by the medially sulcate achenes, and the densely greyish yellow to light brownish velutinous inflorescence axes.

Triplaris americana is not independently described in Syst. Nat. ed. 10, but the publication contains a description of the genus with *americana* mentioned in the margin as the only epithet. I therefore consider this being a valid publication and refer to ICBN art. 33.1. The identity and typification of *T. americana* was elucidated by Dugand (1960).

As here circumscribed *T. americana* is an ochlospecies as defined by White (1962). After having examined all the material I do not find it justified to split up the species, and a rather broad concept has been chosen. It is possible to group some of the specimens into subgroups, which to some extent are correlated with geographic distribution, but intermediates are found, and the variation appears clinal.

The Bolivian specimens including the types of *T. bo-*

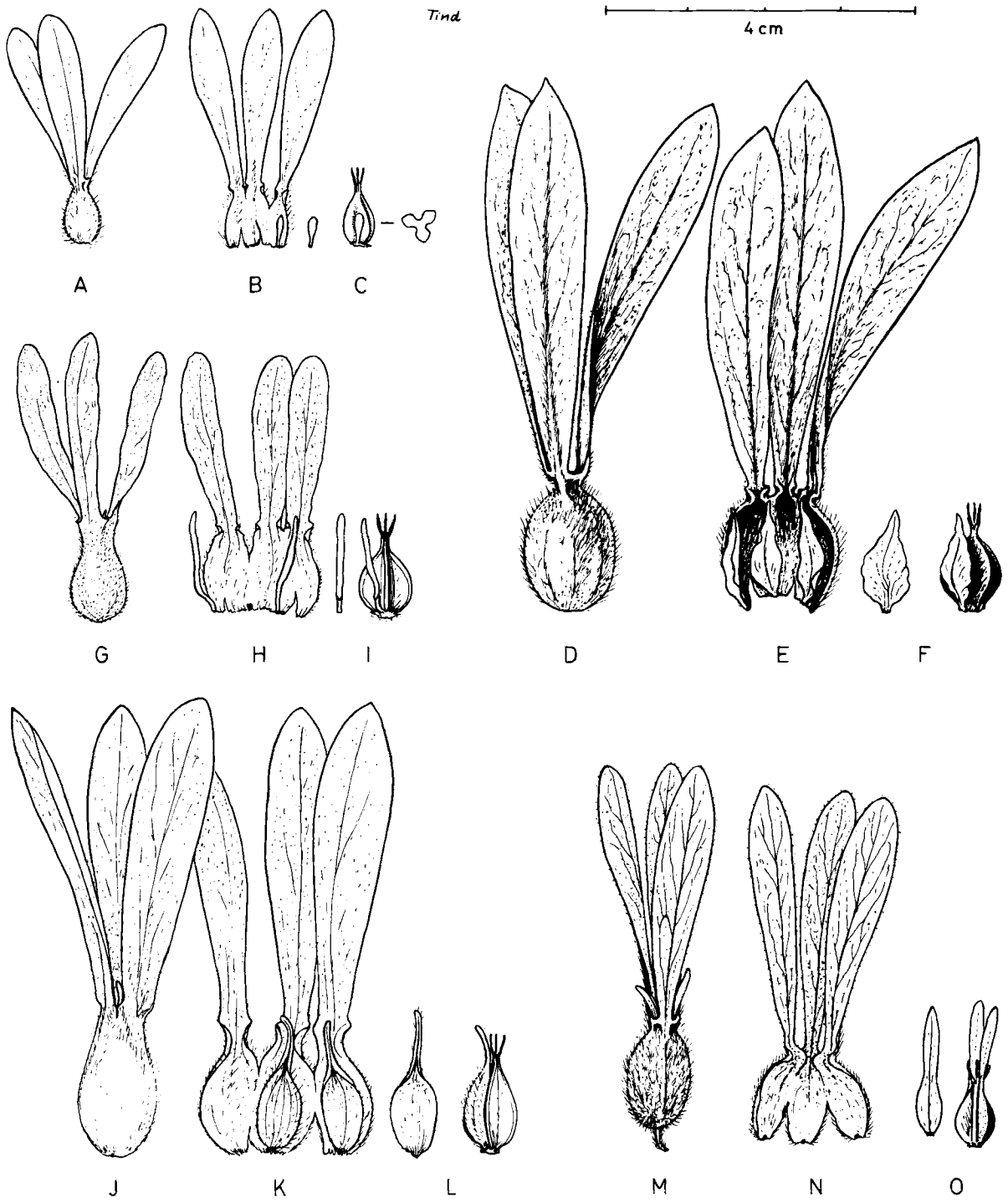

Fig. 2. Fruiting perianth characters of five species of *Triplaris*. – A–C. *T. americana* (Gentry et al. 18134). – A–B. Fruiting perianths. – C. Achene with petals and achene in cross section. – D–F. *T. dugandii* (Øllgaard et al. 34307). – D–E. Fruiting perianths. – F. Achene with petals. – G–I. *T. efistulifera* (Steinbach 3374). – G–H. Fruiting perianths. – I. Achene with petals. – J–L. *T. caracassana* (Pittier & Nakienovich 15315). – J–K. Fruiting perianths. – L. Achene with petals. – M–O. *T. moyobambensis* (Melin 197). M–N. Fruiting perianths. – O. Achene with petals.

liviana, T. williamsii, T. guanaiensis, and *T. estriata* all have oblong leaves as opposed to the more topotypical specimens from northern Colombia and Venezuela with ovate leaves. The eastern Brazilian (Mato Grosso, Goyaz, and Parana) specimens including the types of *T. noli-tangere, T. formicosa,* and perhaps *T. brasiliana* have smaller fruits than the residue.

Some western Amazonian specimens from Colombia (Dep. Amazonas, Dep. Putumayo), Ecuador (Prov. Napo), (Peru Dep. Loreto), and Brazil (State of Amazonas) have rounded achenes like the type of *Ruprechtia martii*. The type of *R. martii* is reported to have been collected at Rio Itahype in Bahia. As the specimens, which are very similar to the type of *R. martii*, all have been collected in western Amazonia and no other specimens of *T. americana* are known from Bahia, I am convinced, that it is erroneously labelled.

The specimens Ancuash 1487(f), Berlin 130(f) and 3512(f) from eastern Peru (Dep. Amazonas), Holm-Nielsen et al. 20427(f), and Brandbyge 42271(f) from eastern Ecuador (Prov. Morona-Santiago), and Aristeguita 4112(f) from western Venezuela (Est. Tachira) are rather big-fruited and have broad petals. These specimens might represent a population, which has been isolated from the rest of the Amazonian population by the Cordilleras Cutucú and Cóndor in Ecuador, Cerros Campanquiz in Peru, and the Cordillera do Merida in Venezuela. The velutinous inflorescence axes and the slightly sulcate achenes reveal their connection with the rest of the specimens of *T. americana*.

Type material of *T. brasiliensis* has not been studied, but it is most likely a small fruited form of *T. americana*, as suggested by Duke (1960).

Local names. Panama. "Palo Santo". Colombia. "Vara Santa". "Palo Santo". Venezuela. "Palo Maria". "Vare de Maria". Peru. "Tangarana". "Tangarana blanca". "Tangarana negra". "Tankana". "Tagána". "Maicharoey" (Huitoto). "Palo Santo". Bolivia. "Palo Santo". Brazil. "Colaburene" (Carajá). "Pau de formiga". "Pau de novato". "Pau Jacu". "Pau Jahu". "Paliteiro". "Tachi". "Taxi". "Tachyzeiro". "Taquari".

Uses. According to field notes of Schunke, Peruvian indians use the bark in an infusion as a depurative. The leaves are smoked to cause hallucinations.

Selected specimens studied. Panama. Darien: Williams 988(f) (NY). *Colombia*. Mutis 5089(f) (MA, US), Amazonas: Schultes & Black 8638(f) (GH, US). Antioquia: Feddema 1970(f) (NY, S). Atlantico: Dugand 954(f) (F). Caldas: Gentry et al. 18134(f) (AAU, MO). Choco: Forero et al. 1019(f) (MO, NY). Magdalena: Ed. André 230 (F). Meta: Little & Little 8271(f) (NY, US). Putumayo: Schultes 3634(f) (GH). Santander: Killip & Smith 19056(f) (A, F, PH, S, US). Tolima: Walker 260(m) (F, GH, NY, US). Vaupés: Schultes 5676(f) (GH). *Venezuela*. Pittier 12204 (MO, NY). Amazonas: Williams 15278(f) (F, US). Apure: Davidse & Gonzales 13789(f) (MO). Bolivar: Maguire 28987(f) (A). Falcon: Ferrari 545(f) (MO, NY). Merida: Steyermark 55925(f,M) (F). Tachira: Aristeguita 4112(f) (US). Yaracuy: Curran 600(f) (NY). *Ecuador*. Napo: Brandbyge et al. 33476(f) (AAU, QCA). Pastaza: Brandbyge & Asanza 31441(f) (AAU, QCA). Morona-Santiago: Holm-Nielsen et al. 20427(f) (AAU, QCA). *Peru*. Amazonas: Ancuash 1487(f) (AAU). Cuzco: Cook & Gilbert 1064 (US). Huanuco: Asplund 13313(m) (S). Junin: Macbride 5448(m) (F, US). Loreto: Asplund 14313(f) (S); Woytkowski 34428(f) (MO, S, UC). Madre de Dios: Alfaro 1055(f) (MO). San Martín: Ferreyra 7995(m) (US). *Bolivia*. Beni: Fleishman 569(f) (S). Cochabamba: Steinbach 405(f) (F, M, NY, S, US). La Paz: Krukoff 10058(m) (A, MO, NY, S, UC, US). Pando: Prance et al. 6614(m) (A). Sta. Cruz: Steinbach 6424(m,f) (A, F, GH, MO, NY, PH, S, UC). *Brazil*. Acre: Prance et al. 2989(f) (F, S). Amazonas: Ducke 884(m) (F, MO, US); Ule 5259(f) (G). Goyaz: Irwin et al. 17989(m) (C, F, NY). Mato Grosso: Maguire et al. 56183(f) (A, C, F); Malme 2284(m) (S). Pará: Kuhlman 1691(f) (RB). Paraná: Hatschbach 17039(f) (AAU, C, F, NY, UC, US). Roraima: Prance & Ramos 6989(f) (MO).

2. Triplaris dugandii Brandbyge

Brandbyge 1984: 761. – Type: Øllgaard et al. 34607(f). Ecuador. Prov. Pastaza: Rio Bobonaza. Rain-forest on river bank, and secondary forest around houses between Huagracachi and Cachitama, below Montalvo. Alt. ca. 300 m. (c. 76°43′ W, 2°20′ S). (Holotype, AAU; isotypes, GH, MO, NY, QCA, S).

Trees, (10–)20–30(–35) m tall. Trunk long, slender. Bark whitish-grey. Twigs brown, striate, densely tomentose to velutinous of golden brown hairs. Stipules up to 32 cm long, densely tomentose of yellowish golden hairs. Petioles 12–18 × 7–10 mm, canaliculate, brownish-golden tomentose to velutinous; leaf-blades oblong to elliptic-oblong, 2–3 times as long as broad, 34–47 × 11–23 cm, apically acuminate, basally rounded to slightly cordate, unequal, glabrous somewhat lustrous above except for the puberulous midrib and lateral veins, beneath yellowish-brown puberulous to tomentose-velutinous, especially along the veins, with 24–30 pairs of lateral veins. Axes of staminate inflorescences densely yellowish-brown to golden brown tomentose, individual branches up to 32 cm long. Bracts 1.5–2 mm long, acute, densely pilose-strigose. Bracteoles 3 mm long, densely pilose-strigose outside, glabrous inside. Perianths 2.5–3 mm long, basally connate for 1 mm, pilose-strigose outside, pilose-villous inside; filaments 3.5–4 mm long, basally adnate to the tube for 0.5–1 mm; anthers 0.5–0.75 mm long. Axes of pistillate inflorescences densely yellowish-brown to golden brown tomentose, individual branches up to 35 cm long. Bracts 2.5–3 mm long, acute, yellowish-brown pilose-strigose. Bracteoles 9–12 mm long, yellowish-brown pilose-strigose outside, glabrous inside. Pedicels of fruiting perianths 6–9 mm long, densely tomentose. Fruiting perianth 6.0–7.0 cm long, the globose-urceolate tube 16–20 × 13–20 mm, sericeous-pilose on both sides; wings 3 times longer than the tubes, 40–50 × 10 mm, oblanceolate, apically acute to rounded, basally only 2–3 mm wide, puberulous; petals 12–23 × 4–8 mm, lanceolate to ovate-lanceolate, somewhat scarious with distinct midvein, not adnate to the calyx tube. Achenes tri-

alate, 10–12 × 8 mm, brown, puncticulate-punctate, without beak or with a very short beak, 1 mm long; styles 3–4 mm long. – Fig. 2D,E,F.

Distribution. Southern Amazonian Colombia, Amazonian Ecuador, northern Amazonian Peru, and State of Acre, Brazil (Fig. 9).

Ecology. Triplaris dugandii is mostly an upper canopy tree in poorly drained upland forest, but it is also found in riverside forest and secondary forest. Alt. 200–500 m.

Notes. This species is distinguished by the brownish-golden indumentum, the globose-urceolate fruiting perianth tubes, and the wings which are very narrow basally.

The two collections from Brazil, Krukoff 5658(f) and Ule 9344(f), have smaller and narrower petals than the rest of the specimens studied. I believe that when more specimens from the area between Amazonian Ecuador and State of Acre have been collected, this apparent variation will appear to be clinal.

Local names. Ecuador. "Tangarana". "Asuchihuita" (Quichua). "Ña ña mai coró„ (Siona-Secoya). Brazil. "Tachy".

Uses. According to the Secoya indians of the northern Oriente of Ecuador, rubbing the dogs with a twig from the plant will make them better fit for hunting.

Selected specimens studied. Colombia. Putumayo: Cuatrecasas 11092(f) (F, US). *Ecuador.* Napo: Brandbyge et al. 33304(f); 36208(f) (AAU, QCA). Pastaza: Lugo 1683(f) (GB). Morona-Santiago: Brandbyge & Asanza 32234(f) (AAU, QCA). *Peru.* Loreto: Klug 3134(m) (F, GH, MO, S, US). *Brazil.* Acre: Krukoff 5658(f) (A, F, M, MO, NY, S, UC, US); Ule 9344(f) (NY, US).

3. Triplaris efistulifera Rusby

Rusby 1900: 129. – Type: Rusby 1425(f). Bolivia, Yungas, 6000 ft., 1885. (Lectotype, US, here designated; isolectotypes, US, NY, PH).

Trees, 15–20 m tall. Twigs dark brown to brown, slender, slightly striate, glabrous. Stipules not seen. Petioles 7–15 × 2–3 mm, semiterete to slightly canaliculate, glabrous; leaf-blades lanceolate, 2.5–3 times as long as broad, 14–20 × 6–8 cm, apically acute to acuminate, basally rounded somewhat oblique, glabrous above, glabrous beneath except for the pilose-tomentose midrib, 18–22 pairs of lateral veins. Staminate inflorescences not seen. Axes of pistillate inflorescences puberulous to tomentose, individual axes up to 14 cm long. Bracts 1 mm long, acute, puberulous. Bracteoles 6–7 mm long, pale brownish puberulous-sericeous outside, glabrous inside. Pedicels of fruiting perianths 3–4 mm long, pale brownish puberulous to tomentose. Fruiting perianths 5.0–5.5 cm long, the elongate-campanulate tubes 16–18 × 10 mm, pilose-sericeous outside, glabrous inside or sparsely pilose; wings about twice as long as the tubes, 35–40 × 7–9 mm, oblanceolate, apically obtuse, sparsely appressed puberulous; petals 20–23 × 2 mm, linear, lying closely in the angles between the wings of the achene, sparsely appressed pilose, not adnate to the tube. Achenes trialate, 12–15 × 8 mm, brown, smooth to slightly pusticulate, tapering into a 1–2 mm long beak; styles 2–3 mm long. – Fig. 2G,H,I.

Distribution. This species, of which only three collections are known seems to be restricted to the Yungas area in Bolivia (Fig. 10).

Notes. Triplaris efistulifera is distinct because of its long linear petals, which are not adnate to the fruiting perianth tube.

Specimens studied. Bolivia. La Paz: Krukoff 10434(f) (A, F, MO, NY, S, UC, US). Sta. Cruz: Steinbach 3374(f) (US).

4. Triplaris caracassana Chamisso

Chamisso 1833: 137; Meisner in de Candolle 1856: 172; Steyermark & Huber 1978: 775.
Triplaris caracassana var. *genuina* Meisner in de Candolle 1856: 172. – Type: Bredemeyer 737, in herb. Willd. 18465 (holotype, B).
Triplaris caracassana var. *vargasii* Meisner in de Candolle 1856: 172. Syntypes: Vargas 33, Bredemeyer 325. Bredemeyer 325 from W has been studied.
Triplaris americana Willdenow 1805. 812., non Linnaeus 1759: 881. Chamisso 1833: 137.

Trees, 8–20(–30) m tall. Bark smooth, brownish green. Twigs brown, striate, glabrous. Stipules not seen. Petioles 10–15 × 4–6 mm, canaliculate, glabrous or with sparse whitish appressed hairs beneath; leaf-blades oblong to oblong-elliptic, 2.5–3 times as long as broad, 20–30 × 8–12 cm, apically slightly acuminate, basally acute, slightly attenuate, glabrous above, glabrous beneath except for pilose-strigose appressed hairs on the midrib and occasionally on the lateral veins, (20–)25–27 pairs of lateral veins. Axes of staminate inflorescences brownish tomentose-velutinous, individual branches up to 12 cm long, pilose-strigose outside, glabrous inside. Perianths 5 mm long, basally connate for 3 mm, puberulous-pilose; filaments 6–6.5 mm long, basally adnate for 3 mm; anthers 1 mm long. Axes of pistillate inflorescences densely greyish-brown to light yellowish-brown tomentose to velutinous, individual branches up to 23 cm long. Bracts 1–2 mm long, densely tomentose, deciduous. Bracteoles 7–9 mm long, tomentose to appressedly strigose outside, glabrous inside. Pedicels of fruiting perianths 4–5 mm long, densely yellowish-brown tomentose. Fruiting perianths (4–)5–6(–6.5) cm long, the globose-campanulate tubes 12–18 × 9–12 mm long, appressedly sericeous outside, with longer patent sericeous-pilose hairs inside; wings 2.5–3 times longer

than the tubes, 35–45 × 8–10 mm, oblanceolate, obtuse, glabrous or minutely puberulous; petals 15–25 × 3–7.5 mm, lanceolate to elliptic, more or less abruptly tapering into a long acuminate to caudate apex, puberulous to appressedly pilose on both sides, not adnate to the tube. Achenes triquetrous to trialate, 11–16 × 8–9.5 mm, brown, somewhat lustrous, glabrous, with conspicuous veins, without beak; styles 3–5 mm long. – Fig. 2J,K,L.

Distribution. Northern and northwestern Venezuela (Fig. 9).

Ecology. This species ranges from riverside forests and forested canyon bottoms to dry rocky slopes and secondary regrowths. Alt. 100–1000 m.

Local names. "Palo de Maria". "Palo Maria". "Maria". "Vara Santa". "Barrabas". "Guayabo".

Uses. The wood, which is reported not to be very durable when in contact with the soil, is used locally for different construction purposes.

Selected specimens studied. Venezuela. Pittier & Nakichenovitch 15315(f) (US). Carabobo: Pittier 7726(f) (US); Williams 12337(f) (F, S, UC, US). Distrito Federal: Manara s.n. Apr. 1976 (MO). Falcon: Ruiz Teran 411(m) (MO). Merida: de Bruijn 1136(f) (M, MO, NY, S, US). Miranda: Davidse & Gonzalez 13691(f) (US). Yaracuy: Gines 4465(f) (US). Zulia: Curran & Haman 1001(f) (A, F, GH, NY, US).

5. Triplaris moyobambensis Brandbyge

Brandbyge 1984: 763. – Type: Klug 3656(f). Peru. Department of San Martín: Zepelacio, near Moyobamba, altitude about 1100 m; forest. (Holotype, GH; isotype, US).

Trees, to 20 m tall. Twigs brown to reddish-brown, striate, glabrous. Stipules not seen. Petioles rather stout, 12–17 × 5–7 mm, canaliculate, glabrous; leaf-blades ovate to ovate-oblong, 2–2.5 times as long as broad, 23–35 × 11–15 cm, apically rounded to acute, basally rounded to cordate, slightly oblique, glabrous, the veins beneath very prominent, 30–37 pairs of lateral veins. Staminate inflorescences not seen. Axes of pistillate inflorescences yellowish-grey to yellowish-brown tomentose-velutinous, individual branches up to 25 cm long. Bracts 2 mm long, acute, yellowish-grey tomentose. Bracteoles up to 7 mm long, appressedly sericeous-pilose to tomentose outside, glabrous inside. Pedicels of fruiting perianths 3–4 mm long, greyish-yellow pilose to tomentose. Fruiting perianths 4.5–5.5 cm long, the oblong-urceolate tubes greyish-yellow sericeous-pilose to tomentose outside, sparsely sericeous-pilose inside; wings almost 3 times as long as the tubes, 35–40 × 7–8 mm, oblanceolate, apically acute to rounded, basally only 2 mm wide, glabrous or with sparsely appressed hairs; petals 20–26 × 4 mm, ovate-lanceolate, broadest in their basal third, sparsely appressed-puberulous, not adnate to the tube, lower part yellowish grey, upper part purple. Achenes trialate, 8–10 × 5.5–6.5 mm, puncticulate, pale yellowish-green to olive green, with a short beak, 1 mm long; styles 2.5 mm long. – Fig. 2M,N,O.

Distribution. This species is only known from three collections near Moyobamba in eastern Peru. The label of Melin 197(f) indicates the locality "Roque", which is believed to be San Roque situated some 80 km south of Moyobamba (Fig. 9).

Notes. Triplaris moyobambensis differs from the other species of *Triplaris* by its very long petals, which are not adnate basally to the fruiting perianth tube.

Specimens studied. Peru. San Martín: Melin 197(f) (S); Woytkowski 35260(m) (UC).

6. Triplaris physocalyx Brandbyge

Brandbyge 1984: 764. – Type Cooper s.n. (f). Brazil. Amazonas: Junction of Rio Madeira and Rio Aripuana, Lat. c. 5°07′ S., long. c. 60°25′ W. Mar. 20–21. 1945. (Holotype, US; isotype, UC).

Trees, 8–10 m tall. Twigs brown, striate, glabrous or with sparse appressed whitish hairs. Stipules not seen. petioles 6–10 × 2–3 mm, canaliculate, glabrous or with sparse appressed hairs; leaf-blades lanceolate, 3–4 times as long as broad, 15–25 × 4–9 cm, apically acute to slightly acuminate, basally acute, slightly decurrent, glabrous, somewhat shiny above, glabrous beneath except for the appressed whitish strigose midrib, 18–20 pairs of lateral veins. Staminate inflorescences not seen. Axes of pistillate inflorescences puberulous to appressedly pilose-strigose, individual axes up to 25 cm long. Bracts up to 2 mm long, triangular, acute, apically with rigid hairs. Brateoles 10–12 mm long, appressedly pilose-strigose outside, glabrous inside. Pedicels of fruiting perianths 4–5 mm long, densely yellowish tomentose. Fruiting perianths 3.0–3.2 cm long, the broadly inflated-campanulate tubes 22 × 15 mm, appressedly sericeous-pilose outside, sparsely pilose inside; wings about half as long as the tubes, 8–10 × 4 mm, oblong, apically obtuse, appressedly pilose; petals 18–20 × 1–1.5 mm, subulate, sparsely pilose, the basal 8 mm adnate to the tube. Achenes trialate, 13–15 × 9–11 mm, light brown to brown, glabrous, shiny, without beak; styles 3–4 mm long. – Fig. 3A,B,C.

Distribution. Apart from the type collection this species has only been collected near Humayta on Rio Madeira some 350–400 km southwest of the type locality (Fig. 9).

Notes. Triplaris physocalyx is clearly separated from all the other species of the genus by the inflated fruiting perianth tubes and the small wings.

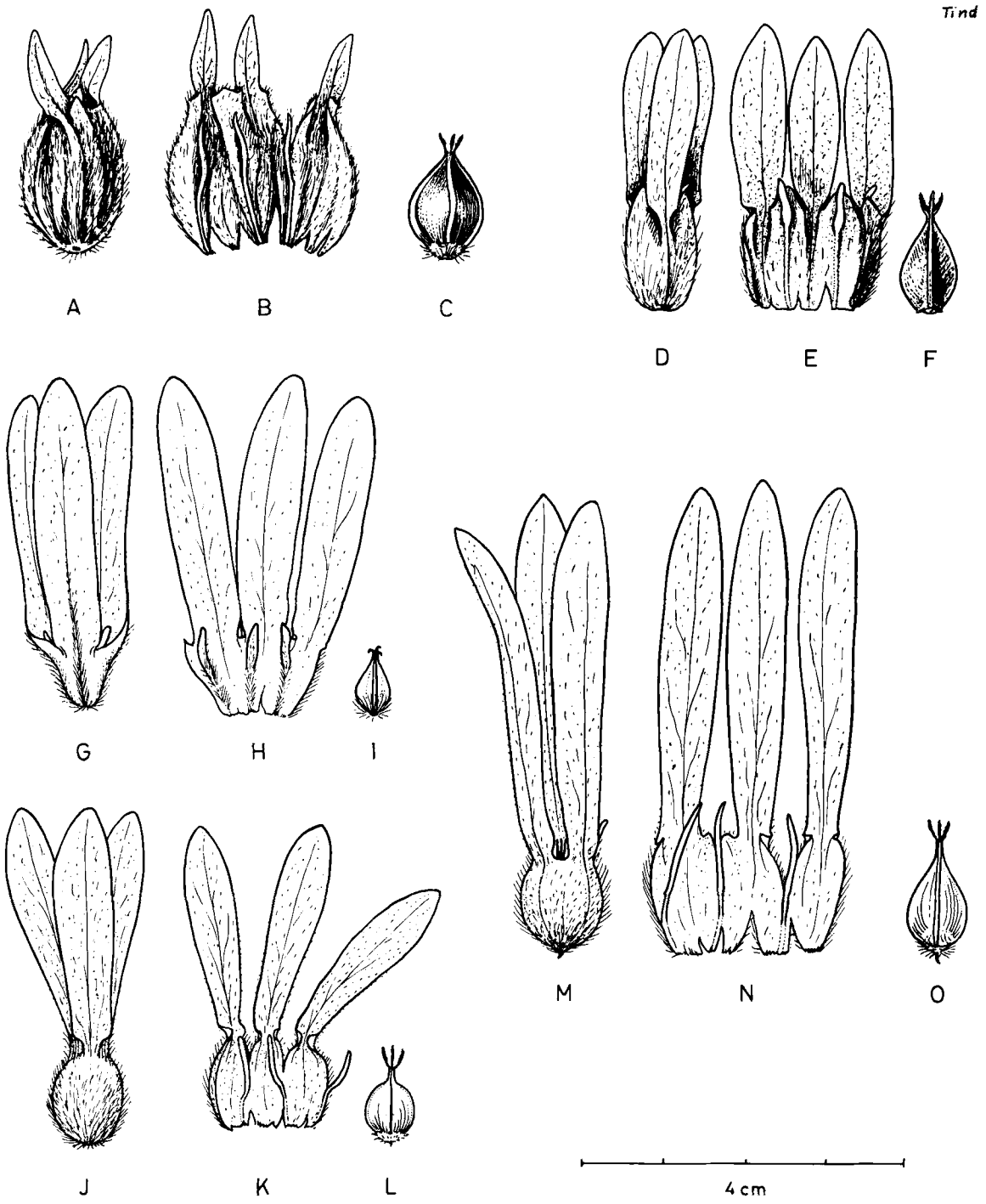

Fig. 3. Fruiting perianth characters of five species of *Triplaris*. – A–C. *T. physocalyx* (Cooper s.n.). – A–B. Fruiting perianths, B showing insertion of petals. – C. Achene. – D–F. *T. peruviana* (Belshaw 3291). – D–E. Fruiting perianths, E showing insertion of petals. – F. Achene. – G–I. *T. longifolia* (Froehner 232). – G–H. Fruiting perianths, H showing insertion of petals. – I. Achene. – J–L. *T. purdiei* (Elias 435). – J–K. Fruiting perianths, K showing insertion of petals. – L. Achene. – M–O. *T. gardneriana* (Drouet 2622). – M–N. Fruiting perianths, M showing insertion of petals. – O. Achene.

Local names. "Taxi". Different orthographic variants of this name are known for other *Triplaris* species from Amazonian Brazil.

Specimen studied. Brazil. Amazonas: Krukoff 6701(f) (A, F, MO, NY, S, US).

7. Triplaris peruviana Fisch. & Mey. ex C.A. Meyer

Meyer 1840: 15; Meisner 1856: 174; Standley 1937: 467. – Type: Mathews 1620(f,m). Peru. Tarapoto. 1835. (Lectotype, K, here designated; isolectotypes, P, F).

Trees, 8–12 m tall. Twigs brownish, stout, striate, glabrous, sparsely papillose. Stipules not seen. Petioles (10–)12–15(–20) × 3–4 mm, slender, canaliculate, glabrous; leaf-blades oblong to oblanceolate, 2–3 times as long as broad, 17–30 × 7–13 cm, apically acuminate, basally acute to obtuse, glabrous above, glabrous or with minute tufts of tomentose hairs in the axils between midvein and lateral veins beneath, 15–18 pairs of lateral veins. Axes of staminate inflorescences glabrous to puberulous, individual branches up to 10 cm long. Bracts 1 mm long, apically strigose. Bracteoles 3–5 mm long, hispid-pilose outside, glabrous inside. Perianths 5 mm long, basally connate for 3.5 mm, hispid-pilose; filaments 6–7 mm long, basally adnate for 3 mm; anthers 0.75–1.25 mm long. Axes of pistillate inflorescences glabrous to puberulous, individual branches up to 14 cm long. Bracts 3–3.5 mm, apically strigose-pilose. Bracteoles 6 mm long, puberulous to shortly appressed pilose outside, glabrous inside. Pedicels of fruiting perianths 5–7 mm long, whitish patently pilose. Fruiting perianths 3.3–3.7 cm long, the tubular-campanulate tubes 13 × 9 mm, sparsely covered with appressed to spreading whitish hairs outside, glabrous inside; wings only slightly longer than the tubes, 20–22 × 6–7 mm, apically obtuse or rounded, puberulous, each sinus with an ovate lobe; petals 14–17 × 1–1.5 mm, subulate-lanceolate, the basal 7–8 mm adnate to the tube. Achenes triquetruos, 9–12 × 6–7 mm, dull brown to brown, lustrous, glabrous, without beak; styles 4 mm long. – Fig. 3D,E,F.

Distribution. Triplaris peruviana seems to be endemic to San Martín Valley (Dep. San Martín) in the Peruvian Amazonia. The collections are restricted to localities adjacent to Rio Huallaga. Meyer's original description only indicates: "In Peru legit Mathews", but the label of the type from K indicates: "Tarapoto, Mathews, 1835". A recent collection (Belshaw 3291(f)) is from the same locality (Fig. 10).

Notes. This species is very distinct because of the rather small fruiting perianths with the ovate lobes in each sinus.

Specimens studied. Peru. San Martín: Belshaw 3291(f) (F, GH, MO, NY, UC, US); Klug 4153(m) (F, GH, MO, S, UC, US).

8. Triplaris longifolia Huber

Huber 1906: 559. – Type: Huber 1458. Peru. Rio Ucayali, Cerro Canchahuaya. Nov. 9. 1898. (Lectotype, RB 259, here designated; a Photo of an isolectotype from MG and a fragment apparently taken from the same specimen is at F).

Trees to 10 m tall. Twigs grey to greyish-brown, slightly striate, glabrous, juvenile plants with slightly swollen internodes. Stipules not seen. Petioles 20–40 × 3 mm, slightly canaliculate, glabrous; leaf-blades oblanceolate to lanceolate, 3.5–4 times as long as broad, 25–45 × 8–14.5 cm, apically acute to slightly acuminate, basally strongly attenuate, glabrous above, glabrous beneath except for a few strigose hairs along the midrib, 20–22 pairs of lateral veins. Axes of staminate inflorescences densely yellowish grey, velutinous; individual branches up to 20 cm long. Bracts inconspicuous. Bracteoles 7–8 mm long, scarious, sparsely long pilose-strigose outside, glabrous inside. Perianths 7 mm long, basally connate for 4.5–5 mm, sparsely pilose-strigose; filaments 8–8.5 mm long, basally adnate for 4.5 mm; anthers 0.5–1 mm long. Axes of pistillate inflorescences greyish-yellow velutinous, individual branches up to 17 cm long. Bracts 3 mm long, scarious, acute, long sericeous-pilose. Bracteoles, deciduous, not seen. Pedicels of fruiting perianths 2–3 mm long, densely yellowish-grey villous of 2 mm long hairs. Fruiting perianths 5.0 cm long, the campanulate tubes 13–15 × 8–9 mm, tapering towards the 2 mm broad base, glabrous outside except for three longitudinal lines of whitish strigose hairs, sparsely strigose inside; wings almost 3 times as long as the tubes, 38 × 9 mm, oblong, with parallel sides to the base, apically rounded, with sparse, short, appressedly strigose hairs, especially along the midvein; petals 13–15 × 2 mm, lanceolate, sparsely appressedly strigose, the basal 7–8 mm adnate to the tube. Achenes trialate, 7–8 × 3–4 mm, brown, puncticulate, without beak; styles 0.5–1 mm long. – Fig. 3G,H,I.

Distribution. This species is only known from two collections. Which are both from localities adjacent to Rio Ucayali in Amazonian Peru (Fig. 9).

Notes. Triplaris longifolia is very distinct because of its long narrow, long-petioled leaves and the campanulate fruiting perianth tubes, which are tapering towards the base.

Local name. "Tangarana".

Specimen studied. Peru. Loreto: Froehner 232(f,m) (MO).

9. Triplaris purdiei Meisner

Meisner 1855: 49. Meisner 1856: 176. – Type: Purdie s.n. (F). Colombia. Santa Martha. (Lectotype, K, here designated).

Trees, (4–)6–8(–12) m tall to 40 cm in diameter, shrubby, much branched; trunk erect, usually short.

Bark smooth, thin, mottled in various shades of grey and greenish, peeling off in patches. Twigs greyish, slender, slightly striate, papillose, pilose to shortly hispid-pilose. Stipules 7–9 cm long, dark brown with yellowish-golden appressedly strigose hairs. Petioles (3–)4–6(–8) × 2–3 mm, semiterete, appressedly strigose especially beneath; leaf-blades ovate-oblong to ovate-elliptic, about twice as long as broad, (11–)14–20(–23) × (5–)7–10(–12) cm, apically acute to slightly acuminate, basally rounded, slightly oblique, shortly appressedly hispid-strigose above, seldom glabrous, puberulous-pilose beneath except for the appressedly strigose midrib, margin ciliate, young leaves often with sparse, long, pilose hairs, 13–17 pairs of lateral veins. Axes of staminate inflorescences pale greyish-brown sericeous-pilose, individual branches up to 13 cm long. Bracts 0.5 mm long, acute, pale yellowish strigose. Bracteoles 4–4.5 mm long, pale yellowish strigose outside, glabrous inside. Perianths 5 mm long, basally connate for 2 mm, tube appressedly strigose outside, sparsely strigose inside; filaments 6–6.5 mm long, basally adnate for 1.5 mm; anthers 1–1.5 mm long. Axes of pistillate inflorescences pale yellowish-brown puberulous to sericeous-pilose, individual branches up to 18 cm long. Bracts 2 mm, ovate, appressedly sericeous-pilose outside, glabrous inside. Pedicels of fruiting perianths 7–10 mm long, patently sericeous-pilose. Fruiting perianths (4.0–)4.5–5.0(–5.3) cm long, the oblong-urceolate tubes 13–17 × 9–11 mm, appressedly sericeous-pilose outside, glabrous to puberulous inside; wings about twice as long as the tubes, 32–37 × 7–8 mm, oblong to oblanceolate, apically acute to rounded, glabrous or sparsely appressedly strigose; petals (12–)14–18(–22) × 1 mm, subulate, basally with sparse rigid hairs, the basal 6–8 mm adnate to the tube. Achenes 10–14 × 7–8 mm, brown, lustrous, glabrous, with a distinct 1–2.5 mm long beak; styles 3–5 mm long. – Fig. 3J,K,L.

Distribution. This species is restricted to the provinces Magdalena, Bolivar, Atlantico, and Guajira in northern Colombia (Fig. 9).

Ecology. Triplaris purdiei ranges from inundated riverside forests over secondary forests to dry thickets and forests. It seems to occur most frequently on sandy soils. Alt. 0–400 m.

Notes. This species is closely related to *T. gardneriana* of eastern and south-eastern Brazil. It differs from that species by the shorter petioles and the pilose-hispid hairs on the twigs.

In his original description of *T. purdiei* Meisner (1855: 49) cited two specimens, Purdie s.n. from Santa Martha in Colombia and Schomburgk 1522(f,m) collected near Rio Barama in British Guyana. The material of Schomburgk 1522 from P, NY, and F, which was studied, belongs to *T. weigeltiana*.

Local names. "Vara Santa". "Candelario". "Juan Pacheco". "Volador". "Uvero bagre". "Guayabo bagre". "Bagre". "Ure-tay" (guajiro). "Uvero".

Selected specimens studied. Colombia. Atlantico: Dugand 5489(m) (MO, US); 5492(f) (MO); Elias 435(f) (US); 1578(f,m) (A, F, NY, S, US). Bolivar: Pennel 3965(f), 3966(m) (NY, US). Guajira: Dugand 6626(f) (US). Magdalena: Haught 4742(f,m) (F, US, W).

10. Triplaris gardneriana Weddell

Weddell 1849: 265; Meisner 1855. 52; Meisner 1856: 174. – Type: Gardner 1829(f,m). Brésil. Province de Ceara. (Lectotype, P (Catal. 1866, No. 18. 4 sheets), here designated; isolectotypes, K, NY, US).
Triplaris tomentosa Weddell 1849: 265. t. 15; Meisner 1855: 51; Meisner 1856: 177. – Type: Blanchet 2917(f). "Provenit in provincia brasiliensi Bahia ad oras fluminis San Francisco". (Lectotype, P, here designated; isolectotypes, F, K, NY).
Triplaris bonplandiana Weddell 1849: 262; Meisner 1855: 48; Meisner 1856: 174. – Type: Bonpland 3599(f). "Habitat in provincia Maranon Peruviae). (Lectotype, P, here designated).
Triplaris pachau Martius ex Meisner 1855: 51; Meisner 1856: 177. – Syntypes: Martius s.n., Blanchet s.n., Pohl 2366, Pohl 3093. Martius s.n. (M) was studied.
Triplaris speciosa Taubert 1890: 14. – Type: Glaziou 11442 (f,m). "Habitat in Brasilia, loco non indicato". (Lectotype, C, here designated; isolectotype, K).
Triplaris baturitensis Huber 1901: 300. – Type: Huber 170(f). Brazil. Serra de Baturité. (Lectotype, RB, here designated).
Triplaris guaranitica Chodat 1903: 393. – Type: Hassler 7158(f). "Ad ripam fluminis Paraguay in dumetis pr. Conception". Aug. 1901 or 1902. (Lectotype, P, here designated; isolectotypes, C, GH, MO, NY, S, UC, US). Paratype: Hassler 7157(m) (C, GH, MO, NY, P, UC, US).

Trees, (5–)8–12(–15) m tall. Twigs slender, grey to light greyish-brown, striate, glabrous or occasionally pilose to tomentose. Stipules up to 7 cm long, with sparse, whitish, appressed hairs. Petioles (7–)9–12(–15) × 2–3 mm, slender, semiterete to slightly canaliculate, glabrous or with sparse hairs; leaf-blades ovate to ovate-oblong, 2–3 times as long as broad, (8–)14–16(–20) × (4–)6–8 cm, apically acute to shortly acuminate, basally acute to rounded, somewhat attenuate, moderately to strongly oblique, glabrous to sparsely and appressedly hairy above, especially in young leaves, beneath glabrous or appressedly pilose-tomentose, especially along the midrib, 13–15(–19) pairs of lateral veins. Axes of staminate inflorescences densely greyish-yellow to light brownish tomentose, individual branches up to 15 cm long. Bracts 1–1.5 mm, densely tomentose. Bracteoles 3–6 mm long, densely tomentose-strigose outside, glabrous inside. Perianths 4–6 mm long, basally connate for 2.5–3.5 mm, tube appressedly pilose-strigose outside, glabrous or sparsely pilose-strigose inside; filaments 5–7 mm long, basally adnate for 2–4 mm, anthers 1–1.5 mm long. Axes of pistillate inflorescences densely greyish-yellow to light brownish tomentose, individual branches up to 15 cm long. Bracts 1–1.5 mm long, tomentose. Bracteoles 7–10 mm long, chartaceous, greyish-yellow tomentose outside, glabrous inside, de-

ciduous. Pedicels of fruiting perianths 6–8 mm long, sericeous-tomentose. Fruiting perianths 3.5–4.5(–5.5) cm long, the oval to oblong-campanulate tubes 12–15 × 8–10 mm, pilose-tomentose outside, glabrous to puberulous inside; wings twice as long as the tubes, 20–35 × 6–8 mm, lanceolate, apically acute to rounded, glabrous to puberulous; petals (10–)12–16(–18) × 1 mm, subulate, sparsely pilose, the basal 5–9 mm adnate to the tube. Achenes moderately to broadly trialate, 10–13 × 5.5–8.5 mm, brown, lustrous, glabrous, with a 1–2 mm long beak; styles 3 mm long. – Fig. 3M,N,O.

Distribution. Southeastern Brazil, and Dep. Cajamarca in northern Peru. Three collections from Peru have been studied. Two of these are recent collections by Woytkowski and the third is the type collection of *T. bonplandiana*, which is a rather poor specimen without leaves. On the label of *T. bonplandiana* is indicated: "Prov. Maranon Peruviae". I believe this to be near Rio Maranon, perhaps in Dep. Cajamarca. The Peruvian specimens have rather broad achenes with short styles, 1.5–2 mm long. The fruiting perianth tubes are broadly campanulate and the sinuses are not inward folded, but with the broad concept of *T. gardneriana* chosen here the Peruvian specimens are not considered to be a distinct subspecies. At this moment I do not have a satisfactory explanation for this puzzling and interesting disjunction, but I am certain that long distance dispersal could not account for it. More probable is some kind of splitting up of populations due to climatic changes in the past or incomplete collection in the interjacent area (Fig. 7).

Ecology. This species grows in places which are subject to periodical inundation. It seems to be most frequent in gallery and swamp forests. Alt. 100–450 m. Flowering in August.

Notes. Triplaris gardneriana is closely related to *T. purdiei* from northern Colombia. It differs from the latter by its shorter petioles and by the twigs, which are never hispid or papillose. It is a rather variable species, but the variation seems to be clinal. The specimens Windisch 760, Marinoni 126, Lima 752 and Malme s.n. all from Mato Grosso might be indicative of some intercrossing with *T. americana*. They all have rather small fruits with petals, which are either short adnate (1–2 mm) to the fruiting perianth tube or not adnate at all.

T. gardneriana was chosen in preference to *T. tomentosa* and *T. bonplandiana*, which appeared in the same publication, because it is the most commonly applied name for this species.

If type material of *T. riedeliana* Fisch. & Mey. ex C.A. Meyer exists, and it is identical with the type of *T. gardneriana, T. riedeliana* will be the correct name of this species, because it antedates *T. gardneriana*.

In Weddell's original description the type specimen is erroneously cited as: "Gardner, pl. exs., No. 1629".

Local name. Brazil. "Pajau". "Pageu". "Pau jau". "Coassu". "Tachy". "Taquari". "Formigueiro".

Selected specimens studied. Brazil. Ceara: Dahlgren 924(f,m) (F); Drouet 2622(f) (F, GH, MO, NY, S, US). Goyaz: Hatschbach 42267(f) (NY); Weddell 3378(m) (NY). Maranhao: Eiten & Eiten 5458(f) (GH, UC, US); Pires & Black 1528(m) (US). Parana: Hatschbach 17039(f) (AAU, C, F, NY, UC, US). Minas Gerais: Claussen 284(m) (S). Bahia: von Lützelburg 1912(f,m) (M). Piaui: von Lützelburg 174 (M). Pernambuco: Pickel 125(f) (GH, MO, PH, US). Paraiba: von Lützelburg 12684(f,m) (M). Alagoas: Falco et al. 1071(m) (RB), 1074(f) (G, RB). Mato Grosso: Malme s.n. (14/7–1903)(f) (S).
Paraguay. Lindman 2095(f,m) (S); Myndel Pedersen 4031(f) (C, US). *Peru.* Cajamarca: Woytkowski 6815(m), 6816(f) (F, GH, MO, S, UC, US).

11. Triplaris poeppigiana Weddell

Weddell 1849: 265; Meisner 1856: 173; Standley 1937: 468. – Type: Poeppig 1958(f). Peru. Maynas alto. (Tocache on the Rio Huallaga). (Lectotype, P, here designated; isolectotype, F). Paratype: Poeppig 1957(m).
Triplaris hispida Rusby 1896: 111. – Type: Bang 1169(f). Bolivia, vic. Cochabamba. (Lectotype, NY, here designated; isolectotypes, GH, K, UC, US). Paratype, Rusby 1424(m) (GH, K, NY, US). Bolivia, Beni River. July, 1886.

Trees, 7–15 m tall to 25 cm in diameter. Bark greyish. Twigs greyish-brown to purplish-brown, slender, striate, sparsely strigose-hispid by long, ferrugineous hairs, papillose where these have fallen off. Stipules not seen. Petioles 8–12 × 3–4 mm, slightly canaliculate, sparsely strigose-hispid by ferrugineous hairs; leaf-blades oblong, 2.5–3 times as long as broad, 25–35 × 8–10(–14) cm, apically acuminate to strongly acuminate, basally obtuse to subcordate, slightly oblique, pale to glossy green with prominent veins, sparsely strigose-hispid with up to 4 mm long appressed to spreading hairs above, papillose where the hairs have fallen off, glabrous beneath except for the strigose-hispid midrib, 27–30 pairs of lateral veins. Axes of staminate inflorescences glabrous to ferrugineously puberulous, individual branches up to 25 cm long. Bracts 1 mm long, acute, densely ferrugineously tomentose. Bracteoles 4 mm long, ferrugineously tomentose to strigose outside, glabrous inside. Perianths 5–6 mm long, basally connate for 3–4 mm, tubes appressed pilose-strigose apically; filaments 6–7.5 mm long, basally adnate for 4 mm; anthers 1 mm long. Axes of pistillate inflorescences glabrous to puberulous, occasionally with 3 mm long, strigose hairs basally, individual branches up to 30 cm long. Bracts 1.5 mm long, acute, strigose. Bracteoles 8–12 mm long, fulvo-strigose outside, glabrous inside. Pedicels of fruiting perianths 5–6 mm long, densely fulvo-tomentose. Fruiting perianths 5.5–7.5 cm long, the narrowly urceolate tubes (15–)18–22(–24) × 8–12 mm, with spreading golden pilose hairs outside, slightly puberulous to almost glabrous inside; wings more than twice as long as the tubes, 40–50 × 8–11 mm, oblanceolate, apically rounded, glabrous to slightly puberulous, especially along the veins; petals 10–14 × 1–2 mm, sub-

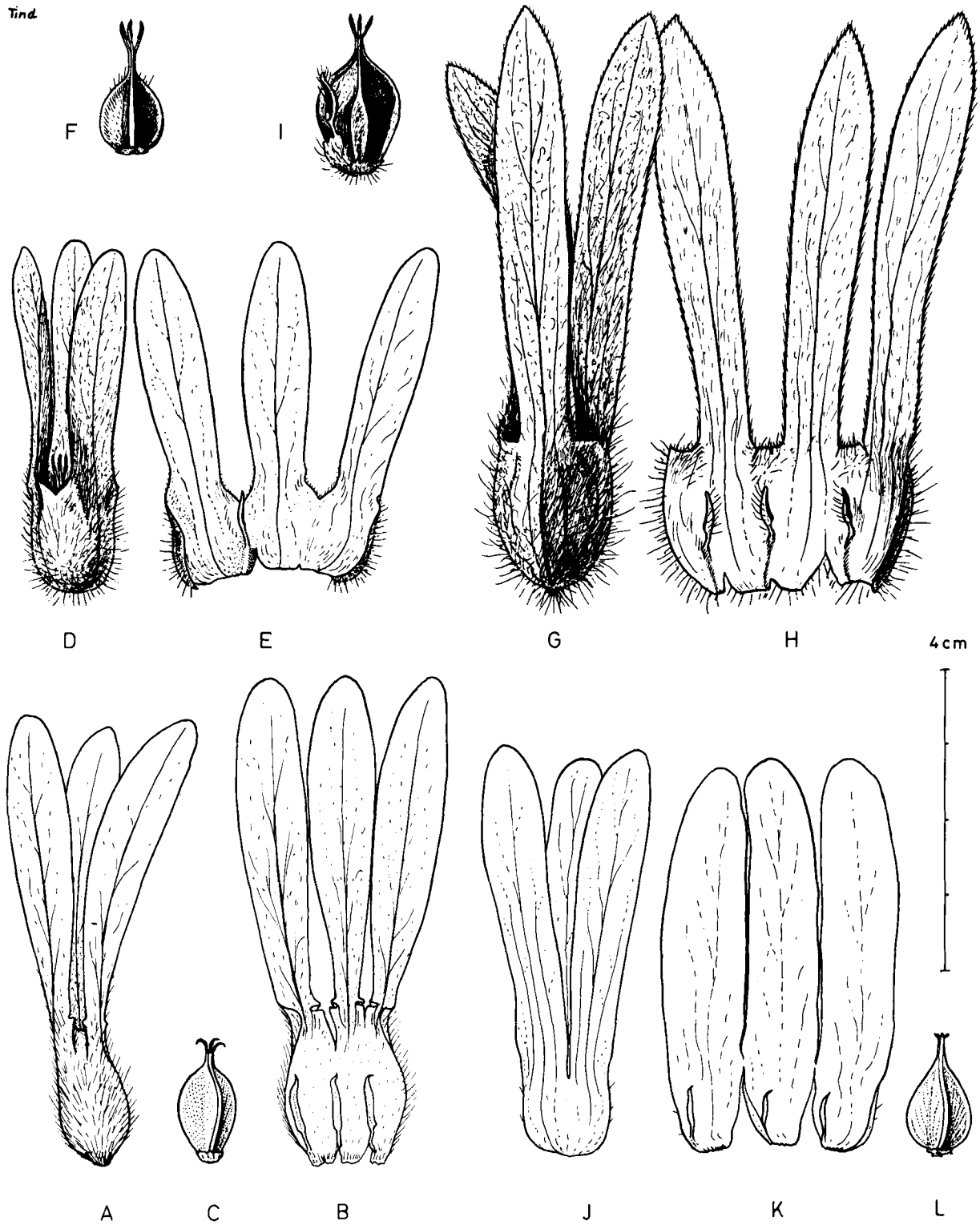

Fig. 4. Fruiting perianth characters of three species and one variety of *Triplaris*. – A–C. *T. poeppigiana* (Schunke 6580). – A–B. Fruiting perianths, B showing insertion of petals. – C. Achene. – D–F. *T. setosa* var. *setosa* (Woytkowski 7488). – D–E. Fruiting perianths, E showing insertion of petal. – F. Achene. – G–I. *T. setosa* var. *woytkowskii* (Woytkowski 7187). – G–H. Fruiting perianths, H showing insertion of petals. – I. Achene with petal. – J–L. *T. punctata* (Schunke 2631). – J–K. Fruiting perianths, K showing insertion of petals. – L. Achene.

ulate-lanceolate, with sparse, rigid hairs, the basal 1–3 mm shortly adnate to the tube. Achenes triquetrous, 12–16 × 7–10 mm, brown, slightly pusticulate, with a short beak, 1–1.5 mm long; styles 3 mm long. – Fig. 4A,B,C.

Distribution. Amazonian Peru and Amazonian Bolivia (Fig. 10).

Ecology. This species ranges from thickets along rivers or open riverside forests to forest edges or dense forest on higher ground.

Notes. *Triplaris poeppigiana* is most closely related to *T. setosa*, from which it is distinguished by less densely setose-hispid twigs and leaves, the narrowly urceolate fruiting perianth tubes, and the slightly pusticulate achenes with short beaks.

Duke (1960: 358) wondered if *T. hispida* was a hybrid between *T. setosa* and *T. guanaiensis*. After having examined the type material of *T. hispida*, I am convinced, that it is conspecific with *T. poeppigiana*. Duke also erroneously cited Standley (1937) to have listed *T. setosa* in synonymy under *T. poeppigiana*, whereas Standley correctly listed *T. hispida* in synonymy under *T. poeppigiana*.

Local names. Peru. "Tangarana". "Tangarana negra".

Uses. Peruvian indians are recorded to drink a decoction of the bark to purify the blood.

Selected specimens studied. Bolivia. Cochabamba: Rusby 1309(f) (F, NY, PH). *Peru*. Cuzco: Vargas 11593(f) (US). Huanuco: Asplund 12431(f) (S); Schunke 6580(f) (F, US). Junin: Killip & Smith 26392(f) (F, US). Loreto: Woytkowski 34394(f) (F, MO, S, UC). Madre de Dios: Barbour 5471(f) (AAU). Puno: Dillon et al. 1227(f) (AAU, MO). San Martín: Schunke 4346(m) (F, MO, US).

12. Triplaris setosa Rusby

Rusby 1927: 237. – Type: White 910(f). Bolivia. Near Covendo 2000 ft. Aug. 1921. (Lectotype, NY, here designated; isolectotype, GH).

Trees, 12–23 m tall. Bark dark greyish. Twigs brown to greenish-brown, striate, profusely setose by 3–6 mm long ferrugineous hairs. Stipules up to 10 cm long, brownish, sparsely whitish strigose by up to 10 mm long hairs. Petioles short and stout, 5–10 × 2–4 mm, slightly canaliculate, setose; leaf-blades lanceolate, 2.5–3 times as long as broad, 25–30(–45) × 9–13(–17) cm, apically acute to acuminate, basally cordate, oblique, both sides setose, midrib beneath more densely setose than the lamina, margin ciliate, venation prominent on both sides, 28–32 pairs of lateral veins. Axes of staminate inflorescences densely brownish tomentose, individual branches up to 15 cm long. Bracts 1.5 mm long, acute, densely pilose-strigose. Bracteoles 4 mm long, basally connate for 2.5 mm, strigose; filaments 5–5.5 mm long, basally adnate for 2 mm; anthers 1–1.25 mm long. Axes of pistillate inflorescences brownish tomentose, basally with long strigose hairs, individual branches up to 22 mm long. Bracts 2 mm long, acute, densely pilose-strigose. Bracteoles 9–12(–22) mm long, appressedly pilose-strigose outside, glabrous inside. Pedicels of fruiting perianths 4–7(–10) mm long, with spreading brownish tomentose hairs. Fruiting perianths 4.5–5.5(–8.5) cm long, the broad campanulate tubes 12–16(–20) × 10–12(–18) mm, outside sparsely pilose, hairs up to 2 mm long, glabrous or sparsely pilose inside; wings 3–4 times as long as the tubes, 30–40(–65) × 7–11 mm, lanceolate, obtuse, glabrous, each sinus broadly rounded to acute; petals 10–14 × 1–1.5 mm, subulate, glabrous or sparsely patent pilose, the basal 4–6 mm adnate to the tube, occasionally absent. Achenes trialate, 10–13(–20) × 7–9(–12) mm, lustrous brown, glabrous, apruptly narrowing into a 2–3 mm long beak, occasionally with a few rigid hairs on the angles towards the beak; styles 4–6 mm long.

Key to the varieties of Triplaris setosa

1. Fruiting perianth 4.5–5.5 cm long; achene 10–13 × 7–9 mm, bracteoles up to 12 mm long ..... var. *setosa*
1. Fruiting perianth 7.5–8.5 cm long; achene 20 × 12 mm, bracteoles up to 22 mm long ..... var. *woytkowskii*

12a. *Triplaris setosa* Rusby var. *setosa*

Leaf-blades up to 30 cm long; bracteoles 9–12 mm long, pedicels of fruiting perianths 4–7 mm long; fruiting perianths 4.5–5.5 cm long; achenes 10–13 × 7–9 mm. – Fig. 4D,E,F.

Distribution. Amazonian Peru and Amazonian Bolivia (Fig. 9).

Ecology. Growing in low forest from 600–900 m alt.

Notes. Krukoff 10676(f) was annotated by Dugand: "*Triplaris setosa* var. *deficiens*" presumably because of the lacking petals. As this is the only character in which this specimen deviates from the others, I do not think, that it is justified to give it varietal rank. *Triplaris setosa* is most closely related to *T. poeppigiana* and *T. punctata*. See the discussions under the descriptions of these species. The description of the male flowers was made from Woytkowski 7489, which is a rather poor specimen, but the only available staminate material.

Local name. Peru. "Tangarana".

Specimens studied. Peru. Junin: Macbride 5401(f) (F, S, US); Woytkowski 7489(m) (MO, UC, US). *Bolivia*. La Paz: Krukoff 10586(f) (A, F, S, UC, US); 10676(f) (F, MO, S, UC, US).

12b. *Triplaris setosa* Rusby var. *woytkowskii* Brandbyge, var. nov.
A var. *setosa* differt partibus omnibus majoribus, perianthiis fructificantibus 7.5–8.5 cm longis, achenibus 20 × 12 mm, bracteolis usque ad 22 mm longis.

Type: Woytkowski 7187(f). Peru. Huinguillo, Dep. San Martín. 29 Mar. 1962. (Holotype, MO (2 sheets); isotypes, US, GH).

Leaf-blades up to 45 cm long, bracteoles 20–22 mm long, pedicels of fruiting perianths 8–10 mm long, fruiting perianths 7.5–8.5 cm long; achenes 20 × 12 mm. – Fig. 4G,H,I.

Distribution. This variety is only known from the type locality.

Notes. T. setosa var. *woytkowskii* is bigger and coarser than var. *setosa* in all characters.

13. Triplaris punctata Standley

Standley 1937: 468. – Type: Krukoff 5277(f). Brazil. Near mouth of Rio Macauhan, a tributary of Rio Yaco, Territory of Acre, on terra firme. Lat. 9°20′ S, long. 69° W. Aug. 1935. (Lectotype, F, here designated; isolectotypes, A, NY, S, UC, US). Paratype: Krukoff 5333(m) (A, F, G, M, MO, NY, S, UC, US).

Trees, 10–20 m tall. Twigs brown, striate, glabrous. Stipules not seen. Petioles 10–20 × 2–3 mm, canaliculate, glabrous; leaf-blades lanceolate, 3–4 times as long as broad, 22–29 × 7–10 cm, apically acute to slightly acuminate, basally acute, glabrous, 23–25 pairs of lateral veins. Axes of staminate inflorescences glabrous, individual branches up to 20 cm long. Bracts 1 mm long, acute glabrous. Bracteoles 3 mm long, glabrous. Perianths 5–6 mm long, basally connate for 3.5 mm, tube glabrous outside except for strigose hairs towards apices of segments, inside with strigose hairs up to 1 mm long; filaments 7 mm long, basally adnate for 4 mm; anthers 1 mm long. Axes of pistillate inflorescences glabrous or occasionally with a few patent hairs, individual branches up to 10 mm long. Bracts up to 4 mm long, acute, glabrous. Bracteoles 7 mm long, glabrous outside or with sparse hairs apically, glabrous inside. Pedicels of fruiting perianths 3 mm long, glabrous. Fruiting perianths 5.5–6.5 cm long, the broadly campanulate tubes 10–12 × 10–12 mm, glabrous; wings about 4 times longer than the tube, 45–50 × 12–13 mm, with parallel sides to the base, apically obtuse, glabrous; petals 8–10 × 1 mm, linear-subulate, glabrous, the basal 3–5 mm adnate to the tube. Achenes trialate, 14–16 × 8–10 mm, brown, with a granulate-pusticulate sculptation and prominent veins, tapering into a conspicuous beak, 3–4 mm long; styles 1 mm long. – Fig. 4J,K,L.

Distribution. This species, only known from a few collections, is restricted to Amazonian Peru and the extreme western part of the Brazilian Amazon (Fig. 10).

Ecology. In high forest on terra firma. Alt. 200–300 m.

Notes. Triplaris punctata is easily distinguished by its long, narrow leaves, the glabrous inflorescence axes and fruiting perianths, and the granulate-pusticulate achenes. The minute dark dots on the lower leaf surface, to which the specific epithet refers, are not restricted to this species, but are found in all species of *Triplaris* to a lesser or greater extent. However, they are strongest developed in *T. punctata*. Duke (1960: 358) stated that *T. punctata* only differed from *T. setosa* in the absence of the pustulate hairs. However, this character in addition to leaf form and surface sculptation of the achenes seems sufficient for maintaining *T. punctata* as a distinct species.

Local names. Peru. "Tangarana blanco".

Specimens studied. Peru. Loreto: Klug 3009(m) (F, GH, MO, S, US); Schunke 2631(f) (F, US). *Brazil.* Acre: Krukoff 5333(m) (F, M, MO, NY, S, US).

14. Triplaris vestita Rusby

Rusby 1927: 236. – Type: Rusby 2175(f). Bolivia, vic. Meguilla, 3000 ft. Jul. 1921. (Lectotype, US, here designated; isolectotypes, GH, K, NY).

Trees, 6–15 m tall. Twigs brown, striate, densely golden tomentose, occasionally glabrous. Stipules densely appressedly pale golden tomentose. Petioles 6–12 × 3–4 mm, semiterete, puberulous to golden tomentose; leaf-blades ovate to ovate-oblong, 2–3 times as long as broad, 10–25 × 5–10 cm, apically acute to slightly acuminate, basally rounded, slightly oblique, puberulous to slightly strigose above especially along the veins, golden puberulous to tomentose beneath, the midrib often light brownish velutinous, 17–25 pairs of lateral veins. Axes of staminate inflorescences pale yellowish-brown to golden brown puberulous to tomentose, individual branches up to 10 cm long. Bracts 0.5–1 mm long, acute, tomentose. Bracteoles 3–4 mm long, densely pilose tomentose outside, glabrous inside. Perianths 5 mm long, basally connate for 3 mm, pilose-strigose; filaments 6–7 mm long, basally adnate for 2.5–3 mm; anthers 1 mm long. Axes of pistillate inflorescences pale yellowish-brown to golden brown puberulous to tomentose, individual branches up to 14 cm long. Bracts 1.5 mm long, acute, tomentose. Bracteoles 4–6 mm long, densely golden brown tomentose outside, glabrous inside. Pedicels of fruiting perianths 3–6 mm long, densely brownish tomentose. Fruiting perianths (3.5–)4.0–4.6(–5.0) cm long, the globose-urceolate tubes 12–14 × 8–11 mm, sericeous-pilose outside and inside; wings 2–2.5 times longer than the tube, 25–35 × 6–7 mm, narrowly oblanceolate to oblong, apically rounded, glabrous to

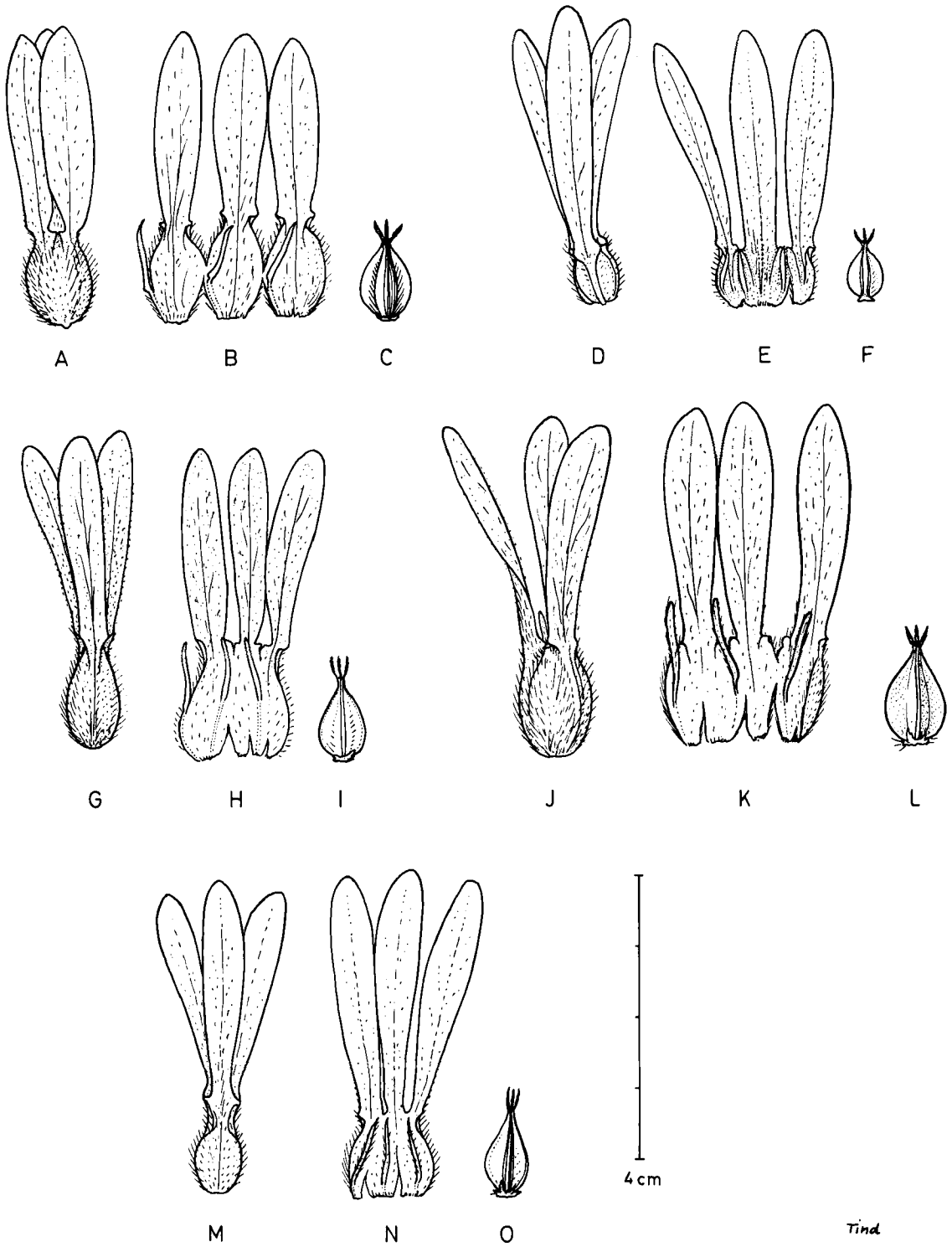

Fig. 5. Fruiting perianth characters of four species and one subspecies of *Triplaris*. – A–C. *T. vestita* (Rusby 2175). – A–B. Fruiting perianths, B showing insertion of petals. – C. Achene. – D–F. *T. weigeltiana* (Mowbray 6971). – D–E. Fruiting perianths, E showing insertion of petals. – F. Achene. – G–I. *T. melaenodendron* ssp. *melaendendron* (Hartman 126). – G–H. Fruiting perianths, H showing insertion of petals. – I. Achene. – J–L. *T. melaenodendron* ssp. *colombiana* (Arbalaez 2091). – J–K. Fruiting perianths, K showing insertion of petals. – L. Achene. – M–O. *T. cumingiana* (Lao 67). – M–N. Fruiting perianths, N showing insertion of petals. – O. Achene.

slightly puberulous; petals 10–16 × 1 mm, linear-subulate, glabrous or with a few, rigid appressed hairs along the midvein, the basal 2–5 mm adnate to the tube. Achenes trialate, 10–12 × 6.5–8.5 mm, brown, glabrous, without beak or with a very short beak; styles 3 mm long. – Fig. §A,B,C.

Distribution. As here circumscribed, this species has a disjunct distribution, apparently with a northern population in the Magdalena Valley of Colombia and a southern population restricted to the extreme eastern Andean slopes of southern Peru and northern Bolivia (Fig. 10).

Ecology. Riverside forest in area with dry forest vegetation. Alt. about 100 m. Flowers in July.

Notes. Triplaris vestita is distinct by the yellowish-brown to golden tomentum. Dugand annotated the Colombian specimens: "*Triplaris subandina*, sp. nov." When more specimens, especially of fruiting material from the Colombian population have been collected a splitting into two subgroups might be appropriate.

Alfaro 182 and West 7194, both collected in Prov. Convencion (Dep. Cuzco), Peru, differ somewhat from the Bolivian type collection by their narrowly oblong leaves, which are less tomentose. Alfaro 182 has petals almost free from the fruiting perianth tube. However, with the broad concept of the species, these deviations lie within the variation.

Local name. Peru. "Canotillos".

Selected specimens studied. Colombia. Antioquia: Scolnik et al. 323 (m) (F, US). Huila: Little 7285 (f) (NY, US). Tolima: Lehmann 8689 (f) (A, F, GH, NY). *Peru.* Cook & Gilbert 1699 (m) (F, US). Cuzco: Alfaro 182 (f) (MO); West 7194 (f) (GH, MO, UC).

15. Triplaris weigeltiana (Rchb.) Kuntze

Basionym: Blochmannia weigeltiana Rchb., in sched. in Weigelt, Pl. Sur. exsicc. 1827; Kuntze 1898. 270. – Type: Weigelt s.n. leg et exsicc. Weigelt 1827. (Lectotype B, here designated; isolectotypes MO, W).
Triplaris surinamensis Chamisso 1833: 138; Meyer 1840: 14; Meisner 1855: 49, t. 24,25,26; Meisner 1856: 175; Eyma 1934: 68; Lemée 1955: 559. – Type: Weigelt s.n. leg. et exsicc. Weigelt 1827.
Triplaris vahliana Fisch. & Mey. ex C.A. Meyer 1840: 14; Meisner 1856: 176; Lemée 1955. 559. – Type: "Rohr in Cayenná". Lectotype, C, here designated.
Triplaris surinamensis var. *crassifolia* Bentham 1845: 628; Meisner 1855: 50; Meisner 1856: 175. – Type: Schomburgk 1. Coll. n. 223. On the Creek Longjohn, on the upper Essequibo. (Lectotype, K, here designated).
Triplaris martiana Fisch. & Mey. ex C.A. Meyer var. *oblongifolia* Meisner 1855: 50; Meisner 1856: 178. – Type: Martius 2841. Brazil: In ripa flum. Amazonum, e.g. ad Praya de Jurupari, prov. Paraënsis. (Lectotype, M, here designated).
Triplaris surinamensis var. *chamissoana* Meisner 1855: 50; Meisner 1856: 175. – Type: Hostmann 439. Habitat in Guyana brasiliensi, gallica anglica, batava. (Lectotype, K, here designated).

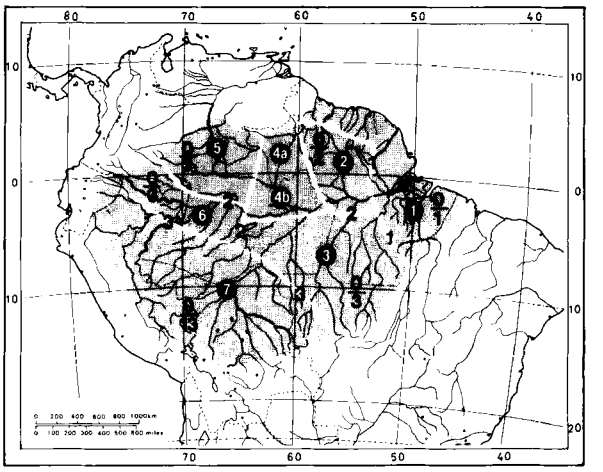

Fig. 6. Map showing the seven major phytogeographic regions of Amazonia proposed by Prance (1977) (white figures in black circles): 1, Atlantic coastal; 2, Jari-Trombetas; 3, Xingu-Madeira; 4, Roraima-Manaus; 5, Northwest-upper Rio Negro; 6, Solimoes-Amazonas west; 7, Southwest. Black figures within regions: above line, endemic species; below line, total number of species found within the region. Figures on lines separating regions: number of species common between two regions.

Triplaris surinamensis var. *benthamiana* Meisner 1855: 50; Meisner 1856: 175. – Type: Schomburgk 1. Coll. n. 223. (Lectotype, K, here designated).
Triplaris siphonopetala H. Gross 1913: 347. – Type: Ule 5706(f). Brazil. Lago de Esperanca, Jurua Miry, Estado de Amazonas, Aug. 1901. (Lectotype, K, here designated); paratype Ule 5577(m).
Triplaris americana Aublet 1775: 910, t. 347., non Linnaeus 1759: 881; Chamisso 1833: 138; Meyer 1840: 15.
Triplaris americana Rottbøll 1776: 5, t. 3., non Linnaeus 1759: 881.
Triplaris americana Vahl 1791: 100., non Linnaeus 1759: 881.

Trees, (6–)15–25(–35) m tall to 50 cm in diameter. Bark grey to greyish-brown. Twigs brown, striate, glabrous. Stipules up to 15 cm long, brownish to dark brown, with sparse golden 2–3 mm long, appressed hairs, which are more dense apically. Petioles (10–)15–20 × 3–5 mm, semiterete to slightly canaliculate, 2–4 times as long as broad, broadest just below the middle, (15–)20–25(–37) × (6–)8–10(–13) cm, often tapering towards the acuminate apex, basally rounded or acute, somewhat decurrent, glabrous above, glabrous beneath except for the yellow to yellowish-brown tomentose-velutinous midrib and axils between midrib and lateral veins, 23–28(–32) pairs of lateral veins. Axes of staminate inflorescences puberulous to puberulous-pilose, individual branches up to 20 cm long. Bracts 1.5 mm long, acute, apically pilose-strigose. Bracteoles 4–5 mm long, pilose-strigose outside, glabrous inside. Perianths 5–6.5 mm long, basally connate for 2.5–3.5 mm, sparsely appressedly pilose outside, pilose-villous inside; filaments 6.5–7.5 mm long, basally adnate for 2.5–3.5 mm; anthers 1–1.25 mm long. Axes of pistillate inflorescences glabrous to puberulous, individual branches up to 16 cm

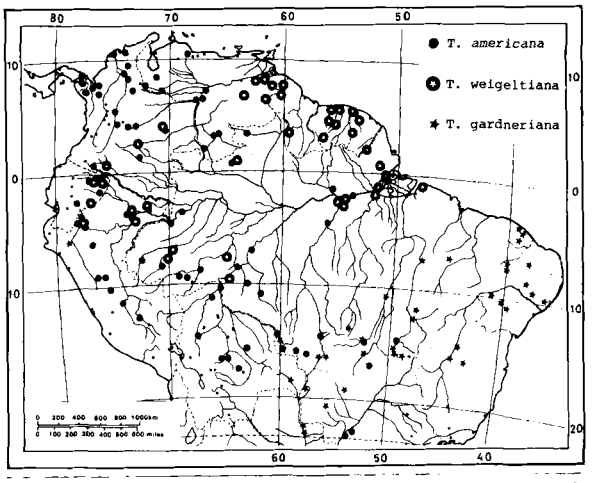

Fig. 7. Known distributions of *Triplaris americana, T. gardneriana*, and *T. weigeltiana*.

long. Bracts 2 mm long, acute, apically pilose-strigose. Bracteoles 5–7 mm long, appressedly pilose-strigose outside, glabrous inside. Pedicels of fruiting perianths 2–4 mm long, yellow to yellowish-grey tomentose-velutinous. Fruiting perianths (3.0–)3.5–4.0(–4.5) cm long, the campanulate to globose-campanulate tubes 9–11 × 6–8 mm, pilose outside, glabrous to slightly puberulous-pilose inside; wings almost 3 times longer than the tubes, (20–)25–30(–35) × 6–8 mm, lanceolate to oblanceolate, apically rounded, glabrous or minutely puberulous, especially along the veins; petals 8–13 × 1 mm, subulate, sparsely pilose, the basal 2–4 mm adnate to the tube. Achenes triquetrous to trialate, 8–10 × 4–6 mm, brown, glabrous, without beak or with a very short beak, never more than 1 mm long; styles 3 mm long. – Fig. 5D,E,F.

Distribution. This species has a wide distribution in the Amazon basin, northeastern Venezuela, Br. Guyana, Surinam and Fr. Guyana (Fig. 7).

Ecology. Partly inundated riverside forests. *T. weigeltiana* seems to be a species, which prefers black water habitats. This is indicated by the fact that all specimens from the Ecuadorian Oriente have been collected along black water rivers or lakes. In Ecuador flowering in July-August. Alt. 100–900 m.

Notes. The name *Blochmannia weigeltiana* Rchb. first appeared in 1827 on a printed label together with the description of *Blochmannia* Weigelt. The specimens were distributed as part of Weigelt's exsiccate of plants from Surinam. According to Nicholson's (1980: 485) key to identification of effectively/ineffectively published material, the names are effectively published, and the publication of *Blochmannia weigeltiana* Rchb. must be treated as a valid case of "descriptio generico-specifica".

When Kuntze published the new combination he indicated, that it was based on *Blochmannia weigeltiana* Rchb., and he also mentioned, that *Triplaris surinamensis* was a synonym, but he did not give any references to the original publication. However, as the combination is published before 1. of January 1953 it is accepted here.

T. weigeltiana is most closely related to *T. cumingiana,* from which it differs by the smaller fruiting perianths, subglabrous inflorescence axis and non-strigose midrib. Duke (1960) suggested that intermediates between *T. weigeltiana* and *T. cumingiana* are encountered in Colombia. Some *T. cumingiana* specimens from Colombia and Panama have the small tufts of hairs in the axil between the midrib and lateral veins beneath, that are so characteristic for *T. weigeltiana*. However, as the other differential characters mentioned are not intermediate, I do not think that these specimens are intermediates.

The two specimens from Dep. San Martín (Peru): Sandeman 276 and Woytkowski 35325, which are both collected near Moyobamba at about 900 m alt. differ somewhat from the typical *T. weigeltiana* by their ovate-oblong leaves and their slightly sulcate achenes. These specimens might be intermediates between *T. weigeltiana* and one of the other Peruvian species, or they might represent a population, that is isolated from the rest of the Amazonian population.

Local names. Colombia. "Palo Santo". "Palo Diablo". Ecuador. "Tangarana". Peru. "Tangarana". Brazil. "Tachy". "Tachi branco". Guyana. "Long John". "Kadaburichi" (Arawak dialect). Surinam. "Mierahoedoe". "Mierenboom". "Mierenhout". "Jekoena". "Tassi". Fr. Guyana. "Don-oudou". Venezuela. "Palo Maria". "Santa Maria".

Uses. The bark is reported to be used against stomach ache in Guyana. Some labels indicate, that the plant is used as fish poison without mentioning which part is being used.

Selected specimens studied. Colombia. Amazonas: Schultes 6033(f) (GH, US). *Ecuador*. Napo: Brandbyge et al. 33599(m); 33600(f) (AAU, QCA); Mowbray 6971(f) (MO, NY). *Peru*. Loreto: Killip & Smith 29390(f) (US); Klug 1451(m) (F, US). San Martín: Sandeman 276(f) (F). *Brazil*. Amapa: Pires et al. 51185(f) (A, F, NY). Amazonas: Fróes 22609(f) (RB). Pará: Spruce 6206(f) (MO). Rondonia. Prance et al. 5342(f) (MO). *Venezuela*. Bolivar: Williams 12720(f) (A, F, S, US), Delta Amacuro: Berti 378(f) (F, MO). *Br. Guyana*. Archer 2510(F: (GH, US); Schomburgk 223(f) (G, GH, K); 1522(m) (F, NY, K). *Surinam*. Hostmann & Kappl 1643(f) (S); Lanjouw 845(m) (NY). *Fr. Guyana*. Hallé 692 (US, NY).

16. Triplaris melaenodendron (Bertol.) Standl. & Steyerm.

Standley and Steyermark 1943: 5. *Vellasquezia melaenodendron* Bertoloni 1840: 40. Pl. 11; Duke 1960. 354. – Neotype: Standley 63952(f) (F). Guatemala.. Near Esquintla, Dep. Esquintla, alt. 135–300 m. Jan. 31. 1939.
Triplaris macombii Donn. Smith 1894: 257. – Type: Shannon 5064(f). Jiquilisco, Dep. Usultán, Salvador. Jan. 1893. (Lecto-

type, US 796909, here designated; isolectotypes, G, GH, NY, US).
Triplaris macombii var. *rufescens* Donn. Smith 1895: 293. – Type: Heyde & Lux 6375(f). Mazatenango, Dep. Suchitepéquez, Guatemala. Jan. 1894. (Lectotype, US 796912, here designated; isolectotypes, F, G, M, US).
Triplaris americana auct. non. L., Standley 1937: 416.

Trees, 6–12(–20) m tall. Bark whitish-brown to brown, mottled, peeling off in pieces. Twigs reddish-brown to greyish-brown, slightly striate, glabrous to appressedly yellowish-brown, puberulous. Stipules up to 10 cm long, chartaceous, sparsely whitish hairy. Petioles 10–22 × 3–5 mm, canaliculate, with short rigid appressed hairs, especially along the margins and basally; leaf-blades ovate to ovate-elliptic, 1.5–2 times as long as broad, 15–35 × 8–18(–22) cm, apically acute or abruptly short acuminate, basally rounded or occasionally slightly cordate, pilose to glabrous above, pilose to puberulous beneath except for the appressedly strigose midrib, 15–20(–25) pairs of lateral veins. Axes of staminate inflorescences greyish-yellow to pale brownish pilose-tomentose to pilose-strigose, individual branches up to 25 cm long. Bracts 0.5–1 mm long, acute, pilose-strigose. Bracteoles 4–5 mm long, pilose-strigose outside, glabrous inside. Perianths 5–5.5 mm long, basally connate for 2.5–3 mm, pilose-strigose; filaments 6–6.5 mm long, basally adnate for 2.5–3 mm; anthers 1–1.5 mm long. Axes of pistillate inflorescences greyish-yellow to pale brownish pilose-tomentose to pilose-strigose, individual branches up to 25 cm long. Bracts 2 mm long, acute, pilose-strigose. Bracteoles 8–10 mm long, pale brownish appressedly sericeous-pilose outside, glabrous inside. Pedicels of fruiting perianths 5–9 mm long, pale brownish pilose-tomentose. Fruiting perianths 4.0–5.5(–6.0) cm long, the narrowly oblong campanulate tubes 15–20 × 6–8 mm, sericeous-pilose outside, less densely sericeous-pilose inside; wings 2–2.5 times as long as the tubes, 25–40 × 6–9 mm, oblanceolate, apically rounded to subacute, puberulous; petals 15–30 × 1–2 mm, linear to linear subulate, basally slightly pilose, the basal 5–9 mm adnate to the tube. Achenes trialate, 10–12(–17) × 6.5–9 mm, dark yellowish-brown to brown, subglabrous to asperulous-punctate, with a short beak, 1–1.5 mm long; styles 3–4 mm long.

Key to the subspecies of Triplaris melaenodendron

1. Achenes glabrous to subglabrous; petals 15–25 mm long..... ssp. *melaenodendron*
1. Achenes asperulous-punctate; petals 20–30 mm long ..... ssp. *colombiana*

16a. *Triplaris melaenodendron* ssp. *melaenodendron*

Fig. 5G,H,I.

Distribution. This subspecies ranges from the Pacific coast of southern Mexico to southern Costa Rica (Fig. 8).

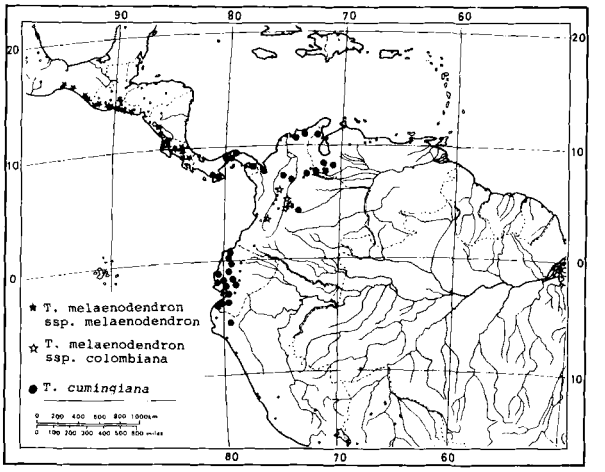

Fig. 8. Known distributions of *Triplaris melaenodendron* ssp. *melaenodendron*, *T. melaenodendron* ssp. *colombiana*, and *T. cumingiana*.

Ecology. Triplaris melaenodendron ssp. *melaenodendron* has a rather broad amplitude ranging from seasonal swamps over moist thickets to dry savannas and deciduous forests on steep slopes. Alt. 100–1200 m. Standley and Steyermark (1946:137) wrote about it: "The tree is abundant in many parts of the Pacific plains, and often affords wide displays of colour, especially in late January and February. It is one of the most characteristic species of the Pacific coast of all Central America".

Notes. Duke (1960) in his discussion of *T. melaenodendron* mentioned that *T. colombiana* only differed from *T. melaenodendron* in having narrower leaves and asperulous-punctate achenes. After having studied the Colombian material of *Triplaris* I have separated some specimens, most of them which was annotated by A. Dugand: "*T. melaenodendron* (Bertol) Standl. & Steyerm. ssp. *mutisiana* Dugand". These specimens are quite similar to the type of *T. colombiana* and separable from *T. cumingiana* by the sculptation of the achenes and the broader leaves with fewer lateral veins. For further discussion of the delimitation between *T. melaenodendron* and *T. cumingiana* see under the description of the latter. Duke treated *T. melaenodendron* in Flora of Panama, but mentioned that he had never seen a specimen collected in Panama. I have seen no specimens of it from Panama either, so it seems, that the Central American population and the Colombian population are geographically separated, and I have chosen to treat them as subspecies.

No specimens were cited in the original description, and as I do not find the illustration in Flora Guatemalensis (Bertoloni 1840) sufficient to typify this species, a designation of a new neotype is warranted. In the original description was indicated: "Habitat in Esquintla". I have seen a few specimens, which were collected near

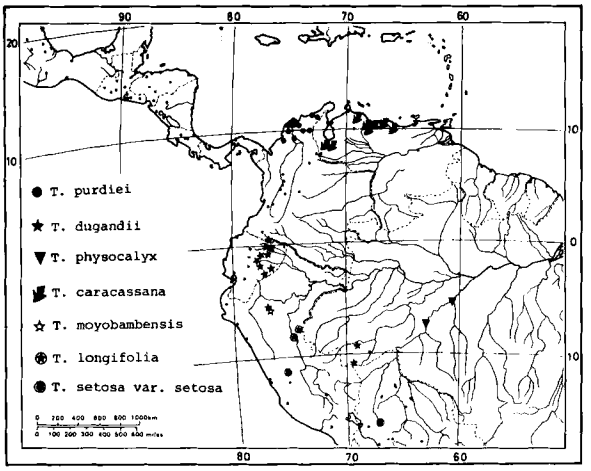

Fig. 9. Known distributions of *Triplaris dugandii, T. moyobambensis, T. physocalyx, T. purdiei, T. caracassana, T. longifolia,* and *T. setosa* var. *setosa*.

Esquintla (Guatemala), and among these the neotype has been chosen.

Local names. Central America. "Hormigo". "Mulato". "Tabaco". "Tabacón". "Gallito". "Canela de mula". "Palo mulato". "Tabaco de monte". "Turi-svan-kra" (Brunka).

Uses. According to Standley and Steyermark (1946: 137) the wood is rather light and soft but firm and easy to work. Apparently it is not durable. It is used locally for construction purposes.

Selected specimens studied. Mexico. Chiapas: Breedlove & Thorne 30535(f) (MO, NY). Oaxaca: McDougall 7106(f). *Guatemala*. Hayes s.n. (23/12–1860) (GH); Standley 87731(m) (F). *El Salvador*. Allen 7209(f) (F, NY, US); Hartman 126(f) (S); Standley 19875(f) (GH, MO, S, US). *Nicaragua*. White 5356(f) (F, US); Ørsted 688(f,m) (C, F, M, US). *Costa Rica*. Condrez 13817(f) (F); Jimenez 540(f) (F); Léon 960(f) (F).

16b. *Triplaris melaenodendron* ssp. *colombiana* (Meisner) Brandbyge, comb. et stat nov.

Basionym: *Triplaris colombiana* Meisner 1856: 175. – Type: Cuming 1108(f). "In Panama et Colombia". (Lectotype, K, here designated; isolectotype, W).

Fig. 5J,K,L.

Distribution. This subspecies is found in central Colombia (Fig. 8).

Selected specimens studied. Colombia. Peréz-Arbaláez(f) (US); Mutis 4610(f) (MA, US). Antioquia: Ballou 1300 (US). Cundinamarca: Walker 260(f) (F, GH, NY, US). Magdalena: Aristeguieta-Joseph A311 (US). Meta: Alston 7656(f) (F, S, US). Tolima: Gentry et al. 8960(f) (AAU, MO). Valle: Duque 1596(f) (US).

17. Triplaris cumingiana Fisch. & Mey. ex C.A. Meyer

Meyer 1840: 14; Meisner 1856: 175; Duke 1960: 356; Dodson and Gentry 1978: 504; Croat 1978: 380. – Type: Cuming s.n. Hab. in Colombia. N.V.
Triplaris guayaquilensis Weddell 1849: 266; Meisner 1856: 173. – Type: Gaudichaud 3(f). "Ecuador, Guayaquil. Aug. 1836". (Lectotype, P, here designated).
Triplaris lindeniana Weddell 1849: 266; Meisner 1856: 176. – Type: Linden 1648(f). "Prov. Rio Hacha, Novo Granata. Jan. 1844". (Lectotype, P, here designated; isolectotype, F, K).
Triplaris arnottiana Meisner 1856: 176. – Type: "Coll. Jameson" (K). (See notes).
Triplaris auriculata Meisner 1856: 174; Standley 1937: 465. Type: Ruiz & Pavon 33–99 (MA). (See notes).

Trees, 10–20 m tall to 30 cm in diameter. Bark light brown, thin, peeling off. Twigs reddish- to greyish-brown, striate, glabrous. Stipules with sparse appressed whitish hairs. Petioles (6–)11–15(–20) × 2–5 mm, canaliculate, glabrous or slightly appressedly pilose; leaf-blades oblong to oblong-elliptic, 2.5–3.5 times as long as broad, 15–25(–32) × 5–10(–13) cm, apically acuminate, basally rounded to acute, sometimes slightly oblique, glabrous above, glabrous beneath except for the strigose midrib, 20–30 pairs of lateral veins. Axes of staminate inflorescences yellowish-grey to olivaceous strigose-tomentose, individual branches up to 25 cm long. Bracts 0.5 mm long, acute, strigose. Bracteoles 3–4 mm long, densely pilose-strigose outside, glabrous inside. Perianths 4–5 mm long, basally connate for 2.5 mm, appressedly pilose-strigose on both sides; filaments 4–6 mm long, basally adnate for 2–2.5 mm; anthers 1–1.5 mm long. Axes of pistillate inflorescences densely yellowish-grey to olivaceous strigose-tomentose, individual branches up to 25 cm long. Bracts 1–1.5 mm long, acute, strigose. Bracteoles 6–10 mm long, appressedly pilose-strigose outside, glabrous inside. Pedicels of fruiting perianths 5–8 mm long, densely strigose-tomentose. Fruiting perianths (4.0–)5.0–6.0(–8.0) cm long, the oblong-urceolate tubes (11–)13–17(–20) × 7.5–10(–14) mm, sericeous-pilose outside, puberulous-pilose inside; wings 2–3 times as long as the tubes, 30–50(–63) × 5–10(–13) mm, oblanceolate, apically rounded to acute, puberulous; petals 10–14(–17.5) × 1–1.5 mm, linear-subulate, slightly pilose in their basal half, the basal 3–6 mm adnate to the tube. Achenes sharply triquetrous to trialate, 10–15 × 6–10 mm, yellowish-brown to dark brown, glabrous to punctate-granulate, often strongly veined, with a very short beak; styles 3–4 mm long. – Fig. 5M,N,O.

Distribution. This species ranges from Panama and northern Colombia to northern Peru (Fig. 8).

Ecology. *Triplaris cumingiana* has a rather broad amplitude ranging from the lower part of the dry deciduous forest up through the humid evergreen forest. Although it is most commonly encountered along river margins it is not linked to this habitat. Common in secondary forest and disturbed roadside forest. Alt. 0–2000 m.

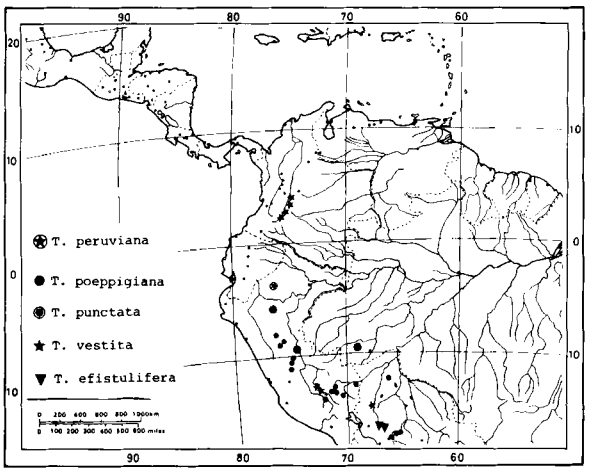

Fig. 10. Known distributions of *Triplaris poeppigiana, T. peruviana, T. efistulifera, T. punctata*, and *T. vestita*.

Notes. Triplaris cumingiana is allied to *T. melaenodendron* and *T. surinamensis*. For its connection with the latter see the discussion under the description of that species. The typical *T. cumingiana* is distinguished from *T. melaenodendron* by the oblong leaves with more than 20 pairs of lateral veins. Intermediate forms, especially between *T. melaenodendron* ssp. *colombiana* and *T. cumingiana*, are found. The specimens of *T. cumingiana* from Panama have punctate-granulate achenes that resemble the heavily asperulous-punctate achenes of *T. melaenodendron* ssp. *colombiana*, whereas the Venezulean specimens of *T. cumingiana* have glabrous achenes. Steyermark & Liesner 118851 is a specimen with very long petals up to 33 mm long. Petals of that length is found only in some specimens of *T. melaenodendron* ssp. *colombiana*.

The Ecuadorian specimens of *T. cumingiana* including the types of *T. guayaquilensis* and *T. arnottiana* differ slightly from the Panamanian and Colombian specimens by their bigger fruiting perianths and rounded, slightly inaequilateral leaf bases. Cazalet & Pennington 5019 and Schimpff 292 are very big fruited indeed with fruiting perianths up to 8.0 cm long. However, as the variation appears to be clinal, I have not found it justified to regard the Ecuadorian population as a separate taxon.

Concerning the type *T. arnottiana* I have seen a specimen from K on which was written: "Ad rip. flum. Guayaquil, Arnott", with a note: "Coll. Jameson". I believe this to be type material. The specimen was very fragmentary consisting of only five attached fruits.

As to the type of *T. auriculata* Meisner's original description said: "In Nova-Granata? et Mexico (Pavon! in herb. Shuttlew.)". In Ruiz & Pavon material from MA two different collections, which might be the specimens, on which Meisner based his description, have been studied. One of these has the number 33–99, and this specimen is similar to *T. cumingiana*. Standley studied the same specimen and reached the same conclusion. He included *T. auriculata* in Flora of Peru because of the possible Peruvian origin of the specimen. The other Ruiz & Pavon specimen has the number 4787, and on the label it says: "Plantae Novae Hispaniae" (Mexico). This specimen belongs to *T. melaenodendron*. Duke (1960) listed *T. auriculata* in synonymy under *T. melaenodendron* in Flora of Panama without citing any studied specimens.

Local names. Panama. "Guayabon". "Guayabo hormiguero". "Palo Santo". Ecuador. "Fernan Sanchez". "Muchina".

Uses. In Ecuador the wood is widely used for different construction purposes and for making furniture.

Selected specimens studied. Panama. Allen 293(f) (A, F, GH, MO); Dressler 3428(f) (GH, MO); Lao 67(f) (MO). *Colombia.* Antioquia: Schott 15(f) (NY). Bolivar: Curran 312(f) (F, US). Guajira: Smith 853(f) (A, F, G, GH, MO, NY, PH, S, UC, US). Meta: Alston 7656(f) (F, S, US). Santander: Killip & Smith 19059(f) (US). *Venezuela.* Barinas: Breteler 3653(f) (F, G, MO, NY, S, US). Merida: Breteler 4895(f) (MO, NY, S). Tachira: Steyermark & Liesner 118851(f) (AAU). Zulia: Steyermark et al. 123291(f) (AAU, MO). *Ecuador.* Eggers 14033(f) (A, M, US); Rimbach 42(f) (F); Schimpff 292(f) (A, MO). Bolivar: Acosta-Solis 6106(f) (F). Chimborazo: Acosta-Solis 5348(m) (F). El Oro: Sparre 18899(f) (S). Esmeraldas: Little & Dixon 21205(f) (NY, US). Guayas: Asplund 17566(f) (S); Böcher et al. 29(f) (C, S), Holmgren 4(f) (S). Loja: Brandbyge 42339(f) (AAU, QCA); Camp E.144(f) (NY). Los Rios: Dodson & Gentry 6259(f) (AAU, GH, MO); Mexia 6558(f) (NY, US). Manabi: Fagerlind & Wibom 598(f) (S). Pichincha: Cazalet & Pennington 5019(f) (NY, UC, US). *Peru.* Piura: Soukup 4280(f) (F, US). Tumbes: Simpson & Schunke 549(f) (GH, NY, US).

Excluded and dubious names

Triplaris abbreviata Rizzini 1974: 7. = *Ruprechtia*. This species was described as belonging to *Triplaris* apparently because of the hollow twigs.

Triplaris americana Pav. ex Meisner 1856: 175. Nom. nud.

Triplaris apetala Walpers 1852: 295. = *Ruprechtia apetala* Weddell. From the original description it appears that Walpers followed Endlicher (1848), when he made this new combination.

Triplaris brachystachya (Benth.) Endlicher 1848: 55. = *Ruprechtia brachystachya* Bentham 1845: 630. Cf. Cocucci 1961: 237.

Triplaris coriacea Karsten 1866: 131, pl. 169. = *Ruprechtia coriacea* (Karst.) Blake 1919: 239. Cf. Cocucci 1961: 260.

Triplaris corylifolia (Griseb.) Kuntze 1898: 270. = *Ruprechtia apetala* Weddell 1849: 268. Cf. Cocucci 1961: 255.

Triplaris crenata Casaretto 1845: 80. Type material has not been studied. Cocucci (1961) on the basis of a photo of the type and the original description, placed this species in *Triplaris*. He agreed with Meisner (1855: 53) that *Ruprechtia carpinoides* was a synonym for *T. crenata*. from the original description and from a specimen (Guillemin cat. No. 1029 (P)), which fits the

original description very well, I have concluded, that this species must belong to *Ruprechtia*. The type locality of *T. crenata* is Rio de Janeiro and so far no specimens of *Triplaris* have been recorded from the vicinity of Rio de Janeiro. *Triplaris cuneata* Endlicher 1848: 55, was a mis-spelling of *Triplaris crenata*.

Triplaris fulva Huber 1906: 560. This species was described on sterile material collected at Rio Ucayali in Amazonian Peru. I have seen a photo and a fragment of the type (Huber 1565, F). The specimen was apparently taken from a young plant, and it has the characteristic hollow internodes. The indumentum is distinctive for the specimen, but it may not be characteristic for mature material. Standley (1937: 466) wrote: "It is probable that the proper treatment of the name will remain obscure, until the type locality is revisited. As a matter of fact it is not altogether certain, that the plant belongs to the genus *Triplaris*". I agree with him that the type locality must be revisited to solve the problem of the identity of *Triplaris fulva*. I am convinced, however, that it belongs to *Triplaris*, whether it will appear to be a juvenile specimen of one of the Peruvian species or a distinct species.

Triplaris laurifolia Chamisso 1828: 55. = *Triplaris scandens* (Vellozo) Cocucci 1957: 361. Cocucci listed *T. laurifolia* in synonymy under his new combination *T. scandens*. = *Ruprechtia*.

Triplaris macrocalyx Casaretto 1845: 79. = *Triplaris scandens* (Vellozo) Cocucci 1957: 362. Cocucci listed *T. macrocalyx* in synonymy under his new combination *T. scandens* = *Ruprechtia*.

Triplaris martiana Fisch. & Mey. ex. C.A. Meyer 1840: 15; Meisner 1855: 50; Meisner 1856: 177. Type material has not been studied. *T. martiana* is identical with either *T. weigeltiana* or *T. gardneriana*. Material of *T. martiana* var. *oblongifolia* Meisner, that was studied, is identical with *T. weigeltiana*.

Triplaris mollis Walpers 1852: 296. Synonym for *Ruprechtia mollis* Weddell (= *R. apetala*). Walpers followed Endlicher (1848), when he made this combination. Type material has not been studied and the original description has not been available. This is most probable a synonym for *Ruprechtia mollis* Weddell (= *R. apetala*), though Cocucci (1961) did not list it in synonymy under that species.

Triplaris paraguayensis Parodi 1878: 157. Type material of this species has not been studied and according to personal communication with the Danish botanist T. Myndel Petersen residing in Argentina, it is not likely to exist. The original description is rather incomplete and provisional, and is probably based on one of the three species of *Ruprechtia*, found in Paraguay.

Triplaris polystachya (Griseb.) Kuntze 1898: 271. = *Ruprechtia laxiflora* Meisner 1855: 56. Cf. Cocucci 1961: 244.

Triplaris prognostica Rottbøll 1776: 16. Nom. nud. Rottbøll published this name without description or diagnosis.

Triplaris ramiflora Jacquin 1763: 14. = *Ruprechtia ramiflora* (Jacq.) C.A. Meyer 1840: 16. Cf. Cocucci 1961: 257.

Triplaris ramiflora Schott. ex Meisner 1855: 54. Nom. nud.

Triplaris riedeliana Fisch. & Mey. ex C.A. Meyer 1840: 15; Meisner 1855: 52; Meisner 1856: 177. Type material has not been available. Meisner (1855) indicated that *T. riedeliana* had affinities with *T. tomentosa, T. pachau*, and *T. gardneriana*. If type material exist, and it is identical with the type of *T. gardneriana, T. riedeliana* will be the correct name of this species, because it antedates *T. gardneriana*.

Triplaris salicifolia Chamisso 1828: 56. = *Ruprechtia salicifolia* (Cham.) C.A. Meyer 1840: 16. Cf Cocucci 1961: 233.

Triplaris salicifolia Miq. ex Meisner 1855: 54. Nom. nud.

Triplaris scandens Schott. ex Meisner 1855: 54. Nom. nud.

Triplaris scandens (Vellozo) Cocucci 1957: 361. Basionym: *Magonia scandens* Vellozo 1825: 165. Apparently because of the hollow twigs Cocucci transferred this species to *Triplaris*. According to the discussion in Brandbyge and Øllgaard 1984: 768, this species belongs to *Ruprechtia*. I am convinced that a careful revision of many of the names Cocucci listed in synonymy under *Triplaris scandens* will reveal more than one taxon. For further discussion, see Howard (1985).

Triplaris tenuiflora (Benth.) Endlicher 1848: 55. = *Ruprechtia tenuiflora* Bentham 1845: 629. Cf. Cocucci 1961: 241.

Triplaris triflora (Griseb.) Kuntze 1898: 271. = *Ruprechtia triflora* Griseb. 1879: 89. Cf. Cocucci 1961: 239.

Triplaris venezoelensis Kunth 1927: 310. Nom. nud.

Triplaris viridiflora Scott ex Meisner 1855: 54. Nom. nud.

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