

A MONOGRAPH OF THE VOCHYSIACEAE
III. QUALEA¹

BY

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The genus *Qualea* is found in tropical South America, particularly in the Hylaea and in the Extra Amazonian part of the Brazilian mainland (see fig. 3); it comprises 59 species as defined in this paper. Many species are forest trees occurring in the Amazonian basin, a number are found in the Brazilian Atlantic coastal forests, whereas other species are typical trees of the campos of the interior plateau.

The genus was first described by AUBLET in 1775; its name is a latinization of the vernacular name "Qualé" used by the "caribbean" inhabitants of French Guiana. AUBLET described *Q. rosea* (type species) and *Q. coerulea*; the first exhaustive and morphologically correct description was given by A. DE ST. HILAIRE (1820) who placed the genus in his newly established family of the *Vochysiaceae*.

ACKNOWLEDGMENTS

The continuation of the revision of the *Vochysiaceae* has been made possible by the courtesy and the co-operation of the herbaria and institutions listed in the second part of this monograph. The author wishes to express once again his sincerest thanks to the directors of these institutions who placed their very important collections at his disposal in such a courteous and generous manner. He had the opportunity of visiting the herbaria in Leiden, London (British Museum of Natural History) and Paris; while it was his privilege to accomplish his task at the Utrecht Botanical Museum. His grateful acknowledgments go to the directors and staff of these herbaria; their great help and kind hospitality were of great value to him.

The abbreviations for the herbaria used in this publication are those proposed in the Index Herbariorum of the International Association for Plant Taxonomy (see LANJOUW et STAFLEU 1952).

¹ Part I, (*Salvertia* and *Vochysia*) in Rec. Trav. Bot. Néerl. 41: 397-540. 1948; also in Med. Bot. Mus. Utr. 95: 397-540.

Part II (*Callisthene*) in Acta Bot. Néerl. 1: 222-242. 1952; also in Med. Bot. Mus. Utrecht 108: 222-242. 1952.

MORPHOLOGICAL REMARKS

Qualea constitutes with the genera *Salvertia*, *Vochysia* and *Callisthene* the tribe of the *Vochysieae* Dumort. (1829 p. 6).

The comparative morphology of these genera was discussed in some detail in the second part of this monograph. The following remarks are mainly concerned with the variation within the genus *Qualea*¹.

The diagrams of the flowers of some species of *Qualea* are given in fig. 1. Not every type of flower which may be encountered in this genus is represented in this figure: the variable number of staminodes

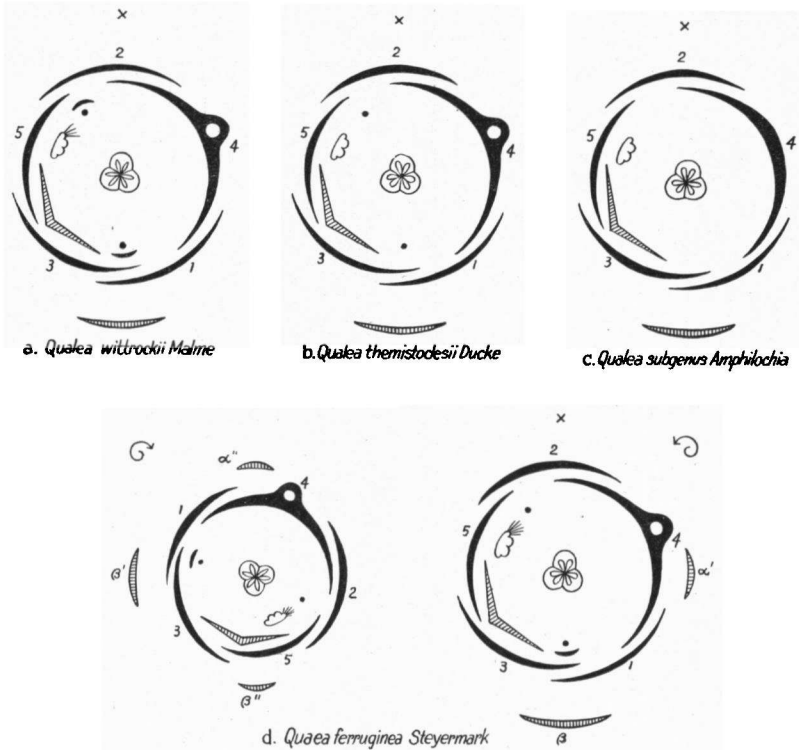


Fig. 1. Diagrams.

and rudimentary petals, together with the presence or absence of a unilateral indumentum on the stamen provide many possibilities.

A. Calyx. In the subgenus *Qualea* the fourth and major lobe of the calyx is provided with a distinct spur; this spur is absent in the subgenus *Amphilochia*. Apart from this presence or absence of a spur two types of calyx may be distinguished:

I. The *Vochysia* type (see e.g. fig. 4c). The fourth (spurred) lobe is three or more times longer and always much wider than the other lobes. The latter are closely adpressed against the former. This type

¹ The subdivision of the genus *Qualea* is given on p. 152.

of calyx is found in *Vochysia* and *Callisthene*, and in *Qualea* sect. *Trichanthera*.

II. The *Salvertia* type. (see e.g. fig. 13d). The fourth (spurred) lobe is about as large as the other lobes; the latter are never closely adpressed against the former. This type is found in *Salvertia*, *Erisma* and *Erismadelphus*; in *Qualea* it is found in all species *except* in those belonging to the section *Trichanthera*.

B. The Corolla consists of one well developed petal, sometimes flanked by one or two rudimentary ones (see fig. 1). This petal of *Qualea* — like the central petal of *Vochysia* — corresponds to the third petal of *Salvertia* (see diagrams in STAFLEU 1952 p. 224). In the subgenus *Qualea* small rudimentary petals may occasionally be found in the same positions as the lateral petals of *Vochysia*. In this latter genus the lateral petals are only rarely reduced or absent; in *Qualea* this is the rule.

It is often difficult to decide whether organs found in this position are staminodes or petals: the staminodes in *Qualea* (and in *Vochysia*) belong to the second cycle of stamens situated at the base of the petals. Only when both kinds of organs are present is it evident that the flimsy straps flanking the main petal do indeed represent the lateral petals (the numbers 1 and 5 of the theoretical cycle).

C. Androecium. The only fertile stamen stands in front of the first calyx-lobe outside the plane of symmetry; it therefore belongs to a cycle alternating with the corolla. The staminodes (0, 1, 2, or 3) always belong to a second — alternating — cycle.

In different flowers of one species and even of one specimen the number of staminodes may vary and as this is also true of the rudimentary petals it is evident that many different combinations may be seen. These types have only slight taxonomic value: the most complete flowers are found in the section *Trichanthera*; some of the species of sect. *Qualea* and sect. *Costatifolium* are also provided with rudimentary organs, but in the section *Polytrias* and in the subgenus *Amphilochia* none are found.

Two types of fertile stamen may be distinguished:

1. *Innate* (also in *Salvertia*, *Vochysia* and *Callisthene*). In *Qualea* stamens of this type occur in the section *Trichanthera* in which they are provided with a unilateral beard (cf. fig. 1a and 8d).

2. *Dorsifixed* (also in *Erisma* and *Erismadelphus*). All other species of *Qualea* have stamens of this type: the filament is attached either to the centre of the connective (sect. *Costatifolium*) or somewhat above the base of the back (fig. 12c and 13c).

D. Stipules. One of the main peculiarities of *Qualea* is the manifold specialization of the stipules. They provide characters which are of great importance for the determination of sterile specimens. This usefulness is enhanced by the fact that the specializations are generally characteristic of the species concerned.

a. Glands. The following types may be distinguished:

1. *Transformed stipules* (see fig. 2 and 7). The stipules are fully developed; the apex is short and often deciduous or caducous; the base is

glandular. This base may be swollen in youth (fig. 2) and even remain so for its life time, but more often it is transformed into a crateriform "gland" which is rather flat, elliptic or round and provided with a thick-walled often light-coloured margin (see fig. 7).

Only a careful anatomical investigation of duly conserved materia

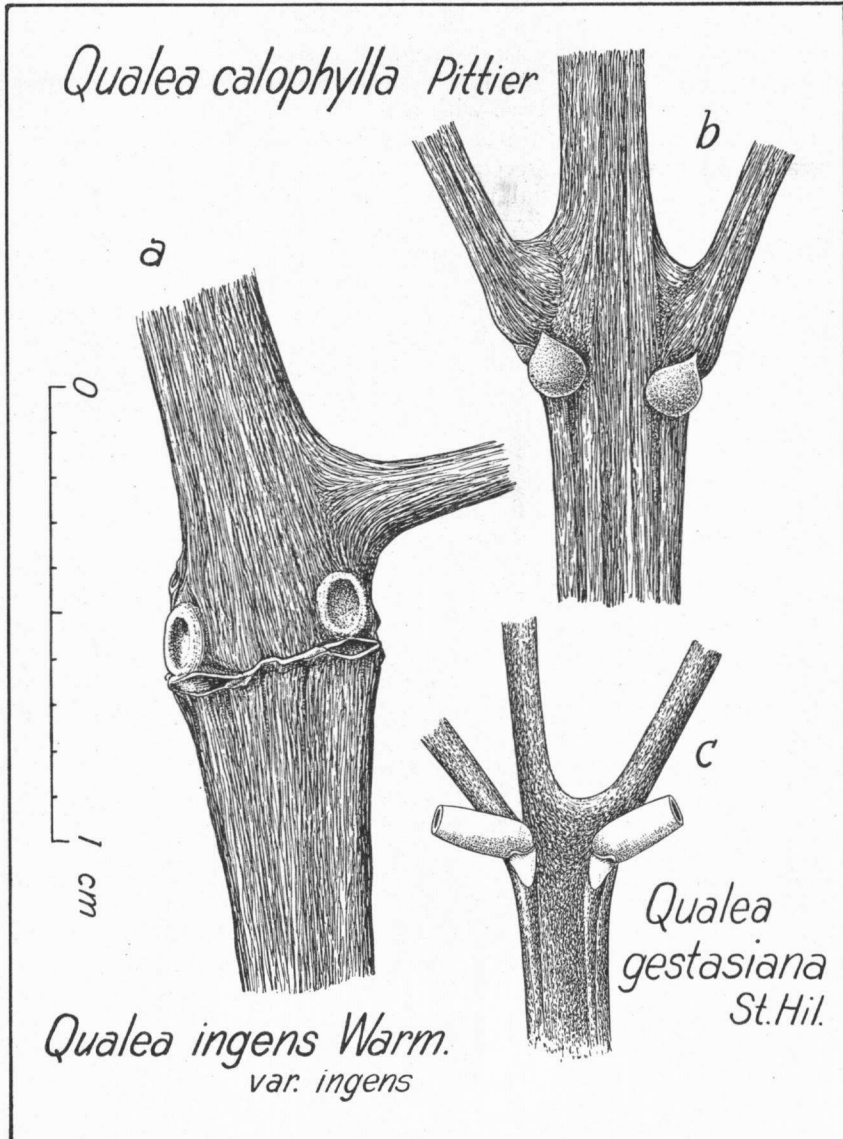


Fig. 2. Glands in the genus *Qualea*. a. Axillary glands; b. young transformed stipules; c. true extrafloral nectaries.

would make it clear whether the inside of these "glands" is indeed glandular.

This type of gland is present in quite a number of species from all groups, e.g. *Q. calophylla*, *Q. rigida*, *Q. grandiflora*, *Q. tessmannii*.

2. *Stipular glands* (fig. 4 and 9). The stipules are represented by the crateriform glands described above. The apex is absent. This type is found in most species.

3. *Axillary glands* (fig. 2 and 10). The stipules are complete, either flat or incrassate. In their axils glands are found which show a great resemblance to those of the first two types. In some cases, however, (fig. 10) they are subglobose with a narrow mouth. All are provided with a thick callous margin or wall. Glands of this type are found in e.g.: *Q. ingens*, *Q. lineata*, *Q. glaziovii* (see POULSEN 1876 p. 273), *Q. elegans* (glands in serial pairs).

4. *True extrafloral nectaries*. POULSEN (1881) has demonstrated with pickled material that the structures as depicted in our fig. 2 are indeed extrafloral nectaries. These are tube-shaped (in other cases subglobose or urceolar), thin-walled nectaries, situated in the axils of the stipules. Here too the bases of the stipules may be either flat or incrassate (subglandular). Such nectaries are found in *Q. gestasiana*, *Q. amoena*, *Q. magna*, *Q. paraensis* and *Q. rosea*.

b. The "stipular ridge". Sometimes the stipules of opposite leaves are connected by a narrow transverse elevated line. This ridge merges into the bases of the stipules. It is interesting to make a comparison with the situation found in the *Trigoniaceae* where the stipules are often interpetiolar and at the same time not connate.

E. The vegetative buds of *Qualea* are very often perulate, that is, furnished with a number of small protective scales (see also part II p. 225). As in *Callisthene*, these scales or cataphyls, are more or less persistent and they are to be found at the bases of the young branchlets. The basal ones are crowded and the respective internodes are correspondingly short. This is especially so in species of the subgenus *Amphilochia*.

F. The inflorescence — as always in this family (see part II p. 226) — is characterized by the cincinnus (fig. 1e). It is therefore remarkable that *Q. cymulosa*, the only Central American species of the genus, has a panicle of distinctly peduncled three-flowered regular cymes. This feature separates this already geographically isolated species from all others.

GEOBOTANICAL AND ECOLOGICAL REMARKS

The area of *Qualea* is continuous, as can be seen from fig. 3. It lies in tropical South America but it has a very slight extension towards Panama where the morphologically isolated species *Q. cymulosa* is found. In South America the area nearly covers that of *Vochysia* with the exception of an extension into the northern Venezuelan mountains (*Q. calophylla*). For a discussion of the boundaries of this area see part I p. 409-414.

The western boundary of *Qualea* runs along the eastern slopes of

the Andes. Unlike *Vochysia* the species are not found in the subtropical parts of these mountains. The southern boundary follows the 18° isotherm of the coldest month, which may be used for the delimitation of the tropical zone. In eastern Brazil several endemic species are found in the atlantic coastal forests. The northern boundary follows the coastline except in the extreme East where *Qualea* is absent in Parahyba and northern Ceara and in the extreme West, where it avoids the dry coastal parts of Venezuela.

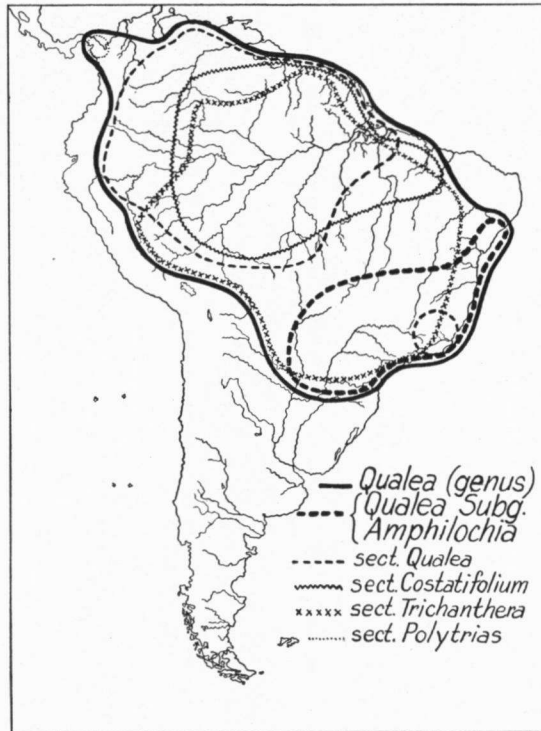


Fig. 3. Distribution of the genus *Qualea* and its subdivisions.

The species of *Qualea* — like those of *Vochysia* — are found either in the rain forests or in the savannas (campos and llanos). Some species are present in the Caatinga and the Cacaes zones of Brazil (see SAMPAIO 1934) but in these zones they are found in places which can be considered as “disjunctions” of the zone of the campos. This is also the case with the occurrence of *Q. grandiflora* and *Q. parviflora* — both typical trees of the campos — in the Hylaea.

The areas of the subgenera and sections have been indicated in fig. 2. The section *Qualea* has a disjunct area: the major part of the species is Hylaeal, whereas three species are southern Brazilian. Two of the latter are trees of the coastal rain forests, one is a shrub of the

campos. The disjunction Hylaea-Coastal Forests may be encountered in many taxa, in the *Vochysiaceae*, for instance, in *Vochysia* subsect. *Ferrugineae*.

In general it may be said that the subgenus *Amphilochia* is restricted to the zones of the Campos and of the Coastal Forests. The sections *Trichanthera* and *Qualea* are chiefly Hylaeae. The species of the section *Costatifolium* are found either in the Hylaea or in the Campos, with "disjunctions" into the neighbouring zones.

NOTES AND ABBREVIATIONS

Most of the species of *Qualea* are of very little economic value or even of no use at all. A number of rain forest species are in use as timber or lumber trees but for the most part the products seem to be of moderate or even of inferior quality.

Several "kwarrie" species are included among wood from Suriname used in the Netherlands for industrial purposes (*Q. albiflora*, *Q. rosea*, *Q. dinizii* and *Q. coerulea*).

ST. HILAIRE (1820 p. 261) relates that the inhabitants of Minas Geraes used to extract a dye from the cortex of "pau terra" (*Q. grandiflora*, *Q. multiflora* and *Q. parviflora*).

The *abbreviations* used for the herbaria are those proposed in the Index Herbariorum (LANJOUW et STAFLEU 1952).

Fl. Months during which flowering specimens have been collected.

Fr. Idem, fruiting specimens.

s.n. unnumbered specimen.

Qualea Aubl.

Aubl. Pl. Gui. 1: 5. 1775; Juss. 1789 p. 424; Lam. 1791 p. 11; Willd. 1797 p. 18; Poir. 1804 p. 8; Vahl 1804 p. 6; Roem. & Schult. 1817 p. 5; St. Hil. 1820 p. 253, 265, 269; Mart. 1824 p. 130; Spreng. 1825 p. 4, — 1827 p. 4; DC. 1828 p. 28; A. Dietr. 1831 p. 97; Meisn. 1836-43 1: 119, 2: 85; Endl. 1836-40 p. 1178; D. Dietr. 1839 p. 21; Steud. 1841 p. 425; Benth. & Hook. 1862-67 1: 976; Baill. 1874 p. 95; Warm. 1875 p. 29; Petersen 1896 p. 317; Record and Mell 1924 p. 366; Benoist 1915 p. 237, — 1931 p. 163; Lemée 1934 p. 709; Record and Hess 1944 p. 551; Mennega 1948 p. 44; Staffl. 1951 p. 190, — 1952 p. 223 seq. *Amphilochia* Mart. 1824 p. 127; Spreng. 1827 p. 4; DC. 1828 p. 26; G. Don 1832 p. 669; Meisn. 1836-43 1: 119, 2: 85, 355; Endl. 1836-40 p. 1177; D. Dietr. 1839 p. 21; A. Dietr. 1831 p. 96; Spreng. 1830 p. 21. *Agardhia* Spreng. 1825 p. 4, 17; DC. 1828 p. 30; A. Dietr. 1831 p. 97. *Schuechia* Endl. 1836-40 p. 1178; Walp. 1843 p. 68.

Trees or shrubs. Indumentum, if present, consisting of simple or biramosse hairs. Perulate buds often present. Stipules often represented by crateriform glands, sometimes normally developed and provided with similar axillary glands or with extrafloral nectaries. Leaves opposite, simple, petioled, entire, coriaceous or subcoriaceous, penninerved, equal-sided or nearly so, the petioles mostly rugulose and

canaliculate above, the midrib prominent below. Flowers either solitary or in few-flowered cincinni in the axils of the leaves or in the terminal and axillary compound racemes or panicles with cincinni (very rarely regular cymes) as partial inflorescences, hermaphrodite, irregular. Bracts caducous. Peduncles extremely short. Pedicels distinct. Calyx gamosepalous, quincuncial, the base cup-shaped, the limb five parted, the lobes unequal and deciduous: the fourth ("posterior", "major" or "spurred") one large, mostly spurred or bag-shaped at the base, convolute and enveloping the inner whorls; the other lobes varying in size but always smaller, the second one on the axial side, the first and second ("lateral") ones often smaller than the third and fifth ("anterior") ones; spur, if present, at first adpressed against the back of the lobes, later on patent. Corolla white, yellowish, yellow, purplish-blue or pink, often spotted with violet, with the stamen and the staminodes perigynously inserted on the calyx. Petal one, membranous, alternating with the third and fifth calyx-lobes, convolute, caducous, generally obcordate, the base unguiculate. Rudimentary petals sometimes present. Stamen one, in front of the fifth calyx-lobe; the filament in anthesis often elongated, the anther bithecate, the locules introrse, adhering to the filament at the base (innate), somewhat above the base or in the centre (dorsifixed); the connective not or slightly produced beyond the locules; the pollen grains globose, triporous. Staminodes often present, glabrous, small. Pistil tricarpellary. Ovary superior, densely pilose, trilocular, the outer wall trisulcate, dissepiments complete; the ovules up to 12 per loculus, inserted in two rows, axile, epitropous, integuments two. Style one, simple, in anthesis often elongated and spirally coiled. Stigma one, terminal, mostly subcapitate. Fruit a trilocular loculicidal capsule, mostly shortly cylindric, the angles rounded or obtuse, never winged; the exocarp thick, woody, mostly adhering to the thinner endocarp, central column if present free and thin or breaking away with the valves. Seeds exalbuminous, few per loculus, oblong, winged, the wing unilateral, consisting of numerous long hairs inserted on the chartaceous testa, the body of the seed tomentose. Embryo homotropous, straight; radicle small, the cotyledons convolute and plicate.

Type species: *Qualea rosea* Aubl.

Distribution: 59 species in tropical America.

Ecology: Mostly trees of rain forests or savannas.

Remarks on the subdivision: MARTIUS (1824) described the genus *Amphilochia* as distinct from *Qualea*. WARMING (1875), however, gave this taxon the rank of "series", whereas in this monograph it is considered to be of the rank of subgenus. MARTIUS had good reasons to establish a separate genus: the species concerned differ from those of the present subgenus *Qualea* by a number of important characters such as the absence of a spur, a thick, densely pilose petal, the complete absence of staminodes. Yet the differences existing between the other genera of the *Vochysiaceae* tribus *Vochysieae* are of greater importance: the stamen may belong to another cycle (*Vochysia*, *Salvertia*), the structure of the capsule may be fundamentally different (*Callisthene*), etc. Intermediate forms between the present genera are never observed. The characters dividing *Amphilochia* and *Qualea* are not as "absolute" as those dividing these present genera; for instance, a non-spurred calyx is found in *Q. calantha* (subgenus *Qualea*), a more or less membranous petal in *Q. lundii* (subgenus *Amphilochia*), etc. For these reasons the present author does not wish

to reinstate *Amphilochia* as a genus. A secondary but nevertheless very important reason is found in the circumstance that he thinks it unfit, without very convincing arguments, to effect changes in generic names which would necessitate the re-naming of several common species. WARMING's concept of a series differs somewhat from that of our days: it is not certain whether he considered to category "series" to be higher or lower in rank than "section". In his treatment of the Brazilian species of *Qualea*, WARMING (1875) distinguished three series: *Calophylloideae*, *Costatae* and the above-mentioned *Amphilochia*. The first two series cover our present subgenus *Qualea*. In this monograph this latter subgenus is divided into four sections. In order to be in agreement with Art. 31 of the "Code", the names of these sections are substantives resembling the names of genera. This makes it inadvisable to use WARMING's names again (they have of course no status outside the rank of series). WARMING's first series (*Calophylloideae*) is more or less covered by our sections *Trichanthera* and *Qualea*, his second series (*Costatae*) is about covered by our *Costatifolium*. Our fourth section (*Polytrias*) contains only one species, unknown to WARMING.

This division of the subgenus *Qualea* into four taxa of equal rank seems justified in the light of the present knowledge of the variation in the subgenus. The section *Trichanthera* is well characterized by its innate, barbate anther and "Vochysioid" calyx, the section *Costatifolium* by its peculiar leaves and perulate buds (both absent in the former and following sections), and the section *Polytrias* by its cymes (absent in all other sections).

Key to the subgenera and sections

- 1a. Petal glabrous or nearly so; spur clavate or cylindrical, well developed. subgenus I. **Qualea** 2
- b. Petal densely pilose. Spur not or very weakly developed: the base of the fourth calyx-lobe shallowly saccate or gibbous subgenus II. **Amphilochia** (Mart.) Stafl. p. 202.
- 2a. Lateral nerves 10-50 per cm, making an angle of about 80' with the midrib 3
- b. Lateral nerves 8 or less per cm (major ones), making an angle of 60-80' with the midrib. 4
- 3a. Anther unilaterally barbate. Spurred calyx-lobe 3 or more times longer than the other lobes, the latter closely adpressed against the former sect. A. **Trichanthera** Stafl. p. 153.
- b. Anther glabrous or pilose on the back. Spurred calyx-lobe somewhat longer than or at most up to 2½ times longer than the other lobes, the latter never closely adpressed against the former sect. B. **Qualea** p. 170.
- 4a. Inflorescence composed of cincinni sect. C. **Costatifolium** Stafl. p. 192.
- b. Inflorescence a panicle of regular trichotomous peduncled cymes sect. D. **Polytrias** Stafl. p. 201.

subgenus I. **QUALEA**

Arbores vel frutices. Folia nervis lateralibus numerosis vel satis paucis, rectis et exacte parallelis, nervo limbali margini proximo parallelo junctis. Calcar calycis clavatum vel cylindricum primum dorso laciniae adpressum, dein patens. Petalum glabrum vel fere glabrum, tenerum.

Type species: *Qualea rosea* Aubl. (type species of genus).

Distribution: 51 Species, widely distributed in the Hylaea Americana and

in the Extra Amazonian Province of Brazil with the adjacent parts of Bolivia and Northern Paraguay.

Section A. **Trichanthera** Staffl. nov. sect.

Series I *Calophylloideae* Warm. 1875 p. 30 p.p.

Arbores vel frutices. Perulae perpaucae.

Folia glaberrima basi haud obliqua, nervis lateralibus numerosissimis (5–50 per cm.) parallelis sub angulo c. 80' e costa ortis nervo limbali margini parallelo et proximo ($\frac{1}{2}$ –1 mm) junctis. Alabastra elongato-conica. Calycis lacinia quarta calcarata, ceteras arte adpressas pluries superans. Anthera unilateraliter barbata, innata, filamento glabro. Staminodia et petala rudimentaria saepe adsunt. Ovarium in stylum sensim transiens (exc *Q. cassiquiarensis*).

Type species: *Qualea trichanthera* Spruce ex Warm.

Distribution: 15 Species of Hylaea and 1 of Caatinga.

Key to the species

- | | | |
|-----|---|---|
| 1a. | Leaves glabrous or nearly so | 2 |
| b. | Lower surface of young leaves conspicuously ferrugineous-tomentellous | 1. Q. rubiginosa Staffl. |
| 2a. | Apex of the leaves acute-acuminate | 3 |
| b. | Apex of the leaves rounded or obtuse and often retuse or shortly obtuse-acuminate | 6 |
| 3a. | Spur about as long as or somewhat longer than the pedicel, rarely only slightly shorter | 4 |
| b. | Spur distinctly shorter than the pedicel, mostly about half as long | 2. Q. trichanthera Spruce ex Warm. |
| 4a. | Basal half or two-third of the style densely hirsute | 5 |
| b. | Style glabrous except the basal 1–3 mm | 3. Q. clavata Staffl. |
| 5a. | Leaves ovate or ovate-elliptic, $1\frac{1}{2}$ –2 times longer than wide | 4. Q. gardneriana Warm. |
| b. | Leaves oblong-lanceolate or subelliptic-oblong, $2\frac{1}{2}$ –4 times longer than wide | 5. Q. wittrockii Malme |
| 6a. | Flowers in the axils of frondose leaves only, no terminal inflorescences | 7 |
| b. | Flowers arranged in terminal — often branched — inflorescences, only the lowermost flowers or cincinni in the axils of the upper leaves | 8 |
| 7a. | Cortex of the branchlets exfoliating (small fragments) | 6. Q. retusa Spruce ex Warm. |
| b. | Cortex of the branchlets not exfoliating | 7. Q. albiflora Warm. |
| 8a. | Leaves thinly coriaceous | 9 |
| b. | Leaves firm, thick and leathery | 11 |
| 9a. | Leaves about two times longer than wide | 7. Q. albiflora Warm. |
| b. | Leaves about three to four times longer than wide | 10 |

- 10a. Petioles 2–4 mm long. Cortex not exfoliating 8. **Q. nitida** Staffl.
 b. Petioles 6–10 mm long. Cortex exfoliating (small fragments) 15. **Q. urceolata** Staffl.
- 11a. Base of the leaves rounded or cordate 12
 b. Base of the leaves cuneate or obtuse 14
- 12a. Leaves about two times longer than wide 13
 b. Leaves about three times longer than wide, $8-11 \times 2\frac{1}{2}-4$ cm 9. **Q. rigida** Staffl.
- 13a. Leaves $5-6 \times 2\frac{1}{2}-3\frac{1}{2}$ cm 10. **Q. verruculosa** Staffl.
 b. Leaves $7-10 \times 3-5\frac{1}{2}$ cm 11. **Q. esmeraldae** Standl.
- 14a. Flower-buds 2–4 mm wide near the base; spur distinctly longer than wide 15
 b. Flower-buds 5–6 mm wide near the base; spur bag-shaped, $3-4 \times 3-4$ mm 12. **Q. cassiquiarensis** Spruce ex Warm.
- 15a. Flower-buds fulvous-puberulous or nearly glabrous. Style glabrous except the lower 1–5 mm. 17
 b. Flower-buds ferrugineous-pubescent. Style ferrugineous-hirtous on the lower $\frac{2}{3}$ part 16
- 16a. Spur clavate; leaves $10-13 \times 4\frac{1}{2}-6$ cm 13. **Q. belemnensis** Staffl.
 b. Spur cylindrical; leaves $5-9 \times 2\frac{1}{2}-4\frac{1}{2}$ cm 14. **Q. ferruginea** Steyermark
- 17a. Spur conspicuously clavate 18
 b. Spur subcylindrical, 4–7 mm long, about as long as or somewhat shorter than the pedicel 19
- 18a. Spur shorter than the pedicel 15. **Q. urceolata** Staffl.
 b. Spur longer than the pedicel 3. **Q. clavata** Staffl.
- 19a. Base of the leaves cuneate and acute, surfaces of the leaves concolor; flower-buds about 20 mm long, anther about 14 mm long 16. **Q. obtusata** Briq.
 b. Base of the leaves obtuse or rounded, surfaces of the leaves discolor; flower-buds about 17 mm long, anther about 10 mm long 10. **Q. verruculosa** Staffl.

1. **Qualea rubiginosa** Staffl. nov. spec. (*fig. 4*).

Subgenus *Qualea*, sectio *Trichanthera* Staffl. Arbor parva. Ramuli juveniles, petioli et foliorum juvenilium pagina inferior ferrugineo-pubescentes. Glandulae ellipticae, circa 1 mm longae. Petiolus circa 5 mm longus. Lamina rigide coriacea, lanceolato-oblonga vel elongato elliptico-oblonga, circa 7–10 cm longa et $2\frac{1}{2}-3$ cm lata, apice rotundata, obtusa vel breviter obtuse-acuminata, valde mucronata, basi obtusa vel rotundata; nervis lateralibus ultra 20 per cm; venis numerosissimis. Inflorescentia thyrsoidae terminalis, cincinnis 2–3 floris, rachi, bracteis, pedicellis et calyce extra ferrugineo-pubescentibus; bracteis deciduis, triangularibus, circa 1 mm longis, pedicellis 5–10 mm longis. Alabastra 9–11 mm longa, subacuta, gracilia. Calycis laciniae minores

triangulari-ovatae, acuto-acuminatae, laterales circa 2 mm longae, anteriores circa 3 mm longae; lacinia major circa 9–11 mm longa, calcare cylindrico, circa 3–5 mm longo. Petalum glabrum sed margine subciliatum, circa 2 cm longum et $1\frac{1}{2}$ –2 cm latum. Anthera

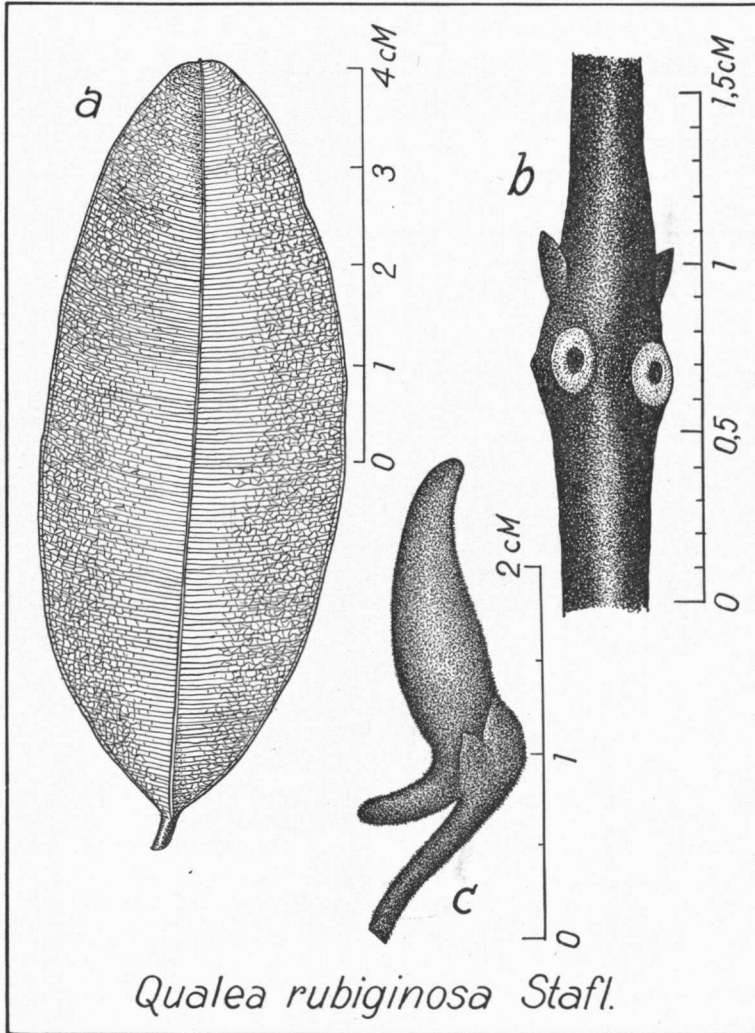


Fig. 4. *Qualea rubiginosa* Stafl. a. Leaf; b. stipular glands; c. flower-bud.

barbata, lineari-oblonga, circa 6–8 mm longa. Filamentum ad 10 mm longum. Staminodia 1–2, linearia, circa 1 mm longa. Ovarium elongato-ovoideum, ferrugineo-hirtum, indumento styli partem $\frac{1}{2}$ – $\frac{1}{3}$ inferiorem occupante.

Holotype: Cardona 1905 in US.

Distribution: Once collected.

VENEZUELA, Guayana: Uaipari R. (affl. of Ikabar), Caroni, Cardona 1905.

Ecology: In savannas (llanos), 500 m, fl. Oct.

Observation: Differs from the other species of this section by the ferrugineous (rubiginose) tomentum on the young parts and by the small flowers and narrow leaves.

2. **Qualea trichanthera** Spruce ex Warm. *Flora Bras.* 13(2): 35. 1875; Benoist 1915 p. 239, 241.

Large tree. Young branchlets, petioles, midrib of the leaves, inflorescences and outside of the calyx puberulous. Stipular glands suborbicular or elliptic, subprominent, concave. Petioles slender, 9–12 mm long. Leaf-blades somewhat rigid, glabrous except the midrib, elongate-elliptic or suboblong, 7–10 × 3–4 cm, the apex acute-acuminate and mucronulate, the base acute in youth, obtuse or rounded in age; the lower side of the midrib provided with two narrow wings; more than 10 thin, strictly parallel lateral nerves per cm; numerous veinlets on the entire surface. Inflorescence composed of terminal and axillary racemes (10–15 cm long) bearing 1–3 flowered cincinni; the pedicels slender, 5–8 mm long; the bracts deciduous, acute, 1–2 mm long. Flower-buds about 11–14 × 2–3 mm, the apex acute, the back rounded but with a thin rib near the top. Minor calyx-lobes ovate or deltoid, acute, the anterior ones 2–3 mm long. Spurred lobe about 11–14 mm long, the spur straight or somewhat recurved, constricted near the base, about half as long as the pedicel. Petal white, streaked with red, glabrous except the subpilose lower side of the base. Anther barbate, 7–9 mm long. Ovary lanuginose, elongate-ovoid; the lower half of the style also lanuginose. Capsules unknown.

Holotype: *Spruce* 2706 in C. Isotypes in: BM, BR, C, F, G, GH, GOET, K, NY, OXF, P, W.

Distribution: Upper Amazonia.

BRAZIL, Amazonas: Near Panuré on R. Uaupès, *Spruce* 2706; S. Paulo de Olivença, *Krukoff* 8834; Curucuhy, S. Gabriel, *Froes* 21443.

Ecology: On terra firma in high forest; fl. Nov.

3. **Qualea clavata** Staf. nov. spec. (*fig.* 5).

Subgenus *Qualea*, sectio *Trichanthera* Staf. Arbor magna. Ramuli juveniles subpuberuli, decorticantes, seniores et folia glabra. Glandulae subellipticae, vix prominentes, $\frac{1}{2}$ –1 mm longae. Petiolus robustus, 7–9 mm longus. Lamina rigide coriacea, subnitida, elliptica vel elliptico-oblonga, circa 8–10 cm longa et 3–4 $\frac{1}{2}$ cm lata, apice mucronulata, breviter acuto-acuminata vel subobtusa, basi obtusa; nervis lateralibus in utraque pagina prominentibus, ultra 20 per cm; venis numerosis. Inflorescentia thyrsoida, multiflora, terminalis et axillaris; cincinnis 1–2 floris; rachi (ad 12 cm longi) et pedicellis (circa 5 mm longis) ferrugineo-subpuberulis. Flores fragrantae. Alabastra subsericea, subellipsoidea vel subcylindrica, obtusa, circa 14–17 mm longa et 4–5 mm lata. Calycis laciniae minores ciliatae, subovatae, subobtusae, laterales circa 3 mm longae, anteriores circa 4 mm longae; lacinia major oblonga. Calcar clavatum, 8–10 mm longum et 3–4 mm latum, apice rotundatum, basi constrictum. Petalum glabrum sed margine ciliatum,

album macula lutea, suborbiculari. Anthera barbata, circa 12 mm longa, apice acuta, filamentum plusminusve aequans. Staminodia linearia, circa 1 mm longa. Ovarium subsericeum, ovoideum, indumento styli partem $1/6-1/3$ inferiorem occupante. Capsula ignota.

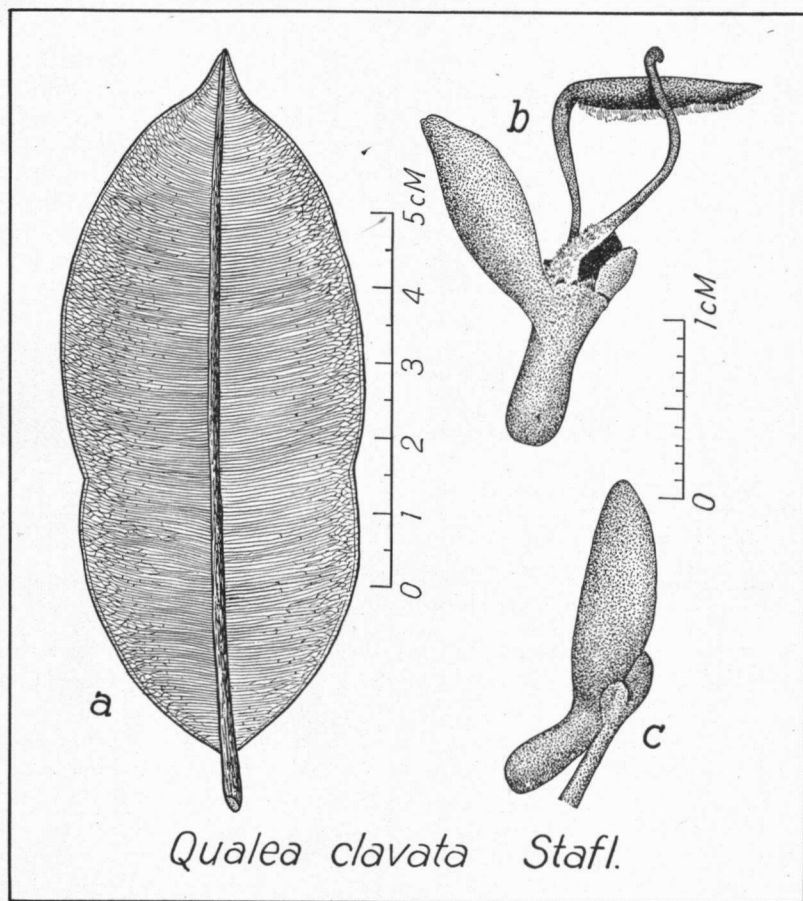


Fig. 5. *Qualea clavata* Staf. a. Leaf; b. flower (the petal taken away); c. flower-bud.

Holotype: *Ducke* RB 23793 in U. Isotypes in: G, K, S, US.

Distribution: Twice collected.

BRAZIL, Amazonas: Sao Paulo de Olivenca, *Ducke* RB 23793; —, — 1061.

Ecology: In woods outside the range of annual floods; fl. Oct.

Observation 1: Characterised by the rigid leaves, the large flowers with the short clavate spur and the indumentum of the style.

Observation 2: The type-specimen was referred to as *Qualea albiflora* by *Ducke* (1938 p. 37).

4. ***Qualea gardneriana*** Warm. *Flora Bras.* 13(2): 35. t. 5. 1875; *Benoist* 1915 p. 239, 241.

Large tree. Young branchlets, rachis, petioles, and lower side of

the midrib subpuberulous. Young branchlets subterete, the cortex exfoliating (small fragments). Stipular glands subprominent, elliptic or suborbicular, about 1 mm long, the callous margin greyish. Petioles 5–9 mm long. Leaf-blades coriaceous, ovate or ovate-elliptic, $6-7 \times 3\frac{1}{2}-4$ cm, the apex acuminate and mucronate, the base mostly rounded, in younger leaves also acute or obtuse. Midrib winged below. Lateral nerves subconspicuous, scarcely prominent on either side, 15–25 per cm. Veinlets numerous on the entire surface. Flowers in 1–3 flowered cincinni in the axils of the leaves and in terminal racemes, apparently in clusters because of the short pedicels and long spurs. Pedicels pubescent, 3–4 mm long. Flower-buds sub-cylindrical, 13–15 mm long, acute, the back rounded. Outside of the calyx densely — somewhat adpressed — pubescent with mixed longer and shorter hairs; the minor lobes subovate, subacute or obtuse, 2–3 mm long; the spur 4–6 mm long, cylindrical. Petal white painted with red. Anther barbate, obtuse, about 10 mm long. Staminodes linear, about 1 mm long. Ovary elongate-ovoid, like the lower half of the style densely fulvous-hirsute, the latter elongated and coiled. Capsule unknown.

Holotype: *Gardner* 2841 from Piauhu in W. Isotypes in: BM, F, G, GH, K, NY, P.

Distribution: Once collected.

BRAZIL, Piauhu: *Gardner* 2841 (The Paris and the second Vienna and BM specimens are labelled "Pernambuco", district of Rio Preto).

Ecology: Fl. Sept.

Observation: The Piauhu specimen in Vienna bears a label with WARMING's handwriting and agrees completely with his figure (l.c. t. 5).

5. ***Qualea wittrockii*** Malme, Ark. Bot. Stockholm 5(6): 6. 1905; Ducke 1922 p. 195; — 1938 p. 37. *Qualea arirambae* Ducke 1915 p. 47.

Large tree. Leaves and branchlets glabrous or nearly so; the cortex of the latter exfoliating. Stipular glands elliptic, subprominent, $1\frac{1}{2}-2$ mm long, the callous margin greyish-brownish. Petioles 3–7 mm long. Leaf-blades coriaceous, oblong-lanceolate or subelliptic-oblong, $8-17 \times 3-5$ cm, the apex gradually acute-acuminate, the base mostly distinctly cordate or rounded, sometimes subobtuse, often complicated; the midrib not winged; the lateral nerves very slender, not prominent, 5–10 major ones per cm and several minor ones in between each pair; veinlets numerous. Inflorescence a terminal panicle of up to 10 cm long racemes bearing 1–3 flowered cincinni, sometimes some racemes in the axils of the upper leaves. Pedicels and top of the rachis puberulous, the former 2–4 mm long. Flower-buds acute, up to 13 mm long. Calyx sericeous outside, the minor lobes triangular or ovate, acute, about 2–3 mm long, the spurred lobe provided with a dorsal rib, 12–15 mm long, the spur cylindrical, straight or recurved, up to 5 mm long. Petal white with pink nerves and basically orange central nerve, obovate-orbicular, up to $2\frac{1}{2}-3$ cm long and wide. Anther barbate, 8–10 mm long; the filament up to 7 mm long. Staminodes and rudimentary petals linear, about 1 mm long. Ovary ovoid-conical, like the

lower 2/3 of the style pilose; the latter about 14–18 mm long and often spirally coiled. Capsules about 3 × 1 cm, verruculose, apically acuminate.

Holotype: *Malme* II 2248 in S. Isotypes in: BM, F, G, US. Holotype of *Q. arirambae* Ducke: *Ducke* PG 14869 in PG, isotypes in: BM, G, K, P, RB, S, U, US.

Distribution: Throughout Brazilian Para and Amazonas, type-collection from Matto Grosso.

BRAZIL, Matto Grosso: Chapada, *Malme* II 2248. Para: Ariramba, *Ducke* RB 5730 = PG 14869; —, — PG 11425; —, — PG 8001; Bella Vista on Rio Tapajoz, *Ducke* PG 16491 = RB 8422; Porto de Moz, lower Xingu, *Ducke* PG 16666; Obidos, *Ducke* PG 15669; Montealegre, *Ducke* PG 16143. Amazonas: Borba, *Ducke* 992; Rio Negro between Camanaos and Sao Gabriel, *Ducke* RB 23487.

Ecology: Found in "cabeceiras": swampy forests of river sources. In Para also in the Igapó (swampy forests along rivers); fl. Sept.–Febr. In Matto Grosso fl. in dry season. Sec. *Malme* (l.c. p. 6) proterandric; often visited by colibris.

Vernacular names: Mandioqueira, Umiri-rana (Para).

Observation: Mentioned by *Ducke* (1905 p. 304) as *Q. aff. acuminata*.

6. ***Qualea retusa*** Spruce ex Warm. *Flora Bras.* 13(2): 34. *t.* 4 *fig.* 1. 1875; — 1889 p. 22; *Glaziou* 1905 p. 30; *Ducke* 1915 p. 46; — 1938 p. 37; *Benoist* 1915 p. 239, 240; *Hoehne* 1951 p. 257.

Tree of medium size. Young branchlets with subpilose exfoliating cortex (small fragments). Stipular glands elliptic, $\frac{1}{2}$ –1 mm long. Petioles subpilose, 1–5 mm long. Leaf-blades obovate-oblong or subelliptic, 3–5 × 2–3 cm; the apex rounded or obtuse, mostly distinctly retuse, mucronulate; the base obtuse or rounded; the surfaces somewhat shining, glabrous; the midrib somewhat hairy and narrowly winged below; lateral nerves about 10–20 per cm; veinlets few, mainly near the margin. Flowers fragrant, solitary or in pairs in the axils of the leaves. Pedicels 2–10 mm long. Bracts linear, 2–3 mm long. Flower-buds acuminate, provided with a weak dorsal ridge. Calyx sericeous outside, the minor lobes deltoid, acute, ciliate, the lateral ones about half as long as the about 2–3 mm long anterior ones; the spurred lobe 12–14 mm long, the spur subclavate or cylindrical, straight or recurved, 5–9 mm long. Petal white with a yellow midrib and a few vermilion spots on each side, ovate-suborbicular, up to 4 × 3 cm. Anther barbate, about 6–8 mm long, the filament up to 10 mm long. Staminodes about 1 mm long. Ovary and lower third of the style whitish-yellowish lanuginose, the latter often coiled. Capsules about 2 cm long, the exocarp — in age — releasing from the endocarp, the valves lanceolate-elliptic, apically acute or acuminate. Seeds 10–12 × 3–4 mm, the winged half included.

Holotype: *Spruce* 1838 in M. Isotypes in: BM, G, GH, K, OXF, P, U, W. Cotypes: *Spruce* 1290 (K, P) and *Riedel* s.n. along Rio Negro (OXF, P). See Obs. 1.

Distribution: Mainly in the eastern parts of Brazilian Amazonas.

BRAZIL, Amazonas: Manaos, *Spruce* 1838; —, — 1290; —, — 1132; —, s.n.; —, *Riedel* s.n.; —, *Ducke* PG 11546 = RB 14060; —, — 1277; —, *Ule* 8883; —, *herb. Schwacke* III 280; —, — III 487; Rio Branco, Caracarahy, *Kuhlmann* 181 = RB 2926; Rio Negro, Preto Campinha, *Froes* 22758, 22759; Rio Madeira, Porto velho, *Ducke* 221 = RB 34660; —, — 227; Maués, *J.M. Pires* 55; Manuas, *Froes* 21616. Para: Lac de Faro, *Ducke* PG 6922. Minas Geraes: Campos de Inficionado, *Glaziou* 13810.

Ecology: On sandy, often marshy, terra firma, also along rivers in forests outside the reach of the seasonal floods. Flowering reports from nearly each month but mainly from April till June (rainy season).

Vernacular names: Umiry-rana (false Umiry or Umiri: *Humiria floribunda* Mart.).

Observation 1: According to manuscript notes in the Copenhagen herbarium Warming used Munich specimens for his analysis and it is highly probable that the Munich specimen of Spruce 1838 is the holotype.

Observation 2: For *Q. retusa* var. *coriacea* Ducke see *Q. obtusata* (no. 16).

7. ***Qualea albiflora*** Warm. Flora Bras. 13(2): 36. 1875; Pulle 1906 p. 250; Benoist 1915 p. 241; — 1931 p. 163; Pfeiffer 1926 p. 353; Ducke 1930 p. 145; — 1938 p. 37; Smith 1939 p. 188; Amshoff 1948 p. 9, 17; Mennega 1948 p. 44 (anatomy); Stafleu 1948(2) p. 644; — 1951 p. 191; Macbride 1950 p. 876. *Qualea glaberrima* Ducke 1915 p. 46 t. 19F; — 1922 p. 195.

Large or medium-sized tree. Young branchlets and leaves subpuberulous, the older ones glabrous. Branchlets brownish-purplish in youth, greyish in age, the cortex not exfoliating. Stipular glands scarcely prominent, about 1 mm long. Petioles 4–8 mm long. Leaf-blades subcoriaceous, thin, obovate or subelliptic, 4–8 × 2–3½ cm; the apex obtuse or subrotundate or shortly obtuse-acuminate, the base acute or subobtusate; more than 20 lateral nerves per cm; veinlets few. Flowers fragrant, solitary or in 2–3 flowered cincinni, the latter axillary or arranged in racemes, the rachis, the pedicels and the outside of the calyx subpuberulous or nearly glabrous, the pedicels 6–10 mm long. Flower-buds acute or acuminate, 11–14 × 3–4 mm. Minor calyx-lobes acute, ciliate, 1–4 mm long; the spurred lobe 12–16 × 6–8 mm, ciliate; the spur 5–7 × 2–3 mm, slightly recurved or nearly straight, clavate. Petal white with an orange-yellow base, suborbicular, 2–4 cm long and wide, apically truncate or emarginate, glabrous except the subpilose base. Anther barbate, acute-acuminate, about 6–8 mm long; the filament up to 10 mm long. Staminodes and rudimentary petals often present, ½–1 mm long. Ovary sericeous. Style glabrous except the basal 1–2 mm, spirally coiled, 15–20 mm long. Capsules ellipsoid, blackish, rugulose, nitid, subacuminate, about 3 cm long.

Lectotype: *Kappler* 2037 in W. Isotypes in: F, GOET, L, P, U, Holotype of *Q. glaberrima* Ducke: *Ducke* PG 15491 in PG; isotypes: BM, F, G, P, US. See also obs. 1.

Distribution: Guiana, Brazilian Para and Amazonas.

BRAZIL, Para: Belem, *Ducke* PG 15491; —, — PG 17027; —, — PG 15550; Gurapá, *Ducke* PG 16559 = RB 8461; *N.T. da Silva* 88. Amazonas: Manès, *Ducke* RB 23486.

FRENCH GUIANA: Maroni, *Mélinon* 361; —, — 390.

BRITISH GUIANA: Essequibo R., *A. C. Smith* 2709.

SURINAME: Numerous collections, see Stafleu 1951 p. 192; e.g.: Upper Marowijne R. (Maroni), *Kappler* ed. *Hohenacker* 2037.

Ecology: In "terra firma" forests; fl. Sept.–Dec.

Vernacular Names: BRAZIL, Para: Mandioqueira. SURINAME: Kwarie, Gronfoloe; full details see Stafleu 1951 p. 192.

Observation 1: The *Kappler* 2037 specimen from Vienna is the lectotype: Warming mentions the number without reference to a herbarium.

Observation 2: The inner wall of the calyx is often provided with smallish, irregularly placed scales.

8. *Qualea nitida* Stapf. nov. spec. (fig. 6).

Subgenus *Qualea*. Arbor. Ramuli juveniles glabri, subteretes, haud decorticantes; gemmis subpuberulis, acutis, circa 1 mm longis. Glandulae ellipticae, circa $\frac{1}{2}$ mm longae, vix prominentes. Petiolus 2-4 mm longus. Lamina glabra, tenuiter subcoriacea, nitida, lanceolato-

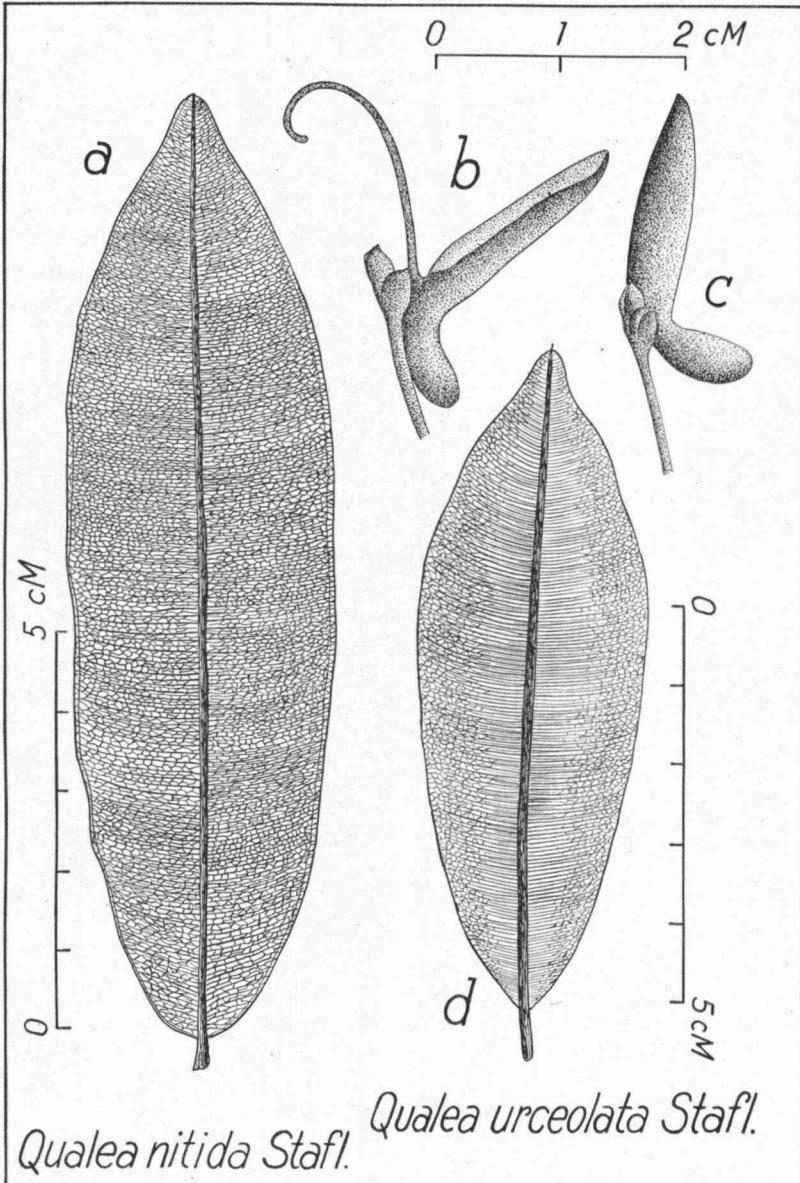


Fig. 6. a. *Qualea nitida* Stapf., leaf. b-d. *Qualea urceolata* Stapf. b. Calyx and style; c. flower-bud; d. leaf.

oblonga, 10–14 cm longa et 3–4 cm lata, in siccis supra virescens, infra fusca; costa bialata, alis ciliatis; nervis lateralibus in utraque pagina subprominentibus, ultra 10 per cm; venis paucis prope marginem; costis marginalibus duabus tenuibus. Flores et fructus ignoti.

Holotype: *Tate* 915 in US (ster).

Distribution: Once collected.

VENEZUELA, Aguita, slopes of Mount Duida, *Tate* 915.

Ecology: 1300 m.; fl. Jan.

Observation: The section to which the species belongs cannot be established with any certainty as long as the flowers remain unknown.

9. *Qualea rigida* Staffl. nov. spec. (*fig.* 7).

Subgenus *Qualea*, sectio *Trichanthera* Staffl. Arbor. Ramuli glabri, cortice nigro in squamulas minutas soluto. Glandulae subellipticae, circa 2 mm longae, vix prominentes. Petiolus crassus, 3–7 mm longus, basi incrassatus. Lamina rigide coriacea, glabra, lanceolata vel lanceolato-elliptica, 8–10 cm longa et $2\frac{3}{4}$ –4 cm lata, supra subnitida, subtus opaca, apice mucronata, obtusa vel acuta, raro rotundata et subretusa, basi cordata vel subrotundata; nervis lateralibus ultra 10 per cm, leviter curvatis; venis paucis prope marginem; costis marginalibus duabus, tenuibus. Inflorescentia thyrsioidea, terminalis, densiflora, in typo circa 7 cm longa; cincinnis 2–3 floris; pedicellis, bracteis et calyce extra ferrugineo-pubescentibus; bracteis triangularibus, acutis, circa 2 mm longis; pedicellis 4–10 mm longis. Flores fragrantis. Alabastra elongato-conica, circa 20 mm longa, apice acuta, recurvata. Calycis lacinae minores triangulares, acutae, 3–5 mm longae, lacinia major suboblonga. Calcar cylindricum, 3–5 mm longum et 1–2 mm latum. Petalum album, versus basim lineis luteis et rubris notatum, apice subrotundatum. Petalum secundum rudimentarium ellipticum, acuminatum, circa 2–3 mm longum. Anthera barbata, acuta, circa 10 mm longa; filamentum circa 13–15 mm longum. Staminodia linearia, circa 1 mm longa. Indumentum styli partem 1/5–1/3 inferiorem occupans. Capsula ignota.

Holotype: *Cardona* 1762 in US

Distribution: Venezuelan-Guianan Mountains.

VENEZUELA, Guayana: Orillas del Caroni, *Cardona* 1762.

BRITISH GUIANA, Upper Cujang R., *Ri. Schomburgk* 1537; Annaway Valley, *Ro. Schomburgk* 19.

Ecology: Type specimen fl. Oct., 720 m.; *Schomburgk* specimen from savannas.

Observation 1: The specimen *Schomburgk* 1537 was preserved in Berlin; the present author saw a photograph. It is possible that this specimen was the type of *Qualea muelleriana* Schomburgk (nomen nudum) but the label does not exactly correspond with the details given by Schomburgk (1848 p. 1099). Therefore the name *Qualea muelleriana* cannot be maintained: Schomburgk neither described nor typified such a taxon.

Observation 2: The nearly allied *Q. nitida* has much thinner leaves which are acuminate and provided with a winged midrib; its stipular glands are much smaller; *Q. esmeraldae* differs from *Q. rigida* by the apically and basically rounded elliptic leaves which are twice (not thrice) as long as wide, by the obtuse straight flowerbuds and the smaller stipular glands.

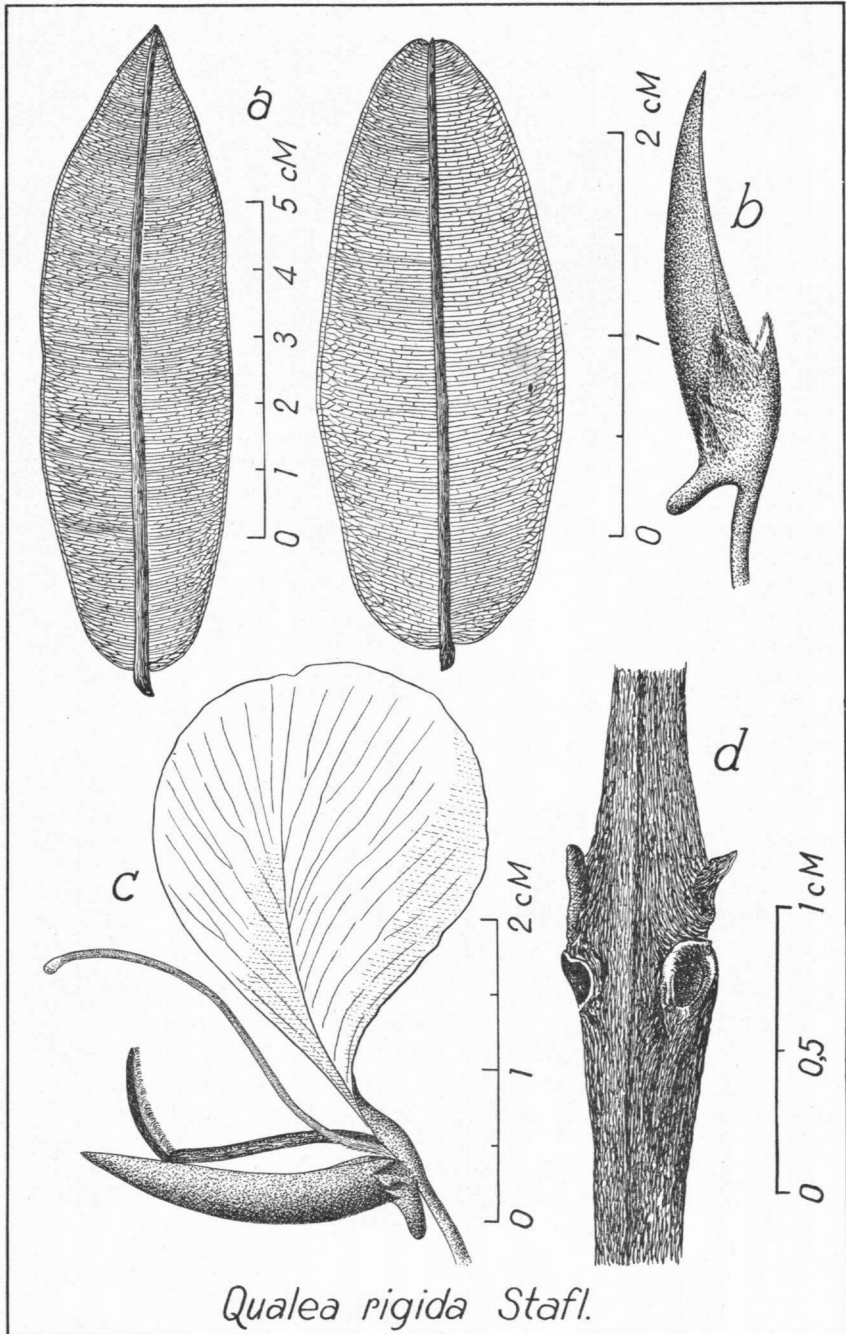


Fig. 7. *Qualea rigida* Stafl. a. Leaves; b. flower-bud; c. flower; d. stipular glands.

10. **Qualea verruculosa** Staf. nov. spec. (fig. 8).

Subgenus *Qualea*, sectio *Trichanthera* Staf. Arbor parva. Ramuli glabri haud decorticantes. Glandulae ellipticae, circa 1 mm longae, haud prominentes. Petiolus 5–9 mm longus, basi incrassatus. Lamina subrigide coriacea, glabra, oblonga, subelliptica vel subovata, 5–6 cm longa et 2½–4 cm lata, apice rotundata vel rotundato-obtusa, saepe emarginata vel retusa, basi obtusa vel subrotundata; costa subtus bialata; nervis lateralibus in utraque pagina subprominentibus, ultra 10 per cm; venis numerosis. Cincinni 1–2 flori in racemos axillares et terminales paucifloros dispositi. Pedicelli subpuberuli, 4–8 mm longi. Alabastra fulvo-subpuberula, cylindrica, obtusa, circa 17 mm longa et 3 mm lata. Calycis lacinae minores ovatae, acutae, ciliatae, laterales circa 2 mm, anteriores circa 3–4 mm longae; lacinia major oblonga, circa 17 mm longa. Calcar subclavatum basi constrictum, 4–6 mm longum. Petalum glabrum sed margine ciliatum, 2½–3 cm longum et latum; colore ignoto. Petala rudimentaria 1–2, linearia, circa 1–2 mm longa. Anthera barbata, apice acuta, basi obtusa, circa 10 mm longa; filamentum 10–14 mm longum. Staminodia 1–2, circa 1 mm longa. Ovarium ovoideum. Stylus circa 20 mm longus post anthesim curvatus, indumento styli partem 1/8–1/10 inferiorem occupante. Capsula (immatura) ellipsoideo-obovoidea, valvis nigris minute verruculosis.

Holotype: *E. G. Holt* & *E. R. Blake* 717 in US.

Distribution: Upper Amazonia.

VENEZUELA, Amazonas: Cerro Yapacana, upper Rio Orinoco, *E. G. Holt* & *E. R. Blake* 717.

BRAZIL, Amazonas: Rio Curicuriary, affl. Rio Negro, *Ducke* RB 34668.

Ecology: Type specimen fl. et fr. April; *Ducke* specimen fl. Nov.

Observation: This species differs from *Q. obtusata* by the shape of the leaves, the size of the flower-bud and the length of the anther. *Q. esmeraldae* has larger leaves, inflorescence and flowers, longer petioles and an entirely glabrous petal.

11. **Qualea esmeraldae** Standl. Bull. Torr. Bot. Club 58: 380. 1931.

Shrub or small tree. Branchlets and leaves glabrous. Cortex somewhat exfoliating. Stipular glands subprominent, blackish, about 1 mm long. Petioles 4–14 mm long, Leaf-blades oblong or elliptic-oblong, 7–10 × 3–5½ cm, reddish-brown below; the apex rounded and often retuse, sometimes subobtuse or mucronate; the base rounded; the nervation subprominent on both sides; 10–20 lateral nerves per cm; veinlets numerous. Inflorescence a terminal raceme composed of 1–2 flowered cincinni. Rachis brownish puberulous. Pedicels subpilose, firm, 4–7 mm long. Flower-buds brownish-puberulous, straight, subacute, 16–22 mm long. Minor calyx-lobes acute, ciliate, the lateral ones about 2 mm long, the anterior ones about 4 mm long; the spurred lobe elliptic, up to 22 mm long, the back provided with a rib; the spur stretched along the pedicel, cylindrical, 3–5 mm long, not or only slightly constricted near the base. Petal pink or turning white, suborbicular or subelliptic, about 3–3½ cm long. Rudimentary petals

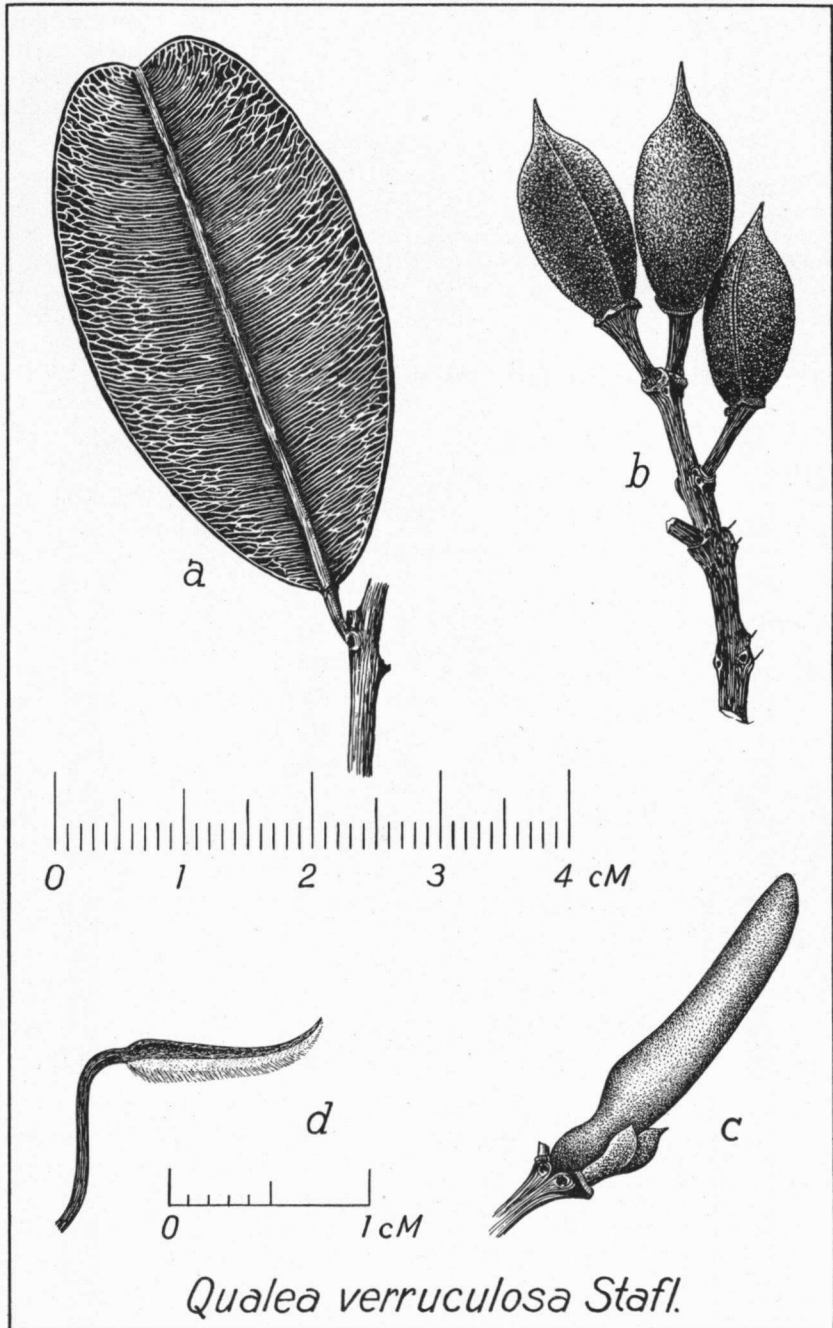


Fig. 8. *Qualea verruculosa* Staf. a. Leaf; b. fruits; c. flower-bud; d. stamen.

linear, about 1–2 mm long. Anther barbate, about 10 mm long, the filament in anthesis up to 2 cm long. Staminodes flask-shaped, about 1 mm long. Ovary pyramidal, ferruginous-hirsute; the style up to $2\frac{1}{2}$ cm long, often coiled, the basal 1–3 mm hirsute. Capsules ellipsoid, glabrous, verruculose, acute acuminate on account of the persistent base of the style.

Holotype: *Tate* 194 in NY.

Distribution: Southern Venezuela.

VENEZUELA, Amazonas: Esmeralda, *Tate* 194; —, *Steyermark* 57828; Rio Orinoco, San Antonio, *Ll. Williams* 15063.

Ecology: In savannas, about 100 m.; fl. Aug.–Oct.; fr. Oct.–Apr.

Observation: See observation under no. 10: *Q. verruculosa*.

12. ***Qualea cassiquiarensis*** Spruce ex Warm. *Flora Bras.* **13**(2): 34. 1875; *Ducke* 1933 p. 43.

Large or medium-sized tree. Branchlets and leaves glabrous. Cortex blackish, not exfoliating. Stipular glands not prominent, $\frac{1}{2}$ –1 mm long. Petioles firm, 1– $2\frac{1}{2}$ cm long and 2–3 mm wide. Leaf-blades rigidly coriaceous, oblanceolate, subelliptic or suboblong, 10–17 × 4–6 cm; the apex obtuse and mucronulate; the base obtuse; the midrib narrowly winged below, the wings ciliate; 15–25 lateral nerves per cm, subprominent on both sides; veinlets mainly near the margin. Inflorescence a terminal panicle composed of 1–2 flowered cincinni, puberulous, about 10 cm long. Pedicels firm, 5–9 mm long. Flower-buds brownish-puberulous, conical, the back rounded, the apex obtuse, about 20 mm long and 5–6 mm wide near the base. Flowers fragrant. Minor calyx-lobes subequal, 3–6 mm long. Spur stretched along the pedicel, wide, almost bursiform, not or scarcely constricted near the base and situated almost in the produced part of the back of the lobe, 3–4 × 2–4 mm. Petal white with a yellow spot, obcordate, up to 4 cm long. Rudimentary petals not present. Anther barbate, about 15 mm long; the filament glabrous, up to 10 mm long. Staminodes absent(?). Ovary ovoid, fulvous-lanuginose (the hairs about 2 mm long), more or less abruptly merging into the style; the latter glabrous except the basal 1 mm, often elongated and coiled, about $2\frac{1}{2}$ cm long. Capsules unknown.

Holotype: *Spruce* 3298 in C. Isotypes in: BM, BR, F, G, GH, GOET, K, NY, OXF, P, W; B (vide photograph in F).

Distribution: Brazilian and Venezuelan Amazonas.

BRAZIL, Amazonas: Cassiquiare, Vasiva and Pacimoni R., *Spruce* 3289; *Manaos, Ducke* RB 23489; —, — 61; —, — 46.

VENEZUELA, Amazonas: San Carlos, Rio Negro, *Ll. Williams* 14636.

Ecology: In lowland swamp-forests, not reached by seasonal floods (“Igapó”). Flowering reports from March, June, Oct., Nov.

Observation 1: *Q. cassiquiarensis* var. *belemnensis* *Ducke* (1915 p. 47, 1922 p. 195) is raised to the rank of species: no. 13 *Q. belemnensis*.

Observation 2: The note by *Ducke* (1938 p. 37) refers to *Q. cassiquiarensis* as well as to *Q. belemnensis* and *Q. urceolata*.

Observation 3: The species is closely allied to no. 13 *Q. belemnensis* and to no. 15 *Q. urceolata*; see observations under those species.

13. **Qualea belemnensis** Staffl. nov. spec. (fig. 9).

Qualea cassiquiarensis Spruce ex Warm. var. *belemnensis* Ducke 1915 p. 47; — 1922 p. 195.

Arbor magna. Ramuli juveniles, petioli, gemmae et costa subtus fusco-puberuli. Ramuli juveniles quadranguli et ad apices internodiorum valde compressi, demum subteretes, glabri, haud decorticantes, gemmis parvis, perulis duabus exteriores subcarnosis, glabris. Glandulae $1\frac{1}{2}$ – $2\frac{1}{2}$ mm longae, margine crasso discolore. Petiolus 3–8 mm longus. Lamina coriacea, elliptico-obovata, 10–13 cm longa et $4\frac{1}{2}$ –6 mm lata, apice rotundata et retusa, basi obtusa; costa subtus bialata; nervis lateralibus ultra 15 per cm; venis numerosis. Inflorescentia ferrugineo-pubescentia, thyrsoida, terminalis et axillaris, ad 15 cm longa; cincinnis circa 2 floris; pedicellis 6–10 mm longis. Alabastra ferrugineo-pubescentia, elongato-conica, obtusa, circa 16–18 mm longa et 4–6 mm lata. Calycis laciniae minores ovatae, subacutae vel obtusae, 3–4 mm longae; lacinia major elliptica, rotundata, circa 10 mm lata. Calcar clavatum, 4–7 mm longum et 3–4 mm latum, apice rotundatum, basi constrictum, sub angulo obtuso (120–150°) ex alabastro emergens. Petalum glabrum, album macula lutea, subellipticum, carinatum, apice rotundatum, circa 3–4 cm longum. Petala rudimentaria linearia, 1– $1\frac{1}{2}$ mm longa. Anthera barbata, subacuta, circa 13 mm longa; filamentum circa 15 mm longum. Staminodia linearia, ad 1 mm longa. Ovarium ovoideo-conicum. Stylus post anthesim ad $2\frac{1}{2}$ cm longus, basi pilosus. Capsula 2– $2\frac{1}{2}$ cm longa, acuminata, verruculosa.

Holotype: Ducke PG 9610 in US. Isotypes in: BM, G, P.

Distribution: Brazilian Para.

BRAZIL, Para: Belem, Ducke PG 9610; —, — PG 15509; Gurupá, Ducke PG 15975 = RB 8455.

Ecology: In humid forests, often in marshy places not reached by seasonal floods; fl. Sept.–Jan.: in the middle of the dry season.

Observation: The species differs from *Q. cassiquiarensis* by the clavate spur, the wider leaves, the shorter petioles, the hirsute style which merges gradually into the ovary, etc. It differs from *Q. urceolata* for instance by the rigid leaves, the densely pubescent and obtuse flower-buds.

14. **Qualea ferruginea** Steyermark, Fieldiana Botany 28: 295. 1952.

Large or medium-sized tree. Young parts ferruginous-pubescent; branchlets and leaves further glabrous. Stipular glands about 1 mm long. Petioles 3–9 mm long. Leaf-blades coriaceous, elliptic-subobovate or elliptic, $4-9 \times 2-4\frac{1}{2}$ cm, deepgreen and shining above, yellow or pale green below; the apex mucronulate, rounded or obtuse; the base cuneate or obtuse; the midrib winged below, the wings pubescent; more than 25 lateral nerves per cm; veinlets numerous. Inflorescences terminal, the basal cincinni in the axils of the upper leaves; the cincinni 1–2 flowered; the pedicels densely ferruginous-pubescent, 4–8 mm long. Flowers fragrant. Calyx ferruginous pubescent, the minor lobes subequal, acute, 3–4 mm long; the spurred lobe about 15 mm long, suboblong, obtuse or rounded; the spur cylindrical, $3-5 \times 1-2$

mm. Petal glabrous; white with orange centre bordered on either side by salmon orange or brick streaks, suborbicular, diameter about 25 mm; rudimentary petals linear, 1-2½ mm long. Anther barbate, 5-6½ mm long; the filament up to 11 mm long. Ovary and lower 2/3

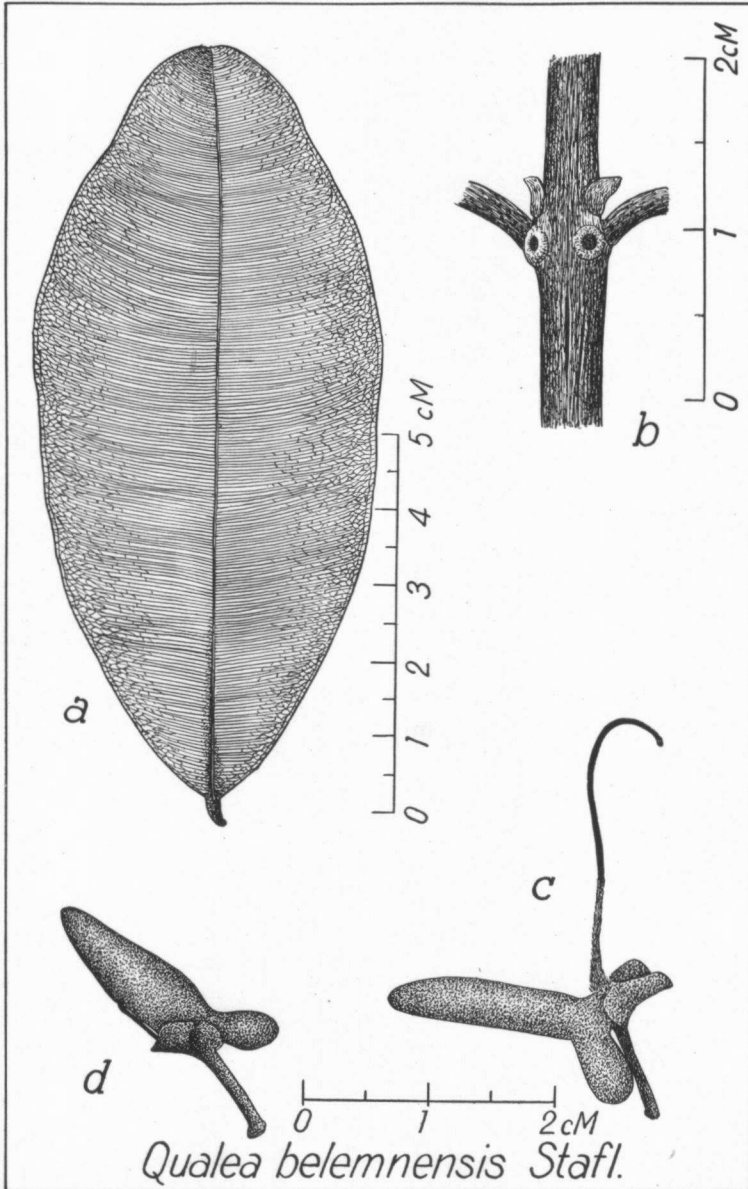


Fig. 9. *Qualea belemnensis* Stafl. a. Leaf b. stipular glands; c. calyx and style; d. flower-bud.

of the style densely ferruginous-hirtous, the latter coiled, $1\frac{1}{2}$ –2 cm long. Capsules about 3 cm long, verruculose, ellipsoid, the apex acuminate owing to the persistent style-base; the base obtuse.

Holotype: *Steyermark* 60914 in F.

Distribution: Venezuela, Bolivar and adjacent British Guiana.

VENEZUELA, Bolivar: St. Teresita de Kavanayén, *Steyermark* 60914, 60438; Ptari-tepuí, *Steyermark* 60028; between Ptari-tepuí and Sororopan-tepuí, *Steyermark* 60291; Kavanayén, *Lasser* 1759.

BRITISH GUIANA: Upper Mazaruni R., *Pinkus* 240.

Ecology: In forests between 1000 and 1700 m; often along ravines. Fl. Nov.–Dec. Fr. May.

Vernacular names: VENEZUELA, Bolivar: Amu-rieu-wai-yek, keu-pau-rik-orai-yek, minchorai-yek, copai-yek.

15. ***Qualea urceolata*** Staf. nov. spec. (*fig. 6*).

Subgenus *Qualea*, sectio *Trichanthera* Staf. Arbor magna. Ramuli subteretes, cortice in squamulas parvas fisso. Glandulae ellipticae, circa 1 mm longae, subprominentes. Petiolus 6–10 mm longus. Lamina subcoriacea, glabra, lanceolato-oblonga vel sub lanceolato-subelliptica, 8–11 cm longa et $3\text{--}4\frac{1}{2}$ cm lata, apice mucronulata et breviter obtuso-acuminata, basi obtusa vel subacuta; nervis lateralibus ultra 10 per cm; venis paucis prope marginem. Inflorescentia thyrsoides, racemis elongatis paucifloris usque ad 25 cm longis; cincinnis 1–2 floris; rhachi quadrangulari subpuberuli; bracteis subovatis, acutis, 1–2 mm longis; pedicellis usque ad 12 mm longis, primum subpuberulis. Alabastra elongato-conica, 18–22 mm longa et 4–5 mm lata, apice oblique acuto-acuminata. Calycis laciniae subpuberulae, minores obtusae vel subacutae, laterales circa 2, anteriores circa 3–4 mm longae; lacinia major oblonga. Calcar clavatum, inflatum (*urceolatum*), 7–10 mm longum et 4–5 mm latum, basi constrictum, apice rotundatum, sub angulo obtuso ($120\text{--}150^\circ$) ex alabastro emergens. Petalum glabrum, album macula lutea, ellipticum, apice rotundatum, $4\text{--}4\frac{1}{2}$ cm longum et $3\text{--}3\frac{1}{2}$ cm latum. Anthera barbata, acuta, circa 12 mm longa; filamentum ad 15 mm longum. Staminodia linearia, 1–2 mm longa. Ovarium ovoideum. Stylus ad $2\frac{1}{2}$ –3 cm longus, indumento partem $1/3\text{--}1/2$ inferiorem occupante. Capsula ignota.

Holotype: *Ducke* RB 17742 in U. Isotypes in: K, S.

Distribution: Once collected.

BRAZIL, Para: Belem, *Ducke* RB 17742.

Ecology: In humid forests not reached by seasonal floods; fl. Dec.

Observation 1: Named after the urceolar spur.

Observation 2: Distributed by *Ducke* under "*Q. cassiquiarensis*". It differs from this species by the slender, thin, acute-acuminate leaves, the slender flower-bud, the entirely different spur, etc. It differs from *Q. belemensis* by the shape and texture of the leaves, the indumentum of the calyx and the acute-acuminate flower-bud.

16. ***Qualea obtusata*** Briq. Annu. cons. Jard. Bot. Genève 20: 383. 1919. *Qualea retusa* Spruce ex Warm. var. *coriacea* *Ducke* 1938 p. 37.

Small or medium-sized tree. Branchlets and leaves glabrous, the cortex of the former exfoliating in age. Stipular glands subprominent,

about 1 mm long. Petioles about 5 mm long. Leaf-blades generally obovate, $6-7 \times 2\frac{1}{2}-3\frac{1}{2}$ cm, the apex rounded and often retuse or emarginate, the base cuneate, gradually narrowing towards the petiole; the midrib winged below, the wings ciliate; 10-20 lateral nerves per cm, subprominent; veins numerous on the entire surface. Inflorescence terminal, few-flowered, consisting of 2-4 pairs of opposite flowers (1-flowered cincinni); the pedicels nearly glabrous, 5-7 mm long. Flower-buds about 20 mm long. Calyx subpuberulous or nearly glabrous, the smaller lobes ciliate, obtuse or rounded, the lateral ones about 2-3, the anterior ones about 4 mm long; the spurred lobe about 20 mm long; the spur cylindrical or subclavate, rounded, 5-7 mm long. Petal white with a yellow spot, rounded, about $3-3\frac{1}{2}$ cm long and 3 cm wide. Anther barbate, acute, about 14 mm long; the filament firm, about 15 mm long. Staminodes — if present — linear, about 1 mm long. Ovary fulvous sericeous. Style about $2\frac{1}{2}$ cm long, glabrous except the lower 2-6 mm. Capsules about 3×1 cm, acute-acuminate (owing to the persistent base of the style); the surface black, minutely rugulose.

Holotype: *Spruce* 3341 in G. Isotypes in: BM, BR, C, F, GH, GOET, K, NY, OXF, P, W. Holotype of *Q. retusa* var. *coriacea* Ducke: *Ducke* RB 34669 in RB; isotypes: G, K, P, S, U, US.

Distribution: Amazonia.

BRAZIL, Amazonas: "Ad flumina Cassiquiari, Vasiva et Pacimoni", *Spruce* 3341; Rio Negro, Igarapè Macacuny, *Ducke* RB 34669.

VENEZUELA, Amazonas: Alto Cassiquiare, *Ll. Williams* 15728.

Ecology: In riverine forests inundated by seasonal floods; fl. Sept.; fr. Jan. and May (one report each).

Observation 1: Mentioned by Warming 1875 p. 55 under "*Qualea e serie Calophylloidearum*".

Observation 2: Briquet could not put the species in its proper place for lack of flowers but it is now clear that it belongs to the section *Trichanthera* in the neighbourhood of *Q. ferruginea* and *Q. discolor*. It is characterized by the cuneate leaf-base, the concolorous leaves, the indumentum of calyx and ovary and the minutely rugulose surface of the fruit.

Section B. *Qualea*

Series I. *Calophylloideae* Warm. 1875 p. 30 p.p.

Arbores vel frutices. Folia glabra vel fere glabra, basi haud obliqua; nervis lateralibus numerosissimis (5-50 per cm), creberrimis, rectis, parallelis, sub angulo circo 80' a media ortis, nervo limbali margini parallelo et proximo ($\frac{1}{2}$ -1 mm) junctis. Alabastra subovoidea vel late conica. Calycis lacinia quarta ceteras haud adpressas aequans vel paullo superans (ad $2\frac{1}{2}$ ×). Petala rudimentaria et (vel) staminodia saepe adsunt, glabra, parva. Anthera dorsifixta, glabra vel pilosa sed haud unilateraliter barbata, filamenta saepe brevior. Ovarium valde abrupte in stylum transiens, stigmatum capitato vel subcapitato.

Type-species: *Qualea rosea* Aubl. (type-species of genus).

Distribution: Mainly Hylaeian species. The area is disjunct because of the presence of three species in Rio de Janeiro and Minas Geraes.

Key to the species

- 1a. Pedicels $1\frac{1}{2}$ –2 times longer than the flower-buds 2
 b. Pedicels about as long as or shorter than the flower-buds 3
- 2a. Minor calyx-lobes subequal, 10–13 mm long, covering the spur; pedicels firm 17. **Q. themistoclesii** Ducke
 b. Minor calyx-lobes unequal, the lateral ones 5–7 mm long; the spur in anthesis exerted; the pedicels very slender, less than 1 mm wide 18. **Q. pulcherrima** Spruce ex Warm.
- 3a. Flower-buds less than 11 mm long 4
 b. Flower-buds 12–30 mm long. 8
- 4a. More than 10 lateral nerves per cm. Spur shorter than the bud 5
 b. 3–8 major lateral nerves per cm. Spur about as long as the bud see section C. *Costatifolium* p. 192.
- 5a. Minor calyx-lobes subequal. No (rarely only small) extrafloral nectaries near the stipules or the stipular glands 6
 b. Minor calyx-lobes unequal. Conical, 2–3 mm high, extrafloral nectaries near the stipules. Flower-bud 9–13 mm long. 19. **Q. gestasiana** St. Hil.
- 6a. Anther about 2 mm long. Spur exerted in anthesis 7
 b. Anther about 4–5 mm long. Spur hidden by the outer calyx-lobes, even in anthesis. 20. **Q. homosepala** Ducke
- 7a. Stipular ridge present. Leaves long acuminate ($1-1\frac{1}{2}$ cm). Flower-buds 8–10 mm long. Filament pilose. 21. **Q. sprucei** Warm.
 b. Stipular ridge absent. Leaves acute or shortly acuminate (less than 5 mm). Flower-buds 5–7 mm long. Filament glabrous 22. **Q. coerulea** Aubl.
- 8a. Ovary gradually merging into the style 9
 b. Ovary more or less abruptly merging into the style 11
- 9a. Stipules of opposite leaves not connected by a distinct elevated stipular ridge 10
 b. Stipular ridge present. 23. **Q. impexa** Macbr.
- 10a. Leaves long acute-acuminate. Spur exerted in anthesis 24. **Q. acuminata** Spruce ex Warm.
 b. Leaves obtuse or somewhat rounded. Spur — in anthesis — hidden by the calyx-lobes. 25. **Q. elegans** Taub. ex Benoist
- 11a. Stipules of opposite leaves connected by a distinct straight or V-shaped stipular ridge 12
 b. Stipular ridge absent 18
- 12a. Spur present 13
 b. Fourth calyx-lobe bag-shaped at the base, no distinct spur 26. **Q. calantha** Pilger
- 13a. Stipular ridge V-shaped 14
 b. Stipular ridge straight 15
- 14a. Petal blue, striped with yellow. Apex of the leaves obtuse or shortly obtuse-acuminate 27. **Q. ingens** Warm. var. **duckei** Staff.

- b. Petal white with red and yellow. Apex of the leaves long-acuminate 28. **Q. amoena** Ducke
 15a. Leaf-bases rounded or obtuse 16
 b. Leaf-bases cordate 27. **Q. ingens** Warm. var. **ingens**
 16a. Cortex of the branchlets not exfoliating. Petal mainly pink 17
 b. Cortex of the branchlets exfoliating. Petal mainly yellow
 29. **Q. rosea** Aubl.
 17a. Anther glabrous or nearly so, apically obtuse, about 8 mm long 30. **Q. lineata** Staffl.
 b. Anther pilose, apically acute, 4–5 mm long
 31. **Q. polychroma** Staffl.
 18a. Anther and filament both distinctly pilose 19
 b. Anther, filament or both glabrous or nearly so 20
 19a. Pedicels 7–14 mm long. Spur exerted in anthesis
 32. **Q. macropetala** Warm.
 b. Pedicels 4–5 mm long. Spur covered by the calyx-lobes during anthesis 33. **Q. brevipedicellata** Staffl.
 20a. Main colour of the petal white, mostly with a yellow base and painted with red or orange on either side. 21
 b. Main colour of the petal blue, pink or yellow 29
 21a. Leaf-blades 3–5 cm long 22
 b. Leaf-blades 7–15 cm long 23
 22a. Extrafloral nectaries in the axils of the stipules, 2–3 mm high. Anther glabrous. . . 19. **Q. gestasiana** St. Hil.
 b. No axillary extrafloral nectaries; the base of the stipules subglandular. Anther pilose . . 34. **Q. tricolor** Benoist
 23a. Apex of the anther two-lobed or emarginate 24
 b. Apex of the anther acuminate, acute or obtuse 25
 24a. Leaf-blades distinctly puberulous . . 35. **Q. gracilior** Pilger
 b. Leaf-blades glabrous 36. **Q. paraensis** Ducke
 25a. Anther glabrous or with a few hairs 26
 b. Anther pilose on the back . 37. **Q. calophylla** Pittier
 26a. Leaves apically acute, obtuse or shortly acuminate 27
 b. Leaves apically long-acuminate (about 1 cm)
 28. **Q. amoena** Ducke
 27a. Leaves wider than 3 cm, 2–3 times longer than wide 28
 b. Leaves $1\frac{1}{2}$ – $2\frac{1}{2}$ cm wide, 3–4 times longer than wide
 38. **Q. magna** Kuhlmann
 28a. Spur not hidden by the calyx-lobes in anthesis. Flower-bud 17–25 mm long . . 39. **Q. schomburgkiana** Warm.
 b. Spur hidden by the second calyx-lobe in anthesis. Flower-bud 14–18 mm long 40. **Q. tuberculata** Staffl.
 29a. Petal blue with a yellow base. Cortex of the branchlets not exfoliating 30
 b. Petal mainly pinkish. Cortex of the branchlets exfoliating
 41. **Q. decorticans** Ducke
 30a. Leaves lanceolate or suboblong, $2\frac{1}{2}$ – $3\frac{1}{2}$ cm wide. Anther glabrous 42. **Q. suprema** Ducke
 b. Leaves elliptic-oblong, $4\frac{1}{2}$ –6 cm wide. Anther pilose
 43. **Q. cyanea** Ducke

17. **Qualea themistoclesii** Ducke, Arch. Inst. Biol. Veg. 4(1): 38. 1938.

Tree of medium size. Branchlets and leaves glabrous, the cortex of the former not exfoliating. Stipular glands subprominent, diameter about 1 mm, sometimes two per stipule. Petioles firm, 8–13 mm long. Leaf-blades rigidly coriaceous, yellow-greenish above, elliptic or elliptic-oblong, 8–12 × 4–6 cm; the apex shortly obtuse-acuminate or -apiculate, sometimes slightly folded; the base rounded or rounded-obtuse; the midrib winged below; the lateral nerves inconspicuous, very slender, about 20–30 per cm; veinlets numerous. Inflorescence an up to 25 cm long raceme of 2–3 flowered cincinni; the pedicels subpuberulous, firm, 1½–2 cm long and 1–1½ mm wide. Flower-buds ovoid, apically somewhat rounded, 10–13 × 7–9 mm. Calyx reddish-brown with a greyish subsericeous indumentum, the minor lobes rounded, about 10–13 mm long, the spurred lobe up to 16 mm long, the spur hidden by the outer lobes, up to 10 × 5 mm. Petal white, up to 3½ cm long and 4 cm wide, obcordate, emarginate. Anther subpilose on the back, about 4 mm long, the base cordate, the apex apiculate; the filament subpilose, firm, up to 13 mm long. Staminodes sublinear, about ½ mm long. Ovary globose. Style nearly glabrous, up to 13 mm long. Capsules unknown.

Holotype: *Ducke* RB 34671 in RB. Isotypes in: G, K, P, S, U, US.

Distribution: Upper Rio Negro.

BRAZIL, Amazonas: Rio Curicuriary, affl. Rio Negro, *Ducke* RB 34671; R. Ica, affl. Rio Negro, *R. L. Froes* 22377.

Ecology: The type-specimen was collected on rocky soils, the second one in "caatinga" forest on sandy soil.

Observation: This species was discovered by *Ducke* on an expedition organized by Colonel Themistocles Paes de Souza Brasil, head of the Brazilian eastern frontier commission.

18. **Qualea pulcherrima** Spruce ex Warm. Flora Bras. 13(2): 37. 1875; *Ducke* 1938 p. 38.

Large tree. Branchlets and leaves glabrous, the cortex of the former exfoliating (smallish fragments). Stipular glands urceolar, prominent, mainly in the inflorescence, diameter about 1 mm. Petioles 8–14 mm long. Leaf-blades coriaceous, elliptic or oblong-elliptic, 6–9 × 3–4 cm; the apex long obtuse-acuminate, the base rounded or obtuse, the midrib not winged, the lateral nerves about 15 per cm, subprominent on both sides; veinlets inconspicuous. Inflorescence a loose panicle bearing 2–3 flowered cincinni, the slender pedicels subpuberulous, (1–)1½–2 cm long. Flower-buds acute, about 10 × 5 mm. Calyx blue, adpressed greyish-pilose outside, the first minor lobe about 5–7 mm long, the other minor lobes 7–10 mm long, the spurred lobe obtuse or rounded, about 15–18 mm long; the spur subclavate, about 6–7 mm long, slightly constricted near the base, more or less stretched along the pedicel. Petal rose-pink, broadly obcordate, emarginate, up to 3 cm long and 4 cm wide. Anther recurved, subpuberulous, about 3 mm long; the filament slender, glabrous, about 7 mm long. Stami-

nodes — if present — about $\frac{1}{2}$ mm long. Ovary subglobose. Style glabrous except the base, 8–10 mm long. Capsules unknown.

Holotype: *Spruce* 3388 in C. Isotypes in: BM, BR, G, GH, GOET, F, K, NY, OXF, P, W.

Distribution: Upper Rio Negro.

BRAZIL, Amazonas: "Ad flumina Cassiquiari, Vasiva et Pacimoni", *Spruce* 3388; Rio Curicuriary, affl. Rio Negro, *Ducke* RB 34665.

COLOMBIA, Uaupes: *P. H. Allen* 3346.

Ecology: *P. H. Allen*: "frequently in areas of 'Rebalsa' which are flooded during the rainy season". *Ducke*: "In forests on high grounds".

19. ***Qualea gestasiana*** St. Hil. Mém. Mus. Paris **6**: 254. 1820; Spreng. 1825 p. 17; Schult. 1827 p. 99; DC. 1828 p. 28; A. Dietr. 1831 p. 99; Don 1832 p. 671; D. Dietr. 1839 p. 21; Warm. 1875 p. 54; — 1889 p. 23; Poulsen 1881 p. 112, 123; Wille 1882 p. 181 (anat.); Glaziou 1905 p. 31. *Qualea microphylla* Warm. l.c. p. 37.

Large tree. Branchlets and leaves glabrous or nearly so. Stipules triangular, about 1 mm long, the apex caducous, the base subglandular and subprominent; extrafloral nectaries above these glands, urceolar, about 3 mm high, the base about 1 mm wide. Petioles slender, about 7–12 mm long. Leaf-blades coriaceous, elliptic, broadly lanceolate or obovate-elliptic, 3–5 × 1½–2½ cm; the apex abruptly obtuse-acuminate; the base acute; the midrib winged; 30–40 lateral nerves per cm, minor and major ones only slightly different; veinlets only near the margin. Flowers fragrant, in few-flowered axillary racemes, the latter 2-, 4- or 6-flowered; the pedicels subpuberulous, slender, about as long as the buds, the latter about 9–13 × 6–8 mm. Calyxlobes ciliate, the first one about 4 mm, the second one about 5–7 mm, the anterior ones 7–8 mm long; the spurred lobe about 15 mm long and wide, the outside of the base whitish-sericeous, the spur hidden between the other lobes, bag-shaped, about 2 mm long. Petal white (in sicc. yellow) with a yellow centre and painted with red above the base, obcordate, about 4 × 4 cm. Stamen glabrous, the anther recurved, acuminate and flattened, 6–7 mm long; the filament about 10 mm long. Rudimentary petals and staminodes — if present — about $\frac{1}{2}$ mm long. Style glabrous, about 1 cm long. Capsules about 4 cm long, the apex obtuse or rounded.

Holotype: *St. Hilaire* 72 near Tejuca, Rio de Janeiro in P. Holotype of *Q. microphylla* Warm.: *Dux d'Abrantes* s.n. in P.

Distribution: In the forests around the town of Rio de Janeiro.

BRAZIL, Rio de Janeiro: *St. Hilaire* 72; *Dux d'Abrantes* s.n.; *Glaziou* nos 9416, 10731; *Ducke* RB 21289; *Kuhlmann* RB 48136; *Duarte de Barros* 53; *Nadeaud* s.n.

Ecology: In coastal forests on the atlantic slopes near Rio de Janeiro; fl. Febr.; up to 750 m.

Observation: *St.-Hilaire* mentions as collectors of the type-specimen the Count de Gestas and the Countess de Roquefeuille. These names are not present on the type-sheet in Paris which bears a normal *St. Hilaire* label (*Voyage* 1816–1821). The species was named after the first collector.

20. ***Qualea homosepala*** *Ducke*, Arch. Inst. Biol. Veg. **4**: 38. 1938.

Large tree. Branchlets and leaves glabrous or nearly so, the cortex of the former not exfoliating. Stipules transversely elliptic with an

acute, caducuous apex and a glandular, persistent base. Petioles 9–13 mm long. Leaf-blades coriaceous, oblong or elliptic-oblong, 6–13 × 3–6 cm, the apex obtuse-acuminate, the base rounded; the midrib narrowly winged below; the lateral nerves subprominent, 20–30 per cm; the veinlets numerous. Inflorescence a panicle composed of racemes bearing 2–8 pairs of 2–3 flowered cincinni. Rachis, pedicels and bracts puberulous; the pedicels 5–7 mm long; the bracts and bracteoles caducous, transversely elliptic, rounded or obtuse, about $\frac{1}{2}$ –1 mm long. Flower-buds about 8–10 mm long, obtuse or rounded. Calyx-lobes dark pink-brownish, greyish sericeous outside; the minor lobes subequal, rounded or obtuse, up to 6–10 mm long; the spurred lobe broadly elliptic, about 15 mm long; the spur hidden by the lobes, straight, cylindrical, about 10–12 mm long. Petal pink, obcordate, emarginate, up to 3 × 3½ cm. Rudimentary petals and staminodes — if present — $\frac{1}{2}$ –1 mm long. Anther acute, about 4–5 mm long, greyish-puberulous on the back; the filament puberulous, about 10 mm long. Style nearly glabrous. Capsules unknown.

Holotype: *Ducke* RB 34666 in RB. Isotypes in: G, IAN, K, NY, P, S, U, US. Distribution: Upper Amazonia.

BRAZIL, Amazonas: Parintins, Lago José-assú, *Ducke* RB 34666.

COLOMBIA, Uaupès: Miraflores, *Gutierrez & Schultes* 530

Ecology: Type-specimen on high sandy grounds; fl. Dec.–Jan.

21. ***Qualea sprucei*** Warm. *Flora Bras.* 13(2): 38. 1875.

Branchlets and leaves glabrous; the cortex of the former not exfoliating. Stipular glands — if present — prominent; opposite stipules connected by a prominent stipular ridge. Petioles 6–10 mm long. Leaf-blades coriaceous, oblong or elliptic, 8–9 × 2½–3½ cm; the apex long and more or less abruptly acuminate (1–1½ cm); the base obtuse or rounded; the midrib pilose above, provided with ciliate wings below; 10–20 lateral nerves per cm; veinlets few, mainly near the margin. Inflorescence a many-flowered panicle bearing 1–3 flowered cincinni. Pedicels densely tomentellous, 6–8 mm long. Flower-buds acute, 8–10 mm long. Calyx, the spurred lobe in particular, densely greyish-sericeous outside; the minor lobes 5–6 × 4–5 mm; the spurred lobe suborbicular, emarginate, up to 8–12 mm long and wide; the spur up to 8 mm long, subclavate or subcylindrical, straight or slightly incurved. Petal obcordate, two-lobed, up to 3 × 3 cm, glabrous except the base. Anther glabrous, oblong, 1½–2 mm long; the filament pilose, about 5 mm long. Staminodes oblong, up to 1 mm long. Style nearly glabrous. Capsules unknown.

Holotype: *Spruce* 2740 in C. Isotypes in: BM, BR, F, G, GH, GOET, K, NY, OXF, P, W.

Distribution: Once collected.

BRAZIL, Amazonas: Panuré on Rio Uaupès, *Spruce* 2740.

22. ***Qualea coerulea*** Aubl. *Pl. Gui.* 7. t. 2. 1775; *Lam.* 1791 p. 11; *Willd.* 1797 p. 18; *Vahl* 1804 p. 6; *Pers.* 1805 p. 4; *Roem. & Schult.* 1817 p. 37; *Spreng.* 1825 p. 17; *Schult.* 1827 p. 99; *DC.*

1828 p. 28; A. Dietr. 1831 p. 98; Don 1832 p. 671; D. Dietr. 1839 p. 21; Warm. 1875 p. 38; — 1889 p. 22; Pulle 1906 p. 250; Benoist 1915 p. 242; — 1919 p. 319; — 1931 p. 165; Ducke 1922 p. 196; — 1938 p. 38; Pfeiffer 1926 p. 351; Amshoff 1948 p. 41; Mennega 1948 p. 45; Stafleu 1951 p. 192; Lindeman 1953 p. 116.

Large or medium-sized tree. Branchlets and leaves glabrous or nearly so. Stipules deltoid, acute, the apex deciduous, the base subglandular, elliptic, not prominent; extrafloral nectaries rarely present in the axils, about 1 mm high. Petioles 4–7 mm long. Leaf-blades coriaceous, elliptic, 6–9 × 3–4 cm; the apex acute or obtuse-acuminate; the base acute in youth; the midrib below provided with ciliate wings; 30–50 thin lateral nerves per cm, curved upwards near the margin, with the numerous veinlets forming a distorted reticulate venation near the margin. Fragrant flowers in many-flowered compound racemes bearing 1–3 flowered cincinni. Pedicels 4–8 mm long, subpuberulous. Flower-buds 5–8 mm long. Calyx subsericeous outside, the minor lobes rounded or obtuse, 3–5 mm long; the spurred lobe 7–8 × 9–11 mm, emarginate; the spur cylindrical, slender, 5–6 mm long. Petal blue with a yellow base, obcordate, deeply emarginate, about 1½–2½ cm long and wide. Stamen glabrous, the anther about 2 × 1 mm, apically recurved; the filament slender, up to 8 mm long. Staminodes and rudimentary petals sometimes present, ½–1 mm long. Style entirely glabrous, 5–7 mm long. Capsules 6–7 cm long, the exocarp coming off.

Holotype: *Aublet* s.n. in BM.

Distribution: French Guiana, Suriname, Para and Maranhao.

BRAZIL, Para: Belem, *N. T. da Silva* 135; Rio Tapajoz, *Ducke* PG 16455 = RB 8420; Rio Anajaz, *Ducke* RB 17775; Belem, *Archer* 7878; Beira do Rio Irituia, *Black & Forster* 48–3348. Maranhao: Carutapera Region, *Froes-Krukoff* 2029.

SURINAME: Numerous collections; for detailed numbers, etc. cf. Stafleu 1951 p. 193.

FRENCH GUIANA: Numerous collections by *Mélinon*, *Sagot*, *Wachenheim*, *Benoist*, e.g.: Maroni, *Mélinon*, 47, 105; Karouany, *Sagot* 981; *Aublet* s.n.; Gourdonville, *Benoist* 1604.

Ecology: In forests within and outside the range of seasonal floods; fl. Sept.–Dec.; fr. Dec.–March.

Vernacular names: BRAZIL, Para: Páu de Mastro; Maranhao: Guiariuba.

FRENCH GUIANA: Couaie. **SURINAME:** Watra kwarrie (Surinam); Muneridang (Arawak); Jakopi or Iriakopi (Caraib); for a complete list of French Guiana and Suriname names cf. Stafleu 1951 p. 194.

23. ***Qualea impexa*** Macbr. Field Mus. Bot. 11: 67. 1931; — 1950 p. 878.

Medium-sized tree. Branchlets glabrous, the cortex not exfoliating. Stipules broadly deltoid, acute, about 1 × 1 mm, the apex caducous, the base persistent and subglandular; those of opposite leaves connected by a straight stipular ridge. Petioles 9–13 mm long. Leaf-blades glabrous, elliptic or suboblong, up to 11 × 5 cm; the apex shortly obtuse-acuminate (4–10 mm); the base abruptly contracted towards the petiole; the midrib below provided with two narrow ciliate wings; more than 30 lateral nerves per cm; veinlets numerous on the entire

surface. Inflorescence a many-flowered panicle composed of 1–2 flowered cincinni. Pedicels subpuberulous, 9–13 mm long. Flower-buds $1\frac{1}{2}$ –2 cm long, subacute. Calyx greyish-sericeous outside, especially the inner lobes; the minor lobes subequal, about 8 – 12×7 – 12 mm; the spurred lobe broadly elliptic, about $1\frac{1}{2}$ – $2 \times 1\frac{1}{4}$ – $1\frac{1}{2}$ cm; the spur bag-shaped, constricted near the base, about 4–6 mm long. Petal yellow, cordate, about 4×5 cm. Stamen glabrous; the anther 8–9 mm long; the filament about 11–14 mm long. Staminodes, if present, linear, about 1 mm long. Ovary gradually merging into the glabrous style. Capsules unknown.

Holotype: *G. Klug* 748 in F. Isotypes in: G, US.

Distribution: Once collected.

PERU, Loreto: Mishuyacu near Iquitos, *G. Klug* 748.

Ecology: In forest, 100 m.; fl. Jan.

Observation: Differs from *Q. schomburgkiana* by the presence of a stipular ridge, by the numerous veinlets on the entire surface and by the yellow petal: from *Q. lineata* for instance by the equal lateral nerves and also by the yellow petal.

24. ***Qualea acuminata*** Spruce ex Warm. *Flora Bras.* 13(2): 40. 1875; Petersen 1896 p. 318. *fig. 172 M*; Benoist 1915 p. 242; — 1931 p. 163; Ducke 1933 p. 44; — 1938 p. 40; Stafleu 1951 p. 194. *Qualea speciosa* Huber 1902 p. 425; Ducke 1915 p. 49; — 1922 p. 197.

Large or medium-sized tree. Branchlets subpuberulous or glabrous, the cortex not exfoliating. Stipular glands prominent, about 1 mm long. Petioles 2–9 mm long. Leaf-blades glabrous, coriaceous, oblong or elongate-elliptic, 8 – $18 \times 3\frac{1}{2}$ – $4\frac{1}{2}$ cm; the apex long acute-acuminate ($\frac{1}{2}$ – $1\frac{1}{2}$ cm); the base truncate, rounded or subcordate; the midrib not or narrowly winged below, the wings puberulous; 30–45 lateral nerves per cm; veinlets few, mainly near the margin. Inflorescence a raceme or panicle composed of 1–2 flowered cincinni; the pedicels 5–10 mm long, pubescent. Flowers fragrant, the buds 15–23 mm long, acute. Minor calyx-lobes purplish, sericeous outside, the first one about 6 mm, the other ones about 7–11 mm long; the spurred lobe densely sericeous outside, up to $2\frac{1}{2} \times 2$ cm; the spur 7–10 mm long, constricted near the base. Petal white with a red basal spot and a yellow central strip, obcordate, 4–5 cm long and wide. Stamen glabrous; the anther 9–11 mm long, apically recurved and acute; the filament firm, 8–11 mm long. Staminodes, if present, linear, up to 3 mm long. Ovary gradually merging into the style; the latter 10–14 mm long, glabrous except the lower 2–3 mm. Immature capsule about 3 cm long, rugulose.

Lectotype: *Spruce* 2612 in C. Isotypes in: BM, BR, F, GH, GOET, K, NY, OXF, P, W. Holotype of *Q. speciosa* Huber 1844 in PG, isotype in G.

Distribution: Throughout the entire Amazonian basin.

BRAZIL, Para: Gurupa, *Ducke* PG 15978; —, — RB 17761; Rio Mojù, *Ducke* RB 17762; Almeirim, *Ducke* PG 17286 = RB 13698; Rio Tucuruhy, *Ducke* PG 16593 = RB 13699; Tomé Assu, *Mexia* 5973a; —, *J. M. Pires* 1441; Arama, *Huber* PG 1844. Amazonas: Manãos, *Ducke* RB 23488; —, — 55; —, *Killip & Smith* 30204; near Panuré on Rio Uaupès, *Spruce* 2612; Humayta, *Krukoff* 7169; Rio Iá, *Froes* 22378; Sao Paulo de Olivença, *Krukoff* 8949; Rio Icana, *Black* 48-2664; Rio Solimoes, *Froes* 23760.

COLOMBIA, Uaupès: Yurupari, *Cuatrecasas* 6956.

BOLIVIA, Beni: Rio Ibon, *Cardenas* 2083.

FRENCH GUIANA: *Leprieur* s.n.; — 284.

Ecology: In forests on high grounds as well as on grounds reached by seasonal floods; fl. mainly Sept.–Feb., sometimes later.

Vernacular names: Para: Mirabau do Varzea.

Observation: It is not possible to say which of the Spruce 2612 specimens was Warming's holotype.

25. ***Qualea elegans*** Taub. ex Benoist in Lecomte, Not. Syst. 3: 177. 1915; Taub. ex Glaziou 1905 p. 30 nomen nudum.

Shrub. Branchlets puberulous in youth, glabrous in age, the cortex not exfoliating. Stipules broadly elliptic, about 1 mm long and 2 mm wide at the base, apiculate. Glands single or in serial pairs in the axils of the stipules, crateriform, up to 1 mm wide. Stipular ridge weak. Petioles 2–4 mm long. Leaf-blades glabrous above, slightly hairy below (in youth) especially on the wings of the midrib, rigidly coriaceous, ovate or elliptic-ovate, up to 10 × 5 cm, the apex obtuse or somewhat rounded, the base rounded or cordate; 10–20 subprominent slightly curved lateral nerves per cm; veinlets on the entire surface; the margin subrevolute. Inflorescence a few-flowered raceme composed of opposite 1(–2) flowered cincinni. Pedicels puberulous, firm, 14–18 mm long. Flower-buds acute, about 20 mm long. Calyx subpuberulous outside, the minor lobes subequal, rounded, 7–12 mm long; the spurred lobe elliptic, rounded or obtuse, 2–2½ cm long; the spur hidden by the lateral lobes, bag-shaped, about 4 × 3 mm, pressed against the back of the fourth lobe. Petal "white-yellowish". Stamen glabrous; the anther acute, linear-oblong, 10–12 mm long; the filament 6–10 mm long. Staminodes, if present, linear, about 1 mm long. Ovary gradually merging into the glabrous style. Capsules unknown.

Holotype: *Glaziou* 19153 in P. Isotypes in: C, F, K, S.

Distribution: Once collected.

BRAZIL, Minas Geraes: Biribiri near Diamantina, *Glaziou* 19153, fl. March.–April.

26. ***Qualea calantha*** Pilger, Notizbl. Berlin 11: 297. 1931; Macbride 1950 p. 876.

Tree of medium size. Branchlets glabrous, the cortex not exfoliating. Stipular glands subprominent, connected by a V-shaped stipular ridge. Petioles firm, about 10 mm long. Leaf-blades glabrous, rigidly coriaceous, elliptic or elliptic-oblong, about 11 × 5 cm; the apex long-acuminate; the base rounded; more than 10 lateral nerves per cm, curved upwards near the margin; veinlets numerous, mainly near the margin. Inflorescence an up to 13 cm long many-flowered panicle composed of 1–2 flowered cincinni. Pedicels puberulous, 7–10 mm long. Flower-buds acute, about 15 mm long. Minor calyx-lobes rounded, subpuberulous, ciliate, subequal, 8–10 mm long; the spurred lobe 13–16 mm long, the base bag-shaped, not spurred. Petal white with a yellow centre and a pink base, cordate-obovate, deeply two-lobed, up to 5½ cm long. Anther oblong, about 8 mm long, shortly

apiculate; the filament about 12 mm long. Staminodes, ovary, style and capsules unknown.

Holotype: *Tessmann* 4855 in B, now destroyed. No duplicate is known to the present author. Photograph in GH.

Distribution: Eastern Peruvia.

PERU, Loreto: Pongo de Manseriche, *Tessmann* 4855.

Ecology: On slopes in virgin forest, 30 m above water level, 160 m.; fl. Dec.

Observation: The above description is based on Pilger (l.c.) and on the GH photograph. The species, which seems to be a good one, is closely related to *Q. macropetala*. It is characterised by the bag-shaped base of the fourth calyx-lobe (no spur), the small flowers and the ample raceme. Further material should be examined.

27. ***Qualea ingens*** Warm. *Flora Bras.* 13(2): 40. 1875; Hoehne 1951 p. 257.

var. ***ingens*** (*fig. 2a*)

Large tree. Cortex of the young branchlets exfoliating. Stipules caducous, triangular, $\frac{1}{2}$ –1 mm long and about 1 mm wide; crateriform glands in the axils; those of opposite leaves connected by a straight, prominent stipular ridge. Petioles about 10 mm long. Leaf-blades coriaceous, complicate, elliptic-oblong or subelliptic, 10–14 × 4–7 cm; the apex obtuse-acuminate or subobtuse; the base cordate; the midrib winged below; more than 50 lateral nerves per cm, curved upwards near the margin; veinlets numerous on nearly the entire surface. Inflorescence a many-flowered panicle composed of 1–2 flowered cincinni. Pedicels puberulous or glabrous, about 5 mm long. Flower-buds acute, up to 18 mm long. Calyx nearly glabrous outside, the minor lobes subequal, obtuse, 6–9 × 4–7 mm; the spurred lobe ovate, up to 18 × 15 mm; the spur irregularly bag-shaped, about 7 × 4 mm, the apex rounded, the base constricted, often slightly compressed. Petal “coeruleous”. Anther acute, subrecurved, pilose on the back, about 7 mm long; the filament 12–15 mm long. Staminodes, if present, linear, about 1 mm long. Style glabrous. Capsules unknown.

Holotype: *Riedel* s.n. in C. Isotypes in: BM, G, GH, K, NY, OXF, P.

Distribution: Once collected.

BRAZIL, Matto Grosso: along Rio Aterrado between Cuyaba and Diamantino, *Riedel* s.n.

Ecology: “In humidis ad rivulum”, probably in the so-called cabeceiras, i.e. swampy river sources (cf. Ducke 1922 p. 197) as *Q. wittrockii* Malme (no. 5); fl. Sept.

var. ***duckei*** Staff. nov. var.

Arbor magna, cortice ramulorum juvenilium fusco. Stipulae 1–2 mm longae, eae foliorum oppositorum basibus linea prominula curvata ramulum transiente connexis; glandulae axillares adsunt. Lamina basi rotundata. Petalum coeruleum lineis luteis, obcordatum.

Holotype: *Ducke* PG 15795 = RB 5725 in U. Isotypes in: BM, G, IAN, P RB, US.

Distribution: Once collected.

BRAZIL, Para: Rio Cauhy, *Ducke* PG 15795 = RB 5725.

Ecology: In marshy forests, together with *Q. wittrockii* Malme (no. 5); fl. Oct.
 Observation: Differs from the var. *ingens* by the curved stipular ridge and the shape of the leaf-base. Ducke (1922 p. 196, 1938 p. 39) mentioned the variety sub: "*Qualea ingens* Warm. var. (vel spec. nova affinissima)".

28. ***Qualea amoena*** Ducke, Arch. Jard. Bot. Rio 3: 197. 1922; — 1938 p. 41.

Large tree. Branchlets subpuberulous in youth, the cortex exfoliating. Stipules acute, $\frac{1}{2}$ –1 mm long, connected with another by a V-shaped subprominent stipular ridge, axillary extrafloral nectaries up to 2×2 mm, irregularly urceolar, thin-walled, the base constricted. Leaf-blades coriaceous, lanceolate-oblong or rarely elliptic-oblong, up to 10×3 cm; the apex gradually and long acuminate (about 10 mm); the base obtuse; the midrib subpuberulous and winged below; about 10 major lateral nerves per cm, 2–4 slightly weaker ones in between each pair; numerous veinlets on the entire surface. Inflorescences many-flowered panicles composed of 1–2 flowered cincinni. Pedicels 7–10 mm long, puberulous. Flowers fragrant, the buds 12–15 mm long. Calyx sericeous outside, the minor lobes about half as long as the spurred one, rounded, the first one about 6 mm, the other ones 8–12 mm long; the spur ellipsoid, $6-7 \times 4-5$ mm. Petal white with a yellow centre and red spots near the base, about $4 \times 4\frac{1}{2}$ cm. Rudimentary petal and staminodes present. Anther glabrous or with a few hairs on the back, subrecurved, lanceolate, about 9 mm long; the filament glabrous, about 12–14 mm long. Style glabrous. Capsules unknown.

Holotype: Ducke PG 15890 = RB 8345 in PG. Isotypes in: F, G, IAN, K, P, RB, U, US. Photograph of PG type in F.

Distribution: Central Amazonian basin.

BRAZIL, Para: Salgado lake, Ducke PG 15890 = RB 8345. Amazonas: Humayta on Rio Madeira, Krukoff 6433 and 6575; Esperança, Rio Javary, Ducke 1063.

Ecology: On terra firma; fl. Oct.–Dec.

29. ***Qualea rosea*** Aubl. Pl. Gui. 5. t. 1. 1775; Lam. 1791 p. 11. t. 4; Willd. 1791 p. 18; Poir. 1804 p. 8; Vahl 1804 p. 6; Pers. 1805 p. 4; Roem. & Schult. 1817 p. 36; Spreng. 1825 p. 17; DC. 1828 p. 28; A. Dietr. 1831 p. 97; Don 1832 p. 671; D. Dietr. 1839 p. 21; Warm. 1875 p. 54, — 1889 p. 23; Benoist 1915 p. 242, — 1919 p. 319; — 1931 p. 163; Berlin 1920 p. 81; Stafleu 1951 p. 194. *Qualea violacea* Mart. & Zucc. ex Schult. 1827 p. 99 (in synonym.) *Qualea melinonii* Beckmann 1908 p. 280.

Tree of medium size. Branchlets glabrous, the cortex exfoliating. Stipules about 1 mm long, connected by a stipular ridge; extrafloral nectaries in the axils, mostly urceolar or conical, about 2 mm high, about 1 mm wide, thin-walled. Petioles 7–15 mm long. Leaf-blades glabrous, firmly coriaceous, the margin dark when dry, broadly elliptic, oblong or ovate-oblong, $7-11 \times 3\frac{1}{2}-6$ cm; the apex shortly obtuse-acuminate; the base rounded or obtuse in age, obtuse in youth; the midrib below provided with two narrow wings; more than 20

lateral nerves per cm; veinlets numerous on the entire surface. Panicle few-flowered. Cincinni 1(-2) flowered, at the base provided with bracts, stipules and nectaries. Pedicels subpilose, 1-1½ cm long. Flowers fragrant, the buds 12-17 mm long. Minor calyx-lobes more or less rounded, puberulous, the first one 5 mm, the others 7-9 mm long; the spurred lobe suborbicular, emarginate, up to 17 mm long, sericeous outside, glabrous and pinkish inside; the spur bag-shaped, slightly inflated or somewhat depressed, 4-7 × 3-5 mm, before anthesis hidden between the outer calyx-lobes. Petal yellow with a whitish base, suborbicular-obcordate, about 3-3½ × 3-3½ cm. Anther recurved, lanceolate, subapiculate, 6-8 mm long, the centre of the back pilose or nearly glabrous; the filament glabrous, up to 15 mm long. Staminodes and rudimentary petals linear, 1-2 mm long. Style glabrous except the basal 1 mm. Capsules up to 9 cm long, the exocarp 5-8 mm thick, woody, the outer surface dull, rugulose and glabrous, releasing from the ½-1 mm thick, shining endocarp; up to 10 seeds per locule.

Holotype: *Aublet* s.n. in BM. Holotype of *Q. melinonii* Mélinon (1863) s.n. in B, now destroyed (photograph in F); isotypes in: BM, NY, P, US.

Distribution: French Guiana and Suriname.

SURINAME: Brownsberg, tree 1008 *B.W.* nos. 1761, 4260, 6336, tree 1168 *B.W.* 2479; Moengo Tapoe, *Lanjouw & Lindeman* 392, 395; Nassau Mountains, *Lanjouw & Lindeman* 2440, 2802, 2920; *B.B.S.* 171.

FRENCH GUIANA: Maroni, *Mélinon* s.n.; —, Gandoger 100; Charvein, *Benoist* 187; Godebert, *Wachenheim* s.n.; *Mélinon* (1863) s.n.; *Poiteau* s.n.

Ecology: In high primeval forests which are not reached by seasonal floods; fl. Sept.-Dec.; fr. Febr.-March.

Vernacular names: (for a complete list cf. Stafleu 1951 p. 196) SURINAME: Bergkwarric, Gronfoloe (Surinam), Gronfoloe, Muneridang (Arawak); Iriakopi (Carai). FRENCH GUIANA: Cèdre jaune, Cèdre gris.

Use: Bertin (l.c.) mentions the use as a lumber tree in French Guiana.

30. *Qualea lineata* Staff. nov. spec. (fig. 10).

Subgenus *Qualea*, sectio *Qualea*. Arbor magna. Ramuli juveniles subpuberuli. Stipulae late ovatae, acuto-acuminatae, 1-2 mm latae, basi incrassatae; eae foliorum oppositorum basibus linea prominula ramulum transiente connexis. Glandulae in axillis stipularum circa 1 mm latae. Petiolus 4-6 mm longus. Lamina glaberrima, oblonga vel elliptico-oblonga, ad 10 × 4½ cm, apice breviter (4-8 mm) acuminata, basi rotundata; costa subtus bialata et subpuberula; nervis lateralibus majoribus 8-20 per cm, inter se venulis transversalibus creberrimis junctis. Inflorescentia thyrsoides; cincinnis unifloris; pedicellis puberulis 10-15 mm longis, circa ½ mm latis. Alabastra conica, subacuta, 14-18 mm longa. Calycis lacinae sericeae, in vivo virescente-roseae, minores subequales, subellipticae, rotundatae, circa 8-13 mm longae et 7-11 mm latae; lacinia major subovata vel suborbicularis, ad 20 × 20 mm. Calcar ellipsoideum, sub anthesi laciniis calycis lateralibus obtectum, basi subconstrictum. Petalum roseum vel roseo-luteum, medio purpureum. Stamen glabrum; anthera oblonga apice obtusa, circa 8 mm longa. Staminodia linearia, ½-1 mm longa. Basis styli (2-3 mm) puberula. Capsula ignota.

Holotype: *Cuatrecasas* 14410 in U. Isotype in US.

Distribution: Once collected.

COLOMBIA, Del Valle: Cordillera occidental, between Pavas and Miramar, *Cuatrecasas* 14410.

Ecology: 350-450 m.; fl. Apr.

Observation: Characterised by the major and minor lateral nerves, the stipular ridge, the numerous veinlets, etc. Nearest related to *Q. schomburgkiana* (no. 39) and *Q. impexa* (no. 23).

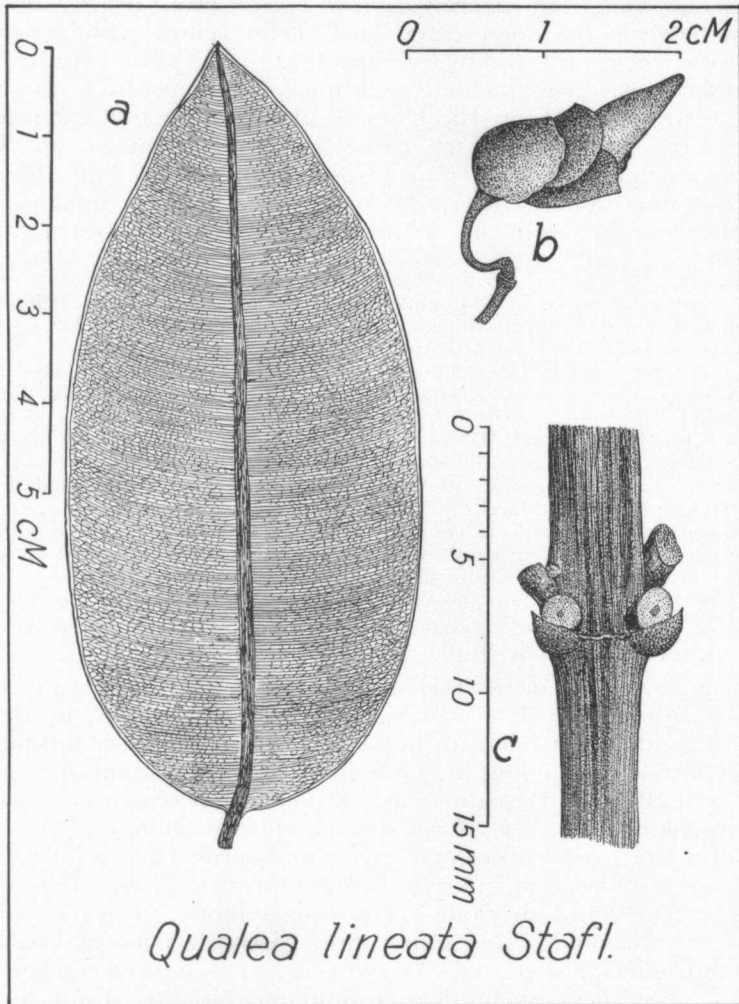


Fig. 10. *Qualea lineata* Stafl. a. Leaf; b. flower-bud; c. stipules and axillary glands.

31. ***Qualea polychroma*** Stafl. nov. spec. (fig. 11).

Subgenus *Qualea*, sectio *Qualea*. Arbor magna. Ramuli glabri, decorticantes, cortice nigro. Stipulae subovatae; basi incrassata et haud decidua; apice acuto et deciduo; basibus linea prominula

ramulum transiente connexis. Petiolus 5–9 mm longus. Lamina glabra, elliptica vel elliptico-oblonga, 9–13 cm longa et $3\frac{1}{2}$ – $4\frac{1}{2}$ cm lata; apice breviter acuto-acuminata; basi rotundata; costa subtus bialata; nervis lateralibus ultra 20 per cm, inter se venulis transversalibus creberrimis junctis. Inflorescentia thyrsoida, cincinnis 1–2 floris, pedicellis puberulis, 8–11 mm longis. Alabastra 12–16 mm longa. Calycis lacinae intus rufo-brunneae, extra nigrae, sericeae, minores 7–13 mm longae;

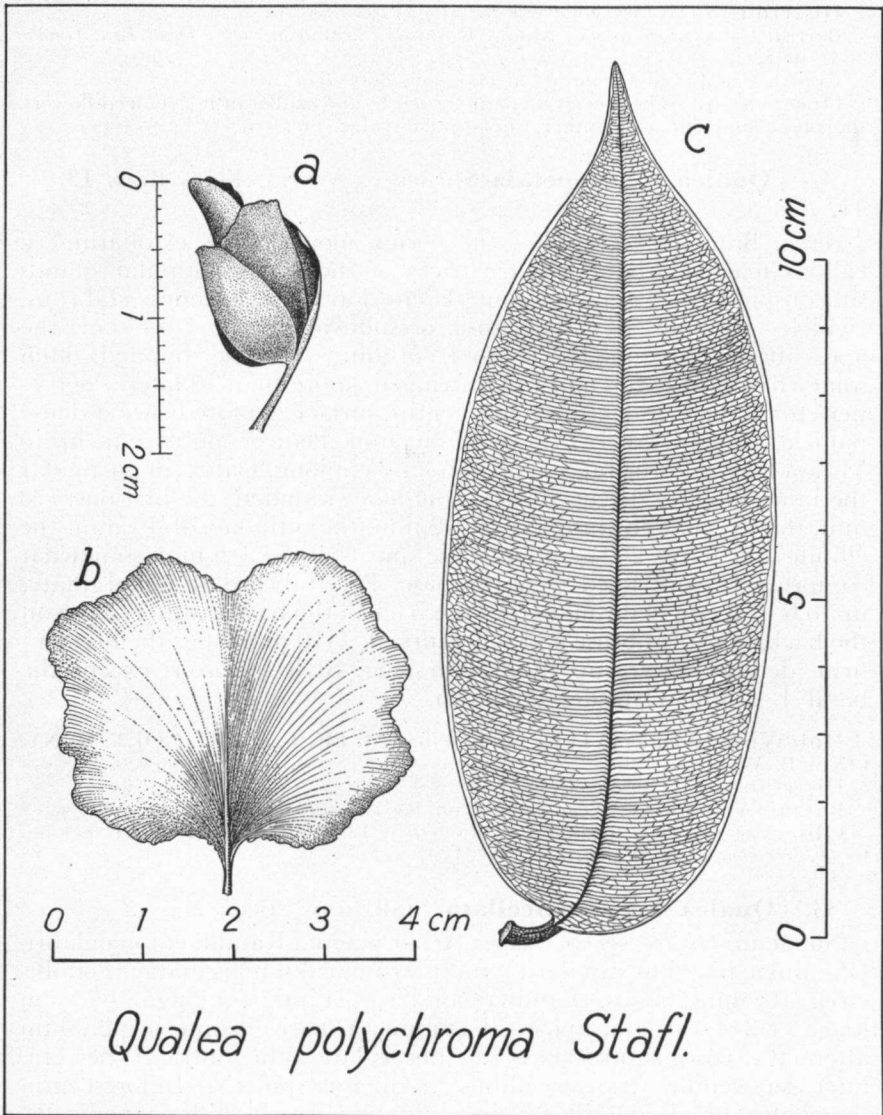


Fig. 11. *Qualea polychroma* Stafl. a. Flower-bud; b. petal; c. leaf.

lacinia major caduca, expansa non vidi. Calcar cylindricum, caducum, circa 6 mm longum. Petalum roseo-rubescens medio lineis flavis notatum, late ellipticum, emarginatum, ad 3 cm longum et $4\frac{1}{2}$ cm latum. Anthera nigra pilosa, lineari-oblonga, acuta, 4–5 mm longa. Filamentum roseo-rubescens, pilosum, circa 10 mm longum. Staminodia vel (et) petala rudimentaria circa 1 mm longa. Stylus glaber, ruber, circa 1 cm longus, stigmatibus capitato. Capsula ignota.

Holotype: *Forest Dept. Brit. Guiana* 2832 in K.

Distribution: Once collected.

BRITISH GUIANA: Slopes of Mount Roraima, Arabupu, *Forest Dept. Brit. Guiana* 2832 in K.

Ecology: "In mixed forest on clay soil, 4600 feet".

Observation: The species is characterised by the exuberantly coloured flowers, the pilose filament and anther, the stipular ridge, etc.

32. ***Qualea macropetala*** Spruce ex Warm. *Flora Bras.* 13(2): 41. t. 6 fig. 1. 1875.

Tree. Branchlets glabrous, the cortex more or less exfoliating; a callous margin around the cicatrices of the leaves. Stipular glands subconspicuous. Petioles about 1 cm long. Leaf-blades glabrous, rigidly coriaceous, broadly elliptic or subovate, 9–12 × 5–6 cm; the apex abruptly acuminate, up to 1 cm long; the base rounded, often somewhat folded; the midrib not winged; more than 10 lateral nerves per cm; veinlets numerous on the entire surface. Inflorescence a dense panicle composed of 1–2 flowered cincinni. Pedicels pubescent, up to 14 mm long. Flower-buds acute, about 2 cm long. Calyx, in particular the inner lobes, sericeous outside, the lobes rounded, the first one 7–8 mm, the second and third ones 9–12 mm, the fifth one 10–13 mm, the elliptic fourth one 2–2½ cm long; the spur 8–10 × 3–5 mm, somewhat compressed, constricted near the base. Petal obcordate, emarginate, up to 6 × 8 cm, glabrous except the back of the base. Anther pilose on the back, apically obtuse and subrecurved, 7–10 mm long; the filament firm, densely pilose, up to 14 mm long. Style glabrous except the basal 1–2 mm. Capsules unknown.

Holotype: *Spruce* 2713 in G. Isotypes in: BM, BR, F, G, GH, GOET, K, NY, OXF, P, W.

Distribution: Once collected.

BRAZIL, Amazonas: Near Panuré on Rio Uaupès, *Spruce* 2713.

Observation: The specimen mentioned by Ll. Williams (1947 p. 91) belongs to *Q. schomburgkiana* Warm.

33. ***Qualea brevipedicellata*** Staff. nov. spec. (*fig. 12*).

Subgenus *Qualea*, sectio *Qualea*. Arbor magna. Ramuli et folia glabri. Glandulae in axillis stipularum minutarum, callo-marginatae. Petiolus circa 10 mm longus. Lamina coriacea, elliptico-oblonga, 6–8 cm longa et 3–4 cm lata, apice subacuminata, basi abrupte in petiolum attenuata; costa subtus vix alata; nervis lateralibus ultra 20 per cm, inter se venulis transversalibus frequentibus junctis. Inflorescentia thyrsoides, brevis, densiflora; cincinnis uni- vel rarius bifloris; pedicellis dense rufo-pubescentibus, crassis, 4–5 mm longis. Alabastra subovoidea,

circa 13–16 mm longa. Flores fragrantes. Calycis laciniae extra dense rufo-sericeae, minores subequales, rotundatae, 8–12 mm longae; lacinia major late elliptica, rotundata, ad 16 mm longa. Calcar ellipsoideum, apice rotundatum, 6–8 mm longum, sub anthesi laciniis calycis lateralibus obtectum. Petalum extra pilosum, suborbiculare, emarginatum, album medio luteum, versus basim maculae rufae

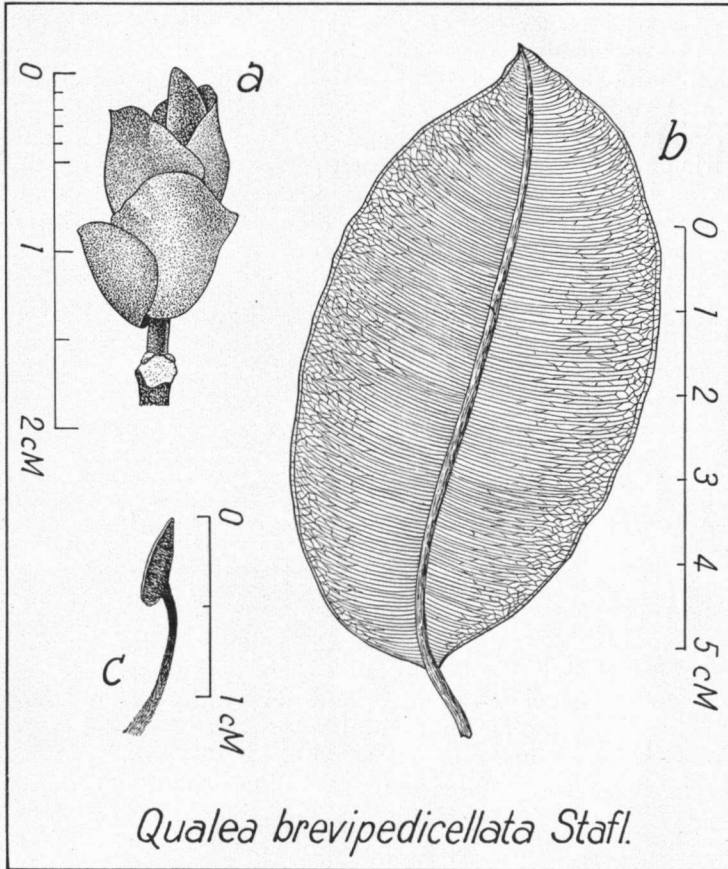


Fig. 12. *Qualea brevipedicellata* Stafl. a. Flower-bud; b. leaf; c. stamen.

duabus notatum, basi unguiculata circa 8 mm longa. Petalum rudimentarium petaloideum, oblongum, apiculatum, circa 2 mm longum. Anthera dorso pilosa, apiculata, circa 5 mm longa, connectivo angusto. Filamentum dense pilosum, 12–14 mm longum. Staminodia linearia vel subulata, circa $\frac{1}{2}$ mm longa. Stylus glaber. Capsula ignota.

Holotype: *Ducke* 668 in F. Isotypes in: IAN, MO, NY, US.

Distribution: Once collected.

BRAZIL, Amazonas: Manaus, Estrada do Aleixo, *Ducke* 668.

Ecology: In forest on terra firma; fl. Jan.

Observation: Differing from *Q. gracilior* and *Q. paraensis* by the short pedicels, the structure of the stamen, the nervation of the leaves, etc.

34. **Qualea tricolor** Benoist in Lecomte, Not. Syst. **3**: 176. 1915; Benoist 1931 p. 164; Stafleu 1951 p. 195.

Large tree. Cortex of the branchlets exfoliating (small fragments). Stipules with acute deciduous apex and subglandular persistent base. Petioles about 5 mm long. Leaf-blades subcoriaceous, glabrous except the midrib, elliptic, up to $5 \times 2\frac{1}{2}$ cm; the apex obtuse-acuminate; the base acute; the midrib pilose below, hardly winged; 15–35 slightly curved lateral nerves per cm; veinlets few, only near the margin. Racemes composed of 1–2 flowered cincinni. Pedicels puberulous, up to 13 mm long. Flower-buds about 18 mm long. Calyx sericeous outside, the lobes rounded or obtuse, the minor ones $6-10 \times 4-7$ mm, the spurred lobe 15–17 mm long, the spur nearly glabrous, subcylindrical, slightly constricted near the base, 7–8 mm long, in youth ovoid and hidden between the lobes. Petal white with a yellow base and two red spots, suborbicular, subemarginate, up to 4×4 cm. Anther pilose on the back, apically truncate, 7–9 mm long; the filament glabrous, 10–12 mm long. Rudimentary petals petaloid, 3–5 mm long. Staminodes linear, about 1 mm long. Style glabrous. Capsules unknown.

Holotype: *Benoist* 1564 in P. Cotype: *Mélinon* 142 (1842) in P; duplicates in L and US.

Distribution: French Guiana.

FRENCH GUIANA: Gourdonville, *Benoist* 1564; *Mélinon* 142 (1842).

Ecology: Fl. Aug.

35. **Qualea gracilior** Pilger, Notizbl. Berlin **11**: 296. 1931; Ducke 1943 p. 18; Macbride 1950 p. 877. *Qualea lancifolia* Ducke 1935 p. 53; — 1938 p. 41.

Large tree. Young branchlets pubescent. Stipules acute-acuminate; axillary glands suburceolar, about 1 mm wide. Petioles 5–8 mm long, densely tomentose above. Leaf-blades coriaceous, $7-11 \times 2\frac{1}{2}-3\frac{1}{2}$ cm, lanceolate or lanceolate-oblong; the apex gradually and long acuminate (1 cm), obtuse and mucronulate; the base rounded or obtuse; the upper surface tomentose on the midrib, subpuberulous on the limb; the lower surface puberulous, the midrib hirsute on the narrow wings; 4–7 major lateral nerves per cm, 1–3 minor ones and many veinlets in between each pair, the nervation elegantly reticulate. Inflorescence a dense panicle composed of 1–2 flowered cincinni. Pedicels 6–8 mm long, densely pubescent. Flowers not fragrant; the buds about 13–17 mm long. Calyx densely sericeous outside, the minor lobes rounded, the lateral ones 6–9 mm, the anterior ones 9–12 mm long; the spurred lobe 15–17 mm long, rounded and emarginate; the spur ellipsoid, constricted near the base, glabrous, 5–7 mm long. Petal white, painted with yellow and red, the apex two-lobed, about 3 cm long and 5 cm wide. Anther pilose on the back or nearly glabrous, 8–10 mm long, the locules narrow and marginal on the 2 mm wide connective, the apex distinctly two-lobed and often recurved; the filament glabrous, 10–12 mm long. Style nearly glabrous. Capsules unknown.

Holotype: *Tessmann* 4465 in B, photographs in F and GH. No duplicate of the *Tessmann* type is known to the present author. The original is now destroyed and if no other specimens have been preserved it will be necessary to consider the photograph as the lectotype. Holotype of *Q. lancifolia* Ducke: *Ducke* RB 24160 in RB; isotypes in: K, NY, P, S, U, US.

Distribution: Eastern Peru and Upper Amazonia.

BRAZIL, Amazonas: Sao Paulo de Olivença, Rio Solimoes, *Ducke* RB 24160; Esperança on Rio Javary, *Ducke* 1064.

PERU, Amazonas: Upper Marañon, mouth of Rio Santiago, *Tessmann* 4465.

Ecology: In forests which are not reached by seasonal floods; fl. Oct.–Nov.

36. ***Qualea paraensis*** Ducke, Arch. Jard. Bot. Rio 1: 48. t. 16. 1915; *Ducke* 1922 p. 197; — 1938 p. 40; *Pilger* 1931 p. 296; *Macbride* 1950 p. 878.

Large tree. Cortex of the young branchlets exfoliating. Stipules acute, $\frac{1}{2}$ –1 mm long. Extrafloral nectaries in the axils of the stipules, urceolar, diam. about 1 mm, 1–2 mm high, the wall thin, the base somewhat constricted. Petioles 1–1 $\frac{1}{2}$ cm long. Leaf-blades coriaceous, oblong or elliptic-oblong, 5–11 \times 3–4 $\frac{1}{2}$ cm; the apex abruptly acuminate (4–8 mm); the base obtuse or acute; the midrib puberulous and narrowly winged below; about 8–15 major lateral nerves per cm, minor ones and numerous veinlets in between. Inflorescence composed of panicles bearing mostly 2-flowered cincinni. Pedicels puberulous, 4–8 mm long. Flowers fragrant, the buds 15–18 mm long. Calyx sericeous outside, in particular the inner lobes; the lobes rounded, the lateral ones 5–8 mm, the anterior ones 8–12 mm, the spurred one up to 18 mm long; the spur ellipsoid, 4–7 mm long. Petal white with a red base and a yellow centre, about 3 $\frac{1}{2}$ –4 $\frac{1}{2}$ cm long and wide. Anther lanceolate, about 7–9 mm long, subcurved, the back pilose, the apex rounded and emarginate; the filament glabrous, about 12 mm long. Staminodes $\frac{1}{2}$ –1 mm long; rudimentary petals 1–3 mm long. Style nearly glabrous, the stigma semilateral, not capitate. Capsules unknown.

Holotype: *Guédes* PG 1591 in PG. Isotypes in: BM, F, G, P, US. Cotypes: *Ducke* PG 15547 in PG (duplicates: BM, F, G, P, RB, US) and *Ducke* PG 15658 in PG (duplicates: BM, F, US).

Distribution: Amazon basin, mainly in Para.

BRAZIL, Para: Belem, *Ducke* PG 15547, 15658; —, *Guédes* PG 1591; Rio Tapajoz, *Ducke* PG 16427; —, *Capucho* 446; Faro, *Ducke* RB 20566. Matto Grosso: along Madeira-Mamoré railroad, *Kuhlmann* RB 17767. Amazonas: Manaus, *Ducke* RB 23485; —, *Riedel* s.n.; —, *Ferreira* 530.

COLOMBIA, Uaupès: Mitu, *P. H. Allen* 3342.

BRITISH GUIANA: Upper Essequibo river, *Myers* 5662; Berbice-Demarara watershed, *Forest Dept. Brit. Guiana* 832.

PERU, Amazonas: Rio Marañon, near mouth of Santiago, *Tessmann* 4291 sec. *Pilger* l.c.

Ecology: In terra firma forests; fl. Sept.–Febr.

Vernacular names: Para: Lacreiro.

Uses: Wood used for roofs (Para).

Observation: "Delicious scent, somewhat like violets. One of the loveliest flowering trees I ever saw" *J.G. Myers* in sched.

37. ***Qualea calophylla*** Pittier, Contr. Fl. Ven. (Arb. Arbust. Nuev.) 29. 1923; — *Bol. Soc. Cienc. Nat.* 4(30): 88. 1938; this publication *fig. 2b*.

Large or medium-sized tree. Branchlets glabrous. Apex of the stipules acute, deciduous, the base persistent, greyish, subglandular, about 2 mm wide, axillary nectaries absent. Petioles 12–20 mm long. Leaf-blades glabrous, firmly coriaceous, oblong or elongate elliptic-oblong, 7–12 × 3½–5 cm; the apex obtuse-acuminate; the base rounded or subobtuse; the midrib narrowly winged below; more than 20 about equally strong lateral nerves per cm (near the midrib); veinlets numerous on almost the entire surface. Inflorescence an ample, many-flowered raceme composed of 1-flowered cincinni. Pedicels densely ferruginous-tomentose, 12–17 mm long. Flower-buds obtuse, 17–25 mm long. Calyx reddish, the lobes densely ferruginous-sericeous, rounded, the minor ones about 10–12, 12–15, 14–16 and 15–18 mm respectively, the spurred lobe up to 25 mm long; the spur dependent, puberulous, about 6–8 mm long, obtuse, the base slightly constricted. Petal white with red and yellow streaks, obcordate, about 4½ cm long and wide. Anther pilose on the back, lanceolate-ovate, acute, 8–9 mm long; the filament nearly glabrous, about 12–14 mm long. Staminodes (or rudimentary petals) linear, 1–2 mm long. Style glabrous. Capsules ellipsoid, about 5 cm long, the brownish exocarp minutely tuberculate.

Holotype: *Jahn* 500 in US.

Distribution: Northern Venezuela.

VENEZUELA, Carabobo: *Funck & Schlim* 637. Aragua: *Pittier* 15444, 15720, 14045. Federal District: *Ernst* s.n.; *Jahn* 500, 543, 1335.

Ecology: In lowland and mountain forests not reached by seasonal floods; from the lowlands up to 1500 m; fl. May–Sept.; fr. (one rep.) Jan.

Vernacular names: The name “floretillo” used by *Pittier* in 1923 is not really in use for this tree (*Pittier* 1938).

38. ***Qualea magna*** Kuhlmann, An. Prim. Reun. Sul-Am. Bot. 3: 80. 1938.

Large tree. Branchlets pubescent in youth, glabrous in age, the cortex not exfoliating. Stipules about ½–1 mm long, acute, the base incrassate; extrafloral nectaries above the stipules, urceolar-subglobose, diam. about 1 mm. Petioles slender, subpuberulous, 7–10 mm long. Leaf-blades subcoriaceous, glabrous, oblong, 7–8½ × 1½–2½ cm; the apex obtuse or obtuse-acuminate; the base subacute; the midrib puberulous, not or narrowly winged; more than 20 about equally strong lateral nerves per cm; veinlets on nearly the entire surface. Panicle loose, rachis and pedicels densely puberulous. Pedicels 10–14 mm long. Flower-buds 15–18 × 9–12 mm. Calyx-lobes ciliate and subpuberulous, the first one 8–10 mm diam., the other minor ones 10–13 mm long, the spurred lobe about 18 mm long, the spur enclosed by the lateral lobes, ellipsoid, 6–7 × 4–5 mm. Petal white, painted with red above the base, obcordate, emarginate, about 5–5½ cm long and up to 7 cm wide. Stamen glabrous, the anther recurved, ovate-lanceolate, acute, about 8–10 mm long; the filament 13–15 mm long. Staminodes and rudimentary petals present. Style glabrous, about 1½ cm long. Capsules unknown.

Holotype: *Kuhlmann* 196 = RB 34385 in RB. Isotypes in: K, U, US.

Distribution: Espirito Santo.

BRAZIL, Espirito Santo: Corrego de Durao, Linhares, Rio Doce, *Kuhlmann* 196 = RB 34385, 432 = RB 57596.

Ecology: In the zone of the coastal forests; fl. Apr.

Vernacular names: Angelica.

Uses: Lumber tree.

39. ***Qualea schomburgkiana*** Warm. *Flora Bras.* 13(2): 39. 1875.

Large or medium-sized tree. Branchlets glabrous. Stipules acute, about 1 mm long, with crateriform about 1 mm wide axillary glands. Petioles 7–17 mm long. Leaf-blades glabrous, firmly coriaceous, oblong or elliptic-oblong, 7–13 × 3–5½ cm; the apex acute, obtuse or shortly acuminate; the midrib two-winged below; more than 10 major lateral nerves per cm, minor ones in between; veinlets near the margin. Inflorescence composed of racemes bearing 1(–2) flowered cincinni. Pedicels subpuberulous, slender, 10–17 mm long. Flowers fragrant, the buds acute, 17–25 mm long. Calyx reddish, green-tinged, the minor lobes rounded, subsericeous or nearly glabrous, the first one about 10 × 7 mm, the other ones 12–15 × 7–9 mm; the spurred lobe rounded, greyish sericeous outside, up to 25 mm long, ovate-elliptic; the spur dependent, glabrous, straight, 7–10 × 2–3 mm; the apex acute, the base constricted. Petal white, streaked with vermillion in the centre, flushed with yellow at the base, obcordate, up to 4 × 6 cm. Stamen glabrous; the anther recurved, about 6 mm long, subacute; the filament up to 15 mm long. Rudimentary petals (or staminodes) 3–5 mm long. Style glabrous except the basal 1–3 mm; the stigma indistinctly three-lobed. Capsules unknown.

Holotype: *Ri. Schomburgk* 893 in B (photograph in F). This specimen (with Warming's handwriting) is now destroyed; the GH duplicate is proposed as the lectotype. *Ro. Schomburgk* 1047; (BM, G, K, L, P, W) cited by Warming in the second place cannot be taken as the lectotype since Warming makes a certain reservation.

Distribution: Roraima district and Pacaraima ridge.

BRITISH GUIANA: Roraima, *Ri. Schomburgk* 893; —, *Ro. Schomburgk* 1047; —, — 584; —, — VII; —, *Forest Dept. Brit. Guiana* 2827; —, *Im Thurn* 79; —, *Tate* 206.

VENEZUELA, Bolivar: Roraima, *Pinkus* 64; Pacaraima, St. Teresita de Kavanayén, *Steyermark* 60490; —, Ptari-tepui, *Steyermark* 60710, 60674; Caroni R., *Cardona* 1704; Cuquenán R., *Ule* 8627.

Ecology: In mountain forests, often along small rivers ("on brooks" *Ro. Schomburgk*), on rocky banks, etc.; fl. Oct.–March.

40. ***Qualea tuberculata*** Staff. nov. spec. (*fig. 13*).

Subgenus *Qualea*, sectio *Qualea*. Arbor magna. Ramuli glabri, haud decorticantes. Stipulae irregulares, linea haud prominula junctae; basi incrassata et haud decidua; apice acuto et deciduo. Glandulae in axillis stipularum tuberculiformes, poro apicali praeditae, diam. 1–2 mm. Petiolus 14–18 mm longus. Lamina glabra, subcoriacea, oblonga vel elliptico-oblonga, 11–17 cm longa et 4–7 cm lata; apice breviter obtuse-acuminata; basi subrotundata et brevissime attenuata; costa subtuse bialata; nervis lateralibus ultra 30 per cm, tenuissimis et creberrimis, inter se venulis transversalibus prope marginem junctis. Inflorescentia ampla, thyrsoida; cincinnis bi- vel rarius unifloris;

pedicellis pubescentibus, 13-18 mm longis. Flores fragrantes. Alabastra 14-18 mm longa. Calycis laciniae pallido-roseae, minores extra subpuberulae, 8-11 mm longae; lacinia major extra dense sericea, circa 18-20 mm longa et lata. Calcar ellipsoideum, circa 4-5 mm longum, sub anthesi calycis lacinia secunda obtectum. Petalum fere album, carinatum, ad 5 cm longum et latum. Stamen glabrum vel fere glabrum; anthera late-elliptica, acuta, circa 8 mm longa et 4 mm lata;

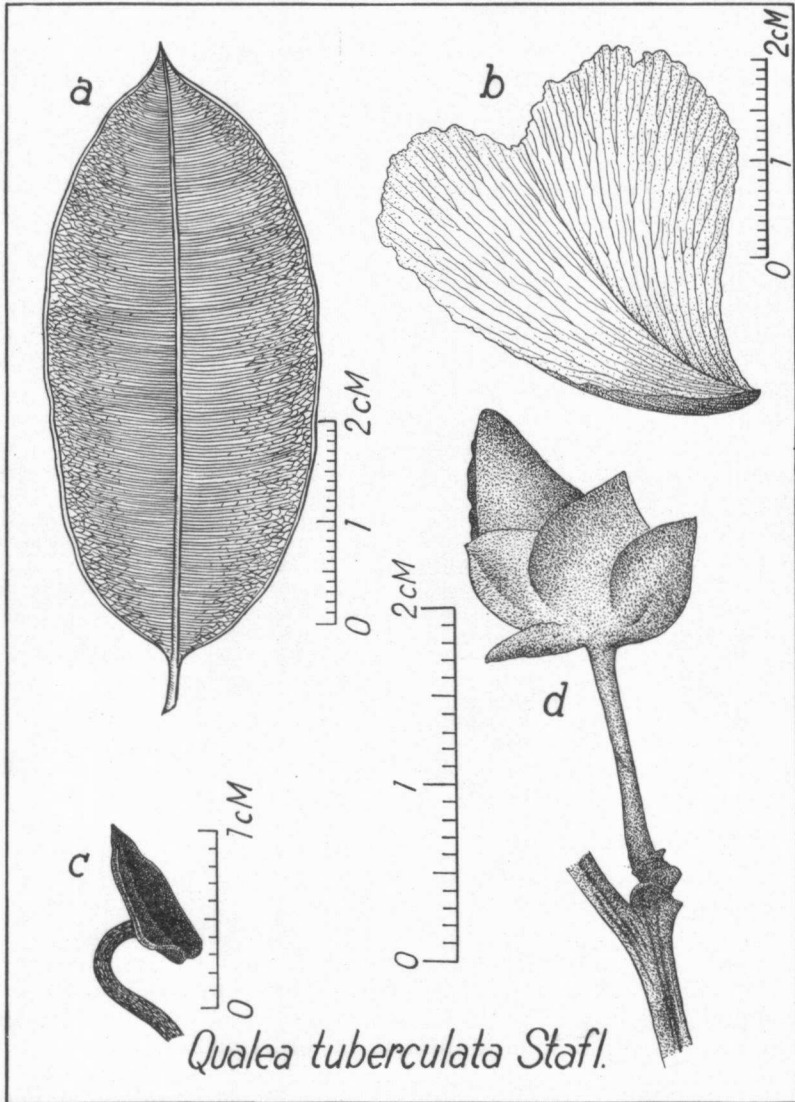


Fig. 13. *Qualea tuberculata* Stafl. a. Leaf; b. petal; c. stamen; d. flower-bud.

filamento crasso ad 15 mm longo. Stylus circa 10 mm longus. Capsula ignota.

Holotype: *Ll. Williams* 14384 in F. Isotype in US.

Distribution: Venezuelan Amazonas.

VENEZUELA, Amazonas: Rio Guainía, *Ll. Williams* 14384, 14830.

Ecology: In high forests on terra firma; fl. Febr.–March; 127 m.

Observation: Characterised by the peculiar (tuberculate) extrafloral nectaries in the axils of the stipules, the large, oblong leaves, the broad-elliptic anther, etc.

41. ***Qualea decorticans*** Ducke, Arch. Inst. Biol. Veg. 4: 39. 1938.

Large tree. Branchlets glabrous, the cortex exfoliating. Stipules minute; axillary glands urceolar with thick walls, 1 mm wide, $\frac{1}{2}$ mm high. Petioles 10–18 mm long. Leaf-blades coriaceous, glabrous, lanceolate, 7–11 \times 2 $\frac{1}{2}$ –3 $\frac{1}{2}$ cm; the apex long acute-acuminate (10 mm); the base obtuse or acute; the midrib narrowly two-winged below; more than 40 lateral nerves per cm, hardly prominent; veinlets numerous on the entire surface. Panicle many-flowered, cincinni 1–4 flowered. Bracts triangular. Pedicels puberulous, slender, 5–8 mm long. Flower-buds acute, 13–17 mm long. Calyx in vivo cyaneo-violaceous, the lateral lobes subpuberulous and ciliate, 4–6 mm long, the anterior lobes obtuse, nearly glabrous, 6–8 mm long; the spurred lobe elliptic-oblong, up to 17 mm long; the spur glabrous, subcylindrical, 4–5 mm long. Petal pink, obcordate, emarginate, 2 $\frac{1}{2}$ –3 \times 3–3 $\frac{1}{2}$ cm. Anther subacuminate, about 7 mm long, the back pilose; the filament glabrous, somewhat flattened, about 10 mm long. Rudimentary petals and staminodes linear, the former up to 8 mm, the latter about $\frac{1}{2}$ –1 mm long. Ovary subpilose. Style glabrous, about 10 mm long. Capsules unknown.

Holotype: *Ducke* RB 34667 in RB. Isotypes in: G, IAN, K, NY, P, S, U, US.

Distribution: Once collected.

BRAZIL, Amazonas: Cucuhy on the Venezuelan-Brazilian border between the Rio Negro and the granitic mountains, *Ducke* RB 34667.

Ecology: In somewhat swampy forest not reached by seasonal floods; fl. Sept.

42. ***Qualea suprema*** Ducke, Arch. Inst. Biol. Veg. 2: 53. 1935; *Ducke* 1938 p. 39.

Shrub or small tree. Branchlets glabrous, the cortex not exfoliating. Persistent bases of the stipules subprominent, about 1 mm long. Petioles 4–7 mm long. Leaf-blades glabrous, thinly coriaceous, when dry yellowish-green, lanceolate, lanceolate-ovate or suboblong, 7–10 \times 2 $\frac{1}{2}$ –3 $\frac{1}{2}$ cm; the apex gradually long acute-acuminate (10–15 mm); the base obtuse or nearly rounded; the midrib narrowly two-winged below; about 10 main lateral nerves per cm, one minor one in between each pair; veinlets in- or subconspicuous. Inflorescences few-flowered up to 6 cm long racemes composed of 2–3 pairs of 1–2 flowered cincinni. Pedicels slender, 12–20 mm long, subpuberulous or glabrous, slightly incrassate towards the apex. Flower-buds acute, about 2–2 $\frac{1}{2}$ cm long, subpuberulous outside. Calyx in vivo dirty violaceous, the minor lobes rounded, up to 16 mm long; the spurred lobe up to 2 $\frac{1}{2}$ cm

long, obtuse-rounded; the spur ellipsoid, 3–6 mm long, hidden between the other lobes. Petal blue with a yellow base, $4\frac{1}{2}$ –6 cm long and wide, obcordate, emarginate, in vivo laterally involute and curved. Stamen glabrous, the anther 10–12 mm long, slightly recurved, the connective wide, the locules narrow, marginal; the filament somewhat flattened, thick, about 13 mm long. Staminodes linear, 3–4 mm long. Style glabrous, 15–18 mm long. Capsules unknown.

Holotype: *Ducke* RB 24161 in RB. Isotypes in: K, P, S, U, US.

Distribution: Upper Rio Negro region.

BRAZIL, Amazonas: Rio Curicuriary, affl. Rio Negro, *Ducke* RB 24161, 336 = RB 34662; Rio Ia affl. Marié, *Froes* 22389.

Ecology: In lowland forests, flooded by seasonal floods (varzea); fl. Nov.–June.

43. ***Qualea cyanea*** *Ducke*, Arch. Inst. Biol. Veg. 2: 54. 1935 p. 54; *Ducke* 1938 p. 38.

Large tree. Branchlets glabrous, the cortex not exfoliating. Stipular glands subprominent, about 1 mm wide. Petioles 12–15 mm long. Leaf-blades coriaceous, glabrous, elliptic-oblong or ovate-elliptic, $7\text{--}11 \times 4\frac{1}{2}\text{--}6$ cm; the apex abruptly and shortly obtuse-acuminate; the base obtuse, both often folded; the midrib not winged; 10–15 major subprominent lateral nerves per cm, one minor one in between each pair; veinlets in- or subconspicuous. Panicle terminal, loose, often surpassing 20×20 cm, composed of racemes bearing several pairs of 1(–2) flowered cincinni. Pedicels subpuberulous, slender, 8–15 mm long. Flower-buds 13–16 mm long. Calyx in vivo dark violaceous, whitish puberulous outside, the first lobe about 7–8 mm, the other minor ones about 10–14 mm long; the spurred lobe broadly elliptic, emarginate, 16–20 mm long; the spur cylindrical, about 6 mm long, covered by the second lobe. Petal blue with a yellow central streak, obcordate, emarginate or two-lobed, about $30\text{--}35 \times 35\text{--}42$ mm. Anther pilose on the back, lanceolate, apiculate, about 5 mm long; the filament glabrous. Staminodes, if present, linear, about 1 mm long. Style nearly glabrous, 7–12 mm long. Capsules unknown.

Holotype: *Ducke* RB 24165 in BR. Isotypes: IAN, K, NY, P, S, U, US.

Distribution: Once collected.

BRAZIL, Amazonas: between Jacurapá and Puruité rivers (affl. Rio Ica), *Ducke* RB 24165.

Ecology: In moist places in terra firma forest; fl. Oct.

Section C. ***Costatifolium*** Staff. nov. sect.

Series II. *Costatae* Warm. Flora Bras. 13(2): 32. 1875 (latin diagn.).

Trees or shrubs. Buds mostly perulate. Stipules represented by subprominent, crateriform glands with a dark interior and a thick, callous, lighter coloured margin. Leaves pilose or glabrous, nearly equal-sided; midrib impressed above, strongly prominent below; major lateral nerves less than 8 per cm, subparallel, making an angle of 60–80° with the midrib; anastomosing veinlets distinct and numerous; marginal nerve undulate. Flower-buds ovoid, the minor lobes not closely adpressed against the spurred lobe. Stamen glabrous, the anther

dorsifixed, distinctly shorter than the filament. Staminodes rarely present. Ovary densely hirsute, abruptly merging into the slender style. Stigma subcapitate.

Type-species: *Qualea grandiflora* Mart.

Distribution: Three species in the region of the campos and four in the Hylaca.

Key to the species

- | | | |
|------|--|---|
| 1a. | Cortex of the branchlets not exfoliating (or rarely with small fragments). Spur shorter than 10 mm | 2 |
| b. | Cortex of the branchlets exfoliating. Spur 15–25 mm long in adult flowers | 44. Q. grandiflora Mart. |
| 2a. | Leaves distinctly pilose below | 3 |
| b. | Leaves glabrous below; on young ones sometimes some scattered hairs | 5 |
| 3a. | Petal mainly blue. Flower-buds 5–7 mm long, about as long as the spur | 4 |
| b. | Petal mainly white. Flower-buds about 10 mm long, the spur distinctly shorter, densely lanuginose with patent hairs | 45. Q. multiflora Mart. ssp. pubescens (Mart.) Staff. |
| 4a. | Apex of the leaves obtuse, sometimes subacute or rounded. Spur straight or slightly curved | 46. Q. parviflora Mart. |
| b. | Apex of the leaves acuminate. Spur strongly incurved towards the pedicel | 47. Q. dinizii Ducke |
| 5a. | Lateral nerves at 1–5(–6) mm distance | 6 |
| b. | Lateral nerves at 7–15 mm distance | 11 |
| 6a. | Petal mainly white. Flower-buds longer than 9 mm; the spur shorter than the bud | 7 |
| b. | Petal mainly blue. Flower-buds 5–7 mm long, about as long as the spur | 8 |
| 7a. | Spur glabrous; 4–7 major lateral nerves per cm. | see no. 31. Q. gracilior Pilger |
| b. | Spur densely pilose; 1–3 main lateral nerves per cm. | 45. Q. multiflora Mart. ssp. multiflora |
| 8a. | Spur patent, curved, about as long as the bud | 9 |
| b. | Spur stretched along the back of the fourth calyx-lobe, somewhat longer than the bud | 48. Q. tessmannii Mildbr. |
| 9a. | Apex of the leaves acuminate | 10 |
| b. | Apex of the leaves mostly obtuse, sometimes subacute or rounded | 46. Q. parviflora Mart. |
| 10a. | Base of the leaves rounded and narrowly cordate. Spur incurved towards the anterior lobes and sometimes touching them | 49. Q. rupicola Ducke |
| b. | Base of the leaves, in particular of the young ones, acute or obtuse, never cordate. Spur incurved towards the pedicel | 47. Q. dinizii Ducke |
| 11a. | Base of the leaves rounded or cordate. Inflorescence a terminal raceme of 2–3 flowered epedunculate cincinni . | 12 |

- b. Base of the leaves gradually narrowing towards the petiole, the extreme base narrowly cordate. Inflorescence a panicle of regular, peduncled, three-flowered cymes
 see no. 51. **Q. cymulosa** Schery
- 12a. Perulate buds conical, acuminate, about 4 mm long. Capsules 3–4 cm long 50. **Q. psidiifolia** Spruce ex Warm.
- b. Perulate buds ovoid, subacute, 1–2 mm long. Capsules 8–9 cm long see no. 58. **Q. megalocarpa** Staffl.

44. **Qualea grandiflora** Mart. Nov. Gen. Sp. 1: 133. *t.* 79. 1824; Schult. 1827 p. 102; Spreng. 1827 p. 10; DC. 1828 p. 29; A. Dietr. 1831 p. 99; Don 1832 p. 671; D. Dietr. 1839 p. 21; Ettingshausen 1861 p. 185; Warm. 1867 p. 29; — 1875 p. 41 *t.* 8 II; — 1889 p. 22; — 1892 p. 224; Wille 1882 p. 181 seq. (anat.); Malme 1900 p. 44; — 1905 p. 7; — 1924 *t.* I fig. 2; Chodat 1902 p. 736; Chodat & Hassler 1903 p. 243; Glaziou 1905 p. 30; L. B. Smith 1945 p. 300; Macbride 1950 p. 877; Hoehne 1951 p. 257. *Qualea ecalcarata* Mart. 1824 p. 131. *t.* 78; Schult. 1827 p. 101; Spreng. 1827 p. 10; DC. 1828 p. 29; A. Dietr. 1831 p. 99; Don 1832 p. 671; Reichenbach 1836 t. 332 (fide Warm. 1875 p. 42); D. Dietr. 1839 p. 21; Warm. 1875 p. 42. *Schuechia brasiliensis* Endl. ex Walp. 1843 p. 68, 1845–46 p. 663. *Schuechia ecalcarata* Warm. 1867 p. 33.

Tree, the trunk often distorted; the young branchlets, buds, petioles, midrib and lower surface of the leaves tomentellous; the cortex of the branchlets exfoliating. Perulate buds ovoid. Crateriform bases of the stipules 1–2 mm long; the tops wanting or minute and then acute. 0–4 Accessory glands sometimes present. Petioles 6–10 mm long. Leaf-blades coriaceous, discolor, oblong or suboblong, 10–20 × 4–8 cm; the apex shortly acuminate; the base rounded, subcordate or obtuse; 30–45 main lateral nerves on either side at about 3–7 mm distance. Cincinni 1–4 (mostly 2-) flowered, arranged in terminal or axillary racemes; cincinni sometimes axillary. Rachis, peduncles, pedicels and bracts tomentellous. Bracts obtuse, 6–9 mm long. Peduncles up to 5 mm long. Pedicels 10–20 mm long. Flower-buds about 15–25 mm long. Flowers fragrant. Calyx sericeous outside; the lobes rounded or obtuse; the spur cylindrical, up to 30 mm long, elegantly curved. Petal white with a yellow base or yellow, obcordate-orbicular, up to 4 × 6 cm. Anther about 10 mm long with a triangular, more or less V-shaped connective and narrow, marginal locules; the apex subacute, the base cordate, adhering to the about 15 mm long filament somewhat above the base. Staminodes 2, about 1 mm long. Style glabrous. Capsules about 6–8 cm long, ovoid; the base rounded; the apex apiculate; glabrous, dull and minutely verruculose outside; the exocarp woody, 4–6 mm thick, the endocarp about 1 mm thick. Seeds numerous, the wings about 4 mm long.

Holotype: *Martius* s.n. in M (Sao Paulo, in the fields near Ypanema). Holotype of *Q. ecalcarata* Mart., of *Schuechia brasiliensis* Endl. ex Walp. and of *Schuechia ecalcarata* Warm.: *Martius* s.n. in M (Minas Geraes) Note: *Q. ecalcarata* is the type-species of the genus *Schuechia* Endl. (1836–40 p. 1178).

Distribution: In the Central Brazilian Campos and the Amazonian Campinas.

BRAZIL, Parana: Itararé, *Dusen* 35/41, 9655, 11287, 16438. Sao Paulo: Ypanema, *Martius* s.n., 114; *Regnell* III 527; *Viégas* 5548; *Mosen* 1270, 1271; *Hemmenndorf* 264, 269; *Löfgren* 1089, *Raben* s.n. Minas Geraes: Numerous collections in many herbaria, e.g. *Martius* s.n.; *Glaziou* nos. 17611, 17612, 9794, 14696, 19154. Goyaz: *Gardner* 3143; *Pohl* 428; *Lützelburg* 437; *Ule* 326; *Glaziou* 20683, *Brade* 15472; *Burchell* 6106, 8255. Bahia: *Blanchet* 3081; *Lützelburg* 3098, 3099. Ceara: *Löfgren* 288. Piauh: *Dahlgren* 871; *Gardner* 2162; *Lützelburg* 14074. Maranhao: *Carolina*, *Pires & Black* 2005; 2222, *Vitoria*, *Pires & Black* 1693a. Matto Grosso: *Lindmann* A 2729; *Malme* I 1142; *Moore* 740; *Robert* 570b. Para: *Spruce* s.n. 336; *Kuhlmann* RB 17769; *Ducke* PG 3585 = RB 14068, PG 8159; *Da Costa* 299. Amazonas: Rio Madeira, *Krukoff* 5821A.

PARAGUAY: Rio Apa, *Fiebrig* 4465, *Hassler* 7881, 7881a; Sa de Maracayú, *Hassler* 5583; Co Noaga, *Anisits* 2024, 2365, 2837.

BOLIVIA: Santa Cruz, Sara, Buenavista, *Steinbach* 6785; Velasco, *Kuntze* s.n.; Iumapassa, *R. S. Williams* 528; Atten, *R. S. Williams* 1575.

Ecology: Characteristic tree of the "campos cerrados", mostly with distorted trunks (cf. orchard trees). Protected against fires and drought by an extremely thick, suberous cortex. Outside the campo-region found in similar vegetations (savannas, campinas, etc.). The tree bears flowers during the rainy season: in Central Brazil especially in Nov., Dec. and Jan. but occasionally from Oct.-March (Fr.: Febr.-April; new leaves: Aug.-Oct.), in lower Amazonia from Febr.-June. After fire sometimes flowering in the dry season (*Malme* 1905 l.c.).

Vernacular names: BRAZIL: Pao terra, Páu terra, Páu terra uassú, Páu terra do campo, Páu terra da folha larga (grande); regional names: Minas Geraes: Páu santo, Arvore de terra, Uva puva do Campo; Para: Ariuaú.

Observation 1: It is possible that *Agardhia grandiflora* Spreng. (1827 p.17) and *Lozania grandiflora* Schult. (1827 p. 109) are also later synonyms for this species, but this cannot be established with any certainty. Sprengel mentions no type and his description does not cover completely that of *Q. grandiflora*. Schultes cites *Agardhia grandiflora* as a synonym to his *Lozania grandiflora*, but not to *Q. grandiflora* or *Q. ecalcarata*.

Observation 2: *Q. ecalcarata* Mart. differs from this species only by the absence of the spur and the occasional occurrence of two stamens and two petals. The one collection is apparently a monstrosity.

Observation 3: *Glaziou* (1905 p. 30, ex Taub.) refers the specimen *Glaziou* 17611 (in P) to a non-described variety. The relevant specimen has somewhat shorter and wider leaves but this variation does not seem to justify the description of a separate variety.

45. **Qualea multiflora** Mart. Nov. Gen. Sp. 1: 134. t. 80. 1824; Spreng. 1827 p. 9; Schult. 1827 p. 100; DC. 1828 p. 29; A. Dietr. 1831 p. 100; Don 1832 p. 671; D. Dietr. 1839 p. 21; Ettingshausen 1861 t. 80; Warm. 1867 p. 30; — 1875 p. 44 t. VII; Wille 1882 p. 181 seq. (anat.); Petersen 1896 p. 318; Malme 1900 p. 45; *Glaziou* 1905 p. 30; *Correa* 1931 p. 263 (vern. names, uses).

ssp. **multiflora** (includes: var. *glabra* Mart. l.c., Schult. l.c.; D. Dietr. l.c.).

Small tree or shrub, the trunk often distorted, the vegetative parts glabrous; the cortex of the branchlets not exfoliating. Perulate buds ovoid, 3-4 × 1-2 mm. Stipular glands 1-2 mm wide, often some smaller accessory glands on the internodes. Leaves mostly opposite, rarely in trimerous whorls or nearly scattered. Petioles 2-5 mm long. Leaf-blades coriaceous, often oblong or broadly lanceolate, sometimes also ovate or elliptic, 7-16 × 2-7 cm; the apex short-acuminate, sometimes obtuse or acute; the base obtuse or rounded, sometimes

subcordate; 15–25 major lateral nerves on either side, prominent below, minor ones in between, disappearing in the reticulate venation. Upper part of the inflorescence a raceme of 2–5 flowered cincinni, the lower part branched with the cincinni on the branches. Bracts acute or acuminate, 3–5 mm long. Peduncles 1–5 mm long. Pedicels 5–10 mm long, puberulous with mixed longer and shorter hairs. Flower-buds obtuse, about 10 mm long. Flowers fragrant. Calyx densely fulvous sericeous, the lobes rounded, the spur subclavate or cylindrical, rounded, straight in youth but curved in age, 5–8 mm long, the lanuginose indumentum composed of mixed longer and shorter hairs contrasting with the sericeous indumentum of the lobes. Petal obcordate, two-lobed, white or later yellow, spotted with red or violet, up to 3 × 3 cm. Stamen 10–14 mm long, the anther recurved and subacute, the connective incrassate, adhering to the slender filament somewhat above the cordate base. Style slender, glabrous except the basal 1–2 mm. Capsules up to 3 cm long, the exocarp minutely verruculose, brownish, woody, about 2 mm thick.

Holotype: *Martius* s.n., Minas Geraes (“in campis raro arboribus obsitis”) in M. Distribution: Central Brazilian Plateau and Northern Paraguay.

BRAZIL, Minas Geraes: *Martius* s.n.; *Glaziou* 17613; *Claussen* div. coll.; *Lund* s.n.; *Warming* s.n.; *Reinhardt* s.n.; *Pohl* 5848; *Regnell* III 528c, — II 99; *Oliveira* s.n.; *Barreto* 7134, 7135, 7138; *St. Hilaire* B^a 2359, C^a 294. Sao Paulo: *Hemmendorf* 268, 286; *Mosen* 1272, 1273, 1274; *Löfgren & Edwall* 13537; *Burchell* 5214; *Gaudichaud* 857, *Lund* s.n. Parana: *Dusen* 16506, 11724. Matto Grosso: *Regnell* III 526x; *Kuntze* s.n. Rio de Janeiro: Nova Friburgo, *Glaziou* 19148.

PARAGUAY: Sierra de Amanbay, *Hassler* 10734, 10738.

Ecology: In campo-vegetation on dry grounds or in semi-deserts; fl.: wet season, mainly Nov.–March, occasionally later; fr.: Febr.–Aug. The leaves fall in the last months of the dry season (July–Sept.); the new leaves appear in the first months of the wet season.

Vernacular names: BRAZIL, Minas Geraes & Sao Paulo: Uva puva do Campo, Páu terra; Rio de Janeiro: Louro-tinga. Correa (l.c.) cites: Páu terra do campo, Páu de Tucano, Cinzeiro.

Use: The wood is used for canoes and as lumber (Correa l.c.).

ssp. **pubescens** (Mart.) Staff. nov. comb. *Q. multiflora* Mart. var. *pubescens* Mart. 1824 p. 135 (latin diagnosis); Schult. 1827 p. 100; DC. 1828 p. 29; Don 1832 p. 671; D. Dietr. 1839 p. 21. *Qualea jundiahy* Warm. 1867 p. 31 fig. 5, 6.; — 1875 p. 45 t. VII fig. 1; Wille 1882 p. 181 seq. (anat.); Petersen 1896 p. 318 fig. 172A; Malme 1900 p. 46; Löfgren 1903 fig. 32 fide Index Londinensis; Glaziou 1905 p. 30; Kuhlmann & Kühn 1947 p. 81, 162. *Qualea pilosa* Warm. 1875 p. 45; — 1889 p. 23; Wille 1882 p. 181 seq. (anat.); Malme 1900 p. 45; Pilger 1901 p. 166, 230; Chodat & Hassler 1903 p. 243; Glaziou l.c.; Malme 1905 p. 8; Hoehne 1914 p. 52 t. 10; Erdtman 1952 p. 452. *Qualea virgata* Rusby 1912 p. 99.

Differs from the ssp. *multiflora* by the presence of a whitish-greyish, often brownish indumentum on the lower surface of the leaves, on the branchlets, the petioles and the perulate buds.

Lectotype: *Martius* s.n. in M. *Martius* does not indicate a particular specimen. It can be assumed that he used his own collections from Minas Geraes and Sao Paulo. The sheets in the Munich herbarium bear blank labels and one of these

has been chosen as the type. Holotype of *Q. jundiahy* Warm.: Warming s.n. at Lagoa Santa, in C. Holotype of *Q. pilosa* Warm.: Regnell III 528 (29-11-1849 or 1848) in S. Only one of the numerous Regnell III 528 sheets bears the indication *Q. pilosa* in Warming's handwriting. Branchlets from what appears to be the same tree on other sheets are named *Q. jundiahy*. Holotype of *Q. virgata* Rusby: R. S. Williams 415 in NY, duplicates in BM, K, US.

Distribution: Central Brazilian Plateau, Eastern Bolivia and Northern Paraguay.

BRAZIL, Minas Geraes: Regnell III 528b, III 1760; Mexia 5581, 5641; Pohl 2860; Warming s.n. (Lagoa Santa); Glaziou 19150a; Barreto 8514; St. Hilaire B² 2352, 2353, s.n.; Weddell 2847; Claussen div. coll. Sao Paulo: Regnell III 528a; Mosen 4144; Hemmendorf 216; Riedel 459. Rio de Janeiro: Glaziou 3956, 19148. Goyaz: Gardner 3146; Pohl 3930; St. Hilaire C¹ 731, 732, 902bis; Glaziou 20684; Ule 325. Matto Grosso: Malme I 1168; Robert 643; Gaudichaud 305. Piahy: Gardner 3144. Bahia: herb. Kegel 12340. Maranhao: Pires & Black 2478.

BOLIVIA: Velasco, Kuntze s.n.; Iumapaza, R. S. Williams 415, 397; Ixiamos, Cardenas 2002.

PARAGUAY: Upper Apa river, Hassler 8144.

Ecology: In campo vegetation ("cerrado", "capoes de mata", "mata aberta" and "capueira") up to 1000 m. Characteristic cerrado tree: much-branched and the distorted trunk and branches provided with a thick cortex (cf. *Q. grandiflora*, *Vochysia cinnamomea*). Fl.: wet season, mainly Nov.-March, occasionally later. Fr.: April (one report). Flowers visited by several insects, e.g. by common bees (Kuhlmann & Kühn l.c.).

Vernacular names: BRAZIL, Minas Geraes: Páu terra, Páu terra da folha miuda, Páu terra do mato; Jundiahy (at Lagoa Santa).

Observation 1: Warming (1875) describes two separate species (*Q. pilosa* and *Q. jundiahy*). In the opinion of the present author these two species cannot stand, in particular when the greatly enlarged number of specimens and the subsequent wider knowledge of the variability of this group is taken into account. The differences are (cf. Warming l.c.): a. *Q. jundiahy* has a less developed indumentum than *Q. pilosa*, the limb of the leaves being usually visible between the hairs; b. the petioles differ in length; c. the calyx-lobes differ in structure. The arguments b. and c. have to be dropped at once; the enlarged material shows a variability in these respects excluding specific differences. The first point is of some importance, but in this respect too a series of intermediate forms is found (cf. Claussen 489 in S) and it is often impossible to decide whether a specimen belongs to *Q. jundiahy* or to *Q. pilosa*. It would be impracticable to distinguish even varieties. In the present treatment both species of Warming are described under the ssp. *pubescens* of *Q. multiflora*. The differences of the "multiflora" group on the one hand and the "pubescens" group on the other, are not of a specific character. The flowers, the nervation and the shape of the leaves, the stipules and the glands are always alike and the only difference can be found in the indumentum. Martius describes a var. *pubescens* "a que ceterum nullo modo differt". The rank of subspecies seems more appropriate since both groupes differ in an — admittedly small — group of characters and because of the absence of intermediate forms.

Observation 2: *Qualea virgata* Rusby differs in no respects from the present species. No differences are mentioned by Rusby himself!

Observation 3: *Qualea macroptera* A. Dietr. (1831 p. 101) and *Qualea subvillosa* Link ex A. Dietr. (1831 p. 101) may also belong to this species. The descriptions of A. Dietrich are, however, inadequate; no types were mentioned. The Berlin collections which could have given further information are now destroyed. The description of both species, although rather short, does not contradict our supposition. A Sellow specimen "ex Berlin" is preserved in US; it bears the annotation *Q. macroptera* Lk. and belongs clearly to this subspecies.

Qualea subvillosa Link ex A. Dietr. var. *glabrifolia* A. Dietr. is possibly identical with the ssp. *multiflora*.

46. *Qualea parviflora* Mart. Nov. Gen. Sp. 1: 135. t. 81. 1824; Spreng. 1827 p. 10; Schult. 1827 p. 103; DC. 1828 p. 29; A. Dietr.

1831 p. 100; Don 1832 p. 671; D. Dietr. 1839 p. 21; Schnizlein 1843-70 *t.* 260 *fig.* 2, 6-15; Ettingshausen 1861 *t.* 80; Warm. 1867 p. 30; — 1875 p. 43; — 1889 p. 22; Wille 1882 p. 181 seq. (anat.); Malme 1900 p. 45; — 1924 *t.* 1, 3; Pilger 1901 p. 165, 230; Chodat 1902 p. 736; Chodat & Hassler 1903 p. 243; Glaziou 1905 p. 30; Ducke 1938 p. 41; Standley 1933 p. 20; Hoehne 1951 p. 257. *Qualea parviflora* Mart. var. *tomentosa* var. *glabrata* & var. *discolor* Mart. l.c. (also Schult., DC., Don and D. Dietr. l.c.).

Small tree or shrub with distorted trunk and branches and with a thick, suberosus cortex. Branchlets often puberulous in youth, the cortex not exfoliating. Stipular glands about 1 mm long; often some accessory glands scattered on the internode. Petioles 3-6 mm long. Leaf-blades coriaceous, in general oblong, 5-14 × 1½-4 cm, extremely variable in size, shape and indumentum, glabrous or tomentellous; the apex obtuse, subacute, rounded or emarginate, often mucronulate; the base obtuse or rounded. Lateral nerves slender, subprominent below, the major ones often at 2-4 mm distance with minor ones and a reticulate venation in between. Inflorescences cylindrical. Racemes terminal and axillary, cylindrical, up to 20 × 4 cm, composed of 2-6 flowered epedunculate cincinni, the latter sometimes congested and the flowers in semi-whorls. Pedicels pubescent, slender, 5-15 mm long. Flower-buds obtuse, about 6-7 mm long. Calyx greyish-whitish sericeous outside, the spurred lobe more or less convolute; the spur cylindrical or subclavate, 6-8 mm long, straight or slightly curved. Petal violaceous or coeruleous, the base whitish and subpilose, about 1½-2 cm long and 2 cm wide. Anther about ½ mm long, the connective incrassate with marginal locules, often strongly recurved; the filament about 5 mm long. Staminodes and rudimentary petal sometimes present. Style about 5 mm long. Capsule up to 3½ cm long, ovoid-oblongoid, the woody, resinous exocarp about 1 mm thick, verruculose.

Lectotype: *Martius* s.n. (Minas Geraes ad Arraial das Contendas) in M. Martius does not cite a precise locality. Of the several Munich specimens the one with a complete label, belonging to the "var. *tomentosa*" has been chosen as the lectotype. The specimen depicted on *t.* 81 (Mart. 1824) was composed for the occasion.

Distribution: Widely distributed in Southern and Central Brazil, Eastern Bolivia and Northern Paraguay.

BRAZIL, Minas Geraes: Numerous collections in many herbaria. Sao Paulo: *Regnell* III 526; *Hemmenndorf* 265. *Martius* s.n. Goyaz: *Gardner* 3145; *Burchell* 6108, 6008, 7280, 8520, 7591; *St. Hilaire* C¹ 800; *Machado* 435; *Siek* B 24. Matto Grosso: *Malme* I 1036, II 1806, II 2291; *Lindmann* A 3031; *Moore* 486; *Robert* 568, 568b. Ceara: *Duarte* 1491; *Dahlgren* 882; *Miranda* 7; *Löfgren* 635, 320; *Gardner* 1597; *Lützelburg* 12492, 25880, 16171, 26206. Maranhao: *Ducke* 2183; *Froes* 11712, 21577, 24248; *Pires & Black* 2309, 2579, 2166. Piauh: *Lisboa* PG 2397. Bahia: *Blanchet* 2808; *Lützelburg* 2094, 3024; *Zehntner* 402. Para: *Capucho* 488; *Da Costa* 224. Amazonas: *Ducke* RB 34663.

BOLIVIA: Tipuani-Guanai, *Bang* 1663; O. Velasco, *Kuntze* s.n.; Yungas, *Weddell* 4214.

PARAGUAY: Sierra de Maracayù, *Hassler* 5590; Upper Apa river, *Hassler* 8229; Sierra de Amanbay, *Hassler (Rojas)* 10692; Apa river, *Anisits* 2424; —, *Fiebrig* 4013 (4964).

Ecology: In campo vegetation, mainly on dry and stony ground. The leaves fall at the end of the dry season (July-Sept.); the flowers appear shortly after the

first rains (Sept.–Dec.). Malme (1905 l.c.) states that the flowers may appear before the rains after fire. Fr. Apr.–Sept. Characteristic tree of the campos cerrados with *Q. multiflora*, *Q. grandiflora* and *Vochysia cinnamomea*.

Vernacular names: BRAZIL, Ceara: Craiba. Minas Geraes: Páu terra, Páu terra con folhas miudas, Páu terra do campo, Páu terra miuda. Maranhao: Páu de Judeu, Judeu.

Use: The wood is used as timber.

47. ***Qualea dinizii*** Ducke, Arch. Jard. Bot. Rio 1: 49. t. 17, 19E. 1915; — 1938 p. 41; Pfeiffer 1926 p. 354; A. C. Smith 1939 p. 188; Mennega 1948 p. 46; Stafleu 1951 p. 195. *Qualea dinizii* Ducke var. *glabrifolia* Meurs ex Amshoff 1948 p. 12 (nomen nudum).

Large tree. Branchlets subpuberulous or glabrous, the cortex exfoliating (small fragments). Perulate buds ovate, acute, pilose. Stipular glands subprominent, less than 1 mm wide. Petioles 2–4 mm long. Leaf-blades subcoriaceous, generally oblong, up to 11 × 4½ cm but on flower-bearing branchlets usually much smaller; the apex acuminate; the base acute in youth; glabrous above, puberulous and glabrescent below; lateral nerves straight, 3–5 major ones per cm with minor ones in between, subprominent above, not so below; major veinlets subprominent above, the minor ones inconspicuous above and distinctly reticulate below. Racemes whitish-pubescent, mainly axillary, up to 10 cm long, composed of 1–2 flowered cincinni. Peduncles ½–1 mm long. Pedicels slender, 4–6 mm long. Flower-buds about 5 mm long, whitish-sericeous pubescent. Minor calyx-lobes 2–3 mm long; the spurred lobe carinate, about 4–5 mm long; the spur cylindrical, 4–6 mm long, strongly curved. Petal lilac or violaceous, obcordate, emarginate, 10–13 × 13–18 mm. Anther about 1 mm long with a thick connective and semicircularly curved locules. Staminodes absent. Style glabrous, about 3 mm long. Capsule up to 5 cm long, oblongoid, the apex obtuse, the exocarp dull, rugulose, woody, about 3 mm thick.

Holotype: *Ducke* PG 7991 in PG. Isotypes in: BM, G. Cotypes: *Ducke* PG 9028, 11261, 15006, 15641.

Distribution: Eastern Hylaea.

BRAZIL, Para: Rio Mapuera, *Ducke* PG 9028; Rio Tocantins, *Ducke* PG 15641; Lower Rio Trombetas, *Ducke* PG 15897; Obidos, *Ducke* RB 13695; Rio Trombetas, Castanhas do Rio Cuminá, *Ducke* PG 7991; Ariramba, *Ducke* PG 11261; Rio Erepecurú, *Ducke* PG 15006. Amazonas: Terr. Rio Branco, *Froes* 23034.

BRITISH GUIANA: Kanuku Mts., *A. C. Smith* 3250.

SURINAME: (Full details cf. Stafleu 1951 p. 196) Sectie O: *B. W.* nos 2394, 2814 3811, 4173, 4320, 4914, *Boschbeheer* 53, *Woodherb.* 59, 59a. Zanderij I: *B. W.* nos. 738, 1501; Wia Wia bank, *Lanjouw & Lindeman* 1195.

Ecology: In forests on high grounds. Fl.: towards the end of the dry season (Oct.–Dec.). Fr. March (one rep.).

Vernacular names: BRAZIL, Para: Quaruba, Páu mulato da Terra Firme. SURINAME: (cf. Staf. l.c.) e.g.: Wassie-wassie-kwarrie (Negro-English).

Observation: Named to honour José P. Diniz, organizer of the expedition on which *Ducke* discovered this species (*Ducke* 1915 p. 50).

48. ***Qualea tessmannii*** Mildbr. Notizbl. Berlin 9: 141. 1924; Macbride 1950 p. 879.

Tree of medium size. Branchlets in youth puberulous with long and

short hairs, the cortex not exfoliating; in age glabrous, densely lenticellate. Stipular glands subprominent, about 1 mm wide. Perulate buds slender, about 2 mm long. Petioles 2–3 mm long. Leaf-blades coriaceous, glabrous except the midrib, oblong-lanceolate, 40–70 × 12–19 mm; the apex obtuse or sometimes obtuse-acuminate; the base obtuse; the lateral nerves slightly curved, at 1–2 mm; veinlets reticulate. Inflorescence a terminal 6–10 cm long raceme composed of 1–4 flowered epedunculate cincinni, some of the latter in the axils of the upper leaves. Rachis provided with many short and some longer hairs. Pedicels slender, 2–5 mm long, puberulous. Flower-buds 5–7 mm long. Calyx greyish-sericeous outside; the spurred lobe about 6 mm long, conically involute; the spur rounded, subclavate, pilose, stretched along the back of the lobe, about 6–7 mm long. Petal violet, cuneate-suborbicular, the base pilose, 10–12 mm long and wide. Anther about 1 mm long, the locules semicircularly curved; the filament about 5 mm long, narrowed towards the anther. Staminodes not present. Style 4 mm long, glabrous. Capsule 2½–3 cm long, the exocarp woody, resinous, squamulose, about 1 mm thick.

Lectotype: *Tessmann* 3451 in S. The holotype (*Tessmann* 3451 in B) was destroyed during world war II. Photograph of the B specimen in F.

Distribution: Peru and Northern Bolivia.

PERU, San Martin: Juanjuí, *Klug* 4275. Loreto: Middle Ucayali, *Tessmann* 3451.

BOLIVIA, La Paz: San Yungas, basin of Rio Bopi, *Krukoff* 10124.

Ecology: In forests outside reach of seasonal floods. Up to 900 m. Fl. Dec.; fr. July.

49. *Qualea rupicola* Ducke, Arch. Inst. Biol. Veg. 4: 41. 1938.

Small tree with distorted trunk and reddish cortex. Branchlets subpuberulous in youth, glabrous and densely lenticellate in age, the cortex not exfoliating. Stipular glands about 1 mm wide. Petioles 2–5 mm long. Leaf-blades thinly coriaceous, glabrous, oblong or ovate-elliptic, 5–9 × 2–4 cm; the apex subabruptly obtuse-acuminate (top about 10 mm long); the base rounded and narrowly cordate, often folded; main lateral nerves thin, subprominent, at 2–4 mm distance; veinlets reticulate, subprominent. Raceme terminal, densiflorous, composed of 2–3 flowered, epedunculate cincinni, 8–12(–18) cm long, densely greyish-pubescent on all parts. Bracts 2–4 mm long. Pedicels 2–5 mm long. Flower-buds 5–6 mm long; the spur exerted already in young buds. Calyx densely greyish-sericeous outside; the minor lobes rounded, 3–5 mm long; the spurred lobe 5–6 mm long, subcarinate, often convolute; the spur strongly incurved, often curved around the pedicel towards the back of the third lobe, 5–6 mm long. Petal violaceous, up to 15 × 18 mm, obcordate, emarginate, the base pilose. Anther with small connective and semicircularly curved narrow locules; the filament 5–7 mm long. Staminodes not present. Style glabrous, 5–6 mm long. Capsule up to 28 mm long.

Holotype: *Ducke* RB 34674 in RB. Isotypes in: G, IAN, K, P, S, U, US. Distribution: Once collected.

BRAZIL, Amazonas: Rio Negro, Serra do Jacamim, above St. Isabel, *Ducke* RB 34674.

Ecology: On rocks on top of granitic mountains; fl. March.

50. ***Qualea psidiifolia*** Spruce ex Warm. *Flora Bras.* 13(2): 46. *t.8 fig. 1.* 1875; *Ducke* 1938 p. 42.

Large tree. Branchlets glabrous or pilose with about 1 mm long hairs, the cortex not exfoliating. Perulate buds conspicuous, conical, about 4 mm long, the outer scales acuminate. Stipular glands about 1–1½ mm long. Petioles 5–10 mm long, subpilose. Leaf-blades thinly coriaceous, glabrous except the midrib below, oblong or elliptic-oblong, up to 18 × 6 cm; the apex shortly obtuse-acuminate; the base rounded or cordate, sometimes folded; the major lateral nerves at irregular distances, 8–15 on either side, not prominent above, prominent below, ending in the undulate marginal nerve at about 3–6 mm from the margin, a smallish secondary marginal nerve close to the margin; veinlets reticulate, subprominent. Raceme terminal, up to 10 cm long, composed of 2–3 flowered cincinni, fulvous-villose, the hairs up to 2 mm long. Bracts 4–5 mm long. Peduncles 0–3 mm long. Pedicels 8–15 mm long. Flower-buds 8–10 mm long, adpressed villose outside. Spurred calyx-lobe conically convolute, 7–9 mm long; the spur about as long as or somewhat longer than the lobe, clavate, recurved, patent. Petal pink, obcordate, about 2½ × 2½ cm. Anther about 2 × 1 mm, the locules recurved, the filament about 7 mm long. Staminodes not present. Style glabrous, 7–9 mm long. Capsule about 3(–4) cm long, squamulose-verruculose, the valves elliptic-oblong; the apex obtuse; the exocarp woody, about 1½ mm thick.

Holotype: *Spruce* 3059 in C. Isotypes in: BR, G, GOET, K, NY, OXF, P, RB, U, W. ("near San Carlos"). Cotype: *Spruce* 3059 (fr.) ("ad flumina Cassiquiari, Vasiva et Pacimoni").

Distribution: Upper Rio Negro Region.

BRAZIL, Amazonas: Along Cassiquiari, Vasiva and Pacimoni rivers, *Spruce* 3059 (fr.); Cucuhy, Upper Rio Negro, *Ducke* RB 34664; Rio Curicuriary, affl. Rio Negro, *Ducke* RB 23791.

VENEZUELA, Amazonas: San Carlos on Rio Negro, *Spruce* 3059 (fl.).

Ecology: In riverine forest; fl. Sept.–Oct.

Section D. ***Polytrias*** Staffl. nov. sect.

Arbor, ramulis hornotinis ad basim perulis instructis, gemmis perulatis, foliis basi subobliquis, nervis lateralibus haud numerosis (5–8), subparallelis, sub angulo circa 60–80' e costa ortis. Axes inflorescentiarum secundarii cymas pedunculatas regulariter trichotomas formant. Petalum basi pilosum. Stamen glabrum, anthera dorsifixa filamento brevior, connectivo subincrassato. Petala rudimentaria vel (et) staminodia absunt. Ovarium dense hirsutum, abrupte in stylum transiens.

Type-species: *Qualea cymulosa* Schery.

Distribution: One species in Panama and adjacent Colombia.

Observation: The name refers to the numerous three-flowered cymes in the inflorescence.

51. *Qualea cymulosa* Schery, Ann. Missouri Bot. Gard. **36**(3): 285. 1949.

Large tree. Branchlets puberulous in youth, glabrous and densely lenticellate in age. Stipular glands crateriform, the margin light-brownish; a small accessory gland 1–3 mm below the main ones. Petioles 5–9 mm long. Leaf-blades elliptic or obovate-elliptic, up to 13 × 6 cm; the apex acute-acuminate; glabrous except the midrib and the axils of the lateral nerves below; major lateral nerves 5–8 on either side; marginal nerve at about 3–4 mm from the margin, often rather incomplete; minor lateral nerves and veinlets reticulate. Inflorescence terminal or axillary; the peduncles 12–14 mm long, the pedicels 8–10 mm long. Flowers “showy, rose-pink”. Flower-buds about 7 mm long. Calyx densely greyish-sericeous outside; the spurred lobe conically convolute, about 7 mm long; the spur bag-shaped, rounded, constricted near the base, about 4 mm long. Petal obcordate, two-lobed, up to 2 × 2½ cm, the base pilose below. Anther nearly 2 mm long, recurved, the connective subincrassate; the filament about 5 mm long. Style glabrous except the base. Fruit about 5 cm long; the valves oblong; the base and apex obtuse; the exocarp minutely verruculose outside, about 3 mm thick; the endocarp thin, its three parts connate at the base after dehiscence of the fruit.

Holotype: *P. H. Allen* 4645 in MO. Isotypes in K, U.

Distribution: Panama and adjacent Colombia.

PANAMA, Darien: Headwaters of Rio Chico, *P. H. Allen* 4645.

COLOMBIA, Bolivar: Lands of Loba, *Curran* 169.

Ecology: Up to 600 m.; fl. June; fr. Apr.–May.

Observation: The peduncled three-flowered cymes are not found in any other species of *Qualea*. The species is allied to those of the section *Costatifolium* by the convolute spurred calyx-lobe, the structure of the stamen, the nervation of the leaves, etc. Apart from being morphologically isolated *Q. cymulosa* is also geographically isolated: it is the only Central American species of the genus.

Subgenus II: **AMPHILOCHIA** (Mart.) Staf. nov. comb.

Amphilochia (genus) Mart. Nov. Gen. Sp. **1**: 127. 1824 (latin diagnosis); Spreng. 1827 p. 4, — 1830 p. 21; DC 1828 p. 26; A. Dietr. 1831 p. 96; Don 1832 p. 669; Meisn. 1836–43 **1**: 119, **2**: 85; Endl. 1836–40 p. 1177; D. Dietr. 1839 p. 21. *Qualea* series *Amphilochia* Warm. 1875 p. 32.

Trees or shrubs. Cortex of the branchlets not exfoliating. Cataphylls deciduous, crowded near the base of the branchlets. Perulate buds in the axils of both cataphylls and ordinary leaves. Leaf-bases often oblique. Lateral nerves subparallel, rather few, the central ones making an angle of about 60–80° with the midrib, curved upwards, ending in the margin, anastomosing or ending in a strongly undulate marginal nerve at some distance from the margin. Cincinni epedunculate, mostly opposite, thick-set. Minor calyx-lobes not closely adpressed against the fourth lobe, the latter not provided with a spur but sometimes somewhat hollow or gibbous at the base. Petal firm, subchartaceous (at least the unguiculate base) but the margins often membranous, densely pilose on both sides. Anther distinctly shorter

than the filament, the connective not incrassate, the locules linear, adhering to the filament somewhat above the base of the back. Staminodes not present. Ovary densely hirsute, abruptly merging into the style, the base of the latter hirsute (except *Q. glaziovii*). Exocarp of the capsules woody, blackish, squamulose-verruculose, mostly partly releasing from the thin endocarp.

Type-species: *Qualea dichotoma* (Mart.) Warm. (*Amphilochia dichotoma* Mart.).

Distribution: Eight species widely distributed in the Extra Amazonian Province of Brazil and in adjacent parts of Bolivia and Northern Paraguay.

Observation: Named after Amphilochos, the post-Aristotelian writer on forage-plants (cited by Plinius).

Key to the species

- | | | |
|-----|--|---|
| 1a. | Branchlets and lower surface of the leaves pilose. | 2 |
| b. | Branchlets and leaves glabrous. | 5 |
| 2a. | Perulate buds subglobose, apically rounded, the outer scales closely adpressed. | 3 |
| b. | Perulate buds elongate-ovoid, apically acuminate, the outer scales divergent. 52. Q. lundii Warm. | |
| 3a. | Leaf-bases rounded and mostly cordate. Nervation subprominent below. | 4 |
| b. | Leaf-bases acute or obtuse, sometimes subrotundate, never cordate. Nervation strongly prominent below. | |
| | 53. Q. selloi Warm. ssp. pubescens Staf. | |
| 4a. | Petioles 5–10 mm long, leaves 5–8 × 3–4 cm. | |
| | 54. Q. dichotoma (Mart.) Warm. var. dichotoma | |
| b. | Petioles 10–15 mm long, leaves 5–12 × 3–6 cm. | |
| | 54. Q. dichotoma (Mart.) Warm. var. elongata (Warm.) | |
| | Staf. | |
| 5a. | Leaf-blades firmly coriaceous. Petioles firm (1–3 mm thick), relatively short: length less than 1/7 th of that of the leaf-blade. | |
| b. | Leaf-blades thinly coriaceous. Petioles slender (less than 1 mm thick), relatively long: length 1/4–1/6th of the length of the leaf. | 9 |
| 6a. | Leaf-bases cordate, wide. | 7 |
| b. | Leaf-bases acute or obtuse, sometimes somewhat rounded, never cordate. 53. Q. selloi Warm. ssp. selloi | |
| 7a. | Leaves 3–8 × 1½–4½ cm (on flowering branchlets), if larger: nervation subprominent below. | 8 |
| b. | Leaves 9–15 × 5½–8½ cm (on flowering branchlets), the nervation strongly prominent below. | |
| | 55. Q. densiflora Warm. | |
| 8a. | Inflorescence loose: the flowers of adjoining pairs of cincinni not touching each other. | |
| | 56. Q. cordata Spreng. var. cordata | |
| b. | Inflorescence dense-flowered; the flowers of adjoining pairs of cincinni touching each other. Leaves acute or subacute | |
| | 56. Q. cordata Spreng. var. intermedia (Warm.) Staf. | |

- 9a. Leaf-blades $1\frac{1}{2}$ –2 times longer than wide, apically shortly acute-acuminate, acute, obtuse or rounded 10
 b. Leaf-blades $2\frac{1}{2}$ –3 times longer than wide, apically gradually acute-acuminate 57. **Q. glaziovii** Warm.
- 10a. Capsules less than 3 cm long. Petioles 8–16 mm long 11
 b. Capsules 8–9 cm long. Petioles 6–10 mm long 58. **Q. megalocarpa** Staff.
- 11a. Leaf-blades generally ovate, apically acute or obtuse 59. **Q. cryptantha** (Spreng.) Warm. var. **cryptantha**
 b. Leaf-blades generally oblong, apically rounded or obtuse 59. **Q. cryptantha** (Spreng.) Warm. var. **marginata** (Miq.) Staff.

52. **Qualea lundii** (Warm.) Warm. Flora Bras. **13**(2): 47. t. 9. 1875; Warm. 1889 p. 23; Wille 1882 p. 181 seq. (anat.); Petersen 1896 p. 318 fig. 172 K, L; Glaziou 1905 p. 30. *Amphilochia lundii* Warm. 1867 p. 27, 45 fig. 10.

Shrub or small tree. Branchlets subpuberulous. Perulate buds elongate-ovoid, acuminate, subpuberulous, 3–6 mm long, the outer scales divergent. Stipular glands concave, hardly prominent, about 1 mm long. Petioles 8–14 mm long. Leaf-blades firmly coriaceous, obovate, oblong or elliptic, $5-9 \times 2\frac{1}{2}-5$ cm, nearly glabrous above, densely adpressed tomentellous below; the apex often more or less rounded; the base often cuneate; the nervation impressed above and prominent below, 8–15 lateral nerves on either side, anastomosing or ending in a marginal nerve exactly along the margin; the veinlets numerous, conspicuously reticulate. Flowers in 6–12 flowered pseudo-whorls along a rachis and in the axils of the leaves. Bracts about 1 mm long. Pedicels about 1–2 mm long. Flower-buds about 8–10 mm long. Calyx adpressed subpubescent, the lateral lobes about 3 mm, the anterior ones 6–7 mm long; the fourth lobe $8-10 \times 10-12$ mm. Petal broadly elliptic, about 10 mm long, densely sericeous on both sides, slightly fleshy. Stamen glabrous; the anther oblong, apiculate, about 4 mm long. Capsule $2-2\frac{1}{2}$ cm long, the valves oblong, the apex acute, the woody exocarp $\frac{1}{2}-1$ mm thick.

Holotype: *Warming* s.n. (Serra da Piedade, 3-2-1866) in C.

Distribution: Minas Geraes.

BRAZIL, Minas Geraes: Serra da Piedade, *Warming* s.n. (3-2-1866); Caraça, Glaziou 14697.

Ecology: In campo cerrado vegetation and along fringe of forests; up to 1300 m; fl. Dec.–Febr.; fr. Febr. (one rep.).

Observation: The "dichotomy" in this and other species of the subg. *Amphilochia* is a false one caused by an obliteration at a late date of the top of a branchlet. No dichotomy is observed in Glaziou's well developed specimen.

53. **Qualea selloi** Warm. Flora Bras. **13**(2): 49. 1875; Wille 1882 p. 181 seq. (anat.).

ssp. **selloi**

Tree. Branchlets and leaves glabrous or nearly so. Older branchlets lenticellate. Perulate buds subglobose, glabrous, the outer scales

closely adpressed. Stipular glands subprominent, about 1 mm long; minor accessory ones often situated below the major ones. Petioles 14–18 mm long. Leaf-blades firmly coriaceous, elongate-elliptic, broadly lanceolate, oblanceolate or suboblong, 10–13 × 4–5 cm; the apex acute or shortly acute-acuminate, often oblique; the base acute, obtuse or nearly rounded; 9–14 lateral nerves on either side, not parallel (the angles with the midrib between 30 and 70°), irregularly curved, prominent below, real marginal nerve absent; major veinlets prominent below, minor ones not so. Raceme composed of 2–3 flowered cincinni, one or two pairs of cincinni in the axils of the upper leaves. Pedicels pilose, 2–4 mm long. Flower-buds 8–10 mm long. Minor calyx-lobes subsericeous outside, 5–8 mm long; the fourth lobe about 10 mm long. Petal membranous, densely pilose, especially in the centre, purplish and spotted with red and yellow (Hoehne). Anther glabrous, about 3 mm long; the filament slender, whitish pilose. Style about 10 mm long. Capsules about 2½ cm long; the exocarp about 1 mm thick; valves oblong, the apex apiculate.

Lectotype: *Sellow* 346 in US. Isotypes in: BR, G, NY, P, U. The *Warming* holotype was preserved in Berlin (cf. photograph in F); this specimen was destroyed during world-war II and the US duplicate has been chosen as the lectotype. None of the known isotypes bears *Warming's* handwriting.

Distribution: Once collected.

BRAZIL, Sao Paulo: *Sellow* 346; cult. Jard. Bot. Sao Paulo, *Hoehne* 28397.

Ecology: The cultivated specimen: fl. et fr. Oct.

ssp. **pubescens** Staff. nov. ssp.

Petioli et folia subtus dense pubescentes. Ramuli, gemmae perulatae et rachis pubescentes. Petioli 10–18 mm longi.

Holotype: *Claussen* s.n. in W (coll. Reichenbach 124203), isotypes in W (id. 124223) and US.

Distribution: Mainly in Minas Geraes.

BRAZIL, Minas Geraes: *Claussen* s.n., 219A, 42(119), 338, 430(1430); 439A, 441, 133A, 134A (numbers different in different herbaria). Sao Paulo: *St. Hilaire* C¹ 1193.

Observation: The *Claussen* specimens have hitherto been named *Q. glauca* Warm. This species, however, is based on specimens (*Pohl* s.n., *Netto* s.n., *Claussen* 484) that differ greatly from the above-mentioned ones. The shape, structure and dimensions of the leaves bring the *Claussen* specimens to *Q. selloi*; they differ from the type specimen (and the type-subspecies) by the presence of an indumentum on all parts.

54. **Qualea dichotoma** (Mart.) Warm. *Flora Bras.* 13(2): 48. 1875; Wille 1882 p. 181seq. (anat.); Correa 1931 p. 116. *Amphilochia dichotoma* Mart. 1824 p. 128 t. 177; Spreng. 1827 p. 10; Schult. 1827 p. 106; DC. 1828 p. 26; A. Dietr. 1831 p. 96; Don 1832 p. 669; D. Dietr. 1839 p. 21

var. **dichotoma**

Shrub or small tree. Young parts of the branchlets, petioles, lower surface of the leaves, rachis, and pedicels densely pubescent. Branchlets often pseudo-dichotomous. Stipular glands inconspicuous, ½–1 mm long. Perulate buds subovoid, about 1–1½ mm long, the scales ad-

pressed. Petioles 5–10 mm long. Leaf-blades coriaceous, oblong, oblong-ovate or elliptic-oblong, 5–8 × 3–4 cm; the apex mostly rounded or subobtuse; the base rounded or cordate; lateral nerves 8–15 on either side, subprominent below, major veins subprominent below, minor ones not so; marginal nerve not present. Inflorescence cylindrical, dense-flowered, up to 12 cm long, the flowers in clusters composed of pairs of 1–3 flowered cincinni. Pedicels about 2 mm long. Bracts 2–4 mm long. Flower-buds about 8–10 mm long. Minor calyx-lobes subsericeous outside, the lateral ones about 4–5 mm, the anterior ones about 5–7 mm long; the fourth lobe sericeous on the back of the base, about 8–10 mm long. Petal yellow or whitish, spotted with purple, about 10 mm long, sericeous on all parts but densest on the back, the base thickish. Anther nearly glabrous, 3–4 mm long, apically obtuse; the filament subpilose on the base, 5–8 mm long. Style 6–8 mm long. Capsules 2–2½ cm long, the exocarp about 1 mm thick; the valves oblong-elliptic; the apex acute or obtuse.

Lectotype: *Martius* s.n. in M. The *Martius* specimens in Munich bear no labels mentioning localities. Some confusion exists but there is no reason to doubt that the sheets were indeed used by *Martius*. The one specimen with flowers and a fruit has been chosen as the lectotype.

Distribution: Southern Brazil.

BRAZIL, Minas Geraes: Barra do Jiquitibeo, *Riedel* s.n.; —, *Langsdorff* 822; Sierra do Callony, *Barreto* 12133 (*F. Markgraf* 3313); Diamantina, *Barreto* 9309; *Martius* s.n.; *Gardner* 4554. Goyaz: *Pohl* s.n. Espirito Santo: *Lützelburg* 7219.

Ecology: In campo vegetation; fl. Sept.–Nov.; fr. Nov. (one rep.).

Vernacular names: Cascudo (fide *Correa* l.c.). This name is applied also to two *Cenostigma* (*Caesalp.*) species with leaves like those of *Q. dichotoma*.

var. **elongata** (Warm.) *Staf.* nov. comb. *Qualea elongata* Warm. *Flora Bras.* 13(2): 48. 1875; *Kuhlmann & Kühn* 1947 p. 81. *Qualea glauca* Warm. l.c. p. 49 t. 10; Warm. 1889 p. 23; *Petersen* 1896 p. 318 fig. 172B; *Glaziou* 1905 p. 31; *Malme* 1905 p. 8; *Kuhlmann & Kühn* 1947 p. 81.

Shrub or tree. Petioles 10–14 mm long. Leaves 5–12 × 3–6 cm, the nervation prominent or strongly prominent on the lower surface; the upper surface often distinctly glaucous.

Holotype: *Riedel* s.n. (Curvelho, Minas Geraes) in C. Isotypes: G, GH, K, NY, P, S, US, W. Type material of *Q. glauca* see obs. below.

Distribution: Southern Brazil.

BRAZIL, Rio de Janeiro: Nova Friburgo, *Glaziou* 12664; —, *Claussen* s.n. Minas Geraes: *Claussen* 484; Arcos, *Oliveira* 163; Curvelho, *Riedel* s.n.; Morada, *Netto* s.n.; Carandai, *Duarte* 690. Sao Paulo: Cotia, *Constantino* 152 = RB 45514. Goyaz: Fazenda do Rajadinho, *Glaziou* 20685; Upper Tocantins river, *Ule* 69. Matto Grosso: Santa Anna da Chapada, *Malme* II 2380, 2380a.

Ecology: In the thickets and the open forests of the campo vegetation, rarely in the open campo cerrado itself or on stony ground. Up to 1300 m. Fl. Sept.–Nov.; fr. Febr., Apr. (two rep.).

Vernacular names: Goyaz: Cascudo. Minas: Carvalho brasileiro (Carvalho = Oak).

Use: "The timber is of a good quality, hard and heavy" (*Duarte* in sched.).

Observation: *Warming* (1875 l.c.) makes a distinction between *Q. dichotoma*, *Q. elongata* and *Q. glauca* but adds in a note that the future may demonstrate these species to be one and the same. In 1889 he mentions *Glaziou* 12664 as an inter-

mediary form between *Q. glauca* and *Q. elongata*. The differences between the latter species cannot stand: a number of specimens has now come to hand showing a gradual variation from subprominent to sharp-prominent lateral nerves, the length of the petioles varies from 10 to 14 mm (Warming: *Q. glauca* 12–13 mm, *Q. elongata* 10–12 mm). The indumentum too is not fundamentally different: Warming states: “molliter pubescentia” in *Q. elongata* and “patenter pilosa” in *Q. glauca*. This is only a gradual developmental difference. The present author cannot detect a specific or even a varietal difference between these forms.

The difference between the vars. *elongata* and *dichotoma* is found mainly in the length of the petioles and the size of the leaves. In all other respects these forms are exactly alike.

It should be noted that of the specimens listed by Warming under *Q. glauca* the Pohl (s.n.) specimen belongs to the var. *dichotoma* (short petioles) whereas the Netto (s.n.) and Claussen (484) specimens belong to the var. *elongata*. The latter specimen is in agreement with Warming's description and chosen as the lectotype of *Q. glauca*. For this reason *Q. glauca* is cited (in this treatment) under var. *elongata*.

55. ***Qualea densiflora*** Warm. Flora Bras. 13(2): 50. 1875; Malme 1900 p. 47; Glaziou 1905 p. 31.

Tree. Branchlets and leaves glabrous. Perulate buds subglobose, 1–2 mm wide, the scales closely adpressed. Stipular glands subprominent, 1–1½ mm long, the margin light-coloured; sometimes two or three accessory glands below the major one. Petioles firm, thicker than 1 mm, 1–2 cm long. Leaf-blades firmly coriaceous, ovate, subelliptic or subobovate, somewhat glaucous on both sides, 9–15 × 5½–8½ cm; the nervation not prominent above, distinctly and strongly so below; major lateral nerves 10–14 on either side, curved upwards and disappearing near the margin; major veinlets transversal, minor ones reticulate; marginal nerve not present. Inflorescence dense-flowered, up to 10 × 2 cm, the cincinni in a pseudo-spike, 2–3 flowered, the adjoining pairs often touching each other. Pedicels pubescent, 2–4 mm long. Flower-buds about 8–10 mm long. Calyx-lobes, in particular the inner three, sericeous outside, the fourth lobe oblong, 10–13 × 6–8 mm. Petal whitish-yellowish, densely pilose, especially on the back, deeply emarginate, 12–15 mm long. Anther glabrous, 3–4 mm long; the filament pilose on the base, about 6 mm long. Style 5–7 mm long. Capsule 2–3 cm long, apically acute; the exocarp 1–1½ mm thick, not releasing from the endocarp.

Holotype: Widgren s.n. (Minas Geraes) in C. Isotypes in: BR, GOET, GH, K, M, P, S, U, US. Cotypes: Pohl s.n. (Paracatu) and Regnell III 529.

Distribution: Minas Geraes and Sao Paulo.

BRAZIL, Minas Geraes: Villa do Paracatu, Pohl s.n. (or 575?); Caldas and Canna Verde, Regnell III 529 (527); Widgren s.n. Sao Paulo: Bocaina, Glaziou 12664a; Serra de Caracol, Mosen 4143

Ecology: In campo vegetation on dry grounds, one report from a forest. Fl. Oct.–Dec. Fr. March (one rep.).

56. ***Qualea cordata*** Spreng. Syst. 1: 17. 1825; Warm. 1875. p. 51; — 1889 p. 23; Wille 1882 p. 181 seq. (anat.); Malme 1900 p. 47; Chodat 1902 p. 736; Glaziou 1905 p. 31; Correa 1931 p. 520. *Amphilochia cordata* Mart. 1824 p. 129; Schult. 1827 p. 107; Spreng. 1827 p. 10; DC. 1828 p. 26; A. Dietr. 1831 p. 97; Don 1832 p. 669; D. Dietr. 1839 p. 21; Warm. 1867 p. 26. *Qualea cordata* Spreng. forma *rupestris* Hassler 1903 p. 244.

var. **cordata**

Small tree. Branchlets and leaves glabrous. Perulate buds subglobose, the outer scales closely adpressed. Stipular glands subprominent, about $\frac{1}{2}$ mm long. Petioles 3–6 mm long, $1\frac{1}{2}$ – $2\frac{1}{2}$ mm wide. Leaf-blades coriaceous, somewhat glaucous, variable in size and shape, ovate, oblong or elliptic-oblong, 4–9 × 2–5 cm; the apex acute or obtuse, the base cordate; the nervation not prominent above, subprominent below; lateral nerves 8–14 on either side, marginal nerve absent. Inflorescence few-flowered, up to 10 × 2 cm; the pairs of 1–3(–4) flowered cincinni remote. Pedicels pubescent, 2–4 mm long. Flower-buds 8–10 mm long. Lateral calyx-lobes 5–7 mm long, nearly glabrous; anterior lobes sericeous on the back, 7–10 × 5–6 mm; the fourth lobe oblong, about 12 mm long, the back sericeous. Petal yellow or whitish, spotted with violet in the centre, about 15–18 mm long, emarginate, membranous except the incrassate base, sericeous in the centre. Anther glabrous, about 5 mm long; the filament slightly pilose, narrowing towards the anther, 6–8 mm long. Capsules 2– $2\frac{1}{2}$ cm long, minutely verruculose, the valves oblong, apically acuminate.

Lectotype: *Sellow* s.n. in P. Sprengel's holotype was *Sellow* s.n. (or 2015) in B (photograph in F). The Berlin specimen is no more extant. Holotype of the forma *ruprestis* Hassler: *Hassler* 6705 in G.

Distribution: Southern Brazil and Northern Paraguay.

BRAZIL, Minas Geraes: *Pohl* 2577, 3460, s.n.; *Glaziou* 12663, 14695, 19149; *Sampaio* 6843; *Vauthier* 429; *St. Hilaire* B¹ 1979; *Lund* s.n.; *Barreto* 7149, 7151, 7152, 9245; *Duarte* 2252, 2751; *Warming* s.n.; *Regnell* III 529x; *Widgren* s.n. Sao Paulo: *Sellow* s.n. (2015); *Weir* 385; *St. Hilaire* C¹ 1244; *Burchell* 4278; *Vecchi* 408; *Campanema* RB 14061. Parana: *Dusen* 10466a, 11725, 10559, 16507, 11748, 11649; *Reiss* 62, 63; *Jönsson* (*Dusen*) 387a; *Weir* s.n.

PARAGUAY (Northern and Central): *Fiebrig* 517, 5147, 6363; *Hassler* 3528, 3528a, 6705, 8790, 12356; *Balansa* 2014, 2014a; *Lindmann* I A 3861; *Anisits* 2363, 2708; *Jörgensen* 3730.

Ecology: In campo vegetation, often in the "campo cerrado" on stony ground. Fl.: rainy season, mainly Nov.–Jan., but reports from Sept.–June; fr. mainly Jan.–Apr.

Vernacular names: BRAZIL: Dedaleira preta, Páu terra. PARAGUAY: Quebracho falso, Burro-caá.

Use: (*Correa* l.c.) The wood is used as timber and lumber. The fruits and the bark yield a dye.

Observation 1: The publication by Sprengel (1825) seems to be antedated by that of Martius (1824) but Martius cites Sprengel with precise mention of page and volume!

Observation 2: The forma *ruprestis* Hassler is represented by the specimens *Hassler* 6705 and *Jörgensen* 3730. They differ by their fruticose habit, the smaller leaves (3–5 × $1\frac{1}{2}$ –2 cm) and the stronger glaucescence. However, the variation of *Hassler* 6705 reaches inside the variation of the other specimens. It seems unnecessary to describe different forms when these may be found on one and the same plant.

var. **intermedia** (Warm.) Staff. nov. comb. *Qualea intermedia* Warm. *Flora Bras.* 13(2): 50. *t.* 9. 1875.

Leaves ovate or ovate-elliptic, rarely ovate-oblong, the base cordate, the apex acute or shortly acuminate, 6–9 × 3– $4\frac{1}{2}$ cm. Inflorescence as in *Q. densiflora*, i.e.: the cincinni arranged in a terminal, densiflorous and multiflorous pseudo-spike (up to 10 × 2 cm) in which the pairs

of cincinni touch each other; young inflorescences closed cylinders, at least in the upper halves; some cincinni in the axils of the upper leaves.

Lectotype: *Sellow* s.n. in US (from Sao Paulo). Warming's holotype was *Sellow* s.n. in B (now destroyed). The US specimen is well preserved and bears Warming's handwriting.

Distribution: Southern Brazil.

BRAZIL, Sao Paulo: *Sellow* s.n. (5252); *Löfgren* 380. Minas Geraes: Serra de Mutuca, *L. O. Williams* 5439. Bahia: Serra do Sincorá, *Ule* 7316.

Ecology: In campo vegetation; fl. Nov.–Febr.; fr.: Febr. (one rep.).

Observation: The only essential difference between these specimens and those of the var. *cordata* is found in the structure of the inflorescence.

var. **grandifolia** Warm. *Flora Bras.* 13(2): 52. 1875.

Branchlets firmer than in var. *cordata*. Petioles about 5 mm long. Leaf-blades up to 12 × 7 cm. Some cincinni in the axils of the upper three or four pairs of leaves, a few others arranged in a terminal raceme. Petal white, painted with red. (fide Warm. l.c.).

Holotype: Riedel s.n. in LE from Serra de Caraça, Minas Geraes, Brazil, fl. Sept.

Observation: The present author did not see the relevant specimen and has no opinion on its status.

57. **Qualea glaziovii** Warm. *Flora Bras.* 13(2): 53. *t. 6 fig. 2.* 1875; Warm. 1889 p. 23; Poulsen 1876 p. 273, — 1881 p. 123; Wille 1882 p. 181 seq. (anat.); Glaziou 1905 p. 31.

Tree. Branchlets and leaves glabrous. Perulate buds ovoid-conical. Stipules in youth triangular, about $\frac{1}{2}$ mm long, in age inflated, the apex breaking away and the limb developing into a thin-walled nectary. Subprominent, discoid, $\frac{1}{2}$ –1 mm long nectaries with a callous margin sometimes found in the axils of the stipules. Petioles slender, 10–15 mm long. Leaf-blades coriaceous, elongate-ovate or -elliptic, 6–11 × 2–4 cm; the apex gradually acute-acuminate; the base obtuse or subrotundate, often oblique; the nervation subprominent on both sides; lateral nerves 10–20 on either side, curved upwards near the margin; marginal nerve not present. Inflorescence terminal, short, few-flowered, some 2–3 flowered cincinni in the axils of the leaves, other 1–2 flowered ones in a raceme. Pedicels puberulous, 2–3 mm long. Flower-buds 8–10 mm long. Calyx-lobes subsericeous, the lateral ones 5–7 mm, the anterior ones 6–8 mm, the fourth one 9–11 mm long. Petal white, spotted with purple, about 1 $\frac{1}{2}$ cm long and wide, the centre hirsute on both sides. Anther glabrous, about 4 mm long; the filament slightly pilose, narrowing towards the anther, about 6–7 mm long. Capsules about 3 $\frac{1}{2}$ cm long; the exocarp 1(–2) mm thick.

Lectotype: *Glaziou* 2567 in C. Isotypes in BR, K, P. Warming mentions several *Glaziou* specimens in numerical order. The best one is *Glaziou* 2567. Cotypes: *Glaziou* 2113 (fr.), 2926, 3957.

Distribution: Rio de Janeiro, in the mountains around the town.

BRAZIL, Rio de Janeiro: Tijuca forest, *Glaziou* 2567, 2113, 2926, 3957, 6473; Alto Macahé, *Glaziou* 16766, 19147. Hort. Bot. Rio de Janeiro, cult. *Ducke*, RB 18372.

Ecology: In mountain forest; fl. Febr.–March, fr. Nov. (one rep.).

Observation: To be distinguished from *Q. cryptantha* by the slender, acute-acuminate leaves with obtuse or subrotundate base and the larger capsules (about $3\frac{1}{2}$ cm long) with a thick exocarp.

58. ***Qualea megalocarpa*** Staff. nov. spec. (*fig. 14*).

Arbor media. Ramuli glabri, haud decorticantes. Gemmae perulatae ovoideae, subpuberulae, 1–2 mm longae, perulis exterioribus subacutis. Glandulae subprominentes, ellipticae vel suborbiculares, circa $\frac{1}{2}$ –1 mm longae. Petiolus tenuis, 6–8 mm longus, circa 1 mm latus. Lamina fere glabra, tenuiter coriacea, oblonga vel oblongo-obovata, 6–8 $\frac{1}{2}$ × 3–4 cm, apice breviter et subabrupte obtuse-acuminata, basi rotundata, nervis in utraque pagina haud prominentibus, nervis lateralibus subparallelis, haud numerosis (intervallum 4–7 cm), nervo limbali margini parallelo junctis; venulis numerosis, reticulatis. Inflorescentia terminalis. Flores ignoti. Capsula magna (circa 8–9 cm longa) in pedunculo crasso circa 10–12 mm longo, valvis elongato-ellipticis, circa 2 $\frac{1}{2}$ cm latis, apice subacuta; exocarpio lignoso, minute verruculoso, extra nigro, 2–4 mm crasso, ab endocarpio tenuo haud soluto. Semina ala exclusa elliptica, circa 1–1 $\frac{1}{2}$ cm longa, ala circa 2 $\frac{1}{2}$ –3 cm longa.

Holotype: *Barreto* 1705 in F.

Distribution: Once collected.

BRAZIL, Minas Geraes: Fazenda do Cachoeira, Tobos, *Barreto* 1705 (fr.).

Ecology: In forest; fr. June.

Vernacular names: Merindiba bagre.

Observation: The subgenus to which the species belongs cannot be established with any certainty as long as the flowers remain unknown. The characters of the leaves, which have very much in common with those of *Q. cryptantha*, the glands and the perulate buds make it plausible that the species belongs to the subgenus *Amphilochia*.

59. ***Qualea cryptantha*** (Spreng.) Warm. *Flora Bras.* **13**(2): 53. *t.* **12**. 1875; Glaziou 1905 p. 31. *Agardhia cryptantha* Spreng. 1820 p. 462; — 1825 p. 17; DC. 1828 p. 30; A. Dietr. 1831 p. 97; Don 1832 p. 672. *Amphilochia cryptantha* Warm. 1867 p. 27. *Amphilochia acuminatula* Gardn. 1843 p. 343; Walp. 1843 p. 915.

var. ***cryptantha***

Tree. Branchlets and leaves glabrous. Perulate buds ovoid or subglobose, 1–2 mm long. Stipules in youth triangular, about $\frac{1}{2}$ –1 mm long, acute, in age inflated, the apex falling off and the limb constituting a thin-walled nectary. Subprominent, discoid, $\frac{1}{2}$ –1 mm long nectaries with callous margin sometimes found in the axils of the stipules. Petioles slender, 8–16 mm long, less than 1 mm thick. Leaf-blades thinly coriaceous, generally ovate, 5–8 × 3–5 cm; the apex shortly acute-acuminate, acute or obtuse, rarely subrotundate; the base broadly rounded or subtruncate, often oblique; the nervation hardly prominent; 8–15 main lateral nerves on either side, curved upwards and anastomosing near the margin; marginal nerve absent. Inflorescence terminal, cylindrical, up to 9 × 2 cm. Cincinni opposite,

2-3(-5) flowered, the pairs remote, the lower ones in the axils of the upper leaves; sometimes all cincinni axillary. Pedicels 2-4(-5) mm long, puberulous. Flower-buds 7-10 mm long. Calyx-lobes sericeous outside, the lateral ones 4-6 mm, the anterior ones 6-8 mm, the fourth lobe 10-12 mm long. Petal $1\frac{1}{2}$ cm long and wide, the centre densely pilose on both sides. Anther glabrous, about 3 mm long, recurved; the

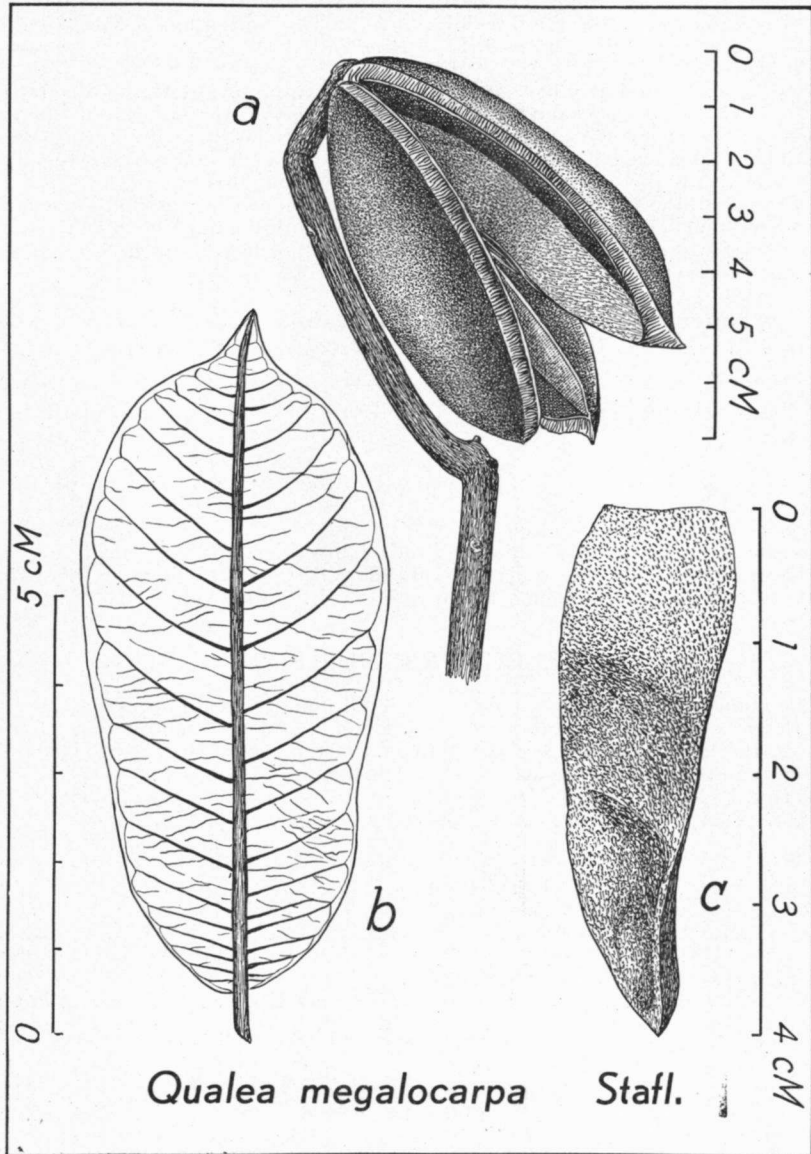


Fig. 14. *Qualea megalocarpa* Staf. a. Fruit; b. leaf; c. seed.

filament pilose, in particular the base, narrowed towards the anther, about 7 mm long. Capsules 2–2½ cm long, the exocarp less than 1 mm thick, verruculose, not or hardly releasing from the endocarp.

Lectotype: *Sellow* s.n. in P. Holotype not indicated by Sprengel but probably *Sellow* s.n. in B (now destroyed). Holotype of *Amphilochia acuminatula* Gardn.: Gardner 374 in BM.

Distribution: Zone of the atlantic coastal rain-forests of Brazil.

BRAZIL, Espirito Santo: Between Campos and Victoria, *Sellow* s.n.; Linhares, Rio Doce, *Kuhlmann* 108 = RB 34387. Rio de Janeiro: Orgaos Mts., Gardner 374; —, *Miers* s.n., 3451, 4599. Bahia: *Blanchet* 1692. Pernambuco: Igarassu, *Ridley, Lea & Ramage* s.n.

Ecology: In mountain forests; fl. Oct., March (two rep.); fr. March (one rep.).

Observation: The diagnosis of Sprengel does not cover the present species in every respect: the calyx is said to have three sepals and the corolla five petals. The other characters, however, correspond to those of the relevant species. Warming who saw the Berlin material, came to the conclusion that Sprengel's *Agardhia cryptantha* was in fact a *Qualea*. This is confirmed by the Berlin labels on the *Sellow* specimens that were sent abroad. Therefore, notwithstanding the disagreement between description and characters, the present author feels justified in accepting Warming's conclusion.

var. **marginata** (Miq.) Staff. nov. comb. *Amphilochia marginata* Miq. *Linnaea* 22: 796. 1849; Walp. 1851/52 p. 527; Warm. 1867 p. 27. *Qualea marginata* Warm. 1875 p. 52; — 1889 p. 23.

Leaves oblong, ovate-oblong or elliptic-oblong, apically rounded or obtuse.

Lectotype: *Blanchet* 3455 in BR. The place where Miquel's original specimen is preserved is not known. Isotypes in: BM, C, F, G, K, MO, NY, OXF, P, W.

Distribution: Once collected.

BRAZIL, Bahia: Serra Jacobina, on top of the ridge, *Blanchet* 3455.

Observation: The only difference with the var. *cryptantha* is found in the shape of the leaves (generally oblong, apically rounded).

COLLECTORS' NUMBERS

The numbers in parentheses refer to the serial numbers of the species of *Qualea*. The letter a refers to the subdivision containing the nomenclatural type of the species, the letter b to the second subdivision of the respective species. The collectors' numbers printed in *italics* are not mentioned in the text.

ALLEN, P. H. 3342 (36); 3346 (18); 4645 (51). ANISITS 2024 (44); 2363 (56a); 2365 (44); 2424 (46); 2708 (56a); 2837 (44). ARCHER 7878 (22). BALANSA 2014 (56a); 2014a (56a). BANG 1663 (46). BARRETO 1705 (58); 7125 (44); 7128 (44); 7129 (44); 7130 (44); 7132 (44); 7134 (45a); 7135 (45a); 7138 (45a); 7139 (46); 7140 (46); 7142 (46); 7147 (46); 7148 (46); 7149 (56a); 7151 (56a); 7152 (56a); 8514 (45b); 8816 (46); 9245 (56a); 9309 (54a); 9750 (46); 12133 (54a); 12134 (46). BENOIST 187 (29); 1564 (34); 1604 (22). BLACK, G. A. 48–2664 (24). BLACK & FORSTER 48–3348 (22). BLANCHET 1692 (59a); 2808 (46); 3081 (44); 3455 (59b). BOSCHBEHEER 12 L (22); 48 (7); 53 (47). B.B.S. 11 (22); 171 (29); 405 (22); 600 (22); 1011 (22); 1015 (22); 1016 (22); 1024 (47); 1040 (47). B.W. 738 (47); 1346 (22); 1372 (22); 1425 (7); 1501 (47); 1694 (22); 1761 (29); 1861 (22); 1884 (22); 2144 (7); 2328 (7); 2394 (47); 2462 (7); 2479 (29); 2814 (47); 3784 (22); 3811 (47); 4017 (22); 4173 (47); 4260 (29); 4287 (22); 4320 (47); 4331 (22); 4914 (47); 4928 (7); 5451 (22); 5511 (22); 6019 (47); 6220 (7); 6336 (29); 6338 (22). BRADE 15472 (44). BURCHELL 4278 (56a); 5214 (45a); 6008 (46); 6106 (44); 6108 (46); 6144 (45b); 7280 (46); 7591 (46); 7926 (46); 8255 (44); 8498 (44); 8520 (46). CAMPOS NOVAES 1111 (45a). CAMPANEMA RB 14061 (56a). CAPUCHO 446 (36); 488 (46). CARDENAS 2002 (45b); 2083 (24). CARDONA 1704 (39); 1762 (9); 1905 (1). CLAUSSEN: numbers

often unreliable. CONSTANTINO 152 (54b). COSTA, R. C. MONTEIRO DA 224 (46); 299 (44). CUATRECASAS 6956 (24); 14410 (30). CURRAN 169 (51). DAHLGREN 871 (44); 882 (46). DUARTE 690 (54b); 1491 (46); 2252 (56a); 2751 (56a). DUARTE DE BARROS 53 (19). DUCKE 46 (12); 55 (24); 61 (12); 221 (RB 34660) (6); 227 (6); 336 (RB 34662) (42); 668 (33); 992 (5); 1061 (3); 1063 (28); 1064 (35); 1277 (6); 2183 (46). — PG numbers (Museo Goeldi): PG 3585 (RB 14068) (44); PG 6922 (6); PG 7991 (47); PG 8001 (5); PG 8159 (44); PG 9028 (47); PG 9610 (13); PG 11261 (47); PG 11425 (5); PG 11546 (RB 14060) (6); PG 14869 (RB 5730) (5); PG 15491 (7); PG 15006 (47); PG 15509 (13); PG 15547 (36); PG 15550 (7); PG 15641 (47); PG 15658 (36); PG 15669 (5); PG 15795 (RB 5725) (27b); PG 15890 (RB 8345) (28); PG 15897 (47); PG 15975 (RB 8455) (13); PG 15978 (24); PG 16143 (5); PG 16427 (36); PG 16455 (RB 8420) (22); PG 16491 (RB 8422) (5); PG 16559 (RB 8461) (7); PG 16593 (RB 13699) (24); PG 16666 (5); PG 17027 (7); PG 17286 (RB 13698) (24). — RB numbers (Jardim Botânico Rio de Janeiro): RB 5725 (PG 15795) (27b); RB 5730 (PG 14869) (5); RB 8345 (PG 15890) (28); RB 8420 (PG 16455) (22); RB 8422 (PG 16491) (5); 8455 (PG 15975) (13); RB 8461 (PG 16559) (7); RB 13695 (47); RB 13698 (PG 17286) (24); RB 13699 (PG 16593) (24); RB 14060 (PG 11546) (6); RB 14068 (PG 3585) (44); RB 17742 (15); RB 17761 (24); RB 17762 (24); RB 17775 (22); RB 18372 (57); RB 20566 (36); RB 21289 (19); RB 23485 (36); RB 23486 (7); RB 23487 (5); RB 23488 (24); RB 23489 (12); RB 23791 (50); RB 23793 (3); RB 24160 (35); RB 24161 (42); RB 24165 (43); RB 34660 (Ducke 221) (6); RB 34662 (42); RB 34663 (46); RB 34664 (50); RB 34665 (18); RB 34666 (20); RB 34667 (41); RB 34668 (10); RB 34669 (16); RB 34671 (17); RB 34674 (49). DUSEN 35/41 (44); 9655 (44); 10466a (56a); 10559 (56a); 11287 (44); 11649 (56a); 11724 (45a); 11725 (56a); 11748 (56a); 16438 (44); 16506 (45a); 16507 (56a). FERREIRA 530 (36). FIEBRIG 517 (56a); 4013 (4964) (46); 4465 (44); 5147 (56a); 6363 (56a). FOREST DEPT. BRIT. GUIANA 832 (36); 2827 (39); 2832 (31). FROES 11712 (46); 21443 (2); 21577 (46); 21616 (6); 22377 (17); 22378 (24); 22389 (42); 22758 (6); 22759 (6); 23034 (47); 23760 (24); 24248 (46). FROES-KRUKOFF 2029 (22). FUNCK & SCHLIM 637 (37). GANDOGGER 100 (29). GARDNER 374 (59a); 1597 (46); 2162 (44); 2163bis (44); 2841 (4); 3143 (44); 3144 (45b); 3144 (46); 3145 (46); 3146 (45b); 4554 (54a); GAUDICHAUD 305 (45b); 715 (44); 857 (45a). GLAZIOU 2113 (57); 2567 (57); 2926 (57); 3956 (45b); 3957 (57); 6473 (57); 9416 (19); 9794 (44); 10731 (19); 10738 (46); 12662 (46); 12663 (56a); 12664 (54b); 12664a (55); 13808 (46); 13810 (6); 14695 (56a); 14696 (44); 14697 (52); 16766 (57); 17611 (44); 17612 (44); 17613 (45a); 19147 (57); 19148 (45a, b); 19149 (56a); 19150 (46); 19150a (45b); 19153 (25); 19154 (44); 20298 (46); 20683 (44); 20684 (45b); 20685 (54b). GUEDES PG 1591 (36). GUTIERREZ & SCHULTES 530 (20). HASSLER 3528 (56a); 3528a (56a); 5583 (44); 5590 (46); 6705 (56a); 7881, 7881a (44); 8144 (45b); 8229 (46); 8790 (56a); 10076 (44); 10242 (45b); 10692 (46); 10734 (45a); 10738 (45a); 12356 (56a). HEMMENDORF 216 (45b); 264 (44); 265 (46); 268 (45a); 269 (44); 286 (45a). HENSCHEN (vide Regnell II 99) (45a). HILAIRE, St. 72 (19); 902bis (45b); B¹ 1360 (46); B¹ 1979 (56a); B¹ 1953bis (46); B² 2345 (44); B² 2352 (45b); B² 2353 (45b); B² 2357bis (46); B² 2359 (45a); C¹ 225bis (44); C¹ 731 (45b); C¹ 732 (45b); C¹ 800 (46); C¹ 1193 (53b); C¹ 1244 (56a); C² 294 (45a). HOEHNE 28397 (53a). HOLT & BLAKE 717 (10). HOSTMANN & KAPPLER, ed. HOHENACKER 1293 (22). HUBER PG 1844 (24). JAHN 500 (37); 543 (37); 1335 (37). JÖNSSON 387a (56a). JÖRGENSEN 3730 (56a). KAPPLER ed. HOHENACKER 1293 (22) (cf. HOSTMANN & KAPPLER); 2037 (7). KEGEL (herb.) 12340 (45b). KILLIP & SMITH 30204 (24). KLUG 748 (23); 4275 (48). KRUKOFF 5821 A (44); 6433 (28); 6575 (28); 7169 (24); 8834 (2); 8949 (24); 10124 (48). KUHLMANN 108 (RB 34387) (59a); 181 (RB 2926) (6); 196 (RB 34385) (38); 432 (RB 57596) (38); RB 17767 (36); RB 17769 (44); RB 34385 (38); RB 48136 (19). LANGSDORFF 822 (54a). LANJOUW & LINDEMAN 392 (29); 395 (29); 429 (22); 1195 (47); 2440 (29); 2656 (7); 2802 (29); 2920 (29). LASSER 1759 (14). LEBLOND 40 (22). LEPRIEUR 284 (24). LINDMANN A. 2729 (44); A. 3031 (46); A. 3861 (56a). LISBOA PG 2397 (46). LÖFGREN 288 (44); 320 (46); 380 (56b); 635 (46); 1089 (44). LÖFGREN & EDWALL 1337 (45a). LÜTZELBURG 437 (44); 2094 (46); 3024 (46); 3098 (44); 3099 (44); 7219 (54a); 12492 (46); 14074 (44); 25880 (46); 26171 (46); 26206 (46). MACEDO, A. 1291 (46). MACEDO, O. 282 (46). MACHADO 435 (46).

MAGUIRE 24841 (7). MALME I. 1036 (46); I. 1142 (44); I. 1168 (45b); II. 1806 (46); II. 2248 (5); II. 2291 (46); II. 2380 (54b); II. 2380a (54b). MARKGRAF 3313 (54a); 3142 (46). MARTIUS 114 (44); 1181 (44). MATTHEWS 742 (59a). MELINON 10 (22); 47 (22); 49 (22); 105 (22); 142 (34); 361 (7); 390 (7). MEXIA 5581 (45b); 5639 (44); 5641 (45b); 5698 (46); 5973a (24). MIERS 3451 (59a); 4599 (59a). MIRANDA 7 (46). MONTEIRO DA COSTA, R. C. 224 (46); 299 (44). MOORE 486 (46); 740 (44). MOSEN 1270 (44); 1271 (44); 1272 (45a); 1273 (45a); 1274 (45a); 4143 (55); 4144 (45b). MOURA, DE 75 (45b). MYERS 5662 (36). NETTO 68 (44). OCCHIONI *RB 44194* (46). OLIVEIRA 163 (54b). PINKUS 64 (39); 240 (14). PIRES, J. M. 55 (6); 1441 (24). PIRES & BLACK 1693a (44); 2005 (44); 2166 (46); 2222 (44); 2309 (46); 2478 (45b); 2579 (46). PITTIER 14045 (37); 15444 (37); 15720 (37). POHL 428 (44); 574 (46); 575 (55); 2577 (56a); 2860 (45b); 3460 (56a); 3930 (45b); 3931 (46); 5848 (45a). REGNELL II. 99 (45a); III. 526 (46); III. 526 (45a); III. 527 (44); III. 528a (45b); III. 528b (45b); III. 528c (45a); III. 529 (55); III. 529* (56a); III. 1545 (45b); III. 1760 (45b). REISS 62 (56a); 63 (56a). RIEDEL 459 (45b). ROBERT 568 (46); 568b (46); 570b (44); 643 (45b). ROJAS (cf. Hassler) 10738 (45a). RORAIMA EXP. (cf. Thurn) 79 (39). SAGOT 981 (22). SAMPAIO 6843 (56a). SCHOMBURGK VII (39); 19 (9); 584 (39); 893 (39); 1047 (39); 1537 (9). SCHWACKE (herb.) III. 280 (6); III. 487 (6). SELLOW 346 (53a); 1524 (46); 2003 (46); 2015 (56a); 5252 (56b). SICK B. 24 (46). SILVA, N. T. DA 88 (7); 135 (22). SMITH, A. C. 2709 (7); 3250 (47). SPRUCE 336 (44); 1132 (6); 1290 (6); 1838 (6); 2612 (24); 2706 (2); 2713 (32); 2740 (21); 3059 (50); 3289 (12); 3341 (16); 3388 (18). STEINBACH 6067 (44); 6785 (44). STEYERMARK 57828 (11); 60028 (14); 60291 (14); 60438 (14); 60490 (39); 60674 (39); 60710 (39); 60914 (14). TATE 194 (11); 206 (39); 915 (8). TESSMANN 3451 (48); 4291 (36); 4465 (35); 4855 (26). THURN, Im ("Roraima Exp.") 79 (39). ULE 59 (46); 69 (54b); 325 (45b); 326 (44); 7316 (56b); 8627 (39); 8883 (6). VAUTHIER 429 (56a). VECCHI 408 (56a). VIEGAS 5548 (44). WACHENHEIM 49 (22); 125 (22); 205 (22). WEDDELL 1594 (44); 1610 (44); 1956 (44); 2167 (46); 2500 (46); 2596 (46); 2847 (45b); 2852 (44); 4214 (46). WEIR 385 (56a). WILLIAMS, LL. 14384 (39); 14636 (12); 14830 (39); 15063 (11); 15728 (16). WILLIAMS, L. O. 5439 (56b). WILLIAMS, R. S. 397 (45b); 528 (44); 1575 (44). Woodherbarium Suriname 31 (7); 59, 59a (47); 95, 95a (7); 333 (22). ZEHNTNER 402 (46).

VERNACULAR NAMES

The numbers refer to the serial numbers of the species of *Qualea*

| | | | |
|---------------------------------|-----------|--|----------------|
| Amu-rieu-wai-yek | 14 | Lacreiro | 36 |
| Angelica | 38 | Louro-tinga | 45 |
| Ariuaú | 44 | Mandioqueira | 5, 7 |
| Arvore de terra | 44 | Merindiba bagre | 58 |
| Bergkwarrie | 29 | Minchorai-yek | 14 |
| Burro-caá | 56 | Mirabau do Varzea | 24 |
| Carvalho brasileiro | 54 | Muneridang | 22, 29 |
| Cascudo | 54 | Pao terra | cf. Pau terra |
| Cèdre gris | 29 | Páu de judeu | 46 |
| Cèdre jaune | 29 | Páu de Mastro | 22 |
| Copzeiro | 45 | Páu Santo | 44 |
| Copai-yek | 14 | Páu de Tucano | 45 |
| Couaie | 22 | Páu Mulato | 47 |
| Craiba | 46 | Páu terra or Páu-Terra (and com- positions) | 44, 45, 46, 56 |
| Dedaleiro(a) preto(a) | 56 | Quaruba | 47 |
| Gronfoloe | 7, 22 | Quebracho falsa | 56 |
| Guiariuba | 22 | Umiri-rana (Umiry-rana) | 5, 6 |
| Iriakopi (Jakopi) | 7, 22, 29 | Uva Puva do Campo | 44, 45 |
| Judeu | 46 | Wassie wassie kwarrie | 47 |
| Jundiahy | 45 | Watra Kwarrie | 22 |
| Keu-pau-rik-orai-yek | 14 | | |
| Kwarie | 7 | | |

SPECIFIC AND INFRASPECIFIC NAMES

The numbers refer to the serial numbers of *Qualea* under which the respective names are cited. The names printed in *italics* are synonyms; those printed in **bold face** type refer to new taxa.

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|--|----|--|----|
| <i>Agardhia</i> | | <i>ingens</i> Warm. | 27 |
| <i>cryptantha</i> Spreng. | 59 | var. duckeii Staf. | 27 |
| <i>grandiflora</i> Spreng. | 44 | var. <i>ingens</i> | 27 |
| <i>Amphilochia</i> | | <i>jundiahy</i> Warm. | 45 |
| <i>acuminatula</i> Gardn. | 59 | <i>lancifolia</i> Ducke | 35 |
| <i>cordata</i> Mart. | 56 | lineata Staf. | 30 |
| <i>cryptantha</i> Warm. | 59 | <i>lundii</i> (Warm.) Warm. | 52 |
| <i>dichotoma</i> Mart. | 54 | <i>macropetala</i> Spruce ex Warm. | 32 |
| <i>lundii</i> Warm. | 53 | <i>macroptera</i> A. Dietr. | 45 |
| <i>marginata</i> Miq. | 59 | <i>magna</i> Kuhlmann | 38 |
| <i>Lozania</i> | | <i>marginata</i> Warm. | 59 |
| <i>grandiflora</i> Schult. | 44 | megalocarpa Staf. | 58 |
| <i>Qualea</i> | | <i>melinonii</i> Beckmann. | 29 |
| <i>acuminata</i> Spruce ex Warm. | 24 | <i>microphylla</i> Warm. | 19 |
| <i>albiflora</i> Warm. | 7 | <i>multiflora</i> Mart. | 45 |
| <i>amoena</i> Ducke | 28 | var. <i>glabra</i> Mart. | 45 |
| <i>arirambae</i> Ducke | 5 | ssp. <i>multiflora</i> | 45 |
| belemnensis Staf. | 13 | var. <i>pubescens</i> Mart. | 45 |
| brevipedicellata Staf. | 33 | ssp. pubescens (Mart.) Staf. | 45 |
| <i>calantha</i> Pilger | 26 | nitida Staf. | 8 |
| <i>calophylla</i> Pittier | 37 | <i>obtusata</i> Briq. | 16 |
| <i>cassiquiarensis</i> Spruce ex Warm. | 12 | <i>paraensis</i> Ducke | 36 |
| var. <i>belemnensis</i> Ducke | 13 | <i>parviflora</i> Mart. | 46 |
| clavata Staf. | 3 | var. <i>discolor</i> Mart. | 46 |
| <i>coerulea</i> Aubl. | 22 | var. <i>glabrata</i> Mart. | 46 |
| <i>cordata</i> Spreng. | 56 | var. <i>tomentosa</i> Mart. | 46 |
| var. <i>cordata</i> | 56 | <i>pilosa</i> Warm. | 45 |
| var. <i>grandifolia</i> Warm. | 56 | polychroma Staf. | 31 |
| var. intermedia (Warm.) | | <i>psidiifolia</i> Spruce ex Warm. | 50 |
| Staf. | 56 | <i>pulcherrima</i> Spruce ex Warm. | 18 |
| forma <i>rupestris</i> Hassler | 56 | <i>retusa</i> Spruce ex Warm. | 6 |
| <i>cryptantha</i> (Spreng.) Warm. | 59 | var. <i>coriacea</i> Ducke | 16 |
| var. <i>cryptantha</i> | 59 | rigida Staf. | 9 |
| var. marginata (Miq.) Staf. | 59 | <i>rosa</i> Aubl. | 29 |
| <i>cyanea</i> Ducke | 43 | rubiginosa Staf. | 1 |
| <i>cymulosa</i> Schery. | 51 | <i>rupicola</i> Ducke | 49 |
| <i>decorticans</i> Ducke | 41 | <i>tessmannii</i> Mildbr. | 48 |
| <i>densiflora</i> Warm. | 55 | <i>themistoclesii</i> Ducke | 17 |
| <i>dichotoma</i> (Mart.) Warm. | 54 | <i>trichanthera</i> Spruce ex Warm. | 2 |
| var. <i>dichotoma</i> | 54 | <i>tricolor</i> Benoist | 34 |
| var. elongata (Warm.) Staf. | 54 | tuberculata Staf. | 40 |
| <i>dinizii</i> Ducke | 47 | <i>schomburgkiana</i> Warm. | 39 |
| var. <i>glabrifolia</i> Meurs ex Amsh. | 47 | <i>selloi</i> Warm. | 53 |
| <i>ealcarata</i> Mart. | 44 | ssp. pubescens Staf. | 53 |
| <i>elegans</i> Taub. ex Benoist | 25 | ssp. <i>selloi</i> | 53 |
| <i>elongata</i> Warm. | 54 | <i>speciosa</i> Huber | 24 |
| <i>esmeraldae</i> Standl. | 11 | <i>sprucei</i> Warm. | 21 |
| <i>ferruginea</i> Steyermark | 14 | <i>subvillosa</i> Link ex A. Dietr. | 45 |
| <i>gardneriana</i> Warm. | 4 | var. <i>glabrifolia</i> A. Dietr. | 45 |
| <i>gestasiana</i> St. Hil. | 19 | <i>suprema</i> Ducke | 42 |
| <i>glaberrima</i> Ducke | 7 | urceolata Staf. | 15 |
| <i>glauca</i> Warm. | 54 | verruculosa Staf. | 10 |
| <i>glaziovii</i> Warm. | 57 | <i>violacea</i> Mart. & Zucc. ex Schult. | 29 |
| <i>gracilior</i> Pilger | 35 | <i>virgata</i> Rusby | 45 |
| <i>grandiflora</i> Mart. | 44 | <i>wittrockii</i> Malme | 5 |
| <i>homosepala</i> Ducke | 20 | <i>Schuechia</i> | |
| <i>impexa</i> Macbride | 23 | <i>brasiliensis</i> Endl. ex Walp. | 44 |
| <i>intermedia</i> Warm. | 56 | <i>ealcarata</i> Warm. | 44 |

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