

FLORA DA RESERVA DUCKE, AMAZONAS, BRASIL: SAPOTACEAE

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Sapotaceae Jussieu, A. L., Gen. Pl 151. 1789.

Miquel, F. A. W. 1863. *In*: Martius, Fl. bras. 7: 38-117.

Pennington, T. D. 1990. Sapotaceae. Fl. Neotrop. 52: 1-770.

Pennington, T. D. 1991. The genera of Sapotaceae. Royal Botanic Gardens, Kew & New York Botanical Garden. 295p.

Trees and shrubs, with latex in the trunk, branches and fruit. Indumentum of malpighiaceus hairs. Stipules present or absent. **Leaves** spirally arranged, alternate and distichous or rarely opposite or verticillate, simple, entire. **Inflorescence** fasciculate, fascicles usually solitary, axillary or ramiflorous or rarely cauliflorous, occasionally several on short leafless axillary shoots. **Flowers** bisexual or unisexual (plant monoecious or dioecious). Sepals 4–6 in a single imbricate whorl, or 2 whorls of 3 sepals and then the outer whorl valvate. Corolla cyathiform or tubular, less frequently rotate, gamopetalous, tube shorter than, equalling or exceeding the lobes; lobes 4–6(–9), entire, lobed or divided into 3 segments, the 2 lateral segments entire, or shallowly or deeply divided. Stamens 4–6(–9), fixed in the upper or lower half of the corolla tube, or rarely free, opposite the corolla lobes, included or exerted; anthers often extrorse. Staminodes 0–6, in a single whorl alternating with the stamens or fixed in the corolla lobe sinus. Disk annular or absent. Ovary superior, 1–5(–8)-locular, loculi 1-ovulate. **Fruit** a berry or occasionally a drupe, pericarp leathery or fleshy. **Seeds** 1-several, usually with a smooth shining testa, usually free or occasionally adherent to the pericarp. Seed scar adaxial or basi-ventral, narrow or broad or

sometimes extending to cover most of the seed surface. Embryo with plano-convex cotyledons and no endosperm or with thin foliaceous cotyledons and copious endosperm.

About 400 species in the Neotropics, *ca.* 350 in Africa and *ca.* 350 in tropical Asia and the Pacific. The Sapotaceae are mostly denizens of primary lowland rainforest and their greatest diversity is found in a broad swathe from Venezuela and the Guianas across Brazilian Amazonia to the foothills of the Andes in Colombia, Ecuador and Peru, and also in coastal Brazil. One hundred and two species are described in this account, which includes all species found in the vicinity of Manaus. Seventy one species have been recorded from Reserva Ducke.

Collections in this account from the Smithsonian/INPA Biological Dynamics of Forest Fragments Project (*ca.* 2°20' – 2°25' S, 59°45' – 60°05' W) situated 50–120 km north of Manaus are cited as “PDBFF” (Projeto Dimâmica Biológica de Fragmentos Florestais). The numbers of sterile collections refer to marked trees within several different reserves, distributed in 3 large cattle ranches.

The majority of the illustrations are adapted from Flora Neotopica 52 with permission from the New York Botanical Garden.

Key to the genera of Sapotaceae of the Manaus area

1. Calyx of 2 whorls of 3 sepals, those of the outer whorl valvate, corolla lobes divided into 3 segments 1. *Manilkara*
1. Calyx a single whorl of 4-6 imbricate sepals, corolla lobes simple.
 2. Stipules present, well developed, leaving a conspicuous scar.
 3. Flowers long-pedicellate, pedicels and calyx reddish, staminodes present, seed with dull rough testa, scar broad, covering 2/3 of seed surface 3. *Chromolucuma*

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3. Flowers sessile, calyx greenish, staminodes absent, seed with smooth shining testa, scar narrow 8. *Ecclinusa*
2. Stipules absent (except *Pouteria stipulifera* and *P. flavilata* which have minute caducous stipules).
 4. Stamines present, as many as the corolla lobes.
 5. Venation craspedodromous or brochidodromous, often with secondary and tertiary veins closely parallel and leaves appearing finely striate, seed laterally compressed, with copious endosperm 2. *Micropholis*
 5. Venation variable, but not closely parallel and leaves never finely striate, seed shape variable, seed usually without endosperm.
 6. Leaves spirally arranged, corolla and staminodes not carinose, stamens nearly always included, stamens and staminodes not inflexed against the style 6. *Pouteria* (major part)
 6. Leaves alternate and distichous, corolla tube and staminodes carinose, stamens exerted, stamens and staminodes strongly inflexed 4. *Sarcaulus*
 4. Stamines absent, or if present then fewer than the corolla lobes.
 7. Corolla tubular, or campanulate, globose, or cyathiform, stamens included.
 8. Ovary usually 2-locular, embryo with plano-convex cotyledons and included radicle, endosperm absent 6. *Pouteria* (minor part)
 8. Ovary 5-locular, embryo with thin foliaceous cotyledons, radicle exerted, copious endosperm present 7. *Chrysophyllum*
 7. Corolla rotate, stamens exerted.
 9. Ovary unilocular, loculi with 2 basal ovules, seed scar basal or basi-ventral 10. *Diploön*
 9. Ovary 2-5-locular, loculi uniovulate, ovules axile, seed scar adaxial.
 10. Leaves spirally arranged, usually minutely punctate on lower surface (lens), filaments not geniculate at the apex, not strongly narrowed below anther insertion, ovary 2-3-locular, fruit a berry 5. *Elaeoluma*
 10. Leaves often opposite or verticillate, not punctate, filaments geniculate at the apex and strongly narrowed below anther insertion, ovary 5-locular, fruit a drupe 9. *Pradosia*

1. *Manilkara*

Manilkara Adanson, Fam. Pl. 2: 166. 1763. *Nom. cons.*

Unarmed **trees** with sympodial branching. Small caducous stipules present or absent. Leaves spirally arranged, clustered at the shoot apex. Venation brochidodromous, secondary veins straight, parallel, ascending, looping below the margin and sometimes forming a submarginal vein; higher order venation parallel to the secondaries. **Inflorescence** axillary and in the axils of leaf scars. **Flowers** fasciculate, bisexual. Calyx of 2 whorls of 3 more or less free sepals, the outer whorl valvate. Corolla tube much shorter than

the lobes, lobes 6, divided to the base into 3 segments; median segment erect, narrow, clawed, clasping the stamen; 2 lateral segments spreading, equalling or slightly exceeding the median segment, entire or deeply divided. Stamens 6 in a single whorl inserted at the top of the corolla tube, free or partly fused to the staminodes; anthers extrorse. Staminodes 6, alternating with the stamens, lanceolate, apex often lobed or irregularly toothed. Ovary usually 6-locular, puberulous or glabrous; style exerted. **Fruit** 1-several-seeded, smooth or scaly, glabrous, fleshy. **Seed** ellipsoid to obovoid, strongly laterally compressed, with a hard shining woody testa; scar narrowly

elongate, basiventral or adaxial; embryo vertical with foliaceous cotyledons and an exerted radicle; endosperm copious.

About 30 species in the Neotropics, *ca.* 20 in Africa, and *ca.* 12 in Asia and the Pacific. Three species in Reserva Ducke.

Key to the species of *Manilkara* of the Manaus area

1. Leaf undersurface without obvious appressed indumentum 2. *M. bidentata*
1. Leaf undersurface with finely closely appressed or scurfy, whitish, yellowish or golden indumentum, often forming a pellicle
 2. Leaves 5–8.5(–12) cm broad, usually broadly oblong or oblong-elliptic, secondary veins *ca.* 30–35 pairs; petiole 3.5–6.5 cm long; ovary puberulous 3. *M. huberi*
 2. Leaves 3–4.5 cm broad, oblanceolate, secondary veins *ca.* 16 pairs; petiole 5–8 mm long; ovary glabrous 1. *M. cavalcantei*

1.1 *Manilkara cavalcantei* Pires & Rodrigues *ex* T. D. Penn., Fl. Neotrop. 52: 52, figs. 3, 5. 1990. **Fig. 1 a-b**

Stipules present, 1.5–2 mm long. **Leaves** 6–12 × 3–4.5 cm, oblanceolate, apex obtuse to emarginate, base narrowly attenuate, upper surface glabrous, lower surface with dense, closely appressed scurfy, yellowish-brown indumentum, midrib sunken on the upper surface, secondary veins *ca.* 16 pairs. Petiole 5–8 mm long, channelled, subglabrous. **Fascicles** axillary, 10–20-flowered. Pedicel 1–1.2 cm long, puberulous. Sepals 3–3.5 mm long, puberulous outside. Corolla glabrous, 2.5–3 mm long, tube *ca.* 0.5 mm long, median segment of corolla lobes narrowly boat-shaped, lateral segments equalling the median segment, narrowly lanceolate. Staminal filaments *ca.* 1.25 mm long, free; anthers *ca.* 0.8 mm long. Staminodes 0.5–1 mm long, apex irregularly toothed or lobed. Ovary glabrous. **Fruit** *ca.* 2.5 × 1 cm, narrowly ellipsoid; smooth, glabrous. **Seed** solitary, *ca.* 2.2 × 0.6 × 0.4 cm, laterally compressed, testa smooth, pale, not shining; scar basiventral, *ca.* 1.3 × 0.2 cm.

Field characters: Tree 15–20 m high, with fissured bark, small buttresses and sticky white latex from the slash. Flowers white to cream-coloured, mature fruit orange. Flowering in April, fruiting in May.

Brazil (Amazonas, Pará) in non-flooded lowland rainforest.

Local names: Maparajuba, Massaranduba.

22.XII.1994 (fl) Nascimento, J. R. *et al.* 696 (BM G IAN INPA K MBM UB UEC US); 23.IV.1968 (fr) Souza, J. A. INPA21202 (INPA); 7.III.1980 (st) Souza, J. A. 17 (INPA); 10.V.1994 (fr) Vicentini, A. *et al.* 527 (INPA K MG MONY RB SP).

Manilkara cavalcantei has the same closely appressed indumentum on the lower leaf surface as *M. huberi*, but it differs from that species in its oblanceolate leaves, with fewer secondary veins, and shorter petiole.

It is closest to *M. paraensis*, which is not yet recorded from Amazonas (known only from Pará, Mato Grosso and Maranhão). It differs in its sunken midrib, more curved secondary veins, longer pedicels, free filaments and poorly developed staminodes.

1.2 *Manilkara bidentata* (A.DC.) Chev., Rev. Int. Bot. Appl. Agric. Trop. 12: 270. 1932; Pennington, T. D., Fl. Neotrop. 52: 58, fig. 7. 1990. **Fig. 1 c-g**

Mimusops bidentata A. DC. in A. P. Candolle, Prodr. 8: 204 (1844).

Stipules absent. **Leaves** 7–20 × 2.5–6 cm, elliptic, oblong or oblanceolate, glabrous, or occasionally with a waxy cuticular covering; midrib slightly raised on the upper surface; secondary veins 12–25 pairs. Petiole 1.5–3.5 cm long, not or only slightly channelled, glabrous. **Fascicles** axillary, 5–20-flowered. Pedicel 1–2.5 cm long, glabrous. Sepals 4–6 mm long, glabrous. Corolla glabrous, 3.5–6 mm long, tube 0.5–1 mm long, median segment of corolla lobes elliptic or subulate,

lateral segments equalling the median segment, lanceolate and entire to deeply divided into 2 linear parts. Staminal filaments 1.5–2.5 mm long, usually free; anthers 1–2 mm long. Staminodes 1–3.5 mm long, very variable in form. Ovary glabrous. **Fruit** 1–3 cm long, ellipsoid or globose, smooth, glabrous. **Seeds** 1–2, 0.9–2.5 cm long, strongly laterally compressed, often with an abaxial crest, testa smooth, shining; scar basiventral or adaxial, 0.4–1.2 × 0.1–0.2 cm.

Field characters: A tree whose size varies according to situation. In rainforest it can reach 40 m high and 1–2 m diam., whereas in drier situations, as in campina, it may flower at only a few metres high. Bark greyish-brown and deeply fissured, with a reddish slash and copious sticky white latex. Flowers greenish-white, slightly fragrant, fruit ripening reddish-purple or black. Deciduous for a short period before flowering, with flowers and new leaves opening together. Flowering in the dry season mostly July to October, fruiting in January.

West Indies, Guianas to southern Amazonian Brazil, occurring in periodically flooded and non-flooded forest, and in campina forest on white sand.

Local names: Massaranduba.

17.XII.1993 (fr) *Assunção, P. A. C. L. 06* (COL IAN INPA K SPF); 19.V.1978 (st) *Coêlho, L. 791* (INPA); 9.VII.1976 (fl) *Haroldo INPA57813* (INPA); 5.II.1976 (fr) *Mello, F. et al. INPA54752* (INPA); 29.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 928* (G IAN INPA K R U UB US); 21.I.1965 (fr) *Rodrigues, W. & Monteiro, O. P. 6840* (INPA); 23.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7608* (INPA); 15.VII.1966 (fl) *Rodrigues, W. & Monteiro, O. P. 8174* (INPA); 19.VII.1966 (fl) *Rodrigues, W. & Monteiro, O. P. 8197* (INPA); 19.VII.1966 (fl) *Rodrigues, W. & Monteiro, O. P. 8198* (INPA); 3.VIII.1963 (fr) *Rodrigues, W. 9576* (INPA); 15.VI.1988 (fl) *Santos, J. L. & Lima, R. P. 933* (INPA K MG MO NY R RB SP U); 15.VI.1988 (fr) *Santos, J. L. & Lima, R. P. 945* (INPA K MG MO NY RB SP); 6.VIII.1968 (fl) *Souza, J. A. INPA21318* (INPA); 25.VI.1976 (fl) *Souza, J. A. INPA57827* (INPA); 25.VII.1968 (fl) *Souza, J. A. 65* (INPA); 29.X.1968 (fr) *Souza, J. A. 239* (INPA); 4.XII.1993 (fr) *Vicentini, A. & Assunção, P. A. C. L. 387* (BM

INPA K MBM MG UEC VEN); 13.IX.1994 (fr) *Vicentini, A. et al. 689* (B F INPA K MG P PEUFR UFMT VIC).

Manilkara bidentata is represented in central Amazonia only by subsp. *surinamensis*. This subspecies has a wide geographical and ecological range and a correspondingly variable morphology, especially in leaf size, leaf shape, flower size, staminode length and lobing, and fruit size. The lack of leaf indumentum distinguishes it from the other *Manilkara* species in Reserva Ducke.

1.3 *Manilkara huberi* (Ducke) Chev., Rev. Int. Bot. Appl. Agric. Trop. 12: 276, fig. 11. 1932; Pennington, T. D., Fl. Neotrop. 52: 80, fig. 11. 1990. **Fig. 1 h-j**

Mimusops huberi Ducke, Arch. Jard. Bot. Rio de Janeiro 2: 14. 1918.

Stipules absent. **Leaves** 15–23 × 5–8 cm, usually oblong-elliptic, elliptic or oblanceolate, apex usually obtuse or rounded, upper surface glabrous, lower surface minutely and densely appressed scurfy-puberulous with pale yellowish or whitish hairs forming a pellicle; midrib usually slightly prominent, but recessed on the upper surface, secondary veins 30–35 pairs, conspicuous below. Petiole 3.5–6.5 cm long, not or only slightly channelled at the apex, glabrous. **Fascicles** axillary, 10–15-flowered. Pedicel 2–4 cm long, appressed puberulous. Sepals 5–5.5 mm long, appressed puberulous outside. Corolla glabrous, 4.5–5.5 mm long, tube 1–1.5 mm long, median segment of corolla lobes narrowly boat-shaped, lateral segments equalling or slightly exceeding the median segment, narrowly lanceolate, entire. Staminal filaments ca. 2 mm long, shortly fused with the staminodes; anthers 1–1.5 mm long. Staminodes 1.5–2.5 mm long, narrowly oblong, apex toothed or lobed. Ovary appressed puberulous. **Fruit** 2.5 × 2.5–3.5 × 2.8 cm, ovoid or globose, smooth, glabrous. **Seed** not seen.

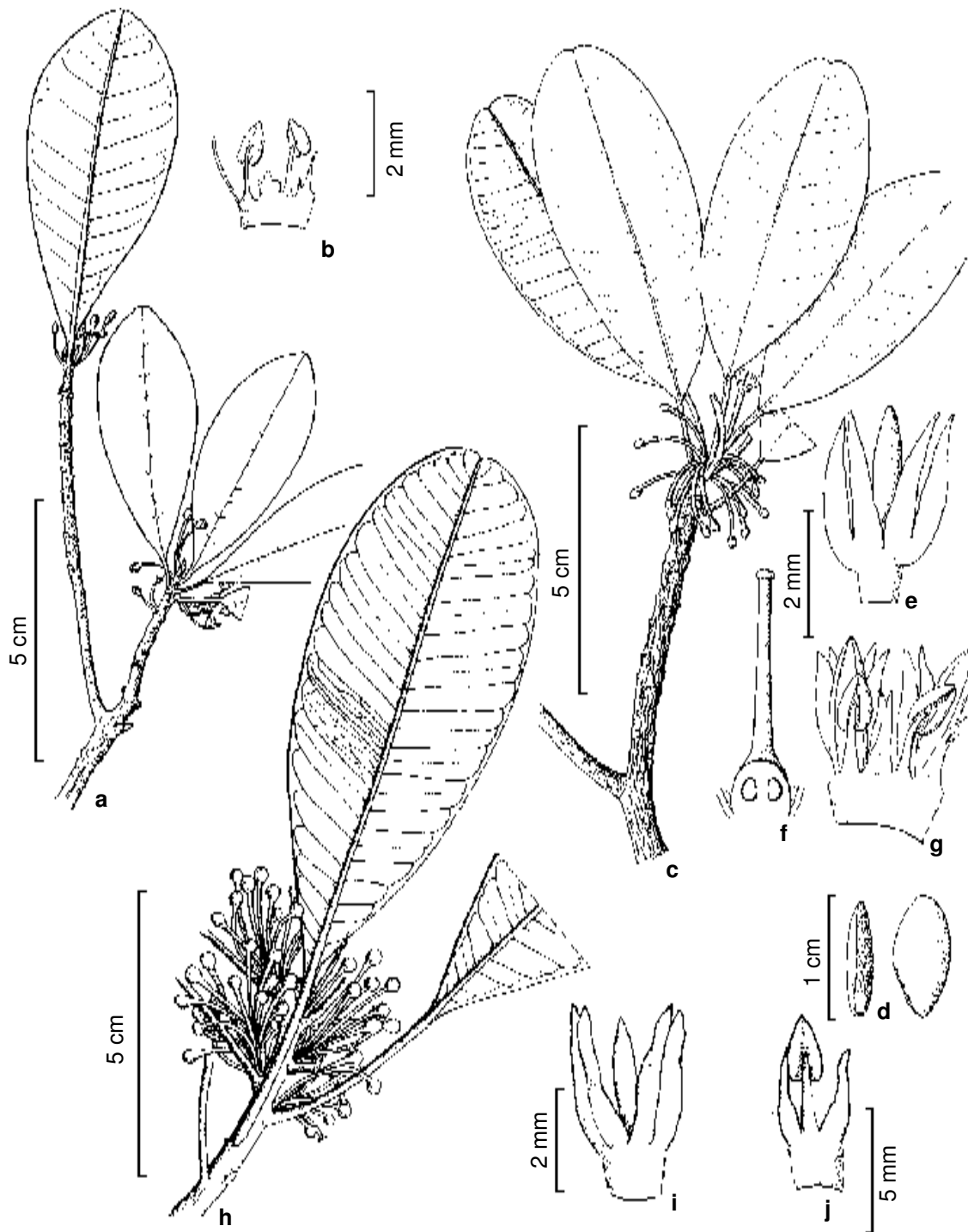


Figura 1 - a-b. *Manilkara cavalcantei* - a. habit; b. stamens & staminodes (Fróes 31690). c-g. *Manilkara bidentata surinamensis* - c. habit (Kubitzki et al. 79-233); d. seed (Bernardi s.n. Tree 8/50); e. part corolla; f. ovary; g. stamens & staminodes (Maguire et al. 36525). h-j. *Manilkara huberi* - h. habit (Mori & Pipoly 15431); i. corolla lobe; j. stamen & staminodes (M.G. Silva & Bahia 3164).

Field characters: Large tree reaching 50 m high and 2–3 m diam., with simple, thick, steep buttresses to 2 m or more high, bole cylindrical. Bark greyish- to blackish-brown, deeply fissured and grid-cracked, slash pink with whitish streaks and copious sticky white latex, crown broad and spreading. The pale yellowish lower leaf surface is characteristic in the field. The leaf undersurface of seedlings and saplings is white. Flowers greenish-white and ripe fruit yellowish-green. Flowering April to November, fruiting noted throughout the year.

Southern Venezuela and the Guianas south to Mato Grosso, usually in non-flooded rainforest, occasionally present in *várzea* forest.

Local names: Massarandubarana.

29.XI.1957 (st) *Coelho, D. s.n.* (INPA 6006);

26.VIII.1976 (st) *Reis, L. Q. s.n.* (INPA 58585);

27.VIII.1976 (st) *Reis, L. Q. s.n.* (INPA 58598).

Note: The only collections known from Reserva Ducke are from planted trees, but it is common elsewhere in the Manaus region.

Manilkara huberi is distinctive because of the rather large and relatively broad leaves, yellowish on the lower surface, and the conspicuous parallel secondary venation. The puberulous ovary is also unusual. The species produces a hard heavy durable construction timber, and the latex was formerly used in Pará as a source of balata.

2. *Micropholis*

Micropholis (Gris.) Pierre, Not. Bot. 37. 1891. *Nom. cons. prop.*

Unarmed **trees**. Stipules absent. **Leaves** spaced, alternate and distichous or spirally arranged. Venation brochidodromous with a submarginal vein or craspedodromous, secondary veins usually closely parallel and often not differentiated from the higher order venation, and then the leaf appearing finely striate. **Inflorescence** axillary, or rarely ramiflorous or cauliflorous, fasciculate, sometimes developing into short scaly persistent shoots. **Flowers** often unisexual. Calyx a single whorl of (4–)5 free, imbricate sepals. Corolla campanulate to shortly cylindrical, the tube longer than the lobes; lobes (4–)5, simple, erect to reflexed. Stamens (4–)5, fixed near the top of the corolla tube, included or exserted; filaments short and straight or long and geniculate (at least in bud); anthers extrorse. Staminodes (4–)5, fixed in the corolla lobe sinuses, alternating with the stamens, usually lanceolate or subulate. Small annular disk surrounding the base of the ovary sometimes present. Ovary (4–)5-locular; style included or exserted. **Fruit** 1-several-seeded. **Seed** laterally compressed, testa smooth or transversely wrinkled, shining or dull; scar adaxial, narrow, extending the length of the seed; embryo vertical, with thin foliaceous cotyledons and exserted radicle, surrounded by thick endosperm.

Thirty eight species in Central and South America and the West Indies. Thirteen species in and around Reserva Ducke.

Key to the species of *Micropholis* of the Manaus area

1. Secondary veins close, finely striate, higher order venation indistinguishable from the secondary venation, or visible only with a lens.
 2. Inflorescences trunciflorous to near ground level, and ramiflorous; fruit longitudinally 5-sulcate 7. *M. trunciflora*
 2. Inflorescences axillary or confined to smaller twigs, fruit not longitudinally sulcate.
 3. Stamens exserted, corolla lobes spreading or reflexed.
 4. Mature leaves persistently rufous-brown appressed puberulous on the lower surface, corolla more than 10 mm long. 11. *M. splendens*
 4. Mature leaves glabrous or with some residual indumentum along the lower midrib, corolla *ca.* 4 mm long 12. *M. obscura*

3. Stamens included, corolla lobes erect.
 5. Lower leaf surface with persistent appressed indumentum 9. *M. humboldtiana*
 5. Lower leaf surface glabrous (occasionally with residual indumentum on the midrib).
 6. Leaves usually less than 10 cm long, leaf apex caudate.
 7. Midrib impressed on the upper surface, secondary veins slightly sunken on the upper surface, spreading almost at right angles to the midrib 8. *M. cylindrocarpa*
 7. Midrib flat or raised on the upper surface, secondary veins not sunken on the upper surface, ascending 6. *M. venulosa*
 6. Leaves more than 10 cm long, leaf apex not caudate.
 8. Fruit longitudinally 4-ribbed or 4-winged, flowers tetramerous 5. *M. acutangula*
 8. Fruit not longitudinally ribbed or winged, flowers pentamerous (except sometimes *M. venulosa*).
 9. Secondary venation very close, finely striate, steeply ascending, indistinguishable from the higher order venation; fruit 4–7 cm long 4. *M. melinoniana*
 9. Secondary venation striate, but higher order venation can be distinguished with a lens.
 10. Corolla 5–6 mm long, fruit ca. 5 cm long 2. *M. mensalis*
 10. Corolla 2–3 mm long, fruit 2–3 cm long.
 11. Leaves usually drying blackish, flowers 5-merous, corolla scarcely exceeding the calyx; ovary flattened or winged, finely puberulous 3. *M. casiquiarensis*
 11. Leaves not drying black, flowers 4–5-merous, corolla clearly longer than calyx, ovary ovoid, not winged, stiffly pubescent 6. *M. venulosa*
 1. Secondary veins spaced, not finely striate, higher order venation usually reticulate, visible to the naked eye.
 12. Young shoots velutinous-hirsute, lower leaf surface uniformly pubescent with erect hairs, fruit velutinous 10. *M. williamii*
 12. Young shoots finely appressed puberulous or glabrous, lower leaf surface finely appressed puberulous or glabrous, fruit finely appressed puberulous or glabrous.
 13. Young shoots, lower leaf surface and inflorescences with fine appressed indumentum, older inflorescences produced on short, stout, recurved scaly shoots, secondary venation not obviously prominent or sunken; stamens included 1. *M. guyanensis*
 13. Whole plant essentially glabrous, inflorescences fasciculate, not on recurved scaly shoots, secondary venation impressed on upper surface, prominent on lower surface; stamens exerted 13. *M. submarginalis*

2.1 *Micropholis guyanensis* (A. DC.) Pierre, Not. Bot. 40. 1891; Pennington, T. D., Fl. Neotrop. 52: 175, fig. 32. 1990.

Sideroxylon guyanense A. DC., in A.P. de Candolle, Prodr. 8: 182. 1844.

Young shoots finely appressed puberulous. **Leaves** alternate and distichous or spirally arranged, 6–15 × 2.5–8.5 cm, elliptic, oblong-elliptic or oblanceolate, apex

obtusely cuspidate to narrowly attenuate, base variable, glabrous above, finely appressed puberulous below with golden or reddish-brown hairs, which turn paler with age; venation brochidodromous with a submarginal vein, midrib usually sunken on the upper surface, secondary veins 15–25 pairs, often obscure, parallel; higher order venation finely reticulate and usually impressed on the upper surface.

Petiole 1–2 cm long, channelled. **Fascicles** axillary, 2–15-flowered, usually developing into stout, recurved, densely scaly shoots up to 1 cm long, which persist on old wood. Pedicel 2–5 mm long. **Flowers** unisexual (plant dioecious). Sepals 5, 2–3 mm long, appressed puberulous on both surfaces. Corolla 2.5–3 mm long, shortly and broadly tubular to campanulate, tube exceeding the lobes, glabrous. Stamens 5, included; anthers absent in female flowers. Staminodes 5, 0.5–1 mm

long, lanceolate to oblong. Annular pubescent disk usually present around the base of the ovary in male flowers, obscure or absent in female. Ovary pubescent, 5-locular. **Fruit** 1.5–2.5 cm long, ellipsoid, smooth, finely puberulous to glabrous. **Seed** solitary, 1–2.3 cm long, laterally compressed, testa smooth, shining; scar adaxial, 1–2 mm wide.

Southern Central America, West Indies, South America to Peru, Bolivia and coastal Brazil.

Key to the subspecies of *Micropholis guyanensis*

1. Leaves usually 5–12 × 2.5–5 cm, usually narrowly elliptic or oblanceolate 2–4 times as long as broad, base narrowly attenuate, cuneate or acute; lower leaf surface with appressed indumentum, venation obscure, midrib sunken, petiole *ca.* 1–1.5 cm long 1a. *Micropholis guyanensis* subsp. *guyanensis*
1. Leaves 10–15 × 6–8.5 cm, broadly elliptic or broadly oblong-elliptic, often about twice as long as broad, base obtuse or rounded, lower leaf surface with appressed indumentum, venation obscure, midrib sunken, petiole usually *ca.* 2 cm long 1b. *Micropholis guyanensis* subsp. *duckeana*
1. Leaves 9–13.5 × 4.5–5.5 cm, elliptic to oblanceolate, 2–4 times as long as broad, base attenuate, lower leaf surface more or less glabrous, secondary and higher order venation easily visible, midrib flat; petiole 1–1.5 cm long 1c. *Micropholis guyanensis* subsp. 3

2.1a *Micropholis guyanensis* (A. DC.) Pierre subsp. *guyanensis*; Pennington, T. D., Fl. Neotrop. 52: 175, fig. 32. 1990. **Fig. 2 a-c**
Field characters: Tree to 25 m high and 50 cm diam., with steep simple buttresses, base of trunk often fluted, bark brown or reddish-brown, finely fissured, with pink or orange slash, with sticky white latex. The pale buff or reddish leaf undersurface is conspicuous. Flowers cream-coloured to pale greenish, scented. Fruit ripening purplish-black. Flowering June–August, fruit maturing December. This species flowers as a small tree 2–3 m high in campinarana forest.

Southern Central America, West Indies, N and W South America to Amazonia and Bolivia, in seasonal evergreen rainforest, usually on non-flooded land, and in gallery forest in the drier areas of Central Brazil. It also occurs in campinarana forest.

Local name: Rosadinha.

4.VI.1993 (fl) *Ribeiro, J. E. L. S. et al.* 847 (GIAN INPA K R U); 4.VII.1993 (bd) *Ribeiro, J. E. L. S. et al.* 1001 (INPA K MG MO NY RB SP U); 15.VIII.1996 (fl) *Sothers, C. A. & Assunção, P. A. C. L.* 895 (COL FIAN INPA K SPF UEC UFMT VEN).

2.1b *Micropholis guyanensis* subsp. *duckeana* (Baehni) T. D. Penn.; Pennington, T. D., Fl. Neotrop. 52: 180, fig. 32. 1990. **Fig. 2 d**

Pouteria dückeana Baehni, Candollea 18: 161. 1962.

Field characters: Tree to 22 m high and 30 cm diam., with small buttresses. Bark scaly, brown; slash reddish, with white sticky latex. Flowers yellowish-green, fruit maturing green or black, often with an easily removed ferruginous indumentum. The fruit is sweet and edible. Flowering May to July, fruit maturing December.

Amazonian Brazil, Peru and Colombia to Venezuela and the Guianas, in non-flooded rainforest over clay and white sand.

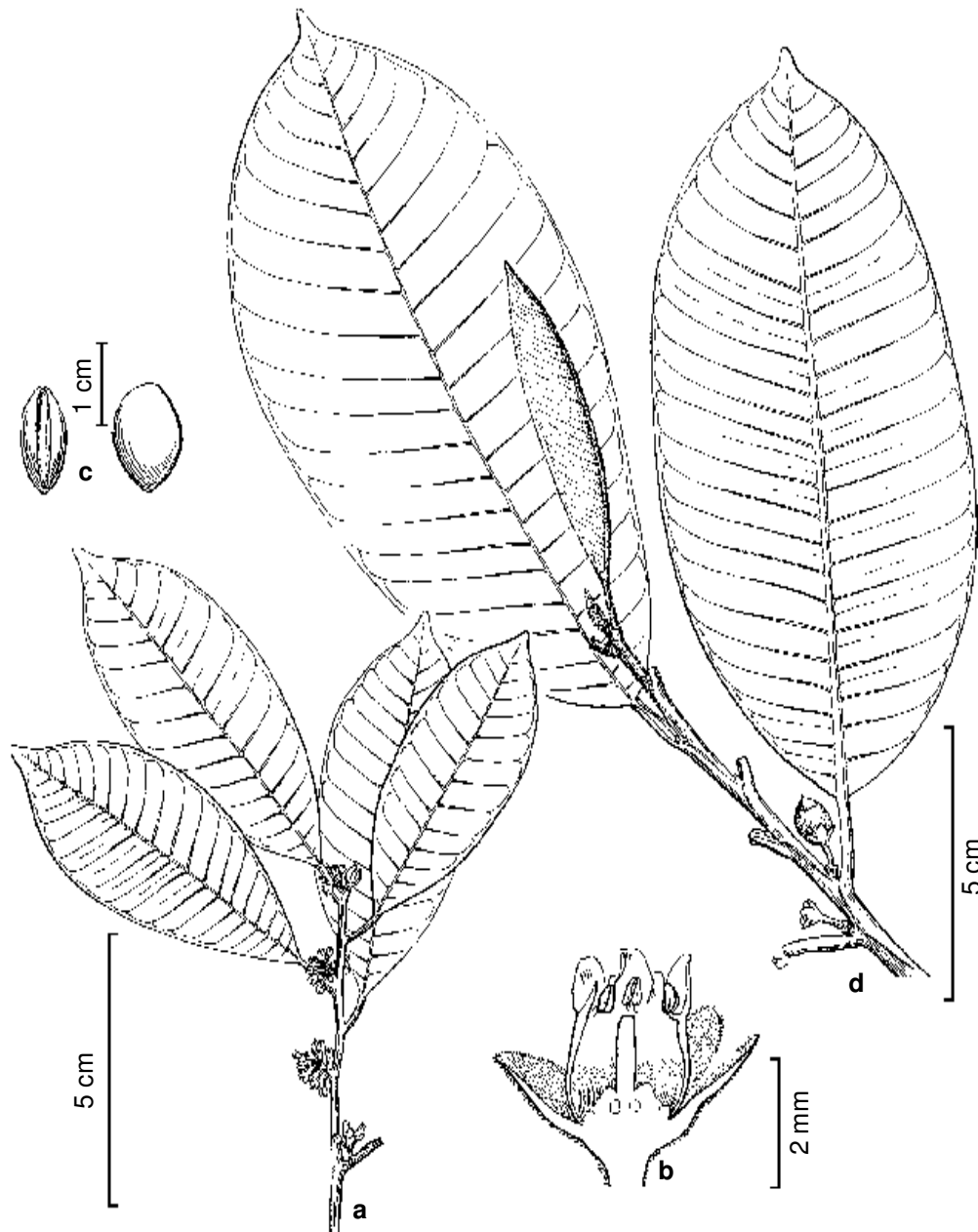


Figura 2 - a-c. *Micropholis guyanensis* subsp. *guyanensis* - a. habit (Mori & Boom 14757); b. 1/2 flower (Irwin et al. 14091); c. seed (Steyermarck et al. 125697). d. *Micropholis guyanensis* subsp. *duckeana* - d. habit (Prance et al. 8234).

Local name: Rosadinha.

5.VIII.1994 (fl) Hopkins, M. J. G. et al. 1475 (BM INPA K MBM MG UB US); 4.VI.1993 (fl) Ribeiro, J. E. L. S. et al. 847 (G IAN INPA K R U); 5.VI.1993 (fl) Ribeiro, J. E. L. S. et al. 867 (INPA K MG MORB); 29.VI.1993 (bd) Ribeiro, J. E. L. S. et al. 923 (BM IAN INPA K MBM); 4.VII.1993 (bd) Ribeiro, J. E. L. S. et al. 1001 (INPA K MG MO NY RB SP U); 12.VIII.1993 (fl) Ribeiro, J. E. L. S. et al. 1112 (GH IAN ICN INPA K P VIC); 15.VIII.1996 (fl) Sothers, C. A. & Assunção, P. A.

C. L. 895 (COL FIAN INPA K SPF UEC UFM T VEN); 23.V.1995 (fl) Vicentini, A. & Silva, C. F. 964 (GH ICN INPA K MG S UPCB VIC W).

2.1c *Micropholis guyanensis* (A. DC.) Pierre subsp. 3.

Field characters: Tree to 30 m high and 35 cm diam., with simple or branched concave buttresses to 75 cm high. Bark finely fissured,

greyish brown, slash reddish, with white latex. Flowers yellowish-white. Fruit not known. Flowering in June (Reserva Ducke only).

So far known only from central Amazonian Brazil and Amapá, where it is a tree of non-flooded rainforest.

4.VI.1993 (bd) *Ribeiro, J. E. L. S. et al.* 835 (INPA K MG NY SP); 5.VI.1993 (fl) *Ribeiro, J. E. L. S. et al.* 870 (G INPA K MG UB US).

This subspecies of *M. guyanensis* is recognizable by the more or less glabrous leaves, conspicuous secondary and higher order venation, and the flat midrib (not impressed on the upper surface). Its fruit is unknown and its status doubtful. It may just be part of a single widespread species (*M. guyanensis*) but, whereas there are many intermediates between subsp. *guyanensis* and subsp. *duckeana*, at present all the collections of subsp. 3 can be clearly distinguished from the rest of the species. Although only collected twice in Reserva Ducke it is common in the PBDF reserves.

2.2 *Micropholis mensalis* (Baehni) Aubrév., *Adansonia* 3: 21. 1963; Pennington, T. D., *Fl. Neotrop.* 52: 191, fig. 36. 1990. **Fig. 3 b-e**

Pouteria mensalis Baehni, *Candollea* 14: 64. 1952.

Young shoots sparsely appressed puberulous. **Leaves** alternate and distichous, 8–11 × 3.2–4.5 cm, elliptic or oblong-elliptic, apex narrowly acuminate to caudate, base acute or narrowly attenuate, usually drying pale green, glabrous; venation brochidodromous with a submarginal vein very close to the leaf margin, midrib flat on the upper surface, secondary veins numerous, wide-spreading, slightly stronger than the parallel intersecondaries and tertiaries, the leaf appearing striate. Petiole 5–8 mm long, channelled. **Fascicles** axillary and below the leaves, 1–3-flowered. Pedicel 5–7 mm long. **Flowers** probably bisexual. Sepals 5, 3–5 mm long, appressed puberulous outside, with a glabrous margin. Corolla 5–6.5 mm long, tubular, lobes 5, ca. 1.5 mm long, glabrous. Stamens 5, included. Staminodes 5, ca. 1.5 mm long, lanceolate. Disk absent. Ovary 5-locular,

with dense, long, stiff hairs. **Fruit** ca. 5 cm long, ellipsoid, with a long attenuate apex, smooth, glabrous. **Seeds** 1–2, ca. 2.5 cm long, laterally compressed, testa rough, minutely transversely wrinkled, not shiny; scar adaxial, ca. 3 mm wide.

Field characters: Understorey tree to 12 m high and 20 cm diam., with greyish-brown bark and scarce white latex. Flowers whitish. Flowering in September, fruiting in March.

The Guianas to central Amazonian Brazil in non-flooded rainforest where it occurs as a component of the understorey. In the Guianas it also occurs on granitic outcrops.

19.XI.1997 (fr) *Ribeiro, J. E. L. S. et al.* 1953 (INPA K). PBDF: Reserva km 41, *Oliveira A49* (INPA K).

The leaf venation of this species is close to that of *M. casiquiarensis*, but *M. mensalis* can be distinguished by the pale green leaves, larger flowers and rostrate fruit. It is always a small understorey tree whereas *M. casiquiarensis* is a large buttressed canopy tree.

2.3 *Micropholis casiquiarensis* Aubrév., *Mem. New York Bot. Gard.* 23: 211. 1972; Pennington, T. D., *Fl. Neotrop.* 52: 193, fig. 36. 1990. **Fig. 3 a**

Young shoots minutely appressed puberulous. Leaves alternate and distichous, 7–15 × 4–7 cm, elliptic, apex obtusely acuminate, base rounded or obtuse, usually drying blackish, glabrous; venation brochidodromous with a submarginal vein very close to the margin, midrib flat on the upper surface, secondary veins numerous, slightly ascending, the more or less parallel intersecondaries and tertiaries equally prominent, the leaf appearing striate. Petiole 0.6–1.1 cm long, channelled. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 0.5–1 cm long. **Flowers** ? bisexual. Sepals 5, 2–2.5 mm long, slightly swollen at the base and abruptly contracted into the pedicel, appressed puberulous on both surfaces. Corolla 2.5–3 mm long, campanulate or broadly tubular, lobes 5, shorter than the tube, glabrous. Stamens 5, included. Staminodes 5, 0.75–1 mm long, narrowly lanceolate. Disk absent. Ovary 5-locular, flattened or slightly winged at the base,

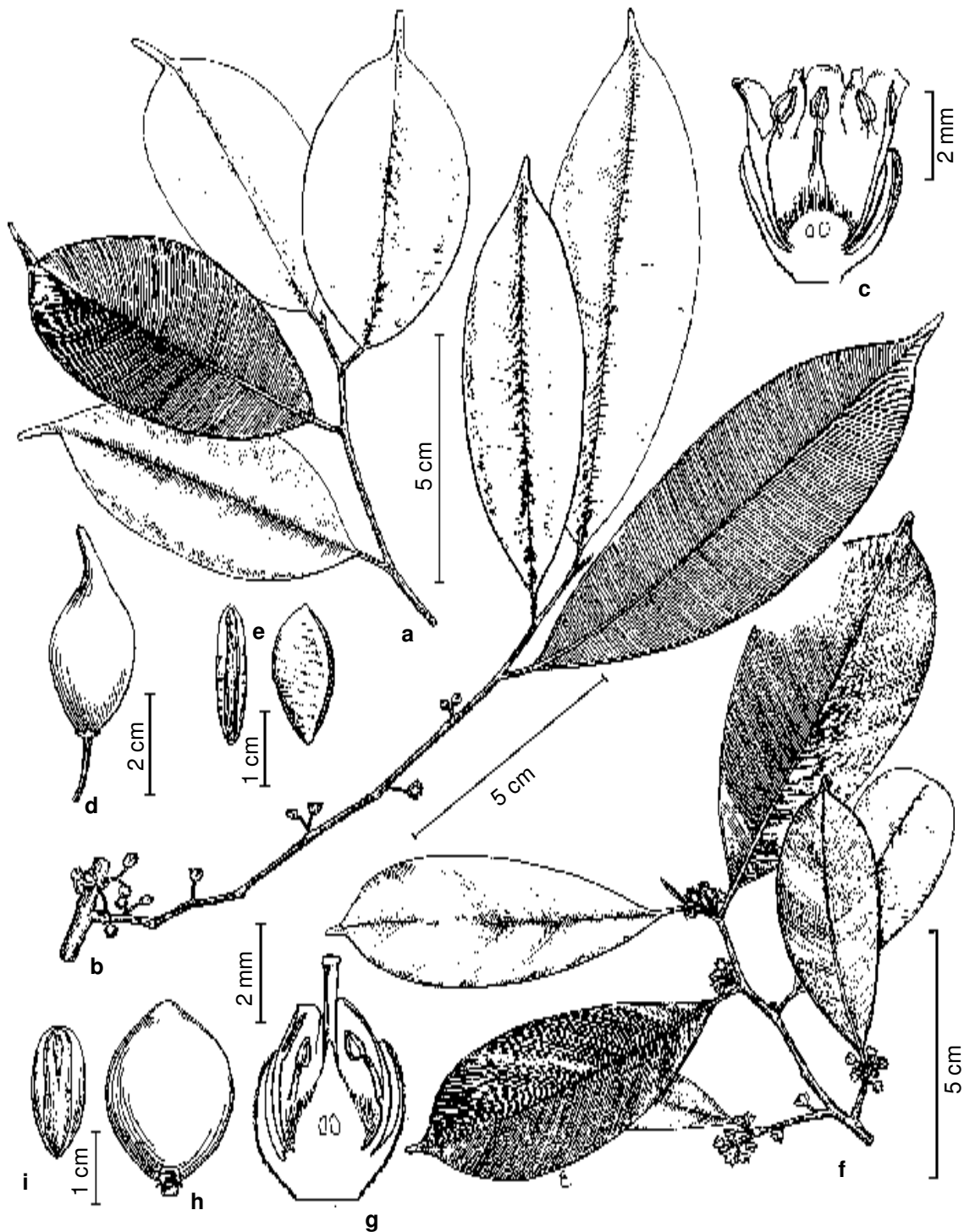


Figura 3 - a. *Micropholis casiquiarensis* - a. habit (Maguire et al. 36522). b-e. *Micropholis mensalis* - b. habit; c. 1/2 flower (Maguire 24452); d. fruit; e. seed (Tillett et al. 45192). f-i. *Micropholis melinoniana* - f. habit (Silva & Bahia 3132); g. 1/2 flower (Lissot 75/50); h. fruit (Granville 4267); i. seed (Petrov 121).

puberulous. **Fruit** ca. 2.5 × 1.5 cm, ellipsoid, apex rounded, smooth, glabrous. **Seed** solitary, ca. 1.5 cm long, laterally compressed, testa rough, wrinkled, not shiny; scar adaxial, ca. 5 mm wide.

Field characters: Canopy tree to 35 m high and 2 m diam. with symmetrical plank buttresses to 2 m high and bole often fluted to 4–5 m high, bark greyish-brown to dark brown, scaling in irregular plates or longitudinal strips exfoliating from the base, slash brown, ca. 1 cm thick, with small amount of watery white latex. Flowering October to November, the fruit maturing February to March. The flowers are greenish-white and the fruit matures reddish-black.

Southern Venezuela to central Brazilian Amazonia, in non-flooded rainforest, up to 1100 m altitude in Venezuela.

11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F.* 644 (BM G INPA K MBM MG UEC US); 17.IX.1997 (fl) *Costa, M. A. S. et al.* 776 (IAN INPA K MONY RB SP U UB); 6.X.1965 (fl) *Loureiro, A.* INPA16142 (INPA); 2.III.1995 (fr) *Nascimento, J. R. et al.* 770 (GIAN INPA K MBM MO R RB U); 14.VI.1980 (fr) *Nelson, B. W. & Nelson, S. P.* 427 (INPA); 12.IX.1962 (fr) *Rodrigues, W. & Coêlho, D.* 4452 (INPA); 3.I.1964 (fr) *Rodrigues, W. & Monteiro, O. P.* 5660 (INPA); 17.III.1966 (fr) *Rodrigues, W. & Coêlho, D.* 7588 (INPA); 25.III.1966 (fr) *Rodrigues, W. & Coêlho, D.* 7626 (INPA); 29.III.1966 (fr) *Rodrigues, W. & Coêlho, D.* 7640 (INPA); 12.XII.1993 (fr) *Vicentini, A.* 401 (INPA K MG NY SP); 28.II.1994 (fr) *Vicentini, A. & Pereira, E. C.* 410 (IAN INPA K).

This species is close to *M. mensalis* and their distinguishing features are listed under the latter.

2.4 *Micropholis melinoniana* Pierre, Not. Bot. 40. 1891; Pennington, T. D., Fl. Neotrop. 52: 193, fig. 37. 1990.

Fig. 3 f-i

Young shoots minutely appressed puberulous. **Leaves** alternate and distichous, 7–15 × 2.8–5 cm, oblong, elliptic or oblanceolate, apex obtuse, acute or shortly attenuate, base acute to narrowly cuneate, glabrous; venation craspedodromous or sometimes brochidodromous with a submarginal vein very close to the margin, midrib flat or only slightly sunken on the upper

surface, secondary and higher order venation indistinguishable, ascending, finely striate. Petiole 0.8–1 cm long, channelled. **Fascicles** 5–10-flowered, axillary. Pedicel 2–6 mm long. **Flowers** unisexual (?monoecious). Sepals 5, 2–3 mm long, appressed puberulous outside, sparsely so or glabrous inside. Corolla 2.5–3.5 mm long, shortly tubular, lobes 5, with a truncate apex, shorter than the tube, scattered appressed hairs outside or glabrous. Stamens 5, included. Staminodes 5, 0.75–1.25 mm long, narrowly oblong, glabrous. Disk absent. Ovary 5-locular, ovoid, pubescent, style long, exerted. **Fruit** 4–7 cm long, broadly ellipsoid, apex and base acute or obtuse, smooth, glabrous. **Seeds** 1-several, 2.5–2.6 cm long, laterally compressed, testa smooth, shining; scar adaxial, 4–6 mm wide.

Field characters: Massive tree to 40 m high and 1.5 m diam., with thick buttresses to 2 m high. Bark smooth to finely fissured, greyish-brown, with a thick cream-brown to reddish slash, with sticky white latex. Flowers scented, greenish-white. Fruit maturing through yellow, red to purple, sometimes slightly sulcate. Flowering in central Amazonia in July, fruit maturing in November. The fruit is eaten by *Cebus apella*.

Mexico through Central America to Amazonian Brazil, Ecuador and Peru, in non-flooded lowland and montane rainforest, up to 1500 m altitude.

Not yet collected in Reserva Ducke.

PBDF: Reserva km 41, *Spironello 105* (INPA K).

Micropholis melinoniana is characterized by its very closely striate, rather steeply ascending venation, truncate corolla lobes, exerted style and the large fruit. The leaf lamina on dried specimens often splits along the secondary veins.

2.5 *Micropholis acutangula* (Ducke) Eyma, Recueil Trav. Bot. Néerl. 33: 198. 1936; Pennington, T. D., Fl. Neotrop. 52: 195, fig. 37. 1990.

Fig. 4 a-c

Sideroxylon acutangulum Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 159. 1925.

Young shoots closely appressed puberulous, soon glabrous. **Leaves** alternate

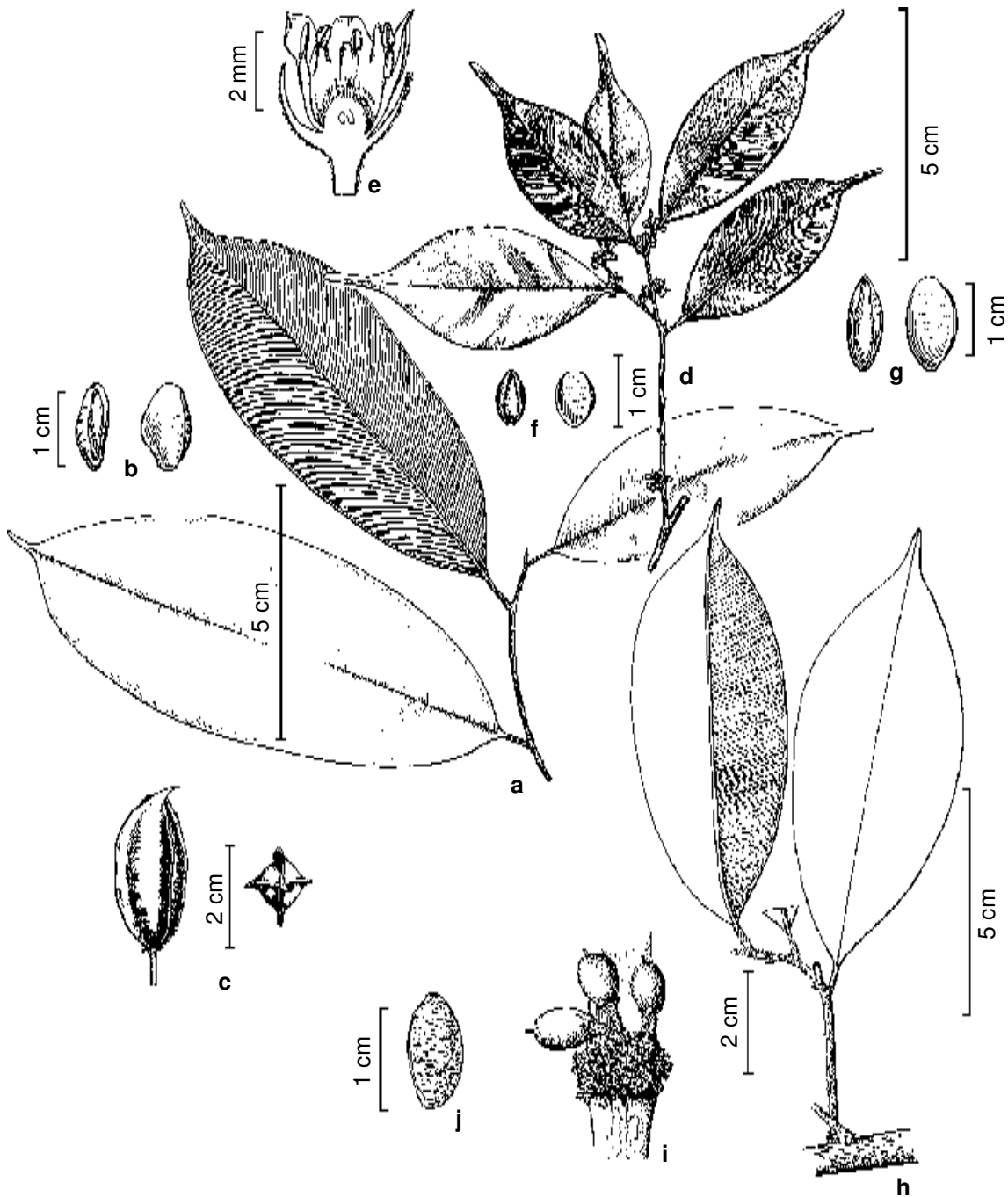


Figura 4 - a-c. *Micropholis acutangula* - a. habit; b. seed (Silva 57840); c. fruit (Jangoux & Bahia 114). d-g. *Micropholis venulosa* - d. habit (Heringer et al. 5482); e. 1/2 flower (Wurdack & Adderley 43434); f. seed (Daly et al. 1923); g. seed (Huashikat 2082). h-j. *Micropholis trunciflora* - h. habit (Ducke 2216); i. fruits (Solomon 3582); j. seed (Diaz & Jaramillo 1275).

and distichous, 8–12 × 3–6.2 cm, elliptic to broadly oblong, apex shortly and narrowly attenuate or acute, base acute or obtuse, glabrous; venation brochidodromous with a submarginal vein very close to the margin, midrib flat or slightly raised on the upper surface, secondary and tertiary venation finely striate, about equally prominent. Petiole 1–1.4 cm long, channelled. **Fascicles** 5–10-flowered, axillary. Pedicel 5–7 mm long. **Flowers** unisexual (? dioecious). Sepals 4, 1.5–3 mm long, sparsely appressed puberulous outside, glabrous inside. Corolla 2–4 mm long, campanulate, lobes 4, shorter than the tube, glabrous. Stamens 4, included. Staminodes 4, *ca.* 1.25 mm long (male flowers), *ca.* 0.5 mm long (female flower), lanceolate, glabrous. Disk absent. Ovary 3–4-locular, ovoid, densely pubescent; style included. **Fruit** 3–4.7 cm long, ellipsoid, strongly 4-winged or 4-ribbed (ribs 3–4 mm deep), apex narrowly attenuate or beaked, base acute or obtuse, smooth, glabrous. **Seed** solitary, 1.2–1.5 cm long, laterally compressed, tapering to the base, testa transversely wrinkled, shining; scar adaxial, 3–4 mm wide.

Field characters: Small to medium-sized tree reaching 25 m high and 35 cm diam. Bark dark grey or reddish, striate, slash yellowish, with white latex which is slow to appear. Flowers greenish-white and fruit maturing orange. In central Amazonia flowering from October to December, with the fruit maturing in March.

French Guiana to central and eastern Amazonian Brazil in non-flooded lowland rainforest.

23.III.1966 (fr) *Rodrigues, W. & Coelho, D.* 7607 (INPA).

PDBFF: Reserva Km 41, *Oliveira et al.* 287 (INPA K); *Oliveira et al.* 256 (INPA K).

Similar to *M. melinoniana* in its venation, but with slightly more differentiation between secondary and higher order venation, and also differing in its 4-merous flowers and winged fruit.

2.6 *Micropholis venulosa* (Mart. & Eichl.) Pierre, Not. Bot. 40. 1891; Pennington, T. D., Fl. Neotrop. 52: 196, fig. 37. 1990. **Fig. 4 d-g**

Sideroxylon venulosum Mart. & Eichl., in Mart., Fl. bras. 7: 52. 1863.

Young shoots puberulous to pubescent with golden brown or ferruginous hairs, soon glabrous. **Leaves** usually alternate or less frequently spirally arranged, 4–11 × 1.3–4.5 cm, elliptic or lanceolate, apex caudate or narrowly attenuate, base narrowly attenuate to rounded, glabrous; venation craspedodromous or brochidodromous with a submarginal vein very close to the margin, midrib flat or slightly raised on the upper surface, higher order venation appearing finely striate to the naked eye, but with a lens the parallel intersecondaries and tertiaries can be distinguished. Petiole 3–7 mm long, channelled. **Fascicles** axillary, 5–10-flowered. Pedicel 2–4 mm long. **Flowers** unisexual (plant monoecious). Sepals 4–5, 1.5–2 mm long, shortly pubescent outside, sparsely pubescent or glabrous inside. Corolla 1.25–3 mm long, shortly tubular or campanulate, lobes 4–5, shorter than the tube, glabrous. Stamens 4–5, included. Staminodes 4–5, 0.5–0.75 mm long, ovate or lanceolate, glabrous. Disk absent. Ovary 4–5-locular, ovoid, densely stiff-pubescent; style included. **Fruit** 1.2–3 cm long, subglobose to ellipsoid apex and base rounded to acute, smooth, glabrous. **Seed** solitary, 1–1.5 cm long, laterally compressed, testa finely transversely wrinkled, shining; scar adaxial and sometimes extending around the base of the seed, 1.5–2.5 mm wide.

Field characters: Small or large tree to 35 m high and 40 cm diam. The species is variable in the degree of buttressing, with some quite large specimens recorded as unbuttressed or with trunk only fluted at the base, whereas others have well-developed buttresses several metres high. The upper bole is cylindrical. Bark greyish-brown, finely fissured to scaling in small pieces. Slash reddish-brown, with plentiful white latex. Flowers pale green and fruit maturing yellowish. Flowering recorded in central Amazonia in May, July, August, September, November, December and March, and mature fruit in November and December.

Costa Rica and Panama and tropical South America east of the Andes, including coastal Brazil. Ecologically variable, occurring in non-flooded forest, but also commonly found in periodically flooded *várzea* forest, permanently flooded igapó forest and in dwarf campina forest over white sand.

9.I.1995 (fl) *Assunção, P. A. C. L. 122* (G IAN INPA K MBM R U UB US); 13.XII.1995 (fr) *Nascimento, J. R. et al. 686* (INPA K MG MO NY R RB SP U); 20.XI.1996 (fl) *Ribeiro, J. E. L. S. & Pereira, E. C. 1862* (BM COL INPA K MG SPF UEC UFMT VEN); 31.V.1994 (fl) *Vicentini, A. et al. 565* (INPA K MG MO NY RB SP).

The small leaves with a caudate apex are generally sufficient to distinguish this species. Larger-leaved species might be confused with *M. acutangula*, but they can be distinguished by the fine differences in detail of the higher order venation and by the fruit.

2.7 *Micropholis trunciflora* Ducke, Bol. Técn. Inst. Agron. N. 19: 19, fig. 6. 1950; Pennington, T. D., Fl. Neotrop. 52: 200, fig. 39. 1990.

Fig. 4 h-j

Young shoots with brown tomentose evanescent indumentum. **Leaves** alternate and distichous, 10–17 × 3–6.5 cm, elliptic, oblong-elliptic or oblong, apex narrowly attenuate to obtusely cuspidate, base acute or narrowly attenuate, glabrous or with some residual tomentum along the midrib below; venation craspedodromous or brochidodromous sometimes with a submarginal vein close to the margin, midrib sunken on the upper surface, leaves finely and minutely striate, the secondary veins indistinguishable from the higher order venation, venation widely spreading almost at right angles to the midrib. Petiole 7–10 mm long, channelled, tomentose at first. **Fascicles** 2–10-flowered, axillary and on the small and large branches and densely clustered on large woody protuberances on the trunk to almost ground level. Pedicel 3–4 mm long, shortly tomentose. **Flowers**

unisexual (plant monoecious). Sepals 4–5, 1.5–2.5 mm, long, pubescent outside, glabrous inside. Corolla 2.5–3 mm long (female), 4–4.5 mm long (male), tubular, lobes 4–5, shorter than the tube, glabrous. Stamens 4–5, included; stamens absent in female flowers. Staminodes 4–5, 0.5–0.75 mm long, narrowly lanceolate, glabrous. Disk absent. Ovary 5-locular, ovoid, densely pubescent. **Fruit** 1.3–2 cm long, ellipsoid to globose, longitudinally 5-sulcate, apex acute to rounded, apiculate, base acute to rounded, glabrous. **Seed** solitary, 1.3–1.5 cm long, laterally compressed, testa finely transversely wrinkled, shining; scar adaxial, 1.5–2 mm wide.

Field characters: A small or medium understory tree to 20 m high and 25 cm diam., with an irregular often fluted bole, densely covered with large woody protuberances bearing the inflorescences. Bark brown, slightly scaly, slash pink with small amount of white latex. Flowers pale green with a disagreeable smell in the early morning and fruit ripening dark purplish.

Central and western Amazonian Brazil and adjacent Peru, where it is found in lowland forest on non-flooded land.

Local name: Abiurana.

14.III.1995 (fr) *Assunção, P. A. C. L. & Pereira, E. C. 193* (INPA K MG MO NY R RB SP U); 9.IV.1997 (fr) *Assunção, P. A. C. L. et al. 495* (BM G INPA K MBM MG UB UEC US); 2.IV.1971 (fl) *Prance, G. T. et al. 11278* (INPA); 10.II.1994 (fl) *Ribeiro, J. E. L. S. et al. 1202* (INPA K MG MO NY RB SP); 19.VII.1993 (fl) *Rodrigues, W. 5381* (INPA); 24.XII.1963 (fl) *Rodrigues, W. & Coêlho, D. 5613* (INPA); 20.XII.1963 (fl) *Rodrigues, W. & Coêlho, D. 5640* (INPA); 4.III.1966 (fl) *Rodrigues, W. & Coêlho, D. 7541* (INPA); 23.I.1996 (fl) *Sothers, C. A. & Pereira, E. C. 783* (BM INPA K MG UEC); 23.I.1996 (fl) *Sothers, C. A. & Pereira, E. C. 789* (G INPA K MBM MG R U UB US).

An easily recognized species on account of the cauliflory from many protuberances on the trunk, the leaves with midrib deeply sunken on the upper surface and with wide-spreading finely striate venation and sulcate fruit.

2.8 *Micropholis cylindrocarpa* (Poepp. & Endl.) Pierre, Not. Bot. 40. 1891; Pennington, T. D., Fl. Neotrop. 52: 211, fig. 39. 1990.

Fig. 5 a-b

Sideroxylon cylindrocarpon Poepp. & Endl., Nov. Gen. Spec. Pl. 3: 72. 1845.

Young shoots appressed puberulous, soon glabrous. **Leaves** alternate and distichous, 5–10 × 1.8–2.7 cm, elliptic or oblong-elliptic, apex caudate, base acute or narrowly cuneate, glabrous; venation craspedodromous or brochidodromous and then sometimes with a submarginal vein close to the leaf margin, midrib sunken on the upper surface, secondary veins shallowly ascending, finely striate and indistinguishable from the higher order venation. Petiole 3–8 mm long, channelled, appressed puberulous. **Fascicles** 1–2-flowered, axillary and below the leaves. Pedicel 1–2 mm long, puberulous. Sepals 5, *ca.* 2.5 mm long, shortly appressed pubescent outside, scattered appressed hairs inside. Corolla *ca.* 3.5 mm long, shortly cylindrical, lobes 5, shorter than the tube, glabrous. Stamens 5, included. Staminodes 5, *ca.* 1 mm long, subulate, glabrous. Disk absent. Ovary 4-locular, ovoid, stiffly hairy. **Fruit** 2–2.5 cm long, ellipsoid, apex acute and apiculate, base rounded, smooth, glabrous. **Seed** solitary, 1.1–2 cm long, laterally compressed, testa finely transversely wrinkled, shining; scar adaxial, *ca.* 2 mm wide.

Field characters: Small understory tree to 15 m high and 30 cm diam., sometimes with a fluted bole. Bark finely striate, greyish, slash brown, with scarce sticky white latex. The fruit matures reddish-purple. Apparently flowering and fruiting throughout the year.

Amazonian Peru to central Amazonian Brazil. A component of the forest understory on non-flooded land.

9.IV.1997 (fr) *Assunção, P. A. C. L. et al.* 493 (INPA K MG MO NY RB SP); 6.XII.1996 (fl) *Hopkins, M. J. G. et al.* 1613 (IAN INPA K MO NY RB SP U UB); 21.XI.1964 (fl) *Rodrigues, W. & Monteiro, O. P.* 6760 (INPA).

PDBFF: Fazenda Esteio, *Pereira et al. s.n.* PDBFF 1301.2411 (INPA K); PDBFF Reserva km 41, *Spiroello A275* (INPA K).

2.9 *Micropholis humboldtiana* (Roem. & Schult.) T. D. Penn., Fl. Neotrop. 52: 212. 1990.

Fig. 5 c-d

Chrysophyllum humboldtianum Roem. & Schult., Syst. Veg. 4: 813. 1819.

Young shoots appressed pubescent with ferruginous hairs, becoming glabrous. **Leaves** alternate and distichous, 4.5–8.5 × 2.5–4 cm, broadly lanceolate or oblong-lanceolate, apex caudate, base rounded, glabrous above, densely and finely appressed sericeous below, indumentum ferruginous turning silvery-white with age; venation craspedodromous, leaf margin slightly revolute, midrib sunken on the upper surface, secondary venation widely spreading, finely striate, indistinguishable from the higher order venation. Petiole 4–7 mm long, ferruginous-pubescent at first. **Fascicles** 1–2-flowered, axillary. Pedicel 2–3 mm long, ferruginous pubescent. Sepals 5, 2.5–4 mm long, appressed pubescent outside, glabrous inside. Corolla 3.5–5 mm long, shortly cylindrical, lobes 5, shorter than the tube, glabrous. Stamens 5, included. Staminodes 5, *ca.* 1 mm long, narrowly lanceolate, glabrous. Disk absent. Ovary 5-locular, ovoid, shortly pubescent. **Fruit** *ca.* 1 cm long, ellipsoid, apex shortly beaked, subglabrous. **Seed** not seen.

Field characters: Small tree to 12 m high and 10 cm diam., with reddish slash. Flowers greenish-white, fruit maturing dark wine-red. Flowering June to November, young fruit from August.

Southern Venezuela, along the drainage of the R. Negro to central Amazonian Brazil. A tree of flooded igapó forest and periodically flooded savanna.

Not recorded from Reserva Ducke.

AMAZONAS: R. Cueiras, Repartimento, *Rodrigues 6097* (INPA); Manaus, *Schwacke 3* (R); Rio Negro, Jerusalém, *Froés 21087* (K).

The leaf shape and venation are somewhat similar to *M. cylindrocarpa* but *M. humboldtiana* differs in its revolute leaf margin and the rounded leaf base, and sericeous indumentum on the lower surface. The species also differ in their ecological preferences.

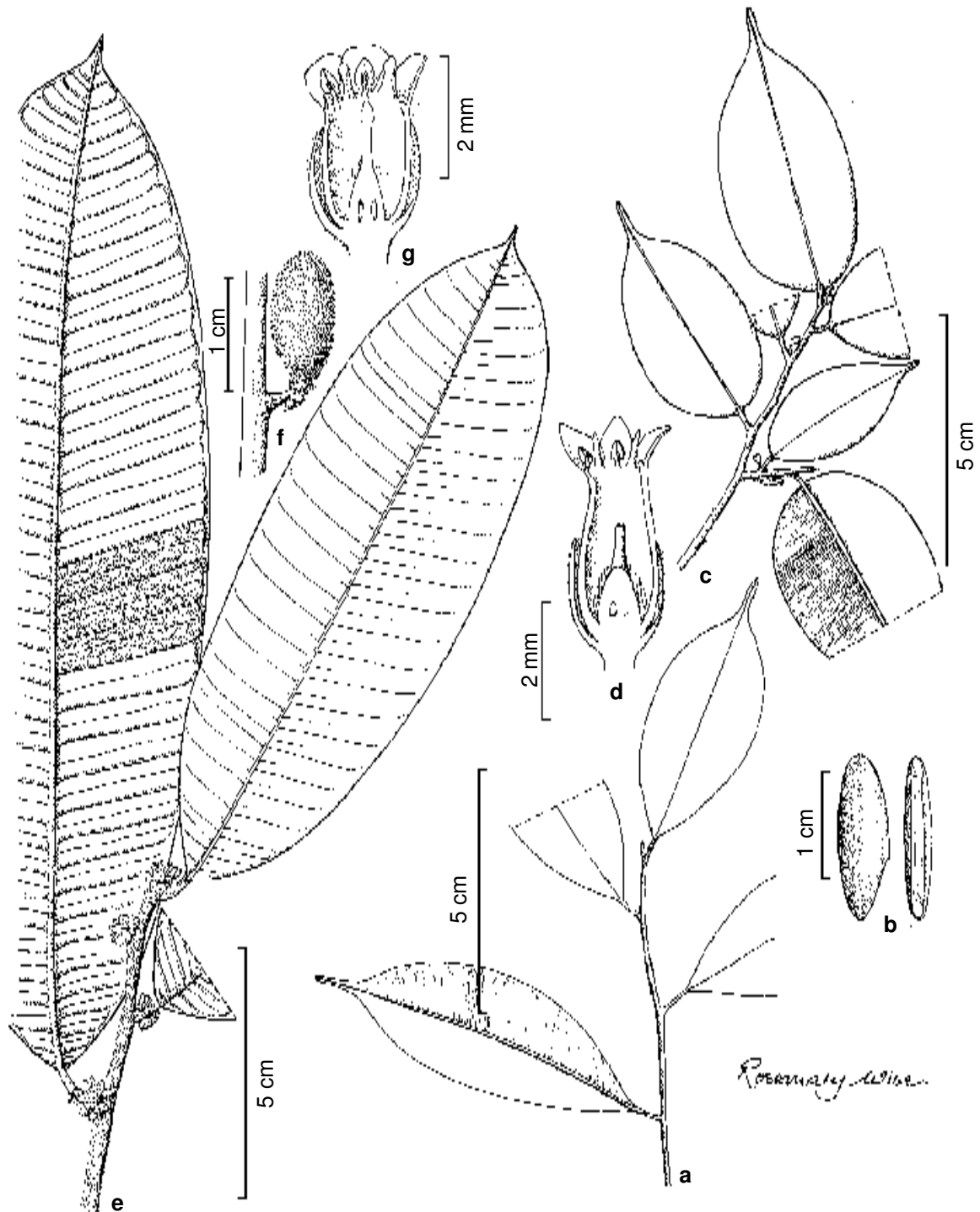


Figura 5 - a-b. *Micropholis cylindrocarpa* - a. habit (Killip & Smith 29021); b. seed (Diaz & Jaramillo 1221). c-d. *Micropholis humboldtiana* - c. habit; d. 1/2 flower (Frões 21087). e-g. *Micropholis williamii* - e. habit (Prance et al. 22683); f. fruit (Amaral et al. 221); g. 1/2 flower (Rodrigues & Coêlho 1284).

2.10 *Micropholis williamii* Aubrév. & Pellegr., *Adansonia* 1: 179. 1962; Pennington, T. D., *Fl. Neotrop.* 52: 215, fig. 43. 1990. **Fig. 5 e-g**

Young shoots densely velutinous-hirsute with erect brown hairs, indumentum persistent. **Leaves** alternate and distichous, 11–22 × 5–7 cm, broadly oblong or oblong-elliptic, apex obtusely cuspidate, base acute to obtuse, glabrous above, pubescent below with a mixture of short appressed hairs and longer erect hairs; venation brochidodromous with a submarginal vein, midrib sunken on the upper surface, secondary veins 30–40 pairs, widely spreading, parallel, straight, prominent on the lower surface; intersecondaries extending to the margin; tertiaries reticulate. Petiole 1–1.5 cm long, not channelled, densely velutinous-hirsute. **Fascicles** 2–5-flowered at first, developing into dense, many-flowered clusters on short scaly shoots, these 0.5–1 cm long. Pedicel *ca.* 1 mm long, densely hairy. Sepals 5, 3–3.5 mm long, densely velutinous-pubescent outside, appressed pubescent inside. Corolla 4–4.5 mm long, shortly tubular, lobes 4–5, shorter than the tube, glabrous. Stamens 4–5, included. Staminodes 4–5, *ca.* 1 mm long, lanceolate to subulate, glabrous. Disk absent. Ovary 4–5-locular, ovoid, pubescent. **Fruit** 2–2.5 cm long, ellipsoid, narrowed above into a long acute apex, base rounded, densely velutinous-hispid with brown hairs. **Seed** solitary, 1–1.5 cm long, laterally compressed, smooth, shining; scar adaxial.

Field characters: A small or medium-sized tree to 15 m high and 20 cm diam., with small buttresses. Bark dark brown, slightly striate, inner bark reddish, with sticky white latex. Flowers sweet-scented, pale greenish. Fruit covered with dense brown hairs. Flowering recorded in central Amazonia in February, September and October and fruit in July and December.

Central Brazilian Amazonia (Amazonas and Pará) in forest on non-flooded sites. 23.VII.1996 (fr) *Assunção, P. A. C. L. 453* (INPA K MG MO NY RB SP U); 21.IX.1997 (fl) *Assunção, P. A. C. L. et al. 676* (IAN INPA K MO NY RB SP); 9.II.1994 (fr) *Ribeiro, J. E. L. S. et al. 1199* (INPA K

MG UEC VEN); 9.IX.1959 (fl) *Rodrigues, W. & Coelho, D. 1284* (INPA); 8.V.1969 (fl) *Souza, J. A. 281* (INPA); 1.XII.1969 (fr) *Souza, J. A. 301* (INPA); 19.XII.1996 (fr) *Souza, M. A. D. et al. 301* (BM G INPA K MBM MG R UB US).

A very characteristic species within *Micropholis* on account of the large leaves with widely spaced prominent secondary veins and the dense indumentum on all parts of the plants.

2.11 *Micropholis splendens* Gilly *ex* Aubrév., *Mem. New York Bot. Gard.* 23: 210. 1972; Pennington, T. D., *Fl. Neotrop.* 52: 219, fig. 35. 1990. **Fig. 6 a-b**

Young shoots minutely appressed puberulous with reddish-brown hairs. **Leaves** spirally arranged, 10–16 × 4.5–6.2 cm, broadly elliptic or elliptic-oblong, apex obtusely cuspidate or obtuse, base obtuse to acute, glabrous above, minutely golden-brown appressed puberulous below; venation craspedodromous or brochidodromous and then with a submarginal vein very close to the margin, midrib prominent on the upper surface, secondary and higher order venation finely striate, shallowly ascending. Petiole 1–2 cm long, channelled, subglabrous. **Fascicles** 5–10-flowered, mostly ramiflorous. Pedicel 1–1.5 cm long, appressed puberulous. Sepals 5–6, 6–8 mm long, appressed puberulous on both surfaces. Corolla 1.5–1.7 cm long, cylindrical, tube 1.2–1.3 cm long, lobes 5, 3–4 mm long, reflexed, glabrous. Stamens 5, exserted. Staminodes 5, *ca.* 2.5 mm long, narrowly lanceolate, glabrous. Disk absent. Ovary 5-locular, broadly ovoid, pubescent. **Fruit** 2.5–3.5 cm long, ellipsoid, apex narrowly beaked, smooth, glabrous. **Seed** solitary, 1.8–2 cm long, laterally compressed, testa smooth, shining; scar adaxial, 7–8 mm wide.

Field characters: Tree to 30 m high and 50 cm diam., larger specimens with plank buttresses. Bark whitish-brown, finely fissured, slash pale brown, mealy, with white latex. The leaf undersurface is persistently reddish-brown. Flowers greenish-white, fruit glaucous-green. In central Amazonia flowering December to January, and fruit maturing in April.

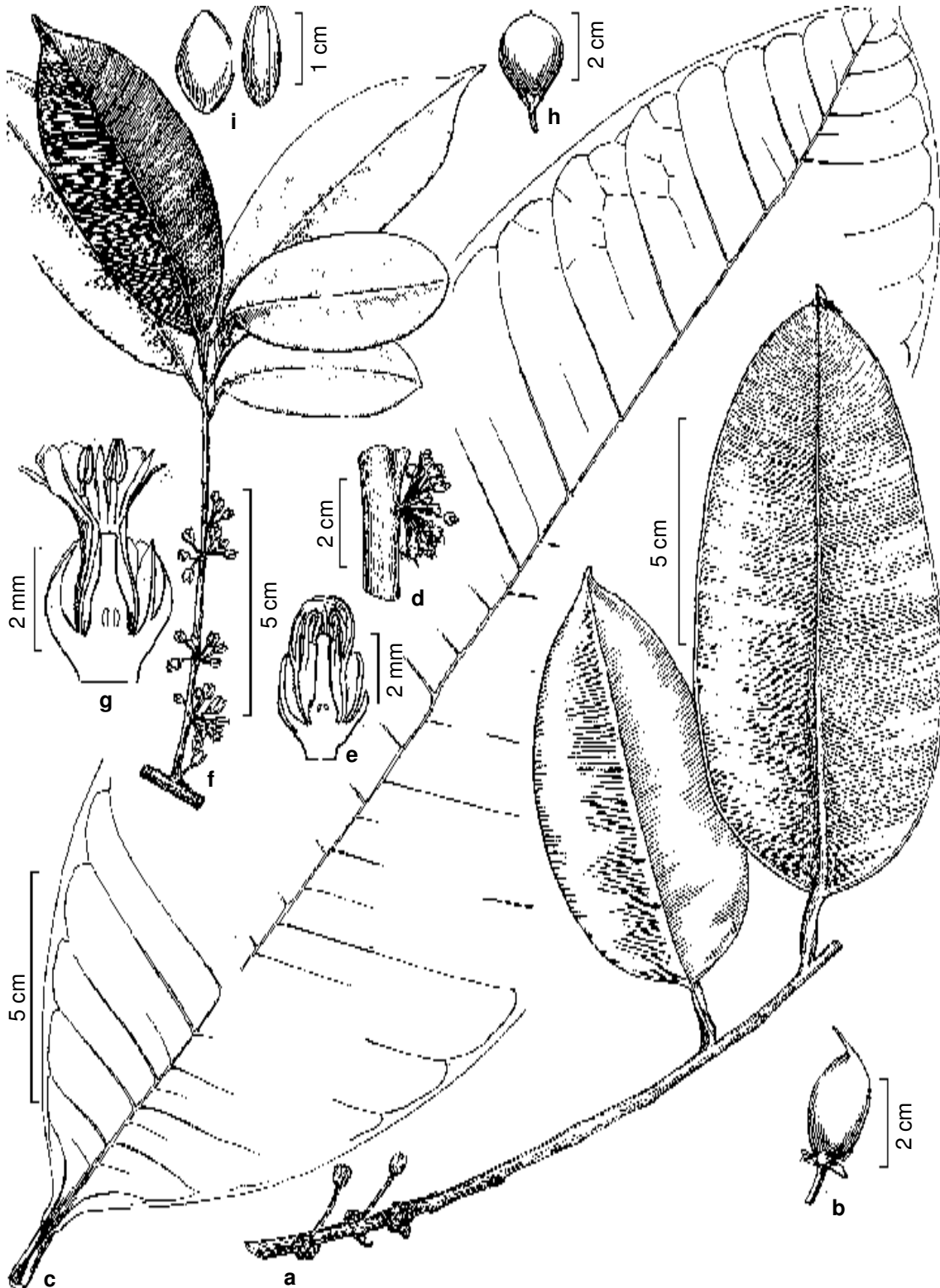


Figura 6 - a-b. *Micropholis splendens* - a. abit (Marcano-Berti & Salcedo 70-979); b. fruit (Clark 7095). c-e. *Micropholis submarginalis* - c. leave; d. inflorescence; e. young flower (Coêlho & Osmarino 29806). f-i. *Micropholis obscura* - f. habit (Maguire et al. 56042); g. 1/2 flower (FDBG 7176); h. fruit; i. seed (SF 7417).

Southern Venezuela to central Amazonian Brazil, where it occurs in forest on non-flooded sites.

19.IV.1994 (fr) *Assunção, P. A. C. L. & Pereira, E. C. 13* (INPA K MG MO NY SP); 21.IX.1997 (fl) *Assunção, P. A. C. L. et al. 671* (INPA K MG MO NY R RB SP U); 19.IX.1997 (fl) *Souza, M. A. D. et al. 419* (BM G INPA K MBM MG UB UEC US).

Micropholis splendens is easily recognized by its finely striate leaves with persistent reddish-brown indumentum on the lower leaf surface, the large flowers with exserted stamens and beaked fruit.

2.12 *Micropholis obscura* T. D. Penn., Fl. Neotrop. 52: 227, fig. 41. 1990. **Fig. 6 f-i**

Young shoots appressed pubescent with ferruginous hairs, soon glabrous. **Leaves** alternate and distichous, 8.5–13 × 2.5–4.5 cm, elliptic or oblong, apex narrowly acuminate, base acute or narrowly cuneate, glabrous above and with some residual ferruginous pubescence along the midrib below, venation brochidodromous with a weak submarginal vein, midrib flat or slightly prominent on the upper surface, secondary and higher order venation obscure, finely striate, shallowly ascending. Petiole 0.7–1.2 cm long, channelled, appressed pubescent at first. **Fascicles** 5–15-flowered, mostly in the axils of fallen leaves. Pedicel 5–7 mm long, puberulous. Sepals 5, 2.5–3 mm long, appressed puberulous on both surfaces. Corolla 3–4 mm long, shortly tubular, lobes 5, equalling the tube, reflexed, glabrous. Stamens 5, exserted. Staminodes 5, 1–1.5 mm long, subulate, glabrous. Disk absent. Ovary 5-locular, globose, pubescent. **Fruit** 2–3 cm long, broadly ellipsoid, apex rounded, apiculate, base obtuse, smooth, glabrous. **Seed** solitary, ca. 1.8 cm long, laterally compressed with an abaxial keel, testa smooth, shining; scar adaxial, ca. 4.5 mm wide. **Field characters:** Tree to 35 m high and 85 cm diam., with large thin convex buttresses to 1.5 m high. Bark reddish-brown, shaggy, coarsely scaling in large irregular plates, slash yellowish-brown with a small amount of white latex. Flowers pale green, scented. Fruit maturing yellowish. Flowering in central Amazonia

September to October, fruit maturing March to April.

The Guianas and southern Venezuela to central Amazonian Brazil and Amazonian Peru, in non-flooded lowland forest.

Not yet collected from Reserva Ducke, but frequent in the PDBFF plots.

PDBFF: Reserva km 41, *Oliveira et al. 109* (INPA K), *Lepsch Cunha et al. 3* (INPA K); *Spironello s.n.* (INPA 190939 K).

Micropholis obscura can be distinguished in the field by its convex buttresses and bark scaling in large irregular plates. The floral structure is similar to that of *M. splendens* but the flowers are much smaller, and it lacks the golden-brown indumentum of that species.

2.13 *Micropholis submarginalis* Pires & T. D. Penn., Fl. Neotrop. 52: 228. 1990. **Fig. 6 c-e**

Young shoots appressed pubescent at first, soon glabrous and scaly. **Leaves** spirally arranged, 19–30 × 7.5–9.5 cm, elliptic or oblong-elliptic, apex shortly narrowly attenuate or acute, base acute, margin slightly revolute, glabrous or with small amount of appressed indumentum on the midrib below; venation brochidodromous with a conspicuous submarginal vein, midrib raised on the upper surface, secondary veins 25–30 pairs, parallel, slightly arcuate, impressed on the upper surface, prominent on the lower surface, higher order venation lax, mostly oblique. Petiole 1.5–2.2 cm long, strongly channelled with slightly winged margins, subglabrous. **Fascicles** mostly on the branches below the leaves, 15–30-flowered. Pedicel 6–9 mm long, glabrous. Sepals 5, 2.5–3 mm long, glabrous. Corolla 4–5 mm long, shortly tubular, tube about equalling the lobes, lobes 5, reflexed, with sparse appressed indumentum outside. Stamens 5, exserted. Staminodes 5, lanceolate, glabrous. Disk absent. Ovary 5-locular, ovoid, shortly pubescent. **Fruit** ca. 2 cm long, ellipsoid, apex rounded, apiculate, base rounded, smooth, glabrous. **Seed** ca. 1.2 cm long, laterally compressed, scar adaxial, 4–5 mm wide.

Field characters: Small or medium-sized tree to 20 m high and 20 cm diam., unbuttressed, with dark brown hard, slightly flaky bark. The slash contains scarce white latex. Flowers creamish-white, mature fruit yellow. Flowering from May to June, fruit maturing in November.

From the Guianas to central and southern Amazonian Brazil, where it is a tree of non-flooded lowland forest.

Not yet collected in Reserva Ducke. PDBFF: Fazenda Esteio, *Nee 42885* (INPA K); Fazenda Dimona, *Pacheco et al. 80* (INPA K).

A very distinct species among *Micropholis* with large glossy glabrous leaves, widely spaced, numerous secondary veins which are impressed above and prominent below, and flowers with exerted stamens.

3. *Chromolucuma*

Chromolucuma Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 160, t. 18. 1925.

Unarmed **trees**. Stipules present, large. **Leaves** clustered, spirally arranged. Venation eucamptodromous. **Flowers** unisexual. Calyx a single whorl of 5 free sepals. Corolla cyathiform or broadly tubular, tube equalling or slightly larger than the lobes (slightly shorter in male flowers) lobes 5, simple. Stamens 5, fixed in the upper half of the corolla tube, included. Staminodes 5, fixed in the corolla lobe sinuses, alternating with the stamens. Disk absent. Ovary 2–5-locular. **Fruit** 1-seeded. **Seed** with dull rough testa and broad adaxial scar; embryo with plano-convex cotyledons, radicle slightly exerted; endosperm absent.

Two species from southern Venezuela to central Amazonian Brazil. A single species in Reserva Ducke.

3.1 *Chromolucuma rubriflora* Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 160, t. 18. 1925; Pennington, T. D., Fl. Neotrop. 52: 229, fig. 44. 1990. **Fig. 7 a-e**

Young shoots massive, with sparse appressed pubescence, very rough with prominent scars of fallen leaves and inflorescences. Stipules 1.5–2.5 cm long,

narrowly lanceolate with a long tapering apex, longitudinally striate, sparsely appressed puberulous. **Leaves** 20–30 × 8–10 cm, broadly oblanceolate, apex acute, obtuse or rounded, base long, narrowly cuneate or acute, glabrous or with some appressed indumentum on the midrib below; venation eucamptodromous, midrib flat or slightly sunken on the upper surface, secondary veins 20–25 pairs, parallel and slightly arcuate; intersecondaries absent; tertiaries oblique, numerous; higher order venation reticulate. Petiole 3–4 cm long, strongly channelled, glabrous. **Fascicles** many-flowered, on twigs below the leaves. Pedicel 2–2.5 cm long, slender, puberulous. **Flowers** unisexual (plant monoecious). Sepals 4–5 mm long, appressed puberulous on both surfaces. Corolla (male) *ca.* 5 mm long, tube slightly shorter than the lobes; (female) *ca.* 4 mm long, glabrous. Staminodes *ca.* 1.25 mm long (male), *ca.* 0.5 mm long (female), lanceolate, glabrous. Ovary broadly truncate to ovoid, 2–3-locular, densely pubescent. **Fruit** 4–8 cm long, broadly ellipsoid, rounded at base and apex, smooth or rugose (drying to become strongly and irregularly ribbed or furrowed, shortly velutinous. **Seed** solitary, 2.5–5.5 cm, long, ellipsoid, rounded at base and apex; testa rough, not shining; scar adaxial, covering 2/3 of the seed surface.

Field characters: Tree to 30 m high and 60 cm diam., with concave buttresses to 2 m high; trunk cylindrical; bark reddish-brown, scaly and striate, and with vertical rows of lenticels, slash with yellow latex. The pedicels and calyx are red and the corolla cream to greenish; it is very conspicuous when in flower because of the dense clusters of reddish inflorescences held below the leaves. Fruit golden brown. Flowering in central Amazonia in August and September, fruit maturing January to February.

Southern Venezuela to central Amazonian Brazil in periodically flooded or poorly drained forest often on riversides.

25.IX.1957 (fl) *Ferreira, E. 105* (INPA); 31.VIII.1995 (fl) *Ribeiro, J. E. L. S. et al. 1677* (INPA K MG MO RB SP U); 13.IX.1995 (fl) *Ribeiro, J. E. L. S. & Pereira, E. C. 1700* (INPA

K NY); 7.XII.1994 (fr) *Vicentini, A. & Pereira, E. C.* 778 (INPA K MG MO NY R RB SP U); 26.VIII.1997 (fl) *Vicentini, A. et al.* 1229 (IAN INPA K MO NY RB SP U).

Easily recognized in the field by the yellowish latex, massive scaly twigs with large stipules and the red flowers.

4. *Sarcaulus*

Sarcaulus Radlkofer, Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München 12: 310. 1882.

Unarmed **trees**. Stipules absent. **Leaves** spaced, alternate and distichous or occasionally weakly spirally arranged. Venation brochidodromous. **Inflorescence** axillary, flowers unisexual. Calyx a single whorl of 5 sepals. Corolla globose or broadly cyathiform, lobes 5, simple. Stamens 5, fixed at the top of the corolla tube, exerted, with short swollen filaments. Staminodes 5, thick, carnos. Disk absent. Ovary 2–5-locular. **Fruit** 1-several-seeded. **Seed** laterally compressed, scar adaxial, embryo with plano-convex cotyledons, endosperm absent.

Five species in tropical South America.

4.1 *Sarcaulus brasiliensis* (A.DC.) Eyma, Recueil Trav. Bot. Néerl. 33: 192. 1936; Pennington, T.D., Fl. Neotrop. 52: 233, fig. 46. 1990. **Fig. 7 f-h**

Chrysophyllum brasiliense A. DC., in A. P. de Candolle, Prodr. 8: 156. 1844.

Young shoots minutely appressed puberulous. **Leaves** alternate and distichous or weakly spirally arranged, 7–13 × 2.5–4.4 cm, elliptic or oblong-elliptic, apex narrowly acuminate, base acute to rounded, glabrous; venation brochidodromous, midrib slightly raised on the upper surface, secondary veins 9–12, more or less parallel, arcuate; intersecondaries moderately long; tertiaries forming a lax reticulum. Petiole 0.7–1 cm long, flat, often expanded into a narrow wing at the apex, glabrous. **Fascicles** 1–8-flowered, axillary and below the leaves. Pedicel 6–10 mm long, often recurved or coiled in bud, appressed puberulous. **Flowers**

unisexual (plant dioecious). Sepal 2–3 mm long, appressed puberulous on both surfaces. Corolla 3–4 mm long, tube about equalling the lobes, weakly to strongly carnos, appressed puberulous on both surfaces. Stamens absent in female flowers. Staminodes 0.5–1.25 mm long, triangular or ovate, appressed puberulous. Ovary ovoid, puberulous. **Fruit** 1.8–3 cm long, ellipsoid to subglobose, apex acute to rounded, base rounded or tapered, smooth, glabrous. **Seeds** 1–2, 1.2–1.7 cm long, laterally compressed, testa smooth, shining; scar adaxial, 2–4 mm wide.

Field characters: Unbuttressed tree to 20 m high and 35 cm diam. with a cylindrical bole, bark pale greyish, slightly scaling or dippled, and lenticellate; slash reddish with plentiful white latex. Flowers whitish, without scent, fruit maturing yellow, with a sticky whitish pulp surrounding the seed. Flowering in central Amazonia in October, fruit maturing January to February.

Southern Central America to the Guianas, Amazonian Brazil, Peru and Bolivia, in lowland and montane forest on periodically flooded and non-flooded land.

27.II.1998 (fr) *Assunção, P. A. C. L. et al.* 804 (IAN INPA K MONY RB SP U UB); 19.IX.1997 (fl) *Martins, L. H. P. et al.* 48 (G INPA K MBM MG U UB UEC US); 3.III.1966 (fr) *Rodrigues, W. & Coêlho, D.* 7543 (INPA); 31.X.1995 (fl) *Vicentini, A. & Assunção, P. A. C. L.* 1106 (INPA K MG MO NY RB SP).

Sarcaulus brasiliensis contains two subspecies, but only the typical subspecies is known from central Amazonia. The genus *Sarcaulus* is close to *Pouteria*, but may be distinguished by its leaf arrangement and the carnos corolla.

5. *Elaeoluma*

Elaeoluma Baill., Hist. Pl. 11: 293. 1891.

Unarmed **trees** or **shrubs**. Stipules absent. **Leaves** spirally arranged, minutely punctate on the lower surface. Venation eucamptodromous or brochidodromous, higher order venation often obscure, forming a lax reticulum. **Inflorescence** axillary. **Flowers** unisexual. Calyx a single whorl of 5 sepals.

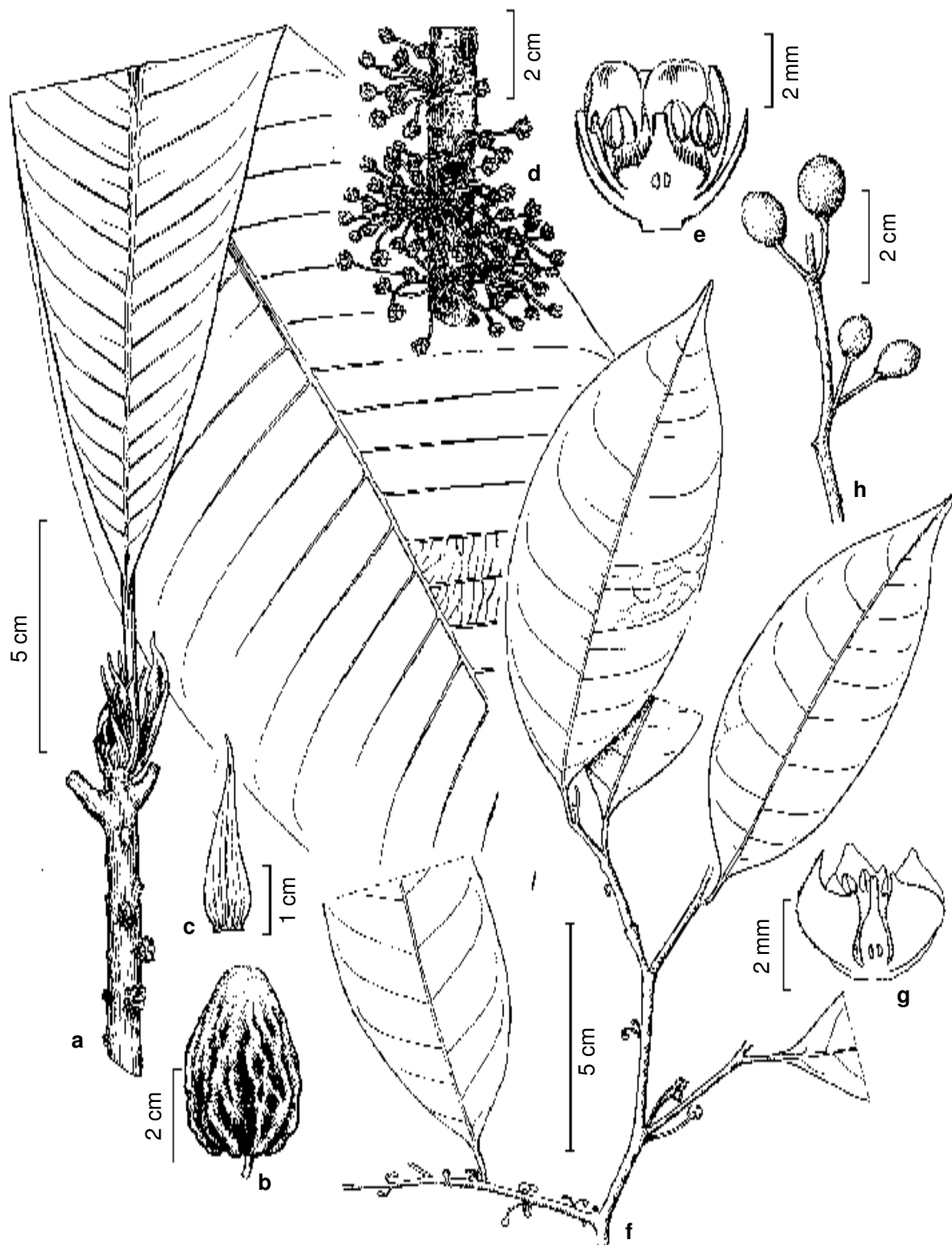


Figura 7 - a-e. *Chromolucuma rubriflora* - a. habit; b. fruit (Maguire et al. 37399); c. stipule (Alencar 475); d. inflorescence; e. 1/2 flower (Ducke 289). f-h. *Sarcaulus brasiliensis* subsp. *brasiliensis* - f. habit (Granville 3641); g. 1/2 flower (Klug 2333); h. fruits (Lescure 358).

Corolla broadly cyathiform to rotate, tube shorter than the lobes (rarely equalling the lobes in the female flowers); lobes 5, simple, spreading widely. Stamens 5, fixed at the top of the corolla tube, exserted; filaments well-developed. Staminodes usually absent, rarely 1–2. Disk absent. Ovary 2–3-locular. **Fruit** 1-seeded. **Seed** broadly ellipsoid, laterally

compressed or not, testa smooth to slightly wrinkled, shining; scar adaxial, narrow or broad; cotyledons plano-convex, radicle slightly exserted, thin sheath of endosperm present.

Four species in Venezuela and northern and central Brazilian Amazonia, extending to Panama and Goiás (Brazil). Three species present in central Amazonia.

Key to the species of *Elaeoluma* of the Manaus area

1. Leaves 4–8 × 1.5–3.5 cm, oblanceolate, fruit 1.2–1.4 cm long 1. *E. schomburgkiana*
1. Leaves mostly 9–17 × 3.5–6.5 cm, elliptic, elliptic-oblong or obovate, fruit 2–3 cm long.
 2. Leaves usually oblong-elliptic with acute apex: tertiary venation more or less parallel to secondary venation, intersecondary veins usually well-developed, seed scar broad, seed not laterally compressed 2. *E. glabrescens*
 2. Leaves usually obovate with rounded apex; tertiary venation oblique to perpendicular; intersecondary veins absent; seed scar narrow, seed laterally compressed 3. *E. nuda*

5.1 *Elaeoluma schomburgkiana* (Miq.) Baill., Hist. Pl. 11: 294. 1891; Pennington, T. D., Fl. Neotrop. 52: 240, fig. 48. 1990. **Fig. 8 a-c**
Myrsine schomburgkiana Miq., in Mart., Fl. bras. 10: 315. 1856.

Young shoots subglabrous. **Leaves** 4–8 × 1.5–3.5 cm, oblanceolate, apex rounded, base acute or narrowly cuneate, margin often slightly revolute, coriaceous, glabrous, lower surface usually minutely punctate; venation eucamptodromous to brochidodromous, often obscure, midrib slightly raised to slightly sunken on the upper surface, secondary veins 5–7 pairs, steeply ascending, parallel or slightly convergent, straight or slightly arcuate; intersecondaries often long; tertiaries reticulate. Petiole 3–5 mm long, not channelled, glabrous. **Fascicles** axillary, 1–5-flowered. Pedicel 2–3 mm long. **Flowers** unisexual (plant dioecious). Sepals 2–3 mm long, glabrous. Corolla 2.5–3.5 mm long, broadly cyathiform to more or less rotate, tube shorter than the lobes; lobes elliptic to suborbicular, glabrous. Stamens exserted, absent in female flowers. Staminodes absent. Ovary 3-locular, conical or ovoid, sparsely pubescent. **Fruit** 1.2–1.4 cm long, broadly ellipsoid, apex and base rounded, soft-skinned, smooth, glabrous. **Seed** solitary, 0.8–1 cm long, broadly ellipsoid, not

laterally compressed, sometimes with a small beak at the apex of the scar, testa smooth, shining; scar adaxial, 5–6 mm wide, rugose or verrucose. **Field characters:** Shrub or small tree to 5 m high, with white latex. Flowers pale greenish-white, fruit ripening purple or black. Flowering in central Amazonia in October and November, fruiting in March.

Southern Venezuela and Guyana to central Amazonian Brazil, in flooded (*igapó*) forest, on sandy beaches and in wet savanna, ascending to 1300 m altitude in Venezuela.

Not recorded from Reserva Ducke. AMAZONAS: Manaus, Tarumã, Praia da Lua, *Vicentini 352* (INPA K); between Tarumãzinho & Tarumã Grande, *Keel et al. 215* (INPA K).

Easily recognized within *Elaeoluma* by its small leaves and the small fruit, and the seed with a broad scar.

5.2 *Elaeoluma glabrescens* (Mart. & Eichl.) Aubrév., Adansonia 1: 26. 1961; Pennington, T. D., Fl. Neotrop. 52: 242, fig. 48. 1990.

Fig. 8 d-f

Lucuma glabrescens Mart. & Eichl., in Mart., Fl. bras. 7: 72. 1863.

Young shoots sparsely appressed puberulous to glabrous. **Leaves** 12–20 × 3.5–7 cm, oblong-elliptic or elliptic, apex usually acute, base narrowly attenuate or cuneate,

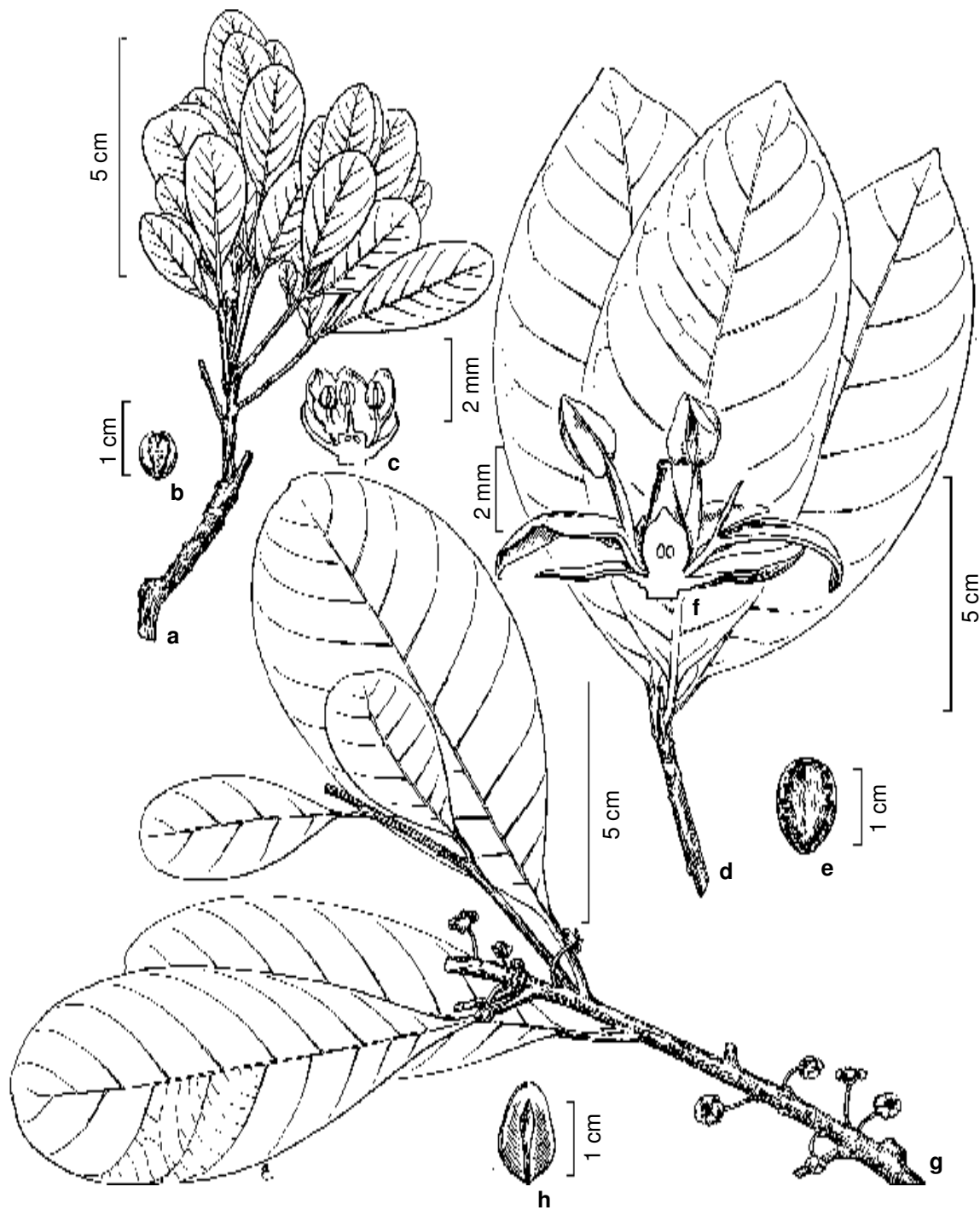


Figura 8 - a-c. *Elaeoluma schomburgkiana* - a. habit; b. seed (Prance et al. 4661); c. 1/2 flower (Maguire & Fanshawe 32176). d-f. *Elaeoluma glabrescens* - d. habit; e. seed (Revilla 177); f. 1/2 flower (Amaral et al. 397). g-h. *Elaeoluma nuda* - g. habit (Silva & Brazão 60650); h. seed (Amaral 1545).

margin often slightly revolute, glabrous, lower surface minutely punctate; venation eucamptodromous to brochidodromous, midrib flat or slightly raised on the upper surface, secondary veins 9–12 pairs, sometimes impressed on the upper surface, ascending, slightly convergent and arcuate, obscure below; intersecondaries well-developed; tertiaries obscure, more or less parallel to secondary venation. Petiole 0.7–2 cm long, not or only slightly channelled, glabrous. **Fascicles** 3–10-flowered, axillary and below the leaves. Pedicel 5–10 mm long, glabrous. **Flowers** unisexual (plant dioecious). Sepals (male) 3–4 mm long, (female) ca. 2.5 mm long, glabrous. Corolla (male) rotate, 4.5–5 mm long, tube much shorter than the lobes (female), cyathiform, ca. 2.5 mm long, tube about equalling the lobes. Stamens absent in female flowers. Staminodes absent or vestigial. Ovary 3-locular, ovoid, sparsely pubescent. **Fruit** 2–2.5 cm long, broadly ellipsoid, apex acute to rounded, base rounded, soft skinned (wrinkling when dry), smooth, glabrous. **Seed** solitary, 1.3–1.6 cm long, plano-convex, rounded at both ends, not laterally compressed, testa smooth, shining, forming an irregular projecting fringe around the edge of the scar; scar adaxial 1–1.1 cm wide, verrucose.

Field characters: Tree to 30 m high and 30 cm diam., with copious sticky white latex. The bark is light brown, smooth, with a reddish slash. Flowers greenish-white, the fruit ripening reddish-black or purple. The fruits are sweet and edible. Flowering in central Amazonia in August and September, fruit maturing April to June.

Central Panama to Venezuela, Amazonian Brazil, Mato Grosso and Goiás, occurring along riversides and in periodically or permanently flooded forest, and occasionally in white sand savanna.

Not recorded from Reserva Ducke, but occurring in flooded areas near Manaus.

AMAZONAS: Manaus, Tarumã-mirim, *Ferreira* 234 (INPA K); Rio Negro, Ilha Baependi, *Mori et al.* 21308 (K); Rio Negro, Rio Cuieiras, *Mori & Gracie* 22456 (K).

Elaeoluma glabrescens is superficially similar to *E. nuda* but can be separated from it by a series of small differences. These are listed after the latter species. The two species are ecologically distinct, *E. glabrescens* is one of the common species of flooded forest throughout Amazonia, while *E. nuda* is confined to terra firme forest.

5.3 *Elaeoluma nuda* (Baehni) Aubrév., *Mem. New York Bot. Gard.* 23: 224. 1972; Pennington, T. D., *Fl. Neotrop.* 52: 245, fig. 48. 1990. **Fig. 8 g-h**

Pouteria nuda Baehni, *Candollea* 14: 72. 1952.

Young shoots finely appressed pubescent, soon glabrous. **Leaves** 9–16 × 3.5–6.5 cm, usually obovate, apex rounded, base narrowly attenuate or cuneate, margin often slightly revolute, glabrous, lower surface minutely punctate; venation eucamptodromous, midrib raised on the upper surface, secondary veins 8–12 pairs, parallel or slightly convergent; intersecondaries absent; tertiaries oblique to perpendicular. Petiole 0.5–2 cm long, not channelled, glabrous. **Fascicles** 2–5-flowered, axillary and below the leaves. Pedicel 3–10 mm long, glabrous. **Flowers** unisexual (plant dioecious). Sepals 2–4 mm long, sparsely appressed pubescent outside. Corolla broadly cyathiform or rotate, 4–5.5 mm long, tube much shorter than the lobes, glabrous. Staminodes usually absent. Ovary 2–3-locular, ovoid, sparsely pubescent. **Fruit** 2.5–3 cm long, broadly ellipsoid, apex and base rounded, smooth, thin-walled, glabrous. **Seed** solitary, 1.5–2 cm long, broadly ellipsoid, slightly laterally compressed, obtuse or rounded at base and apex, testa smooth, shining; scar adaxial, 1–3 mm wide.

Field characters: Tree to 30 m high and 75 cm diam., with small concave buttresses, or base of trunk fluted, upper trunk cylindrical. Bark dark reddish-brown, scaling in rectangular pieces, slash pinkish, with white latex. Flowers pink to greenish-white, fruit

ripening purplish to black. Flowering in central Amazonia August to October, fruit maturing February to March.

Costa Rica to the Guianas and Amazonian Brazil. A species of terra firme forest in lowland Amazonia, ascending to 2000 m in montane forest in Venezuela.

20.VIII.1997 (fl) *Costa, M. A. S. et al.* 748 (BM COL G INPA K MBM MG SPF UB UEC U); 15.IX.1994 (fl) *Nascimento, J. R. & Assunção, P. A. C. L.* 597 (INPA K MG MONY RRB SP U); 15.XII.1994 (fl) *Ribeiro, J. E. L. S. & Silva, C. F.* 1532 (INPA K MG MONY RRB SP U); 13.IV.1998 (fr) *Ribeiro, J. E. L. S. & Assunção, P. A. C. L.* 1973 (K); 26.VIII.1997 (fl) *Souza, M. A. D. et al.* 391 (AAUCEN CUZ GB HB IAN IC INPA K QCA RFA W); 2.IX.1997 (fl) *Souza, M. A. D. et al.* 409 (E HAMAB HRB INPA K MAC MG MICH ULM); 25.XI.1997 (fl) *Souza, M. A. D. et al.* 466 (ACRE INPA K MEXU MG PUELS UP CB W).

PDBFF: *Pereira s.n.* PDBFF3402.3400.2 (INPA K).

Elaeoluma nuda can be distinguished from *E. glabrescens* by its obovate leaves with rounded apex, absence of intersecondary veins, oblique to perpendicular tertiary venation, and the slightly laterally compressed seed with narrow scar.

6. *Pouteria*

Pouteria Aubl., Hist. Guiane 1: 85, pl. 33 (excl. fruct.). 1775; Baehni, C., Boissiera 5: 144. 1941; Candollea 9: 149. 1942; Cronquist, A. J., Lloydia 9: 257. 1946; Pennington, T. D., Fl. Neotrop. 52: 247. 1990.

Unarmed **trees** or **shrubs**. Stipules absent (present in *P. flavilatex*). **Leaves** nearly always

spirally arranged, rarely opposite. Venation eucamptodromous or brochidodromous, not finely striate. **Inflorescence** axillary or ramiflorous, fasciculate. **Flowers** often unisexual. Calyx a single whorl of 4–6 free, imbricate sepals, or rarely 6–11 in a closely imbricate spiral. Corolla cyathiform to shortly tubular, rarely rotate, tube shorter than, equalling or exceeding the lobes, lobes 4–6(–9), usually erect, rarely spreading, simple. Stamens 4–6(–9) fixed in the lower or upper half of the corolla tube, rarely free, usually included, rarely exerted, the filaments generally short. Staminodes usually the same number as the corolla lobes, rarely partially lacking, inserted in the corolla sinus or inside the tube. Disk rarely present. Ovary 1–6-locular, style included or exerted. **Fruit** a 1-several-seeded berry. **Seed** broadly ellipsoid, plano-convex, shaped like the segment of an orange or laterally compressed, testa smooth, wrinkled or pitted; scar adaxial, narrow or broad or sometimes covering most of the seed surface. Embryo vertical, usually with plano-convex cotyledons and included radicle, less frequently with thin foliaceous cotyledons and exerted radicle; endosperm usually absent, less frequently present.

About 200 species throughout the Neotropics, and about 150 species in tropical Asia and the Pacific.

Key to the species of *Pouteria* of the Manaus area

1. Flowers tetramerous (K4,C4,A4, staminodes 4, G4), corolla lobes and staminodes often fringed-ciliate (section *Pouteria*).
 2. Lower leaf surface with indumentum of spreading or erect hairs.
 3. Leaf base acute to rounded, fruit 3–4 cm long, several-seeded, velutinous 53. *P. hispida*
 3. Leaf base narrowly attenuate, fruit 2–2.5 cm long, 1-seeded, villose 51. *P. caimito*
 2. Lower leaf surface with closely appressed indumentum or glabrous.
 4. Venation brochidodromous with a submarginal vein, secondary veins 20–35 pairs 48. *P. gomphiifolia*
 4. Venation eucamptodromous, or if brochidodromous then without a submarginal vein, secondary veins usually fewer.
 5. Venation brochidodromous.

6. Higher order venation laxly reticulate, petiole margins strongly infolded, corolla *ca.* 3 mm long, fruit soft-skinned and squashy 46. *P. plicata*
6. Higher order venation finely reticulchln etate, petiole margin infolded or not, corolla often longer, fruit hard-skinned, not shrinking on drying.
 7. Leaf apex rounded, corolla 3–5 mm long, seed scar 2–3.5 mm wide 53. *P. hispida*
 7. Leaf apex usually acute or narrowly attenuate, corolla 4–7 mm long, seed scar usually broader.
 8. Leaf 7–14 × 2.8–5 cm, base often narrowly attenuate, petiole 0.8–1.4 cm long, slightly channelled or flat, pedicel 0.5–1 mm long 51. *P. caimito*
 8. Leaf 11–20 × 5–7 cm, base acute, petiole 1.3–2.5 cm long, margins strongly infolded, pedicel 5–6 mm long 50. *P. guianensis*
5. Venation eucamptodromous.
 9. Lower leaf surface with closely appressed, sometimes sericeous indumentum.
 10. Petiole margins strongly infolded for the whole of their length 50. *P. guianensis*
 10. Petiole margins not infolded, flat or only slightly channelled near the apex.
 11. Leaf midrib slightly raised on the upper surface, leaves without finely areolate reticulum on upper surface, corolla 3–3.5 mm long, lobes ciliate 43. *P. filipes*
 11. Leaf midrib sunken on the upper surface, leaves with fine areolate reticulum (visible with lens) on upper surface, corolla *ca.* 6 mm long, lobes not ciliate 55. *P. freitasii*
 9. Lower leaf surface glabrous, or with close minute appressed hairs forming a pellicle.
 12. Higher order venation finely reticulate.
 13. Bark scaling profusely in large thin papery sheets, leaf apex narrowly acuminate to caudate, lower leaf surface with sparse whitish closely appressed hairs, flowers sessile 54. *P. decorticans*
 13. Bark not scaling in papery sheets, leaf apex narrowly attenuate to rounded, lower leaf surface more or less glabrous, flowers usually pedicellate.
 14. Leaf apex obtuse or rounded.
 15. Petiole not channelled, seed often slightly laterally compressed 51. *P. caimito*
 15. Petiole channelled, seed not laterally compressed 53. *P. hispida*
 14. Leaf apex acute to narrowly attenuate.
 16. Leaves 25–35 × 9–13 cm, secondary veins 19–25 pairs, higher order vein reticulum fine, sharp and conspicuous (lower surface) 52. *P. torta*
 16. Leaves not exceeding 20 × 7 cm, secondary veins 9–16 pairs, higher order venation coarser and less conspicuous.
 17. Secondary veins 9–12 pairs, leaves 7–14 cm long, petiole not channelled, pedicel 0.5–1 mm long 51. *P. caimito*
 17. Secondary veins 12–16 pairs, leaves 11–20 cm long, petiole margins strongly infolded, pedicel 5–6 mm long 50. *P. guianensis*
12. Higher order venation oblique or perpendicular, or if reticulate, then rather lax and often obscure, not finely reticulate.
 18. Leaves with sparse closely appressed whitish hairs below, petiole 3–4.5 cm long, corolla 8–9 mm long 44. *P. petiolata*
 18. Leaves glabrous or with fine appressed hairs forming a pellicle, petiole usually shorter, corolla 2–5 mm long.
 19. Secondary veins 14–20 pairs, tertiary veins reticulate, lax; petiole margins strongly infolded 46. *P. plicata*

19. Secondary veins 7–15 pairs, tertiary venation oblique and/or perpendicular, petiole margins not strongly infolded.
20. Leaf base acute to rounded, lower leaf surface often with minute appressed hairs forming a pellicle, secondary veins 10–15 pairs 42. *P. glomerata*
20. Leaf base narrowly attenuate, leaves more or less glabrous, secondary veins 7–9 pairs.
21. Leaves 11–17.5 × 4.3–8 cm, apex acuminate, petiole 2–3.5 cm long 45. *P. fimbriata*
21. Leaves 5.5–11 × 2.5–5 cm, apex obtuse or rounded, petiole 5–10 mm long 47. *P. resinosa*
1. Flowers not tetramerous (if with 4 sepals then ovary 1-2-locular, or corolla lobes 6 or more).
22. Sepals 4, corolla 1.1–1.3 cm long, corolla lobes, stamens and staminodes 6, ovary 7–8-locular 41. *P. venosa*
22. Sepals 4–5, or more, corolla not exceeding 1 cm long, usually much less, corolla lobes, stamens & staminodes 4–5 (up to 6 in *P. opposita* with opposite leaves), ovary 1–5-locular
23. Corolla rotate, stamens exserted 57. *P. eugeniifolia*
23. Corolla cyathiform or tubular, stamens included.
24. Flowers strictly pentamerous with K5, C5, A5, staminodes 5, G5 (except *P. engleri* and *P. stylifera* which lack several or all staminodes).
25. Flowers lacking staminodes, or if present then reduced in number and vestigial style long-exserted, somewhat accrescent.
26. Leaves 10–12 × 3.5–7 cm, apex shortly attenuate, acute or rounded, secondary veins 6–8 pairs, corolla 3.5–4 mm long. 27. *P. engleri*
26. Leaves 3.7–7 × 1.6–3 cm, apex shortly mostly narrowly attenuate, secondary veins 9–10 pairs, corolla ca. 3 mm long 28. *P. stylifera*
25. Flowers with full complement of staminodes, style usually included.
27. Seed with copious endosperm, embryo with thin foliaceous cotyledons.
28. Stamens free, fruit 6–9 cm long, globose or obovoid 36. *P. laevigata*
28. Stamens fixed about halfway up the corolla tube or in the upper half, fruit 2.5–3.5 cm long.
29. Leaf apex acute or obtuse, tertiary venation obscure, sepals glabrous 34. *P. tarumanensis*
29. Leaf apex usually rounded, tertiary venation oblique, sepals sericeous inside 35. *P. oblanceolata*
27. Seed without endosperm (thin layer present in *P. maxima*), embryo with plano-convex cotyledons.
30. Lower leaf surface pubescent to tomentose with branched ferruginous or reddish-brown hairs.
31. Leaves alternate and distichous, 13–21 × 8–11.5 cm, broadly elliptic or ovate, base truncate, lower surface (at least midrib and veins) crisped pubescent with ferruginous hairs, fruit ca. 4 cm long, ellipsoid, glabrous 37. *P. maxima*
31. Leaves spirally arranged, 10–15 × 4.5–6.5 cm, elliptic or oblanceolate, base narrowly attenuate, lower surface tomentose to pubescent with reddish-brown hairs, fruit 7.5–10 cm long, globose, velutinous 40. *P. manaosensis*
30. Lower leaf surface glabrous or with some minute appressed hairs.
32. Lower leaf surface glaucous, with minute appressed hairs 39. *P. macrophylla*

32. Lower leaf surface not glaucous, glabrous.
33. Stamens fixed near the base of the corolla tube, secondary veins 16–20 pairs, fruit 9–10 cm long 49. *P. pariry*
33. Stamens fixed at the top of the corolla tube, secondary veins 9–15 pairs, fruit 3.5–4 cm long.
34. Leaves 5–8.5 cm wide, tertiary veins oblique, petiole 2–4.6 cm long, corolla cyathiform, tube shorter than the lobes 21. *P. pentamera*
34. Leaves 2–4.5 cm wide, tertiary veins forming a loose reticulum, petiole 0.5–1.2 cm long, corolla tubular, tube longer than the lobes 56. *P. procera*
24. Flowers not strictly pentamerous (K4–6, C4–5(–9), A4–5, staminodes 0–5, G. 1–2(–3)).
35. Staminodes usually absent (flowers may have 1–3(–5) vestiges present). Leaves usually glaucous with higher level venation obscure.
36. Leaves opposite, corolla lobes and stamens 7–9 32. *P. opposita*
36. Leaves spirally arranged, corolla lobes and stamens 5.
37. Leaves 5–7 cm wide, secondary veins 11–13 pairs, petiole 2–3 cm long, corolla 5.5–6.5 mm long 33. *P. ambelaniifolia*
37. Leaves 2.5–6 cm wide, secondary veins 15–22 pairs, petiole 0.5–2 cm long, corolla 2.5–3.5 mm long.
38. Midrib sunken on the upper surface, stamens fixed in the lower half of the corolla tube with well-developed filaments, fruit slender with acute to narrowly attenuate apex 30. *P. elegans*
38. Midrib slightly raised on the upper surface, stamens fixed near the top of the corolla tube, with very short filaments, fruit broader with rounded apex 31. *P. cuspidata*
35. Staminodes well-developed, equal in number to the corolla lobes; leaves not usually glaucous (exceptions *P. egregia*, *P. aff. gardneri*), venation obvious.
39. Higher order venation (tertiary or quaternary) finely reticulate, ovary 1-locular.
40. Leaves bullate, persistently pubescent on the lower surface, indumentum not appressed 15. *P. platyphylla*
40. Leaves not bullate, lower leaf surface with appressed indumentum or glabrous.
41. Lower leaf surface densely appressed puberulous with reddish or golden-brown indumentum.
42. Leaves 6.5–13.5 × 3–5, elliptic, apex narrowly attenuate or acuminate, corolla *ca.* 4.5 mm long, lobes ciliate, stamens fixed about halfway up the corolla tube 10. *P. erythrochrysa*
42. Leaves 14–20 × 14–10 cm, obovate, apex usually rounded or truncate, corolla *ca.* 3 mm long, lobes not ciliate, stamens fixed in the upper half of the corolla tube 17. *P. fulva*
41. Indumentum of lower leaf surface not as above, or leaves glabrous.
43. Corolla *ca.* 1 cm long, corolla lobes, stamens and staminodes 4, corolla tube 4–5 times as long as the lobes 13. *P. ericoides*
43. Corolla not exceeding 5 mm long, corolla lobes, stamens and staminodes 5, corolla tube shorter than, equalling or only slightly longer than the lobes.
44. Stamens fixed in the upper half or at the top of the corolla tube, ovary hairy.
45. Leaves strongly coriaceous, 1.8–4.5 cm wide, often oblong, with acute, obtuse or rounded apex, pedicel *ca.* 1 mm long 9. *P. pachyphylla*

45. Leaves thinner, usually broader, elliptic or oblanceolate with attenuate apex, pedicel longer than 1 mm.
46. Leaves with fine appressed indumentum on lower surface.
47. Leaves 4.5–9 cm wide, corolla 4.5–5 mm long, anthers 1.5–2 mm long, fruit 1.5–2 cm long, seed scar 1.5–2 mm wide 11. *P. campanulata*
47. Leaves 5–6 cm wide, corolla 2–3 mm long, anthers *ca.* 0.5 mm long, fruit 3–3.5 cm long, seed scar *ca.* 4 mm wide 7. *P. gongrijpii*
46. Leaves glabrous.
48. Corolla 4.5–5 mm long, anthers 1.5–2 mm long 11. *P. campanulata*
48. Corolla 1.5–3.5 mm long, anthers 0.5–0.6 mm long.
49. Petiole 0.5–1 cm long, corolla 1.5–3 mm long, tube about equalling the lobes, lobes ciliate, anthers often hairy 8. *P. reticulata*
49. Petiole 2–3 cm long, corolla *ca.* 3.5 mm long, tube much shorter than the lobes, lobes not ciliate, anthers glabrous 12. *P. retinervis*
44. Stamens fixed in the lower half or about halfway up the corolla tube, ovary glabrous.
50. Leaves 5–13 cm long, often lanceolate, base rounded to acute, upper surface usually smooth and glossy, whole plant more or less glabrous 16. *P. vernicosa*
50. Leaves 10–23 cm long, elliptic, base narrowly attenuate, upper surface not smooth and glossy, young shoots and inflorescence with some fine appressed indumentum
..... 14. *P. rostrata*
39. Higher order venation not finely reticulate, or if so then ovary 2(–3)-locular.
51. Stamens free or fixed near the base of the corolla tube.
52. Venation brochidodromous, secondary veins 14–20 pairs, parallel and usually straight, tertiary veins parallel to the secondaries and descending from the margin, leaves glaucous below 6. *P. egregia*
52. Venation eucamptodromous, secondary veins 8–10 pairs, strongly arcuate, convergent, tertiary veins reticulate, not parallel to the secondaries and not descending from the margin, leaves not glaucous 5. *P. coriacea*
51. Stamens in the upper half of the corolla tube (in the lower half in *P. williamii* and *P. anomala* which have 5 corolla lobes).
53. Ovary unilocular, glabrous 18. *P. peruviansis*
53. Ovary 2-locular (rarely 3–5-locular in *P. anomala*), pubescent.
54. Stamens fixed in the lower half of the corolla tube.
55. Venation brochidodromous with a strong submarginal vein, secondary veins 15–20 pairs, staminodes absent, ovary 3–5-locular, style exerted 29. *P. anomala*
55. Venation eucamptodromous to brochidodromous, submarginal vein absent, secondary veins 8–10 pairs, staminodes present, ovary 2-locular, style included 25. *P. williamii*
54. Stamens fixed in the upper half of the corolla tube.
56. Lower leaf surface with persistent indumentum (lens may be necessary).
57. Stipules present, lower leaf surface finely golden-brown sericeous, leaves 9–15 × 4–6.8 cm, apex obtuse or round. 26. *P. flavilatax*
57. Stipules absent, lower leaf surface with minute stiff whitish appressed indumentum (lens), leaves 15–27 × 7–10.5 cm, apex usually narrowly attenuate 23. *P. pallens*
56. Leaves glabrous (residual indumentum sometimes present on lower midrib).
58. Stipules present, leaves 3.5–6.5 × 1.5–2.7 cm, secondary veins 5–6 pairs 2. *P. stipulifera*

58. Stipules absent, leaves larger, secondary veins more than 6 pairs.
59. Corolla 1–2 mm long, corolla lobes 4 (*P. cladantha* has a mixture of 4 and 5 lobes).
60. Venation brochidodromous, fascicles often clustered on leafless axillary shoots to several cm long, seed with smooth testa 19. *P. cladantha*
60. Venation eucamptodromous, fascicles axillary, not clustered on leafless shoots, seed with wrinkled testa.
61. Leaves elliptic, apex narrowly attenuate, secondary venation strongly arcuate and convergent, intersecondary veins moderate to long, ovary glabrous 3. *P. bilocularis*
61. Leaves broadly oblanceolate to obovate, apex obtuse to rounded, secondary venation slightly arcuate, parallel, intersecondaries absent, ovary puberulous ... 4. *P. minima*
59. Corolla 3–5 mm long, corolla lobes 5.
62. Lower leaf surface glaucous 1. *P. aff. gardneri*
62. Lower leaf surface not glaucous.
63. Leaves with fine areolate higher order vein reticulum conspicuous on both surfaces (lens) 12. *P. retinervis*
63. Higher order venation not finely reticulate.
64. Leaf apex rounded or truncate, secondary veins 6–8 pairs, fruit 4–5 cm long 24. *P. virescens*
64. Leaf apex acute to narrowly attenuate, secondary veins 9–12 pairs, fruit 2–3 cm long.
65. Venation brochidodromous, higher order venation impressed on both surfaces (lens), corolla 2.5–4 mm long, ciliate, fruit velutinous 22. *P. jariensis*
65. Venation eucamptodromous (sometimes brochido-dromous in upper half), higher order venation not impressed, corolla 4–5 mm long, not ciliate, fruit glabrous 20. *P. durlandii*

Section 1. *Franchetella* (Pierre) Eyma

6.1 *Pouteria* aff. *gardneri* (Mart. & Miq.) Baehni, Candollea 9: 233. 1942; Pennington, T. D., Fl. Neotrop. 52: 271, fig. 56. 1990.

Chrysophyllum gardneri Mart. & Miq., in Mart., Fl. bras. 7: 102. 1863.

Young shoots with spreading pale pubescence, soon glabrous. **Leaves** spirally arranged, 7.5–16 × 3–6.5 cm, elliptic to oblanceolate, apex narrowly attenuate, base acute, upper surface glabrous, lower surface with residual loose indumentum on the midrib, slightly glaucous below; venation eucamptodromous, midrib flat or slightly prominent on the upper surface, secondary veins 8–14 pairs parallel or slightly convergent, slightly arcuate, intersecondaries absent, tertiaries oblique, widely spaced, higher order reticulum conspicuous on the upper surface. Petiole 1.3–2 cm long, slightly channelled, with loose spreading pubescence

at first, becoming glabrous. **Fascicles** on twigs below the leaves, 2–5-flowered. **Flowers** probably unisexual. Pedicel 4–5 mm long, sparsely appressed puberulous. Sepals 5, 2–2.5 mm long, appressed puberulous outside, glabrous inside. Corolla ca. 4 mm long, cyathiform, lobes 5, much longer than the tube, glabrous. Stamens 5, fixed at the top of the corolla tube, included, glabrous. Staminodes 5, in the corolla lobe sinuses, ovate, glabrous. Ovary ? 2-locular, pubescent. **Fruit** 1.5–2 cm long, ellipsoid, apex and base rounded, smooth, glabrous apart from some residual indumentum at base and apex, pericarp soft and fleshy. **Seed** solitary, 1–1.5 cm long, ellipsoid, laterally compressed, testa smooth, shining; scar adaxial, full length, 4–5 mm wide. Seed without endosperm.

Field characters: Tree to 25 m high and 25 cm diam., with branched buttresses to 1.5 m high. Bark yellowish, scaling in irregular

plates. Flowers greenish, fruit maturing reddish-black. Flowering in January, fruiting from February to April.

East and southeast Brazil, Paraguay and Bolivia. If the central Amazonian plant is the same species, this is a range extension from Goiás and Maranhão. *Pouteria gardneri* is a plant of cerrado, gallery forest and grassy campo. The central Amazonian plant is confined to non-flooded high forest.

One tree known in Reserva Ducke, tagged tree number 4596.

PDBFF: Reserva km 41, Oliveira et al. 300 (INPA K); Oliveira et al. 398 (INPA K).

This plant differs from the southeast Brazilian *P. gardneri* only in the longer petioles, and the slightly thicker textured leaves. Only one flowering specimen has been seen, and this is apparently a male flower, with the ovary reduced and only 1 minute locule without ovules.

6.2 *Pouteria stipulifera* T. D. Penn. sp. nov. (section *Franchetella*). **Type:** Brazil, Amazonas, Manaus, Reserva Ducke, 2°53'S, 59°58'W, 20.VII.1994, fl, P. A. C. L. Assunção 33 (holotype INPA, isotypes G K MG MO NY R RB SP). **Fig. 9 a-g**

P. gardneri affinis sed stipulis parvis, foliis parvis nervis secundariis paucis differt.

Arbor; stipulae 3–5 mm longae, anguste lanceolatae; folia 3.5–6.5 × 1.5–2.7 cm, elliptica vel oblanceolata; nervi secundarii 5–6-jugi, convergentes et valde arcuati; fasciculi axillares; pedicellus 3–5 mm longus; sepala 5, ca. 2 mm longa; corolla cyathiformis, ca. 3.5 mm longa, lobis 5; staminodia 5; ovarium 2-loculare; fructus 3.5–4.5 cm longus, obovoideus vel ellipsoideus.

Tree. Young shoots sparsely appressed puberulous, soon glabrous and scaling. Stipules 3–5 mm long, narrowly lanceolate, glabrous, caducous. **Leaves** spirally arranged, 3.5–6.5 × 1.5–2.7 cm, elliptic or oblanceolate, apex acute to obtuse, base narrowly cuneate or attenuate, glabrous; venation eucamptodromous in the

lower half, brochidodromous in the upper half, midrib flat or slightly raised on the upper surface, secondary veins 5–6 pairs, convergent and strongly arcuate, intersecondaries short or absent, tertiaries forming an open reticulum. Petiole 5–7 mm long, channelled, subglabrous. **Fascicles** axillary, 1–2-flowered. Pedicel 3–5 mm long, sparsely appressed puberulous. Sepals 5, ca. 2 mm long, ovate, apex acute, appressed puberulous outside, glabrous within, margin ciliate. Corolla cyathiform, ca. 3.5 mm long, tube ca. 1.5 mm long, lobes 5, ca. 2 mm long, broadly ovate or elliptic, apex obtuse; glabrous. Stamens 5, fixed in the upper half of the corolla tube, filaments ca. 0.5 mm long, glabrous, anthers 1–1.25 mm long, broad, glabrous. Staminodes 5, ca. 1 mm long, lanceolate-subulate, carnosae, glabrous. Disk absent. Ovary pulvinate, 2-locular, densely short pubescent, style ca. 1 mm long, glabrous, included, style-head simple. **Fruit** 3.5–4.5 cm long, obovoid or ellipsoid, apex obtuse or rounded, base obtuse or tapered, soft-skinned and fleshy, smooth (wrinkling in drying) shortly velutinous. **Seed** solitary, ca. 2 cm long, ellipsoid, apex and base obtuse or rounded, not laterally compressed, testa smooth, shining; scar adaxial, ca. 1.7 × 0.8 cm, verrucose. Seed without endosperm.

Field characters: Tree to 15 m high and 30 cm diam., with small buttresses. Bark reddish, dippled; slash yellowish, with white or yellowish latex. Flowers with green sepals and pink corolla. Fruit maturing orange. Flowering in July and fruit maturing in January.

Known only from three collections in the vicinity of Manaus, Amazonas, Brazil.

Paratype: 19.XI.1997 (fr) Ribeiro, J. E. L. S. & Pereira, E. C. 1956 (INPA K).

Other collections from outside Reserva Ducke: Brazil, Amazonas, Manaus, Igarapé do Bindó, D. Coêlho s.n. INPA3321 (INPA).

A very distinct plant whose floral structure and size are close to *P. simulans*, *P. gardneri* and *P. benai*. It differs from all these by the presence of stipules, and by the very small leaves with few secondary veins. The relatively large velutinous fleshy fruit is also

distinctive. *Pouteria benai* has leaves of similar size, but the venation is quite different, as are the long-pedicellate flowers.

6.3 *Pouteria bilocularis* (Winkler) Baehni, Candollea 9: 229. 1942; Pennington, T. D., Fl. Neotrop. 52: 283, fig. 52. 1990. **Fig. 9 h-j**

Labatia bilocularis Winkler, Repert. Spec. Nov. Regni Veg. 7: 112. 1909.

Young shoots glabrous. **Leaves** spirally arranged, 7–12.5 × 3–5.5 cm, elliptic, apex and base narrowly attenuate, glabrous, lower surface minutely punctate, venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 7–11 pairs, arcuate, convergent, intersecondaries moderate to long, tertiaries reticulate and some parallel to the secondaries. Petiole 1.2–1.4 cm long, slightly channelled, glabrous. **Fascicles** 5–20-flowered, axillary and below the leaves. Pedicel 4–5 mm long, glabrous. **Flowers** unisexual. Sepals 4, 1–1.5 mm long, subglabrous. Corolla 1.75–2 mm long, cyathiform, tube equalling or slightly longer than the lobes, glabrous. Stamens 4, fixed at the top of the corolla tube, glabrous, absent in female flowers. Staminodes 4, ovate to subulate, glabrous, vestigial in female flower. Ovary flattened (male flowers) or ovoid (female flowers), 2-locular, glabrous, style included. **Fruit** 2–3 cm long, ellipsoid, apex rounded or obtuse, base acute, hard-skinned, smooth, glabrous. **Seed** solitary, 1.8–2.5 cm long, ellipsoid, laterally compressed, rounded at both ends, testa wrinkled or verrucose, shining; scar adaxial, full-length, 2–3 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 45 cm diam., larger specimens buttressed, bole cylindrical, bark reddish to dark brown, longitudinally fissured and peeling in rectangular plates, slash reddish-brown, with sweet smell, with scarce white latex. Flowers scented, greenish, the fruit ripening orange-yellow. Flowering in central Amazonia in April.

The Guianas and Venezuela across Amazonia to the Andean countries, where it is a species of lowland rainforest, mostly on non-

flooded land. It ascends to 1200 m altitude in Bolivia.

15.IV.1994 (fl) Nascimento, J. R. et al. 508 (G INPA K MBM MG MONY R RB SP U UEC US).

PDBFF: Reserva km 41, Pennington et al. 12986 (INPA K); Freitas et al. F-376 (INPA K).

This species is characterized by the rather coriaceous leaves with conspicuous arcuate venation, the tertiary veins usually more or less parallel to the secondaries, and the seed with a wrinkled testa.

6.4 *Pouteria minima* T. D. Penn., Fl. Neotrop. 52: 285, fig. 59. 1990. **Fig. 10 g-i**

Young shoots glabrous, soon scaling and cracked. Leaves spirally arranged, 6–14 × 3.5–8.3 cm, broadly oblanceolate to obovate, apex obtuse to rounded, base acute to shortly attenuate, coriaceous, glabrous; venation eucamptodromous, midrib slightly prominent on the upper surface, secondary veins 8–9 pairs, slightly arcuate, parallel, intersecondaries absent, tertiaries oblique and reticulate. Petiole 0.9–1.2 cm long, not channelled, glabrous. **Fascicles** 10–20-flowered, axillary and below the leaves. Pedicel 2–3 mm long, sparsely and minutely appressed puberulous. **Flowers** unisexual (plant monoecious). Sepals 4, 1–1.5 mm long, sparsely appressed puberulous. Corolla cyathiform, 1.5–2 mm long, tube about equalling the lobes, lobes 4, glabrous. Stamens 4, fixed in the upper half of the corolla tube, glabrous; absent in female flowers. Staminodes 4, fixed in the corolla lobe sinuses, 0.3–0.4 mm long, glabrous. Ovary ovoid, 2-locular, puberulous. **Fruit** 2.3–2.65 cm long, ellipsoid to obovoid, apex rounded, base acute, hard-skinned, smooth, glabrous. **Seeds** 1–2, ca. 1.7 cm long, ellipsoid, laterally compressed, testa wrinkled, shining; scar adaxial, full-length, ca. 1.5 mm wide. Seed without endosperm.

Field characters: Tree to 35 m high with cylindrical bole, often fluted at the base and with superficial roots. Bark dark brown, fissured, inner bark reddish, with translucent whitish sap. Flowers slightly perfumed, cream-coloured, fruit maturing yellowish-orange. Flowering in central Amazonia in March, fruiting July to December.

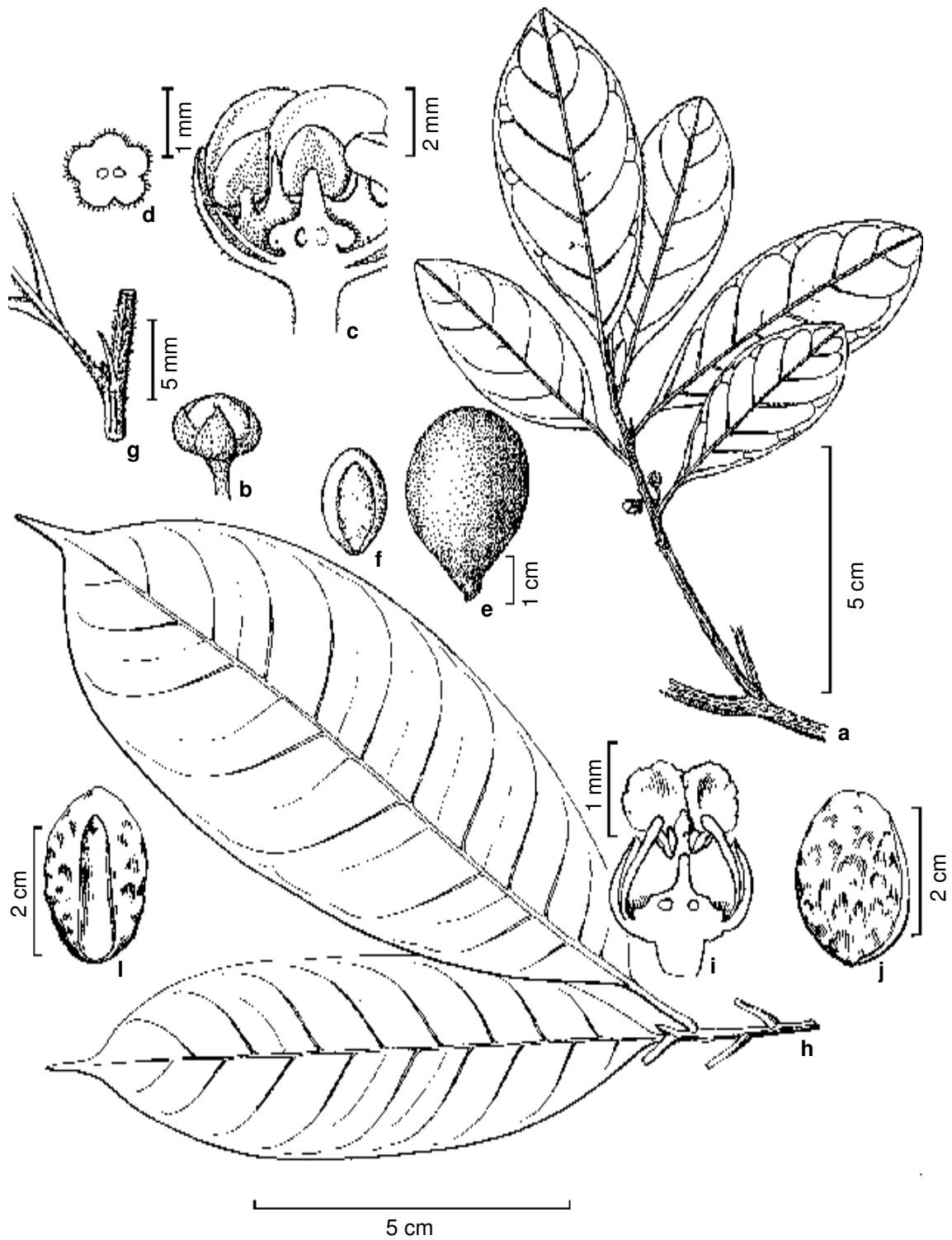


Figura 9 - a-g. *Pouteria stipulifera* - a. habit; b. flower; c. 1/2 flower; d. ovary; e. fruit; f. seed (Assunção 33); g. stipules (Ribeiro 1197); h-l. *Pouteria bilocularis* - h. habit (Woytkowski 6216); i. 1/2 flower (Krukoff 10560); j e l. seeds (Davidse & Huber 15370).

Central and northwestern Brazilian Amazonia, in lowland forest on non-flooded land. 17.X.1997 (fr) *Assunção, P. A. C. L. & Pereira, E. da C. 703* (BM COL IAN INPA K SPF UEC VEN); 18.VII.1997 (fr) *Forzza, R. C. 294* (G INPA K MBM MG RB U UB US); 5.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 854* (INPA K MG MO NY SP); 10.II.1994 (fl) *Ribeiro, J. E. L. S. et al. 1201* (INPA K MG MO NY RB SP); 25.III.1997 (fl) *Ribeiro, J. E. L. S. & Pereira, E. C. 1872* (G INPA K MBM MG R U UB US); 26.III.1997 (fl) *Ribeiro, J. E. L. S. & Pereira, E. C. 1876* (B FIAN INPA K P PEUFR UFMT).

This species has a similar floral and fruit structure to *P. bilocularis*. It differs from this species in the different leaf shape (apex usually rounded), the much less prominent higher order venation, and smaller flowers.

6.5 *Pouteria coriacea* (Pierre) Pierre, Symb. Antill. 5: 109. 1904; Pennington, T. D., Fl. Neotrop. 52: 285, fig. 49. 1990. **Fig. 10 d-f**

Guapeba coriacea Pierre, Not. Bot. 42. 1891.

Young shoots finely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 8–15 × 3.2–5.5 cm, elliptic, apex narrowly attenuate or acuminate, base acute to narrowly attenuate, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 8–10 pairs, strongly arcuate, convergent, intersecondaries short to moderately long, tertiaries forming an open reticulum. Petiole 0.6–1.1 cm long, slightly channelled, glabrous. **Fascicles** axillary and in the axils of fallen leaves, 5–10-flowered. Pedicel 3–7 mm long, glabrous. **Flowers** bisexual. Sepals 4, 1–1.5 mm long, glabrous. Corolla cyathiform, 2–3 mm long, tube equalling or longer than the lobes, lobes 4, glabrous except for sparse hairs on the tube. Stamens 4, free or fixed at the base of the corolla tube, filaments long, glabrous. Staminodes 4, 0.4–0.8 mm long, glabrous. Ovary ovoid, 2-locular, densely strigose. **Fruit** 2–4 cm long, ovoid or ellipsoid, apex acute to attenuate, base acute to rounded, hard-skinned, smooth, glabrous. **Seed** solitary, 1.4–2.4 cm long, ellipsoid, slightly laterally compressed,

testa shining, strongly transversely wrinkled; scar adaxial, full-length, 2–3 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 40 cm diam., unbuttressed or larger specimens with low buttresses, bole cylindrical, bark shallowly fissured, reddish brown, slash reddish with small amount of white latex. Flowers pale green, fruit ripening yellow. Flowering (Guianas) April to October, fruit January to September.

Venezuela and the Guianas to central Amazonian Brazil, in lowland forest on non-flooded land, up to 700 m altitude in the Guianas.

Not yet recorded in Reserva Ducke. PDBFF: Reserva km 41, *Freitas et al. F-108* (INPA K); *Freitas et al. F-162* (INPA K); *Lepsch Cunha et al. 633* (INPA K).

Pouteria coriacea shares a similar floral structure with *P. egregia*. Both species have 4 sepals, 4 corolla lobes, 4 stamens, 4 staminodes and a 2-locular ovary. Both also have the stamens free or inserted at the base of the corolla tube. They can be distinguished by their leaf morphology, with *P. egregia* having a glaucous leaf undersurface and brochidodromous venation with more numerous secondary veins (eucamptodromous in *P. coriacea*).

6.6 *Pouteria egregia* Sandwith, Bull. Misc. Inform. 1931: 479. 1931; Pennington, T. D., Fl. Neotrop. 52: 289, fig. 59. 1990. **Fig. 10 a-c**

Young shoots sparsely and minutely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 5–10 × 2.5–3.5 cm, oblanceolate to oblong-elliptic, apex obtusely cuspidate, base narrowly attenuate or cuneate, upper surface glabrous, lower surface glaucous, sometimes with scattered minute appressed hairs; venation brochidodromous, midrib flat or slightly raised on the upper surface, secondary veins 14–20 pairs, parallel and usually straight, intersecondaries long, tertiaries mostly parallel to the secondaries and descending from the margin. Petiole 3–9 mm long, slightly channelled, glabrous. **Fascicles** 5–15-flowered, axillary and below the leaves. Pedicel 1–v8 mm long, with sparse minute

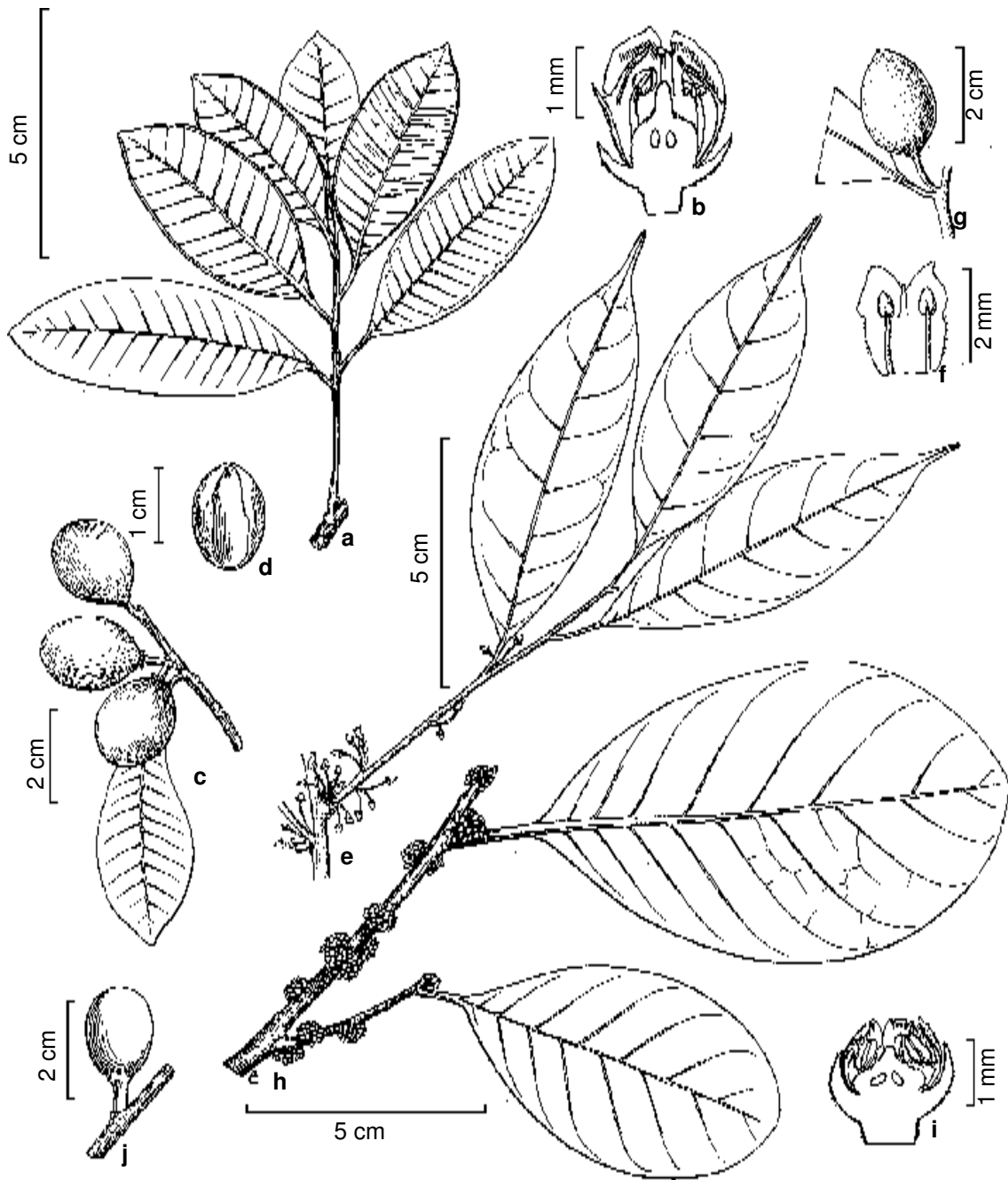


Figura 10 - a-c. *Pouteria egregia* - a. habit (Wurdack & Monachino 39693); b. 1/2 flower (Blanco 268); c. fruits (Blanco 582); d. seed (Marcano-Berti 184). e-f. *Pouteria coriacea* - e. habit; f. 1/3 flower (LBB 12627); g. fruit (Davidse et al. 13753). h-j. *Pouteria minima* - h. habit (Schultes & Pires 9070); i. 1/2 flower; j. young fruit (Schultes & Pires 9094).

appressed indumentum. **Flowers** unisexual (plant dioecious). Sepals 4, 0.5–1 mm long, sparsely appressed puberulous. Corolla ca. 2 mm long, cyathiform, tube slightly shorter than or equalling the lobes, lobes 4, minutely appressed puberulous outside. Stamens 4, free or fixed in the lower half of the corolla tube, glabrous, absent in female flowers. Staminodes 4, 0.5–1 mm long, subulate, glabrous, reduced to vestiges in female flower. Ovary ovoid, 2-locular, appressed puberulous. **Fruit** 2–2.5 cm long, broadly ellipsoid to globose, apex rounded to obtuse, base rounded or tapered, smooth, glabrous. **Seed** solitary, 1.4–1.8 cm long, broadly ellipsoid, slightly laterally compressed, testa smooth, shining; scar adaxial, full-length, 4–8 mm wide. Seed without endosperm.

Field characters: Tree to 40 m high and 1 m diam., with simple or branched running buttresses to 2.5 m high, and spreading up to 3 m, bole slightly fluted at the base, cylindrical above. Bark pale buff-brown or grey-brown, vertically cracked and scaling in thin narrow strips, slash streaked orange with copious sticky white latex. Leaves greyish-green to glaucous when fresh. Flowers greenish white, and fruit maturing yellow to orange. Flowering September to November, fruiting in May.

Amazonian Colombia and Venezuela to the Guianas, Pará and central Amazonia, in lowland rainforest on non-flooded land.

Not yet recorded from Reserva Ducke. PDBFF: *Lars, L. s.n.*, 15.VI.1984, Reserva 3004 (INPA K).

The glaucous lower leaf surface and brochidodromous venation of this species is superficially like that of *P. cuspidata*, but it differs from this species in its 4-merous flowers (5-merous in *P. cuspidata*) with free stamens or stamens fixed at the base of the corolla tube, and in the consistent occurrence of the full complement of staminodes. The floral structure of *P. egregia* is similar to that of *P. coriacea*, but the latter has eucamptodromous venation with few secondary veins and the lower leaf surface is not glaucous.

6.7 *Pouteria gongrijpii* Eyma, Recueil Trav. Bot. Néerl. 33: 185. 1936; Pennington, T. D., Fl. Neotrop. 52: 293, fig. 61. 1990. **Fig. 11 a-d**

Young shoots minutely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 15–19 × 5–6 cm, oblanceolate, apex shortly acuminate, base narrowly attenuate, glabrous above, usually sparsely appressed puberulous below with minute closely appressed hairs; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 12–15 pairs, convergent, arcuate, intersecondaries few, short to moderately long, tertiaries forming an open reticulum, fine quaternary reticulum visible on the upper surface. Petiole 1–1.5 cm long, not channelled, subglabrous. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 5–6 mm long, finely appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 5, 1.5–2 mm long, finely appressed puberulous outside, glabrous within. Corolla cyathiform, 2.5–3 mm long (male), 2–2.25 mm long (female), tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous, converted to lanceolate staminodes (female). Staminodes 5, 0.75–1 mm long, usually glabrous. Ovary ovoid (female) to truncate (male), 1-locular, appressed puberulous. **Fruit** 3–3.5 cm long, ellipsoid, apex rounded, base tapering, smooth, subglabrous. **Seed** solitary, 2–2.2 cm long, oblong, rounded or obtuse at both ends, not laterally compressed, testa smooth, adherent to the pericarp; scar adaxial, full-length, ca. 4 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 40 cm diam., with small buttresses. Bole cylindrical, with reddish-brown bark exfoliating in thin scales, slash orange or red, with copious sticky, white latex. Flowers pale green, scented, fruit maturing orange. Flowering in central Amazonia in September.

Venezuela and the Guianas to eastern and central Amazonian Brazil, in mixed lowland forest on non-flooded land.

17.IX.1987 (bd) *Pruski, J. F. et al.* 3267 (INPA K MGRB SP).

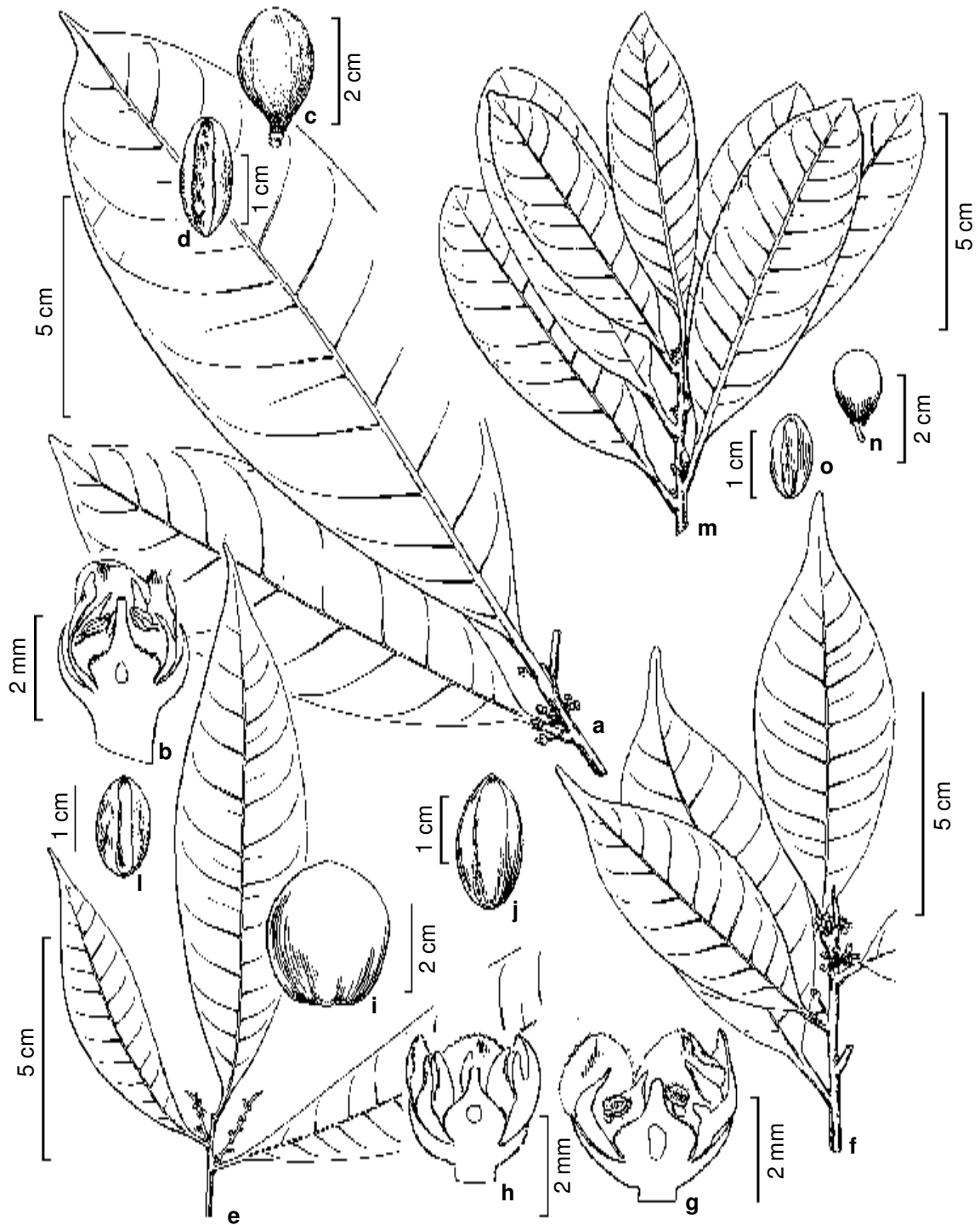


Figura 11 - a-d. *Pouteria gongrijpii* - a. habit; b. flower (Mori et al. 8743); c. fruit; d. seed (Oldeman 3298). e-l. *Pouteria reticulata* subsp. *reticulata* - e. habit (Krukoff 6704); f. habit (Gentle 1208); g. male flower (Croat 49844); h. 1/3 female flower; i. fruit; j. seed (Pennington et al. 11489); l. seed (Pennington et al. 11364). m-o. *Pouteria pachyphylla* - m. habit (Teixeira et al. 1228); n. fruit; o. seed (Prance et al. 4763).

This species is closely related to *P. reticulata*, but may be distinguished from it by the oblanceolate leaves with more arcuate secondary veins, by the indumentum on the lower leaf surface, and by its non-ciliate corolla lobes.

6.8 *Pouteria reticulata* (Engl.) Eyma, Recueil Trav. Bot. Néerl. 33: 183. 1936; Pennington, T. D., Fl. Neotrop. 52: 295, fig. 61. 1990.

Fig. 11 e-l

Young shoots appressed puberulous at first, soon glabrous. **Leaves** spirally arranged, 9–14 × 3.5–6 cm, elliptic, apex narrowly attenuate or acuminate, base narrowly attenuate, glabrous; venation eucamptodromous or sometimes brochidodromous near the apex, midrib slightly raised on the upper surface, secondary veins 9–13 pairs, parallel or slightly convergent, arcuate, intersecondaries usually short, tertiaries reticulate, fine areolate higher order network visible on both surfaces. Petiole 0.5–1 cm long, not channelled, glabrous. **Fascicles** 5–15-flowered, axillary and in the axils of fallen leaves. Pedicel 4–7 mm long, sparsely appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 4–5, 1–2 mm long, appressed puberulous outside, glabrous within. Corolla cyathiform, 1.5–3 mm long, tube about equalling the lobes, lobes 5, ciliate. Stamens 5, fixed near the top of the corolla tube, anthers often hairy; reduced to sterile staminodes in female flower. Staminodes 5, 0.5–1 mm long, glabrous. Ovary ovoid or conical, 1-locular, puberulous. **Fruit** 1.5–3 cm long, ellipsoid or ovoid, apex acute to rounded, base tapered to rounded, soft-skinned and fleshy, smooth, glabrous. **Seed** solitary, 1–2.5 cm long, ellipsoid, obtuse at apex and base, slightly laterally compressed, testa smooth, shining, usually free from the pericarp; scar adaxial, full-length, 2–8 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 50 cm diam., with simple or branched buttresses to 2 m high, lower bole frequently fluted, bark brown to pale greyish, scaling in long irregular plates, slash variable, from pale straw-coloured to reddish, with copious white latex. Flowers

greenish-white, usually scented, the fruit maturing orange to black. Flowering in central Amazonia in October and November, fruit maturing January to March.

Mexico and Central America and throughout tropical South America to coastal Brazil, Peru and Bolivia. A common species of both seasonal and everwet rainforest, mostly on non-flooded sites.

This is a widespread and variable species within which are recognized two subspecies. Only subspecies *reticulata* is known from central Amazonia, and this has a complex variation pattern, where several locally distinct forms exist side by side. These forms are recognized on the basis of bark, leaf and flower morphology, but because the character sets are not completely correlated, they cannot at present be used as a basis for formal taxonomic categories. The variation in these forms is described below.

Form 1. Typical subspecies *reticulata* as in the description above. This is a slightly buttressed tree with grey brown bark varying from shallowly fissured to slightly scaling and exfoliating in narrow thin pieces. The bark is frequently fissured and scaling on the same trunk. The slash is pale brown with a few drops of white latex or sometimes none at all. The leaves have a fine higher order reticulum on the lower surface. The flowers have a glabrous corolla. Examples of this form are:

PDBFF: *Nascimento et al.* PDBFF2206.2471 (INPA K); *Pennington et al.* 13212 (INPA K).

Form 2. A buttressed tree with rich brown bark which which exfoliates in large irregular scales. The slash is brown with plentiful sticky white exudate. The leaves of this form are small and coriaceous with a rounded base and fine reticulation on both surfaces. They resemble the leaves of a small-leaved *Pouteria vernicosa*. The very small flowers have a distinctly pubescent corolla.

22.XII.1994 (fl) *Nascimento, J. R. et al.* 695 (INPA K MG MONY RRB SP U); 7.III.1995 (fr) *Nascimento, J. R. et al.* 775 (INPA K MG MONY RRB SP U). PDBFF: *Boom et al.* 8639 (INPA K); *Mori et al.* 20531 (INPA); *Palheta s.n.* PDBFF 2303.3454.2; *A. P. Silva s.n.* PDBFF 1301.3497.2.

Form 3. A buttressed tree with brown to orange-brown bark, scaling in large irregular plates. The slash is brown, with plentiful running white latex. The trunk and bark characters are similar to form 2. This form contains two distinct leaf types a) typical subspecies *reticulata* as in the description above; b) leaves with widely spreading (almost at right angles to the midrib) more or less straight secondary veins and lacking the prominent higher order areolate vein network. The floral structure of this form is typical of subspecies *reticulata* (i.e., with a glabrous corolla).

22.VIII.1997 (bd) *Assunção, P. A. C. L. et al.* 624 (IANINPA K MONY RB SP UUB); 27.XI.1997 (fr) *Assunção, P. A. C. L. et al.* 728 (IANINPA K MONY RB SP UUB).

PDBFF: *C. F. Silva s.n.* PDBFF 3402.683.2 (INPA); *M. J. R. Pereira et al. s.s.* PDBFF 3402.780 (KINPA).

6.9 *Pouteria pachyphylla* T. D. Penn., Fl. Neotrop. 52: 303, fig. 61. 1990. **Fig. 11 m-o**

Young shoots glabrous. **Leaves** spirally arranged, 5.5–12 × 1.8–4.5 cm, oblanceolate, oblong or elliptic, apex acute to obtuse or rounded, base narrowly attenuate, strongly coriaceous, glabrous; venation eucamptodromous to brochidodromous, midrib slightly raised on the upper surface, secondary veins 12–15 pairs, slightly convergent or parallel, slightly arcuate or straight, intersecondaries moderate to long, tertiaries forming an areolate reticulum on the lower surface. Petiole 0.5–1.5 cm long, not channelled, glabrous. **Fascicles** 5–10-flowered, axillary. Pedicel ca. 1 mm long, glabrous. Sepals 5, ca. 1 mm long, glabrous, margin ciliate. Corolla cyathiform, ca. 2 mm long, tube shorter than the lobes, lobes 5, glabrous, slightly ciliate. Stamens 5, fixed at the top of the corolla tube, glabrous. Staminodes 5, ca. 0.5 mm long, glabrous. Ovary ovoid, 1-locular, pubescent. **Fruit** 1.7–2.1 cm long, narrowly obovoid to ellipsoid, apex and base acute to obtuse, smooth, glabrous. **Seed** solitary, 1.4–1.8 cm long, narrowly ellipsoid, not laterally compressed, testa smooth, shining; scar adaxial, full-length, 2.5–4 mm wide. Seed without endosperm.

Field characters: Tree to 20 m high and 20 cm diam., slash with white latex. Flowers whitish or pale green, the fruit ripening blackish. Flowering in central Amazonia, September to November, fruit maturing in April.

Central and western Brazilian Amazonia, where it occurs in periodically flooded and permanently flooded forest.

Not recorded from Reserva Ducke.

AMAZONAS, Rio Cuieiras, Rio Branquinho, *Prance et al.* 17864 (K); Rio Cuieiras, *Campbell et al.* 21850 (K); Manaus-Itacoatiara, Rio Urubú, *Prance et al.* 4763 (K).

Pouteria pachyphylla is easily recognized by the thickly coriaceous leaves on short petioles, the flowers on short pedicels, and the short corolla tube exceeded by the lobes. These characters distinguish it from the most closely related species *P. reticulata* and *P. gongrijpii*.

6.10 *Pouteria erythrochrysa* T. D. Penn., *sp. nov.* (section *Franchetella*). **Type:** Brazil, Amazonas, Manaus, ca. 90 km N of Manaus, Distrito Agropecuário, BR 174, km 72, Fazenda Dimona, 2°19'S, 60°05'W. Reserva 2303 A. *P. Silva s.n.* (holotype INPA/WWF 2303.3025.2 n.v., isotype K). **Fig. 12 a-h**

P. campanulatae et *P. rostratae affinis sed ramulis novellis et foliorum pagina inferiore pilis erythrochrysis dense et persistenter adpresse puberula, nervis secundariis 12-14-jugis parallelis differt.*

Arbor; stipulae nullae; folia 6.5-13.5 × 3-5 cm, elliptica; nervi secundarii 12-14 jugi, paralleli, arcuati; fasciculi in axillis foliorum delapsorum enati; pedicellus 5-7 mm longus; sepala 5; corolla cyathiformis, ca. 4.5 mm longa, lobis 5; stamina 5; staminodia 5; ovarium 1-loculare; fructus 2.2-3 cm longus, ellipsoideus, apice rotundatus.

Tree. Young shoots finely appressed puberulous with reddish-golden hairs, soon becoming glabrous, greyish, finely cracked and fissured. Stipules absent. **Leaves** spirally arranged, 6.5–13.5 × 3–5 cm, elliptic, apex narrowly attenuate to acuminate, base narrowly cuneate or attenuate, glabrous above, finely but

densely appressed puberulous below with reddish-golden hairs; venation eucamptodromous, midrib flat on the upper surface, secondary veins 12–14 pairs, parallel, arcuate, intersecondaries mostly short or absent, tertiaries oblique to perpendicular, fine areolate network sometimes visible on upper surface. Petiole 1.5–2.2 cm long, not or only slightly channelled, sparsely appressed puberulous. **Fascicles** 5–10-flowered, mostly clustered in the axils of fallen leaves. Pedicel 5–7 mm long, finely appressed puberulous. Sepals 5, 1.75–2 mm long, broadly ovate to orbicular, finely appressed puberulous outside, subglabrous inside. Corolla *ca.* 4.5 mm long, cyathiform, tube *ca.* 2 mm long, lobes 5, *ca.* 2.5 mm long, orbicular, margin ciliate, glabrous. Stamens 5, fixed about halfway up the corolla tube, filaments *ca.* 0.3 mm long, glabrous, anthers *ca.* 1 mm long, ovoid, glabrous. Staminodes 5, 1–1.5 mm long, lanceolate-subulate, glabrous. Disk absent. Ovary ovoid, 1.75–2 mm long, 1-locular, glabrous except for long hairs at the base; ovary gradually tapering into a short style, *ca.* 0.5 mm long, included; style-head minutely lobed. **Fruit** 2.2–3 cm long, ellipsoid, apex and base obtuse to rounded, fleshy, soft-skinned, smooth, glabrous. **Seed** solitary, 2–2.2 cm long, ellipsoid, laterally compressed, apex acute, base rounded, testa smooth, shining; scar adaxial, full length, *ca.* 2.5 mm wide; embryo with plano-convex, free cotyledons, extending to the surface. Seed without endosperm.

Field characters: Buttressed tree to 30 m high and 60 cm diam., with cylindrical bole; bark reddish-brown, scaling irregularly in small thin pieces, slash reddish, with whitish latex. Fruit ripening black, with sweet pulp. Flowering in October, fruiting in January.

A common component of non-flooded rainforest in central Amazonia. Thirty individuals (10 cm diam. or greater) were collected from the 25 hectare Sapotaceae plot in the PDBFF reserve at km 41.

Paratypes: 11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F. 642* (INPA K MG MO NY RB SP U UB); 30.I.1996 (fr) *Ribeiro, J. E. L. S. et al. 1785* (INPA K MG MO NY RB SP U); 15.XII.1997 (fl) *Sothers, C. A. & Pereira, E. C. 1073* (INPA K).

This species clearly belongs within section *Franchetella* to the group of species containing *P. campanulata*, *P. sagotiana*, *P. rostrata* and *P. platyphylla*. All have a very similar floral structure with 5 sepals, 5-lobed corolla with the lobes longer than the tube, 5 included stamens, 5 staminodes, and a unilocular ovary. They also share the relatively small fruit, with a single seed bearing a narrow adaxial scar. It differs from all these species in the presence of the fine persistent reddish-golden indumentum on the young parts and lower leaf surface, and in the details of leaf size, shape and venation.

6.11 *Pouteria campanulata* Baehni, Candollea 9: 275. 1942; Pennington, T. D., Fl. Neotrop. 52: 306, fig. 64. 1990. **Fig. 12 i-l**

Young shoots finely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 18–27 × 4.5–9 cm, oblanceolate, apex narrowly attenuate to obtuse, base narrowly attenuate or cuneate, coriaceous, upper surface glabrous, lower surface finely appressed puberulous with whitish hairs; venation eucamptodromous, midrib not raised on the upper surface, secondary veins 16–22 pairs, parallel or slightly convergent, slightly arcuate, intersecondaries absent, tertiaries oblique, fine areolate reticulum visible on lower, or sometimes both surfaces. Petiole 2–3 cm long, not channelled, subglabrous. **Fascicles** mostly on twigs below the leaves, 2–10-flowered. Pedicel 7–9 mm long, sparsely appressed puberulous. Sepals 5, 2.5–3 mm long, appressed puberulous outside. Corolla 4.5–5 mm long, tube shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed in the upper half of the corolla tube, glabrous. Staminodes 5, *ca.* 2 mm long, glabrous. Ovary broadly conical, 1-locular, puberulous. **Fruit** 1.5–2 cm long, ellipsoid, apex and base obtuse to rounded, thin-walled, smooth, glabrous. **Seed** solitary, 1.4–1.8 cm long, ellipsoid, laterally compressed, base and apex obtuse to rounded, testa smooth, shining; scar adaxial, full length, 1.5–2 mm wide. Seed without endosperm.

Field characters: Small or medium sized tree to 30 cm diam., sometimes with small

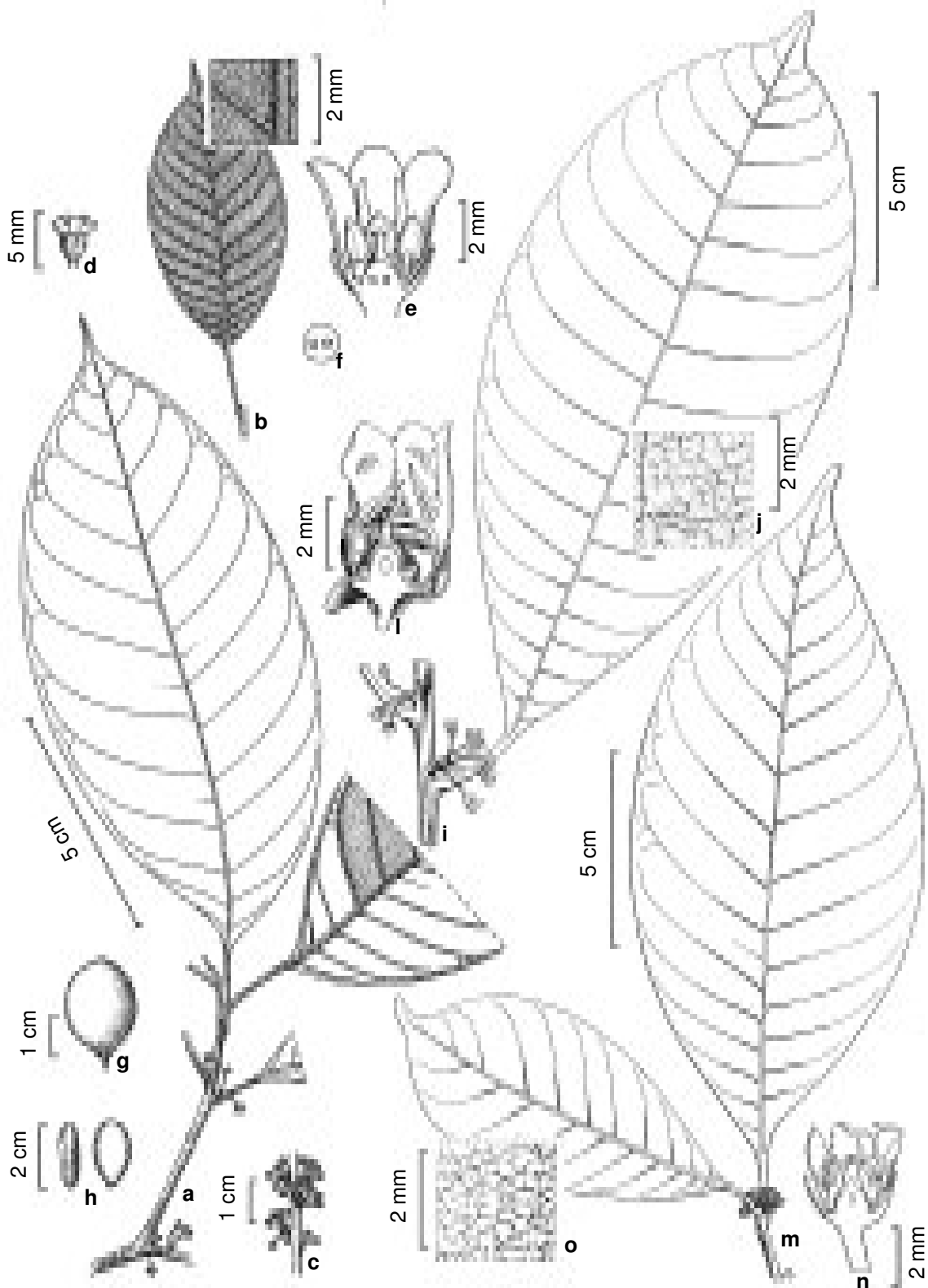


Figura 12 - a-h. *Pouteria erythrochrysa* - a. habit; b. leaf undersurface (Sothers 1075); c. inflorescence; d. flower; e. 1/2 flower; f. ovary (Assunção 742); g. fruit; h. seed (Ribeiro 1785). i-l. *Pouteria campanulata* - i. habit; j. detail of leaf; l. flower (Pires 552). m-o. *Pouteria retinervis* - m. habit; n. 1/2 flower; o. detail of leaf (Mori & Boom 15239).

buttresses. Bark reddish-brown, scaling in small pieces, slash laminated exuding copious white latex. Flowers cream-coloured, fruit black, leathery, sweet. Flowering in central Amazonia in October, fruit maturing in March.

Amazonian Brazil from Acre to Pará, in lowland forest on non-flooded land. A common lower and mid storey tree.

12.IX.1997 (fl) *Assunção, P. A. C. L. et al.* 660 (ACRE IAN INPA K MEXU PUEL S U PCB W); 19.IX.1997 (fl) *Assunção, P. A. C. L. et al.* 664 (E HAMAB HRB INPA K MAC MG MICH ULM); 21.IX.1997 (fl) *Assunção, P. A. C. L. et al.* 673 (GH ICN INPA K MG); 10.IX.1997 (fl) *Brito, J. M. et al.* 34 (BM IAN INPA K MBM SPFUEC US VEN); 7.XI.1997 (fl) *Costa, M. A. S. & Pereira, E. C.* 788 (B COL F INPA K MG PEUFR UFMT VIC); 7.III.1995 (fr) *Nascimento, J. R. et al.* 776 (INPA K MG MONY R RB SP U); 7.III.1995 (fr) *Nascimento, J. R. et al.* 781 (BM COL INPA K MG SPFUEC UFMT VEN); 16.XII.1994 (fl) *Ribeiro, J. E. L. S. & Silva, C. F.* 1547 (INPA K MG MONY R RB SP U); 4.X.1995 (fl) *Sothers, C. A. et al.* 597 (G IAN INPA K UB); 28.II.1994 (fr) *Vicentini, A. & Pereira, E. C.* 414 (G IAN INPA K MBM UB US).

A similar plant which may just represent a form of *P. campanulata* is common in the PDBFF reserves, though it has not been collected in Reserva Ducke. It differs from typical *P. campanulata* only in its leaf shape, which is broadly elliptic and only about twice as long as broad. The leaf indumentum, floral and fruit structure are the same as typical *P. campanulata*. Examples of this plant are *Costa et al. s.n.* INPA/WWF 1202.2919; *Lepsch Cunha et al.* 459; *Pennington et al.* 12975. It flowers and fruits at the same time of year as typical *P. campanulata*.

6.12 *Pouteria retinervis* T. D. Penn., Fl. Neotrop. 52: 308, fig. 64. 1990. **Fig. 12 m-o**

Young shoots finely appressed puberulous with brown hairs, soon glabrous. **Leaves** spirally arranged, 14–24 × 7–11.5 cm, mostly broadly elliptic, apex shortly and narrowly attenuate, base narrowly attenuate or acute, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 11–18 pairs, parallel, straight or slightly arcuate, intersecondaries absent, tertiaries widely spaced, oblique, fine

quaternary areolate reticulum conspicuous on both surfaces. Petiole 2–3 cm long, not channelled, glabrous. **Fascicles** axillary and in the axils of fallen leaves, 2–10-flowered. Pedicel 2–4 mm long, appressed puberulous. Sepals 5, ca. 2 mm long, appressed puberulous outside. Corolla cyathiform, ca. 3.5 mm long, tube much shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed in the upper half of the corolla tube, glabrous. Staminodes 5, ca. 1.4 mm long, glabrous. Ovary conical, 1–2-locular, with a ring of hairs around the base. **Fruit** unknown.

Field characters: Tree to 30 m high and 45 cm diam., larger specimens buttressed to 2 m high. Bark brown, scaling in rectangular plates, slash laminated with alternating bands of orange and white; milky white latex present. Flowers greenish-white. Flowering October to November.

The Guianas to central Amazonian Brazil, occurring in lowland forest on non-flooded sites.

29.X.1997 (fl) *Ribeiro, J. E. L. S. et al.* 1936 (IAN INPA K MONY RB SP U UB).

PDBFF: *Freitas et al.* F-62 (INPA K); *Freitas et al.* 633 (INPA K); *Pereira s.n.* (PDBFF1301.3407.2).

Pouteria retinervis can be recognized when sterile by the rather thin textured leaves with finely areolate venation, which is sharp and conspicuous (with a lens) on both surfaces.

6.13 *Pouteria ericoides* T. D. Penn., *sp. nov.* (section *Franchetella*). **Type:** Brazil, Amazonas, Manaus, Distrito Agropecuário, Reserva 1501 (km 41), 2°24'S, 59°43'W, *Freitas et al.* 478 (holotype INPA, isotype K). **Fig. 13 a-e**

P. campanulatae affinis sed sepalis 4, lobis corollae 4, staminibus 4, staminodiis 4, et tubo corollae lobis 4–5-plo longiore differt.

Arbor; stipulae nullae; folia 8.5–13 × 3.5–6 cm, elliptica; nervi secundarii 13–15-jugi recti paralleli; fasciculi axillares; pedicellus 7–9 mm longus; sepala 4; corolla longe campanulata, ca. 1 cm longa, lobis 4; stamina 4; staminodia 4; ovarium 1-loculare, glabrum.

Tree. Stipules absent. Young shoots subglabrous, becoming dark blackish-brown,

cracked and lenticellate. **Leaves** lax, spirally arranged, 8.5–13 × 3.5–6 cm, elliptic, apex and base narrowly attenuate, chartaceous, glabrous; venation mostly eucamptodromous, sometimes brochidodromous near the apex, secondary veins 13–15 pairs, straight and more or less parallel, intersecondaries numerous and long, tertiaries forming a conspicuous reticulum on both surfaces. Petiole 7–9 mm long, slightly channelled, glabrous. **Fascicles** axillary and in the axils of fallen leaves, few-flowered. Pedicel 7–9 mm long, minutely appressed puberulous. Sepals 4, 2–2.5 mm long, broadly ovate to orbicular, with scattered minute appressed hairs on both surfaces, inner sepals ciliate. Corolla *ca.* 1 cm long, long-campanulate, tube *ca.* 8 mm long, lobes 4, 1.5–2 mm long, orbicular, often with small auricles at the base; glabrous. Stamens 4, fixed near the apex of the corolla tube (but with strong filament traces to near the base of the tube), filaments *ca.* 0.5 mm long, geniculate, glabrous; anthers *ca.* 0.7 mm long, ovoid, glabrous. Staminodes 4, *ca.* 1.5 mm long, narrowly lanceolate, glabrous. Disk absent. Ovary ovoid, 1-locular, glabrous, tapering into a glabrous style *ca.* 3 mm long, included. **Fruit** unknown.

Field characters: Tree to 30 m high and 35 cm diam. with steep concave buttresses to 75 cm high, lower bole often fluted, cylindrical above. Bark brown, scaling in large irregular thin sheets, slash pale brown to pinkish-red, with white latex. Flowers yellowish-white in September and October.

Known only from central Amazonian Brazil, where it occurs in lowland mixed forest on non-flooded land. It is relatively common in the PDBFF reserves (0.5 individuals per hectare in the 25 hectare Sapotaceae plot).

Not yet recorded in Reserva Ducke.

Paratypes: PDBFF *Spironello s.n.* (INPA K); *Lepsch Cunha et al.* 386 (INPA K); *Pereira et al. s.n.* PDBFF1301.4294 (INPA K). *Da Silva s.n.* PDBFF2303.485.2 (INPA K).

Pouteria ericoides has the leaf venation common to a large group of species within section *Franchetella*, and including *P. reticulata*, *P. campanulata*, and *P. gongrijpii*, but is unusual

in having 4 sepals, 4 corolla lobes, 4 stamens and 4 staminodes associated with a unilocular ovary. All other known species of section *Franchetella* with this number of floral parts have a 2-locular ovary. It is also unique in the section in having a corolla tube 4–5 times as long as the small orbicular lobes. All other species in the section have the corolla tube shorter than, equalling or only slightly larger than the lobes.

The leaf venation of *P. ericoides* is very similar to that of *P. durlandii* and they can easily be confused when sterile. Their floral structure is however quite distinct.

6.14 *Pouteria rostrata* (Huber) Baehni, *Candollea* 9: 270. 1942; Pennington, T. D., *Fl. Neotrop.* 52: 310, fig. 66. 1990. **Fig. 13 f**

Lucuma rostrata Huber, *Bull. Soc. Bot. Genève, Sér. 2*, 6: 195. 1914.

Young shoots sparsely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 10–23 × 4–9 cm, mostly elliptic, apex narrowly attenuate or acuminate, base narrowly attenuate, glabrous, often minutely punctate on the lower surface; venation eucamptodromous, midrib flat or slightly raised on the upper surface, secondary veins 10–14 pairs, convergent, arcuate, intersecondaries short to moderate, tertiaries few, oblique and open reticulate, fine areolate reticulum visible on the lower surface. Petiole 0.8–1.7 cm long, not channelled, glabrous. **Fascicles** axillary and in the axils of fallen leaves, 5–10-flowered. Pedicel 8–10 mm long, sparsely and minutely puberulous. Flowers unisexual (plant dioecious). Sepals 5, 1.25–1.5 mm long, appressed puberulous outside, inner ones ciliate. Corolla cyathiform, 3–4 mm long, tube shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed about halfway up the corolla tube, glabrous. Staminodes 5, *ca.* 1.5 mm long, narrowly lanceolate, glabrous. Ovary ovoid, 1-locular, glabrous. **Fruit** 1.7–2 cm long, ellipsoid, rounded or obtuse at apex and base, smooth, soft-skinned, glabrous. **Seed** solitary, 1.5–1.7 cm long, ellipsoid, slightly laterally compressed, testa, smooth, shining; scar adaxial, full-length, 1.5–2 mm wide. Seed without endosperm.

Field characters: Tree to 25 m high and 60 cm diam., with small buttresses. Bole often fluted. Bark dark brown or reddish-brown with scaling bark, slash pinkish with sticky white latex. Flowers whitish and fruit maturing pale orange. Flowering in central Amazonia in January.

Central and western Amazonian Brazil, Colombia, Ecuador and Peru, in both non-flooded and periodically flooded forest.

11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F. da* 648 (INPA); 12.IX.1997 (fl) *Assunção, P. A. C. L. et al.* 658 (B GH ICN INPA K MG S UP CB VIC); 12.IX.1997 (fl) *Assunção, P. A. C. L. et al.* 659 (COL FIAN INPA K PEUFR SPF UFMT VEN); 17.IX.1997 (fl) *Costa, M. A. S. et al.* 777 (BM G IAN INPA K MBM UB UEC US); 24.XI.1994 (fl) *Nascimento, J. R. et al.* 664 (INPA K MG MONY R RB SP U).

Pouteria rostrata is close to *P. campanulata*, but may be distinguished by the glabrous leaves with fewer, more arcuate secondary veins, shorter petiole, smaller flowers and glabrous ovary. It is also closely related to the Peruvian *P. aubrevillei*.

6.15 *Pouteria platyphylla* (A.C. Smith) Baehni, *Candollea* 9: 274. 1942, Pennington, T. D., *Fl. Neotrop.* 52: 311, fig. 66. 1990. **Fig. 13 g-h**

Lucuma platyphylla A.C. Smith, *Bull. Torrey Bot. Club* 60: 388. 1933.

Young shoots densely golden-brown tomentose, indumentum persistent. **Leaves** spirally arranged, 15–30 × 6.5–16 cm, mostly broadly oblanceolate or obovate, apex shortly and narrowly acuminate or cuspidate, base acute or narrowly attenuate, strongly bullate, glabrous above, uniformly pubescent below with stalked 2-branched hairs, denser on midrib and veins; venation brochidodromous or eucamptodromous, midrib raised but recessed on upper surface, secondary veins 10–15 pairs, parallel or slightly convergent, arcuate, sunken on the upper surface, strongly raised on the lower surface, intersecondaries short or absent, tertiaries oblique, widely spaced, fine areolate network visible on both surfaces. Petiole 2–3 cm long, not channelled, tomentose. **Fascicles** on twigs below the leaves, 5–10-flowered. Pedicel 1–3 cm long, pubescent. **Flowers** unisexual

(plant dioecious). Sepals 5, 2–3 mm long, pubescent outside, subglabrous inside. Corolla cyathiform, *ca.* 4 mm long (female), 5–8 mm long (male), tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed in the upper half of the corolla tube, glabrous, reduced to sterile staminodes in female flowers. Staminodes 5, 1.5–3 mm long, lanceolate, glabrous. Ovary truncate in male, ovoid in female, 1-locular, densely pubescent. **Fruit** 2.7–3 cm long, ovoid to globose, apex and base rounded or truncate, smooth, glabrous. **Seed** solitary, 2–2.5 cm long, ellipsoid, not laterally compressed, testa smooth; scar adaxial, full-length, *ca.* 2 mm wide. Seed without endosperm.

Field characters: Tree to 20 m high and 25 cm diam., bole fluted at the base. Bark dark brown or reddish, scaling in regular plates. Slash fibrous, yellowish, with a sweet smell, and scarce white latex. Flowers greenish-white and fruit maturing black. Flowering in central Amazonia in October, fruiting in March.

Central Amazonian Brazil to Amazonian Peru, in mixed lowland rainforest on non-flooded land.

15.V.1995 (fr) *Cordeiro, I. et al.* 1555 (IAN INPA K U UB); 21.VI.1980 (fr) *Nelson, B. W. & Nelson, S. P.* 429 (INPA); 24.III.1994 (fr) *Ribeiro, J. E. L. S. et al.* 1247 (INPA K MG MONY RB SP); 24.III.1994 (fr) *Ribeiro, J. E. L. S. et al.* 1248 (G IAN INPA K MBM UEC US); 8.IV.1964 (fr) *Rodrigues, W. & Loureiro, A.* 5736 (INPA). PDBFF: *Spironello s.n.* (INPA 190940 K), *Pennington et al.* 13173 (INPA K).

The strongly bullate leaves and brown tomentum on young parts and the lower leaf surface of this species are very characteristic. The floral structure confirms that it belongs to the group of closely related species containing *P. campanulata*, *P. rostrata*, *P. vernicosa* and *P. erythrochrysa*.

6.16 *Pouteria vernicosa* T. D. Penn., *Fl. Neotrop.* 52: 311, fig. 63. 1990. **Fig. 14 a-b**

Young shoots subglabrous. **Leaves** spaced, spirally arranged, 5–13 × 3–7 cm, broadly lanceolate, elliptic or oblong-elliptic, apex narrowly attenuate to acuminate, base rounded to acute, coriaceous, upper surface usually smooth and glossy, glabrous; venation

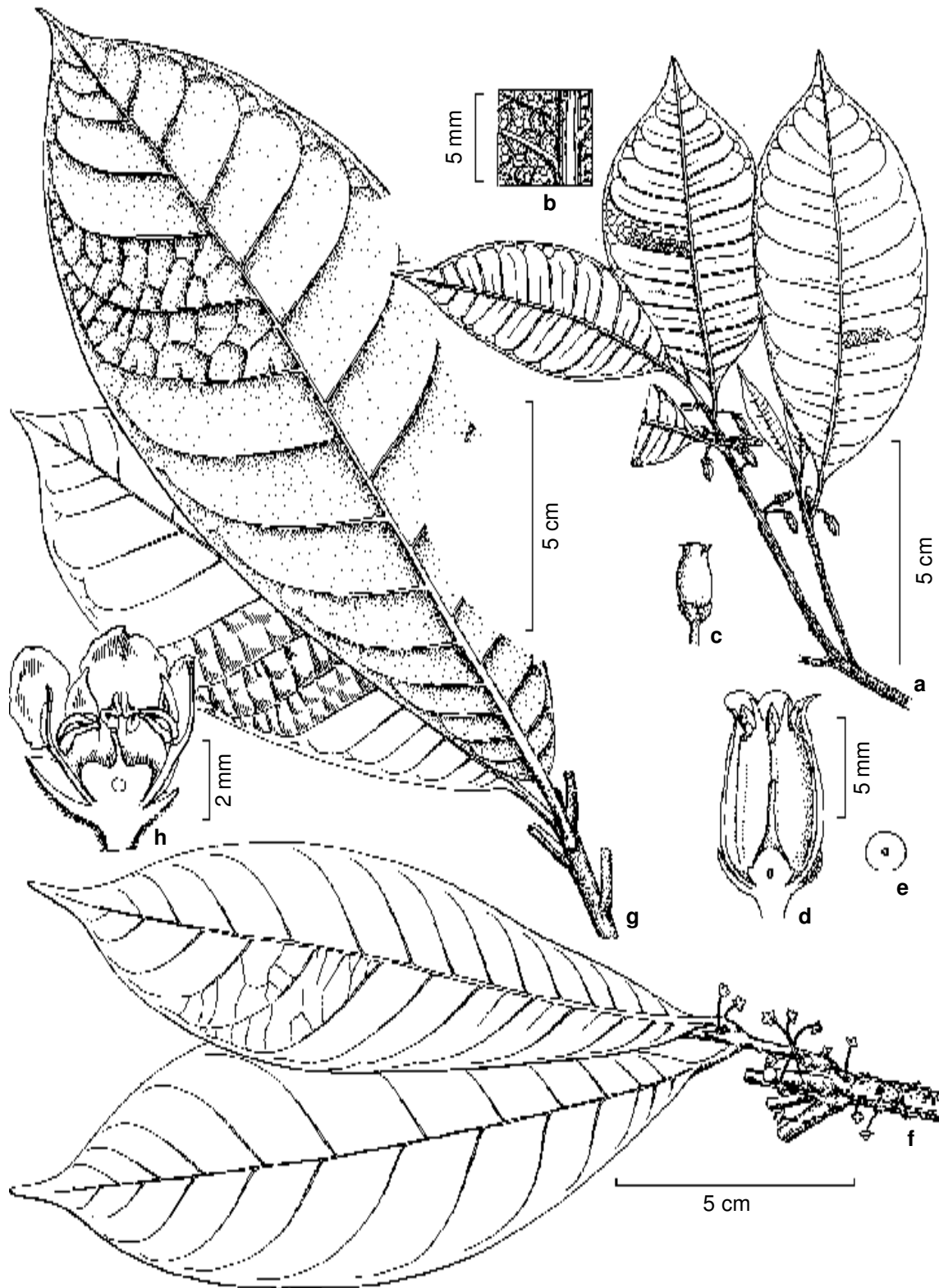


Figura 13 - a-e. *Pouteria ericoides* - a. habit; b. venation on leaf undersurface (da Silva s.n. PDBFF2303.485.2); c. flower; d. 1/2 flower; e. ovary (Lepsch Cunha 386). f. *Pouteria rostrata* - f. habit (Krukoff 5701). g-h. *Pouteria platyphylla* - g. habit (Nelson & Nelson 429); h. 1/2 flower (Ducke RB37452).

eucamptodromous to brochidodromous, midrib slightly raised (rounded) on the upper surface, secondary veins 9–14 pairs, parallel or slightly convergent, arcuate, intersecondaries short to moderately long, tertiaries few, oblique or forming a lax reticulum, fine higher order areolate network visible with lens. Petiole 1–1.5 cm long, not or only slightly channelled, glabrous. **Fascicles** mostly borne below the leaves, 2–10-flowered. Pedicel 0.5–2 cm long, glabrous. Sepals 5, *ca.* 1.5 mm long, sparsely appressed puberulous or glabrous, sometimes ciliate. Corolla cyathiform, 3–4 mm long, tube shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous. Staminodes 5, *ca.* 1.5 mm long, lanceolate, glabrous. Ovary ovoid-conical, 1-locular, glabrous; tapering into a short included style. **Fruit** 2.5–3 cm long, ellipsoid, apex and base rounded, hard-skinned, smooth, glabrous. **Seed** solitary, 2–2.3 cm long, ellipsoid, laterally compressed, testa transversely wrinkled, shining; scar adaxial and extending around the base, 3–3.5 mm wide. Seed without endosperm.

Field characters: Tree to 35 m high and 65 cm diam., larger specimens with small buttresses, bole often fluted at the base, cylindrical above, bark scaling in thin longitudinal rectangular pieces, slash reddish with some white latex. Flowers greenish-white to cream coloured, fruit reddish-black. Flowering in central Amazonia September to December, fruit maturing in June.

Central Amazonian Brazil to Amazonian Peru and Ecuador in lowland forest on non-flooded sites.

21.IX.1997 (fr) *Assunção, P. A. C. L. 669* (K); 14.IX.1987 (fl) *Pruski, J. F. et al. 3238* ((K) INPA MG RB SP); 8.V.1996 (fr) *Rodrigues, W. 8596* (INPA); 29.III.1995 (fr) *Sothers, C. A. & Pereira, E. C. 380* (INPA K MG MO NY R RB SP U).

AMAZONAS: Manaus-Itacoatiara km 29, CEPLAC, *Pennington P 22773* (INPA K).

Pouteria vernicosa is distinctive on account of the coriaceous, glossy leaves, which are usually lanceolate with a rounded base. The whole plant is subglabrous. The floral structure

conforms closely to other species in this group (*P. campanulata*, *P. rostrata*, *P. platyphylla*, *P. erythrochrysa*), except that the stamens are fixed in the lower part of the corolla tube.

6.17 *Pouteria fulva* T. D. Penn., Fl. Neotrop. 52: 313, fig. 67. 1990. **Fig. 14 c-d**

Young shoots minutely appressed puberulous with golden-brown indumentum. **Leaves** spirally arranged, 14–20 × 6–10 cm, obovate, apex usually rounded or truncate, sometimes obtusely cuspidate, base narrowly attenuate, coriaceous, upper surface subglabrous, lower surface finely appressed puberulous with golden-brown hairs, becoming sparser with age; venation eucamptodromous, midrib slightly raised (rounded) on the upper surface, secondary veins 11–15 pairs, parallel or slightly convergent, straight or slightly arcuate, intersecondaries short or moderate, tertiaries few, oblique and reticulate, fine higher order areolate network visible with lens. Petiole 1–1.5 cm long, not channelled, finely appressed puberulous at first. **Fascicles** on twigs below the leaves, 5–10-flowered. Pedicel 0.5–1.5 cm long, finely appressed puberulous with golden-brown indumentum. Sepals 5, *ca.* 2 mm long, finely appressed puberulous on both surfaces. Corolla cyathiform, *ca.* 3 mm long, tube shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed in the upper half of the corolla tube, hairy or glabrous. Staminodes 5, *ca.* 1.5 mm long, subulate, glabrous. Ovary truncate (?male flowers), 1-locular, densely pubescent, style short, included. **Fruit** unknown.

Field characters: Tree to 25 m high and 35 cm diam., buttressed to 1 m high. Bark reddish brown, scaling in small plates, slash reddish with white latex. Flowers whitish. Flowering in central Amazonia in January.

Central and western Amazonian Brazil, in non-flooded rainforest

Not yet recorded from Reserva Ducke. PDBFF: Reserva km 41, *Oliveira et al. 304* (INPA K); *Lepsch Cunha et al. 757* (INPA K); *Pennington et al. 13206* (INPA K).

This species is distinctive on account of the obovate leaves with rounded apex and

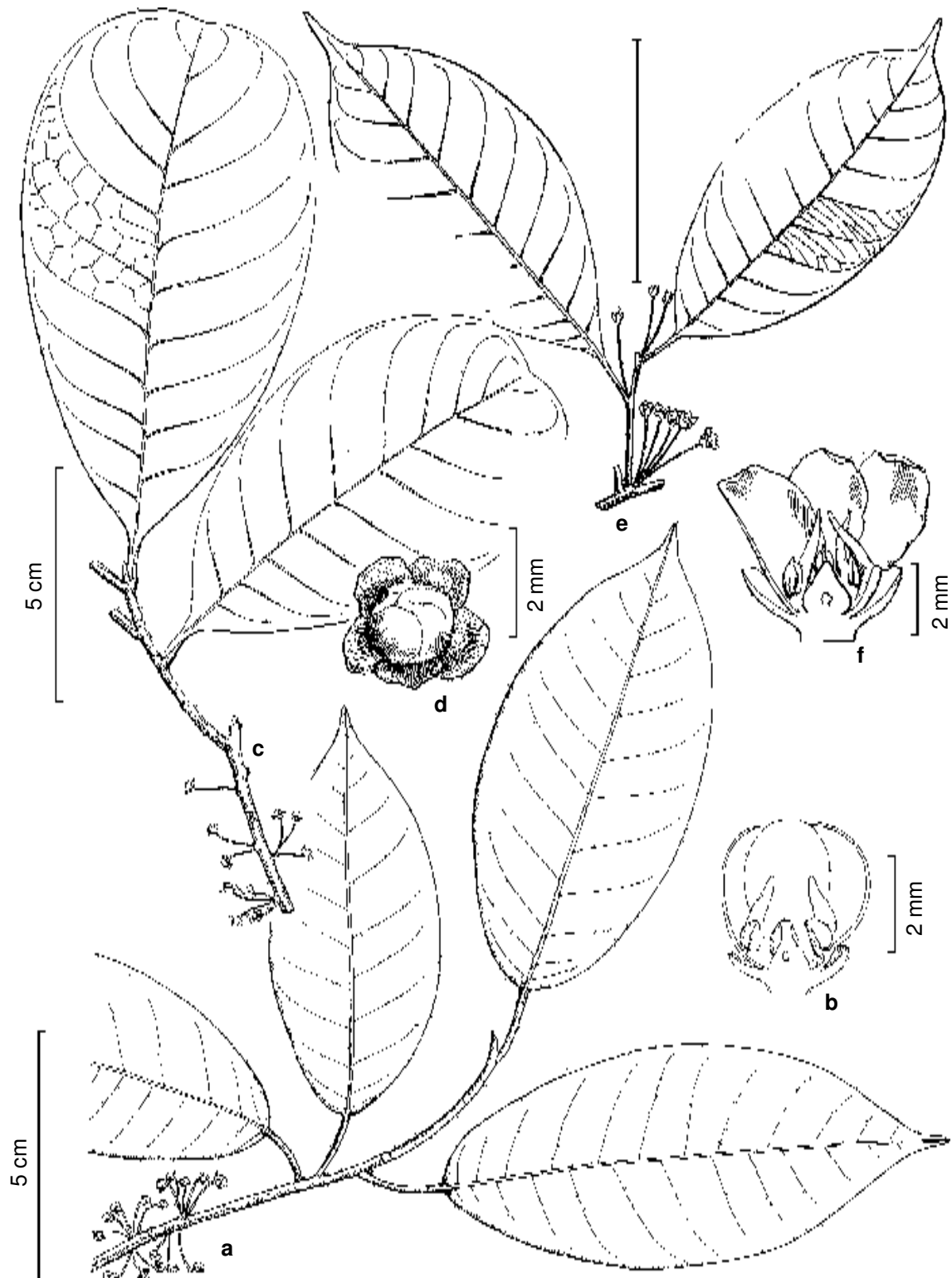


Figura 14 - a-b. *Pouteria vernicosa* - a. habit (Krukoff 8192); b. 1/2 flower (Rodrigues 3364). c-d. *Pouteria fulva* - c. habit; d. flower bud (Krukoff 8882). e-f. *Pouteria peruviana* - e. habit; f. flower (Wurdack 2363).

close appressed indumentum on the lower surface. The floral structure is closest to that of *P. campanulata*. The leaves and indumentum are similar to *Chrysophyllum prieurii*, but lack the numerous oblique or perpendicular tertiary veins of the latter.

6.18 *Pouteria peruviansis* (Aubrév.) Bernardi, *Candollea* 22: 231. 1967; Pennington, T. D., *Fl. Neotrop.* 52: 317, fig. 67. 1990. **Fig. 14 e-f**
Eremoluma peruviansis Aubrév., *Adansonia* 5: 199. 1965.

Young shoots subglabrous. **Leaves** spirally arranged, 10–12 × 4.5–5 cm, elliptic, apex acuminate, base obtusely or narrowly attenuate, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface, secondaries 9–12 pairs, more or less parallel, slightly arcuate, intersecondaries moderate to long, tertiaries oblique and forming a coarse areolate reticulum. Petiole 0.8–1.2 cm long, not or only slightly channelled, glabrous. **Fascicles** axillary and on twigs below the leaves, 3–10-flowered. Pedicel 0.5–2 cm long, subglabrous. **Flowers** unisexual, (plant dioecious). Sepals 5, 1.5–2 mm long, partially united, subglabrous. Corolla cyathiform, 5–6 mm long (male), ca. 3 mm long (female), tube much shorter than the lobes in male, about equalling the lobes in female, lobes 5, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous, reduced to sterile staminodes (female). Staminodes 5, 1.5–3 mm long, lanceolate-subulate, glabrous. Ovary ovoid, 1-locular, glabrous, style short, included. **Fruit** unknown.

Field characters: Tree to 25 m high and 30 cm diam., with a fluted bole. Bark reddish-brown, scaling in large irregular plates. Slash pinkish-yellow with scarce white latex. Flowers strongly scented, calyx and corolla greenish, stamens off-white. Flowering in central Amazonia September to October.

So far known only from Amazonian Peru and central Amazonian Brazil, where it occurs in non-flooded rainforest up to 550 m altitude. 1.IX.1995 (fl) *Ribeiro, J.E.L.S. et al.* 1691 (INPA K MG MO NY R RB SP U); 11.X.1995 (fl) *Sothers, C.A. & Pereira, E. da C.* 621 (BM G INPA K MBM MGUB UECUS).

Pouteria peruviansis is the only member of this group of species which lacks the finely areolate higher order venation. Its venation is much coarser and resembles that of *P. bilocularis* and *P. durlandii* (see after the latter for further comments).

6.19 *Pouteria cladantha* Sandwith, *Bull. Misc. Inform.* 1931: 480. 1931; Pennington, T. D., *Fl. Neotrop.* 52: 317, fig. 69. 1990. **Fig. 15 a-c**

Young shoots subglabrous. **Leaves** spirally arranged, 7–13 × 2.5–6.5 cm, oblanceolate, obovate or elliptic, apex obtusely cuspidate, obtuse or rounded, base narrowly attenuate, margin often revolute, glabrous, often minutely punctate on the lower surface; venation brochidodromous, midrib raised on the upper surface, secondary veins 8–13 pairs, straight, parallel, often slightly impressed on the upper surface, intersecondaries long, tertiaries obscure, more or less parallel to the secondaries and descending from the margin. Petiole 0.5–1.5 cm long, not channelled, glabrous. **Fascicles** 5–15-flowered, axillary and clustered on leafless axillary shoots to 8 cm long. Pedicel 3–5 mm long, finely appressed puberulous. **Flowers** bisexual or unisexual (plant dioecious). Sepals 4–5, 1.5–2 mm long, appressed puberulous on both surfaces. Corolla cyathiform, 1–2 mm long, tube exceeding the lobes, lobes 4–5, sparsely appressed hairy on the tube, or glabrous. Stamens 4–5, fixed in the upper half of the corolla tube, glabrous, absent in female flowers. Staminodes 4–5, 0.2–0.4 mm long, subulate, glabrous. Ovary patelliform (in male flowers) or ovoid (in female flowers), 2-locular, puberulous, style included. **Fruit** 2–3 cm long, ellipsoid to globose, rounded at apex and base, fleshy, smooth, glabrous. **Seed** solitary, 1.5–2 cm long, ellipsoid, slightly laterally compressed, testa smooth, shining; scar adaxial, full-length, 3–4 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 80 cm diam., buttressed to 2 m high, bole often fluted at the base. Bark dark brown, scaling in thin longitudinal strips, inner bark pinkish or reddish with small amount of watery white latex.

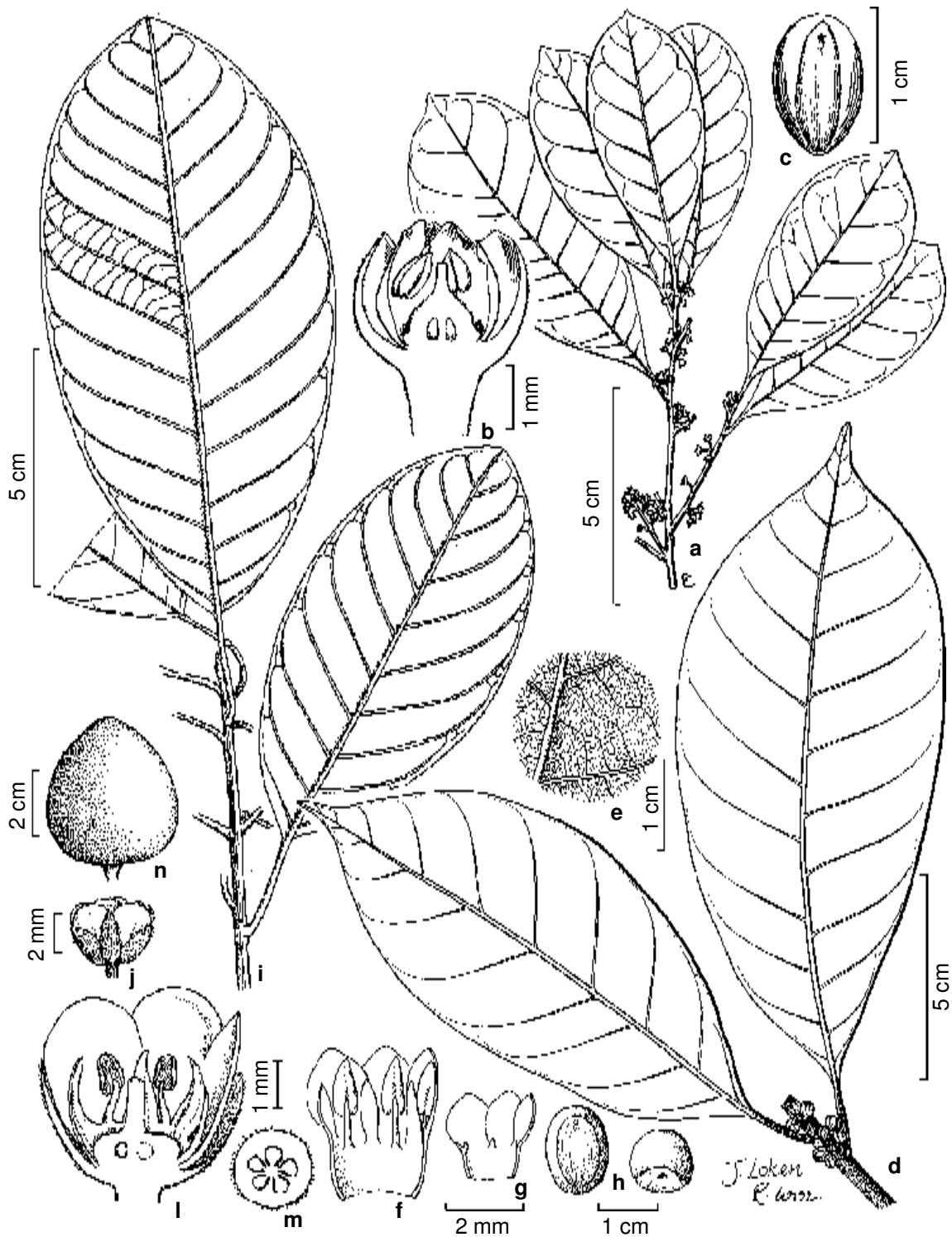


Figura 15 - a-c. *Pouteria cladantha* - a. habit (Mori et al. 8219); b. 1/2 flower (Tessmann 5451); c. seed (Oliveira 4503). d-h. *Pouteria durlandii* - d. habit; e. detail of venation (Steyermark 39228); f. part female flower (Lundell & Contreras 20754); g. part male flower (Lundell & Cuatrecasas 19138); h. seed (Lundell 12262). i-m. *Pouteria pentamera* - i. habit (Spironello s.n.); j. flower; l. 1/2 flower; m. section of ovary; n. fruit (Oliveira 186).

Flowers greenish-white, the fruit maturing yellow, with clear pulp. Flowering in central Amazonia in July and August.

The Guianas, across the whole of Amazonia to Colombia and Peru, in lowland mixed rainforest on non-flooded land, reaching 800 m altitude.

25.VII.1997 (bd) *Assunção, P. A. C. L. et al.* 568 (INPA K MG MONY R RB SP U); 14.VIII.1997 (fl) *Assunção, P. A. C. L. & Pereira, E. C.* 616 (BM G IAN INPA K MBM UB UEC US); 24.I.1966 (fr) *Rodrigues, W. & Coêlho, D.* 7401 (INPA); 15.III.1966 (fr) *Rodrigues, W. & Coêlho, D.* 7575 (INPA).

Pouteria cladantha is easily recognized by the small oblanceolate or obovate leaves with brochidodromous venation, obscure tertiary venation descending from the margin, and the often compound inflorescence. The leaves dry a characteristic dark brown colour, which is unusual in the family and characteristic in herbarium specimens.

6.20 *Pouteria durlandii* (Standl.) Baehni, *Candollea* 9: 422. 1942; Pennington, T. D., *Fl. Neotrop.* 52: 323, fig. 70. 1990. **Fig. 15 d-h**

Lucuma durlandii Standl. *Trop. Woods* 4: 5. 1925.

Young shoots sparsely appressed pubescent. **Leaves** spirally arranged, 9–17 × 4–7 cm, elliptic or oblanceolate, apex narrowly attenuate, base narrowly attenuate, glabrous; venation eucamptodromous or brochidodromous in the upper half, midrib slightly raised on the upper surface, secondary veins 10–12 pairs, slightly arcuate and slightly convergent, intersecondaries moderate to long, tertiaries forming a coarse reticulum. Petiole 1–2 cm long, not channelled, subglabrous. **Fascicles** 3–10-flowered, axillary and below the leaves. Pedicel 3–5 mm long, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 5, 2.5–3 mm long, appressed puberulous outside, glabrous inside, ciliate. Corolla cyathiform, male *ca.* 4 mm long, female 2.5–3.5 mm long, tube shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous, absent in

female flower. Staminodes 5, 1.25–1.75 mm long, lanceolate-subulate, glabrous. Ovary cushion-shaped in male, ovoid in female, 2-locular, sparsely pubescent, style included. **Fruit** 2–2.5 cm long, ellipsoid to subglobose, apex rounded to acute, base rounded to truncate, smooth, glabrous. **Seed** 1–2, 1.5–2.2 cm long, ellipsoid, sometimes slightly laterally compressed (plano-convex when 2 in a fruit), testa smooth, shining; scar adaxial, full-length, broad, covering about one third of the seed surface. Seed without endosperm.

Field characters: Tree to 25 m high and 60 cm diam., without buttresses, bole sometimes fluted at the base, bark reddish-brown, longitudinally fissured, the ridges exfoliating in rectangular plates, inner bark pinkish, rapidly darkening on exposure to air, with some watery white latex. Flowers pale green or greenish-white, fruit ripening yellow or orange. Flowering in central Amazonia in July and August.

A widely distributed species occurring from southern Mexico through Central America to northern South America and Amazonian slopes of the Andes. In Brazil it is known from central Amazonia and also from along the Atlantic coast. It is a component of seasonal and everwet rainforest and extends up to 800 m altitude in montane forest.

22.VIII.1997 (fl) *Assunção, P. A. C. L. et al.* 623 (INPA K MG MONY R RB SP U); 22.VIII.1997 (fl) *Assunção, P. A. C. L. et al.* 626 (COL F INPA K MG PEUFR SPF UFMT VEN); 22.VIII.1997 (fl) *Assunção, P. A. C. L. et al.* 630 (GH ICN INPA K MG P VIC); 16.II.1998 (fr) *Assunção, P. A. C. L. et al.* 790 (INPA K MG MO NY RB SP U UB); 23.X.1997 (fl) *Martins, L. H. P. et al.* 52 (ACRE GH IAN ICN INPA K S U PCB W); 21.VII.1997 (fl) *Ribeiro, J. E. L. S. et al.* 1904 (BM G IAN INPA K MBM UB UEC US); 21.VIII.1997 (fl) *Ribeiro, J. E. L. S. et al.* 1907 (B GH IAN ICN INPA K P U PCB VIC); 11.I.1998 (fr) *Sothers, C. A. & Assunção, P. A. C. L.* 1085 (INPA).

The venation of this species is similar to that of *P. peruviana*, but they differ in the details of their floral structure, such as the pubescence of the sepals, proportions of corolla tube and lobes, length of staminal filaments.

6.21 *Pouteria pentamera* T. D. Penn., *sp. nov.* (section *Franchetella*). **Type:** Brazil, Amazonas, Distrito Agropecuário, ca. 90 km NE of Manaus, Reserva 1501 (km 41), 2°24'S, 59°43'W, *W. Spironello s.n.* (holotype INPA n.v., isotype K). **Fig. 15 i-m**

P. durlandii affinis sed nervis tertiariis subtiliter reticulatis, ovario 5-loculari, antheris parvis differt.

Arbor; stipulae nullae; folia 10–17.5 × 5–8.5 cm, late elliptica vel oblanceolata; nervi secundarii 10–13-jugi recti paralleli; fasciculi in axillis foliorum delapsorum enati; pedicellus 3–5 mm longus; sepala 5; corolla cyathiformis, 4–4.5 mm longa, lobis 5; stamina 5; staminodia 5; ovarium 5-loculare, pubescens; fructus ca. 4 × 3.5 cm, ovoideus.

Tree. Stipules absent. Young shoots finely appressed puberulous at first, soon glabrous, becoming pale greyish, cracked and scaling. Stipules absent. **Leaves** spirally arranged, 10.5–17.5 × 5–8.5 cm, broadly elliptic to broadly oblanceolate, apex shortly attenuate to rounded, base acute to rounded, glabrous or sometimes with sparse minute appressed hairs on the lower surface; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 10–13 pairs, straight or slightly arcuate, parallel, intersecondaries absent, tertiaries oblique, quaternary reticulum prominent on the lower surface. Petiole 2–4.6 cm long, channelled above, sparsely appressed puberulous. **Fascicles** mostly on twigs below the leaves, 2–5-flowered. Pedicel 3–5 mm long, appressed puberulous. Sepals 5, 3–3.5 mm long, broadly elliptic to oblong, apex obtuse to rounded, appressed puberulous on both surfaces. Corolla cyathiform, 4–4.5 mm long, tube slightly shorter than the lobes, lobes 5, ovate, apex rounded; glabrous. Stamens 5, fixed at the top of the corolla tube, filaments ca. 1 mm long, glabrous, anthers ca. 0.75 mm long, globose. Staminodes 5, ca. 1.5 mm long, narrowly elliptic, acute, fleshy, glabrous. Disk absent. Ovary 5-locular, pulvinate, flat-topped, pubescent; style 1.5–2 mm long, glabrous, included, style head minutely 5-lobed. **Fruit** ca. 4 × 3.5 cm ovoid,

apex obtuse, base truncate, smooth (wrinkled when dry), puberulous. **Seeds** 1-several, ca. 2 cm long, ellipsoid, not or only slightly laterally compressed, testa smooth, ?shining; scar ? 2–3 mm wide, adaxial, full-length. Embryo not seen.

Field characters: Tree to 30 m high and 50 cm diam., unbuttressed. Bole cylindrical, bark dark greyish-brown, scaling in small thick irregular pieces, slash laminated orange-cream, with white latex. Flower with pale green corolla, fruit maturing yellow. Flowering August to October, fruit maturing November to December.

Known only from central Amazonian Brazil, where it occurs in lowland rainforest on non-flooded land. It is a common tree in the PDBFF reserve.

Not yet recorded from Reserva Ducke.

Paratypes: PDBFF: Reserva km 41, *Oliveira et al. 186* (INPA K); *Oliveira et al. 185* (INPA); *Pennington et al. 13019* (INPA K); *Pennington et al. 13170* (INPA K); *Pennington et al. 12973* (INPA K); Reserva 1301 (Fazenda Esteio), 2°23'S, 59°51'W, *da Silva PDBFF 1301.4942.2* (INPA).

Pouteria pentamera has a similar floral size and structure to *P. durlandii* and *P. anteridata* (Venezuela). It differs from *P. durlandii* in having a 5-locular ovary (2-locular in *P. durlandii*) and much smaller anthers. The leaf venation of the two species is also quite different. *Pouteria pentamera* has a fine reticulate higher order venation which is absent in *P. durlandii*. The leaf venation is also quite different from that of *P. anteridata*.

6.22 *Pouteria jariensis* Pires & T. . Penn., *Fl. Neotrop.* 52: 331, fig. 72. 1990. **Fig. 16 d-f**

Young shoots sparsely appressed puberulous. Leaves spirally arranged, 6.5–18 × 3.5–7.5 cm, elliptic, apex acute to narrowly attenuate, base narrowly attenuate or acute, coriaceous, glabrous; venation brochidodromous, midrib raised on the upper surface, secondary veins 9–10 pairs, parallel, arcuate, intersecondaries short or absent, tertiaries few, reticulate and oblique, slightly impressed on both surfaces. Petiole 0.5–2 cm

long, not channelled, glabrous. **Fascicles** axillary and below the leaves, few-flowered. Pedicel 2–3 mm long, appressed puberulous. Sepals 5, 2.5–3 mm long, appressed puberulous outside, glabrous inside, ciliate. Corolla cyathiform, 4–5 mm long, tube about equalling the lobes, lobes 5, ciliate, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous. Staminodes 5, 1–2 mm long, lanceolate, glabrous. Ovary ovoid, 2-locular, pubescent, style included. **Fruit** 2.5–3 cm long, ellipsoid, apex and base obtuse to rounded, smooth, velutinous. **Seeds** 1–2, 1.5–2 cm long, ellipsoid (plano-convex when 2 seeds in a fruit), not laterally compressed, testa smooth, adherent to the pericarp; scar adaxial, full-length, elliptic, 4.5–7 mm wide. Seed without endosperm.

Field characters: Tree to 25 m high and 40 cm diam., with simple buttresses to 1.5 m high, bole often fluted near the base, bark brown, scaling in thin irregular pieces, slash yellowish, with a little watery white latex. Flowers pale greenish-white, fruit ripening yellow or orange. Flowering in central Amazonia in November, fruit maturing March to April.

Not yet recorded from Reserva Ducke. PDBFF: Reserva km 41, *Oliveira et al.* 215 (INPA K); *Alexandro* 336 (INPA K); *Freitas et al.* F-439 (INPA K).

Pouteria jariensis has a closely similar floral structure to *P. durlandii*, but can be easily distinguished from it by the details of its leaf venation, which is uniformly brochidodromous, with the higher order venation impressed on both surfaces.

6.23 *Pouteria pallens* T. D. Penn., Fl. Neotrop. 52: 335, fig. 72. 1990. **Fig. 16 a-c**

Young shoots finely appressed puberulous, soon becoming glabrous. **Leaves** spirally arranged, 15–27 × 7–10.5 cm, broadly elliptic, apex narrowly attenuate to obtuse, base acute to obtuse, glabrous above, sparsely and minutely hairy below, indumentum of stiff closely appressed whitish hairs (visible only with a lens); venation eucampto-dromous or brochidodromous, midrib raised on the upper

surface, secondary veins 10–15 pairs, parallel or slightly convergent, slightly arcuate, slightly raised on the upper surface, intersecondaries absent, tertiaries mostly oblique. Petiole 2–4 cm long, not channelled, sparsely appressed puberulous. **Fascicles** 3–10-flowered, axillary and clustered on twigs below the leaves. Pedicel 3–5 mm long, appressed puberulous. Sepals 5, ca. 4 mm long, ovate, appressed puberulous outside, glabrous inside. Corolla cyathiform, 5.5–6 mm long, tube ca. 2 mm long, lobes 5, ca. 2.5 mm long, ovate, margin truncate; glabrous. Stamens 5, fixed at the top of the corolla tube, anthers 1.75–2 mm long, glabrous. Staminodes 5, ca. 2.25 mm long, lanceolate-subulate, glabrous. Ovary ovoid, 2-locular, appressed puberulous, style ca. 2.25 mm long, glabrous, exerted in bud, equalling the corolla in open flowers. **Fruit** 2.3–3 cm long, ellipsoid, apex and base rounded, smooth, finely puberulous. **Seeds** 1–2, ca. 2 cm long, apex and base obtuse, not laterally compressed, testa smooth, shining; scar adaxial, full-length, ca. 4 mm wide. Seed without endosperm.

Field characters: Tree to 20 m high and 30 cm diam., with the trunk fluted at the base. Bark reddish-brown, scaling in small pieces, slash pink to orange with white latex. Flowers with pale green corolla, fruit maturing greenish. Flowering in central Amazonia from July to October, fruit maturing December to February.

Known only from central and western Brazilian Amazonia where it is a mid-storey component of lowland rainforest on non-flooded sites.

17.XII.1993 (fr) *Assunção, P. A. C. L.* 5 (INPA K MG NY); 22.VIII.1997 (fl) *Assunção, P. A. C. L. et al.* 633 (INPA K MG MONY R RB SP U); 21.VII.1997 (fl) *Ribeiro, J. E. L. S. et al.* 1905 (INPA K MBM MG MONY R RB SP U U).

Pouteria pallens is related to *P. durlandii* and *P. jariensis*, but differs from both in the fine whitish appressed indumentum on the lower leaf surface. It also differs in the detail of the higher order venation.

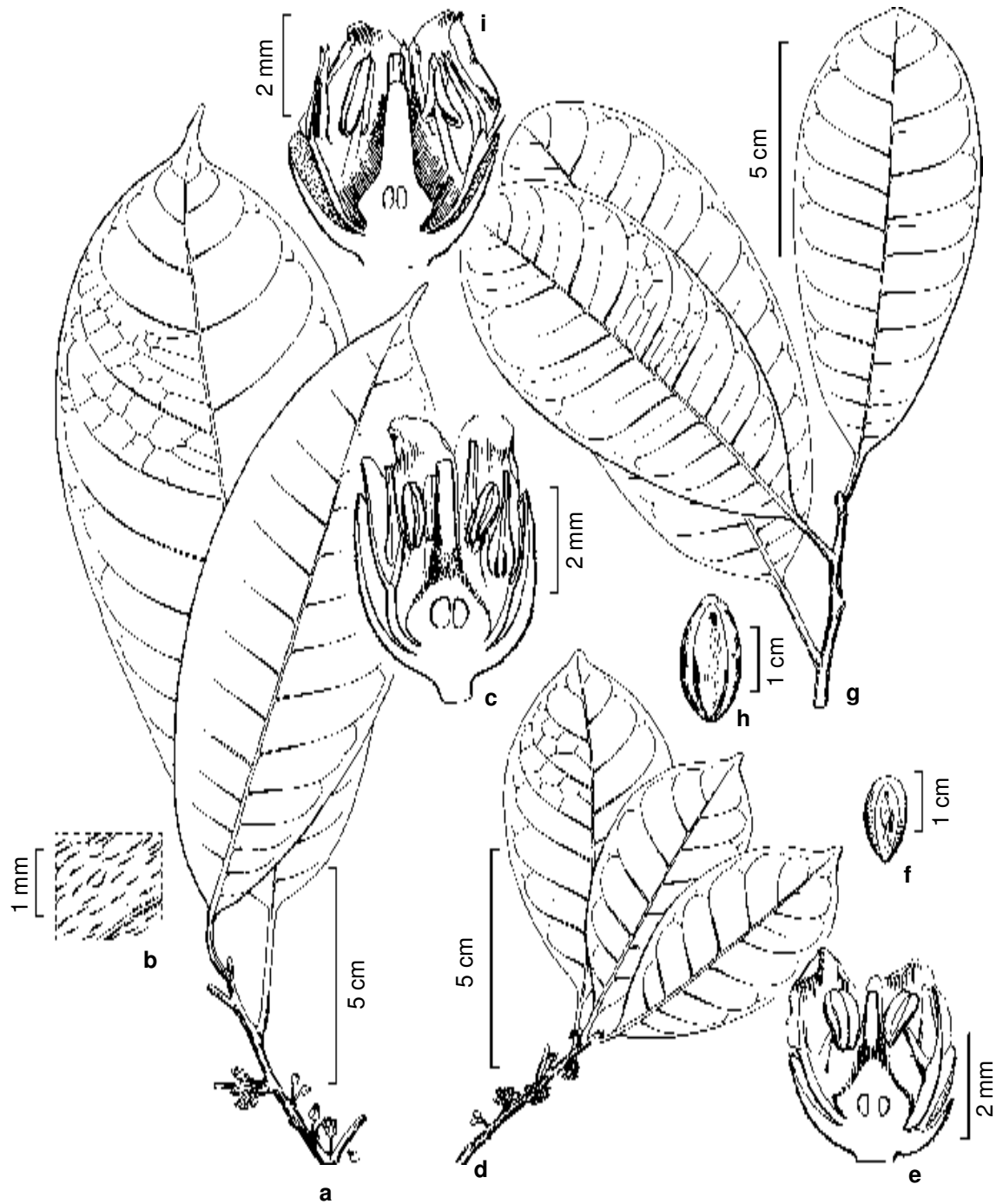


Figura 16 - a-c. *Pouteria pallens* - a. habit; b. detail of leaf indumentum; c. 1/2 flower (Maguire et al. 56671). d-f. *Pouteria jariensis* - d. habit (N. T. Silva 2895); e. 1/2 flower (Daly et al. 1514); f. seed (A. Silva 122). g-i. *Pouteria virescens* - g. habit; h. seed (FDBG 5547); i. 1/2 flower (FDBG 4248).

6.24 *Pouteria virescens* Baehni, Candollea 14: 66. 1952; Pennington, T. D., Fl. Neotrop. 52: 337, fig. 72. 1990. **Fig. 16 g-i**

Young shoots appressed puberulous. **Leaves** spirally arranged, 5.5–11 × 4–5.8 cm, obovate to elliptic, apex rounded or truncate, base obtuse to truncate, coriaceous, sparse appressed indumentum on the lower midrib or glabrous, venation mostly brochidodromous, midrib flat or only slightly raised on the upper surface, secondaries 6–8 pairs, straight or arcuate, parallel or slightly convergent, slightly impressed on the upper surface, intersecondaries moderate to long, tertiaries forming a lax reticulum which is sharply prominent on the lower surface. Petiole 1.5–1.7 cm long, not channelled, appressed puberulous. **Fascicles** axillary and below the leaves, 3–6-flowered. Pedicel 3–4 mm long, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 5, ca. 4 mm long (male), ca. 2.5 mm long (female), appressed puberulous outside. Corolla cyathiform, (male) ca. 5 mm long, tube shorter than the lobes, (female) ca. 3 mm long, tube equalling the lobes, lobes 5, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous, absent in female flower. Staminodes 5, (male) 2.5–3 mm long, (female) ca. 1 mm long, lanceolate-subulate, glabrous. Ovary conical, 2-locular, stiff-pubescent, style included. Fruit 4–5 cm long, ellipsoid to obovoid, apex obtuse to rounded, base truncate, smooth, velutinous. **Seeds** 2, 2.5–3 cm long, ellipsoid, slightly plano-convex, testa smooth, shining, adherent to the pericarp; scar adaxial, full-length, elliptic, ca. 8 mm wide.

Field characters: Tree to 30 m high and 50 cm diam., with buttresses to 2 m high. Bole often fluted. Bark reddish-brown, fissured, the ridges exfoliating in rectangular pieces, slash yellowish, with slow to appear white latex. Flowers yellowish-white and fruit ripening reddish-orange. Flowering in central Amazonia in September and October, the fruit maturing in March. Seed without endosperm.

From the Guianas to central Amazonian Brazil, in mixed rainforest on non-flooded land.

1.X.1957 (st) *Ferreira, E.* 126 (INPA); 19.IX.1997 (fl) *Martins, L. H. P. et al.* 43 (IAN INPA K MONY RB SP U UB); 19.IX.1997 (fl) *Martins, L. H. P. et al.* 49 (GIAN INPA K); 7.III.1996 (fr) *Sothers, C. A. & Assunção, P. A. C. L.* 818 (INPA K MG MONY R RB SP U). PDBFF: Reserva km 41, *Oliveira et al.* 146 (INPA K); *Pennington et al.* 13093 (INPA K).

Pouteria virescens is distinguished from *P. durlandii* and other species with the same floral structure by the rather short, broad leaves with a rounded apex, the very open, lax tertiary venation and the large velutinous fruit.

6.25 *Pouteria williamii* (Aubrév. & Pellegr.) T. D. Penn., Fl. Neotrop. 52: 338, fig. 74. 1990.

Fig. 17 a-d

Eremoloma williamii Aubrév. & Pellegr., Adansonia 1: 169, pl. 8. 1962.

Young shoots subglabrous. **Leaves** spirally arranged, 7–12 × 3.5–6.5 cm, elliptic to obovate, apex rounded to emarginate, base obtuse to narrowly attenuate, coriaceous, glabrous; venation eucamptodromous to brochidodromous, midrib slightly raised on the upper surface, secondary veins 8–10 pairs, parallel, slightly arcuate or straight, rather uneven, intersecondaries moderate to long, tertiaries forming a lax open reticulum. Petiole 5–12 mm long, not channelled, glabrous. **Fascicles** axillary and below the leaves, 3–10-flowered. Pedicel 6–12 mm long, finely appressed puberulous. Sepals 5, 2–3 mm long, finely appressed puberulous outside, shortly ciliate. Corolla cyathiform, 3–4 mm long, tube slightly shorter than the lobes, lobes 5, glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous. Staminodes 5, 0.3–0.5 mm long, subulate, glabrous. Ovary broadly ovoid, 2-locular, densely pubescent with crisped hairs, style included. **Fruit** ca. 4 × 3 cm, ellipsoid, apex acute, base obtuse, smooth, velutinous. **Seed** solitary, ca. 2.3 × 2 cm, broadly ellipsoid, not laterally compressed, testa smooth, matt, adherent to the pericarp; scar adaxial and extending around the base of the seed, very broad, covering more than half the seed surface. Seed without endosperm. **Field characters:** Tree to 20 m high and 40 cm diam., with small concave buttresses, bole fluted, bark dark brown, thin scaling and with

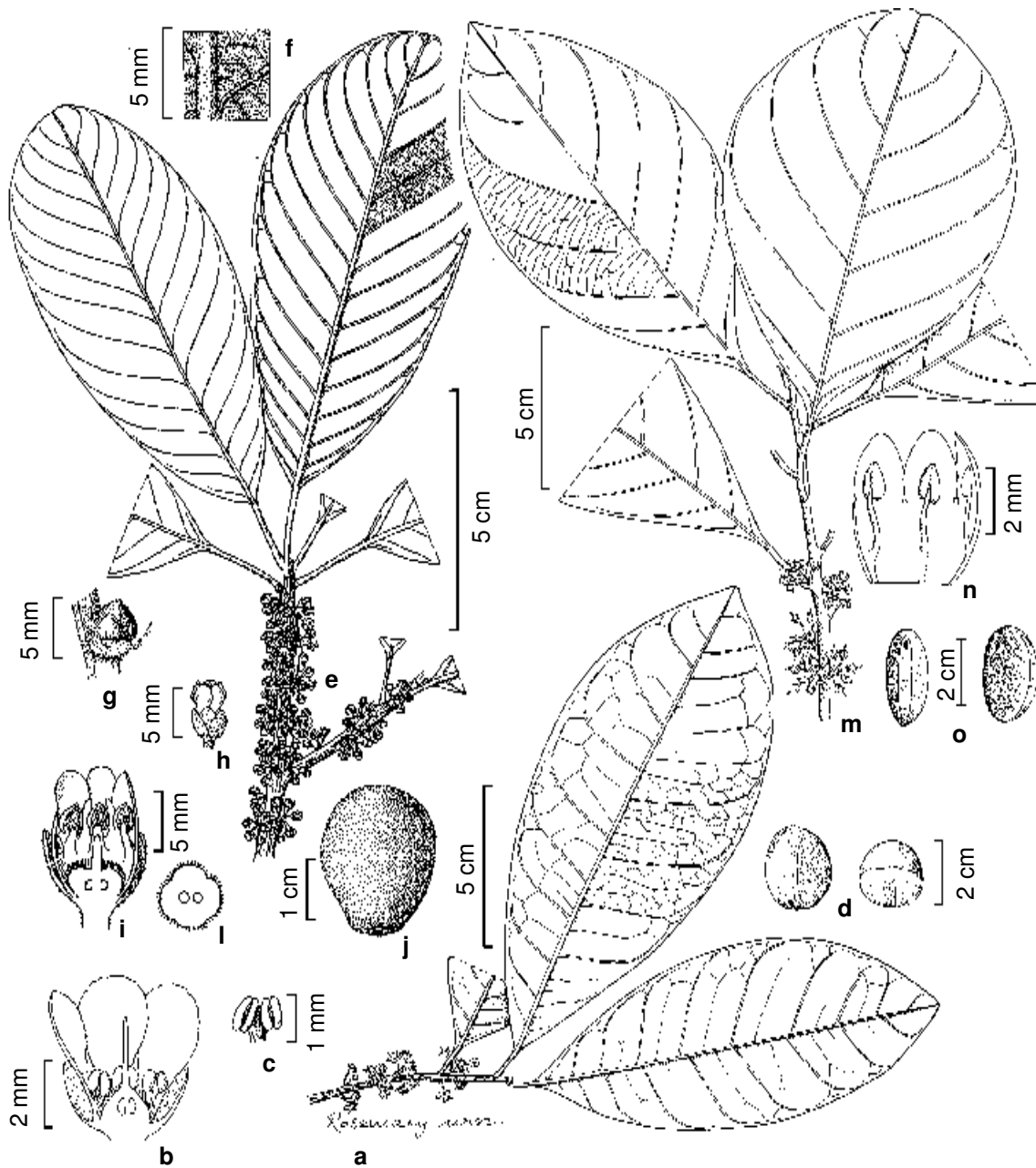


Figura 17 - a-d. *Pouteria williamii* - a. habit; b. flower; c. anther (abaxial view) (Oldeman 1628); d. seed (Grenand 780). e-j. *Pouteria flavilata* - e. habit; f. indumentum on leaf undersurface; g. stipule; h. flower; i. 1/2 flower (Ribeiro 1906); j. fruit; l. section of ovary (Ribeiro 1197). m-o. *Pouteria engleri* - m. habit; n. part corolla (Schultz 7326); o. seed (FDBG 2362).

prominent lenticels in horizontal rows, slash yellowish with sparse translucent yellowish latex. Flowers with pinkish-yellow corolla and fruit covered with golden-brown velvety tomentum. Flowering in central Amazonia in September and October.

The Guianas to central Brazilian Amazonia, in wetter low lying areas of rainforest often near streams.

26.IX.1957 (fl) *Ferreira, E. 108* (INPA); 28.X.1994 (bd) *Sothers, C. A. & Silva, C. F. da 253* (INPA K MG MONY RRB SPU); 2.XII.1997 (fr) *Souza, M. A. D. de et al. 477* (IAN INPA K MONY RB SPU UB).

The leaf morphology of this species is similar to that of *P. virescens*, except that the secondary veins are uneven (not straight). They differ in the fine details of floral morphology, for example the staminodes of *P. williamii* are much smaller than those of *P. virescens* and the anther structure is quite different. The seed and seed scar of *P. williamii* are broader than those of *P. virescens*.

6.26 *Pouteria flavilata* T. D. Penn., *sp. nov.* (section *Franchetella*). **Type:** Brazil, Amazonas, Manaus- Itacoatiara, km 26, Reserva Ducke, August 1997, fl., *J.E.L.S. Ribeiro et al. 1906* (holotype INPA, isotype K). **Fig. 17 i-j**

P. durlandii et *P. williamii* *affinis sed latice cortici flavo, stipulis parvis et foliorum pagina inferiore adpresse sericea, pilis chrysobrunneis differt.*

Arbor; stipulae ca. 3 mm longae, ovatae; folia 9–15 × 4–6.8 cm, late oblanceolata; nervi secundarii 13–15-jugi recti paralleli; fasciculi in axillis foliorum delapsorum enati; pedicellus 3–5 mm longus; sepala 5; corolla cyathiformis, 4–4.5 mm longa, lobis 5; stamina 5; staminodia 5; ovarium 2-loculare; fructus 4–4.5 cm longus, ovoideus.

Tree. Young shoots appressed puberulous with golden-brown indumentum, soon glabrous, pale grey. Stipules *ca.* 3 mm long, ovate, appressed puberulous, caducous. **Leaves** spirally arranged, 9–15 × 4–6.8 cm, broadly

oblanceolate, apex obtuse or rounded, base acute, upper surface glabrous, lower surface finely golden-brown-sericeous; venation eucamptodromous, midrib slightly sunken on the upper surface, secondary veins 13–15 pairs, straight, ascending, parallel, intersecondaries absent, tertiaries oblique, parallel. Petiole 1.5–2.2 cm long, not or only slightly channelled at the apex, appressed puberulous. **Fascicles** 5–10-flowered densely clustered on twigs below the leaves. Pedicel 3–5 mm long, appressed puberulous. Sepals 5, 2.5–3 mm long, ovate to suborbicular, appressed puberulous on both surfaces. Corolla cyathiform, 4–4.5 mm long, tube about equalling the lobes, lobes 5, ovate to broadly oblong, apex rounded, not ciliate, glabrous. Stamens 5, fixed in the upper half of the corolla tube, filaments stout, 0.75–1 mm long, glabrous, anthers 0.7–1.2 mm long, broadly ovate and flattened dorso-ventrally, glabrous. Staminodes 5, 1.2–2 mm long, lanceolate-subulate, glabrous. Disk absent. Ovary 2-locular, pulvinate, densely pubescent, style *ca.* 1 mm long, glabrous, included, style-head simple. **Fruit** 4–4.5 cm long, obovoid, base obtuse or rounded, base truncate, smooth, shortly velutinous. **Seeds** 1–several, *ca.* 2.3 cm long, ellipsoid, not laterally compressed, testa rough, not shining, adherent to the pericarp; scar adaxial, full-length, *ca.* 1 cm wide. Embryo with plano-convex cotyledons, radicle extending to the surface; endosperm absent.

Field characters: Tree to 30 m high and 65 cm diam., with plank buttresses to 1 m high, lower part of bole often fluted, cylindrical above. Bark brown, scaling in small thin, irregular pieces, slash pinkish-brown, with yellow latex. Flowers scented, with green calyx, corolla reddish-pink, the lobes with white margins. Fruit brown (dry). Flowering has been recorded in August and November, and mature fruit collected in February.

So far known only from Pará and central Amazonia, Brazil, where it is a canopy tree of non-flooded lowland rainforest.

Paratypes: 22.VIII.1997 (bd) *Assunção, P. A. C. L. et al. 627* (K); 9.II.1994 (fr) *Ribeiro, J. E. L. S. et al. 1197* (INPA K MG MONY RB SP); 21.VIII.1997 (fl)

Ribeiro, J. E. L. S. et al. 1906 (K); 21.VIII.1997 (bd)
Ribeiro, J. E. L. S. et al. 1909 (K).

Pouteria flavilata is placed in the group of species containing *P. durlandii*, *P. jariensis*, *P. virescens* and *P. williamii*, all of which share a similar floral structure and broad seed scar. *Pouteria flavilata* is closest to *P. williamii* in floral size. It is easily distinguished from all these species, however, both in the field and herbarium, by the presence of yellow latex in the slash, the presence of small caducous stipules and by the golden brown appressed indumentum on the lower leaf surface. *Pouteria flavilata* is one of the few species of *Pouteria* with a red corolla.

6.27 *Pouteria engleri* Eyma, Recueil Trav. Bot. Néerl. 33: 178. 1936; Pennington, T. D., Fl. Neotrop. 52: 343. 1990. **Fig. 17 l-n**

Young shoots finely appressed puberulous at first, soon glabrous. **Leaves** spirally arranged, 10–12 × 3.5–7 cm, elliptic to obovate, apex shortly attenuate, acute or rounded, base narrowly attenuate, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 6–8 pairs, strongly arcuate, convergent, intersecondaries mostly absent; tertiaries oblique to perpendicular. Petiole 0.6–1.5 cm long, not channelled, appressed puberulous to glabrous. **Fascicles** axillary and below the leaves, 10–20-flowered. Pedicel 3–8 mm long, finely appressed puberulous. Sepals 5, 2–2.5 mm long, sparsely appressed puberulous outside, sericeous inside, ciliate. Corolla shortly tubular, 3.5–4 mm long, tube equalling or exceeding the lobes, lobes 5, glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous. **Staminodes** 0–5, minute, glabrous. Ovary conical, gradually tapering into the style, 5-locular, densely pubescent, style exerted (and elongating further after the corolla falls). **Fruit** 2–2.5 cm long, ellipsoid, apex and base rounded, fleshy (shrinking on drying), smooth, glabrous. **Seed** solitary, 1.8–2 cm long, ellipsoid, slightly laterally compressed, testa shining, slightly wrinkled; scar adaxial, full-length, ca. 2 mm wide. Seed without endosperm.

Field characters: Tree to 40 m high and 1 m diam., with simple or branched buttresses to 2 m high, bole cylindrical, bark reddish-brown to greyish-brown, shallowly fissured or scaling, sometimes with lenticels in vertical rows, slash orange-brown, with scarce white latex. Flowers greenish-white, fruit maturing orange-yellow, the seeds surrounded by soft sweet pulp. Flowering in central Amazonia in September and October.

From the Guianas to central and eastern Brazilian Amazonia, in lowland forest on non-flooded land. In Reserva Ducke it also occurs in wetter areas in the 'floresta de baixio'.

6.III.1964 (fr) Rodrigues, W. & Monteiro, O. P. 5727 (INPA); 18.X.1995 (fl) Vicentini, A. & Silva, C. F. 1086 (INPA K MG MONY RB SP).

Pouteria engleri is characterized by the relatively broad leaves which usually dry blackish, with few secondary veins, and by the sepals which are sericeous on the inner face and the exerted style. The flowers often lack staminodes, a feature it shares with *P. anomala*.

6.28 *Pouteria styliifera* T. D. Penn., *sp. nov.* (section *Franchetella*). **Type:** Brazil, Amazonas, road Manaus to Caracaraí, km 57, September 1977, fl., C. Damião & A. Mota 675 (holotype INPA). **Fig. 18 a-e**

P. engleri affinis sed foliis parvis, anguste ellipticis vel oblanceolatis, apice attenuato, et floribus diminutis differt.

Arbor; stipulae nullae; folia 3.7–7 × 1.6–3 cm, elliptica vel oblanceolata; nervi secundarii 9–10-jugi, arcuati, convergentes; fasciculi axillares et in axillis foliorum delapsorum enati; pedicellus 2–3 mm longus; sepala 5; corolla tubularis, ca. 3 mm longa, lobis 5; stamina 5; staminodia nulla; ovarium 5-loculare; fructus (leviter immaturus) ca. 1.5 cm longus.

Tree. Stipules absent. Young shoots finely appressed puberulous with golden hairs, becoming glabrous, greyish, smooth and lenticellate. Stipules absent. **Leaves** spirally arranged, 3.7–7 × 1.6–3 cm, elliptic or oblanceolate, apex narrowly attenuate, less frequently acute, base narrowly attenuate,

glabrous; venation eucamptodromous, midrib raised on the upper surface (rounded in section), secondary veins 9–10 pairs, arcuate, convergent, intersecondaries few, moderately long, or absent, tertiaries reticulate, obscure. Petiole 3–4 mm long, not channelled, glabrous. **Fascicles** 5–20-flowered, axillary and densely clustered below the leaves. Pedicel 2–3 mm long, sparsely appressed puberulous. Sepals 5, 1–1.5 mm long, ovate to suborbicular, apex obtuse to rounded, sparsely puberulous outside, sericeous inside. Corolla *ca.* 3 mm long, tubular, tube slightly exceeding the lobes, lobes 5, margin rounded or truncate, glabrous. Stamens 5, fixed about halfway up the corolla tube, filaments 1–1.5 mm long, glabrous, anthers *ca.* 0.5 mm long, ovate, glabrous. Staminodes absent. Disk absent. Ovary 5-locular, globose, *ca.* 1 mm diam., densely pubescent, style tapering from base to apex, *ca.* 3 mm long, exerted in bud and long exerted in open flower, glabrous, style-head minutely lobed. **Fruit** *ca.* 3 cm long, ellipsoid, apex obtuse with persistent style base, base obtuse, smooth, leathery-fleshy, glabrous, shining. **Seed** solitary, *ca.* 2.2 cm long, laterally compressed, apex and base acute, testa rough and slightly verrucose; scar adaxial, full length, *ca.* 4 mm wide. Embryo not seen.

Field characters: Tree to 30 m high and 70 cm diam. with small concave buttresses, bole fluted at the base, cylindrical above. Bark slightly dipped near the base, otherwise smooth, dark brown, slash with some white latex. Flowers yellowish-green, young fruit green, with copious sticky white latex. Flowering June to September, immature fruit in November.

So far known only from collections in central Amazonian Brazil in the region of Manaus. It is frequent in the forests of the PDBFF Reserves north of Manaus. The species is recorded only from non-flooded forest.

Not recorded from Reserva Ducke.

Paratypes: PDBFF: Fazenda Dimona, *Kukle 67* (K); *Pereira et al. s.n. PDBFF2303.2966* (INPA); *da Silva s.n. PDBFF2303.1381.2* (INPA); Reserva km 41, *Freitas F-459* (INPA K).

Pouteria stylifera is close to *P. engleri* and shares with it the lack of floral staminodes. The new species is well characterized by the very small narrowly elliptic or oblanceolate leaves with an attenuate apex. The leaves have more secondary veins than *P. engleri*, and the flowers are much smaller, with the distinctive tapered style about 3 times the length of the ovary. It also differs from *P. engleri* in its rough, verrucose seed.

6.29 *Pouteria anomala* (Pires) T. D. Penn., Fl. Neotrop. 52: 344. 1990. Fig. 18 f-h

Chrysophyllum anomalum Pires, Bol. Técn. Inst. Agron. N. 38: 34. 1960.

Young shoots finely and sparsely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 7–10 × 2–4 cm, narrowly elliptic, less frequently oblong, apex narrowly attenuate to acuminate, base narrowly attenuate, glabrous; venation brochidodromous with a strong submarginal vein, midrib slightly raised on the upper surface, secondary veins 15–20 pairs, parallel, slightly arcuate, intersecondaries numerous, long, often extending to near the margin, tertiaries reticulate and tending to perpendicular. Petiole 5–7 mm, not or only slightly channelled, subglabrous. **Fascicles** axillary and below the leaves, 3–10-flowered. Pedicel 4–6 mm long, sparsely appressed puberulous. Sepals 5, *ca.* 2 mm long, subglabrous outside, sericeous inside, inner ones ciliate. Corolla shortly tubular, 3–3.5 mm long, tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous. Staminodes absent. Ovary gradually tapering into the style, 3–5-locular, appressed puberulous, style exerted. **Fruit** 2–3-cm long, globose or ellipsoid, rounded at base and apex, smooth, glabrous. **Seed** solitary, 1.8–2 cm long, broadly ellipsoid, testa smooth, shining; scar adaxial, full-length, 5–9 mm wide. Seed without endosperm.

Field characters: Tree to 35 m high and 70 cm diam., with branched, slightly convex buttresses to 2 m high, bole cylindrical, bark greyish-brown, finely vertically cracked, slash orange to reddish-brown, granular, with sticky

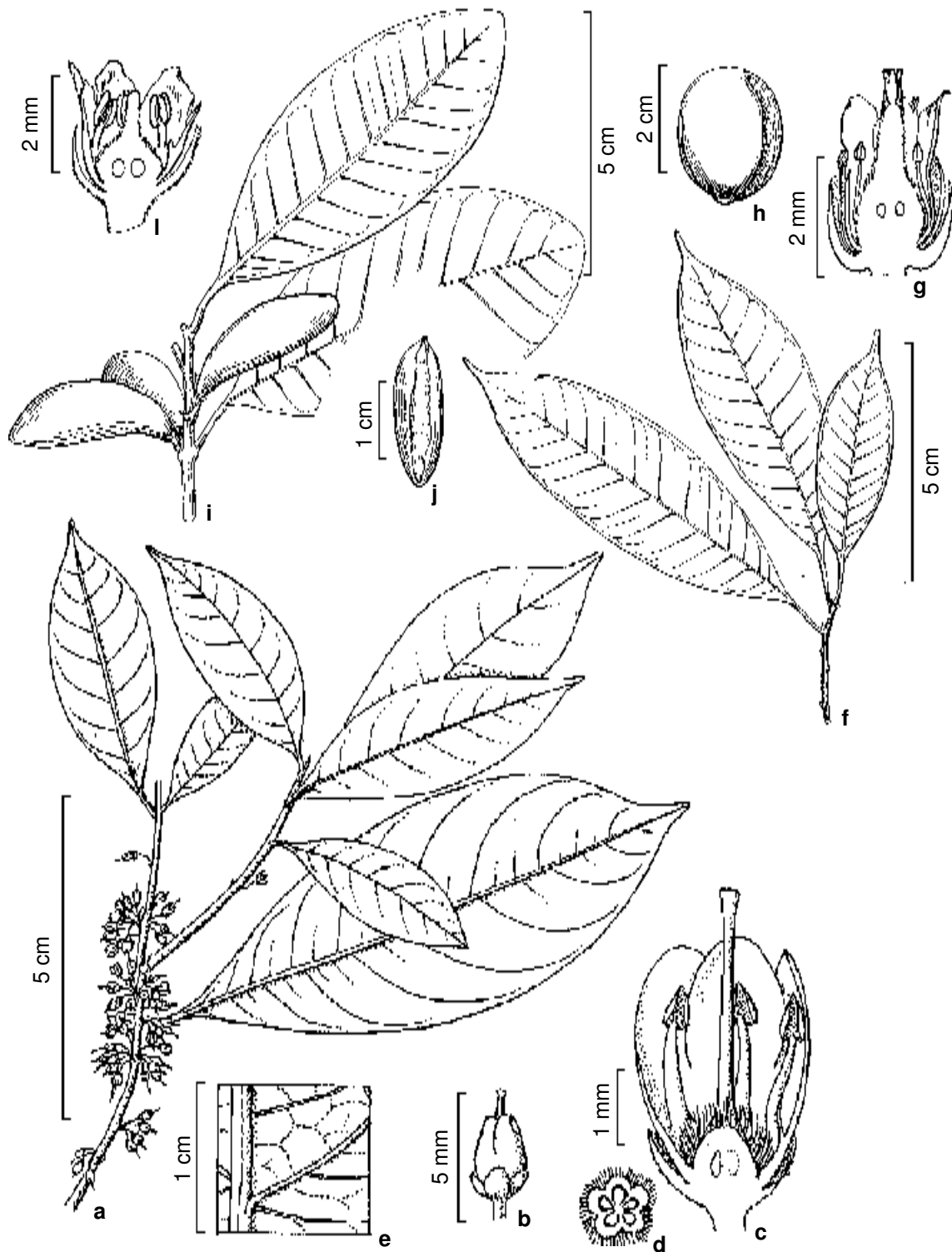


Figura 18 - a-e. *Pouteria styliifera* - a. habit; b. flower; c. 1/2 flower; d. ovary; e. leaf undersurface (da Silva s.n. tree number 2305.1381.2). f-h. *Pouteria anomala* - f. habit (Rodrigues & Coelho 7586); g. 1/2 flower (Lissott 75/77); h. seed (Moore 58). i-l. *Pouteria elegans* - i. habit; j. seed (Maguire & Wurdack 34994); l. 1/2 flower (Frões 263).

white latex. Flowers greenish-white, fruit ripening reddish. Flowering in central Amazonia in October.

From southern Venezuela to central Amazonia and Pará, in lowland forest on non-flooded land.

31.X.1997 (fl) *Ribeiro, J. E. L. S. & Pereira, E. da C. 1943* (BM G IAN INPA K MBM UB UEC US); 29.XII.1965 (fr) *Rodrigues, W. & Monteiro, O. P. 7376* (INPA); 17.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7586* (INPA); 4.X.1995 (fl) *Sothers, C. A. et al. 598* (INPA K MG MO NY RB SP U); 16.XII.1997 (fr) *Sothers, C. A. & Pereira, E. C. 1068* (INPA K MG MONY RB SPU UB).

PDBFF: *Kukle 99* (K); *da Silva s.n. PDBFF 2303.3306.2*.

This species is easily recognized by the rather slender leaves with brochidodromous venation, numerous parallel secondary veins and a conspicuous submarginal vein. The floral structure is close to that of *P. engleri*, and it shares with this species the lack of staminodes and the long exerted style.

Section *Oxythece* (Miq.) Eyma

6.30 *Pouteria elegans* (A.DC.) Baehni, *Candollea* 9: 197. 1942; Pennington, T. D., *Fl. Neotrop.* 52: 346, fig. 75. 1990. **Fig. 18 i-l**

Sideroxylon elegans A.DC. in DC., *Prodr.* 8: 183. 1844.

Young shoots minutely appressed puberulous at first, soon glabrous. **Leaves** spirally arranged, 8.5–17.5 × 2.5–6 cm, elliptic or broadly oblong, apex obtuse to rounded, base narrowly attenuate to obtuse, coriaceous, greyish-glaucous below, glabrous or with sparse minute pale appressed hairs in the lower surface; venation obscure, brochidodromous, sometimes with a submarginal vein, midrib sunken on the upper surface, secondary veins 15–22 pairs, straight, parallel, sometimes slightly impressed on the upper surface, intersecondaries long, often extending to the margin, tertiaries few, parallel to the secondaries. Petiole 1–2 cm long, slightly channelled, glabrous. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 7–9 mm long with scattered minute appressed hairs. **Flowers** unisexual (plant dioecious).

Sepals 5, 2–3 mm long, with scattered minute appressed hairs outside, glabrous inside. Corolla cyathiform to shortly tubular, 2.5–3.5 mm long, tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous; anthers absent in female flowers. Staminodes 0–2, usually rudimentary, glabrous. Ovary ovoid or flattened, 2-locular pubescent, style included. **Fruit** 3–3.5 cm long, narrowly oblong or ellipsoid, apex acute to narrowly attenuate, base rounded to tapered, smooth, appressed puberulous with golden-brown hairs. **Seed** solitary, 2–3 cm long, narrowly oblong or ellipsoid, not laterally compressed, testa smooth, pale, shining; scar adaxial, full-length, 1–4 mm wide. Seed without endosperm.

Field characters: Tree to 20 m high and 35 cm diam., with brown fissured bark and copious sticky white latex. Flowers scented, greenish-white, fruit maturing greenish-brown. Flowering in central Amazonia August to October, fruit maturing April to May.

Throughout the drainage of the Amazon from Pará to southern Venezuela and Colombia. A common riverside tree, usually found in periodically or permanently flooded forest (in both black and white water) also occasionally from savanna.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus, Rio Tarumã-Mirim, *Ferreira 226* (K); Manaus, Rio Tarumã-Açú, *Nelson 1258* (K); Rio Cuieiras, *Mori & Gracie 19264* (K).

This species is close to *P. cuspidata* but may be distinguished from it by the rounded leaf apex (acute to attenuate in *P. cuspidata*), sunken midrib (midrib raised in *P. cuspidata*) and slender fruit with acute or attenuate apex (fruit broader, apex rounded in *P. cuspidata*).

6.31 *Pouteria cuspidata* (A. DC.) Baehni, *Candollea* 9: 231. 1942; Pennington, T. D., *Fl. Neotrop.* 52: 349, fig. 75. 1990.

Sideroxylon cuspidatum A. DC. in DC., *Prodr.* 8: 183. 1844.

Young shoots minutely appressed puberulous at first, soon glabrous. **Leaves**

spirally arranged, 5–13.5 × 2.5–6 cm, elliptic to oblanceolate, apex usually acute to attenuate, base narrowly attenuate, usually coriaceous, upper surface glabrous, lower surface sometimes glaucous, with closely appressed pale or golden indumentum or glabrous; venation obscure, brochidodromous, sometimes with a submarginal vein, midrib slightly raised on the upper surface, secondary veins 15–20 pairs, straight, parallel, usually slightly impressed on both surfaces, intersecondaries long, often extending to near the margin, tertiaries obscure, parallel to the secondaries. Petiole 0.5–1.5 cm long, not channelled, subglabrous. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 5–7 mm long, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 5, 2–2.5 mm long, sparsely and minutely

appressed puberulous outside, glabrous inside. Corolla cyathiform or shortly tubular, 3–3.5 mm long, tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed near the top of the corolla tube, glabrous, absent in female flowers. Staminodes 0–3, usually vestigial, glabrous. Ovary truncate or conical, 2-locular, shortly pubescent, style included. **Fruit** 2–3 cm long, ellipsoid or obovoid, apex rounded, base acute, smooth, with residual appressed indumentum. **Seed** solitary, 1.2–2.5 cm long, ellipsoid, laterally compressed, testa smooth, shining; scar adaxial, full-length and sometimes extending around the base of the seed, 1–3 mm wide. Seed without endosperm.

Panama, across northern South America to Goiás and Mato Grosso, Brazil.

Key to the subspecies of *Pouteria cuspidata*

1. Leaves 7–13.5 cm long, lower surface glaucous and glabrous, secondary veins not impressed on the lower surface 31a. *P. cuspidata* subsp. *cuspidata*
1. Leaves 5–8 cm long, lower surface not glaucous, often with appressed golden-brown indumentum, secondary veins usually slightly impressed on both surfaces 31b. *P. cuspidata* subsp. *dura*

6.31a *Pouteria cuspidata* (A. DC.) Baehni subsp. *cuspidata*; Pennington, T. D., Fl. Neotrop. 52: 350, fig. 75. 1990. **Fig. 19 a-d**
Field characters: Tree to 30 m high and 60 cm diam., with slender buttresses to 1.5 m high, bole fluted, bark smooth or granular, pale greyish brown, slash pinkish with white latex. Flowers scented, pale greenish-white, fruit ripening yellowish-green to orange. Flowering in central Amazonia September to November, fruit maturing March to April.

Colombia, Venezuela and the Guianas to Amazonian Brazil, Peru and Bolivia. Usually along riversides, near waterfalls or in periodically or permanently flooded forest.

Tree number 667 (INPA).

AMAZONAS: Manaus, Ponta Negra, *Ducke 1743* (K); Rio Negro, above Camanaus, *Prance et al. 16023* (K).

6.31b *Pouteria cuspidata* (A. DC.) Baehni subsp. *dura* (Eyma) T. D. Penn., Fl. Neotrop. 52: 352, fig. 75. 1990. **Fig. 19 e**

Pouteria dura Eyma, Recueil Trav. Bot. Néérl. 33: 187. 1936.

Field characters: Tree to 30 m high and 50 cm diam., with small buttresses to 1 m high. Bole cylindrical, bark smooth or finely cracked, slash orange-brown, with cream or white latex, sometimes smelling of almonds. Flowers greenish-white, scented, fruit maturing yellowish, with some brown indumentum. Flowering in central Amazonia from June to September, fruit maturing in February and March.

Panama across northern South America to the Guianas, and south across Amazonia to Peru. A plant of rainforest on non-flooded sites, ascending to 1250 m altitude.

1.X.1997 (fl) *Assunção, P. A. C. L. et al. 686* (BM G INPA K MBM MG UB UEC US); 29.IX.1994 (fl)

Hopkins, M. J. G. et al. 1490 (G IAN INPA K MBM MOR RB U); 24.XI.1994 (fr) Nascimento, J. R. et al. 662 (INPA K MG NY SP); 29.VI.1993 (bd) Ribeiro, J. E. L. S. et al. 924 (INPA K MG NY SP); 15.IV.1966 (fr) Rodrigues, W. & Coêlho, D. 7680 (INPA); 5.X.1994 (fl) Sothers, C. A. et al. 200 (IAN INPA K MONY RB SP U); 4.II.1995 (fr) Vicentini, A. et al. 849 (G IAN INPA K MBM R U UB US); 15.III.1995 (fr) Vicentini, A. & Pereira, E. C. 906 (INPA K MG MONY RB SP).

Subspecies *dura* varies widely in the amount of indumentum present on the lower leaf surface, some specimens having a uniform pubescence of golden brown appressed hairs, other being quite glabrous.

Note: Assunção et al. 629 and Vicentini et al. 445, both collections of tagged tree number 917, which has leaves measuring ca. 5 × 2 cm and small subglabrous flowers may represent a distinct taxon. The fruit and seed are however typical for *P. cuspidata*, and with only a single flowering collection, I hesitate to describe it.

6.32 *Pouteria opposita* (Ducke) T. D. Penn., Fl. Neotrop. 52: 361, fig. 78. 1990.

Fig. 19 f-j

Glycoxylon oppositum Ducke, Arch. Inst. Biol. Veg. Rio de Janeiro 2: 68. 1935.

Young shoots finely appressed puberulous with golden-brown hairs, soon glabrous. **Leaves** opposite, 10–20 × 7–9 cm, obovate to broadly oblong, apex rounded or emarginate, base acute to narrowly attenuate, coriaceous, glabrous above, closely and finely appressed puberulous with golden hairs (lens) below; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 10–13 pairs, parallel, slightly arcuate, intersecondaries usually absent, tertiaries obscure, mostly perpendicular. Petiole 1.5–3 cm long, not channelled, finely appressed puberulous to glabrous. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 3–6 mm long, appressed puberulous. Sepals 5–6, ca. 3 mm long, appressed puberulous. Corolla

broadly cyathiform, ca. 4 mm long, tube about equalling the lobes, lobes 7–9, glabrous. Stamens 7–9, fixed near the top of the corolla tube, glabrous. Staminodes 0–1, ca. 1 mm long, glabrous. Ovary ovoid, 2-locular, pubescent, style included. **Fruit** 3–4.5 cm long, broadly ellipsoid, apex rounded, base obtuse to truncate, smooth, with some fine appressed indumentum, becoming glabrous. **Seeds** 1–2, 2–3 cm long, ellipsoid, slightly laterally compressed and with an abaxial keel, testa smooth, shining; scar adaxial, extending for about 3/4 the length of the seed or full length, 4–7 mm wide. Seed without endosperm.

Field characters: Tree to 25 m high and 40 cm diam. with small simple slightly concave buttresses. Bole fluted at the base, usually cylindrical above. Bark dark brown, slightly scaling, slash reddish or brown with copious white latex. Flowers yellowish-green, fruit ripening orange-yellow. The ripe fruit is sweet and edible.

Amazon basin from Pará in Brazil to Peru, a species of non-flooded rainforest up to 800 m altitude in Peru.

Local name: Caramuri.

21.IX.1997 (fl) Assunção, P. A. C. L. et al. 667 (BM G INPA K MBM MG UB UEC US); 21.IX.1997 (fl) Assunção, P. A. C. L. et al. 674 (INPA K MG MO NY RB SP U); 27.II.1998 (fr) Assunção, P. A. C. L. et al. 802 (INPA K MG NY); 23.X.1957 (fl) Ferreira, E. 159 (INPA); 19.IX.1997 (fl) Martins, L. H. P. et al. 45 (COL F IAN INPA K PEUFR SPF UFMT VEN); 12.VI.1976 (fr) Mello, F. & Ramos, J. F. INPA55207 (INPA); 13.II.1976 (fr) Mello, F. & Ramos, J. F. INPA55215 (INPA); 4.III.1976 (fr) Mello, F. INPA55339 (INPA); 19.II.1966 (fr) Rodrigues, W. & Coêlho, D. 7516 (INPA); 4.III.1966 (fr) Rodrigues, W. & Coêlho, D. 7534 (INPA).

The only species of *Pouteria* in central Amazonia with opposite leaves. Most closely related to *P. ambelaniifolia* which has spirally arranged leaves and different venation and fewer puberulous corolla lobes.

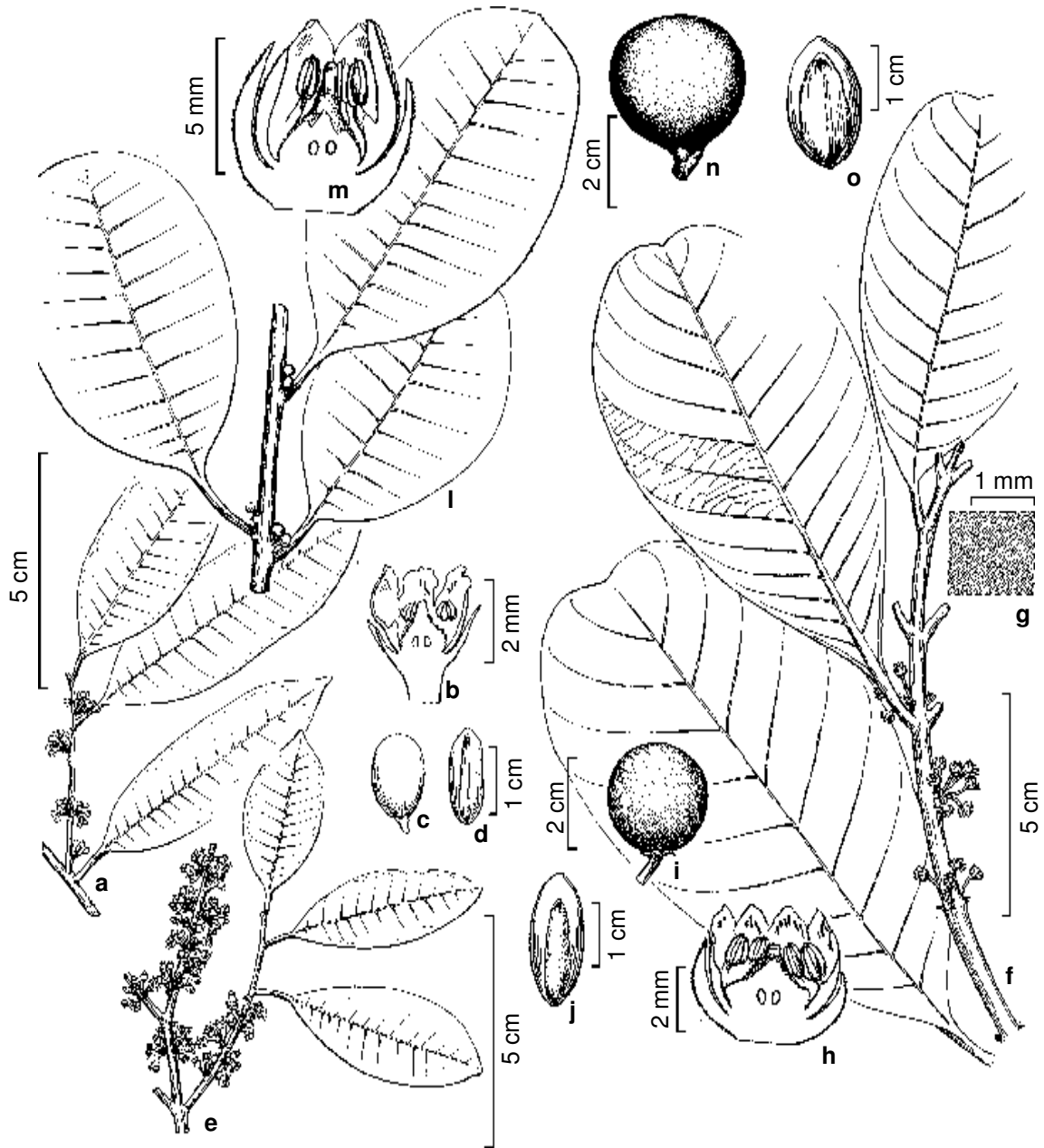


Figura 19 - a-d. *Pouteria cuspidata* subsp. *cuspidata* - a. habit (Campbell et al. P22356); b. 1/2 flower (Sandwith 448); c. fruit (Jenman 2359); d. seed (Anderson 12093). e. *Pouteria cuspidata* subsp. *dura* - e. habit (Schulz 7327). f-j. *Pouteria opposita* - f. habit; g. detail of indumentum; h. 1/2 flower (Schunke 10878); i. fruit; j. seed (Rodrigues & Coêlho 7516). l-o. *Pouteria ambelaniifolia* - l. habit (Mori et al. 8220); m. 1/2 flower (Tillett & Tillett 45518); n. fruit; o. seed (Marcano-Berti 217).

6.33 *Pouteria ambelaniifolia* (Sandwith) T. D. Penn., Fl. Neotrop. 52: 362, fig. 78. 1990.

Fig. 19 l-o

Chrysophyllum ambelaniifolium
Sandwith, Bull. Misc. Inform. 1931: 476. 1931.

Young shoots finely appressed puberulous with pale hairs, soon glabrous. **Leaves** spirally arranged, 11–17 × 5–7 cm, mostly broadly oblong, apex rounded or truncate, base shortly narrowly attenuate, coriaceous, glabrous or sometimes the lower surface with sparse minute pale appressed hairs (lens); lower surface often glaucous; venation mostly eucamptodromous, sometimes brochidodromous near the apex, midrib slightly raised on the upper surface, secondary veins 11–13 pairs, parallel, straight or slightly arcuate, intersecondaries moderate to long, tertiaries obscure, more or less parallel to the secondaries and often descending from the margin. Petiole 2–3 cm long, not channelled, subglabrous. **Fascicles** 2–7-flowered, axillary and below the leaves. Pedicel 4–5 mm long, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 5, 5–6 mm long, appressed puberulous outside, scattered appressed hairs inside. Corolla shortly tubular, 5.5–6.5 mm long, tube much longer than the lobes, lobes 5, appressed puberulous on the tube, lobes glabrous. Stamens 5, fixed in the lower half of the corolla tube, glabrous, absent in female flower. Staminodes absent. Ovary ovoid, 2–4-locular, appressed puberulous, style included. **Fruit** 3–3.2 cm long, globose (sometimes oblate when immature) rounded at apex and base, smooth, finely appressed puberulous. **Seeds** 1–2, ca. 2 cm long ellipsoid, slightly laterally compressed, testa smooth, shining; scar adaxial, almost full-length, ca. 9 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 60 cm diam., with simple or branched buttresses to 1 m high. Bole cylindrical, bark greyish, scaling irregularly, slash pinkish with plentiful white latex. Flowers pale greenish-brown, fruit maturing yellowish. Flowering in central Amazonia in September, fruit maturing February to March.

Venezuela and the Guianas to central Brazilian Amazonia in lowland rainforest on non-flooded sites.

22.VIII.1997 (fr) Assunção, P. A. C. L. et al. 625 (INPA K MG MO NY R RB SP U); 6.V.1997 (fl) Ribeiro, J. E. L. S. & Pereira, E. C. 1895 (INPA K MG MO NY R RB SP U).

PDBFF: *Alexandro* 327 (INPA K); Brazil, Amazonas, Manaus-Caracarái km 14, *Rodrigues & Coêlho* 2504 (INPA K).

The two collections from Reserva Ducke (cited above) which are both from the same tree, differ significantly in floral structure from typical *P. ambelaniifolia*. Their flowers are half the size, have a glabrous corolla, and stamens attached near the top of the corolla tube, and therefore resemble much more closely those of *P. opposita*, except that they have only 5 corolla lobes and stamens (7–9 in *P. opposita*). In respect of leaf morphology and fruit they agree with *P. ambelaniifolia*. One other collection from the Manaus area (*da Silva s.n. PDBFF2303.17903.2*) represents the same taxon. Further collections may show it to be distinct from both *P. ambelaniifolia* and *P. opposita*.

Section *Oligothea* (A. DC.) Baehni

6.34 *Pouteria tarumanensis* Pires, Bol. Técn. Inst. Agron. N. 38: 37, tabs. 11, a, b, c, d, 20. 1960; Pennington, T. D., Fl. Neotrop. 52: 368, fig. 80. 1990.

Fig. 20 a

Young shoots subglabrous. **Leaves** spirally arranged, 15–22 × 5–8 cm, elliptic to oblanceolate, apex acute or obtuse, base narrowly attenuate, coriaceous, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 7–9 pairs, parallel or slightly convergent, slightly arcuate, intersecondaries absent, tertiaries obscure. Petiole 1.5–3 cm long, not channelled, glabrous. **Fascicles** 5–10-flowered, axillary and below the leaves. Pedicel 5–7 mm long (accrescent to 1.5 cm in fruit), glabrous. Sepals 4–4.5 mm long, glabrous. Corolla cyathiform, ca. 5.5 mm long, tube about equalling the lobes, lobes 5, glabrous. Stamens 5, fixed in the upper half of the corolla tube, glabrous. Staminodes

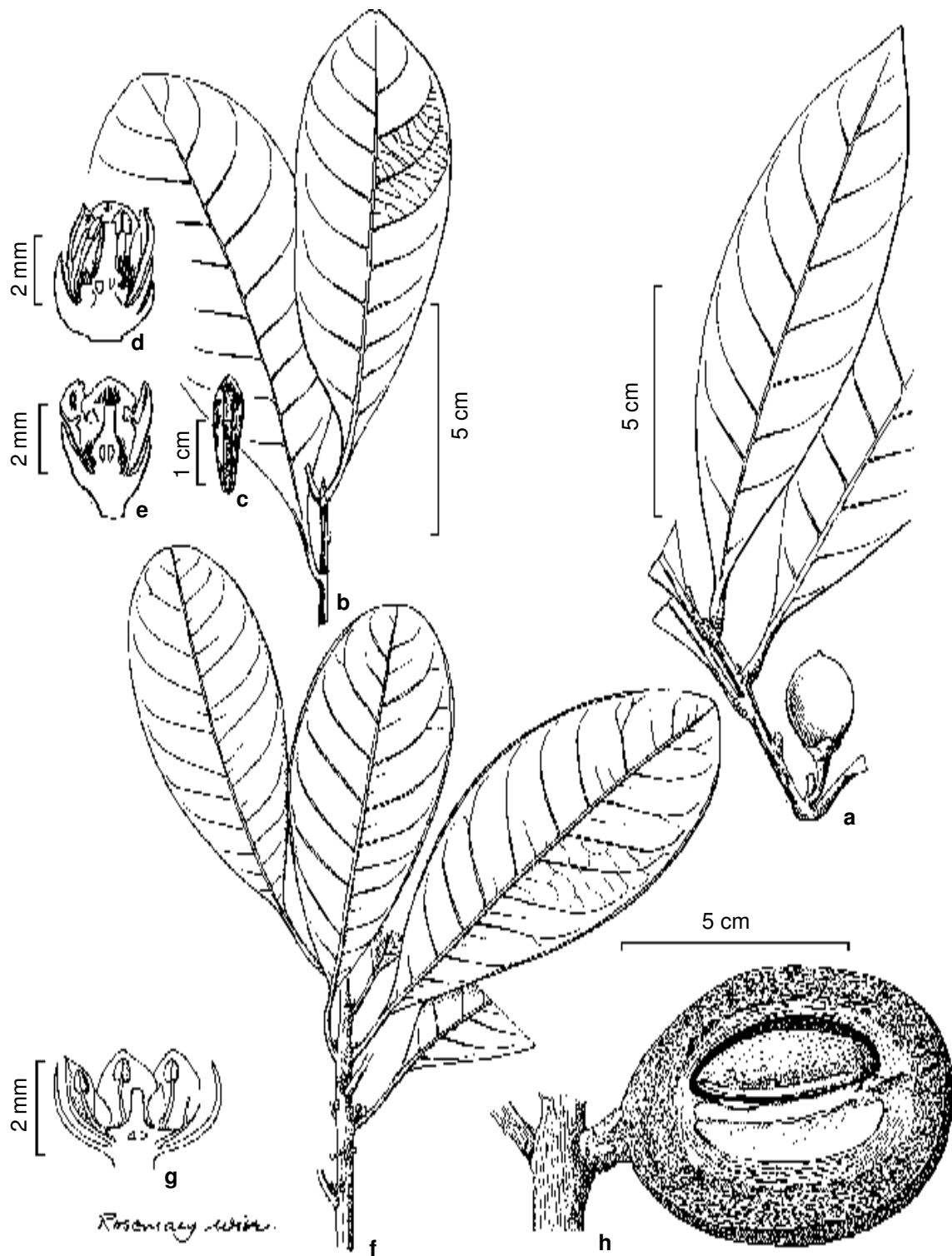


Figura 20 - a. *Pouteria tarumanensis* - a. habit (Steward et al. P20243). b-e. *Pouteria oblanceolata* - b. habit; c. seed (Pires & Silva 4432); d. 1/2 male flower (Pennington & Monteiro P22635); e. 1/2 female flower (Mori et al. 15002). f-h. *Pouteria laevigata* - f. habit (Diaz et al. 441); g. 1/2 flower (Schunke 368); h. fruit (Croat 19437).

5, 1–2.5 mm long, glabrous. Small patelliform disk surrounding the ovary. Ovary globose, 5-locular, pubescent. **Fruit** 2.5–3 cm long, narrowly obovoid, apex rounded, apiculate, base slightly tapered, smooth, glabrous. **Seed** solitary, ca. 1.8 cm long laterally compressed, testa smooth, shining; scar adaxial, full-length, ca. 1.5 mm wide. Seed with endosperm.

Field characters: Tree to 20 m high and 35 cm diam., with sticky white latex. Flowers whitish, scented, fruit ripening yellow. Flowering June and July, fruit maturing February to April

Known only from central Amazonian Brazil, where it occurs in lowland non-flooded forest over sand.

Not recorded from Reserva Ducke.

AMAZONAS: Rio Cuieiras, *Ongley & Ramos 21781* (K); Manaus, *Ducke RB24939* (K RB); Manaus-Caracará km 130.5, *Steward et al. 20243* (K).

Closely related to *P. oblanceolata* and possibly conspecific with it. It differs in the usually elliptic leaves with obtuse or acute apex, and in the lack of tertiary venation and the glabrous calyx. This doubtfully distinct plant is known from only a few collections in the vicinity of Manaus.

6.35 *Pouteria oblanceolata* Pires, Bol. Técn. Inst. Agron. N. 38: 38, tabs 12, a, b, c, d, e, 22, 23. 1960; Pennington, T. D., Fl. Neotrop. 52:369, fig. 80. 1990. **Fig. 20 b-e**

Young shoots finely appressed puberulous at first, soon glabrous. **Leaves** spirally arranged, 8–17 × 3–7 cm, broadly oblanceolate, apex usually rounded or obtuse, base narrowly attenuate, glabrous; venation eucamptodromous, midrib raised on the upper surface, secondary veins 9–10 pairs, parallel or slightly convergent, straight or slightly arcuate, intersecondaries absent, tertiaries oblique. Petiole 1–2.5 cm long, not channelled, glabrous. **Fascicles** 3–10-flowered, mostly clustered on small twigs below the leaves. Pedicel 3–5 mm long, subglabrous. **Flowers** unisexual, plant dioecious. Sepals 5, 3–3.5 mm long, glabrous outside, sericeous inside. Corolla cyathiform, or shortly tubular, 4–5 mm long, tube about equalling the lobes, lobes 5, glabrous. Stamens

5, fixed about halfway up the corolla tube, reduced to vestiges without anthers in female flower, glabrous. Staminodes 5, 1.75–2.5 mm long lanceolate, glabrous. Ovary ovoid, 5-locular, densely pubescent, style included. **Fruit** 2.5–3.5 cm long, narrowly obovoid, or ellipsoid, apex rounded, apiculate, base tapered, smooth, glabrous, except for a few appressed hairs around the base. **Seed** solitary, 1.8–2 cm long, strongly laterally compressed, apex rounded, base acute, testa smooth, shining, adherent to the pericarp; scar adaxial, full-length, 2–3 mm side. Seed with endosperm.

Field characters: Tree to 30 m high and 60 cm diam., larger specimens with small, simple or branched buttresses, trunk fluted in the lower part, cylindrical above. Bark reddish-brown, shallowly and narrowly fissured, inner bark surface orange, slash pale pinkish or red, fibrous, with a sweet smell, with abundant sticky white latex. Flowers greenish-white, fruit ripening yellow. Flowering in central Amazonia from June to September.

The Guianas and eastern Pará, across Amazonia to Amazonian Peru, in mixed lowland forest on non-flooded land, ascending to 600 m altitude.

3.VIII.1994 (fr) *Ribeiro, J. E. L. S. & Silva, C. F. 1373* (INPA K MG MONY R RB SP U).

AMAZONAS: Manaus-Itacoatiara km 133, *Pennington & Monteiro P22635* (INPA K); *PDBFF: Freitas et al. 780* (INPA K).

This species, together with *P. tarumanensis*, is characterized by its smooth, glabrous leaves with rather obscure venation, the 5-merous flower and endospermous seed.

6.36 *Pouteria laevigata* (Mart.) Radlk., Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München 14: 457. 1884; Pennington, T. D., Fl. Neotrop. 52: 373, fig. 122. 1990. **Fig. 20 f-h**

Labatia laevigata Mart., Flora 21, Beibl. 2: 92. 1838.

Young shoots glabrous, becoming fissured and scaling. **Leaves** spirally arranged, 7–13 × 3–5.5 cm, broadly oblanceolate, apex obtuse or rounded, base narrowly attenuate, glabrous;

venation eucamptodromous or sometimes brochidodromous near the apex, midrib slightly prominent on the upper surface, margin often slightly revolute, secondary veins 10–12 pairs, slightly convergent and arcuate, intersecondaries moderately long, tertiaries a lax reticulum. Petiole 1–1.5 cm long, not channelled, glabrous. **Fascicles** axillary and in the axils of fallen leaves, 2–10-flowered. Pedicel 2–3 mm long, glabrous. Sepals 5, subvalvate, 2–3 mm long, glabrous except for a small tuft of hair at the apex. Corolla broadly cyathiform, 2.5–3.5 mm long, lobes much longer than the tube, lobes 5, glabrous. Stamens 5, free, glabrous. Staminodes 5, 0.75–1.5 mm long, lanceolate, glabrous. Ovary flattened, 5-locular, pubescent, style included. **Fruit** 6–9 cm long, globose or obovoid, apex and base rounded, becoming rough-skinned, glabrous. **Seed** 3–4 cm long, ellipsoid to slightly plano-convex, laterally compressed, testa not shining, rough and adherent to the pericarp; scar adaxial, extending most of the length of the seed, 3–4 mm wide. Seed with endosperm.

Field characters: Tree to 40 m high and 50 cm diam., unbuttressed, with a straight cylindrical bole. Bark smooth, pale brown, finely vertically cracked, up to 2 cm thick, slash beige, with sticky white latex. Flowers whitish, fruit maturing bright yellow, with black lenticels. Seed surrounded by and adherent to a layer of greenish gelatinous pulp. Flowering in central Amazonia in April.

A widely distributed species occurring from Costa Rica across northern South America to French Guiana, and in Brazilian and Peruvian Amazonia. Ecologically variable, occurring in non-flooded rainforest but also frequently on periodically and permanently flooded sites.

8.VII.1994 (fr) *Hopkins, M. J. G. et al. 1455* (INPA K MG MONY R RB SPU); 28.VI.1980 (fr) *Nelson, B. W. & Nelson, S. P. 432* (INPA); 3.V.1961 (fr) *Rodrigues, W. & Coêlho, L. 2457* (INPA); 19.IV.1966 (fr) *Rodrigues, W. & Coêlho, D. 7720* (INPA); 26.IV.1994 (fr) *Vicentini, A. et al. 491* (B F INPA K MG PEUFR); 21.VII.1994 (fr) *Vicentini, A. et al. 639* (G INPA K MBM MG UB US); 1.XI.1994 (fr) *Vicentini, A. et al. 762* (BM COL IAN INPA K SPF UEC UFMT VEN).

Pouteria laevigata is distinctive in the field because of its unbuttressed cylindrical bole, very thick smooth bark and the large globose fruit. It differs from other species in this section by its free stamens.

6.37 *Pouteria maxima* T. D. Penn., *sp. nov.* (section *Oligothece*). **Type:** Brazil, Amazonas, Reserva Ducke, Manaus-Itacoatiara, km 25, 2°53'S, 59°58'W, fl., C. A. Sothers & P. A. C. L. Assunção 982 (holotype INPA, isotype K).

Fig. 21 i-n

Ab aliis speciebus section Oligotheceae foliis latis basi truncata, ramis novellis foliorum costa et nervis infra ferrugineo-tomentosis differt.

Arbor; stipulae nullae; folia 13–21 × 8–11.5 cm, late elliptica vel ovata, basi truncata; nervi secundarii 10–14-jugi, paralleli, recti vel leviter arcuati; fasciculi in axillis foliorum delapsorum enati; pedicellus 3–5 mm longus; sepala 5; corolla tubularis, ca. 6 mm longa, lobis 5; stamina 5; staminodia 5; ovarium 5-loculare, dense pubescens; fructus 4–5 × 2.5–3 cm, ellipsoideus, laevis, glaber.

Tree. Young shoots densely ferrugineous-tomentose, becoming subglabrous, greyish, prominently fissured and grid-cracked. Stipules absent. **Leaves** alternate and distichous, 13–21 × 8–11.5 cm, broadly elliptic or ovate, apex obtusely cuspidate to rounded, base truncate, glabrous above, lower midrib and veins and sometimes lamina crisped-pubescent with branched ferrugineous hairs; venation eucamptodromous, midrib flat to slightly raised on the upper surface, secondary veins 10–14 pairs, parallel, straight or slightly arcuate, slightly raised above, strongly raised below, intersecondaries short or absent; tertiaries oblique. Petiole 0.8–1.5 cm long, not channelled, flattened dorso-ventrally (up to 5 mm wide), tomentose. **Fascicles** 2–10-flowered, mostly on twigs below the leaves. Pedicel 3–5 mm long, tomentose. Sepals 5, 4–4.5 mm long, broadly elliptic to suborbicular, apex obtuse or rounded, ferrugineous pubescent outside, sparsely

sericeous, glabrous inside. Calyx slightly accrescent in fruit. Corolla *ca.* 6 mm long, tubular, tube *ca.* 4 mm long, lobes 5, *ca.* 2 mm long, ovate with a truncate apex; glabrous. Stamens 5, fixed at the apex of the corolla tube, filaments 0.3–0.5 mm long, glabrous, anthers *ca.* 0.75 mm long, glabrous. Staminodes 5, *ca.* 1.5 mm long, broadly oblong, glabrous. Disk absent. Ovary ovoid, *ca.* 2.5 mm long, 5-locular, densely pubescent, style 3–4 mm long, slightly exserted, style-head simple. **Fruit** 4–5 × 2.5–3 cm, ellipsoid, apex obtuse to shortly apiculate, base obtuse or rounded, hard-skinned, smooth, glabrous. **Seed** solitary, *ca.* 2.5 cm long, narrowly ellipsoid, laterally compressed, apex slender, base obtuse, testa shining, slightly roughened; scar adaxial, full-length, *ca.* 5 mm wide, embryo with thick, flat, free cotyledons, radicle 2–3 mm long, exserted; surrounded by a thin sheath of endosperm.

Field characters: A magnificent forest giant up to 40 m high and 50 cm diam. (above the buttresses), massively buttressed to 8 m high, these mostly simple but some branched near the base, bole fluted, bark greyish-brown, profusely scaling in rectangular or irregular plates, slash pinkish with plentiful sticky white latex. Flowers greenish-white, fruit maturing yellow or orange. Flowering in May, fruit maturing from December to February.

French Guiana and central Amazonian Brazil, where it is a generally rare species of non-flooded lowland rainforest.

Paratypes: 24.II.1997 (fr) *Ribeiro, J. E. L. S. et al.* 1868 (K); 13.XII.1995 (fr) *Souza, M. A. D. & Assunção, P. A. C. L.* 189 (K); 4.XII.1996 (fr) *Vicentini, A. et al.* 1203 (K).

Pouteria maxima is placed in section *Oligothea* on account of its floral structure. The floral formula is K5, C5, A5 (stamens fixed at the top of the corolla tube), staminodes 5, G5. It also shares with other species of this section, such as *P. oblanceolata*, the tendency towards an accrescent fruiting calyx. The embryo structure is slightly anomalous in having thick flat cotyledons (not foliaceous as in other species of the section) and the endosperm is reduced to a relatively thin layer.

In the field it is distinguished by the huge plank buttresses, reminiscent of some *Sloanea* species, which extend far up the trunk, and by the fluted bole with bark scaling in rectangular or irregular plates. The young growth and leaves have conspicuous ferruginous indumentum, and the broad leaves with a truncate base are also distinctive. The species was first collected in 1986 in French Guiana, but was impossible to place due to lack of flowers.

6.38 *Pouteria* aff. *latianthera* T. D. Penn., Fl. Neotrop. 52: 371, fig. 80. 1990.

Young shoots sparsely appressed pubescent, soon glabrous, becoming greyish and cracked and fissured. **Leaves** opposite, 4–7 × 2.5–5 cm, obovate, apex rounded, truncate or emarginate, base acute, to narrowly cuneate or alternate, glabrous; venation brochidodromous with a submarginal vein (very close to the margin), midrib raised on the upper surface, secondary veins 8–10 pairs, strongly arcuate, convergent, intersecondaries short or absent, tertiaries numerous, perpendicular, parallel. Petiole 2–3 mm long, not channelled, sparsely pubescent. **Fascicles** mostly on twigs below the leaves, few-flowered. **Flowers** not seen. **Fruit**, *ca.* 1.8 cm long (immature), ellipsoid, apex and base rounded, smooth glabrous.

Field characters: Tree up to 35 cm diam., with small buttresses. Bole fluted. Bark dark brown, scaling in large irregular pieces, slash orange, exuding drops of white latex. Young fruit in September.

At present known only from Reserva Ducke.

2.XII.1997 (fr) *Assunção, P. A. C. L. et al.* 732 (INPA K); 13.IX.1994 (fr) *Vicentini, A. et al.* 688 (INPA K).

The opposite leaf arrangement, parallel perpendicular tertiary venation and form of the fruit place this species in section *Oligothea* with the group of species containing *P. oppositifolia*, *P. arcuata* and *P. latianthera*. It differs from all these in its distinctive leaf shape with truncate or emarginate apex, and in the presence of a submarginal vein.

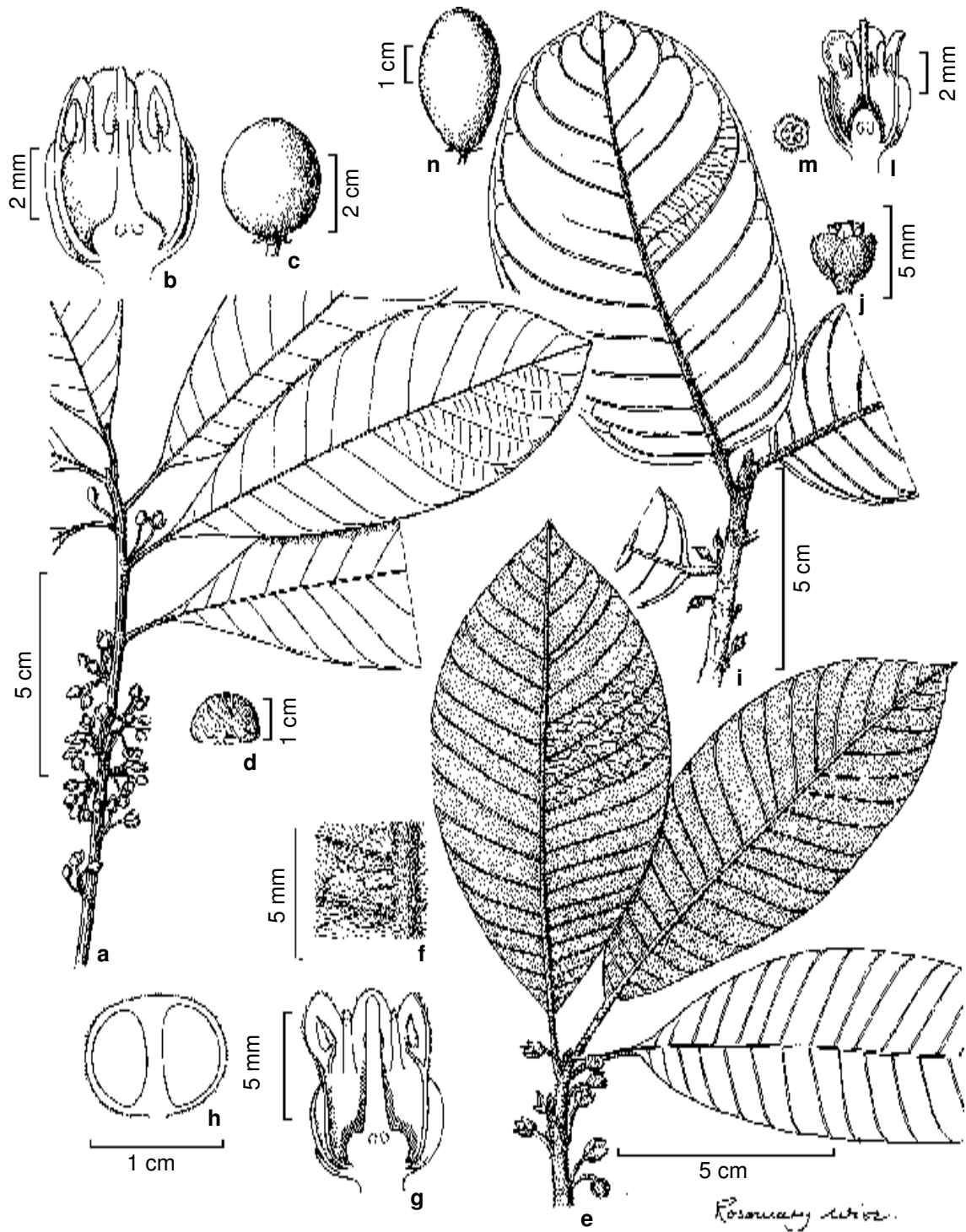


Figura 21 - a-d. *Pouteria macrophylla* - a. habit (Krukoff 1040); b. 1/2 flower (Krukoff 5711); c. fruit (Nelson 1214); d. seed (Baker 67). e-h. *Pouteria manaosensis* - e. habit; f. detail of indumentum (Cid et al. 1002); g. 1/2 flower (Ducke 1150); h. 1/2 fruit (Daly et al. 1148). i-n. *Pouteria maxima* - i. habit; j. flower; l. 1/2 flower; m. ovary (Sothers 982); n. fruit (Souza 189).

Section *Rivicoa* (A. DC.) Baehni

6.39 *Pouteria macrophylla* (Lam.) Eyma, Recueil Trav. Bot. Néerl. 33: 164. 1936; Pennington, Fl. Neotrop. 52: 375, fig. 56. 1990.

Fig. 21 a-d

Chrysophyllum macrophyllum Lam., Tab. Encycl. 2: 44. 1794.

Young shoots finely appressed puberulous, becoming lenticellate and glabrous. **Leaves** spirally arranged, 10–15 × 3–6.5 cm, narrowly elliptic to broadly oblanceolate, apex obtuse or rounded, base narrowly attenuate, glabrous above, lower surface with fine minute appressed hairs (visible only with lens), lower surface glaucous; venation eucamptodromous, midrib flat or slightly sunken on the upper surface, secondary veins 8–12 pairs, straight or slightly arcuate, more or less parallel, intersecondaries absent, tertiaries perpendicular to oblique, usually obscure. Petiole 0.5–1.7 cm long, not channelled, finely appressed puberulous. **Fascicles** mostly axillary, 3–10-flowered. Pedicel 4–5 mm long, finely appressed puberulous. **Flowers** bisexual. Sepals 5, *ca.* 3 mm long, broadly ovate, sericeous outside, glabrous inside, ciliate. Corolla shortly tubular, *ca.* 4 mm long, tube slightly longer than the lobes, lobes 5, broadly lanceolate, apex obtuse; glabrous. Stamens 5, fixed near the top of the corolla tube, glabrous. Staminodes 5, *ca.* 1.5 mm long, glabrous. Ovary ovoid, 5-locular, pubescent, style exerted, style-head simple. **Fruit** 4–5 × 3–4 cm, globose or ellipsoid, apex usually with a pronounced beak, base obtuse or rounded, smooth, glabrous. **Seed** solitary or paired, 2.5–4 cm long, broadly ellipsoid to globose, or plano-convex when paired, scar covering from 1/3 to nearly all the seed surface and then leaving a narrow smooth, shining, adaxial strip. Seed without endosperm.

Field characters: Tree to 30 m high and 40 cm diam., larger specimens with straight or concave buttresses to 1.5 m high. Bark reddish-brown, finely fissured and scaling in rectangular pieces, slash pink or cream, with white latex. Flowers with green corolla and stamens. Fruit

maturing green to yellow with whitish pulp. Flowering from August to December, with mature fruit collected in April.

The Guianas and coastal Brazil across Amazonia to Peru and Bolivia, in non-flooded lowland rainforest. It is also present in secondary forest in some areas and extends into drier forest, transitional between high forest and cerrado vegetation.

24.VIII.1995 (fl) *Assunção, P. A. C. L. et al.* 232 (COL FINPA K MG PEUFR SPF UFMT VEN); 21.IX.1997 (fl) *Assunção, P. A. C. L. et al.* 668 (E HAMAB INPA K MAC MEXU MG PUEL ULM); 7.XI.1994 (fl) *Hopkins, M. J. G. & Nascimento, J. R.* 1506 (ACRE GH ICN INPA K MG S UP CB W); 2.XI.1994 (bd) *Nascimento, J. R. & Pereira, E. C.* 615 (INPA K MG MO NY R RB SP U); 7.IV.1994 (fr) *Ribeiro, J. E. L. S. et al.* 1254 (INPA K MG MO NY RB SP); 29.X.1996 (fl) *Sothers, C. A. & Pereira, E. C.* 924 (B GH IAN ICN INPA K P UP CB VIC); 9.V.1969 (fr) *Souza, A. C.* 283 (INPA); 6.XII.1994 (fl) *Vicentini, A. & Pereira, E. C.* 771 (BM G IAN INPA K MBM UB UECUS).

Uses: The fruit is edible and sold on the markets in Pará and elsewhere. Selected semi-domesticated strains have fruit up to 6 cm diam.

Pouteria macrophylla is easily recognized by its glaucous leaves with minute appressed hairs on the lower surface, its pentamerous flowers and by its large seed scar. Plants from central Amazonia have smaller flowers than elsewhere and the fruit is often beaked.

6.40 *Pouteria manaosensis* (Aubrév. & Pellegr.) T. D. Penn., Fl. Neotrop. 52: 377, fig. 81. 1990.

Fig. 21 e-h

Richardella manaosensis Aubrév. & Pellegr., Adansonia 1: 176. 1962.

Young shoots tomentose with reddish-brown persistent hairs. **Leaves** spirally arranged, 10–15 × 4.5–6.5 cm, elliptic to broadly oblanceolate, apex obtuse to rounded, base narrowly attenuate, margin slightly revolute, upper surface sparsely pubescent to glabrous, lower surface tomentose to pubescent with stalked, 2-branched, reddish-brown hairs, indumentum denser on the veins; venation

eucamptodromous, midrib slightly raised on the upper surface, secondary veins, 20–25 pairs, widely spreading, parallel, straight, intersecondaries absent, tertiaries numerous, oblique. Petiole 2.5–3 cm long, not or only slightly channelled, tomentose. **Fascicles** axillary and below the leaves, 2–5-flowered. Pedicel 7–10 mm long, tomentose. **Flowers** bisexual. Sepals 5, 4–6 mm long, tomentose outside, glabrous inside. Corolla shortly tubular, 7–8 mm long, the tube slightly exceeding the lobes, lobes 5, sericeous outside, glabrous inside. Stamens 5, fixed near the top of the corolla tube, glabrous. Staminodes 5, 2–2.5 mm long, subulate. Ovary ovoid, 5-locular, densely pubescent. **Fruit** 7.5–10 cm long, globose or depressed globose, apex and base rounded or truncate, smooth, velutinous with reddish brown hairs. **Seeds** 2 to several, 3.5–4 cm long, plano-convex, scar covering nearly all the seed surface, leaving only a narrow, smooth, shining abaxial strip. Seed without endosperm.

Field characters: Tree to 25 m high and 50 cm diam., unbuttressed, with a cylindrical bole. Bark reddish-brown, scaling or vertically striate, exfoliating in small irregular pieces; slash fibrous, reddish-brown, with a sweet smell and sticky white latex. Flowers with green corolla, fruit with conspicuous reddish-brown indumentum. Flowering in August and September, fruit maturing in March.

Guianas and Brazil, Maranhão to central Amazonia, in mixed lowland forest on non-flooded land.

8.III.1995 (fr) *Assunção, P. A. C. L. & Pereira, E. C. 189* (INPA K MG MO R RB U); 18.VIII.1994 (fl) *Nascimento, J. R. & Pereira, E. C. 571* (BMG IAN INPA K MBM UB UEC US); 25.IX.1994 (fl) *Nascimento, J. R. 607* (COL F IAN INPA K PEUFR SPF UFMT VEN); 3.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 794* (INPA K MG NY SP); 29.VII.1963 (fl) *Rodrigues, W. 5415* (INPA); 10.V.1966 (fr) *Rodrigues, W. & Coêlho, D. 7828* (INPA); 20.X.1970 (fl) *Rodrigues, W. 8976* (INPA); 27.IX.1994 (bd) *Sothers, C. A. et al. 174* (INPA K MG MO NY R RB SP U); 23.VIII.1968 (fl) *Souza, J. A. 108* (INPA).

Pouteria manaosensis is easily recognized by its persistent dense reddish-

brown indumentum on the young shoots, lower leaf surface and inflorescence, the leaves with numerous rather widely spreading parallel secondary veins, pentamerous flower and large reddish-brown velutinous fruit.

Section *Antholucuma* (A.DC.) Eyma

6.41 *Pouteria venosa* subsp. *amazonica* T. D. Penn., Fl. Neotrop. 52: 399, fig. 88. 1990.

Fig. 22 a-b

Young shoots finely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 7.5–14 × 3.5–5.7 cm, broadly oblanceolate, apex obtuse or obtusely cuspidate to rounded, base narrowly attenuate, glabrous; venation eucamptodromous, midrib slightly raised on the upper surface; secondary veins 8–12 pairs, more or less parallel, slightly arcuate, intersecondaries absent, tertiaries oblique. Petiole 1–1.7 cm long, channelled, finely appressed, puberulous. **Fascicles** mostly borne on twigs below the leaves, 1–3-flowered. Pedicel 0.7–1.3 cm long, finely appressed puberulous. **Flowers** bisexual. Sepals 4, 7–10 mm long, outer pair ovate, inner pair broadly elliptic, sparsely and finely appressed puberulous on both surfaces. Corolla broadly tubular, 1.1–1.3 cm long, tube slightly longer than the lobes, lobes 6, glabrous. Stamens 6, fixed at the top of the corolla tube, glabrous. Staminodes 6, 2–3 mm long, subulate, glabrous. Ovary conical, 7–8-locular, densely pubescent, style becoming slightly exerted. **Fruit** 4–8 cm long, globose or depressed globose, apex and base rounded, smooth, velutinous at first, becoming glabrous. **Seeds** 1–3, 3–4.5 cm long, ellipsoid or plano-convex, testa smooth, shining; scar adaxial, covering about 2/3 of the seed surface. Seed without endosperm.

Field characters: Tree to 30 m high and 50 cm diam., the base fluted or with small buttresses. Bark reddish brown, scaling in small pieces, slash pinkish with sticky white latex. Flowers pale green, with a sweet scent. Fruit maturing orange or yellow, with rather

mealy flesh. Flowering in central Amazonia in July, fruit maturing December to January.

Venezuela and the Guianas to Amazonian Brazil in mixed non-flooded rainforest, usually lowland but ascending to 1200 m in southern Venezuela.

10.VII.1995 (bd) *Lohmann, L. G. et al.* 10 (B FINPA K MG PEUFR UFMT); 6.VII.1993 (fl) *Ribeiro, J. E. L. S. et al.* 909 (INPA K MG MONY SP); 23.VII.1964 (fl) *Rodrigues, W. & Monteiro, O. P.* 5967 (INPA); 16.VII.1995 (fl) *Sothers, C. A. et al.* 510 (BM COL INPA K MG SPF UB UEC VEN); 17.VII.1995 (fl) *Sothers, C. A. et al.* 524 (G IAN INPA K MBM R RB U US); 8.VIII.1968 (fl) *Souza, J. A.* 82 (INPA); 22.IX.1995 (fr) *Vicentini, A. et al.* 718 (INPA K MG MONY R RB SP U).

The only member of section *Antholucuma* found in Reserva Ducke, and easily identified by its large flowers with 4 sepals, the outer two larger than the inner, and the 6-lobed corolla. The large fruit is also distinctive. The type subspecies of *P. venosa*, which has a much smaller fruit, is confined to coastal Brazil.

Section *Pouteria*

6.42 *Pouteria glomerata* (Miq.) Radlk., Sitzbungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München 12: 333. 1882; Pennington, T. D., Fl. Neotrop. 52: 417, fig. 92. 1990. **Fig. 22 c-f**

Lucuma glomerata Miq. in Mart., Fl. bras. 7: 81, tab. 36, fig. 2. 1863.

Young shoots appressed puberulous, soon becoming glabrous and scaling. **Leaves** spirally arranged, 8–5 × 3.5–6 cm, oblanceolate, apex usually obtuse or rounded, base acute, obtuse or rounded, glabrous above, minutely puberulous below with whitish loosely appressed hairs usually forming a pellicle, sometimes becoming subglabrous with age; venation eucamptodromous, midrib flat or slightly sunken on the upper surface, secondary veins 10–15 pairs, convergent or parallel, usually slightly arcuate, intersecondaries usually absent, tertiaries oblique to perpendicular. Petiole 5–10 mm long, not channelled, appressed puberulous. **Fascicles**

axillary or on twigs below the leaves, 2–10-flowered. Pedicel 0.5–1 mm long, appressed puberulous. **Flowers** unisexual (plant monoecious or dioecious). Sepals 4, 2–3 mm long, often hooded, the outer 2 appressed puberulous outside, inner 2 more or less glabrous. Corolla broadly cylindrical, 2–3.5 mm long, tube exceeding the lobes, lobes 4, broadly oblong, apex rounded or truncate, glabrous. Stamens 4, fixed in the lower half of the corolla tube, glabrous; absent or reduced to vestiges in female flowers. Staminodes 4, 0.3–1 mm long, lanceolate or oblong, glabrous. Ovary 4-locular, ovoid, densely long-strigose, style included. **Fruit** 3–6 cm long, globose or depressed globose, often broader than long, often irregular and knobbly, surface rough or smooth, more or less glabrous or scurfy. **Seeds** 1-several, 2–3 cm long, broadly ellipsoid (when solitary) or plano-convex, smooth shining area of testa reduced to a small abaxial segment, testa woody, 1–3 mm thick; scar often verrucose. Seed without endosperm.

Field characters: Tree to 20 m high and 30 cm diam., slash with sticky white latex. Flowers greenish-cream, fruit maturing yellowish or pale brown with a hard skin. Flowering in central Amazonia March to May, fruit maturing from May to July.

Mexico and Central America and throughout tropical South America to Paraguay and Argentina. A common tree of riverbanks and periodically or permanently flooded forest.

Not recorded from Reserva Ducke.

AMAZONAS: Município de Manaus, Ilha de Marchantaria, *Ferreira* 179 (K), 204 (K); vic. Manaus, Igarapé Ipixuna, *Prance et al.* 11260 (K). **Uses:** Large fruited varieties are eaten in Mexico, Central America and Pará.

Pouteria glomerata is close to *P. filipes* and they have a similar floral structure. It may be distinguished by the acute to rounded leaf base, shorter petioles, shorter pedicels, non-ciliate corolla lobes and more or less sessile globose fruit.

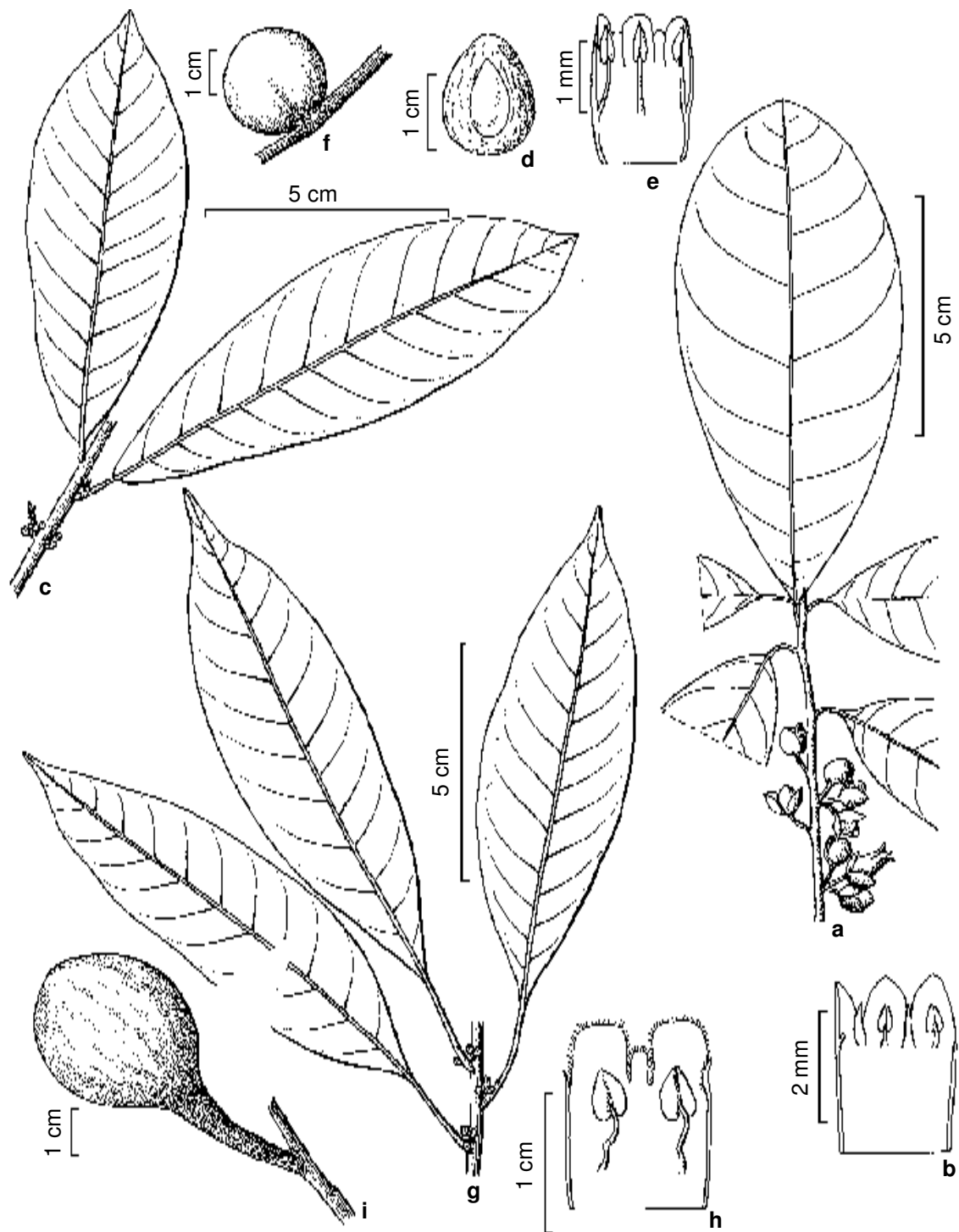


Figura 22 - a-b. *Pouteria venosa* subsp. *amazonica* - a. habit; b. part corolla (Meijeraan 22). c-f. *Pouteria glomerata* - c. habit; d. seed (Cid et al. 1715); e. 1/2 corolla (Schinini 6303); f. fruit (Black 52-15434). g-i. *Pouteria filipes* - g. habit (Steyermark & Rabe 96112); h. corolla (Roberts LBB16304); i. fruit (Steyermark & Liesner 120748).

6.43 *Pouteria filipes* Eyma, Recueil Trav. Bot. Néerl. 33: 180. 1936; Pennington, T. D., Fl. Neotrop. 52: 428, fig. 92. 1990. **Fig. 22 g-i**

Young shoots finely appressed puberulous, becoming glabrous and scaling. **Leaves** spirally arranged, 9–17 × 3–7 cm, elliptic or oblanceolate, apex narrowly attenuate, base narrowly attenuate, glabrous above, densely appressed puberulous to sericeous below with golden-brown or silvery hairs; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 10–14 pairs, parallel or slightly convergent, slightly arcuate, intersecondaries absent, tertiaries oblique to perpendicular. Petiole 0.8–3 cm long, not channelled, appressed puberulous. **Fascicles** axillary and below the leaves, 3–10-flowered. Pedicel 2–4 mm long, appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 4, 2–2.5 mm long, broadly ovate to orbicular, outer 2 appressed puberulous outside, inner 2 more or less glabrous. Corolla shortly tubular, 3–3.5 mm long, tube exceeding the lobes, lobes 4, broadly oblong, apex rounded or truncate, margin long-ciliate. Stamens 4, fixed about halfway up the corolla tube, glabrous, absent in female flower. Staminodes 4, 0.5–0.7 mm long, lanceolate, ciliate. Ovary 4-locular, ovoid to globose, densely strigose. **Fruit** 2.5–3.5 cm long, globose to obovoid, apex rounded, base rounded or tapered, shortly pubescent, becoming subglabrous with age. **Seeds** 1–2, 1.8–2.5 cm long, plano-convex, testa woody, scar area covering most or all of the seed surface.

Field characters: Tree to 40 m high and 50 cm diam. above buttresses to 2 m high. Bole fluted. Bark reddish brown, scaling profusely and exfoliating from the base in thin pieces, slash pale brown exuding white or beige watery latex. Flowers slightly scented, with pale green corolla. Fruit olive-green to greenish-brown. Flowering from September to December, fruit maturing in March.

Southern Central America, Venezuela and the Guianas to central Amazonian Brazil in mixed lowland rainforest on non-flooded sites.

2.III.1994 (fr) *Ribeiro, J. E. L. S. et al.* 1210 (BM IAN INPA K MBM UEC US VEN); 9.III.1994 (fr) *Ribeiro, J. E. L. S. et al.* 1221 (INPA K MG MONY RB SP); 6.VIII.1963 (fr) *Rodrigues, W.* 9578 (INPA); 4.XII.1993 (fl) *Vicentini, A. & Assunção, P.A.C.L.* 388 (INPA K MG NY SP); 24.III.1994 (fr) *Vicentini, A. et al.* 437 (G INPA K MG R U UB).

The differences between this species and *P. glomerata* are discussed under the latter. *Pouteria filipes* in the Guianas has a fruit with a well developed stipe 1–2 cm long, whereas the few central Amazonian specimens I have seen have fruit which are globose or only slightly tapered. There are no collections from the intervening area, but one from Amapá is more or less intermediate between the two extremes.

6.44 *Pouteria petiolata* T. D. Penn., Fl. Neotrop. 52: 433, fig. 96. 1990. **Fig. 23 a-b**

Young shoots subglabrous. **Leaves** spirally arranged, 16–30 × 5.5–9 cm, oblanceolate, apex obtuse to narrowly attenuate, base narrowly attenuate, decurrent on the petiole, glabrous above, with sparse closely appressed, whitish hairs below, becoming glabrous; venation eucamptodromous, midrib raised on the upper surface, secondary veins 12–16 pairs, parallel or slightly convergent, arcuate, intersecondaries absent, tertiaries oblique to perpendicular, numerous. Petiole 3–4.5 cm long, not channelled, glabrous. **Fascicles** axillary, 2–3-flowered. Pedicel 3–4 mm long, pubescent. Sepals 4, 6–7 mm long, ovate to broadly elliptic, outer pair hooded, appressed pubescent with brown hairs, inner pair glabrous. Corolla broadly tubular, 8–9 mm long, tube exceeding the lobes, lobes 4, oblong, apex rounded, margin densely fringed-hairy. Stamens 4, fixed about halfway up the corolla tube, glabrous. Staminodes 4, ca. 1.5 mm long, narrowly oblong, densely fringed-hairy. Ovary globose, 4-locular, densely long-strigose, style included. **Fruit** unknown.

Field characters: Tree to 15 m high and 15 cm diam., unbuttressed. Bark brown, shallowly fissured and scaling in thin papery pieces, slash with white or yellowish sticky latex. Flowers

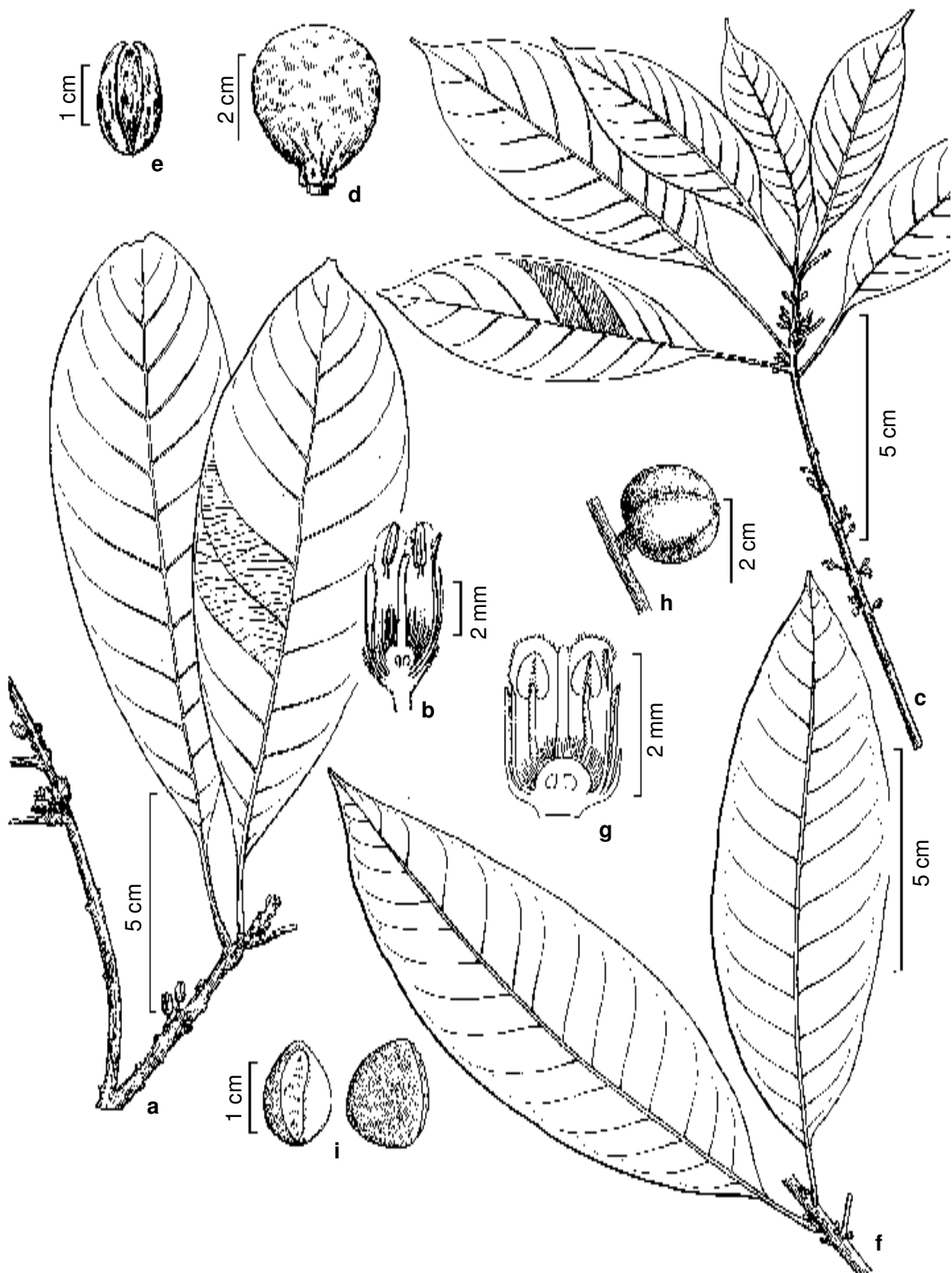


Figura 23 - a-b. *Pouteria petiolata* - a. habit; b. 1/2 flower (Cid et al. 2363). c-e. *Pouteria fimbriata* - c. habit (FDBG 3759); d. fruit; e. seed (Coelho INPA1897). f-i. *Pouteria plicata* - f. habit (Krukoff 6632); g. 1/2 flower (Davidse & González 12134A); h. fruit (Revilla 2250); i. seed (Rodrigues & Lima 2270).

sweetly scented, with green corolla. Flowering in central Amazonia in November and December.

Brazilian Amazonia (Pará and Amazonas) and Amazonian Ecuador.

28.XI.1996 (fl) *Sothers, C. A. 946* (INPA K M G N Y SP); 1.X.1968 (fl) *Souza, J. A. 197* (INPA).

PDBFF: *Kukle 161* (K); *Lepsch Cunha et al. 776* (INPA K).

Pouteria petiolata is closely related to *P. glomerata* and *P. filipes* but differs from both in the long petioles and much larger flowers. It also lacks the dense sericeous indumentum present on the lower leaf surface of *P. filipes*.

6.45 *Pouteria fimbriata* Baehni, Candollea 14: 68. 1952; Pennington, T. D., Fl. Neotrop. 52: 444, fig. 98. 1990. **Fig. 23 c-e**

Pouteria raulantonia Aubrév. & Pellegr., Adansonia 1: 161. 1962.

Young shoots subglabrous. **Leaves** spirally arranged, 11–17.5 × 4.3–8 cm, elliptic or broadly oblanceolate, apex acuminate, base narrowly attenuate, glabrous or with sparse appressed hairs on lower midrib; venation eucamptodromous, midrib prominent on the upper surface, secondary veins 7–9 pairs, slightly convergent, arcuate, intersecondaries absent, tertiaries numerous, oblique to perpendicular. Petiole 2–3.5 cm long, channelled, finely appressed puberulous. **Fascicles** 2–5-flowered, axillary and below the leaves. Pedicel 3–4 mm long, sparsely appressed puberulous. Sepals 4, 2.5–3 mm long, broadly ovate or elliptic, sparsely appressed puberulous outside. Corolla broadly tubular, ca. 4 mm long, tube exceeding the lobes, lobes 4, broadly oblong, apex rounded, fringed-ciliate. Stamens 4, fixed about halfway up the corolla tube, anthers with an apical tuft of hairs. Staminodes 4, ca. 0.7 mm long, oblong, fringed-ciliate. Ovary ovoid, 4-locular, densely long-strigose, style included. **Fruit** 4–5 cm long, obovoid, apex rounded, base tapered, smooth, glabrous. **Seeds** several, 2.5–2.8 cm long, oblong-ellipsoid, somewhat laterally compressed, testa hard, woody, smooth,

adherent to the pericarp, scar adaxial, full-length, 2–4 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 40 cm diam. with small plank buttresses, bole irregular or fluted, bark brown, scaling in small irregular pieces, slash with a small amount of white latex. Flowers green, fruit maturing yellow. Flowering from February to April, fruit maturing August and September.

Venezuela and the Guianas to central Amazonia, confined to lowland rainforest on non-flooded land.

21.VIII.1997 (fr) *Ribeiro, J. E. L. S. et al. 1908* (G IAN INPA K MBM MO RRB U).

This species is close to *P. filipes*, but differs in its glabrous leaves, fewer secondary veins, anthers with an apical tuft of hairs and the narrow seed scar.

6.46 *Pouteria plicata* T. D. Penn., Fl. Neotrop. 52: 456, fig. 92. 1990. **Fig. 23 f-i**

Young shoots minutely appressed puberulous, soon glabrous, becoming cracked and fissured. **Leaves** spirally arranged, 10–20 × 3–6 cm, elliptic to oblong, apex narrowly attenuate to obtuse, base acute to narrowly attenuate, glabrous; venation eucamptodromous, midrib flat or raised on the upper surface, secondary veins 14–20 pairs, parallel or slightly convergent, arcuate to straight, intersecondaries short to moderate, tertiaries reticulate and oblique. Petiole 0.8–2 cm long, margins strongly infolded, subglabrous. **Fascicles** axillary and clustered below the leaves, 5–10-flowered. Pedicel 0.5–1.5 mm long, sparsely appressed puberulous. Sepals 4, ca. 2 mm long, outer pair minutely appressed puberulous, inner pair glabrous. Corolla broadly tubular, ca. 3 mm long, tube exceeding the lobes, lobes 4, broadly oblong, ciliate. Stamens 4, fused in the lower half of the corolla tube, glabrous. Staminodes 4, ca. 0.75 mm long, lanceolate, ciliate. Ovary ovoid, 4-locular, densely pubescent, style included, style-head simple. **Fruit** 2–4 mm long, globose, apex and base rounded, soft-skinned and fleshy, wrinkling on drying, glabrous. **Seeds** several, 1.8–2 cm long, broadly

ellipsoid, testa smooth, adherent to the pericarp, scar adaxial, full-length, 0.4–1 cm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 40 cm diam. Bark reddish-brown, scaling, slash with white latex. Flowers with greenish-yellow corolla, and fruit maturing yellow. The fruit is eaten by fish. Flowering and fruiting has been recorded throughout the year.

Throughout Brazilian Amazonia and the drainage of the Orinoco in Venezuela. A tree of periodically and permanently flooded forest.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus: Ilha do Marapata, Rodrigues & Lima 2270 (NY); Vila Betancourt, Ferreira & Lima 3664 (K); Praia do Cajo, L. Coêlho 658 (INPA).

Recognized among other species of section *Pouteria* by its strongly infolded petiole margins, rather numerous secondary veins, subsessile flowers and the squashy yellow fruit.

6.47 *Pouteria resinosa* T. D. Penn., *sp. nov.* (section *Pouteria*). **Type:** Brazil, Amazonas. Distrito Agropecuário, ca. 90 km N of Manaus, Fazenda Esteio, fl., August 1989, S.S. da Silva s.n. (INPA/WWF 1301.36.2) (holotype INPA n.v., isotype K). **Fig. 24 a-d**

P. singulari affinis sed foliis parvis, nervis secundariis paucis et corolla parva glabra differt.

Arbor; stipulae nullae; folia 5.5–11 × 2.5–5 cm, late oblanceolata, apice obtusa vel rotundata; nervi secundarii 7–8-jugi, paralleli, leviter arcuati; nervi tertiarum obliqui vel perpendiculares; fasciculi in axillis foliorum delapsorum enati; pedicellus 3–5 mm longus; sepala 4; corolla tubularis, ca. 5 mm longa, lobis 4; stamina 4; staminodia 4; ovarium 4-loculare.

Tree. Young shoots with sparse minute appressed hairs or glabrous, becoming pale greyish and slightly scaling. Stipules absent. **Leaves** spirally arranged, 5.5–11 × 2.5–5 cm, broadly oblanceolate, apex obtuse or rounded, base narrowly attenuate, glabrous; venation

euamptodromous; midrib raised on the upper surface (rounded in section), secondary veins 7–8 pairs, parallel, slightly arcuate, intersecondaries absent, tertiaries perpendicular to oblique. Petiole 5–10 mm long, slightly channelled, glabrous. **Fascicles** 3–10-flowered, mostly on twigs below the leaves. Pedicel 2–3 mm long, sparsely and minutely appressed puberulous or glabrous. Sepals 4, ca. 4 mm long, ovate, apex obtuse or rounded, with some minute appressed hairs outside or glabrous; young buds covered by a layer of transparent resin. Corolla tubular, ca. 5 mm long, tube slightly exceeding the lobes, lobes 4, broadly oblong, apex rounded, ciliate. Stamens 4, fixed about halfway up the corolla tube, filaments ca. 2 mm long, glabrous, anthers ca. 1.3 mm long, ovate, glabrous. Staminodes 4, ca. 1.75 mm long, oblong-lanceolate or oblong, ciliate. Disk absent. Ovary 4-locular, ovoid, lobed, puberulous, style 2–3 mm long glabrous above, included, style head simple or minutely lobed. **Fruit** unknown.

Field characters: Large canopy tree to 30 m high and 70 cm diam., with slightly concave buttresses to 3 m high. Bark greyish-brown, scaling in large irregular plates, slash pale brown with white latex. Flowers greenish-white. Flowering in July and August.

Known only from central Amazonian Brazil in the region of Manaus, where it is a canopy tree in rainforest on non-flooded land.

Not recorded from Reserva Ducke.

Paratypes: PDBFF: Reserva km 41, Mori & Cardoso 20666 (INPA K); Pennington et al. 13057 (INPA K); Spironello s.n. INPA190948 (INPA K).

Pouteria resinosa belongs in a group of closely related and imperfectly known Amazonian species containing *P. singularis*, *P. franciscana* and *P. juruana*. All have a similar facies and are difficult to separate when sterile. *Pouteria franciscana* differs in its larger leaves with more numerous secondary veins, and slightly larger flowers with a strigose corolla. Both *P. juruana* and *P. singularis* have more slender flower buds than *P. resinosa*, and they also differ in the fine details

of their venation. Species differences in Sapotaceae are usually seen in fruit and seed characters, but unfortunately the fruit of both *P. resinosa* and *P. juruana* remain unknown.

6.48 *Pouteria gomphiifolia* (Mart.) Radlk., Sitzungsber. Math.-Phys. Cl. Konigl. Bayer. Akad. Wiss. München 12: 33. 1882; Pennington, T. D., Fl. Neotrop. 52: 463, fig. 105. 1990. **Fig. 24 e-g**

Lucuma gomphiifolia Mart. ex Miq., in Mart., Fl. bras. 7: 78, tab. 37, fig. 1. 1863.

Young shoots subglabrous, usually covered with transparent resin, and later scaling in thin papery pieces. **Leaves** spirally arranged, 10–21 × 3–6 cm, oblanceolate, apex acute, obtuse or rounded, base narrowly attenuate, glabrous; venation brochidodromous with a submarginal vein, midrib raised (rounded) on the upper surface, secondary veins 20–35 pairs, parallel, straight, intersecondaries numerous, long, usually extending to near the margin, tertiaries reticulate. Petiole 0.5–1 cm long, not channelled, glabrous. **Fascicles** 3–10-flowered, axillary. Pedicel 3–5 mm long, glabrous. **Flowers** unisexual (plant dioecious). Sepals 4, 2.5–3.5 mm long, ovate, glabrous. Corolla broadly tubular, 4–5 mm long, tube equalling or slightly longer than the lobes, lobes 4, oblong, ciliate. Stamens 4, fixed in the lower half of the corolla tube, glabrous, absent in female flower. Staminodes 4, 1.5–2 mm long, subulate, glabrous. Ovary ovoid, 4-locular, pubescent, style slightly exerted, style-head simple. **Fruit** 4–5 cm long, obovoid or ellipsoid, apex obtuse to rounded, base tapered, smooth, glabrous. **Seeds** 1–2, 2.5–3 cm long, ellipsoid, laterally compressed, apex rounded, base acute, testa smooth and shining; scar adaxial, 4–5 mm wide. Seed without endosperm.

Field characters: Tree to 20 m high and 40 cm diam., larger specimens buttressed to 1 m high. Bark scaling, slash with copious white latex. Flowers with greenish corolla and fruit maturing yellow to orange. Flowering in central Amazonia in October and November and the fruit maturing in May.

Throughout Brazilian Amazonia and into Peru, Colombia and Venezuela. It is confined to periodically and permanently flooded forest. AMAZONAS: Município de Manaus, Comunidade Nossa Senhora de Fátima, *Ferreira 251* (K), 255 (K); Rio Cuieiras, *Mori et al. 20334* (K).

Pouteria gomphiifolia is easily recognized in the vegetative state by its distinctive leaves with brochidodromous venation and a submarginal vein, and the numerous straight parallel secondary veins.

6.49 *Pouteria pariry* (Ducke) Baehni, Candollea 9: 354. 1942; Pennington, T. D., Fl. Neotrop. 52: 468, fig. 106. 1990. **Fig. 24 h-j**

Lucuma pariry Ducke, Arch. Jard. Bot. Rio de Janeiro 3: 231, t. 15. 1922.

Young shoots shortly brown-pubescent, soon becoming glabrous, scaling and grid-cracked. **Leaves** spirally arranged, 15–22 × 6–9 cm, broadly oblanceolate, apex obtuse to rounded, base tapering but finally abruptly rounded or truncate, glabrous; venation eucamptodromous, midrib sharply raised on the upper surface, but often recessed, secondary veins 16–20 pairs, parallel, straight or slightly arcuate, intersecondaries absent, tertiaries oblique. Petiole 2–4.5 cm long, strongly channelled, subglabrous. **Fascicles** borne on twigs below the leaves, 5–10-flowered. Pedicel ca. 4 mm long, puberulous. Sepals 5, 2.5–3 mm long, ovate, puberulous outside, ciliate. Corolla shortly tubular, ca. 3.5 mm long, tube equalling the lobes, lobes 5, obovate to broadly oblong, apex truncate, ciliate. Stamens 5, fixed near the base of the corolla tube, glabrous. Staminodes 5, ca. 0.5 mm long, subulate, glabrous. Ovary ovoid, 5-locular, densely pubescent, style slightly exerted in bud, style-head simple. **Fruit** 9–10 cm diam., depressed globose, smooth glabrous. **Seeds** 2–3, 3–4.5 cm long, plano-convex or shaped like the segment of an orange, testa smooth, shining, scar adaxial, covering about half the seed surface. Seed without endosperm.

Field characters: Tree to 30 m high and 80 cm diam., with dark greyish scaling bark and white

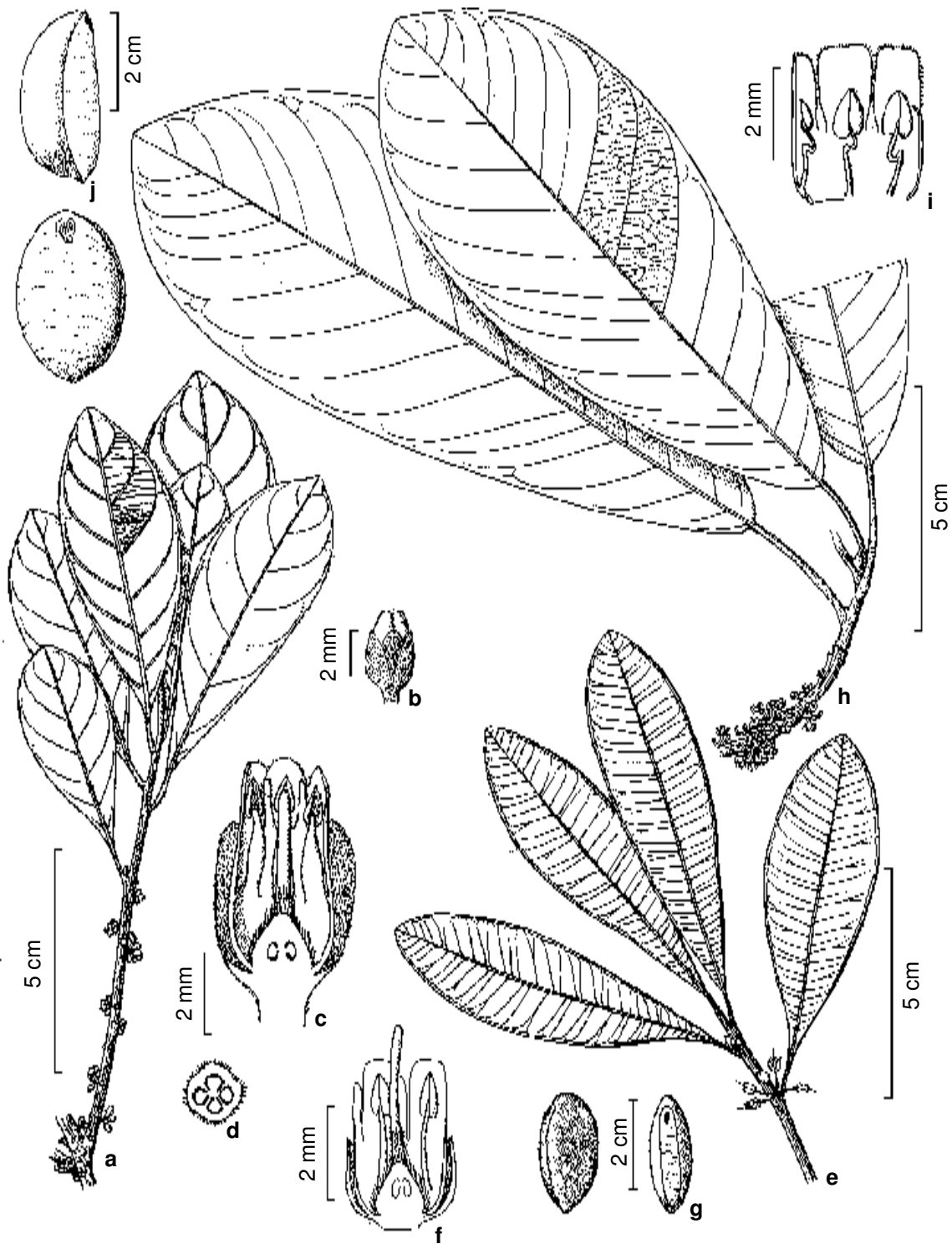


Figura 24 - a-d. *Pouteria resinosa* - a. habit (Mori & Cardoso 20666); b. flower; c. 1/2 flower; d. ovary (Silva s.n.). e-g. *Pouteria gomphiifolia* - e. habit (Croato 20416); f. 1/2 flower (Fróes 219); g. seed (Rimachi 3463). h-j. *Pouteria pariry* - h. habit; i. 1/2 corolla (Capucho 431); j. seed (Cavalcante 282).

latex. Flowers with green corolla, fruit scented, ripening orange, with pale yellowish-green, fibrous, juicy flesh. Flowering August to October and fruit maturing December to April.

Amazonian Brazil from Pará to Rondônia, where it occurs in non-flooded rainforest.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus-Itacoatiara, km 68, W. Rodrigues 8728 (INPA); PARÁ: Tapajós, Boa Vista, Capucho 431 (F IAN); Paraná de Baixo de Óbidos, Ducke 15711 (FMG).

Uses: The large scented fruit is edible and eaten fresh, alone or with sugar, and it is also made into drinks.

Local name: Pariri.

Pouteria pariry differs from other members of section *Pouteria* found in central Amazonia in its 5-merous flowers (4-merous in all other species), with stamens inserted near the base of the corolla tube, and in the very large fruit.

6.50 *Pouteria guianensis* Aubl., Hist. Pl. Guiane 1: 85, tab. 33 (excl. fruit). 1775; Pennington, T. D., Fl. Neotrop. 52: 472, fig. 109. 1990.

Fig. 25 a-d

Young shoots finely appressed puberulous at first, becoming glabrous and scaling. **Leaves** spirally arranged, 11–20 × 5–7 cm, broadly oblanceolate, apex narrowly attenuate to rounded, base acute, glabrous above, minutely appressed puberulous to glabrous below; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 12–16 pairs, parallel or slightly convergent, slightly arcuate, intersecondaries short or absent, tertiaries oblique, quaternaries reticulate, conspicuous on the lower surface. Petiole 1.3–2.5 cm long, margins strongly infolded, finely appressed puberulous. **Fascicles** axillary and on twigs below the leaves, 5–10-flowered. Pedicel 5–6 mm long, appressed puberulous. **Flowers** bisexual. Sepals 4, ca. 4 mm long, broadly ovate, appressed puberulous to sericeous outside. Corolla broadly tubular, 6–7 mm long, tube exceeding the lobes, lobes 4, broadly oblong, apex truncate, ciliate. Stamens 4, fixed about halfway up the corolla tube, glabrous.

Staminodes 4, ca. 1 mm long, narrowly lanceolate, glabrous. Ovary ovoid, 4-locular, densely long-strigose, slightly exerted, style-head simple. **Fruit** 3–6 cm long, ellipsoid or globose, apex and base obtuse to rounded or truncate, smooth, shortly tomentose, becoming glabrous. **Seeds** 2–4, 1.5–3.5 cm long, ellipsoid or plano-convex, rounded at base and apex, testa smooth and shining, scar adaxial and often extending around the base, 0.5–1 cm broad. Seed without endosperm.

Field characters: Tree to 40 m high and 90 cm diam. with steep, slender, thick buttresses, or trunk merely fluted from the base, bole usually fluted above. Bark reddish brown, finely vertically fissured and scaling in long narrow friable strips, slash pale brown with sticky white latex, wood red. Flowers with pale greenish-yellow corolla, and fruit maturing orange-yellow. Flowering in central Amazonia in August and September, fruit maturing in March and April.

Throughout Amazonian Brazil and extending to the Andean countries and the Guianas. Present in lowland rainforest on non-flooded land and extending into montane rainforest in Venezuela and the Andes where it reaches an altitude of 2500 m.

17.XII.1993 (fr) Assunção, P. A. C. L. 04 (IAN INPA K R U); 9.IX.1994 (fl) Assunção, P. A. C. L. 51 (INPA K MG MONY PEUFR RB SPU); 19.IX.1997 (fl) Assunção, P. A. C. L. et al. 665 (COL F INPA K MG SPF UEC UFMT VEN); 10.III.1994 (fr) Ribeiro, J. E. L. S. et al. 1222 (INPA K MG MONY RB SP); 21.VIII.1997 (fl) Ribeiro, J. E. L. S. et al. 1902 (BM G IAN INPA K MBM R UB US); 31.XII.1963 (fr) Rodrigues, W. & Monteiro, O. P. 5646 (INPA); 23.III.1966 (fr) Rodrigues, W. & Coêlho, D. 7603 (INPA).

Local names: Abiu, abiurana.

Uses: The species provides useful heavy construction timber.

Pouteria guianensis is recognizable in the field by its narrowly buttressed and fluted bole, with narrowly fissured reddish-brown bark, and by the petioles with strongly infolded margins. The reticulate higher order venation is characteristic in dried specimens. It is closely related to *P. caimito*, *P. hispida* and *P. torta*. See under those species for further comment.

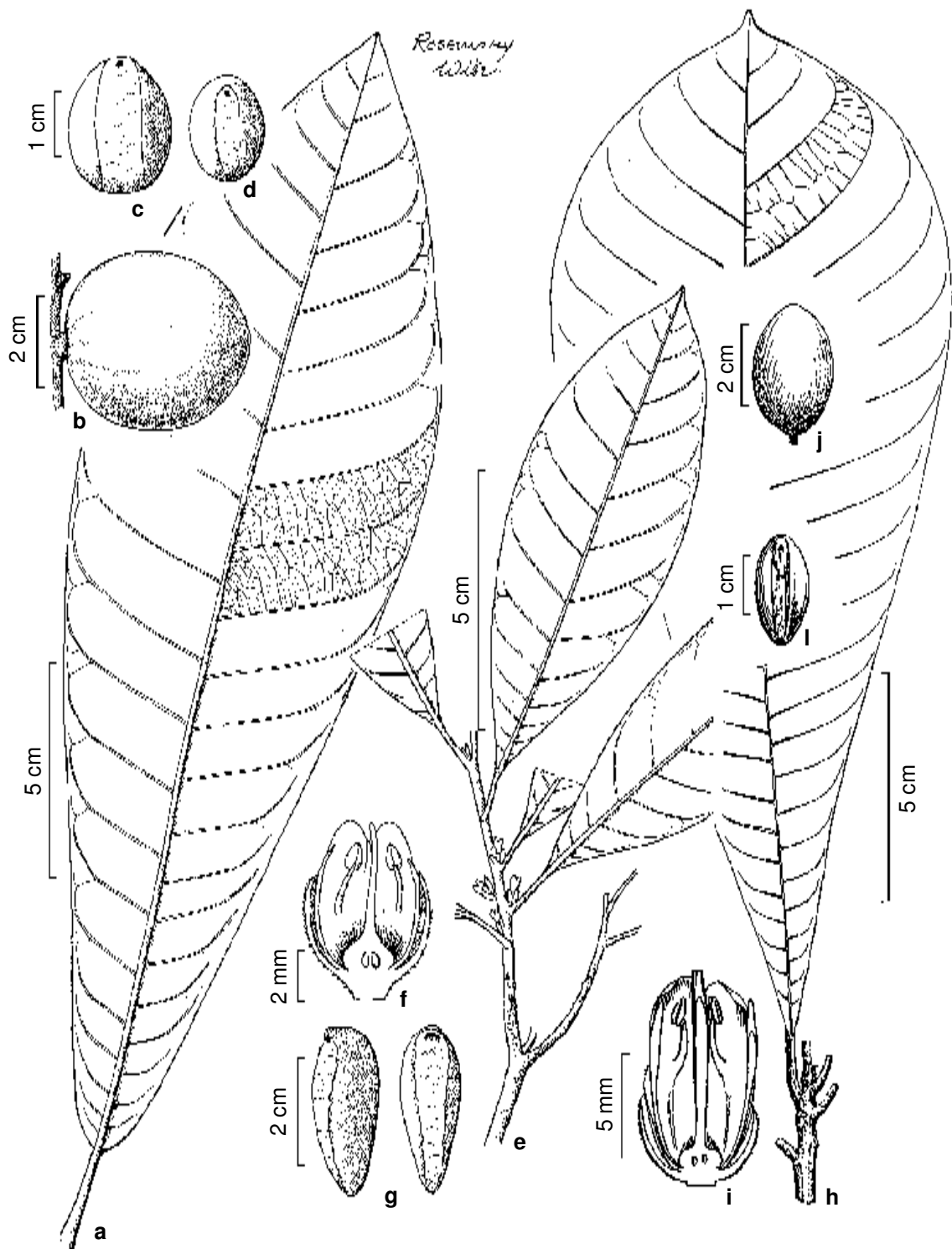


Figura 25 - a-d. *Pouteria guianensis* - a. leaf (Steyermark 122161); b. fruit (Steyermark 60991); c. seed (Steyermark & Davidse 116748); d. seed (Granville 5256). e-h. *Pouteria caimito* - e. habit (Baker 75); f. 1/2 flower (Pennington & Tenorio 10746); g. seed (Pennington 10672). h-l. *Pouteria torta* subsp. *glabra* - h. habit; i. 1/2 flower (Pennington & Tenorio 10745); j. fruit; k. seed (Gentry et al. 25495).

6.51 *Pouteria caimito* (Ruiz & Pavón) Radlk., Sitzungsber. Math.-Phys. Cl. Konigl. Akad. Wiss. München 12: 33. 1882; Pennington, Fl. Neotrop. 52: 475, fig. 109. 1990. **Fig. 25 e-h**

Young shoots finely appressed puberulous, soon glabrous and scaling. **Leaves** spirally arranged, 7–14 × 2.8–5 cm, oblanceolate or elliptic, apex narrowly attenuate to obtuse, base narrowly attenuate, glabrous; venation eucamptodromous or sometimes brochidodromous in the upper half, midrib slightly raised on the upper surface, secondary veins 9–12 pairs, parallel or slightly convergent, slightly arcuate, intersecondaries short to moderate, tertiaries few, mostly reticulate, finer higher order reticulum present. Petiole 0.8–1.4 cm long, channelled or not, glabrous. **Fascicles** 3–5-flowered, axillary and on twigs below the leaves. Pedicel 0.5–1 mm long, appressed puberulous. **Flowers** bisexual. Sepals 4, 2.5–3 mm long, outer pair ovate, inner pair broadly elliptic, appressed puberulous outside. Corolla tubular, 4–4.5 mm long, tube exceeding the lobes, lobes 4, broadly oblong, apex truncate or rounded, ciliate. Stamens 4, fixed about halfway up the corolla tube, glabrous. Staminodes 4, ca. 1 mm long, narrowly lanceolate, glabrous. Ovary ovoid, 4-locular, densely long-strigose, style slightly exserted, style-head simple. **Fruit** 3–5 cm long, ellipsoid, ovoid or globose, apex acute to rounded, base rounded or truncate, smooth, pubescent or glabrous. **Seeds** 1-several, 1.5–2.5 cm long, oblong to ellipsoid, sometimes laterally compressed, base and apex rounded or obtuse, testa smooth, shining; scar adaxial, full-length, 2–4 mm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 50 cm diam., but often flowering when only a few metres high. Larger individuals are shortly buttressed and may have a fluted bole. Bark scaling and shallowly fissured, and slash cream with white latex. The flowers are scented, with greenish white corolla. Fruit maturing yellow, with white flesh. Flowering in central Amazonia in November.

The cultivated form of this species has a smooth yellow fruit up to 7 cm long.

Southern Central America and across tropical South America to coastal Brazil. The species is found in both lowland and montane rainforest up to 1500 m altitude, on both non-flooded and periodically flooded sites.

11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F. 649* (G IAN INPA K MBM MO RB U UB); 12.IX.1997 (fl) *Assunção, P. A. C. L. et al. 661* (INPA K MG UEC US); 25.XI.1997 (fr) *Brito, J. M. et al. 45* (INPA K MG MONY RB SPU); 21.VI.1980 (fr) *Nelson, B. W. & Nelson, S.P. 428* (INPA); 10.II.1994 (fr) *Ribeiro, J. E. L. S. et al. 1205* (INPA K MG MONY SP); 8.I.1962 (fr) *Rodrigues, W. & Chagas, J. 3263* (INPA); 23.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7601* (INPA); 9.XII.1994 (fl) *Sothers, C. A. et al. 298* (INPA K MG NY SP); 16.I.1998 (fr) *Souza, M. A. D. et al. 520* (BM G INPA K MBM MG UB US). PDBFF: *Freitas et al. F-427* (INPA K); *Freitas et al. F-420* (INPA K).

Uses: This species has one of the best edible fruit of the family, and it is widely cultivated and sold on the local markets. The best varieties are to be found in western Amazonia, especially in Amazonian Peru. The cultivated form fruits as a small bush a few metres high.

Pouteria caimito is close to *P. guianensis*, but may be distinguished from it by its smaller leaves with fewer secondary veins and narrowly attenuate base (acute in *P. guianensis*), smaller flowers and usually laterally compressed seeds. Two forms of *P. caimito* exist in Reserva Ducke. The typical form has a closely appressed indumentum on the young parts and inflorescence, and the other form has a spreading, coarser indumentum on the young parts. The latter sometimes has a small 1-seeded coarsely hairy fruit. It is represented by *Sothers et al. 298*.

6.52 *Pouteria torta* subsp. *glabra* T. D. Penn., Fl. Neotrop. 52: 484, fig. 111. 1990.

Fig. 25 i-m

Young shoots shortly pubescent with golden-brown hairs, soon becoming glabrous. **Leaves** clustered at the shoot tips, spirally arranged, 25–35 × 9–13 cm, broadly oblanceolate with a long tapering base, apex

obtusely cuspidate to shortly and narrowly attenuate, base acute to obtuse; glabrous, or with some short pubescence along the midrib above; venation eucamptodromous, midrib not or only slightly raised on the upper surface, sometimes recessed, secondary veins 19–25 pairs, straight, parallel, intersecondaries absent, tertiaries oblique, numerous, fine quaternary reticulum visible on both surfaces. Petiole 1.5–5.5 cm long, channelled, shortly pubescent. **Fascicles** few-flowered, clustered on twigs below the leaves. Pedicel 0–2 mm long, shortly pubescent. Sepals 4, 4–10 mm long, ovate or elliptic, sericeous outside, glabrous inside. Corolla tubular, 0.7–1.3 cm long, tube exceeding the lobes, lobes 4, broadly oblong, apex rounded to truncate, often ciliate. Stamens 4, fixed about halfway up or in the upper half of the corolla tube, glabrous. Staminodes 4, 1–2 mm long, lanceolate or subulate, glabrous. Ovary ovoid, 4-locular, densely long-strigose, style exerted, style-head simple or minutely lobed. **Fruit** 3–5 cm long, ellipsoid to globose, apex obtuse to rounded, base rounded or truncate, smooth, pubescent. **Seeds** 1–4, 2–3.5 cm long, rounded at apex and base, plano-convex or sometimes slightly laterally compressed, testa smooth, shining; scar adaxial and often extending around the base, rather variable in width, up to 1 cm wide. Seed without endosperm.

Field characters: Tree to 30 m high and 50 cm diam., larger specimens with small buttresses. Bole fluted, bark reddish brown, scaling in small papery pieces. Slash reddish-brown with sticky white latex. Flowers scented, with greenish-yellow corolla. Fruit maturing yellow or orange. Flowering in central Amazonia from October to December, fruit maturing April to May.

The Guianas and across the whole of Brazilian Amazonia to the foothills of the Andes in lowland and montane rainforest up to 1000 m altitude. It is recorded from both non-flooded and periodically flooded sites.

7.V.1958 (fr) *Coelho, L. 2* (INPA); 5.V.1994 (fr) *Ribeiro, J. E. L. S. et al. 1310* (G INPA K); 5.IV.1966 (fr) *Rodrigues, W. & Monteiro, O. P. 7656* (INPA28.IV.1994 (fr); *Vicentini, A. et al. 517* (INPA K NY).

Pouteria torta is closely related to *P. guianensis* and their flower and fruit are very

similar. They differ, however, in the details of their bark and leaf morphology. The petiole of *P. torta* subsp. *glabra* is less strongly infolded than that of *P. guianensis* and the leaves are generally larger with a finer, closed higher order vein reticulum. *Pouteria torta* subsp. *glabra* also lacks the sericeous indumentum which is often present on the lower leaf surface of *P. guianensis*.

6.53 *Pouteria hispida* Eyma, Recueil Trav. Bot. Néerl. 33: 177. 1936; Pennington, T. D., Fl. Neotrop. 52: 488, fig. 122. 1990. **Fig. 26 a-f**

Young shoots closely appressed pubescent to hispid, soon becoming glabrous. **Leaves** spirally arranged, 5–20 × 2.5–6 cm, oblanceolate, apex narrowly attenuate to rounded, base acute to narrowly attenuate, upper surface usually glabrous, lower surface shortly hispid to glabrous; venation eucamptodromous to brochidodromous, midrib slightly raised on the upper surface, secondary veins 10–15 pairs, straight or slightly arcuate, slightly convergent, intersecondaries mostly short or absent, tertiaries oblique, fine higher order reticulum present. Petiole 9–15 mm long, channelled, hispid to subglabrous. **Fascicles** mostly clustered below the leaves, 2–5-flowered. Pedicel 0–1.5 mm long, hispid to appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 4, 2–4 mm long, broadly ovate, sericeous outside. Corolla broadly tubular, 3–5 mm long, tube exceeding the lobes, lobes 4, apex rounded or truncate, often ciliate. Stamens 4, fixed in the lower or upper half of the corolla tube, glabrous, anthers absent in female flower. Staminodes 4, 0.5–1.5 mm long, subulate, glabrous, vestigial in female flower. Ovary ovoid, 4-locular, densely long-strigose, style exerted or included. **Fruit** 3.5–6 cm long, ovoid or globose, apex and base obtuse to rounded or truncate, smooth, velutinous. **Seeds** several, 2.5–3.5 cm long, ellipsoid or shaped like the segment of an orange, testa smooth, shining; scar adaxial, 2–3.5 mm wide, sometimes extending around the base of the seed. Seed without endosperm.

Field characters: Tree to 30 m high and 1 m diam., larger specimens buttressed to several metres high. Bole usually fluted, bark reddish-brown, scaling in longitudinal or irregular pieces, slash pinkish-red to orange, with sticky white latex. Flowers with greenish corolla. Fruit maturing orange to red, with thick hard flesh; there is a thin (2–3 mm) layer of sweet yellowish juicy jelly surrounding the seed. Flowering October to December, fruit maturing March to May.

Southern Central America, Venezuela and the Guianas, Amazonian Brazil, Peru and Bolivia, in lowland rainforest on non-flooded land.

12.V.1995 (fr) *Assunção, P. A. C. L. & Silva, C. F. 197* (G INPA K MBM MG R RB U US); 11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F. 645* (BM G INPA K MBM MG SPF UEC US VEN); 10.III.1998 (fr) *Assunção, P. A. C. L. et al. 813* (G INPA K MBM MG UB US); 12.XII.1969 (fr) *Monteiro, O. P. 20* (INPA); 7.I.1966 (fr) *Rodrigues, W. & Monteiro, O. P. 7381* (INPA); 29.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7635* (INPA); 15.IV.1966 (fr) *Rodrigues, W. & Coêlho, D. 7684* (INPA); 4.V.1966 (fr) *Rodrigues, W. & Coêlho, D. 7814* (INPA); 16.XII.1997 (fl) *Sothers, C. A. & Pereira, E. C. 1070* (IAN INPA K MO NY RB SP U UB VEN); 1.III.1996 (fr) *Souza, M. A. D. et al. 237* (BM IAN INPA K NY UB).

There are two forms of this species in Reserva Ducke. The first has rather small leaves with a rounded apex, and an indumentum of appressed hairs (*Assunção & Silva 197*). The second has larger leaves with an attenuate apex and an indumentum of erect 2-branched hairs (*Souza et al. 237*). They are not recognized as distinct species due to the numerous intermediates found in other areas. *Pouteria hispida* is close to *P. torta*, but may be distinguished from it by the leaf size and/or shape and the indumentum difference, and the smaller flowers.

6.54 *Pouteria decorticans* T. D. Penn., Fl. Neotrop. 52: 489, fig. 112. 1990. **Fig. 26 g-l**

Young shoots finely appressed puberulous with pale hairs, soon glabrous and scaling in thin papery sheets. **Leaves** clustered at the shoot tips, spirally arranged, 14–20 × 5–8 cm,

oblanceolate, apex narrowly acuminate to caudate, base narrowly attenuate, glabrous above, fine pale appressed hairs below, mostly confined to the midrib and veins; venation eucamptodromous, midrib slightly raised on the upper surface; secondary veins 14–18 pairs, mostly straight and parallel, intersecondaries absent, tertiaries oblique, quaternary reticulum present. Petiole 1.5–3.5 cm long, channelled, subglabrous. **Fascicles** axillary and clustered below the leaves, 2–4-flowered. **Flowers** sessile. Sepals 4, 6–7 mm long, broadly ovate or elliptic, appressed pubescent on the outer surface. Corolla broadly tubular, 1–1.1 cm long, tube exceeding the lobes, lobes 4, broadly oblong, glabrous. Stamens 4, fixed in the upper half of the corolla tube, glabrous. Staminodes 4, ca. 2 mm long, narrowly lanceolate, glabrous. Ovary ovoid, 4-locular, densely stiff-hairy, style exerted from the flower bud, later included. **Fruit** 3–3.5 cm long, broadly ellipsoid, apex and base obtuse, smooth, appressed puberulous with pale hairs. **Seeds** several, 1.8–2 cm long, oblong to ellipsoid, often plano-convex, testa smooth, shining; scar adaxial and extending around the base, ca. 2 mm wide. Seed without endosperm.

Field characters: Tree to 25 m high and 35 cm diam., unbuttressed or larger specimens with small buttresses to 50 cm high, bole fluted or irregular in section, bark reddish-brown, exfoliating profusely in large irregular papery pieces, slash ca. 2 mm, orange, pink or cream, with sticky white latex. Flowers with greenish-white corolla, and fruit maturing yellow or pale orange. Flowering in central Amazonia in July, fruit maturing in November.

Venezuela and the Guianas, across Brazilian Amazonia to Rondônia, where it occurs in non-flooded rainforest up to 500 m altitude.

Not collected in Reserva Ducke.

PDBFF: *Lepsch Cunha et al. 220a* (INPA K); *Freitas et al. 314* (INPA K); *Ferreira et al. PDBFF 3402.4510* (INPA K).

Although closely related to *P. torta* and other species of this group, *P. decorticans* has a distinctive appearance both in the field and

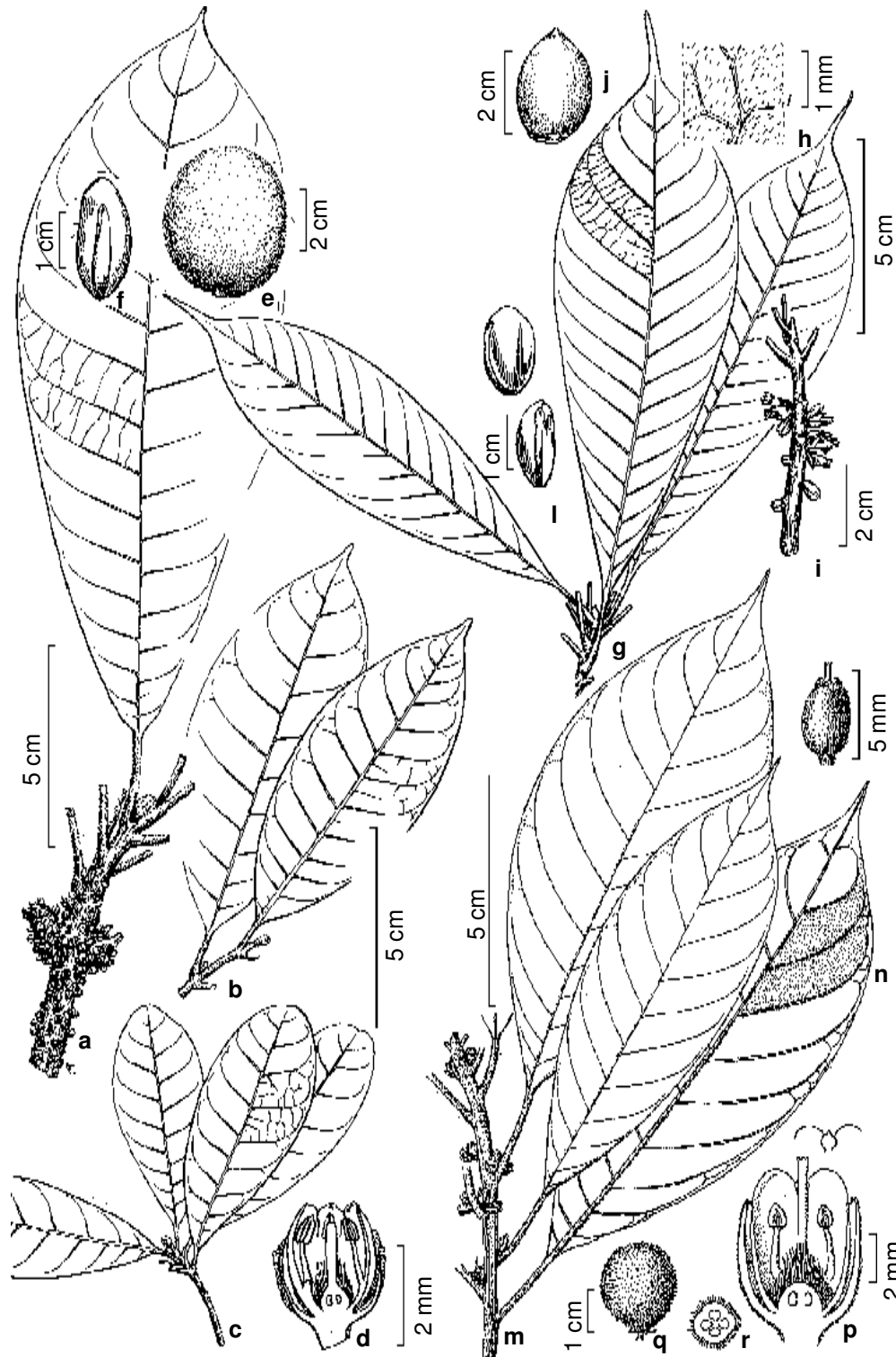


Figura 26 - a-f. *Pouteria hispida* - a. habit (FDBG 7551); b. habit (Blanco 72); c. habit (Blanco 78); d. 1/2 flower (Marcano-Berti 261); e. fruit; f. seed (Diaz et al. 1058). g-l. *Pouteria decorticans* - g. habit; h. detail of indumentum (Boom & Mori 1970); i. inflorescence (Black et al. 57-19964); j. fruit; l. seed (Mori & Pipoly 15409). m-q. *Pouteria freitasii* - m. habit; n. indumentum on leaf lower surface (Ribeiro 1919); o. flower bud; p. 1/2 flower (Freitas 510); q. young fruit; r. section of ovary (Souza 508).

herbarium, that enable it to be distinguished at a glance. The thin papery reddish-brown bark is unlike that of any other Sapotaceae, and in the herbarium the long petioles and pale undersurface, acuminate or caudate leaf tip form a distinctive combination.

6.55 *Pouteria freitasii* T. D. Penn., *sp. nov.* (section *Pouteria*). **Type:** Brazil, Amazonas, Manaus, Distrito Agropecuário, Reserva 1501 (km 41), August 1990, fl., M. A. de Freitas 510 (tree 324) (holotype INPA *n.v.*, isotype K).

Fig. 26 m-q

P. filipes affinis sed foliorum costa supra impressa, nervis quaternariis subtiliter areolatis, et floribus magnis differt.

Arbor; stipulae nullae; folia 11–19 × 5–7.5 cm, late oblanceolata, infra adpresse pubescentia pilis chrysobrunneis; nervi secundarii 11–14-jugi, recti, paralleli; fasciculi plerumque axillares; pedicellus 1–1.5 mm longus; sepala 4; corolla tubularis, ca. 6 mm longa, lobis 4; stamina 4; staminodia 4; ovarium 4-loculare, pubescens.

Tree. Young shoots appressed pubescent with golden brown hairs, eventually becoming glabrous, pale greyish. Stipules absent. **Leaves** spirally arranged, 11–19 × 5–7.5 cm, broadly oblanceolate, apex narrowly attenuate or cuspidate, base acute, glabrous above, closely and densely appressed pubescent below with golden-brown hairs; venation eucamptodromous, midrib sunken on the upper surface, secondary veins 11–14 pairs, straight or slightly arcuate, parallel, intersecondaries absent, tertiaries few, oblique, fine quaternary areolate reticulum visible on the upper surface (with lens). Petiole 1.3–3 cm long, slightly channelled above, appressed pubescent. **Fascicles** 3–5-flowered, mostly axillary. Pedicel stout, 1–1.5 mm long, sericeous. Sepals 4, 4–4.5 mm long, outer pair broadly ovate, apex obtuse, inner pair orbicular; sericeous outside, glabrous inside. Corolla tubular, *ca.* 6 mm long, tube exceeding the lobes, lobes 4, *ca.* 1.5 mm long, apex truncate, not ciliate, glabrous. Stamens 4, fixed in the lower half of the corolla tube,

filaments *ca.* 2.5 mm long, glabrous, anthers *ca.* 0.75 mm long, flattened dorso-ventrally, glabrous. Staminodes 4, 0.5–0.75 mm long lanceolate to ovate, glabrous. Disk absent. Ovary 4-locular, globose, densely pubescent, style *ca.* 3 mm long, glabrous, exserted, style-head simple or minutely 4-lobed. Fruit unknown.

Field characters: Tree to 30 m high and 70 cm diam., bole fluted at the base, cylindrical above. Bark greyish-brown, or brown, regularly and narrowly fissured, outer slash dark brown, inner pinkish, with plentiful white latex. The leaves are golden-brown on the lower surface. Flowers with green corolla. Flowering in August.

Known only from central Brazilian Amazonia, where it occurs in mixed rainforest on non-flooded sites. It is particularly common at the type locality where 48 individuals (10 cm DBH or greater) were recorded from a 25 hectare sample.

Paratypes: 14.I.1998 (fr) Assunção, P. A. C. L. & Silva, C. F. 770 (K); 23.IX.1997 (fl) Ribeiro, J. E. L. S. & Assunção, P. A. C. L. 1919 (K); 19.IX.1997 (fl) Souza, M. A. D. 420 (K); 18.XII.1997 (fr) Souza, M. A. D. *et al.* 508 (K).

PDBFF: Freitas F-503 (K); Pennington *et al.* 12649 (INPA K); Pennington *et al.* 12940 (INPA K); Pennington *et al.* 13004 (INPA K).

Pouteria freitasii is one of the most easily recognized trees among central Amazonian Sapotaceae, on account of its distinctive bole and the golden-brown indumentum on the lower leaf surface. Its trunk is fluted at the base and the bark is characteristically narrowly and regularly fissured. In the herbarium sterile specimens may easily be confused with *P. filipes*, which has a similar indumentum, but the latter lacks the sunken midrib of *P. freitasii* and the fine areolate reticulum (visible on the upper surface with a lens). The flowers of *P. freitasii* are about twice the size of those of *P. filipes*.

The leaf venation and floral size and structure place this species firmly within the group of *P. guianensis*, *P. hispida*, *P. decorticans*, but it differs from all of these in the characteristic reddish-brown indumentum of the young shoots, leaves and inflorescence, in the sunken midrib of the leaves and in the finely areolate venation.

Section *Aneulucuma* (Radlk.) T. D. Penn.

6.56 *Pouteria procera* (Mart.) T. D. Penn., Fl. Neotrop. 52: 504, fig. 116. 1990. **Fig. 27 a-d**

Lucuma procera Mart., Flora 22, Beibl. 1: 57. 1839.

Young shoots minutely puberulous at first, soon glabrous and scaling. **Leaves** spirally arranged, 6–12 × 2–4.5 cm, elliptic or lanceolate, apex narrowly attenuate or acuminate, base shortly and narrowly attenuate, glabrous; venation eucamptodromous, midrib flat or slightly raised on the upper surface, secondary veins 9–15 pairs, slightly convergent, arcuate, intersecondaries short to moderately long, tertiaries forming a loose reticulum. Petiole 5–12 mm long, slightly channelled, glabrous. **Fascicles** axillary and on twigs below the leaves, 3–12-flowered. Pedicel 0.5–2 mm long, sometimes with 1–2 small bracts, sparsely appressed puberulous. Sepals 5–6, outer 1.5–2 mm long, inner 3–3.5 mm long, broadly ovate, sparsely appressed puberulous or glabrous outside, sericeous inside; ciliate. Corolla shortly tubular, 3–5.5 mm long, tube exceeding the lobes, lobes 5, broadly oblong, glabrous. Stamens 5, fixed at the top of the corolla tube, glabrous. Staminodes 5, 0.5–1.5 mm long, lanceolate or subulate, glabrous. Ovary ovoid, 5-locular, densely pubescent, style slightly exerted in flower bud, equalling or exceeding the open corolla. **Fruit** 3.5–4 cm long, broadly obovoid, apex rounded, base attenuate, smooth, thin-walled (often shrinks on drying), with residual appressed puberulous indumentum. **Seeds** 1–2, 2–3 cm long, broadly ellipsoid, rounded at base and apex, testa smooth to slightly verruculose; scar adaxial and extending around the base, 0.6–1.2 cm wide. Seed without endosperm.

Field characters: Tree to 45 m high and 1 m diam., larger specimens buttressed. Slash with white latex. The flowers have a yellowish green corolla, and the fruit ripens yellow or orange. Flowering in central Amazonia in February.

Venezuela, Brazilian Amazonia to Peru and Bolivia, coastal Brazil. It occurs in lowland rainforest, frequently on periodically flooded land (*restinga alta*).

Not recorded from Reserva Ducke

AMAZONAS: Manaus, Careiro, *Fróes 24061* (NY); Amazonas, mouth of R. Embira, *Krukoff 5177* (A BMFKMMONYRB US).

Pouteria procera is the only species of section *Aneulucuma* in central Amazonia. The section is characterized by having a calyx of more than 5 sepals arranged in a spiral, 5-locular ovary and seed with a broad scar and frequently verrucose or pitted testa.

Section *Gayella* (Pierre) T. D. Penn.

6.57 *Pouteria eugeniifolia* (Pierre) Baehni, Candollea 9: 218. 1942; Pennington, T. D., Fl. Neotrop. 52: 527, fig. 124. 1990.

Fig. 27 e-g

Micropholis eugeniifolia Pierre, Not. Bot. 40. 1891.

Young shoots appressed puberulous to sericeous with reddish-ferruginous hairs, soon glabrous. **Leaves** spaced, usually opposite, but often variable on the same shoot and then some spirally arranged, 4–10 × 2–8 cm (leaves on sterile specimens may be 1.5–2 times this size), lanceolate, elliptic or oblong-elliptic, apex acute to attenuate, base narrowly attenuate, acute or rounded, glabrous or some reddish-ferruginous appressed indumentum restricted to the midrib and veins below, often slightly glaucous below; venation brochido-dromous, midrib flat or slightly sunken on the upper surface, secondaries 15–18 pairs, widely spreading, straight, parallel, slightly impressed on the upper surface, intersecondaries long, extending from the submarginal loops to the midrib, tertiaries reticulate, tending to descend from the margin towards the midrib. Petiole 5–10 mm long, not channelled, appressed puberulous with reddish-ferruginous hairs. **Fascicles** 5–10-flowered, axillary and clustered on twigs below the leaves. Pedicel 4–5 mm long, appressed puberulous. Sepals 5, 1–1.5 mm long, ovate or triangular, puberulous outside. Corolla rotate, 2–2.5 mm long, tube shorter than the lobes, lobes 5, lanceolate, apex acute, appressed pubescent outside, glabrous

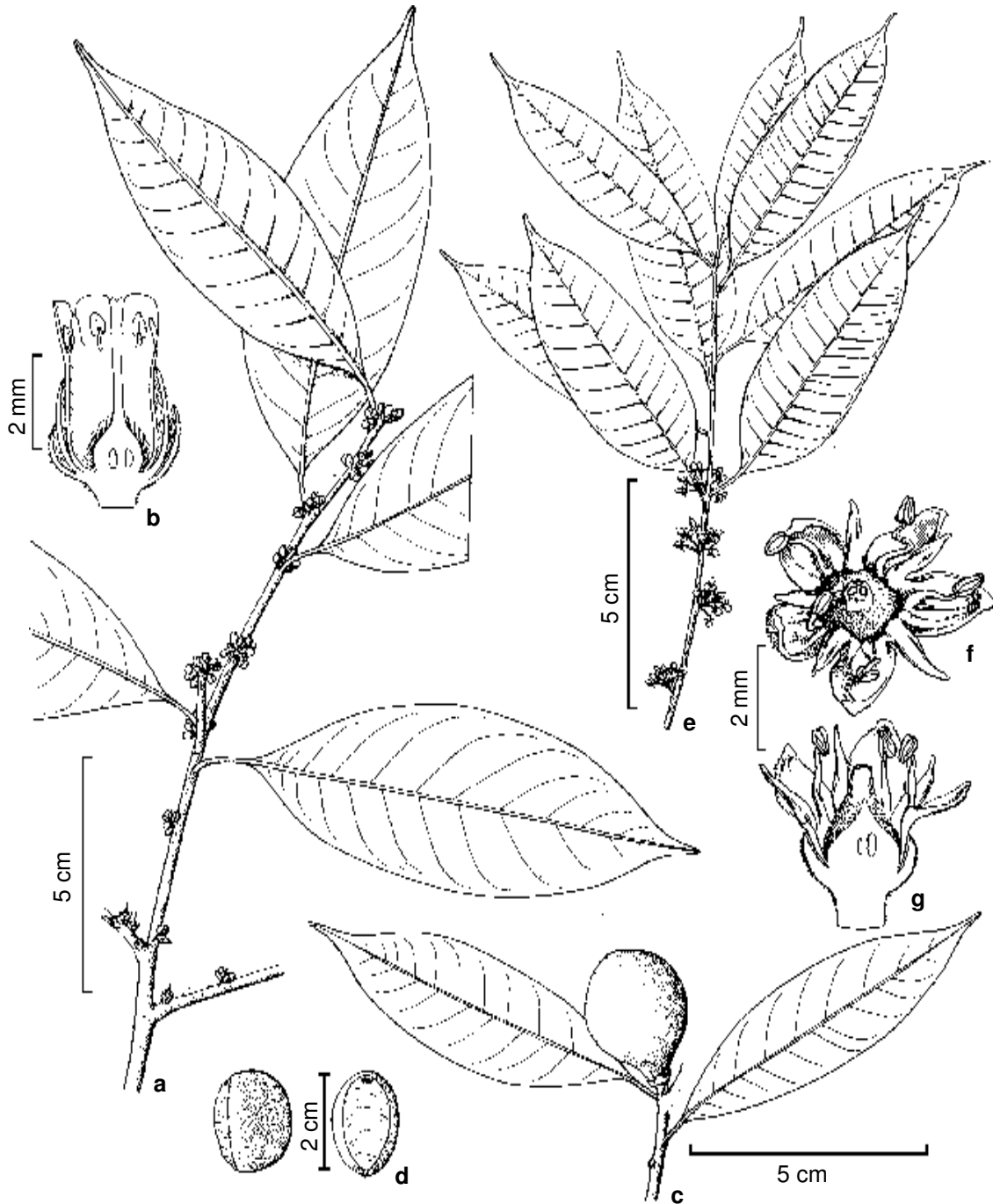


Figura 27 - a-d. *Pouteria procera* - a. habit (Pinheiro 328); b. 1/2 flower (Santos 378); c. habit with fruit (Steyermark et al. 101941); d. seed (Curran 25). e-g. *Pouteria eugeniifolia* - e. habit (Silva & Bahia 3093); f. flower; g. 1/2 flower (Maguire & Politi 28742).

inside. Stamens 5, fixed at the top of the corolla tube, exerted, glabrous. Staminodes 5, 1.5–2 mm long, narrowly lanceolate, or subulate, glabrous. Ovary ovoid, 4–5-locular, appressed puberulous, style glabrous. **Fruit** 1.5–2 cm long, subglobose, apex rounded, base rounded or tapered, smooth, appressed puberulous with ferruginous hairs. **Seed** solitary, 1–1.3 cm long, broadly ellipsoid, testa smooth; scar adaxial, 3–5 mm broad. Seed without endosperm.

Field characters: Tree to 40 m high and 60 cm diam., larger specimens with simple or branched steep buttresses merging into a fluted bole, upper bole usually cylindrical. The buttresses sometimes run several metres from the trunk. Bark reddish-brown, scaling in large irregular pieces. Slash reddish-brown, with cream or cream-brown sticky latex. Flowers pale green, fruit brown. Flowering in central Amazonia recorded in May and September.

Colombia, Venezuela and the Guianas and Amazonian Brazil. It occurs in non-flooded rainforest up to an altitude of 1000 m. 9.IX.1994 (fl) *Assunção, P. A. C. L. 49* (INPA K MG MONY R RB SP U); 21.V.1997 (fl) *Sothers, C. A. 990* (BM G IAN INPA K MBM UB UEC US).

Pouteria eugeniifolia is the only species of section *Gayella* in central Amazonia and is characterized by its rotate pentamerous flowers with exerted stamens. In the field it is distinctive because of the opposite (decussate) leaves which are usually glaucous below.

7. Chrysophyllum

Chrysophyllum L., Sp. Pl. 192. 1753; Cronquist, A. J. Bull. Torrey Bot. Club 72: 191. 1945; 73: 286. 1946.

Unarmed **trees**. Stipules absent. **Leaves** alternate and distichous or spirally arranged. Venation brochidodromous or eucamptodromous, tertiary veins parallel to the secondaries and descending from the margin, or oblique and closely parallel or reticulate. **Inflorescence** axillary or ramiflorous. **Flowers** unisexual or bisexual. Calyx a single whorl of 5 sepals, sometimes accrescent in fruit. Corolla globose, campanulate or cylindrical, tube shorter than, equalling or longer than the lobes, lobes 5, simple. Stamens 5, fixed in the lower or upper part of the corolla tube, included; anthers hairy or glabrous. Staminodes absent (minute staminodes present in *C. pomiferum* and *C. durifructum*). Ovary (2–)5-locular, style included. **Fruit** 1–5-seeded. **Seed** laterally compressed and with a narrow adaxial scar, or not laterally compressed and then the scar broader, basi-ventral or adaxial; testa smooth and shining, or rough and then adherent to the pericarp; embryo with thin, foliaceous or thick flat cotyledons and exerted radicle; endosperm abundant.

Forty three species in the Neotropics, ca. 15 in Africa, ca. 10 in Madagascar and 2–3 in Asia and the Pacific. Eleven species in Reserva Ducke and environs.

Key to the species of *Chrysophyllum* of the Manaus area

1. Leaves alternate and distichous, venation mostly brochidodromous, seed scar broad, basiventral.
 2. Corolla sericeous; stamens fixed at the apex of the corolla tube, anthers glabrous 1. *C. argenteum*
 2. Corolla more or less glabrous; stamens fixed in lower half of the corolla tube, anthers hairy 2. *C. sparsiflorum*
1. Leaves spirally arranged, venation eucamptodromous, seed scar narrow, adaxial, sometimes extending around the base of seed.
 3. Seed coat rough, not shining, adherent to the pericarp.
 4. Leaves broadly oblanceolate or obovate, persistently rufous-brown sericeous below, secondary veins 7–14 pairs 8. *C. prieurii*
 4. Leaves narrower, not rufous-brown sericeous, secondary veins often more than 14 pairs.

5. Indumentum of young parts and lower leaf surface crisped or spreading, not appressed, secondary veins straight 7. *C. manaosense*
5. Indumentum of young shoots and lower leaf surface appressed, secondary veins slightly arcuate.
 6. Leaves 16–26 cm long, secondary veins 13–21 pairs, petiole 2–4.5 cm long, fruit 4.5–5 cm long, rough-skinned, without lenticels 6. *C. colombianum*
 6. Leaves 9.3–17.5 cm long, secondary veins 10–13 pairs, petiole 1–2.2 cm long, fruit 3–4.5 cm long, smooth, lenticellate 5. *C. amazonicum*
3. Seed coat smooth, shining, free from pericarp.
 7. Sepals usually accrescent in fruit; seed scar adaxial and extending around the base.
 8. Leaf indumentum closely appressed or leaves glabrous 3. *C. sanguinolentum*
 8. Leaf indumentum tomentose with ferruginous spreading hairs 4. *C. ucuquirana-branca*
 7. Sepals not accrescent in fruit; seed scar adaxial, not extending around the base.
 9. Young shoots, leaves and inflorescence densely golden or ferruginous-tomentose with spreading hairs 13. *C. eximium*
 9. Young shoots, leaves and inflorescence with closely appressed pubescence or glabrous.
 10. Corolla tube shorter than the lobes 11. *C. lucentifolium*
 10. Corolla tube equalling or exceeding the lobes.
 11. Leaves mostly less than 10 cm long, venation mostly brochidodromous, secondary veins 7–10 pairs, petiole 3–7 mm long 9. *C. pomiferum*
 11. Leaves 11–28 cm long, venation eucamptodromous, secondary veins 11–16 pairs, petiole 2–4 cm long.
 12. Leaves 13–28 × 6–12 cm, secondary veins slightly convergent, tertiary veins reticulate, sepals glabrous, staminodes present 10. *C. durifructum*
 12. Leaves 11–15 × 4.5–6 cm, secondary veins parallel, tertiary veins oblique, sepals sericeous inside, staminodes absent 12. *C. wilsonii*

Section *Chrysophyllum*

7.1 *Chrysophyllum argenteum* Jacq., Enum. Syst. Pl. 15. 1760; Pennington, T. D., Fl. Neotrop. 52: 543, fig. 126. 1990. **Fig. 28 a-d**

Young shoots sericeous, with golden-brown hairs, soon glabrous. **Leaves** alternate and distichous, 8–15 × 4–6 cm, broadly oblong or elliptic, apex obtusely cuspidate or narrowly attenuate, base acute to rounded, glabrous above, golden sericeous to subglabrous below; venation mostly brochidodromous, midrib sunken on the upper surface, secondary veins 10–16 pairs, parallel, straight or slightly arcuate, not impressed or raised on the upper surface, intersecondaries often long, tertiaries more or less parallel to the secondaries and descending from the margin, eventually forming a lax reticulum. Petiole 1–1.5 cm long, channelled, sericeous. **Fascicles** axillary, 5–10-flowered. Pedicel 3–5 mm long, sericeous. **Flowers**

bisexual. Sepals 1.5–2 mm long, sericeous outside. Corolla 4–5 mm long, tubular, tube much longer than the lobes, sericeous outside. Stamens fixed at the top of the corolla tube, glabrous. Ovary 5-locular, appressed puberulous, style-head conspicuously 5-lobed. **Fruit** 1–2.5 cm long, ellipsoid, apex and base acute to rounded, smooth, glabrous, fleshy. **Seed** solitary, 0.8–2 cm long, ellipsoid, slightly laterally compressed, testa smooth, shining; scar broad, basi-ventral.

Field characters: Tree to 30 m high and 50 cm diam., but often flowering when only a few metres high. Large specimens have small rounded buttresses. Bark fissured, greyish, with pink or reddish slash and copious sticky white latex. Flowers pale greenish-cream and fruit ripening purplish-black. Flowering in central Amazonia mostly July to September, fruit ripening November to April.

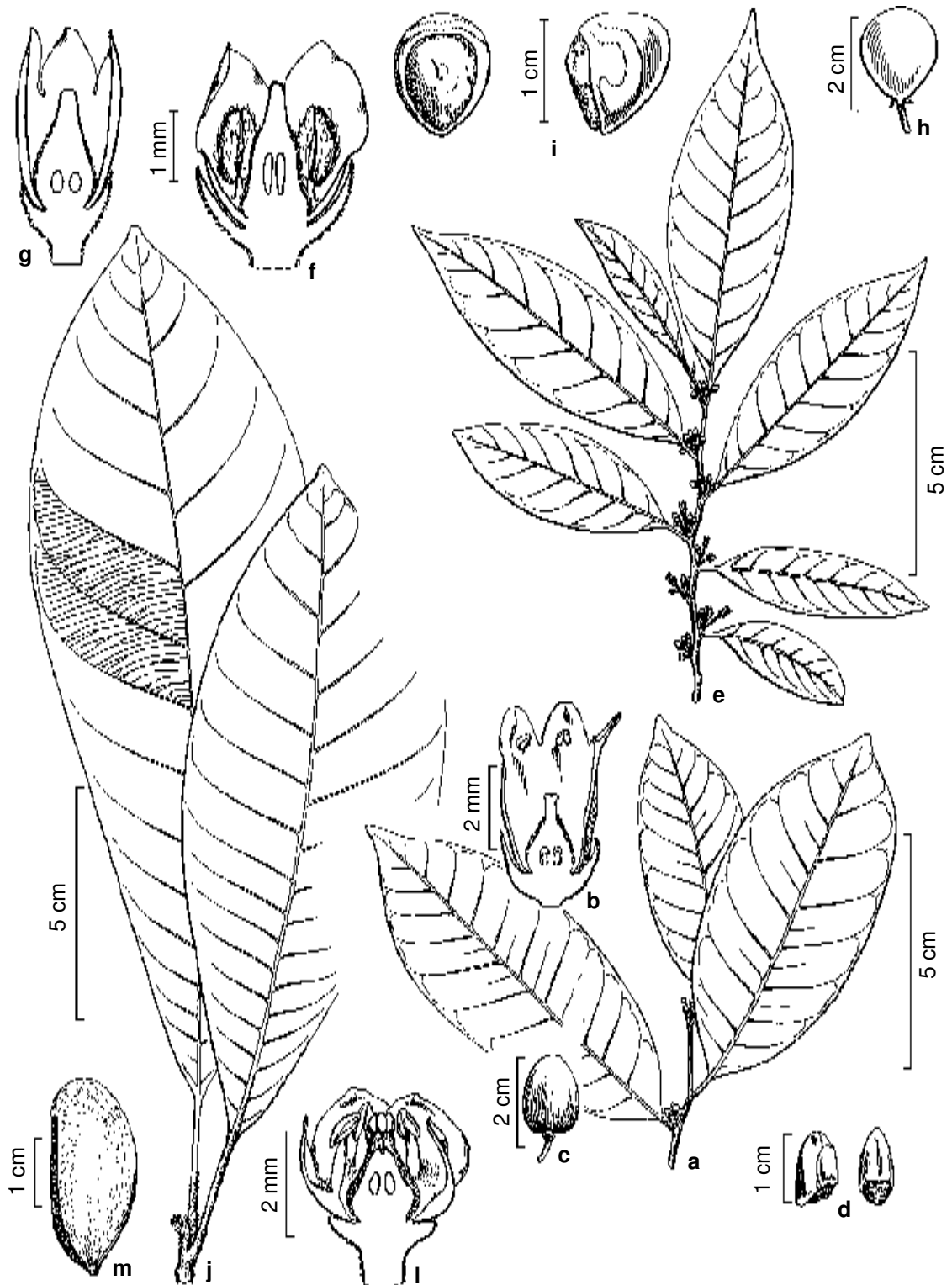


Figura 28 - a-d. *Chrysophyllum argenteum* subsp. *auratum* - a. habit (Irwin 48231); b. 1/2 flower (Lima 53-1445); c. fruit; d. seed (Bruijn 1389). e-i. *Chrysophyllum sparsiflorum* - e. habit; f. 1/2 male flower (Delascio & Liesner 7075); g. female flower (Aristeguieta & Labbiente 7313); h. fruit; i. seed (Bahia 50). j-m. *Chrysophyllum colombianum* - j. habit; l. 1/2 flower (Castenada 4855); m. seed (Pennington & Poveda 11451).

Southern Central America, northern and central South America to Ecuador and Peru, Caribbean islands. Five subspecies are recognized in *C. argenteum*, and that present in central Amazonia is subsp. *auratum* (Miq.) T. D. Penn., which has a distribution from Venezuela and the Guianas to central and western Amazonia. Subspecies *auratum* occurs in a wide range of forest types, both ever wet and seasonal, in both lowland and montane regions up to 1600 m altitude.

Not yet recorded from Reserva Ducke. PDBFF: Reserva km 41, *Lepsch Cunha et al.* 740 (INPA K).

Sterile specimens of *C. argenteum* are easily confused with *C. sparsiflorum* but in the latter the upper leaf surface is glossy and the secondary veins are slightly raised or slightly sunken above (matt upper surface in *C. argenteum* and secondary veins flat). The tertiary venation of *C. argenteum* is parallel to the secondary venation and descending from the margin of the leaf, whereas that of *C. sparsiflorum* forms a lax reticulum. See also under *C. sparsiflorum* for differences in flower and fruit.

Section *Villocuspis* A. DC.

7.2 *Chrysophyllum sparsiflorum* Klotzsch ex Miq. in Mart., Fl. bras. 7: 90. 1863; Pennington, T. D., Fl. Neotrop. 52: 580, fig. 134. 1990.

Fig. 28 e-i

Young shoots finely sericeous with golden hairs, becoming glabrous. **Leaves** alternate and distichous, 6.5–14 × 2.8–7 cm, elliptic, apex obtuse to narrowly attenuate, base obtuse to narrowly attenuate, upper surface glabrous, lower surface finely golden sericeous; venation mostly brochidodromous, midrib sunken on the upper surface, secondary veins 10–14 pairs, straight, parallel, slightly raised or slightly impressed on the upper surface, intersecondaries often long, tertiaries forming a lax reticulum. Petiole 1.3–1.8 cm long, channelled, sericeous. **Fascicles** axillary, 5–25-flowered. Pedicel 6–10 mm long, sericeous. **Flowers** unisexual (plant dioecious). Sepals 1–1.5 mm long, sericeous outside. Corolla cyathiform, 3.5–4 mm long, tube

about equalling the lobes, glabrous. Stamens fixed near the base of the corolla tube, hairy; absent in female flowers. Ovary ovoid, pubescent, style-head obscurely lobed. **Fruit** 2.5–3 cm long, ellipsoid, apex and base rounded, smooth, glabrous, fleshy. **Seed** solitary, 2–2.3 cm long, ellipsoid, not laterally compressed, testa thick and woody, shiny; scar broad, covering the adaxial face of the seed.

Field characters: Canopy tree to 40 m high and 40 cm diam., without buttresses. Bark brown, fissured or scaling in longitudinal strips, inner bark pink to red, with copious white latex. Flowers with green corolla and cream or reddish stamens, sometimes reported to have an unpleasant scent. The fruit mature yellowish. Flowering in central Amazonia November to December, fruit ripening April to June.

Venezuela and Guyana to Maranhão and south to Rondônia and Mato Grosso, in mixed lowland rainforest on non-flooded land.

24.V.1967 (fr) *Albuquerque, B. W. P. de & Elias, J.* 61 (INPA); 6.XII.1996 (fl) *Hopkins, M. J. G. et al.* 1614 (B GH INPA K MG P VIC); 4.VI.1993 (fr) *Ribeiro, J. E. L. S. et al.* 829 (INPA K MG MONY SP); 19.XI.1996 (fl) *Ribeiro, J. E. L. S. et al.* 1859 (BM G IAN INPA K MBM UB UEC US); 25.IV.1995 (fr) *Sothers, C. A. & Silva, C. F.* 410 (G INPA K MBM MGR RB U US); 12.XI.1996 (fl) *Sothers, C. A. & Silva, C. F. da* 927 (COL F INPA K MG PEUFR SPF UFMT VEN); 18.XI.1996 (fl) *Sothers, C. A. & Pereira, E. C.* 932 (INPA K MG MONY R RB SP U).

Although very similar to *C. argenteum* in leaf morphology, this species is easily separated with flowers or fruit. The corolla of *C. sparsiflorum* is glabrous (sericeous in *C. argenteum*), the corolla is cyathiform with the tube and lobes about equal (corolla tubular, tube much longer than the lobes in *C. argenteum*), the seed has an adaxial scar (scar basi-ventral in *C. argenteum*).

Section *Ragala* (Pierre) T. D. Penn.

7.3 *Chrysophyllum sanguinolentum* (Pierre) Baehni, Boissiera 11: 74. 1965; Pennington, T. D., Fl. Neotrop. 52: 583. 1990.

Young shoots finely appressed puberulous, becoming glabrous. **Leaves** spirally arranged, 12.5–30–6 × 15 cm, broadly elliptic, oblong-elliptic

or obovate, apex obtuse to rounded or emarginate, base narrowly attenuate to rounded or truncate, upper surface glabrous, lower surface finely appressed puberulous with pale brown to silvery hairs, or glabrous; venation eucamptodromous, midrib and secondary veins sunken on the upper surface, prominent below, secondary veins 11–20 pairs, parallel, straight or slightly arcuate, intersecondaries absent, tertiaries numerous, oblique. Petiole 0.8–4 cm long, flat and often narrowly winged, appressed puberulous. **Fascicles** ramiflorous, 5–15-flowered. Pedicel 2–6 mm long, appressed puberulous. **Flowers** bisexual. Sepals 2–3 mm

long, accrescent in fruit, appressed puberulous outside. Corolla 3–4 mm long, cyathiform, tube shorter than the lobes, glabrous. Stamens fixed about halfway up or in the upper half of the corolla tube, glabrous. Ovary densely villose, style-head minutely lobed. **Fruit** subtended by the accrescent sepals, 2.5–6 cm long, globose, apex truncate or depressed, base rounded or truncate, smooth, glabrous or with some residual pubescence. **Seeds** several, 1.5–2.5 cm long, laterally compressed, testa smooth, shining; scar narrow, adaxial and extending around the base.

Northern and western South America to Amazonian Brazil.

Key to the subspecies of *Chrysophyllum sanguinolentum*

1. Lower leaf surface closely appressed puberulous with pale brown or silvery hairs; fruiting calyx usually strongly accrescent (sepals strongly thickened, ca. 1 × 1.5 cm) 3c. *C. sanguinolentum* subsp. *balata*
1. Lower leaf surface glabrous; fruiting calyx weakly accrescent (sepals not or only weakly thickened, less than 1 cm long).
 2. Petiole usually less than 2 cm long, leaves elliptic to obovate, base usually tapered 3a. *C. sanguinolentum* subsp. *sanguinolentum*
 2. Petiole 2–4 cm long, leaves broadly elliptic with rounded or truncate base 3b. *C. sanguinolentum* subsp. *spurium*

7.3a *Chrysophyllum sanguinolentum* (Pierre) Baehni subsp. *sanguinolentum*; Pennington, T. D., Fl. Neotrop. 52: 583, fig. 136. 1990. **Fig. 29 a-b**

Ragala sanguinolenta Pierre, Not. Bot. 60. 1891.

Field characters: Tree up to 40 m high and 60 cm diam., with simple, stout buttresses to 1 m high. Bark reddish-brown, scaling and leaving conspicuous dipples, the scales exfoliating to leave a reddish-orange surface. Slash pink or reddish, exuding copious sticky white latex. Flowers greenish, fruit pale brown, rough skinned; the inner layer of the pericarp is soft and fleshy. Flowering in central Amazonia in August. The fruit takes about six months to reach maturity.

Southern Venezuela and the Guianas to central Amazonian Brazil and Amazonian Peru. A frequent tree in non-flooded forest.

1.VII.1993 (fl) *Ribeiro, J. E. L. S. et al.* 968 (INPA K MG MONY RB SP).

PDBFF: *da Silva PDBFF1301.626.2.*

7.3b *Chrysophyllum sanguinolentum* subsp. *spurium* (Ducke) T. D. Penn., Fl. Neotrop. 52: 585, fig. 136. 1990. **Fig. 29c-e**

Ecclinusa spuria Ducke, Bull. Mus. Hist. Nat. (Paris), sér. 2, 4: 743. 1932.

Field characters: Tree to 35 m high and 50 cm diam., with small buttresses. Bark brown, scaling in large plates and leaving conspicuous dipples. Slash pinkish with abundant sticky white latex. Flowers whitish, fruit maturing brown. Flowering in July in central Amazonia.

Central and western Amazonia, in rainforest on non-flooded sites.

26.VII.1994 (fl) *Nascimento, J. R. et al.* 549 (INPA K MG MO NY R RB SP U); 26.VII.1994 (fl) *Nascimento, J. R. et al.* 550 (G IAN INPA K MBM UB US); 5.VI.1993 (fr) *Ribeiro, J. E. L. S. et al.* 858 (INPA K MG MONY SP); 4.XII.1993 (fr) *Vicentini, A. & Assunção, P. A. C. L.* 385 (K).

7.3c *Chrysophyllum sanguinolentum* subsp. *balata* (Ducke) T. D. Penn., Fl. Neotrop. 52: 587, fig. 136. 1990. **Fig. 29 f-h**

Ecclinusa balata Ducke, Rev. Int. Bot. Appl. Agric. Trop. 10: 850. 1930; Trop. Woods 31: 19. 1932.

Field characters: Tree to 40 m high and 60 cm diam., with small buttresses. Bark greyish-brown, scaling and leaving conspicuous dipple marks. Slash reddish with copious sticky white latex. Flowers cream-coloured, fruit maturing pale brown. Flowering April to July, fruit maturing in December.

Central Amazonian Brazil to Amazonian Colombia and Peru and north to Venezuela and Guyana. In Reserva Ducke in non-flooded forest but elsewhere frequently collected on periodically flooded sites.

14.VIII.1993 (fr) *Ribeiro, J. E. L. S. et al. 1151* (INPA K MG MO NY SP); 4.XII.1993 (fr) *Vicentini, A. & Assunção, P. A. C. L. 379* (INPA K MG RB U).

7.4 *Chrysophyllum ucuquirana-branca* (Aubrév. & Pellegr.) T. D. Penn., Fl. Neotrop. 52: 589, fig. 137. 1990. **Fig. 29 i-j**

Ecclinusa ucuquirana-branca Aubrév. & Pellegr., Adansonia 1: 23. 1961.

Young shoots ferruginous-brown tomentose, becoming glabrous, and with prominent leaf and inflorescence scars. **Leaves** spirally arranged, 13.5–24 × 7.5–11 cm, broadly elliptic, apex shortly attenuate to rounded, base rounded or obtuse, slightly decurrent, upper surface glabrous, lower surface uniformly crisped tomentose with ferruginous hairs; venation eucamptodromous, midrib and secondary veins sunken on the upper surface, very prominent below, secondaries 13–21 pairs, parallel, slightly arcuate, intersecondaries absent, tertiaries numerous, oblique. Petiole 1.5–2.5 cm long, flat and narrowly winged, puberulous. **Fascicles** ramiflorous, 10–20-flowered. Pedicel 1–2 mm long, tomentose. **Flowers** unisexual (plant dioecious). Sepals 5–6 mm long, accrescent and thickened in fruit to 1.5 × 1.5 cm, ferruginous tomentose outside. Corolla (male) 5–6 mm long, lobes much longer than the tube, glabrous, (female) ca. 4 mm long.

Stamens fixed near the top of the corolla tube, glabrous, absent in female flowers. Ovary densely villose, style-head minutely lobed. **Fruit** subtended by the persistent accrescent calyx, 4.5–5 cm long, globose, apex depressed, densely rufous-villose. **Seeds** several, ca. 2 cm long, laterally compressed, testa smooth, shiny; scar adaxial and extending around the base of the seed, ca. 2 mm broad.

Field characters: Tree to 30 m high and 45 cm diam., larger specimens with small buttresses. Bark dark brown, scaling and leaving dipple marks which are lenticellate. Slash reddish-brown, with abundant sticky milky latex. Flower pale green, fruit matures reddish. Flowering in central Amazonia July to November, fruit maturing in March.

Central and northern Amazonian Brazil to southern Venezuela, in rainforest on non-flooded sites.

13.VII.1994 (bd) *Nascimento, J. R. & Pereira, E. C. 534* (INPA K MG MO NY RB SP); 7.III.1995 (fr) *Nascimento, J. R. et al. 777* (INPA K MG MO NY RB SP); 16.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7570* (INPA); 31.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7651* (INPA); 24.V.1966 (fr) *Rodrigues, W. & Coêlho, D. 7864* (INPA).

This species is similar in form to *C. sanguinolentum* but is easily recognized by the ferruginous tomentose indumentum on the young parts and lower leaf surface, and by the dense reddish indumentum of the fruit.

Section *Priourella* (Pierre) T. D. Penn.

7.5 *Chrysophyllum amazonicum* T. D. Penn., Fl. Neotrop. 52: 595, fig. 140. 1990.

Fig. 30 a-e

Young shoots minutely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 8–15 × 4–6.5 cm, oblanceolate or narrowly ovate, apex obtuse or rounded, base acute to narrowly attenuate, glabrous on both surfaces; venation eucamptodromous, midrib slightly raised on the upper surface, secondaries 10–12 pairs; parallel, straight or slightly arcuate, slightly prominent on both surfaces, intersecondaries absent, tertiaries numerous, oblique. Petiole 0.7–2 cm long, not channelled,

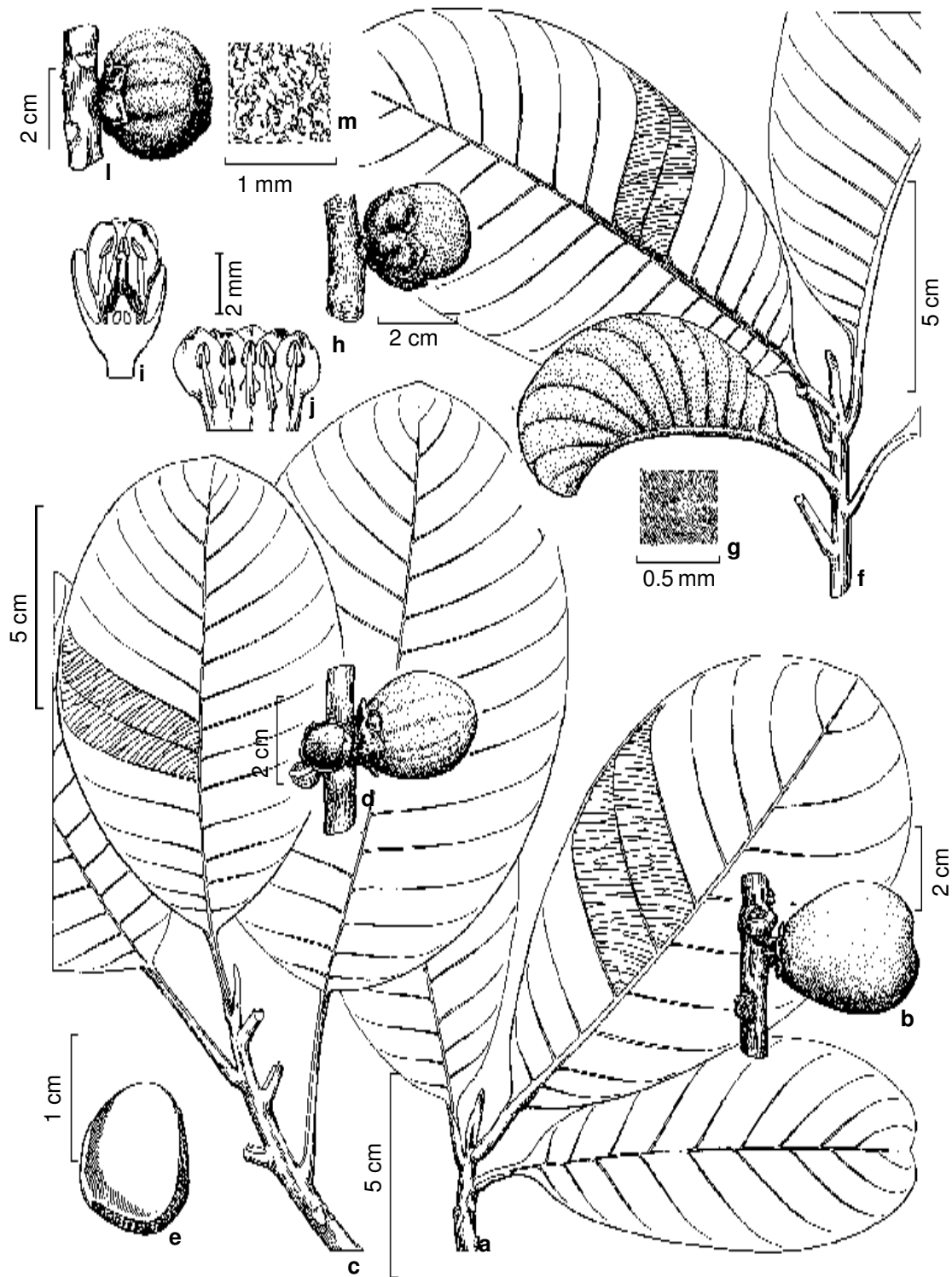


Figura 29 - a-b. *Chrysophyllum sanguinolentum* subsp. *sanguinolentum* - a. habit; b. fruit (Fróes 25988). c-e. *Chrysophyllum sanguinolentum* subsp. *spurium* - c. habit (Schultes & López 9065); d. young fruit (Clark & Maquirino 8323); e. seed (Rimachi 4434). f-h. *Chrysophyllum sanguinolentum* subsp. *balata* - f. habit; g. detail of leaf indumentum (Fróes 554); h. young fruit (Fróes 21825a); i. 1/2 flower; j. corolla & stamens (Silva & Santos 4749). l-m. *Chrysophyllum ucuquirana-branca* - l. young fruit; m. detail of leaf indumentum (Marcano-Berti & Salcedo 85-979).

glabrous. **Fascicles** ramiflorous, 10–25-flowered. Pedicel 0.8–1.3 cm long, finely appressed puberulous. **Flowers** unisexual (plant dioecious). Sepals 2.5–3 mm long, appressed puberulous on both surfaces, inner ones with fringed-ciliate margin. Corolla *ca.* 3 mm long, lobes much longer than the tube, glabrous. Stamens fixed near the top of the corolla tube, glabrous, reduced to vestigial filaments in female flower. Ovary ovoid, densely strigose, style-head minutely lobed. **Fruit** 2.5–3.5 cm long, ovoid, ellipsoid or globose, apex rounded to truncate, base rounded or tapered, smooth, finely puberulous or shortly velutinous or glabrous. **Seeds** 1–several, 2–2.5 cm long, laterally compressed, testa not shining, adherent to the pericarp; scar adaxial, *ca.* 2 mm wide.

Field characters: Tree to 30 m high and 50 cm diam. with small buttresses. Bark brown, narrowly but deeply fissured, slash reddish, smelling of almonds, with milky white latex. Flowers scented, yellowish-green, the fruit maturing yellowish. Flowering in central Amazonia in November, fruit maturing February to June.

Across the whole of Amazonian Brazil to Peru, Colombia and southern Venezuela, in non-flooded rainforest, up to 800 m altitude.

8.XI.1994 (fl) *Assunção, P. A. C. L. 66* (INPA K MG MONY R RB SP U); 10.VI.1995 (fr) *Assunção, P. A. C. L. & Pereira, E. C. 207* (G INPA K MG R U UB US); 14.XI.1994 (fl) *Nascimento, J. R. et al. 637* (G INPA K MG MONY R RB SP U).

Chrysophyllum amazonicum is close to *C. manaosense*, but lacks the short ferruginous pubescence present on the young parts and lower leaf surface of the latter. It is also closely related to *C. prieurii*. See there for further comment.

7.6 *Chrysophyllum colombianum* (Aubrév.) T. D. Penn., Fl. Neotrop. 52: 596, fig. 138. 1990. **Fig. 28 j-m**

Priurella colombiana Aubrév. *Adansonia* 7: 143, pl. 1. 1967.

Young shoots pubescent with mostly appressed golden-brown hairs. **Leaves** spirally arranged, 13–25 × 5–8 cm, oblanceolate, apex

narrowly attenuate, base acute or narrowly attenuate, glabrous above or with residual pubescence along the midrib, midrib and secondary veins on the lower surface with golden-brown indumentum of appressed and some spreading hairs; venation eucamptodromous, midrib slightly raised on the upper surface, secondaries 14–17 pairs, parallel, straight, intersecondaries absent, tertiaries numerous, oblique. Petiole 1.5–2.5 cm long, slightly channelled, appressed pubescent. **Fascicles** ramiflorous, 5–15-flowered. Pedicel 4–5 mm long, accrescent to 1.2 cm in fruit, appressed pubescent. **Flowers** unisexual (plant monoecious). Sepals 3–3.5 mm long, appressed puberulous on both surfaces, inner ones with fringed ciliate margin. Corolla 2.5–3.5 mm long, glabrous except for a tuft of hairs inside near the base of the lobes. Stamens fixed near the top of the corolla tube, glabrous; anthers absent in female flowers. Ovary ovoid, appressed puberulous, style-head minutely lobed. **Fruit** 3–4.5 cm long, broadly ellipsoid or obovoid, apex depressed, wrinkled when dry, pubescent with golden-brown hairs, ? becoming glabrous with age. **Seeds** several, 2.5–4 cm long, laterally compressed, testa rough, not shining, adherent to the pericarp; scar adaxial, *ca.* 2 mm wide.

Field characters: Small tree to 15 m high and 15 cm diam., fluted at base, bole cylindrical. Bark reddish-brown, scaling in fine sheets. Slash reddish, smelling of almonds, with moderate white latex. Flowers scented, greenish, fruit maturing golden-brown. Flowering in central Amazonia in August and September; fruiting March to June.

Costa Rica to Colombia and Ecuador, western and central Brazilian Amazonia, in lowland and montane rainforest up to 1200 m altitude.

21.VI.1994 (fr) *Hopkins, M. J. G. & Assunção, P. A. C. L. 1419A* (BM INPA K MG SPF UEC VEN); 25.VIII.1994 (fl) *Sothers, C. A. et al. 140* (INPA K MG MONY R RB SP U); 7.XII.1994 (fr) *Sothers, C. A. & Silva, C. F. 282* (INPA K MG MONY R RB SP U); 16.III.1995 (fr) *Vicentini, A. & Pereira, E. C. 913* (G IAN INPA K MBM UB US).

Chrysophyllum colombianum is close to *C. amazonicum* but may be distinguished by

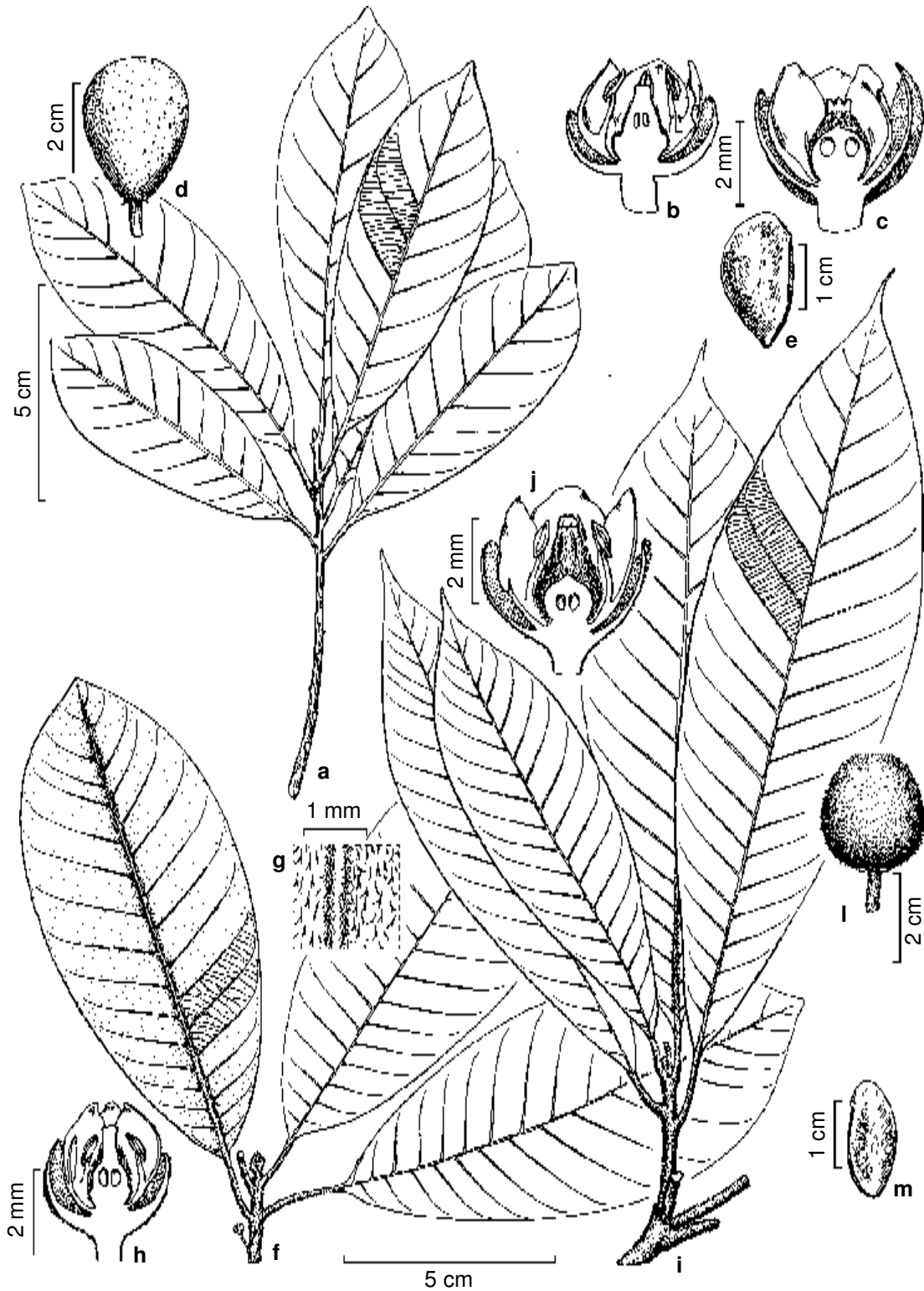


Figura 30 - a-e. *Chrysophyllum amazonicum* - a. habit (Prance et al. 18330); b. 1/2 female flower (Silva & Brazão 60710); c. 1/2 female flower (Wurdack 2293); d. fruit; e. seed (Schunke 2592). f-m. *Chrysophyllum manaosense* - f. habit; g. detail of leaf indumentum $\times 10$; h. 1/2 flower (Silva & Santos 4736); i. habit (Rimachi 2785); j. 1/2 flower (Foster 4403); l. fruit; m. seed (Castro 335).

its generally longer leaves with more numerous secondary veins, and by the golden-brown indumentum present on the young parts and on the midrib and secondary veins on the lower leaf surface.

7.7 *Chrysophyllum manaosense* (Aubrév.) T. D. Penn., Fl. Neotrop. 52: 598, fig. 140. 1990.

Fig. 30 f-m

Prieurella manaosensis Aubrév., Adansonia 4: 370. 1964.

Young shoots shortly pubescent with ferruginous hairs. **Leaves** spirally arranged, 11–15.5 × 4–7.5 cm, oblanceolate to obovate, apex obtuse or shortly and narrowly attenuate, base acute, upper surface glabrous, lower surface uniformly pubescent with erect ferruginous 2-branched hairs; venation eucamptodromous, midrib slightly raised on the upper surface, secondaries 14–16 pairs, parallel, straight, intersecondaries absent, tertiaries numerous, oblique. Petiole 2–2.3 cm long, not channelled, shortly pubescent. **Fascicles** ramiflorous, 5–15-flowered. Pedicel 4–10 mm long, puberulous. Sepals 3–4 mm long, appressed puberulous on both surfaces, inner ones with fringed ciliate margin. Corolla 3–3.5 mm long, glabrous. Stamens fixed at the top of the corolla tube, glabrous. Ovary ovoid, densely strigose. **Fruit** 3.5–4 cm long, obovoid, apex rounded, base tapered, glabrous, smooth. **Seeds** several, 1.8–2 cm long, laterally compressed, testa verrucose, not shining, adherent to the pericarp; scar adaxial and extending partly around the base, ca. 2 mm wide.

Field characters: Tree to 40 m high and 65 cm diam., with small plank buttresses. Bark reddish-brown, longitudinally fissured, exfoliating in rectangular pieces. Slash brown, smelling of almonds, with whitish latex. Flowers greenish, fruit maturing reddish-orange. Flowering in central Amazonia May to July, fruit maturing in March.

Extending from western Amazonia to Surinam, in non-flooded rainforest below 300 m altitude.

27.V.1997 (fl) *Assunção, P. A. C. L. et al.* 505 (INPA K NY); 5.V.1988 (fr) *Coêlho, D. & Lima, R. P.* 16-D (INPA K MG NY); 6.VII.1993 (fr) *Ribeiro, J. E. L. S. et al.* 903 (INPA K MG MO SP); 24.III.1994 (fr) *Ribeiro, J. E. L. S. et al.* 1246 (G IAN INPA K R RB U).

This species is close to both *C. amazonicum* and *C. colombianum*, but differs from them in its short ferruginous pubescence of erect 2-branched hairs on the lower leaf surface.

7.8 *Chrysophyllum prieurii* A. DC., Prodr. 8: 161. 1844; Pennington, T. D., Fl. Neotrop. 52: 600, fig. 138. 1990. **Fig. 31 e-h**

Young shoots closely appressed puberulous with reddish-golden hairs. **Leaves** spirally arranged, 12–20 × 5.5–8.5 cm, broadly oblanceolate or obovate, apex obtuse to rounded, base narrowly cuneate or attenuate, glabrous above, closely reddish-golden sericeous below; venation eucamptodromous, midrib slightly raised on the upper surface, secondaries 8–10 pairs, parallel, slightly arcuate, intersecondaries absent; tertiaries perpendicular to oblique, numerous. Petiole 3–5 cm long, not channelled, sericeous. **Fascicles** ramiflorous, 5–10-flowered. Pedicel 0.5–1 cm long, sericeous. **Flowers** unisexual (plant dioecious). Sepals 2–3 mm long, appressed puberulous on both surfaces. Corolla 2.5–3 mm long, lobes much longer than the tube, glabrous apart from a few hairs at the base of the corolla lobes inside. Stamens fixed near the top of the corolla tube, glabrous, reduced to vestiges in female flower. Ovary ovoid, densely strigose. **Fruit** 3.5–4 cm long, globose, apex and base rounded, smooth, glabrous (central Amazonia only). **Seeds** 1–5, 2–3 cm long, laterally compressed, testa rough, adherent to the pericarp; scar adaxial, 2–3 mm wide.

Field characters: Tree to 35 m high and 1 m diam., with a cylindrical bole and steep branched buttresses to 2 m high. Bark dark brown or reddish-brown, shallowly fissured, the ridges scaling profusely in small friable pieces. Slash pinkish, smelling of almonds, with a small amount of white latex. Flowers pale green, scented, fruit maturing greenish-brown. Flowering in central Amazonia in September, fruit ripening from March to June.

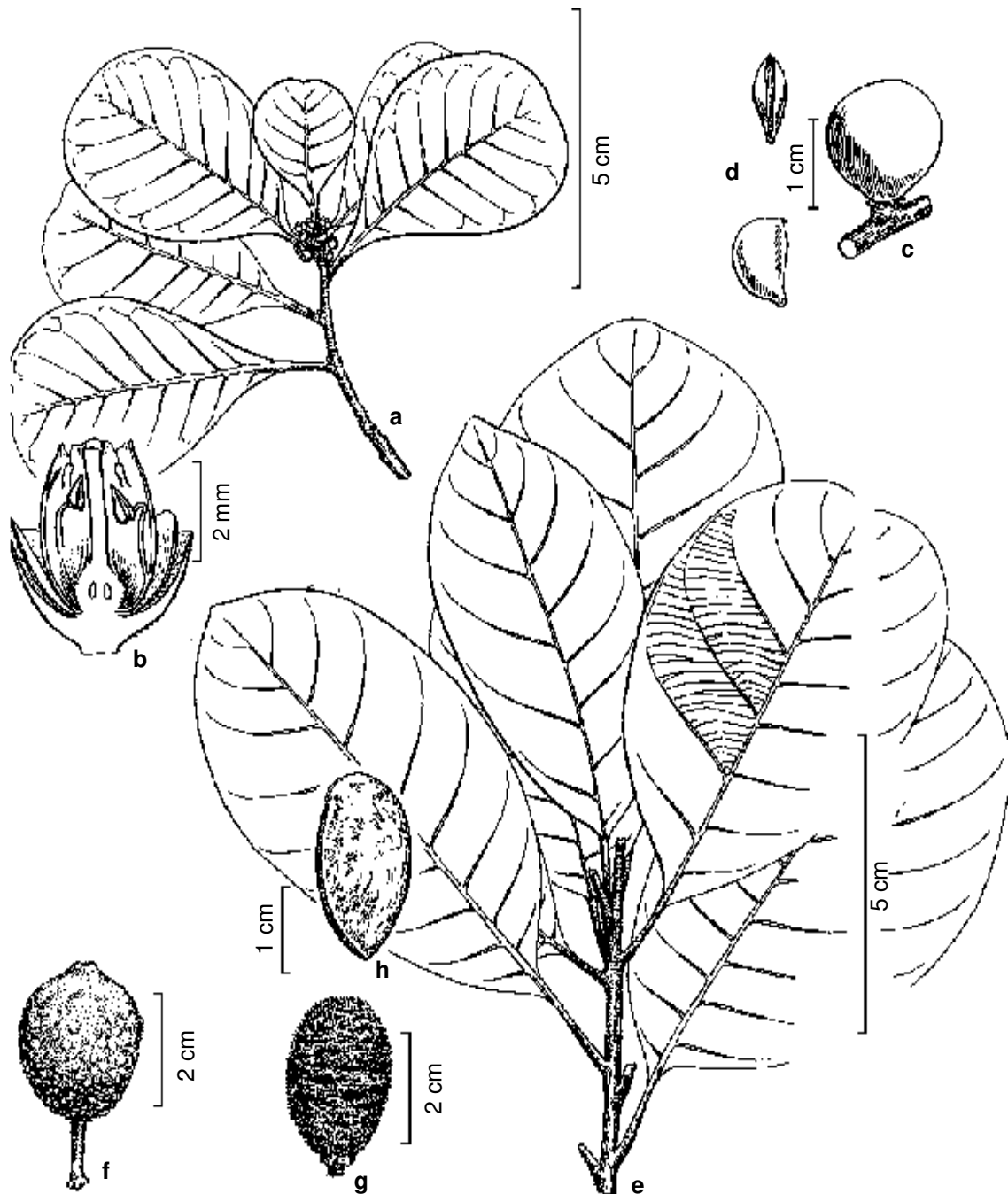


Figura 31 - a-d. *Chrysophyllum pomiferum* - a. habit (Prance et al. 3082); b. 1/2 flower (FDBG 2641); c. fruit (Santos 69); d. seed (Mori & Bolten 8520). e-h. *Chrysophyllum prieurii* - e. habit (Mori & Boom 15284); f. fruit (Pires & Silva 4430); g. fruit (Steward et al. P. 20306); h. seed (Gómez 4161).

Widely distributed across the whole of northern South America to Panama. It occurs in non-flooded rainforest and in sandy campina forest. It extends up to 1200 m altitude in everwet forest in Peru.

8.IX.1994 (fl) *Assunção, P. A. C. L. 41* (INPA K MG MONY R RB SP U); 7.III.1995 (fr) *Nascimento, J. R. et al. 778* (BM COL INPA K MG SPF UEC UFMT VEN); 26.IV.1988 (fr) *Ramos, J. F. & Lima, R. P. 1860* (INPA K MG MO NY R RB SP U); 3.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 797* (G INPA K MG UB); 11.VIII.1993 (fr) *Ribeiro, J. E. L. S. et al. 1102* (INPA K MBM MG US); 7.V.1968 (fr) *Souza, J. A. INPA21211* (INPA).

This species is readily recognized by the long petiolate broadly oblanceolate leaves with numerous perpendicular tertiary veins and with persistent reddish-golden sericeous indumentum on the lower surface. It is closely related to *C. amazonicum* but differs in its broader leaves with generally fewer secondary veins, perpendicular tertiary veins and the sericeous indumentum on the lower surface.

Section *Aneuchrysophyllum* Engl.

7.9 *Chrysophyllum pomiferum* (Eyma) T. D. Penn., Fl. Neotrop. 52: 602, fig. 141. 1990.

Fig. 31 a-d

Achrouteria pomifera Eyma, Recueil Trav. Bot. Néerl. 33: 193, fig. 3. 1936.

Young shoots glabrous. **Leaves** spirally arranged, 4.5–11 × 2–6 cm, broadly oblanceolate or obovate, apex rounded or truncate, base narrowly attenuate, glabrous; venation eucamptodromous in the lower half, usually brochidodromous in the upper half, midrib flat or slightly raised on the upper surface, secondaries 6–8 pairs, straight or slightly arcuate, parallel or slightly convergent, slightly raised on the upper surface, prominent on the lower surface, intersecondaries few, moderate to long, tertiaries forming a lax reticulum. Petiole 2–10 mm long, not channelled, glabrous. **Fascicles** axillary and below the leaves, 2–10-flowered. Pedicel 2–3 mm long, with scattered appressed hairs. **Flowers** unisexual (plant dioecious). Sepals 2.5–3 mm long, with scattered appressed hairs outside. Corolla shortly tubular or campanulate, 3–4 mm long, tube much longer

than the lobes, glabrous. Stamens fixed in the lower half of the corolla tube, glabrous. Staminodes 0.2–0.7 mm long, glabrous. Ovary globose, densely strigose, style-head simple. **Fruit** 3–5 cm long, globose, apex and base rounded, smooth, glabrous. **Seeds** up to 5, 1.5–2.2 cm long, laterally compressed, testa smooth, shining; scar adaxial, 5–6 mm wide.

Field characters: Tree to 40 m high and 75 cm diam., bole fluted at the base, cylindrical above, bark brown, scaling in suberous plates, slash pale brown, with scarce white latex. Flowers greenish-white, fruit ripening yellow to orange. In central Amazonia flowering in October, with the fruit maturing in March.

The Guianas and Venezuela, across Amazonia to Peru. A plant of mixed rainforest on non-flooded land, up to 700 m altitude.

11.IX.1997 (fl) *Assunção, P. A. C. L. & Silva, C. F. 651* (INPA K MG MO NY RB SP U UB); 11.XI.1997 (fr) *Assunção, P. A. C. L. et al. 714* (BM COL INPA K MBM MG UB UEC VEN); 5.VI.1993 (fr) *Ribeiro, J. E. L. S. et al. 860* (INPA K MG MO NY SP); 30.III.1966 (fr) *Rodrigues, W. & Coêlho, D. 7633* (INPA); 28.III.1995 (fr) *Vicentini, A. et al. 925* (G INPA K MG R RB U US).

Chrysophyllum pomiferum is distinguished from the other members of this group (*C. lucentifolium* and *C. durifractum*) by its much smaller obovate leaves with rounded apex.

7.10 *Chrysophyllum durifractum* (Rodrigues) T. D. Penn., Fl. Neotrop. 52: 604. 1990.

Achrouteria durifracta W.A. Rodrigues, Acta Amazonica 4(3): 15, fig. 2. 1974.

Young shoots subglabrous. **Leaves** spirally arranged, 13–28 × 6–12 cm, broadly oblanceolate, apex obtuse to emarginate, base acute, glabrous; venation eucamptodromous, midrib not raised on the upper surface, secondary veins 12–16 pairs, slightly convergent and arcuate, intersecondaries small, tertiaries reticulate. Petiole 2–4 cm long, channelled, glabrous. **Fascicles** axillary and below the leaves, few-flowered. Pedicel 5–10 mm long, glabrous. Sepals 4–6 mm long, glabrous. Corolla 3–4 mm long, tube about equalling the lobes, glabrous. Stamens fixed in the lower half of the corolla tube, glabrous. Staminodes 0.5–0.7 mm

long, glabrous. Ovary ovoid, densely strigose, style-head simple. **Fruit** 5–6.5 cm long, depressed globose, smooth, glabrous. **Seeds** 5, 2.5–4.3 cm long, laterally compressed, testa smooth, shining; scar adaxial, 3–6 mm wide.

Field characters: Tree to 30 m high and 50 cm diam., without buttresses, trunk cylindrical and bark thin, scaling, slash with scarce white latex. Flowers pale green, fruit green. Flowering and fruiting in March.

Known only from the type collection from central Amazonian Brazil, where it was collected in non-flooded forest.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus-Caracaráí rd., km 27, Rodrigues, W. A. 8783 (INPA MG).

This species is close to *C. lucentifolium*, but differs from it in the much larger leaves with longer channelled petiole, and in its corolla structure (tube more or less equalling lobes, in *C. lucentifolium* the corolla tube is much shorter than the lobes) and presence of staminodes. The leaves of *C. durifrutum* lack the fine vein reticulum of *C. lucentifolium*.

7.11 *Chrysophyllum lucentifolium* subsp. *pachycarpum* Pires & T. D. Penn., Fl. Neotrop. 52: 606, fig. 141. 1990. **Fig. 32 l-o**

Young shoots finely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 10–19 × 4–7 cm, usually elliptic, apex acute, narrowly attenuate or rarely rounded, base narrowly attenuate, glabrous; venation eucamptodromous, midrib flat or slightly raised (rounded) on the upper surface, secondaries 12–15 pairs, straight or slightly arcuate, parallel, raised on both surfaces, intersecondaries absent, tertiaries numerous, oblique, joined by a fine reticulum. Petiole 0.7–1.5 cm long, not channelled, glabrous. **Fascicles** axillary, 5–15-flowered. Pedicel 3–5 mm long, sparsely appressed puberulous. **Flowers** ? bisexual. Sepals 2–3 mm long, appressed puberulous outside. Corolla 3–4 mm long, tube shorter than the lobes, glabrous. Stamens fixed near the top of the corolla tube, glabrous. Staminodes usually absent, rarely present as a few small vestiges. Ovary ovoid, densely pubescent. **Fruit** 3.5–5 cm long, ovoid

to globose, apex rounded or truncate, thick-walled, smooth, glabrous. **Seeds** up to 5, 2–2.5 cm long, laterally compressed, testa smooth, shining; scar adaxial, 1.5–3 mm wide.

Field characters: Tree to 40 m high and 80 cm diam., with small buttresses and cylindrical bole, slash cream-coloured with small amount of white latex. Flowers pale green, fruit maturing yellowish-green. Flowering in Amazonia June to September, mature fruit collected December.

Ecologically variable: present in lowland and montane rainforest, up to 1400 m altitude, but also in tropical dry forest in Pacific coastal Ecuador and Peru.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus-Caracaráí, km 57, Nascimento 42 (INPA); Pará, Santarém, km 70 rd to Palhão, Silva & Souza 2646 (K); Serra dos Carajás, near camp at Serra Norte, Daly *et al.* 1895 (K).

The above description refers only to *C. lucentifolium* subsp. *pachycarpum*, which occupies most of the range of the species except coastal Brazil. The type subsp. is confined to coastal Brazil. The species is close to *C. pachycarpum* and to *C. pomiferum*, and their differences are discussed under those species.

7.12 *Chrysophyllum wilsonii* T. D. Penn., *sp. nov.* (section *Aneuchrysophyllum*). **Type:** Brazil, Amazonas, Manaus, Distrito Agropecuário, PDBFF Reserva 1501 (km 41), August 1996, W. Spironello *s.n.* (holotype INPA 190944, *n.v.*, isotype K). **Fig. 32 b**

C. lucentifolio affinis sed apice foliorum anguste attenuato, nervis secundariis paucis, floribus magnis, sepalis intus sericeis, staminibus prope basem tubo corollae affixis differt.

Arbor; stipulae nullae; folia 11–15 × 4.5–6 cm, oblanceolata vel elliptica, glabra; nervi secundarii 11–13-jugi, paralleli, recti; fasciculi axillares et in axillis foliorum delapsorum enati; pedicellus 4–10 mm longus; sepala 5; corolla late tubularis, 4–5 mm longa, lobis 5; stamina 5, prope basem tubo corollae affixa; staminodia nulla; ovarium 5-loculare; fructus 4–5 cm diametro, globosus, glaber.

Tree. Stipules absent. Young shoots puberulous with golden indumentum, finally becoming glabrous, greyish-white, grid-cracked. **Leaves** spirally arranged, 11–15 × 4.5–6 cm, oblanceolate or elliptic, apex narrowly attenuate, base narrowly attenuate and decurrent on the petiole, glabrous; venation eucamptodromous, midrib raised on the upper surface (rounded in section), secondary veins 11–13 pairs, raised on the upper surface, rather steeply ascending, parallel, straight or slightly arcuate, intersecondaries short or absent, tertiaries oblique. Petiole 1–2 cm long, not channelled, subglabrous. **Fascicles** 4–10-flowered, axillary and clustered below the leaves. Pedicel 4–10 mm long, sparsely puberulous. Sepals 5, 2.5–4 mm long, broadly ovate to suborbicular, apex rounded, subglabrous outside, sericeous inside, with a broad hyaline margin. Corolla 4–5 mm long, broadly tubular, the tube slightly longer than the lobes, lobes 5(–6), broadly oblong, apex rounded to truncate, glabrous. Stamens 5(–6), fixed near the base of the corolla tube, filaments 2–3 mm long, glabrous, anthers 1–1.25 mm long, broadly lanceolate, apiculate, glabrous. Staminodes absent. Disk absent. Ovary 5(–6)-locular, lobed, densely pubescent, style *ca.* 2.5 mm long, slightly exerted in bud, included in open flower, pubescent in the lower part, style-head simple, unexpanded. **Fruit** 4–5 cm diam., globose, apex and base rounded, thick-walled (9–10 mm thick when dry) and becoming woody on drying, smooth, glabrous. **Seeds** several, 2.2–2.3 cm long, laterally compressed with an abaxial keel, testa mostly smooth, but slightly verrucose on the sides, shining; scar adaxial, *ca.* 1.6 cm long, *ca.* 7 mm wide; embryo with foliaceous cotyledons and exerted radicle, surrounded by copious endosperm.

Field characters: Tree to 40 m high and 85 cm diam., buttressed to 2 m high, bole cylindrical above. Bark dark, scaling in large rectangular plates, slash with white latex. Flowers greenish-yellow and fruit ripening yellowish. Flowering from August to October, fruit maturing in April.

At present known only from the PDBFF Reserve 1501 (km 41) north of Manaus, Amazonas, Brazil, where it occurs in lowland rainforest (50–125 m altitude) on non-flooded land.

Not yet recorded from Reserva Ducke. PDBFF: Reserva km 41, *Oliveira, A. A. et al. 151* (INPA K); *Oliveira, A. A. et al. 168* (INPA K); *Oliveira, A. A. et al. 379* (INPA); *Oliveira, A. A. et al. 430* (INPA).

Chrysophyllum wilsonii is a superb canopy tree, with close affinities with *C. durifructum* and *C. lucentifolium*. The differences that separate it from *C. lucentifolium* are the narrowly attenuate leaf apex (usually obtuse or rounded in *C. lucentifolium*), fewer secondary veins, much larger calyx and corolla, inner face of calyx sericeous, corolla tube longer than lobes (shorter than lobes in *C. lucentifolium*), stamens fixed at the base of the corolla tube (at top of corolla tube in *C. lucentifolium*), broader, shorter seed scar.

The floral structure is similar to that of *C. durifructum*, but this species has much larger leaves with differing venation, a glabrous calyx and 5 staminodes (these absent in *C. wilsonii*).

7.13 *Chrysophyllum eximium* Ducke, Bull. Mus. Hist. Nat., (Paris), sér. 2, 4:744. 1932; Pennington, T. D., Fl. Neotrop. 52: 618, fig. 145. 1990. **Fig. 32 a-c**

Young shoots densely ferruginous or golden tomentose. **Leaves** spirally arranged, 11–20 × 3.5–10 cm, oblanceolate to obovate, apex obtuse to rounded, base narrowly attenuate, margin revolute, upper surface glabrous or with residual tomentum along the midrib, lower surface densely golden- or ferruginous-tomentose; venation eucamptodromous, midrib slightly raised on the upper surface, secondary veins 7–11 pairs, steeply ascending, slightly convergent or parallel, arcuate, impressed on the upper surface, prominent below, intersecondaries absent, tertiaries oblique to perpendicular, obscure. Petiole 1.2–1.5 cm long, not channelled,

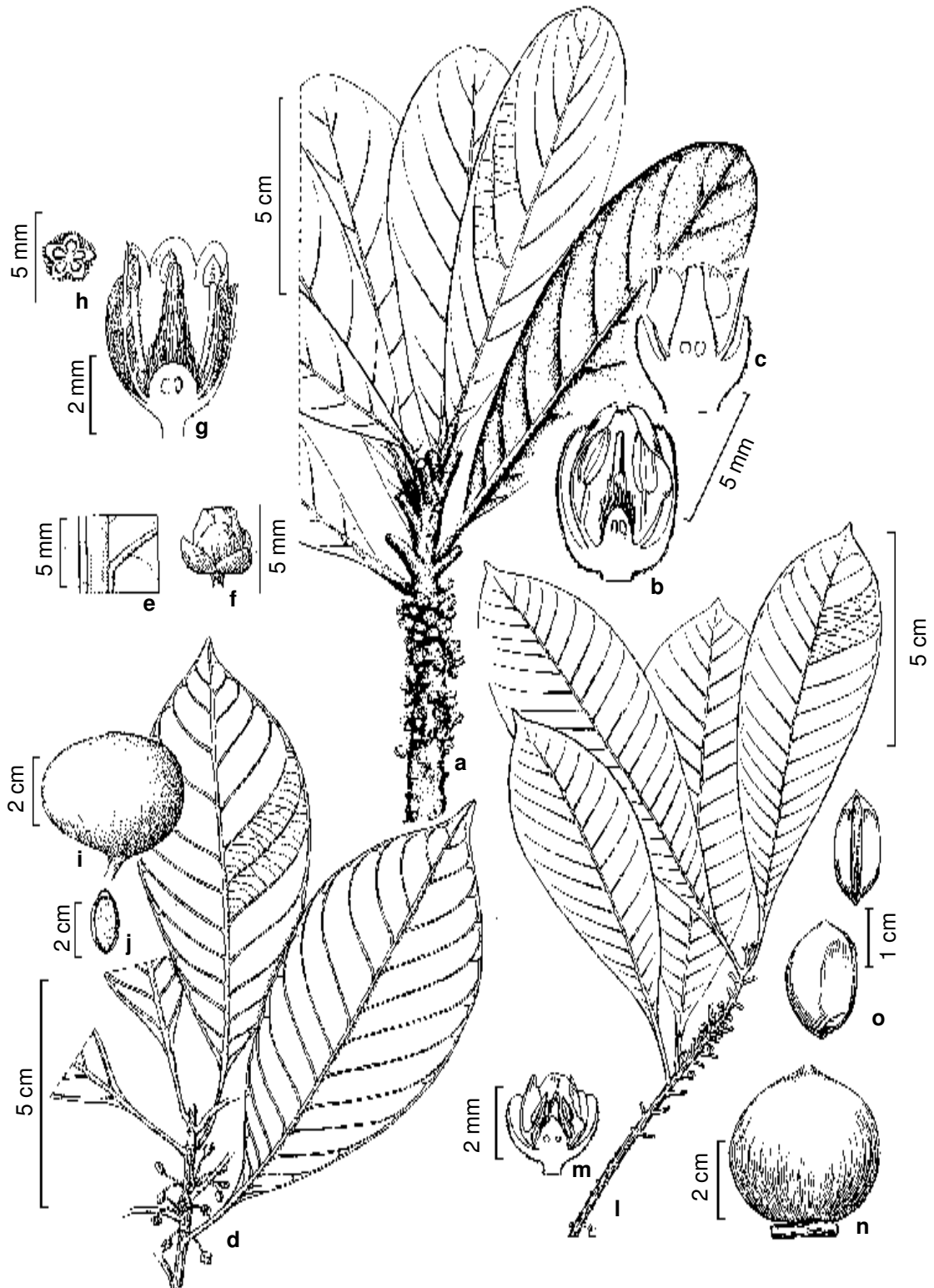


Figura 32 - a-c. *Chrysophyllum eximium* - a. habit (Kubitzki et al. 79-234); b. 1/2 male flower (Ducke 22234); c. 1/2 female flower (Ducke 2098). d-j. *Chrysophyllum wilsonii* - d. habit; e. leaf undersurface; f. flower; g. 1/2 flower; h. ovary (Spironello s.n.); i. fruit; j. seed (Oliveira 430). l-o. *Chrysophyllum lucentifolium* subsp. *pachycarpum* - l. habit (Blanco 951); m. 1/2 flower (Bruijn 1723); n. fruit (Liesner & González 11125); o. seed (Williams 12911).

tomentose. **Fascicles** axillary and below the leaves, 5–10-flowered. Pedicel 3–7 mm long, tomentose. **Flowers** unisexual (plant dioecious). Sepals *ca.* 3 mm long (female), 3.5–4 mm long (male), densely tomentose outside. Corolla 3.5–4 mm (female), 5–7 mm (male), tube equalling lobes in female, shorter than lobes in male, glabrous or with some scattered appressed indumentum. Stamens fixed in the lower half of the corolla tube, glabrous, absent in female flowers. Ovary ovoid, 2–3-locular, densely pubescent. **Fruit** 4.5–5 cm long, obovoid or globose, apex slightly depressed or obtusely apiculate, base broadly tapering, smooth, glabrous. **Seed** laterally compressed, with a narrow adaxial scar.

Field characters: Tree to 20 m high and 35 cm diam., with white latex, lower leaf surface conspicuously golden- or ferruginous-brown on the lower surface. Flowers greenish-white. Flowering September to November, young fruit in March.

The Guianas to central and northwestern Brazilian Amazonia in swampy forest and periodically flooded campina.

Not yet recorded from Reserva Ducke. AMAZONAS: Manaus, Rio Tarumã, *Ducke RB34980* (IAN K MG); Rio Negro, Rio Teá, above Bacurí, *Kubitzki et al. 79-234* (INPA K MG); São Gabriel da Cachoeira, Rio Cubate, *Rodrigues 10834* (K).

Chrysophyllum eximium is a very distinctive species on account of the densely

tomentose golden or ferruginous indumentum on the young parts, inflorescence and lower leaf surface, the rather few steeply ascending secondary veins and revolute leaf margin.

8. *Ecclinusa*

Ecclinusa Mart., *Flora* 22, Beibl. 1: 2. 1839.

Unarmed **trees**. Stipules large, caducous, leaving a conspicuous scar. Leaves spirally arranged. Venation eucamptodromous to brochidodromous, intersecondaries absent, tertiaries oblique, numerous. **Inflorescence** axillary or in the axils of fallen leaves. **Flowers** sessile, subtended by small persistent bracts, unisexual (monoecious or dioecious). Calyx a single whorl of 5 free imbricate sepals. Corolla campanulate or shortly tubular, the lobes usually exceeding the tube; lobes 5–7, simple. Stamens 5–7, usually fixed halfway or in the upper half of the corolla tube, glabrous. Staminodes absent. Disk absent. Ovary 5–9-locular, style included. **Fruit** 1-several-seeded, often thin-walled and constricted between the seeds. **Seed** globose or ellipsoid, sometimes laterally compressed, testa smooth, shining; scar adaxial and extending around the base of the seed, narrow; embryo with thick plano-convex cotyledons, radicle not exerted, endosperm absent.

Eleven species in the Neotropics, distributed from Panama throughout tropical South America, 3 in central Amazonia.

Key to the species of *Ecclinusa* of the Manaus area

1. Indumentum of young shoots and leaves tomentose with crisped and spreading hairs. 2. *E. ramiflora*
1. Indumentum of young shoots and leaves fine, closely appressed
 2. Stipules 5–10 mm long, leaves 10–20 cm long, usually elliptic or oblong-elliptic, corolla lobes 5, fruit thin-walled, 1.5–3 cm long 1. *E. guianensis*
 2. Stipules 1–2 cm long, leaves 20–40 cm long, usually oblanceolate, corolla lobes 5–7, fruit thick-walled, 5–6 cm long 3. *E. lanceolata*

8.1 *Ecclinusa guianensis* Eyma, Recueil Trav. Bot. Néerl. 33: 203. 1936; Pennington, T. D., Fl. Neotrop. 52: 623, fig. 146. 1990.

Fig. 33 a-c

Ecclinusa bacuri Aubrév. & Pellegr., Adansonia 1: 21. 1961.

Young shoots finely appressed puberulous. Stipules 5–10 mm long, lanceolate, appressed puberulous on the adaxial surface, with a broad glabrous margin, caducous. **Leaves** spirally arranged, 10–20 × 3–6 cm, narrowly elliptic or oblong-elliptic, apex narrowly attenuate to acuminate, base narrowly attenuate, glabrous; venation eucamptodromous, midrib prominent on the upper surface (but often recessed), secondary veins 17–25 pairs, parallel, straight or slightly arcuate, sometimes impressed on the upper surface, intersecondaries absent, tertiaries oblique, close, numerous; higher order venation areolate. Petiole 0.5–1.5 cm long, channelled, appressed puberulous. **Fascicles** mostly in the axils of fallen leaves, 5–10-flowered. **Flowers** unisexual (plant monoecious). Sepals 2.5–3 mm long, appressed puberulous outside, glabrous inside. Corolla 2.5–3 mm long, tube much shorter than the lobes, glabrous, lobes 5. Stamens 5, fixed at or near the top of the corolla tube, glabrous, absent in female flowers. Ovary 5-locular, globose, densely long-strigose. **Fruit** 1–3 cm long, globose, apex and base truncate or rounded, smooth, thin-walled, finely puberulous, becoming glabrous. **Seed** 1-several, 1.2–2 cm long, broadly ellipsoid, sometimes slightly laterally compressed, testa smooth, shining scar adaxial and extending around the base of the seed, 2–3 mm wide in several-seeded fruit, up to 9 mm wide in 1-seeded fruit.

Field characters: Tree to 35 m high and 75 cm diam., unbuttressed, with cylindrical bole, bark reddish-brown to dull grey-brown, scaling and leaving small circular dipples, slash cream-brown, with copious sticky white latex. Flowers fragrant, greenish-white, fruit ripening yellow. Flowering in central Amazonia July to August, the fruit maturing in January.

The Guianas and northern Venezuela to central Amazonia, where it occurs in non-flooded forest up to 600 m altitude. The species is present in savanna forest in Surinam.

18.I.1995 (fr) *Assunção, P. A. C. L. 162* (GIAN INPA K MBMR U UB US); 6.V.1997 (fr) *Assunção, P. A. C. L. et al. 503* (GIAN INPA K MBM UB US); 15.VII.1997 (fl) *Assunção, P. A. C. L. et al. 540* (INPA K MGR U); 25.XI.1997 (fr) *Brito, J. M. et al. 47* (BM IAN INPA K); 15.IV.1994 (bd) *Nascimento, J. R. et al. 509* (INPA K MG MONY RB SP); 12.VIII.1993 (fr) *Ribeiro, J. E. L. S. et al. 1118* (INPA K MG MONY RB SP); 3.VII.1963 (fr) *Rodrigues, W. 5333* (INPA); 15.IV.1964 (fr) *Rodrigues, W. & Loureiro, A. 5798* (INPA); 27.V.1964 (fr) *Rodrigues, W. & Loureiro, A. 5823* (INPA); 10.II.1965 (fr) *Rodrigues, W. & Monteiro, O. P. 6860* (INPA); 27.VI.1965 (fl) *Rodrigues, W. & Coêlho, D. 6960* (INPA); 20.IX.1968 (fr) *Souza, J. A. 164* (INPA).

Ecclinusa guianensis is distinctive within the genus on account of its small, rather narrow, glabrous leaves and numerous secondary veins and its small fruit.

8.2 *Ecclinusa ramiflora* Mart., Flora 22, Beibl. 1: 2. 1839; Pennington, T. D., Fl. Neotrop. 52: 625, fig. 146. 1990. **Fig. 33 d-f**

Young shoots tomentose with golden-brown hairs. Stipules 0.6–2 cm long, broadly lanceolate or ovate, pubescent on the abaxial surface, with a broad glabrous margin. **Leaves** 21–30 × 8–10.5 cm, mostly oblanceolate, apex narrowly attenuate or acute, base acute or narrowly attenuate, glabrous above, tomentose to pubescent below; venation eucamptodromous, midrib prominent on the upper surface, but recessed, secondary veins 16–28 pairs, parallel, straight or slightly arcuate, often slightly impressed above, intersecondaries absent, tertiaries oblique, parallel, numerous. Petiole 1.2–2 cm long, channelled, tomentose to pubescent. **Fascicles** below the leaves and ramiflorous, 5–10-flowered. **Flowers** unisexual (plant dioecious). Sepals 5, 2–3 mm long, pubescent outside, appressed puberulous inside. Corolla 3–3.5 mm long, tube much shorter than the lobes, lobes 5, glabrous outside, sparsely hairy inside. Stamens 5, fixed near the top of the corolla tube, glabrous, absent in female flower.

Ovary ovoid, 5-locular, densely long-strigose. **Fruit** 2.5–5 cm long, globose, apex rounded, base rounded or depressed, densely pubescent to velutinous. **Seeds** several, 1.8–2.2 cm long, ellipsoid, laterally compressed or shaped like the segment of an orange, testa smooth, shining; scar adaxial and extending around the base of the seed, 3–6 mm wide.

Field characters: Tree to 30 m high and 1 m diam., unbuttressed, with a cylindrical bole. Bark black-grey to reddish-brown, scaling and leaving conspicuous dipples, slash cream with copious sticky white latex.

Flowers greenish-white, fruit maturing yellow or orange. Flowering in central Amazonia September to December.

Colombia, Venezuela and the Guianas to Amazonian Brazil and Bolivia, in everwet and seasonal lowland rainforest on non-flooded land.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus, Estrada do Aleixo, *Ducke 1073* (K); Manaus, Cachoeira do Mindú, *Ducke RB22249* (K).

This species is similar in leaf size and shape to *E. lanceolata*, but differs in its tomentose spreading indumentum, and in the strictly 5-merous flowers.

8.3 *Ecclinusa lanceolata* (Mart. & Eichl.) Pierre, Not. Bot. 57. 1891; Pennington, T. D., Fl. Neotrop. 52: 635, fig. 150. 1990.

Fig. 33 g-h

Passaveria lanceolata Mart. & Eichl. in Mart., Fl. bras. 7: 86, tab. 38. 1863.

Young shoots closely appressed puberulous. Stipules 1–2 cm long, lanceolate, often longitudinally striate, appressed puberulous on the abaxial face with a broad glabrous margin. **Leaves** spirally arranged, 20–40 × 8–15 cm, usually oblanceolate, apex obtuse to shortly and narrowly attenuate, base narrowly attenuate, cuneate or acute, closely whitish-sericeous below, glabrous; venation eucamptodromous, midrib slightly prominent on the upper surface, secondary veins 28–40 pairs, parallel, straight or slightly arcuate, intersecondaries absent, tertiaries oblique, numerous. Petiole 2–4 cm, long, channelled, appressed puberulous. **Fascicles** axillary and in the axils of fallen leaves,

5–10-flowered. **Flowers** unisexual (plant ? monoecious). Sepals 5, 2.5–4 mm long, appressed puberulous outside, glabrous within. Corolla 3–5.5 mm long, tube shorter than or equalling the lobes, lobes 5–7, glabrous. Stamens 5, fixed in the upper half of the corolla tube, glabrous, absent in female flowers. Ovary ovoid, 7–9-locular, densely long-strigose. **Fruit** 5–6 cm long, globose, apex and base rounded or truncate, thick-walled, smooth, minutely puberulous. **Seeds** several, 2–3 cm long, broadly ellipsoid or shaped like the segment of an orange, testa smooth, shiny; scar adaxial and extending around the base of the seed, 5–9 mm wide.

Field characters: Tree to 30 m high and 50 cm diam., trunk unbuttressed, cylindrical. Bark dark brown or black, strongly dippled, slash cream to reddish with copious sticky white latex. Flowers greenish-white, fruit maturing orange, with the inner pericarp white and spongy. Flowering August to November, fruit maturing January to July.

The Guianas to western Brazilian Amazonia, Peru, Colombia and Panama, where it occurs in lowland and montane rainforest up to 1300 m altitude, on non-flooded and periodically flooded land.

Not yet recorded at Reserva Ducke but frequent in the PDBFF reserves.

PDBFF: Reserva km 41, *Lepsch Cunha et al. 737* (INPA K); *Pennington et al. 12626* (INPA K); *Freitas et al. F-224* (INPA K).

This species has a similar indumentum to *E. guianensis* but differs in its much larger leaves, longer petioles and it often has more than 5 corolla lobes and a 7–9-locular ovary.

9. *Pradosia*

Pradosia Liais, Climat. Geol., Faune Brésil 614. 1872.

Unarmed trees. Stipules absent. **Leaves** opposite, verticillate or spirally arranged. Venation usually eucamptodromous, less frequently brochidodromous, midrib usually sunken on the upper surface, secondary veins often impressed on the upper surface, tertiary veins usually oblique to perpendicular. Minute paired stipels sometimes present on petiole. Usually cauliflorous or ramiflorous.

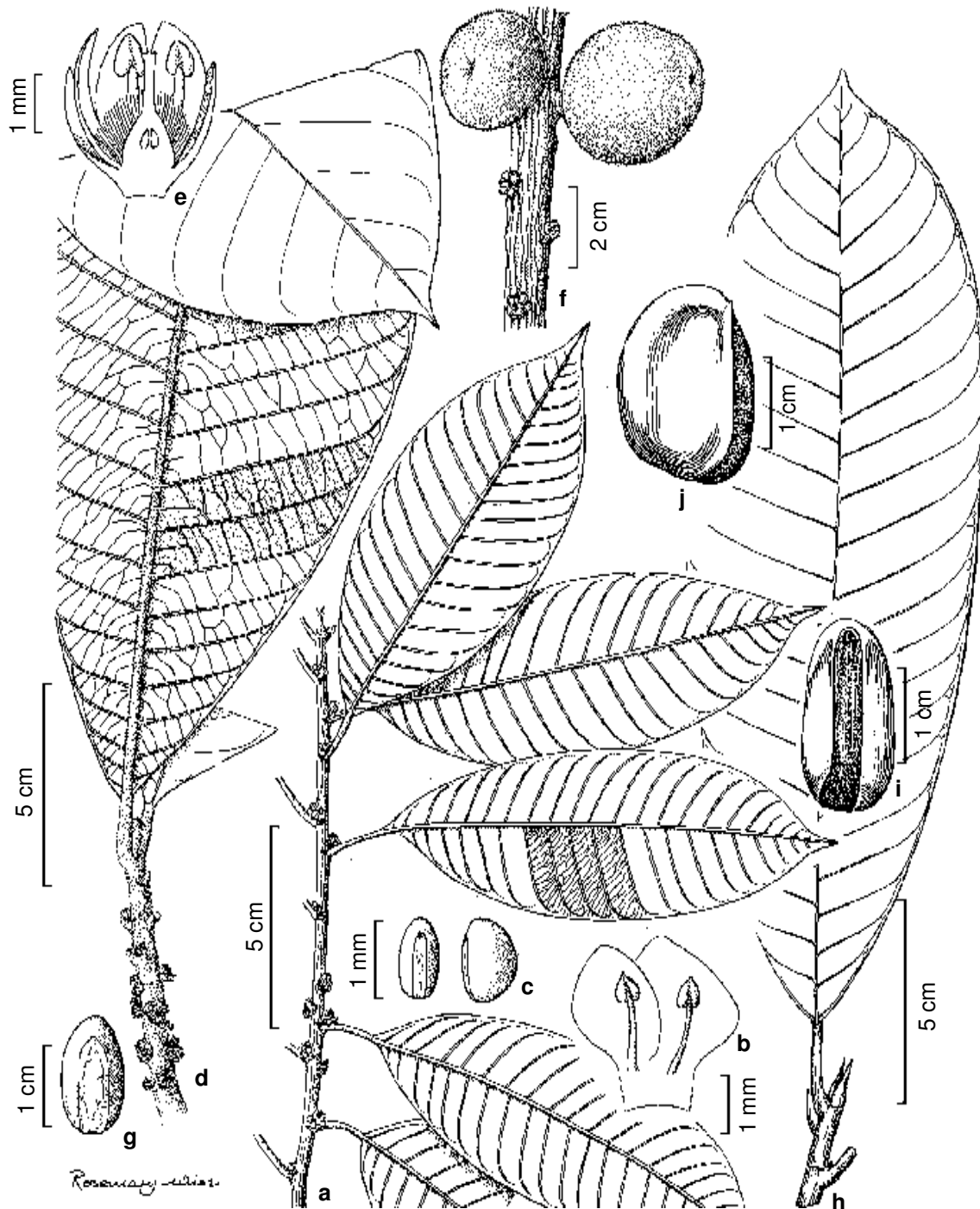


Figura 33 - a-c. *Ecclinusa guianensis* - a. habit (Marcano-Berti 368); b. part corolla with stamens (Marcano-Berti 366); c. seed (Blanco 531). d-f. *Ecclinusa ramiflora* - d. habit (Maguire et al. 60094); e. 1/2 flower (Hoehne 28590); f. fruit (Steyermark & Liesner 120700); g. seed (Grenand 855). h-j. *Ecclinusa lanceolata* - h. habit (Boom & Mori 1884); i. seed (side view); j. seed (frontal view) (Mori & Pipoly 15408).

Flowers bisexual. Calyx a single whorl of 5 sepals. Corolla rotate, tube nearly always shorter than the lobes, lobes 5. Stamens 5, fixed at the top of the corolla tube or at the base of the lobes, exserted, filaments long and geniculate below the apex. Staminodes absent. Disk absent. Ovary 5-locular. **Fruit** a drupe with a thinly cartilaginous endocarp, often slightly asymmetrical. **Seed** solitary,

with smooth, shining testa and full-length adaxial scar; embryo with thinly plano-convex cotyledons and a thin sheath of endosperm.

Twenty three species in South America with one species extending into southern Central America. Seven species in central Amazonia.

Key to the species of *Pradosia* of the Manaus area

1. Petiole with a pair of minute stipels near the apex (*ca.* 1 mm long) 7. *P. aff. grisebachii*
1. Petiole without paired stipels.
 2. Venation brochidodromous 5. *P. schomburgkiana*
 2. Venation eucamptodromous.
 3. Corolla 5 mm long or more.
 4. Midrib slightly raised on the upper surface, corolla glabrous 2. *P. decipiens*
 4. Midrib sunken on the upper surface, corolla with some appressed indumentum
 5. Leaves subverticillate, secondary veins 15–20 pairs 1. *P. subverticillata*
 5. Leaves spirally arranged, secondary veins 9–10 pairs 3. *P. ptychandra*
 3. Corolla not exceeding 4 mm long.
 6. Secondary veins 23–26 pairs, lower leaf surface shortly dark brown pubescent 6. *P. verticillata*
 6. Secondary veins less than 18 pairs, leaves glabrous 4. *P. cochlearia*

9.1 *Pradosia subverticillata* Ducke, Trop. Woods 71: 13. 1942; Pennington, T. D., Fl. Neotrop. 52: 646, fig. 151. 1990. **Fig. 34 a-b**

Young shoots long and stiffly pubescent.

Leaves subverticillate, 9–15 × 4–6 cm, broadly oblanceolate, apex rounded or shortly narrowly attenuate, base acute or narrowly attenuate, glabrous; venation eucamptodromous, midrib sunken on the upper surface, secondary veins 15–20 pairs, parallel, slightly arcuate, slightly impressed on the upper surface, intersecondaries absent, tertiaries very fine, oblique. Petiole 1.5–3 cm long, not channelled or only slightly channelled at the apex, glabrous; stipels absent. **Fascicles** many-flowered, axillary and below the leaves. Pedicel 4–6 mm long, shortly pubescent. Sepals 2.5–3 mm long, appressed pubescent outside, margin ciliate. Corolla *ca.* 6 mm long, tube much shorter than the lobes, sparsely sericeous outside. Stamens fixed at the base of the corolla lobes, exserted,

glabrous. Ovary narrowly ovoid, densely strigose. **Fruit** 2.5–4 cm long, subfalcate-oblong, apex acuminate, smooth, subglabrous. **Seed** with an oblong scar.

Field characters: Tree to 20 m high with cylindrical bole and yellowish-grey, sweet-tasting bark. Flowers greenish. Flowering recorded in June and September, fruit in March and May.

Central Amazonia to Pará, in non-flooded forest over sand.

Not yet recorded from Reserva Ducke. AMAZONAS: Manaus, Upper Tarumã, Ducke RB22145 (RB); Manaus, Ducke RB35544 (RB); Manaus, Rio Tarumã, Ducke 812 (IAN K RB).

Local names: Casca doce, pau doce (Amazonas).

This species is characterized by the subverticillate glabrous leaves and the numerous parallel secondary veins with fine oblique tertiaries.

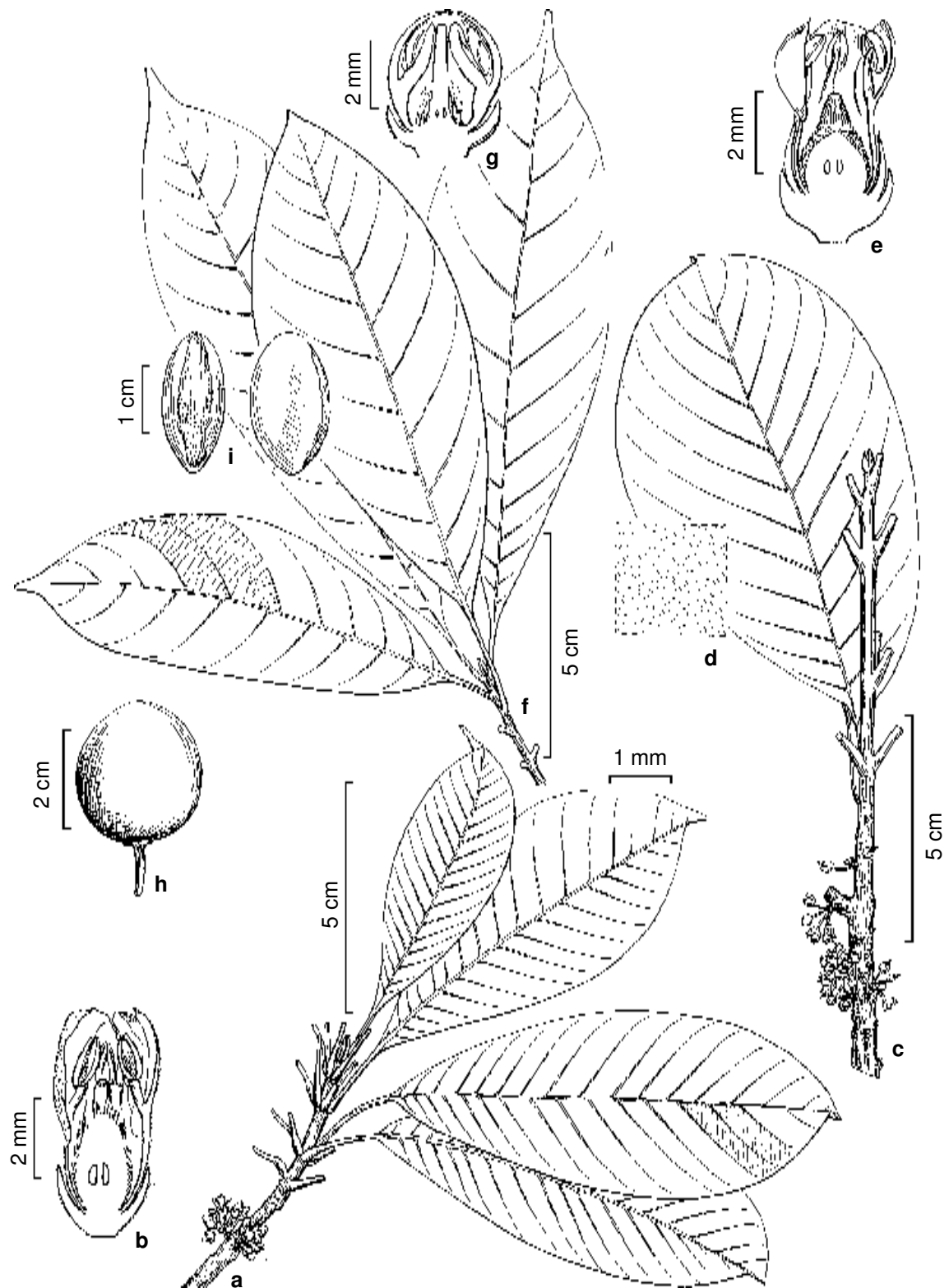


Figura 34 - a-b. *Pradosia subverticillata* - a. habit; b. 1/2 flower (Ducke 812). c-e. *Pradosia decipiens* - c. habit; d. detail of leaf indumentum; e. 1/2 flower (Ducke 24860). f-i. *Pradosia ptychandra* - f. habit; g. 1/2 flower (Mori & Veyret 8982); h. fruit; i. seed (Pennington & Mori 12103).

9.2 *Pradosia decipiens* Ducke, Trop. Woods 71: 17. 1942; Pennington, T. D., Fl. Neotrop. 52: 646, fig. 151. 1990. **Fig. 34 c-e**

Young shoots finely appressed puberulous, soon glabrous. **Leaves** spirally arranged, 8–15 × 3.2–8 cm, elliptic or obovate, apex obtuse to rounded, base acute or obtuse, upper surface glabrous, lower surface with some sparse appressed brown indumentum, venation eucamptodromous, midrib raised on the upper surface, secondary veins 11–13 pairs, parallel, straight or slightly arcuate, slightly impressed on the upper surface, intersecondaries absent, tertiaries oblique, fine, obscure. Petiole 1.5–2.5 cm long, channelled in the upper half, glabrous; stipels absent. **Fascicles** below the leaves, 5–15-flowered. Pedicel 0.5–1.2 cm long, glabrous. Sepals 2.5–3 mm long, glabrous. Corolla ca. 5 mm long, the tube shorter than the lobes, glabrous. Stamens fixed at the base of the corolla lobes, glabrous. Ovary narrowly ovoid, appressed puberulous. **Fruit** 3–3.5 cm long, ellipsoid and slightly asymmetrical, apex acute or obtuse, base tapered, smooth, glabrous. **Seed** ca. 2 cm long, ellipsoid, laterally compressed, testa smooth and shining; scar adaxial 2–2.5 mm wide.

Field characters: Tree to 30 m high and 50 cm diam., with convex, asymmetrical buttresses to 2 m high, bole cylindrical, bark whitish-brown, scaling and leaving orange-coloured dipples, slash orange, astringent, with sweet smell, containing whitish translucent latex. Flowers yellowish-green with a pink ovary. Fruit maturing yellow, with whitish pulp. Flowering in central Amazonia October to December, fruit maturing in March.

Central Amazonian Brazil to Peru, in lowland forest often on poorly drained sites. 9.IV.1998 (fr) *Assunção, P. A. C. L. et al.* 833 (INPA K MG MONY RB SP U UB); 9.IX.1997 (bd) *Brito, J. M. et al.* 31 (BM G IAN INPA K MBM UB UEC US); 28.X.1994 (fl) *Hopkins, M. J. G.* 1499 (INPA K MG MONY R RB SP U); 23.III.1995 (fr) *Ribeiro, J. E. L. S. & Assunção, P. A. C. L.* 1579 (BM G IAN INPA K MBM SPF UEC US); 19.XI.1997 (fl) *Ribeiro, J. E. L. S. et al.* 1950 (B GH IAN ICN INPA K S U PCB VIC); 2.XII.1997 (fl) *Souza, M. A. D. et al.* 474 (COL F IAN INPA K PEUFR SPF UFMT VEN).

Pradosia decipiens is distinctive among the larger-flowered species of the genus because of the raised leaf midrib, the minute appressed indumentum on the lower leaf surface (visible only with a lens), the obscure tertiary venation and glabrous flowers.

9.3 *Pradosia ptychandra* (Eyma) T. D. Penn., Fl. Neotrop. 52: 648, fig. 153. 1990.

Fig. 34 f-i

Pouteria ptychandra Eyma, Recueil Trav. Bot. Néerl. 33: 189. 1936.

Young shoots appressed puberulous. **Leaves** spirally arranged, 9–15 × 3.5–5 cm, oblanceolate, apex narrowly attenuate, base narrowly cuneate or attenuate, glabrous; venation eucamptodromous, midrib sunken on the upper surface, secondary veins 9–10 pairs, arcuate, slightly convergent, intersecondaries absent, tertiaries numerous, oblique. Petiole 1.5–2 cm long, strongly channelled, finely appressed puberulous to glabrous; stipels absent. **Fascicles** mostly ramiflorous, many-flowered. Pedicel 9–10 mm long, finely appressed puberulous. Sepals 2–2.5 mm long, finely appressed puberulous outside, inner ones with broad glabrous margin. Corolla 5–6 mm long, tube shorter than the lobes, appressed puberulous outside on lower part of lobes and tube. Stamens fixed at the tip of the corolla tube, glabrous. Ovary conical, pubescent. **Fruit** 3.3–4 cm long, broadly ellipsoid, apex and base rounded, smooth, glabrous. **Seed** solitary, 2.5–2.6 cm long, oblong-ellipsoid, slightly laterally compressed, testa smooth or horizontally striate, shining; scar adaxial, 8–9 mm wide.

Field characters: Tree to 20 m high and 40 cm diam., usually unbuttressed, trunk cylindrical, bark greyish-brown, smooth to dippled, often with vertical rows of lenticels, slash cream, streaked with orange, slowly exuding sticky white latex. Flowers wine-red and fruit maturing orange-yellow, with the inner pericarp a soft transparent sweet-tasting jelly. The endocarp is cartilaginous and remains attached to the seed. Flowering in central Amazonia January to April.

The Guianas to central Amazonia, in non-flooded lowland rainforest.

Not yet recorded from Reserva Ducke. PDBFF: Reserva 3209, *Ferreira et al. PDBFF 3209.1291*.

Pradosia ptychandra is distinguished from the other large-flowered central Amazonian species by its spirally arranged leaves with few secondary veins, sunken midrib and red flowers.

9.4 *Pradosia cochlearia* (Lecomte) T. D. Penn., Fl. Neotrop. 52: 655, fig. 154. 1990. **Fig. 35 a-b**

Chrysophyllum cochlearium Lecomte, Notul. Syst. (Paris) 4(2): 63. 1923.

Glycoxylon praealtum Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 165, pl. 20. 1925.

Young shoots appressed puberulous with reddish-brown hairs, soon glabrous. **Leaves** spirally arranged or verticillate, 7.5–13 × 2.7–5.4 cm, broadly oblanceolate to obovate, apex rounded or retuse, base narrowly attenuate, glabrous; venation eucamptodromous, midrib raised on the upper surface, secondary veins 13–17 pairs, parallel, slightly arcuate, intersecondaries absent, tertiaries perpendicular to oblique. Petiole 1–1.5 cm long, channelled in the upper half, subglabrous; stipels absent. **Fascicles** 5–10-flowered, below the leaves. Pedicel 0.5–3 mm long, appressed puberulous. Sepals *ca.* 2 mm long, appressed puberulous. Corolla 1.75–3 mm long, the tube shorter than the lobes, sparsely sericeous outside. Stamens fixed at the base of the corolla lobes, glabrous. Ovary ovoid, appressed puberulous. **Fruit** 4–5 cm long, ellipsoid or obovoid, apex tapered or rounded, base acute, smooth, glabrous. **Seed** solitary 2.2–2.8 cm long, oblong, not laterally compressed, testa smooth, shining; scar adaxial, 6–7 mm wide.

Field characters: Tree to 50 m high, with straight, simple buttresses to several metres high, bole cylindrical, bark greyish-white scaling in irregular plates, and with vertical lines of lenticels; slash pinkish, sweet, with scarce translucent white latex. Flowers greenish, fruit maturing yellow. Flowering August to January, fruit maturing in April.

Pará and the Guianas through central and western Amazonia, in lowland rainforest on non-flooded land.

20.II.1998 (fr) *Assunção, P. A. C. L. et al.* 797 (INPA K MG MO NY RB SP U); 9.IX.1997 (fl) *Brito, J. M. et al.* 29 (INPA K MG MO NY R RB SP U); 1.X.1997 (fl) *Mesquita, M. R.* 20 (INPA K MG MO NY R RB SP U); 7.IV.1994 (fr) *Ribeiro, J. E. L. S. et al.* 1259 (INPA K MG MO NY R RB SP U).

The above description refers to *P. cochlearia* subsp. *praealta* (Ducke) T. D. Penn., the only subspecies present in central Amazonia. It is distinguished from the other small flowered species of *Pradosia* by the small obovate leaves with raised midrib and few secondary veins.

9.5 *Pradosia schomburgkiana* (A. DC.) Cronq., Bull. Torrey Bot. Club 73: 311. 1946; Pennington, T. D., Fl. Neotrop. 52: 657, fig. 155. 1990. **Fig. 35 c-d**

Chrysophyllum schomburgkianum A. DC. in A. P. de Candolle, Prodr. 8: 157. 1844.

Pradosia inophylla (Mart.) Ducke, Trop. Woods 71: 16. 1942.

Young shoots subglabrous. **Leaves** opposite, 6–11 × 3.5–6.5 cm, obovate, apex obtuse, rounded or emarginate, base acute to rounded or truncate, glabrous; venation brochidodromous with a submarginal vein, midrib flat (not raised) on the upper surface, margin slightly revolute, secondaries 14–20 pairs, parallel, straight or arcuate, intersecondaries numerous, long, often extending to the margin, tertiaries reticulate. Petiole 0.5–1.2 cm long, not or only slightly channelled, glabrous; stipels absent. **Fascicles** on twigs below the leaves, 5–20-flowered. Pedicel 4–7 mm long, glabrous. Sepals 1–1.5 mm long, glabrous. Corolla 2–3 mm long, tube shorter than the lobes, glabrous. Stamens fixed at the base of the corolla lobes, glabrous. Ovary ovoid, appressed pubescent. **Fruit** 1.2–1.6 cm long, broadly ellipsoid or obovoid, apex rounded, base rounded or tapered, smooth, glabrous. **Seed** solitary, 1–1.5 cm long, subglobose or ellipsoid, slightly laterally compressed, testa smooth, shining; scar adaxial, about 2/3 the length of the seed, 2–5 mm wide.

Field characters: In campina and campinarana vegetation this is only a shrub or

small tree flowering when a few metres high, but in high rainforest it can be a buttressed tree to 30 m high and 40 cm diam. Bark light brown to reddish-brown, scaling to leave round dipple marks, slash reddish, sweet, with sticky white latex. Flowers greenish-white, fruit maturing yellow. Flowering in central Amazonia November to February, fruit February to March.

Venezuela and the Guianas to central and eastern Amazonia, occurring in a variety of habitats from savanna, campina and campinarana to high rainforest, often on white sand, up to 1400 m altitude.

27.III.1996 (fr) Brito, J. M. *et al.* 21 (INPA K MG MO RB); 13.II.1996 (fr) Campos, M. T. V. A. *et al.* 484 (INPA K MG NY SP); 23.XI.1993 (fr) Ribeiro, J. E. L. S. *et al.* 1166 (INPA K MG NY SP); 4.II.1995 (fl) Vicentini, A. *et al.* 844 (INPA K MG MO NY R RB SP U); 9.II.1995 (fr) Vicentini, A. *et al.* 862 (G INPA K MBM MG MOR RB U).

Local name: Pau doce.

Easily recognized among other *Pradosia* here by the relatively short but broad leaves with brochidodromous venation and submarginal vein, and by the numerous secondary veins with numerous long intersecondaries.

9.6 *Pradosia verticillata* Ducke, Trop. Woods 71: 12. 1942; Pennington, T. D., Fl. Neotrop. 52: 664, fig. 155. 1990. **Fig. 35 e-f**

Young shoots densely brown-tomentose. **Leaves** verticillate in whorls of 5–7, 11–25 × 4.5–10 cm, broadly oblanceolate, apex shortly and obtusely attenuate to rounded, base acute to narrowly cuneate, upper surface glabrous or with some residual indumentum, lower surface dark brown-pubescent, denser on the midrib and veins; venation eucamptodromous, midrib, secondary and tertiary veins sunken on the upper surface, secondary veins 23–26 pairs, parallel, slightly arcuate, intersecondaries absent, tertiaries numerous, oblique. Petiole 1.5–4 cm long, channelled in the upper part, brown-tomentose; stipels absent. **Fascicles** on twigs below the leaves and on branches, 5–10-flowered. Pedicel, *ca.* 1 mm long, appressed puberulous. Sepals *ca.* 2 mm long,

appressed puberulous outside, glabrous inside. Corolla *ca.* 4 mm long, tube shorter than the lobes, densely sericeous outside, except for the glabrous margin. Stamens fixed at the base of the corolla lobes, glabrous. Ovary conical, densely strigose. **Fruit** 3.5–5 cm long, narrowly obovoid, asymmetric, apex rounded, base attenuate, smooth, glabrous. **Seed** solitary, 2.5–3 cm long, laterally compressed, testa smooth, shining; scar adaxial, full-length, *ca.* 4 mm wide.

Field characters: Tree to 35 m high and 35 cm diam., with short, simple, stout buttresses to 0.5 m high, bark pale buff-brown, exfoliating in large irregular thin sheets and leaving dipples, slash orange-brown, with sticky white latex. Crown with massive twigs and dense terminal clusters of leaves. Flowers dark violet-black. Flowering in central Amazonia in October.

The Guianas to central Amazonian Brazil, in mixed lowland rainforest on non-flooded land.

Tagged tree number 724, 926, 2348.

PDBFF: Pennington *et al.* s.n. (INPA K); Amazonas, Manaus, Villa Municipal, Ducke 811 (IAN K MG RB).

A very distinct species in *Pradosia* with the characteristic dark brown tomentum on its young parts and lower leaf surface, and verticillate leaves with numerous parallel veins.

9.7 *Pradosia aff. grisebachii* (Pierre) T. D. Penn., Fl. Neotrop. 52: 655, fig. 154. 1990.

Young shoots finely appressed puberulous with reddish-brown hairs. **Leaves** subverticillate, 10–5 × 3.5–4.5 cm, oblanceolate, apex shortly and narrowly attenuate, base narrowly attenuate, glabrous above, sparsely and minutely appressed puberulous below (lens); venation eucamptodromous, midrib sunken on the upper surface, secondary veins 13–16 pairs, parallel, slightly arcuate, intersecondaries absent, tertiaries numerous, fine, oblique. Petiole 1–2 cm long, strongly channelled in the upper half, subglabrous; stipels present near the apex of the petiole or on the lower midrib at the base of the lamina, *ca.* 1 mm long, paired. **Fascicles** cauliflorous, many-flowered. Pedicel 7–10 mm long, finely

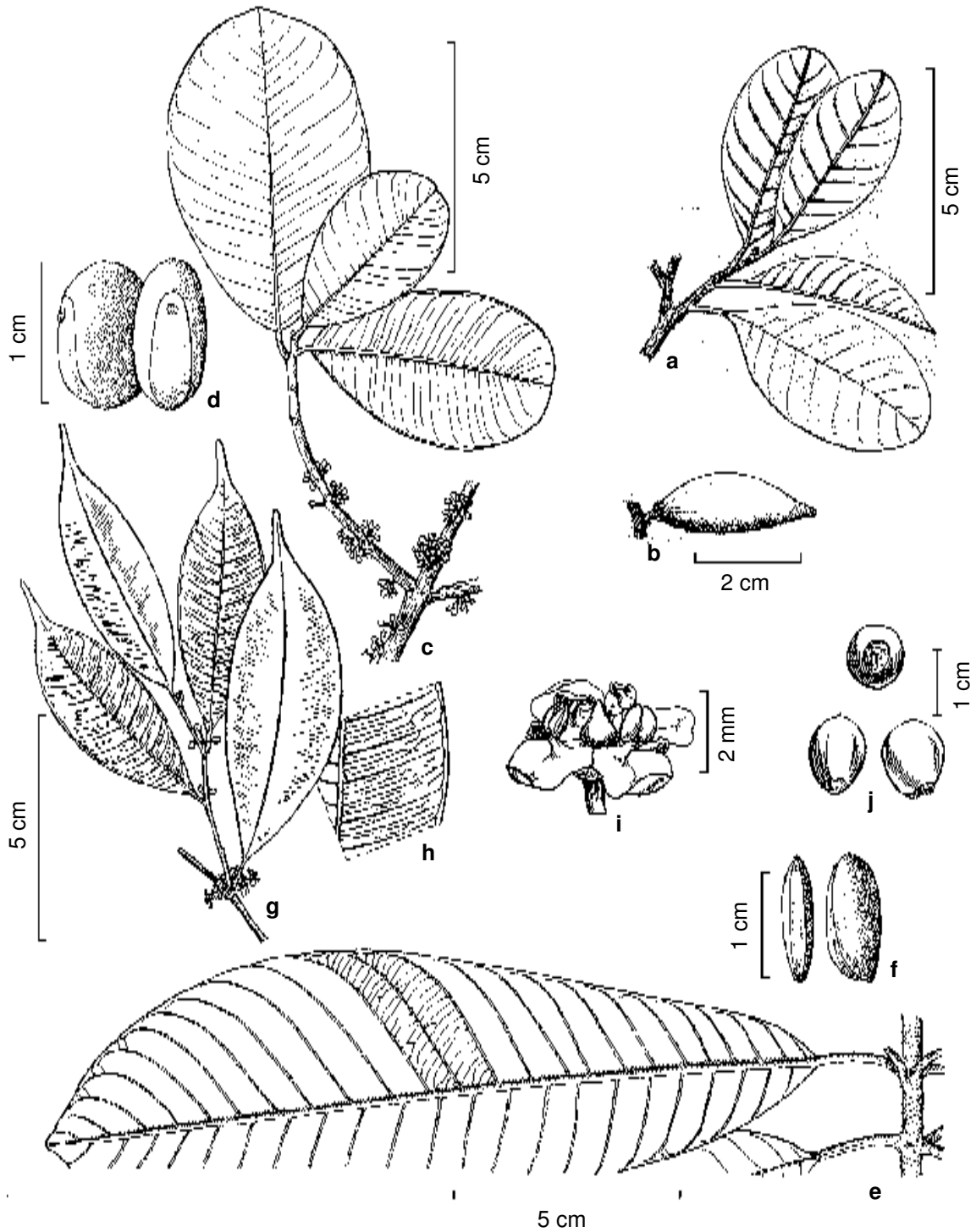


Figura 35 - a-b. *Pradosia cochlearia* subsp. *praealta* - a. habit; b. fruit (Ducke 1663). c-d. *Pradosia schomburgkiana* - c. habit (Clark & Maquirino 7619); d. seed (Liesner 3369). e-f. *Pradosia verticillata* - e. habit; f. seed (Ducke 881). g-j. *Diploön cuspidatum* - g. habit; h. detail of venation (Hatschbach 19595); i. flower (Wurdack & Monachino 39595); j. seed (Hatschbach 20951).

appressed puberulous. Sepals 3–5 mm long, finely appressed puberulous outside, the inner ones with a broad glabrous margin. Corolla 7.5–8 mm long, tube much shorter than the lobes, subglabrous. Stamens fixed at the top of the corolla tube, glabrous. Ovary conical, appressed puberulous, tapered gradually into the style. **Fruit** unknown.

Field characters: Unbuttressed tree to 12 m high and 14 cm diam., bark hard, scaling in small pieces, slash light orange, fibrous, exuding drops of white latex. Flowering in November.

Known only from a single collection from the PDBFF Dimona Reserve in central Amazonia.

PDBFF: Fazenda Dimona, *Kukle* 75 (K).

This plant differs from *P. grisebachii*, which is known only from Venezuela, in its much larger flowers, which are twice the size, in its sub-verticillate leaves and in the position of the stipels at the apex of the petiole, or attached to the lower midrib at the base of the leaf (in *P. grisebachii* they are attached in the lower half or midway up the petiole). The other Amazonian species with petiole stipels, *P. atroviolacea*, also has much smaller flowers and lacks the indumentum on the lower leaf surface.

10. *Diploön*

Diploön Cronquist, A. J. Bull. Torrey Bot. Club 73: 466. 1946.

Unarmed **trees**. Stipules absent. **Leaves** alternate and distichous. Venation brochidodromous, with a submarginal vein, intersecondaries long, extending to the margin, giving the leaves a somewhat striate appearance. Calyx a single whorl of 5 sepals. Corolla rotate, with a very short tube and much longer lobes, lobes 5, simple. Stamens fixed at the top of the corolla tube, exerted. Staminodes absent. Disk absent. Ovary 1-locular with 2 basal ovules. **Seed** with small basal or basi-ventral scar; embryo with plano-convex cotyledons, endosperm absent.

A single species in South America.

10.1 *Diploön cuspidatum* (Hoehne) Cronquist, Bull. Torrey Bot. Club. 73: 466. 1946; Pennington, T. D., Fl. Neotrop. 52: 669, fig. 44. 1990.

Fig. 35 g-j

Chrysophyllum cuspidatum Hoehne, Ostenia 302, tab. 8. 1933.

Young shoots minutely appressed puberulous. **Leaves** 6.5–11.5 × 2–4 cm, elliptic to oblanceolate, apex narrowly acuminate or caudate, base narrowly attenuate, glabrous; venation brochidodromous, midrib slightly raised on the upper surface, secondary veins 17–20 pairs joining to form a submarginal vein, parallel, straight or slightly arcuate, intersecondaries long, often extending to the margin, tertiaries parallel to the secondaries and descending from the margin. Petiole 4–8 mm long, slightly channelled, subglabrous. **Fascicles** 3–10-flowered, axillary and below the leaves. Pedicel 4–5 mm long, sparsely appressed puberulous. **Flowers** bisexual. Sepals 1–1.5 mm long, sparsely appressed puberulous outside. Corolla 2.5–3 mm long, tube ca. 0.5 mm long, lobes 2–2.5 mm long, broadly elliptic, apex rounded or slightly hooded, glabrous. Stamens with filaments 1–1.5 mm long, anthers 1–1.25 mm long, glabrous. Ovary ovoid, glabrous, style 0.5–1 mm long, glabrous, style-head simple. **Fruit** 1.8–2 cm long, broadly ellipsoid to globose, apex and base rounded, smooth, glabrous. Seed solitary, ca. 1.5 cm long, broadly ellipsoid, not laterally compressed, rounded at base and apex, testa smooth, shining; scar basal or basi-ventral, ca. 7 × 5 mm.

Field characters: Tree to 30 m high and 50 cm diam., buttressed and with slightly fluted bole. Bark reddish-brown, scaling, with white latex. Flowers creamish-white, fruit maturing reddish to black. Flowering September to December, fruit maturing November to February.

Widely distributed from Venezuela and Guyana to southern Amazonian Peru and Bolivia, also in coastal Brazil from Alagoas to Paraná. A tree of lowland rainforest on non-flooded land.

Not recorded from Reserva Ducke.

AMAZONAS: Manaus-Caracará km 39, A. P. Silva s.n. INPA108274 (INPA).