

NEW SPECIES OF *ELATTOSTACHYS* (BLUME) RADLK.
(SAPINDACEAE)

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SUMMARY

Seven new species of *Elattostachys* (Blume) Radlk. are described, five from New Guinea and one each from Celebes and the Solomon Islands. A key to the species of Celebes and one to the species of New Guinea is given.

INTRODUCTION

Elattostachys is a small genus (c. 20 species) in the tribe Cupanieae of the family Sapindaceae. It is widely distributed from Java, Borneo and the Philippines, through New Guinea and Australia, into the Pacific to New Caledonia, Samoa and Tonga.

Elattostachys is closely related to *Lepidopetalum*, *Synima* and *Toechima* (Muller & Leenhouts, 1976). From *Lepidopetalum* it differs in the domatia: absent or pocket-like to small sacks; the petals with auricles instead of one large scale; the 3-locular instead of 2-locular ovary; the globular instead of flattened fruits. From *Synima* and *Toechima* it differs especially in the petals that have auricles shorter than the blade instead of two scales almost as long as the blade.

CELEBES

According to Radlkofer (1933) three species of *Elattostachys* occur in Celebes, viz., *E. duplicato-serrata* Radlk., *E. verrucosa* (Blume) Radlk., and *E. zippeliana* (Blume) Radlk.

Elattostachys duplicato-serrata proved to be only an aberrant form of *E. zippeliana*, to which it is reduced.

In the material of *E. verrucosa* two specimens that are in several aspects different from that species, were found. They are here described as a new species.

Elattostachys erythrocarpum Adema, *spec. nov.* – Fig. 1.

Arbuscula vel frutex; foliolis plus minusve coriaceis, obtusis vel rotundatis, domatiis nullis. Infructescentiae 15–30 mm longae. Capsulae plus minusve globosae, 9–10 × 9–10 mm, pericarpio 1,2–1,5 mm crasso, exocarpio rubro, glabro. — Typus: *Eyma* 1778, Indonesia, Celebes, Manado, between Tg. Karang and Donggala, 22.8.1935 (L, holo; iso in K, U).

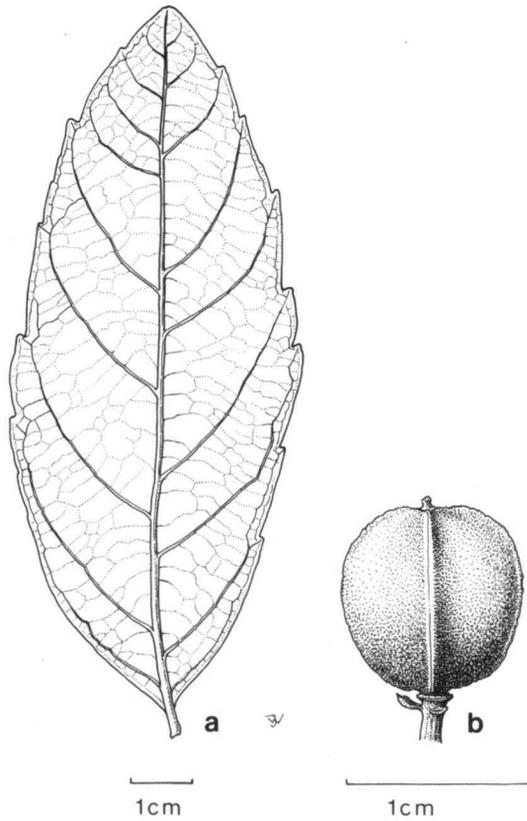


Fig. 1. *Elattostachys erythrocarpum* Adema. a. Leaflet, lower side; b. fruit (Curran 3414, A).

Small trees or shrubs, c. 6 m high. Axial parts densely strigose, glabrescent. Flowering twigs 1.5–2.5 mm in diameter. Leaves 2–4-jugate, petiole 15–30 mm, rachis 20–50 mm, both semiterete, densely strigose, glabrescent. Leaflets elliptic to ovate, asymmetric, 5.5–11 × 2–5 cm, index 2.1–3.5, coriaceous, above and below glabrous, base acute to rounded, apex obtuse to rounded, margin irregularly or remotely dentate, midrib (slightly) prominent above, nerves 5–11 per side, 5–20 mm apart, angle to midrib 60°, domatia absent; petiolule 2–4 mm, strigose. Inflorescences in fruit 15–30 mm. Fruits about globular, 9–10 × 9–10 mm, wall 1.2–1.5 mm thick, outside glabrous. Seeds ± obovoid, 6 × 4 mm, sarcotesta 2-lobed, reaching up to 1/2.

Distribution – Malesia: Celebes. Specimens seen: Curran 3414, Paloe, Eyma 1778.

Habitat & Ecology – Forest. Fruiting: May, August.

Field notes – Leaflets dark green. Fruit red.

Notes – The present species differs from *E. verrucosa* in its thicker leaflets with obtuse to rounded apices, its shorter inflorescences, and its smaller fruits that are more circular in cross section.

The species of Celebes can be keyed out as follows:

- 1a. Domatia usually absent, if present inconspicuous, pocket-like, not hairy. Fruits 9–20 × 9–18 mm, wall 1.2–2.4(–3.7) mm thick. Sarcotesta two-lobed . . . 2
- b. Domatia pocket-like or saccate, ciliate. Fruits 13–25 × 11–20 mm, wall 1.4–3.4 mm thick. Sarcotesta rounded, not lobed. (Inside of petals hairy. Anthers glabrous.) *E. zippeliana*
- 2a. Apex of leaflets acute. Inflorescences in fruit 30–100 mm. Fruits 10–20 × 9–18 mm, rounded deltoid in cross section. (Inside of petals glabrous. Anthers hairy.)
E. verrucosa
- b. Apex of leaflets obtuse to rounded. Inflorescences in fruit 15–30 mm. Fruits 9–10 × 9–10 mm, ± circular in cross section *E. erythrocarpum*

NEW GUINEA

According to Radlkofer (1933) three species of *Elattostachys* occur in New Guinea, viz. *E. obliquinervis* Radlk., *E. tetraporandra* Radlk., and *E. zippeliana*. In the material collected since Radlkofer's time not less than five new species of the genus were discovered. They are described below.

Differences between the species tend to be small. Moreover, the material of several of the new species is rather incomplete. This makes the delimitation of the species, and also the construction of the key, rather difficult. However, in my opinion all taxa described deserve species rank.

Elattostachys aiyurensis Adema, *spec. nov.* – Fig. 2a, b.

Arbor; foliis oppositis, acutis, infra densissime pilosis, domatiis minutis marsupiiiformibus. Capsulae plus minusve obovoideae, in sectione transversali fere circulares, 17 × 14 mm, pericarpio 2 mm crasso, exocarpio breve adpresso piloso. — Typus: *NGF 1042*, Papua New Guinea, Madang Prov., Aiyura, alt. 1500–2000 m, 10.1944 (L, holo).

Trees c. 30 m high, d. b. h. c. 60 cm. Axial parts densely short-tomentose. *Flowering twigs* 2 mm in diameter. *Leaves* 2-jugate, petiole 15–20 mm, rachis 15–20 mm, both ± terete, densely short-tomentose. *Leaflets* opposite, narrowly elliptic, slightly asymmetric, 6–11.5 × 2–4 cm, index 2.4–3, thickly chartaceous, above thinly pilose, midrib more densely so, below rather densely pilose, midrib and nerves more densely so, base cuneate, apex acute, margin entire, midrib prominent above, nerves 9–10 per side, 5–14 mm apart, angle to midrib 45–50°, domatia small, pocket-like; petiolule 1–2 mm, densely short-tomentose. *Inflorescences* in fruit 55 mm. *Fruits* ± obovoid, almost circular in cross section, 17 × 14 mm, wall 2 mm thick, outside shortly appressed-hairy.

Distribution – Malesia: Papua New Guinea (Madang Prov.). Specimen seen: *NGF 1042*.

Habitat & Ecology – Altitude 1500–2000 m. Fruiting: October.

Vernacular name – Morzipa (Anona).

Field notes – Outer bark brown with numerous small pustular lenticels, inner bark streaked red brown on pale background, within yellow brown tinged with pink. Wood

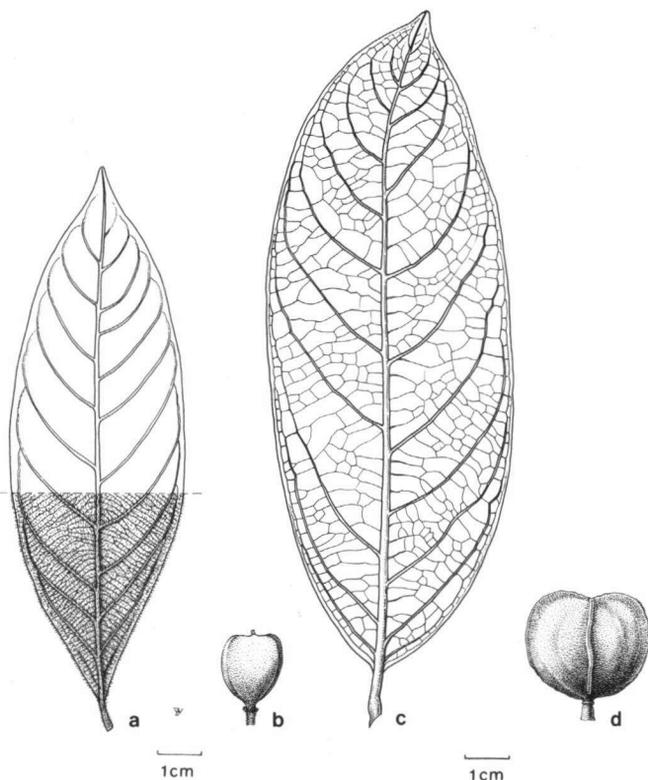


Fig. 2. *Elattostachys aiyurensis* Adema. a. Leaflet, lower side; b. fruit (NGF 1042, L). — *E. angulosa* Adema. c. Leaflet, lower side; d. fruit (NGF 43733, L).

pale. Leaflets dark green above, rusty on the nerves below. Fruits green or tinged with pink.

Notes — Rather similar to *E. obliquinervis* but different in the length of petioles, rachises and petiolules, in the hairiness of the leaflets, in the size of the fruits, and the hairiness of the exocarp.

The type specimen of this new species was collected at a much higher altitude than were the specimens of *E. obliquinervis*.

***Elattostachys angulosa* Adema, spec. nov. — Fig. 2c, d.**

Arbuscula; foliolis acutis vel acuminatis. Capsulae plus minusve obovoideae, in sectione transversali acute deltoideae, manifeste carinatae, 25–35 × 20–25 mm, pericarpio 3,7–5,5 mm crasso, exocarpio glabro ad velutinoso. Semina obovoidea vel ellipsoidea, 10–11 × 6–7 mm. — Typus: Craven & Schodde 994, Papua New Guinea, Gulf Prov., Saw Mountains, near junction of Tauri and Kapau Rivers, c. 1100 m, 11.3.1966 (L, holo; iso in A, K).

Small trees 6–20 m high, d.b.h. 3–6 cm. Axial parts glabrous to strigose. Flowering twigs 2–5 mm in diameter. Leaves 2–4-jugate, petiole 35–135 mm, rachis

70–220 mm, both terete, strigose, glabrescent. *Leaflets* elliptic, slightly asymmetric, 6.5–29 × 3.5–9.5 cm, index 1.5–3.5, chartaceous, above and below glabrous, midrib with (few) short hairs, base cuneate to rounded, apex acute or acuminate, margin entire, midrib (slightly) prominent above, nerves 10–17 per side, 5–22 mm apart, angle to midrib 50–70°, domatia if present pocket-like; petiolule (1–)5–15 mm, short-hairy to glabrous. *Inflorescences* in fruit 40–90 mm. *Fruits* globular to obovoid, triquetral in cross section, distinctly keeled, 20–35 × 20–25 mm, wall 3.7–5.5 mm thick, outside glabrous to strigose. *Seeds* ellipsoid to obovoid, 10–11 × 6–7 mm, sarcotesta rounded, reaching up to 1/5–1/3.

Distribution – Malesia: New Guinea (Irian Jaya, Manokwari; Papua New Guinea, West Sepik, Morobe, Gulf, and Central Prov.). Specimens seen: *BW 3703*, *Craven & Schodde 994*, *LAE 50513*, *NGF 43733*, *UPNG 53*.

Habitat & Ecology – Primary or secondary forest, or shaded edge of swamp. Altitude 90–1000 m. Clay soil. Fruiting: March to September.

Field notes – Bark smoothish, grey to dark brown, inner bark red or mid-brown. Wood straw or creamish. Leaflets mid or dark green above, paler below. Flowers cream. Fruits pale (yellowish) green to red, blackish brown when old.

Note – *Craven & Schodde 994* from West Sepik Province has smaller fruits and seeds than the other specimens.

Elattostachys globosa Adema, *spec. nov.* – Fig. 3.

Arbor; foliolis acutis vel acuminatis vel obtuso ad rotundato, domatiis minutis marsupiiiformibus. Antherae glabrae. Capsulae globosae ad obovoideae, in sectione transversali circulares vel rotundo-deltaoideae, 20–35 × 20–30 mm, pericarpio 4–6,5 mm crasso, exocarpio glabro ad velutinosa. Semina 11–13 × 6–8 mm, sarcotesta rotundata, non lobata. — **Typus**: *Forbes 567*, Papua New Guinea, Sogeri Region, 1885–86 (L, holo; iso in FI, MEL).

Trees 6–15 m high, d. b. h. 18–45 cm. Axial parts densely tomentose. *Flowering twigs* 2–4 mm in diameter. *Leaves* 2–4(–6)-jugate, petiole 30–140 mm, rachis 25–215 mm, both semiterete, densely tomentose. *Leaflets* elliptic to ovate, (slightly) asymmetric, 7–36 × 3–12 cm, index 1.9–3.7, chartaceous, above glabrous to pilose, midrib (and nerves) glabrous to pilose, below (thinly) pilose, midrib and nerves more densely so, base cuneate to rounded, apex obtuse to rounded, or acute or acuminate, margin entire, rarely apically dentate, midrib (slightly) prominent above, nerves 10–17 per side, 6–25 mm apart, angle to midrib 45–65°, domatia small, pocket-like; petiolule 2–15 mm, densely tomentose. *Inflorescences* 20–75 mm, in fruit 20–85 mm. *Bracts* and *bracteoles* triangular or ovate to narrowly elliptic, 0.6–1.9 × 0.3–1.6 mm, outside appressed-hairy, inside glabrous or appressed-hairy. *Buds* about globular, 1.9 × 1.9 mm. *Pedicels* 1.7–2.2 mm. *Sepals* ovate to elliptic, 1.6–2.5 × 0.6–1.3 mm. *Petals* 0.8–1.4 × 0.8–1.2 mm, claw 0.4–0.6 mm, outside shortly appressed-hairy, ciliate, inside glabrous, auricles woolly. Filaments of *stamens* 0.5–0.8 mm, anthers c. 1.2 mm, glabrous. *Pistillode* 0.6–1.0 × 0.7–1.0 mm. *Fruits* globular to obovoid, circular or rounded deltoid in cross section, 20–35 × 20–30 mm, wall 4.0–6.5 mm thick, outside glabrous to velutinous. *Seeds* ellipsoid to obovoid, 11–13 × 6–8 mm, sarcotesta rounded, lobed, reaching up to 1/5–1/3.

Distribution – Malesia: Papua New Guinea (Morobe, Central, Gulf, and Milne

Bay Prov.). Specimens seen: *Brass 25999, Clemens 8616, Craven & Schodde 956, Forbes 567, Graham 5203, Kanis 1217, NGF 7468, 34057, 45216, UPNG 6583.*

Habitat & Ecology — Lowland rain forest, margin of primary forest, riverbank in secondary forest. Altitude 15–1200 m. Flowering: July, August; fruiting: March to November.

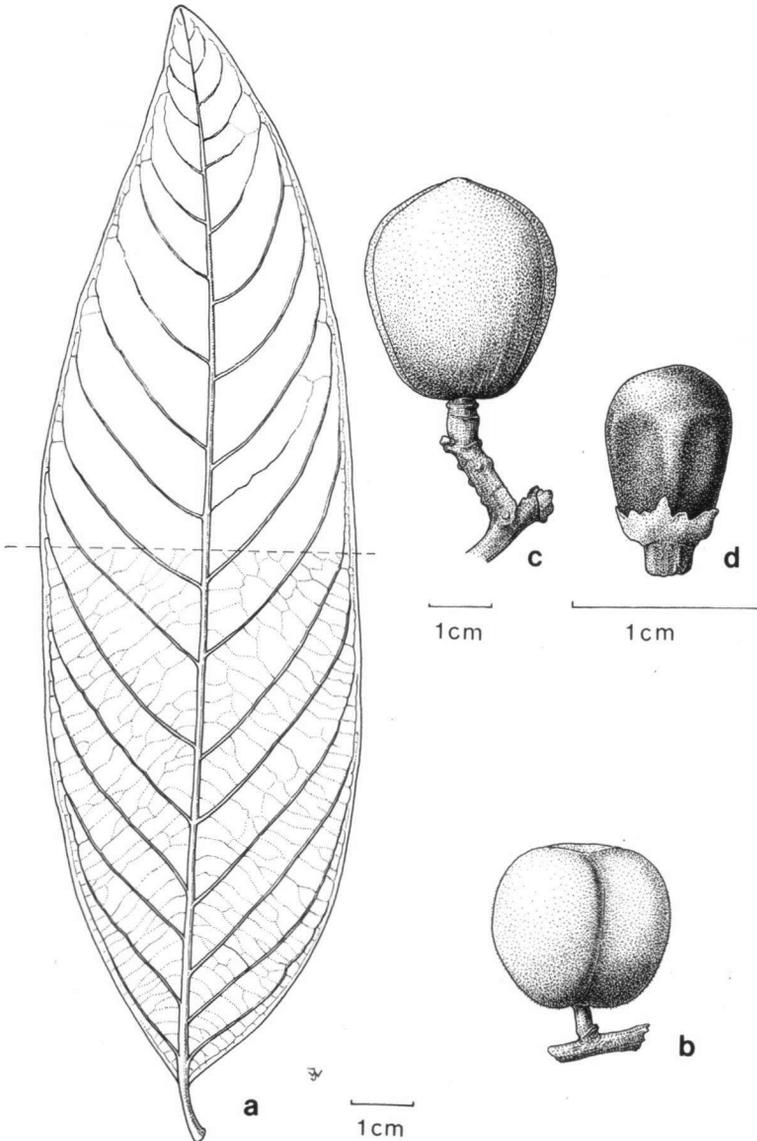


Fig. 3. *Elattostachys globosa* Adema. a. Leaflet, lower side; b, c. fruit; d. seed (a, b: *Forbes 567, L.*; c, d: *NGF 7468, L.*).

Field notes – Bark rough or smooth, dark grey or (blackish) brown with grey patches, inner bark (chestnut) brown, blaze orange brown. Wood white or creamish. Leaflets glossy dark or mid green above, paler and duller below. Flowers cream. Fruits glossy mid or pale green to reddish or rose purple.

Author's note – The sarcotesta is apically lobed, not bilobed as in *E. verrucosa*.

***Elattostachys goropuensis* Adema, *spec. nov.* – Fig. 4a, b.**

Arbor; foliis ellipticis vel ovatis, 10,5 × 5 cm, acutis, domatiis minutis marsupiiiformibus. Inflorescentiae 7 cm longae, infructescentiae 11–15 cm longae. Capsulae plus minusve ellipsoideae, in sectione transversali rotundo-deltaeidae, 27 × 20 mm, pericarpio 2,5–2,9 mm crasso, exocarpio glabro. Typus: *Veldkamp & Stevens 5942*, Papua New Guinea, Goropu Mts (Mt Suckling), alt. 1420 m, 17.7.1972 (L, holotype; iso in CANB, US).

Trees 30 m high. Axial parts ± short-tomentose. *Flowering twigs* c. 3 mm in diameter. *Leaves* 3-jugate, petiole 75 mm, rachis 120 mm, both semiterete, ± short-tomentose. *Leaflets* (broadly) elliptic to ovate, slightly asymmetric, 10.5–20 × 5–7.5 cm, index 2.1–2.6, chartaceous, above and below glabrous, midrib with short hairs, base (broadly) cuneate, apex acute, margin entire, midrib prominent above, nerves 10–15 per side, 12–22 mm apart, angle to midrib 45–55°, domatia small, pocket-like; petiolule 7–10 mm, thinly short-hairy. *Inflorescences* 7 cm, in fruit 11–15 cm. *Bracts and bracteoles* ± deltoid, 0.6 × 0.7 mm, outside and inside shortly appressed-hairy. *Pedicels* 2 mm. *Sepals* elliptic or triangular, 1.9–2.5 × 0.9–1.4 mm. *Petals* 1.1–1.4 × 1.0–1.1 mm, claw 0.2 mm, outside and inside shortly appressed-hairy, auricles woolly. *Disc* 0.4 mm high. Filaments of *stamens* 0.9 mm, with few hairs, anthers 1.2 mm, hairy. *Pistillode* 1.2 × 0.9 mm. *Fruits* ± ellipsoid, rounded deltoid in cross section, 25–30 × 20–25 mm, wall 2.5–2.9 mm thick, outside glabrous.

Distribution – Malesia: Papua New Guinea (Northern Prov.). Specimen seen: *Veldkamp & Stevens 5942*.

Habitat – *Euphorbia*–*Ficus* forest.

Vernacular name – Maitun-Maitun (Dgga-Bonenau).

Field notes – Flowers green. Fruits pink-scarlet. Seeds black, sarcotesta small, basal, purple.

***Elattostachys rubrofructus* Adema, *spec. nov.* – Fig. 4c, d.**

Arbuscula; foliis acutis. Antherae pilosae. Capsulae plus minusve globosae, in sectione transversali rotundo-deltaeidae, 10–13 × 10 mm, pericarpio 1,4–2,1 mm crasso, exocarpio pilis remotis brevibus obsito. Semina late obovoidea, 5–6 × 3 mm, sarcotesta rotundata, non lobata. — Typus: *Brass 21977*, Papua New Guinea, Milne Bay Dist., Menapi, Cape Vogel Peninsula, 40 m, 18.4.1953 (L, holotype; iso in US).

Small *trees* 5–16 m high, d.b.h. 15–17.5 cm. Axial parts strigose. *Flowering twigs* 2(–3) mm in diameter. *Leaves* 2–5-jugate, petiole 20–45(–75) mm, terete or semiterete, rachis 35–130 mm, semiterete, both strigose. *Leaflets* (narrowly) elliptic or ovate, slightly asymmetric, 7–14 × 2.5–5 cm, index 1.8–4, chartaceous, above and below glabrous, midrib below glabrous or strigose, base cuneate to rounded, apex acute, margin entire, midrib prominent above, nerves 8–14 per side, 7–15 mm apart,

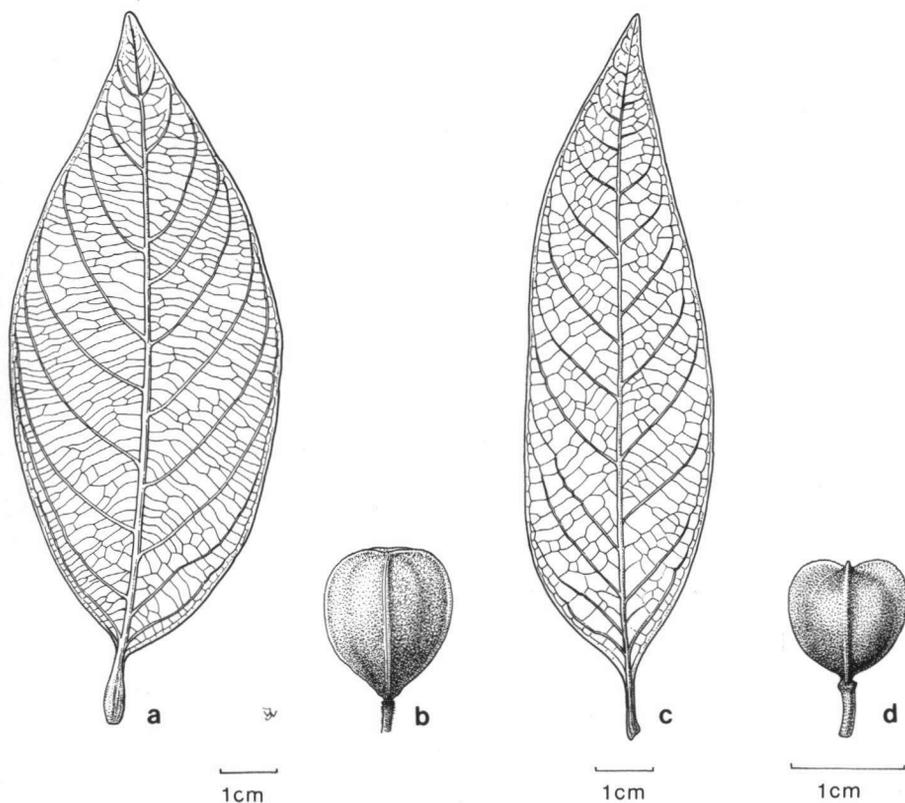


Fig. 4. *Elattostachys goropuensis* Adema. a. Leaflet, lower side; b. fruit (Veldkamp & Stevens 5942, L). — *E. rubrofructus* Adema. c. Leaflet, lower side; d. fruit (Brass 21977, L).

angle to midrib c. 45° , domatia if present small, pocket-like; petiolule 2–5 mm, short-hairy to glabrous. Inflorescences 40 mm, in fruit 50–85 mm. Bracts and bracteoles \pm triangular, 0.7×0.5 mm, outside and inside shortly appressed-hairy. Buds \pm globular, $1.9\text{--}2.0 \times 1.9$ mm. Pedicels c. 4 mm. Sepals (narrowly) elliptic, $2.9\text{--}3.2 \times 1.1\text{--}1.6$ mm. Petals $1.6\text{--}1.9 \times 1.2\text{--}1.7$ mm, claw 0.6 mm, outside and inside glabrous, auricles ciliate. Disc 0.7 mm high. Filaments of stamens 1.6–1.9 mm, anthers 1.7–1.9 mm, hairy. Pistillode 1.7×0.7 mm. Fruits about globular, rounded deltoid in cross section, often slightly keeled, $10\text{--}13 \times 10$ mm, wall 1.4–2.1 mm thick, outside with scattered short hairs. Seeds broadly obovoid, $5\text{--}6 \times 3$ mm, sarcotesta rounded, not lobed, reaching up to $1/3$.

Distribution — Malesia: Papua New Guinea (Morobe, Central, Milne Bay Prov.). Specimens seen: Brass 1601, 21977, Carr 11258, NGF 8252, 14792, UPNG 4345.

Habitat & Ecology — Rain forest, often along rivers, swamp at edge of lake. Altitude 15–200 m. Understory tree, once cited for limestone (Brass 21977). Flowering: May; fruiting February to July.

Small trees 6–16 m high, d. b. h. 10–27.5 cm. Axial parts strigose, glabrescent. Flowering twigs 1–3 mm in diameter. Leaves 2–5-jugate, petiole 30–130 mm, terete or semiterete, rachis 30–190 mm, semiterete, both strigose, glabrescent. Leaflets elliptic to ovate, rarely falcate, asymmetric, 6–21.5 × 1.5–8 cm, index 2.3–4, chartaceous, above and below glabrous, midrib below exceptionally with few hairs, base cuneate to rounded, apex acute, margin entire, midrib slightly prominent above, nerves 8–13 per side, 5–18 mm apart, angle to midrib 45–55°, domatia usually absent, if present very small, pocket-like; petiolule 2–9(–13) mm, short-hairy to glabrous. Inflorescences in fruit 40–100 mm. Fruits ellipsoid to globular, rounded deltoid in cross section, 16–26 × 15–24 mm, wall 1.1–2.5 mm thick, outside glabrous, inside glabrous to thinly appressed-hairy. Young seeds ± ellipsoid, 8–12 × 4–7 mm, sarcotesta shield-like, rounded, reaching up to 1/3 or 1/4.

Distribution – Solomon Islands (Santa Isabel, Malaita, Renell). Specimens seen: Brass 3339, BSIP 4472, 9646, 10572, 10586, 14814, 14827, 14928, 14978.

Habitat & Ecology – Well drained primary and secondary forests. Altitude 20–600 m. Fruiting: May to August.

Vernacular names – Aioka (Malaita), felofelogwane, sufusane (both Renell) (all Kwara'ae language).

Field notes – Bark smooth or scaly, grey or dark brown, inner bark light brown. Wood hard, white to mauve brown. Fruits green or red.

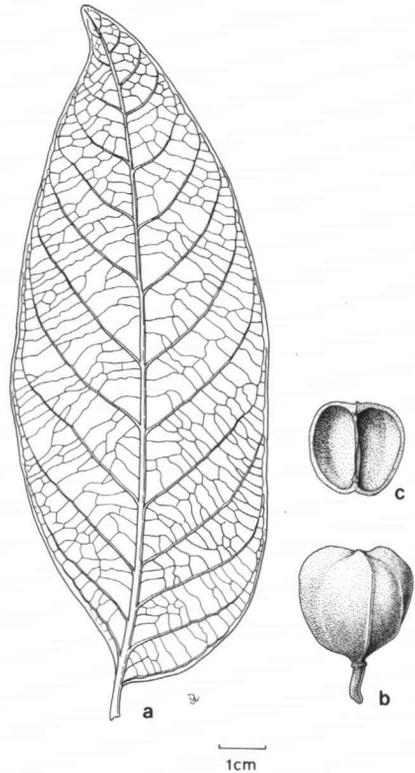


Fig. 5. *Elattostachys solomonensis* Adema. a. Leaflet, lower side; b. fruit; c. fruit valve, inside (BSIP 14814, L).

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REFERENCES

- Muller, J., & P.W. Leenhouts. 1976. A general survey of pollen types of Sapindaceae in relation to taxonomy. In: I.K. Ferguson & J. Muller (eds.), The evolutionary significance of the exine. Linn. Soc. Symp. Ser. 1: 407–445.
- Radlkofer, L. 1933. Sapindaceae, *Elattostachys*. In: A. Engler, Pflanzenreich 98: 1258–1268.