THE LIGNEOUS GENUS ENDOSPERMUM Benth. (EUPHORBIACEAE) IN NEW GUINEA.

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(Plates I and II.)

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Pax (1912, pp. 33–39; 1914, p. 418) and Pax and Hoffmann (1919, p. 53), in the most complete account of the genus available, record only one species of Endospermum, *E. formicarum* Becc., from New Guinea. No descriptions of more recent additional species from this locality have been found. From observations made in the field it was suspected that at least three species occurred in those portions of the island visited. More critical examination of herbarium specimens has confirmed this belief. One of the three species proved referable to *E. formicarum*, but the remaining two did not agree with accounts of any of the Malaysian or Polynesian members of the genus and are here described as new. Type-specimens, illustrated in plates I and II, are deposited in the Queensland Herbarium, Brisbane. To complete the treatment of New Guinea species and to overcome the inadequacy in some respects of the original description, a full account of *E. formicarum* is also given. In addition a key is provided to distinguish the species dealt with.

E. formicarum and *E. myrmecophilum* sp. nov. most commonly occur as small to medium-sized trees on the rain-forest margin or in low regrowth forest. Each of them always possesses hollow branchlets, with neat circular outlets along them, which have been channelled out by and are inhabited by a species of blackish ant. This type of symbiosis, which is fairly common in the genus and has also been observed in several trees belonging to unrelated families, has been discussed in a paper by Docters van Leeuwin (1929) on *E. formicarum*. *E. medullosum* sp. nov., on the other hand, has been observed mainly within the rain forest. It normally develops into quite a tall tree and invariably has solid branchlets.

Approximately 600 ft. is the maximum altitude as yet recorded for any of the New Guinea specimens of *Endospermum*. A specimen from the Solomon Islands, tentatively placed under *E. medullosum*, was collected at approximately 2,700 ft., an altitude attained by many lowland rain-forest species.

The timbers of the three species of *Endospermum* dealt with are similar to one another. They are pale straw to pale yellow-brown in colour, moderately soft, straight-grained, and split cleanly on the "quarter." The timber from the smaller trees is inclined to be slightly softer. Cut transversely, moistened, and examined under the hand-lens, a piece of the wood shows a reticulum or a series of fine regular bands of soft tissue, narrow rays, and medium-sized pores commonly arranged in radial multiples. In these features the wood grossly resembles that of *Alstonia scholaris* (L.) R. Br., a widely distributed, unrelated tree belonging to the family Apocynaceae, and colloquially known in Queensland as Milky Pine. As the timber of the latter tree has approximately equivalent density and hardness, it seems probable that similar uses will be found for the wood of *Endospermum,* that is, general light indoor work, etc. (see Swain, 1928, p. 111). Like Milky Pine, the timber is also subject to borer attack and blue mould.

The letter "T," when placed within the brackets following the collection number of the specimens cited below, indicates that hand samples of the timber were collected from the same tree that provided the botanical material. A set of these is deposited with the Division of Forest Products Laboratory of the Council for Scientific and Industrial Research, Melbourne, and it is understood that an account of the wood anatomy will be published in due course.

The specimens cited are largely from a collection made by direction of Major J. B. McAdam, CRE New Guinea Forests, by responsible members of his unit headquarters and the two associated forest survey companies. This collection is indicated by the letters "NGF." preceding the collection number. Both of the specimens selected as types were collected in conjunction with Mr. C. T. White, Queensland Government Botanist, and Dr. H. E. Dadswell, Officer in Charge, Wood Structure Section of the C. S. & I. R. Division of Forest Products Laboratory, during a visit made by them to Lae for the purpose of conducting a forestry school for the instruction of members of the abovementioned units.

The districts used in grouping the localities of specimens cited throughout this paper, are those given by Bartholomew in "Joseph's Reference Atlas" (1936 Impression).

Endospermum Benth.

As pointed out by Corner (1940, p. 250) and others, the genus is difficult to distinguish satisfactorily from *Macaranga* Thou. It consists of about 16 species distributed from S.E. Asia through Malaysia to Polynesia with a single species in N.E. Queensland. Of these, 3 occur in New Guinea.

Pax (1912, p. 34) and Pax and Hoffmann (1931, p. 184) recognize two subgenera distinguished as follows:—

Folia non peltata. Ovarium 2-loculare .. *Euendospermum* Pax.

Folia peltata vel nonnulla epeltata. Ovarium 4-6-loculare .. .. *Capellenia* (Teijsm. et Binnend.) Pax.

Although *E. formicarum* clearly belongs to the second subgenus, both of the new species described below differ from the first in the ovary being 1-celled in all flowers examined. In addition, one new species has consistently peltate leaves, while the other normally has some peltate leaves mixed with the more typical cordate ones in the crown of all trees examined.

It does not seem desirable to create a new subgenus distinguished only by the 1-locular condition of the ovary, but rather to broaden the conception of the subgenus *Euendospermum*. It would then embrace those species with a reduction in the number of ovary-cells below the typical 3-locular condition in the family, this reduction being most commonly though not invariably associated with the development of non-peltate leaves. The description of this subgenus is therefore emended as follows:—

Euendospermum Pax emend. L. S. Smith. Folia non peltata vel interdum peltata. Ovarium 1–2-loculare.

KEY TO THE SPECIES.

Ovary and fruit 1-celled. Female inflorescence distinctly paniculate, the lower primary branches attaining 3-13 cm. Fruits less than 0.75 cm. diam.:	
Fruits 0.8-0.9 cm. long; branchlets containing pith; lower surface of leaf-blade distinctly tomentose to the naked eye and with conspicuous elevated reticulation of the veins; petiolar glands shortly cylindrical or subglobose and stipitate ..	1. *E. medullosum* L. S. Smith.
Fruits up to 0.6 cm. long; branchlets hollow; lower surface of leaf-blade not tomentose to the naked eye (very minutely so under the lens), and with the reticulation of the veins neither conspicuous nor elevated; petiolar glands triangular or ovate in outline, appressed, convex or bluntly conical	2. *E. myrmecophilum* L. S. Smith.
Ovary and fruit (4-)6-celled. Female inflorescence racemose or with one or two short branches at the base less than 2 cm. long. Fruits approximately 2.0-2.5 cm. diam. (Branchlets hollow; lower surface of leaf-blade glabrous or almost so; petiolar glands depressed globular)	3. *E. formicarum* Beccari.

1. **Endospermum medullosum** L. S. Smith sp. nov.—Plate I.

Arbor unisexualis, ca. 35-45 m. alta; truncus ca. 0.75–1.0 m. diam., basi anteridibus saepe praeditus; cortex avellaneus vel cinereo-fuscus, tenuiter suberosus; lignum cremeum. *Ramuli* modice crassi, 0.5–1.2 cm. diam., medullosi, sursum pubescentes vel etiam pilis longioribus interspersis interdum ornati, deorsum cicatricibus ellipticis vel suborbicularibus foliorum delapsorum notati. *Stipulae* lanceolatae vel dentato-subulatae, usque ad 0·5 cm. longae, pubescentes, caducae. *Petioli*

stellato-pubescentes, glabrescentes, 3–12 (–23 in foliis surculorum) cm. longi, 0.15–0.4 cm. diam., basi haud (vel raro) contracti, apice glandulis 2 (interdum 3–4 vel 0) 0.1–0.2 cm. diam. breviter cylindraceis vel subglobosis et ± stipitatis ornati, stipite minute pubescenti quam glandula saepe angustiore. *Foliorum laminae* firme coriaceae, ovatae vel ovato-oblongae vel orbiculari-ovatae, 8–25 (–33) cm. longae, 5.5–20 (–25) cm. latae, supra mox glabrae, subtus stellato-tomentosae, basi cordatae vel obtusae vel rotundatae vel truncatae vel interdum peltatae deinde lamina usque ad insertionem petioli interdum fissa, apice obtusae vel latissime recurvae deinde emarginatae, margine subtus incrassatae; nervi supra tenuiter canaliculati, subtus valde elevati, 5–7 (–9) e basi vel prope basin laminae orti; nervus medius nervis secundariis 6–9 utroque latere praeditus; rete venularum comparate intricatum, supra obscurum vel manifestum, subtus partim valde elevatum partim prominens; glandulae hypophyllae globosae, ca. 0.1 cm. diam., in axillis bifurcationum nervorum marginem versus sitae, plerumque nullae. *Inflorescentiae* in axillis foliorum superiorum ortae, pubescentes, paniculatae, usque ad 20 cm. longae pedunculo usque ad 6 cm. longo incluso; rami primarii panicularum ♂ usque ad 8 cm. longi, panicularum ♀ usque ad 5 cm. longi; bracteae ovatae vel lanceolatae, 0.15–0.4 cm. longae, basi late affixae, apice obtusae vel acuminatae incurvae, margine integrae vel utroque latere unidentatae, in axillis dentium interdum glanduliferae. *Flores* ♂ subsessiles, glomerulati, articulati; perianthium ca. 0.15 cm. longum, truncatum vel sparse irregulariterque obtuse dentatum, breviter stellato-pubescens; columna staminum demum exserta, usque ad 0.4 cm. longa, basi nuda angustata; stamina ca. 3 - 6, filamentis ca. 0.03 cm. longis, antheris peltatis (3–) 4–locularibus. *Flores* ♀ breviter pedicellati, pedicellis 0.05–0.1 (–0.2 sub fructu) cm. longis, singuli, articulati; perianthium ca. 0.2 cm. longum, extus breviter stellato-tomentosum, irregulariter obtuseque 3-5-dentatum vel subtruncatum; discus tubulatus, 0.02–0.05 cm. longus, glaber, integer vel sparse irregulariterque crenulatus; ovarium ellipsoideum vel globosum, 0.14–0.3 cm. longum, minute denseque tomentosum, 1-loculare, 1-ovulatum; stigma ± badium, sessile, semiglobosum vel late conicum, ca. 0.075–0.125 cm. diam. *Fructus* pallide viridus, drupaceus, ellipsoideus, 0.8–0.9 cm. longus, 0.5–0.6 cm. diam., apice stigmate ca. 0.15–0.2 cm. diam. coronatus, basi perianthium ca. 0.2 cm. diam. persistens ferens; epicarpium minute sparseque stellato-pubescens vel subglabrum; mesocarpium tenue, nonnihil oleagineum; endocarpium cartilagineum. *Semen* nigrescens, ca. 0.6 cm. longum, 0.4 cm. diam., irregulariter costatum, sparse verrucosum.

Territory of New Guinea.—Aitape District: Aitape, a few miles south-east of Tadji airstrip, alt. ca. 25 ft., in rain forest, *L. S. Smith* NGF.1204 (fruits—T), January 1945 (A tree 110 ft. overall, the branches appearing whorled and very obliquely ascending. Bole 75 ft., narrowly buttressed to 4 ft., d.a.b. 1½ ft. Bark ¼ in. thick; outer—greyish or pale brown, marked by longitudinal lenticellate lines and often finely horizontally cracked, hard or somewhat corky; inner—green on the back, within a creamy colour with fine yellow-brown speckle. Sapwood not defined, wood whitish. Leaves glossy above, whitish or greyish beneath. Glands

on petiole more frequently absent than present. Fruits pale green). Sepik District: Abunti (Middle Sepik) on hills 400-600 ft., *C. E. Lane-Poole* 787 (old ♀ inflorescences—fruits missing), 14th July 1923 (A medium to large tree. 6 ft. 6 in. in girth, with a 40-ft. bole and reaching 60 ft. overall. Medium buttresses to a height of 8 ft. Leaves . . . bent at right angles at junction with blade . . . generally cordate also peltate . . . Fruit on panicles up to 1 ft. long . . . Bark grey and brown, scaly—scales shed in small more or less round patches, leaving bole crocodile-skinned. Inner bark speckled yellow and orange. Wood yellow, sap undefined, axes firmly. Said to be used for canoes. Wood and bark have a turnip smell. Later, in Lavengai, I found this growing with a bole of 90 ft. Native name—Mabung (Lavengai)). Morobe District: Lae, alt. 25 ft. in rain forest, *J. Cavanaugh* NGF.2 (immature inflorescences—T), June 1944 (Notes at present unavailable); between Lae and Nadzab (9 mile post), alt. ca. 50 ft., in rain forest, *2 Aust. For. Svy. Coy.* NGF.215 (fruits—T), June 1944 (A tree 100 ft. overall with sparse crown. Bole 70 ft., buttressed to 6 ft., g.a.b. 78 in. Bark brown, ½ in. thick; outer—fairly smooth but roughened by prominent pustules and pocklike marks; inner—light brown. Wood cream in colour, light, easy to cut, splits freely to smooth surface. Leaves leathery, dark green and shiny above, pale green beneath. glands 2–4 at junction with petiole . . .); Lae, in rain forest, *CRE N. G. Forests* NGF.697 (♂ flowers—T), in 1944 (Notes at present unavailable); Lae, alt. ca. 25 ft. in rain forest, *C. T. White, H. E. Dadswell & L. S. Smith* NGF.1513 (fruits—T), July 1944 (A tree up to 130 ft. high with a short flattish crown. Bole unbuttressed, 90 ft., d.b.h. 2½ ft. Bark ½ in. thick; outer—pale grey, thin, fairly smooth; inner—greenish on the back, within pale yellow-brown, speckled, and somewhat granular. Wood pale, sapwood scarcely defined. Leaves . . . cordate or peltate . . . prominently veined beneath, with two shortly cylindrical prominent glands on the petiole . . . Fruits green); Lae, in rain forest, *C. T. White, H. E. Dadswell & L. S. Smith* NGF.1703 (♂ flowers—T), August 1944 (A tree 90 ft. overall. Bole 60 ft., buttressed to 3 ft., d.b.h. 1¼ ft. Bark ⅜ in. thick; outer—grey-brown, thin, corky, finely longitudinally cracked; inner—green on the back, orange-brown with fine white and yellowish speckle within. Wood pale straw, sapwood ill-defined. Leaves clustered . . .branchlets . . . solid . . . fairly hairy. Petiole 3–6 in., curved immediately beneath its peltate or cordate insertion and with 2 or more commonly 3 very shortly cylindric glands. Blade shiny green above, grey and hairy beneath where the reticulation of the veins is prominent. Yellow globular glands occur about ¾ in. in from the leaf-margin in the axils of the final forkings of the main lateral veins, i.e., approx. 5–8 on each side. Flowers greenish-yellow); Lae, in rain forest, *C. T. White, H. E. Dadswell & L. S. Smith* NGF.1738 (TYPE— ♀ flowers and fruits—T), August 1944 (A tall tree, 130 ft. overall, with shallow umbrella-shaped crown. Bole 100 ft., buttressed to 6 ft., d.a.b. 2½ ft. bark ⅜–½ in. thick; outer—pustular and pitted in the grooves between the buttresses, finely longitudinally fissured and corky on the ends of the buttresses, pale greenish-brown above, corky, thin; inner—cream streaked with green on the back, cream within with orange-brown and yellow-brown flecks. Wood pale straw, sapwood not defined. Leaves clustered towards the ends of fairly stout branchlets. Petiole 2–3 in. long, curved upwards beneath its insertion on the blade where two shortly cylindrical glands occur. Blade dark glossy green above, veins yellowish-green, lower surface pale, shortly and densely pubescent and with veins elevated. Flowers in axillary panicles, ovary green. Fruits green, ¼ in. diam., mesocarp green, 1/16 in. thick, endocarp thin and cartilaginous, seed black, rugose).

PAPUA.—Northern District; Buna hinterland, Dobodura Plain, Popondetta area, alt. 600 ft., in rain forest on rich grey sandy loam, *J. Cavanaugh & D. Fryar* NGF.2075 (♂ flowers—T), March 1945 (A tree 110 ft. overall. Bole 70 ft., 38 in. diam. Bark ⅜ in. thick; outer—light brown, rough, somewhat scaly, with scattered fairly large pustules; inner—pink, yellow and green on the back, light brown (from indistinct layers of fibres) with little white patches within. Wood very light yellow. Leaves curled backwards at apex, dark green above, light green, hairy, and with conspicuous veins beneath . . . Flowers . . . in panicles up to 9 in. long).

SOLOMON ISLANDS.—Bougainville: Koniguru, Buin, alt. 900 m., common in rain forest, *S. F. Kajewski* 2107 (♂ flowers), 18 August 1930 (Native name—Manogo. A large sized tree up to 20 m. high. Leaves light green. Stamens white, numerous, stems of buds green. The natives say the wood is not very strong).

In the field, the umbrella-shaped crown with horizontal to obliquely ascending, somewhat whorled branches gives the tree a characteristic appearance when seen from the side. The buttresses are usually stout and rather narrow, and the bole comparatively long to the length of the crown.

NGF.215 and NGF.1705 have as many as 3-4 glands at the apex of the petiole, while in NGF.1204 these glands are very frequently absent. NGF.1703 possesses hypophyllous glands on the majority of leaves, whereas these appear to be absent from the remainder of the specimens. Although these features and the type of insertion of the petiole on the blade may vary, the tomentum and prominent venation on the undersurface of the blade appear to be constant.

Of those dealt with, this is the most important species from the timber utilization point of view. The bole is fairly straight and cylindrical with a basal diameter above the buttresses of up to 3 ft., and may be clear of branches for 100 ft. A slight curve throughout the length of the bole is probably associated with the occurrence of bands of tension wood which have been found in some of the logs (see Dadswell, 1944, pp. 20–21). The consequent woolliness in sawing has caused trouble in milling.

Kajewski 2107 is placed here with some reservation as it bears male flowers only.

Lane-Poole (1925, pp. 105-106) gives an account of this species under the name of *Macaranga* sp.

The specific epithet is derived from the Latin word "medulla," meaning marrow or pith, and refers to the branchlets containing pith in this species as opposed to being hollow.

2. **Endospermum myrmecophilum** L. S. Smith sp. nov.—Plate II.

Arbor unisexualis, saepe 10–20 m. alta sed usque ad 35 m. alta; truncus ca. 0.2–0.7 m. diam., cinereus vel ± avellaneus, lenticellatus, interdum anteridibus praeditus; lignum cremeum, comparate molle. *Ramuli* crassi, 1–1.5 cm. diam. cavi, a formicis pertusi, apice angustati, ± dense stellato-pubescentes, basin versus cicatricibus foliorum delapsorum notati. *Stipulae* anguste deltoideae, usque ad 0.3 cm. longae, pubescentes, caducae. *Petioli* minute stellato-tomentosi, demum glabrescentes, 6–22 cm. longi, 0.15–0.4 cm. diam., basi contracti, apice glandulis 2 appressis convexis vel latissime conicis ovatis vel oblique triangularibus ca. 0.2–0.3 cm. longis ornati. *Foliorum laminae* peltatae, firme chartaceae vel coriaceae, ovatae vel deltoideo- vel orbiculari-ovatae, 10–30 cm. longae, 9–24 cm. latae, minute stellato-tomentosae, supra mox glabrae, basi late rotundatae vel subtruncatae vel late cordatae, apice obtusae vel breviter acuminatae saepe mucronulatae, margine subtus incrassatae; nervi subtus prominentes, (7-) 9 e basi vel prope basin laminae orti; nervus medius nervis secundariis 4-7 utroque latere praeditus; rete venularum laxum, supra manifestum subtus prominulum;

glandulae hypophyllae parvae, globosae, in axillis bifurcationum nervorum marginem versus sitae, interdum nullae. *Inflorescentiae* ♂ ignotae, ♀ in axillis foliorum superiorum sitae, stellato-pubescentes, late pyramidatae vel ovoideae, usque ad 30 cm. longae, e basi ramosae vel pedunculo usque ad 8 cm. longo praeditae; rami primarii paniculorum usque ad 15 cm. longi; bracteae anguste ovatae vel lanceolatae, 0.1–0.3 cm. longae, integrae vel utroque latere unidentatae, apice obtusae. *Flores* ♀ pedicellati, pedicellis 0.15–0.2 (-0.4 sub fructu) cm. longis, singuli, articulati; perianthium ca. 0.15–0.2 cm. longum, extus breviter pubescens, minute irregulariterque 3-4-dentatum; discus angustus, minutus, glaber, saepe lobatus vel obliquus; ovarium ellipsoideum, ca. 0.2 cm. longum, minute denseque tomentosum, 1-loculare, 1-ovulatum, basi contractum; stigma badium, sessile, plano-convexum, ca. 0.1 cm. diam., margine interdum obscure lobatum. *Fructus* pallide viridus, drupaceus, late ellipsoideus vel subglobosus, ca. 0.6 cm. longus, 0.5 cm. diam., apice stigmate ca. 0.15 cm. diam. coronatus, basi perianthium persistens patulum undulatum 0.2–0.3 cm. diam. ferens; epicarpium minute stellato-tomentosum; mesocarpium tenue, parce oleagineum; endocarpium tenuiter cartilagineum. *Semen* ochraceum vel castaneo-notatum, ca. 0.45 cm. longum, 0.35 cm. diam., irregulariter costatum, sparse muricatum.

Territory of New Guinea.—Morobe District: Yalu, between Lae and Nadzab, alt. ca. 100 ft., amongst regrowth in brown sandy loam on cleared alluvial flat near Munim Waters, *2 Aust. For. Svy. Coy.* NGF.274 (immature fruits—T), July 1944 (Tree 55 ft. high, bole 25 ft. high, with small spur roots, g.b.h. 35 in. Outer bark grey, smooth, covered with abundant insignificant brownish lenticels. Inner bark light brown 1/10 in. thick. Wood cream, easy to cut and split. Branchlets hollow and swarming with black ants. Leaves dark green above, greyish-green beneath, margins slightly undulate, veins amber coloured. Fruits green, somewhat wrinkled, stigma hard and brown, mesocarp thin, green and fleshy); Yalu, on rain-forest margin, *C. T. White, H. E. Dadswell & L. S. Smith* NGF.1640 (type—fruit—T), July 1944 (A small tree, 30 ft. overall. Leaves dark green above, whitish beneath; glands 2, flat or convex, ovate in outline, yellowish, one each side of the petiole at its insertion. Branchlets hollow, inhabited by ants. Panicles semi-erect, fruits pale green, subglobular).

Papua.—Northern District: Embi Creek, Buna hinterland, alt. ca. 25 ft., in rain forest, *J. Cavanaugh & D. Fryar* NGF.2411 (old ♀ flowers and immature fruits), March 1945 (A tree 110 ft. overall, bole 90 ft., buttressed to 3 ft., d.a.b. 28 in. Outer bark grey and light brown, smooth but for very small fissures and small groups of pustules. Inner bark ⅜ in. thick, light pinkish-brown within, dark green on the back, composed mostly of thick dark brown fibres with a little white matter between. Wood pale yellow, light, soft, sapwood 3 in. thick. Leaves dark green above, light green beneath. Fruits round, light green, ¼ in. diam., immature, with brown stigma, in panicles up to 10 in. long). Central District: Vanapa, Veimauri, Aroa, *C. E. Lane-Poole* 21 (slightly immature fruits), June 1922 (A large tree 8 ft. by 70 ft. bole with narrow buttresses running up to 8 ft. Flowers in axillary panicles up to 6 in. long. Fruit . . . green . . . in panicles on hairy peduncles and pedicels, ¼ in. diam. containing one seed. Bark more or less smooth, grey brown. Inner bark streaked white and orange, ½ in. thick. Sapwood ill-defined, white, merging into yellow. Rays very fine indeed. Pores numerous, distinct. A light soft wood, rather nicely marked on the quarter. Suitable for indoor work. Native name—Kerea (Suku)).

Lane-Poole (1925, p. 105) gives an account of this species under the name of *E. formicarum*. To judge from the text (see p. 8), Veimauri is probably the locality in which the specimen cited was collected.

The larger flattened glands on the petiole readily distinguish the foliage of this species from that of both of the others, and thus serve as a useful field character.

The specific epithet is derived from the two Greek words μύρμηξ, ant, and φιλέω, I love.

3. **Endospermum formicarum** Beccari in Malesia ii, 44, t. ii (1884); Warburg in Engl. Bot. Jahrb. xiii, 348 (1891); Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 406 (1901); Pax in Pflanzenr. IV. 147 iv, 36 (1912); Pax & Hoffmann in Engl. & Prantl Natürl. Pflanzenfam. 2 Aufl., Band 19 c, 184, fig. 97 (1931).

A unisexual tree, ca. 10–16 m. high; trunk ca. 0.15–0.3 m. diam.; bark greyish to light brown; wood cream-coloured. Branchlets thick, 1–1.5 cm. diam., hollow, the cavity inhabited by ants, the apex sometimes minutely stellate-pubescent, otherwise glabrous, the lower part marked by leaf-scars. Stipules deltoid, ca. 0.1 cm. long (so far as seen), caducous. Petioles soon glabrous, 6–19 cm. long, 0.15–0.4 cm. diam., contracted at the base, the apex with 2 depressed globular glands ca. 0.15–0.2 cm. diam. Leaf-blades peltate, chartaceous to thinly coriaceous, ovate to orbicular-ovate, 10–25 cm. long, 7.5–21 cm. wide, at length glabrous, the base broadly rounded, truncate, or very shallowly cordate, the apex acutely or obtusely acuminate, mucronulate, the margin slightly thickened; nerves 8–10 from at or near the base; mid-nerve with 4–7 lateral nerves on each side, all somewhat elevated beneath; reticulation of the veinlets lax, not prominent; hypophyllous glands present (in the type specimen, sec. Beccari, l.c.) in the axils of forkings of the lateral nerves near the leaf-margin, or absent (in all specimens cited). Inflorescences in the upper leaf axils, pubescent; male inflorescence a ± pyramidal panicle up to 20 cm. long including the peduncle which is up to 7 cm. long, lower branches up to 5.5 cm. long; female inflorescence a raceme or very narrow raceme-like panicle, up to 30 cm. long including the peduncle which is up to 11 cm. long, when paniculate then with the lower branches up to 1.25 cm. long; bracts lanceolate to deltoid, 0.3–0.7 cm. long, pubescent, shortly decurrent at the base, sometimes unidentate on each side, obtuse or acuminate at the apex. Male flowers subsessile, clustered, articulate; perianth 0.2–0.3 cm. long, irregularly and shortly 2–4 toothed, ± pubescent; staminal column at length exserted, up to 0.4 cm. long, bare at the base; stamens ca. 8–10, filaments 0.025–0.05 cm. long, anthers peltate (3–) 4-celled. Female flowers shortly pedicellate with the pedicels 0.05 (–0.15 beneath the fruit) cm. long, single or few in a cluster, articulate; perianth 0.3–0.6 cm. long, ± glabrescent, irregularly and sparsely toothed; disc annular, 0.02–0.04 cm. wide, thinly lining the base of the calyx-tube; ovary broadly oblong or depressed globular, ca. 0.3 cm. long, minutely and densely tomentose, (4–) 6-celled, with one ovule in each cell; stigma red-brown, sessile, discoid, 0.3–0.5 cm. diam. Fruit pale green to creamy green, drupaceous, depressed globular, ca. 2–2.5 cm. diam. (when living), the

umbilicate stigma which is ca. 1 cm. diam. borne at the apex, the persistent, undulate, ± spreading perianth present at the base; epicarp thin, subglabrescent; mesocarp firmly fleshy, thick; pyrenes 4–6, free, compressed ellipsoid, thinly cartilaginous, 1-seeded. Seeds chestnut-coloured to blackish, 0.6–0.7 cm. long, 0.3–0.4 cm. diam., sparsely and irregularly ribbed and verrucose.

Territory of New Guinea.—Morobe District: Yalu, between Lae and Nadzab, alt. ca. 100 ft., amongst regrowth in grey-brown sandy loam on alluvial flats beside Munim Waters, *2 Aust. For. Svy. Coy.* NGF.273 (fruits—T), July 1944 (Tree 40 ft. high, with small open crown and horizontal branches. Bole 25 ft. clear, girth 30 in. Outer bark thin, light grey, smooth, with isolated corky pustules. Inner bark white to orange (intermingled). Wood creamy white, straight grained, soft, splits easily. Branchlets hollow and inhabited by ants, leaf scars prominent. Leaves . . . paler beneath, venation prominent on both surfaces. Racemes up to 6 in. long. Fruits depressed globular, ca. ½–¾ in. long, epicarp pale green, mesocarp greenish-white and fleshy, pyrenes 4–6, seeds with brittle black testa); Yalu, in regrowth area, *C. T. White, H. E. Dadswell & L. S. Smith* NGF.1639 (♀ flowers and fruits—T), July 1944 (A small tree 35 ft. overall. Bole 6 in. diam. Bark ⅛–3/16 in. thick; outer—greyish; inner—green on the back, pale yellow-brown within and whitish against the sapwood. Wood pale straw. Leaves dark green above, slightly paler beneath, glands 2 slightly compressed-globular, punctate in centre and located at insertion of petiole. Branchlets hollow, inhabited by ants. Fruits creamy green, soft, depressed-globular, with yellow-brown stigma in a depression at the apex, arranged in pendulous spikes); Yalu, on rain-forest margin, *C. T. White, H. E. Dadswell & L. S. Smith* NGF.1641 (♂ flowers—T), July 1944 (A small tree, 20 ft. overall. Bole 5 in. diam. Bark 3/16 in. thick; outer—brownish; inner—green on back, cream within. Wood pale straw or whitish. Leaves dark green above, slightly paler beneath, glands 2, compressed-globular, punctate in centre, one on each side of petiole at its insertion on the blade. Flowers male, yellowish, paniculate). New Britain: Jacquinot Bay, *R. S. Haas* NGF.134 (fruits—T), December 1944 (A small tree 75 ft. overall, 40 in. g.b.h., slight ground swellings to 2 ft., scant foliage. Bark thin, grey, mottled, ca. ½ in. thick, smooth with light horizontal ribbing. Wood white to light yellow, sapwood indistinguishable. Leaves . . . dying yellowish. Petiole 10–12 in. long. Branchlets hollow. Fruit round, green, 1–1½ in. diam.).

Papua.—Western District: Strickland River, *W. Bauerlen* (old ♀ inflorescences —fruits missing), in 1885.

All of the specimens examined differ from the description of the type and subsequent accounts in not possessing hypophyllous glands. As specimens of the two previous species occur both with and without these glands, their presence or absence appears to be of little taxonomic significance. A further difference is the normally 6-locular condition of the ovary. It was found, however, that 1–2 (or rarely more) loculi may soon become obscured through non-development of the ovules. Beccari has probably overlooked these rudimentary loculi and counted only the fertile cells. This seems even more likely in view of the fact that, to judge from his figure, the type is in young fruit. As the above cited specimens agreed in all other essentials with the original description and figure, particularly in the reduced female inflorescence, I have little hesitation in assigning them here, although the type-specimen (*Beccari* 648) collected at Andai in Dutch New Guinea in 1872 has not been seen.

It seems possible that, after decomposition of the fruit, the cartilaginous seed-cases may behave as cocci and dehisce along the top to free the seed.

REFERENCES.

Corner, E. J. H., 1940. Wayside Trees of Malaya. i. Singapore.

Dadswell, H. E., 1944. Report on a visit to the Mandated Territory of New Guinea. Melbourne. (Cyclostyled.)

Docters van Leeuwin, W. M., 1929. Einige Beobachtungen ueber das Zusammenleben von Camponotus quadriceps F. Smith mit dem Ameisenbaum Endospermum formicarum Becc. aus Neu-Guinea. Treubia, X, pp. 431-437.

Lane-Poole, C. E., 1925. The Forest Resources of the Territories of Papua and New Guinea. Melbourne.

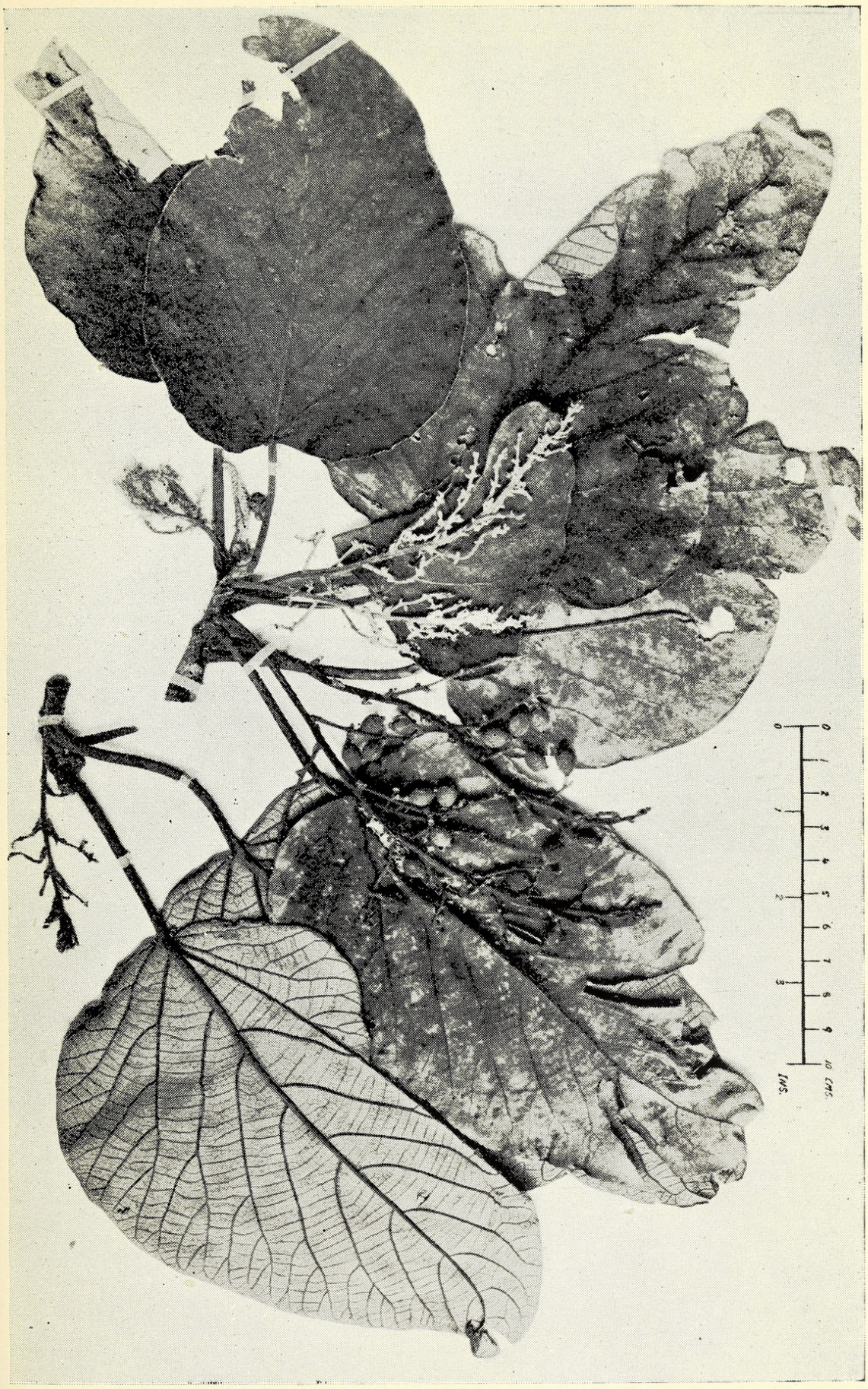
Pax, F., 1912. Euphorbiaceae-Gelonieae. Pflanzenr. IV. 147 iv.

————. 1914. Euphorbiaceae-Acalypheae-Mercurialinae. Pflanzenr. IV. 147 vii.

Pax, F., and Hoffman, K., 1919. Euphorbiaceae-Additamentum VI. Pflanzenr. IV. 147 xiv.

————. 1931. Euphorbiaceae. Engl. & Prantl Natürl. Pflanzenfam. 2 Aufl., Band 19 c.

Swain, E. H. F., 1928. The Timbers and Forest Products of Queensland. Brisbane.



Endospermum medullosum L. S. Smith; type-specimen.

Photo. Dept. Agric. & Stock.

Endospermum myrmecophilum L. S. Smith; type-specimen.

Photo. Dept. Agric. & Stock.