

# A NEW SPECIES OF LANGSDORFFIA FROM NEW GUINEA (BALANOPHORACEAE)

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## INTRODUCTION

In December 1969 Mr. H. Streimann, Technical Officer of the Division of Botany, Lae, New Guinea, discovered a plant belonging to the *Balanophoraceae*, which Mr. J. S. Womersley, Chief of the Division of Botany, Lae, supposed to be closely related either to the African genus *Thonningia* or to the American genus *Langsdorffia*. He sent spirit material to Dr. C. G. J. van Steenis in April 1970 for identifying this most remarkable plant; the latter entrusted me with this task. In 1970 more collections were made, partly preserved in F. A. A. allowing to make microtome preparations.

The plant has proved to belong to the genus *Langsdorffia*, hitherto a monotypic genus of the South American tropics.

When this paper was already in the hands of the editors it appeared that a preliminary announcement of the new find, with particulars about its ecology, was published by J. S. WOMERSLEY & H. STREIMANN, in *P. & N. G. Sci. Soc. Proc.* 1970, 22: 31-34, 3 fig. 1971.

## 2. KEY TO THE SPECIES OF LANGSDORFFIA

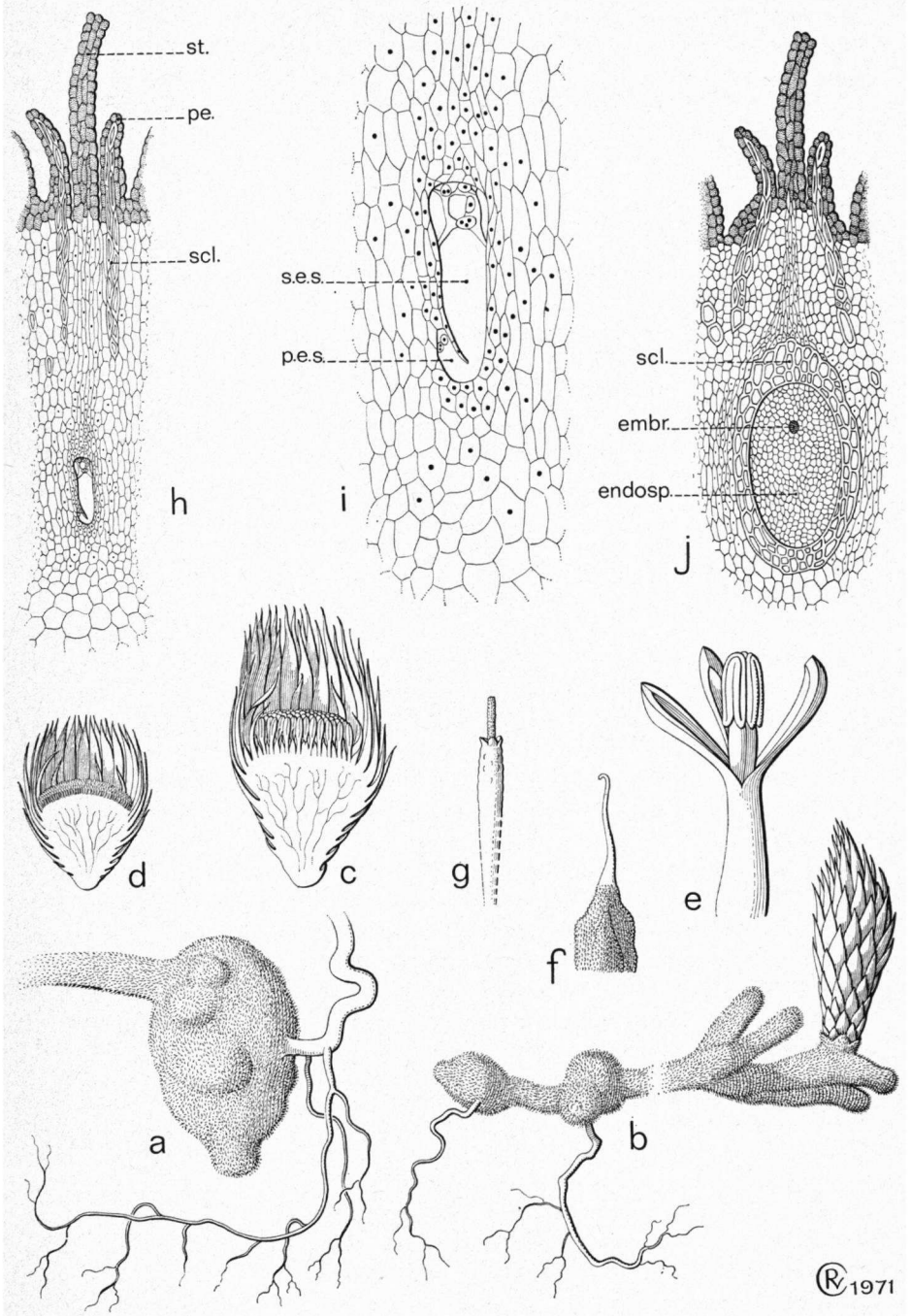
1. ♂ Receptacle flat to slightly concave. ♂ Tepals oblong, about twice as long as wide, 7 mm long. Anthers ovate-elliptic, c. 4 by 2 mm. ♀ Perianth tube c. 1.3 mm long, style exerted for c. 1.3 mm. Fruit c. 2.2 by 1.2 mm

*L. papuana*

1. ♂ Receptacle ovoid to cylindrical, c. 5 cm high. ♂ Tepals suborbicular, c. 2½ mm. Anthers subglobular, c. 2 mm Ø. ♀ Perianth tube c. 0.7 mm, style exerted for c. 0.7 mm. Fruit c. 1 by ½ mm . . . . . *L. hypogaea*



Fig. 1. *Langsdorffia papuana* Geesink, nov. spec. a. Swollen part of tuber with part of root of the host, × ½, b. tuber with young inflorescence, × ½, c. longitudinal section through a nearly full-grown ♂ capitulum, × ½, d. ditto, ♀ capitulum, × ½, e. ♂ flower, × 3, f. reduced scale between ♂ flowers, × 3, g. ♀ flower, × 6, h. longitudinal section through a full-grown, not fertilized ♀ flower, × 17, reconstructed from several slides, st. = style, pe. = perianth, scl. = string of sclerenchyma, dotted parts contain hardened resin, i. ditto, embryo-sac enlarged, × 47, with 6 inflated nuclei, p.e.s. = primary embryo-sac, s.e.s. = secondary embryo-sac, j. fruiting stage, × 16, scl. = sclerenchyma, endosp. = endosperm, embr. = embryo (All *N.G.F.* 47524 *Streimann & Kairo*, type).



**Langsdorffia papuana** Geesink, *nov. spec.* Fig. 1.

*L. hypogaea* Mart. valde affinis, differt receptaculo masculino plano ad subconcavo, tepalis oblongis 7 mm longis, antheris longioribus, ovato-ellipticis c. 4 mm longis, 2 mm latis, tubo perianthii feminini longiore, c. 1.3 mm longo, stylo magis exserto, fructibus maioribus.

Type: N. G. F. 47524 Streimann & Kairo (holotype L, isotypes CANB, K, L, LAE).

Tuber cylindrical, c. 9 mm  $\varnothing$ , irregularly branched, containing waxy balanophorin, swollen up to 3 cm  $\varnothing$  where in touch with host, densely patently hairy over nearly the whole surface, the swollen parts somewhat glabrescent; hairs 2-celled, up to 1.5 mm long, hyaline. Primordia of inflorescences endogenous, on the cylindrical part of the tuber. Volva dehiscing into 5–8 short, broadly triangular lobes. Inflorescence unisexual, capituliform, glabrous, outside with pergamentaceous, imbricate, apically directed scales. Scales creamy stramineous to reddish with brown tips, at the base of the capitulum small, triangular, c. 5 by 5 mm, near the edge of the receptacle narrowly triangular, up to 5 by 1 cm, with a swollen base. Receptacle infundibuliform, at the base c. 1 cm  $\varnothing$ . – ♂ Capituli up to 5 cm  $\varnothing$ ; receptaculum flat to slightly concave, densely papillose. Among the ♂ flowers reduced reddish scales with a papillose, swollen base. ♂ Flowers developing about simultaneously, c. 10 by 3 mm when not expanded, creamy yellow. Pedicels c. 7 by 1.5 mm, not papillose at the base. Tepals (2–)3, elliptic, boat-shaped, valvate, fleshy, c. 7 by 3 mm. Stamens (2–)3, epitepalous; filaments united into a tube, the visible part 2.5 by 1 mm; anthers dorsifix, erect, their connectives united up to 1/3 of their length, ovate elliptic, emarginate at the base, rounded at apex, c. 4 by 2 mm, 4-celled, at the base the loculi of each half connected, apically the inner and the outer two loculi contiguous. ♀ Capituli up to 3½ cm  $\varnothing$ . Receptacle distinctly concave to semiglobular. Style up to halfway surrounded by a tubiform, apically shortly 4–6-lobed perianth up to 1.3 by 0.4 mm; exserted part of the style c. 1.3 by 0.2 mm, outside with swollen cells. Embryo-sac united with the tissue of the receptacle, c. 1.5 mm under the flower base, elliptic, 0.4 by 0.1 mm, hyaline. – Fruit elliptic, c. 2.2 by 1.2 mm, liberated after the decay of the capitulum. Embryo about globular, consisting of a cluster of isomorphic cells surrounded by endosperm.

NEW GUINEA. East New Guinea, Morobe District, Wau Subdistrict, Head of Baime Creek, New Yamap (7° 08' S, 146° 46' E), alt. 1500 m, N.G.F. 44461 Streimann (CANB, K, L, LAE) on *Metrosideros eugenoides*; N.G.F. 47524 Streimann & Kairo (type, CANB, K, L, LAE) on *Eugenia* sp.; N.G.F. 47526 Streimann & Kairo (L, LAE) on *Metrosideros eugenoides*, N.G.F. 47528 Streimann & Kairo (CANB, K, L, LAE) on *Meliosma pinnata*.

ECOLOGY: *L. papuana* grows in the humus layer, with only the upper parts of the flowering heads showing.

Parasitism has been observed besides on *Eugenia* sp., *Meliosma pinnata*, *Metrosideros eugenoides*, and also on *Vaccinium* sp.

In passing it may be mentioned that the scant data on *L. hypogaea* reveal that this is found parasitizing *Ficus*, some palms, and *Mimosa*.

The forest is dominated by *Nothofagus* sp. and consists further of *Galbulimima belgraveana*, *Engelhardia rigida*, *Sycopsis dunnii*, *Eugenia* spp., occasional *Podocarpus neriifolius*, *Dacrycarpus imbricatus*, *Myristica* sp., *Helicia* spp., *Garcinia* sp., *Pentaphalangium* sp., small *Kibara* sp., *Dubouzetia* sp. Numerous *Balanophora* spp. were found nearby parasitic on *Araliaceae* and on a climbing *Ficus*. In the neighbourhood some isolated *Castanopsis acuminatissima* occurred with parasitic *Mitrastemon yamamotoi* (*Rafflesiaceae*).

The soil is very sandy, covered by undecomposed leaves. The underlying rock consists of decomposed granodiorite of the Morobe batholith.

### 3. MORPHOLOGICAL NOTES

1. The development of the ♀ flowers does not seem to be different from that in *L. hypogaea*, as described by FAGERLIND (1945). The "primary embryo-sac" forms, when possessing four nuclei, about halfway a protuberance, into which the basal two nuclei migrate. This protuberance overlaps the rest of the embryo-sac which then starts degenerating. Near the new-formed top of the embryo-sac the egg-nucleus is formed in the "secondary embryo-sac" (*fig. 1, i*). At this stage the middle cell layer of the perianth tube starts lignifying, and the cells of the style, which all contain resin, start hardening. When the egg nucleus is not fertilized, the embryo-sac and its neighbouring cells do not develop further (*fig. 1, h*). After fertilization the 2-3 cell layers surrounding the young "fruit" develop into sclereids (*fig. 1, j*). The amorphous embryo is surrounded by endosperm (*fig. 1, j*). The "fruits" are liberated after the capitulum has decayed.

2. The so-called reduced ♀ flowers in the ♂ capitulum, as observed by HARMS (1935) and former authors, are considered bracts by FAGERLIND (1945). Beside the characters of *L. hypogaea* mentioned by Fagerlind, *L. papuana* shows transitions between these bracts and the involucreal scales, which strongly sustains Fagerlind's consideration.

3. It is not yet known whether *L. papuana* is dioecious or monoecious.

### 4. PHYTOGEOGRAPHICAL REMARKS

The present remarkable record increases the list of amphi-transpacific genera compiled by VAN STEENIS (1962: 250-253) with a singularly important addition through the parasitic habit of the plant. It is true that such a transpacific range was known already in the Balanophoraceae, viz. in the subfamily *Helosioideae*, of which *Helosis* and *Corynaea* occur in Mexico and tropical America and *Rhopalocnemis* in Indo-Malesia, with a fourth genus, *Ditepalanthus*, in Madagascar. But in the case of *Langsdorffia* the interesting feature is that this disjunction occurs within one genus, with the species certainly closely allied.

One other parasitic genus also shows this disjunction, namely, *Mitrastemon* of the *Rafflesiaceae*, and it is remarkable to realize that they even occur together at the same site in New Guinea. To this pair could be added the saprophytic genus *Corsia* of the *Corsiaceae*, of which the only other member, the genus *Arachnites*, occurs in Chile.

The other disjunct amphi-transpacific distribution patterns shown by either tribes, subtribes, genus pairs, or genera, belonging to 53 families in all, are of non-parasitic plants, the majority of which is woody.

They must be a testimony of high antiquity, dating back to a period when the physiography of the earth crust permitted reasonable means for their dispersal.

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