

# *Goniothalamus amplifolius* B.J.Conn & K.Q.Damas (Annonaceae), a new species from Papua New Guinea

Barry J. Conn<sup>1</sup> and Kipiro Damas<sup>2</sup>

<sup>1</sup>National Herbarium of New South Wales, Mrs Macquaries Road, Sydney NSW 2000, Australia.

<sup>2</sup>Papua New Guinea National Herbarium, PO Box 314, Lae, Papua New Guinea.

## Abstract

The new species of *Goniothalamus amplifolius* B.J.Conn & K.Q.Damas, from the Vanimo area of the West Sepik botanical region (Sandaun Province, Papua New Guinea), is here described, with habitat notes and a botanical illustration. Although the affinities of this species are unclear, it is morphologically similar to *G. grandiflorus*, but differs by its larger leaves and smaller flowers.

## Introduction

*Goniothalamus* (Blume) Hook.f. & Thomson (Annonaceae) is a large palaeotropical genus of more than 130 species (Saunders & Chalermglin 2008). The genus is characterized by mostly axillary, usually pendant, bisexual flowers that consist of three sepals, and six petals arranged in two whorls. The outer whorl of petals is typically larger than the inner whorl, with the latter whorl connivent, forming a mitre-like dome over the numerous free stamens and carpels. The stamens have broad apical connectives and the fruits are apocarpous. The species of *Goniothalamus* that occur in Papua New Guinea are small subcanopy trees that are a frequent component of lowland forests. Prior to the discovery of *Goniothalamus amplifolius*, seven species were commonly recognized as occurring in Papua New Guinea, namely, *G. aruensis* Scheff. (Scheffer 1885), *G. cauliflorus* K.Schum. (Schumann 1889), *G. grandiflorus* Boerl. (Boerlage 1899) and *G. imbricatus* Scheff. (Scheffer 1885) – all common, wide-ranging species; *G. caloneurus* Miq.– only known from Milne Bay region; *G. inaequilaterus* K.Schum. & Lauterb. – recorded from the Finschhafen area, Morobe region, and *G. viridiflorus* K.Schum. & Lauterb.– once collected from near the Ramu River, Madang region (Schumann and Lauterbach 1900).

There have been no recent taxonomic studies of the genus in New Guinea, with recent workers focusing on the species of neighbouring regions: Australia (Jessup 1986), Borneo (Mat-Salleh 2001), Peninsula Malaysia (Saunders 2003), Sumatra, Indonesia (Saunders 2002) and Thailand (Saunders and Chalermglin 2008). The taxonomic status of other names published by Burck (1911), Lauterbach (1905), Lauterbach and

Schumann (1898), Schumann and Lauterbach (1900) for the species occurring in the New Guinea region is poorly understood. A review of the genus in this region is urgently required.

The Papua New Guinean botanical regions cited in this paper follow Womersley (1978). The use of the term 'podium' for pedicellate flowers follows Conn (1995).

***Goniothalamus amplifolius*** B.J.Conn & K.Q.Damas, *sp. nov.*

a *G. grandifloro* (Warb.) Boerl. foliis longioribus (100–120 cm) latioribusque (7–13 cm), costis petiolisque robustioribus, floribus brevioribus, petalis interioribus 20–25 mm longis differt.

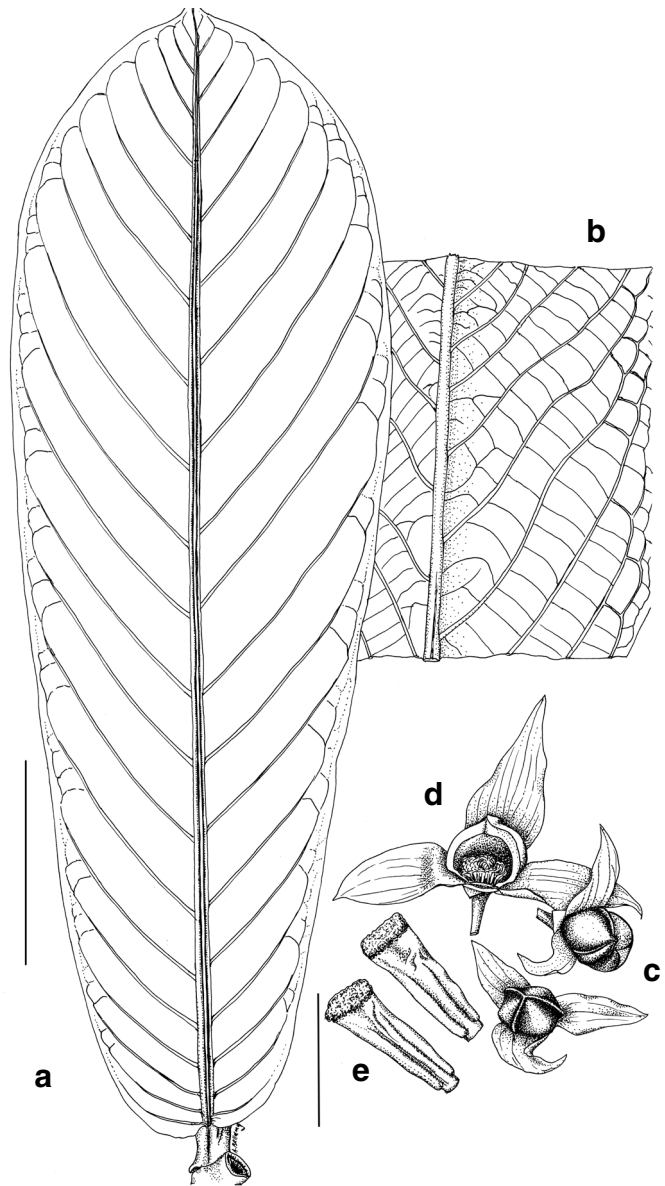
**Type:** Papua New Guinea: West Sepik: near Vanimo, *K.Q. Damas LAE79249*, 31 Aug 1994 (holo: LAE289781; iso BRI, K, L, NSW, NY).

Small tree, up to 5 m high, usually single-stemmed, bearing distinct leaf scars. Leaves simple, alternate; petiole 3–3.5 cm long, swollen (pulvinate), up to 1.5 cm thick, abaxially convex beneath lamina, adaxially grooved; lamina narrowly oblong to narrowly obovate, 100–110(–120) cm long, 25–30(–35) cm wide (length to width ratio 3.3–4), abaxial surface finely puberulous, adaxial surface glabrous; base rounded, very shortly subcordate; margin entire; apex shortly and indistinctly acuminate (acumen c. 4 mm long) to subobtusate; midrib straight, stout, raised and prominent on abaxial surface, grooved on adaxial surface, especially towards base, almost flattened distally; secondary veins distinct and prominent, especially on abaxial surface, grooved adaxially, up to 27(–30) pairs, arising at an angle of 45–50 degrees to midrib; tertiary veins percurrent. Inflorescence cauliflorous; flowers in raised clusters, podiate (podium 20–25 mm long); bracts, inserted at base of podium, broadly ovate, distal bract largest (c. 3 mm long, c. 2.5 mm wide). Sepals 3, brownish green, almost half-way connate, each sepal triangular, c. 8 mm long, margin entire, apex obtuse to subacute, inner and outer surfaces densely covered with variously appressed, antrorse, or spreading, rusty red hairs 0.1–0.2 mm long. Petals arranged in 2 whorls; outer petals 3, brownish green, narrowly ovate, 40–50 mm long, 11–12 mm wide near base (length to width ratio 3.6–4), 3–4 mm thick, margin entire, apex tapering, incurved on distal half, densely hairy as for sepals; inner petals 3, valvate, connivent, broadly ovate to slightly rhombic, 20–25 mm long, 20–25 mm wide (length to width ratio c. 1), 1.5–2 mm thick, concave, slightly incurved, densely hairy (hairs  $\pm$  patent, 0.1–0.2 mm long). Stamens many, spirally arranged, flattened-oblong, 3–4.2 mm long, connectives pulvinate at apex, concealing anthers. Gynoecium apocarpous, glabrous; carpels many, c. 50, slightly asymmetrically fusiform, 3–3.5 mm long, with longitudinal groove ventrally; style very short, slightly incurved; stigma indistinct, ligulate to subcylindrical, c. 2.5 mm long. Fruit of separate fleshy carpels; mature carpels (apocarps) fusiform to ellipsoidal, dark reddish brown, glossy, 60–70 mm long, 20–22 mm diameter, base tapering; stipe 6–8 mm long, c. 7 mm diameter (basally), glabrous; seeds 6–7 per carpel, flattened ovoid, 10–12 mm long, glabrous. Figures 1 & 2.

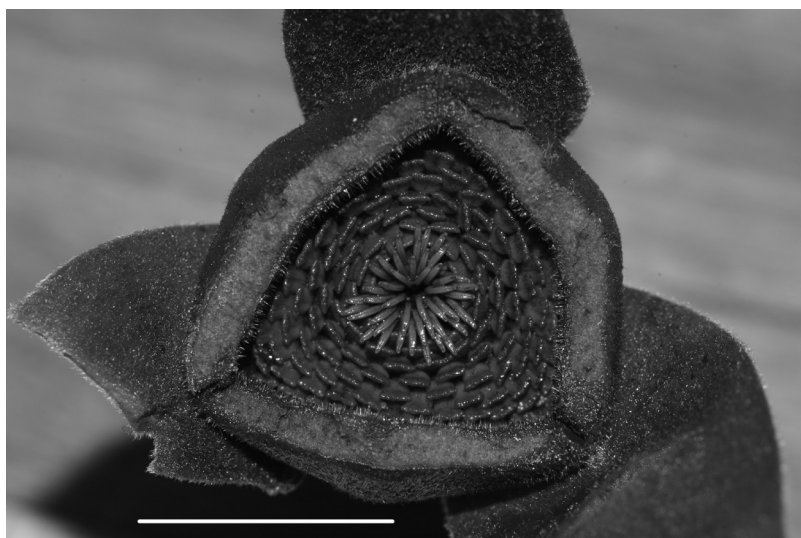
**Distribution:** only known from Pasi Forest area, near Vanimo, West Sepik (Sandaun Province), Papua New Guinea.

**Habitat:** this is a common, albeit scattered species occurring in Closed Lowland Rainforest, at an elevation of about 200 m.

**Notes:** a comparison of the morphology of the following three common species of



**Fig.1.** *Goniothalamus amplifolius* B.J.Conn & K.Q.Damas. **a**, adaxial surface of leaf showing petiole, lamina, and primary and secondary venation; **b**, detail of abaxial leaf lamina showing percurrent tertiary veins; **c**, 2 complete flowers showing 3 outer petals and 3 inner petals permanently connivent distally to form a mitre-like dome over reproductive organs; **d**, flower showing 3 outer petals, with one proximal inner petal removed to show androecium and gynoecium; and **e**, detail of two stamens. Scale: a & b = 20 cm; c = 50 mm; d = 30 mm; e = 4 mm. All from *Damas LAE79249*.

**a****b**

**Fig. 2.** *Goniothalamus amplifolius* B.J.Conn & K.Q.Damas. **a**, distal half of inner corolla removed to revealed a top view of stamens surrounding gynoecium, with stigmas visible. Scale bar = 10 mm; **b**, single, sessile fruiting apocarp attached to enlarged receptacle, other apocarps removed. Scale bar = 25 mm.

*Goniothalamus* in Papua New Guinea with *G. amplifolius* is based on direct field observations, evaluation of herbarium collections at LAE and NSW, and information included in the protologues (see references cited in the 'Introduction,' above). *Goniothalamus amplifolius* has leaves 100–110(–120) cm long, 25–30(–35) cm wide) whereas, those of *G. grandiflorus* are (16–)20–35(–50) cm long, 7–12(–13) cm wide, with the other common Papua New Guinean species, *G. aruensis* having leaves of a similar size to the latter species (16–30 cm long, (5–)7–12 cm wide). The outer petals of all three species are possibly similar in length (*G. amplifolius*: 40–50 mm long; *G. grandiflorus*: 20–40(–50) mm long; *G. aruensis*: 17–40(–50) mm long). *Goniothalamus amplifolius* has longer inner petals than *G. grandiflorus* (20–25 mm long and c. 17 mm long, respectively). Differences in fruit size suggest that *G. amplifolius* and *G. grandiflorus* have larger fruits (60–70 mm long, 20–22 mm diameter and c. 80 mm long, c. 40 mm diameter, respectively), whereas, the fruits of *G. aruensis* are smaller, 30–50 mm long and 10–15 mm diameter.

*Goniothalamus cauliflorus* and *G. imbricatus* are also both widespread species of lowland forests. However, both species are readily distinguished from *G. amplifolius*. *Goniothalamus cauliflorus* has laminae that tend to have fewer secondary veins (8–11 cf. up to 27(–30) pairs of secondary veins in *G. amplifolius*), and shorter outer and inner petals (c. 9 mm long and c. 5 mm long, respectively), whereas in *G. amplifolius* outer petals are 40–50 mm long and inner ones 20–25 mm long. *Goniothalamus imbricatus* has leaves with a long-attenuate base (*G. amplifolius* with base of lamina rounded), carpels 6–9 (*G. amplifolius* at least 50) and seeds orbicular and 2–5 per apocarps (*G. amplifolius* with seeds flattened ovoid and 6–7 per apocarps). Morphological comparisons with other published names must await a more detailed review of the genus in New Guinea.

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