

*Calamus bousigonii*JOHN DRANSFIELD<sup>1</sup>

*Summary.* Variation in the disjunct Indochinese rattan palm, *Calamus bousigonii* Becc. is discussed. Two subspecies are recognised, subsp. *bousigonii* from extreme south-east Thailand, Cambodia and Vietnam and subsp. *smitinandii* J. Dransf., described as new, from Peninsular Thailand.

For many years I have been aware of a distinctive low-growing Thai rattan with diamond-shaped leaflets. In the Kew Herbarium there are several collections of this taxon made in the 1920s and 30s by A. F. G. Kerr in Peninsular Thailand. I first saw it in the field in 1979 in the hills of Khao Chong in Trang Province. There are very few species of *Calamus* with such distinctive diamond-shaped leaflets. Most are high-climbing rattans that are rarely collected fertile, largely because they seem to flower and fruit high in the forest canopy and perhaps also because their foliage, with broad leaflets, is much less conspicuous in the canopy than that of rattans with more usual linear leaflets. These rattans with diamond-shaped leaflets were included by Furtado in his section *Rhombocalamus* (Furtado 1956); they are almost all restricted to the ever-wet forests of West Malesia — Borneo, the Malay Peninsula, Sumatra and Java. Two, *Calamus blumei* Becc. and *C. tomentosus* Becc., occur in Peninsular Malaysia, but the low-growing plant from Trang has inflorescences very different from those of these two species. *Calamus blumei* is now known to occur in Peninsular Thailand (e.g. *Kerr* 12079 (BK, K), *Dransfield & Bhoonab* 5441 (BKF, K)), although it has been confused with *C. tomentosus* in a recent popular book on Thai palms (Hodel *et al.* 1998); as far as I am aware, true *C. tomentosus* remains unrecorded for Thailand. Adding to the confusion, the distinctive rattan under discussion in this paper is erroneously referred to as *C. blumei* in Hodel's book. So what is this Peninsular Thai species?

One taxon with diamond-shaped leaflets was described by Beccari from Lower Cochinchina, far from the distribution area of the other rhomboid-leafleted species mentioned above. This is *Calamus bousigonii*, based on a collection made in Baria "in montibus Muxoai" by Pierre in September 1866 (in the southern part of Vietnam, lying to the south-east of Saigon) and represented by a mere four herbarium collections. However, the inflorescences of the Peninsular Thai plant are superficially very different from those of *C. bousigonii*, and so I believed at first that it could not be the same. I have in the past annotated the Peninsular Thai rattan in herbaria as "*Calamus* sp. aff. *C. bousigonii*" and a study of the demography of rattans in Khao Chong by Anders Bøgh Pedersen (1996) that included this species referred to the plant as *Calamus* nov. sp. ined. I have now had the chance to examine the

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type of *C. bousigonii* and the rather extensive collections from Peninsular Thailand in Thai and European herbaria and have concluded that although there are significant differences in the inflorescence, the two rattans are otherwise so similar that it would be best to regard them as two different, geographically separated subspecies of the same species, *Calamus bousigonii*. The typical subspecies occurs in Vietnam, Cambodia and the extreme south-eastern corner of Thailand on the Cambodian border, while subsp. *smitinandii*, here described as new, is restricted to Peninsular Thailand. It has been reported by Lim Chong Keat (pers. com.) from Kedah in West Malaysia, but I have seen no material to confirm the record.

***Calamus bousigonii*** *Becc.*, *Rec. Bot. Surv. India* 2: 209 (1902) and *Ann. Roy. Bot. Gard. (Calcutta)* 11: 343 (1908); Magalon, *Contr. Étude Palmiers Indochine* Fr. 99 (1930); Conrard in Gagnepain & Conrard, *Fl. Gén. de l'Indochine* 6: 1023 (1937). Type: Vietnam, *Pierre* 4836 (Holotype P).

subsp. ***bousigonii***

Slender rattan climbing to 20 m. Stem without sheaths 6–8 mm diam., with sheaths 10–12 mm; internodes 5–12 cm long. Leaves ecirrate; leaf sheath rather densely covered with solitary spines 1–13 mm long, with slightly swollen bases, the spines generally drying the same colour or slightly paler than the sheath surface, thin scattered caducous pale brown tomentum present between the spines; knee prominent, c. 3 mm high, tending to be unarmed or more sparsely armed than the sheath; flagellum to 125 cm long; petiole 7–12.5 cm long, c. 4 mm wide, armed abaxially and laterally with recurved spines to 4 mm, adaxially ± unarmed; rachis 22–47 cm long, armed abaxially throughout with recurved spines; leaflets rhomboid, 5–6 on each side of the rachis, arranged regularly but rather distant, the apical pair divergent, basal leaflets 6–10 × 2.8–4.6 cm, mid-leaf leaflets 9–17.5 × 3.5–6.5 cm, with numerous veins radiating from the base, transverse veinlets conspicuous, margins slightly undulate bearing rather regularly arranged black spines to 2 mm long. Inflorescences (only pistillate known) to 90 cm long including the terminal flagellum to 60 cm long, branching to 2 orders with 1–3 partial inflorescences; prophyll strictly tubular, entire, 8–19 cm long, c. 5 mm wide at the tip, armed with scattered reflexed spines and with scattered pale tomentum, sometimes subtending a partial inflorescence; rachis bracts similar to the prophyll but shorter; partial inflorescences inserted on the rachis at the mouth of the subtending bract, 5–7 cm long, with a few (5–7 in all) distichous rachillae, the whole ± triangular in outline; rachillae 1–4 cm long, c. 1.5–2 mm diam., ± straight or slightly curved, appearing zig-zag from the flower insertions; rachilla bracts striate, bearing scattered pale to mid brown hairs; involucre and involucrophore forming a flattened cup c. 2 mm diam.; involucrophore striate, ± rounded with two low triangular lobes. Sterile staminate flower unknown (already fallen). Pistillate flower with calyx striate, tubular in basal 2 mm, c. 2 mm wide, lobes triangular acute, to 1 mm long; corolla exceeding the calyx, petals 3–1.8 mm, very thick, smooth and appearing almost polished; staminodal ring to 1 mm high, sterile anthers elongate 1.2 × 0.2 mm; ovary 3 × 1.8 mm, stigmas 1.1 × 0.3 mm, recurved.

Fruit (description ex Beccari 1908) broadly ovoid, suddenly beaked, the beak to 18 × 14 mm; scales arranged in 18 vertical rows, broader than long, c. 1.5 × 2 mm, very slightly channelled, straw-yellow, narrowly bordered with dark brown, the tips obtuse. Seed oblong-ovoid, rounded at both ends, 10 × 7 – 8 mm, coarsely pitted superficially; endosperm superficially ruminate; embryo basal.

SPECIMENS EXAMINED. VIETNAM. Baria, montibus Muxoai, Sept. 1866, *Pierre* 4836 (Holotype P). Tourane (Da Nang). Hoi Mit, May – July 1927, *J. & M. S. Clemens* 4247 (K). CAMBODIA. Mont de l'Elephant, clay soil, alt. 1000 m, 7 Sept. 1919, *Poilane* 244 (P). THAILAND: Southeastern. Trat, Bo Rai, c. 600 m, 30 Nov. 1924, *Kerr* 9505 (K).

The typical subspecies is known from only a few specimens from the southern part of Indochina — two collections from Vietnam, one from Cambodia and one from the extreme southeast of Thailand on the border with Cambodia.

***Calamus bousigonii* subsp. *smitinandii* J. Dransf., subsp. nov.**

*Calamus* nov. sp. ined., Bøgh, *Principes* 40 (1): 5 (1996).

*Calamus blumei* sensu Hodel, non Becc., *The Palms and Cycads of Thailand*: 28 (1998).

A varietate typica bracteis primariis inflorescentiae longis fissis laminam conspicuam facientibus vice valde tubulosis integris, ramis primariis inflorescentiae aliquantum infra orem bracteeae insertis vice ad orem insertis, fructibus ellipsoideis vice ovoideis distincta. Typus: Thailand, Peninsular, Khao Chong, *Dransfield & Bhoonab*, JD5427 (Holotypus K, isotypus BKF).

Slender clustering rattan climbing to 10 m (rarely to 20 m), often flowering and fruiting at 2 – 3 m tall. Stem without sheaths 4 – 8 mm diam., with sheaths 5 – 16 mm diam.; internodes 6 – 10 cm long. Leaves ecirrate; leaf sheath rather densely covered in solitary narrow triangular spines 1 – 13 mm long, with slightly to strongly swollen bases, the spines generally drying the same colour or slightly paler than the sheath surface, thin scattered caducous pale brown tomentum present between the spines; knee well developed to c. 4 mm high, tending to be unarmed or more sparsely armed than the rest of the sheath; flagellum to 1.5 mm long; petiole 10 – 45 cm long, sparsely to densely armed with short black-tipped triangular spines with swollen bases adaxially, abaxially and along margins; rachis to 95 cm long, usually shorter, armed with scattered reflexed spines; leaflets rhomboid, 6 – 8 on each side of the rachis, arranged regularly but rather distant, the apical pair divergent, shiny, dark green except at the insertion on rachis where pale, basal leaflets 10 – 20 × 3 – 7.5 cm, mid-leaf leaflets 14 – 23 × 4.5 × 8.5 cm, apical leaflets 11 – 14.5 × 2.5 – 6.5 cm, all leaflets with numerous veins radiating from the base, transverse veinlets conspicuous, margins slightly undulate bearing rather regularly arranged black spines. Inflorescences to 100 cm long including the terminal flagellum to 40 cm long, the staminate branching to 3 orders, the pistillate to 2 orders, with 2 – 7 partial inflorescences; prophyll tubular at the base, splitting for about one half its length, becoming expanded and blade-like, tattering, sometimes empty, sometimes

subtending a partial inflorescence, with scattered triangular spines and abundant mid brown tomentum; rachis bracts very conspicuous, similar to the prophyll but generally shorter, sometimes splitting almost to the base, unarmed, to c.  $11 \times 1 - 1.5$  cm, often shorter; partial inflorescences inserted on the rachis about one third to one half way along the length of the subtending bract, with relatively few (2–7 in pistillate, up to 20 in staminate) distichous rachillae, the whole  $\pm$  triangular in outline; rachillae  $\pm$  straight or slightly curved, appearing zig-zag from the flower insertions, the staminate c. 10–15 mm long, 1 mm diam., the pistillate to 30 mm long, c. 2 mm diam.; rachilla bracts c. 1 mm long, with a triangular limb to 1.5 mm long, with sparse tomentum and scales; involucre and involucrophore forming a flattened cup c. 2 mm diam.; involucrophore striate,  $\pm$  rounded with two low triangular lobes. Staminate flower c.  $5 \times 1.75$  mm; calyx striate, tubular in basal 2 mm, with triangular lobes to  $1 \times 1$  mm; petals  $4.5 \times 1.5$  mm, connate in basal 1 mm, smooth, as if almost polished, tipped and edged with dark brown; anthers  $2.3 \times 0.5$  mm. Sterile staminate flower as the fertile but with empty anthers. Pistillate flower with calyx striate, tubular in basal 2 mm, c. 2 mm wide, lobes triangular acute, to 1 mm long; corolla exceeding the calyx, petals  $3 \times 1.8$  mm, very thick, smooth and appearing almost polished; staminodal ring to 1 mm high, sterile anthers elongate  $1.2 \times 0.2$  mm; ovary  $3 \times 1.8$  mm, stigmas  $1.1 \times 0.3$  mm, recurved. Fruit ellipsoid,  $15 - 18 \times 10 - 11$  mm, including beak  $2 - 3 \times 1 - 1.5$  mm; scales arranged in 20 vertical rows, c.  $1.5 \times 1.5$  mm, channelled, dull yellow-brown and sometimes with the distal half dark brown, narrowly bordered with dark brown, the tips obtuse. Seed  $13 \times 5$  mm, ellipsoid, surface sparsely pitted; endosperm sparsely ruminate; embryo basal. Fig. 1.

SPECIMENS EXAMINED. THAILAND. Peninsular. Surat Thani, Khao Luang, c. 1100 m, 10 Aug. 1927, *Kerr* 13266 (K); Nakhon Si Thammarat: Khao Luang, alt. c. 900 m, 29 April 1928, *Kerr* 15465 (K); alt. 750–950 m, 22 May 1968, *van Beusekom & Phengkhlai* 930 (BKF, K, L); alt. 800 m, 25 Feb. 1991, *Chawalit Niyomdham* 2346 (BKF, K). Phatthalung, Kao Soi Dao, c. 700 m, 18 April 1930, *Kerr* 19444 (K). Trang: Khao Chong National Park, alt. 100 m, 18 April 1979, *Dransfield & Bhoonab*, JD5427 (BKF, K); 1970, *Charoenphol et al.* 3721 (AAU, BKF, K); alt. 50–400 m, 1982–85, *Vongkaluang* 120 (BK, K); rattan study plot above Peninsular Botanic Garden,  $99^{\circ}48' E 07^{\circ}33'$ , mixed evergreen forest, alt. 200 m, 3 Dec. 1993, *Bøgh* 45177 (AAU, BKF, K, PSU). Satun: Talae Ban, Nature Trail leading away from the border with Malaysia,  $100^{\circ}10' E 06^{\circ}42'$ , alt. 100–150 m, 29 Sept. 1996, *Barfod et al.* 43817 (AAU, BKF, K); Talae Ban, 20 km NE of Satun,  $100^{\circ}07' E 06^{\circ}45'$ , alt. 100–150 m, 4 Nov. 1990, *Barfod & Uecharakan* 41103 (AAU, BKF, K).

*Calamus bousigonii* subsp. *smitinandii* differs from typical *C. bousigonii* in the inflorescence rachis bracts and fruit shape. In *C. bousigonii* subsp. *bousigonii* the rachis bracts are strictly tubular and for the most part intact, not splitting, and the first order branches are inserted at the mouth of the bracts. In *C. bousigonii* subsp. *smitinandii*, the rachis bracts are elongate and they split for at least half their length, opening out and becoming flattened and tattering, and the first order branches are inserted about half way along the length of the bracts. These differences give the inflorescence a distinctive appearance, somewhat reminiscent of inflorescences of



FIG. 1. *Calamus bousigonii* subsp. *smitinandii*. **A** portion of stem with leaf sheaths, basal part of a leaf and part of a pistillate inflorescence, post anthesis  $\times \frac{2}{3}$ ; **B** apical portion of leaf  $\times \frac{2}{3}$ ; **C** tip of staminate inflorescence  $\times \frac{2}{3}$ ; **D** staminate flower  $\times 4$ ; **E** mature fruit  $\times 1 \frac{1}{3}$ . Drawn by Helen Sanderson.

species in Furtado's section *Platyspathus*, rather than section *Rhombocalamus*. The fruit of subsp. *smitinandii* is uniformly rather narrow ellipsoid rather than broadly ovoid as in subsp. *bousigonii*. Fruit scales in the former are arranged in 20 vertical rows and are approximately 1.5 × 1.5 mm whereas those of the only fruiting specimen of subsp. *bousigonii* are arranged in 18 vertical rows and are approximately 2 × 1.5 mm. However, these last fruit scale differences may not be significant.

*Calamus bousigonii* subsp. *smitinandii* is one of the most attractive of all Thai rattans. Its glossy undulate diamond-shaped leaflets and its neat low habit give it considerable horticultural potential. Among Thai species it is very distinctive. The only other taxon with diamond-shaped leaflets in Peninsular Thailand is *C. blumei*. This is altogether different, being a high-climbing taxon that is rarely found fertile, distinctive in its leaf sheaths densely covered in a thick indument of silvery or golden hairs and chocolate brown scales, with generally scattered very short black spines that are often upward pointing and often borne on rounded bulbous swellings. The inflorescences of the precociously flowering *C. bousigonii* subsp. *smitinandii*, almost always found flowering at a mere 2 – 3 m tall, is immediately distinguishable based on the elongate expanded and tattering peduncular and rachis bracts. This new subspecies was figured erroneously as *C. blumei* in Hodel *et al.* (1998) while his figures of *C. tomentosus* almost certainly refer to *C. blumei*.

The subspecies is named for Tem Smitinand, 1920 – 1995, Thai botanist extraordinary, who often gave me much encouragement in my studies of Thai palms.

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