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A new species and a new synonym in *Pandanus* subg. *Rykia* (Pandanaceae) in Thailand

Martin W. Callmander & Sven Buerki

Abstract

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The genus *Pandanus* Parkinson (*Pandanaceae*) has never been critically revised in Thailand. Most species belong to the taxonomically challenging *Pandanus* subg. *Rykia* (Vrise) B.C. Stone. Recent field observations coupled with a review of herbarium material of Thai *Pandanaceae* (serving as a backbone for the forthcoming family treatment for the Flora of Thailand) have revealed new findings enabling better understanding the taxonomy of *Pandanus* species in this region. In this article, we formally synonymize *Pandanus bifidus* H. St. John under *Pandanus obconicus* H. St. John, two species among the fifteen that Harold St. John described from Thailand in 1963 and 1965. We also describe a new species, *Pandanus voradolii* Callm. & Buerki, restricted to north-eastern Thailand. The new species resembles *Pandanus obconicus* in its acaulescent low shrub habit, but differs in its ecology, shape and texture of its leaves, the length of its peduncle and shape and dimensions of its syncarp. Field photographs and a preliminary risk of extinction assessment is provided for the new species.

Keywords

PANDANACEAE – *Pandanus* subg. *Rykia* – Thailand – New species – New synonym

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Introduction

Three genera of *Pandaneaceae* occur in Thailand: *Benstonea* Callm. & Buerki, *Freycinetia* Gaudich. and *Pandanus* Parkinson. When *Benstonea* was described, 5 species were accepted for Thailand (CALLMANDER et al., 2012). Further taxonomic work conducted on *Benstonea* for the Flora of Peninsular Malaysia (BEENTJE & CALLMANDER, in press) revised this estimate by finding one new synonym and a new species occurrence for Thailand. Consequently, the following species are currently accepted for Thailand: *B. affinis* (Kurz) Callm. & Buerki, *B. herbacea* (Martelli) Callm. & Buerki, *B. humilis* (Lour.) Callm. & Buerki, *B. nana* (Martelli) Callm. & Buerki and *B. ornata* (Kurz) Callm. & Buerki. Only three species of *Freycinetia* were known to occur in Thailand: *F. angustifolia* Blume, *F. javanica* Blume and *F. sumatrana* Hemsl. (STONE, 1970). Further collecting has added a fourth species to the flora: *F. kamiana* B.C. Stone collected in the Peninsula (Narathiwat, Waneng) (Smitinand 1102; BKF [SN078278, SN196133]). This species was previously only known from Peninsular Malaysia and Sumatra (STONE, 1970). These latter two results strengthen prior evidence suggesting strong biogeographical connections between *Pandaneaceae* species across the Sunda shelf (e.g. BUECKI et al., 2016).

Pandanus has never been critically revised in Thailand. ST. JOHN (1963, 1965) has described 15 new species for this country and critical notes were subsequently published by STONE (1965, 1966, 1968a, 1968b) on species from southern Thailand. A first complete survey for Thailand accepted 18 species in the genus (24 including the 6 *Benstonea* species previously placed in *Pandanus*) (STONE, 1971). Most species of *Pandanus* belong to the taxonomically challenging *Pandanus* subg. *Rykia* (Vrise) B.C. Stone. In his revision of this species-rich subgenus Stone accepted 10 species for Thailand including 2 putative new species and the cultivated *P. kaida* Kurz, originally from unknown origin (STONE, 1982).

Field missions were organised in 2012 and 2014 by the Forest Herbarium of the Department of National Parks, Wildlife and Plant Conservation of Thailand and collections held in several herbaria (i.e., BK, BKF, BM, G, K, KLU and PH) were studied to serve as a backbone for the forthcoming *Pandaneaceae* treatment for the Flora of Thailand. These efforts have revealed new findings allowing better understanding the taxonomy of *Pandanus* species in this region. New species occurrence for Thailand has been discovered in the Malay Peninsula in the southern part of the Thai Peninsula, e.g. *P. irregularis* Ridl. (see CHAYAMARIT et al., 2014 based on a first draft checklist compiled by the authors).

In north-eastern Thailand in the Bueng Kan Province, near the border with Laos (Fig. 1), we have collected a rheophytic *Pandanus* growing on sands along streams (Callmänder et al. 1163). This collection morphologically matches with a previously known collection (*Phloenchit* 1984) collected only

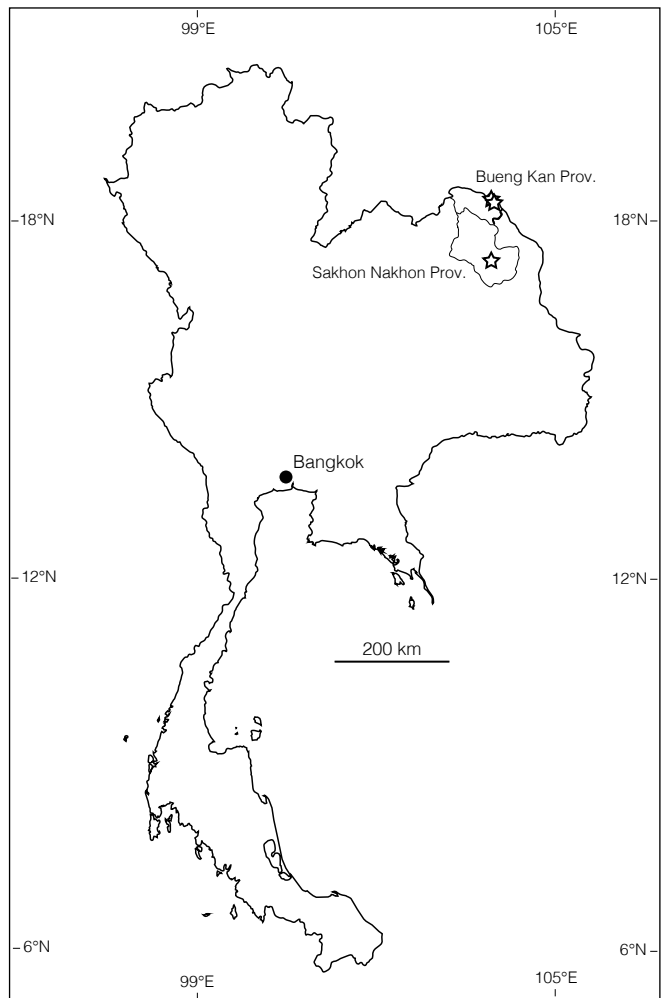


Fig. 1. - Geographic distribution of *Pandanus voradolii* Callm. & Buerki in Thailand.

130 km away. During his taxonomical studies, Stone was unable to confidently assign this latter collection to any known species. As a testament of his doubts, the BKF duplicate of this collection bears a *determinavit* with his handwriting mentioning the unpublished name “*Pandanus jocundus* B.C. Stone sp. nov. 24.12.1970”. This strongly suggests that B. Stone considered publishing a new species to accommodate this collection. STONE (1971, 1972) finally identified this collection as *P. bifidus* H. St. John, thus crossing out his unpublished name on the duplicate of this collection deposited in his own herbarium at PH.

Pandanus bifidus was described based on two collections gathered by Arthur Francis George Kerr (1877-1942) deposited at BK: Kerr 8132 (holotype) and Kerr 20084 (paratype). When assigning *Phloenchit* 1984 to *P. bifidus*, STONE (1971: 19) wrote: “In the small globose heads... this seems to be a distinct species. Unfortunately, only a small collection was

obtained..." and again a year later in his revision of subgenus *Rykia*: "The Phloenchit collection cited is a little aberrant, in its small globose heads and slightly shorter drupes, but it is most probably the same species [as *P. bifidus*]" (STONE, 1982: 10). Stone was most likely unable to fully encapsulate the species concept of *P. bifidus* and he even corrected its species description in 1982 (from its earlier in STONE, 1971) as follows: "leaves 350 cm long... and ending by all 1-celled should be omitted as they do not pertain to this species" meaning that Stone was puzzled on which specimens to assign to *P. bifidus* (STONE, 1982: 10).

Careful examination of the two Kerr collections (cited by ST. JOHN, 1963) demonstrated that they actually do not belong to the same species. While the type collection (*Kerr 8132*) represents a rather small *Pandanus* with short leaves and an oblong syncarp, the other collection (*Kerr 20084*) represents another species with much wider and longer leaves. This latter species is morphologically closely related to a group of species from northern Thailand: *P. acaulescens* H. St. John, *P. ligulatus* H. St. John and *P. penetrans* H. St. John. In addition, further examinations of the type specimen of *P. bifidus* (made of two immature leaves and parts of an oblong syncarp) allowed us to confidently confirm that this species is identical to another species described by ST. JOHN (1963) in the same article: *P. obconicus* H. St. John. Other collections of this species deposited at K bear other names by St. John that were never published: "*Pandanus ambiobtus*" on *St. John 26357* [K000781309] and "*Pandanus kanburiensis*" on *Keer 10402* [K000781305, K000781306]. Based on the latter evidence, *P. bifidus* is below formally synonymized under *P. obconicus*.

We also describe a new species, *P. voradolii* Callm. & Buerki from north-eastern Thailand. The new species resembles *P. obconicus* in its acaulescent low shrub habit, but differs in its ecology, shape and texture of its leaves, the length of its peduncle and shape and dimensions of its syncarp.

Systematic

Pandanus obconicus H. St. John in Pacific Sci. 17: 481. 1963.

Holotypus: THAILAND. Prov. Chanthaburi: Chanburi, Makham, 100 m, 13.I.1958, fr., *Smitinand 4054* (BKF [SNF080175]!).

= *Pandanus bifidus* H. St. John in Pacific Sci. 17: 475. 1963. **Holotypus:** THAILAND. Prov. Nakhon Ratchasima: Pak Tong Chai, Nakawn Rachsima, 200 m, 27.XII.1923, fr., *Kerr 8132* (BK [SN247279]!; iso-: BM [BM000512621]!, K [K000781303, K000781307, K000781308]!), **syn. nov.**

Notes. – ST. JOHN (1963) mentioned the holotype (*Smitinand 4054*) to be held at SING, but no collection has been located there. The BKF collection bears in St. John's handwriting the mention "Holotypus" and should therefore be considered as so. STONE (1972: 48) already corrected this oversight.

We have chosen to give priority to the name *P. obconicus* over *P. bifidus* based on the quality of the type collection of *P. obconicus*, even if this collection is only deposited at BKF.

Pandanus voradolii Callm. & Buerki, **spec. nova** (Fig. 2).

Holotypus: THAILAND. Prov. Bueng Kan: Tham Fun waterfall, Phu Wua WS, 18°15'52"N 103°54'21"E, 345 m, 28.III.2014, fr., *Callmander et al. 1163* (BKF!; iso-: BM!, G [G00428130]!, K!, SRP-061977!).

Pandanus voradolii Callm. & Buerki differs from its congeners by its rheophytic ecology, acaulescent shrubby habit with a crown of narrow, subcoriaceous and flagellate leaves; its sub-spherical to obovate small syncarp on a long, curved, slender peduncle with 200–280 drupes.

Rheophytic shrub along stream on sand, acaulescent to 1 m tall. A crown of erect leaves, pale green to glaucous below. *Leaves* 100–120 cm long, 2.5–3 cm wide in the middle, 2.8–3.2 cm wide near the sheath, attenuate distally on a short flagellum (c. 5 cm long), subcoriaceous; prickles white *in vivo*; marginal prickles beginning at 8–10 cm above the base and extending to the apex, antrorse, 2–2.5 mm in the lower third, (6–)9–15(–20) mm apart, strong, to 1.5–2 mm in the mid third; (15–)20–25(–35) mm apart, to < 1 mm in the apical distal third, 4–11 mm apart; midrib armed at 8–11 cm above base, prickles strong in the lower part, c. 2.5 mm long, getting smaller through the apex, c. < 1 mm long in the apical part (and sparsely arranged in the mid part); prickles discrete in the distal part, c. < 1 mm long, irregularly spaced; sheath 6–7 cm long, 3.5–4 cm wide at apex, c. 5–6(–7) cm large at base. *Infructescence* lateral, monosyncarpic, pending at maturity, on a curved peduncle (rarely straight); syncarp 6–7(–8) × 6–7 cm, sub-spherical to obovate; peduncle with 5–7 caducous leafy bracts; proximal bract up to 80 × 3 cm, subcoriaceous, distal bract up to 30 × 2.5 cm; peduncle, slender, 50–65 cm long, 1–1.5 cm wide at apex, veins conspicuous. *Drupes*, c. 200–280 per syncarp, 20–25 mm high, 7–9 mm wide, 6–8 mm depth, 6 angled; pileus flattened to steeply pyramidal, pale green *in vivo*. *Stigma* unique, bony, bifurcate (rarely simple), brown, 5–6 × 2–3 mm; endocarp c. 10 × 4 mm; seed ellipsoid, 7–8 × 3 mm; proximal and distal mesocarp fibrous. *Staminate* plant unknown.



Fig. 2. - *Pandanus voradolii* Callm. & Buerki. **A-B.** Habit; **C.** Infructescence.
[Photos: M. Callmänder]

Etymology. – This species epithet honours Dr. Voradol Chamchumroon from the Forest Herbarium in Bangkok (BKF). Voradol is specialized in Thai *Rubiaceae* (especially the genus *Ixora* L.; CHAMCHUMROON, 2004, 2006, 2014), but he has an overarching expertise of the Thai flora. His knowledge, enthusiasm, professionalism and dedication to the Thai flora lead to the discovery of this new species that the authors are honoured to name after him.

Distribution and ecology. – *Pandanus voradolii* is currently only known from three collections in north-eastern Thailand where it grows along streams on sands in dry evergreen forests.

Conservation status. – *Pandanus voradolii* is currently known from three locations occurring in the vast Thai protected area network, viz. Phu Phan National Park and Phu Wua Wildlife sanctuary. Despite of the rarity of this species, which is most likely due to under collecting, this new species does not seem to be threatened in the near future and we therefore assign it a provisional status of “Least Concern” [LC] using the IUCN Red List Criteria (IUCN, 2012).

Notes. – In its acaulescent shrubby habit, this new species resembles *P. obconicus*. *Pandanus voradolii* can be nevertheless easily recognized by its subcoriaceous and narrow leaves (< 3 cm vs > 4 cm and coriaceous in *P. obconicus*), long and curved peduncle (50–65 cm vs 20–30 cm) and sub-spherical to obovate small syncarp (6–7(–8) × 6–7 cm vs oblong 8–14 × 5–8 cm) bearing 200–280 drupes (vs 400–500).

Based on its morphology, we assign *P. voradolii* to *Pandanus* subg. *Rykia*. Although this subgenus is polyphyletic and requires to be re-circumscribed (BUERKI et al., 2012), the new species is assigned to the true *Rykia* (*Pandanus* subsect. *Rykia* sensu STONE, 1974) with the type of this section, *Pandanus furcatus* Roxb. STONE (1982) accepted 7 native species of *Pandanus* subsect. *Rykia* including 2 possible new species for Thailand. The first of these putative new species refers to the unpublished name “*Pandanus aphitrios* H. St. John” based on Hansen et al. 11208 (C [C10016345]). To our knowledge, this unpublished name should be regarded as a synonym of *P. reticulosus* H. St. John. The second potential new species refers to the unpublished name “*Pandanus hansenii* H. St. John” based on Hansen et al. 11230 (C [C10016346]). This name belongs to a complex of morphologically closely-related species occurring in the mountains in the north and north-western Thailand described by ST. JOHN (1962, 1963): *P. acaulescens* H. St. John, *P. ligulatus* H. St. John and *P. penetrans* H. St. John. Only *P. acaulescens* and *P. penetrans* have been currently tentatively accepted (CHAYAMARIT et al., 2014) in a first *Pandanaceae* checklist. *Pandanus* subg. *Rykia* is certainly the most species-rich subgenus in Thailand, but more field work in this region and nearby countries (e.g. Viet-Nam and Lao PDR) is required to establish a final taxonomic treatment.

Paratypes. – THAILAND. **Prov. Bueng Kan:** trail to Chet Si waterfall, Phu Wua WS, 18°09'32"N 103°56'55"E, 200 m, 11.III.2016, fr., Poopath et al. 1428 (BKF). **Prov. Sakon Nakhon:** Phu Phan, [16°58'48"N 103°57'00"E], 30.XI.1962, fr., Phloenchit 1984 (BKF, PH).

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