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Distinctive new *Monoon* species (Annonaceae) from Thailand, increasing diversity of a genus of ecologically important Asian trees

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ABSTRACT

The widespread Asian genus *Monoon* (Annonaceae) comprises about 70 tropical forest species, over 20 of which occur in Thailand. Four new species from Thailand are described here: *Monoon ornithocephalum* and *M. roseum* from Peninsular Thailand and *M. phukraduengense* and *M. phuluangense* from North-Eastern Thailand.

KEYWORDS: new species, Peninsular Thailand, North-Eastern Thailand, *Polyalthia*

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INTRODUCTION

Plants in the widespread tropical Asian genus *Monoon* Miq. grow in a variety of forest habitats, many as canopy trees. In Thailand, some reach the greatest heights of any Annonaceae in the region and are often compared to dipterocarps, for example yang dong (ยางดง, *Monoon obtusum* (Craib) B.Xue & R.M.K.Saunders) and yang leuang (ยางเหลือง, yellow dipterocarp, *Monoon jucundum* (Pierre) B.Xue & R.M.K.Saunders). The genus is characterized by leaves with percurrent tertiary venation, a pedicellar bract adnate to the pedicel, monocarps with a single large seed encircled by a longitudinal groove, and lamellate endosperm ruminations.

Monoon was long placed as a taxonomic synonym of *Polyalthia* Blume (Hooker & Thomson, 1872; Sinclair, 1955), but modern studies have clarified its status as a distinct genus within the tribe Miliuseae only distantly related to *Polyalthia s. s.* (Mols *et al.*, 2004; Xue *et al.,* 2012). The genus has yet to receive a comprehensive taxonomic revision. Turner (2018) listed 69 species distributed from India east to southern China and the Ryukyu Islands, and south to Java, the Solomon Islands, and northern Australia. New species have most recently been described from Vietnam (Lý, 2017), the western Pacific (Turner & Utteridge, 2017), Laos (Tagane *et al.*, 2018), Sumatra (Nurmawati *et al.*, 2019) and Borneo (Nurmawati *et al.*, 2020). Study of *Monoon* for the Flora of Thailand project has also revealed undescribed species. Here we propose four distinctive new species; several other possible species remain incompletely known and require further study.

Monoon species can be informally placed in two groups. The first, exemplified by species such as *M. simiarum* (Wall. ex Hook.f. & Thomson) B.Xue & R.M.K.Saunders and *M. lateriflorum* (Blume) Miq., includes plants with thin widely spreading petals and thin-walled monocarps that turn red to purple when the soft fleshy fruit is mature. We describe three species in this group, one from a small area of Peninsular Thailand, and two species with distributions restricted to mountain forests in Northern Thailand.

Until molecular systematic study indicated that they were phylogenetically nested within the larger genus *Monoon s.l.* (Xue & Saunders, 2012), most species of the second group were placed in

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Enicosanthum Becc. Their flowers have broad thick erect petals and inner petals that bend outward at the midpoint. The monocarps are usually pale green to green-yellow at maturity with fibrous flesh. The new species we describe in this group is found in South-Western and Peninsular Thailand and most resembles *M. fuscum* (King) B.Xue & R.M.K.Saunders.

TAXONOMY

Monoon ornithocephalum Bunchalee, **sp. nov.**

Monoon ornithocephalum resembles *M. fuscum*, differing in the absence of an inflorescence peduncle, the oblanceolate petals, and the asymmetrically oblongoid or ellipsoid monocarps 15–20 mm wide with stipes 15–18 mm long (Table 1). In contrast, *M. fuscum* has inflorescence peduncles 2–4 mm long, oblong petals, and symmetrically ovoid monocarps 10–12 mm wide with stipes 3–5 mm long. Type: Thailand, Surat Thani, Amphoe Phanom, Khlong Phanom National Park, trail from headquarters around base of limestone mountain, 8°53′N, 98°40′E, alt. 100 m, 1 Apr. 2003, *Middleton, Lindsay & Pooma 2120* (holotype **BKF** [143702!]; isotype **A!**). Fig. 1.

Trees up to 25 m tall, bark dark grey or grey-brown, smooth. *Twigs* golden-brown tomentose with conspicuous lenticels. *Leaves* thinly coriaceous, asymmetrically oblanceolate or obovate, blades 12–21(–25) × 4.5–11 cm, base rounded or asymmetrically rounded, cuneate to asymmetrically cuneate or retuse, apex acute, asymmetrically cuspidate to asymmetrically acuminate with acumen 5–15(–23) mm long, glabrous on both surfaces except for hairs along midrib and secondary veins, midrib shallowly grooved above, secondary veins fairly straight, impressed, (12–)14–17 per side, tertiary veins percurrent; petioles 6–12 × 2–2.5 mm, flat above, golden-brown tomentose. *Inflorescences* in axils of leafy or leafless twigs, 1-flowered, pedicels 8–10 × 2.2–2.5 mm, golden-brown tomentose, each bearing 1–3 persistent or caducous ovate bracts 3–4 × 3–4 mm near the base; buds ovoid, petals valvate from base to apex. *Sepals* 3(–4), imbricate, free, coriaceous, semicircular to broadly ovate, 5–7 × (4–)6–8(–9) mm, apex broadly acute to obtuse, golden-brown tomentose outside. *Petals* 6(–8), green to yellowish green at anthesis, coriaceous, oblanceolate, surface verrucose outside, apex acute, longitudinal veins on petals slightly conspicuous, golden-brown tomentose on both sides, becoming glabrous toward base; outer petals incurved at base, becoming erect toward apex, 27–35(–37) × 8–10 (–13) mm, inner petals incurved to erect at base, apices spreading, 25–36(–37) × 6–8 mm. *Stamens* numerous, cuneate, 2.8–3 mm long, anther connective apex truncate. *Carpels* up to 5, 3–3.2 mm long, pubescent, stigmas higher than anther connective apices, clavate, 1.2–1.4 mm long, tomentose. *Torus* conical, 4–5 mm in diameter, 2–2.2 mm thick, tomentose. *Fruits* of up to 9 monocarps borne on a pedicel 10–12 × 2.2–2.7 mm. *Monocarps* green at maturity, asymmetrically oblongoid or ellipsoid, 25–30 × 15–20 mm, smooth, golden-brown pubescent, apex with a beak 5–7 mm long, base tapering into a stipe 15–18 mm long, 2.5–3 mm thick, the stipe narrow at base and broader at apex. *Seeds* (probably immature) asymmetrically oblong or elliptic, 15–17 × 5–7 mm, rugulose, brown to blackish brown, apiculate.

Thailand.— SOUTH-WESTERN: Prachuap Khiri Khan [trail above park headquarters, Kui Buri National Park, Kui Buri District, 12°02′N, 99°35′E, alt. 700 m, 23 Jan. 2004, *Middleton et al. 2433* (**A**, **BKF**, **L**)]; PENINSULAR: Surat Thani [Amphoe Phanom, Khlong Phanom National Park, trail from headquarters around base of limestone mountain, 8°53′N, 98°40′E, alt. 100 m, 1 Apr. 2003, *Middleton et al. 2120* (**BKF**, **A**)].

Distribution.— Endemic.

Ecology.— Tropical rainforest, 100–700 m. Flowering: January, April; fruiting: April.

Etymology.— *Monoon ornithocephalum* is named for the shape of the monocarp, which resembles a bird's head.

Vernacular.— Nang na huai nok (หนังหนาหัวนก).

Notes.— Comparisons between *M. ornithocephalum* and *M. fuscum* are given in Table 1; the long stipes of the monocarps of *M. ornithocephalum* (Fig. 1D) are especially striking, longer than those of *M. fuscum* even when the fruits are immature. Material of this species includes both trimerous and tetramerous flowers, but there is not enough material to determine if tetramerous flowers (Fig. 1C) are a regular feature of the species.

Figure 1. *Monoon ornithocephalum* Bunchalee. A. habit; B. leaves; C. flower, side view; D. monocarps; E. immature seed. All from the holotype, *Middleton et al. 2120* (**BKF**).

Table 1. Morphological comparison of *Monoon ornithocephalum* and *M. fuscum*.

Characters	*M. ornithocephalum*	*M. fuscum*
Leaf apex	acute, asymmetrically cuspidate to acuminate, the acumen 5–15(–23) mm long	acute to acuminate, the acumen 4–8 mm long
Petiole dimensions	6–12 mm long, 2–2.5 mm thick	5–8 mm long, 1.5–2 mm thick
Peduncle	absent	present, 2–4 mm long
Pedicel dimensions (flower)	8–10 × 2.2–2.5 mm	4–7 × 2–2.5 mm
Monocarp shape	asymmetrically oblongoid or ellipsoid, base tapering, apex beaked	ovoid, base rounded, apex beaked
Monocarp size	25–30 × 15–20 mm (immature)	22–25 × 10–12 mm
Monocarp stipe dimensions	15–18 mm long, 2.5–3 mm thick	3–5 mm long, 1.5–2 mm thick
Distribution and habitat	South-Western and Peninsular Thailand, tropical rainforest	South-Western Thailand to Peninsular Malaysia, dry evergreen forest

Monoon phukraduengense Bunchalee, **sp. nov.**

Monoon phukraduengense resembles *M. laui* (Merr.) B.Xue & R.M.K.Saunders in texture and size of leaves and flower parts when dried, number of secondary veins, and the thickness of pedicels, but differs in its asymmetrical elliptic to oblanceolate leaves, cuneate to broadly cuneate leaf bases, oblong petals 35–40 × 7–9 mm, and flower pedicels 25–30 × 1.8–2 mm (Table 2). It is also similar to *M. phuluangense* but is distinguished from that species by the inflorescences only 1–4-flowered, glabrous pedicels 25–30 mm long, valvate sepals, petals green to yellowish green and tinged with purplish red on the inner base, and carpels 1–1.2 mm long. Type: Thailand. Loei, Phu Kradueng, Phu Kradueng National Park, trail from Lang Pae to Foothill, 16°52′23″ N, 101°48′38″ E, alt. 1,222 m, 10 June 2013, *Suddee, Trisarasri, Puudjaa, Rueangruea, Keiwbang, Hemrat & Pansamrong 4479* (holotype **BKF** [213584!]). Fig. 2.

Trees up to 25 m tall, bark brown, smooth. *Twigs* puberulous with conspicuous lenticels. *Leaves* thinly coriaceous, asymmetrically elliptic to oblanceolate, blades 11–18 × 3.5–7.5 cm, base acute to broadly acute, apex acuminate with acumen 5–12 mm long, glabrous on both surfaces, midrib grooved above, puberulous, eventually glabrous, secondary veins fairly straight, raised, 16–18 per side, tertiary veins percurrent; petioles 5–7 × 2.2–2.5 mm, shallowly grooved above, glabrous. *Inflorescences* forming fascicles in axils or on tubercles of leafless twigs, 1–4-flowered, pedicels 25–30 × 1.2–2 mm, glabrous, each bearing one adnate bract 1.5–1.7 × 1.2–1.4 mm at the base, the bract ovate, pubescent outside; buds broadly ovoid, petals imbricate at the apices. *Sepals* valvate, free, chartaceous, ovate, 2.5–3 × 3–4 mm, apex acute, sparsely hairy outside and glabrous inside. *Petals* green to yellowish green, purplish red on inner base, thinly coriaceous, oblong, apex acute, glabrous on both sides; outer petals 35–40 × 7–9 mm; inner petals 30–35 × 5–6 mm. *Stamens* numerous, slightly cuneate to oblong, 0.8–1 mm long, anther connective apex truncate. *Carpels* numerous, 1–1.2 mm long, pubescent, stigmas higher than the anther connective apices, oblong, ca 0.4 mm long, pubescent. *Torus* cushion-shaped with a slightly concave apex, 5–6 mm in diameter, 2.5–3 mm thick, pubescent. *Fruit* of up to 30 monocarps borne on a pedicel ca 40 × 1.5–2 mm. *Monocarps* yellow, dull greenish red, or dark red, oblongoid, 30–35 × 20–25 mm, smooth, glabrous, apex and base obtuse, stipes ca 40 mm long, 10–12 mm thick. *Seeds* not examined.

Thailand.— NORTH-EASTERN: Loei [Na Haew, Phu Suan Sai National Park, Route Hinsikon, 17 Jan. 2008, *Maknoi 1940* (**BKF**, **QBG**); route from Kao Lieo to Hin Si Tid, Phu Suan Sai National Park, Na Haew, 11 Mar. 2008, *Maknoi 2049* (**QBG** [37167]); Huai Nam Phak, Na Haew, 17°30′N, 100°56′E, 900 m, 12 Jan. 1998, *P. Srisanga et al. 193* (**QBG** [10532–2 sheets]); Phu Kradueng, Phu Kradueng National Park, trail from Lang Pae to Foothill, 16°52′23″ N, 101°48′38″ E, alt. 1,222 m, 10 June 2013, *Suddee et al. 4479* (**BKF**)]. A *Monoon* from Phetchabun Province (P. Chalermglin, personal

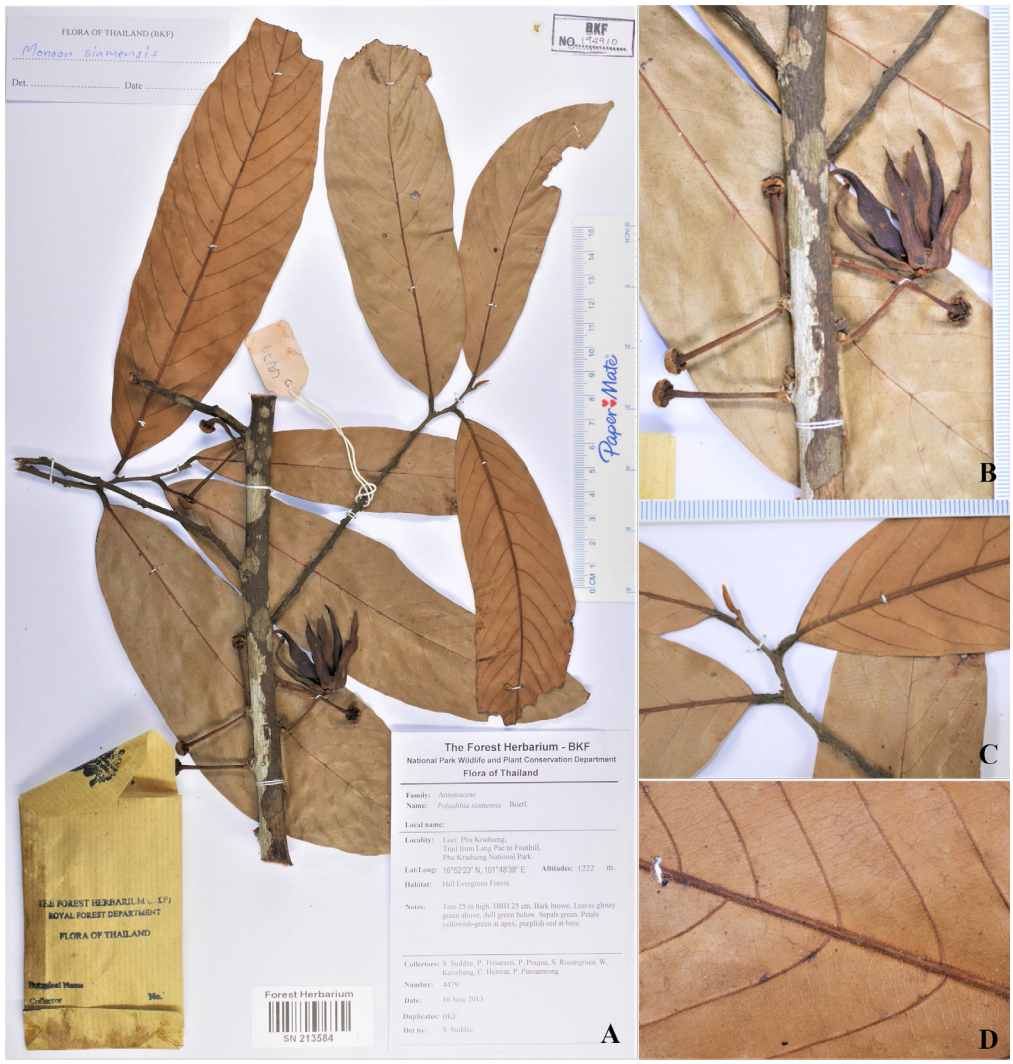

Figure 2. *Monoon phukraduengense* Bunchalee. A & B. leaves and flowers; C. shoot and leaf bases; D. lower surface of leaf. All from the holotype, *Suddee et al. 4479* (**BKF**).

communication) is tentatively identified as this species, but further study of it is needed.

Distribution.— Endemic.

Ecology.— Hill evergreen forest or semi-evergreen forest, 700–1,222 m. Flowering: January–June; fruiting: January, March, May–September.

Vernacular.— Saban nga phukradueng (สะบันงาภูกระดึง).

Etymology.— The specific epithet refers to the type locality.

Notes.— The greatest similarities of *Monoon phukraduengense* are to *M. laui*, a species of Hainan and Vietnam, and to *M. phuluangense*; the three species are compared and contrasted in Table 2. The leaves and flowers of the new species also resemble those of *Monoon lateriflorum*, but that species has leaves that are 20–40 cm long and 6.5–14(–15) cm wide, flower pedicels 50–80 mm long, petals 40–70 mm long, and fusiform monocarps tapering at both the base and the apex. *Monoon phukraduengense* may be the "*Polyalthia* sp." described and illustrated by Chalermglin (2001, p. 314–315).

Monoon phuluangense Bunchalee, **sp. nov.**

Monoon phuluangense differs from both *M. laui* and *M. phukraduengense* in having longer pedicels ((30–)35–50(–60) mm), elliptic-oblong to oblong outer petals (29–)35–43 × 8–10 mm, and inner petals that are elliptic or curved on one side and 40–45 × 10–12 mm (Table 2). *Monoon phuluangense* further differs from *M. phukraduengense* in having inflorescences with up to 10 flowers, pubescent pedicels, glabrous sepals, petals yellow to reddish yellow with conspicuous red veins, and carpels 1.5–1.8 mm long. Type: Thailand, Loei, en route from Lone Tae down to Wang Saphung District, alt. 1,000 m, 17 May 1998, *Wongprasert s.n.* (holotype **BKF** [120861!]). Fig. 3.

Trees up to 15 m tall, bark brown, smooth. *Twigs* pubescent with conspicuous lenticels. *Leaves* thinly coriaceous, asymmetrically narrowly elliptic, elliptic-oblong or oblanceolate, blades (18–)22–30 (–32) × (3.5–)4.5–8 cm, base acute, apex acuminate with acumen 10–20 mm long, glabrous on both surfaces except for base of midrib, midrib grooved above, secondary veins fairly straight, raised, (14–) 16–20 per side, tertiary veins percurrent; petioles 5–7 × 2.2–2.5 mm, shallowly grooved above, pubescent. *Inflorescences* forming fascicles on axillary tubercles of leafless twigs, up to 10-flowered, pedicels (30–)35–50(–60) × 1.2–1.5 mm, pubescent, each bearing one adnate bract 1.5–2 × 1.8–2 mm between the base and the midpoint, the bract ovate, pubescent outside; buds broadly ovoid, petals imbricate at the apices. *Sepals* imbricate, free, chartaceous, ovate, 3–4 × 4–5 mm, apex acute, puberulous outside, glabrous inside. *Petals* yellow to reddish yellow with conspicuous red veins, coriaceous, glabrous on both sides; outer petals elliptic-oblong or oblong, (29–)35–43 × 8–10 mm, apex acute, inner petals elliptic or curved on one side, 40–45 × 10–12 mm, apex acute. *Stamens* numerous, cuneate, 1–1.2 mm long, anther connective apex truncate. *Carpels* numerous, 1.5–1.8 mm long, pubescent, stigmas higher than anther connective apices, oblong, 0.7–0.9 mm long, pubescent. *Torus* cushion-shaped with a slightly concave apex, 4–5 mm in diameter, 2–2.5 mm thick, pubescent. *Fruit and seed* unknown.

Thailand.— NORTH-EASTERN: Loei [Phu Luang Wildlife Sanctuary, 17 May 1998, *Chayamarit et al. 1486* (**BKF**); ibid., Phuyong-Phu, alt. 1,400 m, 15 May 1998, *Wongprasert s.n.* (**BKF** [121723, 121724]); en route from Lone Tae down to Wang Saphung District, alt. 1,000 m, 17 May 1998, *Wongprasert s.n.* (**BKF** [120861])].

Distribution.— Endemic.

Ecology.— Hill evergreen forest with oak trees, in sandy soil, 1,000–1,400 m. Flowering: May.

Vernacular.— Saban nga phuluang (สะบันงาภูหลวง).

Etymology.— The specific epithet refers to the type locality.

Notes.— *Monoon phuluangense* and *M. phukraduengense*, both species of higher-elevation habitats in North-Eastern Thailand, are compared, along with *M. laui*, in Table 2. *Monoon phuluangense* also somewhat resembles *M. roseum*, but the petals of *M. phuluangense* are yellow with red markings and are not attenuate at the base.

Table 2. Morphological comparison of *Monoon phukraduengense*, *M. phuluangense* and *M. laui*.

Characters	*M. phukraduengense*	*M. phuluangense*	*M. laui*
Leaf shape	elliptic to oblanceolate	narrowly elliptic, elliptic-oblong, or oblanceolate	oblong, oblong-elliptic or oblanceolate
Leaf dimensions	11–18 × 3.5–7.5 cm	(18–)22–30(–32) × (3.5–) 4.5–8 cm	8–20 × 3.5–8 cm
Pedicel dimensions (flower)	25–30 × 1.2–2 mm	(30–)35–50(–60) × 1.2–1.5 mm	15–30 × 2.2–2.5 mm
Outer petals	oblong, 35–40 × 7–9 mm	elliptic-oblong or oblong, (29–)35–43 × 8–10 mm	oblong-elliptic, 25–35 × 10–13 mm
Inner petals	oblong, 30–35 × 5–6 mm	elliptic or curved on one side, 40–45 × 10–12 mm	ovate-lanceolate, 20–30 × 13–15 mm

Figure 3. *Monoon phuluangense* Bunchalee. A. leaves and flowers on twig; B. upper surface (left) and lower surface (right) of leaf; C & D. flowers; E. outside (left) and inside (right) of stamens; F. carpel. All from the holotype specimen *Wongprasert s.n.* (**BKF** [120861]).

Monoon roseum Bunchalee, **sp. nov.**

Monoon roseum resembles *M. hookerianum* (King) B.Xue & R.M.K.Saunders and *M. glabrum* (King) B.Xue & R.M.K.Saunders but differs from both species in the fasciculate inflorescence, pale pink to red ovate petals, and monocarp stipes 40–55 mm long, versus pedunculate monochasial cymes, yellow oblong, oblanceolate, or obovate petals, and monocarp stipes 25–40 mm long. Type: Thailand. Ranong, Khao Pota Chong Dong, alt. 300 m, 19 Jan. 1929, *Kerr 16740* (holotype **BK!**). Fig. 4.

Trees up to 10 m tall, bark brownish grey, furrowed, with knobs. *Twigs* pubescent with conspicuous lenticels. *Leaves* chartaceous, asymmetrically oblanceolate or oblong, blades 10.5–18 × (3.7–)4.5–7.5 cm, base asymmetrically cuneate to obtuse, apex acuminate with acumen 7–15 mm long, glabrous on both surfaces except for hairs along the midrib and secondary veins, midrib grooved above, secondary veins fairly straight, slightly raised above, 10–12 per side, tertiary veins percurrent; petioles 5–8 × 3–3.4 mm, flat above,

Figure 4. *Monoon roseum* Bunchalee. A. habit, showing old inflorescence bases on trunk; B. immature and mature leaves on twigs; C & D. flowers; E. mature monocarps; F. lower surface of leaf; G. upper surface of leaf; H. longitudinal section of monocarp and seed. Photographs taken at Ban Kiriwong, Kam Lon, Lan Saka District, Nakhon Si Thammarat Province, A–E on 25 March 2015, F–H from *Bunchalee 162* (**KKU**), collected from the same site on 26 April 2000.

pubescent. *Inflorescences* forming fascicles in axils of leafless twigs and on woody tubercles of trunks, 2–10-flowered, pedicels 25–35(–70) × 2–2.2 mm, pubescent, each bearing one adnate bract 1.5–2 × 1.5–1.7 mm between the base and the midpoint, the bract ovate with an acute apex, pubescent outside and glabrous inside; buds ovoid, petals imbricate at the apices. *Sepals* valvate, free, thinly coriaceous, triangular, 6–8 × 3–4 mm, apex acute and recurved, pubescent outside and glabrous inside. *Petals* incurved, pale pink to red, thinly coriaceous, ovate, apex acute, puberulous outside and glabrous inside, longitudinal veins conspicuous; outer petals 30–35 × 10–12 mm, base attenuate with narrowed portion 4–5 mm long; inner petals 28–33 × 12–15 mm, base attenuate with narrowed portion 5–7 mm long. *Stamens* numerous, cuneate, 1–1.2 mm long, anther connective apex truncate. *Carpels* numerous, 1.5–1.8 mm long, pubescent, stigmas higher than anther connective apices, clavate, 0.6–0.7 mm long, pubescent. *Torus* cushion-shaped, 4–5 mm in diameter, 1.5–2 mm thick, pubescent. *Fruit* of up to 25 monocarps borne on a pedicel 30–55 × 2.5–3 mm. *Monocarps* red to black when mature, oblongoid, 22–25 × 12–15 mm, smooth, glabrous, apex and base obtuse, stipes 40–55 mm long, 2–2.2 mm thick, pericarp less than 1 mm thick. *Seeds* oblongoid, 20–22 × 10–12 mm, light brown, smooth, slightly shiny, endosperm ruminations lamellate.

Thailand.— PENINSULAR: Ranong [Kampon, Kapur, alt. 150 m, 20 Nov. 1973, *Santisuk 643* (**BKF**); Khao Pota Chong Dong, alt. 300 m, 19 Jan. 1929, *Kerr 16740* (**BK**)]; Surat Thani [Ban Ta Khun, 28 Nov. 1986, *Niyomdham 1275* (**BKF**, **L**)]; Phangnga [Kopah, Janjau Hill, 9 Dec. 1917, *Haniff & Nur SFN 2089* (**SING**); Khao Plai Bang To, alt. 600 m, 24 Feb. 1929, *Kerr 17222* (**BK**, **L** [L.1763281, L.1762282])]; Nakhon Si Thammarat [Ban Kiriwong, Kam Lon, Lan Saka District, 26 Apr. 2000, *Bunchalee 162* (**KKU**); Lansaka District, Khao Luang National Park, 1,200 m, 21 Apr. 2016, *Chalermglin 590421* (**IBSC**); Phi Pun District, Khao Luang National Park, NW side of Khao Luang Mountain, approx. 4 km NE of Nuea Fah Substation, 8°31′N, 99°42′E, alt. 500 m, 2 Mar. 2006, *Gardner ST 2420* (**L**); Khao Luang, alt. 500 m, 27 Apr. 1928, *Kerr 15414* (**BK**); ibid., alt. 1,500 ft, Feb. 1922, *Smith 545* (**BK**); ibid., alt. 660 m, 28 Mar. 1955, *Sanan 45* (**BKF**); ibid., 3 May 1957, *Sanan 1067* (**BKF**)]; Trang [Khao Chetyot, Palian, alt. 150 m, 10 Mar. 2007, *Niyomdham 7929* (**BKF**)].

Distribution.— Endemic.

Ecology.— Tropical rainforest, 150–660 (–1,200) m. Flowering: November–March; fruiting: December, February–April.

Vernacular.— Ka nan (กานัน) (Phangnga).

Etymology.— The specific epithet refers to the pale pink to red colour of the flowers, unusual in the genus.

Notes.— *Monoon roseum* is most similar to *M. hookerianum* and *M. glabrum*, having a similar appearance with respect to the shape and texture of the leaves and flower parts. *Monoon roseum* is distinguished by having a fasciculate rather than monochasial inflorescence. In addition, the petals of the new species are ovate and pale pink to red, rather than oblong or obovate and yellow. The three species are compared on these and additional characters in Table 3. *Monoon roseum* was reported as *Polyalthia clavigera* King and *P. hookeriana* King in Chalermglin (2001) and as "*Polyalthia* sp. A" in Gardner *et al.* (2015).

SUMMARY

The new *Monoon* species described here are the only species of the genus known to be endemic to Thailand. *Monoon phukraduengense* and *M. phuluangense* occur in a small area of the North-Eastern Region. The other native *Monoon* species known from this Region, *M. obtusum*, *M. simiarum* and *M. viride* (Craib) B.Xue & R.M.K.Saunders, are more common and widely distributed. In the Peninsular Region, *M. ornithocephalum* and *M. roseum* bring the total number of described native species for the Region to 14 and the *Monoon* diversity for Thailand to 20 described native species.

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Table 3. Comparison of *Monoon roseum*, *M. hookerianum* and *M. glabrum*.

Characters	*M. roseum*	*M. hookerianum*	*M. glabrum*
Leaf shape	oblanceolate or oblong, apex acuminate, the acumen 7–15 mm long	oblanceolate to obovate, apex cuspidate to acuminate, the acumen 5–15 mm long	elliptic-oblong, apex acute to slightly acuminate
Inflorescence morphology	fasciculate, lacking a peduncle	monochasial cyme, peduncle 4–6 mm long, rachis 6–10 mm long	monochasial cyme, peduncle up to 5 mm long, rachis up to 7 mm long
Pedicel dimensions (flower)	25–35(–70) × 2–2.2 mm	25–40 × 2–2.2 mm	20–25 × 1–1.2 mm
Outer petals	ovate, 30–35 × 10–12 mm, base attenuate, the narrowed portion 4–5 mm long	oblong, 25–35 × 8–12 mm, base not narrowed, slightly incurved	oblanceolate, 30–35 × 12–14 mm, base cuneate
Inner petals	ovate, 28–33 mm long, base attenuate with narrowed portion 5–7 mm long	oblanceolate, 35–40 mm long, base not narrowed, slightly incurved	obovate, 27–33 mm long, base attenuate with narrowed portion 5–7 mm long
Monocarps	oblongoid, 22–25 × 12–15 mm, obtuse at base and apex	ellipsoid to sub-oblongoid, 18–22 × 15–18 mm, base obtuse, apex blunt to sub-acute	subglobose, 15–17 mm in diameter, obtuse at base and apex
Pedicel dimensions (fruit)	30–55 by 2.5–3 mm	25–35 by 5–7 mm	25–30 by 2.5–3 mm
Monocarp stipe dimensions	40–55 mm long, 2–2.2 mm thick	35–40 mm long, 1.8–2 mm thick	25–30 mm long, 1.5–1.8 mm thick
Distribution	Northern Peninsular Thailand	Narathiwat Province in Thailand, Peninsular Malaysia, Singapore, Borneo	Peninsular Malaysia

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