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A new species of and a status change in *Ixora* (Rubiaceae) from Thailand

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ABSTRACT. *Ixora phuluangensis*, a new species from Thailand's North-Eastern Floristic Region is described and illustrated. The character states of *I. kratensis* Craib (confined to the South-Eastern Floristic Region) partly overlap with those of *I. brunonis* Wall. ex G. Don (primarily in the Peninsula and the South-Western Floristic Region); its reduction to subspecific status is proposed (*I. brunonis* subsp. *kratensis*). *I. brevidens* Craib is considered a synonym of *I. brunonis* (subsp. *brunonis*).

The genus *Ixora* L. (Rubiaceae) with over 400 species includes shrubs and small trees distributed in tropical and subtropical regions of the world. The large number of species makes delimitation difficult. In Thailand the genus is represented by about 27 species, 2 varieties and 1 subspecies (Chamchumroon, 2004).

When examining specimens of *Ixora* L. (Rubiaceae) for a revision of the Thai species, several collections could neither be matched with existing species from Thailand nor from neighbouring countries. They most likely represent a new species. There are presumably four new species, but three of these are still incompletely known (either good flowering material or mature fruits not available). The fourth, however, is well documented and was also studied in the field. It is described below. This species belongs to the subgenus *Ixora*, section *Brachypus* Brem.

After studying herbarium and living material of *I. brunonis* Wall. ex G. Don and *I. kratensis* Craib, it became clear that the two cannot be upheld as discrete species because of partial character overlaps. It is, therefore, proposed to reduce *I. kratensis* to a subspecies of *I. brunonis*. The status change is further discussed and formally published in the second part of this article.

Ixora phuluangensis V. Chamchumroon, **sp. nov.**

Ixora cibdelae Craib affinis sed, inter alia, lobis calycis majoribus (2–3 mm longis vs. 0.1–0.4 mm) et lobis corollae minoribus (5–6 mm longis vs. 6–9 mm) differt. Type: Thailand, Loei Province, Phu Luang Wildlife Sanctuary, 1,400 m alt., *Wongprasert* s.n., 13 Dec. 1997 (holotypus BKF). Figs. 1–2.

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Shrub 2–3 m high; branchlets glabrous. *Leaves* decussate, with petioles 4–6 mm long, blades elliptic-oblong, 8.5–12(–18) by 2–3.1(–5) cm, with 6–8 pairs of lateral veins, glabrous, coriaceous, base cuneate, apex broadly acuminate. *Stipules* with a basal sheath, a lower triangular part and an apical awn, 3–4 mm long, glabrous. *Inflorescences* terminal, corymbiform, many-flowered, bracteate, axes glabrous; ultimate cymes with 3 flowers on pedicels to 3 mm long; each flower subtended by a pair of narrowly triangular to filiform and glabrous bracteoles 2–3 mm long. *Flowers* fragrant. *Calyx* glabrous, lobes lanceolate, 2–3 mm long. *Corolla* white or pale pinkish, 15–25 mm long; lobes ovate, obtuse or rounded at the apex, 5–6 by 0.6–2 mm, glabrous. *Anthers* exserted, linear, 2–4 mm long, pale orange. *Style* and the 2 filiform stigma lobes exserted for 3–5 mm. *Ovary* ellipsoid, ca. 2 mm long. *Fruit* a (1–)2 seeded drupe crowned by the persistent calyx, globose, 7– 8 mm in diam., changing colour from green to red and, finally, black. *Seeds* semi-globose, ca. 5–6 by 5 mm. Fig. 1.

Distribution.— Endemic to north-eastern Thailand. Only known from NORTH-EASTERN: Loei (Phu Luang).

Ecology.— Uncommon along streams in hill evergreen forest; altitude 1,400–1,800 m. Flowering January–February. Fruiting February.

Vernacular.— Khem dong (เข็มดง) (Loei).

Additional specimens examined (all from Phu Luang).— *Beusekom, Phengklai* 3096, 19 Jan. 1970 (AAU, BKF); *Bunpheng* 1018, 26 Nov. 1957 (BKF); *Bunchai* 1331, 18 Dec. 1966 (AAU, BKF, C, K); *Bunchai* 1496, 7 Feb. 1965 (BKF); *Chamchumroon* 1245, 21 Dec. 2001, (BKF); *Chermsirivathana* 1059, 15 Nov. 1968 (BK); *Smitinand* s.n., 19 Dec. 1981 (BKF); *Tagawa, Iwatsuki, Fukuoka* T-1808, 6 Dec. 1965 (BKF).

Note.— The new species is undoubtedly allied to *I. cibdela*, a taxon widely distributed in Thailand and growing in evergreen and mixed deciduous forests. The two species are readily distinguishable by their differing calyx and corolla lobe lengths. *I. cibdela*, moreover, differs from the new species in a peculiar fruit character that is only seen in the field, before reaching full maturity and turning shiny black, the fruits are always white and black spotted, while the fruits of *I. phuluangensis* merely change colour from red to black during maturation but never have white spots or stripes.

THE STATUS OF *IXORA BRUNONIS, I. BREVIDENS* AND *I. KRATENSIS*

When dealing with *I. kratensis*, Craib (1932, 1934) noted that it differs from *I. brunonis* in having petiolate leaves and shorter corolla lobes and calyx segments. A thorough study of the Thai material, however, showed that the character differences in the fertile region only hold for some of the collections known to Craib whereas they overlap in all additional specimens currently known. As the two taxa are geographically separated and typically differ in some leaf characters they are united here but are considered as separate subspecies.

The investigation of Thai *Ixora* material, moreover, revealed that *I. brevidens* Craib, originally described from Prachuap Khiri Khan [South-Western Region], is inseparable from *Ixora brunonis* Craib (1932, 1934) stated that the species differs from *I. brunonis* in

having a shorter indumentum on the lower leaf surface and shorter calyx lobes. This may have been true in Craib's time when relatively few collections of *I. brunonis* were known. With the many collections available now, it is clear that the supposed distinctive characters of *I. brevidens* fall within the range of variation of *I. brunonis*.

Ixora brunonis Wall. ex G. Don, Gen. Syst., 3: 573.1834; Kurz, Forest Fl. Burma 2: 20.1877; Hook.f, Fl. Brit. Ind. 3: 139.1880; King et Gamble, Mat. Fl. Malay Penins. 15: 72.1904; Ridl., Fl. Malay Penins. 2: 91.1923; Craib, Fl. Siam. Enum. 2: 151.1934; Corner, Gard. Bull. Str. Settl. 11: 183.1941; Wong, Tree Fl. Malaya 4: 356.1989. Type: Malaysia, Penang, *Wallich* 6136 (holotype K!).

Shrub or small tree, 2–3 m high, older branches corky, with rough greyish bark; young twigs, leaves (petioles, lower leaf surfaces) and stipules, inflorescence axes, bracts, bracteoles and calyces densely covered with short spreading hairs to glabrescent. *Leaves* decussate, with petioles 0.2–15 mm long, blades oblanceolate, obovate, oblong or lanceolate-elliptic, 9.2–24.0 by 2.5–7.3 cm, with 7–12 pairs of lateral veins, membranous to subcoriaceous, drying brownish to blackish brown, apex acute to acuminate, base cordate, rounded or cuneate. *Stipules* with a basal sheath, a triangular lower part and an apical awn, 8–20 mm long. *Inflorescences* terminal, sessile or subsessile (peduncles only to 1 cm long), lax, many-flowered; bracts and bracteoles narrowly triangular to ovate. *Flowers* fragrant. *Calyx* lobes narrowly triangular, 0.8–2 mm long. *Corolla* white to pinkish (rarely reddish), 12–30 mm long, pubescent outside and glabrous inside; lobes lanceolate, acute to acuminate at the apex, 5–8 by 1.3–2.5 mm. *Anthers* exserted, linear, 3.5–8 mm long. *Style* and the 2 short, filiform stigma lobes exserted for 4–8 mm. *Ovary* ellipsoid, to ca. 2 mm long. *Fruit* a (1–)2-seeded drupe crowned by the persistent calyx, globose, 6–10 mm in diam., shiny black when fully mature. Seeds semi-globose, ca. 7–8 by 6–7 mm, reddish brownish, with deep basal groove.

subsp. **brunonis**

I. brevidens Craib, in Kew Bull.: 426. 1932; Fl. Siam. Enum. 2: 150. 1934. Type: Thailand, Prachuap Khiri Khan, Huai Yang, *Put* 3253 (holotyp K!; isotyp BK!).

Leaves (sub)sessile or with petioles up to 10 mm long at the most; leaf blade bases distinctly cordate, blades oblanceolate or obovate.

Distribution.— NORTHERN: Kamphaeng Phet (1 collection only); SOUTH-EASTERN: Kanchanaburi, Phetchaburi, Prachuap Khiri Khan; PENINSULAR: Chumphon, Ranong, Surat Thani, Phangnga, Phuket, Krabi, Nakhon Si Thammarat, Phattalung, Trang, Satun, Songkhla, Narathiwat.

Ecology.— Common in evergreen forest (30–800 m). Flowering: January–September. Fruiting: October–June.

Vernacular.— Ngo (เงาะ) (Satun).

Specimens examined.— *Bunyon* s.n., 21 Apr. 1986, Khao Chong (BKF); *Chantaranothai, Middleton, Parnell, Simpson* 1482, 28 Mar. 1993, Khao Sok (K); *Chamchumroon* 846, 13 Jul. 2000, Krung Ching Falls (BKF); *Chamchumroon* 867, 17 Jul. 2000, Khlong Phanom (BKF); *Chamchumroon* 1031, 8 Feb. 2001, Thung Khai (BKF);

Chermsirivathana 76, 24 May 1960, Ao Luek (BK); *Fukuoka, Santisuk, Na Nakhon* T-36005, 8 Sep. 1984, Boonyapan Falls (BKF); *Geesink, Santisuk* 5329, 11 May 1973, Nai Chong (AAU, C, BKF, K); *Geesink, Hattink, Charoenphol* 7195, 13 Jun. 1974, Khao Chong (AAU, BKF, K); *Geesink, Hiepko, Charoenphol* 7521, 24 Nov. 1974, Khlong Na Kha (BKF); *Hamilton, Congdon* 76, 12 Dec. 1978, 7th Day Adv. Hospital (BKF, PSU); *Haniff, Nur* 2743, 11 Dec. 1917, Khao Pa Bang Kram (K); *Jongboonkird* 245, 18 Dec. 1965, Thung Sol (BK); *Kerr* 13199, 8 Aug. 1927, Ban Kawp Kep (K); *Kerr* 13654, 26 Dec. 1927, Hat Yai (AAU, BK, K); *Kerr* 14199, 20 Jan. 1928, Ko Tarutao (BK, C, K); *Kerr* 14635, 17 Mar. 1928, Ban Tan (BK, K); *Kerr* 15765, 16 Apr. 1915, Khao Sung (K); *Kerr* 15917, 25 Jul. 1968, Sanfala (BK, K); *Kerr* 17672, 22 Dec. 1929, Dan Chumphon (BK); *Kerr* 17708, 23 Dec. 1929, Khao Kaep (BK); *Kerr* 17796, 29 Dec. 1929, Khao Kaep (BK); *Kostermans* 779, 30 May 1946, Kwae Noi (K); *Larsen, Larsen* 33569, 2 May 1974, Phato (AAU); *Larsen, Larsen, Barfod, Nanakorn, Ueachirakan, Sirirugsa* 41111, 4 Nov. 1990, Thale Ban (AAU, BKF, PSU); *Larsen, Larsen, Barfod, Nanakorn, Ueachirakan, Sirirugsa* 41403, 15 Nov. 1990, Lamphura (AAU); *Larsen, Larsen, Renner, Niyomdham, Ueachirakan, Sirirugsa* 42777, 10 Jun. 1992, Chieo Lan dam (AAU); *Larsen, Larsen, Renner, Niyomdham, Ueachirakan, Sirirugsa* 42779, 10 Jun. 1992, Chieo Lan dam (AAU, BKF); *Larsen, Larsen, Niyomdham, Sirirugsa, Tirvengadum, Norgaaard* 43132, 5 Jul. 1992, Wat Tapotharam (AAU); *Larsen, Larsen, Niyomdham, Sirirugsa, Tirvengadum, Norgaard* 43303, 11 Jul. 1992, Khao Phanom Bencha (AAU); *Larsen, Larsen, Niyomdham, Sirirugsa, Tirvengadum, Norgaaard* 43463, 16 Jul. 1992, Aow Nang (AAU); *Larsen, Larsen, Norgaard, Pharsen, Puudjaa, Uerchirakan* 44056, 26 Oct. 1993, Khao Phu Khao Ya (AAU); *Larsen, Larsen, Norgaard, Pharsen, Puudjaa, Uerchirakan* 44081, 27 Oct. 1993, Hat Yai (AAU); *Maknoi* 131, 10 Jan. 1999, Ban Rai Nuea (QBG.); *Maxwell* 73-192, 7 Jul. 1973, Sang Khla (AAU); *Maxwell* 84-122, 23 Aug. 1984, Boripat Falls (BKF, PSU); *Maxwell* 85-352, 2 Apr. 1985, Boripat Falls (PSU); *Maxwell* 85-436, 4 May 1985, Khao Kho Hong (PSU); *Maxwell* 85-504, 18 May 1985, Karom Falls (PSU); *Maxwell* 86-724, 24 Sep. 1986, Khao Pu Khao Ya (PSU); *Mauric* 42, 16 Dec. 1995, Thung Khai (BKF); *Newman, Boonthavikoon, Hemarat, Middleton* 1081, 26 Jun. 2000, Thorthip Falls (BKF); *Parnell, Pendry, Jebb, Boonthavikoon* 95-436, 26 Aug. 1995, Thorthip Fall (K); *Phengnaren* 723, 30 Jun. 1945, Chawang (BKF); *Pooma, Chamchumroon, Phattarahirankanok* 1960, 3 Jun. 2001, Thale Ban (BKF); *Pooma, Chamchumroon, Koonkhunthod, Chantaboon* 3635, 9 May 2002, Khao Phanom Bencha (BKF); *Prachit* 266, 16 Apr. 1963, Hat Yai (AAU, BK); *Puff, Igersheim, Urchirakal* 900911-1/7, 11 Sep. 1990, Khao Chong (BKF); *Puff, Igersheim, Urchirakal* 900911-1/7B, 11 Sep. 1990, Khao Chong (BKF); *Puff, Igersheim, Urchirakal* 900913-1/4, 13 Sep. 1990, Thalae Ban (BKF); *Puff, Sridith* 930713-1/1, 13 Jul. 1993, Karom Falls (PSU); *Put* 2936, 22 May 1930, Khao Banthat (BK); *Put* 3253, 8 Oct. 1930, Haui Yang (K); BKF 35106, 18 May 1967, Khuan Kalong (BKF); *Rabil* 390, 6 Aug 1929, Khao Chong (BK, K); *Ramsri* 97, 14 Sep. 1985, Karom Falls (PSU); *Sangkhachand* 902, 7 Dec. 1952, Buketamol (BKF).

subsp. **kratensis** (Craib) V. Chamchumroon, **stat. nov.**

I. kratensis Craib, Bull. Misc. Inform. Kew 1932: 427. 1932; Fl. Siam. Enum. 2(2): 159. 1934. Type: Thailand, Trat, Bo Rai, *Kerr* 9473 (holotyp K!; isotyp BK!).

Leaves distinctly petiolate, petioles mostly longer than 10 mm; leaf blade bases rounded to cuneate; blades elliptic or oblong.

Distribution.— Endemic to the SOUTH-EASTERN Floristic Region of Thailand (Rayong, Chanthaburi, Trat).

Ecology.— Common in evergreen forest, also in secondary forest (150–900 m). Flowering: August–December. Fruiting: September–January.

Vernacular.— Khem khon (เข็มขน), Nuan paeng (นวลแป้ง) (Southeastern).

Specimens examined.— *Beusekom, Smitinand* 2070, 9 Nov. 1969, Khao Soi Dao (AAU, BKF, C, K); *Bunpheng* 188, 20 Oct. 1946, Khao Saming (BKF); *Chamchumroon, Puff* 1106, 29 Jun. 2001, Khao Soi Dao (BKF); *Chamchumroon, Puff* 1117, 8 Aug. 2000, Khao Soi Dao (BKF); *Charoenphol, Larsen, Warncke* 4956, Koh Chang (AAU, BKF, K); *Fukuoka, Ito* T-34925, 10 Dec. 1983, Phlio falls (BKF); *Iwatsuki, Fukuoka* T-7149, 8 Feb. 1966, Khao Soi Dao (BKF); *Kerr* 9473, 29 Nov. 1924, Ban Rai (K); *Kerr* 17672, 22 Dec. 1929, Dan Chumpon (K); *Kerr* 17708, 23 Dec. 1929, Khao Kuap (K); *Kerr* 17796, 26 Dec. 1929, Khao Kuap (K); *Larsen, Larsen, Norgaard, Pharsen, Puudjaa, Uerchirakan* 44292, 7 Nov. 1993, Khao Sa Bap (AAU); *Put* 446, 18 Aug. 1896, Khao Sa Bap (BKF); *Put* 2936, 22 May 1930, Khao Kuap (K); *Put* 2971, 23 May 1930, Khao Kuap (K); *Nupukdee* 77, 18 May 1898, Khao Sa Bab (BKF); *Paisooksantivatana* Y1513-84, 25 Dec. 1984, Khao Soi Dao (BK); *Put* 446, 18 Aug. 1896, Khao Sa Bab (BKF); *Shimizu, Toyokuni, Koyama, Yahara, Phanichaphol* T-23451, 23 Nov. 1979, Khao Cha Mao (BKF); *Shimizu, Toyokuni, Koyama, Yahara, Phanichaphol,* T-23471, 24 Nov. 1979, Khao Cha Mao (BKF); *Shimizu, Toyokuni, Koyama, Yahara, Phanichaphol,* T-23563, 24 Nov. 1979, Khao Cha Mao (BKF); *Shimizu, Toyokuni, Koyama, Yahara, Phanichaphol* T-23632, 26 Nov. 1979, Khao Soi Dao (BKF); *Sorensen, Larsen, Hansen* 489, 18 Jan. 1958, Khao Sa Bap (C); *Sorensen, Larsen, Hansen* 491, 18 Jan. 1958, Khao Sa Bap (C); *Suvarnakoset* 2211, 9 Nov. 1964, Huai Rang (BKF); *Vesterdal* 2c 1936, Khao Soi Dao (C).

Notes.— As shown previously (*Chamchumroon* & *Puff*, 2003), disjunct distribution ranges between the Peninsular (and South-Western Floristic Region) and the South-Eastern Floristic Region are not uncommon in Rubiaceae (and presumably in many other families). These disjunctions are either known to occur within species, or closely allied species pairs are involved. In the case of the *Ixora brunonis-I. kratensis* complex, the two taxa show considerable, but not complete, character state overlaps and the leaf characters given above usually allow for an unambiguous distinction of two entities. For this reason, it was considered the best solution to reduce *I. kratensis* to a (geographic) subspecies of *I. brunonis.*

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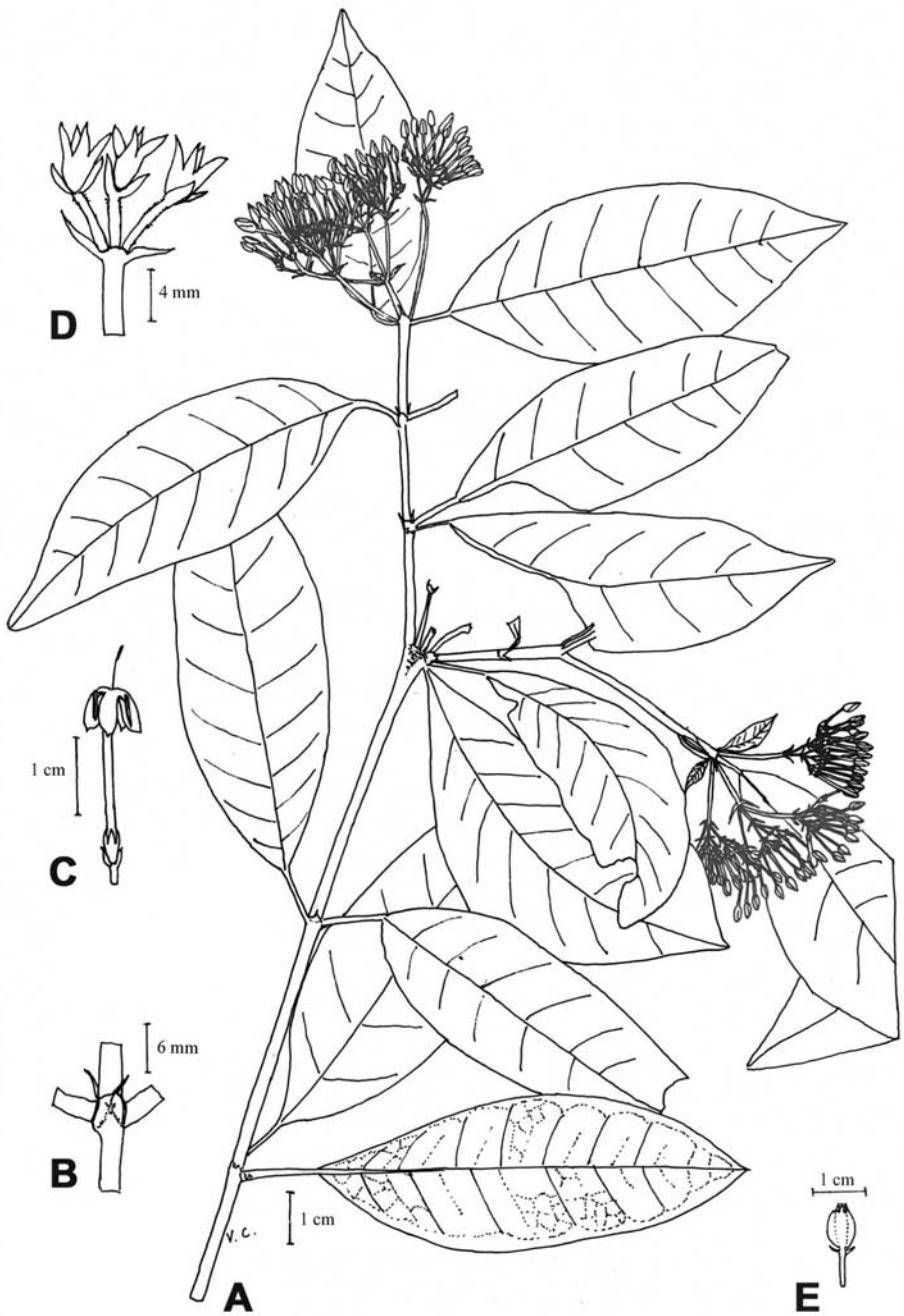

Figure 1. *Ixora phuluangensis* V. Chamchumroon: A. branch with terminal inflorescences; B. stipules; C. flower subtended by paired bracteoles; D. portion of inflorescence (ultimate 3-flowered cyme) subtended by bract pair, each flower (past anthesis; corollas fallen) subtended by paired bracteoles; E. fruit (not fully mature).– A-D. from *Wongprasert s.n.* (BKF), E. from *Chamchumroon* 1245 (BKF).

Figure 2. *Ixora phuluangensis* V. Chamchumroon: A. habit; B. Inflorescences; C. Fruiting branch. Photographed by V. Chamchumroon.