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Kohautia Cham. & Schltdl. (Rubiaceae) – a new genus record for the Flora of Thailand: *K. gracilis* (Wall.) DC. discovered in Kanchanaburi

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ABSTRACT. The genus *Kohautia* (Rubiaceae) is newly recorded for the Flora of Thailand; the species *Kohautia gracilis*, previously only known from Pakistan, Nepal, India, Sri Lanka and Myanmar, has recently been discovered in Kanchanaburi. Notes on the delimitation of the genus and on the main distinctive character for the taxa of the *Oldenlandia–Hedyotis* complex and allies (= Hedyotideae in the old sense; now included in an expanded tribe Spermacoceae) are included.

KEY WORDS: Rubiaceae, *Kohautia*, *Kohautia gracilis*, Flora of Thailand, new genus record.

INTRODUCTION

The genus *Kohautia* was first thought to be Afro-Asiatic, with a distribution range stretching from the African mainland, Socotra and the Arabian Peninsula to Pakistan, Nepal and India (Bremekamp, 1952; Mantell, 1985). Later, a species endemic to Australia was discovered (Halford, 1991). According to Mantell (1985, later followed by Groeninckx et al., 2010), the easternmost limit of the genus' range in continental Asia was thought to be Northeastern India, but they apparently overlooked Hooker's (1880: 68) Myanmar ("Birma") distribution record for *Kohautia* ("*Oldenlandia*") gracilis. A recent collection from Kanchanaburi is not only a new record for Thailand but also marks a further eastward extension of *Kohautia* in continental Asia. The Thai specimens clearly match *Kohautia gracilis*, a taxon hitherto known only from Pakistan, Nepal, India, Sri Lanka and Myanmar.

The Delimitation Of The Genus *Kohautia*

The genus *Kohautia* belongs to the *Oldenlandia –Hedyotis* alliance and has, in the past, often been included in one or the other (*Oldenlandia*: e.g. Hooker, 1880; Hedyotis: e.g. Wight & Arnott, 1834). Whilst working with African *Oldenlandia s.l.*, Bremekamp (1952) discovered that *Kohautia* is a readily distinguishable genus, a view that has not since been disputed. His recognition of two infrageneric taxa (i.e., subgenus *Kohautia* and subgenus *Pachystigma*) was later supported and corroborated by the detailed studies of Mantell (1985) who, based on the morphological differences between the two subgenera, tentatively suggested that they could also be treated as genera. However, she eventually decided decided to maintain a broad definition for the genus *Kohautia*. In a follow up study, heavily relying on molecular data, Groeninckx et al. (2010) formally elevated the two subgenera to generic rank: *Kohautia* subgenus *Kohautia* → *Kohautia* s.str.; *Kohautia* subgenus *Pachystigma* → *Cordylostigma* Groeninckx & Dessein (renamed because a rubiaceous genus *Pachystigma* already exists). The latter does not concern us here; its distribution is confined to Africa and Madagascar.

The Distinctive Character Of *Kohautia*

As noted by Bremekamp (1952) and Mantell (1985), *Kohautia* is distinct from *Oldenlandia s.l.* [the *Oldenlandia–Hedyotis* complex plus allies] by always having monomorphic, short-styled flowers in which anthers and style plus stigmas are always included in the corolla tube. The anthers are inserted in the uppermost, slightly dilated, portion of the tube. The tips of the stigmas may reach the base of the

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anthers, but more commonly they are positioned clearly below them. Recent molecular work suggests that the Hedyotideae in the old sense (hence also the *Oldenlandia–Hedyotis* group and *Kohautia*) should be included in an expanded (yet monophyletic) tribe Spermacoceae (Kårehead et al., 2008; Groeninckx et al., 2009). Luckily, the morphological distinction given above still holds after the transfer of *Kohautia* to the "new" Spermacoceae.

KOHAUTIA

Cham. & Schltdl., Linnaea 4: 156. 1829, nom. cons. — *Hedyotis* sect. *Kohautia* (Cham. & Schltdl.) Wight & Arnott, Prodromus 1: 417. 1834.— *Oldenlandia* subg. *Kohautia* (Cham. & Schltdl.) Benth. & Hook.f., Gen. Pl. 2: 59. 1877.— *Kohautia* (subg. "*Eu-kohautia*") ser. *Noctiflorae* Bremek. in Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Sect. 2, 48: 91. 1952.— "*Kohautia* subg. *Eu-kohautia*" Bremek. in Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Sect. 2, 48: 81. 1952, non rite publ. (Art. 21.3).— Type: *Kohautia senegalensis* Cham. & Schltdl.— *Kohautia* (subg. *Kohautia*) ser. *Diurnae* Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Sect. 2, 48: 81. 1952.— Type: *Kohautia coccinea* Royle.— *Duvaucellia* Bowdich in Bowdich & Bowdich, Exc. Madeira: 259. 1825, nom. rejic. – Type: *Duvaucellia tenuis* S.Bowd.

Annual or perennial herbs, occasionally subshrubs, or more rarely ± dwarf shrubs, sometimes with short (sub)woody subterranean stems or tap-roots; stems mostly erect or ascending, more rarely straggling or decumbent, round to 4-angled in section. *Leaves* sessile and opposite, sometimes seemingly whorled due to leafy short-shoots; blades lanceolate or narrowly elliptic-lanceolate to linear, more rarely filiform or ovate-lanceolate, subacute, acute or rarely subapiculate at the apex, narrowed to the base or rarely ± rounded at the base, mostly 1-nerved, vein mostly prominent below; margins often revolute. *Stipules* with a short membranceous sheath adnate at the leaf-bases, bearing 1 or 2 fimbriae. *Inflorescences* terminal, thyrsic, extensive and panicle-like to occasionally rather few-flowered, sometimes subcapitate or capitate; terminal parts often monochasially branched; subtending bracts leaf-like at lower inflorescence branches, becoming gradually smaller above and eventually reduced to small, inconspicuous, membranaceous triangular rudiments or missing altogether. *Flowers* 4- (rarely 3- or 5-) merous, medium to small, monomorphic, stigmas and anthers always included in the corolla tube, never heterostylous. *Calyx* lobes small, equal or rarely subequal, narrowly triangular, subulate or ovate-lanceolate, sometimes keeled, persistent. *Corolla* hypocrateriform; tube narrowly cylindrical, with dilated barrel-shaped or more rarely narrowly funnel-shaped apical part, entrance to throat and inside of tube glabrous; lobes valvate in bud, broadly elliptic to narrowly linear, completely free or joined for a short distance at the base, subacute to acute or sometimes mucronate or apiculate. *Stamens* always contained in the apical dilated portion of the tube, completely included or only sterile anther connectives emergent; anthers subsessile, dorsifixed. *Style* glabrous, bearing 2 filiform stigmatic lobes; style and stigma always included within the narrow part of the corolla tube, usually held well below the anthers or occasionally just below or touching the anthers. *Ovary* mostly ovoid, ovoid-elliptic to globose, occasionally hemispherical; 2-locular with numerous ovules embedded in a fleshy peltate placenta attached by a short stalk to the middle of the septum. *Capsule* hemispherical, globose, subglobose or ellipsoid, crowned by the persisting calyx lobes, splitting loculicidally at the top, beaked but not conspicuously so. *Seeds* numerous, minute, roundish, angular, or conical to subconical, light to dark brown or black,

A genus of 27 species with the majority of its species in Africa (mostly NE and sub-Saharan), also on the Cape Verde Islands and Socotra, extending to the Arabian Peninsula, Pakistan, Nepal, India, Sri Lanka and Myanmar; one species in Australia. – Subfamily Rubioideae, tribe Spermacoceae (previously Hedyotideae).

Kohautia gracilis (Wall.) DC., Prodr. 4: 430. 1830.— *Hedyotis gracilis* Wall. in Roxburgh, Fl. Ind. 1: 371. 1820.— *Oldenlandia gracilis* (Wall.) Hook.f., Fl. Brit. India 3: 68. 1880; T. Cooke, Fl. Bombay 1: 591. 1903; Duthie, Fl. Gangetic Plain: 415. 1905.— Type: Nepal, without locality, Wallich Cat. 843 (holotype **K-W!**; isotypes **BR**, **E**, **K!**).— *Hedyotis stricta* Wall., Asiat. Res. 13: 369.

1820.— Type: not seen.— *Hedyotis fusca* Buch.-Ham. ex D.Don, Prodr. Fl. Nepal.: 134. 1825.— Type: Nepal, Gorasan, *Hamilton s.n.* (lectotype **BM!**, designated here).— *Hedyotis aspe*ra Bedd., Icon. Pl. Ind. Or.: t. 32. 1869, *nom. illeg.* [*non* Heyne]. Fig. 1.

Annual or perennial strict herbs ca. 20–45 cm tall, with one to several rather slender aerial shoots from a short, subwoody subterranean stem; shoots scabrid to densely minutely papillose, often becoming glabrous towards the apex. *Leaves* narrowly linear to linear-lanceolate or narrowly elliptic-lanceolate, (35–)40–85(–90) by (1.5–)2–5(–6) mm, acute to slightly apiculate at apex, narrowing slightly to the base, scabrid, minutely papillose to subglabrous. *Stipules* with a sheath 1–2 mm long, bearing 1 or 2 fimbriate triangular lobes ca. 1–3 mm long. *Inflorescences* rather few -flowered, strict, erect and ± narrowly cylindrical, mostly only 1 flower per inflorescence node (flower not paired); peduncles and pedicels slender, minutely papillose to subglabrous, mostly separated from each other by tiny bracts, elongating from late bud stage onwards, peduncles 20–80(–120) mm and pedicels ca. 5–35 mm long. *Flowers* 4-merous, with corolla lobes white to creamy-white above; outside of lobes dark pinkish-purplish to brownish-purplish, corolla tubes similarly coloured or greenish-purplish, the widened part often somewhat darker. *Calyx* lobes narrowly triangular to subulate, ca. 1–1.5(–2) mm long, sometimes with short fimbrious elements on either side, at least margins scabrid. *Corolla* lobes linear-oblong to narrowly elliptic 3.5–5(–5.5) by (0.7–)1(–1.5) mm, subacute; tube altogether 7–10(–12) mm long, the upper widened part ca. 2–3 by 1–1.5 mm, the narrow part always < 1 mm in diam. *Stamens* with narrowly linear sessile anthers ca. 2–2.5 mm long, the sterile connective appendages often ± reaching the throat. *Style* 2.5–5 mm long, stigma lobes 2–3.5 mm long. *Ovary* ovoid-elliptic, ca. 1–2(–2.5) by 0.8–1.2(–1.5) mm, slightly scabrid to subglabrous. *Capsules* ovoid-elliptic, (2.5–)3–4 mm wide, often becoming glabrescent. *Seeds* dark brown, angular-subconic, ca. 0.5 mm long.

Thailand.— SOUTH-WESTERN: Kanchanaburi [Thong Pha Phum, Thong Pha Phum-Pilok road, km 3–4 [14° 46′ 13″ N, 98° 36′ 38″ E], 180 m, 17 Dec. 2009, *Pooma, Pattharahirantricin, Thumcharoen, Meeboonya 7444* (**BKF**)].

Distribution.— Pakistan, Nepal (type!), India, Sri Lanka, Myanmar.

Ecology.— Low limestone hills (Thailand). Elsewhere: in open grassland, on open dry rocky slopes, on fringes of coniferous forest; also in seasonally moist areas near streams, growing in sandy and clayey soils; mostly in fire-prone habitats. Altitude: 180 m (Thailand). Elsewhere (65–)250–2000 m. Flowers: December (Thailand). Elsewhere November, January–July.

Notes.— (a) The above description is based on both the only known Thai collection and specimens from throughout the species' distribution range; the character states of the Thai specimens fit well and do not significantly differ.

(b) According to Mantell (1985), *Kohautia gracilis* appears to be most closely related to *Kohautia nagporensis* (Brace ex Haines) Santapau & Merchant, an Indian endemic, previously only known from the mainland but then also discovered on the Nicobar Islands (Mondal & Mahapatra, 1986). The latter has considerably smaller flowers (corolla lobes only to 1.2 mm long, tubes less than 4 mm long) and a lax annual habit with more extensive inflorescences.

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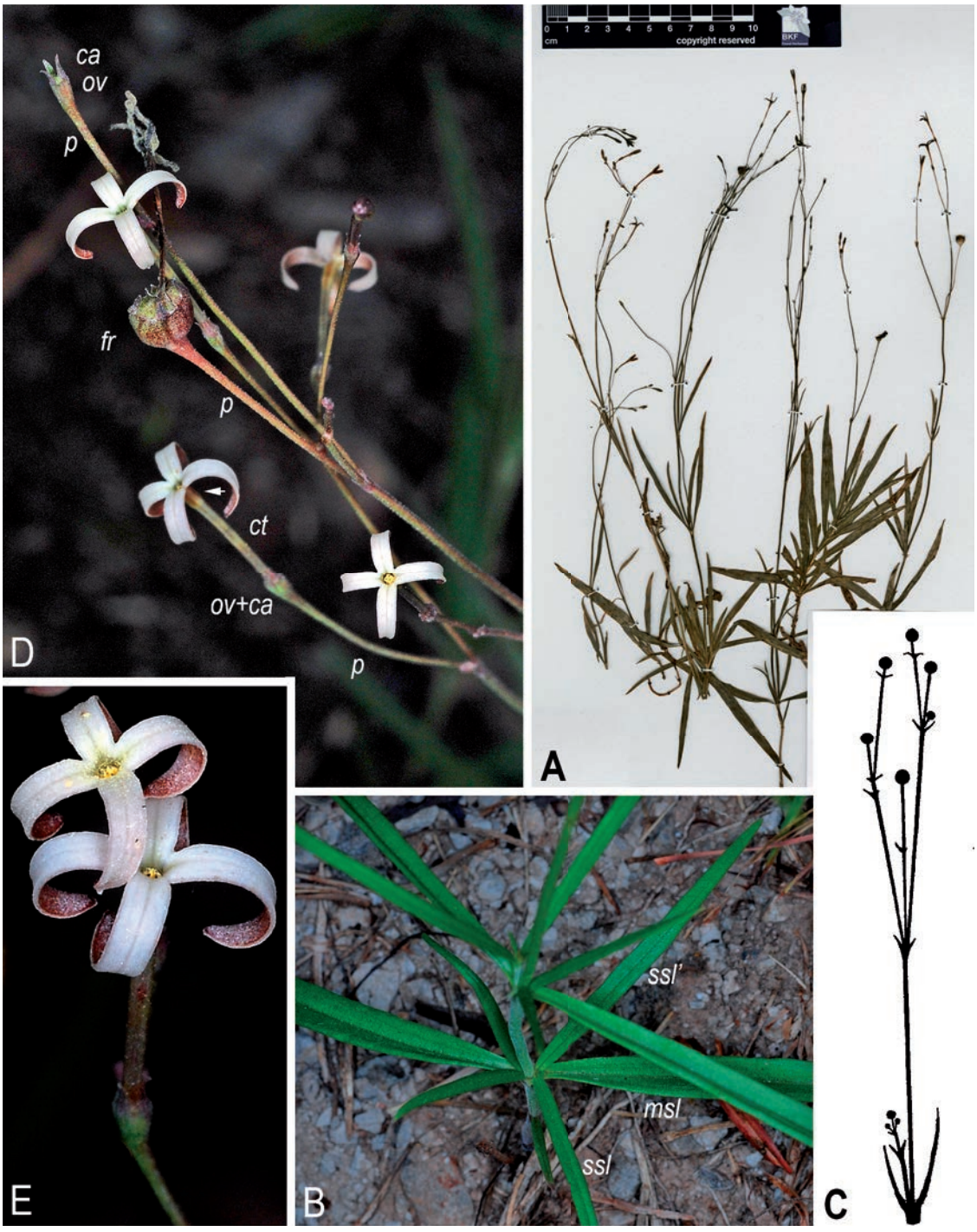

Figure 1. *Kohautia gracilis* (Wall.) DC. (all except C from *Pooma et al. 7444*): A. habit; B. young plant showing seemingly whorled leaf arrangement (msl – main stem leaf; ssl, ssl' – leaf pair of much contracted short shoot); ca. schematic inflorescence structure (from Mantell 1985: Fig. 16); E. portion of inflorescence (p – pedicel; ov – ovary; ca – calyx lobes; ct – corolla tube, arrow points to uppermost, widened part housing the sessile anthers; fr – fruit, with dried up corolla still attached); E. detail of flowers. All photographs by R. Pooma.

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