KNOXIA HOOKERI (RUBIACEAE): A NEW SPECIES FROM INDIA

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Abstract. A new species, *Knoxia hookeri* (Rubiaceae), is proposed here, and a discussion about the invalidity of the three previously published names is presented. A dichotomous key is provided to distinguish the two *Knoxia* species: *K. hookeri* from *K. sumatrensis*. The synonymy of both species is presented with comments on typification.

Keywords: *Knoxia*, *K. hookeriana*, *K. sumatrensis*, Peninsular India, Sri Lanka, Rubiaceae

Knoxia L. (Rubiaceae) is a small genus consisting of ca. nine species confined to the Old World, with about seven species occurring in the Indo-Malayan area and two species in Africa (Mabberley, 2017). In India, *Knoxia* is represented by two species, one subspecies, and four varieties (Bhattacharjee and Deb, 1985).

Bhattacharjee and Deb (1985) proposed "Knoxia sumatrensis var. hookeriana" as a "*stat. et nom. nov.*" for what were previously known as "K. mollis sensu Hook. f., Fl. Brit. India 3 (1880) 129, *non* R. Br. ex Wight & Arn., Prodr. Fl. Ind. Orient. (1834) 439," "K. corymbosa sensu Thwaites, Enum. Pl. Zeyl. (1864) 151 *non* Willd., Sp. Pl. (1798) 587," and "K. teres *auct. non* (Roxb.) DC.: Hook., f. F.B.I. 3 (1880) 129." The two cited specific references ("K. mollis sensu Hook. f., Fl. Brit. India 3 [1880] 129" and "K. corymbosa sensu Thwaites, Enum. Pl. Zeyl. [1864] 151") did not have Latin descriptions or diagnoses.

The varietal taxon proposed by Bhattacharjee and Deb (1985) differs from *Knoxia sumatrensis* (Retz.) DC. var. *sumatrensis* in having shorter and ovate-elliptical, shortly petiolate to subsessile leaves with length/width (l/w) ratio 1.5–2.5:1, congested corymbose inflorescence and more or less globose, subterete and smaller, dark and blackish-brown fruits with mericarps usually remaining unsplit and falling off from the pedicel carrying the columella inside. Since Bhattacharjee and Deb (1985) believed that their varietal name "Knoxia sumatrensis var. hookeriana" was a replacement name at a new rank, they did not provide a Latin diagnosis or description and did not cite a type. These authors, however, did not realize that they inadvertently proposed the name of a new varietal taxon previously known under a misapplied name, that a Latin diagnosis or description and a type citation were needed for a valid publication, and that their intended varietal name was not validly published (Art. 41.7 Note 3, Ex. 23; Turland et al., 2018).

Unaware of the invalidity of "Knoxia sumatrensis var. hookeriana," Prasad and Lakshminarasimhan (in Mudaliar & Prasad, 2001) proposed "Knoxia mollis var. hookeriana" as a "new combination"; later, Subba Rao and Kumari (2003) perpetuated the error in proposing "Knoxia hookeriana" as a *comb. & stat. nov.* Neither of these two combinations was accompanied by a Latin description and type citation. Since the cited basionym "K. sumatrensis var. hookeriana" was not validly published, the two new combinations proposed in 2001 and 2003 were also not validly published.

The current study of the *Knoxia sumatrensis* complex supports the recognition of variety *hookeriana* as a distinct taxon at the rank of species. Accordingly, *K. hookeri* is proposed here as a new species: a description is provided in English, and a holotype is cited. A dichotomous key is provided to distinguish two *Knoxia* species: *K. hookeri* from *K. sumatrensis*. It is noted here that Almeida (2001) did not mention the new taxon at any rank.

Knoxia hookeri Lakshmin., *sp. nov.*
TYPE: INDIA. Tamil Nadu, Pulney mountains, July 1836, *R. Wight 1506* (Holotype: K [K000031543], image)]. Fig. 1.

Erect or straggling *herbs* up to 90 cm high, variable; *stems and branches* obscurely 4-angled, pubescent villous or tomentose. *Leaves* ovate-lanceolate, up to 12.5 × 4 cm, rounded at base, entire at margins, mostly acute at apex, pubescent to villous on both sides, ciliate, brown when dry, with often rufous hairs; petioles up to 1.2 cm long, pubescent; stipules with bristles. *Cymes* with short spreading branches, terminal, forming umbels; *peduncles* up to 2.7 cm long, villous. *Flowers* crowded, ca. 3 mm long, bluish, foetid; *pedicels* up to 3 mm long, villous; *bracts* up to 2 mm long, deltoid, long acuminate, hairy. *Calyx* up to 2 mm long; *tube* hirsute outside; lobes 4, deltoid, up to 1 mm long, acute, pubescent on both sides, ciliate. *Corolla* white, up to 3 mm long; tube up to 1.5 mm long; lobes deltoid, as long as corolla tube, obtuse. *Stamens* 4; filaments up to 1.5 mm long; anthers up to 1.5 mm long. *Ovary* up to 1 mm long; 2-celled; style filiform, up to 1 mm long; stigma bilobed. *Fruits* crowded, smooth, terete, ellipsoid, ca. 2 mm long, glabrous, black when dry, crowned with rounded calyx teeth; *mericarps* connate and adnate to columella.

Distribution: India [Tamil Nadu, Kerala, Karnataka, Maharashtra, Andhra Pradesh], Sri Lanka, Indonesia.

Key to *Knoxia hookeri* and *K. sumatrensis*

1a. Leaves ovate-lanceolate; corolla hirsute without; fruit ovoid to ovoid-ellipsoid, subterete . . . . . *K. hookeri*
1b. Leaves lanceolate to linear-lanceolate; corolla glabrous without; fruit oblong-ellipsoid, quadrangular . . . . . *K. sumatrensis*

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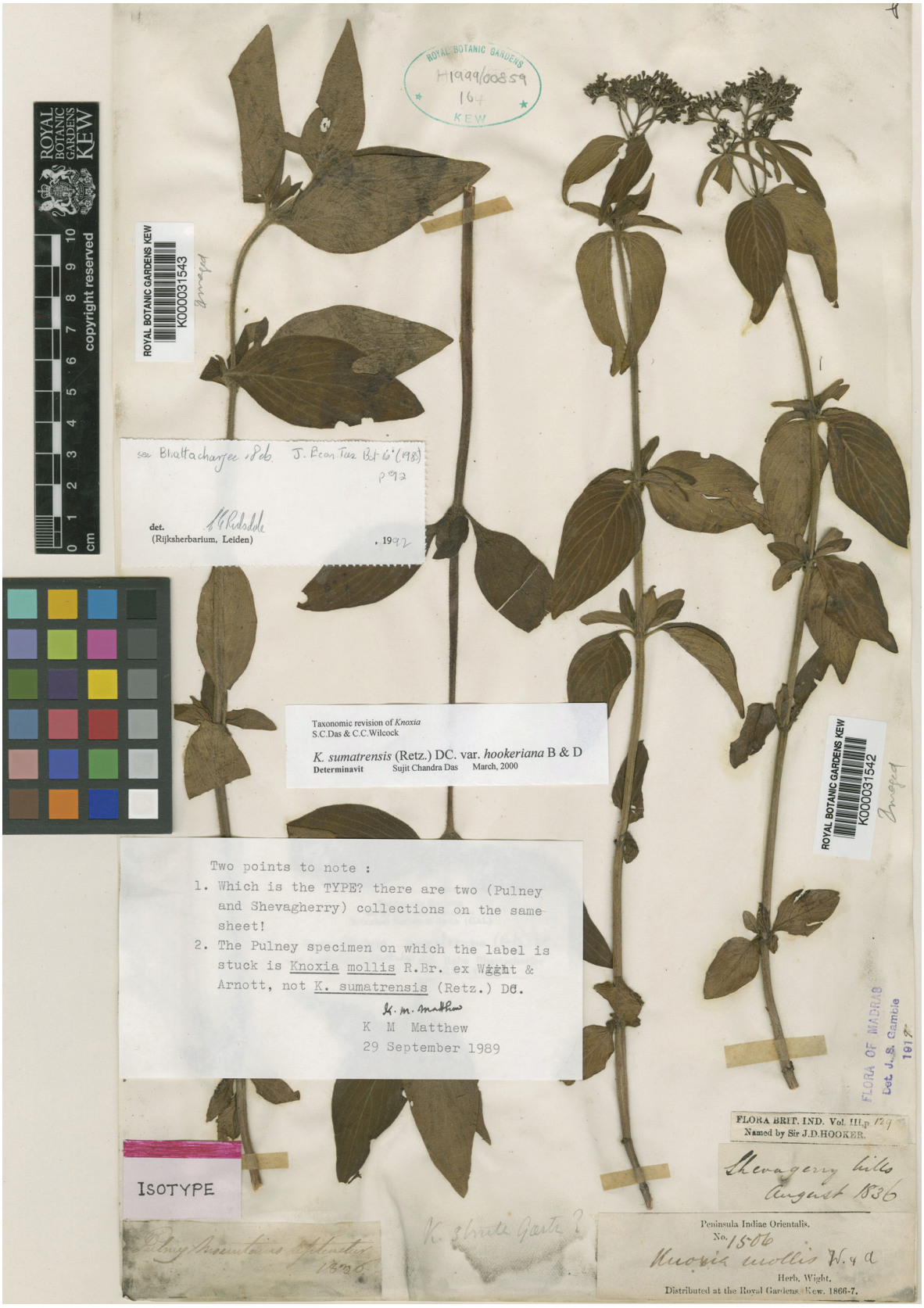

FIGURE 1. Holotype of *Knoxia hookeri* Lakshmin. (K). © by the Board of Trustees of the Royal Botanic Gardens, Kew. Reproduced with permission.

Knoxia hookeri Lakshmin.

Synonyms: "Knoxia hookeriana" Subba Rao & Kumari in P.S.N. Rao (Ed.), Fl. Visakhapatnam Distr. (Andhra Pradesh) 1: 404. 2003, *nom. inval*.

"Knoxia sumatrensis (Retz.) DC. var. hookeriana" R. Bhattacharjee & Deb, J. Econ. Taxon. Bot. 6(1): 92. 1985, *nom. inval*.

"Knoxia mollis R.Br. var. hookeriana" V.P. Prasad & Lakshmin. in N.P. Singh & al., Fl. Maharashtra State, Dicot. 2: 142. 2001, *nom. inval*.

Knoxia sumatrensis (Retz.) DC., Prodr. 4: 569. 1830.

Basionym: *Spermacoce sumatrensis* Retz., Observ. Bot. 4: 23. 1786. TYPE: INDONESIA. "In Sumatra lectam dedit Cel. Wennerberg," *s.d.*, *H.P. Wennerberg s.n.* (Lectotype [likely designated by Bhattacharjee and Deb, 1985: 89]: (LUND).

Although one may interpret Retzius's citation of Wennerberg's single collection from Sumatra as an indication of type (cf., Arts. 40.1, 40.3), it is emphasized here that the preceding two articles pertain to names published during 1953–1989, that Retzius did not cite or indicate a holotype, and that it is impossible to be certain that he used only a single specimen for his description. Therefore, what has been commonly cited as holotype (*H.P. Wennerberg s.n.*: LUND) is construed here as the lectotype (see Shenzhen Code; Turland et al., 1918: xvi).

Synonyms: *Cuncea trifida* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 135. 1825. TYPE: NEPAL ["Hab. in Nepalia. Hamilton"]. Lectotype (likely designated by Bhattacharjee and Deb, 1985: 89): s.d., *F. Buchanan–Hamilton s.n.* (CAL 0000025266; isolectotype CAL 0000025267).

David Don did not cite a holotype or the herbarium housing the type collection; he also did not mention or indicate the number of specimens he used for the description. Therefore, a lectotype designation is required and was likely designated by Bhattacharjee and Deb (1985: 89).

Synonyms: *Knoxia corymbosa* Willd., Sp. Pl. 1: 582. 1798. TYPE: INDIA. ["Habitat prope Velore in India orientali. (v.s.)"]. Tamil Nadu, Vellore 1797, *J.G. Klein 139* (W [BW02677010] image; Curators Herbarium B, 2017).

Willdenow's citation "Habitat prope Velore in India orientali. (v.s.)" pertains to a single specimen at B-W, and it is construed here as the holotype. Willdenow cited "*Knoxia stricta* Gaert. Sem. 1. p. 122. t. 25. f. 8 [1788]?" as a synonym. Since the preceding synonym was cited with an expression of doubt, it does not cause superfluity and illegitimacy (see Art. 52, Note 1).

Knoxia mollis R.Br. in N. Wallich, Numer. List n. 820. 1829. TYPE: INDIA, ANDHRA PRADESH ["A native of moist places amongst the Circar mountains. Flowers during the rainy season"]. Lectotype (designated here): "Spermacoce sumatrensis Linn.," watercolour drawing on paper. Roxburgh number "536" (CAL; Isolectotype: K). Fig. 2.

The protologue of n. 820 (*Knoxia mollis*) is ascribed to Brown and includes a reference to a description ("Spermacoce sumatrensis" sensu Roxb., Fl. Ind. 1: 372. 1820, non Retz. 1786). Since the name *K. mollis* was validly published solely by reference to a previously and effectively published description of Roxburgh, and since Brown did not definitely designate the Wallich Cat. no. 820 as the type, the species name should be typified by an element selected from the entire context of the validating description (Art. 7.8).

Roxburgh (1820: 372), in his treatment of *Spermacoce sumatrensis* Retz., did not cite any collection, but cited the locality and phenology as "[a] native of moist places amongst the Circar mountains. Flowers during the rainy season." A dried specimen collected by Roxburgh from the Circar Mountains has not been located. Alternatively, I looked for any uncited original material used by Roxburgh. According to notes by Clarke (1874), Roxburgh "left at the Calcutta Botanic Garden a set of life-sized coloured drawings, with botanical dissections, of plants 2,542 in number, among which nearly all the Indian species described in his *Flora Indica* are depicted. By these (of which a duplicate set is preserved in the India House, Westminster) the species in the *Flora Indica* may be verified." Among the Roxburgh's icons housed at CAL and also at K (Royal Botanic Gardens, 2006), the Roxburgh number 536 pertains to "Spermacoce sumatrensis sensu Roxb." and agrees with the protologue. Hence, following the Art. 9.12 of the International Code of Nomenclature for Algae, Fungi and Plants (Turland et al. 2018), I have chosen the illustration as the lectotype of *Knoxia mollis*.

In the above regard, Roxburgh's watercolor illustration, housed at CAL, is chosen here as the lectotype, and Kew's icon becomes the isolectotype.

Knoxia stricta Gaertn., Fruct. Semi. Pl. 1: 122, t. 25, fig. 8. 1788. TYPE: SRI LANKA [without precise locality] ["Ex herbario Banksiano. Habitat in Ceylona, undemissa a Koenigio" s.d.]. *J. Koenig* s.n. (TUB? *n.v*).

Gaertner's types are at TUB (vide TL-2, 1: 902; Stafleu and Cowan, 1976); he mentioned that he saw specimen(s) from Banks Herbarium (BM-Banks). It is uncertain whether Gaertner's description was based on a single or two+ specimens. Whatever specimen(s) Gaertner used are likely to be found at TUB; its duplicate(s) may be found elsewhere, for example, BM.

Spermacoce corymbosa Roth in Roemer & Schultes, Syst. Veg., ed. 15 bis. 3: 278. 1818 (non L., 1762) [*Spermacoce corymbosa* Roth, Nov. Gen. Sp. 98. 1821, isonym]; *Knoxia heyneana* DC., Prodr. 4: 570. 1830. TYPE: INDIA [without precise locality] ["*In India. orientali. Benj. Heyne*" s.d.]. *B. Heyne s.n.* (B or B-WILLD; *n.v.*).

Roth's types are at B and B-WILLD (vide TL-2, 4: 916; Stafleu and Cowan, 1983). It is uncertain whether Roth's description was based on a single or two+ specimens. Bhattacharjee and Deb (1985: 90) treated *Knoxia heyneana* as a new species and cited a type. It is emphasized here that de Candolle (1830) proposed *K. heyneana* as a replacement name for *Spermacoce corymbosa* Roth (non L. 1762).

Spermacoce exserta Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 374. 1820. TYPE: INDIA. Andhra Pradesh ["A native of the Circars, where it blossoms in October and November"]. A lectotype designation is needed. Unfortunately, no original material exists at the CAL.

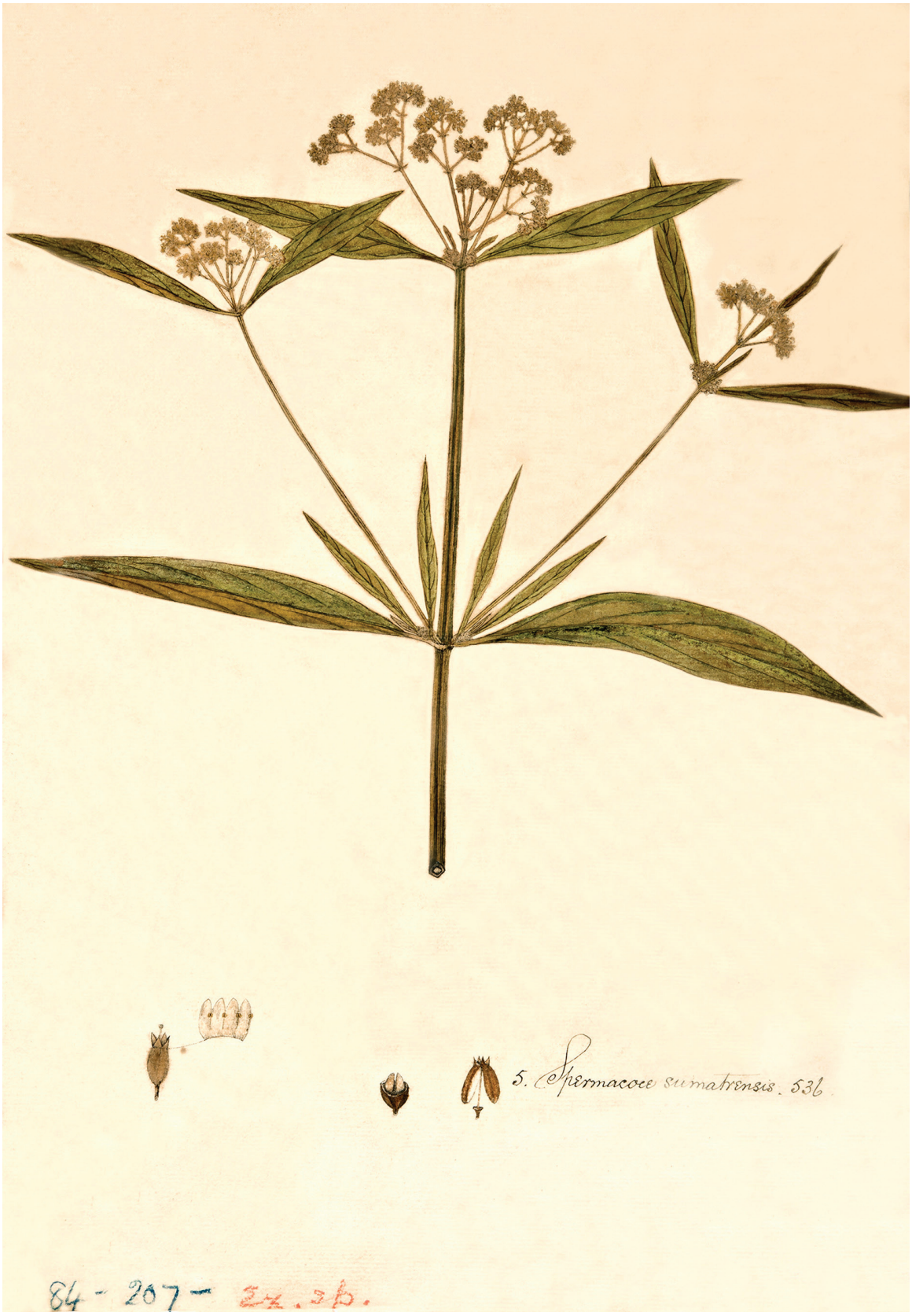

FIGURE 2. Lectotype of *Spermacoce sumatrensis* L. (Roxburgh No. 536—CAL). © by the Director, Botanical Survey of India, Kolkata.

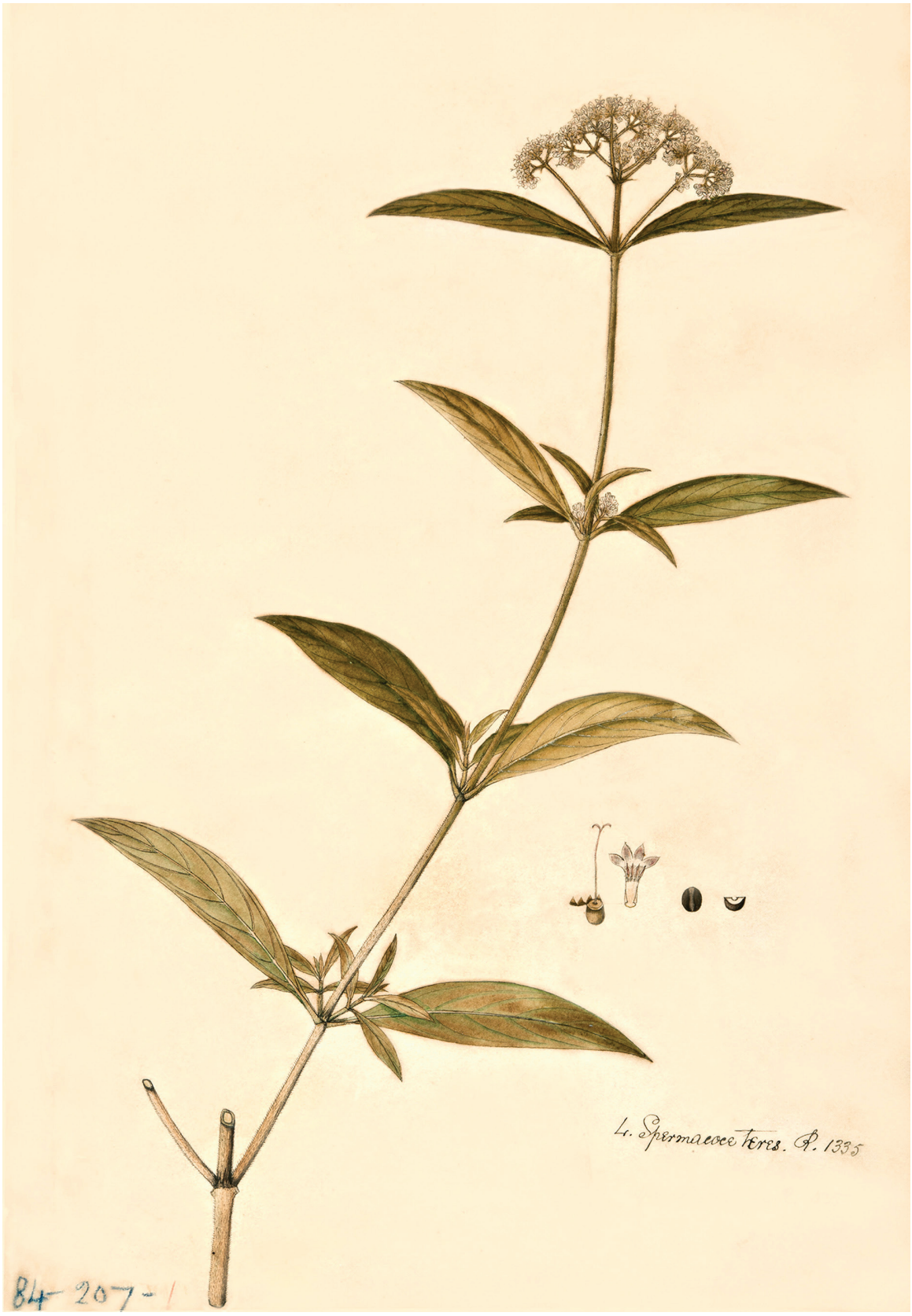

FIGURE 3. Lectotype of *Spermacoce teres* Roxb. (Roxburgh No. 1335—CAL). © by the Director, Botanical Survey of India, Kolkata.

For his *Spermacoce exserta*, Roxburgh did not cite any collection but cited the locality and phenology.

Spermacoce teres Roxb., Fl. Ind. (Carey & Wallich ed.) 1: 373. 1820. *Knoxia teres* (Roxb.) R.Br. in N. Wallich, Numer. List n. 819. 1829 [*Knoxia teres* (Roxb.) DC., Prodr. 4: 569. 1830, isonym] TYPE: INDIA. Coorg District, Karnataka ["Knoxia umbellata, Banks. Herb." "Found by Dr. Buchanan in the woods of Koorg, from whence he sent the seed to the Botanic Garden, where the plants thrive well, and blossom during the rainy season"]. Lectotype (designated here): Watercolor drawing on paper, Roxburgh number "1335" (CAL; Isolectotype: K). Fig. 3.

From Roxburgh's citation ("Found by Dr. Buchanan in the woods of Koorg, from whence he sent the seed to the Botanic Garden, where the plants thrive well, and blossom during the rainy season"), it is evident that his description was based on plants grown at the Calcutta Botanical Garden and that his collection should be chosen as the lectotype. In this regard, it is noted here that Wallich (1829: no. 819g) also referred to "*Spermacoce teres* Hb. Roxb." However, no original material collected by Roxburgh from the Calcutta Botanical Garden has been located at the CAL. Therefore, his watercolor illustration housed at CAL is chosen here as the lectotype, and the Kew icon becomes the isolectotype (see the type remarks sub *Knoxia mollis*).

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