

NOTES RELATING TO THE FLORA OF BHUTAN: XI Euphorbiaceae

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ABSTRACT. Revision of Euphorbiaceae of Bhutan and Sikkim has revealed the following new taxa and combinations: *Euphorbia luteo-viridis* Long, *sp. nov.* from Nepal, Sikkim and SE Tibet; *Euphorbia griffithii* Hook. f. var. *bhutanica* (Fischer) Long, *comb. et stat. nov.*; *Flueggea virosa* (Willd.) Voigt subsp. *himalaica* Long, *subsp. nov.* from Nepal, Sikkim, Bhutan, Assam and Burma; *Glochidion bhutanicum* Long, *sp. nov.* from Bhutan; *Croton himalaicus* Long, *sp. nov.* from East Nepal, Darjeeling district and Assam, and *Baliospermum densiflorum* Long, *sp. nov.* from Bhutan, Burma and Yunnan.

EUPHORBIA

***Euphorbia luteo-viridis* Long, *sp. nov.* Fig. 1B.**

Syn.: *E. himalayensis* sensu Flora Brit. India non (Klotzsch) Boissier.

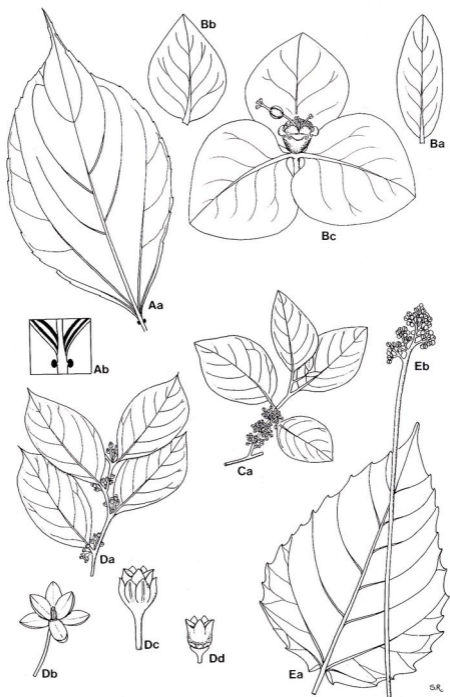
Ab *E. wallichii* Hook. f. *statura minora*, caulibus 17-35(-50) cm altis, foliis caulinis ovatis vel ovato-ellipticis 2.3-4.2 × 1.2-2.4 cm, bracteis minoribus 1.0-1.5 × 0.9-1.4 cm, cyathiis minoribus 4-5 mm diametro, glandulis 5 minoribus 1.7-2.4 mm latis et stylis brevioribus 2.2-2.7 mm longis differt.

Perennial herb with erect stems 17-35(-50) cm arising from stout woody rootstock, stems branched in upper half; young shoots densely whitish appressed crispate-pubescent. Stem leaves alternate, ovate or ovate-elliptic, 2.3-4.2 × 1.2-2.4 cm, obtuse or subacute, sessile with rounded or subcordate base. Uppermost leaves 3-5 in a whorl, ovate or obovate, 1.8-2.7 × 1.2-2.0 cm, acute. Umbel of 3-5 crispate-pubescent rays 1-3 cm. Bracts 3 subtending each cyathium, yellow-green, broadly ovate or suborbicular, 1.0-1.5 × 0.9-1.4 cm, obtuse or subacute. Cyathia campanulate 2.5-3 × 4-5 mm, with 5 rounded, denticulate yellow-green lobes, densely white-hirsute within, alternating with 5 dark green fleshy reflexed reniform marginal glands 1.2-2.0 × 1.7-2.4 mm. Ovary trigonous-globose, 1.8-2.1 mm tall, glabrous, smooth; styles 2.2-2.7 mm, united in lower half, branches spreading to recurved, slender, not divided but each with minutely bilobed stigma. Capsules c. 5 × 6 mm.

C NEPAL: Dakcho, 3350-3650 m, 1930, *Dhwoj* 13 (E, BM); Trisuli Valley, Mailung Khola, 3595 m, v 1962, *Bowes Lyon* 138 (E, BM); Bhanjyang, N of Kathmandu, 2800 m, vi 1973, *Grey-Wilson & Phillips* 146 (BM).

E NEPAL: Arun Valley, Kasuwa Khola, N of Num, 27°35'N, 87°17'E, 3800 m, vi 1956, *Stainton* 530 (E, BM); Arun Valley, Maghang Khola, E of Num, 27°33'N, 87°19'E, 3960 m, v 1956, *Stainton* 595 (E, BM); Lamche Danda, 27°26'N, 86°27'E, 3100 m, vi 1970, *Dobremez* 252 (BM).

SIKKIM: Kapup, 3960 m, 'Yellow flowers, tuberous root', 5 vii 1913, *Cooper* 160 (*holo.* E); Dolumbo, 3800 m, x 1875, *Clarke* 25584 (K); Gnatong, 3960 m, x 1913, *Cooper* 995 (E, BM); Phallut, 3350 m, v 1930, *Cave* s.n. (E); Tari, 3960 m, vii 1913, *Rohmoo* 790 (E); Sincaroon to Faheloungma, 3350-3650 m, v 1881, *Watt* 5205 (E, K); Chiyabanjan to Phalut, 3500-3600 m, vi 1960, *Hara et al.* 3007 (K), 3010 (BM); without locality, 1888,



King's Collector s.n. (E); Lachen, 3050–3350 m, viii 1849, *Hooker* (K, as '*Euphorbia* 26'); Phalut, 3350 m, v 1913, *Lacaita* s.n. (BM); Lachen, 3050 m, v 1885, *Pantling* 46580 (K).

W BENGAL, DARJEELING DISTRICT: Sundukphoo, 3350 m, x 1876, *Clarke* 31673 (K).

SE TIBET: between Tripe and Gyala, Tsangpo Valley, 2835 m, iv 1947, *Ludlow, Sherriff & Elliot* 13542 (K); Shoka, Tsangpo Valley, 29°14'N, 94°10'E, 2985 m, v 1938, *Ludlow, Sherriff & Taylor* 4553 (K).

The plant described here as *Euphorbia luteo-viridis* occurs in the E Himalaya from central Nepal to Sikkim and in SE Tibet; in herbaria and the literature it has been misidentified in the past mostly as *E. himalayensis* (Klotzsch) Boissier and occasionally as *E. wallichii* Hook.f. Study of Himalayan material of this complex has shown that the name *E. himalayensis* has been misapplied, and that there are three, not two, species involved.

Tithymalus himalayensis was first described and illustrated by Klotzsch in Klotzsch & Garcke (1862) based on a collection made by Hoffmeister labelled 'Himalaya'. According to Burkill (1965) Hoffmeister visited both Kathmandu in Nepal, and the NW Himalaya in India, and the precise origin of the plant remains unknown. Boissier in the same year transferred the species to *Euphorbia* and equated with it a plant from Lachen, Sikkim, collected by J. D. Hooker, explaining the differences between Hoffmeister's and Hooker's plants as due to maturity.

Hooker (1887–8) followed Boissier's concept, but based his description of *E. himalayensis* on the Sikkim collection, and also expressed his doubts about the identity of the two collections: 'Klotzsch's figure of *E. himalayensis* represents a miserable specimen of a *Euphorbia* without fruit, which it is impossible to identify'. Since that time the name *E. himalayensis* has been applied in Hooker's sense.

In fact, Klotzsch's illustration shows considerable detail, and his plant differs in several significant respects from the Sikkim populations named *E. himalayensis*; these differences can scarcely be ascribed to maturity, e.g. the Sikkim plant has much larger ovate to ovate-elliptic leaves, fewer umbel rays and only 3 much larger floral bracts.

However, a number of other *Euphorbia* specimens collected since Hooker's time in Nepal, Chumbi and Bhutan, agree remarkably closely with Klotzsch's illustration in habit, leaf shape and size, number of umbel rays and in size and shape of the floral bracts. The conclusion is therefore drawn that these collections (cited below) belong to the true *Euphorbia himalayensis* and that *E. himalayensis* sensu Hooker represents a previously undescribed species, *E. luteo-viridis* Long.

FIG. 1. A. *Croton himalaicus* Long. Aa, leaf; Ab, apex of petiole showing stalked glands (from Haines 828). B. *Euphorbia luteo-viridis* Long. Ba, stem leaf; Bb, uppermost (whorl) leaf; Bc, cyathium with subtending bracts (from Cooper 995). C. *Flueggea virosa* (Willd.) Voigt subsp. *himalaica* Long. Ca, branch with leaves and male flower clusters (from Grierson & Long 2438). D. *Glochidion bhutanicum* Long. Da, branch with leaves and axillary flower clusters; Db, male flower; Dc, female flower; Dd, ovary (from Grierson & Long 2231). E. *Baliospermum densiflorum* Long. Ea, leaf; Eb, male peduncle and panicle (from Grierson & Long 2017). All $\times 0.5$ except Ab $\times 1.5$, Db, Dc, Dd $\times 5$. Drawn by S. J. Rae.

TABLE 1
Differences between *Euphorbia wallichii*, *E. luteo-viridis* and *E. himalayensis*

	<i>E. wallichii</i>	<i>E. luteo-viridis</i>	<i>E. himalayensis</i>
Plant height	25-70 cm	17-35(-50) cm	13-35(-60) cm
Indumentum of upper stems and rays	sparsely to densely ± spreading pubescent	densely appressed crispate-pubescent	finely appressed crispate-pubescent
Stem leaves			
: shape	ovate-lanceolate to elliptic	ovate to ovate-elliptic	oblong to oblong-lanceolate
: size	7-11 × 1.5-3 cm	2.3-4.2 × 1.2-2.4 cm	2-4 × 0.5-0.9 (-1.3) cm
Upper (whorl) leaves			
: shape	narrowly ovate	ovate or obovate	ovate-lanceolate
: size	5-6 × 2-2.5 cm	1.8-2.7 × 1.2-2.0 cm	1-2 × 0.5-0.9 cm
Umbel rays			
: no.	4-5(-6)	3-5	6-10
: length	0.8-2.5 cm	1-3 cm	2-4.5 cm
Bracts			
: no.	3	3	3-4
: shape	ovate to broadly ovate	broadly ovate to suborbicular	broadly ovate to suborbicular
: size	1.8-2.6 × 1.2-2.2 cm	1.0-1.5 × 0.9-1.4 cm	0.8-1.2 × 0.5-0.9 cm
Cyathia			
: cup size	5-6 × 8-10 mm	2.5-3 × 4-5 mm	2.5-3 × 4-5 mm
: gland no.	4	5	5
: gland size	2-2.1 × 3.4-3.8 mm	1.2-2 × 1.7-2.4 mm	0.9-1.0 × 1.8-2.0 mm
Style: length	3.2-4.4 mm	2.2-2.7 mm	1.6-2.0 mm
Ovary: length	2.7-3.2 mm	1.8-2.1 mm	2-3 mm
Fruit: size	n.v.	5 × 6 mm	5 × 6 mm

The differences between *E. luteo-viridis* and its relatives *E. himalayensis* and *E. wallichii* are summarized in Table 1. The closer relative appears to be *E. wallichii*, which has been illustrated and described in detail by Smith (1964). The most important differences are in plant stature, size and shape of leaves, indumentum type and especially in the cyathia which are consistently much larger in *E. wallichii*, and bear only 4 marginal glands in that species, whilst in *E. luteo-viridis* the cyathia have 5 marginal glands; the ovary and styles show corresponding size differences.

E. himalayensis differs strikingly from both these species in its narrow, oblong or oblong-lanceolate stem leaves, more numerous and longer umbel rays and shorter styles.

The three species display different distribution patterns—*E. wallichii* showing a 'NW Himalayan distribution' from E Afghanistan and NW Pakistan to C Nepal; *E. luteo-viridis* showing an 'E Himalayan distribution' from C Nepal to SE Tibet and *E. himalayensis* overlapping these two, from W Nepal to Bhutan.

Euphorbia himalayensis (Klotzsch) Boissier in DC. Prodrum 15(2):113 (1862).

Basionym: *Tithymalus himalayensis* Klotzsch in Klotzsch & Garcke, Bot. Reise Pr. Waldem. 115, t. 20 (1862). Type: Himalaya, Hoffmeister s.n. (n.v.).

W NEPAL: Sialgarhi, Chaudhabise Khola, 29°18'N, 82°22'E, 3050 m, v 1952, *Polunin, Sykes & Williams* 2070 (E, BM); near Jarakot, Bheri River, 28°38'N, 82°09'E, 3350 m, vii 1952, *Polunin et al.* 2396 (E, BM); between Chankhali Lagna and Darma, 29°40'N, 82°07'E, 2130–2440 m, v 1952, *Polunin et al.* 4133 (E, BM); Tarakot, 3700 m, vi 1973, *Einarsson, Skärby & Wetterhall* 1424 (BM).

TIBET, CHUMBI: without locality, vii 1913, *Cooper* 254 (E).

BHUTAN: Phajudin [Pajoding, Thimphu District, 27°29'N, 89°34'E], 3050 m, viii 1914, *Cooper* 2546 (E), 2686 (E, BM); Thimphu district, hillside SE of Pajoding, Thimphu, 27°29'N, 89°35'E, 3400 m, vii 1979, *Grierson & Long* 2747 (E, A, K, TI); Pajoding, Thimphu, 3700 m, v 1984, *Bartholomew & Tse* 1704 (E); Cheka, Paro [Thimphu district], 3350 m, v 1966, *Bowes Lyon* 3090 (BM); Ha [Ha district], 2740 m, vii 1938, *Gould* 1048 (K); Damthang [Ha district], 3050 m, vi 1933, *Ludlow & Sherriff* 55 (BM); Dama Thang [Ha district], 2928 m, vi 1971, *Bedi* 167 (K); below Kale La [Ha district], 4023 m, vi 1971, *Bedi* 325 (K).

The collections of *E. himalayensis* from Nepal match Klotzsch's illustration very closely; the populations from Chumbi and Bhutan differ from them in consistently having 3 instead of 4 floral bracts subtending each cyathium. Further collections are desirable to assess the significance of this.

Euphorbia griffithii Hook. f., Flora Brit. India 5:259 (1887) var. **bhutanica** (Fischer) Long, **comb. et stat. nov.**

Basionym: *E. sikkimensis* Boissier subsp. *bhutanica* Fischer, Kew Bull. 1940:159 (1940). Type: Bhutan, Thimphu District, Chang-Na-Na to Paro, 2925–2360 m, 22 v 1938, *Gould* 128 (holo. K).

The type specimen of subsp. *bhutanica* at Kew shows the bright red bracts characteristic of *Euphorbia griffithii*; in *E. sikkimensis* they are yellow-green. Var. *bhutanica* differs from typical *E. griffithii* in being whitish-hairy throughout; the latter, common in western Bhutan, is glabrous except for the characteristic tufts of whitish hairs below the petiole bases. Until further collections are available, varietal rank is most appropriate.

FLUEGGEA

Flueggea virosa (Willd.) Voigt, Hort. Suburb. Calcutt., 152 (1845) subsp. **himalaica** Long, **subsp. nov.** Fig. 1c.

A subsp. *virosa* foliis ovatis, apice acutis vel obtuse acuminatis, petiolis longioribus 4–10 mm et floribus masculis saepe numerosioribus 15–40 in fasciculis differt.

Evergreen shrub 2–3 m. Leaves membranous, alternate, ovate, 3–10 × 1.5–5 cm, acute or bluntly acuminate, base cuneate, margins entire, glabrous; petioles 4–10 mm; stipules triangular c. 1.5 mm. Dioecious. Male flowers 15–40 in dense clusters in axils mostly of fallen leaves, pedicels

filiform 2–5 mm, sepals 5, obovate, 1 mm, dentate, petals absent, stamens 5, free, exerted, disc-glands and pistillode present, sterile styles simple, exerted. Female flowers 3–6 in axillary clusters, sepals as in males, ovary globose, styles 3 united at base into short column, free part of styles spreading and often appressed to ovary, each bifid with subulate \pm parallel lobes. Fruit globose, firm and green when young, becoming white and fleshy, 5–6 mm diam., 5–8-seeded.

W NEPAL: Darroli, vi 1929, *Bis Ram* 569 (BM).

C NEPAL: Madi Khola, Karelung, 28°14'N, 84°08'E, 610 m, vi 1954, *Stainton, Sykes & Williams* 5907 (E, BM).

E NEPAL: Tamur Valley, Taplejung, 27°24'N, 87°37'E, 1200 m, iv 1967, *Stainton* 5858 (BM); Phulchoki, 1830 m, *Manandhar* 10861 (BM); Kusma, 1070 m, v 1954, *Stainton, Sykes & Williams* 570 (BM); Sanguri Danda near Dharan, 26°50'N, 87°17'E, 760 m, v 1969, *Williams* 96 (BM); Khare Khola, 1370 m, vi 1964, *McCosh* 184 (BM); Teku Nala to Dhara Pani, 800–1000 m, vii 1972, *Kanai et al.* 72403 (BM).

SIKKIM & DARJEELING: Kalimpong, 300 m, vi 1904, *Haines* 821 (E); *ibid.*, 1220 m, v 1904, *Haines* 5816 (K); Rongsong, 915 m, vii 1913, *Cave* s.n. (E); Silak, 610 m, iv 1912, *Cave* s.n. (E); Darjeeling, 610 m, ii 1921, *Cowan* s.n. (E); below Punkabari, *Hooker* (K); Kalimpong, 460 m, v 1876, *Clarke* 27979 (K); Selim, 915 m, x 1884, *Clarke* 36711d (BM); Punkabari, vi 1874, *Gamble* 2747a (K); Pancherai River, terai, iv 1875, *Gamble* 2749b (K); Kalimpong, 1300 m, iv 1960, *Togashi* 3028 (BM); Darjeeling, 250 m, iv 1960, *Togashi* 3038 (BM).

BHUTAN: Phuntsholing district, above Phuntsholing, 26°51'N, 89°25'E, 500 m, v 1979, *Grierson & Long* 833 (E); Tongsa district, Mangde Chu near Yoormu, 27°19'N, 90°35'E, 1250 m, v 1979, *Grierson & Long* 1318 (E, K); Gaylegphug district, Mao valley, 26°54'N, 90°31'E, 300 m, v 1979, *Grierson & Long* 1403 (E, K, A, TI, THIMPHU); Tashigang district, Gamri Chu below Lungten Zampa, 27°21'N, 91°37'E, 1080 m, vi 1979, *Grierson & Long* 2076a (E), 2076b (E); Tashigang district, Gamri Chu above Lungten Zampa, 27°21'N, 91°38'E, 1150 m, vi 1979, *Grierson & Long* 2094 (E, A, K, TI, THIMPHU); Deothang district, Samdrup-Jongkhar to Deothang road, 11 km above Samdrup-Jongkhar, 26°50'N, 91°28'E, 600 m, 'Amongst shrubs in hot jungle. Shrub 2 m, berries white, edible', 21 vi 1979, *Grierson & Long* 2149 (holo. E; iso. A, K, TI, THIMPHU); Mongar district, E side of Kuru Chu Valley below Mongar, 27°16'N, 91°10'E, 1475 m, vii 1979, *Grierson & Long* 2382 (E, A, K, TI), 2383 (E, K, TI); Mongar district, Shongar Chu valley above Lingmethang, 27°15'N, 91°07'E, 1100 m, vii 1979, *Grierson & Long* 2438 (E, K, TI, THIMPHU); Gaylegphug district, between Lodrai and Aie bridge, 26°55'N, 90°31'E, 280 m, iii 1982, *Grierson & Long* 3916 (E, K, A, THIMPHU); Tongsa district, 49.2 km S of Tongsa, 1100 m, v 1984, *Bartholomew* 1603 (E); Tongsa district, 22.6 km N of Shamgong, 960 m, v 1984, *Bartholomew* 1640 (E).

ASSAM: s. loc., *Jenkins* (K); s. loc., 1893, *King's Collector* s.n. (K); Haflong, N Cachar Hills, 760 m, viii 1908, *Craib* s.n. (K); Nungpo, Khasia, 460 m, v 1885, *Clarke* 38101c (BM).

BURMA: Katha district, Mohnyin Reserve, 305 m, vi 1908, *Lace* 3216 (E); Wetwin Near Maymyo, 915 m, vi 1916, *English* 124 (E); Haka, 760 m, iv 1938, *Dickason* 7596 (E).

Flueggea virosa (Willd.) Voigt (*Securinega virosa* (Willd.) Baillon) is a very widespread species throughout the palaeotropics (Airy Shaw, 1975; Webster, 1984), occurring in tropical and S Africa, Arabia, Socotra, India (peninsular India N to the NW Himalaya, Nepal, Bengal and Assam), Andaman and Nicobar Islands, Burma, Malayan peninsula, China, Taiwan, Indo-China, Indonesia and the Philippines. The New Guinea and Australian populations were segregated by Airy Shaw (1980) as *Securinega melanthesoides* (F. Muell.) Airy Shaw. Webster (1984) showed that these and other asiatic taxa formerly placed in *Securinega* belong to the genus *Flueggea*; the above two he treated as subspecies of *F. virosa*, subsp. *virosa* and subsp. *melanthesoides* (F. Muell.) Webster.

Throughout its range subsp. *virosa* varies in stature from a low shrub to a tree, and also in the size of its leaves. However, in leaf shape it is relatively constant; these are obovate with an obtuse, retuse or sometimes subacute apex. Except for a few collections of typical subsp. *virosa* from the edge of the Indian plains, the E Himalayan populations consistently differ in having ovate leaves with an acute or bluntly acuminate apex, and they are frequently larger and of thinner texture than in typical populations. Some collections from Nepal, Assam and Burma also display these differences, which clearly have a geographical basis and suggests that they should be formally recognized as a subspecies.

Hurusawa & Tanaka (1967) reported *Flueggea suffruticosa* (Pallas) Baillon (*Securinega suffruticosa* (Pallas) Rehder) from Darjeeling district, but a duplicate of the cited specimen in BM belongs to *Phyllanthus leschenaultii* Mueller and not to *F. suffruticosa*. The last is a distinct species with elliptic leaves, styles almost completely free, with spreading branches, and with dry trilocular capsules; it is distributed in NE Asia from Mongolia to N and C China, Korea and Japan.

GLOCHIDION

Glochidion bhutanicum Long, sp. nov. Fig. 1d.

G. stellato (Retz.) Beddome similis sed foliis ellipticis apice abrupte et subtiliter acuminatis, in sicco subtus pallidis, nervis lateralibus 5-7-jugis, pedicellis florum femineorum 4-6 mm longis, ovario 5-cellulare, stylo breviter exsertis ovario aequilante, in lobis 5 crassis profunde diviso leviter patentibus differt.

Small tree to 4 m; branchlets weakly striate, glabrous. Leaves alternate, membranous, elliptic, 5-7 × 2.5-3.5 cm, apex abruptly but finely acuminate, base cuneate, decurrent on petiole, brown above and pale green beneath when dry, glabrous except for a few hairs on veins beneath when young, lateral veins 5-7 pairs, prominent beneath; petioles 2.5-4 mm; stipules lanceolate, c. 3 mm, margins ciliate towards base. Monoecious; flowers in axillary clusters, sexes separate or mixed, males 1-3 per axil towards base of branchlets, females 2-9 per axil in middle and upper parts of branchlets. Male pedicels 6-8 mm; sepals 6, ovate, 2-2.2 × 1.5-1.6 mm, obtuse; stamens 3(-4). Female pedicels stouter than males, 4-6 mm; sepals 6, ovate, 1.6-2.0 × 1.2-1.4 mm, acute, with thickened dorsal midrib, margins thin, those of outer 3 sepals ciliate. Ovary disc-like, 5-lobed, 5-celled, narrowly constricted at junction with style; style as broad as ovary, 1.4-1.6 mm tall, deeply divided into 5 thick slightly spreading lobes. Fruit unknown.

BHUTAN: Deothang district, 10 km S of Riserboo, N of Samdrup Jongkhar, 27°05' N, 91°25' E, 2150 m, 'Amongst shrubs on steep bank in moist broad-leaved forest. Small tree 4 m, flowers greenish', 25 v 1979, *Grierson & Long* 2231 (**holo.** E; **iso.** K, TI, THIMPHU).

Although known only from the type collection, *G. bhutanicum* appears to be distinct from all other known Indian, Chinese and SE Asian *Glochidion* species in its very distinctive ovary and style.

CROTON

***Croton himalaicus* Long, sp. nov. Fig. 1A.**

A *C. tiglium* L. foliis late ovato-ellipticis basi late cuneatis valde 5 costatis, subtus stellato-pubescentis, petiolo apice duo glandibus disciformibus breviter stipitatis insertis, racemis 10–20 cm longis, pedicellis florum masculorum stellato-pubescentibus, petalis florum femineorum 5 oblongis 2.5 mm longis, ovario 3–4-cellulare, stylis 3–4 differt.

Small tree to 6 m. Young shoots smooth, grooved, sparsely stellate-hairy. Leaves membranous, alternate, broadly ovate-elliptic, 7–18 × 3.5–8 cm, finely acuminate, base broadly cuneate or somewhat rounded, margins serrulate with gland-tipped teeth, prominently 5-veined at base, with 4–5 pairs of weaker lateral veins above; stellate-hairy on both surfaces, sparsely above; petioles 2.5–6 cm, sparsely stellate, bearing at apex two shortly stalked disc-like glands; stipules lanceolate, 2.5–4 mm, early-deciduous. Monoecious; flowers clustered or solitary in terminal racemes 10–20 cm, female flowers towards base, rachis sparsely stellate-hairy; bracts subulate c. 1 mm. Male flowers: pedicels slender, 2.5–6.5 mm, thinly stellate-hairy; sepals thin, broadly ovate, concave, c. 3.3 × 2.3 mm with tuft of hairs at apex; petals oblong, 2.5–3 mm, white-hairy within; stamens 12–18; receptacle white-hairy, disc-glands minute. Female flowers: pedicels stout, c. 4 mm, densely stellate-tomentose; sepals coriaceous, triangular, c. 4 × 2 mm, stellate-hairy on outer surface; petals 5, oblong, c. 2.5 mm, ovary subglobose 3–4-celled, densely stellate, style spreading, c. 5 mm, glabrous, united in lower $\frac{1}{2}$. Fruit subglobose, 2 cm diam., stellate-hairy.

E NEPAL: Maewa Khola, 27°22' N, 87°34' E, 1525 m, vii 1969, *Williams* 1059 (BM).

DARJEELING DISTRICT: near Pedong, 1640 m, vi 1904, 'Small tree. In forest, wild. [local name] Lepcha Bis.', *Haines* 828 (**holo.**, E); Paungaon Forest, 1525 m, viii 1904, 'Quite wild', *Haines* 828a (K); Hom Linding (?), 1220 m, iii 1875, *Gamble* 629 (K); Pooseepong, Darjeeling, 1670 m, xi 1876, *Gamble* 2023a (K); Kalimpong, 1370 m, xi 1879, *Gamble* 7302 (K); Darjeeling, 610 m, v 1923, *Cowan* s.n. (E).

ASSAM: Zulhami, Naga Hills, 1830 m, vi 1935, *Bor* 4473 (K).

Croton tiglium L. is a widespread tree throughout India and SE Asia, invariably reported as cultivated or naturalized, the seed oil being valued for medicinal purposes. The wild origin of the plant is uncertain; Gamble (1922) stated 'it is not indigenous to India' and Kanjilal et al. (1940) suggested it was native to the Malay Archipelago. *C. tiglium* has been recorded from the E Himalaya on at least three occasions, by Cowan & Cowan (1929) from Darjeeling district, and by Smith (1913) and Hurusawa & Tanaka (1967)

from Sikkim. A search of Edinburgh, British Museum and Kew herbaria has revealed only one correctly identified specimen of it from the E Himalaya (Bhutan, 1838, *Griffith* EIC 2519 (BM)) although other specimens exist from Lakhimpur and Goalpara in nearby Assam.

Most of the eight specimens cited above were labelled '*Croton tiglium* L.'; two of them (*Haines* 828 and 828a) were clearly annotated 'in forest, wild', and 'quite wild' and these probably represent the taxon on which at least some of the published E Himalayan records of *C. tiglium* are based. Although closely allied to *C. tiglium*, *C. himalaicus* differs in a number of respects, especially in the foliar glands, which are shortly stalked and borne on the apex of the petioles; in *C. tiglium* the glands are sessile and consistently borne on the margin of the lamina above its junction with the petiole. Other important differences are the more stellate-hairy leaves and inflorescences of *C. himalaicus* and the presence of petals in the female flowers. The differences are summarized in Table 2.

Cowan & Cowan (1929) almost certainly observed wild plants of *Croton himalaicus* in the forested foothills around Darjeeling, but surprisingly few herbarium specimens exist. Cowan & Cowan (loc. cit.) also stated that 'The young shoots, bark and leaves are used by Lepchas to poison fish'. In view of its close affinity to *C. tiglium* and the important medicinal properties of that species (Watt, 1908), an investigation of the present wild status of *C. himalaicus* is desirable, as is a more detailed taxonomic study and an investigation of its potential medicinal value. Because of its very local distribution it must be considered as an endangered species.

TABLE 2
Differences between *Croton himalaicus* and *C. tiglium*

	<i>C. himalaicus</i>	<i>C. tiglium</i>
Leaf shape	broadly ovate-elliptic	ovate
basal veins	strongly 5-veined	strongly 3-veined with 2 weaker ones
indumentum	stellate-pubescent, more thinly above	glabrous or sparsely stellate beneath
glands	shortly stalked, at apex of petiole	sessile, on edge of lamina near base
Racemes	10-20 cm	6-11 cm
♂ pedicels	2.5-6.5 mm, stellate	3.5-5 mm, glabrous
♀ petals	2.5-3 mm, oblong	reduced to minute glands or absent
ovary	3-4-celled	3-celled

BALIOSPERMUM

Baliospermum densiflorum Long, *sp. nov.* Fig. 1E.

A *B. nepalense* Hurusawa & Tanaka foliis ovato-deltoides, basi cordatis vel truncatis, palmatim 5-venis, floribus majoribus in paniculis corymbosis breviter condensatis, 1.5-4 cm longis et latis, pendunculis elongatis nudis 10-28 cm longis gerentibus, sepalis florum masculorum c.3 mm longis, sepalis florum femineorum c.4 mm longis differt.

Erect subshrub 1–3 m, young shoots glabrous or pubescent. Leaves ovate-deltoid, 13–20 × 9–13 cm, acuminate, base cordate or occasionally truncate, strongly 5-veined, margins usually coarsely crenate-serrate with gland-tipped teeth, subglabrous or pubescent beneath, especially on veins; petioles 8–13 cm, with two sessile rounded glands at apex on some leaves; stipules oblong, c. 2 mm, coriaceous, subpersistent. Male panicles numerous in upper leaf axils, usually densely corymbiform, 1.5–4 × 1.5–4 cm, on long naked peduncles 10–28 cm; bracts lanceolate 2–3 mm. Dioecious. Male flowers: pedicels 2–4 mm, sepals 5, suborbicular, c. 3 mm, concave, white or creamy; stamens 18–20. Female panicles similar to males, 2–3 × 2–3 cm, on naked peduncles 10–14 cm; bracts linear, 3–6 mm, with 1–2 stalked glands near base. Female flowers: sepals 5, lanceolate, c. 4 mm, with 1–2 marginal glandular teeth; ovary globose, c. 1.5 mm diam., styles 3, united at base, bifid to middle, branches spreading. Mature capsules unknown, when young subtended by accrescent bracts and sepals.

BHUTAN: Mongar district, Kole La [= Kori La, 27°17'N, 91°20'E], 2130 m, viii 1915, *Cooper* 4638 (BM, E); Mongar district, Saleng [27°16'N, 91°06'E], 910 m, vi 1969, *Bowes Lyon* 15112 (BM); Tashigang district, E side of Kori La, 27°17'N, 91°20'E, 2100 m, Evergreen oak forest, 'Dioecious shrub 2–3 m, male flowers white', 17 vi 1979, *Grierson & Long* 2017 (holo. E; iso. K, TI, THIMPHU).

BURMA: 2.5 miles beyond Paypat Bungalow, 1830 m, ix 1912, *Kyews* (?) 37 (E, herb. Lace); descent from Sansi Gorge to Sadon, 25°21'N, 2440 m, ix 1912, *Forrest* 9098 (E); Hills around Hlawgaw, 26°10'N, 98°25'E, 1830 m, ix 1924, *Forrest* 25030 (E, K, BM); North Triangle, Hkinlum, 1220–1520 m, vii 1953, *Kingdon Ward* 21148 (BM).

YUNNAN: Teng-yueh, *Howell* 115 (E).

Taxonomically the genus *Baliospermum* in the Sino-Himalayan region presents considerable difficulties: most of the species (excepting the monoecious *B. montanum* (Willd.) Müll. Arg.) are very local and rarely collected, especially female and fruiting plants, and appear to be somewhat variable phenotypically. Due to the few, often inadequate specimens, boundaries between species are not yet well defined.

However, the present new species is more distinctive than some of its close allies, especially in the ovate-deltoid leaves which are cordate and 5-veined at the base, and in the condensed inflorescences on very long naked peduncles, and the large size of the male flowers. The collections do, however, vary in characters such as stem and leaf indumentum, and development of leaf serration.

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