

Review of the genus *Litosanthes* Bl. (Rubiaceae)

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Review of the genus *Litosanthes* Bl. (Rubiaceae)

D. B. DEB
&
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RÉSUMÉ

DEB, D. B. & M. GANGOPADHYAY (1989). Révision du genre *Litosanthes* Bl. (Rubiaceae). *Candollea* 44: 209-223. En anglais, résumés français et anglais.

Révision du genre *Litosanthes* Bl. (Rubiaceae). Le statut taxonomique du genre est réévalué. Quinze espèces sont transférées de *Lasianthus* Sect. *Pedunculatae* Hook. f. dans *Litosanthes* Bl. Des combinaisons nouvelles sont faites: 1. *Litosanthes biermannii* (King ex Hook. f.) Deb & Gang.; 2. *L. capitulatus* (Wt.) Deb & Gang.; 3. *L. cinereus* (Gamble) Deb & Gang.; 4. *L. dichotomus* (Wt.) Deb & Gang.; 5. *L. longicauda* (Hook. f.) Deb & Gang.; 6. *L. micranthus* (Hook. f.) Deb & Gang.; 7. *L. venulosus* (Wt. & Arn.) Deb & Gang.; 8. *L. filiformis* (King & Gamble) Deb & Gang.; 9. *L. filiformis* var. *bracteata* (King & Gamble) Deb & Gang.; 10. *L. pendulus* (Ridley) Deb & Gang.; 11. *L. pseudo-lucidus* (King) Deb & Gang.; 12. *L. robinsonii* (Ridley) Deb & Gang.; 13. *L. scalariformis* (King & Gamble) Deb & Gang.; 14. *L. subspicatus* (King & Gamble) Deb & Gang.; 15. *L. varians* (Hook. f.) Deb & Gang.; 16. *L. villosus* (Ridley) Deb & Gang. Mots clé: taxonomie de la plante, Rubiacées, *Litosanthes*, description de la clé, nouvelles combinaisons.

ABSTRACT

DEB, D. B. & M. GANGOPADHYAY (1989). Review of the genus *Litosanthes* Bl. (Rubiaceae). *Candollea* 44: 209-223. In English, French and English abstracts.

The paper presents a review of the genus *Litosanthes* Bl. (Rubiaceae). The taxonomic status of the genus is reviewed and reinstated. 15 species are transferred from *Lasianthus* Sect. *Pedunculatae* Hook. f. to *Litosanthes* Bl. New combinations made are: 1. *Litosanthes biermannii* (King ex Hook. f.) Deb & Gang.; 2. *L. capitulatus* (Wt.) Deb & Gang.; 3. *L. cinereus* (Gamble) Deb & Gang.; 4. *L. dichotomus* (Wt.) Deb & Gang.; 5. *L. longicauda* (Hook. f.) Deb & Gang.; 6. *L. micranthus* (Hook. f.) Deb & Gang.; 7. *L. venulosus* (Wt. & Arn.) Deb & Gang.; 8. *L. filiformis* (King & Gamble) Deb & Gang.; 9. *L. filiformis* var. *bracteata* (King & Gamble) Deb & Gang.; 10. *L. pendulus* (Ridley) Deb & Gang.; 11. *L. pseudo-lucidus* (King) Deb & Gang.; 12. *L. robinsonii* (Ridley) Deb & Gang.; 13. *L. scalariformis* (King & Gamble) Deb & Gang.; 14. *L. subspicatus* (King & Gamble) Deb & Gang.; 15. *L. varians* (Hook. f.) Deb & Gang.; 16. *L. villosus* (Ridley) Deb & Gang. Key words: plant taxonomy, Rubiaceae, *Litosanthes*, key descriptions, new combinations.

The Indian species are described with key, synonymy, citations, types, distribution, flowering and fruiting time, etc. Malayan and Sri Lankan and others species are not sufficiently available for thorough study of those species.

The genus *Litosanthes* Bl. Bijdr. 994. 1826 was postulated as a monotypic genus from Java. Subsequently 4 species were described from Formosa and New Guinea. DE CANDOLLE (1830), MIQUEL (1855), HOOKER (1873), SCHUMANN (1891) and others recognized the genus. HOOKER (1880), however, reduced it under *Lasianthus* Sect. *Pedunculatae* Hook. f. RIDLEY (1923) followed it. BAKHUIZEN (1965) reestablished the generic status mainly for imbricate aestivation of corolla lobes, divided stipules and pedunculate inflorescence, as mentioned in his key to these two genera, even though in the description of the genus he erroneously mentioned the aestivation as valvate like all earlier workers, even by BLUME himself (1826) in course of describing the monotypic genus.

In course of study of the Indian *Lasianthus* the authors of the present paper observed the presence of these three characters in the species of *Lasianthus* Sect. *Pedunculatae*, distributed in India, Sri Lanka, Java and Malaya as available in herb. CAL. It is now generally accepted that there is only one kind of aestivation of corolla in a genus in Rubiaceae. On the other hand, the combination of these three characteristics is sufficient to exclude such species from the genus *Lasianthus* and place them under the most allied genus *Litosanthes* as rightly distinguished and reinstated by Bakhuizen (l.c.).

The present paper describes the genus *Litosanthes* Bl. in India with key to and descriptions of the species with nomenclatural changes, synonymy, types, citations, distributions, flowering and fruiting time, etc. Nomenclatural changes in the names of Sri Lankan and Malayan species are made but they are not described as some of their types and other specimens were not available for thorough study.

Taxonomic position of the genus

DE CANDOLLE (1830) treated the genus in subtribe *Guettardeae* of the tribe *Guettardaceae* Kunth. Hook. f. (1873) and SCHUMANN (1891) placed it under the tribe *Psychotrieae*. RIDLEY (1923) reduced the genus to the section *Litosanthes* under the genus *Lasianthus*. BAKHUIZEN f. (1965) resurrected it to the generic status for reasons already stated. The genus is placed under the tribe *Psychotrieae* sensu stricto.

Range of morphological characters

The plants vary from under shrubs to small trees up to 6 m in height. Branchlets are glabrous in *L. dichotomus*, glabrous or puberulous in *L. longicauda*, pubescent in *L. cinereus*, ferruginous adpressed pubescent in *L. capitulatus* or strigose in *L. biermannii* and *L. micranthus*. Leaves are very variable in form in most of the species. They are glabrous on upper surface in all the Indian species and some of the Malayan species, but variously hairy on the undersurface; glabrous or sparsely pubescent in *L. venulosus*, pubescent in *L. capitulatus*, *L. cinereus*, puberulous in *L. longicauda*, strigose in *L. biermannii*, pubescent on midrib and nerves in *L. dichotomus*.

Inflorescence is much branched and largest (15-30 × 20-30 mm) in *L. biermannii*, smallest in *L. dichotomus*. Bracteoles are sessile or subsessile in *L. capitulatus*, *L. cinereus* and *L. venulosus*, stalked in *L. dichotomus*. Calyx is toothed or lobed; teeth linear-lanceolate in *L. micranthus*; lobes ovate in *L. capitulatus*, ovate-oblong in *L. biermannii*, ovate-lanceolate or narrowly oblong in *L. dichotomus*, linear-lanceolate in *L. cinereus*, linear in *L. venulosus*. Corolla lobes are 4 in most of the species, 5 in *L. micranthus* and 4-6 in *L. biermannii*, lobes are glabrous above, tomentose beneath in *L. longicauda*, puberulous on both sides in *L. venulosus*, strigose above and villous beneath in *L. biermannii*. Filaments are generally adnate below the midtube but above midtube in *L. biermannii*. Style is longest (12 mm) in *L. capitulatus*, glabrous or puberulous in *L. venulosus*; 4 stigma lobes are common, 5 in *L. biermannii* and *L. micranthus*, 2 or 3 in *L. cinereus*. Pyrenes are generally 4 but in *L. biermannii* and *L. micranthus* 5.

Litosanthes Bl., Bijdr. 994. 1826 & in Flora 8: 189. 1825 (*Lithosanthes*); DC., Prodr. 4: 465. 1830; Miq., Fl. Ind. Bat. 2: 314. 1855; Hook. f. in Benth. & Hook. f., Gen. Pl. 2: 131. 1873; Schumann in Engl. & Prantle, Nat. Pflanzenfam. IV. Rubiac. 121. 1891; Bakh. f. in Backer & Bakh. f., Fl. Java 2: 243. 1965.

Syn.: *Lithosanthes* A. Rich., Mem. Soc. Nat. Hist. Paris 5: 213. 1829. *Santia* Wt. & Arn., Prodr. 422. 1834. *Lasianthus* Sect. *Petiolatae* Hook. f., Fl. Brit. Ind. 3: 190. 1880. *Lasianthus* Sect. *Litosanthes* Ridley, Fl. Mal. Penins. 2: 151. 1923.

Undershrubs, shrubs or small trees, branching di or trichotomous, quadrangular when young, terete in age, glabrous, pubescent or strigose. Leaves opposite, decussate, petiolate, elliptic, elliptic-lanceolate, elliptic-ovate, ovate, oblong, orbicular or obovate, cuspidate or caudate-acuminate at apex, acute or subacute at base, glabrous above, strigose beneath; lateral nerves sub opposite, arcuate, forked, reticulate, inconspicuous above; stipules interpetiolar, more or less lobed or divided,

ciliate, pilose or setose, sometimes glabrous and fleshy. Inflorescence pedunculate, axillary cymes, bracteate and bracteolate, slender or stout, pubescent, puberulous or strigose, branching di or trichotomous or whorled. Flowers sessile or subsessile, bisexual, 4 merous; bracts minute, sometimes prominent. Hypanthium ovoid or obovoid. Calyx tube very short, oblong; teeth or lobes 4, short or long. Corolla urceolate, glabrous above, villous within, especially in throat; lobes 4-6, short, imbricate in bud. Stamens 4-6, adnate in throat; filaments minute; anthers dorsifixed, linear-oblong or oblong, included or subexserted. Disk fleshy, glabrous. Ovary 4-5 loculed; ovule one in each locule, basal, erect, anatropous; stigma 2-5 lobed, subclavate. Fruit a drupe, ovoid, obovoid or globose, crowned with persistent calyx lobes; pyrenes 4-5, ridged and furrowed, thick walled, crustaceous; with or without raphides, 1 seeded. Embryo albuminous, erect, incurved.

Type: *L. biflora* Bl.

Distribution. — About 20 species in India, Sri Lanka, Java, Malaya, Formosa and New Guinea.

Key to the Indian species

- | | | |
|-----|---|--------------------------|
| 1. | Branchlets glabrous in age; leaves glabrous or sparsely pubescent beneath | 2 |
| 1a. | Branchlets strigose or pubescent; leaves strigose or pubescent beneath | 5 |
| 2. | Fruits globose | 4 |
| 2a. | Fruits ovoid | 3 |
| 3. | Fruit glabrous; lateral nerves 6-9 pairs | 7. <i>L. venulosus</i> |
| 3a. | Fruit puberulous; lateral nerves 7 pairs | 4. <i>L. dichotomus</i> |
| 4. | Lateral nerves 3-4 pairs | 3. <i>L. cinereus</i> |
| 4a. | Lateral nerves 6-10 pairs | 5. <i>L. longicauda</i> |
| 5. | Leaves strigose beneath; pyrenes 4 | 6 |
| 5a. | Leaves pubescent beneath; lateral nerves 7-10 pairs | 2. <i>L. capitulatus</i> |
| 6. | Pyrenes 5; stigma 5 lobed | 1. <i>L. biermannii</i> |
| 6a. | Pyrenes 5; stigma 4 lobed | 6. <i>L. micranthus</i> |

1. *Litosanthes biermannii* (King ex Hook. f.) Deb & Gang., **comb. nov.**

Syn.: *Lasianthus biermannii* King ex Hook. f., Fl. Brit. Ind. 3: 190. 1880 (Type: Yoksum, 1857, *T. Thomson s.n.* (K! selected as the lecto); Khasia, *J. D. Hooker & T. Thomson Maphitidia* (K!, CAL!); *Hooker & Thomson 16* (E); Maphlong, *Griffith s.n.* E.I.C. 2931 & 2932 (K! CAL!); Brandis, Ind. Trees 398. 1906; Kanjilal & al., Fl. Assam 2: 93. 1939; Balakr., Fl. Jowai 1: 42. 1981.

Shrubs 3-6 m high; branchlets di or trichotomous, quadrangular when young, terete in age, strigose. Leaves petiolate, 6-22 × 2-5 cm, elliptic, elliptic-ovate or elliptic-lanceolate, caudate or cuspidate acuminate at apex, acute or subacute at base, greyish to blackish green or pale when dry, membranous, glabrous above, strigose beneath on midrib, nerves and sometimes nervules; midrib channelled, slender above; lateral nerves 5-7 pairs, subopposite, arcuate, inconspicuous above; nervules sub parallel, forked, reticulate; petioles 7-14 mm long, slender, strigose; stipules 3-5 × 2-2 mm, 3-5 lobed, triangular, linear-lanceolate or ovate-lanceolate, thick, dentate, mid lobe larger, acuminate, setose, strigose, with colleters at base inside. Inflorescence axillary cymes, 1.5-3 × 2-3 cm; peduncles 5-15 mm long, slender, strigose; branchlets short, di or trichotomous or whorled, sometimes strigose; bracts 6-10 mm long, linear, strigose; bracteoles 2-5 mm long, linear-lanceolate or triangular, strigose. Flowers congested, 8-9 mm long, sessile or subsessile; pedicels 0-0.5 mm long, strigose. Hypanthium 0.5-1 mm long, ovoid, strigose; calyx tube ± 0.5 × 1-1.5 mm, sparsely

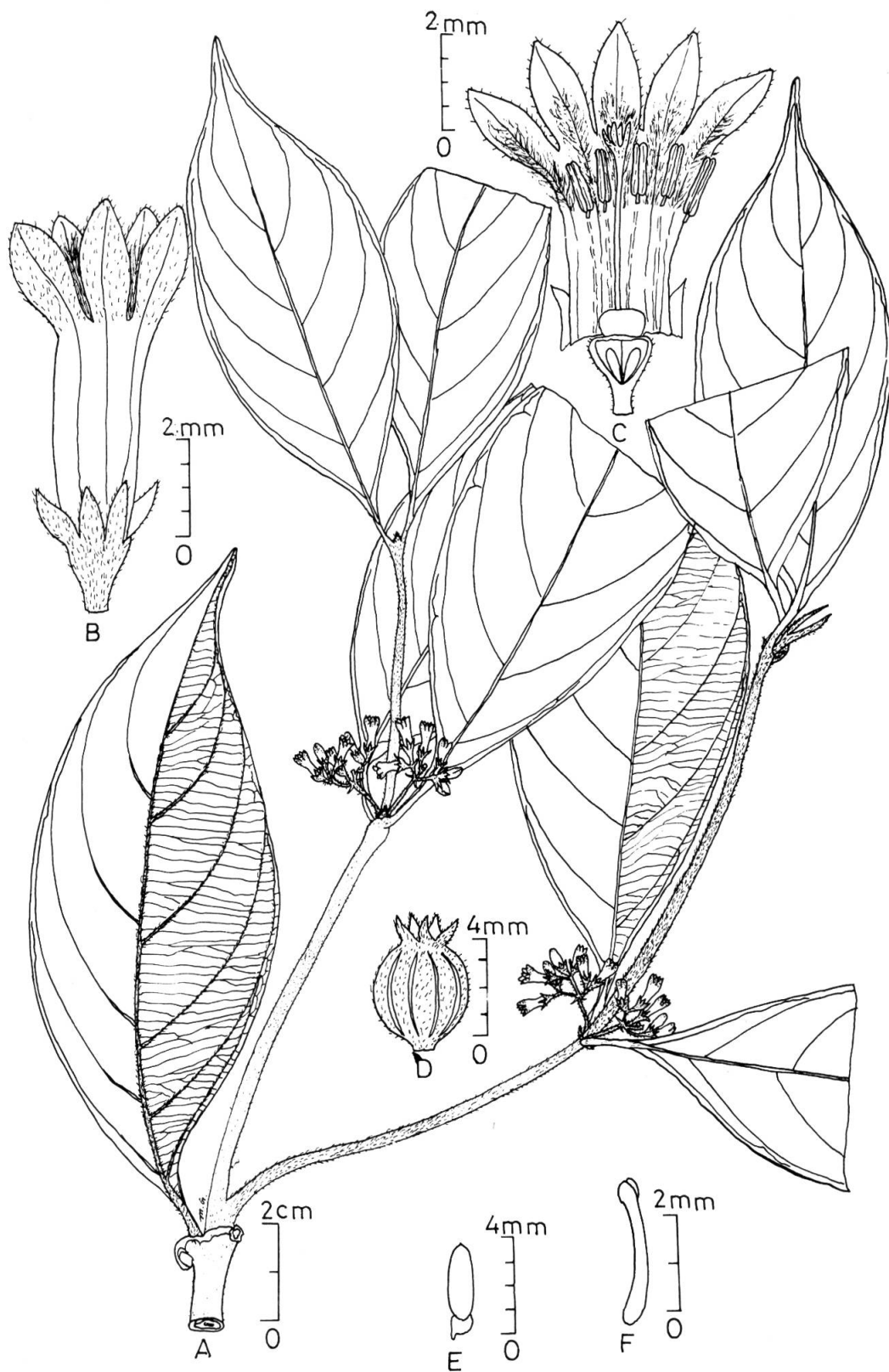


Fig. 1. — *Litosanthes biermannii* (King ex Hook. f.) Deb & Gang.
 A, habit; B, flower; C, flower split opened; D, fruit; E, seed; F, embryo.

strigose; lobes 4-6, white, ovate-oblong, acute at apex, strigose. Corolla tube 3-4 mm long, glabrous above, villous within; lobes 4-6, 2.5-3 mm long, oblong-ovate, strigose above, villous beneath. Stamens 4-6, inserted; filaments minute, adnate below throat; anthers 1-1.5 mm long, oblong, dorsally convex. Ovary \pm 0.5 mm long, obovoid, 5-loculed; style 3-4 mm long, slender, glabrous; stigma 5-lobed, \pm 0.3 mm long, linear, papillose; disk 0.5-1 mm across, flattened, smooth. Fruits sessile or subsessile, blue, 1-1.5 \times 1-1.2 cm, globose, crowned with persistent calyx lobes, strigose; pyrenes 5, acute at both ends, solitary ridged and grooved at back, thick walled, warty, with raphides, mesocarp pulpy. Seeds \pm 5 mm long, broadly stalked, mucronate at apex, dorsally convex; embryo \pm 3 mm long, radicle 2.5 mm long, obtuse at base; cotyledons ovate, acute at apex, thin.

Flowers and fruits. — Throughout the year.

Distribution. — India: Sikkim to Arunachal Pradesh, Assam, Meghalaya, Nagaland, Manipur and Mizoram, at 750-2500 m in altitude; Burma.

Exsiccata studied

Sikkim: Sinebur, *T. Anderson 158* (CAL); Rinchingpong, *T. Anderson 690, 935* (CAL); Sikkim, *G. King 233, 690, 796* (CAL); Yoksam-Bakkim, *H. Hara & al. 1241* (CAL); Pemayangtse, *J. D. A. Stainton 5339* (BM); sureil, *G. H. Cave s.n.* (E); West Bengal: Darjeeling Dt., Rungbee, *C. B. Clarke 8578, 13121B*; *G. King s.n.* (CAL) & *Prain's collector s.n.* (BSI); Surumtong, *C. B. Clarke 12636B* (CAL); Darjeeling, *J. S. Gamble 3789, 8356, 9810* (CAL). Takdah, *J. H. Lace 2203* (CAL, DD, E); Mawrim forest, *J. H. Lace 2456* (E, CAL); Rambhigora, *W. W. Smith 331* (CAL); Sinchal, *S. Kurz s.n.* (CAL); Tangloo, *G. King s.n.* (CAL), Labha, *H. Santapau & S. K. Mukerjee 123* (CAL); Dhobijhora, *J. S. Gamble 10315* (CAL); Rungbee, *C. B. Clarke 8658* (K); Burch Hill, *W. A. Talbot 3365* (BSI). Arunachal Pradesh: Daphla Hills, Shengorh, *J. L. Lister 295 & 298* (CAL) & *I. H. Burkill 36549* (CAL); Upper Renjing, *I. H. Burkill 36284* (CAL); Sissini, *G. Panigrahi 6283* (CAL); Parila-Sissini, *G. Panigrahi 7008* (CAL); Tirap Dt., Wakka, *D. B. Deb 26481* (CAL). Subansiri Dt., Apa Tani valley, *Cox & Hutchinson 388* (E). Meghalaya, *King's collector s.n.* (CAL) & *G. Mann s.n.* (CAL); Momluh, *N. L. Bor 184* (DD); Khasia, *Griffith s.n.* (Kew Distrib. No. 2931, 2932) (CAL, K); Surareem, *C. B. Clarke 45190* (CAL); Khasia, *B. Khan s.n.* (CAL); Oldham 8 (CAL); Jarain, *C. B. Clarke 18319* (CAL); Khasia, *J. D. Hooker & T. Thomson 16* Maphitidia (CAL); *G. A. Gammie 416* (CAL); *G. A. Gammie s.n.* (CAL); Manipur: Japvo, *G. Watt 6238* (BSIS, CAL); Sirohifurar, *G. Watt 6359* (BSIS, CAL, E). Nagaland: Kohima, *C. B. Clarke 40968* (CAL). Mizoram: Aijal, *D. B. Deb 30654* (CAL). Burma: Khaiyana, *F. Kingdon-ward 17424* (BM)

2. *Litosanthes capitulatus* (Wt.) Deb & Gang., comb. nov.

Syn.: *Lasianthus capitulatus* Wt. in Calc. Journ. Nat. Hist. Soc. 6: 511. 1846 (Type: Nilgiri, Sispara, *Wight s.n.* (K!)); Hook. f., Fl. Brit. Ind. 3: 191. 1880; Brandis, Ind. Trees 398. 1906; Gamble, Fl. Pres. Madras 648. 1921.

Maphitidia capitula Walp., Ann. Bot. Syst. 2: 762. 1852.

Shrubs; branches dichotomous; branchlets slender, adpressed ferruginous pubescent. Leaves petiolate, 8-15 \times 2.5-6 cm, elliptic, ovate, oblong or rarely obovate, short acuminate at apex, acute or obtuse at base, slightly incurved at margin, glossy, glabrous above, pubescent beneath, brown or pale green when dry; midrib inconspicuous, shallow channelled above, terete beneath; lateral nerves 7-10 pairs, opposite or sub-opposite, subparallel, curved, ascending, conspicuous on both surfaces; nervules parallel, forked, conspicuous; petioles 3-12 mm long, stout, pubescent; stipules persistent, 1-3 \times 1-2 mm, triangular or ovate, narrowly or irregularly toothed or divided, setose, acute at apex, pubescent. Inflorescence axillary, peduncled cymes, 8-13 \times 10-20 mm, 3-4 flowered, bracteate, bracteoles 1-2 mm long, linear, puberulous. Flowers sessile or pedicellate, 12-15 mm long; pedicels 0-1 mm long, puberulous. Hypanthium \pm 1 mm long, obovoid, puberulous above; calyx tube \pm 0.5 \times 1.5-2.5 mm, puberulous above; lobes 4, 1.5-2 mm long, ovate, acute, glabrous, anastomosing conspicuously. Corolla tube \pm 10 mm long, puberulous above, pubescent at upper part beneath; lobes \pm 5 mm long, ovate-oblong, puberulous above, pubescent beneath. Stamens 4, included; filaments \pm 0.5 mm long, thin, adnate at mid tube; anthers \pm 1 mm long, oblong. Ovary \pm 0.5 mm long, obovoid, 4-loculed; style \pm 15 mm long, narrow, glabrous; stigma 4-lobed,

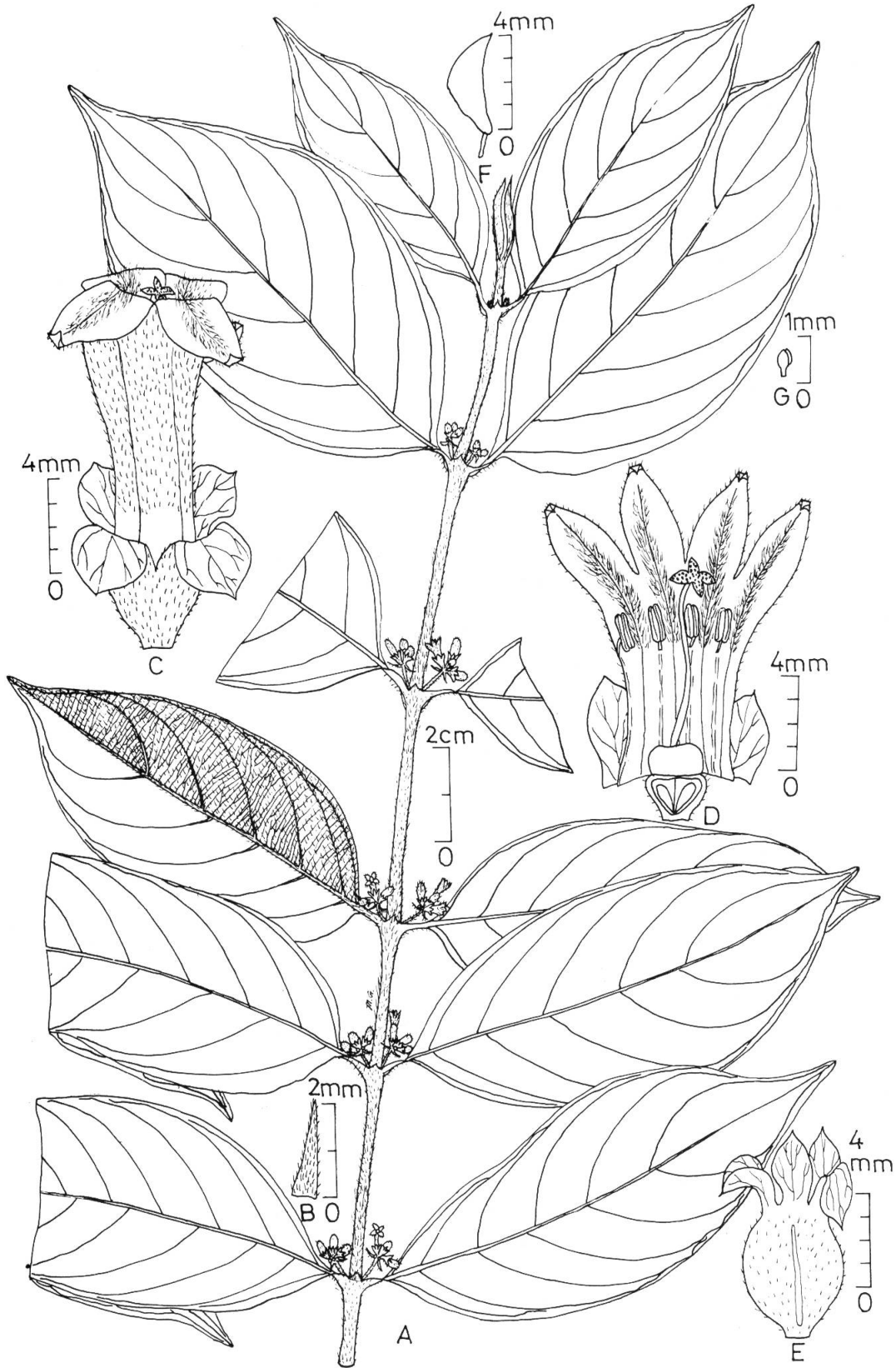


Fig. 2. — *Litosanthes capitulatus* (Wt.) Deb & Gang.
 A, habit; B, bracteole; C, flower; D, flower split opened; E, fruit; F, seed; G, embryo.

horizontally spreading, ± 0.5 mm long, ovate, papillose; disk 1-1.5 mm across, subglobose, smooth. Fruits sessile, $\pm 6 \times 5$ mm, ovoid, crowned with persistent calyx lobes, 4-shallow channelled; pericarp thin, warty; mesocarp thin; pyrenes 4, dorsally convex, ventrally angled, shallow channelled at back, ellipsoid, acute at both ends, without raphides. Seeds ± 3 mm long, thin, flattened, funicle short, embryo 0.5 mm long; radicle minute, ovate, acute at apex.

Flowers: May-September. *Fruits:* November-December.

Distribution. — India: Tamilnadu and Kerala in evergreen forests upto 1800 m in alt.

Exsiccata studied

Tamilnadu: Nilgiri Dt., Sisparaghat, *R. H. Beddome 4051, 4032* (BM) & *J. S. Gamble 13374* (CAL) & *14273* (BM). Kerala: Palghat hills, *R. H. Beddome 4035* (BM); Silent valley, *R. H. Beddome 4023* (BM); Brahmagiri shola, *C. E. C. Fischer 252* (CAL).

3. *Litosanthes cinereus* (Gamble) Deb & Gang., comb. nov.

Syn: *Lasianthus cinereus* Gamble in Kew Bull. 1920: 249 & Fl. Pres. Madras 648. 1921 (Type: Tamilnadu, Kannikatti to Kalivayalpil, 31 May 1901, *C. A. Barber 3014* (K!, CAL)); Natirial near Travancore, March 4, 1917, *K. Rangachari 1450* (MH!).

Undershrubs or shrubs, 2-4 m high; branchlets slender, compressed, pubescent when young, terete, glabrous in age. Leaves petiolate, 7-10 \times 2-3.5 cm, obovate, elliptic or ovate, long acuminate at apex, acute at base, slightly incurved at margin, thin coriaceous, glabrous above, sparsely pubescent beneath on midrib and nerves; midrib slender, channelled above; lateral nerves 3-4 pairs, subopposite, arcuate; nervules parallel, conspicuous; petioles 5-7 mm long, slender, dense or sparsely pubescent; stipules 2-3 \times 1.5-5 mm, triangular, oblong or ovate-lanceolate, irregularly toothed or lobed, setose, acuminate, pilose inside and at margin, few colleters at base beneath. Inflorescence peduncled cymes, 1.5-2.5 \times 1.5-2 cm, di or trichotomously branching, pubescent; bracts and bracteoles 2-4 mm long, linear-lanceolate, pubescent. Flowers sessile or shortly pedicellate, 7-9 mm long, white, sometimes pinkish; pedicels 0.5-1 mm long, pubescent. Calyx pubescent; hypanthium 1-1.5 mm long, obovoid, pubescent; calyx tube $\pm 0.5 \times 1-1.5$ mm; lobes 4, 4-5 mm long, linear-lanceolate, pubescent above. Corolla 4-5 mm long, glabrous above, pubescent beneath at throat; lobes 4, 1.5-2 mm long, ovate, pubescent at tip, glabrous beneath. Stamens 4, inserted; filaments 0.5 mm, adnate at throat; anthers ± 0.5 mm long, oblong. Ovary ± 0.5 mm long, obovoid, 4-loculed; style 3-3.5 mm long, thin, glabrous; stigma 2 or 3 lobed, ± 0.5 mm long, ovate-oblong, glabrous; disk 0.5-1 mm across, subglobose, smooth. Fruits shortly stalked, 5-6 \times 5-6 mm, globose, 4-furrowed, glabrous, crowned with persistent calyx lobes; stalks 1-2 mm long, pubescent or glabrous; pyrenes 4, ovoid, obtuse at apex, acuminate at base, dorsally convex, ventrally angled, thick walled, with raphides. Seeds 3-4 mm long, thin, flat, obtuse at apex, shortly stalked at base; embryo ± 1.5 mm long; radicle ± 1 mm long, obtuse at base, thin, flattened; cotyledons ± 0.5 mm long, ovate, obtuse at apex, thin.

Flowers: March-May. *Fruits:* September-January.

Distribution. — India: Tamilnadu and Kerala at 850-1600 m in alt.

Exsiccata studied

Tamilnadu: Tirunelveli Dt., Agasthymalai, *A. N. Henry 16293* (CAL); Naterikal, *K. C. Jacob 13365* (MH); Sengelteri, *K. M. Mathew 16285* (BM); Kanniya Kumari Dt., Mathukuzhivayal, *A. N. Henry 48627* (CAL); Vanamatti, *A. N. Henry 70390* (CAL); Panagudi, *B. D. Sharma 40028* (MH). Kerala: Trivandrum Dt., Bonaccord Estate, 800 m, *M. Mohanan 59447* (CAL) & *J. Joseph 44506* (MH); Adhinimalai, *M. Mohanan 666010* (MH).

4. *Litosanthes dichotomus* (Wt.) Deb & Gang., comb. nov.

Syn: *Lasianthus dichotomus* Wt. in Calc. Journ. Nat. Hist. Soc. 6: 508. 1845 (Type: Shevagherry hills, April 1836, *Wight 1401* (K!) — selected as lecto; Herb. *Wight s.n.* (K!-para));

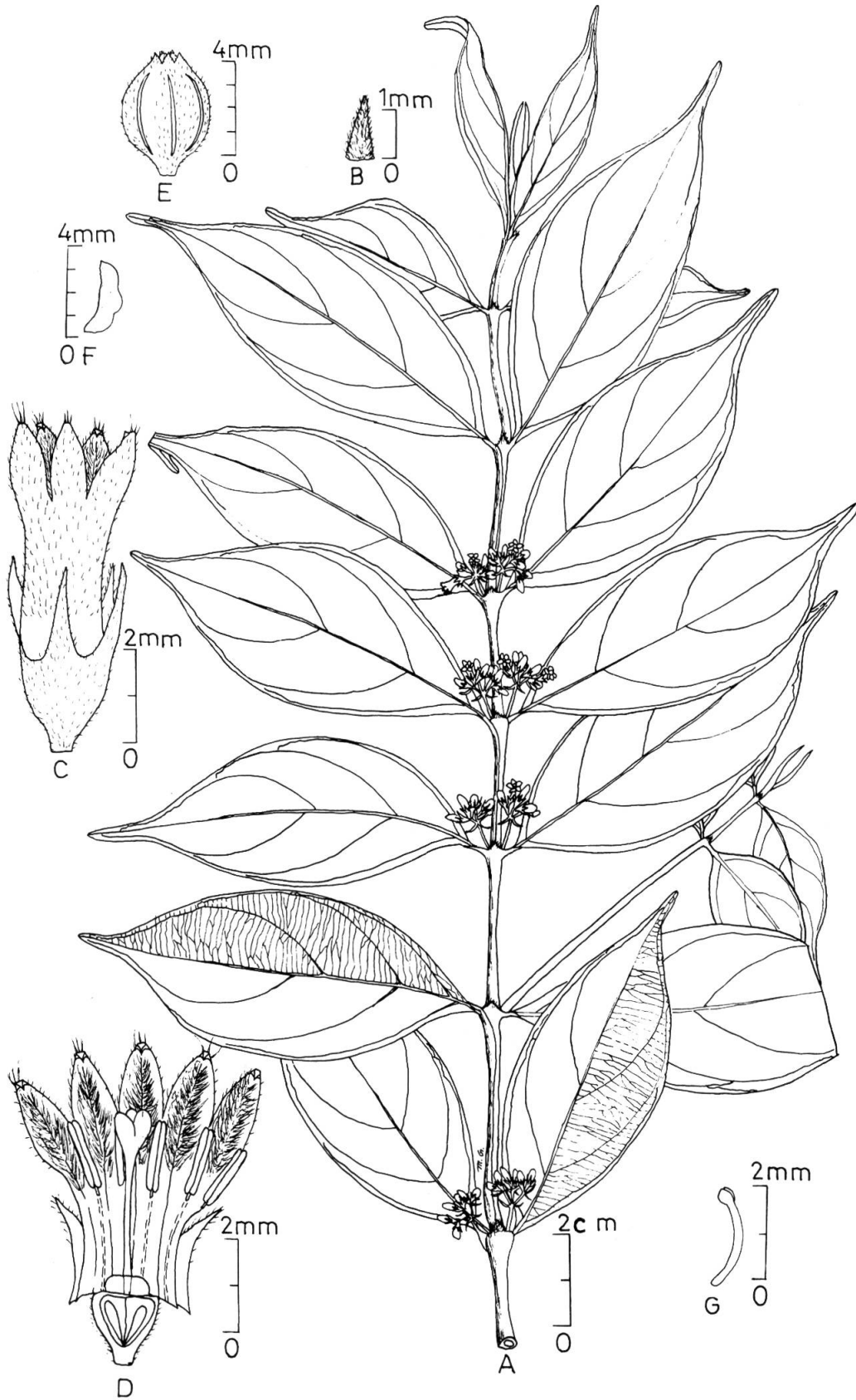


Fig. 3. — *Litosanthes cinereus* (Gamble) Deb & Gang.
A, habit; B, bracteole; C, flower; D, flower split opened; E, fruit; F, seed; G, embryo.

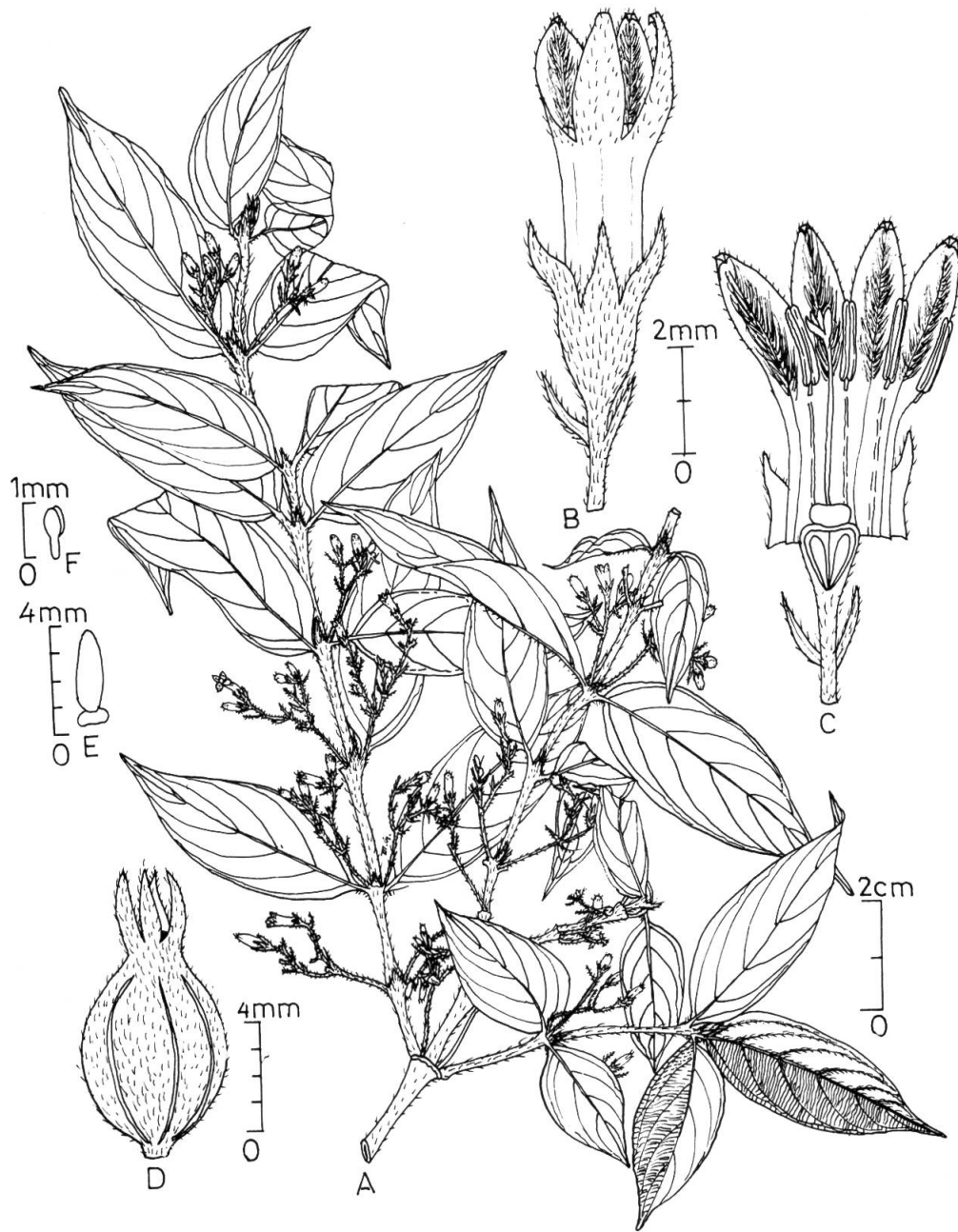


Fig. 4. — *Litosanthes dichotomus* (Wt.) Deb & Gang.
A, habit; B, flower; C, flower split opened; D, fruit; E, seed; F, embryo.

Bedd. Ic. Pl. Ind. Or. 1: t. 13. 1874; Hook. f., Fl. Brit. Ind. 3: 191. 1880; Brandis, Ind. Trees 398. 1906; Gamble, Fl. Pres. Madras 645. 1921.
Mephitidia dichotoma Walp., Ann. Bot. Syst. 2: 761. 1862.

Shrubs about 2 m high, branching dichotomous; branchlets quadrangular, pubescent when young, terete, glabrous in age; cork cells present. Leaves petiolate, 2.5-5.5 × 2-3.5 cm, ovate, ovate-orbicular, shortly acuminate at apex, slightly incurved at margin, cordate at base, thin coriaceous, glabrous above, pubescent on midrib and nerves beneath, pale green when dry, midrib channelled above; lateral nerves 7 pairs, subopposite, subparallel, arched; nervules slender, close, parallel; petioles ± 5 mm long, channelled, glabrous above, terete, pubescent beneath; stipules 5-6 × 2-3 mm, ovate-lanceolate, lobed or dentate, acuminate, pubescent above. Inflorescence axillary peduncled cymes, 2-3 flowered; peduncle 3-4 mm long, slender, pubescent; bracteoles 5-6 mm long, linear, pubescent. Flowers pedicellate, 9-10 mm long; pedicels 0.5-1 mm long, pubescent. Hypanthium 0.5-1 mm long, obovoid, glabrous or pubescent; calyx tube ± 0.5 × 1-1.5 mm, pubescent or glabrous above; lobes 4, 1.5 mm long, linear-oblong, or ovate-lanceolate, puberulous or pubescent above. Corolla tube 3-4 mm long, glabrous; lobes 4, ± 2.5 mm long, ovate-oblong, pubescent. Stamens 4, subexserted; filaments minute, adnate below throat; anthers 1-1.5 mm long, narrowly oblong. Ovary 0.5-1 mm long, obovoid, 4-loculed; style ± 3 mm long, thin, glabrous; stigma 4-lobed, lobes narrowly oblong, glabrous; disk ± 0.5 mm across, subglobose, smooth. Fruit stalked, 8-10 × 4-6 mm, ovoid, crowned with persistent calyx lobes, 4-5 shallow channelled, puberulous; stalks 5-10 mm long, puberulous; pyrenes 4, dorsally convex, ventrally angled, thin walled, with raphides. Seeds 3-3.5 mm long, semiterete, obtuse at apex, stalked at base; stalk flattened; embryo minute.

Flowers: November-January. *Fruits:* February.

Distribution. — India: Tamilnadu and Kerala at altitude upto 1550 m.

Exsiccata studied

Tirunelveli Dt., Tirunelveli hills, *R. H. Beddome 4013* (BM). Kanniyakumari Dt., Pangudi, *B. D. Sharma 40033* (MH). Kerala, South Travancore, 1500 m, *R. H. Beddome 4020* (BM).

5. *Litosanthes longicauda* (Hook. f.) Deb & Gang., comb. nov.

Syn.: *Lasianthus longicauda* Hook. f., Fl. Brit. Ind. 3: 190. 1880 (Type: Khasia, *J. D. Hooker & T. Thomson* (K!, E!, L!); East Bengal, *Griffith s.n.* E. I. C. 2914 (K-para.)); Brandis, Ind. Trees 398. 1906; Kanjilal & al., Fl. Assam 3: 93. 1939.

Shrubs 3-3.5 m high; branchlets quadrangular when young, terete in age, slender, puberulous or glabrous, blackish brown when dry. Leaves petiolate, 7-18 × 1.5-3 cm, ovate-lanceolate, or oblong-lanceolate, caudate acuminate at apex, acute at base, slightly incurved at margin, thin coriaceous, glabrous above, puberulous beneath, brown, pale green or black when dry; midrib slender, channelled above; lateral nerves 6-10 pairs, opposite or subopposite, parallel, slender, faint, intramarginal nerves join them; nervules parallel, forked, inconspicuous; petioles 8-13 mm long, slender, glabrous above, glabrous or sparsely puberulous beneath; stipules 1-2 × 1-2 mm, triangular, lobed or toothed, acute or acuminate, pilose, leaving no hairs when fall off. Inflorescence axillary, short peduncled. Flowers sessile, 7-8 mm long, blue purple. Hypanthium ± 1 mm long, obovoid, glabrous or sparsely puberulous; calyx tube 1 × 1.5 mm, cupular, puberulous above; teeth 4, triangular, acute, puberulous. Corolla tube 4-5 mm long; lobes ± 2 mm long, ovate, glabrous above, tomentose beneath. Stamens 4, inserted; filaments minute, adnate inside the tube; anthers 1-1.5 mm long, oblong. Ovary ± 0.5 mm long, obovoid, 4-loculed; style 4-5 mm long, narrow, glabrous; stigma ± 0.5 mm long, 4-lobed, lobes linear, glabrous, disk ± 1 mm across, subglobose, smooth. Fruit ± 4 × 5 mm, globose, short stalked, crowned with persistent calyx teeth, 4-furrowed; pericarp thin, glabrous; mesocarp thin; pyrenes 4, dorsally convex, shallow longitudinally channelled, ventrally angled, ellipsoid, acute at both ends, thick walled. Seeds ± 4 mm long, oblong, acute at apex, short stalked at base, shallow channelled; embryo ± 3 mm long; radicle ± 2.5 mm long, semiterete, obtuse at base; cotyledons ovate, acute at apex, thin.

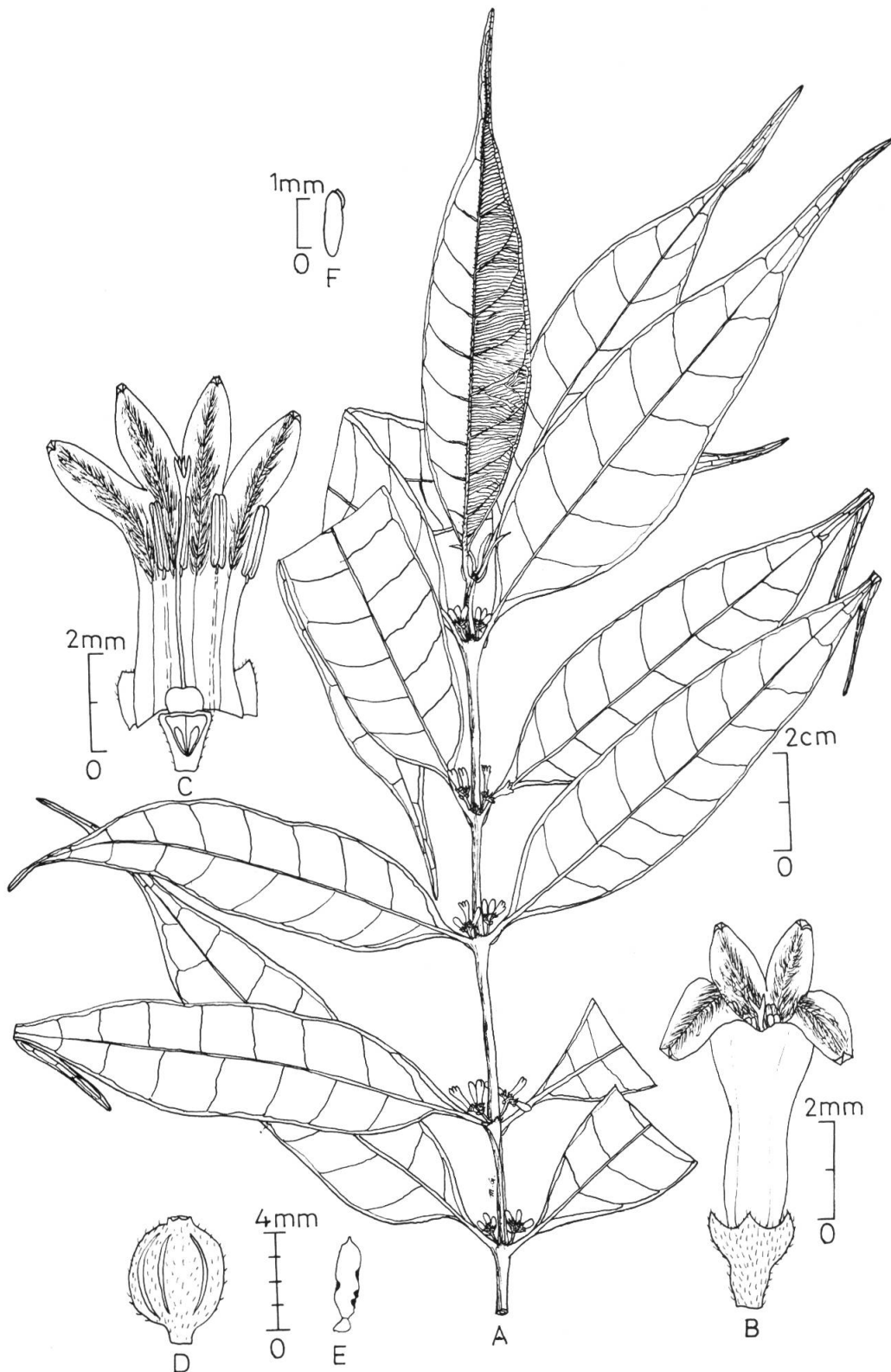


Fig. 5. — *Litosanthes longicauda* (Hook. f.) Deb & Gang.
A, habit; B, flower; C, flower split opened; D, fruit; E, seed; F, embryo.

Flowers: May-July. *Fruits:* August-November.

Distribution. — India: Arunachal Pradesh, Meghalaya at 1200-2100 m in altitude.

Exsiccata studied

Arunachal Pradesh: Subansiri Dt., Hapoli, *G. Panigrahi 19813* (CAL). Meghalaya: Khasi, Maflong, *J. D. Hooker & T. Thomson 1988 & 18* Mephitidia (E, CAL); Surareem, *C. B. Clarke 43890A* (CAL); Maflong, *C. B. Clarke 44237A* (BM), *44237B* (CAL), *44237G* (CAL); Syndoh forest, *U. N. Kanjilal 2497* (CAL); Rambrai, *C. B. Clarke 15318* (CAL); Shillong, *D. Prain s.n.* (BSIS, CAL).

6. *Litosanthes micranthus* (Hook. f.) Deb & Gang., comb. nov.

Syn.: *Lasianthus micranthus* Hook. f., Fl. Brit. Ind. 3: 190. 1880 (Type: Arunachal, Mishmi hills, *Griffith s.n.* EIC 2930 (K!, iso. CAL!); Brandis, Ind. Trees 398. 1906.

Shrubs; branchlets slender, glabrous; very young short strigose. Leaves short petiolate, 7-12 × 3-4 cm, ovate, elliptic-oblong, or obovate, acuminate at apex, rounded or subacute at base, membranous, glabrous above, strigose on midrib, nerves and nervules beneath, pale green when dry; midrib slender, shallow channelled above; lateral nerves 5-6 pairs, subopposite, arcuate, slender, inconspicuous above; nervules slender, parallel; petioles 4-9 mm long, slender, strigose; stipules 1.5-2 × 2-3 mm, triangular, acute, strigose above. Inflorescence short peduncled cymes, 4-5 flowered; peduncle 3-6 mm long, slender, strigose; bracteoles minute, triangular, acute, pubescent or strigose. Flowers sessile, ± 4 mm long, short tubular. Hypanthium ± 1 mm long, obovoid, strigose or puberulous; calyx tube ± 1 × 1.5 mm; teeth 5, linear-lanceolate, puberulous or strigose above. Corolla tube 1.5-2 mm long, glabrous above, villous within above; lobes 5, ± 1.5 mm long, ovate-lanceolate, puberulous or strigose above, glabrous beneath. Stamens 5, included; filaments minute, adnate at mid tube; anthers hardly 1 mm long, oblong. Ovary ± 0.5 mm long, obovoid, 5-loculed; style ± 2 mm long, filiform, glabrous; branches 5, minute; disk ± 0.5 mm across, subglobose, smooth. Fruit 5-6 × 5-6 mm, globose, crowned with persistent calyx lobes, 5-shallow grooved; pericarp thin, glabrous; mesocarp thin; pyrenes 5, dorsally convex, shallow ridged, furrowed, ventrally angled, obtuse at apex and base, thin, hard walled. Seeds ± 2 mm long, curved, terete, obtuse at apex, short stalked at base; embryo ± 1.5 mm long, bent; radicle semi-terete, narrow, obtuse at base; cotyledons ovate, obtuse at apex.

Distribution. — India: Assam, Meghalaya, Arunachal Pradesh.

Exsiccata studied

Assam, *Jenkins s.n.* (CAL); Khasia, *Masters s.n.* (CAL); Khasia, *Masters s.n.* (CAL). Arunachal Pradesh: Baligaon, *Prain's collector 178* (CAL).

7. *Litosanthes venulosus* (Wt. & Arn.) Deb & Gang., comb. nov.

Syn.: *Santia venulosa* Wt. & Arn., Prodr. 422. 1834 (Type: *Wight 1353* (E holo)). *Lasianthus venulosus* (Wt. & Arn.) Wt. in Calc. Journ. Nat. Hist. Soc. 6: 508. 1845; Hook. f., Fl. Brit. Ind. 3: 191. 1880; Wt. Ic. t. 1032. 1845; Bedd., Fl. Sylv. Anal. Gen. t. 17. f. 5. 1869; Cooke, Fl. Pres. Bombay 1: 621. 1903; Brandis, Ind. Trees 398. 1906; Fyson, Fl. Nilgiri Pulney Hill Tops 1: 198. 1915; Gamble, Fl. Pres. Madras 648. 1921. *Mephitidia venulosa* Walp., Ann. Bot. Syst. 2: 761. 1852.

Undershrubs, 1-2 m high; branches and branchlets di or tri-chotomous, glabrous, smooth, blackish chocolate, internode short. Leaves petiolate, 2-12 × 1-5.5 cm, ovate, ovate-oblong, oblong, elliptic or rarely obovate, acute, acuminate or mucronate at apex, rounded or subacute at base, slightly incurved at margin, thin, membranous, glabrous above, glabrous or sparsely pubescent on midrib and nerves beneath, reddish, black or brown when dry; midrib inconspicuous above, stout beneath; lateral nerves 6-9 pairs, opposite or subopposite, subparallel, arcuate, conspicuous; nervules very close, reticulate, conspicuous; petioles 5-10 mm long, stout, glabrous, rarely sparsely pubescent above; stipules 2-4 × 1.5-3 mm, triangular or lanceolate, divided or lobed, acute at apex, pilose at margin and beneath or throughout and few colleters present at base beneath. Inflorescence

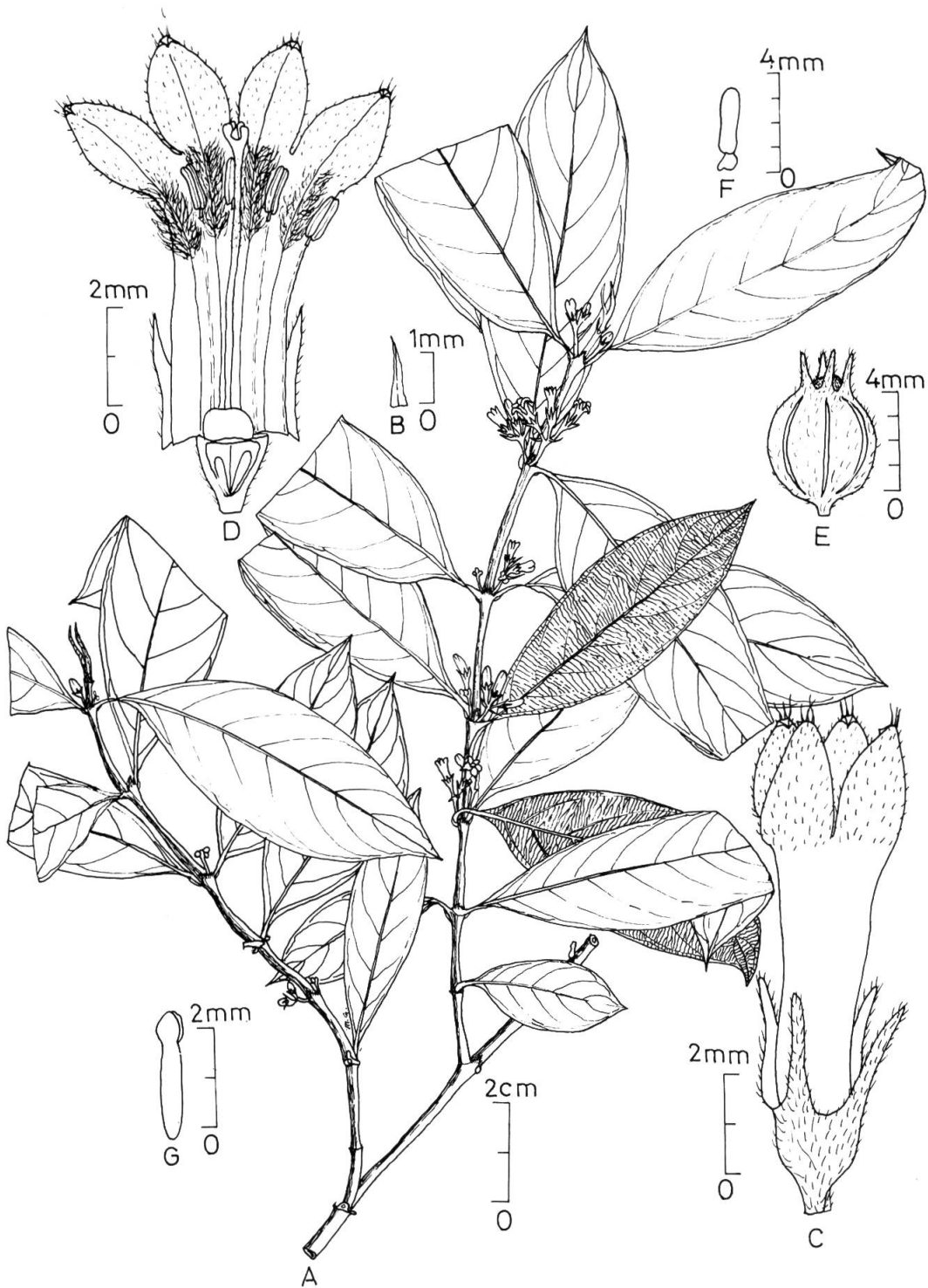


Fig. 6. — *Litosanthes venulosus* (Wt. & Arn.) Deb & Gang.
A, habit; B, flower; C, flower split opened; D, fruit; E, seed; F, embryo.

peduncled cymes, bracteate, bracteolate, 3-4 flowered, subracemose; peduncle 2-8 mm long, glabrous or strigose; branchlets short or absent, strigose or pubescent when present; bracts 6-9 mm long, subulate, pubescent; bracteoles 1-2 mm long, triangular, pubescent. Flowers subsessile or pedicellate, 9-11 mm long, tubular, white; pedicels 0.5-1 mm long, glabrous or sparsely pubescent; hypanthium \pm 1 mm long, obovoid, glabrous or sparsely pubescent; calyx tube \pm 0.5-1.5-2 mm, glabrous or sparsely pubescent above; lobes 4, 2.5-5 mm long, linear, acute or obtuse at apex, puberulous or pubescent. Corolla tube 5.5-6.5 mm long, glabrous above, pubescent within at upper part; lobes 4, \pm 2 mm long, ovate, ovate-lanceolate, puberulous sometimes ciliate at apex. Stamens 4, included or subexserted; filaments 0.5-1 mm long, thin, narrow, glabrous, adnate below throat; anthers \pm 1 mm long, oblong. Ovary \pm 0.5 mm long, obovoid, 4-loculed; style 3-6 mm long, thin, narrow, glabrous or puberulous above; lobes 4, \pm 0.5 mm long, ovate-oblong, obtuse, glabrous; disk \pm 1 mm across, subglobose, smooth. Fruit sessile or short stalked, 6-7 \times 5-6 mm, ovoid, with persistent calyx lobes, 4-shallow channelled, blackish green; pericarp thin, glabrous; mesocarp thin; pyrenes 4, planoconvex, acute at both ends, wall wrinkled. Seeds \pm 4 mm long, narrowly oblong, wrinkled; embryo \pm 3 mm long; radicle 2.5 mm long, blunt, semiterete; cotyledons ovate-oblong, obtuse.

Flowers and fruits: throughout the year.

Distribution. — India: Tamilnadu in evergreen forest at 1500-2500 m in altitude.

Exsiccata studied

Coimbatore Dt., Anamallai, *R. H. Beddome 4033* (BM). Madurai Dt., Pulney ghat, 1800 m, *R. H. Beddome 4034* (BM); Glen falls shola, *Bourne 273* (CAL). Kodaikanal, *D. A. Barber 7593* (MH), *S. Munch 10* (CAL). Nilgiri Dt., *R. H. Beddome 4014* (BM); *Perrotet 509, 510* (BM); *Schmidt s.n.* (CAL, E); Coonoor, 2100 m, *C. B. Clarke 11058A* (BM); *11058B, 11058D* (CAL); *11063A* (BM), *11063B* (CAL); Ooty, *C. B. Clarke 11455A, 11455B* (CAL); *G. King s.n.* (CAL); *D. Brandis s.n.* (CAL) & *Shethi & Nagi 26171* (DD); Dodabetta, *J. S. Gamble 17461* (BSI, CAL) & *N. C. Rathakrishnan 39034* (MH); Lamb's rock, *J. S. Gamble 11596, 11597, 11867, 13115, 13368* (CAL) & *G. A. Gammie 632* (BSI). Sisparaghat, *J. S. Gamble 13373* (CAL); Dodabetta, *J. S. Gamble 11859 & 14471* (CAL); *M. Gangopadhyay & D. C. Mondal 2161* (CAL); Ooty, 2100 m, *J. S. Gamble 17461* (BSI, CAL); Brahmagiri sholas, *C. E. C. Fischer 252* (CAL); Shembaganur, 1800 m, *Sauliere 333* (CAL); Bikhapathimund, *C. E. C. Fischer 4590* (CAL); Pakasurmalai, *K. M. Sebastine 3213 & 3940* (CAL).

New combinations in Malayan and Sri Lankan *Litosanthes* Bl.

1. *Litosanthes filiformis* (King & Gamble) Deb & Gang., **comb. nov.**. Basionym: *Lasianthus filiformis* King & Gamble in Journ. Asiat. Soc. 73: 131. 1904 (Type: Malaya, Pahang, *Scortechini 29!* CAL selected as the lectotype; W. Singa Ryah, *King's collector 851!* (CAL).
2. *L. filiformis* var. **bracteata** (King & Gamble) Deb & Gang., **comb. nov.**. Basionym: *Lasianthus filiformis* var. *bracteata* King & Gamble in Journ. Asiat. Soc. 73: 131. 1904 (Type: Pahang, *W. N. Ridley 8578!* CAL selected as the lectotype; Pahang, *Scortechini 180 & 190!*, CAL).
3. *L. pendulus* (Ridley) Deb & Gang., **comb. nov.**. Basionym: *Lasianthus pendulus* Ridley in Journ. Fed. Mal. States Mus. 4: 67. 1909 (Type: Malaya, Kahang, *Ridley* not seen).
4. *L. pseudolucidus* (King) Deb & Gang., **comb. nov.**. Basionym: *Lasianthus pseudo-lucidus* King in Journ. Asiat. Soc. 73: 128. 1904 (Type: Perak, *L. Wray 4109!* CAL).
5. *L. robinsonii* (Ridley) Deb & Gang., **comb. nov.**. Basionym: *Lasianthus robinsonii* Ridley in Journ. Fed. Mal. States Mus. 4: 37. 1909 (Type: Pahang, *Ridley* not seen).
6. *L. scalariformis* (King & Gamble) Deb & Gang., **comb. nov.**. Basionym: *Lasianthus scalariformis* King & Gamble in Journ. Asiat. Soc. 73: 131. 1904 (Type: Perak, *Scortechini 411!* CAL; *L. Wray 332!* CAL).

7. **L. subspicatus** (King & Gamble) Deb & Gang., **comb. nov.**. Basionym: *Lasianthus subspicatus* King & Gamble in Journ. Asiat. Soc. 73: 118. 1904 (Type: Perak, *L. Wray* 863; Penang, *Curtis* 2476).
8. **L. varians** (Hook. f.) Deb & Gang., **comb. nov.**. Basionym: *Lasianthus varians* Hook. f., Fl. Brit. Ind. 3: 191. 1880 (Type: Sri Lanka, C. P., Galagama, *Thwaites*). *Maphitidia varians* Thw. p.p.
9. **L. villosus** (Ridley) Deb & Gang., **comb. nov.**. Basionym: *Lasianthus villosus* Ridley in Journ. Roy. Asiat. Soc. Str. Br. 79: 88. 1915 (Type: Perak, Tapa Words, *Ridley* ...).

Note. — *Lasianthus moonii* Hook. f., Fl. Brit. Ind. 3: 190. 1880 also most probably represents *Litosanthes* but due to non availability of flowering material it could not be decided properly.

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