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A taxonomic study on the diversity of Indian *Knema* Lour. (Myristicaceae)

Dipanwita BANIK* **and Priyankush Protim BORA**

CSIR-North East Institute of Science & Technology, Jorhat, Assam. 785006, India.
* *Corresponding author. Email:* banikdipanwita@yahoo.com

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ABSTRACT: A taxonomic study on the diversity of the genus *Knema* Lour. belonging to the family Myristicaceae R. Br. in India revealed the distribution of the ten taxa under four series in North East and Peninsular India and Andaman and Nicobar Islands including two endemic species. *Knema* ser. *Obovoideae* W.J. de Wilde is synonymised here under ser. *Knema*. Series *Knema* is represented by two species and ser. *Glaucae* W.J. de Wilde by one species in North East India, while ser. *Laurinae* W.J. de Wilde is represented by three species and two subspecies in North East India and Andaman and Nicobar Island, and ser. *Glomeratae* W.J. de Wilde by 2 species in South and NE India. This is the first taxonomic study on the genus in India. All the taxa are cited with updated nomenclature, diagnostic characters, distribution, phenological data, vernacular names, line drawings, photo plates and specimens examined in various herbaria. Taxonomic keys are provided for easy identification of these taxa.

KEY WORDS: Diversity, *Knema*, India, Myristicaceae, note.

INTRODUCTION

The genus *Knema* Lour. (Myristicaceae) with ca. 93 species is distributed in Indomalesia region (Mabberley, 2008) and found to occur in all types of primary forests in tropics and subtropics. There is no comprehensive work on the genus *Knema* in India although the genus was treated in several regional Floras which were devoid of updated nomenclature and citation of type specimens. Therefore a critical study is attempted on the genus *Knema* for the first time in India to solve the problem.

MATERIALS AND METHODS

The taxonomic study was done following standard taxonomic procedures. The protologues of all the relevant synonyms were consulted along with relevant literatures. The types and specimens belonging to the family Myristicaceae in various herbaria viz., APFH, ARUN, ASSAM, BM, CAL, E, K, TBGT, The Herbarium of Llyod's Botanical Garden, Darjeeling, India (LLOYD) etc were studied critically for their macro and micro morphological characters. The stereo zoom microscope was used to study the herbarium and live specimens. The primary forests were surveyed with the due permission from Forest Department, Govt. of India whenever required. The botanical illustrations were prepared using standard methods. The phenological data, data on habitat, vernacular names, uses of various parts of different species were collected both from primary source in the field and as a secondary source from herbarium labels and were compiled from existing literature. To update the nomenclature and for citation the ICN, 2011 (McNeill *et al.* 2012) was followed. The herbarium abbreviations were used from Holmgren *et al.*1990 unless otherwise mentioned.

RESULTS

The identity was confirmed for nearly 300 specimens deposited in different herbaria.

The study found 8 species and 2 subspecies are distributed in India. Out of 3 taxa distributed in South India and Andaman Nicobar Islands, *Knema attenuata* (Hook.f. & Thomson) Warb. and *Knema andamanica* (Warb.) W.J. de Wilde subspecies *andamanica* W.J. de Wilde are endemic to India. *Knema attenuata* is confined to Southern India, the latter is endemic to Andaman and Nicobar Islands. The rest 6 species are sparsely distributed in North East India. The keys are prepared based on male and female floweres, fruits, indumentums and leaves. The colour photoplates of *Knema erratica* (Hook.f. & Thomson) J. Sinclair, *Knema linifolia* (Roxb.) Warb. and *Knema tenuinervia* W.J. de Wilde subsp. *tenuinervia* W.J. de Wilde are given for the first time.

DISCUSSIONS

de Wilde (1997; 2000) divied this genus into 12 series mainly based on male flower bud, stigma, bark and indumentum. Earlier, Sinclair (1958, 1961) initially divided this genus into different divisions based on female flower. But, in the present study four series viz. ser. *Knema*, ser. *Glomeratae*, ser. *Laurinae* and ser. *Glaucae* are recognized from India. The inter series correlation found among them are given below.

The ser. *Laurinae* is distinguished in having morphological characters i.e. flower bud longer than broad and androphore longer than the diameter of the staminal disc or equal and distributed in North Eastern India and in Andaman and Nicobar Islands.

Ser. *Knema*, ser. *Glomeratae* and ser. *Glaucae* are morphologically similar in having male flower bud

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broader than or as broad as long and androphore shorter than the diameter of the staminal disc. The ser. *Knema* differs in having obovoid male flower bud and anthers half erect when ser. *Glomeratae* and ser. *Glaucae* have flower buds subglobose to broadly obovoid and anthers horizontal.

Ser. *Glomeratae* has distinct pedunculate male inflorescence but male inflorescence is sessile in ser. *Glaucae*. However, ser. *Knema* and ser. *Glaucae* are distributed in North East India.

The series under the genus *Knema* distributed in India can easily be distinguished by morphological characters and are also represented with sparse interlinking distribution pattern among infra-generic taxa. In India the ser. *Knema* and ser. *Glaucae* are distributed in North East India whereas, ser. *Laurinae* and ser. *Glomeratae* are sparsely distributed in North East India, Southern India and Andaman and Nicobar Islands.

But there is inter and intra series variation based on fruits, seeds, leaves and the indumentum which represent interlinking similarity across the series. Based on qualitative and quantitative morphology of fruits and leaves *Knema tenuinervia* is closely similar to *Knema linifolia*, likewise *Knema attenuata* with *Knema angustifolia*, *Knema andamanica* with *Knema globularia* and *Knema erratica* with *Knema lenta.* Therefore, the ser. *Knema* is having similarity with ser. *Laurinae* and ser. *Glomeratae* has similarity with ser. *Glaucae*.

TAXONOMY TREATMENTS

An updated nomenclature of these taxa along with types, distribution, phenological data, habitat, vernacular names, uses and notes are enlisted below with the taxonomic keys for easy identification.

Knema Lour., Fl. Cochinch.: 604 (1790); Warb., Monog. Myrist.: 543 (1897); J. Sinclair, Gard. Bull. Singapore **16**: 254 (1958); **18**: 102 (1961); W.J. de Wilde, Blumea **25**: 321 (1979); **27**: 223 (1981); **32**: 115 (1987); Fl. Males., Ser. **1**, Spermat. 14: 222 (2000). *Myristica* sect. *Knema* Blume, Rumphia **1**: 187 (1836); A. DC., Prodr. 14, **1**: 204 (1856); King, Ann. Roy. Bot. Gard. Calcutta **3**: 284 (1891).

Trees, dioecious. Leaves whitish beneath. Inflorescence axillary or cauline, on woody pedunculate tubercles; tubercles sessile to stalked; male inflorescences numerous flowered; flowers pedicellate; bract 1, obscure, caducous; bracteole 1, late persistent to caducous; perianth puberulous to brown tomentose; 3(–4) lobed, tepals cleft to 1/3–½ at anthesis; androecium stalked, filaments united, forming stalked or sessile disc, anthers free, stellately attached, filaments sessile to subsessile. Female inflorescence shorter than male; flowers sessile to subsessile, bracteole 1, persistent; perianth urceolate, larger than male, style short or absent; stigma disc-shaped, lobed; ovary globose to subglobose, pubescent. Fruits globose to ellipsoid, pericarp fleshy; seed 1, arillate; aril red, laciniate at apex.

Type: *K. corticosa* Lour. [= *K. globularia* (Lam.) Warb.].

Distribution: 93 species are distributed under the genus in India, China, Myanmar, Thailand, Vietnam, Indonesia, Malesia and New Guinea; 8 species and one subspecies distributed in Peninsular and North Eastern India.

Notes: As the series *Obovoideae* W.J. de Wilde contains *K. globularia*, the type species of the genus, the series becomes the type series and series *Obovoideae* is synomymized under ser. *Knema*. About 12 series under the genus are distributed in the world of which 4 series viz. ser. *Laurinae* W.J. de Wilde, ser. *Knema*, ser. *Glomeratae* W.J. de Wilde and ser. *Glaucae* W.J. de Wilde are distributed in India.

Key to the series (distributed in India)

1a. Male flower bud longer than broad, perianth cleft ½ - 2/3 at anthesis, androphore as long as or longer than the diameter of the staminal disc including anthers……... ser. IV **Laurinae**

1b. Male flower bud as broad as long or broader than long, perianth cleft 2/3 or more at anthesis, androphore shorter than the diameter of the staminal disc including anthers……..2

2a. Male flower buds obovoid, perianth cleft ½ - ¾. Anthers half erect, androphore tapering…….……... ser. III **Knema**

2b. Male flower buds subglobose to broadly obovoid, perianth cleft 2/3 or more. Anthers horizontal, sometimes suberect, androphore tapering or cylindrical……...…….....3

3a. Male inflorescence conspicuously pedunculate, male flower buds globose, bracteole apical to pedicel. Staminal disc flat or faintly convex ……..……...…ser. II. **Glomeratae**

3b. Male inflorescence subsessile, male flower buds ovoid, bracteole apical or median to pedicel. Staminal disc flat or faintly concave ……..…….……ser. I. **Glaucae**

I. ser. ***Glaucae*** W.J. de Wilde, Blumea **25**: 445 (1979).

Type: *K. glauca* (Blume) Warb.

c. 17 species are distributed in India to SE Asia (Myanmar, Thailand, Vietnam, Laos and Cambodia to Indonesia, Malaysia and Southern Philippines); 1 species [*K. lenta* Warb.] is distributed in NE India.

1. ***Knema lenta*** Warb., Monog. Myrist.: 584 (1897); Lecomte, Not. Syst. 1(4): 101 (1909); Fl. Indo-Chine 5(2): 104 (1914); W.J. de Wilde, Blumea **25**: 445 (1979). Types: VIETNAM, South Vietnam, Prov. Bien Hoa, Ba Ria 1865, 1866, 1867, *Pierre s.n. & coll. Bois 26*, male fl., female fl. (holotype P, isotypes BM!, K!, E!).

Fig. 1

Myristica corticosa auct. non (Lour.) Hook.f. & Thomson: Hook.f. & Thomson, Fl. Ind. **1**: 158 (1855) *p.p.*; A. DC., Prodr. **14** (1): 205 (1856) *p.p.*: Kurz, Forest Fl. Burma **2**: 284 (1877) *p.p.*

K. cinerea (Poir.) Warb. var. *andamanica* auct. non (Warb.) J. Sinclair: J. Sinclair, Gard. Bull. Singapore **18**: 174, fig. 4 (1961), *p.p. quoad syn. K. lenta* Warb.

Trees. Twigs slender 2–3 mm in diam, glabrous, dark blackish at apex. Petiole 10–20×1–1.5 mm; lamina elliptic to linear-elliptic, 9.5–22×2.5–7 cm, cuneate, acute to acuminate, chartaceous, olivaceous to brown on drying;secondary veins 20–23 pairs. Tubercle 3–5 mm long, stalked upto 0.3 mm, densely puberulous; hairs stellate

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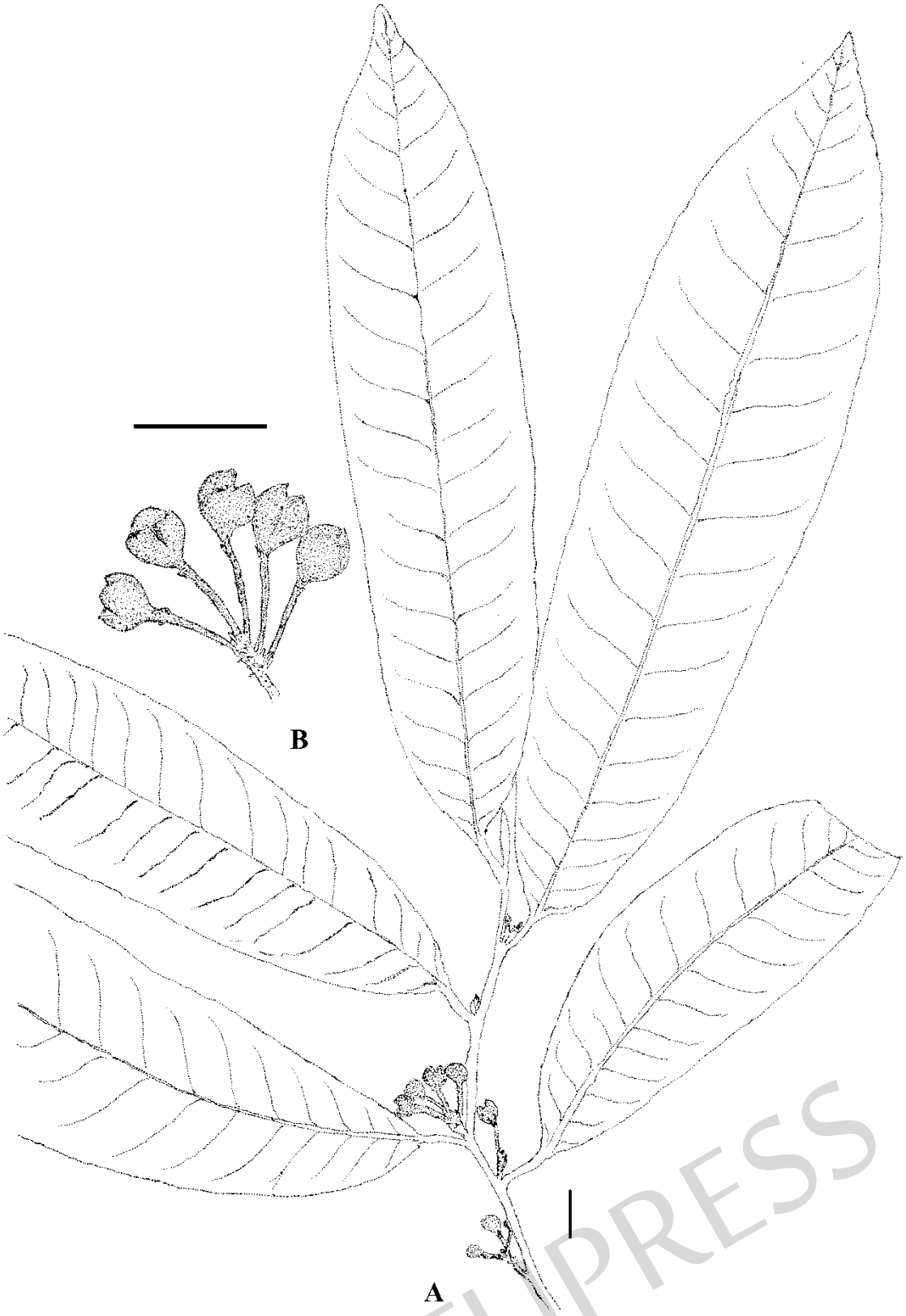


Fig. 1. ***Knema lenta*** Warb.: **A.** Male flowering twig, **B.** male inflorescence [**A- B.** from *J.M. Cowan* 1460 (E)] Scale bars: **A- B.** = 1 cm.

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0.1–0.3 mm long. Male inflorescence 2–5-flowered; pedicels 6–8×c. 1 mm, filiform, puberulous; hairs stellate, 0.1–0.3 mm long, bract basal to pedicel; bracteole ovate to annular, apical to pedicel; bud triangular-globose, 3–4.5 mm in diam; tepals ovate, c. 2×2.5 mm, acute, puberulos; hairs stellate, 0.1–0.3 mm long; disc concave, slightly triangular, 0.8–1×0.6–1 mm, anthers 8–9; obscurely stiped; stalk 0.7–0.8 mm long. Female inflorescence 1–3 flowered; pedicels 3.5–4 mm long, c. 1 mm broad, bracteole at middle, buds ellipsoid, c. 4 mm long, 3.5 mm broad; tepals ovate, ca. 1.5×1.5 mm, acute, stellate; hairs 0.1–0.3 mm long; ovary 2.5–3 mm long, 1–1.5 mm broad, puberulous, brown; style 0.5 mm long; stigma 0.5×0.5 mm, 2 lobed, each lobe 2 lobulate. Fruit stalk 2–3×1.5–2 mm, pilose, hairs 1–3 mm; fruits 2, ellipsoid, 2–2.5×1.5–1.8 cm, attenuate at base, pilose; hairs 1–3 mm long; pericarp 1–1.5 mm thick; seed ellipsoid.

Distribution: India (Andaman Is., Arunachal Pradesh), Bangladesh, Myanmar, China (Yunnan-Mengla, Ruili) Thailand, Vietnam.

Fl.: Apr, July.

Fr.: Apr.

Specimens examined: **INDIA**, ANDAMAN & NICOBAR ISLANDS, South Andamans, BSI, Port Blair *730* (TBGT); ARUNACHAL PRADESH, Hayuliang, Dense Forest, 23 November 1987, *K. Haridasan 4341*, male fl. (APFH); BANGLADESH, East Bengal, Left specimen, 1832, *Roxburgh s.n.* (BM).

II. ser. ***Glomeratae*** W.J. de Wilde, Blumea **25**: 429 (1979).

Type: *K. glomerata* (Blanco) Merr.

c. 15 species are distributed in India to SE Asia (Indonesia, Philippines and Western New Guinea); c. 2 species [*K. attenuata* and *K.erratica* (Hook.f. & Thomson) J. Sinclair] are distributed in Southern and NE India.

Key to the species and subspecies

1a. Leaf upper surface blakish on drying, lamina elliptic-oblong to oblong-lanceolate, 10–32×3–12 cm, fruit ellipsoid to oblong, 2 -- 3 mm apiculate at apex..... 2. ***K. attenuata***

1b. Leaf upper surface greenish to brown on drying, lamina lanceolate to narrowly lanceolate, 12–35×3–5.5 cm, fruit ellipsoid, blunt at apex..... 3. ***K. erratica***

2. *Knema attenuata* (Hook.f. & Thomson) Warb., Monog. Myrist.: 590 (1897); Gamble, Fl. Madras **2** (7): 1215 (1925) & Repr. **2**(4): 851 (1956); Brandis, Indian trees: 523 (1906); Santapau, Rec. Bot. Surv. India **16**: 204 (1960); J. Sinclair, Gard. Bull. Singapore **18**: 166, fig 2. (1961); Gandhi, Fl. Hassan Distr.: 42 (1978); W.J. de Wilde, Blumea **25**: 439 (1979); B.D. Sharma & al., Fl. Karnataka: 235 (1984); R.S. Rao, Fl. Goa. **2**: 367 (1986); G.R. Kumari in A.N. Henry, G.R. Kumari & V. Chithra (Eds.), Fl. Tamilnadu, Ind., Ser I, Analysis **2**: 205 (1987); Vajr., Fl. Palghat: 400 (1990); M. Mohanan & A. N. Henry, Fl. Thiruvananthapuram: 385 (1994); H.B. Naithani & al., For. Fl. Goa 506 (1997); R.S. Rao & al., Fl. East Godavari: 601 (1999). *Myristica attenuata* Wall. ex Hook. f. & Thomson, Fl. Ind. **1**: 157 (1855); A. DC., Prodr. **14** (1): 205 (1856); Dalzell & Gibson, Bombay Fl.: **4** (1861); Bedd., Fl. Sylv. S. India **2**, t. 271 (1872); Hook.f., Fl. Brit. India **5**: 110 (1886); King, Ann. Roy. Bot. Gard. (Calcutta) **3**: 316, pl. 152 (1891); Talbot, Syst. List Trees Bombay: 165 (1894); ed. **2**: 281 (1902); ed. **3**: 417 (1949); T. Cooke, Fl. Bombay **2**: 531 (1906); Bourd., Forest Trees Travancore: 293 (1908). Type: INDIA, S. India, *Wall. Cat. 6791*, female fl., fr (holotype K-Wall!, isotypes K!, CAL!).

Fig. 2

Knema attenuata (Hook.f. & Thomson) Warb. var. β *latifrons* Warb., Monog. Myrist.: 591 (1897). Type: INDIA, S. India, Canara, *Beddome s.n.*, male fl (K!).

Knema neglecta Warb., *nom. nud.* Voucher Specimen: INDIA, S. Canara, Karnataka, Mysore, Con. Kudu. Pindi, 1885, *Beddome s.n.* (BM!).

Myristica amygdalina auct. non Wall.: J. Graham, Cat. Pl. Bombay: 175 (1839).

Myristica corticosa auct. non (Lour.) Hook.f. & Thomson: Bedd., Fl. Sylv. S. India **2**: 271. (1872).

Myristica travancoria Bedd., *nom nud.* Voucher Specimen: INDIA, Maharashtra, Madras, 610--1525m, May 1868 (5/1868), *Beddome 222* (*38* ?), male fl. (K!).

Tree 7–30m. Twigs stout, straite, 2–2.5 mm in diam, tomentose to glabrous; hairs dendroid, 0.2–0.25 mm long. Petiole 0.8–1.4 (–2) cm long, tomentose to glabrous, hairs dendroid, 0.2–0.7 mm long, sulcate; lamina elliptic-oblong to oblong-lanceolate, 10–32 cm ×3–12 cm, attenuate to acute or obtuse to rounded, acuminate, blackish on drying; puberulous to tomentose only at base; hairs sessile stellate-dendroid, 0.2–0.3 mm long; secondary veins 12–22 pairs. Tubercle upto 5 mm long or sessile, tomentose; hairs dendroid up to 0.7 mm long; bract triangular, bracteole semilunar. Male inflorescence 7–9-flowered; pedicel 4–11 mm long, linear, puberulous to tomentose; hairs dendroid, 0.15–0.4 (–0.7) mm long; bud obovoid, 4.5–5 mm long, 4–5.5 mm broad; tepals triangular, acute; striate, puberulous to tomentose; hairs dendroid; 0.15–0.25 mm long; disc transversely elliptic, 1.5–2 mm long, 2.5–3 mm broad; anthers 13–14, sessile to obscurely stalked; stalk ca. 1 mm long. Female inflorescence 2–3 flowered; pedicel 2–3 mm long, 6–7.5 mm long, 4–4.5 mm broad; perianth tomentose; hairs dendroid, 0.1–0.15 mm long; tepals triangular, acuminate; ovary ca. 4 mm long, c. 3.25 mm broad; pilose; hairs 0.15–0.25 mm long; style 0.5–0.6 mm long, glabrous, glandular; stigma 4 lobed; lobes bilobulate, glabrous, glandular. Fruit stalk 1–1.5 cm long, fruit 2.7–3.5 cm long, ellipsoid to oblong, annular at base, 2–3 mm apiculate at apex, puberulous to glabrous; pilose at base; hairs upto 1.5 mm long; pericarp 5–10 mm thick; seed ellipsoid, 2.2–2.5 cm long.

Distribution: India: Maharashtra, Goa, Karnataka (Uttar Kannada, Belgaum, Shimoga, Mysore), Kerala (Kollam, Thiruvanathapuram, Thrusur, Iddukki, Palghat, Trichur,

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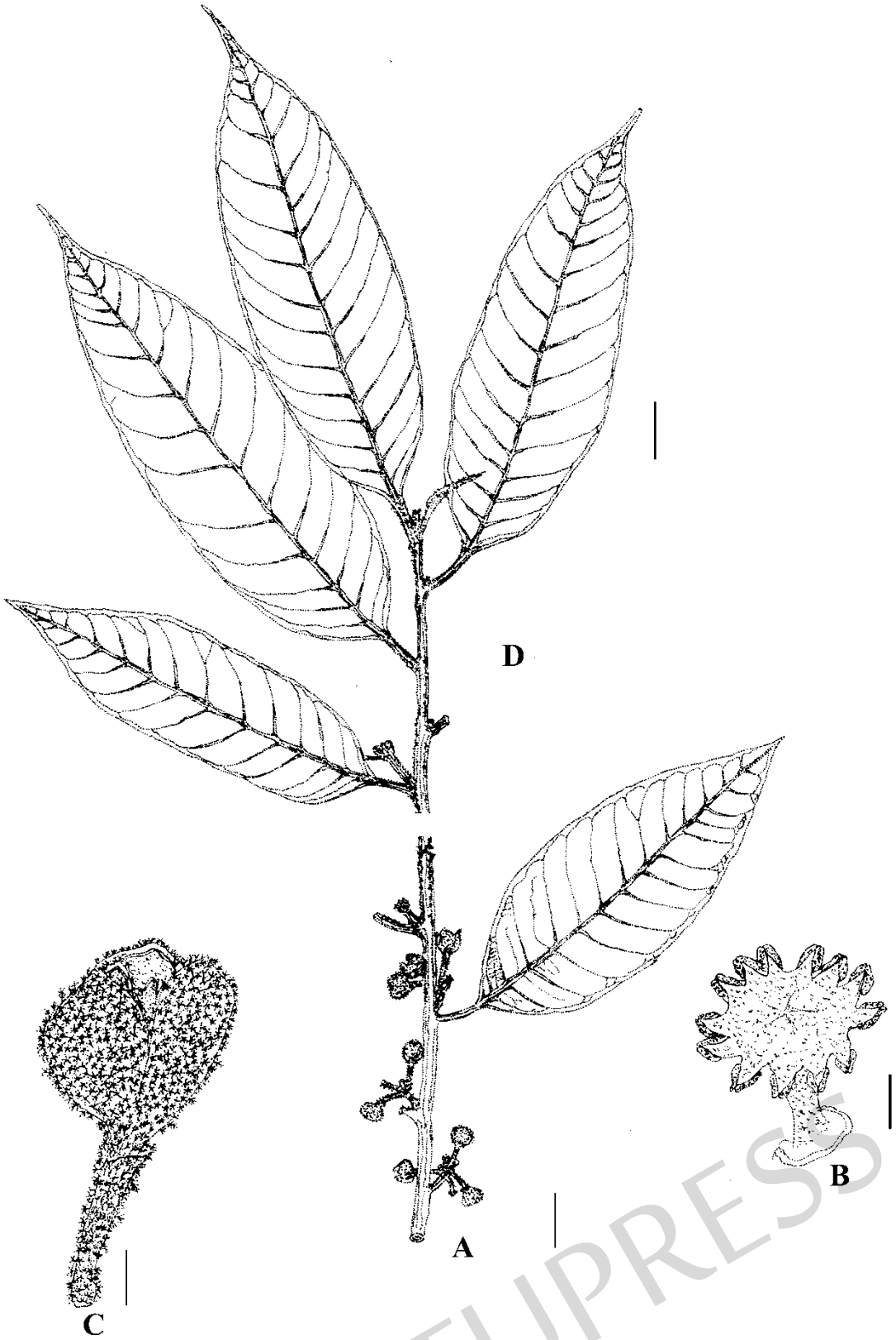


Fig. 2. ***Knema attenuata*** (Hook.f. & Thomson) Warb.: **A.** Male flowering twig, **B.** androecium, **C.** male flower, **D.** male apical twig. [**A,D.** - from *Lawson* 93 (CAL); **B –C.** - from *V.S. Ramachandran* 58797 (CAL)] Scale bars: **A.** = 1 cm; **B** = 0.7mm; **C** = 0.93mm; **D** = 0.48 cm.

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Cannanore) Tamilnadu (Hosur), Andhra Pradesh (East Godavari-Dummakonda), endemic to peninsular India and Lower Risk/least concern ver 2.3 (IUCN 2013.2).

Fl.: Jun–Aug; Nov–March.

Fr.: Feb–June.

Habitat: Common in *Myristica* swamps, evergreen forests, rocky riverside in Kulathupuzha, Quilon, Kerala. Grows between 46–915m.

Vernacular Name: Hedaggal, Ramnadike, Rampaltheu (Kannada); Chennelli, Chora pan (Malayalam); Chora pathiri (Tamil); Ranjayphal (Konkani); Rukt-mara (Marathi).

Uses: Pale brown light wood with less economic value.

Specimens examined: **INDIA**: KARNATAKA, Hassan district, Mysore, Bisle ghat, 26 March 1969, *C.J. Saldanha 13199*, fr. (K, E); Coorg, Kerti Camp II, 22 January 1940, *M.V. Laurie 5474*, male fl. (K); Godhuli, Aug 1883, *W.A. Talbot s.n.* (E); North Canara, Kumta to Sirsi, 26 March 1949, *Joseph Fernandes 235*, fr. (K); KERALA, Peninsula Ind. Orientalis, 1835, *Wight no. 1075* (E); Herb. *Wight 2486*, male fl (K); Peninsula Ind. Orientalis, Malabar, June 1836, Herb. *Wight Proper 864*, fr (E); Trivandrum, Travancore, 19 December 1894, *T.F. Bourdillon 431*, male fl. (K); 432, female fl. (K); Kallar, 2 October 1984, *K. Radhakrishnan s.n.* (TBGT); Pandimotta, 22 December 1992, *M. Abdul Jabbar & ES Santoshkumar* 15511, (TBGT); Sasthanada, 30 June 1992, *A. Nazarudeen 14342* (TBGT); Kappukadu, 350m, 18 July 1991, *N. Mohanan 10893* (TBGT); Bonaccord, 700m, 12 December 1988, *N. Mohanan 7917* (TBGT); Pathanamthitta, Kattachira, 12 September 1991, *S. Bina 2148* (TBGT); Wynaad, Tambracheri ghat, 21 June 1903, *C.A. Barber 5671*, male fl. (K); Wynaad, Manantoddy, January 1923, *Beddome 68* (No. 291600), male fl. (BM); Lakkidl-Adivaram, 20 January 1995, *K. Radhakrishnan 23772* (TBGT); Palghat district, Silent valley, ca. 1000m, 24 June 1976, *A.J.G.H. Kostermans 26212*, fr (K); Palakkad, Pothundy-Kaikatty, 3 February 1996, *K. Radhakrishnan 26590* (TBGT); Idukki, Kolani, 2 February 1993, *Dr V Sesagiri Meeno 17252* (TBGT); Road to Ponmudi, 800m, 8 June 1976, *A.J.G.H. Kostermans 26046*, fr (K); Thrissur, Vazhachal Bridge, 10 July 1996, *A.G. Pandurangan & G. Rajkumar 30695* (TBGT); Kullachikera, 16 February 1957, *G.S. Puri 15052*, fr. (CAL); Kollam district, Kulathupuzha (Colatoorpolay), 26 November 1893, *M.A. Lawson s.n.*, male fl. (K); States of Travancore and Cochin, Vicinity of Vazhachal, 2 January 1953, *Joseph Fernandes 92*, male fl (K); MAHARASHTRA, Bombay Herb., 1878, *N.A. Dalzell s.n.*, male fl. (K); The Ghats, *Dalzell s.n.*, fr (K); Mauinmore, January 20, 1883, *W.A. Talbot 273*, male fl (K, E); Madras Herb., (Herb. H.F.C. Cleghorn) 1896, *M. Johnson s.n.* (E); Khandala, Duke's Nose Row, 8 November 1942, *H. Santapau 1316*, male fl (K); TAMILNADU, Tirunelveli District, Courtallum, August 1835, Herb. *Wight 1075*, male fl (E); February 1836, Herb. *Wight Proper 873*, fl (E); Courtallum hills, July/24, *R.H. Beddome s.n.*, male fl (K); Tinnevelly ghat, 1885, *R.H. Beddome s.n.*, male fl. & fr. (BM); Tirunelveli, Kannikatty, Tenin, June 1901, *C.A. Barbar 7940*, fl (K); Kannikatty, 3000 ft, 31 July 1989, *Shanaras Khan 5301* (TBGT); Travancore, Thenmalai, 23 March 1915, *K. Vencoba Rao* 2913 (1641) (TBGT).

3.*Knema erratica* (Hook.f. & Thomson) J. Sinclair, Gard. Bull. Singapore **18**: 205, fig 9 (1961) *p.p. excl. syn. K. siamensis* Warb.; W.J. de Wilde, *Blumea* **25**: 444 (1979); A.J.C. Grierson & D.G. Long, Fl. Bhutan **1**(2): 246 (1984). *Myristica erratica* Hook. f. & Thomson, Fl. Ind. **1**: 156 (1855); A.DC., Prodr. **14** (1): 205 (1856); King, Ann. Roy. Bot. Gard. (Calcutta) **3**: 323, pl. 162 (1891). *Myristica longifolia* Wall. ex Blume var. *erratica* (Hook.f. & Thomson) Hook.f., Fl. Brit. India **5**: 110 (1886) *p.p. excl. syn. M. corticosa Hook.f. & Thomson*. Type: INDIA, Bor Pauce, Meghalaya, Khasia, 610–915m, 4 October 1850, *Hook.f. & Thomson s.n.* male fl., fr., (holotype K!, isotypes BM!, CAL!, E!,).

Plate 1

K. yunnanensis Hu in J. Roy. Hort. Soc. **63** (8): 387 (1938), *nom. nud.*; J. Sinclair in Gard. Bull. Singapore **16**: 328 (1958) & **18**: 208, 209 (1961). Voucher Specimen: CHINA, S. Yunnan, *Wang 73168, 78230*.

Myristica angustifolia auct. non (Roxb.) Warb.: A. Das in Kanjilal & A. Das (Eds.), Fl. Assam **4**: 45 (1940).

Myristica glaucescens auct. non (Jack) Hook. f. & Thomson: A. Das in Kanjilal & A. Das (Eds.), Fl. Assam **4**: 45 *p.p* (1940),. *quoad specim.* Sibsagar.

Knema malayana auct. non Warb.: Deb, Fl. Tripura **1**: 100 *p.p.* (1981),

Tree 30–60 ft. Twigs stout, 2.5–3 mm in diam, striate, glabrous to puberulous; stellate; hairs 0.5–1 mm long. Petiole 1–1.4 cm long, 1.5–2.5 mm long, puberulous to glabrous, sulcate; lamina lanceolate to narrowly lanceolate, 12–35×3–5.5 cm, coriaceous, obtuse to cuneate, acute to acuminate; hairs stellate-dendroid, 0.2–0.5 mm long; venation raised; secondary veins 25–28 pairs. Tubercle up to 0.5 cm. Male inflorescence 7–8 flowered; pedicels 5–7.5×1.5–2 mm, slender to filiform, stellate, bract keeled, basal to pedicel; bracteole annular, basal to median at pedicel; bud obovoid, 4.5–5 mm in diam; tepals ovate, 3.5×2.5 mm, acute, puberulous; hairs stellate 0.25–0.5 mm long; disc elliptic to slightly triangular, 1–2×1–1.5 mm, concave, anthers 13–14, obscurely stiped; 1.5–2 mm long. Female inflorescence 2–3 flowered; flowers subsessile, bud 4–5×3.5–4 mm, ellipsoid, tepals obovate, 3–3.5×2–2.5 mm, bluntly acute, stellate; hairs 2.25–0.5 mm long; ovary triangular, 2–2.5×1.5–2 mm, pilose; style 0.2–0.3 mm long glabrous; stigma 2 lobed, each lobe 2 lobulate. Fruit stalk 8–10×ca. 2 mm, tomentose; hairs 1–1.5 mm long; fruits 1–3, obovoid, 1.8–2.3×1.3–1.7 cm, blunt at apex, puberulous to glabrescent; pericarp 2.5–5 mm thick; seed obovoid.

Distribution: India (N. West Bengal, Sikkim, Assam, Meghalaya, Manipur, Arunachal Pradesh, Nagaland, Mizoram), Bangladesh, Myanmar, China, Laos, Vietnam.

Habitat: Grows in between 79–238m.

Fl.: Sept–Jan.

Fr.: Mar–July.

Vernacular names: Tezranga, Mamui, Mota-pasuti, Tez lali (Assamese); Bol-lanchi (Garo); Bonsigejao (Kach.); Dieng-soh-lang-snam (Khasi); Chekpulu-arong (Mikir); Indung (Tripuri); Thingthi (Mizo).

Uses: Latex is used to treat mouth sore and gum is used in dysentery.

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Plate 1. ***Knema erratica*** (Hook. f. & Thomson) J. Sinclair: **A.** Habit, **B.** Leafy twig, **C.** Male inflorescence, **D.** Male flower on anthesis, **E.** Female flower, **F.** Red latex from stem, **G.** Young fruits. Scale bars: **C, D** = 5 mm, **E** = 3 mm, **G** = 1 cm and as shown.

NOT EDITED

Note: The present study revealed that *Knema erratica* was inadvertently treated as *Knema malayana* Warb. in Flora of Tripura (Deb 1981) but the latter is distributed in Peninsular Thailand, Malaysia and in Singapore and does not grow in India.

K. glaucescens Jack differs from this present species in having ellipsoid fruits and with chartaceous leaves and is distributed in Malaya, Singapore, Sumatra and Borneo and does not occur in India (De Wilde 1979).

Specimens examined: **INDIA**, ARUNACHAL PRADESH, Flora of Kameng, Between 70–65 Km Becham Camp of SREF, 21 November 1970, *A.S. Rao 50543*, fl. (ASSAM); West Kameng District, Tippi, Ever green forest, 22 March 1983, *K. Haridasan 0989*, female flower with fruit (APFH); East Kameng District, Pakke Wild Life Sanctuary (inside Pakke WLS, near West bank Camp), near Sejusa, 27 April 2012, *B.B. Tham 35085*, fr. (ARUN); Nam Tamai valley, 3000–5000 ft, 10 November 1922, *F.K. Ward 5534* (E); ASSAM, Sibsagar, Barpather, 260 ft., 17 November 1913, *U.N. Kanjilal 2965* (ASSAM); Cachar, Daleswari forest, March 1885, *G. Mann s.n.* (Dr King no. 1890), fr (CAL; K); N.C. Hills, Borail Res., 600 ft, 15 May 1915, *U.N. Kanjilal 5708*, fr. (ASSAM); Deoparbat, N 26˚36.070´; E 093˚43.924´, 110m, 18 January 2014, *D. Banik & P.P. Bora 4243*, fl (NEIST); MANIPUR, Nongjaibong, 1000 ft., Dec 1885, *C.B. Clarke 42348A*, fl. (CAL); 1 December 1885, *C.B. Clarke 43348C*, female fl. (BM); *M. Parker s.n.*, fr. (E); Imphal West, Phaiyeng Village Forest, 4 December 2013, *D. Banik & P.P. Bora 4240*, male fl. (NEIST); MEGHALAYA, Khasia, above 30 pedalis, bis pauce, trop 19/50, *J.D. Hooker s.n.*, fr (K); East Bengal, Herb. Griffith, Herb. No. 4347, male fl. (K); Khasia, *G. Mann s.n.*, fl. (CAL); K & J Hills, Umsaw forest, 12 May 1939, *R.N. De 18618*, fr (ASSAM); Umran forests, 2 July 1932, *Sri Ram 10247*, fr. (ASSAM); MIZORAM, Lungleh, 3–4000 ft., 5 April 1899, *A.T. Gage 114*, fr. (CAL); Lushai hills, Aizal to Champhai, 3400–5200 ft., 17 January 1963, *D.B. Deb 30883* (ASSAM); Aizwal district, Darlawn village, 26 March 2014, from *Lianandwala*, Chief Wild Life Warden, Mizoram through *Laldawngliana*, R/O Darlwan *4265* (NEIST); Lunglei district, Sirep village, 950m, N24˚01.200´, E092˚40.318´, 26 March 2014, *D. Banik & P.P. Bora 4252* (NEIST); NAGALAND, Naga hills, *Cudun* 345 (CAL); SIKKIM, 5000 ft., 8 september 1875, G. King 2439 (K, CAL); Dunybu, 3000 ft., 3 February 1876, (name of collectors missing) (CAL); WEST BENGAL, Darjeeling, Jioohe hills, 3/74, *J.S. Gamble 2308A* (K); Western Duars, Juldeka Res., 3/75, J.S. *Gamble 2307A* (*623*) (K)*;* Mungpoo, 11 Dec 1877, *G. King 605*, fl. (CAL); Sivoke, 17 November 1916, *G.H. Cave s.n.*, male fl (E); Darjeeling, 19??, *J.M. Cowan s.n.*, fr. (E); Way to Buxaduar, 12 May 1976, *J.K. Sikdar 4594*, fr. (CAL); Jalpaiguri,Chilapata, 7 September 1981, *B Safui, S Chandra, A Bhattacharya 10401*, fr. (CAL).

III. Ser. ***Knema***

ser. *Obovoideae* W.J. de Wilde, Blumea **25**: 397 (1979). Type: *K. obovoidea* Merr. [= *K. oblongata* (Lam.) Warb.]

11 species and 2 subspecies are distributed in India, Bangladesh to SE Asia (Indonesia, Malaysia and to Malay Peninsula); 2 species [*K. globularia* and *K. tenuinervia* W.J. de Wilde subsp. *tenuinervia* W.J. de Wilde] are distributed in NE India.

Key to the species

1a. Leaf upper surface blackish on drying, male flower bud 2–3 mm in diam, puberulous, hairs c. 0.1 mm long; fruit subglobose .....4. ***K. globularia***

1b. The leaf upper surface brown on drying, male flower bud 3.5–4.5 mm in diam, hairs dendroid 0.2–0.7 mm long; ellipsoid to globose.....5. ***K. tenuinervia*** subsp. ***tenuinervia***

4. *Knema globularia* (Lam.) Warb., Monog. Myrist.: 601 (1897); J. Sinclair, Gard. Bull. Singapore **16**: 325 (1958) & **18**: 214 (1961); W.J. de Wilde, *Blumea* **25**: 411 (1979) & Fl. Males., Ser. 1**.** Spermat. 14: 265 (2000); H.G. Shu Shu in Z.Y. Wu, P.H. Raven & D.Y. Hong (Eds.), Fl. China **7**: 97 (2008). *Myristica globularia* Lam., Mem. Acad. Sci. (Paris): 162 (1788). Type: MALAY PENINSULA and SINGAPORE: Malaya, *Sonnerat* in Herb. *Lamarck* (holotype P!). **Plate 2; Fig. 3**

K. corticosa Lour., Fl. Cochinnch. ed. 1: 605 (1790); ed. 2 (Willd.): 742 (1793); Warb., Monog. Myrist.: 593, t. 25 fig. 1 - 4 (1897). Myristica corticosa (Lour.) Hook.f. & Thomson, Fl. Ind. 1: 158 (1855), p.p. quoad typ.; A.DC., Prodr. 14 (1): 205 (1856), p.p.; Kurz, Forest Fl. Burma 2: 284 (1877), p.p. Type: VIETNAM, Cochinchina, Loureiro s.n. (BM!).

Myristica glaucescens auct. non (Jack) Hook.f. & Thomson: Hook.f., Fl. Brit. India 5: 111 (1886), p.p.

Myristica lanceolata Wall., Numer. List. no. 6794. 1832, nom. nud. Voucher Specimen: SINGAPORE, 1822, male fl., Wall. Cat. 6794 (K-Wall!, duplicates K!, BM!).

Knema angustifolia auct. non (Roxb.) Warb.: Deb, Fl. Tripura 1: 100 (1981), p.p. quoad syn. M. corticosa Hook.f. &Thomson

Trees 15–35(-50) ft. Twigs 1.5–2.5 mm in diam, glabrous to faintly puberulous; hairs stellate, 0.1 mm long. Petiole 7–13×1 mm; lamina elliptic, 8–25×2.4–3.8 cm, attenuate, acuminate, chartaceous, glabrous, blackish on drying above; secondary veins 15-20 pairs. Inflorescence stalked tubercle; stalk sessile to 0.1 mm long, tubercle 2–3 mm long, densely puberulous; hairs stellate, c. 0.1 mm long. Male inflorescence 4–7-flowered; pedicels 2–4×0.2–0.3 mm; bract basal to pedicel; bracteole ovate to annular, apical to pedicel; bud 2–4 mm in diam; tepals ovate, 1.5–2×2 mm, acute; puberulous; disc concave, slightly triangular, 0.7–1×0.6–1 mm; anthers 8 - 9, obscurely stiped; stalk 0.7–0.8 mm long. Female inflorescence 2–3 flowered; pedicels 2–3.5×0.5–1 mm; bud 3– 3.5×3–4 mm; tepals ovate, 1– 2.5×1–2.5 mm, acute; ovary 2–2.5×1.5–2 mm, puberulous; style 0.1–0.25 mm long; stigma lobulate, 0.5 –1 mm long, 2-lobed, each lobe 2 lobulate. Fruit stalk 2–4×c. 1.5 mm; fruits 2-3, subglobose, 1.5–1.6×1.2–1.3 cm, slightly pointed at apex, with collar at base; puberulous to scatteredly pubescent at maturity; hairs 0.1 mm long; pericarp 1–1.5mm thick; seed obovoid.

Distribution and status: India (Arunachal Pradesh, Assam, Tripura), China (Yunnan), Myanmar, Cambodia, Indonesia, Vietnam, Laos, Malaysia, Thailand, Singapore and status of Lower Risk/least concern ver 2.3 (IUCN 2013.2).

Fl.: Apr–July; Nov–Dec.

Fr.: Mar–July.

Note: *Myristica corticosa* (Lour.) Hook.f. & Thomson was treated as a heterogenous taxon with several synonyms by Hooker & Thomson (1855) and only the type is recognized under this species (de Wilde 1979).

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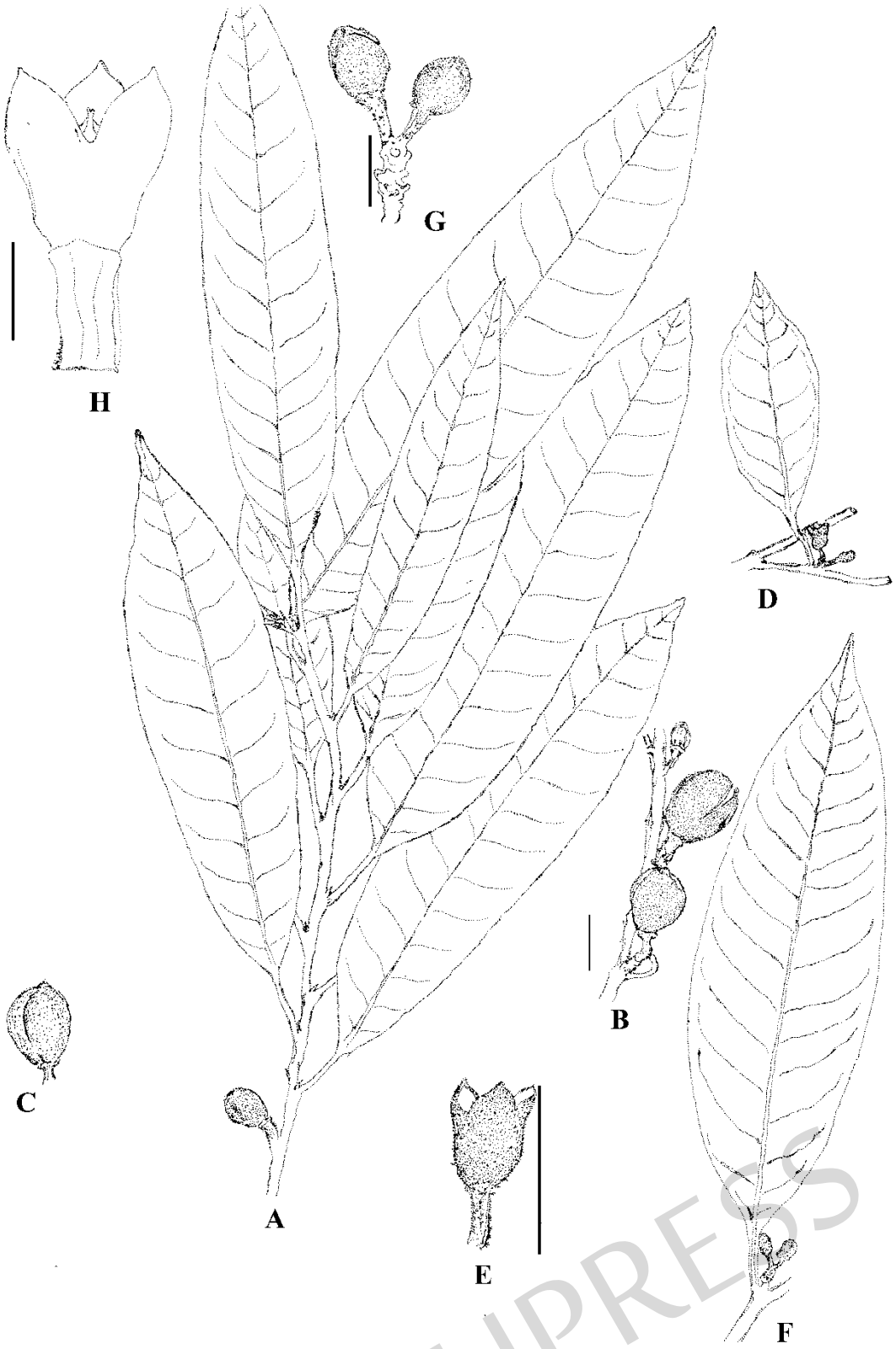


Fig. 3. ***Knema globularia*** (Lam.) Warb.: **A, D.** Female flowering twig, **B, F, G.** fruiting, **C**. fruit, **E, H** . female flower. [**A. – C** .from *Sinclair* 8400 (E); **D** – **G**. from *Sinclair* 6837 (E); **H**. from *Wall. Cat.* 6794 (K-Wall)] Scale bars: **A** – **D, F** = 1 cm, **E** = 3.5 mm, **G** = 3 mm, **H** = 2 mm.

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Plate 2: ***Knema globularia*** (Lam.) Warb. **A.** Habit, **B.** Twig, **C. - D:** Young Inflorescences (initiation). Scale bars; **C, D** = 1 mm and as shown.

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Specimens examined: **INDIA**, ARUNACHAL PRADESH, Lower Subansiri District, Chessa, 14 February 1985, *K. Haridasan s.n.* (APFH); TRIPURA, Teliamura, 21 February 1960, *D.B. Deb 2248*, male fl. (CAL); Dhalai district, Chailengta to Manikpur more, N23˚52´31.0´´; E092˚00´49.6´´, 31 May 2014, *D. Banik & P.P. Bora 4292*, young fl., (NEIST).

5. *Knema tenuinervia* W.J. de Wilde subsp. ***tenuinervia*** W.J. de Wilde, *Blumea* 25: 406 (1979); A.J.C. Grierson & D.G. Long in A.J.C. Grierson & D.G. Long (Eds.), Fl. Bhutan 1(2): 246 (1984); H.G. Shu Shu, in Z.Y. Wu, P.H. Raven & D.Y. Hong (Eds.), Fl. China 7: 97 (2008); M.F. Watson & K. Maden in M.F. Watson, S. Akiyama, H. Ikeda, C.A. Pendry, K.R. Rajbhandari & K. Shrestha (Eds.), Fl. Nepal 3 (2012). Type: NEPAL, E. Nepal, Soktim, 26˚48´N, 87˚55´ E., 457m, 18 April 1971, *J.D.A. Stainton 6782*, female fl. (holotype BM!). **Plate 3**

Trees 30–80 ft. Twigs stout, 4–7 mm in diam, bluntly angular, glabrous to tomentose; hairs dendroid, 2–3 mm long. Petiole 1.2–2 cm long, 3–6 mm broad; sulcate, bluntly striate; lamina lanceolate to broadly lanceolate, 20.5–66×6–16 cm, obtuse to emerginate, acute to acuminate, puberulous to tomentose at base; hairs dendroid; 0.25–0.5 mm long; glabrous to puberulous above; secondary veins 25-35 pairs. Tubercle 0.5–1.3 cm. Male inflorescence 6–8- flowered; pedicels 2.5–5×1–1.5 mm, stout; bract 2.5–3×c. 1 mm, caducous; bracteole keeled, 0.5×1 mm, median to apical to pedicel; bud 3.5–4.5 mm in diam; tepals 1–1.5×1 mm, ovate, acute, striate, tomentose; hairs dendroid 0.2–0.7 mm long; disc concave, elliptic to slightly triangular, 1–2.5 mm long, 1–2 mm broad, anthers 12–13 (-16), sessile; stalk 1–1.2 mm long. Female inflorescence 2–3-flowered; flowers sessile; bud 4–5×4–4.5 mm, ellipsoid; tepals 3×2–2.5mm, pandurate, bluntly acute, tomentose, striate; hairs 0.25 mm long; ovary triangular, 2–2.5 mm long, 2.5 - 3 mm broad, pilose; style 0.25–0.3 mm long, stigma 0.7–1.25 mm long, 2 lobed, each lobe 2 lobulate, undulating at apex. Fruit sessile to subsessile, 1–2, ellipsoid to globose, 2.1–2.5 cm long, 1.7–2.3 cm broad, blunt to pointed, puberulous-rugose; hairs dendroid, 1–1.2 mm long; pericarp 2.5–5 mm thick; seed ellipsoid to globose.

Distribution: E. Nepal, India (Aruachal Pradesh, Assam, Meghalaya, Sikkim, Tripura, West Bengal), Bhutan, Bangladesh, Thailand, Laos, N.C.W. Myanmar, China (Yunnan-Jinping, Xishuangbanna, Yingjiang).

Fl.: Feb–May.

Fr.: Apr–Aug.

Habitat: On the slopes in between 457–610m, in primary forests.

Vernacular names: Twiapsen (War Jaintia dialect).

Specimens examined: **INDIA**, ARUNACHAL PRADESH, Lohit district, Jenthu, 5 May 1987, *K. Haridasan 2594*, female fl. (APFH); ASSAM, Sibsagar, Diroi Reserve, 320 ft, 26 October 1912, *U.N. Kanjilal 1863*, male fl. (ASSAM); North Cachar Hills, above Jatinga, 2300 ft, 11 May 1915, *Dr U.N. Kanjilal 5665* (ASSAM); Jorhat district, Holongapar Gibbon WLS, Compartment 2, 118m, N26˚68124; E094˚34905, 12 November 2013, *D. Banik & P.P. Bora 4230* (NEIST); Naogaon district, [East Bengal], below Nowgong, 20/95, *Griffith s.n.*, fr. (K); Karimganj district, Near BRO Loknath Ashram (Tula Ashram), before Churaibari, N24˚26´32.0´´; E092˚15´43.2´´, 25 May 2014, *D. Banik & P.P. Bora 4277*, fl, (NEIST); MEGHALAYA, East Khasi hill district, below Cherra, Sept 2/50, *J.D. Hooker & T. Thomson s.n.*, fr. (K); Khasia region, *J.D. Hooker & Thomson s.n.*, male fl. (K, CAL); Khasia, Chittagong, *J.D. Hooker & T. Thomson s.n.* (E); East Jaintia hill district, Ratacherra village (adjacent to Bangladesh), 343m, N25˚02.029´; E092˚26.363´, 29 March 2014, *D. Banik & P.P. Bora 4266*, male fl. (NEIST); SIKKIM, 200ft, *Dr King* a 1878, herb *Hance s.n.* (BM); Rungul, 2000ft., 21 May 1914, *G.H. Cave s.n.* (E); Birick, 1 May 1912, *G.H. Cave s.n.* (E); TRIPURA, North Tripura district, Kanchanpur Forest Division, Near laljuli, N24˚07´33.5´´; E092˚11´34.3´´, 25 May 2014, *D. Banik & P.P. Bora 4278*, fr. (NEIST); WEST BENGAL, (Sikkim), above Punkabari & in ramom valle, 1857, *T. Thomson s.n.* (K); below Mongpu, 2500ft, 19 May 1917, *G.H. Cave s.n.*, fl (E); Tista, 1000ft, 19 April 1916, *G.H. Cave s.n.*, male fl (E); Jalpaiguri district, Tondu Evergreen forests, Duars, March 1894, *H.H. Haines 443*, male fl. (K, BM, CAL, E); Darjeeling district, Duchaflor, Terai, 25 February 1876, *J.S. Gamble 483D* (K, CAL, BM).

IV. Ser. ***Laurinae*** W.J. de Wilde, Blumea **25**: 365 (1979). Type: *K. laurina* (Blume) Warb.

c. 11 species are distributed in India to SE Asia (Indonesia, Malaysia and to Malay Peninsula); 3 species [*K. linifolia* (Roxb.) Warb., *K. angustifolia* (Roxb.) Warb., *K. andamanica* (Warb.) W.J. de Wilde subsp. *andamanica* W.J. de Wilde and 2 subspecies [*K. andamanica* (Warb.) W.J. de Wilde subsp. *nicobarica* (Warb.) W.J. de Wilde] and [*K. andamanica* (Warb.) W.J. de Wilde subsp. *peninsularis* W.J. de Wilde] are distributed in India (Andaman Nicobar Inslands, NE India)

Note: For easy identification of the species and subspecies in the field a common key is provived including mainly vegetative characters and male inflorescence.

Key to the species and subspecies

1a. Male inflorescence tomentose, pedicels stout, apex of twig stout, 3–4 mm in diam, striate, leaves elliptic-oblong or oblong-laceolate, 15–75×5–16 cm…….....8. ***Knema linifolia***

1b. Male inflorescence puberulous, pedicels slender, apex of twig slender, 2–3 mm in diam, plain, leaves oblong to lanceolate, 5--30 ×1.5–8.5 cm.....2

2a.Fruits ellipsoid, gibbous on one side, staminal column longer than the disc.....7. *K. angustifolia*

2b. Fruits ellipsoid, pointed at apex, staminal column shorter than the disc.....3

3a. Anthers 6 or 7.....6.2. ***K. andamanica*** subsp. ***nicobarica***

3b. Anthers 9–12……4

4a. Anthers 9–12, stiped…...6.1. ***K. andamanica*** subsp. ***andamanica***

4b. Anthers 9–11, half sessile…….
……6.3. ***K. andamanica*** subsp. ***peninsularis***

6. *Knema andamanica* (Warb.) W.J. de Wilde, Blumea **25**: 370 (1979) & Fl. Males., Ser. 1, Spermat. **14**: 244 (2000).

K. glauca Blume var. *andamanica* Warb., Monog. Myrist.: 596 (1897). Lectotype: **INDIA**: Andaman Islands, Aniket-Hill Jungle, 5 March 1893, *King's Coll. s.n., specim.* male fl., fr., (lectotype K!, duplicate BM!) [Lectotype designated by W.J. de Wilde, Blumea **25**: 370 (1979)].

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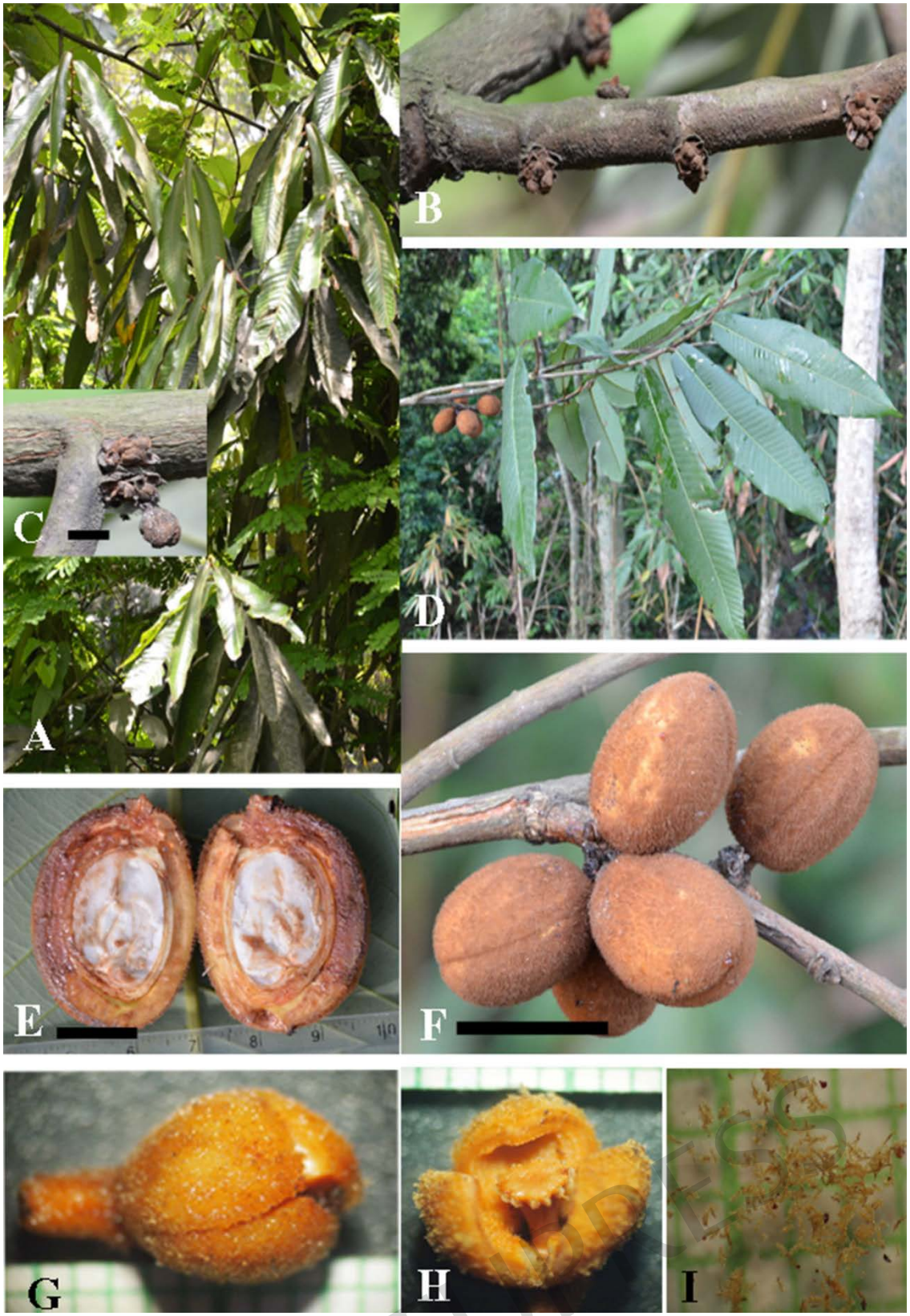


Plate 3. ***Knema tenuinervia*** W.J. de Wilde subsp. ***tenuinervia***: **A.** Habit, **B–C.** Old inflorescence, **D.** Fruiting twig, **E.** L.S. of fruit, **F.** infructiscence, **G.** Male flower bud, **H.** Androecium in male flower, **I.** hairs on tepal. Scale bars: **C**= 3 mm, **E**= 1 cm, **F** = 2.5 cm and as shown in mm.

This species has three subspecies viz., subsp. *andamanica*, subsp. *nicobarica* and subsp. *peninsularis* distributed in India.

6.1 subsp. ***Andamanica***

Myristica glaucescens auct. non (Jack) Hook.f. & Thomson: Fl. Brit. India **5**: 111 (1886) *p.p. quoad sp. andamanica tantum*; C.E. Parkinson, Forest Fl. Andaman Isl.: 223 (1923).

Myristica glaucescens (Jack) Hook.f. & Thomson var. *andamanica* auct. non (Warb.) J. Sinclair: Thoth. & al., Bull. Bot. Surv. India **15**: 255 (1973).

Myristica glauca auct. non Blume: King, Ann. Roy. Bot. Gard. (Calcutta) **3**: 320, pl. 157 (1891) *p.p. quoad sp. andamanica tantum*; Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. **62** (2): 74. (1893).

Trees. Twigs slender, 2–3 mm in diam; puberulous. Petiole 7–15×1–1.5 mm; lamina elliptic to broadly elliptic, 14.5–25.6×4.5–8 cm, obtuse to cuneate, acute to acuminate, chartaceous, glabrous; secondary veins 15-22 pairs. Tubercles 2–5 mm long, densely puberulous; hairs 0.1–0.2 mm. Male inflorescence 5–6 flowered; pedicels 4–10×0.5–1mm, filiform; bract basal to pedicel; bracteole annular, apical to pedicel; bud ellipsoid-oblong, 4.5–5×5–6.5 mm, tepals elliptic, 2.5–3.5×2–2.5 mm, acute, stellate; stellate hairs ca. 0.1 mm; disc flat, triangular to globose, 0.8–1 mm in diam; anthers 9–12, shortly striped; stalk 1.3–1.35 mm long. Female inflorescence 2–3 flowered, pedicels 2–4 mm long, c. 2 mm broad, bracteole apical to pedicel, bud 3–6 mm long, 4.5–6 mm broad, ellipsoid; tepals 4– 5×2.5–3 mm, elliptic, acute, striate, stellate; hairs ca. 0.15 mm; ovary 2.5–3 mm long, 2.5–3 mm broad, pilose, brown; style 0.5–0.7 mm long, stigma lobulate. Fruit stalk 4–6×2–2.5 mm, puberulous, hairs 0.1–0.2 mm long, fruits 1–3, ellipsoid, 1.5–1.9×1.2–1.4 cm, slightly pointed at apex, pericarp 0.2–1 mm thick, puberulous-glabrous; seed ellipsoid.

Distribution and status: INDIA: ANDAMAN AND NICOBAR ISLANDS (North Andamans, Rampur near Mayabandar, Middle Andamans, South Andamans, Mount Harriett, Jusonabad, Long island, Diamond island), Little Andamans, & Nicobar Islands (Narcondam Islands, Katchall Islands, Great Nicobar) and endemic.

Fl.: Nov–Feb.; Fr.: Jan–May; Dec.

Habitat: Grows upto 30m.

Vernacular Names: Jhaiphal

Note: *K. cinerea* (Poir.) Warb. var. *andamanica* (Warb.) J. Sinclair was treated as a heterogenous combination of several taxa (Sinclair 1961) which were treated separately under *K. angustifolia*, *K. anadamanica* subsp. *nicobarica* and *K. lenta*.

Specimens examined: **INDIA**, ANDAMAN & NICOBAR ISLANDS: Andaman Islands, *Dr Buchanan Hamilton s.n.*, fl. (BM); North Andamans, Narcondam, March 1891, *David Prain s.n.*, fr. (K, BM)**;** Middle Andamans, Baratang-Pa-fig, 10.2.1915, *C.E. Parkinson 284*, fr., female fl. (K); South Andamans, *S. Kurz s.n.* (K); South Andamans, 12.12.1900, *R.L. Heining 218*, fl. (CAL); Havelock island, 30 m, 15.5.1974, *R. Ansari 1386*, fr (CAL); North Nicobars, Mildara, Katchal Forest edge, 30m, 10.8.1974, *P. Chakraborty 2017*, fl, fr (CAL).

6.2 subsp. ***nicobarica*** (Warb.) W.J. de Wilde, Blumea **25**: 372 (1979) & Fl. Males., Ser. 1, Spermat. **14**: 244. (2000).

K. glauca Blume var. *nicobarica* Warb., Monog. Myrist.: 596 (1897). Lectotype: INDIA, Nicobar Islands, *King's Coll. 536* (lectotype L *n.v.*, duplicates BM!).[designated by W.J. de Wilde, Blumea **25**: 372 (1979).]

It differes from the type subspecies in having 6 or 7 numbers of half sessile anthers and c. 7 mm long fruit stalk.

Distribution: India (Nicobar Islands), Peninsular Thailand, Malaysia (Penang) and Indonesia (N. Sumatra).

Habitat: Grows up to 1200m.

Fr.: Feb.

Specimens Examined: **INDIA**, ANDAMAN & NICOBAR ISLANDS: Nicobar islands, Kamorta, 2/75, *S. Kurz s.n.*, fl. (CAL); Nicobars, Nutung, Feb 1875, *S. Kurz 26088*, fr (K, BM).

6.3 subsp. ***peninsularis*** W.J. de Wilde, Blumea **25**: 372 (1979) & Fl. Thailand **7**: 751. 2002; L. Rasingam & G.K. Upadhyay, Taiwania **58**: 295. 2013. Type: Thailand (Peninsular Thailand), Trang, Khao Chong, 30 Dec. 1968, *S. Phusomsaeng* 45, fl (L; iso AAU, C!, P).

This subspecies differs from the type subspecies in having 9–11 anthers half sessile.

Distribution: India (Andaman & Nicobar Islands), Thailand.

Habitat: Forest up to 100m altitude.

Fl.: Nov. –Dec.

Note: This subspecies is included here based on Rasingam & Upadhyay, 2013.

7.*Knema angustifolia* (Roxb.) Warb., Monog. Myrist.: 561 (1897) *p.p. quoad* type; W.J. de Wilde, Blumea **25**: 374 (1979); Deb, Fl. Tripura **1**: 100 (1981) *p.p.* excl. syn. *M. erratica*, *M. longifolia* var. *erratica*, *M. corticosa*; N.P. Balakr., Fl. Jowai **2**: 400 (1983) *p.p.* excl. syn. *M. erratica*, *M. longifolia* var. *erratica*; Harid. & R.R. Rao, Forest Fl. Meghalaya 2: 712 (1987) *p.p.* excl. syn. *M. erratica*, *M. longifolia* var. *erratica*. *Myristica angustifolia* Roxb., Fl. Ind. (Ed. Carey) **3**: 847 (1832); Icon. 2572 ined. K!, CAL !. Lectotype: BANGLADESH, East Bengal, *Roxburgh s.n.*, male fl. (lectotype BM!, upper right hand *specim.*). [designated by W.J. de Wilde, Blumea **25**: 374 (1979)]. **Plate 4**

Myristica gibbosa Hook.f. & Thomson, Fl. Ind. **1**: 158 (1855); A. DC., Prodr. **14** (1): 205 (1856); Hook.f., Fl. Brit. India **5**: 112 (1886); King, Ann. Roy. Bot. Gard. (Calcutta) **3**: 321 (1891) *p.p., pl.* 159 *p.p., quoad fr.*; A. Das, in Kanjilal & A. Das (Eds.), Fl. Assam **4**: 46 (1940). Syntypes:- INDIA, Meghalaya (Assam), Khasia Hills, Regio. Subtrop., 914m, *J.D. Hooker & Thomson s.n.*, fr., *p.p.* excl. *C.B. Clarke 43779 B* (BM!); Regio. Subtrop., Cherra, 18 June 1850, *J.D. Hooker & Thomson 1082*, fr. (K!).

Myristica laurifolia auct. non Hook.f. & Thomson: A. Das, In Kanjilal & A. Das (eds.), Fl. Assam **4**: 42 (1940), *p.p. quoad specim* at ASSAM.

Knema cinerea (Poir.) Warb. var. *andamanica* auct non (Warb.) J. Sinclair: J. Sinclair in Gard. Bull. Singapore **18**: 174 (1961) *p.p.quoad syn. M. angustifolia, M. gibbosa*.

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Plate 4. ***Knema angustifolia*** (Roxb.) Warb.: **A.** Habit, **B.** Leafy twig, **C.** Young male inflorescence, **D.** Male flower, **E.** Anthers in Disc, **F.** Mature Fruit, **G.** Androecium, **H.** Infructiscence, **I.** L.S. of Fruit. Scale bars: **C** = 3.5 mm, **D** = 1.5 mm**, E** = 0.5 mm, **F** = 1 cm, **G** = 1 mm, **H** = 2.5 cm, **I** = 2.5cm.

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Trees 20 ft. Twigs slender, 1.5–2.5 mm in diam, puberulous to glabrous; hairs dendroid 0.1–0.15 mm long. Petiole 0.8–1.6×1–1.5 mm; lamina elliptic, 13.6–15.6×2.5–3.8 cm, chartaceous, cuneate, acuminate, glabrous, brown to blackish; secondary veins 17-20 pairs. Tubercle 0.5–1.5×0.2–0.5 mm, unbranched to branched. Male inflorescences 7–8 flowered; pedicels 2–3×0.2–0.7 mm, filiform, faintly puberulous; hairs stellate, bract basal to pedicel; bracteole annular to ovate, median to apical; bud ellipsoid, 4–4.5×3–3.5 mm, tepals obovate, 1–2.5×1.5–2 mm; faintly stellate; stellate hairs 0.1–1.25 mm long; disc flat, rounded to slightly elliptic, 0.6–1×0.5–0.7 mm; anthers 9–10, obliquely stiped; stalk 1.5–1.8 mm long, striate. Female inflorescence 1–2 flowered; flower subsessile, bud 4–5 ×3–4 mm, ellipsoid; tepals obovate, 2–2.5×1.5–2 mm, acute, faintly stellate; hairs 0.1–0.25 mm long; ovary 2–3×2–2.5 mm, puberulous; style 0.15–0.25 mm long; stigma 0.2–0.5 mm long, 2-lobed. Fruit stalk 0.5–1.2 cm long, 0.2–0.4 cm broad; fruits 1–2, ellipsoid, 2.5–3×1.8–2 cm, gibbous or saccate at base, obliquely pointed at apex, finely puberulous, hairs stellate 0.15–0.25 mm long; pericarp 0.2–5 mm thick; seed ellipsoid.

Distribution: India (Assam, Arunachal Pradesh, Meghalaya, Mizoram, Tripura), Bangladesh, N. Myanmar.

Fr.: June–Aug.

Habit: Medium sized tree in primary forest, scatteredly distributed.

Vernacular Names: Mota-pasuti, Tezranga, Mamui (Asasmese); Bol-lanchi (Garo); Dieng-son-lang-snam (Khasi); Ramguwa (Nepali); Thingenthip (Kuki).

Uses: Red latex is used as varnish and used as astringent, also for dysentery and in mouth sores (Anonymous 1956).

Note: The present study revealed that the deposited specimens of *Knema angustifolia* and *Knema erratica* in ASSAM were inadvertently treated in Flora of Assam as *Myristica laurifolia* Hook.f. & Thomson. But *M. laurifolia* is a synonym of *M. dactyloides* Gaertn. and *M. dactyloides* is distributed in Srilanka and does not occur in India.

Specimens examined: **INDIA**, ARUNACHAL PRADESH, Lohit valley, Deuning Outpost, 28˚0´N, 96˚15´E, 2000ft., 4 March 1928, *F. Kingdon Ward 7913*, fr. (K); Walong, (Khasia), 3000 ped., 11 May 1886, *C.B. Clarke 43779B*, fr. (BM); NEFA (Tirap FD), Longsek hillock (Chenglang), 1500m, 18 June 1961, *D.B. Deb 25722*, fr. (ASSAM, CAL); Lower Subansiri District, Doimukh-Sagali Road, 26 October 1985, *G.D. Pal 1926*, male flower (BSI/ARUN); ASSAM, Jorhat district, (Sibsagar Dist), Holongapar, 12 January 1914, *S. Sonowal 7*, fr. (ASSAM); Holongapar, 350 ft, 25 April1913, *U.N. Kanjilal 2180* (ASSAM); Holongapar Gibbon WLS, compartment 2, N26˚68138; E094˚34885, 12 November 2013, *D. Banik & P.P. Bora 4228*, male fl (NEIST); N26˚68138; E094˚34885, 12 November 2013, *D. Banik & P.P. Bora 4229*, female fl (NEIST); 112m, N26˚68076; E094˚34933, 12 November 2013, *D. Banik & P.P. Bora 4231* (NEIST); Cachar District, Bhuban hill, 2800 ft., 2 December 1914, *U.N. Kanjilal 4804*, male fl. (CAL, ASSAM); MEGHALAYA, Khasia, *Griffith 692*, male fl. (K); [East Bengal], *Griffith 4348*, male fl. (K); Khasia, 3000 ped. *J.D. Hooker & T. Thomson s.n.* (BM); fr. (CAL); K & J Hills, Um Dokha valley, 3000 ft., 18 October 1913, *U.N. Kanjilal 2755*, male fl. (ASSAM); Dawki forest, 26 April 1940, *G.K. Deka 19315*, fr. (ASSAM); Garo hills, Mahadew forests, 16 May 1932, *A. Das* through *Sri Ram Sharma 10055*, fr. (ASSAM); MIZORAM, Flora of Lushai Hills, Hauruang (4 Km from Lungleh), 2220 ft, 27 January 1963, *D.B. Deb 31388* (ASSAM); Kolasib to Chummliang, 13 June 1963, *R.M. Dutta 33307*, fr. (ASSAM); TRIPURA, Chailengta, 17 August 1960, *D.B. Deb 2695*, fl. & fr.; Hmanpui (Monpui)–Vaughman, 22 January 1962, *D.B. Deb 27025*, female fl. (CAL); North Tripura, Tlangsang, 2460 ft, 26 January 1962, *D.B. Deb 27170* (ASSAM); Tlangsang to Sabual, N23˚67´19.0´´; E092˚16´36.8´´, 26 May 2014, *D. Banik & P.P. Bora 4280*, fl (NEIST); Behliangchip, N23˚56´59.8´´; E092˚16´45.4´´, 26 May 2014, *D. Banik & P.P. Bora 4282*, fr. (NEIST).

8.*Knema linifolia* (Roxb.) Warb., Monog. Myrist.: 558, t. 24, figs. 1–3 (1897); A. Das in Kanjilal & A. Das (Eds.), Fl. Assam **4**: 44 (1940); J. Sinclair, Gard. Bull. Singapore **18**: 256, fig 17 (1961); Deb, Fl. Tripura **1**: 100 (1981); W.J. de Wilde, *Blumea* **25**: 366 (1979); Harid. & R.R. Rao, Forest Fl. Meghalaya **2**: 712 (1987); H.G. Shu Shu in Z.Y. Wu, P.H. Raven & D.Y. Hong (Eds.), Fl. China **7**: 97 (2008). *Myristica linifolia* Roxb., Fl. Ind. (Ed. Carey) **3**: 847 (1832); Brandis, Indian trees: 523 (1906). Type: BANGLADESH, Chittagong, 1811, *Roxburgh 252*, fl. (holotype BM!). **Plate 5**

Myristica longifolia Wall. ex Blume, Rumphia **1**: 188 (1835); Hook f. & Thomson, Fl. Ind. **1**: 156 (1855), *p.p.* excl. Malesian spp.; A. DC., Prodr. **14** (1): 204 (1856), *p.p.*; Miq., Fl. Ind. Bat.**1** (2) : 69 (1858), *p.p.*; Kurz, Forest Fl. Burma: 283 (1877); Gamble, Man. Ind. Timb.: 314 (1881); Hook.f., Fl. Brit. India **5**: 110 (1886), *p.p.* excl. var. *erratica*; C.B. Clarke, J. Linn. Soc., Bot. **25**: 62 (1889); King, Ann. Roy. Bot. Gard. (Calcutta) **3**: 324 pl. 164, 166 (1891); V.S. Rao, Trees Duars & Terai: 80 (1957), *p.p.* excl. var. *erratica*. Type: BANGLADESH, (Assam), Mt. Sylhet, 1832, *J.D. Hooker, W.G. et R.B.*, Wall. Cat. 6801, male fl. (K-W!, duplicates BM!, K!, CAL!, E!).

Myristica clarkeana King, Ann. Roy. Bot. Gard. (Calcutta) 3: 325, pl. 165 (1891). *K. linifolia* (Roxb.) Warb. var. *clarkeana* Warb., Monog. Myrist.: 561 (1897). Syntypes: ASSAM Sibsagar, Peel 90 (CAL!); BANGLADESH, Kodala hill, 30 miles from Chittagong, August 1883, King's collector (Badal Khan) 97, male fl., (CAL!), K!; February 1886, Badal Khan 412, fl., (CAL!, duplicates L, DD, PDA); Hill tracts, 32 miles from Chittagong, July 1887, King's collector 496, fr., (CAL!, K!); 34 miles from Chittagong, October 1887, Badal Khan (King's ollector) 605, male fl. (CAL!, duplicates BM!, K!.).

Trees 30–80 ft. Twigs stout, striate, angular, tomentose to glabrous; hairs dendroid, 0.15–0.3 mm long. Petiole (-0.9) 1–2.2 (–3.5) cm long, sulcate, striate, tomentose to puberulous; hairs 0.25–0.7 mm long; lamina elliptic–oblong to oblong-lenceolate, (–20)23.2–50.6(–59.4) (-74)×(–5.8) 7.5–12.1 (–15.00) cm, obtuse to emerginate (-cuneate), acute to acuminate to bluntly acuminate, glaucous above, puberulous to tomentose at base; hairs 0.15–0.2 mm long; secondary veins 21–40 pairs. Tubercles 0.5–1 cm long, stalk upto 0.3 mm long, tomentose. Male inflorescence 6–9-flowered; pedicel stout, 8–10 mm long, tomentose; bract basal to pedicel, triangular; bracteole triangular to semilunar, persistent, 2–5 mm from base; bud ellipsoid-oblong, 7–10 mm long, 5–8 mm broad; tepals obovate, acute, tomentose, hairs

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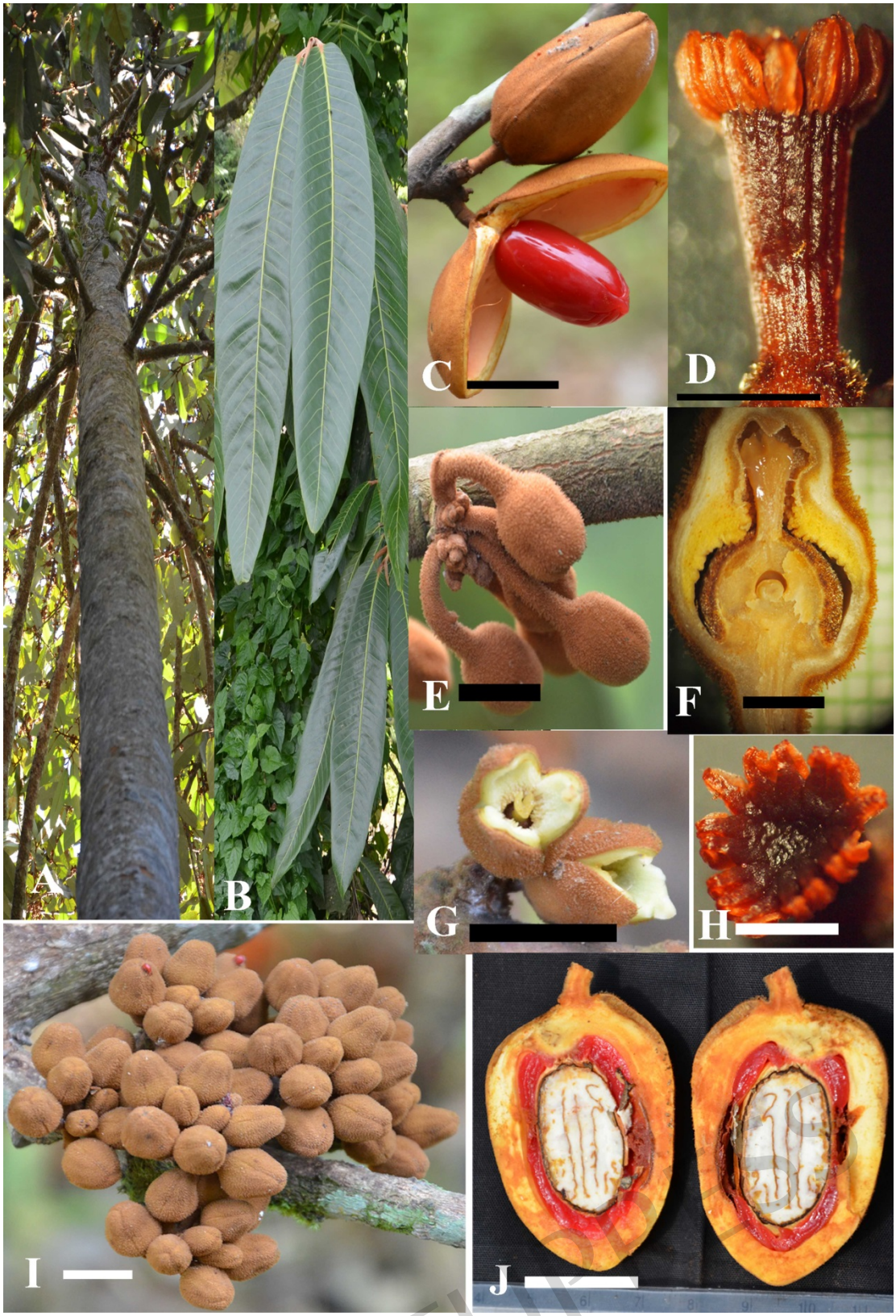


Plate 5. ***Knema linifolia*** (Roxb.) Warb.: **A.** Habit, **B.** Leafy twig, **C.** Mature fruits, **D.** Androecium, **E.** Male inflorescence, **F.** L.S. of female flower, **G.** Female flowers at anthesis, **H.** Anthers in disc, **I.** Female inflorescence, **J.** L.S. of Fruit. Scale bars: **C** = 2 cm, **D** = 1.5 mm, **E** = 8 mm, **F** = 3 mm, **G, I, J** = 1 cm, **H** = 1.5 mm.

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0.2–0.7 mm long; disc concave at middle, elliptic to slightly triangular, 1 mm long, 2.75–3 mm broad; anthers 11–16, sessile; stalk 2.5–4 mm long. Female inflorescence 3–4-flowered; pedicel c. 2 mm long, c. 2.5 mm broad; bud 8 - 12 mm long, 5.5–10 mm broad; tepals acute, tomentose; ovary triangular, 3 mm long, 4 mm broad, pilose; style 0.5 mm long, glabrous; stigma 1.5 mm long, 2 lobed, each lobe 2 lobulate, lamellate, undulating at apex. Fruit stalk 5–10 mm long, puberulous; fruit 3.2–3.7 cm long, ellipsoid, annular at base, blunt to pointed at apex, puberulous to glabrous; pericarp 2.5–3 mm thick; seed ellipsoid.

Distribution: Bhutan (Samchi, Sarbhang and Gyegphug dist), India (Assam, Meghalaya, Western Manipur, Mizoram, Nagaland, Tripura, Sikkim, West Bengal), Bangladesh (Chittagong) and Myanmar, China (SW Yunnan)

Fl.: Oct–Dec.

Fr.: Feb–Sept.

Habitat: Grows in between 137–854m, shaded places in primary forests.

Vernacular names: Tagling-asing (Abor); Se (Manipur); Tring-thi (Lushai); Garo-bhala, Pati Honda, Nigoni Gua (Assamese); Dieng-soh-langor-Shri; Dieng-sohslung, Dieng-tyrkhou, Khasia coli (Khasi); Chekulo-arong (Mikir); Duing-Kim-Chi-Ching (Naga); Bolanchi (Garo); Ramgua (Nepali); Rokto (Bengali).

Uses: Fruits intoxicating and purgative and wood used for construction work.

Specimens examined: **INDIA**, ARUNACHAL PRADESH, Duphla hills, Camp 3 & 4, 15 February 1875, *J.L. Lister 336* (CAL); Rotung, 1000 ft., Abor Expedition, 31 December 1911, *I.H. Burkill 37607*, fl. (CAL); Tirap F.D. (NEFA), Longshek hillock (Chenglang), 1500m, 18 June 1961, *D.B. Deb 25723*, fr. (ASSAM); Tirap District, Borduria, Evergreen Forest, 13 June 1983, *K. Haridasan* 0689, male flower (APFH); Papum Pare, Bath village to towards Poma, 299m, N27˚04.593´; E093˚33.807´, 3 August 2013, *D. Banik & P.P. Bora 4224*, male fl. (NEIST); ASSAM, Towards Negrijan, Griffith s.n. (CAL); Dibrugarh, December, *Masters 1122* (CAL); Assam, *Jenkins s.n.*, male fl. (CAL, K, E); Sibsagar, Naharani, 10 March 1894, *J.S. Peal s.n.* (CAL); (East Bengal), Below Nowgong, 20/95, *Griffith s.n.*, male fl (K); Sibsagar, Mikir Hill, Kaziranga, 265 ft., 22 January 1914, *U.N. Kanjilal s.n., 75P*, fl. (ASSAM); Jorhat district, Tilikium Bezgaon, 19 January 2013, *D. Banik & P.P. Bora 4203*, fl (NEIST); Holongapar Gibbon WLS, compartment 2, N26˚73677; E094˚15710, 12 November 2013, *D. Banik & P.P. Bora 4227*, female fl (NEIST); North Cachar hill district, Borail range, Kangkhali, N24˚58´08.8´´; E092˚45´49.5´´, 2 June 2014, *D. Banik & P.P. Bora 4293*, fr. (NEIST); MANIPUR, Mookoo, 3 November 1885, *C.B.Clarke 42324A*, left specimen (BM); 750 ft., Muneypoor, 30 November 1885, *C.B. Clarke 42324E* (CAL); MEGHALAYA, Khasia, *Griffith 441*, female fl. (K); India Orient Wallich, Ex Herb. *R. Brown*, fl., *Acc. No. 381805* (CAL); Khasia Hills, 3000 ft, *G. Mann 333*, fr. (CAL); Khasia & Chittagong, *J.D. Hooker & T. Thomson s.n.* (CAL); Khasi hills, Herb. *S. Kurz s.n.* (CAL); Khasia, Nongpo, 2000ft, 4 October 1885, *C.B. Clarke 40679B, 40679E* male fl. (E, BM); Khasia, 2000 ft., *C.B. Clarke 40679A* (CAL); Garo hills, 1000 ft., Dec 1885, *G. Mann s.n.*, fl. (CAL); MIZORAM, Lushai hills, 1890, *J.C. Prazer s.n.* (CAL); 15 miles SE of Lungleh, 3-4000 ft, 7 April 1899, *A.T. Gage 152*, fr. (CAL); NAGALAND, Naga hills, Piphewed, 7000 ft., 1 March 1882, *H. Collett 98*, fr. (CAL); Dandobbin Nodu, Jaboca near Naga hills, Jan 1899, *Dr Prain's collector 680*, fl. (CAL); SIKKIM, 2000 ft, *G. King s.n.*, fr., (CAL); March 1975 (3/75), *J.D. Hooker & T. Thomson 623* (CAL); Sikkim Himalayas, *G.H. Cave s.n.*, fl. (LLOYD); Sikkim, Selik, 2000 ft., June 1900, *G.H. Cave s.n.* (LLOYD); TRIPURA, Kailashahar, 16 August 1960, *D.B. Deb 2663* (CAL); Hmanpui to Vaughman (Monpui to Vaughmun), 22 January 1962, *D.B. Deb 27018* (CAL, ASSAM); WEST BANGAL, Mongpoo, 1000 ft., 5 October 1884, *C.B. Clarke 36267*, fr. (CAL); Mungpho, 20ft., 11 December 1877, *G. King s.n.*, fl (LLOYD); Kalijhora, 1000 ft, 11 April 1910, *Ribu & Rhomoo 4087* (CAL, LLOYD).

A few acronyms used in the text for herbaria not mentioned in Index Herbariorum (Holmgren *et al.*, 1990) are given here. APFH: The Herbarium, State Forest Research Institute, Arunachal Pradesh, Itanagar, 791111, LLOYD: The Herbarium of Llyod's Botanical Garden, Darjeeling, West Bengal 734101, NEIST: The Herbarium, CSIR-NEIST, Jorhat, Assam - 785006.

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