

NOTES ON THE FAMILY LAURACEAE FROM INDIA AND ITS ADJOINING COUNTRIES I

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A B S T R A C T

Twenty five new taxa belonging to genera *Beilschmiedia* Nees, *Cinnamomum* Schaeff., *Cryptocarya* R. Brown, *Dehaasia* Blume, *Persea* Mill. and *Phoebe* Nees have been described and illustrated here. Another 8 species have been recorded for the first time from Bangladesh, India, Myanmar and Nepal. A new synonym has been appended.

1. *Beilschmiedia bhutanica* M. Gangop. sp. nov.

B. roxburghianae Nees affinis, sed differt inflorescentiis crassis dense rubellovillosis, floribus cum tepalorum lobis late ovatis et fructu magno obovoideo.

Holotypus : N. P. Balakrishnan 41942 (ASSAM).

Allied to *B. roxburghiana* Nees, but differs in having stout, densely reddish villous inflorescences, flower with broad ovate tepal lobes and large obovoid fruit.

Tall trees, ca 12 m high. Branchlets terete, pale yellowish, to 7 mm diam., rough with leaf scars and lenticels, glabrous, gradually compressed, angled, blackish above, crown puberulous at utmost apex; buds ovate, ca 4 × 2.5 mm, acuminate, pilosulous. Leaves crowded near apices, thinly coriaceous, dark grayish above, pale brown beneath, ovate, elliptic-ovate or obovate-oblong, 9-15.5 × 4.5-7.5 cm, unequally cuneate or cuneate + acute at base, slightly decurrent at extreme base, incurved along margin, obtuse and bluntly apiculate or subacuminate at apex, glabrous; midrib slender, flat, shallow grooved below, slightly raised along length above, stout, terete or squarish beneath, irregularly canaliculate; lateral nerves to 7 pairs, distant, arcuate, slender, raised above, stouter beneath, minutely looped along margin; tertiary nerves prominent; minor nervules laxly reticulate, prominent; petioles 12-20 mm long, 1.5-2 mm wide, concave above, glabrous. Panicle axillary, stout, reddish villous, 1.5-2.5 cm long; peduncles 6-10 mm long, ca 2 mm wide, terete below, angled above, ebracteate at base; branches short, squarish; bracteoles deciduous. Flowers cupular-campanulate, ca 5 × 3 mm; pedicels ca 2 × 1 mm, densely villous. Tepals 3 + 3, ovate, thin, anastomosing hidden, concave ventrally, pilose dorsally, puberulous inside, outer: ca 1.5 × 1.5 mm, subacutish; inner: ca 2.5 × 2 mm, obtuse. Stamens 9, 3 in each whorl, anthers 2-locular, filament sparsely villous, whorl I and II introrse, of III extrorse, biglandular; I whorl: ca 1.2 mm long, filament ca 0.5 mm long, anther oval, obtuse; II whorl:

ca 1.2 mm long, filament *ca* 0.5 mm long, anther oval, retuse; III whorl: *ca* 1.5 mm long, gland *ca* 0.7 mm long, stipe short, head ovate; filament *ca* 1 mm long, anther narrow oblong, obtuse; IV whorl (staminodes 3): *ca* 0.9 mm long, stipe *ca* 0.3 mm long, head oval, acutish, ventrally grooved. Pistil glabrous, *ca* 2.2 mm long; ovary ovoid, *ca* 1 × 0.8 mm, smooth; style stout; stigma thin, peltate. Fruit (detached) obovoid, *ca* 45 × 25 mm, obtuse at apex, tapering to base, dark brown, glabrous, scattered whitish pustulate. (Fig. 1)

Fl. : March (pinkish); *Fr.* : March (green to dark pink appears black from a distance, pink inside of young ones).

Distrib. : Bhutan.

Ecology : Grows on rocky loam at the edges of the forests.

Holotype : Eastern Bhutan, on the way to Samdrup Jankar from Narfong, 29.3.1965, N.P. Balakrishnan 41942 (ASSAM).

The fruits of *Beilschmiedia roxburghiana* are cylindric oblong or ellipsoid oblong, 36-38 mm long, 12-15 mm across; tepal lobes linear-oblong or narrow ovate oblong, *ca* 1 mm wide.

2. *Cinnamomum bhamoensis* M. Gangop. *sp. nov.*

C. burmannii (C.G. & Th. Nees) Bl. affinis, sed differt foliis supra nervis nervulisque impressis, acuminibus latis longisque, floribus cum pedicellis minutis.

Holotypus : ? Cubitt 531(CAL).

Allied to *C. burmannii* (C. G. & Th. Nees) Bl., but differs in having leaves with impressed nerves and nervules above, broad and long acumens and flowers with very short pedicels.

Stature unknown. Branchlets terete, coppery brown, to 3 mm diam., smooth, glabrous, gradually compressed above; terminal buds absent. Leaves alternate below, subopposite above, coriaceous, glossy, pale light green above, glaucous beneath, elliptic to ovate-elliptic, 13-16.7 × 4-5 cm, subequally to unequally acuminate or acute + cuneate at base, slightly decurrent at extreme base, margin thin, incurved, acuminate (acumens 20-25 mm long, broad and obtuse, minutely apiculate at tip) at apex, glabrous, 3-nerved, accessories reach up to base of acumen, impressed above, raised beneath; lateral nerves prominent near margins forming large loops, impressed above; tertiary nerves parallel and forked, impressed above; minor nervules finely reticulate, faint above, obscure beneath; petioles 15-18 mm long, 1.5-2 mm wide, flat and shallow concave above, glabrous. Panicle axillary and terminal, solitary, 4-7 cm long, pilose; peduncle stout, 2-5 cm long, 1.5-2 mm wide, squarish, with prominent scale-scars; branches and branchlets ascending; bracteoles deciduous; flower congested. Flowers infundibuliform, *ca* 10 × 8 mm, pilose, pedicel *ca* 2.5 mm long, *ca* 1 mm wide, stout, squarish. Cup obconic, *ca* 2.5 × 4 mm; tepals 3 + 3, anastomosing prominent, villous at base and pilose at apex inside, margin slightly inflexed; outer: broad elliptic, *ca* 5.8 × 2.8 mm, thin, acutish, inner: obovate, *ca* 5.5 × 2.5 mm, thin, subacutish. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular, filament flat, villous at base; I whorl: *ca* 4.8 mm long, filament

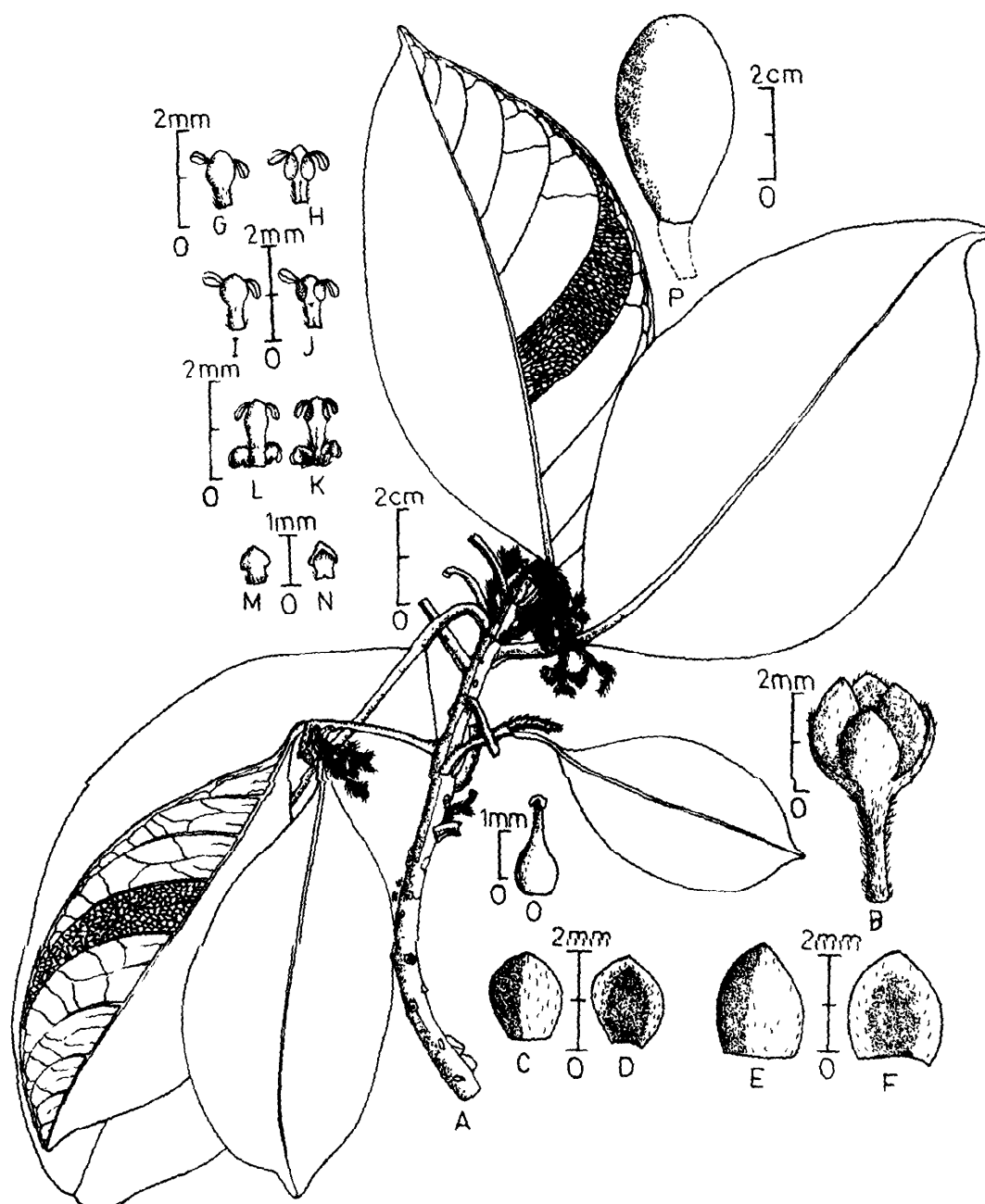


Fig. 1 : *Beilschmiedia bhutanica* M. Gangop. :

A. Flowering branch; upper leaf: upper surface; lower leaf: lower surface; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem ventral view; G-N. Stamens and staminodes: G. Whorl I dorsal view; H. Idem ventral view; I. Whorl II dorsal view; J. Idem ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl.IV dorsal view; N. Idem ventral view; O. Pistil; P. Fruit (after type).

ca 2.8 mm long, anther narrow oblong, obtuse, sparsely fine puberulous; II whorl: *ca* 4.5 mm long, filament *ca* 2.3 mm long, anther ovate-oblong, obtuse or retuse, fine puberulous; III whorl: *ca* 5 mm long, glands attached *ca* 1.5 mm high on filament, stipe short, slender, villous, head oblong, acutish; filament *ca* 2.7 mm long, anther oblong, retuse; IV whorl (staminodes 3): *ca* 2.5 mm long, stipe *ca* 1.3 mm long, head ovate, cordate at base, subacutish at apex, ventrally concave, dorsally villous. Pistil *ca* 5.2 mm long, ovary ovoid-oblong, *ca* 1.5 × 1 mm, smooth; style squarish, sparsely sericeous above, stigma *ca* 1.8 mm long, thin, reflexed, obliquely 2-lobed, each half lobulate. Fruits not seen. (Fig. 2)

Distrib. : Myanmar.

Holotype : Bhamo, ? 1910, ? Cubitt 531 (CAL).

This species looks like *Cinnamomum impressinervium* which has ovate to ovate elliptic leaves but differs in having sunken tertiary nerves above. The flower cup of *C. bhamoensis* is about 7.5 × 8 mm and pedicel up to 2.5 mm long, where as cup of *C. burmannii* is about 6.5 × 5 mm and pedicel up to 7 mm long and *C. impressinervium* bears the cup up to 4 × 4 mm and pedicel to 8 mm long.

3. *Cinnamomum bhaskarii* M. Gangop. *sp. nov.*

C. cupulatum Kosterm. affinis, sed differt foliis late ovatis, inflorescentiis floribusque subtiliter sericeis.

Holotypus : D.K.S. 1869 (APFH).

Allied to *C. cupulatum* Kosterm., but differs in having broad ovate leaves, inflorescences and flowers fine silky puberulous.

Trees. Branchlets slender, terete, *ca* 3 mm diam., appressed pilosulous, gradually compressed, squarish, shallow channelled above. Leaves opposite, thinly coriaceous, greenish above, pale brown beneath, ovate, rarely ovate-oblong, 15-19 × 4.2-7 cm, glabrous (young one pilosulous beneath), obtuse and then cuneate at base, slightly incurved along margin, subacuminate (acumen to 7 mm long, subacute) at apex, 3-nerved, accessory nerves reaching to acumen-base, slender, raised above, flat and canaliculate beneath, penninerved towards margin, faint, lateral nerves of central one 2-3 pairs, slender, arcuate, merging with accessories at tip; tertiary nerves slender, scalariform, forked; minor nervules areolate-reticulate, prominent above; petioles 8-12 mm long, 1.5-2 mm wide, flat and shallow channelled above, tomentellous. Panicle axillary, solitary, slender, 9.5-11 cm long, sparsely fine sericeous; peduncles flat, 5-5.5 cm long, *ca* 1 mm wide, shallow channelled; branches ascending, near apices. Flowers: cupular, *ca* 11.5 × 5.5 mm long, pedicellate, sericeous; pedicels 6-7 mm long, 0.5-1 mm wide, shallow channelled. Cup *ca* 1 × 1.25 mm, narrow oblong-ovoid; tepals 3 + 3, subacutish, thin, anastomosing faint, concave ventrally, fine sericeous inside; outer: ovate, *ca* 3 × 2.2 mm; inner: obovate-elliptic, *ca* 3 × 1.9 mm. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular, filament thin, flat, pilosulous; I whorl: *ca* 2.9 mm long, filament *ca* 1.9 mm long, anther oblong-ovate, truncate; II whorl: *ca* 3 mm long, filament *ca* 1.9 mm long, anther oblong-ovate, mucronulate; III whorl: *ca* 3 mm long, glands attached on filament *ca* 0.9 mm high, stipe short, head sagittate; filament *ca* 1.8 mm long, ventrally glabrous, anther narrow oblong; IV whorl (staminodes 3): *ca* 2 mm long, stipe *ca* 1.2 mm long, ventrally glabrous, head sagittate, subacuminate,

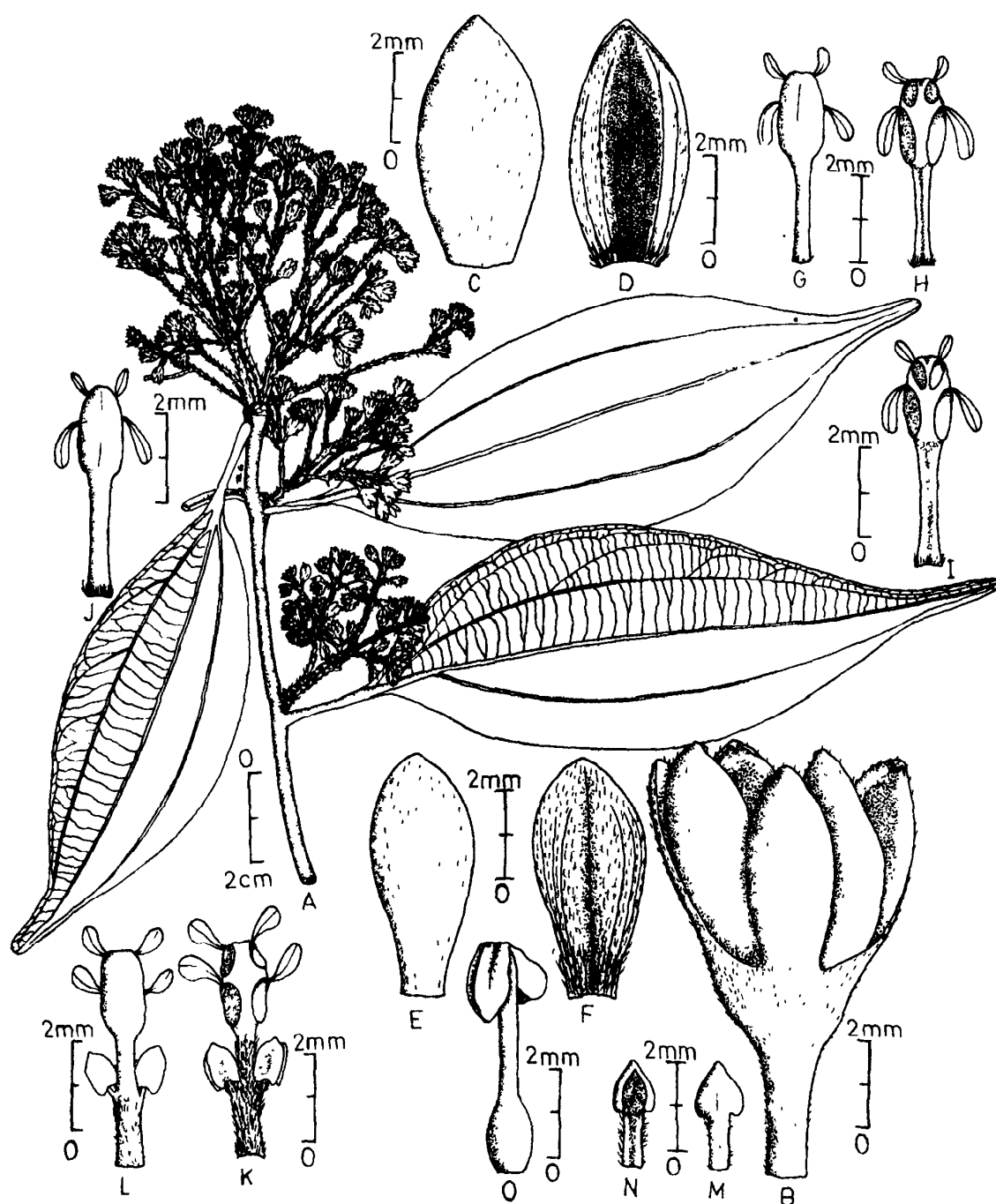


Fig. 2 : *Cinnamomum bhamoensis* M. Gangop. :

A. Flowering branch; left hand side: upper surface of leaf; right hand side: lower surface of leaf; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem-ventral view; G-N. Stamens and staminodes: G. Whorl I dorsal view; H. Idem ventral view; I. Whorl II dorsal view; J. Idem -ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl IV dorsal view; N. Idem ventral view; O. Pistil (after type).

ventrally shallow concave. Pistil glabrous, *ca* 3 mm long, ovary ovoid, *ca* 1.2 × 0.8 mm, smooth; style thin, flat, bent at tip; stigma thin, obliquely peltate, margin dentate. Fruits not seen. (Fig. 3)

Fl. : April (white).

Distrib. : India.

Ecology : Grows in wet evergreen montane forests.

Holotype : Arunachal Pradesh: Lower Subansiri district, Chessa, 6.4.1995, D.K.S. 1869 (APFH).

The specific epithet is contributed to my son Sri Bhaskardyuti Gangopadhyay.

4. *Cinnamomum bishnupadae* M. Gangop. *sp. nov.*

C. tavoyanum Meissn. affinis, sed differt foliis angustis oblongis coriaceis glabris, inflorescentiis glabris perlongioribus, floribusque parvis cupularibus.

Holotypus : Native collectors of Bot. Gard. Calc. s.n., acc. no. 384320 (CAL), iso., in CAL;
Paratypus : G Panigrahi 11136 (CAL); iso., in ASSAM.

Allied to *C. tavoyanum* Meissn., but differs in having narrow oblong coriaceous glabrous leaves, more elongated glabrous inflorescences and small cupular flowers.

Trees, *ca* 13 m high. Branchlets terete, brown, to 4 mm in diam., with corky patches, glabrous, gradually slender, quadrangular, compressed, blackish above, scattered warty; terminal buds ovate, *ca* 4 × 2.5 mm, acuminate, glabrous excepting villous acumens. Leaves opposite above, subopposite below, stiffly coriaceous, glossy, pale greenish-brown above, paler beneath, usually narrow-oblong, sometimes narrow ovate-oblong, (7-) 12-16 × 2-3.5 cm, glabrous, equally or subequally acute to obtuse at base, slightly decurrent at extreme base, incurved along margins, acuminate (acumens 5-12 mm long, blunt or acute) at apex; 3-nerved, commonly running 5-10 mm from lamina base and ultimately reaching at tip, midvein prominent, accessories faint along length; lateral nerves faint above, obscure beneath; tertiary nerves faint above, obscure beneath; minor nervules almost hidden in maturity, faintly reticulate in young one; petioles slender, 8-15 mm long, 1-1.5 mm wide, glabrous, shallow concave above. Panicle axillary, solitary, slender, long peduncled, 7-18 cm long, glabrous; peduncle 4-7.5 cm long, *ca* 1 mm wide, squarish above, terete at base; branches slender, thin, spreading; bracteoles deciduous; lax flowered. Flower cupular, *ca* 7.5 × 2.6 mm, long pedicellate, glabrous; pedicels *ca* 4 mm long, slender. Cup obconic, *ca* 1 × 1.5 mm; tepals 3 + 3, anastomosing obscure, sparsely appressed pilose ventrally; outer: slightly unequal, triangular-ovate, *ca* 2 × 1.6 mm, subacuminate, ventrally flat or shallow concave; inner: ovate, *ca* 2 × 1.6 mm, acutish, ventrally concave. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular, filament sparsely silky villous dorsally and at base ventrally; I whorl: *ca* 2 mm long, filament *ca* 1.2 mm long, anther narrow ovate, truncate, sparsely puberulous dorsally; II whorl: *ca* 2 mm long, filament *ca* 1.3 mm long, anther narrow oblong-ovate, truncate, scattered puberulous dorsally; III whorl: *ca* 1.9 mm long, glands attached *ca* 0.4 mm high on filament, stipe short, head oblong, cordate at base, truncate at apex, pointed at lateral corners; filament *ca* 1 mm long, anther

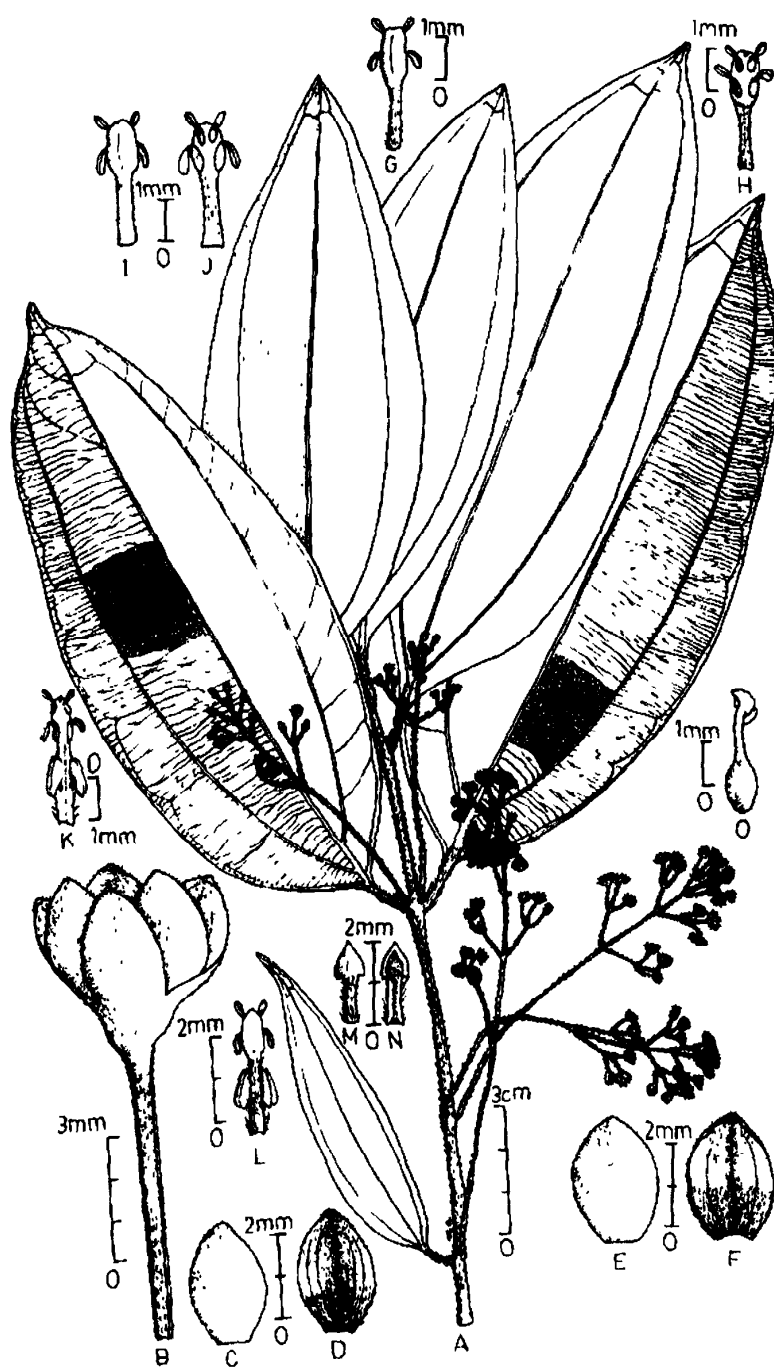


Fig. 3 : *Cinnamomum bhaskarii* M. Gangop. :

A. Flowering branch; right hand side: upper surface of leaf; left hand side : lower surface of leaf; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem-ventral view; G-N. Stamens and staminodes: G. Whorl I dorsal view; H. Idem ventral view; I. Whorl II dorsal view; J. Idem ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl IV dorsal view; N. Idem ventral view; O. Pistil (after type).

narrow ovate, truncate, scattered puberulous; IV whorl (staminodes 3): *ca* 1.2 mm long, stipe *ca* 0.6 mm long, scattered puberulous dorsally, head hastate, ventrally concave. Pistil glabrous, *ca* 2.3 mm long; ovary subglobose, *ca* 1 × 1 mm, rugulose; style short, flat; stigma oblique, lobulate. Fruits not seen. (Fig. 4)

Fl. : March (greenish yellow).

Distrib. : India.

Ecology: Grows in wet evergreen temperate forests at about 1500 m altitudes.

Type specimens : Meghalaya: Khasia hills, *Native collectors of Bot. Gard. Calc. s.n.*, acc. no. 384320, 384321 (CAL); Shillong peak, 21.3 1958, *G Panigrahi* 11136 (ASSAM, CAL).

Cinnamomum tavoyanum bears the ovate- lanceolate or elliptic- lanceolate leaves, densely pilose beneath; panicles pilose, 5–8.5 cm long; flowers up to 12.5 × 4 mm and pedicel to 8 mm long.

The specific epithet is contributed to my father Late Bishnupada Gangopadhyay.

5. *Cinnamomum blandfordii* M. Gangop. *sp. nov.*

C. glaucescens (Nees) Hanz.-Mazz. affinis, sed differt foliis cum petiolis longis gracilibusque, inflorescentiis longioribus patentissimis laxifloris puberulisque.

Holotypus : *H. R. Blandford* 115(CAL); *Paratypus* : *K. Haridasan* 765 (APFH).

Allied to *C. glaucescens* (Nees) Hanz.-Mazz., but differs in having leaves with long and slender petioles, much spreading longer, lax flowered puberulous inflorescences.

Tall trees, 10-20 m high. Branchlets terete, blackish-brown, to 4 mm in diam., frequently scarred, glabrous, gradually compressed, angled, inconspicuously canaliculate, very young part densely brown tomentellous; bud scales ovate or triangular-ovate, 4-7 × 7-11 mm, outer/lower one smaller, brown, rounded or obtuse to subacute, densely appressed silky pilosulous above, glabrous inside. Leaves alternate, (young are crowded at tip and thinly chartaceous), thinly coriaceous, dark brown above, paler beneath, obovate, to 11 × 4 cm, unequally acute + cuneate or acute + obtuse or obtuse + cuneate at base, decurrent to extreme base, incurved along margins, acumen (!) broken, glabrous beneath, (young leaves densely pilosulous on midvein, sparsely so elsewhere); midvein flat, slender above, raised, canaliculate beneath, penninerved; lateral nerves 4-6 pairs, arcuate, faintly looped near margin, axils sometimes with domatia; tertiary nerves scalariform, faint beneath; minor nervules prominent beneath, reticulate; petioles to 25 mm long, *ca* 1.5 mm wide, slender, canaliculate and narrow winged above, glabrous. Panicle axillary and terminal, solitary and also appearing fasciculate near scale scars, silky villosulous, 5-8 cm long, branching dichotomous; peduncles (sometimes branchlets ? stout, short, *ca* 6 × 2 mm), 3-4 cm long, *ca* 1 mm wide, flat, shallow grooved; branchlets slender, short, ascending. Flowers : infundibuliform, *ca* 8.5 × 4.5 mm, long pedicellate, tomentellous; pedicels to 4 mm long, slender, flat. Tube *ca* 1.5 × 2 mm, slightly obconical; tepals 3 + 3, narrow obovate-oblong, anastomosing faint, thin, glabrous inside; outer: *ca* 3 × 1 mm, acutish; inner :

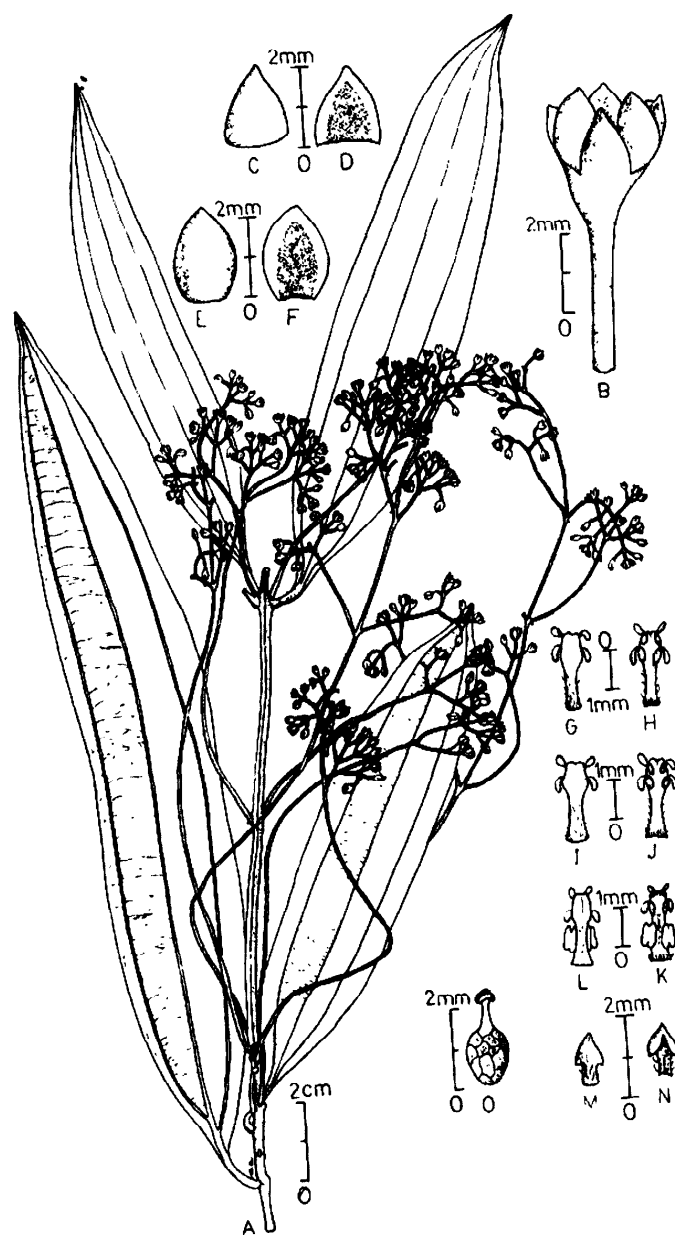


Fig. 4 : *Cinnamomum bishnupadae* M. Gangop. :

A. Flowering branch; left hand side: upper surface of leaf; right hand side: lower surface of leaf; B. Flower; C. Outer tepal - dorsal view; D. Idem - ventral view; E. Inner tepal - dorsal view; F. Idem - ventral view; G-N. Stamens and staminodes: G. Whorl I - dorsal view; H. Idem - ventral view; I. Whorl II - dorsal view; J. Idem - ventral view; K. Whorl III - dorsal view; L. Idem - ventral view; M. Whorl IV - dorsal view; N. Idem - ventral view; O. Pistil (after *Native collectors s.n.*, acc. no. 384320).

ca 2.8 × 1 mm, subacutish. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular, filament narrow, flat; I whorl: *ca* 1.1 mm long, filament *ca* 0.7 mm long, sparsely villous at base ventrally, anther oblong, truncate; II whorl: *ca* 0.9 mm long, filament *ca* 0.6 mm long, sparsely villous at base, anther oblong, retuse; III whorl: *ca* 1.5 mm long, gland *ca* 0.6 mm long, subsessile, head orbicular-ovate, cordate at base; filament *ca* 1.2 mm long, flat, villous, anther obovate, retuse; IV whorl (staminodes 3): *ca* 0.8 mm long, stipe *ca* 0.5 mm long, villous at base, head hastate, ventrally concave. Pistil glabrous, *ca* 2.1 mm long, ovary ovoid-oblong, *ca* 1.1 × 1 mm, smooth; style 0.6 mm long, terete; stigma minute, obliquely peltate. Tepals deciduous when mature, cup entire, white pustulate, villous, glabrescent to maturity. Fruits not seen. (Fig. 5)

Fl. : March onwards (greenish yellow).

Distrib. : India, Myanmar.

Ecology: Common in semi evergreen forests in India and grows at about 180 m altitudes in Myanmar.

Type specimens : MYANMAR : Katha district, 180 m, 8.3.1917, H.R. Blandford 115 (CAL). INDIA. Arunachal Pradesh, Dibang valley, Dambuk, 10.3.1984, K. Haridasan 765 (APFH).

Cinnamomum glaucescens has densely tomentose panicles, 3–4.5 cm long, less spreading; flowers congested and the ovary narrow obovoid; the petioles stout, 17-22 mm long.

The species is named in honor of H.R. Blandford who made the valuable collections in Myanmar.

6. *Cinnamomum lohitensis* M. Gangop. *sp. nov.*

C. bejolghotae (Buch.-Ham.) Sweet affinis, sed differt foliis angustis basi attenuatis, inflorescentiis gracilibus, floribus fere glabris.

Holotypus : K. Haridasan 2810 (APFH).

Allied to *C. bejolghota* (Buch.-Ham.) Sweet but differs in having narrowed leaves with attenuate base; inflorescences slender, flowers almost glabrous.

Tall trees, 20-30 m high. Branchlets terete, yellowish brown, to 3 mm in diam., inconspicuously ribbed and grooved, glabrous, scattered lenticelled, slightly compressed above, utmost tip pilose; lenticels oval or elliptical, encircled by corky patches; bud ovate, *ca* 2 × 1.2 mm, subacuminate, pilose above. Leaves alternate below, opposite above, coriaceous, glossy green above, paler, subglabrous beneath, narrow oblong-lanceolate, oblong-elliptic or ovate, 13-18 × 3-4.3 cm, glabrous, slightly obliquely attenuate at base, decurrent to extreme base, incurved along margin, almost broken apex appearing acuminate; 3-nerved, common portion running 10 mm from lamina base, basal lateral nerves faint, mostly raised and convex above, raised and squarish beneath; lateral nerves faint, mostly along margins; tertiary nerves slender, closely scalariform; minor nervules faint or obscure above, prominent beneath, laxly reticulate; petioles 10-15 mm long, 1.5-2 mm wide, almost flat or rarely shallow channelled above, glabrous. Panicle pseudoterminal, fascicled, very slender, 6.5-8 cm long, lax

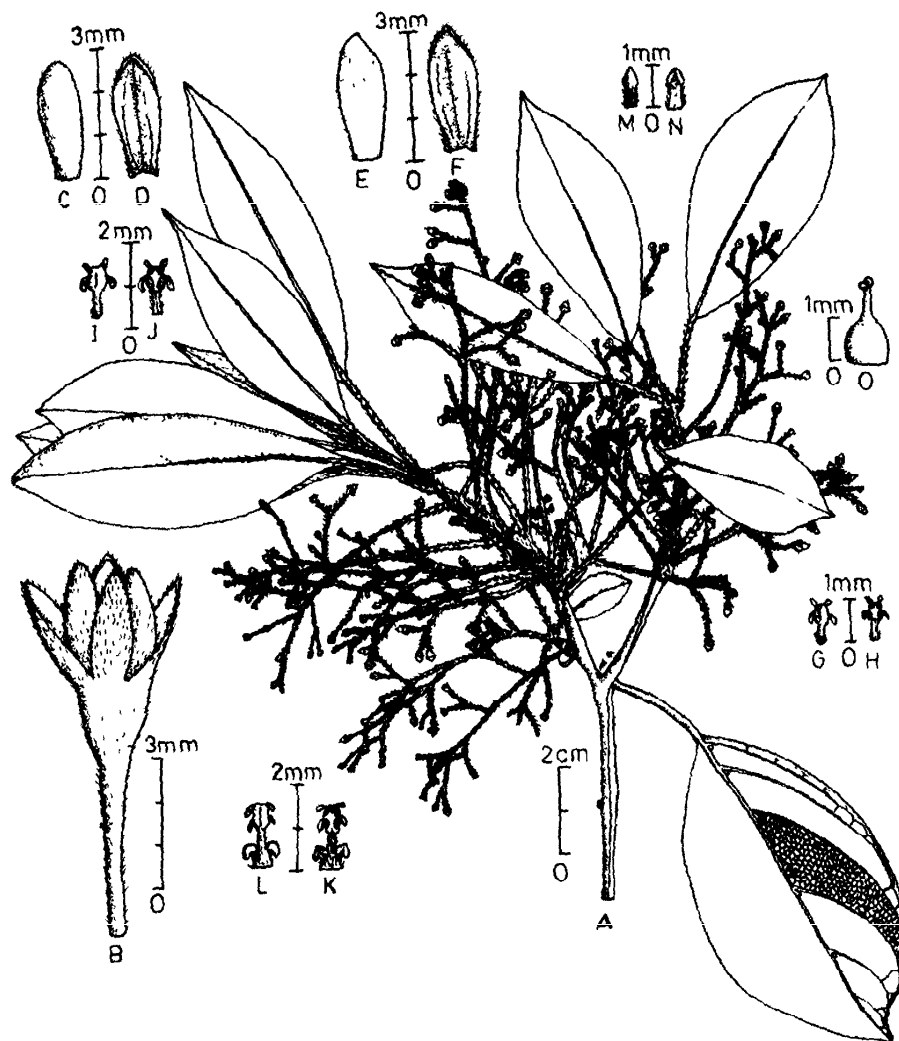


Fig. 5 : *Cinnamomum blandfordii* M. Gangop. :

A. Flowering branch; upper right hand side: upper leaf surface; lower left hand side: lower leaf surface; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem ventral view; G-N. Stamens and staminodes: G. Whorl I dorsal view; H. Idem ventral view; I. Whorl II dorsal view; J. Idem -ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl IV dorsal view; N. Idem ventral view; O. Pistil (after K. Haridasan 765).

flowered; peduncle 2.5-3 cm long, *ca* 1 mm wide, thin, flat, blackish; branches short, glabrous to sparsely sericeous; bracteole deciduous, base densely pilose. Flowers infundibuliform, *ca* 7 × 3 mm; pedicels *ca* 4 mm long, 0.5 mm wide, glabrous. Perianth tube *ca* 1 × 1.5 mm, obconic, glabrous; tepals 3 + 3, ovate, acutish, thin, anastomosing faint; outer: *ca* 2.5 × 1.5 mm, sparsely silky pilosulous above, densely so beneath; inner: *ca* 2.5 × 1.9 mm, very sparsely silky puberulous towards tip dorsally, densely so inside. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular, filament thin, flat; I whorl: *ca* 1.8 mm long, filament *ca* 0.9 mm long, silky puberulous ventrally, pilosulous dorsally, anther oval, obtuse; II whorl: *ca* 1.9 mm long, filament *ca* 0.9 mm long, anther ovate-oblong, mucronulate; III whorl: *ca* 1.9 mm long; glands *ca* 1 mm long, stipe attached at filament base, stipe *ca* 0.5 mm long, pilose, head ovate-orbicular, cordate at base, obtuse to subacute at apex; filament *ca* 1 mm long, pilose; anther narrow ovate-oblong, obtuse; IV whorl (staminodes 3): *ca* 1.2 mm long, stipe *ca* 0.6 mm long, thin, pilose dorsally, head triangular-ovate, cordate at base, acutish at apex, ventrally concave. Pistil: *ca* 2.6 mm long, glabrous; ovary oblong-ovoid, *ca* 1 × 0.7 mm, smooth; style flat, shallow channelled; stigma peltate, oblique, thin, margin undulate. Fruits not seen. (Fig. 6)

Fl. : March (yellowish green).

Distrib. : India.

Ecology : Grows in dense evergreen montane forests.

Holotype : Arunachal Pradesh. Lohit district, Demwee-Hawa pass, 18.3.1986, K. Haridasan 2810 (APFH).

The leaves of *Cinnamomum bejolghota* are large, 25-42 × 6-12.8 cm, obtuse and cuneate at base; panicles 10-26 cm long with to 12 cm long and 3 mm wide peduncles; flowers sericeous. The stipes of staminal glands are always adnate halfway on the filaments of III whorl.

7. *Cinnamomum sanjappae* M. Gangop. *sp. nov.*

C. tavoyanum Meissn. affinis, sed differt foliis latioribus, supra nervis tertiariis canaliculatis, inflorescentiis apicalibus parvioribus crassioribus et tepalorum lobis late ovatis.

Holotypus : Coll. Illeg. 7420 (APFH). allied to *C. tavoyanum* Meissn., but differs in having broad leaves with canaliculate tertiary nerves above, terminal, smaller and stouter inflorescences and broad ovate tepal lobes.

Trees. Branchlets slender, terete, to 3 mm diam., slightly compressed above, silky pilose; buds triangular-ovate, *ca* 3 × 1.5 mm, subacute, densely pilose. Leaves (all broken) opposite to subopposite, coriaceous, greyish, subglossy above, pale brown beneath, broad ovate, 18-23 (approx.) × 7.7-8.5 cm, glabrous above, villous beneath, equally acuminate at base, slightly decurrent to extreme base, margin almost flat, apex uncertain; 3-nerved, running commonly 6-10 mm from lamina base, basal lateral nerves reaching 1/2 of the lamina length or more and merge with the secondaries, raised above, canaliculate beneath, lateral nerves faint and impressed above, raised beneath, arcuate, forming loops along margins; tertiary nerves distantly scalariform, forked, canaliculate above, prominent

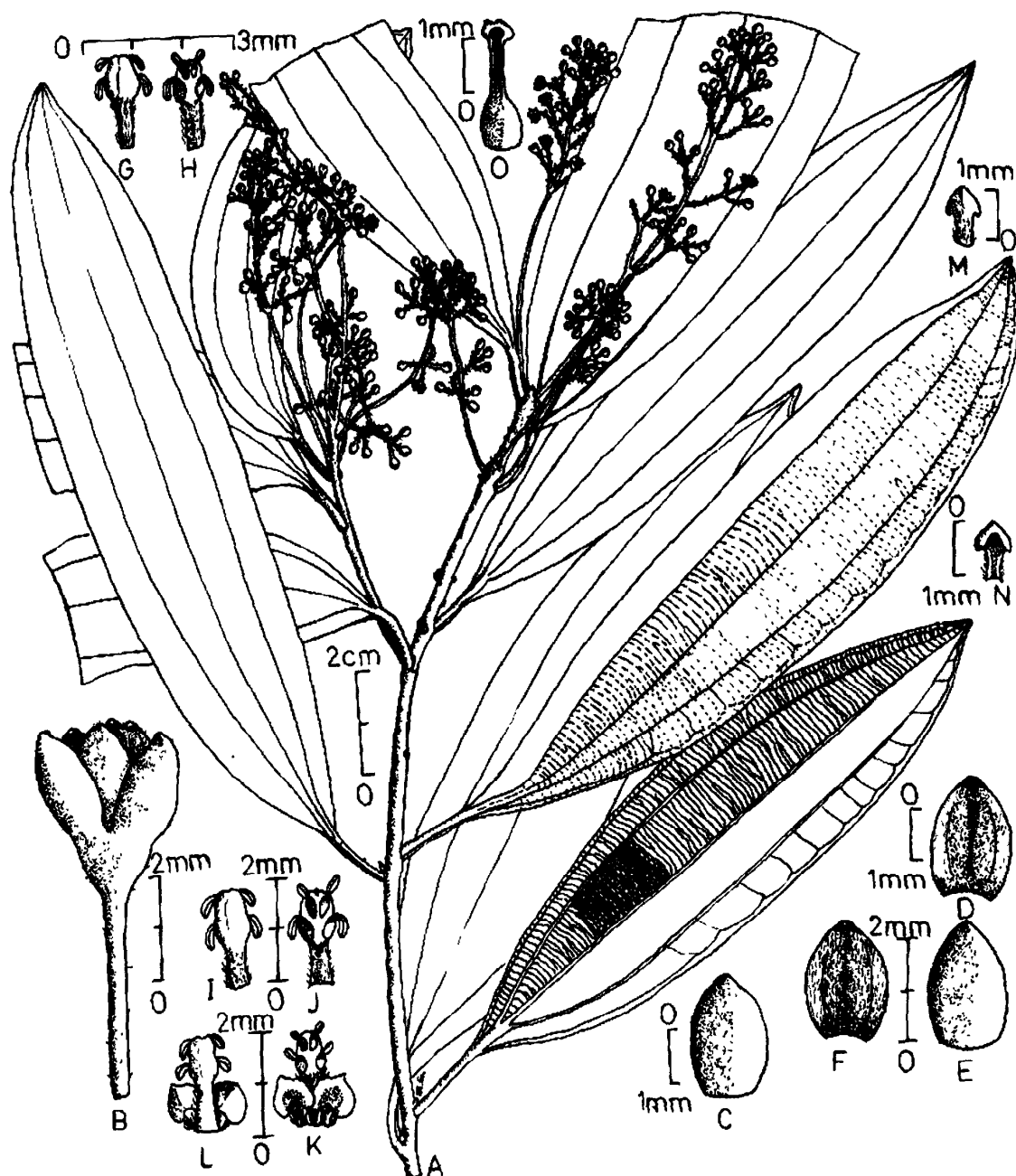


Fig. 6 : *Cinnamomum lohitensis* M. Gangop. :

A. Flowering branch; upper: upper surface of leaf; lower: lower surface of leaf; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem ventral view; G-N. Stamens and staminodes: G. Whorl I dorsal view; H. Idem ventral view; I. Whorl II dorsal view; J. Idem ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl IV dorsal view; N. Idem ventral view; O. Pistil (after type).

beneath; minor nervules faint above, obscure beneath, reticulate; petioles 15-20 mm long, 2-2.5 mm wide, shallow channelled above, pilose. Panicle terminal, fasciculate, 3.8-8.5 cm long, densely whitish pilose, peduncle 2-3.5 cm long, 1-1.5 mm wide, terete below, gradually angled above. Flowers cupular, *ca* 9 × 6 mm, pilose; pedicels 5-4.5 mm long. Perianth cup cupular, *ca* 0.6 mm high; tapals 3 + 3, thin, anastomosing faint, inside pilose; outer: ovate-oblong, *ca* 4 × 2.2 mm, acutish; inner: ovate-orbicular, acutish. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular, filament flat, villous; I whorl: *ca* 3 mm long, filament *ca* 1.5 mm long, anther oblong, subapiculate; II whorl: *ca* 3.1 mm long, filament *ca* 1.6 mm long, anther oblong, slightly oblique; III whorl: *ca* 3.5 mm long, gland attached with filament *ca* 1 mm above from base, stipe *ca* 0.3 mm long, head orbicular-oblong, obtuse and mucronulate at apex, filament *ca* 1.2 mm long, anther narrow-oblong; IV whorl (staminodes) *ca* 2.5 mm long, rarely ill developed, stipe *ca* 1.5 mm long, silky villous dorsally, head sagittate, acutish, concave ventrally. Pistil *ca* 3.4 mm long, glabrous; ovary narrow ovoid, *ca* 1.5 × 0.9 mm, smooth; style *ca* 1.1 mm long, slender, flat; stigma thin, peltate, lobed, margin obscurely toothed. Fruits: not known. (Fig. 7)

Fl. : April (buds pale green).

Distrib. : India.

Ecology : Grows in wet evergreen forests.

Holotype : Arunachal Pradesh. Mauling National Park, Tengging, 16.04.1995, *Coll. Illeg.* 7420 (APFH).

The leaves of *Cinnamomum tavoyanum* are smaller and narrower, 7- 16 × 2-4 cm; tertiary nerves faint, flat above; infructescences axillary, slender; peduncles to 55 mm long; tepal lobes to 1.8 mm broad.

The specific epithet is contributed with honor to Dr. M. Sanjappa, Director, Botanical Survey of India.

8. *Cinnamomum suvrae* M. Gangop. *sp. nov.*

C. cacharensis R. N. Parker affinis, sed differt inflorescentiis brevioribus carssioribus densifloris, foliis perrigidis chartaceis nitidis cum acuminibus brevibus et supra nervis principalibus impressis.

Holotypus : G. Mann 6 (CAL); *Paratypus* : Native collectors of Bot. Gard. Calc. *s.n.*, *acc.* no. 384317 (CAL).

Allied to *C. cacharensis* R. N. Parker, but differs in having shorter, stouter and dense flowered inflorescences, very stiff chartaceous glossy leaves with short acumens and impressed main nerves above.

Stature unknown. Branchlets terete, pale brown, to 8 mm in diam., longitudinally channelled, rough, lenticellate, gradually compressed, blackish above, glabrous; terminal buds lanceolate, *ca* 3 × 2 mm, subacuminate, glabrous. Leaves opposite, stiff chartaceous, glossy, pale brown above,

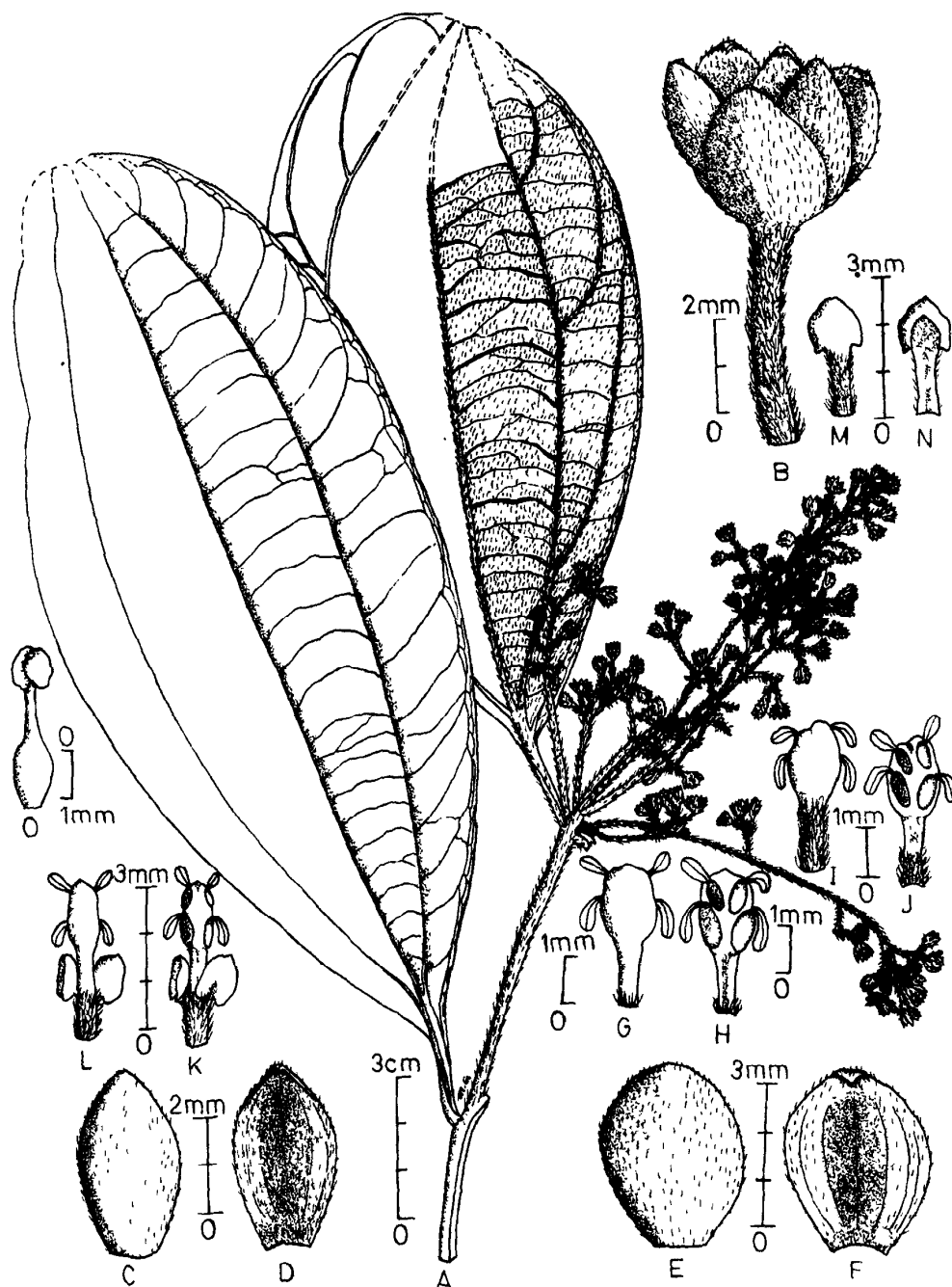


Fig. 7 : *Cinnamomum sanjappae* M. Gangop. :

A. Flowering branch; lower leaf: upper surface; upper leaf: lower surface; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem ventral view; G-N. Stamens and staminodes: G. Whorl I dorsal view; H. Idem ventral view; I. Whorl II dorsal view; J. Idem ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl IV dorsal view; N. Idem ventral view; O. Pistil (after type).

subglaucous beneath, elliptic, obovate-elliptic or oblong-elliptic, 7-12 × 2.8-3.5 cm, glabrous, equally acute or acuminate at base, thin and almost flat along margin, acuminate (acumens 10-12 mm long, acute) at apex; 3- nerved, prominent, both accessories reach to tip, impressed above, raised beneath; lateral nerves prominent; tertiary nerves scalariform, prominent; minor nervules areolate-reticulate, inconspicuous above, prominent beneath; petioles 10-15 mm long, 1-1.5 mm wide, shallow concave above, glabrous. Panicle pseudoterminal, fascicled, 3-6 cm long, pilose; peduncles 1.5-2 cm long, *ca* 1.5 mm wide, stout, squarish; branchlets and pedicels stout; bracteoles deciduous. Flowers cupular, *ca* 6 × 3.2 mm, pedicellate, sericeous; pedicels *ca* 2 × 1 mm, terete. Cup obovoid, *ca* 1 × 2 mm; tepals 3 + 3, ovate, acutish, anastomosing faint, inside pilose; outer: *ca* 3 × 2 mm, inner: *ca* 2.8 × 1.7 mm. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular, filament thin, flat; I whorl: *ca* 2.4 mm long, filament *ca* 1.2 mm long, villous dorsally and at base, pilose above, anther ovate-oblong, retuse, sparsely pilose; II whorl: *ca* 2.2 mm long, filament *ca* 1.2 mm long, villous, anther oblong, pilose dorsally; III whorl: *ca* 2.5 mm long, glands attached *ca* 1 mm high on filament, stipe short, head oblong-ovate, acutish, glabrous; filament *ca* 2 mm long, thin, villous below, anther oblong, truncate, glabrous; IV whorl (staminodes 3): *ca* 1.9 mm long, stipe *ca* 1 mm long, villous dorsally, head ovate, subacuminate, ventrally shallow concave, glabrous. Pistil *ca* 2.5 mm long, glabrous, scattered muriculate, ovary ovoid, *ca* 1 × 0.7 mm; style squarish, longitudinally shallow grooved; stigma thin, peltate, 4-lobulate. Fruits not seen. (Fig. 8)

Fl. : Period uncertain.

Distrib. : India.

Ecology : Grows in wet temperate montane forests.

Type specimens : Meghalaya: Khasi hills, G Mann 6 (CAL); *Ibid.*, Native collectors of Bot. Gard. Calc. s.n., acc. no. 384317 (CAL).

The panicles of *Cinnamomum caoharensis* are 7- 9.5 cm long with slender peduncle 3.5-4.5 cm long, *ca* 1 mm wide, lax flowered and glabrous tepals outside. The acumens of leaves are 15-20 mm long.

The specific epithet is contributed to my wife Smt. Suvra Gangopadhyay.

9. *Cryptocarya biswasii* M. Gangop. *sp. nov.*

C. kurzii Hook. f. affinis, sed differt foliis ovatis, cuneatis ad acuminatis ad basin, fructibus anguste ovoideis et constrictis ad basin.

Holotypus : K. Biswas 1093 (CAL); iso., in CAL.

Allied to *C. kurzii* Hook. f., but differs in having ovate leaves cuneate to acuminate at base, fruit narrow ovoid and constricted at base.

Stature unknown. Branchlets terete, blackish grey, to 5 mm diam., rough, warty, lenticellate, glabrous, leaf bearing branchlets slender, terete below, slightly compressed, glabrous below, utmost

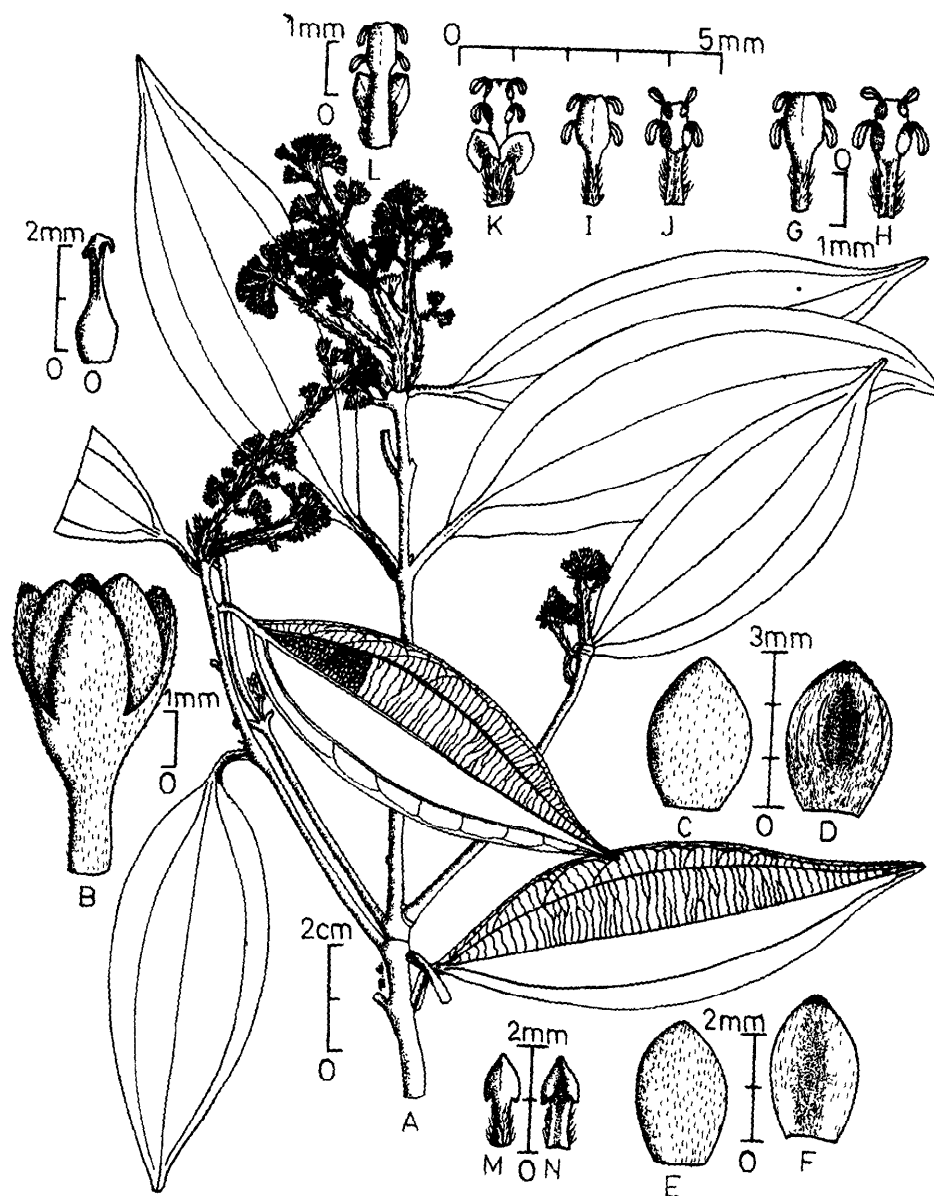


Fig. 8 : *Cinnamomum suvrae* M. Gangop. :

A. Flowering branch; left hand side: upper surface of leaf; right hand side: lower surface of leaf; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem-ventral view; G-N. Stamens and staminodes: G. Whorl I dorsal view; H. Idem ventral view; I. Whorl II dorsal view; J. Idem-ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl IV dorsal view; N. Idem ventral view; O. Pistil (after G. Mann 6).

apex puberulous. Leaves alternate, stiffly chartaceous to thinly coriaceous, dark brown above, glaucous beneath, mostly ovate, sometimes ovate-oblong, $13-20 \times 3.7-8.2$ cm, glabrous above, sparsely puberulous beneath, equally or subequally cuneate to acuminate at base, margin slightly incurved, subacuminate (acumens 7-10 mm long, acute) at apex; midvein shallow channelled above, stout beneath; lateral nerves 8-10 pairs, very faint and canaliculate above, prominent, slender, raised beneath, distant, ascending-arcuate, faintly looped along margin; tertiary nerves faint and almost obscure above, faint, distantly scalariform beneath; minor nervules obscure above, faint beneath, reticulate; petioles stout, 12-17 mm long, *ca* 2 mm wide, flat and canaliculate above, glabrous. Flowers not seen. Inflorescences (all broken) axillary, solitary, stout, few branched; peduncle 1.5-4 cm long, *ca* 2 mm thick, terete below, quadrangular above, glabrous; branches glabrescent below, utmost apex fine puberulous. Fruit narrow ovoid, rarely ellipsoid-ovoid, $20-23 \times 9-11$ mm, light brown, smooth, glabrous, tapering towards apex, constricted at base; stalk slightly swollen, 4-6 mm long, *ca* 1.5 mm wide. (Fig. 9)

Fr. : February.

Distrib. : Myanmar.

Ecology : Grows in plain areas.

Type specimens : Tenasserim district, ± 15 m, 15.2.1931, K. Biswas 1093 (CAL).

The fruits are almost alike in shape with *Cryptocarya everettii* Merr. of Philippine Islands. But in having glossy leaves with impressed lateral nerves and much larger fruits *C. everettii* Merr. differs from it.

The species is named after its collector Dr. K. Biswas who made an extensive collection in India and Myanmar.

10. *Cryptocarya burkillii* M. Gangop. *sp. nov.*

C. kurzii Hook. f. affinis, sed differt foliis latis infra nervulis minoribus obscuris, fructibus latis ellipseideis cum extremitatibus angustatis et pericarpio cum costis prominentibus.

Holotypus : I.H. Burkill 36668 (CAL); iso., in CAL.

Allied to *C. kurzii* Hook. f., but differs in having broad leaves with obscure minor nervules beneath, fruit broad ellipsoid with tapering ends and pericarp with prominent ribs.

Stature unknown. Branchlets terete, blackish brown, to 5 mm thick, shallow longitudinally channelled and ribbed, scattered lenticellate, gradually compressed and angled, tomentellous above. Leaves alternate, coriaceous, glossy, brown above, pale brown and subglaucous beneath, obovate-oblong or obovate, $14-19.5 \times 5-7(-9.5)$ cm, equally obtuse or unequally acute + obtuse at base, not decurrent, slightly incurved to flat along margin, acuminate (acumen to 6 mm long, acute) at apex, glabrous excepting sparsely puberulous midvein above, sparsely so on midvein and lateral nerves beneath; midvein slender, channelled above, raised and stout beneath; lateral nerves 8-10 pairs,



Fig. 9 : *Cryptocarya biswasii* M. Gangop. :
A. Branch with fruits; left hand side: lower surface of leaf; right hand side: upper surface of leaf
(after type).

distant, ascending, faint, flat and canaliculate above, raised, stout, forming prominent loops along margin beneath; tertiary nerves faint above, prominent beneath, distantly scalariform; minor nervules obscure above, partially prominent beneath; petioles 11-15 mm long, 1.5-2.2 mm wide, flat and shallow channelled above, sparsely tomentellous or puberulous. Flowers not seen. Infructescences (excluding fruits) 10-20 cm long, axillary and terminal, stout; peduncles to 6 cm long, 2 mm wide, terete below, compressed, shallow channelled above; branches (? pedicels) slightly wider above, few. Fruits (detached) ellipsoid, 25-30 × 16-20 mm, tapering toward both ends, blackish brown, glabrous, pericarp rigid, broadly ribbed. (Fig. 10)

Fr. : February.

Distrib. : India.

Ecology : Grows in montane evergreen forests.

Type specimens : Arunachal Pradesh : Abor, Rengging, 21.2.1912, I.H. Burkill 36668 (CAL) 2 sheets.

The fruits are having some similarities with the fruits of *Cryptocarya costata* Bl. of Malaysia.

The specific epithet has been given in honor of I. H. Burkill who made an extensive collection in North East India.

11. *Cryptocarya dekae* M. Gangop. *sp. nov.*

C. amygdalinae Nees affinis, sed differt foliis chartaceis cum nervis lateralibus distantibus infrutescentiis gracilibus axillaribus, fructibusque parvioribus ellipsoideo-ovoideis cum costis et sulcis.

Holotypus : G. K. Deka *s.n.*, acc. no. 17789 (ASSAM); iso., in ASSAM; *Paratypus* : Kari 1497 (CAL).

Allied to *C. amygdalina* Nees, but differs in having chartaceous leaves with distant lateral nerves, slender, axillary infructescences and smaller ellipsoid-ovoid fruits with ribs and furrows.

Medium sized trees. Branchlets terete, slender, brown, to 2 mm diam., striate, puberulous, gradually compressed above. Leaves alternate, thinly chartaceous, green, non glossy above, pale brown beneath, obovate-oblong, elliptic-oblong, 16-21 × 5.5-6.8 cm, equal, acute at base, slightly decurrent at extreme base, margin slightly incurved, obtuse and acuminate (acumens 8-10 mm long, blunt) at apex, glabrous; midvein flat, irregularly canaliculate below, slightly raised in length above, convex, slightly raised beneath; lateral nerves to 6 pairs, slender, distant, arcuate, flat above, slightly raised beneath, prominently looped along margin; tertiary nerves prominent, laxly scalariform; minor nervules areolate-reticulate, faint above, prominent beneath; petioles 12-15 mm long, ca 1.5 mm wide, almost flat above, terete beneath, sparsely puberulous when young, glabrous in age. Flowers not seen. Infructescences axillary, solitary, 5-8 cm long, laxly branched, fine puberulous; peduncle slender, 2.3-3.8 cm long,

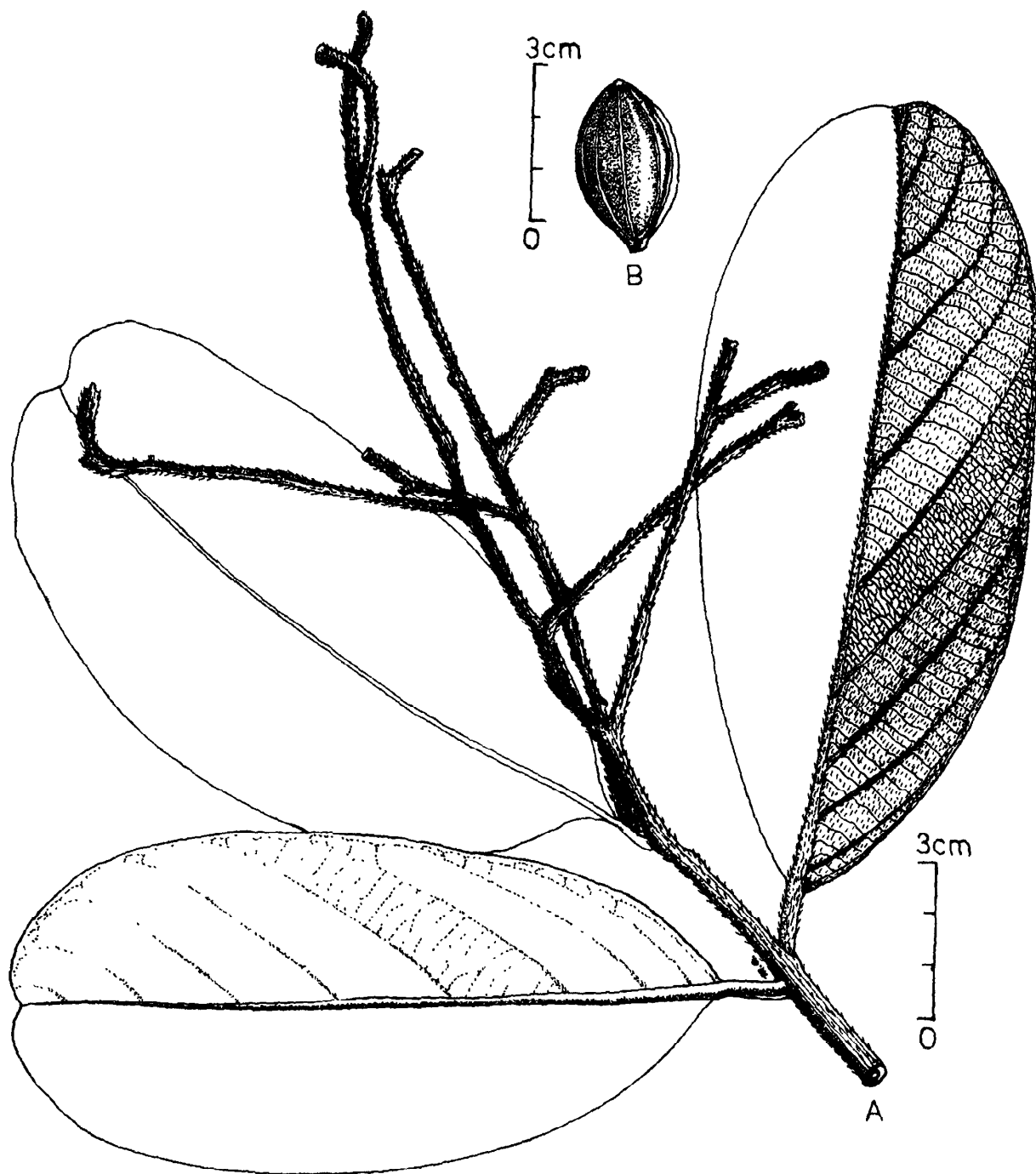


Fig. 10 : *Cryptocarya burkillii* M. Gangop. :

A. Fruiting branch; left hand side: upper surface of leaf; right hand side: lower surface of leaf; B. Fruit (after type).

ca 1 mm wide; branches slender, spreading, flattened. Fruits ellipsoid-ovoid, 10-11 × 6-6.5 mm, blackish-brown, prominently ribbed and furrowed, glabrous, scattered whitish pustulate; stalk ca 2 × 1 mm, puberulous. (Fig. 11)

Fr. : March April.

Distrib. : India.

Ecology : Grows in hill forests of lower elevations.

Type specimens : Assam: Darrang district, Panbari, 28. 4. 1955, G. K. Deka s.n., acc. nos. 17789 (ASSAM); Bharati bank, 63 m, U. N. Kanjilal 3779 (ASSAM); Sikkim: Rungpo, 300 m, 25.3.1909, Kari 1497 (CAL).

The species is named after its collector Mr. G. K. Deka who made an extensive plant collection in north-east India.

12. *Dehaasia arunachalensis* M. Gangop. sp. nov.

D. assamicae Kosterm. affinis, sed differt foliis coriaceis obtuse cuneatis ad basin, fructo cum pedicello tenui brevior.

Holotypus : Coll. Illeg. s.n. (APFH).

Allied to *D. assamica* Kosterm., but differs in having coriaceous leaves obtusely cuneate at base, fruit with slender and shorter pedicel.

Stature unknown. Branches terete, yellowish, ca 6 mm diam., glabrous, rough with elevated lenticels and leaf-scars, gradually smooth above, utmost apex appressed pilose; terminal buds ovate-orbicular or ovate, 3-4 × ca 3 mm, acute to subacute, whitish pilose above. Leaves crowded near apices, thickly coriaceous, yellowish-brown, glossy above, pale, glaucous beneath, glabrous, narrow oblong-obovate or obovate, 10-15 × 2.8-4 cm, equally or subequally obtusely cuneate at base, decurrent into petiole, entire, incurved along margin, bluntly subacuminate at apex; midvein channelled above, raised, terete, fine canaliculate beneath; lateral veins 12-13 pairs, arcuate near margin, faint and slightly impressed above, faint, canaliculate beneath; tertiary nerves laxly reticulate beneath, almost obscure above; minor nervules prominently areolate-reticulate and punctate-reticulate above, prominently areolate-reticulate beneath; petioles 10-14 mm long, 1-1.5 mm wide, concave above, glabrous. Flowers not seen. Infructescences axillary, 6-11 cm long, branches very short; peduncles to 4.5 cm long, ca 2 mm wide, flattened, blackish, white lenticellate, glabrous. Fruit globose, 18-20 mm diam., blackish, glabrous; pedicels slightly swollen, ca 11 mm long, 3 mm wide above, 1.5 mm wide below, glabrous, warty and lenticellate; tepals deciduous, basal rim thick, undulate. (Fig. 12)

Distrib. : India. Arunachal Pradesh.

Specimen : only type.

The staff members of the State Forests Research Institute, Arunachal Pradesh, Itanagar, were unable to provide any field data about the specimen deposited at their herbarium. But they are sure that the collection has been made from the state of Arunachal Pradesh. It was misidentified as *Persea gamblei* (King ex Hook. f.) Kosterm.



Fig. 11 : *Cryptocarya dekae* M. Gangop. :

A. Branch with fruits; left hand side: upper surface of leaf; right hand side : lower surface of leaf
(after G. K. Deka s.n., acc. no. 17789).

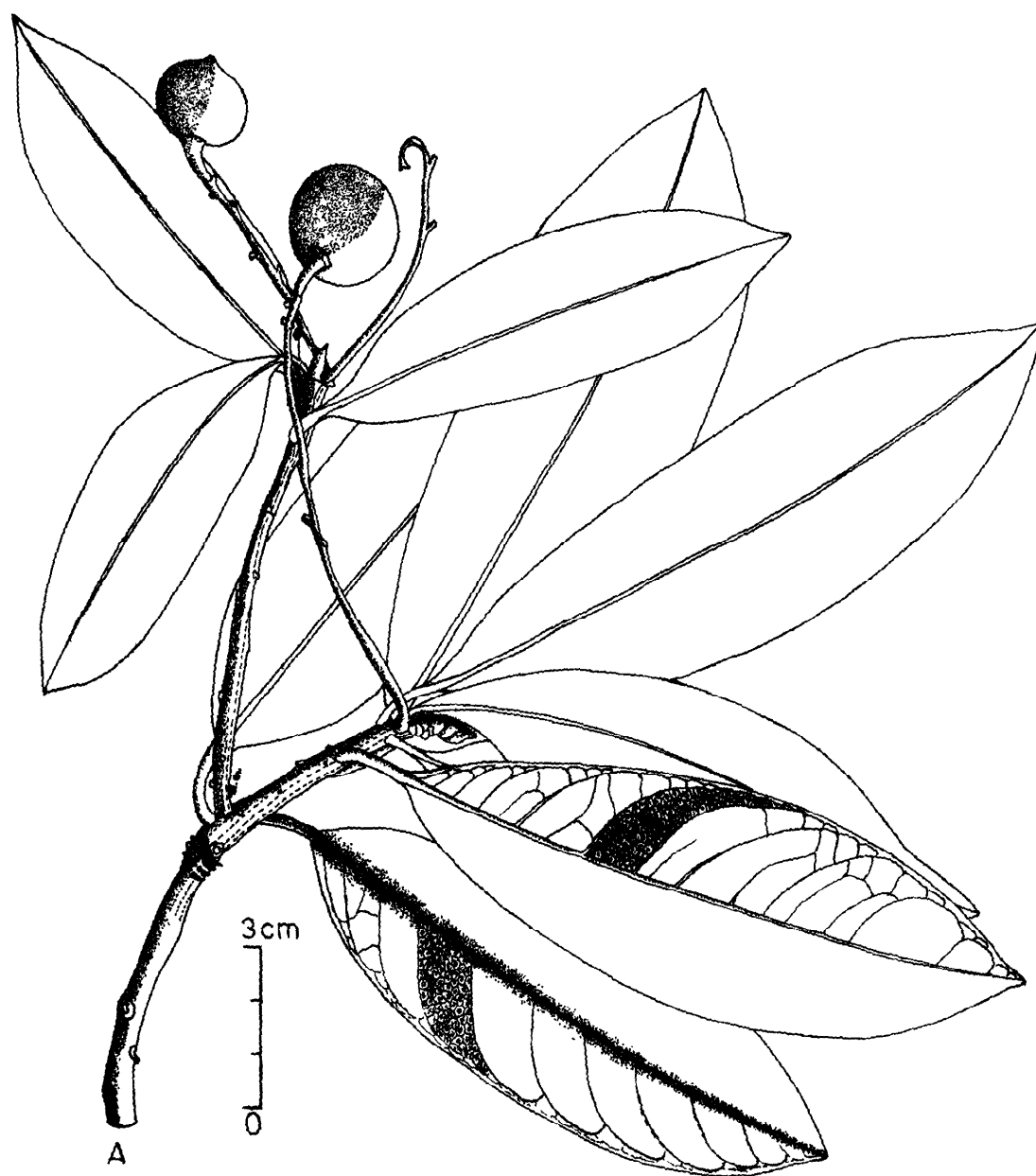


Fig. 12 : *Dehaasia arunachalensis* M. Gangop. :

A. Branch with fruits; lower leaf : upper surface; upper leaf : lower surface (after type).

The genus *Nothaphoebe* does not occur in mainland India. The fruits of the genus *Alseodaphne* of the Indian regions are elongated. The globose fruit of the taxon insist me to put into the genus *Dehaasia*. *D. assamica* Kosterm., described from this region bears globose fruit.

13. *Dehaasia rangamattiensis* M. Gangop. *sp. nov.*

D. cuneatae (Bl.) Bl. affinis, sed differt foliis anguste obovatis cum nervis lateralibus tenuibus, petiolisque gracilibus, fructis cylindrico-oblongis longioribus.

Holotypus : J. S. Gamble 7969 (CAL); *Paratypus* : *Forest Officials s.n.* (CAL); iso., in CAL.

Allied to *D. cuneata* (Bl.) Bl., but differs in having narrow-obovate leaves with slender lateral nerves and slender petioles, longer cylindrical-oblong fruits.

Stature unknown. Branchlets terete, yellowish, 5-6 mm diam., glabrous, lenticellate, gradually scattered puberulous above, utmost apex brown tomentellous. Leaves crowded towards apices, thinly chartaceous, blackish-brown above, coppery-brown beneath, glabrous above, sparsely puberulous on nerves beneath, narrow obovate, 8-12 × 3-6.5 cm, tapering towards base, slightly decurrent at extreme base, obtuse and apiculate or acuminate (acumens 15-18 mm long) at apex; midvein shallowly concave below, gradually slender and raised along length above, raised and prominent beneath; lateral nerves 8-10 pairs, faint above, slender and prominent beneath, obscurely looped near margin; tertiary nerves faint; minor nervules areolate-reticulate above, faintly so beneath; petioles slender, 10-17 mm long, 1-1.5 mm wide, shallow concave above covered by shallow arching wings, puberulous. Panicles axillary and subterminal, long peduncled, slender, 7-14 cm long, utmost apex and nodes puberulous; peduncles 3-6 cm long, ca 1 mm wide, blackish; branches spreading; bracteoles minute, ciliate at margin. Flowers cupular, 5.5-6.5 × ca 3 mm; pedicels 3-4 mm long, triangled, slender, fine puberulous. Tepals 3 + 3, ovate, acutish, shallowly concave ventrally, ciliate along margin, inside at base pilose; outer: smaller, ca 1.1 × 1.1 mm; inner: ca 2.1 × 2.1 mm. Stamens 9, 3 in each whorl, 2-locular, whorl I and II introrse, of III biglandular, extrorse; I whorl ca 0.9 mm long, filaments ca 0.4 mm long, villous, anther ovate-oblong, retuse, dorsally sparsely villous; II whorl: ca 1.2 mm long, filaments ca 0.7 mm long, villous at base, anther ovate, retuse, sparsely villous dorsally; III whorl ca 1.2 mm long, glands ca 0.7 mm long, stipe short, attached near base, head orbicular-oblong, filament ca 0.7 mm long, villous; anther narrow oblong-ovate, villous. IV whorl (staminodes 3): ca 0.7 mm long, stipe short, villous, head sagittate, acute. Pistil: ca 1.5 mm long; ovary subglobose, ca 0.7 mm diam., glabrous; style sparsely sericeous; stigma minute, peltate, lobulate. Fruits: cylindrical-oblong, 2.7-3 × 1.4-1.5 cm, obtuse, blackish, pericarp wrinkled, glabrous. (Fig. 13)

Fl.: March – May. *Fr.*: May onwards.

Distrib. : Bangladesh.

Type specimens : Bangladesh. Chittagong hill tracts, Rangamatti, May 1891, *Forest Officials s.n.*, acc. nos. 551549, 551550 (fls. & fr.) (CAL); *Ibid.* March 1880 (fls.), J. S. Gamble 7969 (CAL).

Fruits of *D. cuneata* Bl. are ellipsoid, to 20 × 10 mm; petioles are stout and shorter, to 10 × 3 mm and lateral nerves of leaves are impressed above. This is also differs from *D. candolleana*

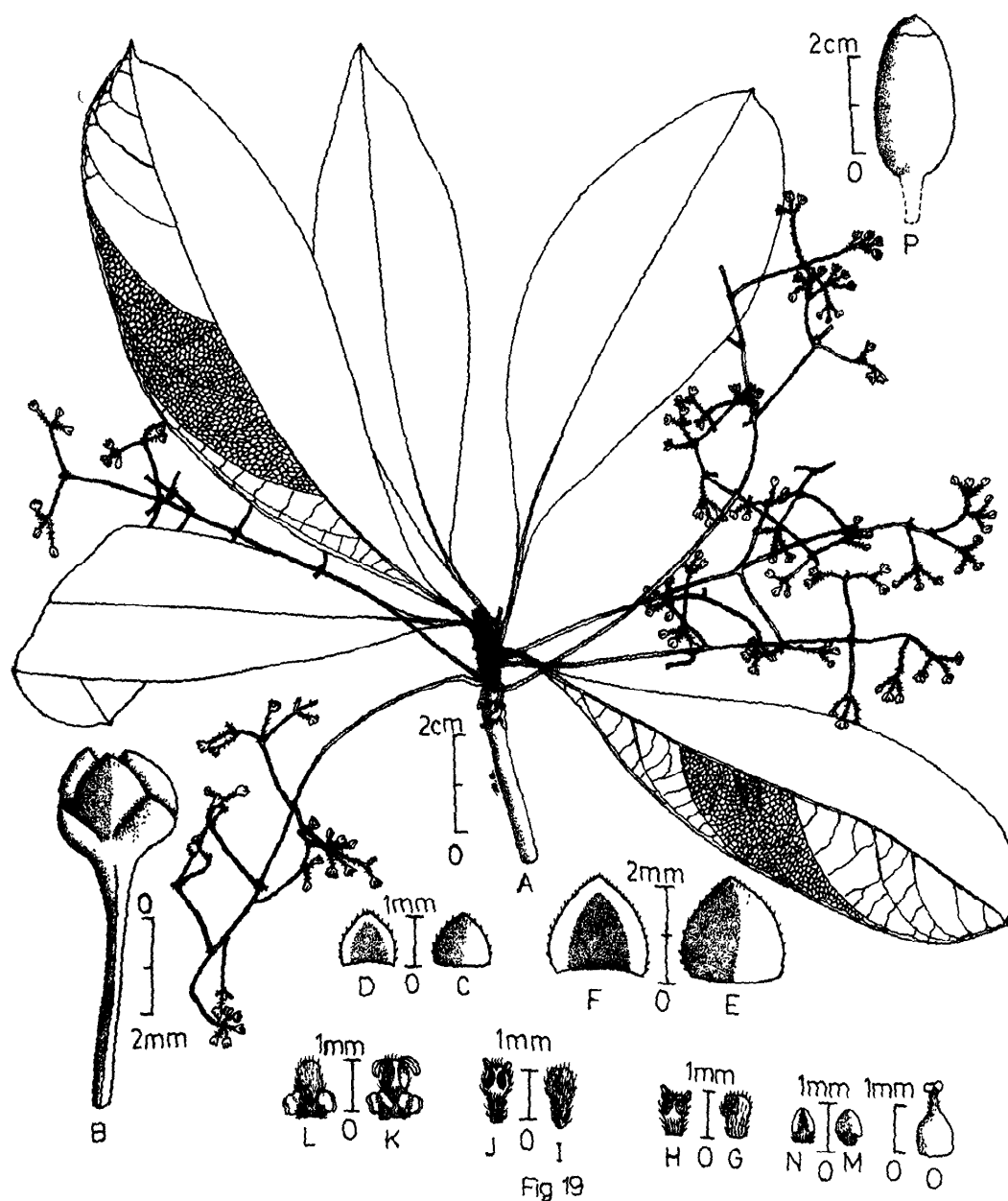


Fig. 13 : *Dehaasia rangamattiensis* M. Gangop. :

A. Flowering branch; left hand side: upper leaf surface; right hand side: lower leaf surface; B. Flower; C. Outer tepal - dorsal view; D. Idem - ventral view; E. Inner tepal - dorsal view; F. Idem - ventral view; G-N. Stamens and staminodes: G. Whorl I - dorsal view; H. Idem - ventral view; I. Whorl II - dorsal view; J. Idem - ventral view; K. Whorl III - dorsal view; L. Idem - ventral view; M. Whorl IV - dorsal view; N. Idem - ventral view; O. Pistil; P. Fruit (after *Forest Officials s.n.* acc. no. 551549).

(Meissn.) Kosterm., which bears glabrous leaves; ovoid-oblong fruits, $40-43 \times 16-18$ mm. The specimens are determined as *D. kurzii* Hook. f. which has leaves bluish glaucous beneath, to 10 mm long petioles and to 20×10 mm fruits.

14. *Persea arunachalensis* M. Gangop. sp. nov.

P. gamblei (King ex Hook. f.) Kosterm. affinis, sed differt foliis atro-brunneis, inflorescentiis longioribus pergracilibus, floribusque longi-pedicellatis cum tepalorum lobis crassis et coriaceis.

Holotypus : K. Haridasan 4529 (APFH).

Allied to *P. gamblei* (King ex Hook. f.) Kosterm., but differs in having dark brown leaves, much slender and longer inflorescences, flowers long pedicellate with thick coriaceous tepal lobes.

Trees, bark brown. Branchlets terete, to 4 mm diam., glabrous, gradually compressed, angled, fine pilosulous above; bud scales various, outer/lower: semicircular, *ca* 2.5×7 mm, rounded, dark brown, glabrous; inner/upper: obovate-spathulate, *ca* 21×11 mm, obtuse, margin brown tomentellous, silky appressed pilosulous above. Leaves alternate, (young one densely yellowish-brown tomentose beneath, blackish) stiff chartaceous, blackish brown above, reddish brown beneath, glabrous above, scattered puberulous to glabrous beneath, obovate-oblong or oblong, $11-12 \times 3.2-5.5$ cm, equally acute at base, slightly incurved along margin, shortly acuminate (acumens 6-9 mm long, acute) at apex; midvein channelled above, raised, terete to squarish, flattened along length, canaliculate beneath; lateral nerves to 8 pairs, slender, faint, flat above, raised beneath, sometimes irregular, close, ascending and arcuate, inconspicuously looped near margin above, obscure beneath; tertiary nerves slender, prominent above, faint beneath, scalariform; minor nervules obscurely areolate-reticulate, above, almost hidden beneath; petioles 11-16 mm long, 1-1.5 mm wide, shallow channelled above, glabrous in age. Panicle axillary, solitary, appearing pseudoterminal and mixed with young leaves, to 7 cm long, sericeous; branches slender, ascending; peduncle 11-25 mm long, 1-1.25 mm wide, thin, flat, shallow channelled; bracteoles linear, *ca* 3×1 mm, acutish, pilosulous. Flowers cupular-campanulate, *ca* 12×3.8 mm; pedicels slender, 6-7 mm long, flat, shallow channelled. Tepals 3 + 3, thick coriaceous, subacutish, concave ventrally, anastomosing hidden, appressed pilosulous dorsally; outer: narrow oblong, *ca* 3.8×1.3 mm, glabrous inside; inner: ovate, *ca* 4×2 mm, pilosulous inside. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular, filaments villous at base; I whorl: *ca* 2.5 mm long, filament *ca* 1.5 mm long, anther oblong, retuse; II whorl: *ca* 3 mm long, filament *ca* 1.7 mm long, anther oblong, subacutish; III whorl: *ca* 3 mm long, glands *ca* 1 mm long; stipe *ca* 0.5 mm long, head oblong-sagittate; filament *ca* 1.7 mm long, anther narrow oblong, obtuse; IV whorl (staminodes 3): *ca* 1.5 mm long, stalk *ca* 1 mm long, ventrally shallow channelled, head sagittate, ventrally shallow grooved. Pistil glabrous, *ca* 4.2 mm long; ovary subglobose, *ca* 1.2×1 mm, smooth; style flat, slender; stigma minute, fringed along margin. Fruits not seen.

(Fig. 14)

Fl. : February March.

Distrib. : India.

Ecology : Grows in evergreen montane forests.

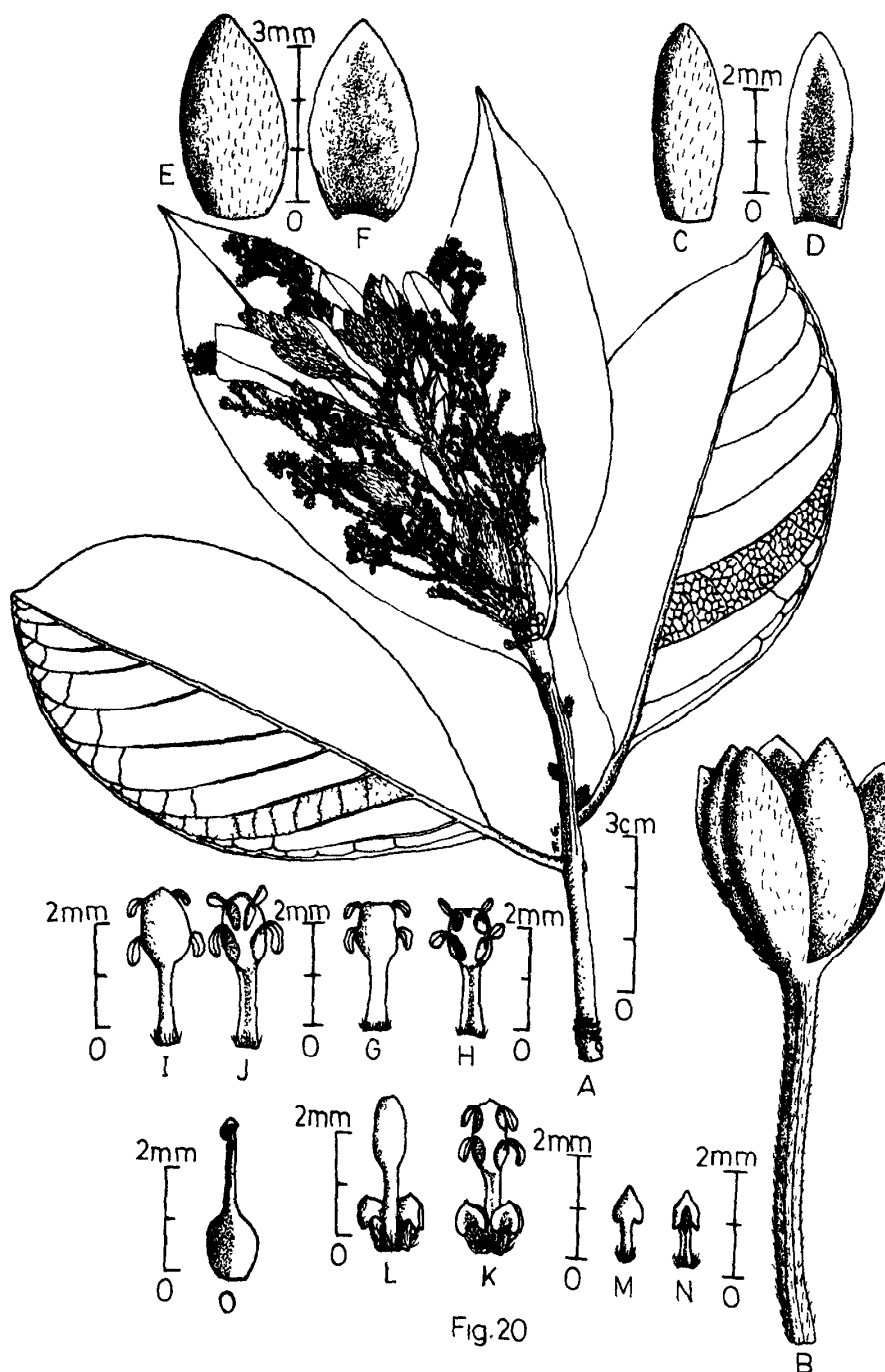


Fig. 14 : *Persea arunachalensis* M. Gangop. :

A. Flowering branch; left hand side: lower surface of leaf; right hand side: upper surface of leaf; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem ventral view; G-N. Stamens and staminodes: G. Whorl I dorsal view; H. Idem ventral view; I. Whorl II dorsal view; J. Idem ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl IV dorsal view; N. Idem ventral view; O. Pistil (after type).

Holotype : Arunachal Pradesh: Karko south east forests, 23.2.1988, K. Haridasan 4529 (APFH).

The panicles of *Persea gamblei* are 3- 4.5 cm long; flowers with pedicels to 4 mm long and the tepal lobes thin, chartaceous.

15. *Persea bhaskarii* M. Gangop. sp. nov.

P. odoratissimae (Nees) Kosterm. affinis, sed differt foliis angustioribus rigidis coriaceis manifeste incurvis secus marginem, reticulo non punctate, infructescentiis non fasciculatis, pedicellis fructificantibus parum tumidis.

Holotypus : A. T. Gage 52 (CAL); *Paratypus* : P. T. Russell 52 (CAL).

Allied to *P. odoratissima* (Nees) Kosterm., but differs in having stiff coriaceous narrower leaves markedly incurved along margin and non punctate reticulation, non fasciculate infructescences and slightly swollen fruiting pedicels.

Stature unknown. Branchlets terete, blackish, to 6 mm diam., glabrous, scattered lenticellate, gradually quadrangular, compressed above, utmost apex sparsely puberulous; buds minute, lanceolate, tomentose. Leaves spirally arranged towards apices, thickly coriaceous, dark greenish above, glaucous beneath, glabrous, narrow elliptic, elliptic-oblong or ovate, 6-13 × 2-2.5 cm, cuneate or acute, rarely tapering at base, slightly decurrent at extreme base, entire margin strongly incurved, subacute to subacuminate at apex; midvein slightly impressed above, raised and almost triangular beneath; lateral nerves 10-14 pairs, slender, distant, arcuate, inconspicuous above, faint beneath; tertiary nerves faint above, prominent beneath; minor nervules obscure above, prominently reticulate beneath; petioles 10-13 mm long, ca 1.5 mm wide, flat and shallow concave above, glabrous. Flowers not seen. Infructescens axillary, 8-16 cm long, glabrous; peduncle 5-11 cm long, 1.5-2 mm wide, terete below, angled and flattened above; branches short, ascending. Fruit globose, 9-10 mm diam., blackish, smooth, glabrous; tepals reflexed, spreading, basal rim pilose; stalk 5-6 mm long, ca 2 mm wide, squarish, slightly swollen. (Fig. 15)

Fr. : February.

Distrib. : Myanmar.

Type specimens : Tavoy, Feb 1918, A. T. Gage 52 (CAL); *Ibid.*, P. T. Russell 52 (CAL).

The species can be placed under the genus *Alseodaphne* Nees in having non-perulate terminal bud and crowded apical leaves but for the presence of fruit with reflexed tepal lobes and slightly swollen pedicel help to retain the species under the genus *Persea*.

Alseodaphne hainanensis Merr. are very allied to it. But readily differ from it in having leaves with prominent nerves and nervules on upper surface, much swollen fruiting pedicels and deciduous tepals.

The leaves of *P. odoratissima* are 2.5-5 cm broad, minor nervules strongly punctuate-reticulate or areolate reticulate on both surfaces, infructescences axillary and sub terminal, congested and fasciculate towards apices; fruiting pedicels to 1 mm wide, sparsely puberulous.



Fig. 15 : *Persea bhaskarii* M. Gangop. :

A. Branch with fruits; left lower leaf: lower surface; left upper leaf: upper surface (after *P. T. Russell* 52).

The specific epithet is contributed to my son Sri Bhaskardyuti Gangopadhyay.

16. *Persea haridasanii* M. Gangop. sp. nov.

P. robustae (W. W. Smith) Kosterm. affinis, sed differt foliis infra non glaucis, nervulis minoribus inconspicuis et stamine biglandulari tantum in verticillo tertio.

Holotypus : K. Haridasan 601 (APFH); *Paratypus* : K. P. Singh 99369 (ASSAM).

Allied to *P. robusta* (W. W. Smith) Kosterm., but differs in having leaves non-glaucous beneath, minor nervules inconspicuous and stamens biglandular only in third whorl.

Trees, 10-15 m high, bark dark brown. Branchlets terete, blackish-brown, to 7 mm diam., rough, warty and lenticellate, gradually compressed, glabrous above; bud scales ovate, ca 5×3 mm, acute, coriaceous, brown tomentellous. Leaves alternate, coriaceous, green or brownish-green above, pale brown beneath, non-glaucous, glabrous, obovate, $24.5-29.5 \times 8.4-11$ cm, unequal, acute + cuneate at base, margin incurved, obtuse and shortly and sharply acuminate (acumens 10-11 mm long) or sometimes apiculate at apex; midvein slender, deeply channelled above, raised, terete, canaliculate beneath; lateral nerves 8-9 pairs, distantly ascending-arcuate, slender, slightly raised or flat and impressed above, prominent beneath; tertiary nerves partially faint above, prominent beneath, distantly scalariform; minor nervules faint, areolate-reticulate above, canaliculate-reticulate in age, faint, areolate-reticulate beneath; petioles almost terete, 35-40 mm long, 2.5-3 mm wide, striate, channelled and narrow winged at corners above, glabrous. Panicles terminal, 5.5-15 cm long; peduncles 1-6 cm long, 1.5-2.5 mm wide, blackish, sparsely tomentellous above, densely so at base; branches flat, ascending, tomentellous. Flowers cupular, $11-13 \times 5.5-7$ mm, fine pilosulous; pedicels 4-5 mm long, ca 1 mm wide, squarish, shallow channelled. Tepals 3 + 3, thick, coriaceous, anastomosing hidden, concave ventrally, acutish; outer: elliptic-oblong, obovate-oblong or obovate, $6-6.7 \times 2-3.2$ mm, pilosulous inside; inner: elliptic-oblong or obovate, $6.5-6.8 \times 2.5-3.5$ mm, pilosulous inside. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular, filaments sparsely villous at base; I whorl: ca 5.5 mm long, filament ca 3.7 mm long, flat, ventrally canaliculate, anther oblong, mucronulate; II whorl: ca 5.5 mm long, filament ca 3.9 mm long, anther oblong, retuse; III whorl: ca 5.5 mm long, glands ca 1.9 mm long, stipe ca 1 mm long, thin, head ovate-cordate, sub acutish, ventrally grooved; filament ca 3.9 mm long, anther narrow-oblong, obtuse; IV whorl (staminodes 3): ca 2.3 mm long, stipe ca 1 mm long, ventrally grooved, head ovate-cordate, acutish, ventrally grooved. Pistil glabrous, 4.5-7 mm long; ovary ovoid, $1.2-2 \times ca 1.2$ mm, smooth; style flat, shallow longitudinal grooved; stigma peltate, thin, shallow lobulate. Fruits not seen.

(Fig. 16)

Fl.: February March (greenish yellow to yellow, faintly fragrant).

Distrib. : India.

Ecology: Common in temperate montane forests at about 600 m altitudes.

Type specimens : Arunachal Pradesh, Dibang valley district, Anini, 30.3.1984, K. Haridasan 601 (APFH); *Ibid.*, Kameng district, Saiden to Jirigoon, 4.2.1995, K.P. Singh 99369 (ASSAM).

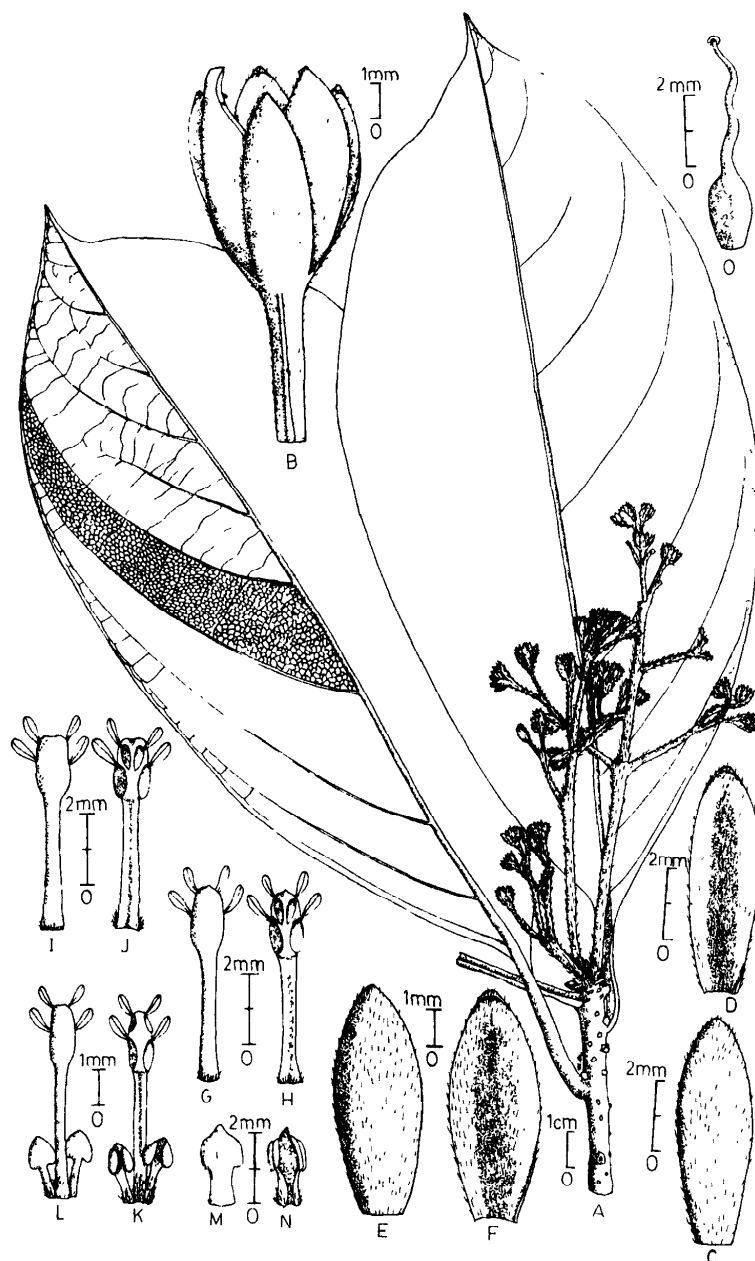


Fig. 16 : *Persea haridasanii* M. Gangop. :

A. Branch with flowers; right hand: upper surface of leaf; left hand: lower surface of leaf; B. Flower; C. Outer tepal - dorsal view; D. Idem - ventral view; E. Inner tepal -dorsal view; F. Idem - ventral view; G-N. Stamens and staminodes: G. Whorl I -dorsal view; H. Idem - ventral view; I. Whorl II - dorsal view; J. Idem - ventral view; K. Whorl III - dorsal view; L. Idem - ventral view; M. Whorl IV - dorsal view; N. Idem - ventral view; O. Pistil (after K. Haridasan 601).

Persea robusta has the stamens with basal glands in all the three whorls. I had dissected the flowers from our specimens. This character does not seen in any Indian species of *Persea*. This proposed new taxon allied to *P. robusta* but is differing in having eglandular stamens in I and II whorls besides the foliage characters. *P. robusta* is distributed in China, Myanmar and north east India.

The specific epithet has been given in honor of Dr. K. Haridasan, The State Forests Research Institute, Arunachal Pradesh, Itanagar, who made an extensive collection of plants in Arunachal Pradesh.

17. *Persea himalayaensis* M. Gangop. sp. nov.

P. odoratissimae (Nees) Kosterm. affinis, sed differt inflorescentiis glabris, fructibusque oblongis, ovoideo-oblongis vel ellipsoideo-oblongis.

Machilus odoratissima Nees var. β Nees in Wall. Pl. Asiat. Rar. 2: 70.1831.

Typi : Wallich s.n. in Wall. Cat. 2601A, *pro parte* (CAL); 2607B (CAL); 2607F (CAL).

M. odoratissima Nees : Hook. f., Fl. Brit. India 5: 139. 1886, *pro parte*.

Allied to *P. odoratissima* (Nees) Kosterm., but differs in having glabrous inflorescences and oblong, ovoid-oblong or ellipsoid-oblong fruit.

Small to large trees, 6-20 m high. Branchlets terete, blackish, 5-7 mm diam., striate, glabrous; gradually slender, compressed, scales scarred above; bud scales (mixed with inflorescences and infructescences) various, small, ovate, acuminate, ciliate at margin to large, ovate or orbicular, obtuse to rounded, densely villous, 3-5 × 3-4.5 mm. Leaves alternate, (young one membranous to thin chartaceous, blackish to chocolate, glabrous) thin to thick coriaceous, glossy or not, brown, blackish or reddish-brown above, paler and glaucous beneath, glabrous, ovate, obovate, elliptic-oblong, obovate-orbicular or sometimes narrow oblong-lanceolate, 6-21 × 3.5-7.5 cm, unequally acute + cuneate, obtuse or cuneate at base, margin slightly incurved, acuminate (acumens to 10 mm long, sharp or blunt), apiculate or rarely retuse at apex; midvein flat, shallow channelled above, raised beneath; lateral nerves 9-14 pairs, close or distant, faint or prominent, arcuate, weakly looped near margins, sometimes forked, slightly raised on both surfaces; tertiary nerves faint to prominent, laxly reticulate; minor nervules prominent, areolate-reticulate and in age punctate-reticulate; petioles slender, 10-20 mm long, to 1.5 mm wide, shallow concave above, glabrous. Panicles axillary and subterminal, fascicled, glabrous, 7-10 cm long; peduncles slender, 3-5 cm long, 1-1.5 mm wide, slender, flat; branches slender, ascending, sometimes few in numbers, lax flowered. Flowers cupular-campanulate, 10-14 × 5-6 mm; pedicel 5-8 mm long, ca 0.5 mm wide, slender. Tepals 3 + 3, thick, coriaceous, striped when mature; outer: narrow oblong to ovate, 4.5-6 × 1.5-2 mm, subacutish, anastomosing obscure, glabrous or rarely ciliate along margin or utmost apex puberulous above; inner: obovate, 4-5 × 2-2.5 mm, hairyness as before. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular; filament flat, thin, villous at base; I whorl: ca 4 mm long, filament ca 2.5 mm long, anther oblong, obscurely retuse; II whorl: ca 4 mm long, filament ca 2.5 mm long, anther oblong, truncate; III whorl: ca 4 mm long, glands 1.5-2 mm long, stipe thin, villous at base, head ovate-cordate,

acutish; filaments *ca* 2.7 mm long, anther narrow oblong, subacutish; IV whorl (staminodes 3): *ca* 2 mm long, stipe *ca* 1.5 mm long, villous at base, head hastate, ventrally shallow grooved, acutish. Pistil glabrous, 4-5 mm long; ovary ovoid-oblong, 1.1-1.2 × *ca* 1 mm, smooth; style 2-3 mm long, slender, flat; stigma small, thin, peltate, shallow lobed. Infructescences 6-13 cm long, blackish, glabrous; peduncles 3-7 cm long, 1.5-2 mm wide; branches slender. Fruits oblong, ovoid-oblong, ellipsoid-oblong, 8-18 × 6-10 mm, obtuse or subacute at apex, dark-brown, brown or blackish, glabrous; pedicels 10-14 mm long, *ca* 1-1.5 mm wide, glabrous; fruiting tepals coriaceous, usually stripped, reflexed, oblong to ovate-oblong, to 6 × 3 mm. (Fig. 17)

Vern.: Kathikaulo (Nep.)

Fl. : February July (green to yellow); *Fr.* : May July.

Distrib. : India frequently common in Western to Central Himalayas, scattered in Eastern Himalayas and North East India; Nepal, Bhutan, Pakistan.

Ecology : Grows in evergreen montane forests at 300-2400 m altitudes.

Specimens : INDIA. Himachal Pradesh. Simla, Indasuni, 1200 m, 12.5.1878 (fr.), *J. S. Gamble* 5994C (CAL); Chamba to Khagiar, 1500-2100 m, 23.4.1896 (fls.), *J. H. Lace* 1339 (CAL). Uttaranchal, below Mussori, 2.6.1870 (fr.), *G King s.n.*, acc. no. 384558 (CAL); near Mussori, *Brandis* 1706 (CAL); *Ibid.*, 1200 m, March 1897 (fls.), *P.W. Mackinnon s.n.*, acc. no. 384564 (CAL); *Ibid.*, 15.4.1897, *P. W. Mackinnon s.n.*, acc. no. 384563 (CAL); *Ibid.*, 19.7.1897 (fls.), *Duthie s.n.*, acc. no. 384540 (CAL); *Ibid.*, 1800-2100 m, July 1897 (fr.), *P.W. Mackinnon s.n.*, acc. no. 384539 (CAL); Dickroad, 1950 m, 8.6.1967 (fr.), *P. Pradhan* 151 (CAL); Kumaon, Kaluna, 1500 m, 31.7.1913 (fr.), *-N. Gill* 638 (CAL); Reja, 1350 m, 11.7.1913 (fr.), *N. Gill* 572 (CAL); Dehradun, *Wallich s.n.* in Cat. 2607 B (CAL); New Forest, April 1939 (fls.), *M. B. Raizada* 18387 (ASSAM); *Ibid.*, 26.4.1901 (immature fr.), *U. N. Kanjilal* 1104 (ASSAM). Uttar Pradesh. Saharanpur Bot. Gard., *G King s.n.*, acc. nos. 384544 to 384546 (CAL). North West Himalayas, *Royle s.n.*, acc. no. 384557 (CAL); Kyna, 25.5.1878 (fr.), *G King s.n.*, acc. no. 384565 (CAL). Janusar Division, Thadiar, 900 m, 18.5.1893 (fr.), *D. Dutt* 137 (ASSAM); Sikkim. Dumsong, May 1877 (fr.), *J. L. Lister s.n.*, acc. no. 384516 (CAL); 1200-2400 m, *J. D. Hooker s.n.*, acc. no. 384523 (CAL); Samsung, May 1877, *J.L Lister s.n.* (CAL); *G King s.n.*, acc. no. 384578 (CAL); *G. A. Gammie s.n.*; *Ibid.*, Tista, 300 m, 20.3.1913 (fls.), *G H. Cave s.n.* (CAL); Toong, 1425 m, 6.7.1907 (fr.), *Smith & Cave* 876 (CAL); Silake, 600 m, 12.6.1884 (fr.), *G King's collector s.n.*, acc. no. 384917 (CAL). West Bengal : Mungpoo, 900 m, 16.3.1909 (fls. buds), *Kari* 613, 620 (CAL); *Ibid.*, 600 m, 8.5.1909 (fr.), *Kari* 1298 (CAL); *Ibid.*, 900 m, 7.5.1909 (fls.), *Kari* 1271 (CAL). Meghalaya. Khasi hills, 1500-1800 m, May 1877 (fr.), *S. Kurz* 226 (CAL). Nagaland : Jaboca, Feb. 1877 (fls.), *A. Huk* 727 (CAL). BHUTAN. *Griffith* 1173 (CAL); East Himalaya, *Griffith* 4266 (CAL) right hand side specimen. NEPAL. *Wallich s.n.* in Cat. 2607A (CAL); Jaingepan (Phulchoti), 1800 m, *P. Pradhan* 6865 (CAL); Nagarjun, 1500 m, 10.4.1961 (fls.), *Shredha & party* 155 (CAL). ? Singapore, *Wallich s.n.* in Cat. 2607F (CAL). PAKISTAN. Hazara dist, Hasanabad to Ahbottabad, 30.5.1899 (fr.), *Inayat s.n.*, acc. no. 384571 (CAL); Hazara, 1200-1500 m, *Coll. Illeg.* 340 (CAL).

The distribution of *Persea odoratissima* (Nees) Kosterm. has concentrated in northeast India, Bangladesh, Myanmar and Malaysia. It is also scattered in the eastern Himalayas and rare in the western Himalayas. On the other hand the distribution of *P. himalayaensis* is more concentrated in

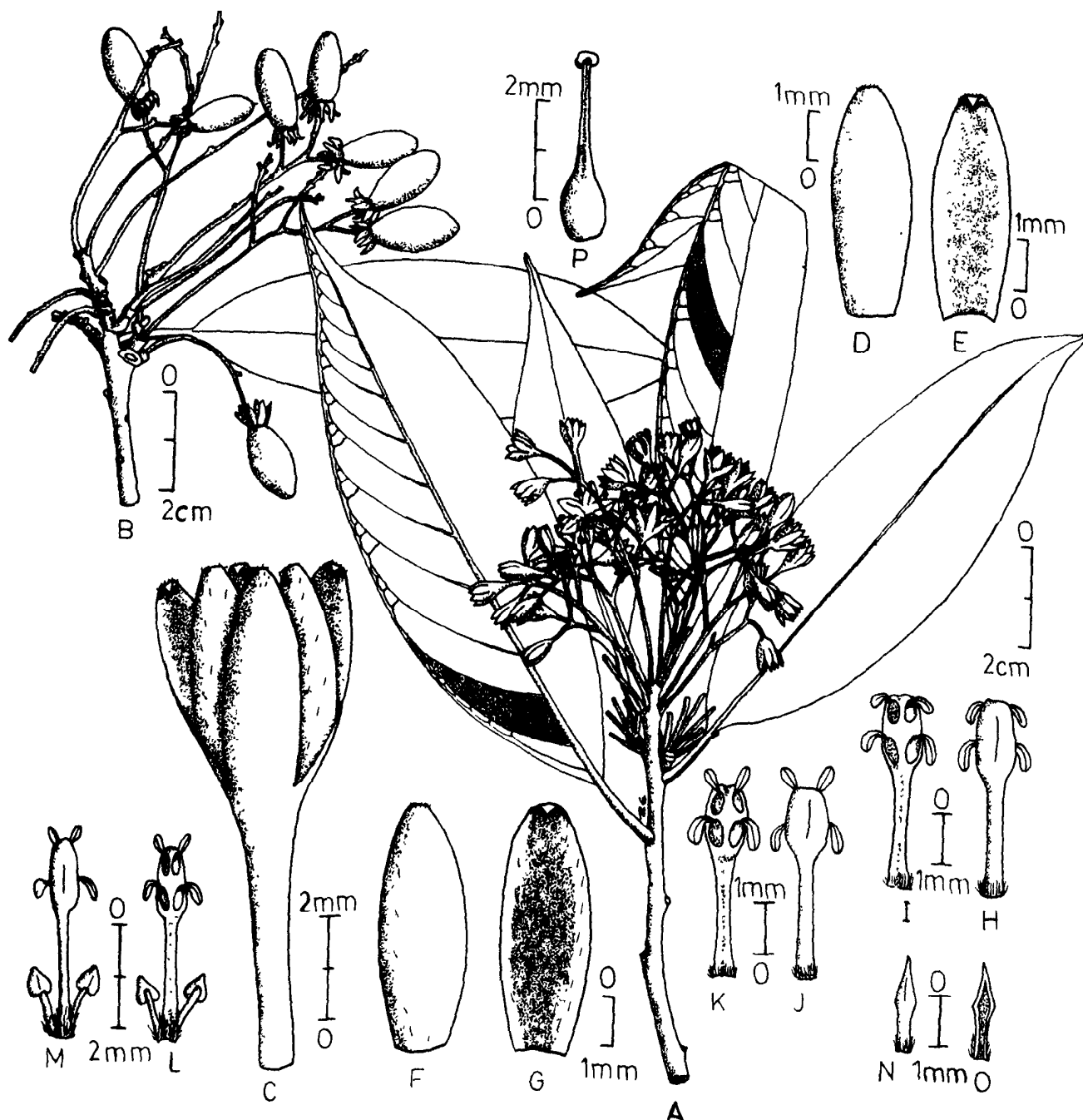


Fig. 17 : *Persea himalayaensis* M. Gangop. :

A. Flowering branch; left hand side: lower surface of leaf; right hand side: upper surface of leaf; B. Branch with fruits; C. Flower; D. Outer tepal dorsal view; E. Idem ventral view; F. Inner tepal-dorsal view; G. Idem ventral view; H-O. Stamens and staminodes: H. Whorl I dorsal view; I. Idem- ventral view; J. Whorl II dorsal view; K. Idem ventral view; L. Whorl III dorsal view; M. Idem ventral view; N. Whorl IV dorsal view; O. Idem ventral view; P. Pistil (A & C-O, after *Coll. Illeg. s.n.*, acc. no. 384556, B. after *Lister s.n.*, acc. no. nil).

the western, central and central-eastern Himalayas and scattered in the eastern Himalayas and north-east India. The distribution of the species in Singapore is uncertain.

18. *Persea lobitensis* M. Gangop. sp. nov.

P. odoratissimae (Nees) Kosterm. affinis, sed differt foliis angustioribus oblongis vel oblongo ellipticis cum acumine longo, infructescentiis solitariis axillaribus pauci-ramosis, fructibus globosis majoribus cum tepalisque non striatis.

Holotypus : K. Haridasan 1693 (APFH); iso., in APFH.

Allied to *P. odoratissima* (Nees) Kosterm., but differs in having much narrow oblong or oblong-elliptic leaves with long acumens, solitary, axillary few branched infructescences, larger globose fruit with non striate tepals.

Trees. Branchlets slender, terete, blackish, to 3 mm diam., striate, glabrous, gradually compressed, angled, shallow channelled, sparse pilosulous above; bud scales narrow ovate-lanceolate, *ca* 3 × 1.5 mm, acuminate, densely pilose. Leaves alternate, thinly chartaceous, light green above, pale brown, glaucous beneath, narrow oblong or oblong-elliptic, 8.5-14.5 × 1.5-2.8 cm, equally to subequally acute or acute + cuneate or obtuse + cuneate at base, flat or slightly incurved along margin, long acuminate (acumens 12-24 mm long, minutely apiculate at tip) at apex, glabrous excepting appressed pilosulous on basal portion of midvein above, sparsely pilosulous beneath; midvein flat, canaliculate, slender above, raised and terete beneath; lateral nerves 10-12 pairs, oblique, distant, arcuate, slightly raised or not, faintly looped near margin; tertiary nerves prominent above, obscure beneath; minor nervules prominent above, inconspicuous beneath, finely areolate-reticulate; petioles 8-12 mm long, *ca* 1 mm wide, channelled above, sparsely pilosulous. Infructescences axillary, solitary; peduncle *ca* 5 cm long, 1.5 mm wide, flat, blackish, glabrous. Fruit (almost broken) globose, *ca* 15 mm diam., blackish, glabrous; stalk *ca* 8 mm long, 1.5 mm wide, glabrous; tepals persistent, reflexed, oblong, *ca* 3 × 2 mm, subacutish, minutely puberulous towards apices dorsally, margin ciliate, glabrous inside, striations absent. (Fig. 18)

Fl.: October (purplish, globose).

Distrib. : India.

Ecology : Fairly common in temperate forests.

Type specimens : Arunachal Pradesh. Lohit district, Melinja, 10.10.1984 (fr.), K. Haridasan 1693 (APFH).

The leaves of *P. odoratissima* are 2.5–5 cm broad and with acumens 6-10 mm long, blunt; panicles congested and fasciculate, much branched; fruits 10–12 mm diam., tepal lobes with prominent striations and with puberulous stalks.

19. *P. russellii* M. Gangop. sp. nov.

P. gamblei (King ex Hook. f.) Kosterm. affinis, sed differt ramulis nigris laevibus, foliis angustis ellipticis vel oblongo ellipticis, fuscis, cum nervis lateralibus canaliculatis, nervulis minoribus suboccultis, floribusque dense tomentosis.

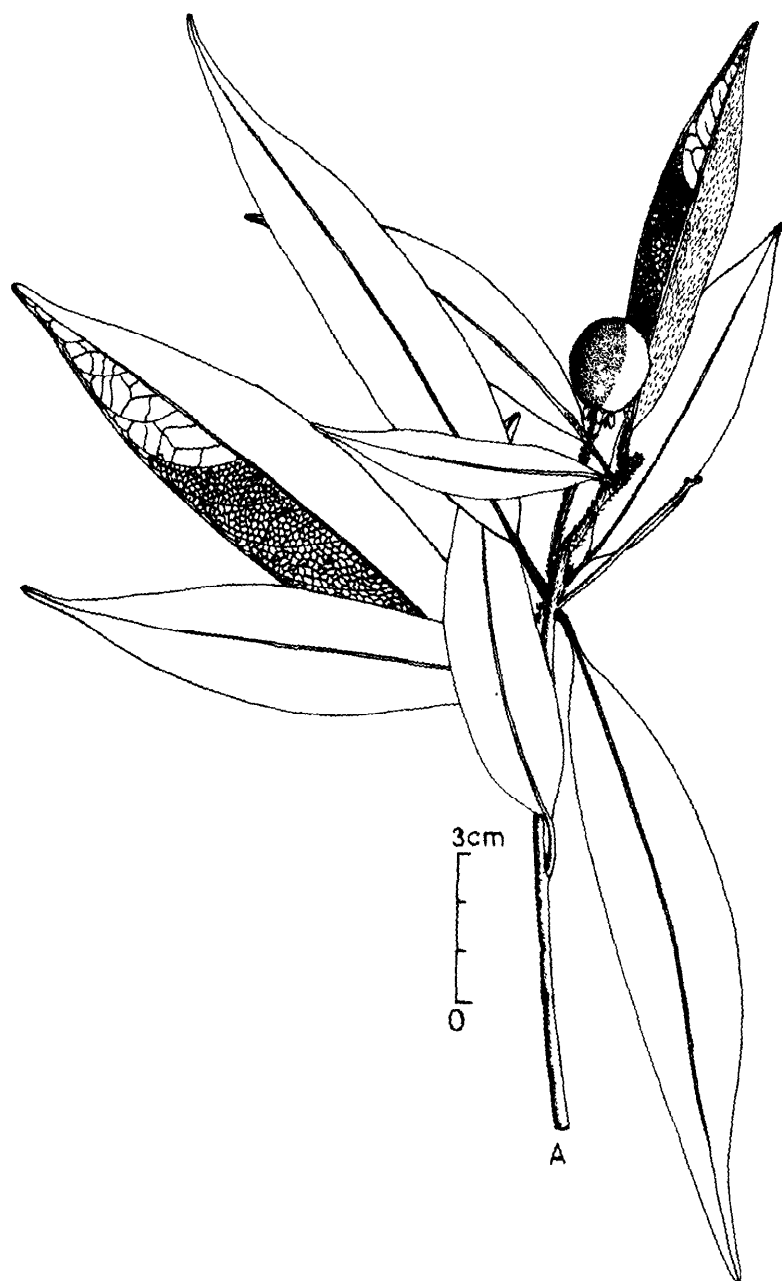


Fig. 18 : *Persea lohitis* M. Gangop. :

A. Branch with fruits; right hand side : lower surface of leaf; left hand side : upper surface of leaf (after type).

Holotypus : *P. T. Russell* 1815 (CAL); iso., in CAL.

Allied to *Persea gamblei* (King ex Hook. f.) Kosterm., but differs in having black smooth branchlets, narrow elliptic or oblong-elliptic dark leaves with faint canaliculate lateral nerves and almost hidden minor nervules and densely tomentose flowers.

Large trees. Branchlets terete, blackish, to 5 mm diam., faintly striate, glabrescent, gradually compressed, densely brown tomentose above ; bud scales ovate, *ca* 1.5 × 1.5 mm, acute to subacute, brown tomentose above. Leaves alternate, coriaceous, dark brown above, whitish glaucous beneath, narrow elliptic, oblong-elliptic, 8.5-15 × 2-4.5 cm, subequally cuneate or acute at base, slightly decurrent at extreme base, margin incurved, long acuminate (acumens to 15 mm long, sharp or not) at apex; midvein slender, shallow channelled above, slightly raised beneath; lateral nerves 8-12 pairs, inconspicuously canaliculate on both surfaces, close, arcuate, faint near margin; tertiary nerves laxly reticulate; minor nervules obscure; petioles slender, 15-20 mm long, 1-1.5 mm wide, shallow channelled above, glabrous. Panicles axillary and subterminal, solitary, to 6 cm long, densely tomentellous; peduncles to 3 cm long, *ca* 1 mm wide; bracteoles *ca* 2 mm long, linear, densely tomentellous above, glabrous beneath, deciduous. Flowers cupular, *ca* 8 × 3.5 mm, tomentose; pedicels 4-6 mm long, *ca* 1 mm wide. Tepals thin, 3 + 3, subacute, anastomosing faint, puberulous inside; outer: oblong to narrow ovate-oblong, *ca* 4.2 × 1.2 mm; inner: ovate-elliptic, *ca* 4.8 × 2 mm. Stamens 9, 3 in each whorl, anthers 4-locular, filament villous at base, whorl I and II introrse, of III biglandular, extrorse; I whorl: *ca* 3.8 mm long, filament *ca* 2.5 mm long, anther ovate-oblong, almost truncate at apex; II whorl: 3.5 mm long, filament *ca* 2.3 mm long, anther oblong; III whorl: 4 mm long; glands *ca* 2 mm long, stipe slender, 1.7 mm long, head sagittate; filaments *ca* 3 mm long; anther narrow oblong, obtuse at apex; IV whorl (staminodes 3): *ca* 2.5 mm long, head ovate-triangular, acute. Pistil glabrous, *ca* 4 mm long; ovary ovoid, *ca* 1.5 × 1.2 mm, smooth; style slender; stigma discoid, thin, shallow lobulate. Fruits (immature): globose, *ca* 2.5 × 2.5 mm, smooth, glabrous; tepals persistent, expanding; stalks to 9 mm long. (Fig. 19)

Fl.: May; *Fr.*: May onwards.

Distrib. : Myanmar.

Ecology : Grows at about 1000 m altitude.

Type specimens : Tavoy, Head waters of Sedi chaung, 1000 m, 17.5. 1920 (fls. & immature fr.), *P. T. Russell* 1815 (CAL).

The leaves of *P. gamblei* upto 6 cm broad, obovate to oblanceolate, sometimes elliptic lanceolate, lateral nerves flat and non canaliculated on both surfaces, minor nervules prominent, punctate reticulate; flowers puberulous without.

The specific epithet has been given in honor of P.T. Russell who made an extensive collection in Myanmar.

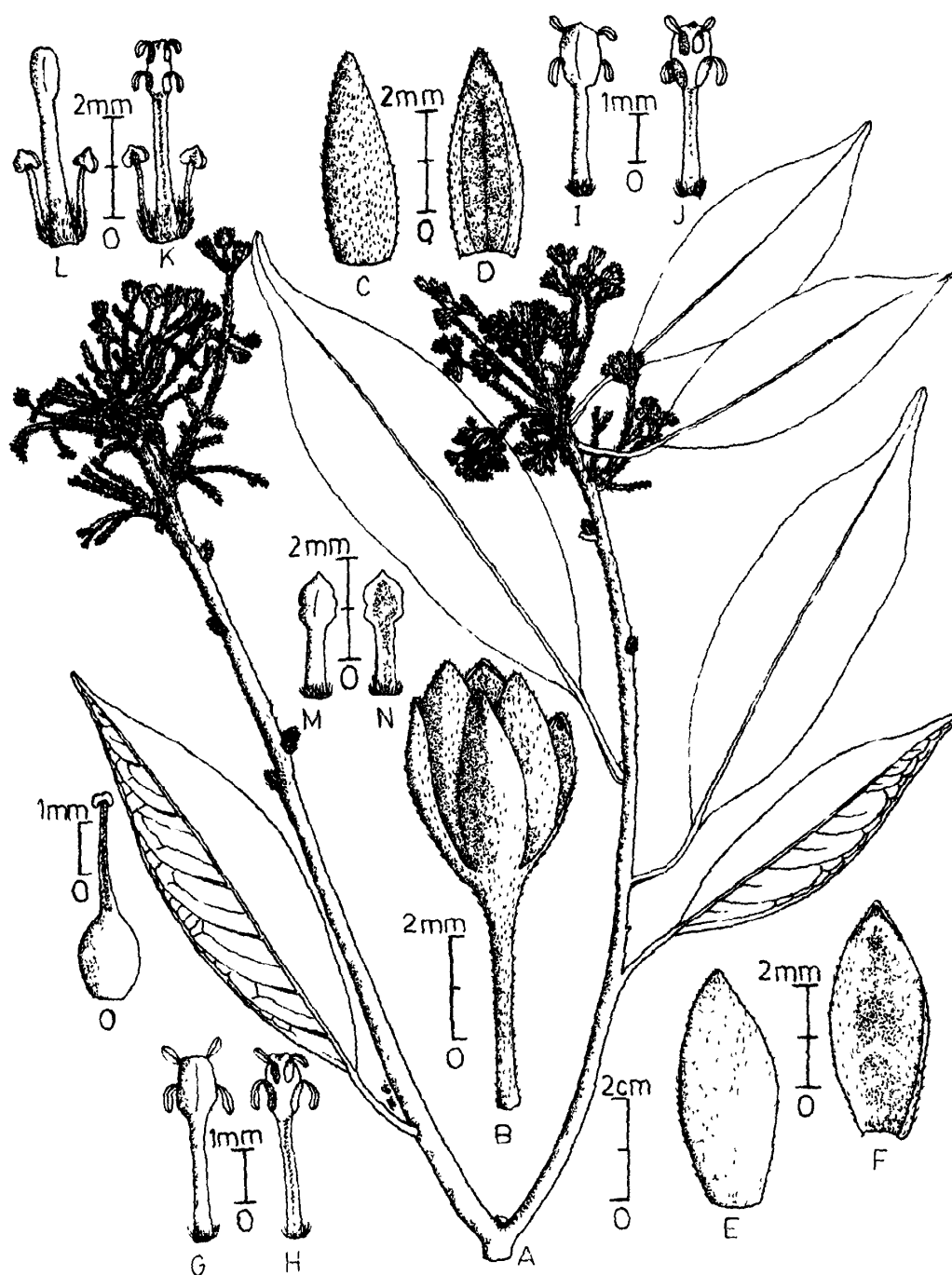


Fig. 19 : *Persea russellii* M. Gangop. :

A. Flowering branch; left hand side: lower surface of leaf; right hand side: upper surface of leaf; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem - ventral view; G-N. Stamens and staminodes: G. Whorl I dorsal view; H. Idem ventral view; I. Whorl II dorsal view; J. Idem -ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl IV dorsal view; N. Idem ventral view; O. Pistil (after type).

20. *Persea sharmae* M. Gangop. *sp. nov.*

P. fructiferae Kosterm. affinis, sed differt foliis angustis luteolis, supra cum nervis lateralibus inconspicuis, inflorescentiis brevioribus pergracilibusque.

Holotypus : S.R. Sharma 9202 (ASSAM); *Paratypes* : S.R. Sharma 10853 (ASSAM); N.L. Bor 21057 (ASSAM); J. H. Lace 4623 (CAL); G.E.S. Cubitt 326 (CAL).

Allied to *P. fructifera* Kosterm., but differs in having narrow yellowish leaves with faint lateral nerves above, much slender and shorter inflorescences.

Small trees. Branchlets terete, brown to blackish, 5-5.5 mm diam., rough with warts and whitish lenticels, glabrous, gradually angled, compressed, smooth, glabrous above; bud scales imbricate, obovate-orbicular to ovate-orbicular, 15-25 × 15-30 mm, thin at margin, obtuse, subacute or apiculate at apex, silky brown or rufous pilose or ciliate only at margin above. Leaves alternate below, opposite towards apices, chartaceous to thinly coriaceous, yellowish above, pale, glaucous beneath, glabrous, narrow obovate, obovate-oblong or obovate, 10-16(-18) × 2-5 cm, equally or subequally, cuneate, acute or obtuse, rarely acute + cuneate at base, slightly decurrent at extreme base, incurved along margin, acuminate (acumens 5-10 mm long, acute) at apex; midvein channelled above, raised and stout beneath; lateral nerves 14-30 pairs, close, ascending, slender, raised on both surfaces, faintly looped near margin; tertiary nerves scalariform, somewhat prominent above, obscure beneath; minor nervules areolate-reticulate or punctate-reticulate above, reticulate beneath; petioles 10-20 mm long, 1-1.5 mm wide, concave above, glabrous. Panicle axillary and subterminal, 4.5-5 cm long, fine puberulous when young, glabrescent in age; peduncle *ca* 2.5 cm long, 1.5 mm wide, slender, flat; branches short, puberulous. Flowers campanulate, *ca* 10 × 6 mm, pilosulous; pedicels *ca* 4 cm long, thin, flat, shallow longitudinal grooved. Tepals 3 + 3, ovate, thin, anastomosing faint, pilosulous inside; outer: *ca* 4.5 × 2 mm, subcutish, ventrally almost flat; inner: *ca* 5 × 2 mm, obtuse, shallow concave ventrally. Stamens 9, 3 in each whorl, anthers 4-locular, I and II introrse, of III extrorse, biglandular, filament villous below; I whorl: *ca* 3.8 mm long, filament *ca* 2.5 mm long, anther narrow oblong-ovate, retuse; II whorl: *ca* 3.9 mm long, filament *ca* 2.5 mm long, anther narrow oblong, obtuse; III whorl: *ca* 3.9 mm long, biglandular, glands *ca* 1.5 mm long, stipe *ca* 1 mm long, thin, head triangular-ovate, obtuse to acute at apex, cordate at base; filament *ca* 2.5 mm; anther narrow-oblong, apiculate; IV whorl (staminodes 3): *ca* 2 mm long, stipe *ca* 1.2 mm long, head sagittate, ventrally concave. Pistil: *ca* 4 mm long, glabrous; ovary oblong-ovoid, *ca* 1.4 × 1.2 mm, smooth; style slender, flat, shallow longitudinally channelled; stigma peltate, thin, lobed, corners acute. Infructescences 4-16 cm long; peduncles 1.5-9 cm long, 1.5-2 mm wide, stout, squarish, glabrous, lenticels obscure; branches short, glabrous. Fruits globose, 2-3 cm diam., blackish, glabrous, pericarp rigid; stalk 10-12 mm long, *ca* 2 mm wide, scattered lenticellate, glabrous; tepals deciduous. (Fig. 20)

Fl. : May October; *Fr.* : June February.

Distrib. : India, Myanmar.

Ecology : Grows in wet temperate montane forests in India.

Type specimens : INDIA. Meghalaya: Khasi hill district, Shillong peak, 7.6.1931 (fls.), S. R. Sharma 9202 (ASSAM); Dawki forests, 25.10.1934 (fls.), S. R. Sharma 10853 (ASSAM); Nagaland: Naga hills,

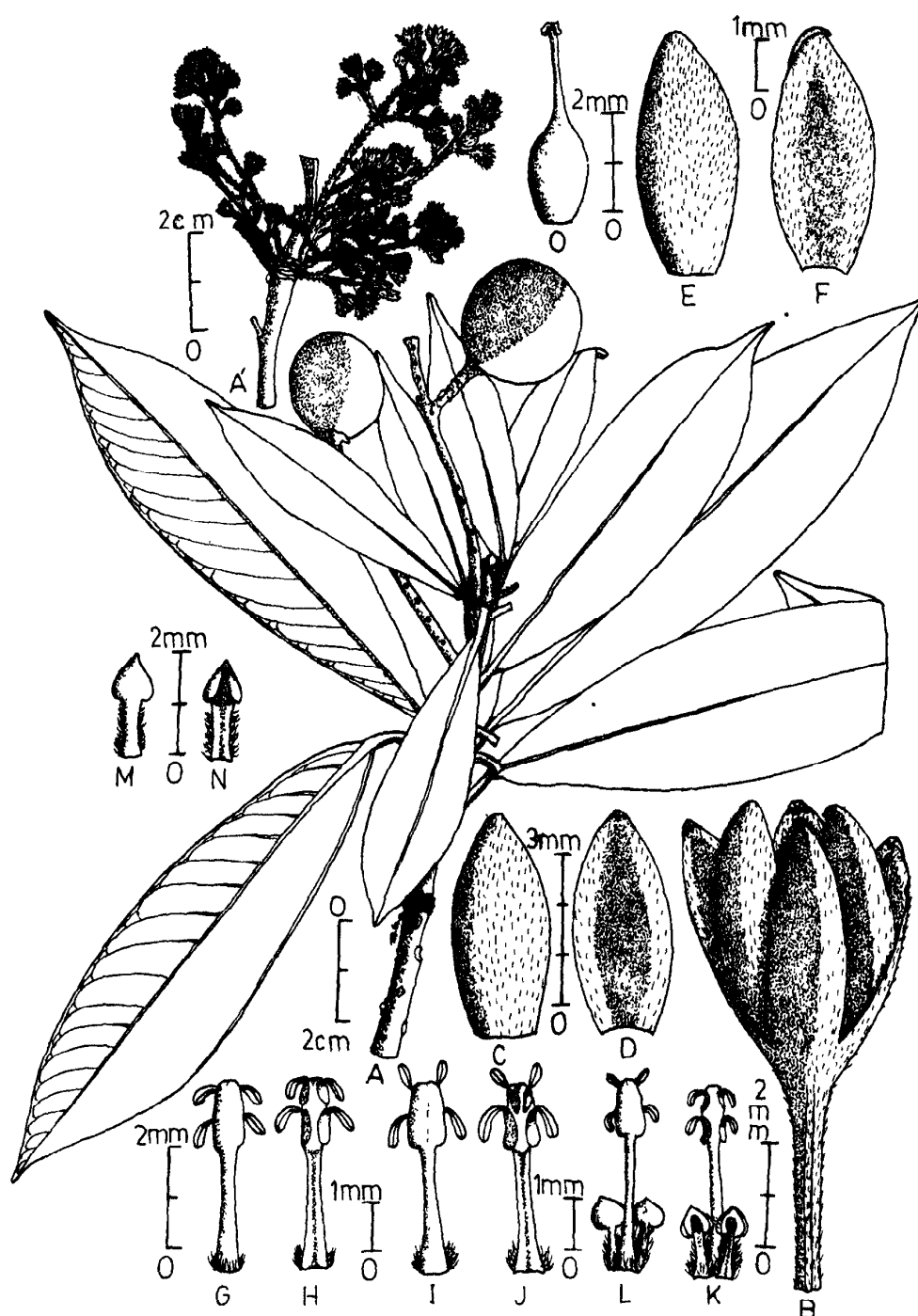


Fig. 20 : *Persea sharmae* M. Gangop. :

A. Branch with fruits; left hand upper leaf: upper surface; left hand lower leaf: lower surface; A'. Inflorescences; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem ventral view; G-N. Stamens and staminodes: G. Whorl I dorsal view; H. Idem ventral view; I. Whorl II dorsal view; J. Idem ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl IV dorsal view; N. Idem ventral view; O. Pistil (A' & B-O after *N.L Bor* 21057 and A after *S.R. Sharma* 9202).

May 1935 (fls.), *N.L. Bor* 21057 (ASSAM). MYANMAR. Thaton district, Panigkyn to Tale, Dacona range, 22.2.1909 (fr.), *J. H. Lace* 4623 (CAL); Bhamo, ? 1909 (fr.), *GE.S. Cubitt* 326 (CAL).

The leaves of *Persea frcutifera* are dark brown reddish brown or grayish above, dark chocolate-brown or coppery-brown beneath; lateral nerves stout, channelled above; infructescences 5-9 cm long, peduncles stout, 3-6 cm long, 1.5-2 mm wide.

The species is named after Mr. S. R. Sharma, who made an extensive plant collection in Assam and adjoining areas.

21. *Persea sikkimensis* M. Gangop. sp. nov.

P. himalayaensis M. Gangop. affinis, sed differt foliis majoribus late obovatis, ovato oblongis, oblongisve, basi cordatis vel obtusis, paniculis pergracilibus elongatis atro-viridis fasciculatis, floribus cum tepalorum lobis non-striatis.

Holotypus : *T. Thomson s.n.*, acc. no. 384803(CAL); iso., in CAL; *Paratypus* : *G. H. Cave s.n.* (CAL).

Allied to *P. himalayaensis* M. Gangop., but differs in having larger broad ovate, ovate-oblong or oblong leaves with cordate or obtuse base, much slender, elongated blackish fasciculate panicles and non striate tepal lobes.

Stature unknown. Branchlets terete, blackish brown, to 6 mm diam., faintly striate, glabrous, scattered lenticellate, gradually compressed above; bud scales coriaceous, large, ovate-orbicular, to 10 × 10 mm, obtuse or rounded, rufus glossy tomentose. Leaves alternate, coriaceous, brown above, subglaucous beneath, obovate, ovate-oblong or oblong, (9-)13-21 × (3-)7-9.5 cm, unequally cordate or obtuse at base, decurrent to extreme base, slightly incurved along margin, acuminate (acumens to 10 mm long, blunt at tip) or subacute at apex, glabrous; midvein slender, flat or concave above, slightly raised beneath; lateral nerves 8-10 pairs, distant, arcuate, prominent, sometimes forked, looped near margin; tertiary nerves prominent; minor nervules prominent, areolate-reticulate; petioles stout, 15-20 mm long, 1.5-2 mm wide, shallow channelled above, glabrous. Flowers not seen. Infructescences to 15 cm long, spreading, few branched, glabrous. Fruits (slightly immature): ovoid-oblong, to 12 × 7 mm, obtuse, smooth, brownish, glabrous; stalks slender, ca 10 mm long, ca 1 mm wide, glabrous; tepals reflexed, oblong, to 4 × 2 mm, subacutish, thinly coriaceous, non striate, glabrous dorsally, sparsely sericeous inside. (Fig. 21)

Fr. : March onwards.

Distrib. : India.

Ecology : Grows at about 300 m altitudes.

Type specimens : Sikkim, no date, *T. Thomson s.n.*, acc. nos. 384803-384805 (immature fr.) (CAL); Tista, 300 m, 20.3.1913 (immature fr.), *G. H. Cave s.n.*, acc. no. nil (CAL).

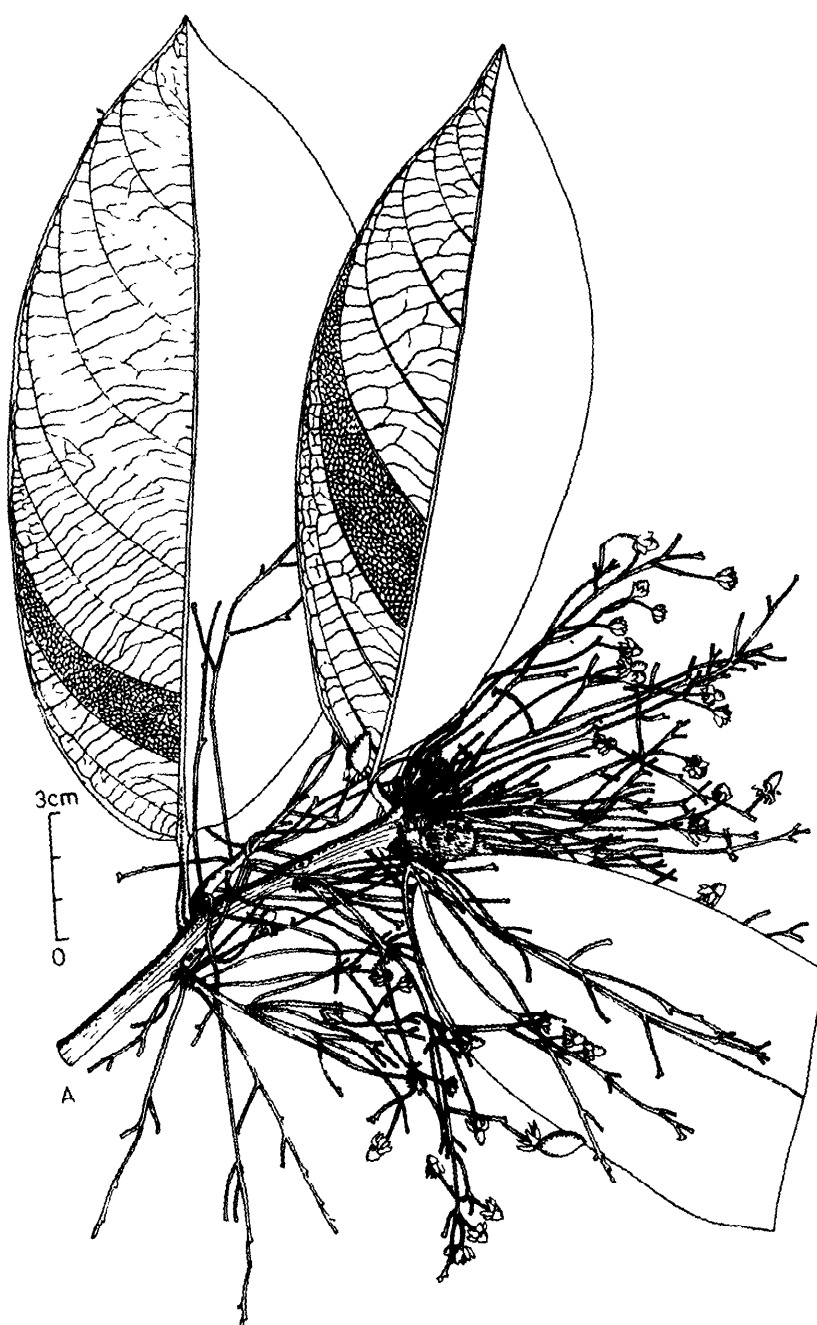


Fig. 21 : *Persea sikkimensis* M. Gangop. :

A. Branch with fruits; upper left hand side leaf: upper surface; right hand side leaf : lower surface (after *T. Thomson s.n.*, acc. no. 384803).

22. *Persea upendrae* M. Gangop. sp. nov.

P. odoratissima (Nees) Kosterm. affinis, sed differt foliis nitidis fuscatis cum nervulis minoribus reticulatis, inflorescentiis gracilibus perramosis elongatisque, floribus cum tepalorum lobis tenuibus.

Holotypus : U. N. Kanjilal 6895 (ASSAM); iso., (ASSAM).

Allied to *P. odoratissima* (Nees) Kosterm., but differs in having glossy dark leaves with reticulate minor nervules, much branched slender and elongated inflorescences and flowers with thin tepal lobes.

Stature unknown. Branchlets slender, terete, blackish-brown, to 3 mm diam., finely striate, glabrous; bud scales ovate-lanceolate, ca 4×1.25 mm, acuminate, fine appressed pale brown pilosulous. Leaves alternate, thinly coriaceous, glossy, dark brown above, paler beneath, elliptic to elliptic-oblong, subequally tapering at base, decurrent at extreme base, margin incurved, acute, subacuminate or sometimes subretuse at apex; midvein faint and shallow channelled above, raised and prominent beneath; lateral nerves 7-12 pairs, slender, slightly raised above, flat beneath, arcuate, looped near margin; tertiary nerves distant, scalariform, prominent; minor nervules reticulate, faint beneath; petioles slender, 8-14 mm long, 1-1.5 mm wide, channelled and narrow winged above. Panicle terminal and axillary, to 16 cm long, slender, glabrous, dark brown; peduncle slender, to 7 cm long, ca 1 mm wide, squarish, shallow longitudinally grooved; branches spreading, lax flowered. Flowers campanulate, ca 9.5×4.2 mm, fine puberulous; pedicel ca 5 mm long. Tepals 3 + 3, ovate-oblong, thin, anastomosing prominent; outer: ca 3.5×1.2 mm, acutish, glabrous inside; inner: ca 4.1×1.8 mm, acutish, sericeous inside. Stamens 9, 3 in each whorl, anthers 4-locular, whorl I and II introrse, of III extrorse, biglandular, filaments silky pilose at base; I whorl: ca 3.5 mm long, filament ca 2.4 mm long; anther narrow ovate-oblong, obtuse; II whorl: ca 3.4 mm long, filament ca 2.4 mm long, thick, anther ovate-oblong, obtuse; III whorl: ca 3.7 mm long; glands ca 1.4 mm long, stipe thin, 0.8 mm long, head ovate, slightly oblique; filament ca 2.5 mm long, thick, anther narrow oblong, truncate; IV whorl (staminodes 3): ca 2.2 mm long, stipe ca 1.2 mm long, thick, head sagittate, sparsely sericeous dorsally. Pistil glabrous, ca 3.2 mm long, ovary ovoid, ca 1.5×1 mm, scattered warty; style slender, flat, shallow longitudinally grooved; stigma thin, peltate, lobed with acute corners. Fruits not seen. (Fig. 22)

Vern.: Kongnal (Tripura).

Fl.: April.

Distrib.: Bangladesh.

Ecology: Grows at about 1500 m (?) altitudes.

Type specimens: Sylhet district, Bashihills, 1500 m (?), 28.04.1915 (fls.), U. N. Kanjilal 6895 (ASSAM).

The panicles of *P. odoratissima* are 2.5-5 cm long, leaves with punctate areolate-reticulate minor nervules; tepal lobes thick, coriaceous.

The species is named in honor of Mr. Upendra Nath Kanjilal.

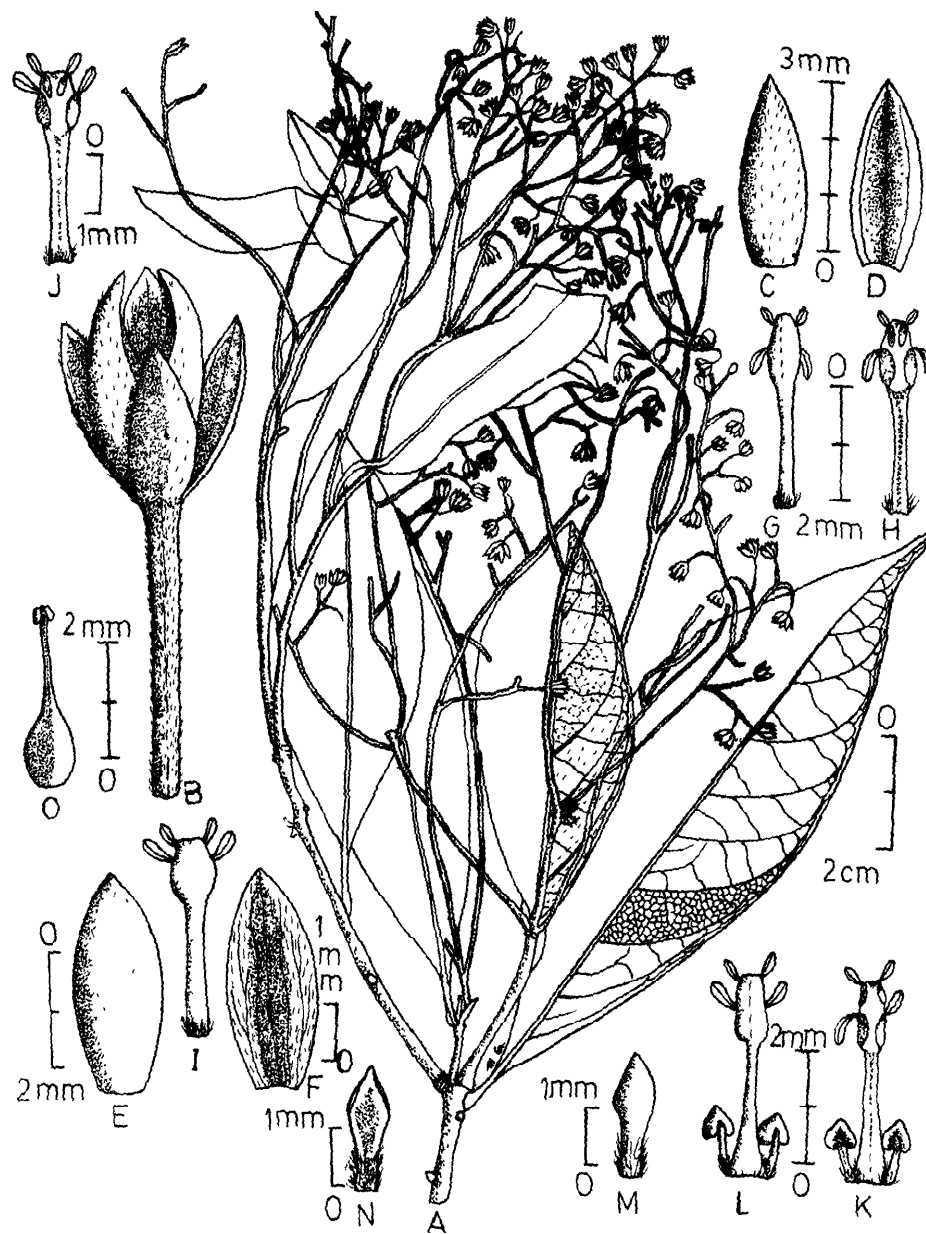


Fig. 22 : *Persea upendrae* M. Gangop. :

A. Branch with flowers; right hand lower leaf: upper surface; right hand upper leaf: lower surface; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem-ventral view; G-N. Stamens and staminodes : G. Whorl I-dorsal view; H. Idem ventral view; I. Whorl II- dorsal view; J. Idem ventral view; K. Whorl III dorsal view; L. Idem ventral view; M. Whorl IV dorsal view; N. Idem ventral view ; O. Pistil (after type).

23. *Phoebe baishyae* M. Gangop. sp. nov.

P. pallidae Nees affinis, sed differt foliis supra nervis lateralibus congestis non impressis, nervulis prominentibus scalariformibus, fructibusque cum tepalorum lobis glabris.

Holotypus : K. Haridasan 4642 (APFH).

Allied to *P. pallida* Nees, but differs in having leaves with close non impressed lateral nerves above, prominent scalariform nervules and fruits with glabrous tepal lobes.

Trees. Branchlets very slender, terete, yellowish-brown, to 2 mm diam., scattered warty, glabrous, gradually darker, appressed whitish villous above; terminal buds not seen. Leaves alternate, thinly coriaceous, dark brown, glossy above, pale brown beneath, non glaucous (according to field data it is glaucous beneath), obovate to oblong-obovate, 9-13 × 2.2-4.3 cm, glabrous (excepting midvein, puberulous below, gradually glabrous in length) above, villous on midvein, sparsely so elsewhere beneath, unequally obtuse to subacute at base, margin slightly incurved, subacuminate (acumens to 5 mm long, acute) or obtuse at apex; midvein slender, channelled above, stout and raised beneath; lateral nerves 14-16 pairs, oblique, faint above, stout and raised beneath, close, ascending, forming prominent loops beneath; tertiary nerves inconspicuous above, prominent beneath, closely scalariform; minor nervules obscure above, faint beneath, laxly reticulate; petioles 6-12 mm long, 1-1.5 mm wide, concave above, villous. Flowers not seen. Infructescences axillary, solitary, 10-14 cm long, slender, few branched, sparsely brown tomentose below, gradually glabrous and scattered warty above; peduncles 4.5-6.5 cm long, ca 1.5 mm wide, angled; branches thin, flat. Fruits ellipsoid-ovoid, ca 13 × 11 mm, blackish brown, glabrous, scattered pustulate; stalk slightly stouter, 8-9 mm long, ca 1.5 mm wide, angled, glabrous, warty; tepals cup ca 4 × 5 mm, glabrous, glossy above, lobes ovate, acutish, inconspicuously ribbed, clasping with fruit, dorsally glabrous, puberulous inside. (Fig.23)

Fr.: September (fruits green, turning purple in age).

Distrib. : India.

Ecology : Grows in evergreen forests.

Holotype : Arunachal Pradesh, West Kameng, Nechiphu, 12.9.1978, K. Haridasan 4642 (APFH).

The clasping and thickened and persisting nature of tepal lobes of fruit do insist me to put the taxon in the genus *Phoebe*.

The specific epithet is contributed to Dr. A. K. Baishya, Joint Director, Arunachal Field Station, Botanical Survey of India.

24. *P. lummaoensis* M. Gangop. sp. nov.

P. lanceolatae (Nees) Nees affinis, sed differt foliis ovatis, elliptico-ovatis vel ellipticis, parvioribus sparsis in ramis, inflorescentiis axillaribus solitariis pauci ramosis, fructu lato ovoideo.

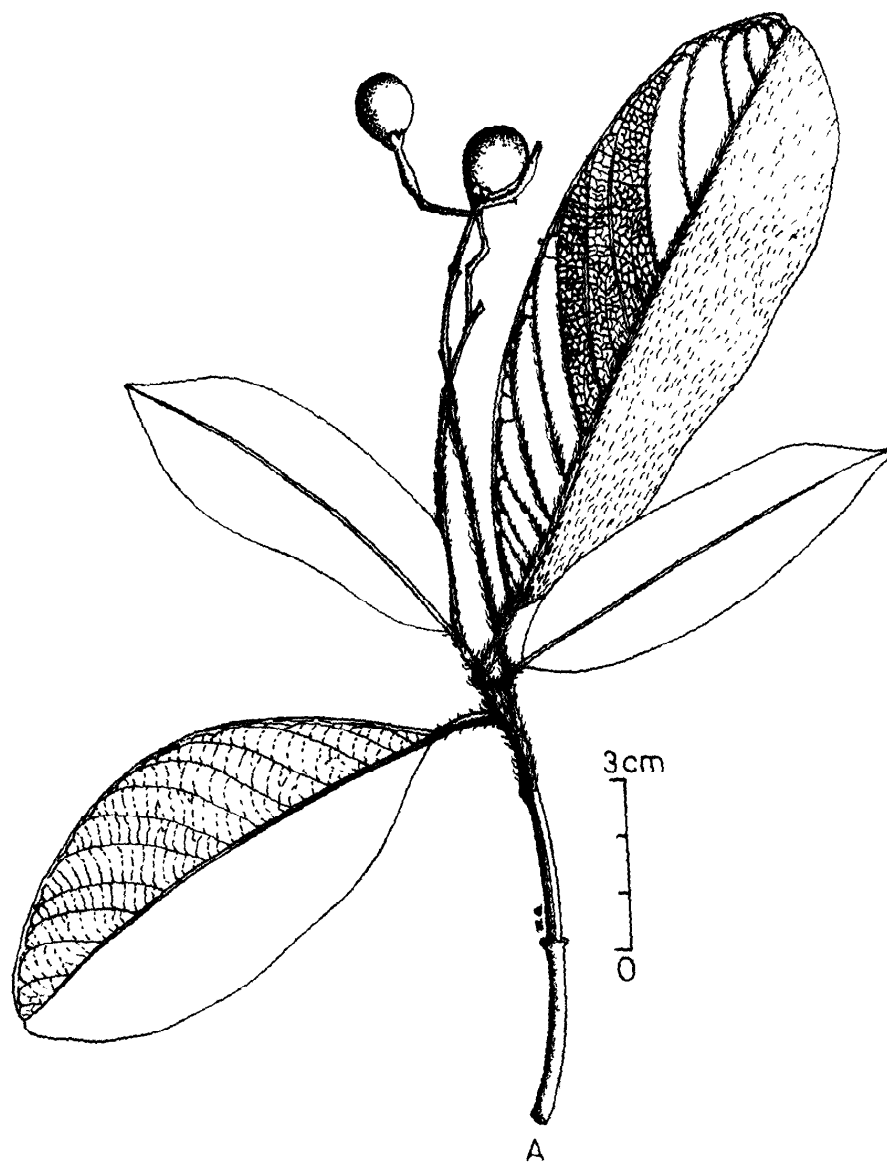


Fig. 23 : *Phoebe baishyae* M. Gangop. :

A. Branch with fruit; left hand side: upper surface of leaf; right hand side: lower surface of leaf (after type).

Holotypus : J. C. Prazer 159 (CAL); *Paratypus* : J. C. Prazer 95 (CAL).

Allied to *Phoebe lanceolata* (Nees) Nees, but differs in having ovate, elliptic-ovate or elliptic smaller leaves scattered on branches, inflorescences axillary, solitary, few branched and broad ovoid fruit.

Trees, 7-14 m high. Branchlets terete, blackish, to 5 mm diam., smooth, glabrous, gradually compressed, angled, striate above; terminal buds ovate or lanceolate, *ca* 5 × 1.2-2 mm, acuminate, whitish velutinous. Leaves alternate, chartaceous, deep brown above, reddish brown beneath, ovate, elliptic-ovate or elliptic, 7-11.5 × 2-3.5 cm, subequally acute or cuneate at base, slightly decurrent at extreme base, margin almost flat, acuminate (acumens to 5 mm long, acute or blunt) or rarely retuse at apex, glabrous above, sparsely appressed white puberulous beneath; midvein slender, slightly raised and flat topped above, shallow canaliculate beneath; lateral nerves 8-10 pairs, faint above, prominent beneath, arcuate, close, forming very faint loops near margin; tertiary nerves inconspicuous above, faint beneath; minor nervules reticulate, faint; petioles 6-12 mm long, 0.5-1 mm wide, very slender, concave above, glabrous. Flowers not seen. Inflorescences axillary, solitary, (3.5-) 7-15 cm long, glabrous; peduncles (1.5-) 4-9 cm long, 1-1.5 mm wide, terete, glabrous, blackish; bracteoles deciduous; branchlets slender, lax, glabrous. Fruit broad, ovoid, 8-10 × 4.5-5 mm, narrowed towards apex, brown, smooth, glabrous; stalk 5-8 mm long, *ca* 0.5 mm wide, glabrous; tepals indurate, thick, clasping, *ca* 3.5 × 5 mm, lobes ovate, acute, inner tepals fine ciliate along margin. (Fig. 24)

Fr.: July.

Distrib. : Myanmar.

Ecology : Common trees grow in montane vegetation.

Type specimens : Lummao hills, 7.7.1890, J. C. Prazer 159 (CAL); Upper Burma, Kalay hills, 5.7.1894, J. C. Prazer 95 (CAL).

The leaves of *P. lanceolata* are mostly lanceolate or oblong-lanceolate, 10-36 × 2.5-7 cm long, long acuminate and the acumens 15-30 mm long; fruits are always ellipsoid.

25. *Phoebe prazeri* M. Gangop. *sp. nov.*

P. cathiae (D. Don) Kosterm. affinis, sed differt statura scandenti et fructu globoso.

Holotypus : J. C. Prazer 138 (CAL); iso., in (CAL).

Allied to *P. cathia* (D. Don) Kosterm., but differs in having climbing stature and globose fruit.

Climbers. Branchlets terete, blackish, to 5 mm diam., swollen at nodes, glabrescent, gradually compressed, slender, rufous tomentose above; terminal buds ovate, *ca* 2 × 1.5 mm, subacuminate, tomentellous. Leaves alternate, thinly chartaceous, greyish, glossy above, glaucous beneath, obovate, obovate-oblong, ovate or elliptic, 11-18 × 3-6 cm, base equal to subequal, acute or acute + cuneate, non decurrent, incurved along margin, acuminate (acumen 5-15 mm long, blunt or acute) at apex,

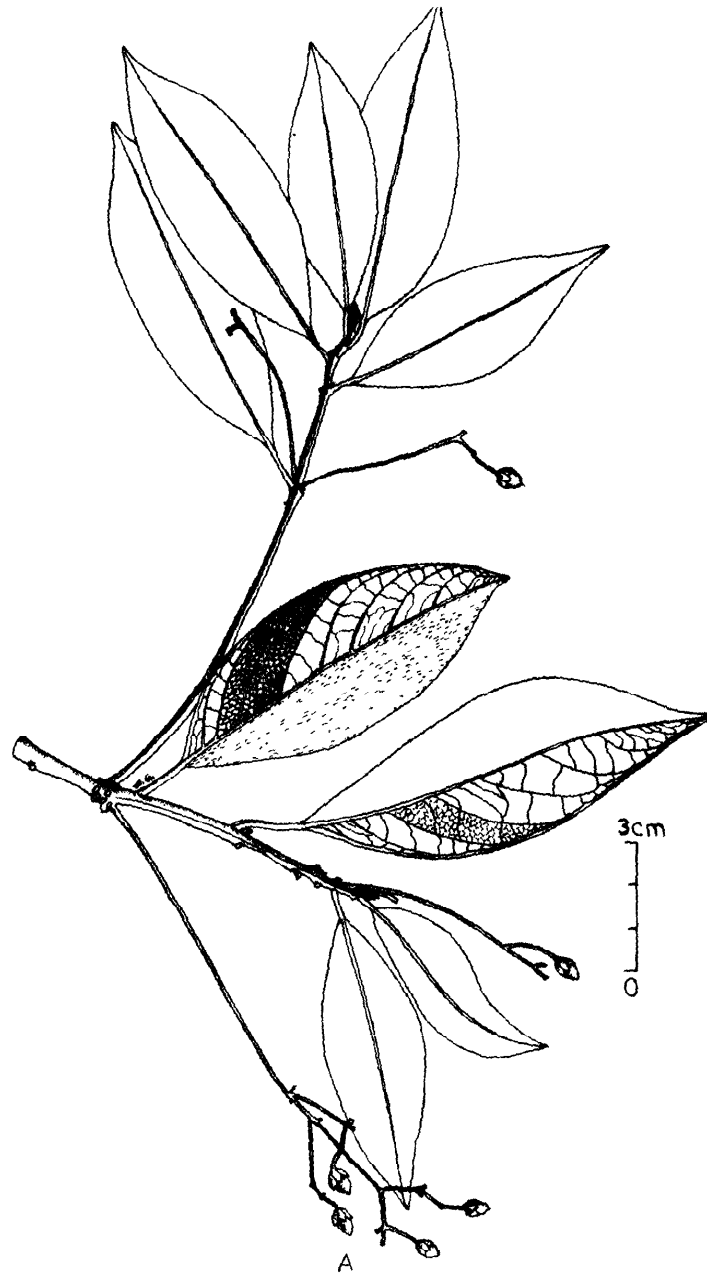


Fig. 24 : *Phoebe lummaoensis* M. Gangop. :

A. Branch with fruits; upper leaf: lower surface; lower leaf: upper surface (after type).

glabrous (young one on midvein and lateral nerves white velutinous) above, tomentose on midvein and lateral nerves beneath; midvein channelled above, terete and raised beneath; tertiary nerves faint above, prominent beneath; minor nervules hidden above, faint beneath, reticulate; petioles slender, 8-16 mm long, 1-1.5 mm wide, flat above, glabrous. Panicle axillary, solitary (rarely two together on short branches), elongate, 7-12 cm long; peduncle 4-6 cm long, *ca* 1 mm wide, slender, tomentose; branches slender, lax, spreading, tomentose. Flowers (slightly over matured): cupular-campanulate, *ca* 7.2 × 3 mm, sericeous; pedicel *ca* 3 mm long, *ca* 1 mm wide, trigonal. Tepals 3 + 3, thick, acutish, concave ventrally, anastomosing hidden; outer: obovate, *ca* 3.5 × 2.5 mm; inner: ovate, *ca* 3.9 × 2.5 mm. Stamens 9, 3 in each whorl, anthers 4-locular, filaments villous below, whorl I and II introrse, of III extrorse, biglandular; I whorl: *ca* 1.8 mm long, filament *ca* 1 mm long, anther ovate-orbicular, truncate at apex; II whorl: *ca* 1.9 mm long, filament *ca* 1 mm long, anther ovate-oblong, truncate and mucronulate at apex; III whorl: *ca* 2.2 mm long; glands *ca* 0.8 mm long, shortly stipitate, head ovate-cordate, acutish; filament *ca* 1.2 mm long, anther narrow-oblong, apiculate; IV whorl (staminodes 3): *ca* 1.1 mm long, stipe *ca* 0.6 mm long, head sagittate, shallowly concave ventrally. Pistil (broken): ovary ovoid-globose, *ca* 3 × 2 mm, glabrous, blackish, cuneate at base. Fruits (slightly immature): globose, *ca* 2.5 mm diam., blackish. (Fig.25)

Fl. & Fr. : July.

Distrib. : Myanmar.

Ecology : Grows in hill forests.

Type specimens : Lockhoe and Sebong hills, Tummoo hills, 6.7.1890, J. C. Prazer 138 (CAL).

Phoebe cathia is arborescent in nature and bears ovoid, to 11 × 7 mm fruits.

The specific epithet has been given in honor of J. C. Prazer, who made an extensive plant collection in Myanmar.

NEW REPORTS

1. **Dehaasia incrassata** (Jack) Kosterm. in J. Sci. Res. Indones. 1: 120(9). 1952 (June) & in Reinwardtia 4: 228, 246. 1957; Merrill in J. Arn. Arb. 33: 230. 1952 (July). *Laurus incrassata* Jack, Mal. Misc. 2(7): 33. 1822; Hook. f., Fl. Brit. India 5: 126. 1886.

Type : n.v.

Distribution known so far : Malesia.

Extension of range : INDIA. Nicobar Islands. Great Nicobar Islands, 40 km on East-West Road, 24.9.1980 (fls.), D.K. Hore 8201 (CAL, PBL); *Ibid.*, 27 km on North-South Road, 7.3.1980 (fls.), R.P. Dwivedi 7916 (CAL) frequent in hill forests, tree *ca* 20 m, bark light brown; Katchal Island, West Bay, Delhi village, sea level, 14.6.1977 (fr.), P. Chakrabarty 6038 (PBL) tree 10 m, fruit-stalk red, fruit violet.

Unmistakable for its greenish leaves, blackish stout inflorescences and long swollen fruit-stalks.

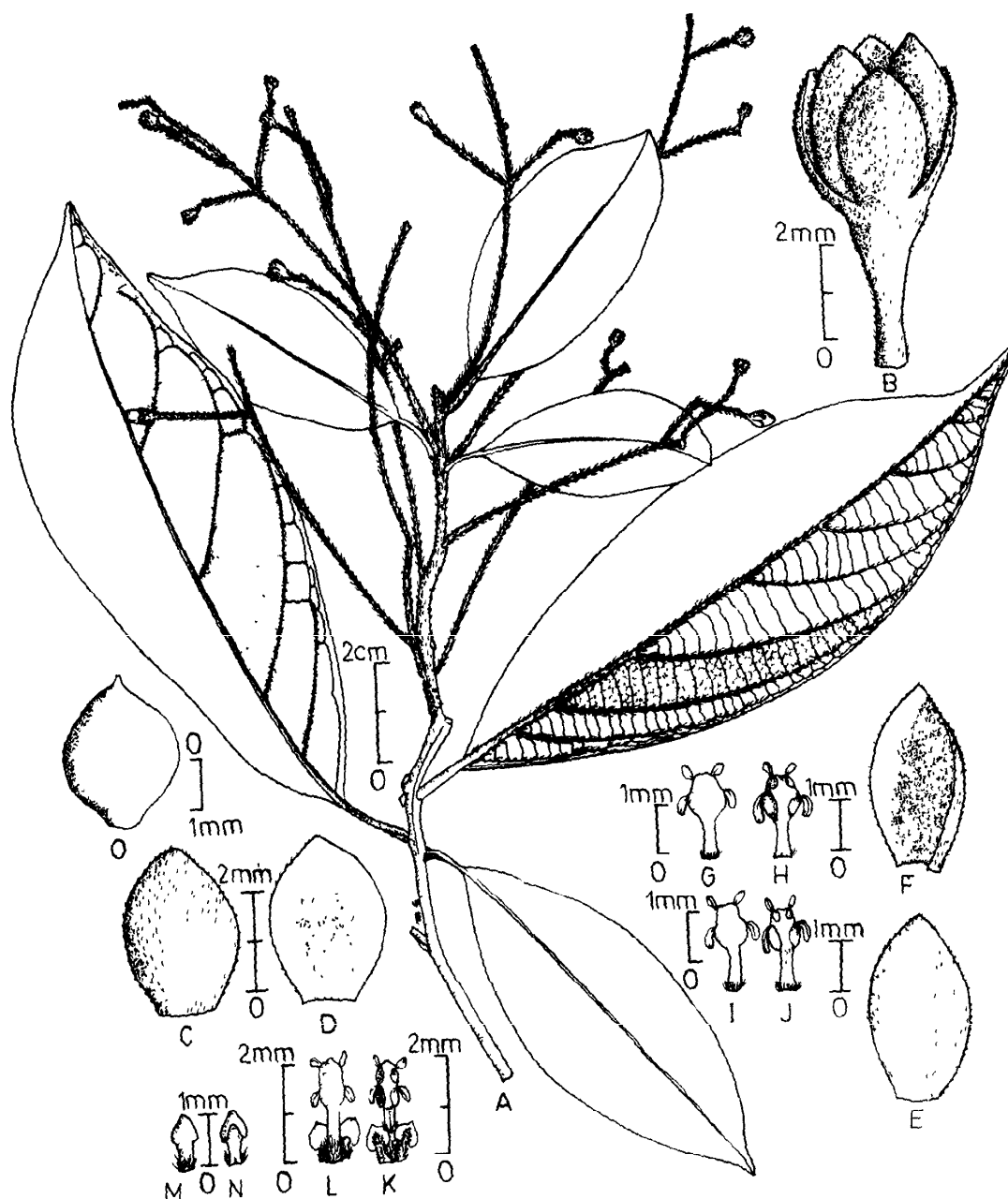


Fig. 25 : *Phoebe prazeri* M. Gangop. :

A. Branch with flowers and fruits; left hand side leaf: upper surface; right hand side leaf: lower surface; B. Flower; C. Outer tepal dorsal view; D. Idem ventral view; E. Inner tepal dorsal view; F. Idem ventral view; G-N. Stamens and staminodes: G. Whorl I - dorsal view; H. Idem - ventral view; I. Whorl II - dorsal view; J. Idem - ventral view; K. Whorl III - dorsal view; L. Idem - ventral view; M. Whorl IV - dorsal view; N. Idem - ventral view; O. Pistil (broken) (after type).

2. **Cinnamomum burmannii** (C.G. & Th. Nees) Bl., Bijdr. Fl. Ned. Ind., II^e Stuk: 569.1826; Hook. f., Fl. Brit. India 5: 136. 1886.

Laurus burmannii C.G. & Th. Nees, de Cinnamomo Disputatio (Amoen. Bonn.) 57, dt. 4. 1823.

Type: *n.v.*

Distribution known so far : China, Philippines, Indo-China, Borneo, W. Flores.

Extension of range: INDIA. Sikkim, *G. King s.n.*, acc. no. 383744 (CAL) fls.; *B.D. Sharma* 265 (CAL) fls. NEPAL. *Wallich* in Wall. Cat. no. 2569A (CAL) fls., dt. as *Laurus albiflora* Wall.

Unmistakable for its short peduncled and much branched spreading inflorescences.

3. **C. macrophyllum** Miq. in Ann. Mus. bot. Lugd. bat. 1: 269. 1864; Kosterm. in Reinwardtia 8: 52. 1970.

Type : Batjan Isl., sterile, local name: Soengana orang, *Teijsmann* 5623 (BO, U); also in CAL!

Distribution known so far : Moluccas.

Extension of range : INDIA. Nicobar Islands. Kamorta Isl., Feb. 1875 (sterile), *S. Kurz s.n.*, acc. no. 383654 (CAL); Nicobars, March 1897 (sterile), *R.L. Heinig s.n.*, acc. no. nil (CAL).

Unmistakable for its large leaves with prominent areolate reticulate minor nervules.

4. **C. mollissimum** Hook. f., Fl. Brit. India 5: 131. 1886; Ridley, Fl. Malay Pen. 3: 95.1924; Kosterm. in Reinwardtia 8: 56.1970.

Type : *Curtis s.n.* (= 308), Penang, fl., fr. (K, SING) (Kosterm., *l.c.*) *n.v.*

Distribution known so far : Malay Peninsula.

Extension of range: MYANMAR. Mergui, Cinchona camp, 22.3.1929 (fr.), *C.C. Colder s.n.*, acc. no. nil (CAL) bumboo jungle shed; Tenasserim, Lipokachong, 60 m, 14.4.1930 (sterile), *K. Biswas* 470 (CAL); Thabawlick, *C.C. Colder s.n.*, acc. no. nil (CAL) fruit fallen; Tenasserim District, *K. Biswas* 1048 (CAL) fls.; Kyankatalau, March 1911 (fr. fallen), *A. Meebold* 14543 (CAL) & (fr.) 14685 (CAL).

Unmistakable for its dense indumentum and short pedicellate fruits.

5. **C. subavenium** Miq., Fl. Ind. Bat. 1(1): 902. 1858; Ridley, Fl. Malay Pen. 3: 93. 1924 (subevenium); Kosterm. in Reinwardtia 8: 68.1970.

Type : *Teijsmann s.n.* (H.B. 1032 and 1037), sterile, (BO, U), Solok, W. Coast of Sumatra (Kosterm., *l.c.*) *n.v.*

Distribution known so far : Moluccas.

Extension of range : MYANMAR. Tavoy district, Dec. 1910 (fr. fallen), *Shaik Mokim* 232 (CAL); Mergui, upper Cinchona camp, 12.4.1924 (sterile), *C.C. Colder s.n.*, acc. no. nil (CAL) tree 25-30 m high.

Unmistakable for its dark green chartaceous leaves and slender, brown tomentellous infructescences.

The specimen, "Tenasserim & Andamans, *Herb. Heifer* 4245 (CAL) fls." was identified as *C. iners* with a question mark. It belongs to this taxon and may be collected from Tenasserim. The distribution of the species in India (? Andamans) is still uncertain.

6. *Persea robusta* (W.W. Smith) Kosterm. in Reinwardtia 6:193.1962.

Machilus robusta W.W. Smith in Notes R.B.G Edinburgh 13: 169. 1921; Calder in Rec. Bot. Surv. India 11(3): 86.1926.

Type: Yunnan, 1800-2100 m, March 1913, *G Forest* 9716; Feb. 1913, *G Forest* 9574; 2100 m, Feb. 1914, *G Forest* 12216; Aug. 1917, *G Forest* 15753 *n.v.*

Distribution known so far: China, Myanmar.

Extension of range: INDIA. Nagaland, Naga hills, June 1935 (fruit fallen), *N. L. Bor* 21058 (ASSAM) tree.

Unmistakable for its glossy leaves with punctate-areolate minor nervules and stout inflorescence. The specimen was identified as *Machilus khasyana* Meissn., which is an entirely different species.

Specimens examined: MYANMAR. Bhamo, 1909, *G E. C. Cubitt* 397 (CAL) fls.; Lahpyehka Sinhum, 1500 m, *D.J. Aitkinson* 199 (DD) fls., vern. "Mai-hkan-kagyi" (Myanmarese). CHINA. N.W. Yunnan, 1800-2100 m, April 1921 (fls.), *G Forest* 19359 (CAL) flowers are deep soft olive-brown.

7. *P. thunbergii* (Sieb. & Zucc.) Kosterm. in Commum, For. Res. Bogor 57: 35. 1957; & in Reinwardtia 4: 227.1957 & *Ibid.*, 6: 188. 1962.

Machilus thunbergii Sieb. & Zucc. in Muench. Abh. II. Cl., Bayr. Akad. Wiss. IV, 3^e Abth. 302. (1846) 1847; Alien in J. Arn. Arb. 17: 327. 1936 & in Ann. Mus. Bot. Gard. 25: 399. 1938.

Distribution known so far: Japan, China.

Extension of range: INDIA. Arunachal Pradesh, Abor Expedition, *I. H. Burkill* 36330 (CAL) sterile.

Uses: A well known timber tree from Japan (Kosterm., 1957).

Unmistakable for its villous bud scales.

8. *Phoebe declinata* (Bl.) Nees, Syst. Lour. 114. 1836; Hook. f., Fl. Brit. India 5: 142. 1886; Kosterm. in Reinwardtia 7: 355. 1968.

Laurus declinata Bl., Catal. Gewassen's Lands Plantent. Buitenzorg 66.1823.

Type: Java, Mt. Salak, "Huruleu-ur" (Sundanese), between Andjira and Lebak, Dec. (L); Salak Mt., Dec., *Blume* 2160a (L) (Kosterm., *l.c.*) • *n.v.*

Persea declinata (Bl.) Kosterm. in Reinwardtia 9: 111. 1974.

Distribution known so far : Malesia.

Extension of range : BANGLADESH. Chittagong, 8.5.1896 (fls.), *Forest Officer s.n.*, acc. no. 385055 (CAL) (typical glabrous form); Chittagong hill tracts, Kasalong river west, 18.2.1876 (fr.), *Lister* 34 (CAL); 50 miles from Chittagong, Dec. 1885 (fls.), *B. Khan* 262 (CAL); Chittagong, Feb. 1940 (fr.), *S. K. Mukherjee* 9 (CAL) (flowers sparsely puberulous).

Unmistakable for its slender inflorescences and globose fruits with semiclasping persistent tepals.

NEW SYNONYM

Nothaphoebe umbelliflora (Bl.) Bl., Mus. Bot. Lugd. bot. 1(21) : 328. 1851; Hook. f., Fl.

Brit. India 5 : 145. 1886; Kosterm. in Bull. Bot. Card. Buitenzorg, ser. 3, 18: 441. 1950.

Ocotea umbelliflora Bl. Bijdr. 573. 1826.

Types : Java, *Blume* (n.v.).

Nothaphoebe nicobarica T. Chakrab. & Vasud. in J. Econ. Tax. Bot. 6(2): 443. 1985, *syn. nov.*

Type : Dwivedi 7893A (CAL holo.); 7893B 7893E (PBL - iso.).

Distrib. : Java, Sumatra, Borneo, Malacca and Nicobar Islands (India).

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भारत एवं निकटवर्ती देशों से लॉरेसी कुल पर टिप्पणियाँ

एम. गंगोपाध्याय

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सार संक्षेप

जेनेरा बिल्समिडिया, सिनेमोमम, क्रिप्टोकेरिया, डेहासिया, पार्सिया, फोबे के पचीस नये टैक्सा के वर्णन तथा चित्र दिए गए हैं। भारत, नेपाल, बंगलादेश, म्यांमार से सर्वप्रथम एक जाति का अभिलेख हुआ है। एक नया पर्यायवाची जोड़ा गया है।