

THE SOUTH INDIAN SPECIES OF *CINNAMOMUM* SCHAEFFER (LAURACEAE)

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A B S T R A C T

Cinnamomum is represented in South India by 12 endemic species and the imported cultivated *C. verum* (synonym *C. zeylanicum*) from Ceylon. Of these *C. filipedicellatum*, *C. goaense*, *C. keralaense* and *C. walaiwareense* are here described for the first time. *Cinnamomum heyneanum* Nees, reduced to *C. pedunculatum*, var. *angustifolium* Hemsley by Allen and later to *C. burmanni*, var. *angustifolium* Hemsley and quite recently reduced to forma *heyneanum* by H. W. Li in 1978, is here reestablished. The single collection known is from S. India and is certainly different from the Chinese *C. angustifolium*; with *C. burmanni* it is not related at all. A complete bibliography of *C. malabattrum* (Burm. f.) Bl. is presented, this was in antiquity the source of *Cassia lignea* bark and of *Folium Indum*. The history of this bark and the leaves is presented.

INTRODUCTION

Sponsored by the late Dr. B. A. Krukoff, the well-known Botanist-Philantropist, I spent the years 1974-1978 at the Rijksherbarium, Leiden, the Netherlands, to prepare a revision of the Malesian Lauraceae. I decided to tackle the most difficult genus, *Cinnamomum*, first. The latest and not very satisfactory revision of *Cinnamomum* dates from 1864 (Meissner** in De Candolle's Prodrumus). Hence, a revision of the strictly Malesian species of *Cinnamomum* made no sense, all species had to be studied, with exception of those of S. and Central America.

Unluckily the work came to a practical standstill when an attack of amoebic dysentery (contracted in 1942-45 as a prisoner-of-war of the Japanese in Thailand) became so sericeous, that the end looked near. The miserable climate of Holland was neither very inducive for improving my deteriorating physical condition. So I gave up, after a draft manuscript of Asian and Pacific species was finished and the greater part of the

herbarium material at Leiden had been put in order.

Thanks to an advice of the same Dr. Krukoff, who saw me rolling over the floor with terrible abdominal pains, to use the medicament: Entobex (produced by Ciba-Geigi, Basel), a medicine not available in the Netherlands because of its so-called side effects, but perhaps more likely to protect the home industry and by moving to a warmer country, Ceylon, I miraculously recovered completely after two years of using Entobex (without any side effects). Part of the huge *Cinnamon* revision is ready for the press (*Cinnamomum* of the Pacific, New Guinea, Australia, the Philippines, Celebes, Ceylon). I decided to have the South Indian species printed as a pupil of Professor S. K. Manilal, Calicut University is preparing a thesis on the leaf anatomy of S. Indian *Cinnamomum*. A private expedition to S. India with the help of the French Institute in Pondichery, India, resulted in solving the age-long puzzle of the identity of the bark of antiquity of *Cassia lignea* and of the *Folium indum*.

* Biotrop and Herbarium Bogoriense, Bogor, Indonesia.

** Meissner is the proper spelling as indicated by Meissner himself in a foot note on the first page of his Lauraceae in de Candolle's Prodrumus 15(1).

CINNAMOMUM Schaeffer

Cinnamomum Schaeffer, Botanica Expedition (Gen. Pl.) 268 & 269. 1760; Boehmer in Ludwig, Defin. Gen. Pl. 63. 1760 (invalid; cf. Wood in J. Arnold Arb. 39: 213. 1958); Trew, Herb. Blackwell Cent. 4 Sign. M 354. 1760; Kostermans, Bibl. Laur. 245-48. 1964. *Camphora* [Bauhin] Fabricius, Hort. Helmstad. 218. 1759; Schaeffer, l.c.; Boehmer, l.c.; Kostermans, l.c. 189-190. *Septina* Noronha in Verhandel. Batav. Genootsch. Kunst. & Wetensch. 5 (ed. 1), Article 4(3): 7. 1790; Kostermans, l.c. 1350; van Steenis et al., Regn. Veget. 71: 376 & 378. 1970. *Camphorina* Noronha, l.c. (1); Kostermans, l.c. 199; van Steenis et al., l.c. 378. *Camphoria* Masamune in Mem. Fac. Sci. Agr. Taihoku Univ. 11, Bot. 4: 203. 1934; Kostermans, l.c. 199. *Parthenoxylon* Blume, Mus. bot. Lugd. bat. 1(21): 322. 1851; Kostermans, l.c. 1191. *Cecidodaphne* Nees in Wallich, Pl. Asiat. rar. 2: 70. 1831; 3: 61 & 72. 1832; Syst. Laur. 21 & 192. 1836; Kostermans, l.c. 238. *Cynamomum* Deniker, Man. de Botan. 226. 1886; Kostermans, l.c. 246. *Temmodaphne* Kostermans in Botanisk Tidskrift 68: 319. 1973. *Carua* and *Karua* Rheede, Hort. Ind. Malabar. 1: 107, t. 57. 1678; Kostermans, l.c. 208 & 554. *Caphura* Ruel, Nat. Hist. Stirp. 102. 1837; Kostermans, l.c. 207. *Katou-karua* Rheede, l.c. t. 53. 1685; Kostermans, l.c. 554. *Cassia* Auct. div., Kostermans, l.c. 211-215. *Cappare coronde* Burman, Thes. Zeyl. 63. 1737; Kostermans, l.c. 307; in Ceylon J. Sci. (Biol. Sci.) 10: 120. 1973. *Culillawan* Rumphius, Herb. Amboin. 2: 66. 1741; 7 (Auctuarium): 65 & 66. 1755; Kostermans, l.c. 442. *Malabathrum* Lamk., Encycl. bot. 3: 445. 1793; Kostermans, l.c. 932.

Small to medium-sized trees with smooth, usually grey and often conspicuously lenticellate, fragrant bark (essential oils mostly cinnamic aldehyde and eugenol, more rarely safrol). Terminal bud with few, inconspicuous bud scales, early caducous. Leaves

opposite (alternate in section *Camphora*, not in India), tri- or triplinerved (very rarely penninerved, not in India); the two basal or sub-basal lateral nerves strongly ascendent, often reaching the tip of the leaf, a few usually rather obscure erect-patent lateral nerves, all nerves connected by more or less dense scalariform nerves. Hairs simple. Flowers in panicles, pseudo-terminal many-flowered or strongly reduced (especially in high mountain species), bracts deciduous. Tepals in two whorls of three. Perianth tube developed. Stamens in three whorls of three each on slender filaments, the inner three flanked by stalked nectarial glands, of which the stalks are sometimes fused with the filaments. Anthers of the 6 outer stamens 4-celled, of the inner 2-celled, the outer ones introrse the inner extrorse, opening by upward flaps. Staminodes of the innermost row three, rather well developed with stalks. Ovary superior, one-celled with one pendulous ovule; style well developed with small peltate or triangular stigma. Fruit at maturity usually black to purplish black, glossy, often mottled with lighter spots with rather thin exo- and mesocarp, one seed. The perianth tube growing out into a more or less deep, fleshy or not, cup, in which the base of the fruit is seated. The tepals at the rim either caducous or indurate and persistent entirely, or only partly (and then the upper parts remaining thin and withering).

Distribution: Pantropic, except Africa. The American species were only recently recognized. Formerly they were included in *Phoebe*, an entirely Asiatic genus.

Note: *Cinnamomum* species are best known for their fragrant barks, since ages used as condiments. Some of these like the Ceylon cinnamon were the cause of strife and wars of nations who wanted to create the lucrative monopolies. The essential oils are still in demand, especially eugenol for the cosmetic and perfumery industry. Information on anatomy, application, etc. is provided under each species.

KEY TO THE SPECIES

1. Basal lateral nerves reaching the leaf tip
 2. Lower leaf surface glabrous or with microscopical sparse, appressed hairs
 3. Fruit cup deep, the rim with the persistent utmost basal parts of the tepals ... 2. *C. goaense*
 3. Fruit cup shallow, crowned by the complete, indurate persistent tepals ... 6. *C. malabattrum*
 2. Lower leaf surface (at least in younger leaves) densely, minutely tomentellous or sublanuginose-tomentellous.
 4. Leaves lanceolate-oblong ... 9. *C. sulphuratum*
 4. Leaves ovate ... 7. *C. perrottetii*
1. Basal lateral nerves not reaching the leaf tip
 5. Young leaves sericeous underneath
 6. Leaves elliptic or subovate-elliptic, obscurely acuminate ... 10. *C. travancoricum*
 6. Leaves oblong, acumen to 1.5 cm long ... 11. *C. walaiwarensense*
 5. Young leaves glabrous or sparingly tomentellous underneath
 7. Flowers 2-2.5 mm long, glabrous or nearly so. Pedicels filiform, 5-15 mm long ... 1. *C. filipedicellatum*
 7. Flowers more than 2.5 mm long, sericeous. Pedicels very thin to thick.
 8. Leaves narrowly lanceolate to linear-oblong
 9. Fruit unknown. Panicles many-flowered ... 8. *C. riparium*
 9. Fruit cup very flat or none, the flaring indurate tepals persistent. Infructescences hardly branched, short ... 3. *C. heyneanum*
 8. Leaves oblong, ovate or ovate-oblong to subovate-elliptic or elliptic.
 10. Fruit with deep cuplike, conspicuously ribbed cup ... 13. *C. verum*
 10. Fruit cup obconical, more or less fleshy, not ribbed.
 11. Panicles long, lax
 12. Fruit cup 5-6 mm high; fruit up to 20 mm long. Bark odourless ... 4. *C. keralaense*
 12. Fruit cup up to 15 mm high; fruit 2 × 2.5 cm. Bark and leaves with clove-aniseed smell ... 5. *C. macrocarpum*
 11. Panicles very short. Bark odourless ... 13. *C. wightii*

1. *Cinnamomum filipedicellatum* Kosterm
sp. nov. — Fig. 1

Cinnamomum gracile Auct. (non Miq.) Hooker f., Fl. Br. Ind. 5 : 133. 1886; Bourne, List Pl. S. India 27. 1898; Gamble, Man. Ind. Timb., ed. 2 : 560. 1902; Fl. Madras 1223. 1925 (reprint 2 : 856. 1957); Brandis, Ind. Trees 534. 1906; Rao, Fl. Pl. Travancore 342. 1914 (quoad nomen); Ramaswami in Rec. Bot. Surv. Ind. 6: 155. 1912; Bor, Man. Ind. For. Bot. 52. 1953; Kostermans, Bibl. Laur. 298. 1964. Typus : Beddome 131 (=16) (K).

? *Cinnamomum litseaefolium* Auct. (non Thw.) Gamble, Man., l.c. 560; Fl., l.c. 1224 (857); Bor, l.c. 52; Kostermans, l.c. 313. p.p., quoad cit. Bor & Gamble.

Arbor parva, ramulis gracilibus glabris vel apice minutissime depresso pilosis, innovationibus minute sericeis, foliis tenuiter coriaceis glabris lanceolatis usque ad lineari-lanceolatis usque ad subovatis, obtuse-acuminatis, basi acutis, nervis principalibus tenuissimis prominulis, subtus obscure dense

minuteque reticulatis, costis prominentibus, nerviis subbasalibus lateralibus tenuibus, 3/4 laminarum attingentibus, nerviis secundariis sat obscuris, parallelis subhorizontalibus, petiolis gracilibus, 7-15 mm longis, paniculis axillaribus vel pseudo-terminalibus glabris, paucifloribus tenuibus, ramulis nullis vel filiformibus, brevibus, pedicellis filiformibus, 5-15 mm longis, floribus 2-2.5 mm longis, minutissime sat sparse sericeis vel glabris, tepalibus interioribus dense adpresse pilosis, antheris exterioribus 4-cellulatis, interioribus tres bi-locellatis, glandulis basalibus filamentis equilongis brevissime stipitatus, stigmatibus peltatis, fructus ellipsoideus, cupulis breviter late-cupulatis tepalis parte basalibus truncatis ornatis.

Typus : Beddome 131 (=16) (BO, G, K, L)

Small tree; branchlets slender, glabrous or the utmost apex microscopically appressed pilose; terminal bud small, minutely sericeous. Leaves opposite and subopposite, thinly coriaceous, glabrous, lanceolate to

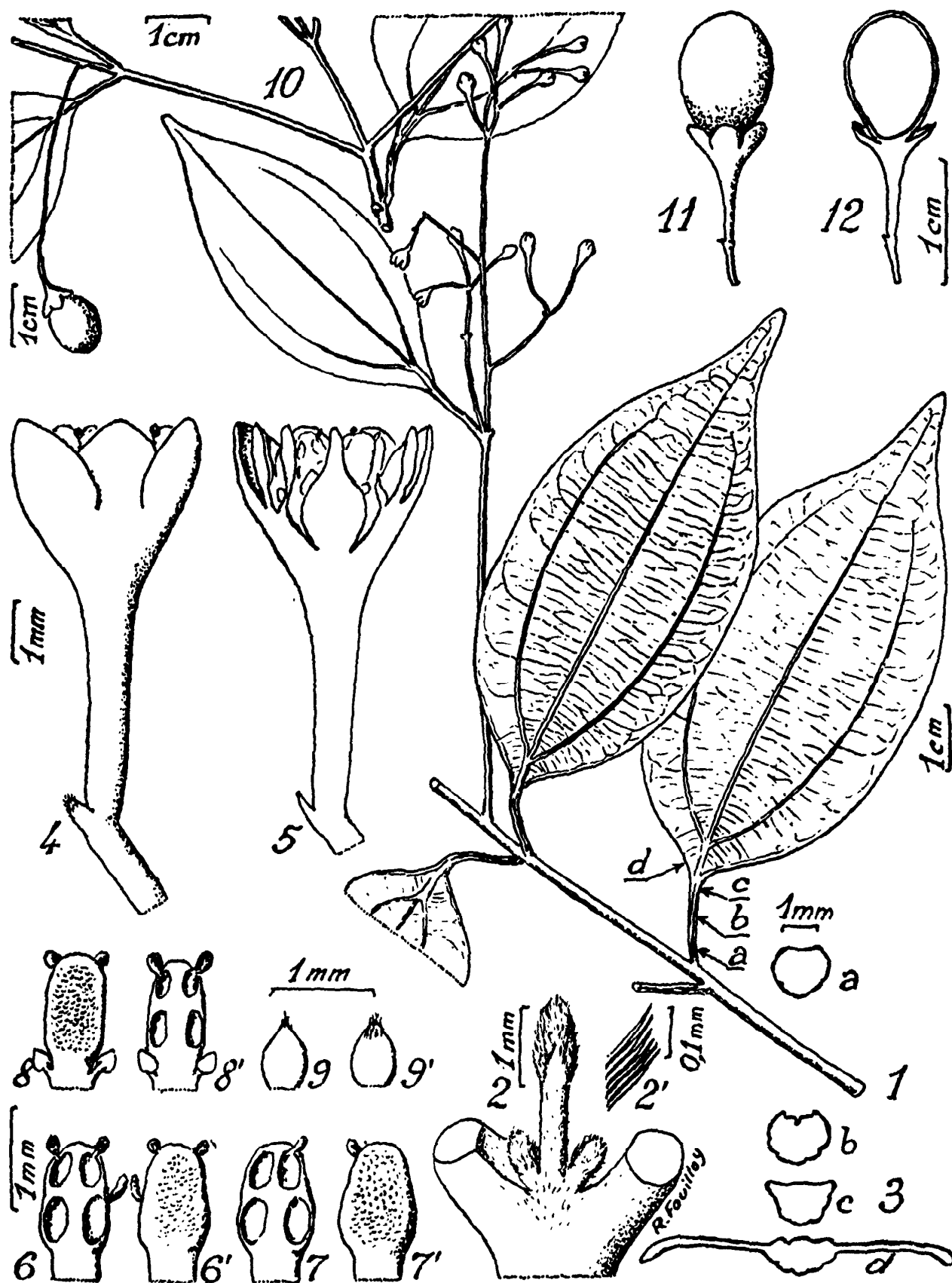


Fig. 1: *Cinnamomum filipedicellatum* Kosterm
(for details see page 132)

linear-lanceolate to sub-ovate, $1.5 \times 4 - 4 \times 8 - (4.5.5) \times 13$ cm, broadly obtusely acuminate (acumen 1-2 cm), base cuneate to acute; above smooth, glossy (minutely pitted in young leaves), the 3 main nerves very slender, prominulous, beneath sometimes glaucous, obscurely densely minutely reticulate, midrib slender, prominent, the sub-basal lateral nerves slender, reaching $3/4$ of the lamina length or less; secondary nerves rather slender obscure, parallel, sub-horizontal, ca. 2 mm apart. Petioles slender, glabrous, concave above, 7-15 mm long.

Panicles axillary or pseudo-terminal, glabrous (except at the nodes), slender, few-flowered, unbranched or with filiform, 1-2 cm long branches; peduncle slender, glabrous or sparsely, minutely appressed pilose. Pedicel filiform, 5-15 mm. Flowers 2-2.5 mm long, minutely, rather sparsely sericeous to glabrous; perianth tube 0.5 mm high, broadly funnel-shaped. Tepals ovate, acutish, 1.5-2 mm, inside densely appressed strigose-pilose. Stamens 1 mm long; anthers oval, longer than the pilose filament, of whorl I and II 4-celled, introrse, of III extrorse, 2-celled; basal glands as long as the filaments on a very short stipe. Staminodes aciculate, slightly shorter than the stamens. Ovary ellipsoid, style short with minute, peltate stigma.

Fruit ellipsoid, up to 8×12 mm; cup shallow, broadly cup-shaped, up to 4 mm high, 8 mm diameter at the rim, which bears the broad, obtuse or truncate, sericeous or glabrous, 1 mm high bases of the tepals.

Distribution : S. India, Western Ghats, Anamalais, Nilgiris.

Notes : The name *C. gracile* is antedated by *C. gracile* Miq. Gamble differentiated *C. riparium* from *C. gracile* by its larger, pilose flowers and the narrower leaves. The flowers in the type material of *C. gracile* are not completely glabrous (hairs near the tepal tips) and on the nodes. The inner stamens are 2-celled.

C. litseaefolium sensu Gamble might be this, but differs by its longer petioles. I have seen no material.

It is still uncertain, whether the fruiting materials belong here, although they are similar to those of the Beddome specimen. The young fruit has a large, fleshy, obconical cup.

S. India: Tamil Nadu, Tinnevely (Tirunelvely) Palam Gootah, Jan., fl., Forest Officer s.n. (Dehra Dun); ibid., alt. 1500 m, Dec., fl., Beddome s.n. (=16=131) (BO, G, K, L) and 94 (K); Muthu Kuli Vazal, 1500 m, March, fl., Bourdillon 810 (K); Kannikatti, June, buds, Barber 448(K); locality unknown, after anthesis, Herb. Dalzell (K); sine coll., fr. (L).

2. *Cinnamomum goaense* Kosterm., spec. nov. — Fig. 2

Arbor ramulis angulatis gracilibus minutissime subadpresse pilosis, gemmis terminalibus parvis minutissime subadpresse pilosis, foliis oppositis coriaceis glabris subovato-oblongis attenuatis et obscure acuminatis basi acutis, utrinque laevibus, supra nervis tribus principalibus tenuibus prominulis, subtus pallidioribus nervo mediano tenuibus prominulis nervis subbasalibus lateralibus gracilibus prominulis apicem laminarum attingentibus, nervis secundariis perobscuris parallelis horizontalibus, petiolis tenuibus glabrescentibus, paniculis fructiferis pseudo-terminalibus longis multifloris pauci-ramosis dense minutissime subadpresse pilosis, fructus ellipsoideis, cupulis profundus tenuibus cupuliformibus, basi tepalorum persistentibus, pedicellis subobconicis.

Typus : J. Fernandez 1453 (A).

Tree, branchlets rather slender, angular, microscopically sub-appressed pilose. Terminal bud small, minutely sub-appressed pilose. Leaves opposite, coriaceous, glabrous (very young ones with microscopical appressed

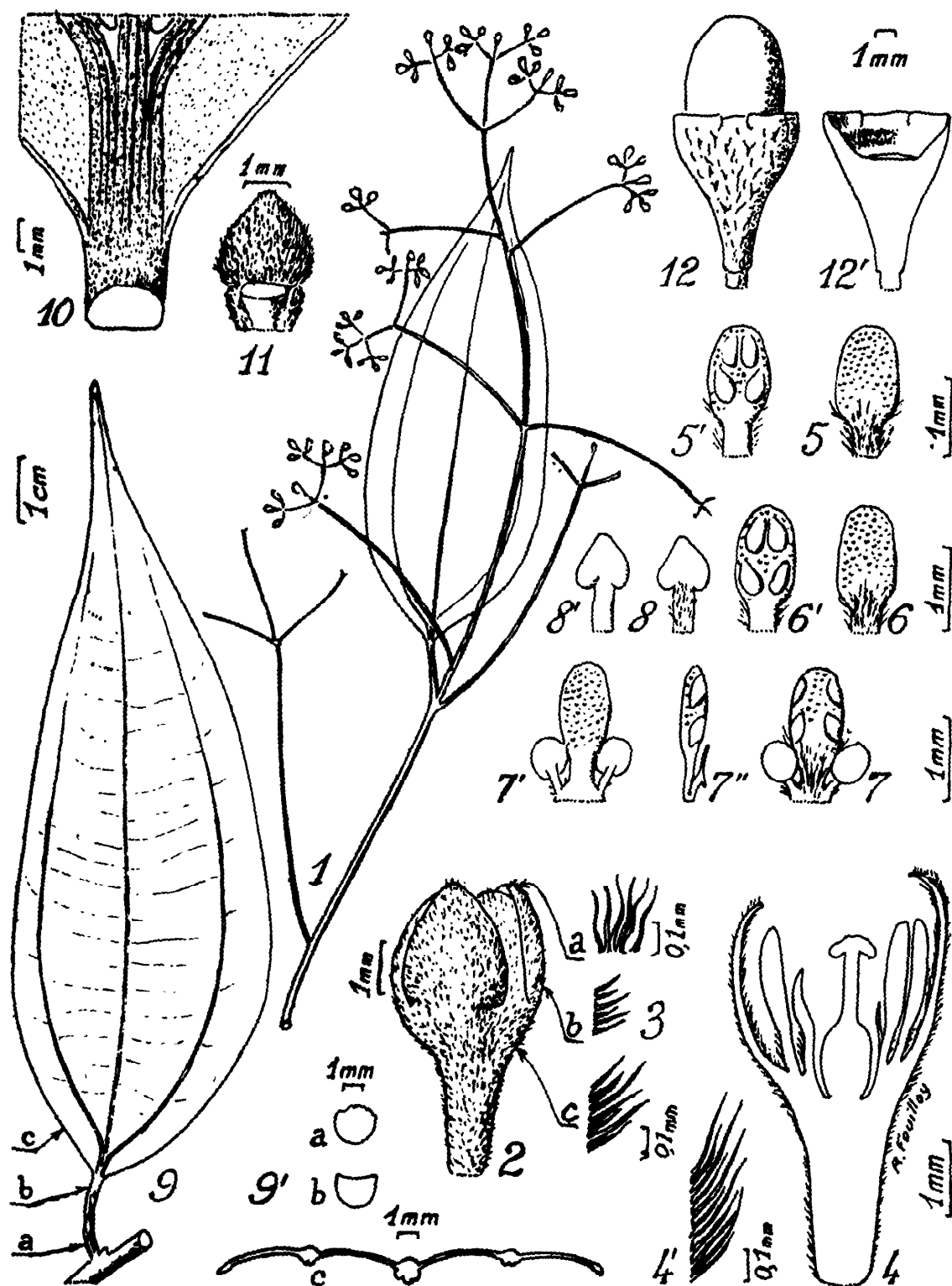


Fig. 2: *Cinnamomum goaense* Kosterm.
(for details see page 132)

hairs below), subovate-oblong, $3.5 \times 10 - 4.5 \times 14$ cm, attenuate and obscurely acuminate, base acute; both surfaces smooth, above glossy, the 3 main nerves slender, prominulous, below paler, the slender midrib and the sub-basal lateral nerves (which reach the leaf tip) prominulous; secondary nerves very obscure, parallel, horizontal, 4-5 mm apart. Petiole slender, 10-15 mm, soon glabrous, concave above.

Panicles axillary and pseudo-terminal, many-flowered with slender peduncle, densely very minutely sub-lanuginose (hairs very thin), 3-9 cm long; branchlets slender, rather patent, 2-4 cm long. Pedicel 4-5 mm long. Flowers very densely sub-appressed, grey sericeous. Perianth tube very short. Tepals ovate-oblong, 3 mm long (sub-mature), inside sericeous. Stamens slightly shorter with large, oblong, 4-celled anthers with rather broad, slightly pilose, as long filaments; whorl I and II introrse, whorl III extrorse with rather small, flat, almost sessile glands, attached to the basal half of the filament. Staminodes with sagittate head and as long stipe. Style cylindrical, thickish with large, peltate stigma.

Fruiting panicle lax, up to 17 cm long, densely, microscopically sub-appressed pilose; branchlets few; fruits numerous. Fruit ellipsoid, up to 6×10 mm; cupula cup-shaped, deep, thin, up to 8 mm high and 6 mm diameter at the thin margin with the persistent utmost bases of the tepals. Pedicel slightly obconical, ca 5 mm long.

Distribution : S. India, Canara and Bombay Presidency.

Note: The species is near *C. sulphuratum* Nees, but the fruit cup is different because of the practically deciduous tepals. It shows some likeness with *C. tavoyanum* Nees, but this has a different indumentum and persistent tepals.

The fruit look very much like those depicted by Rheede under *Carua*.

S. India : Bombay Presidency, towards old Gund village, E. of Goa border, lat.

15-16° N. May, fr., Fernandez 1453 (A, L), distributed as *C. zeylanicum*; Canara, buds, Stocks s.n. (L).

3. *Cinnamomum heyneanum* Nees

— Fig. 3

Nees in Wall., Pl. As. rar. 2: 76. 1831; Syst. Laur. 77. 1836; Meissner in DC., Prodr. 15(1): 20. 1864 (as a syn. of *C. iners*, var. *subvenosum* Meissn.); Hooker f., Fl. Brit. Ind. 5: 136. 1886; Allen in J. Arn. Arb. 17: 325. 1936 (as a syn. of *C. pedunculatum*, var. *angustifolium* Hemsley); id. 20: 51 1939 (as a syn. of *C. burmanni*, var. *angustifolium* Hemsley); Kostermans, Bibl. Laur., l.c. 300; N. W. Li in Act. phytotax. Sinica 16(2): 90. 1978 (as a syn. of *C. burmanni*, f. *heyneanum*). *Laurus heyneana* Wall., Catal. 2576 ex Nees, ll. cc.; Allen, ll. cc.; Kosterm., l.c. 636; Li, l.c. Typus: Coorg (S. India), Heyne in herb. Rottler, = Wallich 2576 (GZU, K, L).

Cinnamomum burmannii (sphalm. *burmanni*), f. *heyneanum* (Nees) H. W. Li in Acta phytotax. Sin. 16(2): 90. 1978 (except all synonyms, except *C. heyneanum* Nees).

Tree. Branchlets slender, minutely grey tomentellous, hairs very thin, wavy. Terminal bud small with the same indumentum. Leaves opposite and sub-opposite, chartaceous, linear-oblong, $1.5 \times 11 - 2 \times 14$ cm, attenuate-acuminate, base attenuate-acute, above glabrous, smooth, midrib prominulous, the sub-basal lateral nerves faint, below initially sparsely, minutely tomentellous, obscurely, minutely, smoothly reticulate, midrib prominent, the sub-basal (starting at different heights) lateral nerves reaching $2/3$ the lamina length, but then continuing in large loops to the apex, in this lamina part the loops belong actually to a few, rather patent, faint lateral nerves; secondary nerves faint, parallel, sub-horizontal, ca. 2 mm apart; in the gradually attenuate leaf tip numerous more distinct lateral nerves. Petiole very slender, sparsely, minutely tomentellous, 5-8 mm long, flattened above.

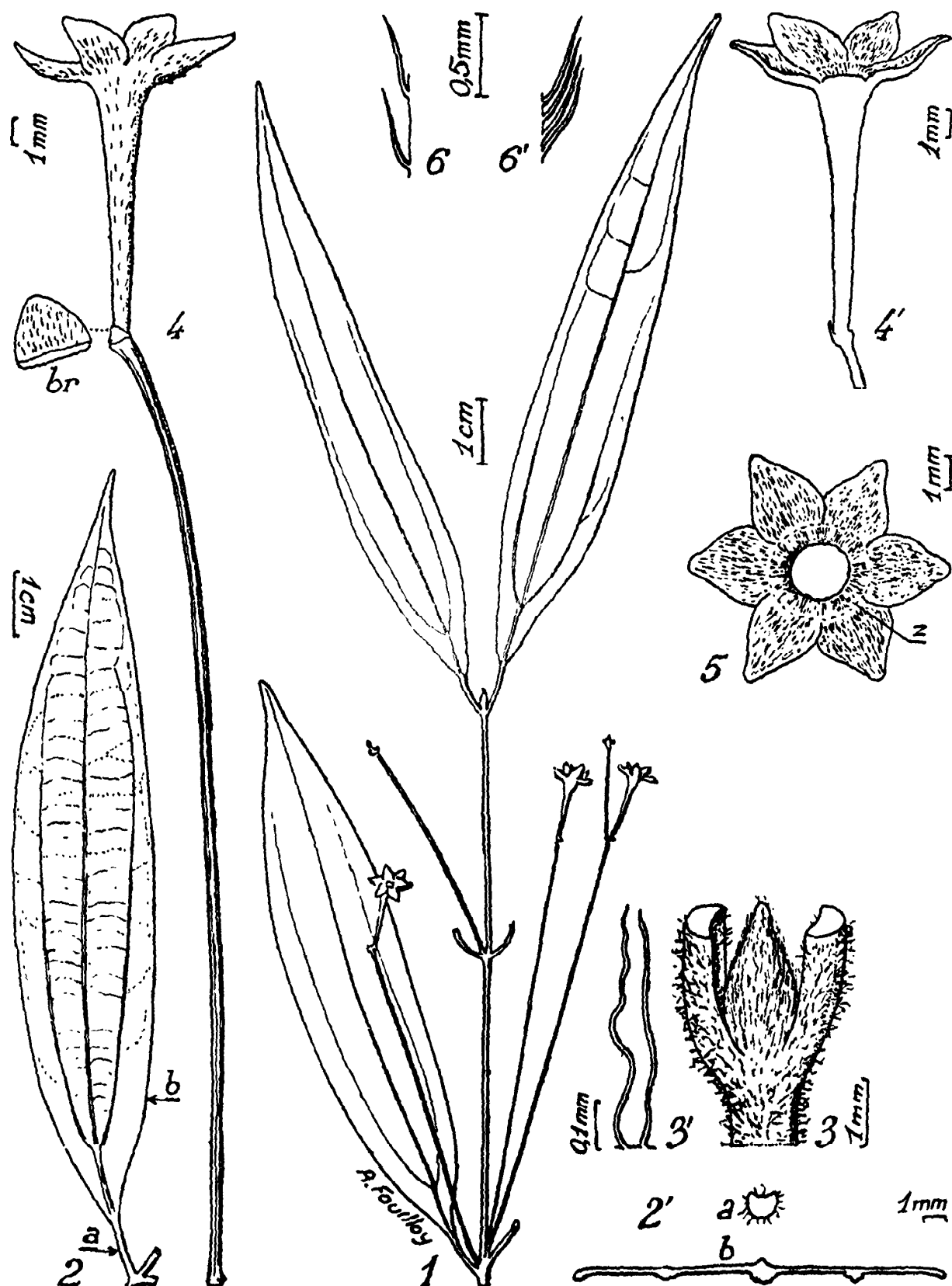


Fig. 3: *Cinnamomum heyneanum* Nees
(for details see page 132)

Infructescences in the axils of terminal leaves with slender, glabrous, 5-8 cm long peduncle unbranched or with a single, apical, 1 cm long branch (the node tomentellous). Fruit ellipsoid, smooth, 7×12 mm. Fruit pedicel obconical, 8-10 mm long, slender. Cupula none or shallow, the flaring, indurate, stiff, ovate, acutish, 4 mm long, persistent tepals inside densely, coarsely appressed pilose.

Distribution : Only known from the type locality.

Note : Only known from a single, fruiting specimen. Allen, who had only a photograph at her disposal, thought it to be conspecific with *C. pedunculatum*, var. *angustifolium* Hemsley; later (in J. Arn. Arb. 20) she referred it definitely to that variety (which she had renamed *C. burmanni*, var. *angustifolium*). The leaves are indeed very similar to those of that variety (which I have included in *C. linearifolium* Lecomte), but the petioles are tomentellous and are not folded on the upper side. *C. linearifolium* has glabrous branchlets and leaves and the indumentum of the apical part of the branchlets and the terminal bud is minutely appressed pilose, entirely different from that of *C. heyneanum*.

The Kew specimen bears a label : ab Amicis Heyne, Coorg, Mart. 1817; the specimen was apparently collected in S. Canara, perhaps near Coorg.

S. India: Coorg, March, fr., Heyne in herb. Rottler, Wallich 2576 (Graz, K, L).

4. *Cinnamomum keralaense* Kosterm., spec. nov. — Fig. 4

Cinnamomum litseaefolium Auct. (non Thwaites) Gamble, Fl. Madras 1224. 1925 (reprint 2: 857. 1957); Kostermans, Bibl. 313. 1964, p.p. (quoad cit. Gamble).

Arbor ramulis et innovationibus glabris, foliis suboppositis coriaceis glabris ovato vel lanceolato-ellipticis obtusis, basi longe cuneatis, supra nitidus laevibus, nervis principalibus

tenuibus prominulis, subtus pallidioribus nervo mediano prominulis, nervis basalibus lateralibus tenuibus prominulis, $2/3$ longitudine laminarum attingentibus, nervis secundariis obscuris, petiolis sat gracilibus longis, paniculis pseudo-terminalibus vel axillaribus laxis longis gracilibus glabrescentibus, fructus anguste ellipsoideis, cupulis subobconicis margine basi tepalorum ornatis, pedicellis obconicis.

Typus : Kostermans 26104 (L).

Tree, up to 25 m tall and 60 cm diam. Few buttresses up to 50 cm high and 50 cm out. Bark grey smooth with pustular lenticels, thin, often hoop-ringed; live bark 15 mm thick, light brown to reddish, odour- and tasteless or with very faint sassafras smell, brittle; bark of twigs odourless. Branchlets glabrous, smooth. Terminal bud small, conical, glabrous. Leaves opposite and subopposite, sub-coriaceous, glabrous, ovate to lanceolate-elliptic, 2.5×6 — 6×12 cm, apex somewhat tapered, obtuse, base contracted and long cuneately decurrent into the petiole; above smooth, glossy, the main nerves slender, prominulous, beneath paler, midrib slender, prominent, the basal-lateral nerves, which reach $2/3$ the lamina length, thin, prominulous, secondary nerves parallel, obscure, ca. 3 mm apart. Petiole rather slender, long, 1.5-2.5 cm, concave above.

Fruiting panicles pseudo-terminal and axillary, lax, up to 15 cm long with few, slender, up to 3 cm long branches, glabrescent. Pedicel obconical, 3-5 mm. Fruit narrowly ellipsoid, up to 8×20 mm; cupula sub-obconical, slightly fleshy, rather thin, up to 5-6 mm high and up to 8 mm diam. at the rim, which bears the 0.5 mm high sericeous bases of the tepals.

Distribution : S. India. Kerala, W. Ghats, Karia Shola near Coimbatore, Tadulinggam.

Ecology : Mid mountain species in wet, evergreen forest.

Note : The species is close to *C. wightii*

Fig. 4: *Cinnamomum keralaense* Kosterm.
(for details see page 132)

Meissn., of which the bark is also odourless, but it has longer petioles, slightly thinner leaves and a long, lax panicle; the fruit cup is smaller, and less fleshy.

Gamble mistook it for the Ceylonese *C. litseaefolium*, which, however, differs by shorter petioles and the much smaller, cup-like cupula with thin, entire rim.

S. India: Kerala, road from Thekadi to Devicolam and Munar, alt. 1100 m, cardamom estate, wet, evergreen, June, fr., Kostermans 26104 (BO, G, K, L, P, US); Mukalee, Silent valley, alt. 1000 m, June, fr., Kostermans 26216 (idem); S. Tamil Nadu, Tirunelveli Distr., E. slopes W. Ghats, Walaiar cardamom estate, alt. 1100 m, wet, evergreen, July, young fr., Kostermans 26283 (idem).

Gamble quotes: Beddome s.n., Tinnevely (Tadulingam) and Brandis quotes: Coimbatore.

5. *Cinnamomum macrocarpum* Hooker f. — Fig. 5

Hooker f., Fl. Brit. Ind. 5: 132, 133. 1886 (exclud. *Carua* Rheede, and Wight, Icon. 130); Woodrow in J. Nat. Hist. Soc. Bombay 12: 367. 1899; Talbot, List Trees & shrubs Bombay 167. 1894; ed. 2: 283. 1902; ed. Poona: 421. 1949; For. Fl. Bombay 2: 389. 1911 (exclud. *Carua* Rheede, and Wight Icon. 130); Bourne, List Pl. S. India 27. 1898; Gamble, Man. Ind. Timb., ed. 2: 560. 1902; Fl. Madras 1225. 1925 (reprint 2: 857. 1957) (exclud. Wight Icon. 130); Brandis, Ind. Trees 533. 1906; Cooke, Fl. Pres. Bombay 2: 535. 1906 (reprint 3: 28. 1958) (exclud. Wight Icon. 130); Rao, Fl. Pl. Travancore 342. 1914 (exclud. cit. Rheede); Lushington, Madras Timb. 75. 1919; Fyson, Fl. S. Ind. Hill Sta. 1: 504. 1932; Kirtikar, Basu & An, Ind. med. Pl. ed. 2, 3: 2151. 1933; Bois, Pl. aliment. 3: 63. 1934; Bor, Man. Ind. For. Bot. 52. 1953; Chopra & al., Gloss. Ind. med. Pl. 65. 1956; Kostermans, Bibl. 316. 1964; Mani, Pl. galls Ind. 255. 1973. Typus: Canara, fr., Dalzell s.n. (K).

Cinnamomum zeylanicum Auct. (non Bl.), Nees in Wall., Pl. As. rar. 2: 74. 1831, adnot. 3, quoad Wight s.n. from Dindigul = Wallich 2573-E (Graz, K).

Cinnamomum aromaticum Auct. (non Bl.), Graham, Cat. Pl. Bombay 173. 1839, p.p.; Wight in Edinb. phil. J. 55: 20-32 (n.v.).

Cinnamomum zeylanicum, var. *inodorum* Meissner in DC., Prodr. 15(1): 13. 1864, p.p., quoad cit. Leschenault 823, fr., Nilgiris.

Tree up to 15 m tall and 20 cm diam., slightly, thinly buttressed. Bark smooth, grey to light brown, thin; live bark pale brown, 5 mm thick with faint aniseed and clove smell (safrol and eugenol). Branchlets thick, angular, glabrous or with a few, microscopical, appressed hairs, smooth. Terminal bud small, densely, very minutely sericeous. Leaves opposite and sub-opposite, thickly coriaceous, glabrous, ovate to ovate-elliptic to lanceolate, 2×7 — 6×14 — 4×15 — 5×20 — 12×25 cm, both ends tapered, obtuse, base cuneate; above smooth, glossy, the main nerves thin, prominulous; beneath paler, minutely smoothly, densely reticulate, midrib slender, prominent, the basal-lateral nerves, which end 2-3 cm below the leaf tip, thin, prominent, secondary nerves faint, parallel, ca. 2-4 mm apart. Petiole stout, 1-2.5 cm long, with 3 nerves above.

Panicles axillary, few-flowered, up to 7 cm long; the long, stout, flattened peduncle almost glabrous; branchlets few, 1-2.5 cm long or none. Pedicels stout, obconical, up to 1 cm long, microscopically, sparsely appressed pilose. Flowers white, large (up to 7 mm), sparsely to more densely minutely sericeous (hairs very short); perianth tube funnel shaped, 1-2 mm high. Tepals fleshy, ovate-oblong, acutish, 3-4 mm long, inside sericeous. Stamens 2-2.5 mm long; anthers oblong, 4-celled, longer than the broad, pilose filaments (or as long), of whorl I and II introrse, of III smaller, latrorse; basal glands rather large, attached 1/3 from the filament base. Staminodes slightly shorter

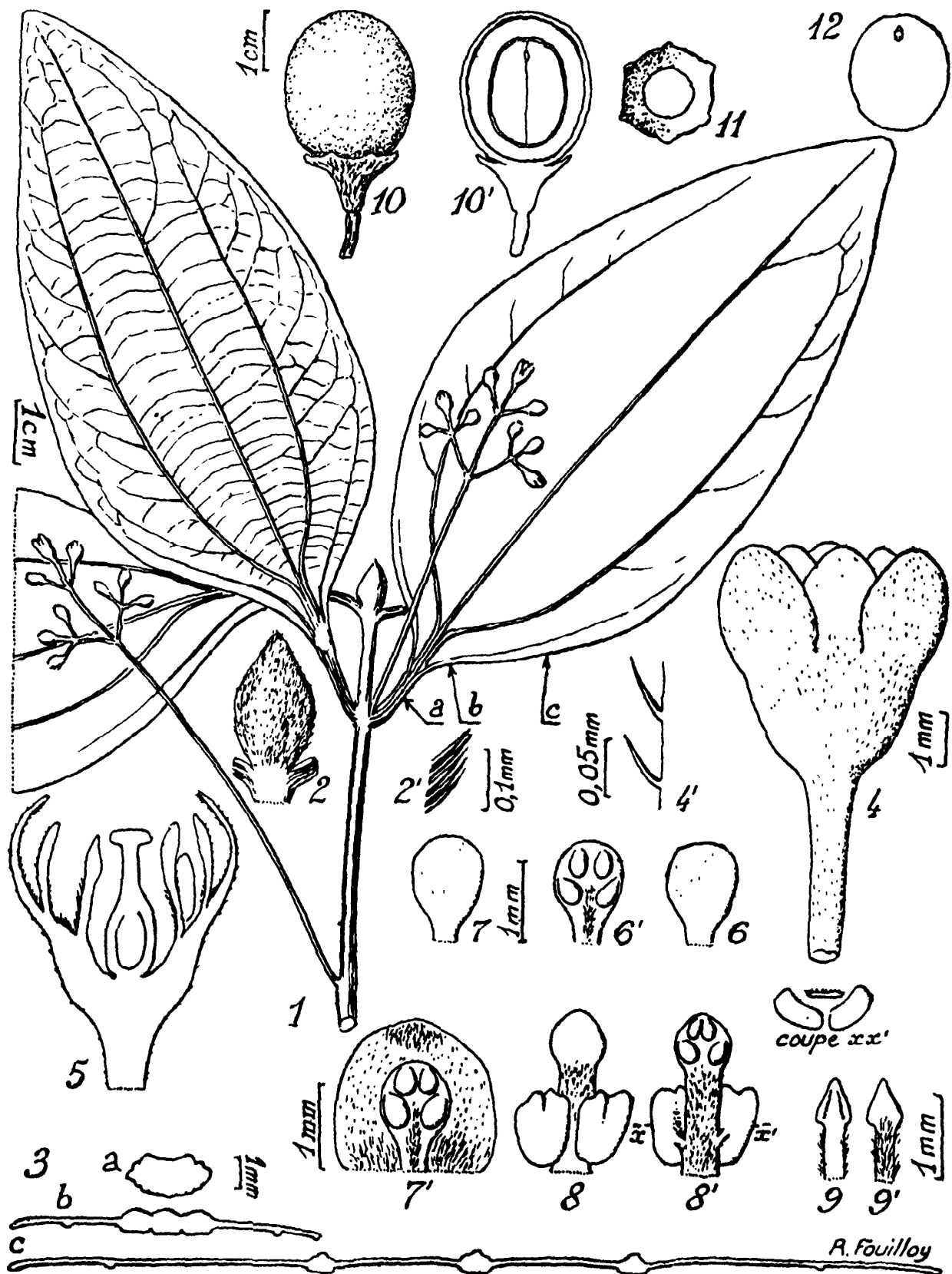


Fig. 5: *Cinnamomum macrocarpum* Hooker f.
(for details see page 132)

than the stamens with hastate-sagittate small apical part and long, pilose stipe. Ovary ellipsoid; style thickish, 1.5-2 mm long; stigma minute, peltate.

Fruit ellipsoid, up to 2×2.5 cm. Cupula thick and fleshy, up to 15 mm high, the obconical, thick basal part not differentiated from the pedicel, flaring upward into the actual cup, which is shallow (ca 3 mm) and 1-1.5 cm diam. at the rim, which bears the withered remnants of the non-enlarged tepals.

Distribution : S. India: Nilgiris, Canara, Anamalais

Ecology : Mountain species.

Note : Wight's Icones 130, named *Cinnamomum iners*, was copied from Rheede's plate of *Carua*, which is in part *C. goaense*, in part *C. verum*.

Hooker f. referred *C. macrocarpum* to *Carua*, but this is impossible, the fruit cup is quite different and in *Carua* the basal-lateral nerves run to the leaf tip.

I suspect, that Rheede's *Carua* is a description of *Cinnamomum verum*, but that the drawing was made after a wild species, probably *C. goaense*, which has a similar fruit cup. Rheede described the leaves as twice as long as broad, but in the drawing they are more than 3 times as long as broad.

The leaves of *C. macrocarpum*, when crushed, smell of aniseed (safrol) and cloves (eugenol), the first smell disappears after drying. The bark has a similar, but very faint smell. The leaves are used in Pykara for flavouring rice dishes; the bark is not used. This is the largest-fruited *Cinnamon* known.

S. India, Nilgiris: Pykara above Ootacamund, near Naduvattam, alt. 2100 m. Apr., fl., Kostermans 24532 and 24534 (BO, G, K, L, P); *ibid.*, fr., Kostermans 24533 (BO, G, K, L, P), same tree; Mar., buds, Debb, Bot. Survey Ind. 31616 (Coimbatore, L); July, y. fr., Kostermans 26241 and 26242 (K, L); sapling, Kostermans 26242 A (L); Kokathurai

For. Res., Carrington Junction, N. side, May, fr., Subramaniam 569 (DD); fl., Subramaniam 286 (DD); Naduvattam (Nadoofrutta), June, after anthesis, Wight 2518 (K); Sispara, alt. 2000 m, Apr., fl., Lawson s.n. (K); May, fl., Gamble 14416 and 20635 (K); Anamalais, Wynaad, Tambracheri Ghat, sine coll., fl., fr. (K); Izenpadi, Coimbatore, ster., Barber 3832 (K); Canara, fr., Dalzell s.n. (K).

6. *Cinnamomum malabathrum* (Burm. f.) Bl.

— Figs. 6, 7

Blume, Rumphia 1 : 38, t. 13, f. 3-4. 1836 (in adnot., *malabathrum*); Nees, Syst. Laur. 663. 1836; Dietrich, Synops. 2 : 1334. 1840; Hasskarl in Flora 35 : 648. 1861; Miquel, Ann. Mus. bot. Lugd. bat. 1 : 270. 1864 (as a synonym. of *C. nitidum*); Meissner in DC., Prodr. 15(1) : 20. 1864 (as a synonym. of *C. iners*, var. *subvenosum*); Boerlage, Handl. Fl. Ned. Ind. 3 : 139. 1900 (as a synonym. of *C. iners*, var. *subvenosum* Meissn.); Kostermans, Bibl. Laur. 318, no. 244 b. 1964; in Manilal, Bot. & Hist. Hortus malabar. 163-167. 1980. *Laurus malabathrum* Burm. f., Fl. Ind. 92. 1768, p.p., quoad cit. *Katou Karua* Rheede; Burman, Index alter Rheede, Hort. malab. 5. 1769; Linnaeus, Mater. med. 64. 1747 (*malabatri folium*); ed. 5 (Schreber) 125. 1787; Bergius, Mater. med. 1 : 318. 1778; Murray, Apparatus medicaminum 444. 1787; *id.*, Arzneivorath 475. 1788; Stokes, Bot. Mater. med. 2 : 411. 1812 (exclud. *Sindoc* Rumph.); Sweet, Hort. suburban. Lond. 89. 1818; Dierbach, Handb. med.-pharm. Bot. 152. 1819; Virey, Hist. nat. med. 163. 18 ; Steudel, Nomencl. 467. 1821 (*malabratum*); ed. 2, 1 : 114 & 366. 1840; 2 : 16. 1841; Th. & C. G. Nees von Esenbeck, de Cinnam. Disputatio 55. 1823 (sphalm. auct. Linnaeus); C. G. Nees, Syst. Laur., l.c. 35; Kostermans, Bibl., l.c. 652. Typus : *Katou-Karua* Rheede, Hort. Ind. Malab. 5 : t. 53.

Cinnamomum malabathrum (Lamk.) Presl in Berchthold & Presl, Priroz Rostlin. 2 : 36

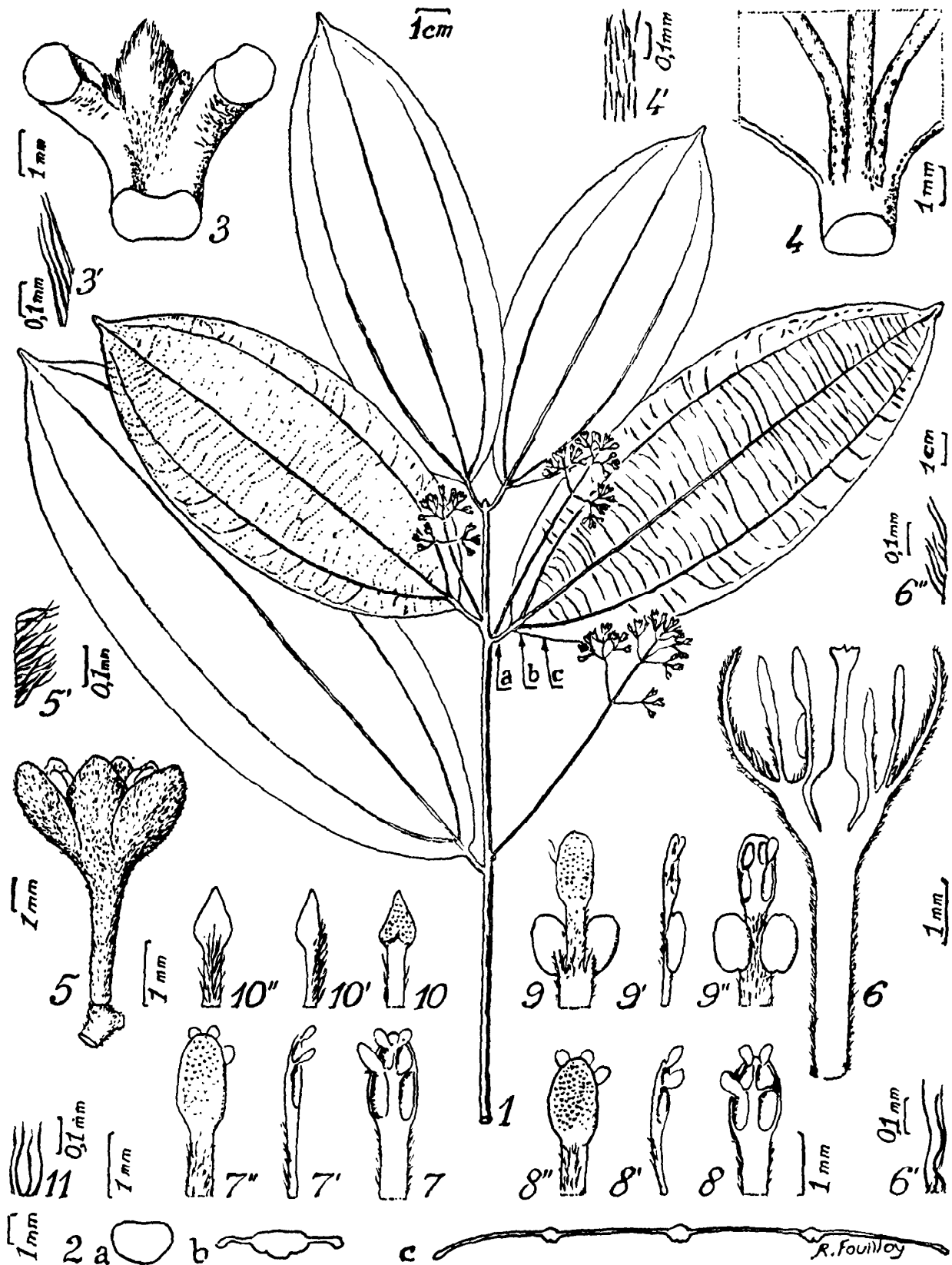


Fig. 6: *Cinnamomum malabattrum* (Burm. f.) Bl
(for details see page 132)

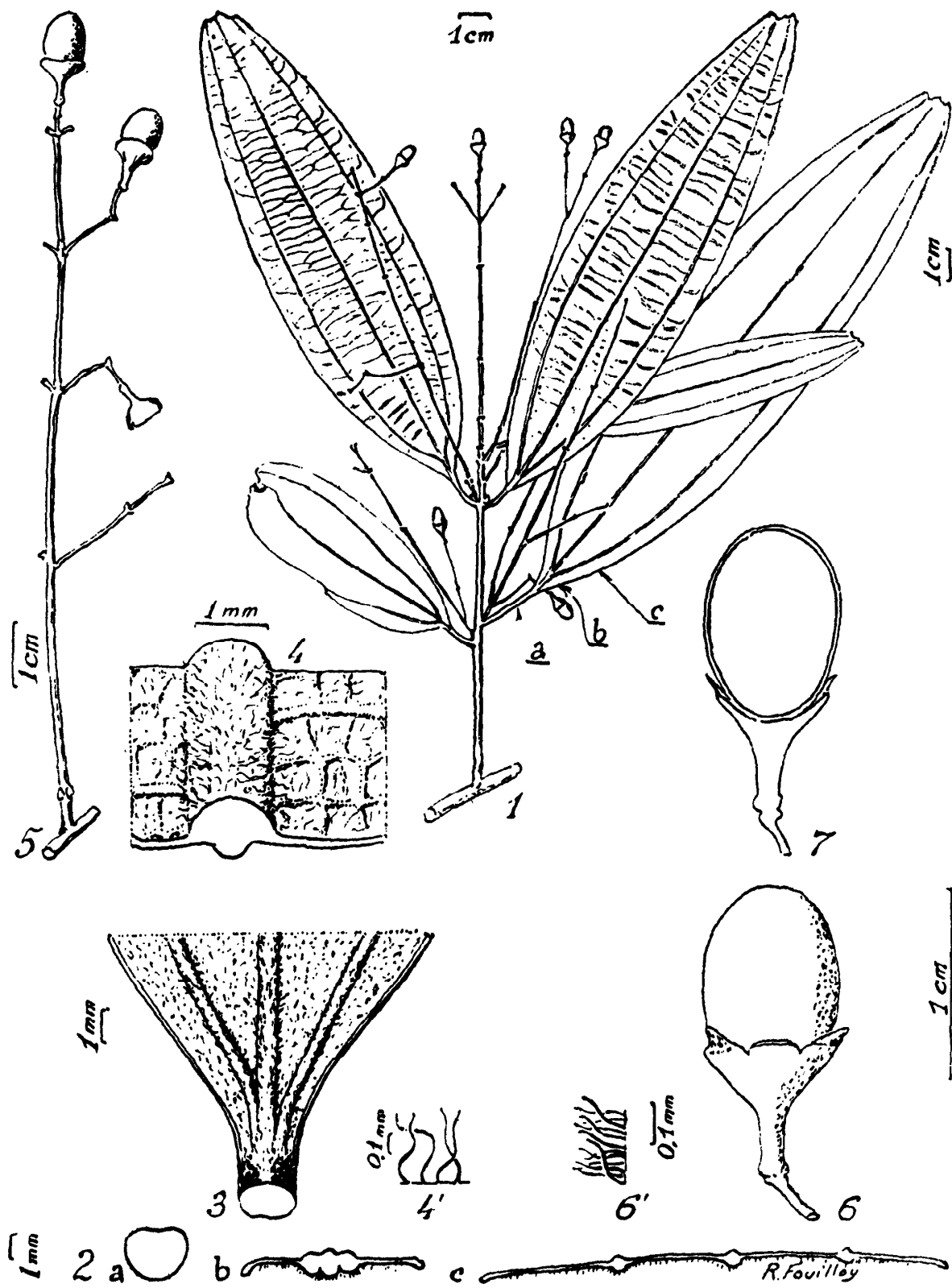


Fig. 7: *Cinnamomum malabattrum* (Burm. f.) Bl.
(for details see page 132)

& 46. 1825; Wseobecny Rostl. 2: 1302. 1846; G. Don in Loudon, Hort. Brit. 160. 1830; ed. 2: 160. 1832; Kostermans, Bibl., l.c. 318 (exclud. cit. Crévost & Pételot). *Cinnamomum malabathrum* (Lamk.) Batka, Dissertatio (Sept. 1833) and in Nova Acta Nat. Cur. 17(2): 618, t. 45 (exclud. cit. Fernandez, Tabernaemontana and *Cinnamomum iners* Reinw. ex Bl.), 1835; Nees, Syst., l.c. 38 & 663 (no. 3) (exclud. *Cinnamomum iners* Bl. & *Laurus iners* Reinw.); Heynold, Nomencl. bot. hortens. 197. 1840 (quoad nomen tantum); Steudel, Nomencl., ed. 2, 1: 366 (1840); 2: 16. 1841; Endlicher, Enchir. 203. 1841; O'Shaughnessy, Bengal Pharmacop. 81. 1844, p.p.; Goeppert, Tertiär Fl. Java, t. 9. 1857 (quoad nomen tantum); Ettinghausen in Deutsche Akad. Wiss. Wien 15: t. 30, f. 4. 1858; Miquel, Fl. Ind. Bat. 1(1): 897. 1858 (as a synonym. of *Cinnamomum iners*); Thwaites, Enum. Pl. Zeyl. 253. 1861 (quoad nomen tantum); Baillon, Hist. Pl. 2: 461. 1872; Traité Bot. médic. 687. 1884; Planchon, Traité prat. Drog. simples 1: 210. 1875; Guibourt & Planchon, Hist. nat. Drogues simples, ed. 7, 2: 413. 1876; Van Heurck, Notes succ. Orig. & Empl. Drog. simples 92. 1876; Cauvet, Nouv. Elém. Mat. médic. 1: 624, f. 35 A. 1886, p.p.; Planchon & Collin, Drogues simples 1: 570, f. 299. 1895, p.p.; Dragendorff, Heilpfl. 239. 1898; Koorders & Val. in Meded. Pl. Tuin Buitenz. 68: 75. 1904 (as a synonym. of *Cinnamomum iners*); Lecomte in Nouv. Arch. Mus., Sér. 5, 5: 79. 1918; Fl. Indoch. 5: 116. 1914 (as a synonym. of *Cinnamomum iners*); Liou Ho, Laur. Chine & Indoch. 30. 1932 (as a synonym. of *Cinnamomum iners*); Kostermans, Bibl., l.c. 318 (no. 244 a & d), exclud. cit. Rheede; Johnston, Dendrograph., Liber 3: 171-72. 1662 (*Malabathro folio*), p.p. *Laurus malabathrum* (sphalm. *malabratum*) Lamarck, Encycl. 3: 445. 1792; Kostermans, Bibl., l.c. Typus: Sonnerat s.n. ex India austral. (Herb. Lamarck, P), paratypus: *Katou-Karua* Rheede, Hort. Ind. Malab. 5: t. 53.

Laurus malabathrica Solander MSS ex Roxburgh, Hort. Bengal. 30. 1814; Fl. Ind. 2: 297. 1832; repr. ed. 337. 1874; Hamilton in Trans. Linn. Soc. 13(2): 559. 1822; Th. & C. G. Nees, de Cinnam. Disput. 56. 1823; Sprengel, Syst. Veget. 2: 265. 1825 [as a tentative synonym. of *Laurus bejolghota* (beiolgota) Hamilt.]; Sweet, Hort. Brit. 344. 1827; ed. 2: 441. 1830; ed. 3: 581. 1839; Batka, l.c. 618 (sphalm. auct. Lamarck); Nees in Wallich, Pl. As. rar. 2: 73. 1831 (as a synonym. of *Cinnamomum eucalyptoides* Nees); in Linnæa 15(2): 590. 1831; Syst., l.c. 42; Lindley, Fl. med., l.c. 332 (quoad nomen tantum); Steudel, Nomencl., ed. 2, 1: 366. 1840; Spach, Hist. nat. Vég. phan. 10: 478. 1841 (as a synonym. of *Cinnamomum nitidum* Hooker f.); Voigt, Hort. suburb. Calcut. 307. 1845 (as a synonym. of *Cinnamomum eucalyptoides*); Jacques & Hér., Man. Pl. 3: 739. 1847-57; Miquel, Fl., l.c. 898 and Ann., l.c. 256 (as a synonym. of *Cinnamomum eucalyptoides*); Meissner, l.c. 20 (as a synonym. of *Cinnamomum iners*, var. *trinerve* Meissn.; in Martius, Fl. Brasil. 5(2): 147. 1866; Drury, Hand. Ind. Fl. 3: 54. 1869; Balfour, Timb. Trees & For. Ind., ed. 3: 75. 1870, p.p.; Hooker f., l.c. 136 (under doubtful species); Robinson in Philipp. J. Sci. Bot. 7: 414 & 418. 1912; Merrill in id. 19: 351. 1921; Kostermans, Bibl., l.c. 651; in Reinwardtia 8: 33. 1970; in Manilal, l.c. 166. Typus: Roxburgh and tab. 122 & bis, Wight Icones.

Cinnamomum iners Auct. (non Reinw. ex Bl.), Graham, Catal. Fl. Bombay 73 (1334) 1840; Wight, Icones t. 122 & bis, text no. VII. 1839; Voigt, l.c., p.p.; Gamble, Fl. Madras 1224-25. 1925; Lisboa in Gazetteer Bombay Presid. 25: 111. 1886; Hooker f., l.c. 130, p.p. & 132, p.p., quoad cit. Wight, Icon.; Kirtikar, Basu & An, Ind. medic. Pl., ed. 2, 3: 2148. 1933; Anon., Wealth of India 2: 178. 1960, p.p.

Cinnamomum iners Auct. (non Reinw. ex Bl.), Nees in Wall., Pl. As. rar. 3: 32. 1832 (nec alior), p.p., quoad cit. Wight s.n. with mature fr. (GRAZ).

Cinnamomum malabatricum de Lukmannoff, Nomencl. Icon. Cannel. Camphr. 8, tab. 6, f. 48. 1889, cum vars. *rheedi* & *smithii* de Lukm. Typus: Herb. de Jussieu, Paris, Herb. Wallich, Paris; Herb. Leschenault, Paris.

Laurus cinnamomum var. *b.* Linn., Fl. Zeyl. 145. 1737; Mater. med. 64. 1749; Willdenow, Sp. Pl. 2(1): 477. 1799; Th. & C. G. Nees, De Cinnam. Disput. 56. 1823; Kostermans, Bibl., l.c. 601. Typus: *Katou Karua* Rheede, Hort. Ind. Malab., l.c. t. 53.

Cinnamomum zeylanicum Auct. (non Bl.), Dalgado, Fl. Goa 161. 1898 (might be also *C. goaense*); Bourne, List Pl. S. Ind. 27. 1898; Talbot, For. Fl. Bombay 2: 389. 1911, p.p.; Trees, Shrubs Bombay, ed. 3: 420. 1949, p.p.; Cooke, Fl. Bombay 2: 535. 1906, pro maxime parte; (non Bl.) Lushington, Madras Timb. 75. 1919; Gamble, Fl. Madras 1224. 1925, p.p.; Santapau, Fl. Kandala in Rec. Bot. Surv. India 16(1): 258. 1953.

Cinnamomum ochraceum Blume, Rumphia 1(3): 37, t. 10, fig. 2-4. 1836; Nees, Syst. Laur. 666. 1836; Dietrich, Syn. 2: 1335. 1840; Steudel, Nomencl., ed. 2, 1: 366. 1840; Meissner in DC., Prodr. 15(1): 20. 1864 (as a synonym of *Cinnamomum iners*, var. *trinerve* Meissn.); Miquel, Ann. Mus. bot. Lugd. bat. 1: 270. 1864; Drury, Handb. Ind. Fl. 3: 54. 1869; Guibourt & Planchon, Hist. nat. Drogues simples 2: 413. 1876 (in nota); Cammerloher in Bull. Jard. Bot. Buitenz., Sér. 3, 7: 472. 1925; Kostermans, Bibl. 329. 1964. Typus: Three detached leaves, probably from India (L).

Cinnamomum eucalyptoides Nees in Wall., Pl. As. rar. 2: 73. 1831, p.p.; in Flora 15(2): 587, 590, 596. 1831; Syst., l.c. 41, 664; Th. Nees, Pl. offic. Düsseldorf, Suppl., Fasc. 4: t. 9. 1831; Th. Nees & Eberm., Handb. med.-pharmaz. Bot. 3: 525. 1832 (perhaps quoad *Laurus malabathrica* Roxb. only, the remainder perhaps *C. verum* and *C. iners*); Blume in Tijdschr. Natuurl. Geschied. & Physiol. 1: 64. 1834 (quoad nomen tantum); Lindley, Pl. med. 332. 1838, p.p.; Miquel, Fl. Ind.

bat. 1(1): 897. 1858 and in Ann. Mus. bot. Lugd. bat. 1: 258. 1864, quoad cit. *C. eucalyptoides* Nees in Wall. and Nees & Eberm. and these quoad *Laurus malabathrica* Roxb. only, the rest represents *C. verum* and *C. iners*; Dietrich, Handb. Pharmac. Bot. 98. 1837, p.p.; Syn. 2: 1331. 1840, p.p.; Sweet, Hort. Brit., ed. 3: 581. 1839 (*eucalyptoides*); p.p.; Steudel, Nomencl., ed. 2, 1: 366. 1840. 52: 15. 1841; Spach, Hist. nat. Vég. phan. 10: 478. 1841, p.p. (this is a mixture of at least 3 species); Hasskarl, Tweede Catal. 87. 1844 (quoad nomen tantum); Voigt, Hort. suburb. Calcut. 307. 1845 (exclud. text); Jacques & Hér., Man. Pl. 3: 739. 1847-57, p.p.; Royle, Man. Mat. med. & Therap. 544. 1847, p.p.; Meissner in DC., Prodr. 15(1): 20, 503. 1864 (as a synonym of *Cinnamomum iners*, var. *trinerve* Meissn, quoad nomen tantum); Drury, Handb. Ind. Fl. 3: 75. 1870, p.p.; Usef. Pl. Ind., ed. 2: 138. 1873, p.p.; Sheriff, Suppl. Pharmacog. Ind. 102. 1869, p.p.; Balfour, Timber Trees Ind., ed. 3: 75. 1870, p.p.; Guibourt & Pl. Hist. nat. Drogues simples 2: 411-13, f. 492. 1876 (sub *Cassia lignea* & *Malabathrum*); Wittstein, Handwörterb. Pharmacogn. 507. 1882; Bisschop-Grevelink, Pl. Nederl. Ind. 2: 234. 1883 (quoad nomen); Hooker f., Fl. Brit. Ind. 5: 130. 1886 (as a synonym of *Cinnamomum nitidum*); Dragendorff, Heilpfl. 239. 1898, p.p.; Engelhardt in Glasnika Zemelsjkog muzeja in Bosni Herzegovina 22(1): 162. 1910, p.p.; Cammerloher in Bull. Jard. Bot. Buitenz., Sér. 3, 7: 471. 1925 (quoad nomen); Kostermans, Bibl. 293-94. 1964 (exclud. Miquel, Leerb. Artsenijgew.; Pl. Junghuhn., Suppl. Fl. Sumatra 142. 1860 and 352. 1861, quoad *Anisophyllea*, cf. Ding Hou in Fl. Malesiana 5(4): 479. 1958); Zollinger, Syst. Verzeichn. 2: 112. 1854; Filet, Pl. Woor-denb., Boerl., Handl., these are all *Cinnamomum iners*).

Laurus culitlawan Auct. (non L.) Wight, Icones ex Meissner in DC., Prodr. 15(1); 20. 1864.

Katou-Karua Rheede van Draakenstein,

Hort. Ind. Malabar. 5: 105, t. 53. 1685; Ray, Hist., l.c. 1562; Commelin, Fl. Malab. Catal. 154. 1696; Burman, Thesaur, Zeyl. 64. 1737; Index Alter, l.c. 5; Burman f., l.c.; Linnaeus, Mater. med. 64. 1749; ed. alter (Schreber) 106. 1772; ed. 5 (Schreber) 123. 1787 (*Kalou-Garua*); Bergius, Mater. med. 1: 318. 1778; Murray, Arzneigew, l.c. 475; Vittman, Summa Pl. 2: 450. 1789; Lamarck, l.c. 445; Houttuyn, l.c. 1: 505 & 514, t. 8 B. 1799; Willdenow, Sp. Pl. 2(1): 477. 1799; Persoon, Syn. 1: 448. 1805; Poiret, Encycl. Suppl. 2: 213. 1811; 3: 213. 1812; Stokes, Bot. Mat. med. 2: 411. 1812; Dennstedt, Schlüssel Hort. Malab. and in Allg. teutschen Gart. Magaz. 2(2): 12, 22, 31. 1818; Hamilton, l.c. 552, 553, 554 (*Carna*), 558 (*Carua*); Jussieu in Dict. Sci. 24: 366. 1822; Th. & C. G. Nees, De Cinnamo Disput., l.c. 56; Presl, l.c. 46 (*katon*); Roxburgh, Fl. Ind., ed. Carey 2: 297. 1832; reprint 337. 1874; Nees in Wall., l.c. 73; in Flora 15, l.c. 597; Syst. Laur., l.c. 35, 38, 46; Batka, l.c. 618; Wight in Edinb. phil. J. 55(28): 20-32. 1839; Hayne, Arzneigew. 12: 20. 1856; Hasskarl in Flora 35: 548. 1861; Miquel, Ann., l.c. 256; Guibourt & Pl., l.c. 413; Hooker f., l.c. 136; Kostermans in J. Sci. Res. Indon. 1: 92. 1952; Bibl., l.c. 554; in Manilal, l.c. 163, 166.

Malabathri folium, Breynius in Ephem. Acad. N. G., Decas I, Ann. 4: 139-140. 1676; Th. & C. G. Nees, De Cinnamomo Disput., l.c. 56; Kostermans, Bibl., l.c. 932.

Arbor canellifera indica cortice acerrima viscida s. mucilaginoso, Breynius, Prodr. 2: 17 (no. 2). 1689; ed. 2(2): 44. 1739; in Ephem. Acad. N.C.C., 11 l.c. An. 4 & 5: 139. 1676; Burman, Thes., l.c. 62; Geoffroy, l.c. 164; Stokes, l. 1. 415; Th. & C. G. Nees, l.c. 49; Woodville, Med. Bot., ed. 3, 4: 670. 1832; Nees, Syst., l.c. 46; Miquel, Fl., l.c. 899; Kostermans, Bibl., l.c. 101 (exclud. identif. *C. zeylanicum*).

Canella sylvestris malabarica, Ray, Hist. 2: 1562. 1688; Commelin, l.c. 17; Dexbach in Valentin, Hist. simpl. 600. 1732; Burman,

Thes., l.c. 64; Lamarck, l.c. 445; Th. & C. G. Nees, l.c. 56; Kostermans, Bibl., l.c. 206.

Canella lignea sive malabarica, Hermann, Hort. Acad. Lugd. Bat. Catal. 130. 1726; Dale, Pharmacol. 299. 1693; Seba in Acta Caes. N. Cur. 1: 4. 1727; Burman, Thes. Zeyl. t. 37, p.p.; Breynius, Prodr. 18. 1689; ed. 2, Fasc. 2: 45. 1739; Geoffroy, Tract. de Mat. med. 2: 171-73. 1741; Linnaeus, Fl. Zeyl. 62. 1747; Trew, Coll. Stirp. Cent. 4, t. 391. 1760; Adanson, Fam. Pl. 2: 535. 1763; Murray, App. med. l.c. 441; Lamarck, l.c. 444; Vittman, Summa Pl. 2: 450. 1789; Commelin, l.c. 73; Willdenow, l.c. 477; de Candolle, Essai Propr. médic. Pl. 66. 1804 (in note); Stokes, l.c. 413, 416; Sims in Bot. Mag. 40 sub tab. 1636. 1841; Steudel, Nom. 166. 1821; ed. 2, 1: 306. 1840; Hamilton, l.c. 554; Th. & C. G. Nees, De Cinnamomo Disput. 53, 54; Presl, l.c. 44; Goebel & Kunze, Pharmac. Waarenkunde 1: 28, t. 4(1-2). 1827-29; Moessler, Handb. d. Gew., ed. 2, 1: 427. 1831; Nees & Eberm., l.c. 427; Kosteletzky, l.c. 489-90; Nees, Syst., l.c. 47 & 48; Dietrich, Handb. Pharm. Bot. 98. 1837; Lindley, l.c. 330; Spach, l.c. 481; Berg & Schmidt, Darstell. u. Beschreib. officin. Gew. 1: V c. 1863; Meissner in Martius, l.c. 147; Flückiger & Hanbury, Pharmacog. 477-79. 1874; Guibourt & Pl., l.c. 406, 409, 441; Wittstein, Handwörterb. Pharmakogn. Pfl. reich 156. 1882; Bisschop Grevelink, Pl. Nederl. Ind. 3: 233. 1883; Pharmac. J. 12 May 1884; Van Gorkom, Oost-Ind. Cultures 2: 854. 1913; Kostermans, Bibl., l.c. 214 (all references above included perhaps also *Cinnamomum macrocarpum* and other Malabar species, even species of Java and Sumatra are often included).

Malabathrum (Malabathrum) Garcia ab Orta, Hist. Aromat. 1563; Tabernaemontanus, Neuw Kreuterbuch 1343. 1588; l'Obel, Icon. 1: 308. 1591; Obs. 165; J. Bauhin, Hist. 1: 430-43. 1619; Parkinson, Theatr. Bot. 1584. 1640; Ray, Hist. Pl. 2, Liber 27: 1563. 1688; Geoffroy, Tract. Mat. med. 2:

264. 1757; Adanson, Fam. Pl. 2: 568. 1763 & 573 (*malabaton*); Garsault, Descript. Vertues & Us. 719 Pl. 1: 33, t. 42. 1767; Burman f., Fl. Ind. 92. 1768; Houttuyn, Natuurl. Historie 2(1): 335. 1774; Murray, Appar., l.c. 4: 443. 1787; Arzneivorath (translat. Seger), l.c. 4: 475. 1788; Lamarck, Encycl. 3: 445. 1793; Stokes, Bot. Mat. med. 2: 411. 1812; Jussieu in Dict. Sci. 6: 132. 1817; Laufer in J. Asiat. XI (12): 1-49, t. 1918 (*malabathron*); Hamilton, l.c. 559; Presl, l.c. 46; Batka, l.c. 619; Nees, Syst., l.c. 38 (in nota); Meissner, Gen. 2: 237. 1841; in DC., Prodr. 15(1): 9. 1864; in Martius, l.c. 145; Lemaire in Orbigny, Dict. Hist. nat. 7: 603. 1846; Baillon, l.c. 429 (in nota); Bentham & Hooker, Gen. Pl. 3: 156. 1880; Post & Kuntze, Lexikon 347. 1904; Markham, Colloq. on the simples & drugs by Garcia de Orta 202-207. 1913; Kostermans, Bibl., l.c. 932 (all quotations are pro parte).

Laurus cassia foliis lanceolatis utrinque acutis triplinerviis, paniculis laxis sublaterilibus, Lamarck, Encycl. 3: 444. 1793; Hamilton, l.c. 555; Nees in Flora 15, l.c. 581.

Vernacular names: Jangli-darchini (Hindi); Ranachadalchini (Mar.); Kattukaruvappattai (Tamil); Adavulavangapatte (Telug. & Kan.); Tikhi (Bombay).

Tree, up to 20 m tall and 40 cm diam. Bark smooth or slightly, longitudinally cracked, light brown, 1 mm thick, live bark 5-10 mm thick, pale brown, inside whitish, brittle, very slimy, without taste and with almost imperceptible aromatic smell. Terminal bud small, like the thickish apical part of the branchlets rather densely, microscopically sub-adpressed pilose, the hairs thin, slightly crispy. Leaves opposite or sub-opposite, thinly coriaceous to coriaceous, elliptic to oblong to subobovate-elliptic, 3×11 — 8×20 — 5×30 cm, attenuate-acuminate to caudate acuminate (acumen up to 3 cm) or shortly acuminate, base acute, cuneately merging into the thick, 5-20 mm long pedicels, above glabrous, smooth, the 3 main nerves slender, prominulous, below

with sparse, microscopical, crisp fine hairs, smooth or with slender, parallel, prominulous, sub-horizontal secondary nerves, 4-5 mm apart, glabrescent, midrib prominent, the 2 usually basal nerves which reach the leaf apex slender, prominulous.

Panicles pseudo-terminal, lax, many-flowered, up to 25 cm long, with few, stiff, rather patent, up to 3 cm long branches, densely, very minutely sub-adpressed pilose with slightly crispy hairs. Pedicels slender, 3-4 mm long, slightly thickened upwards. Flower tube shallow, 1 mm, broad. Tepals fleshy, ovate, acutish, 3-3.5 mm long. Stamens 2-2.5 mm, anthers oblong to subovate-oblong, 4-celled, filaments pilose, slender, slightly longer than the anthers; of whorl I and II introrse, of whorl III extrorse, glands large on short stipes, the basal part adnate to the filament. Staminodes 1.5 mm, hastate, cordate, on as long stipes. Ovary ellipsoid, style cylindrical, thickish, 2 mm, stigma small, peltate.

Fruit ellipsoid, up to 8×10 mm; cup deep, rather fleshy, 7 mm high, 8 mm diam. apically, the base conical, merging into the 5 mm long pedicel. The rim with the persistent, thickened tepals, of which the apical part drops off, the basal part rounded, pilose, 2 mm high, 3 mm wide.

Distribution: Western Ghats in S. India.

Cinnamon barks were already collected and exported from the Malabar region in southern India at the beginning of the christian area (of the chinese cinnamon of *Cinnamomum aromaticum* Nees, synonym *C. cassia* Bl. even much earlier) and by chinese seafarers brought from China, Indochina, Java and Sumatra to the Coast of Malabar from where they were transhipped by Arabs to Arabian ports or East African ports or the Middle East and transported by Phoenicians to southern Europe, where they were essentially used for medicinal uses and embalming, and fetched prices higher than those of gold.

Malabar cassia or *cassia lignea*, the names

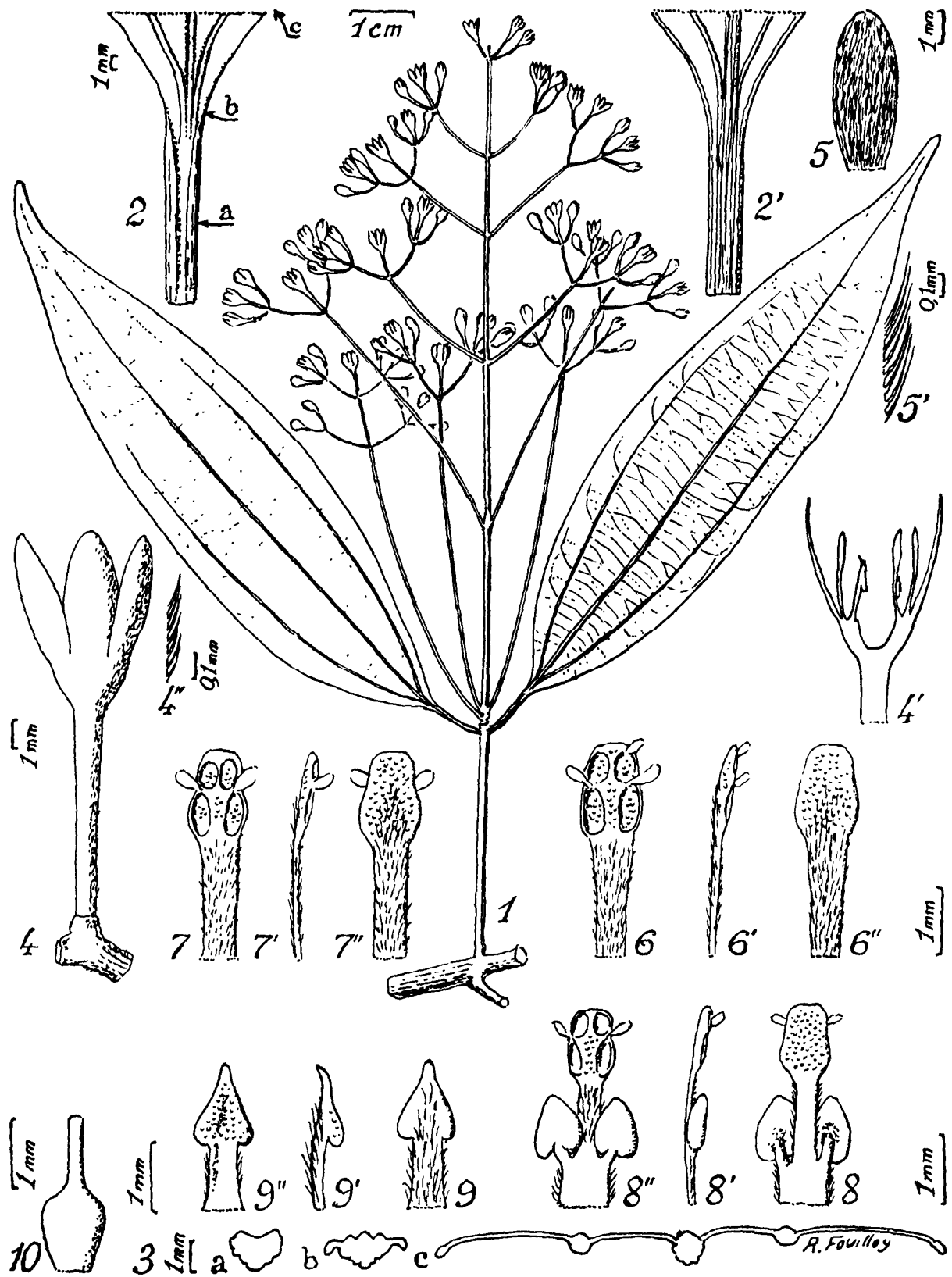


Fig. 8: *Cinnamomum riparium* Gamble
(for details see page 132)

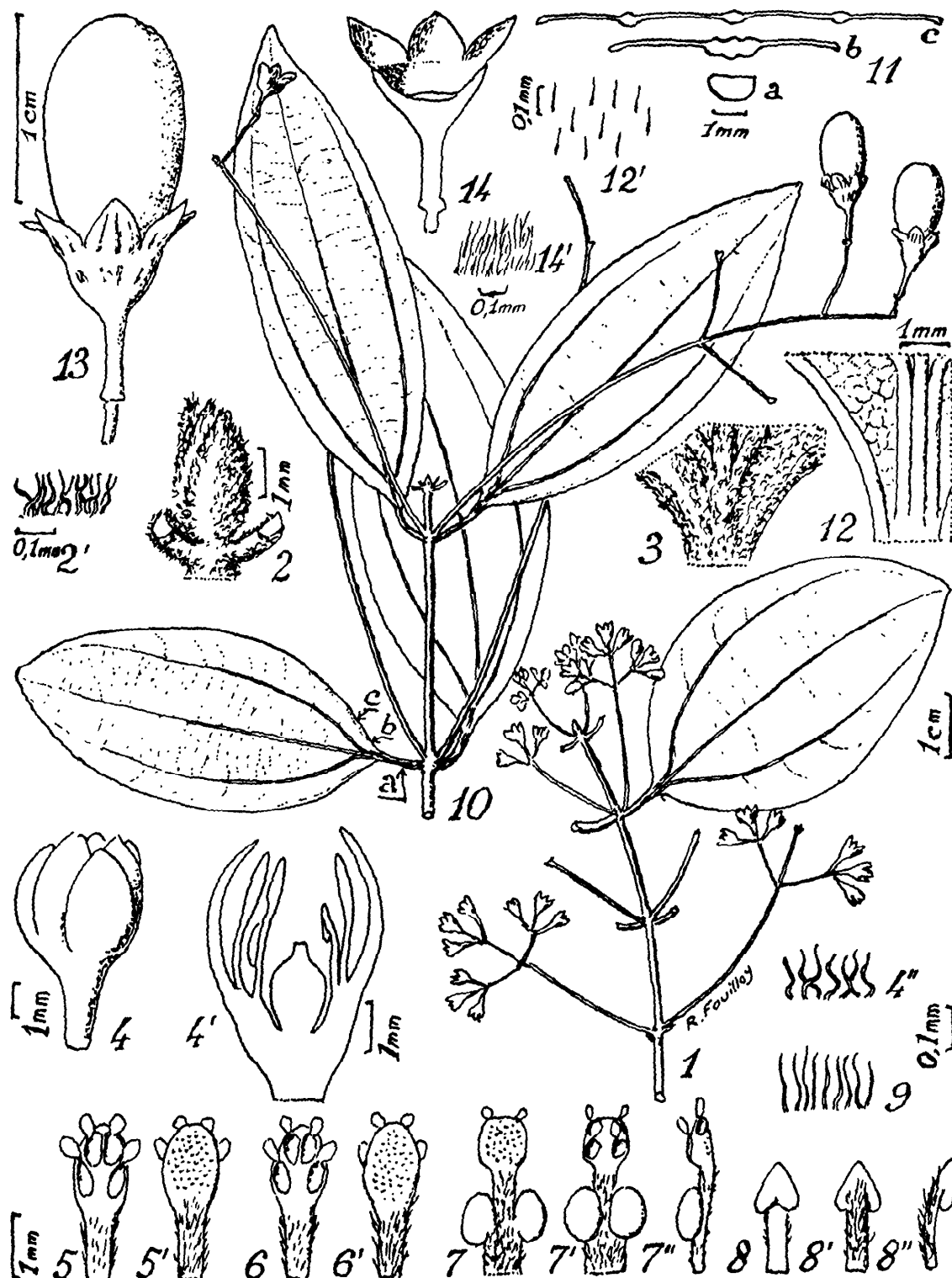


Fig. 9: *Cinnamomum sulphuratum* Nees
(for details see page 132)

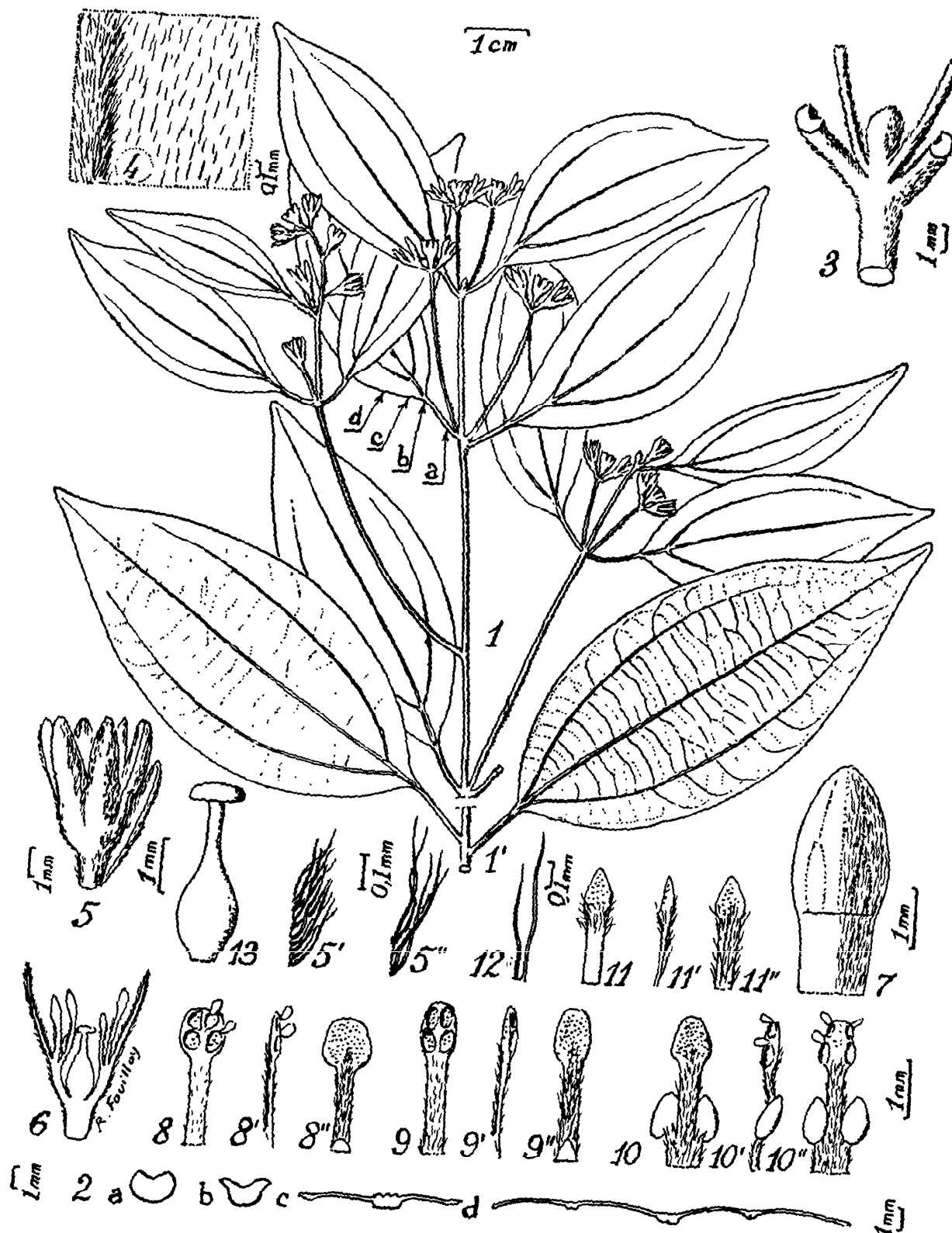


Fig. 10: *Cinnamomum travancoricum* Gamble
(for details see page 133)

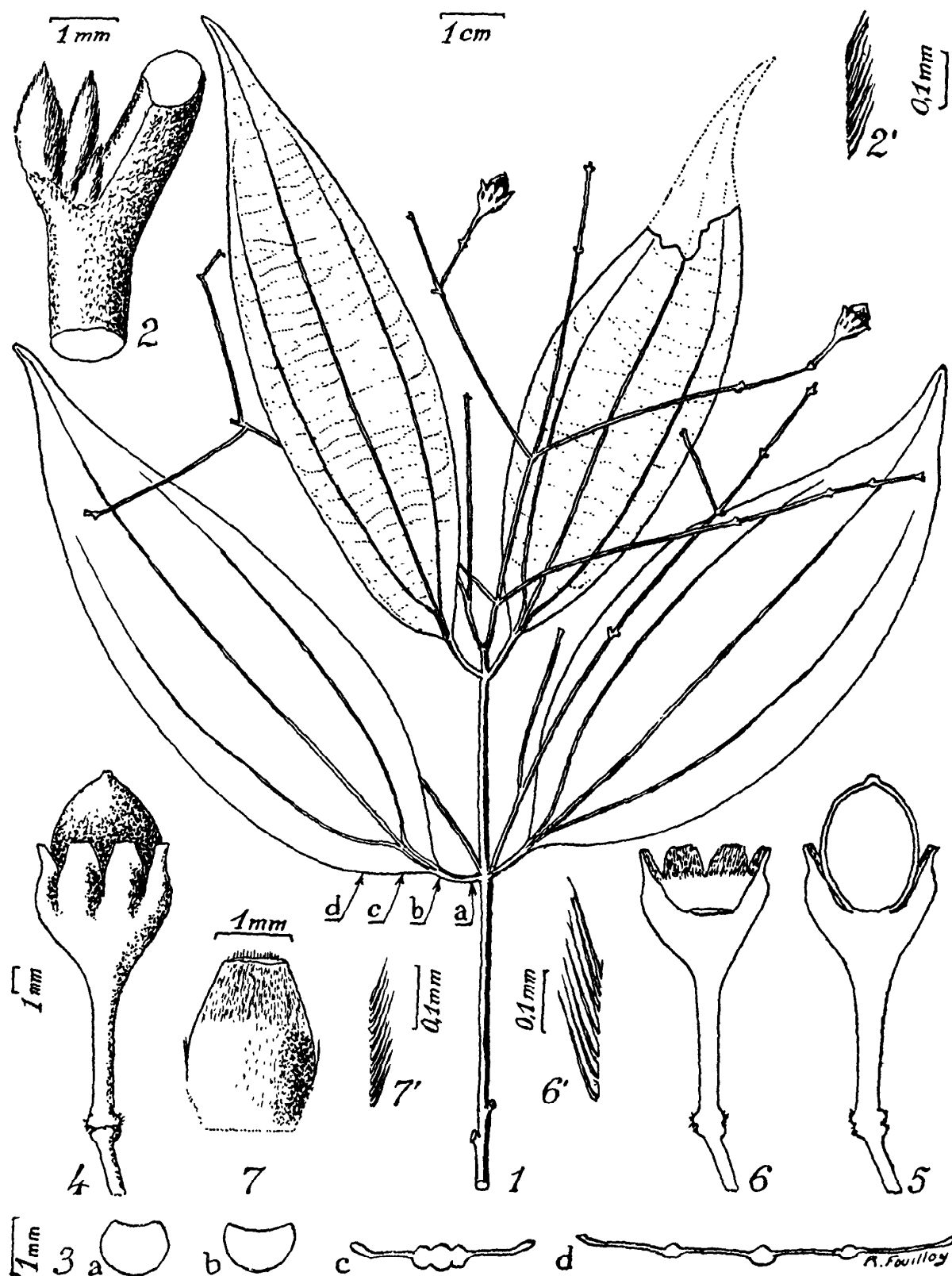


Fig. 11: *Cinnamomum watarwarcense* Kosterm
(for details see page 133)

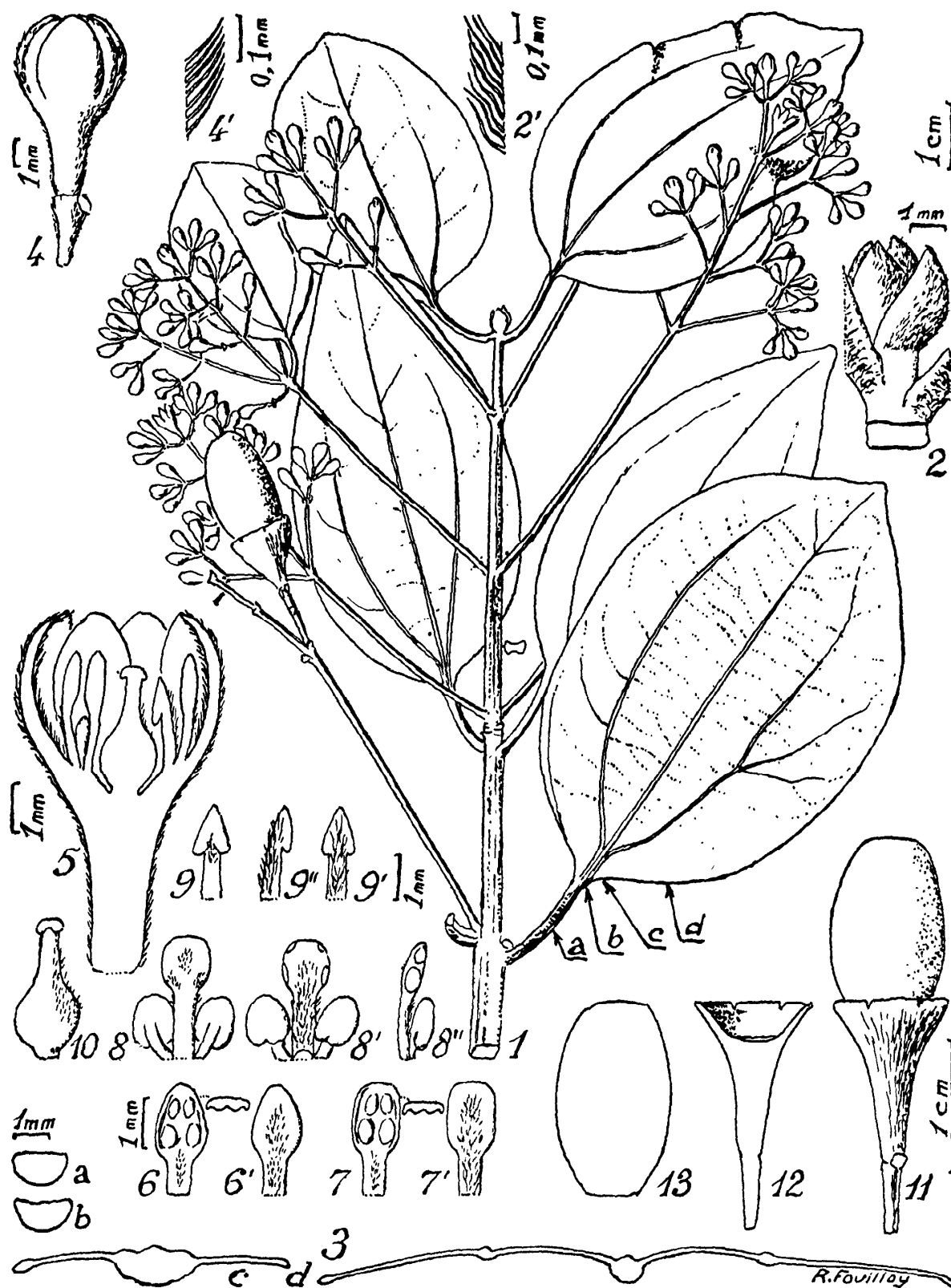


Fig. 12: *Cinnamomum wightii* Meissn.
(for details see page 133)

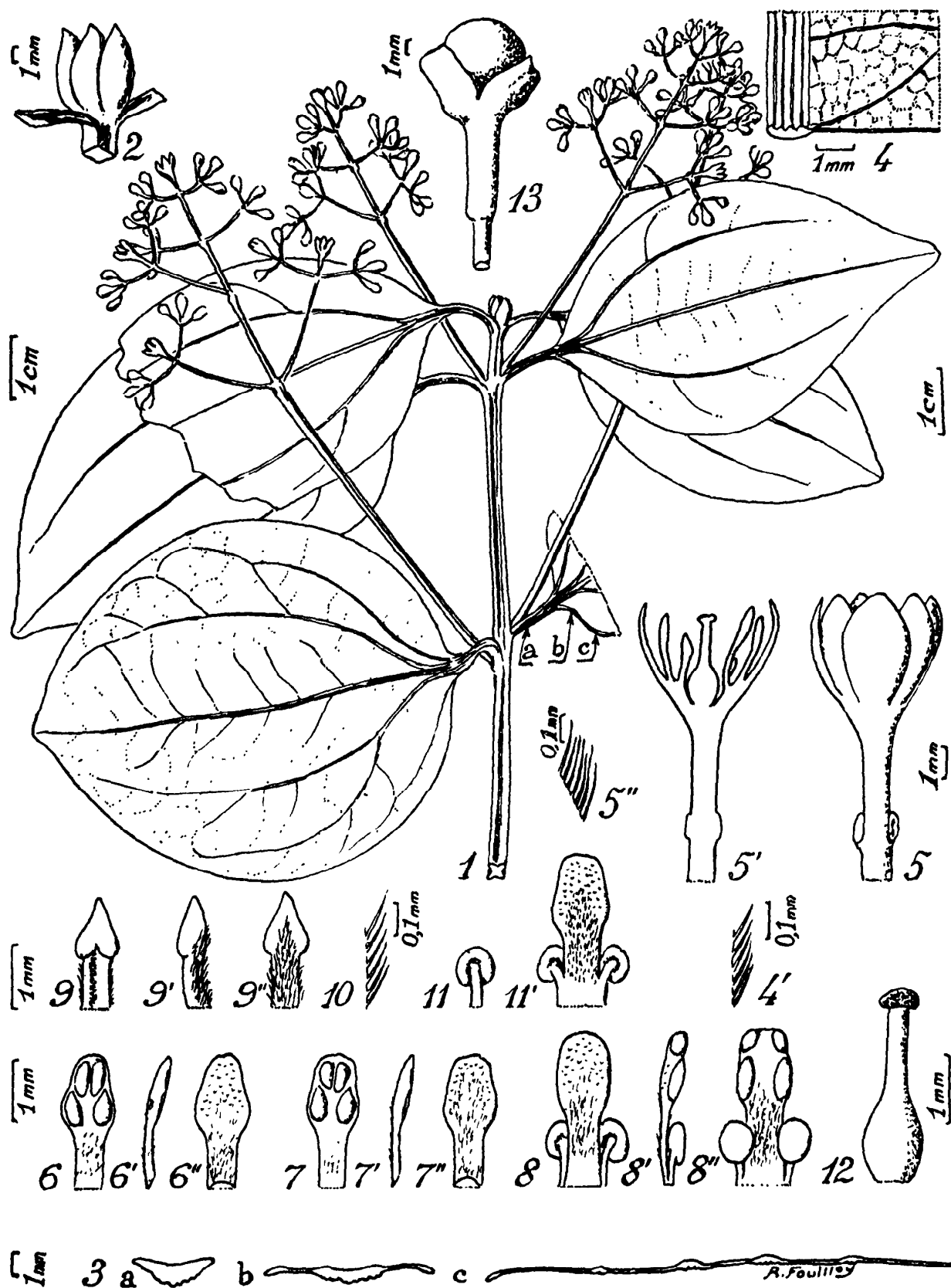


Fig. 13: *Cinnamomum wightii* Meissn.
(for details see page 133)

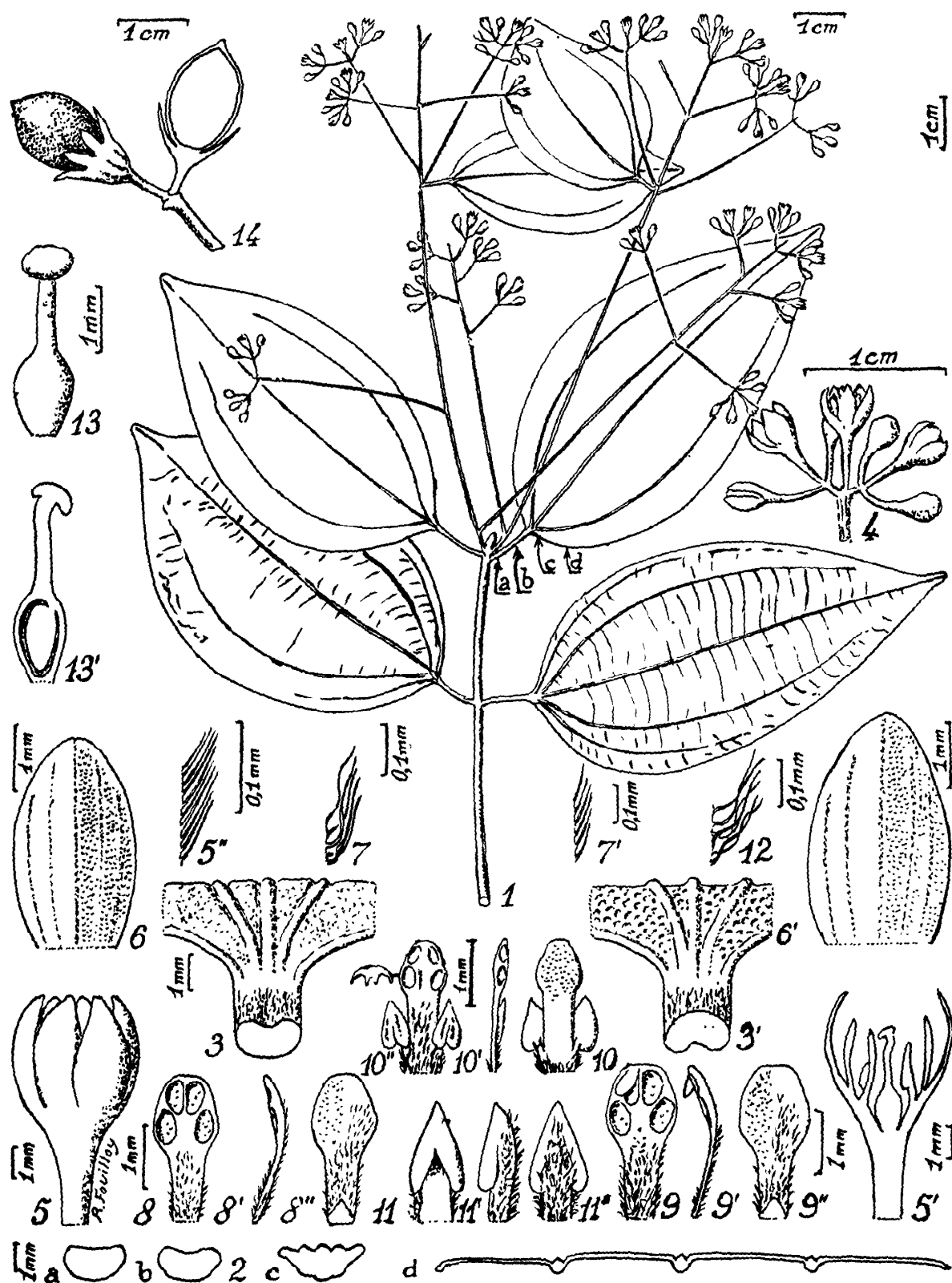


Fig. 11. *Cinnamomum verum* Presl
(for details see page 199)

12'. Pilosity of lower leaf surface; 13. Fruit; 14. Cup, sectioned, 14'. Pilosity of both sides of teeth (after Hooker f. & Thoms. s.n.).

Fig. 10: *Cinnamomum travancoricum* Gamble

1. Branch and flowers, 1'. Pair of leaves 25 mm lower, righthand leaf: lower surface, lefthand leaf: upper surface; 2. a, b, c, d Sections at a, b, c, d; 3. Terminal bud with appressed 0.1-0.2 mm long hairs; 4. Enlarged portion of lower surface and veins; 5. Flower and bracteole, 5' Apical pilosity of flower outside, 5'' Idem of basal part of tepals; 6. Sectioned; 7. Tepals inside with indication of dehiscence; 8, 8', 8''. Stamens of whorl I; 9, 9', 9''. Idem whorl II; 10, 10', 10''. Idem whorl III; 11, 11', 11''. Idem whorl IV; 12. Pilosity of filaments; 13. Pistil (after Bourdillon 545).

Fig. 11: *Cinnamomum walaiwarens* Kosterm.

1. Fruiting branch, lefthand leaf: lower surface, righthand one: upper surface; 2. Terminal bud of another branch, 2'. Its indumentum; 3. a, b, c, d Sections at a, b, c, d; 4. Fruit; 5. Idem, sectioned; 6. Cup, sectioned, 6'. Pilosity of inside of teeth; 7. Enlarged teeth, 7'. Its outside, apical pilosity (after Kostermans 26301).

Fig. 12: *Cinnamomum wightii* Meissn.

1. Flowering and fruiting branch, righthand leaf: lower surface, lefthand one: upper surface; 2. Terminal bud, 2'. Its pilosity; 3. a, b, c, d Sections at a, b, c, d; 4. Flower, 4'. Its outside pilosity; 5. Flower, sectioned; 6, 6'. Stamens of whorl I; 7, 7'. Idem whorl II; 8, 8', 8''. Idem whorl III; 9, 9', 9''. Idem whorl IV; 10. Pistil, partly hairy; 11. Fruit; 12. Cup, sectioned; 13. Berry (after Leschenault 2).

Fig. 13: *Cinnamomum wightii* Meissn.

1. Flowering branch, righthand leaf: upper surface, lefthand leaf: lower surface; 2. Terminal, hairy bud; 3. a, b, c Sections at a, b, c; 4. Detail of lower leaf surface at 2 cm from leaf base, 4'. Pilosity of nerves on lower surface; 5. Flower, 5'. Idem, sectioned, 5''. Its outer and inner indumentum; 6, 6', 6''. Stamens of whorl I; 7, 7', 7''. Idem whorl II; 8, 8', 8''. Idem whorl III; 9, 9', 9''. Idem whorl IV; 10. Pilosity of filament; 11. Glands of whorl IV, not adnate to the filament, 11'. Other samens of whorl III; 12. Glabrous pistil; 13. Fruit (after Perrottet 1840).

Fig. 14: *Cinnamomum verum* Presl

1. Flowering branch, righthand leaf: lower surface, lefthand one: upper surface; 2. a, b, c, d Sections at a, b, c, d; 3. Base of upper leaf surface, upper side of petiole glabrous, grooved, 3'. Idem, upper surface; 4. Cymules; 5. Flower, 5'. Idem, sectioned, 5''. Outside pilosity of idem; 6. Interior tepal from inside, hairy and punctulate, 6. Outer tepal; 7. Pilosity of inner basal part of tepals, 7'. Pilosity of apical inside surface of tepals; 8, 8', 8''. Stamens of whorl I; 9, 9', 9''. Idem whorl II; 10, 10', 10''. Idem whorl III; 11, 11', 11''. Idem whorl IV; 12. Hairs of filaments; 13. Pistil, 13'. Idem, sectioned (after Tirvengadam 220, P); 14. Fruit and sectioned fruit (after Chevalier 26435, P).