LABIATAE (H. Keng, Singapore)[1]

Unarmed, erect, mostly aromatic (sometimes fetid-aromatic) herbs, sometimes woody at the base; stem mostly quadrangular, sometimes conspicuously noded. *Leaves* decussate, rarely whorled, mostly simple, rarely lobed or pinnate, exstipulate. Indumentum of simple, capitate-glandular or stellate hairs, or a combination. (*Extra*-Mal. sometimes woody, climbing, spiny and with spiral leaves.) *Flowers* bisexual, mostly zygomorphic, axillary, in pairs, or in short, fascicled cymes forming verticillasters, or in cincinni, in many cases compound into spurious spicate, racemose, capitate or paniculate, essentially cymose, inflorescences. *Calyx* persistent, ± regular or unequally 4–5-toothed or -lobed, tubular or 2-lipped, sometimes with an appendage. *Corolla* tube long or short, sometimes with a hair-ring within, limb 5-, rarely 4-lobed, mostly 2-lipped and personate, lobes imbricate in bud. *Stamens* usually 4 and didynamous, inserted on the corolla tube, sometimes the upper (posterior) pair imperfect, rarely the lower pair barren (*Mosla*), filaments sometimes hairy, rarely connate at base; anthers linear to round, cells parallel or divaricate, sometimes confluent, rarely one cell barren (*Anisomeles*), or disjoined by a slender connective (*Salvia*), basifixed. *Disk* usually prominent, regular or irregular. *Ovary* superior, consisting of 2 carpels, each of which is 2-celled by intrusion of the ovary wall. Style simple, mostly gynobasic; stigma usually 2-fid, often with unequal arms. *Ovules* solitary, anatropous. *Fruit* consisting of 4 dry or rarely fleshy (*Gomphostemma*), 1-seeded schizocarpous nutlets which remain enclosed in the persistent calyx; the scar of attachment usually small and basal but sometimes sublateral and large; pericarp smooth or sculptured, endocarp sometimes hard; exocarp sometimes becoming gelatinous when moistened. *Seed* small, erect or ± transverse (*Scutellaria*), ± exalbuminous; seed-coat usually much deteriorated as to be almost negligible.

Distribution. Cosmopolitan, with *c.* 180 genera and over 3000 *spp.*, highly developed in the Mediterranean region; certain groups confined to distinct parts of the world, *e.g.* the (woody) *Prostantheroideae* in Australia and Tasmania, and *Catopherioideae* in Central America.

All native genera belong either to the group of 12 (African-) Indo-Australian genera: *Ajuga, Anisomeles, Basilicum, Ceratanthus, Leucas, Mentha, Ocimum, Plectranthus s.l., Pogostemon s.l., Salvia, Scutellaria, Teucrium,* or to the group of 16 Indo-Malesian genera which do not occur in Australia: *Achyrospermum, Acrocephalus, Cymaria, Elsholtzia, Eurysolen, Gomphostemma, Melissa, Mesona, Microtoena, Mosla, Nosema, Orthosiphon, Paraphlomis, Platostoma, Satureja, Stachys.* Several of the last group extend with their species to New Guinea however, *e.g. Acrocephalus, Cymaria, Microtoena, Orthosiphon, Satureja.*

The other genera of this group extend to West Malesia only, sometimes including Celebes. Their species may have a restricted occurrence in West Malesia, being confined *e.g.* to Malaya: *Gomphostemma crinitum,* to Sumatra: *Elsholtzia blanda, Mosla dianthera,* and *Teucrium quadrifarium,* to Java: *Stachys oblongifolia, Platostoma africanum,* to Sumba, or occupy only South Malesia (Sumatra, Java, sometimes also Lesser Sunda Is.): *Gomphostemma parviflorum, Melissa axillaris,* and *Nosema cochinchinense,* or North Malesia (the Philippines): *Salvia scapiformis, Mosla formosana.*

Reversely, none of the genera endemic to Australia have radiated into Malesia, though a few Australian species of wider generic area do extend to East Malesia, *viz Ceratanthus longicornis, Plectranthus congestus, P. parviflorus,* and *Teucrium corymbosum.*

(1) With co-operation of Dr. R. C. Bakhuizen van den Brink Jr and the General Editor.

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As *Labiatae* are largely developed in dry regions of the globe it is not astonishing that there is only one endemic genus in Malesia, *viz Acrymia*, a monotypic genus confined to ancient limestone hills in Malaya.

At species level there are, however, an unexpected large number of endemic Malesian species, namely 16. Half of them occur in more than one island or island group, *viz Achyrospermum densiflorum, Elsholtzia pubescens, Gomphostemma curtisii, G. microcalyx, Paraphlomis oblongifolia, Plectranthus galeatus, P. javanicus*, and *Scutellaria javanica.*

Others have a narrower range and could be called local-endemics, being restricted to one island or island group; they are: *Gomphostemma dolichobotrys, Plectranthus apoensis, P. merrillii, P. petraeus, P. steenisii, Pogostemon philippinensis, P. reticulatus*, and *P. velatus.* The distribution of these endemic species over the islands of Malesia gives quite a different pattern from what is usual in other genera of forest plants, where endemics mostly center in New Guinea, the Philippines, Borneo, and Malaya.

Among the non-endemic species a few show considerable disjunctions (gaps) in their range, *e.g. Leucas marrubioides:* Asia — East Java, *Stachys oblongifolia:* SE. Asia — West Java, *Platostoma africanum:* Africa — India — Sumba, as well as the genus *Ceratanthus* which occurs in continental SE. Asia and then again in New Guinea.

One would expect quite some *Labiatae* in the category of disjunct drought plants, effected by the seasonal drought of the monsoons, as explained by VAN STEENIS (Reinwardtia 5, 1961, 419–429, 6 maps), because *Labiatae* have a tendency towards development in dry hot climates. There are indeed some lowland species which show this disjunct pattern which is defined by a strong or rather strong dry season (classes 4 and 5), *viz: Cymaria elongata* which occurs in India and then in Timor, *Cymaria dichotoma* known from SE. Asia and E. Java, S. Celebes, and N. Philippines, *Gomphostemma hemsleyanum* occurring in Upper Burma and then in the driest part of E. Java near Asem Bagus, *Platostoma africanum* found in India and Sumba, and *Orthosiphon thymiflorus* from SE. Asia and E. Java. There are some others, *e.g. Leucas marrubioides* which show a similar disjunction between SE. Asia and East Java, but this plant is little affected by the dry season, as it grows in East Java at 2000–2400 m altitude, and is thus less restricted in area by drought.

Malesian *Labiatae* show also a relation with those of the Pacific Islands, where this family is poorly represented, except in Hawaii, where there are 3 endemic genera of which some possess several species, *viz Haplostachys, Phyllostegia*, and *Stenogyne.* It is interesting that they are in part climbing and furthermore that they possess drupaceous fruits. According to BRIQUET (1895) they are allied to the Indo-Malesian genus *Gomphostemma* which shares this fruit character.

Ecology. *Labiatae* are found in almost all Malesian vegetation types, with exception of distinctly oligotrophic soil types. They are mostly dryland plants, although a few may extend into swampy places and lake beds, as *e.g. Pogostemon stellatus* and *Mesona palustris.*

They prefer open, sunny, hot places, rocky areas and grassland, but there are also true forest dwellers, as *e.g.* species in the genera *Gomphostemma, Pogostemon, Plectranthus, Achyrospermum, Microtoena*, and *Stachys.*

Gregarious occurrence is very rare and always bound to interference by man in anthropogenous vegetation; *e.g.* on Mt Jang (E. Java) there are extensive, pure stands of *Elsholtzia pubescens* on the glades in the pyrogenous *Casuarina* forest (fig. 10). In dry areas fields and abandoned or fallow agricultural land may be invaded by the introduced *Hyptis suaveolens.*

As to altitude *Labiatae* are found in Malesia at all altitudes, except alpine; they find their upper level at *c.* 3400 m. But a number of genera occur in Malesia only in the mountains above 1000 m, *e.g. Melissa, Mosla, Stachys, Elsholtzia, Microtoena*, and *Eurysolen.* There are of course a number of species of other genera which ascend to fairly high altitude, or are even confined to montane or subalpine altitude, *e.g.* certain species of *Plectranthus. Cf.* VAN STEENIS, Origin of the Malaysian Mountain Flora in Bull. Jard. Bot. Btzg III, 13 (1934) 221–223, and his work Mountain Flora of Java (1972) pl. 24–25. It is noteworthy in this respect that the genus *Ajuga*, which would be expected to occur in the tropics in the mountains, occurs in Malesia at low altitudes.

Dispersal. No special mechanisms are known for the dispersal in nature of the dry nutlets in Malesia. In *Gomphostemma* the white pericarp is fleshy, but anyway the nutlets remain concealed

in a fairly large calyx. In some *Labiatae* the calyx teeth are bent inward more or less prohibiting the nutlets falling out and in such cases the calyx may act as a diaspore. In *Ocimum* and some other genera the pericarp swells and becomes gelatinous in contact with water.

Pollination. Malesian *Labiatae* are generally pollinated by bees and bumble-bees; there are no native representatives with long vividly coloured flowers to attract honey birds. It has, however, been described from the introduced *Leonotis nepetaefolia* by W. M. DOCTERS VAN LEEUWEN (Trop. Natuur 14, 1925, 68–72, 7 fig.), who observed flower visits by the honey bird *Cinnuris pectoralis* HORSF.; for the rest he remarked that it is homogamous so that self-pollination is not excluded.

On flowers of *Anisomeles*, *Leucas* and *Salvia* he observed not bees or bumble-bees but only *Xylocopa*. This was also observed by HEIDE for *Plectranthus tuberosus* in Java (Med. Alg. Proefst. Landb. 14, 1923).

Further DOCTORS VAN LEEUWEN remarked that the small and narrow-flowered *Labiatae*, as *e.g. Mentha* and *Thymus* are visited by syrphids.

Protandry is a common phenomenon in *Labiatae*.

Cleistogamous flowers occur for instance in *Orthosiphon aristatus:* BACKER & BAKHUIZEN VAN DEN BRINK Jr (Fl. Java 2, 1965, 660) recorded that they are not rarely occurring, in which case the corolla is hidden in the calyx base; stamens are very short, the style is tortuous; ovary and nutlets, are, however, normal. Normally *Orthosiphon* is pollinated by butterflies (HEIDE, Dansk Bot. Ark. 5, 1927).

Ocimum gratissimum is visited by bees for its nectar; it has ultimately self-pollination.

Plectranthus javanicus is regularly visited in Java by *Bombus rufipes* (DOCTERS VAN LEEUWEN, Verh. Kon. Ak. Wet. A'dam 31, 1933, 261); *Elsholtzia pubescens* attracts by its honey-scented flowers swarms of bees in East Java.

In India *Ajuga bracteosa* is exclusively visited by day-time sphingids.

General literature: BRIQUET in E. & P. Nat. Pfl. Fam. 4, 3a (1895) 200; VAN DER PIJL, Blumea 20 (1972) 93, bibliogr.

Palynology. The colour of the fresh pollen ranges from white to yelllow, orange, red or brownish red, the grains are small to large (extremes: 21 μm in *Cymaria acuminata*, 124 μm in *Catopheria chiapensis*). Shape varies between oblate and prolate. When acetolysed the grains appear radially symmetric, but according to RISCH (1956) they are often bilaterally compressed in fresh condition. Apertures are colpate, rarely operculate (*Teucrium*). Endexinous apertures are absent, although ERDTMAN (1952) mentions poroid structures in *Ajuga*. However, according to NABLI (1972) this is not the case in *Ajuga chamaepitys*. On the basis of the number of colpi *Labiatae* can be subdivided into two groups, one with 3 (rarely 4) colpi, the other with 6 (rarely 8 or 12) colpi.

The pollen grains of the first group are shed in the 2-nucleate stage and are considered primitive, those of the second group in the 3-nucleate stage and would be advanced (BORSOVA, 1960; WUNDERLICH, 1967). Only in *Monarda lindheimeri* both 3- and 6-colpate grains have been recorded (SCORA, 1967).

The exine consists of endexine, footlayer, layer of straight or branched columellae and an echinulate, perforate, reticulate or supra-reticulate tectum (NABLI, 1967).

The division of *Labiatae* in two main groups according to aperture number and nucleate condition, first recognized by ERDTMAN (1945) is correlated with differences in seed development, trichome distribution, anther morphology, chemotaxonomy and rust fungus resistance. It appears to indicate a fundamental demarcation line within the family, which is most clearly expressed in the taxonomic sequence of BENTHAM's system, where it can be placed between tribes IV and V. In BRIQUET's and MELCHIOR's treatment of the family this is less satisfactorily reflected (EL-GAZZAR & WATSON, 1968, 1970; WUNDERLICH, 1967). — *References:* ERDTMAN, Svensk Bot. Tidskr. 39 (1945) 279–285; Pollen-morph. plant-tax. I, Angiosp. (1952) 217–220; RISCH, Willdenowia 1 (1956) 617–641; BORSOVA, Dokl. Ak. Nauk. SSSR 133 (1960) 1465–1467; SCORA, Univ. Calif. Publ. Bot. 41 (1967) 1–71; WUNDERLICH, Öst. Bot. Z. 114 (1967) 383–483; EL-GAZZAR & WATSON, New Phytol. 67 (1968) 739–743; *ibid.* 69 (1970) 451–486; NABLI, C. R. Ac. Sc. Paris 294 (1972) 3210–3213; in The evolutionary significance of the exine, Linn. Soc. Symp. Ser. 1 (1976) 499–510. — J. MULLER.

Phytochemistry & Chemotaxonomy[1]. Chemical characters of *Labiatae* were treated in vol. 4 (1966) of my 'Chemotaxonomie der Pflanzen' (pp. 289–346, 474–476, 502). Supplementary chemotaxonomic comments were given in vol. 6 (1973; pp. 777–779 and 792–793) *sub Verbenaceae*. The manifold uses of members of the family as medicinal and culinary herbs, as spices and as sources of highly esteemed essential oils are based on the accumulation of different classes of secondary metabolites. A number of chemical features and trends are rather characteristic of *Labiatae*; including some of the most recent findings, these may be summarized as follows.

(1) Many taxa of the family are strongly aromatic. As a rule their essential oils accumulate in distinct glandular hairs. Sometimes (*e.g. spp.* of *Pogostemon*) internal glandular hairs and oil cells are present also. Depending on the species, the essential oils contain mainly monoterpenoids, sesquiterpenoids or phenylpropane derivatives. The occurrence of two to several chemotypes with regard to essential oils within many species is a highly interesting feature. Leaves of *P. cablin* BTH. yield the sesquiterpenoid-rich oil of patchouly which is highly esteemed in perfumery. It also contains two acidic compounds with bactericidal activity (E. KLEIN & W. ROJAHN, Tetrahedron Letters, 1969, 2279; S. NAKAHARA *c.s.* Phytochemistry 14, 1975, 2712) and the two sesquiterpenic alkaloids epiguaipyridine and patchoulipyridine (G. BÜCHI *c.s.* J. Am. Chem. Soc. 88, 1966, 3109).

(2) Iridoid glycosides (*i.e.* glucosylated cyclopentanoid non-volatile monoterpenoids: compare the reviews of O. STICHER & U. JUNOD-BUSCH, Pharm. Acta Helv. 50, 1975, 127–144 and of S. ROSENDAL JENSEN & B. JUHL NIELSEN, Bot. Notis. 128, 1975, 148–180) were isolated from many Labiates in recent time. They are especially common in the so-called verbenoid *Labiatae* and in many genera of *Stachydeae* and seem to replace volatile isoprenoids in a number of weakly aromatic taxa. More than 25 individual iridoid glycosides including lamiol, lamiide, phlomiol (C_{10}-aglucones), melittoside, catalpol, antirrhinoside, galiridoside, harpagide, ajugol and reptoside (all with a decarboxylated C_9-aglucone) are known at present from the genera *Ajuga, Anisomeles, Eremostachys, Galeopsis, Hemiandra, Lagochilus, Lamium, Leonurus, Leucas, Melittis, Microcorys, Molucella, Phlomis, Physostegia, Prasium, Prostanthera, Salazaria, Scutellaria, Sideritis, Stachys s.l., Teucrium*, and *Trichostema*. Some species of *Nepeta* and *Teucrium marum* L. do not glucosylate the cyclopentanoid monoterpenoids, such as the nepetalactones and dolichodial, produced by them (*e.g.* F. E. REGNIER *c.s.* Phytochemistry 6, 1967, 1271, 1281; U. M. PAGNONI *c.s.* Austr. J. Chem. 29, 1976, 1375). These volatile constituents of their essential oils are toxic to insects (T. EISNER, Science 146, 1965, 1318) and excite cats (*Nepeta cataria*!) and related mammals.

(3) Diterpenes seem to be ubiquitous in Labiates. They occur as resinous compounds, as lactonoid bitter principles, as colourless phenolic compounds and as related quinonoid pigments. Accumulation takes place either in the glandular hairs or in the tissues of leaves, stems and roots. Many of these diterpenes are biologically active; depending on structural details and the localization in the plants they may act mainly as antifeedants, antibacterial, antifungal or antinematodal constituents (*e.g.* I. KUBO, Agric. Biol. Chem. 38, 1974, 1261). Diterpenes were investigated very intensively in recent years; like *e.g. Compositae, Labiatae* proved to be very versatile with regard to diterpenoid synthesis. Monocyclic lactonoid diterpenes (ovatolide and anisomelic acid) occur in *Anisomeles ovata* R. BR. and *A. malabarica* R. BR. (K. K. PURUSHOTHAMAN *c.s.* Indian J. Chem. 13, 1975, 1357). Bicylic diterpenes of the labdane-manooloxide-type seem to be very common in the family. Many representatives of this structural type were isolated from members of the genera *Ballota, Lagochilus, Lasiocorys, Leonotis, Leonurus, Marrubium, Nepeta*, and *Sideritis*. Rearranged labdane-type diterpenes with the so-called clerodane skeleton were isolated from several species of *Teucrium*, a few species of *Salvia* and *Stachys* and from *Ajuga remota* (I. KUBO *c.s.* J. C. S. Chem. Commun. 1976, 949: the antifeedants ajugarin-I, -II and -III). Phenolic and quinonoid tricyclic diterpenoids with the abietane skeleton occur in many members of the family. Examples are carnosol, royleanone, horminone, the tanshinones, fuerstione and the many coleones (*e.g.* C. H. EUGSTER *c.s.* Angew. Chemie 82, 1970, 259; Helv. Chim. Acta 54, 1971, 1606; *ibid.* 56, 1973, 2534; *ibid.* 58, 1975, 343, 1899, 1921, 1934). The quinones represent the

(1) This chapter is much longer than usually in Flora Malesiana, but so much has been published since 1966 that it could only be meaningful in this way. — Ed.

yellow to red pigments of the glandular hairs on the leaves of certain species of *Coleus*, *Fuerstia*, *Horminum*, *Hyptis*, and *Plectranthus* and occur also in the roots of many *Labiatae*. The phenolic compounds of this class occur predominantly as lactonic bitter principles in leaves (many species of *Salvia*, *Rosmarinus officinalis* L., *Coleus barbatus* (BTH.) AGNEW, *Nepeta spp.*) and accompany the quinonoid pigments in roots (compare *e.g.* C. H. BRIESKORN & H. BUCHBERGER, Planta Medica 24, 1973, 190; A. PATUDIN *c.s. ibid.* 26, 1974, 201; W. H. WATSON *c.s.* Tetrahedron Letters, 1976, 2501). Tetracyclic kaurane-type bitter diterpenes are presently known from *Englerastrum scandens* ALSTON and several species of *Sideritis* and *Isodon*. The latter genus also produces the enmeine-type rearranged kauranes (review: E. FUJITA *c.s.* J. Pharm. Soc. Japan 94, 1974, 788). In the genus *Sideritis* pimarane-type tricyclic diterpenes, stachane-type and atisane-type tetracyclic diterpenes and trachylobane-type pentacyclic diterpenes were also detected (*e.g.* T. G. DE QUESADA *c.s.* Phytochemistry 14, 1975, 517). Most of the biologically active diterpenes are strongly oxigenated; epoxy, acetoxy, lactonoid and furanoid groupings occur frequently. It deserves mentioning that sometimes (*e.g.* the ajugarins) even a butenolide group is present; such diterpenes may be confused with cardenolides when plants are screened for cardioactive constituents. A structurally and biosynthetically different lactonoid bitter principle, ovatolide, was isolated long ago from leaves of *Hyptis pectinata*. A similar compound, bronolide, has been recently isolated from the Madagascan plant *Tetradenia fruticosa* (N. C. FRANCA & J. POLONSKY, C. R. Ac. Sc. Paris 273C, 1971, 439).

(4) *Labiatae* produce large amounts of triterpenes and phytosterols. Free triterpenic acids are main constituents of the cuticular waxes. In many instances ursolic and oleanolic acids predominate; they are often (*e.g. Anisomeles malabarica*, *Hyptis emoryi*, *Lepechinia chamaedryoides*) accompanied or replaced by betulinic acid. Recently a number of new triterpenic acids such as micromeric acid (J. BERMEJO *c.s.* Tetrahedron Letters, 1967, 4649: first isolation from *Micromeria benthamii* WEBB & BERTH.) and several oxigenated derivatives of ursolic and oleanolic acids (species of *Isodon*, *Nepeta*, *Salvia*, and *Rosmarinus*) was isolated from certain species; they are usually minor compounds of the cuticular waxes. Besides triterpenic acids, most Labiates produce appreciable amounts of triterpenic alcohols. As a rule the latter are present as acetates or related esters in resinous exudates (*e.g. Salvia glutinosa*) or in similar external or internal lipoid fractions. α-Amyrine, β-amyrine, lupeol, germanicol and uvaol are rather common. Recent investigations demonstrated the additional occurrence of betuline (*Plectranthus rugosus* WALL., *Nepeta aragonensis* LAMK) and many new compounds like anagadiol, 9,11-dehydro-α-amyrine, nivadiol, epialnusenol and 11α-hydroxy-β-amyrine in species of *Nepeta* and *Salvia* (*e.g.* A. G. GONZALEZ *c.s.* J. C. S. Chem. Commun. 1971, 567; An. Quim. Madrid 68, 1972, 709, 1433; D. A. H. TAYLOR, J. Chem. Soc. 1967C, 490). Weakly hemolytic saponins seem to be wide-spread in the family; their chemistry is still scarcely known, however; most probably the sapogenins are triterpenes. According to recent Russian investigations leaves of *Orthosiphon stamineus* BTH. ('*kumis kutjing*)' contain the siphonosides A, B, C, D, and E with unidentified triterpenes as sapogenins and arabinose, glucose and galactose in the sugar chains. The ecdysone-type oxigenated sterols detected in several species of *Ajuga* (S. IMAI *c.s.* Chem. Pharm. Bull. 17, 1969, 335, 340; J. C. S. Chem. Commun. 1969, 82, 546), but not in members of 20 other genera of *Labiatae*, deserve mentioning here. The phytoecdysones cyasterone, ecdysterone, ajugasterone A, B, and C were isolated from *Ajuga chia*, *A. decumbens*, *A. incisa*, *A. iva*, *A. japonica*, *A. nipponensis*, and *A. turkestanica*. *A. decumbens* contains at the same time the insect-moulting inhibitor ajugalactone (K. NAKANISHI *c.s.* J. Am. Chem. Soc. 92, 1970, 7512). Just as iridoid glycosides phytoecdysones seem to be restricted to the verbenoid part of *Labiatae*.

(5) *Labiatae* synthesize and accumulate large amounts of phenolic constituents; flavonoids and caffeic acid derivatives form the bulk of their phenols. Flavonoids are ubiquitous in cormophytes, but some trends of flavonoid metabolism such as replacement of flavonols by flavones, lack of proanthocyanidins and catechins, 6-hydroxylation of flavones (*e.g.* 6-hydroxyapigenin (= scutellarein), 6-hydroxyluteolin) and methylation of one to several of the flavonoid hydroxyls are very characteristic of *Labiatae* and a number of more or less closely related taxa. Many new flavonoids were isolated from the family in recent time; most of them are heavily methylated derivatives of scutellarein and 6-hydroxyluteolin; they occur either as glycosides or as glucuronides, and — the more lipophilic ones — also as free compounds in exudates, cuticular waxes

and other lipoid fractions. Some medicinal plants may serve to illustrate trends in flavonoid metabolism. Eupatirin, sinensetin and three additional tetramethyl ethers of 6-hydroxyapigenin and 6-hydroxyluteolin were isolated quite recently from leaves of *Orthosiphon stamineus* (E. BOMBARDELLI *c.s.* Fitoterapia 43, 1972, 35; S. MATSUURA *c.s.* J. Pharm. Soc. Japan 93, 1973, 1317). Salvigenin (= 3',6,7-trimethoxy-5-hydroxyflavone) occurs free and as 5-glycoside in leaves of *Salvia triloba* L. *f.* and *S. virgata* JACQ. (A. ULUBELEN *c.s.* J. Pharm. Sci. 57, 1968, 1037; Lloydia 38, 1975, 446). Roots of *Scutellaria baicalensis* GEORGI yielded two additional flavones, skullcap-flavone-I and -II; the latter was shown to be 2',6',6,7,8-pentamethoxy-5-hydroxyflavone; this compound has a rather unusual B-ring substitution; leaves of the same species yielded two free flavanones, carthamidin and isocarthamidin (M. TAKIDO *c.s.* J. Pharm. Soc. Japan 95, 1975, 108; *ibid.* 96, 1976, 381). Flavanones occur rarely in *Labiatae*; another example is didymin (= acinoside) from *Monarda didyma* L. and *Acinos thymoides* MOENCH (= *Satureja acinos* SCHEELE) which was shown to be the 7-rutinoside of isosakuranetin (= 5,7-dihydroxy-4'-methoxyflavanone) (H. WAGNER *c.s.* Chem. Ber. 102, 1969, 3605). Free chrysosplenetin (formerly isolated from *Chrysosplenium*!) occurs in relatively large amounts in *Plectranthus marrubioides* HOCHST. (leaves and inflorescences: M. HENSCH & C. H. EUGSTER, Helv. Chim. Acta 55, 1972, 1610). Flavone-C-glycosides seem to be restricted in *Labiatae* to those members which have the strongest affinities with *Verbenaceae*; they became known from members of the genera *Phlomis* and *Teucrium*. Caffeic acid is present in large amounts in practically all *Labiatae*. It is esterified with quinic acid (the several chlorogenic acids), glucose or with the alcoholic hydroxyl of α-hydroxydihydrocaffeic acid (the so-called rosmarinic or labiatic acid). Mixtures of these polyphenolic constituents have some of the properties of true tannins and are described in botanical and phytomedical literature as 'tannins'. Generally they represent 1 to several percent of the dry weight of leaves and are more or less active as antibiotics, antipyretics and antioxidants. Rosmarinic acid and sugar esters of caffeic acid occur mainly in *Labiatae sensu strictissimo* (highly aromatic taxa with trinucleate, hexacolpate pollen grains) (compare *e.g.* V. I. LITVINENKO *c.s.* Planta Medica 27, 1975, 372). Rosmarinic acid has also been isolated from leaves of *Orthosiphon stamineus*. A number of phenolic compounds are likely to occur rather infrequently in *Labiatae*. Examples are hydroquinone (herb of *Majorana hortensis* MOENCH: S. S. SUBRAMANIAN *c.s.* Curr. Sci. 41, 1972, 202) and lignans such as (+)-sesamin (herb of *Sideritis canariensis* AIT.: A. G. GONZALEZ *c.s.* Phytochemistry 11, 1972, 2115), a diester of secoisolariciresinol (seed oil of *Salvia plebeia* R. BR.: R. G. POWELL & R. D. PLATTNER, Phytochemistry 15, 1976, 1963), and the cytotoxic constituents of leaves of *Hyptis verticillata* (podophyllotoxin and 4'-demethylpodophyllotoxin: V. F. GERMAN, J. Pharm. Sci. 60, 1971, 649). The strange coumarins from *Sideritis canariensis*, *S. montana* L. (siderin = 4,7-dimethoxy-5-methylcoumarin: P. VENTURELLA *c.s.* Tetrahedron Letters, 1974, 279) and *Leonotis nepetaefolia* R. BR. (6-methoxysiderin: K. K. PURUSHOTHAMAN *c.s.* J. C. S. Perkin I, 1976, 2594) and lithospermic acid which is present in leaves of some medicinally used East Asiatic species of *Lycopus* belong to the same category of phenolic constituents of *Labiatae*.

(6) True alkaloids are unknown from *Labiatae*. The betaines stachydrine and betonicine are produced in large amounts by many species of *Stachys* and related genera like *Eremostachys*, *Galeopsis*, *Lagochilus*, *Lamium*, *Leonurus*, *Marrubium*, *Panzeria*, *Phlomis* and *Sideritis*. Certain medicinally used East Asiatic species of *Leonurus* contain leonurine and several similar guanidine derivatives (G. REUTER & H. J. DIEHL, Pharmazie 26, 1971, 777). The alkaloids described in literature for *Rosmarinus officinalis* have been shown to be artefacts of isolation.

(7) Like *Scrophulariaceae*, *Plantaginaceae* and some related families, *Labiatae* do not store starch in their subterranean parts; perennial species store large amounts of oligogalactosides of sucrose (raffinose, stachyose, verbascose and ajugose).

(8) Seeds of *Labiatae* store proteins, fatty oils and sucrose and planteose (an isomer of raffinose); starch is absent. Generally fatty oils are present in largest amounts. With regard to seed oils *Labiatae* can be devided roughly in two main groups; those producing oils with linolenic acid as main fatty acid and those producing oils with oleic and linolic acids as main fatty acids. The former group includes taxa with hexacolpate trinucleate pollen grains and the latter mainly taxa with tricolpate binucleate pollen grains. Besides these trends with regard to 'common' fatty acids, certain species produce seed oils with appreciable amounts of 'unusual' fatty acids such as

laballenic acid (*Leonotis nepetaefolium* R. BR.), lamenallenic acid (*Lamium purpureum* L.), 5,9,12-octa-decatrienoic acids (*Teucrium depressum* SMALL) and α-hydroxyoleic and α-hydroxylinolic acids (*Salvia nilotica* MURR.) (some recent references: J. M. HAGEMAN *c.s.* Lipids 2, 1967, 371; C. R. SMITH *c.s. ibid.* 4, 1969, 462; M. B. BOHANNON & R. KLEIMAN, *ibid.* 10, 1976, 1976; J. S. COWIE *c.s.* J. C. S. Perkin I, 1972, 2197).

(9) The nutlets of many *Labiatae* are rich in mucilage. The taxonomic significance of this character has been discussed by I. C. HEDGE (Not. R. Bot. Gard. Edinb. 30, 1970, 79). Chemically the mucilages have only been studied in *Ocimum basilicum* L., *O. canum* SIMS, and *O. gratissimum* L.; they contain two uronic acids (galacturonic and mannuronic), three hexoses (glucose, galactose, mannose) and two pentoses (arabinose, xylose); additionally rhamnose may be present (R. T. TARANATHAN *c.s.* Austr. J. Chem. 24, 1971, 1501; *ibid.* 28, 1975, 1345; Indian J. Chem. 13, 1975, 307).

Summarizing it may be stated that *Labiatae* are characterized by an astonishingly broad spectrum of isoprenoid compounds (many types of monoterpenoids, sesquiterpenoids, diterpenoids and triterpenoids), caffeic acid derivatives and apigenin- and luteolin-derived flavonoids and by the replacement of starch-accumulation in perennial parts by oligosaccharides of the so-called stachyose series. At the same time they store mainly linolic or linoleic acid-rich oils in their starch-free seeds. True tannins and alkaloids are lacking. Their chemical characters place them convincingly in *Lamiales sensu* TAKHTAJAN and affirm close relationships of the latter with *Scrophulariales* of the same author. At family level the chemical characters agree very well with the classification proposed by R. WUNDERLICH (Öst. Bot. Z. 114, 1967, 383) and with the proposals of EL-GAZZAR & WATSON (New Phytologist 67, 1968, 739; *ibid.* 69, 1970, 451, 478) who plead for combination and reclassification of *Verbenaceae* and *Labiatae* (compare: Chemotaxonomie der Pflanzen 6, 1973, 777–779, 792–793). — R. HEGNAUER.

Taxonomy. Within the *Tubiflorae* the *Labiatae* are closest related with the *Verbenaceae* and the distinction between these two families rests on rather arbitrary grounds, as pointed out by BRIQUET in his admirable treatment in the Pflanzenfamilien (4, 3a, 1895, 205). He clearly explained that the traditional main distinction between these two families, *viz* a terminal style in *Verbenaceae* and a gynobasic one in *Labiatae* is not tenable. JUNELL (Symb. Bot. Uppsala 1, *n.* 4, 1934, 1–219, f. 1–257) has later studied this in more detail. In the system of BRIQUET (extracted by SHAW, Willis Dict. ed. 8, 1973, 625) *Ajugoideae* and *Prostantheroideae* have no gynobasic style, hence, the nutlets have in these two subfamilies a lateral-ventral attachment. Besides this, some genera of *Labiatae* have fruits without separation of nutlets, like a drupe, a situation which is frequent in *Verbenaceae*. However, there is rather unanimity of opinion that genera as *Ajuga*, *Teucrium*, *Rosmarinus*, and *Prostanthera* should be retained in *Labiatae*.

An other allied family is *Boraginaceae*, but that family is sharply separated from *Labiatae* by the position of the radicle. As BRIQUET (1895) remarked also in this family there are two types of ovary structure, gynobasic and with a terminal style, which thus supports the idea to keep *Labiatae* in the traditional sense. According to BRIQUET the gynobasic structure would represent a derived stage.

Subdivision. BRIQUET *l.c.* based his subdivision of the family almost entirely on the structure of the gynoecium and the fruit. He distinguished 8 subfamilies. I have arranged the native genera of Malesia into the 5 subfamilies which occur in Malesia as follows:

1. Style not gynobasic. Nutlets with lateral-ventral attachment, the contact surface often more than half the height of the ovary. Seed without endosperm. **Ajugoideae:** *Acrymia*, *Ajuga*, *Cymaria*, *Teucrium*.

1. Style gynobasic. Nutlets basally attached, with very small surface of contact.
 2. Nutlets drupaceous with fleshy or strongly thickened exocarp and hard crustaceous endocarp. **Prasioideae:** *Gomphostemma*.
 2. Nutlets with dry and often thin pericarp.
  3. Seeds more or less transverse. Embryo with a bent radicle lying on one cotyledon. Disk tubular, elongate. **Scutellarioideae:** *Scutellaria*.
  3. Seeds erect. Embyo with short, straight, superior radicle. Disk lobes when distinct alternate with the lobes of the ovary.
   4. Stamens ascending or spreading and projecting straight forwards. **Stachyoideae:**

Achyrospermum, Anisomeles, Elsholtzia, Eurysolen, Leucas, Melissa, Mentha, Microtoena, Mosla, Paraphlomis, Pogostemon, Salvia, Satureja, Stachys.

4. Stamens descending, lying upon or enclosed in the lower lip. **Ocimoideae**: *Acrocephalus, Basilicum, Ceratanthus, Mesona, Nosema, Ocimum, Orthosiphon, Platostoma, Plectranthus s.l.*

The key to the subfamilies can obviously not well be used as the main frame of a practical, general key to the genera.

For this we have chosen the key offered by BACKER & BAKHUIZEN VAN DEN BRINK *f.* in the Flora of Java, in which we have inserted the 7 genera which do not occur in Java. This key has the merit to cover also the genera which are solely represented by introduced, naturalized species, *viz Hyptis, Leonotis,* and *Leonurus,* and, furthermore, those genera of which the species occur only in cultivation, either for ornamental, medicinal, commercial, or other purposes. The latter are listed concisely at the end of this revision.

Uses. By their volatile, aromatic oils of different sorts *Labiatae* are in frequent use and even in cultivation, for medicinal purposes, condiments, and the perfume industry. An occasional one is yielding edible tubers, *e.g. Plectranthus rotundifolius.* See for further data under the species.

KEY TO THE GENERA

Genera of which all species are cultivated are unnumbered; their species are listed at the end of this revision

1. Corolla hidden in basal part of the calyx tube, minute (2–3 mm long). Flowers cleistogamous. Calyx bilabiate; upper lip much broader than the teeth of lower lip, its margins decurrent along the tube **30. Orthosiphon**

1. Corolla exserted from the calyx. Flowers chasmogamous.
2. Flowers spirally arranged along the rachis of very dense, 2–15 cm long, simple spikes, 1.5–2 cm long, blue. Bracts during anthesis exceeding the calyx, very conspicuous at the tops of the spikes, brown, acutely acuminate, long-ciliate. Calyx below the apical margin of the short tube with 5 equal, *c.* 0.5 cm long, at first filiform, afterwards spinous teeth, alternating with 5 minute toothlets, finally closed at the top. Leaves linear-lanceolate, sharply serrate, ± sessile. Cultivated . . . . . **Pycnostachys**
2′. Flowers pale yellow in axillary long-peduncled (6–8 cm), dichotomously branched, straight, many-flowered cincinni. Long-soft-hairy short plant with a soft-woody, prostrate stem less than 10 cm long, and crowded large leaves 15–20 by 10–12 cm; internodes *c.* 0·5 cm . . . . . **1. Acrymia**
2″. Otherwise. Flowers in verticillasters or in cymes, these with or without well-developed rachises, often combined into spurious heads, spurious spikes, racemes, or panicles.
3. Perfect stamens 2; connective usually filiform; if not, then the plant finely stellate-hairy.
4. Filaments short, not toothed; connective transverse to the filament and articulate with it, versatile, long-filiform; its anterior part erect under the upper lip, bearing a single well-developed, often linear perfect anther-cell; its posterior part stuck into the throat, never bearing a perfect anther-cell, but sometimes with effete malformed one. No stellate hairs. . . . . **20. Salvia**
4′. Connective otherwise, the two anther-cells not separated in this way.
5. Leaves rather approximate, subsessile, linear-lanceolate, with recurved, entire margins, rigid, finely stellate-hairy, 1.5–3.5 cm by 1.5–4.5 mm. Cultivated . . . . . **Rosmarinus**
5. Leaves well-spaced, petioled, not stellate-hairy, rhomboid to ovate, 1–2 by 0.5–1 cm; margin flat, toothed . . . . . **17. Mosla**
4″. Otherwise again. Continue lead 6.
3′. Stamens 4 but only the upper pair perfect; anther-cells divaricate. Calyx 2-lipped. Verticillasters 2-flowered, secund, spaced, in racemes. Corolla almost actinomorphic, hardly 2-lipped . **17. Mosla**
3″. Perfect stamens usually 4; if fewer, then the plant not stellate-hairy, nor the connective long-filiform.
6. At least the medium and lower leaves deeply palmatifid or pinnatifid. Calyx teeth in normal flowers 5, subequal, rarely 6–7. Stamens covered by the upper lip. Style arms subequal. Disk equal-sided.
7. Verticillasters combined into a terminal head or dense spurious spike. Corolla white; upper lip tinged with red, deeply bipartite. Calyx 13–15-nerved. Corolla tube exceeding the calyx; 2 posterior stamens longest. Nutlets ovoid, black. Plant lemon-scented when bruised. Cultivated. **Cedronella**
7. Lower verticillasters wide apart, axillary. Corolla red; upper lip entire, densely pilose. Calyx 10-ribbed. Corolla tube slightly shorter than the calyx; 2 anterior stamens longest. Nutlets cuneate-trigonous, truncate, brown. Plant not lemon-scented . . . . . **12. Leonurus**
6. Leaves much less deeply or not divided.
8. Upper lip of corolla distinctly spurred, shortly 3-lobed, lower lip subentire. Flowers blue, in spaced small verticillasters. ± Scapose herb, the stem with a few leaf pairs near the base **25. Ceratanthus**
8. Upper lip of corolla not distinctly spurred.
9. Calyx limb on the anterior side spathaceously split to near the base; tube very short. Flowers in dense spurious spikes; verticillasters 2-flowered. Bracts imbricate, large. Flowers small, white or pale red. Leaves entire, rather densely canescent on both surfaces, 0.5–2 by 0.7–1 cm. Cultivated **Majorana**

9. Calyx limb not deeply split on the anterior side, 2–10-fid, bilabiate or not.
10. Calyx segments (sometimes minute) in all flowers 4 or 2[1].
11. Calyx with 2 entire lips which after anthesis appress themselves firmly against each other and close the mouth of the calyx; upper lip with a dorsal, patent, broadly oval, concave scale-like appendage finally falling off together with the posterior part of the tube; rest of the calyx persistent. Verticillasters spaced in raceme-like inflorescences . . . . . **6. Scutellaria**
11. Calyx without such a caducous hood-like appendage.
12. Flowers in spaced raceme-like inflorescence. Fruiting calyx urceolate-campanulate, the upper lobe strongly reflexed backwards. Filaments dilated below, but without a basal appendage . . . . . **31. Platostoma**
12. Flowers in dense, spike-like inflorescence. Fruiting calyx tubular-campanulate, the upper lobe not reflexed backwards. Posterior filaments with a basal appendage.
13. Calyx 8-nerved, in fruit deeply pitted between the nerves; the latter connected by many transverse vein-bars. Upper filaments glabrous . . . . . **27. Mesona**
13. Calyx 10-nerved, not deeply pitted between the nerves; transverse vein-bars inconspicuous. Upper filaments hairy . . . . . **28. Nosema**
10′. Calyx segments 8–10[1]; upper lip of calyx not decurrent along the tube; anther-cells in a line with each other.
14. Corolla orange, 2.2–5.2 cm long; tube inside either with 3 rings of hairs or without any ring; lower lip shrivelling up before the expansion of the flower . . . . . **11. Leonotis**
14. Corolla white, 1.2–1.5 cm long; tube inside with a single ring of hairs; lower lip large, not shrivelling up. . . . . **13. Leucas**
10″. Calyx segments in all or most flowers 5, rarely more, but then the calyx distinctly bilabiate with a broad, entire, decurrent upper lip.
15. Calyx distinctly bilabiate, *viz* the segments arranged into 2 groups of 1–4, which considerably differ in dimension and shape; segments of each group contiguous, not alternating with those of the other group.
16. Lower lip of corolla 3-fid. Upper lip of calyx either 3-fid (3-dentate) or represented by an oval, entire, *c.* 1 mm long lobule, or the corolla is not distinctly bilabiate but subequally 4-lobed.
17. Leaf margin recurved, entire.
18. Plant finely white-stellate-hairy. Calyx 13-nerved; upper lip entire, ovate, *c.* 1 mm long, lower one 4-dentate. Spurious spikes on hard, more than 5 cm long stalks. Corolla blue or violet, *c.* 1 cm long. Stamens included. Style arms oblong, flattened. Stem acutely quadrangular. Leaves beset with white glands, longer than 2 cm. Cultivated . . . **Lavandula**
18. Plant with ordinary hairs. Calyx 10-nerved; upper lip 3-dentate; lower lip 2-fid. Verticillasters axillary, only the upper ones combined into a spurious spike. Corolla pale red or violet; *c.* 0.5 cm. Stamens usually exserted. Style bidentate. Stem obtusely quadrangular; internodes very short. Leaves beset with orange-brown glands, up to 10 by 3 mm. Cultivated . . . . . **Thymus**
17. Leaf margin either crenate-serrate or, if entire, not recurved.
19. Higher verticillasters placed in the axils of bracts, closely approximate, not combined into panicles; flowers distinctly bilabiate, not yellow; 1–2 stamens sometimes reduced to minute staminodes; ovary glabrous . . . . . **21. Satureja**
19′. All verticillasters placed in the axils of ordinary leaves, distant; flowers distinctly bilabiate, white or pale violet; all stamens perfect; ovary glabrous . . . . . **14. Melissa**
19″. Otherwise again. Continue lead 24.
16. Lower lip of corolla and upper segment of calyx both entire, or corolla subequally 5-lobed, not distinctly bilabiate.
20. Corolla tube much exceeding the calyx.
21. Stamens free, distinctly exceeding the corolla. Stigma capitate-clavate. Corolla tube straight, narrow. Verticillasters at most 6-flowered . . . . . **30. Orthosiphon**
21. Stamens connate in their lower part, embraced by the lower lip. Style shortly bifid. Corolla tube sigmoid. Verticillasters 6–∞-flowered . . . . . **32. Plectranthus**
20. Corolla tube as long as or shorter than the calyx.
22. Verticillasters 6-flowered; inflorescence of older plants composed of spurious spikes or racemes. Calyx without a basal whorl of hairs. Topmost leaves not forming an involucre to the inflorescence.
23. Margins of upper lip of calyx decurrent along the tube. Stamens far exserted; 2 posterior ones just above the base with a pilose transverse process or with a tuft of hairs. Corolla 3.5–4 mm long . . . . . **29. Ocimum**
23. Margins of upper lip of calyx not decurrent along the tube. Stamens not far exserted, not with a subbasal process, nor with a tuft of hairs. Corolla at most 3 mm long **24. Basilicum**
22. Verticillasters ∞-flowered, combined into terminal very dense heads or spikes 0.5–3 cm long. Calyx with a basal whorl of long hairs. Topmost leaves forming an involucre to the inflorescence . . . . . **23. Acrocephalus**

(1) An undivided lip is counted for 1 segment. Sometimes the segments are minute, tooth-like.

15. Calyx otherwise.
24. Corolla seemingly unilabiate as upper lip is very small and consists of 2 erect segments joined to the underlip which is seemingly 5-fid.
25. Flowers in rather dense terminal racemes or panicles. Leaves regularly crenate **4. Teucrium**
25. Flowers in axillary verticillasters. Leaves often decrescent upwards. Leaf margin irregularly wavy or remotely dentate . . . . . **2. Ajuga**
24'. Corolla 4-lobed or obscurely bilabiate, *viz* the segments not considerably differing in size or shape. Stamens (if not reduced to minute staminodes) usually exserted (sometimes only by their anthers) and divergent; anther-cells parallel or divergent, more or less confluent. Flowers neither yellow nor red.
26. Filaments covered with patent long hairs . . . . . **19. Pogostemon**
26. Filaments glabrous or nearly so.
27. Anterior lobe of disk tongue-shaped, distinctly longer than the other lobes. Verticillasters combined into spurious spikes, these at last united into candelabre-shaped inflorescences. Corolla white; tube on the inside with an oblique ring of hairs . . . . . **9. Elsholtzia**
27. Disk equal-sided.
28. Verticillasters combined into dense, usually uninterrupted, spurious spikes, these solitary or sometimes at the base with 1–2 smaller spikes. Calyx often with a faucal row of erect long hairs; teeth long-ciliate. Corolla reddish violet, 5–6 mm long. Nutlets suborbicular. Stem subterete, usually swollen above the nodes, in the upper part rather densely covered with longish hairs . . . . . **19. Pogostemon**
28. Otherwise. . . . . **15. Mentha**
24''. Corolla distinctly bilabiate. Stamens covered by the upper lip or embraced by the lower lip, less often exserted and then approximate and subparallel. Anther-cells parallel or in a line with each other.
29. Lower lip of corolla, or at least its medium segment, deflexed, saccate, at first embracing the likewise deflexed stamens and style; upper lip flat, lobed. Calyx segments 5, acute or subulate. Corolla 2.5–6 mm long. Flowers often capitate, but sometimes in fascicles, in unilateral cymes, or occasionally solitary.
30. Nutlets conchiform with a broad, inflexed, ribbed-crenate margin. Flowers in 6–15-flowered heads, violet; anther-cells in a line with each other. Leaves less than 5 cm long. Cultivated . . . . . **Marsypianthes**
30. Nutlets not conchiform, not with an inflexed margin. Flowers white or violet, capitate, or not; anther-cells confluent. Leaves often longer than 5 cm . . . . . **26. Hyptis**
29. No saccate lip or lip-segment present.
31. Lower lip of corolla entire, boat-shaped, stretched; upper lip 4-lobed, erect. Stamens embraced by the lower lip. Anterior disk-lobe tongue-shaped . . . . **32. Plectranthus**
31. Lower lip of corolla more or less deeply 3-fid, not boat-shaped; midlobe sometimes divided again; upper lip 2-lobed or entire. Stamens covered by the upper lip. Disk equal-sided.
32. Upper lip of corolla distinctly 2-lobed. Mouth of calyx oblique. Anther-cells in line with each other (parallel).
33. Flowers densely spicate, reddish violet, pink or rarely white; verticillasters 6-flowered. Calyx 10-nerved. Corolla inside with a ring of hairs. Anthers of the 2 anterior stamens short-hairy, as are all filaments. Ovary truncate, apically finely pubescent. Nutlets with apical bristles . . . . . **7. Achyrospermum**
33. Flowers in ∞-flowered cymes often combined into panicles; at least the lower cymes stalked. Calyx 15-nerved. Corolla white, red-dotted tube glabrous inside. Filaments glabrous. Ovary not truncate, glabrous like the nutlets. Cultivated . . . . . **Nepeta**
32. Upper lip of corolla entire, or at most emarginate.
34. Flowers at least 1.5 cm long, often much longer.
35. No stellate hairs present. Corolla tube on the inside with a transverse ring of hairs.
36. Stamens not projecting from below the upper lip of the corolla. Anther-cells 2, ± in a line with each other. Cymes not terminating in cincinni. Corolla white or pale yellow, not variegated . . . . . **18. Paraphlomis**
36. Stamens far projecting from below the upper lip, 2 posterior ones with 1 anther-cell, 2 anterior ones with 2 parallel cells. Cymes terminating in rather long cincinni. Corolla white or with a violet lower lip . . . . . **8. Anisomeles**
35. Stellate hairs present at least on some part of the plant, especially on the lower surface of the leaves and the outside of the calyx, often intermixed with simple hairs. Corolla tube glabrous or hairy inside but without a ring of hairs, thin at the base, widened above the middle; upper lip distinctly convex. Corolla yellowish white or light yellow . . . . . **5. Gomphostemma**
34. Flowers less than 1.5 cm long.
37. Flowers in verticillasters, these often spicately arranged.
38. Leaves oblong-lanceolate, from a truncate or cordate base, obtuse or rounded. Flowers reddish violet . . . . . **22. Stachys**
38. Leaves ovate to rhomboid, with a cuneate base attenuate in the petiole, apex acute. Flowers white . . . . . **10. Eurysolen**

37. Flowers cymose or panicled, not in spikes or verticillasters, yellow, often brownish red spotted.
39. Flowers 4–7 mm long, in terminal and/or axillary, compound cymes. Calyx 2–3 mm long. Ovary slightly 4-lobed, style arms subequal. Nutlets reticulate-rugose with very large lateral contact scars.
40. Upper lip of corolla spreading, reflexed. Long-soft-hairy condensed plant with a prostrate soft-woody stem less than 10 cm long and crowded large leaves 15–20 by 10–12 cm; internodes *c.* 0.5 cm. Calyx 2.5–3 mm long (in fruit 3–4 mm). Corolla pale, 6–7 mm long, sulphur-yellow, endlobe white, tube dark red . **1. Acrymia**
40. Upper lip of corolla erect, arched (hooded). Habit quite different from the above. Calyx 2–2.2 mm long. Corolla 4–5 mm long, pale yellow, lower lip with a red blotch **3. Cymaria**
39. Flowers 11–14 mm long, yellow, upper lip often brownish red, often panicled; inflorescence not distinctly forked and not ending in cincinni. Calyx 3.5–8 mm long. Ovary deeply 4-partite, glabrous. Style-arms very unequal. Nutlets obtusely trigonous, smooth . . . . . **16. Microtoena**

1. ACRYMIA

PRAIN, Kew Bull. (1908) 114; KENG, Gard. Bull. Sing. 24 (1969) 29. — **Fig. 1.**

Herb or undershrub. *Flowers* small, in terminal and axillary, many-flowered, peduncled, compound cymes. *Calyx* subcampanulate, 8-nerved, 5-toothed, the teeth subequal; throat naked within. *Corolla* shortly exserted, tube slightly enlarged upwards; limb 2-lipped, upper lip suberect or recurved, 2-fid, lower lip 3-lobed, spreading, midlobe larger than the lateral ones. *Stamens* 4, exserted, in

Fig. 1. *Acrymia ajugiflora* PRAIN, at foot of Kanching Ridge, Kanching For. Res., Selangor, Malaya. Leaves dark green, pale veined, flowers white with dark red throat (Photogr. J. A. REID, July 1953).

2 pairs, the upper pair slightly shorter; anthers reniform, 2-celled, at length confluent. Disk small, equal, entire. Style briefly 2-fid, branches very short. *Nutlets* obovoid, rugose and hirsute, scar very large, lateral.

Distr. Monotypic; in *Malesia:* Malay Peninsula.

1. Acrymia ajugiflora PRAIN, Kew Bull. (1908) 114; J. As. Soc. Beng. 74, ii (1908) 878; in Hook. *f.* Ic. Pl. 30 (1911) t. 2946; RIDL. Fl. Mal. Pen. 2 (1923) 654; HEND. J. Mal. Br. R. As. Soc. 17 (1939) 65; KENG, Gard. Bull. Sing. 24 (1969) 29, f. 3, pl. 1. — **Fig. 1.**

Low herb or undershrub. Stem soft woody, prostrate and rooting below, densely leafy above. *Leaves* thin chartaceous, elliptic to broadly elliptic, 15–20 by 10–12 cm, obtuse, base broadly acute or subtruncate, at margin irregularly serrate or doubly serrate, hirsute and strigose on both sides, especially along the nerves; petiole 3–4 cm, hirsute and strigose. *Compound cymes* dichotomously branched, with terminal flowers; flowers on the branches secund; peduncles slender, 6–8 cm. Bracteoles subulate, shorter than the pedicels. Pedicels slender, strigose, 2–3 mm long. *Calyx* campanulate, 2.5–3 mm long, in fruit 3–4 mm; teeth triangular, subequal in length, ciliate. *Corolla* pale sulphur, endlobe white, tube dark red, 6–7 mm long, glabrous; upper lip suberect or recurved, 2-lobed, lobes oblong; lower lip spreading, 3-lobed, midlobe very large, obovate to orbicular. *Anthers* 2-celled, at length confluent; filaments exserted, hirsute only at base, glabrous elsewhere. *Nutlets* obovoid, subtriquetrous, 1.2–1.5 by 1 mm, rugose, sparsely hirsute.

Distr. *Malesia:* Malay Peninsula (Perak, Selangor).

Ecol. Undergrowth in dipterocarp forest on distinctly sandy soil at the foot of quartzite ridges (Klang Gates). As REID (Mal. Nat. J. 14, 1959, 27) pointed out former records from limestone rest on an error through confusion with the nearby limestone of Bt. Takun. A rare lowland plant. *Fl.* Jan.–Febr.

Note. A rather unique plant resembling *Gomphostemma* in habit, *Ajuga* in corolla structure, and *Cymaria* in inflorescence and fruit.

2. AJUGA

LINNÉ, Gen. Pl. ed. 5 (1754) 246; Sp. Pl. (1753) 561; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1895) 209; KENG, Gard. Bull. Sing. 24 (1969) 31. — **Fig. 2.**

Annual or perennial herbs. *Verticillasters* (in Mal. *sp.*) many-flowered, axillary or in terminal leafy spike-like inflorescence. *Calyx* usually 10-nerved; teeth 5, subequal. *Corolla* exserted; tube often annulate within; limb 2-lipped, upper lip usually very short, 2-fid, lower lip long and spreading or slightly concave, 3-lobed, midlobe the largest, often notched at apex. *Stamens* 4, in 2 pairs, ascending, exserted; anthers 2-celled, divaricate, often confluent at length. Disk equal-sided or produced behind. *Ovary* shortly 4-lobed; style 2-fid at the end, arms subequal. *Nutlets* elliptic or obovoid, reticulate-rugose; scar very large, lateral.

Distr. About 50 *spp.*, throughout the Old World, in *E. Malesia* 1 *sp.*, in E. Australia and Tasmania 2 *spp.*

Ecol. Mainly temperate, but in the Malesian tropics also in the lowland.

1. Ajuga bracteosa WALL. (Cat. 1829, *n.* 2032, *nomen*) *ex* BTH. in Wall. Pl. As. Rar. 1 (1830) 59; Lab. Gen. Sp. (1835) 696; in DC. Prod. 12 (1848) 597; HOOK. *f.* Fl. Br. Ind. 4 (1885) 702; MERR. En. Philip. 3 (1923) 408; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 287; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 224; HOLTH. & LAM, Blumea 5 (1942) 237; HARA, En. Sperm. Jap. 1 (1948) 192; QUIS. Medic. Pl. Philip. (1951) 811; MASAM. Ic. Rep. Kanazawa Un. 4 (1955) 50; HATUS. Mem. Fac. Agr. Kagoshima Un. 5, 3 (1966) 48; KENG, Gard. Bull. Sing. 24 (1969) 31, f. 4. — *A. remota* BTH. in Wall. Pl. As Rar. 1 (1830) 59. — *A. macrosperma* (*non* WALL.) MIQ. Fl. Ind. Bat. 2 (1859) 991. — *Bulga pyramidalis* (L.) O.K. *var. bracteosa* (WALL.) O.K. Rev. Gen. Pl. 2 (1891) 513. — **Fig. 2.**

Low, diffuse, much branched herb, usually less than 20 cm. Stem and branches from the rootstock, erect or ascending, generally hispid. *Leaves* oblanceolate, narrowly obovate or subspathulate, hirsute on both surfaces, 4–8 by 2–3 cm, obtuse or rounded, base cuneate or gradually attenuate, margin undulate; upper leaves sessile, lower ones shortly petioled. *Flowers* many in axillary verticillasters, sometimes crowded in a terminal, spike-like inflorescence, with ovate or cuneate-obovate, entire or toothed prominent bracts. *Calyx* campanulate, often ± oblique, 3–3.5 mm long, teeth

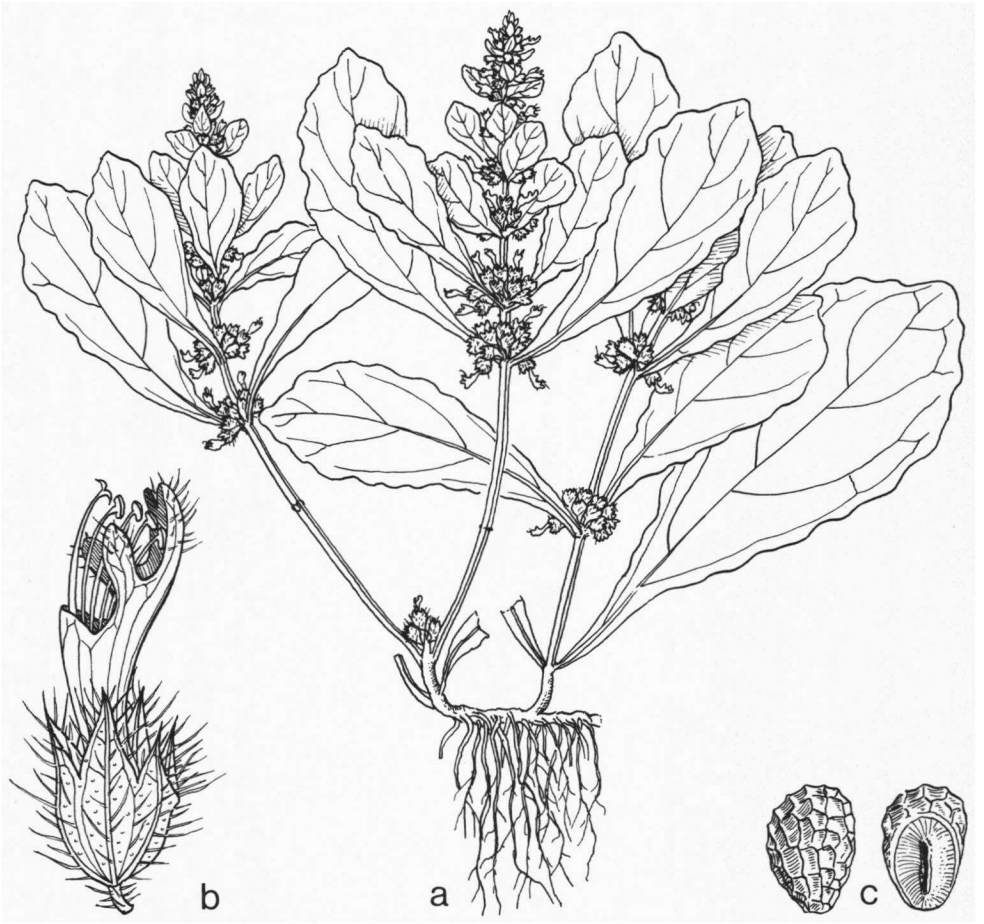


Fig. 2. *Ajuga bracteosa* WALL. *ex* BTH. *a.* Habit, × ²/₃, *b.* flower, *c.* nutlet, in two views, one showing the large hilum, both × 4 (*a* FORSTEN *s.n.*, *b–c* PLEYTE 171).

triangular. *Corolla* white or pale blue (QUIS. *l.c.*), the tube straight, exserted, not inflated at base; lower lip 2 mm long, 3-lobed, hirsute without. *Stamens* exserted, the cells confluent, often hairy. *Nutlets* obovoid, 1.5–2 by 1 mm, shallowly rugose-reticulate, yellowish.

Distr. From Afghanistan through continental SE. Asia (India, Burma, Thailand, Indo-China, S. China to Formosa and the Ryu Kyu Is.); in *Malesia:* Philippines (Batan Is., Luzon, Mindanao), Talaud Is., N. & E. Celebes, Moluccas (Ternate, Halmaheira), and W. New Guinea (Jappen I.: Serui).

Ecol. Stream banks and shaded ravines, also in open grassland, clearings, rice-fields, and coffee estates, mostly in damp places, in Indonesia below *c.* 200 m, but in the Philippines from 600–1700 m (MERR. *l.c.*). *Fl.* Jan.–Dec.

Vern. *Tilad*, Celebes, *sabasasi*, Jappen I.

Uses. Unknown in Malesia; in India leaves are said to be used medicinally (KIRTIKAR & BASU, Ind. Medic. Pl. 1918, 1048) and recorded to have a peculiar resinous odor and bitter taste.

Notes. Specific delimitation is in some alliances of this genus difficult. BENTHAM (Fl. Austr. 5, 1870, 136) already remarked that one of the Australian species could be hardly distinguished from the northern hemisphere *A. genevensis*. In contrast to HOOKER *f.* and MUKERJEE, I have taken the species in a more restricted sense, not including several synonyms, hence not occurring in Ethiopia and Japan. In comparison with the type (WALLICH 2032) Malesian specimens have more elongate and less hairy leaves and a shorter corolla. They match better the type of *A. remota* BTH. (WALLICH 2033), but there are intermediates and the latter is unanimously reduced to the former.

Fig. 3. *Cymaria dichotoma* BTH. *a.* Habit, × ²/₃, *b.* fruiting calyx, × 8. — *C. elongata* BTH. *c.* Fruiting calyx, × 8 (*a–b* Timor ZIPPELIUS 430 in L, *c ex* Flores CHB XV.K.B.XXVI.6 in L).

3. CYMARIA

BTH. Bot. Reg. *sub* t. 1292 (1830); BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1895) 209; KENG, Gard. Bull. Sing. 24 (1969) 63. — *Anthocoma* ZOLL. & MOR. Nat. Geneesk. Arch. N. I. 2 (1845) 569. — **Fig. 3.**

(Sub)shrubs. Stems and branches faintly 4-angled. *Flowers* small, in lax, many-flowered, peduncled, dichotomously branched cymes; cymes usually axillary, sometimes the upper ones forming a terminal thyrsoid inflorescence. *Calyx* campanulate (in fruit urceolate or subglobose), 10-nerved, intermediate nerves weaker than the other 5, equally 5-toothed. *Corolla* tube straight, exserted; limb 2-lipped, upper lip arched, erect, lower lip 3-lobed, spreading, midlobe larger than the lateral. *Stamens* 4, ascending under the upper lip, in 2 pairs, upper pair shorter; anthers 2-celled, divaricate, cells connivent, at length confluent. Disk equal, entire. Style 2-fid at apex, upper branch very short. *Nutlets* subglobose or obovoid, subtriquetrous, rugose, apex beset with white hairs; scar of contact surface very large, lateral.

Distr. About 2 *spp.* in continental Asia (Burma, Thailand, Indo-China, Hainan) and *Malesia.*
Ecol. Bound to a seasonal lowland tropical climate.

KEY TO THE SPECIES

1. Fruiting calyx urceolate, 2–2.5 mm long, with deltoid teeth. Corolla 2–2.5 mm long. Leaves membranaceous, glabrescent or puberulent . . . . . **1. C. dichotoma**
1. Fruiting calyx campanulate, 5 mm long, with lanceolate teeth. Corolla 5.5–6 mm long. Leaves chartaceous to coriaceous, tomentose or densely woolly . . . . . **2. C. elongata**

1. Cymaria dichotoma BTH. (in Wall. Cat. 1829, *n.* 2080, *nomen*) Bot. Reg. *sub* t. 1292 (1830); in Wall. Pl. As. Rar. 1 (1830) 64; Lab. Gen. Sp. (1835) 705; in DC. Prod. 12 (1848) 603; MIQ. Fl. Ind. Bat. 2 (1859) 992; HOOK. *f.* Fl. Br. Ind. 4 (1885) 705; PRAIN, J. As. Soc. Beng. 66, ii (1899) 522; *ibid.* 74, ii (1907) 826; RIDL. Fl. Mal. Pen. 2 (1923) 654; HEND. J. Mal. Br. R. As. Soc. 17 (1939) 66; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 227; KENG, Gard. Bull. Sing. 24 (1969) 65, f. 10 a–d. — *C. acuminata* DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 399 (Herb. Timor. Descr. 1835, 71); DELESS. Ic. Pl. 3 (1837) t. 86; BTH. in DC. Prod. 12 (1848) 602; MIQ. Fl. Ind. Bat. 2 (1859) 992; F.-VILL. Nov. App. (1880) 166; VIDAL, Phan. Cuming. Philip. (1885) 136; Rev. Pl. Vasc. Filip. (1886) 214; PRAIN, Ann. Bot. 6 (1892) 215; VAL. Bull. Dép. Agr. Ind. Néerl. 10 (1907) 53; MERR. En. Philip. 3 (1923) 408; BACK. & BAKH. *f.* Fl. Java 2 (1965) 617; KENG, Gard. Bull. Sing. 24 (1969) 63, f. 10 e–f (*excl. syn. C. timoriensis* BACK.). — *Anthocoma flavescens* ZOLL. Nat. Geneesk. Arch. N. I. 2 (1845) 569; HASSK. Flora 30 (1847) 596. — *Gomphostemma dichotomum* Z. & M. in Moritzi, Syst. Verz. (1846) 54; HASSK. Flora 30 (1847) 596 (not based on BTH.!). — *C. mollis* MIQ. Fl. Ind. Bat. 2 (1859) 992; WARB. Bot. Jahrb. 18 (1893) 208; K.SCH. & LAUT. Fl. Schutzgeb. (1900) 527; MANSFELD, Bot. Jahrb. 62 (1929) 377. — *Gomphostemma flavescens* (ZOLL.) MIQ. Fl. Ind. Bat. 2 (1859) 987; KOORD. Exk. Fl. Java 3 (1912) 143. — *Phlomis flavescens* (ZOLL.) BOERL. Handl. 2 (1899) 716, *non* MILL. 1768. — **Fig. 3a–b.**

Shrub, 0.5–2 m. Stem and branches finely pubescent. *Leaves* membranaceous, sometimes very thin, narrowly elliptic, ovate to rhomboid, 5–11 by 3.5–6 cm, acute or subacute, rarely acuminate, serrate, crenate or remotely dentate, base cuneate or attenuate, entire; glabrous or finely hirsute above, appressed-pubescent beneath; petiole 0.5–2 cm, finely puberulent. *Flowers* small, 4–15 secundly arranged on the branches of axillary and terminal cymes; main peduncles 0.5–3 cm, finely pubescent. Bracts under the branches ovate, spathulate to lanceolate, 3–5 mm long. Pedicels short and slender, finely pubescent. *Calyx* campanulate, 1.5 mm long (in fruit urceolate, 2–2.5 mm long, often crowned with the erect, deltoid teeth), glandular and pubescent; teeth triangular. *Corolla* whitish, pale yellow or yellow, with a red basal spot in lower lip, 2–2.5 mm long, outside finely pubescent. Filaments ascending under the upper lip, included. *Nutlets* obovoid, 1.2–1.5 by 0.6 mm, reticulate, apex glandular and beset with short stiff hairs.

Distr. Continental SE. Asia (Burma, Thailand, Indo-China, Hainan) and *Malesia:* through Malesia, but very rare in the Malay Peninsula, absent in Sumatra, Borneo, western half of Java, Celebes except in the south, and Lesser Sunda Is., in the Moluccas only in Babar and Tenimbar Is.

Ecol. Distinctly bound to a seasonal, lowland climate, in Malay Peninsula and Puger (SE. Java) on limestone rocks, in open thickets and secondary growths, forest edges, deciduous forest, below 500 m *Fl.* (Jan.–)March–Aug.(–Oct.).

Vern. *Lukut lukut*, Luzon, *nigu nigu*, Sulu Is.

Notes. In my precursor I have kept *C. dichotoma* and *C. acuminata* as distinct, but a re-examination of the variability of the size and shape

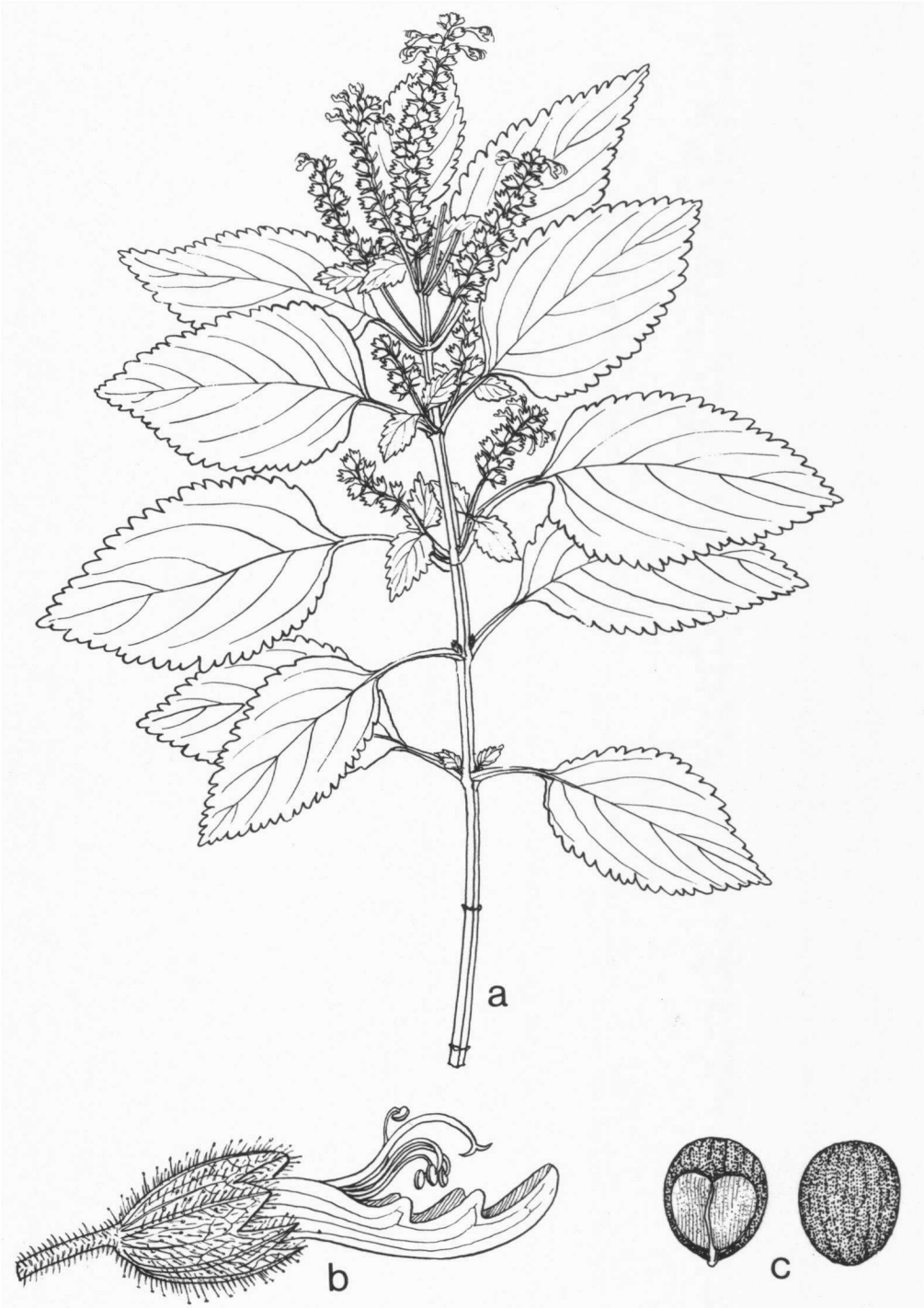


Fig. 4. *Teucrium viscidum* BL. *a.* Habit, × ²/₃, *b.* flower, × 8, *c.* seed from two sides, inner surface with large hilum, × 14 (J. J. SMITH 840).

of the leaves, the length of the main peduncles, *etc.* are too inconstant; the intermediates showed that this distinction is not tenable. The Timor specimens cited in the precursor (*l.c.* 64) have appeared to belong to a second species.

2. Cymaria elongata BTH. (in Wall. Cat. 1829, *n.* 2079, *nomen*; Bot. Reg. *sub* t. 1292, 1830, *nomen*) in Wall. Pl. As. Rar. 1 (1830) 64; Lab. Gen. Sp. (1835) 705; in DC. Prod. 12 (1848) 603; HOOK. *f.* Fl. Br. Ind. 4 (1885) 705; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 228. — *C. timoriensis* BACK. *in sched.*; KENG, Gard. Bull. Sing. 24 (1969) 64, *in nota, nomen.* — **Fig. 3c.**

Shrub. Stem and branches tomentose or densely villose. *Leaves* thin- to thick-coriaceous, oblong-ovate or ovate, 4.5–7 by 2.5–3.5 cm, acute or obtuse, serrate or crenate, puberulent or densely villose above, tomentose or densely woolly beneath, base rounded, shortly attenuate, entire; petiole 0.5–1 cm, tomentose. *Flowers* small, 6–15 secundly arranged on the branches of axillary and terminal cymes; main peduncles 0.2–0.5 cm long, densely villose. Bracts and bracteoles subulate, minute. Flowers almost sessile. *Calyx* tubular, 3.5–4 mm long (in fruit campanulate, slightly inflated below, 5 mm), glandular and woolly; teeth lanceolate. *Corolla* 5.5–6 mm long, outside finely pubescent. Filaments ascending under the slightly arched upper lip, included. Style 2-branched at tip, shortly exposed. *Nutlets* obovoid-ellipsoid, subtriquetrous, 1.8 by 0.8 mm, coarsely reticulate, apex beset with soft hairs.

Distr. India (Burma), in *Malesia:* Lesser Sunda Is. (Timor: Atapupu).

Ecol. Obviously as the former species confined to regions with a distinctly seasonal climate.

Notes. At Leyden there are two collections (TEYSMANN 11672) from Timor and a duplicate from a plant grown in Hort. Bog. *sub* XV.K.B. XXVI.6 said to come from Flores. The late Dr. BACKER recognized this as a new species in MS which I referred with doubt to *C. acuminata* in my precursor. However, it appears distinct and supposed to be conspecific with *C. elongata.*

Excluded

Cymaria triphylla BACK., *inedit.* Under this name plants were distributed which have appeared to belong to *Vitex cymarioides* LAM & MEEUSE, Blumea 3 (1939) 248 = *Garrettia siamensis* FLETCHER, *cf.* BACK. & BAKH. *f.* Fl. Java 2 (1965) 612 (*Verbenaceae*).

4. TEUCRIUM

LINNÉ, Gen. Pl. ed. 5 (1754) 247; Sp. Pl. (1753) 562; BTH. in B. & H. Gen. Pl. 2 (1876) 1221; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1895) 210; KENG, Gard. Bull. Sing. 24 (1969) 175. — **Fig. 4.**

Annual or perennial hairy herbs (in Mal.); hair sometimes capitate-glandular. *Leaves* decussate. *Flowers* either 2 in a verticillaster, secund, forming terminal and axillary raceme-like inflorescences, or 6–18 in a verticillaster forming terminal and axillary cylindric thyrses. *Calyx* campanulate, 10-nerved, 5-toothed with the upper 3 teeth slightly longer, less conspicuously 2-lipped. *Corolla* exserted; tube without a hair-ring inside; limb 2-lipped, the upper lip deeply 2-lobed, seemingly absent, the lower lip 3-lobed, associated with the two upper lobes forming a 5-lobed whole. *Stamens* 4, exserted, two lower ones longest; anthers reniform, 2-celled, at length confluent. Disk symmetrical. Style 2-fid, branches subequal. *Nutlets* flattened, subtriquetrous, rugose or reticulate; surface of contact large, oblique, lateral.

Distr. About 100 *spp.*, worldwide, many in the Mediterranean area; in *Malesia:* 3 *spp.* in the montane zone.

KEY TO THE SPECIES

1. Inflorescence raceme-like, with 2 flowers in each verticillaster.
   2. Plant distinctly to densely, patently often yellowish-long-pubescent on stems, rachis, and at least the underside of the leaf. Lower leaves rather shortly petioled; marginal teeth proportionally fine. Calyx teeth unequal, upper ovate-acute, lower narrow-acute, laterals shorter, ovate-deltoid bluntish. Corolla *c.* 12 mm (stretched). Floral bracts ovate-lanceolate, distinctly narrowed at both ends, narrower than the calyx and hardly as long . . . . . **1. T. wightii**
   2. Plant sparsely hairy to glabrescent; stem and rachis puberulous to short hairy, the hairs curved and appressed. Lower leaves within long petioles; marginal teeth rather coarse. Calyx teeth equal. Corolla 6–9 mm (stretched). Floral bracts lanceolate, acute, narrower than and not concealing the calyx **2. T. viscidum**
1. Inflorescence a cylindric thyrse, each verticillaster consisting of a pair of 3–9-flowered dichasia **3. T. corymbosum**

1. Teucrium wightii HOOK. *f.* Fl. Br. Ind. 4 (1885) 701; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 220. — *T. tomentosum* WIGHT, Ic. (1849) t. 1458. — *T. quadrifarium* (*non* HAM. *ex* D. DON) KENG, Gard. Bull. Sing. 24 (1969) 175.

Erect annual, 0.5–1 m. Stem, branches, and leaves rather densely patent-pubescent, often yellowish. *Leaves* chartaceous, narrowly elliptic to ovate, 6–9 by 2–4 cm, serrulate, bluntly acute, base truncate or cordate, often oblique; margin slightly rugose above; petiole 1–1.5 cm, uppermost leaves subsessile. *Spurious racemes* axillary and terminal, generally forming panicles 7–10 cm long, in fruit to 15 cm or more. Pedicels 2–3 mm. Bracts ovate-lanceolate, acuminate, cuneate at base, smaller than the calyx. *Calyx* tubular-campanulate, pubescent, purple, 3–5 mm long, in fruit 6–7 mm, upper tooth ovate, broad, 2 lower teeth lanceolate, 1.5–2 mm long, the lateral teeth shorter than the others, broad-ovate deltoid, bluntish. *Corolla* white with pale rosa markings on lip, expanded and recurved, 15–20 mm. *Nutlets* ovoid, 1.5 by 1 mm, rugose, dark-brown.

Distr. India, Thailand, to Kwantung; in *Malesia:* N. Sumatra (Gajo Lands: Takengon), one collection.

Ecol. Moist secondary forest, locally common, *c.* 1300–1400 m. *Fl.* Aug.

Notes. I have earlier referred the N. Sumatran plant to *T. quadrifarium* HAM. *ex* D. DON. Closer study showed that Asian material distributed under the latter name is often not homogeneous. Following HOOKER's interpretation of DON's species shows that this is clearly distinct from the Sumatran plant by the very much larger, broader bracts broadly rounded or almost truncate at base, which especially at the tips of racemes conceal the flowers and are neatly arranged in a 4-ranking strobiloid shape, DON saying: "*bracteae cordatae, acuminatae, foliaceae, quadrifariam imbricatae*".

It seems that the N. Sumatran material is best arranged with *T. wightii*, which was originally described from the Nilghiries; but I saw at Leiden matching material from Thailand and Kwantung, and still other localities may turn up among erroneously named *T. quadrifarium*.

2. Teucrium viscidum BL. Bijdr. (1826) 827; HASSK. Cat. Hort. Bog. (1844) 133; MIQ. Fl. Ind. Bat. 2 (1859) 991, *incl. var. densiflora* MIQ.; MERR. En. Philip. 3 (1923) 409; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 295; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 218; BACK. & BAKH. *f.* Fl. Java 2 (1965) 618; CHOW, Acta Phytotax. Sin. 10 (1965) 330; KENG, Gard. Bull. Sing. 24 (1969) 176. — *T. stoloniferum* HAM. *ex* BTH. in Wall. Pl. As. Rar. 1 (1830) 58; ROXB. (Hort. Beng. 1814, 44, *nomen*) Fl. Ind. ed. Carey 3 (1832) 3; BTH. Lab. Gen. Sp. (1835) 674; in DC. Prod. 12 (1848) 583; MIQ. Fl. Ind. Bat. 2 (1859) 990; MAXIM. Bull. Ac. Imp. Sc. St. Pétersb. 9 (1877) 825, *pro var. typicum*; WARB. Bot. Jahrb. 13 (1891) 425; K.SCH. & LAUT. Fl. Schutzgeb. (1900) 527; KOORD. Exk. Fl. Java 3 (1912) 142; BOLD. Zakfl. (1916) 110. — *Melissa inodora* HASSK. Tijd. Nat. Gesch. Phys. 10 (1843) 127; Cat. Hort. Bog. (1844) 132; MIQ. Fl. Ind. Bat. 2 (1859) 969, *sec.* KOORD. Exk. Fl. Java 3 (1912) 142. — *T. philippinense* MERR. Philip. J. Sc. 7 (1912) Bot. 100 — Fig. 4.

Erect annual, 20–80 cm, often branched and stoloniferous. Stem and branches hirsute, viscous-glandular. *Leaves* membranaceous, slightly fetid, narrowly ovate to ovate, 4–7 by 3–4 cm, distinctly crenate-serrate, acute or broadly acute, base cuneate or round, both surfaces scattered with weak, white hairs; petiole slender, 1.5–3 cm. Raceme-like *inflorescences* terminal and axillary, 2–3 cm long, in fruit up to 10 cm, densely or sparsely covered with both non-glandular and viscous, glandular hairs. Pedicels 2–3 mm. Bracts pilose, lanceolate, 2–3 mm. *Calyx* campanulate, 2–3 mm long, in fruit: urceolate or tubular, 3–6 mm, glandular-ciliate, 3 upper teeth ovate or triangular, 2 lower ones slightly narrower. *Corolla* pinkish to purple, slender, exserted, 5–8(–12) mm long, slightly concave. *Nutlets* shallowly ridged, ovoid or globoid, 1.5 mm long.

Distr. India, Burma, Thailand, Indo-China, Hongkong to China, Korea, Formosa, and Japan; in *Malesia:* Central Sumatra, Java (mainly in W, Mt Gedeh-Mt Tjeremai, rare eastward: Mt Wilis, ?Tengger), Lesser Sunda Is. (Bali, Lombok, Timor), Philippines (Luzon), and New Guinea.

Ecol. Shaded localities, in forests and thickets, also sometimes on limestone rocks, occasionally in coffee estates, usually locally common, (550–) 800–1700 m. *Fl.* Jan.–Dec., mainly March–June.

Vern. Java: *sangket*, S, *rukuku*, J; New Guinea: *funeh*, Musa lang., Safia, *kalal-anarg*, Amele lang., Amele, *tëbiyhaai*, Hattam lang., Mt Arfak.

3. Teucrium corymbosum R. BR. Prod. (1810) 504; BTH. in DC. Prod. 12 (1848) 577; HOOK. *f.* Fl. Tasm. 1 (1857) 285; BTH. Fl. Austr. 5 (1870) 133; CURTIS, Stud. Fl. Tasm. 3 (1967) 556. — *Scoparia australis* SIEB. in Schult. Mant. (1822) 66. — *Anisomeles australis* (SIEB.) SPRENG. Syst. Veg. Cur. Post. (1827) 226.

Erect or sprawling perennial, to 1 m high, weakly woody beneath. Stem, branches and leaves covered with short white hairs. *Leaves* chartaceous, narrowly elliptic to narrowly obovate, 2–5.5 by 0.8–2 cm, remotely serrate or deeply toothed, acute, base attenuate; petiole 0.5–1 cm long. Cylindric *thyrse* terminal and in the upper axils, 12–15(–25) cm long, consisting of 6–10 verticillasters, each verticillaster consisting of a pair of 3–9 flowered dichasia. Pedicels 3–5 mm long. Bracts linear, minute. *Calyx* campanulate, pilose, 2–2.5 mm long, 5-lobed; lobes lanceolate, spreading, 3 upper ones slightly longer than the 2 lower ones. *Corolla* white, 5–6 mm long, the lowermost lobe shallowly boat-shaped. *Nutlets* elliptical, flattened, 1–1.2 mm (immature) long, hispid.

Distr. Australia (Queensland, New South Wales, Victoria, S. Australia, and Tasmania); in *Malesia:* East New Guinea (Kainantu, Eastern Highlands), once collected.

Ecol. On riverside, at 1450 m. *Fl.* Febr.

Doubtful & Excluded

Teucrium melissaefolium NORONHA, Verh. Bat. Gen. 5 (1790) ed. 1, art. IV, 27, repr. 85, *nomen.*

Identity unchecked, possibly *T. viscidum* BL.

Teucrium virginicum (*non* L.) THUNB. Fl. Jav. (1825) 15, *nomen.*

Identity unchecked, possibly *T. viscidum* BL.

Teucrium oliganthum HASSK. Cat. Hart. Bog. (1844) 310.

This was described from Japanese specimens cultivated in the Botanic Gardens, Bogor.

5. GOMPHOSTEMMA

WALL. *ex* BTH. Bot. Reg. *sub* t. 1292 (Jan. 1830) *nom. valid.*; in Wall. Pl. As. Rar. 2 (1830–31) 12; PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 242; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1895) 223; KENG, Gard. Bull. Sing. 24 (1969) 79. — **Fig. 5.**

Perennial herbs or undershrubs, sometimes with tuberous roots. Stem coarse, tomentose or stellately pubescent. *Leaves* opposite, large, mostly long-petioled. *Flowers* medium or large, in few- to many-flowered verticillasters, often forming densely sessile or laxly branched cymose inflorescences, rarely seemingly racemose. Bracts ovate, lanceolate or linear. *Calyx* campanulate, 10-nerved, subequally 5-toothed. *Corolla* creamy to orange-yellow, tube slender, erect or incurved; throat narrow or inflated; limb 2-lipped, the upper lip galeate, entire or emarginate, the lower lip spreading, broadly 3-lobed. *Stamens* 4, pubescent, all ascending, the lower pair longer; anthers connivent in pairs, each anther 4-celled in bud, later 2-celled, cells transverse, parallel. Disk subequal or gibbous behind. Style very briefly 2-branched, lobes subulate, anterior one slightly longer. *Nutlets* drupaceous, glabrous or pubescent, pericarp usually fleshy and white, with a broad hilum; only 1 or 2, rarely all 4 developed.

Distr. About 30 *spp.*, continental SE. Asia (E. India and Burma to SW. China); in *Malesia:* 8 *spp.*, mostly in Sumatra and Malaya, not extending east of the Philippines, Celebes and Bali.

Ecol. Mostly in everwet rain-forest, but *G. javanicum* also in seasonal teak-forest in Java, mostly below 1000 m, rarely (*G. javanicum*) extending locally to 1500, 1800, and even 2400 m.

Note. PRAIN *l.c.* subdivided the genus into 3 sections, essentially based on corolla characters and this has also been the basis for the key here. In addition, the structure of the inflorescence and shape and size of the calyx have been found useful to differentiate the Malesian species.

KEY TO THE SPECIES

1. Corolla with almost straight tube and narrow throat, glabrous inside. Nutlets usually 1 or 2. *Sect. Stenostoma.*
   2. Calyx teeth triangular or lanceolate, much shorter than the tube.
      3. Flowers few in a verticillaster and forming an axillary spurious raceme. Calyx (in flower) 10–12 mm long . . . . . **1. G. dolichobotrys**
      3. Flowers many in densely congested axillary verticillasters. Calyx 6–8 mm long . **2. G. microcalyx**
   2. Calyx teeth linear-subulate or narrow lanceolate, as long as or longer than the tube. Flowers in lax, axillary, peduncled, often branched cymes.
      4. Calyx teeth narrow lanceolate, nearly as long as the tube. Plant generally covered with golden yellow or dark brownish tomentum . . . . . **3. G. parviflorum**
      4. Calyx teeth linear-subulate, considerably longer than the tube. Plant generally covered with ash-grey tomentum . . . . . **4. G. crinitum**
1. Corolla with broad, distinctly incurved tube and inflated throat. Nutlets usually 1–4.
   5. Corolla tube hirsute inside, and included in the calyx; lips small. Nutlets usually 1–3. *Sect. Podosiphon* **5. G. hemsleyanum**
   5. Corolla tube glabrous inside, and exceeding the calyx; lips large and prominent. Nutlets usually 4. *Sect. Gomphostemma.*
      6. Calyx tube not ribbed. Ovary glabrous or punctate. Flowers in lax, peduncled, branched cymes. Stem ascending. . . . . **6. G. curtisii**
      6. Calyx tube often conspicuously ribbed. Ovary villous or hispid. Flowers more or less congested in axillary verticillasters. Stem erect.
         7. Calyx teeth generally shorter than the tube. Flowers *c.* 10–15 in a verticillaster. Bracts linear-lanceolate. Calyx (in flower) 10–15(–20) mm long . . . . . **7. G. javanicum**
         7. Calyx teeth often considerably longer than the tube. Flowers *c.* 20 in a verticillaster. Bracts subulate. Calyx (in flower) 18–25 mm long . . . . . **8. G. scortechinii**

1. Gomphostemma dolichobotrys MERR. Contr. Arn. Arb. 8 (1934) 148. — *G. racemosum* H. KENG, Gard. Bull. Sing. 24 (1969) 80, f. 14. — **Fig. 5a–b.**

Erect herb, to 2 m. Stem, branches, and inflorescence axis densely covered with yellowish brown long, simple and short, stellate hairs. *Leaves* chartaceous, elliptic or ovate-elliptic, 8–20(–25) by 6–13(–14) cm, acute or shortly acuminate, base broadly acute or subrounded; margin denticulate; long, appressed hairs above, ciliate, velutinous beneath, dense stellate hairs on the midrib and nerves; petiole 1–5(–7) cm, densely covered with brown hairs. *Verticillasters* 6–8-flowered, forming an axillary spurious racemose inflorescence 6–7

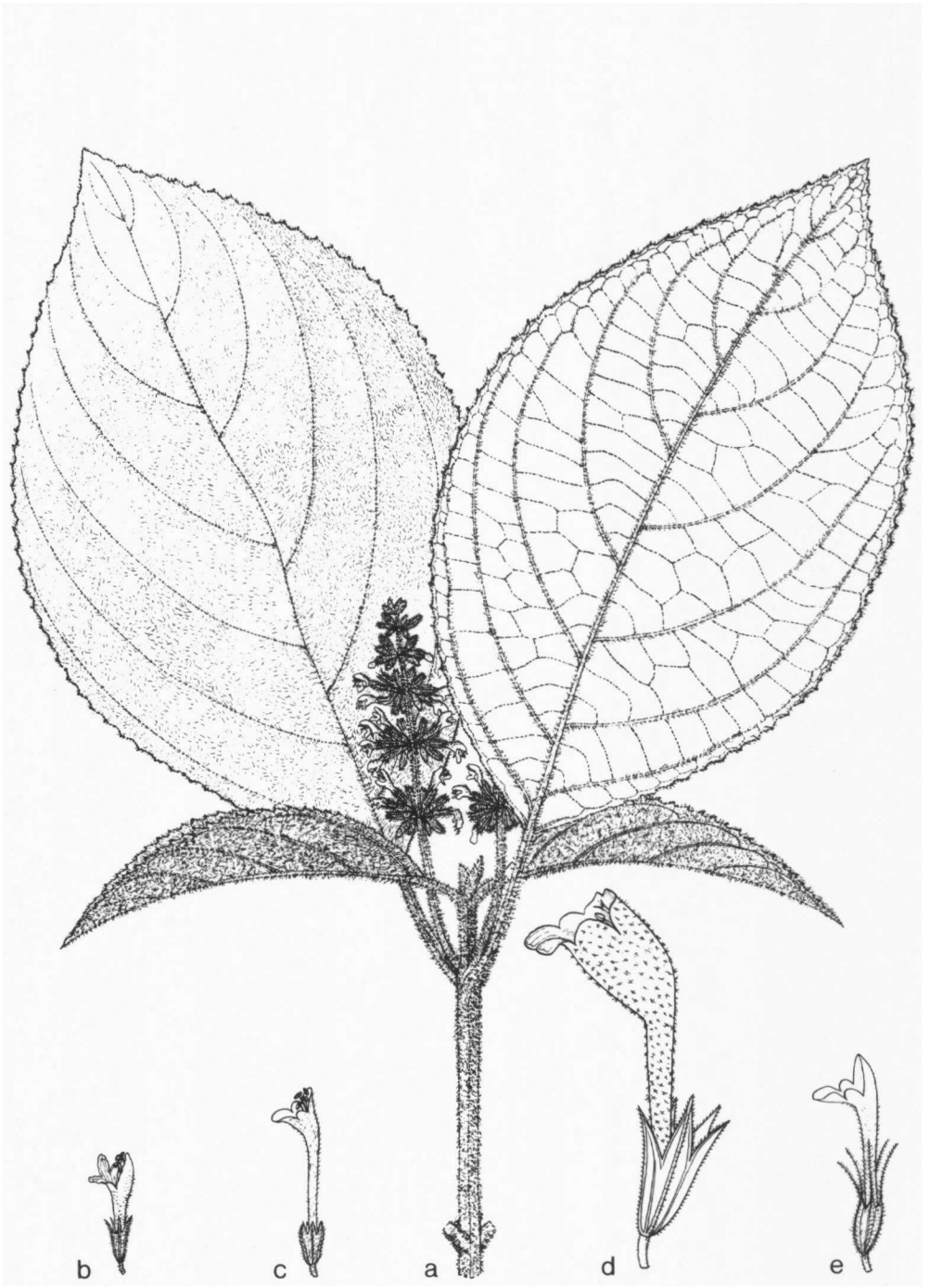


Fig. 5. *Gomphostemma dolichobotrys* MERR. *a*. Habit, × 1/2, *b*. flower. — *G. microcalyx* PRAIN. *c*. Flower. — *G. scortechinii* PRAIN. *d*. Flower. — *G. crinitum* WALL. *ex* BTH. *e*. Flower. All flowers nat. size (*a–b* VAN STEENIS 8684, *c* KUNSTLER 2155, *d* Scortechini *s.n.*, *e* GRIFFITH *s.n.*; *c–e* after PRAIN).

(–10) cm long excluding the peduncle. Bracts narrowly lanceolate, 6–8 mm, caducous. Pedicels 1.5–2 mm. *Calyx* tubular, 10–12 mm long, densely stellate-pubescent, teeth lanceolate, acuminate, 3–4 mm long. *Corolla* tubular, slender, white, 18–20 mm long, puberulent outside. *Stamens* epicorolline, free portion 4 mm long, ciliate. Ovary glabrous. *Nutlet*, usually only one developed, globose.

Distr. *Malesia:* North Sumatra (Gajo Lands: Takengon; Lau Alas).

Ecol. Rain-forest, along streams, 1000–1150 m. *Fl.* Jan.–Aug.

Note. Readily recognized by the axillary, spurious racemose inflorescence (unique in the genus) and the linear caducous bracts subtending the flowers.

2. Gomphostemma microcalyx PRAIN, J. As. Soc. Beng. 59, ii (1890) 316; Ann. R. Bot. Gard. Calc. 3 (1891) 251, pl. 84; J. As. Soc. Beng. 74, ii (1907) 723; RIDL. Fl. Mal. Pen. 2 (1923) 652; KENG, Gard. Bull. Sing. 24 (1969) 82. — **Fig. 5c.**

A coarse perennial herb, 60–150 cm, woody below. Stem stout, erect, hoary pubescent and scabrid. *Leaves* herbaceous, oblong-ovate, 12–15 by 7–9 cm, acute, base abruptly cuneate, entire; margin elsewhere entire or crenate or remotely toothed, finely stellate-pubescent on both surfaces; petiole of upper leaves 1–2 cm, of lower leaves 4–5 cm, scabrid. *Flowers* in dense, few-flowered verticillasters in the axils of the lower leaves and on the bare stem below the leaves. Bracts ovate-lanceolate, entire, 6–7 mm long. *Calyx* 6–7 mm long; teeth short, triangular, less than half as long as the tube. *Corolla* tubular, orange-yellow, cream pale yellow, or whitish, 2.5–3.5 cm long, puberulent outside; throat very narrow. Style and ovary glabrous. *Nutlets* smooth, glabrous.

Distr. *Malesia:* Sumatra, Malay Peninsula, and Borneo.

Ecol. Lowland rain-forest, also in bamboo forest, in Malaya also found on limestone hills, mostly at low altitudes, but in Sumatra ascending to *c.* 1800 m. *Fl.* Jan.–Dec.

Note. Closely allied to *G. parviflorum* WALL. *ex* BTH., but with a much smaller calyx with diminutive teeth and a much narrower corolla. The structure of the inflorescence in these two species is also different: verticillasters densely congested in *G. microcalyx*, peduncled, lax and often branched in *G. parviflorum.*

3. Gomphostemma parviflorum WALL. *ex* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 12, *in parte*; MIQ. Fl. Ind. Bat. 2 (1859) 987; HOOK. *f.* Fl. Br. Ind. 4 (1885) 697, *in parte*; PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 252, pl. 86; DUNN, Not. R. Bot. Gard. Edinb. 6 (1915) 189; KOORD. Exk. Fl. Java 3 (1923) 143; BACK. & BAKH. *f.* Fl. Java 2 (1965) 619; KENG, Gard. Bull. Sing. 24 (1969) 83. — *G. dichotomum* ZOLL. & MOR. Syst. Verz. (1846) 54; MIQ. Fl. Ind. Bat. 2 (1859) 986. — *G. bartlettii* MERR. Pap. Mich. Ac. Sc. 19 (1934) 191.

Coarse, erect shrub, 2.5–3 m. Stem stout, sulcate, densely brownish stellate-tomentose. *Leaves* chartaceous, elliptic-ovate, 15–20 by 6–10 cm, acute, base attenuate, entire; margin elsewhere finely serrate, hirsute above, densely tomentose beneath; petiole 2–4 cm, tomentose. *Flowers* in lax or condensed, many-flowered, axillary, peduncled, often branched cymes. Bracts lanceolate to ovate, 1–1.5 cm long. *Calyx* 1–1.4 cm long, densely tomentose outside; teeth narrow lanceolate, nearly as long as the tube. *Corolla* orange to orange-yellow, pale yellow or greenish white, 2–2.5 cm long, outside puberulent, throat narrow. Style and ovary glabrous. *Nutlets* smooth, glabrous, 8 by 3 mm.

Distr. Continental SE. Asia (India, Assam, Khasya, Sikkim, Burma, Thailand to SW. China: Yunnan) and *Malesia:* Sumatra (northern half), West Borneo (once), and West Java (Priangan: Pasir Kiamis near Garut, once).

Ecol. Rain-forest from almost sea-level to *c.* 1500 m. *Fl.* Jan.–Dec.

Vern. Sumatra: *kotok ring-ring*, Karo-Alas, *sarang banua, suri-suri*, Toba-Batak, Asahan.

Note. The single specimen from West Borneo (HANS WINKLER 1113) was in my precursor mentioned under *G. curtisii.*

4. Gomphostemma crinitum WALL. *ex* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 12; Lab. Gen. Sp. (1835) 648; in DC. Prod. 12 (1848) 552; MIQ. Fl. Ind. Bat. 2 (1859) 987; HOOK. *f.* Fl. Br. Ind. 4 (1885) 695; PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 254, pl. 88; J. As. Soc. Beng. 74, ii (1907) 723, *incl. var. griffithii*; RIDL. Fl. Mal. Pen. 2 (1923) 652; HEND. Mal. Nat. J. 6 (1950) 389, f. 359; KENG, Gard. Bull. Sing. 24 (1969) 84. — *G. parviflorum* (*non* WALL. *ex* BTH. 1830) BTH. Lab. Gen. Sp. (1835) 648; in DC. Prod. 12 (1848) 551. — **Fig. 5e.**

Coarse perennial herb, 50–150 cm. Stem stout, erect, sulcate, hoary-pubescent or scabrid. *Leaves* herbaceous, elliptic-ovate or oblanceolate, 25–30 by 8–15 cm, acute, base cuneate, entire; margin elsewhere entire or remotely serrate, pubescent above, softly pubescent or tomentose beneath; petiole 2–5 cm, scabrid. *Flowers* in lax or condensed, many-flowered axillary, often branched cymes. Bracts linear, lanceolate or ovate-lanceolate, 1–2 cm long. *Calyx* 1.5–2 cm long, hispid-tomentose; teeth linear subulate, 9–13 mm long. *Corolla* greenish white or yellow, 2.5–3.5 cm long, outside puberulent; throat narrow. Style and ovary glabrous. *Nutlets* smooth, glabrous, 6 by 3 mm.

Distr. Continental SE. Asia (Burma: Tenasserim; Thailand, Indo-China) and *Malesia*: Malay Peninsula (common).

Ecol. Usually on limestone cliffs and at the base of limestone hills, below *c.* 500 m. *Fl.* Jan.–Dec.

Vern. *Chĕmpaka hutan, dĕrita dapur, jĕnjulong bukit, mĕnjulong bukit, mungulon bukit*, M.

Uses. BURKILL (Dict. 1935, 1097) reported that a decoction of the roots is administered after confinement. Pounded leaves, with camphor, are applied to swellings of the groin.

5. Gomphostemma hemsleyanum PRAIN *ex* COLLETT & HEMSL. J. Linn. Soc. Bot. 28 (1890) 116; PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 250, pl. 82; BACK. & BAKH. *f.* Fl. Java 2 (1965) 619; KENG, Gard. Bull. Sing. 24 (1969) 85.

Perennial herb, *c.* 60 cm. Stem erect, woody, 4-angled, sulcate, densely tomentose. *Leaves* oblong to elliptic ovate, 6–12(–18) by 3.5–4.5(–7) cm, acute; base attenuate; margin crenulate-

serrulate, hispid above, densely greyish tomentose beneath; petiole 1–1.5(–3) cm. *Flowers* ∞, in axillary subglobular verticillasters, the upper ones almost forming an interrupted spurious spike. Bracts linear lanceolate, 6–12 by 2–3 mm. *Calyx* tubular-campanulate, 12–14 mm long, in fruit 16–22 mm; teeth broadly lanceolate, 7–9 mm long. *Corolla* white or creamy yellow, 8–10 mm long, incurved, inside hirsute below the throat. *Nutlets* 1–3, smooth, glabrous, ellipsoid, 4.5(–6) by 2.5 (–5) mm.

Distr. Upper Burma and *W. Malesia:* extreme East Java (near Asem Bagus, once).

Ecol. Seasonally very dry, arid sunny place, at 150 m. *Fl.* May.

The species shows the characteristic disjunct area of species between the drought areas of Burma and Java, *cf.* STEEN. Reinwardtia 5 (1961) 426, map 6. Asem Bagus is situated in the driest part of Java with only 0–5 rainy days during the four driest consecutive months of the year.

Note. Though the single Javanese record has smaller dimensions in leaves and flowers as compared with the typical form, and the leaf margin is crenulate-serrate instead of 'argute'-serrate, there is no doubt about the identity.

6. Gomphostemma curtisii PRAIN, J. As. Soc. Beng. 59, ii (1890) 315; Ann. R. Bot. Gard. Calc. 3 (1891) 266, pl. 92; J. As. Soc. Beng. 74, ii (1907) 725; RIDL. Fl. Mal. Pen. 2 (1923) 654; BURTT, Bull. Bot. Surv. India 7 (1965) 87; KENG, Gard. Bull. Sing. 24 (1969) 85. — *Cyrtandromoea repens* RIDL. J. Str. Br. R. As. Soc. *n.* 57 (1910) 74; Fl. Mal. Pen. 2 (1923) 543. — *G. parvum* MERR. Pap. Mich. Ac. Sc. 19 (1934) 192.

Coarse perennial herb, 60–150 cm. Stem flexuose, ascending, scabrid. *Leaves* herbaceous, ovate to oblong-ovate, or cordate, 8–12 by 3–7 cm, acute, base very shortly cuneate; margin serrate or denticulate, sparsely hirsute above, appressed tomentose beneath; petiole 3–12 cm, tomentose. *Flowers* many in lax, axillary, branched cymes at the lower part of the stem. Bracts oblong, 10–15 mm long, long-acuminate, entire or crisped. *Calyx* 12–14 mm long, smooth, red glabrous within; teeth subulate-lanceolate, slightly larger than the tube. *Corolla* white, 25–35 mm long, distinctly recurved, outside puberulous. Style and ovary glabrous. *Nutlets* glabrous or punctate, oblong-ovoid, 6 by 3 mm, apex rounded.

Distr. *Malesia:* Sumatra, Malay Peninsula.

Ecol. Hill and montane rain-forest, 250–1300 m. *Fl.* March–Sept.

Vern. *Dukut tawar panas*, Karo-Batak, Asahan.

Notes. The records from Borneo in my precursor are referred now to *G. parviflorum.*

Specimens from the Gajo Lands (N. Sumatra) collected by DE WILDE (12358, 12844, 13483, 13615) deviate in having orange flowers and narrow, fusiform-swollen tuberous roots. Also in other species the colour of the corolla is variable.

7. Gomphostemma javanicum (BL.) BTH. Lab. Gen. Sp. (1835) 650; HASSK. Cat. Hort. Bog. (1844) 133; BTH. in DC. Prod. 12 (1848) 553; MIQ. Fl. Ind. Bat. 2 (1859) 986; F.-VILL. Nov. App. (1880) 166; PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 261; KOORD. Exk. Fl. Java 3 (1912) 143; Fl. Tjibodas 3 (1918) fam. 254, p. 83; BACK. & BAKH. *f.* Fl. Java 2 (1965) 618; KENG, Gard. Bull. Sing. 24 (1969) 86. — *Prasium javanicum* BL. Bijdr. (1826) 840. — *Prasium phlomoides* REINW. *ex* BL. (Cat. 1823, 84, *nomen*) Bijdr. (1826) 840. — *G. oblongum* WALL. *ex* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 12; in DC. Prod. 12 (1848) 551; MIQ. Fl. Ind. Bat. 2 (1859) 986; PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 261, pl. 95; J. As. Soc. Beng. 74, ii (1907) 725; KOORD. Exk. Fl. Java 3 (1912) 143; RIDL. Fl. Mal. Pen. 2 (1923) 653, f. 131, *incl. var. setosa* RIDL.; MERR. Contr. Arn. Arb. 8 (1943) 148; DOAN, Fl. Gén. I.-C. 4 (1936) 1032; HEND. J. Mal. Br. R. As. Soc. 17 (1939) 66. — *G. phlomoides* (REINW. *ex* BL.) BTH. Lab. Gen. Sp. (1835) 649; ZOLL. Nat. Geneesk. Arch. N. I. 2 (1845) 59; BTH. in DC. Prod. 12 (1848) 551; MIQ. Fl. Ind. Bat. 2 (1859) 985; KURZ, Nat. Tijd. N. I. 27 (1864) 213; KOORD. Exk. Fl. Java 3 (1912) 143; BEUMÉE, Flor.-anal. Onderz. Djatibosschen (1927) 138. — *G. philippinarum* BTH. in DC. Prod. 12 (1848) 551; F.-VILL. Nov. App. (1880) 166; VIDAL, Phan. Cuming. Philip. (1885) 136; Rev. Pl. Fasc. Filip. (1886) 214; PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 259, pl. 101; MERR. En. Philip. 3 (1923) 409. — ?*G. furfuraceum* HALL. *f.* Bull. Herb. Boiss. 6 (1898) 351, t. 9, f. 1 a–c, 622. — *G. cinereum* ELMER, Leafl. Philip. Bot. 8 (1919) 3086. — *G. lacteum* RIDL. J. Bot. 62 (1924) 300; Fl. Mal. Pen. 5 (1925) 326.

Coarse perennial herb, 0.5–2 m. Stem erect, woody, 4-angled, densely tomentose. *Leaves* herbaceous, elliptic-oblong, ovate or obovate, 15–30 by 5–10 cm, acute, base abruptly cuneate or subtruncate; margin crenate or crenate-serrate; hispid above, densely pubescent beneath; petiole 1–3 cm, densely tomentose. *Flowers* 10–15 in dense, axillary verticillasters. Bracts ovate-lanceolate, 6–10 mm long. Pedicels 4.7 mm. *Calyx* 1–1.5 (–2) cm long, often very prominently ribbed, hirsute within; teeth lanceolate, acute or acuminate, generally shorter than the tube. *Corolla* creamy yellowish white or white, 4–4.5(–5) cm long, distinctly incurved, tomentose externally. Style sparingly hirsute when young, later glabrous; ovary villous. *Nutlets* 1–4, smooth, hispid at the apex, 6 by 4 mm, glassy-whitish.

Distr. Continental SE. Asia (Burma, Andamans, Indo-China); in *Malesia:* Malay Peninsula, Sumatra (incl. Mentawai Is., Banka), Java (incl. Madura I.), Lesser Sunda Is. (Bali), Borneo (incl. Anambas & Natuna Is.), throughout the Philippines, SW. Celebes (Bonthain).

Ecol. In shaded localities, mainly (rain-)forests, also in teak forests under a seasonal climate, from the lowland to *c.* 2400 m. *Fl.* Jan.–Dec.

Galls on sprouts and inflorescences are caused by gall-gnats.

Vern. Java: *galipung bulu, kali(n)dung, sapunĕga,* S, *djintĕnan lĕgĕtan, pèpèr, p. tahi, pèperan, sĕmbung limpung, tĕngku,* J, *kopètan,* Md; Philippines: *ata-ata,* Tag., *kagong,* Bag., *kasunisuni, magtiñgon,* Buk., *añganab,* Ilocos Norte.

Uses. The leaves are administered to wounds, and an extraction is used internally against stomach-ache. HARTLEY (Lloydia 32, 1969, 265) listed it as a medicine against cancer.

Notes. This is the most widely spread, hence a polymorphous species in indument and characters

of the leaf and flowers, which is the reason that it was described under various names. BACKER & BAKHUIZEN VAN DEN BRINK *f. l.c.* recognized in Java two main forms: *f. javanicum:* corolla 3–5.2 cm; narrow part of corolla tube 1.5–2 cm, exceeding the strongly ribbed calyx; calyx lobes often abruptly acuminate; style glabrous or almost so; and *f. phlomoides* (BTH.): corolla 2.5–3 cm; narrow part of corolla tube whether or not exceeding the not very strongly ribbed calyx, 0.8–1.2 cm; calyx lobes acute to subacuminate; style with many long hairs at apex. But they also pointed out that these two extremes are connected by a large series of intermediates.

I have included *G. furfuraceum* HALL. *f.* (from Sumatra); the only difference in the description and illustration is the colour of the fruit, which was said to be red (*l.c.* 622), that of *G. javanicum* being creamy white, at length turning into brownish or black.

8. Gomphostemma scortechinii PRAIN, J. As. Soc. Beng. 59, ii (1890) 315; Ann. R. Bot. Gard. Calc. 3 (1891) 260, pl. 93; J. As. Soc. Beng. 74, ii (1907) 724; RIDL. Fl. Mal. Pen. 2 (1923) 653; KENG, Gard. Bull. Sing. 24 (1969) 89, *excl. specim. sumatr.*— **Fig. 5d.**

Coarse, perennial herb, 60–150 cm, erect, woody below. Stem sulcate, scabrid. *Leaves* thin- to thick-herbaceous, elliptic-oblong or obovate, 20–30 by 10–15 cm, acute, the base long-cuneate; margin entire or remotely serrate, sparingly hirsute above, densely tomentose on the nerves beneath; petiole usually short, 0.5–1 cm long, sometimes obsolete. *Flowers c.* 20 in dense axillary verticillasters. Bracts subulate, 6–8 mm long. Pedicels 8–10 mm long. *Calyx* 18–25 mm long, prominently ribbed, hirsute within; teeth lanceolate, longer than the tube. *Corolla* orange-yellow or yellow, 30–60 mm long, distinctly incurved, outside tomentose. Style hirsute towards the apex, with spreading hairs; ovary densely villous. *Nutlets* smooth, hispid towards the apex, 8 by 5.5 mm.

Distr. Continental SE. Asia (Burma: Tenasserim; Thailand) and *Malesia:* Malay Peninsula.

Ecol. Rain-forest, 300–1500 m. *Fl.* Jan.–March.

Note. Close to *G. javanicum.* The Sumatran specimens cited in my precursor I have now referred to *G. parviflorum.*

6. SCUTELLARIA

LINNÉ, Gen. Pl. ed. 5 (1754) 260; Sp. Pl. (1753) 598; BTH. in DC. Prod. 12 (1848) 412; in B. & H. Gen. Pl. 2 (1876) 1201; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 225; KENG, Gard. Bull. Sing. 24 (1969) 164. — **Fig. 6.**

Herbs, sometimes woody below. *Leaves* opposite, petioled, rarely sessile. *Flowers* in terminal or upper axillary racemose inflorescence. Bracts minute or conspicuous and foliaceous. *Calyx* short, campanulate, 2-lipped, accrescent; calyx tube with a large caducous shield- or pouch-like appendage ('scutellum') above the upper lip; in fruit, at first the lips closed together, then the upper lip falling away together with the appendage. *Corolla* trumpet-shaped, usually sharply recurved from the base and erect upwards, not annulate within, 2-lipped; upper lip often boat-shaped, entire or notched; lower lip broad, 3-lobed. *Stamens* 4; lower pair longer, anthers often dimidiate or 1-celled; upper pair shorter, anthers 2-celled. Disk tubular, elongate. Ovary oblique, on a short gynophore; style 2-fid. *Nutlets* very minute, smooth, granular or hispid; seeds more or less transverse, with curved embryo.

Distr. About 200 *spp.* almost throughout the world, absent in S. Africa, the Pacific islands (except the Bonins near Japan), and New Zealand, in *Malesia* 3 *spp.*

Ecol. In the Malesian tropics both at low and high altitude.

KEY TO THE SPECIES

1. Flowers mostly 3 (rarely 2 or 4) in a verticillaster, radially spreading . . . . . **1. S. discolor**
1. Flowers generally 2 in a verticillaster, secund.
2. Flowering calyx 1–1.5 mm long; pedicels ± perpendicular to the rachis. Leaves broadly ovate, rounded or reniform, the base often cordate . . . . . **2. S. indica**
2. Flowering calyx 3–4 mm long; pedicels always obliquely erect (at angles of 60° to 75°) to the rachis. Leaves lanceolate or narrowly ovate, the base acute to rounded . . . . . **3. S. javanica**

1. Scutellaria discolor WALL. *ex* BTH. in Wall. Pl. As. Rar. 1 (1830) 66; BTH. Lab. Gen. Sp. (1834) 428; in DC. Prod. 12 (1848) 417; MIQ. Fl. Ind. Bat. 2 (1859) 972; PRAIN, J. As. Soc. Beng. 74, ii (1907) 714; KOORD. Exk. Fl. Java 3 (1912) 144; RIDL. Fl. Mal. Pen. 2 (1923) 649; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 253; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 337; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 146; HEND. Mal. Nat. J. 6 (1950) 394, f. 364; BACK. & BAKH. *f.* Fl. Java 2 (1965) 620; KENG, Gard. Bull. Sing. 24 (1969) 165; STEEN. Mt. Fl. Java (1972) pl. 24–7. — *S. indica* (*non* L.) BL. Bijdr. (1826) 839. — *S. colebrookiana* (*non* WALL.) Z. & M. *ex* MOR. Syst. Verz. (1846) 54. — *S. heteropoda* MIQ. Fl. Ind. Bat. 2 (1859) 972, *incl. var. grandis* MIQ. — *S. zollingeriana* BRIQ. Ann. Cons. Jard. Bot. Genève 2 (1898) 104.

See further synonym under the variety.

***var.* discolor.**

Small herbs, usually 20–50(–100) cm. Stem hirsute, rarely branched. *Leaves* membranaceous, broadly elliptic to rounded, rarely ovate, 4–6(–11) by 2.5–5(–10) cm, sometimes smaller, obtuse or rounded, base often rounded to cordate, margin coarsely crenate, glabrescent or sparsely pubescent on both surfaces; petiole 1–2 (or more) cm, hirsute. *Flowers* in simple terminal raceme-like inflorescences 10–15 cm long; 3 (sometimes 2 or 4) flowers subverticillately arranged in verticillasters not confined to one plane. Bracts linear, 1–3 mm. Pedicels 2–4 mm, pubescent. *Calyx* cup-shaped, 2–2.5 mm long, in fruit 4–5 mm, hirsute. *Corolla* trumpet-shaped, blue, pale-blue, or purple-violet, 10–12 mm long. *Nutlets* ellipsoid, 1.2 by 0.7 mm, black, echinate.

Distr. Continental SE. Asia (from the Deccan to Assam, Nepal, Burma, Thailand, Indo-China, and SW. China: Yunnan), widely spread in *Malesia:* Malay Peninsula, Java, Bawean I., Lesser Sunda Is. (Kangean, Lombok, Flores, Sumba, Sumbawa, Alor, Wetar, Timor), Moluccas (Ceram, Ambon), and New Guinea.

It is peculiar that this species is not found in several large islands (Celebes, Philippines). The single record of Sumatra by KORTHALS specimens named by MIQUEL *S. heteropoda var. grandis* (KENG, *l.c.* 166) is almost certainly mislocalized and came from Java where other similar specimens of KORTHALS had their provenance.

Ecol. Grassland along streams, shady and moist places in rain-forest, trails in forest, moist rocks in ravines, in Sumbawa in lowland Dipterocarp forest, in the Vogelkop in oak forest, in Timor on limestone in *Podocarpus* forest; from the lowland up to *c.* 2400 m, at low altitude on several small islands but also on the larger islands. *Fl.* Jan.–Dec.

Vern. *Nilam bukit, toma,* M; Java: *beungbeureuman tangkal, daun kukuran, djawĕr kotok (leuweung), kipahit, tjawir kotok hutan,* S, *ampĕru lĕmah, djarongan, lampĕsan,* J; Moluccas: *daun kukur,* Ambon, *huta alosu,* Ceram, *majana kusu,* Ternate.

Uses. According to HEYNE (Nutt. Pl. 1927, 1326) used against pains in the loins.

Notes. A wide-ranging, rather variable species. Early collected and described Indian specimens were rather tiny herbs usually less than 30 cm, with rounded or reniform leaves *c.* 1.5–2 cm and

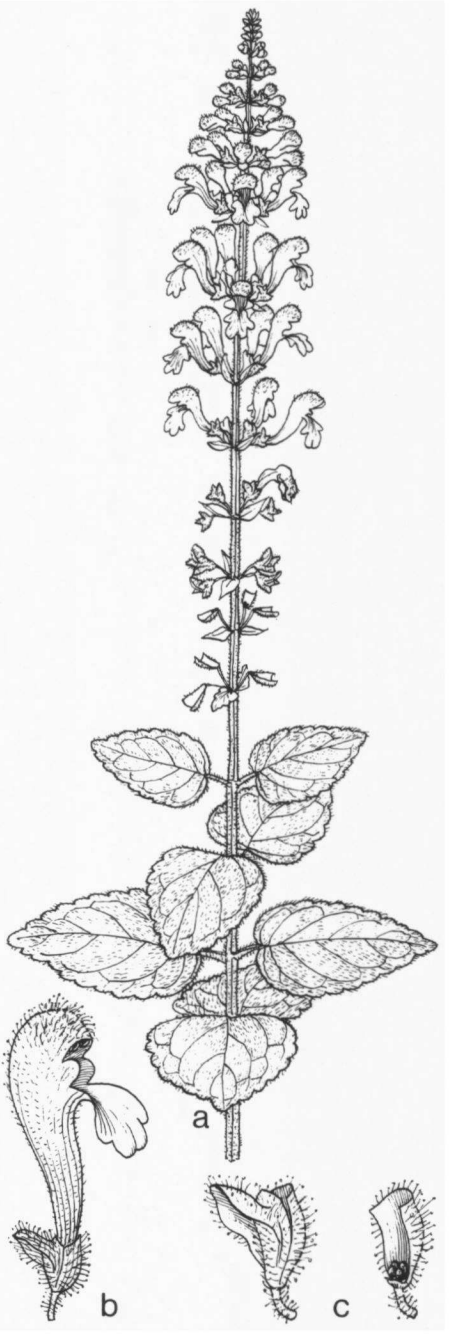


Fig. 6. *Scutellaria discolor* WALL. *ex* BTH. *var. cyrtopoda* (MIQ.) ADELB. *a.* Habit, × ²/₃, *b.* flower, × 2, *c.* left: calyx in fruit, intact; right: final fruiting stage, × 4 (COERT 252).

few-flowered terminal inflorescence. Malesian specimens are generally taller with elliptic to rounded, larger leaves *c.* 4.5–6 by 3.5–5 cm and many-flowered terminal and upper-axillary inflorescences.

According to MIQUEL (*l.c.* 973) the bracts, calyx, and corolla are glandular-pilose.

S. zollingeriana I have here referred to the type variety.

var. **cyrtopoda** (MIQ.) ADELB. in Back. Bekn. Fl. Java (em. ed.) 14 (1954) fam. 201, p. 14; BACK. & BAKH. *f.* Fl. Java 2 (1965) 620; KENG, Gard. Bull. Sing. 24 (1969) 167; STEEN. Mt. Fl. Java (1972) pl. 25–8. — *S. cyrtopoda* MIQ. Fl. Ind. Bat. 2 (1859) 973; KOORD. Exk. Fl. Java 3 (1912) 144. — **Fig. 6.**

Stem densely glandular-hairy. Leaves chartaceous, ovate to broadly ovate, 3.5–5 by 2–4 cm, acute or broadly acute, base rounded, margin crenate-serrate, appressed hirsute above, pilose on the nerves beneath; petiole 0.5–1.5 cm, pilose. Bracts very prominent, lower ones lanceolate, 3–5 mm long, decrescent upwards.

Distr. *Malesia:* W.–E. Java (Mt Malabar eastwards to Mt Jang).

Ecol. Shady places, sometimes moist, both in light mixed and in *Casuarina* forest, 1600–3200 m. *Fl.* Jan.–Dec.

Notes. The variety is mainly characterized by the more copiously glandular-hairy stem, rather small ± thicker leaves, and more prominent bracts.

DUNN (Not. R. Bot. Gard. Edinb. 6, 1915, 176) referred HENRY 10240 from Yunnan to this taxon, but this is probably not correct.

2. Scutellaria indica LINNÉ, Sp. Pl. (1753) 600; BURM. *f.* Fl. Ind. (1768) 130; HASSK. Cat. Hort. Bog. (1844) 132; BTH. in DC. Prod. 12 (1848) 417; Fl. Hongk. (1861) 278; K.SCH. & LAUT. Fl. Schutzgeb. (1900) 527; MERR. En. Philip. 3 (1923) 409; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1923) 255; MANSFELD, Bot. Jahrb. 62 (1929) 377; BACK. & BAKH. *f.* Fl. Java 3 (1968) 657; KENG, Gard. Bull. Sing. 24 (1969) 167. — *S. copelandii* MERR. Philip. J. Sc. 7 (1912) Bot. 349.

Small herb, usually prostrate, 20–30 cm, often not branched. Stem and branches acutely 4-angular, glabrescent or strigose. *Leaves* chartaceous, mostly radical, broadly ovate to rounded or reniform, 1.5–2(–3) by 1.5–2 cm, base usually cordate, appressed hirsute on both surfaces, margin crenate; petiole 0.5–1.5 cm, hirsute and scabrid. *Flowers* in a terminal, raceme-like inflorescence, solitary or occasionally several; flowers 2 in a verticillaster, opposite. Pedicels nearly perpendicular to the rachis. Bracts rounded to ovate, 2–3 mm long, villose. *Calyx* 1.5 mm long, in fruit 3–4 mm, glandular-hairy. *Corolla* pale to deep purple, 12–14 cm long, puberulent. *Nutlets* protuberant, 1 by 0.6 mm.

Distr. Continental East Asia (Indo-China, China, Japan, Formosa, Hongkong) to *Malesia:* N. Sumatra (Gajo & Batak Lands), W. Java (Mt Ipis in Priangan), Lesser Sunda Is. (Sumbawa, Alor, Flores, Timor), Central Celebes (Masamba), Philippines (Mindanao, Mindoro), Moluccas (Ternate, Halmaheira, Banda), and New Guinea.

Ecol. On cliffs and boulders along streams, grassy open plain, along tracks in secondary forest, rather rare in Malesia, from low altitude to 2300 m. *Fl.* Jan.–Dec.

Vern. Sumatra: *bangun bangun batu,* Batak; Java: *daun kukuran*; Philippines: *banod,* Bag.; New Guinea: *samsi,* Wapi lang., Wigote.

Note. The Papuan specimens tend to have larger and thinner leaves and often the stems are branched, each branch ending in a racemose inflorescence, perhaps representing a distinct form or variety.

3. Scutellaria javanica JUNGH. Java 1 (1853) 661; MIQ. Fl. Ind. Bat. 2 (1859) 974; KOORD. Exk. Fl. Java 3 (1912) 144; BACK. & BAKH. *f.* Fl. Java 2 (1965) 620; KENG, Gard. Bull. Sing. 24 (1969) 168. — *S. horsfieldiana* MIQ. Fl. Ind. Bat. 2 (1859) 974; KOORD. Exk. Fl. Java 3 (1912) 145; STEEN. Arch. Hydrobiol. Suppl. 10 (1932) 324. — *S. violacea* HEYNE *var. horsfieldiana* (MIQ.) O. K. Rev. Gen. Pl. 2 (1891) 531.

See for further synonyms under the varieties.

KEY TO THE VARIETIES

1. Leaves thin-membranaceous, usually over 3 cm long; margin crenate or entire.
2. Rachis of inflorescence not or thinly glandular-hairy. Leaves 3–4 by 1.5–2 cm **a. *var.* javanica**
2. Rachis of inflorescence often densely glandular-hairy. Leaves 7.5–10 by 3–3.5 cm **b. *var.* sumatrana**
1. Leaves chartaceous to thin-coriaceous, much shorter; if long then the margin often with 2–3 coarse teeth on each side.
3. Leaves 0.5–1.5 cm long; margin often remotely crenate or subentire . . . . **c. *var.* luzonica**
3. Leaves 2–3.5(–6.5) cm long; margin often with 2–3 coarse teeth on each side **d. *var.* russeliaefolia**

a. *var.* javanica.

Slender undershrub, 60–100 cm, often branched. Stem and branches acutely 4-angled, pubescent. *Leaves* thin-membranaceous, lanceolate, narrowly ovate to ovate, 3–4(–5) by 1.5–2(–3) cm, acute or caudate, base rounded or acute, more or less entire, margin elsewhere crenate or remotely serrate, often only few-toothed; puberulent on both surfaces; petiole 1–3 cm, hirsute. *Flowers* in terminal, sometimes also in upper axillary, lax, pseudo-racemes 8–10 cm long; rachis glandular-hairy, often 2 flowers in a whorl, secund. Pedicels obliquely attached (in angles of 60° to 75°) to the rachis. *Calyx* campanulate, 3–4 mm long, in fruit 5–6 mm, hirsute. *Corolla* trumpet-shaped, blue or white, 14–16 mm long, puberulent, upper lip notched. *Nutlets* broadly oblong, flattened, 1.5–1 mm long, black, finely tuberculate and puberulent.

Distr. *Malesia:* Sumatra (rare), Central to East Java (Mts Diëng E. to Mt Ardjuno), Central & North Celebes, Philippines (Luzon, Mindoro), Moluccas (Ceram) and New Guinea.

Ecol. Open primary, often light forest, forest-edges, trails, in Tondano in coffee-estates, near Moresby in Eucalypt savannah and in Daru I. on damp soil in savannah forest; from low altitude to *c.* 2300 m, in Java not below 600 m. *Fl.* Jan.–Dec.

Vern. Java: *perlutan, sonkèttan*, J, Diëng, *kapunten, upar upar*, J, *Ungaran*; New Guinea: *riemos*, Tehid lang., Vogelkop Pen.

b. *var.* sumatrana (MIQ.) BACK. Trop. Natuur 10 (1921) 37, f. 7; STEEN. Arch. Hydrobiol. Suppl. 10 (1932) 323; ADELB. in Back. Bekn. Fl. Java (em. ed.) 14 (1954) fam. 201, p. 14; BACK. & BAKH. *f.* Fl. Java 2 (1965) 620; KENG, Gard. Bull. Sing. 24 (1969) 171. — *S. sumatrana* MIQ. Fl. Ind. Bat. 2 (1859) 974; MERR. Contr. Arn. Arb. 8 (1934) 149.

Differs from the type variety mainly in the thinner and larger leaves (7.5–10 by 3–3.5 cm) and in the sparsely hirsute inflorescence rachis which may reach a length of 20 cm and is not glandular-hairy. Flowers blue, lip-base white.

Distr. *Malesia:* Sumatra, Lesser Sunda Is. (Sumba, Flores), and Philippines (Mindoro, Mindanao).

Ecol. In thickets along trails, on ridges and in forest, 500–2850 m, usually above 1000 m. *Fl.* Jan.–Dec.

Vern. N. Sumatra: *bangun bangun na gerger, b. b. na rata, b. b. na rosa*, Karo-Batak.

c. *var.* luzonica (ROLFE) H. KENG, Gard. Bull. Sing. 24 (1969) 171. — *S. luzonica* ROLFE, J. Linn. Soc. Bot. 21 (1884) 315; MERR. En. Philip. 3 (1923) 410; MANSFELD, Bot. Jahrb. 62 (1929) 377; LAM, Blumea 5 (1945) 582; QUIS. Medic. Pl. Philip. (1951) 833. — *S. marivelensis* ELMER, Leafl. Philip. Bot. 2 (1908) 516.

Ascending, procumbent herb. Leaves chartaceous, lanceolate to broadly ovate, 0.5–1.5 by 0.3–1 cm, acute to acuminate, base subrounded, margin remotely crenate or subentire; petiole 2–3 mm or leaf subsessile. Racemes 2–4 cm long.

Distr. *Malesia:* Philippines (Luzon) and New Guinea.

Ecol. Ravines, ridges in mossy forest, grassland, stream banks, forest floor, peaty forest on sand, (300–)1000–2400 m, at 3300 m on Mt Suckling (New Guinea), along mountain streams occasionally found at lower altitude. *Fl.* Jan.–Dec.

Vern. Philippines: *lupiñgan, sidit*, Ig.; New Guinea: *buisk*, Telefomin.

d. *var.* russeliaefolia (VATKE) H. KENG, Gard. Bull. Sing. 24 (1969) 172. — *S. russeliaefolia* VATKE, Bot. Zeit. 30 (1872) 716; MERR. En. Philip. 3 (1923) 410.

Small herb, suberect. Leaves chartaceous to thin-coriaceous, ovate, 2–2.5(–6.5) by 1–2(–3) cm, acute or acuminate, base rounded or often subcordate, the margin with 2–3 coarse teeth on each side; lateral veins usually very prominent; petiole less than 5 mm long or subsessile, hirsute. Flowers blue and white.

Distr. *Malesia:* Philippines (Luzon, Mindoro, Catanduanes, Basilan, Leyte, Panay), NE. Celebes (Minahassa).

Ecol. Primary forest, often in mossy forest, 500–2350 m. *Fl.* Jan.–June.

Cultivated

Scutellaria splendens LINK, KLOTSCH & OTTO, Ic. Pl. Rar. Hort. Berol. 1 (1841) 31, t. 13; BACK. & BAKH. *f.* Fl. Java 2 (1965) 620.

A plant with bright red corolla, native to Mexico. Cultivated in mountain regions in Java as a garden ornamental.

Scutellaria *sp.* — At the Mission Station Toromambuno, Papua, 2500 m, another species is cultivated (BORGMANN 342).

Excluded

Scutellaria ? japonica BURM. *f.* Fl. Ind. (1768) 130; MERR. Philip. J. Sc. 19 (1921) 378.

BURMAN recorded this species for Japan and Java. BENTHAM concluded that BURMAN's description is based on a mixture (in DC. Prod. 12, 1848, 58, 241, 431) which he referred in part to *Plectranthus coetsa* D. DON and in part to *Melissa parviflora* BTH.; he stated to have examined the original specimens in the Burman herbarium. However, neither of these two species occurs in either Japan or Java. In MERRILL's opinion (*l.c.*) BURMAN's description was mainly drawn up from the *Melissa* part. Also, BURMAN could not have had material from the Javanese *Plectranthus teysmannii* and *Melissa axillaris* BAKH. *f.* (with which they might have been confounded) as at BURMAN's time these mountain plants from the interior of Java were not yet collected.

KOIDZUMI and later OHWI (Fl. Jap. 1965, 786) have accepted BURMAN's description as the basis of *Plectranthus japonicus* (THUNB.) KOIDZ.

7. ACHYROSPERMUM

BLUME, Bijdr. (1826) 840; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 268; J. K. MORTON, J. Linn. Soc. Lond. Bot. 58 (1962) 261; KENG, Gard. Bull. Sing. 24 (1969) 23. — **Fig. 7.**

Undershrubs or herbs. Stems terete to obscurely 4-angled, pubescent. *Verticillasters* few-flowered, usually forming a terminal, spike-like inflorescence. *Calyx* 10-nerved, tubular-campanulate, 5-toothed, ± 2-lipped, the upper lip slightly longer. *Corolla* slender, 2-lipped, the upper (or posterior) lip short, erect, notched; the lower (or anterior) lip 3-lobed, the midlobe often concave. *Stamens* 4, under the upper lip in 2 pairs, the lower (or anterior) pair longer; anthers 2-celled, cells

parallel. Disk equal-sided. Styles briefly 2-fid. *Nutlets* scaly and chaffy on the ventral surface and on the top, rough and pubescent on the dorsal surfaces.

Distr. Over 10 *spp.* described from tropical E. Africa, Madagascar, and the Seychelles through Indo-Himalaya to *W. Malesia* (1 *sp.*).

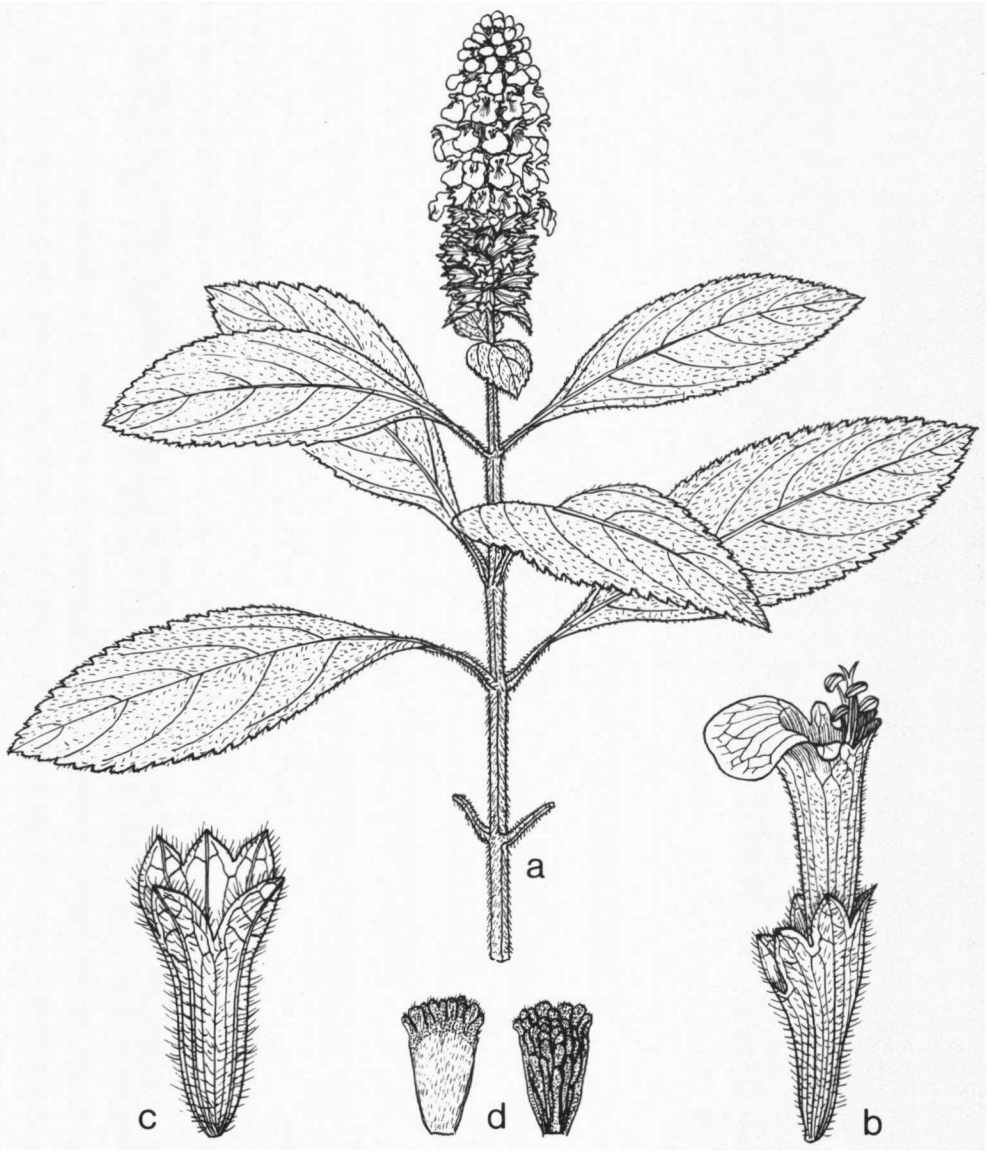


Fig. 7. *Achyrospermum densiflorum* BL. *a.* Habit, × $^2/_3$, *b.* flower, *c.* fruiting calyx, both × 4, *d.* nutlet, left from outside, right from inside, × 12 (*a–b* POPTA 4316, *c–d* BACKER 4818).

1. Achyrospermum densiflorum BL. Bijdr. (1826) 840; BTH. in DC. Prod. 12 (1848) 458; MIQ. Fl. Ind. Bat. 2 (1859) 989; HOOK. *f.* Fl. Br. Ind. 4 (1885) 673, *in nota*; MERR. En. Philip. 3 (1923) 412; BACK. & BAKH. *f.* Fl. Java 2 (1965) 624; KENG, Gard. Bull. Sing. 24 (1969) 23, f. 1; STEEN. Mt. Fl. Java (1972) pl. 24–2; MURATA, Acta Phytotax. Geobot. 25 (1973) 106. — *A. phlomoides* BL. Bijdr. (1826) 841; MIQ. Fl. Ind. Bat. 2 (1859) 990; KOORD. Exk. Fl. Java 3 (1912) 148. — *A. philippinense* BTH. in DC. Prod. 12 (1848) 458; MIQ. Fl. Ind. Bat. 2 (1859) 990; F.-VILL. Nov. App. (1880) 165; VIDAL, Phan. Cuming. Philip. (1885) 136; Rev. Pl. Vasc. Filip. (1886) 214. — **Fig. 7.**

Suberect herb, 10–60 cm. Stem and branches pubescent. *Leaves* thin, narrowly elliptic or ovate, 6–8 by 2.5–4 cm, acute or broadly acute, base cuneate or attenuate, hirsute or pilose on both surfaces, margin serrate or crenate-dentate; petiole 0.5–6 cm, hirsute. *Verticillasters* always in a terminal, spike-like inflorescence 4–6 (or more) cm long. Bracts pale greenish yellow to pink, broadly ovate or spathulate, 6–8 mm, pilose and ciliate. *Calyx* campanulate, 6–8 mm long, in fruit 8–10 mm, more or less 2-lipped, the upper lip 2-toothed, slightly longer than the lower lip, the teeth straight (in fruit often slightly recurved), obtuse or rounded at apex. *Corolla* white to light violet or pink, 3–4 mm exceeding the calyx, upper lip erect, emarginate, lower lip much longer than the upper one, straight or decurved. *Stamens* in 2 pairs, the lower pair longer, exserted. *Nutlets* obtusely trigonous, 1.2–2 by 0.5 mm, scaly and chaffy on the ventral surfaces and on the top, rough and pubescent on the dorsal surface.

Distr. *Malesia:* Central & S. Sumatra, W. Java (E. as far as Mt Tjeremai and Banjumas), Lesser Sunda Is. (Lombok, W. Sumbawa), and Philippines (Luzon, Mindoro, Leyte, Mindanao).

Ecol. In forests often along streams and in damp, shaded places at low and medium altitudes from *c.* 500 to 2000 m, rarely reported down to 150 m confined to everwet climatic conditions. *Fl.* Febr.–Sept.

Vern. *Tjutjung leuweung*, S.

Note. HOOKER *f.* (*l.c.*) suggested possible conspecificity with the Indian *A. wallichianum* (BTH.) BTH., but I rather want to keep them apart.

8. ANISOMELES

R.BR. Prod. (1810) 503; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 268; KENG, Gard. Bull. Sing. 24 (1969) 33. — **Fig. 8.**

Herbs, or sometimes shrubby. Stems and branches softly pubescent or woolly. *Flowers* in axillary whorls or forming a loose terminal spicate or paniculate inflorescence. *Calyx* ovoid or tubular-campanulate, straight, 10-nerved, almost equally 5-toothed. *Corolla* tube short, annulate within; upper lip short, entire and erect; lower lip 3-lobed, broad and patent, midlobe retuse or notched. *Stamens* exserted, in 2 pairs, those of the lower pair often ± longer; anthers of the upper pair sterile, of the lower pair only one cell fertile. Disk equal-sided. Style subequally 2-fid. *Nutlets* smooth, flattened, bluntly angular, and with rather prominent scar on the ventral surface.

Distr. About 5–6 *spp.*, through the Old World, from E. Africa through SE. Asia, and Malesia to NE. Australia; in *Malesia:* 2 *spp.*

Ecol. Open, often waste places, and secondary growths, not a constituent of the primary forest, in the lowland and hills.

Notes. Already BENTHAM (Fl. Austr. 5, 1870, 89) remarked on the difficulty of specific delimitation. Alluding to R. BROWN, who described three species from Australia, he said he could not follow him, having a very much larger range of specimens before him, and decided that they form a continuum of one variable species, *A. salvifolia*. However, he remarked in addition that certain specimens were very similar to others found in India, but did not further elaborate this point.

CLARKE (in Hook. *f.* Fl. Br. Ind. 4, 1885, 672) had four species, but made a remark under two of them, *viz A. candicans* BTH. and *A. heyneana* BTH. to the effect that they were very doubtful or perhaps a form of another species, thus leaving only two distinct species.

Both the continental Asian and Malesian material, of which I have now a far larger range of specimens than BENTHAM, shows a large variability; in habit and degree of hairiness. Leaf-shape varies considerably, apical and basal leaves differ in one specimen; and there are degrees and transitions of the leaf-base, from narrow-cuneate to rounded.

There appears to be only one major constant taxonomic character, *viz* the length (not the exact shape) of the calyx lobes in proportion to the calyx tube.

It may be possible that there occur, besides the phenotypic and the fluctuating variability, genetically defined replacing races or subspecies, but their discrimination falls outside the realm of herbarium taxonomy.

Nomencl. BABU & NAYAR (Taxon 18, 1969, 595) have proposed to conserve the name *Anisomeles* against *Epimeredi* ADANS. 1763, because ROTHMALER (in Fedde, Rep. 53, 1944, 12) had claimed that ADANSON's type (in P) was *Anisomeles*. According to BAKHUIZEN VAN DEN BRINK *f.* (Fl. Java 2, 1965, 624) this is a mixture, making conservation unnecessary.

KEY TO THE SPECIES

1. Fruiting calyx teeth nearly as long as the tube. Leaves generally ovate to broadly ovate, varying from glabrescent, hirsute to densely villose. Flowers usually numerous (over 20) in dense, axillary verticillasters forming together a terminal, dense, spurious-spicate inflorescence . . . . . **1. A. indica**
1. Fruiting calyx teeth much shorter (less than $^1/_3$) than the tube. Leaves generally narrowly oblong, always densely woolly. Flowers fewer (usually less than 15) in axillary verticillasters which are often distantly disposed . . . . . **2. A. malabarica**

1. Anisomeles indica (L.) O.K. Rev. Gen. Pl. 2 (1891) 512, *incl. f. albiflora* (HASSK.) O.K., *f. rubicunda* O.K.; MERR. Fl. Manila (1912) 411; Sp. Blanc. (1918) 336; En. Philip. 3 (1923) 412; BACK. Onkr. Suiker. (1931) 560, *incl. var. mollissima* (BTH.) BACK., Atlas (1973) t. 531; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 152; STEEN. Bull. Jard. Bot. Btzg III, 17 (1948) 389, *incl. var. biflora* STEEN.; QUIS. Medic. Pl. Philip. (1951) 812; BACK. & BAKH. *f.* Fl. Java 2 (1965) 624, *incl. var. albiflora* (HASSK.) BACK., *var. serratifolia* (MIQ.) ADELB.; KENG, Gard. Bull. Sing. 24 (1969) 34, f. 5. — *Nepeta indica* L. Sp. Pl. (1753) 571; THUNB. Fl. Java (1825) 15. — *Ballota disticha* L. Mant. 1 (1767) 83; BURM. *f.* Fl. Ind. (1768) 126. — *Marrubium indicum* BURM. *f.* Fl. Ind. (1768) 127. — *Nepeta amboinica* L. *f.* Suppl. (1781) 273, *excl. syn.* RHEEDE *quae est Anisochilus carnosus* (L.) WALL. — *A. ovata* R.BR. in W.T.Ait. Hort. Kew. ed. 2, 3 (1811) 364; DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 396; BTH. Lab. Gen. Sp. (1835) 702, *incl.* β *mollissima* BTH.; in DC. Prod. 12 (1848) 455; MIQ. Fl. Ind. Bat. 2 (1859) 975, *incl. var.* γ *serratifolia* MIQ.; F.-VILL. Nov. App. (1880) 665; VIDAL, Phan. Cuming. Philip. (1885) 136; Rev. Pl. Vasc. Filip. (1886) 214; HOOK. *f.* Fl. Br. Ind. 4 (1885) 672; PRAIN, J. As. Soc. Beng. 74, ii (1907) 715; RIDL. Fl. Mal. Pen. 2 (1923) 649. — *A. disticha* HEYNE *ex* ROTH, Nov. Pl. Sp. (1821) 254. — *Nepeta disticha* (*non* L.) BL. Bijdr. (1826) 823. — *Nepeta malabarica* (*non* L.) BL. Bijdr. (1826) 823. — *A. mollissima* WALL. Cat. (1829) *n.* 2039, *nomen.* — *A. glabrata* BTH. in Wall. Cat. (1829) *n.* 2041, *nomen.* — *A. candicans* BTH. in Wall. Pl. As. Rar. 1 (1830) 59 (WALL. Cat. 1829, *n.* 2038), *e descr.* — *A. heyneana* BTH. in Wall. Pl. As. Rar. 1 (1830) 59 (WALL. Cat. 1829, *n.* 2028). — *Phlomis indica* (L.) BLANCO, Fl. Filip. (1837) 474; ed. 2 (1845) 330; ed. 3, 2 (1878) 247. — *Phlomis alba* (*non* FORSK. 1775) BLANCO, Fl. Filip. (1837) 474; ed. 2 (1845) 330; ed. 3, 2 (1878) 247; *cf.* MERR. Sp. Blanc. (1918) 336. — *A. malabarica* [*non* (L.) R.BR.] HASSK. Cat. Hort. Bog. (1844) 133; Pl. Jav. Rar. (1848) 485, *incl. var. albiflora* HASSK.; MIQ. Fl. Ind. Bat. 2 (1859) 976. — *A. albiflora* (HASSK.) MIQ. Fl. Ind. Bat. 2 (1859) 976; KOORD. Exk. Fl. Java 3 (1912) 148. — *A. secunda* O.K. Rev. Gen. Pl. 2 (1891) 512, *nom. superfl.*, based on WALL. Cat. (1829) *n.* 2028 (= *A. heyneana*). — *A. tonkinense* GANDOGER, Bull. Soc. Bot. Fr. 65 (1918) 65, *e descr.* — *Epimeredi indicus* (L.) ROTHMALER in Fedde, Rep. 53 (1944) 12, *p.p.*; PARHAM, Pl. Fiji (1964) 254. — **Fig. 8.**

Herbaceous or shrubby, 0.5–2 m. Stem and branches acutely 4-angled, sparingly hairy to densely pubescent. *Leaves* thin- to thick-membranaceous, ovate to broadly ovate, 4.5–6 by 3–3.5 cm, acute, crenate-serrate, base rounded or truncate, hirsute or woolly on both surfaces, subcordate, less often shortly cuneate, entire, sometimes almost pinnatifid; petiole 1.5–4 cm, tomentose. *Flowers* usually numerous (over 20), in a dense verticillaster, the whorls distant below, approximate above in a dense spicate inflorescence, rarely very few-flowered with solitary flowers in the leaf-axils. Bracts linear, 3–4 mm, pilose. *Calyx* campanulate, 5–7 mm long, in fruit 9–10 mm, shortly pedicelled, hirsute and pilose; teeth lanceolate, acute, almost as long as the tube, ciliate. *Corolla* greenish to whitish, with dark reddish lines inside, sometimes purple or blue, tubular, 15–18 mm long. Filaments hirsute. *Nutlets* broadly ovoid, 1.8–2 by 1.4–1.5 mm, subcompressed, black.

Distr. India, China, Japan, Ryu Kyu Is., Taiwan, throughout *Malesia*, Bismarck Arch., and Fiji Is.

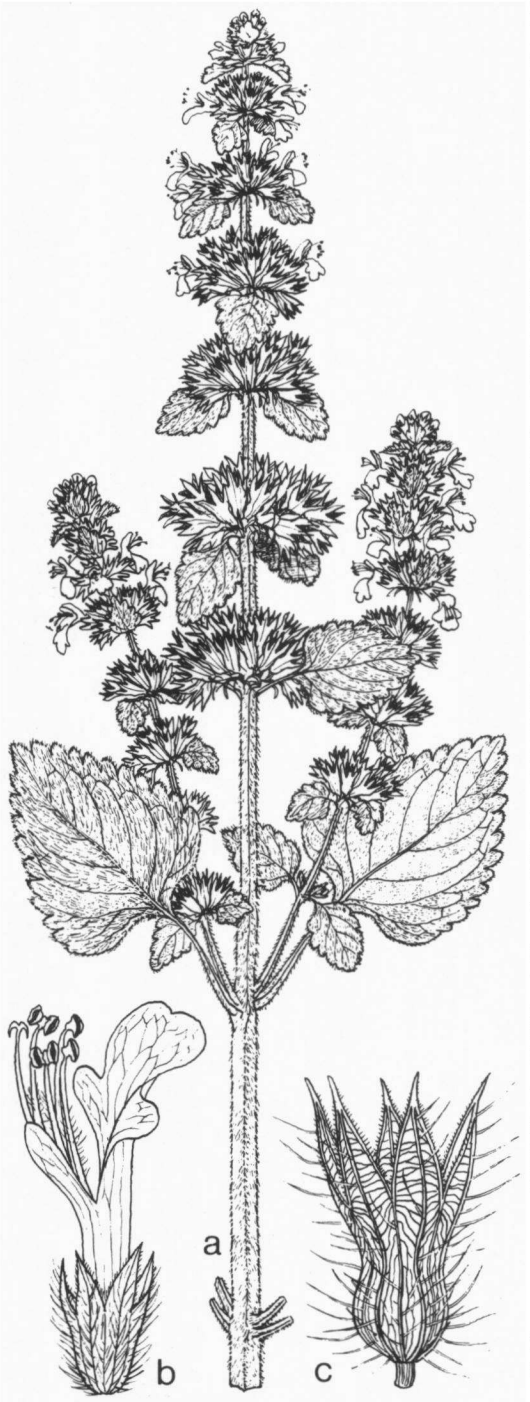
Ecol. Open and waste, sunny places, grasslands, in settled areas, also in teak-forests, common, under everwet and seasonal climatic conditions, 1–600(–*c.* 1700) m. *Fl.* Jan.–Dec.

Vern. *Malabar catmint*, E; Sumatra: *sibo*, *tibo*, Karo, *batu-babra*, M; Java: *babadotan beureum*, *b. bodas*, *bandotan putih*, *patuk bangkong*, S, *kihlleud*, J, *daun salangkeng*, Md, *rumput ati-ati*, *r. upuh*, M; Philippines: *kabling-laláke*, *kadlingparang*, *talingharap*, Tag., *lilltan*, *litalit*, *subasuba*, Ilk., *sauang sauang*, Mbo.; Celebes: *balotji*, *mankuru-im-parab*.

Uses. According to RIDLEY (*l.c.*) this is an excellent plant for hive bees. HEYNE (1927) mentions that in Java a decoction of the leaves is internally used for gravel, and in the Philippines it is said to be antirheumatic and stomachic, and good for gastric catarrh and intermittent fever (QUISUMBING, *l.c.*). The leaves would contain a volatile oil and a bitter alkaloid. In Malaya the plant is commonly used in cakes of sago (BURK. Dict. 1935, 160). From Sumba reported to be a fetid herb with aromatic-scented flowers.

Note. The flower colour varies considerably.

2. Anisomeles malabarica (L.) R.BR. *ex* SIMS, Bot. Mag. 46 (1819) t. 2071; BTH. in Wall. Pl. As. Rar. 1 (1830) 59; in DC. Prod. 12 (1848) 456; HOOK. *f.* Fl. Br. Ind. 4 (1885) 673; PRAIN, J. As. Soc. Beng. 74, ii (1907) 716; RIDL. Fl. Mal. Pen. 2 (1923) 649;



MUKERJEE, Rec. Bot. Surv. India 14 (1940) 153; KENG, Gard. Bull. Sing. 24 (1969) 37. — *Nepeta malabarica* L. Mant. 2 (1771) 566. — *A. salviifolia* R.BR. Prod. (1810) 503; BTH. Lab. Gen. Sp. (1835) 702; in DC. Prod. 12 (1848) 455; MIQ. Fl. Ind. Bat. 2 (1859) 976; BTH. Fl. Austr. 5 (1870) 89; K.SCH. & HOLLR. Fl. Kais. Wilh. Land (1889) 118; WARB. Bot. Jahrb. 13 (1891) 425; K.SCH. & LAUT. Fl. Schutzgeb. (1900) 528; MANSFELD, Bot. Jahrb. 62 (1929) 376; DOMIN, Bibl. Bot. 22 (Heft 89) (1929) 1121, *incl. var. moschata* (R.BR.) DOMIN, *var. inodora* (R.BR.) DOMIN; KENG, Gard. Bull. Sing. 24 (1969) 37; HENTY & PRITCHARD, Bot. Bull. Lae 7 (1975) 103, fig. — *A. moschata* R.BR. Prod. (1810) 503. — *A. inodora* R.BR. *l.c.* — *A. candicans* (*non* BTH. 1830) DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 396; MIQ. Fl. Ind. Bat. 2 (1859) 976. — *A. intermedia* WIGHT *ex* BTH. Lab. Gen. Sp. (1835) 703; BTH. in DC. Prod. 12 (1848) 456. — *Epimeredi salviifolius* (R.BR.) ROTHMALER in Fedde, Rep. 53 (1944) 12. — *Epimeredi malabaricus* (L.) ROTHMALER, *l.c.*

Subshrubby, 0.5–1.5 m. Stem and branches densely villose or woolly. *Leaves* membranaceous to thick-chartaceous, oblong to narrowly ovate, 3–8 by 1.5–3 cm, acute, crenate-serrate, base broadly acute or shortly cuneate, entire, densely woolly beneath, sparsely hirsute above; petiole 0.5–2.5 cm, softly woolly. *Flowers* many (10–15 or less) in dense axillary whorls, the whorls distantly disposed below, more or less approximate above, forming an interrupted spicate inflorescence. Bracts linear-lanceolate to lanceolate, 1–3 mm long. *Calyx* tubular-campanulate, 6–8 mm long, in fruit 8–10 mm, hirsute or densely villose externally, teeth lanceolate, much shorter (less than $^1/_3$) than the tube, ciliate. *Corolla* lilac or pale blue, 6–10 (–14) mm long, puberulent. Filaments puberulent or pubescent. *Nutlets* ellipsoid, 2 by 1 mm, smooth and shining.

Distr. Mauritius, continental SE. Asia (Ceylon, India, Burma, Thailand, Indo-China) to tropical Australia; in *Malesia:* Penang (2 old coll.), Lesser Sunda Is. (Timor), the South Moluccas (Babar, Tanimbar), New Guinea (W.–E.), and Bismarck Arch.

Ecol. Open, often waste places, mostly under seasonal climatic conditions, at low altitude. *Fl.* Febr.–Sept.

Notes. FERN.-VILLAR (Nov. App. 1880, 165) mentioned this species to occur in the Philippines, but MERRILL excluded it (En. Philip. 3, 1923, 413), and no material is available to sustain this record.

The species is taken here in the broad sense. BENTHAM already referred to the variability of the Australian material and remarked that Australian forms approached very near to a few of narrow-leaved Indian specimens. Both leaf-shape and indumentum vary a great deal.

Fig. 8. *Anisomeles indica* (L.) O. K. *a.* Habit, × $^2/_3$, *b.* flower, *c.* fruiting calyx, both × 4 (BOERLAGE *s.n.*).

9. ELSHOLTZIA

WILLD. in Roem. & Usteri, Mag. 4, 11 (1790) 3; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 327; KENG, Gard. Bull. Sing. 24 (1969) 73. — *Aphanochilus* BTH. Bot. Reg. *sub* t. 1282 (1829). — **Fig. 9–10.**

Herbs or undershrubs. *Verticillasters* in spike-like or paniculate inflorescences, slender or stout, terete or secund. Bracts linear to lanceolate, (in Mal. *spp.*) usually small. *Calyx* ovoid or campanulate, 5-toothed, teeth unequal. *Corolla* tubular, shortly exserted, straight or incurved; limb 4- or 5-lobed, obliquely 2-lipped, upper lip erect, notched, lower lip spreading, 3-lobed. *Stamens* 4, divergent or distant, often slightly unequal; anthers 2-celled, cells divaricate or at length confluent; filaments glabrous. Disk produced behind the ovary, oblique. Style subequally 2-fid with subulate lobes. *Nutlets* minute, ovoid, glandular and (in Mal. *spp.*) pubescent.

Distr. About 60 *spp.*, in the northern temperate to tropical part of the Old World, 1 *sp.* in Ethiopia, 1 *sp.* in Europe, centering in Asia; in *Malesia:* 2 *spp.* in Sumatra, Java, the Lesser Sunda Is., and SW. Celebes.

Ecol. In Malesia characteristic of the montane to subalpine zone, sometimes gregarious.

KEY TO THE SPECIES

1. Verticillasters consisting of 2–12 flowers, apart, secund, forming a spike-like inflorescence. Calyx 2 mm (in fruit 2·5–3 mm) long, tube gibbous, sparsely short-haired . . . . . **1. E. blanda**
1. Verticillasters consisting of many (usually over 15) flowers, closely approximate, terete, in dense spike-like or paniculate inflorescences. Calyx tubular, not gibbous, 2–4.5 mm long, in fruit 3–6.5 mm, sparsely or densely covered with whitish hairs . . . . . **2. E. pubescens**

1. Elsholtzia blanda KENG, *nom. nov.*, based on the type of *Aphanochilus blandus* BTH.: WALLICH, Cat. (1829) *n.* 1550. — *Perilla elata* D. DON, Prod. Nep. (1825) 115, *non E. elata* Z. & M. 1845. — *Aphanochilus blandus* BTH. Bot. Reg. sub t. 1282 (1829), *nomen*; in Wall. Pl. As. Rar. 1 (1830) 29, *descr.*; *ibid.* 2 (1830–31) 19; Bot. Mag. 58 (1831) t. 3091. — *E. blanda* BTH. Lab. Gen. Sp. (1833) 162; in DC. Prod. 12 (1848) 160; HOOK. *f.* Fl. Br. Ind. 4 (1885) 643; STEEN. Arch. Hydrobiol. Suppl. 10 (1932) 323; Bull. Jard. Bot. Btzg III, 13 (1934) 222; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 89; KENG, Gard. Bull. Sing. 24 (1969) 73, f. 12.

Herb, woody below, *c.* 1 m. Stem often branched, puberulous or hoary. *Leaves* elliptic lanceolate, 3–5 by 0.5–1 cm, acuminate, base attenuate, narrowed into the petiole, coarsely serrate, glabrous above, puberulous and dark glandular beneath; petiole 0.5 cm. *Verticillasters* 2–12-flowered, closely apart, secund, in spike- or panicle-like inflorescences, 5–12 cm long. Bracts lanceolate, 1–2.5 mm. *Calyx* urceolate, 1.5–2 mm long, in fruit 2–3 mm, glandular pubescent without; mouth of fruiting calyx slightly contracted; teeth erect, lanceolate. *Corolla* campanulate, yellowish green or whitish, 2.5–3 mm long, 2-lipped, sparingly pubescent. *Stamens* in 2 pairs, subequal; filaments pubescent. *Nutlets* broadly ellipsoid, flattened, *c.* 0.7 mm long.

Distr. Continental SE. Asia (India, Burma, Thailand, to S. China); in *Malesia:* N. Sumatra (Toba region; Mts Singalang, Merapi & Talang).

Ecol. Forest edges, light forest, glades, open heathland, *c.* 1000–1800 m. *Fl.* April–Sept. Shoots and inflorescences are sometimes galled by aphids.

Vern. *Ser ser, silassie*, Sumatra.

Nomencl. After having described *Aphanochilus blandus* in 1829 BENTHAM soon afterwards (in Wall. Pl. As. Rar. 2: 19) found that it had earlier been described by D. DON as *Perilla elata*. In proposing the new combination under *Elsholtzia* he maintained his own epithet, emphatically citing *Perilla elata* as a synonym, whereby his new combination is illegitimate under the present Code. The epithet elata is already occupied in *Elsholtzia* and no other synonyms are available.

As the epithet *blanda* is established in botanical literature for nearly $1^1/_2$ century, it is for stability of nomenclature advisable to keep it in use. Therefore a new name is coined, based on the same type as that of BENTHAM, for which reason it is not a homonym (Art. 64) and in accordance with Art. 72 dates from this revision.

2. Elsholtzia pubescens BTH. Lab. Gen. Sp. (1833) 162; in DC. Prod. 12 (1848) 161; MIQ. Fl. Ind. Bat. 2 (1859) 965; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 222; BACK. & BAKH. *f.* Fl. Java 2 (1965) 632; *ibid.* 3 (1968) 657; KENG, Gard. Bull. Sing. 24 (1969) 76; STEEN. Mt. Fl. Java (1972) pl. 24–6. — *E. mollissima* BTH. Lab. Gen. Sp. (1833) 163; in DC. Prod. 12 (1848) 161; KOORD. Exk. Fl. Java 3 (1912) 150. — *E. elata* ZOLL. & MOR. Nat. Geneesk. Arch. N. I. 2 (1845) 5; BTH. in DC. Prod. 12 (1848)

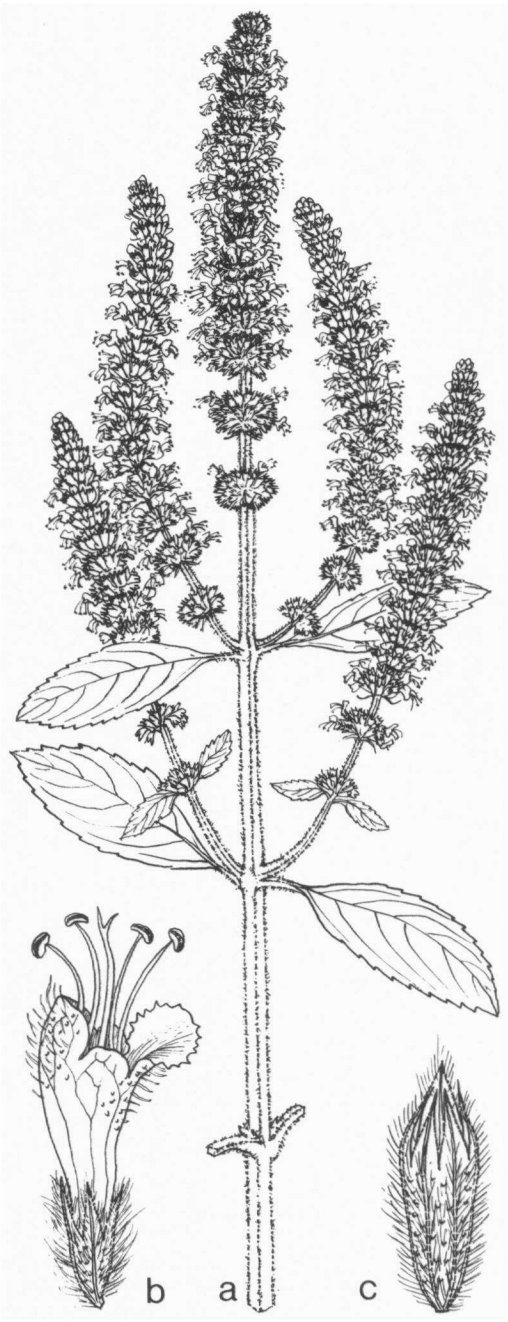


Fig. 9. *Elsholtzia pubescens* BTH. *a.* Habit, × ½, *b.* flower, *c.* fruiting calyx, both × 6 (*a–b* B. J. KARSTEN 32, *c* KOORDERS 29143).

161; JUNGH. Java 1 (1853) 633; MIQ. Fl. Ind. Bat. 2 (1859) 966; KENG, Gard. Bull. Sing. 24 (1969) 75. — *E. eriantha* BTH. in DC. Prod. 12 (1848) 161; MIQ. Fl. Ind. Bat. 2 (1859) 966; KOORD. Exk. Fl. Java 3 (1912) 150. — *Anisochilus euneurus* MIQ. Fl. Ind. Bat. 2 (1858) 957; KOORD. Exk. Fl. Java 3 (1912) 153. — **Fig. 9–10.**

Erect herb, 1–2 m or more. Stem and branches densely tomentose. *Leaves* membranaceous, narrowly lanceolate, ovate or elliptic, 5–8 by 2.5–3.5 cm, acute or acuminate, serrulate or serrate, base acute or attenuate, entire, sparingly hirsute above, velutinous or tomentose beneath; petiole 0.5–1.5 cm. *Verticillasters* 20–30-flowered, closely approximate (or widely apart below), forming terminal, spike-like or paniculate inflorescences, 7–10 cm. Bracts linear, linear-lanceolate to ovate, 2.5–4 mm, densely pubescent. *Calyx* tubular, narrowed at both ends, 2–4.5 mm long, in fruit 4–7.5 mm, with soft curled, appressed whitish hairs, teeth subequal, sharply pointed. *Corolla* white, 4–7 mm long. *Stamens* exserted, filaments puberulent. Style shortly 2-fid. *Nutlets* narrowly ellipsoid, 1–1.2 by 0.5 mm, puberulent and gland-dotted.

Distr. *Malesia:* Java (from Mts Tangkuban Prahu & Papandajan eastwards), Lesser Sunda Is. (Bali, Lombok, Sumba, Flores, Timor), the tip of the SW. Peninsula of Celebes (Mt Bonthain), ? New Guinea (NGF 3617).

Ecol. Open places, in grassfields, in *Casuarina junghuhniana* forest often in masses, also in Eucalypt forest in Timor, 1000–2950 m. *Fl.* June–Nov. An excellent honey producer for wild bees. Fig. 10.

Vern. *Djugul*, S, *djungul*, Bali, *kudèang*, J, *kadangu*, Sumba.

Uses. Leaves sometimes used as a vegetable.

Notes. *E. elata* Z. & M., in the precursor still recognized as distinct, is only a robust form with somewhat stouter, robust spikes and larger calyx (4–4.5 mm).

Related to *E. incisa* BTH. from India.

Fig. 10. Thickets of *Elsholtzia pubescens* BTH. (in front, 2 m high) are found in the pyrogenous mountain tjemara forest (*Casuarina junghuhniana*) on the Jang Plateau, East Java, *c.* 2000 m altitude, where *Pteridium* hardly ever fails (right lower edge). The sweet scent of *E. pubescens* attracts small bees and their honeycombs are a welcome delicacy (Photogr. VAN STEENIS).

10. EURYSOLEN

PRAIN, Sc. Mem. Med. Offic. Ind. 11 (1898) 43; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 275; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 226; KENG, Gard. Bull. Sing. 24 (1969) 77. — **Fig. 11.**

Herb or undershrub. *Flowers* small, in many-flowered verticillasters condensed in terminal and axillary spikes. *Calyx* tubular, 10-nerved, 5-toothed, teeth nearly equal, throat naked within. *Corolla* shortly exserted; tube annulate within, gibbous in front above the annulus; limb 2-lipped, upper lip erect, slightly concave, retuse at the tip, lower lip 3-lobed, spreading, midlobe broader than lateral ones. *Stamens* 4, in 2 pairs, the lower pair slightly longer; anthers ellipsoid, 2-celled in bud, later confluent and 1-celled; filaments puberulous. Disk uniform. Style shortly 2-fid, upper branch very short. *Nutlets* ovoid, subtriquetrous, papillose-glandular; scar of contact surface very large, lateral.

Distr. Monotypic, continental SE. Asia (Burma, Thailand to Yunnan); in *Malesia:* Central Sumatra, E. Java, and Lesser Sunda Is.

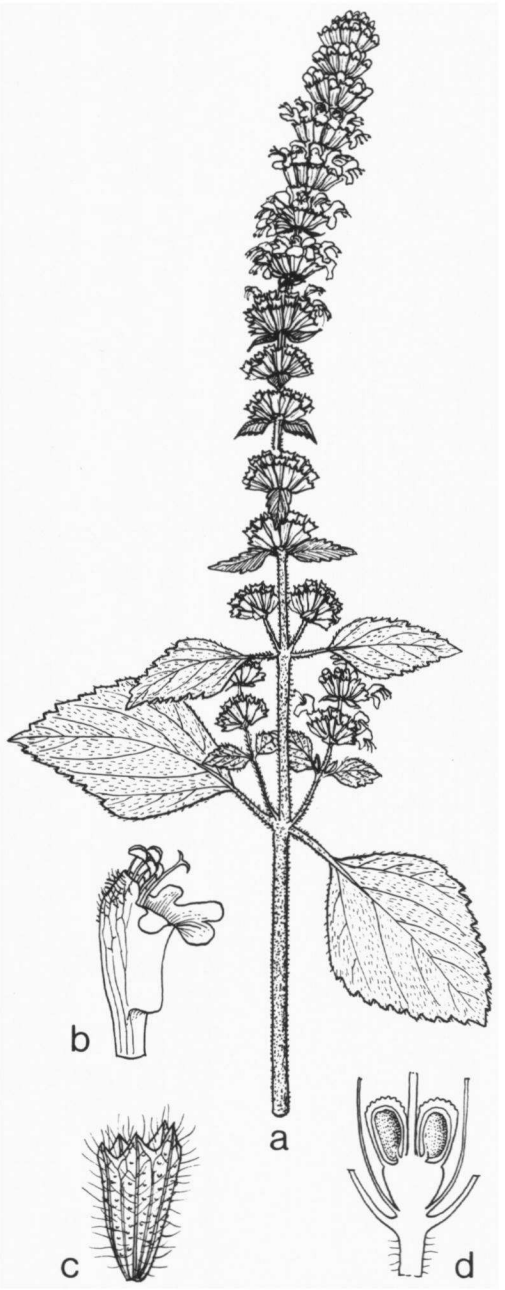


Fig. 11. *Eurysolen gracilis* PRAIN. *a*. Habit, × ²/₃, *b*. corolla, *c*. calyx, both × 4, *d*. LS of fruiting stage (*a* VAN STEENIS 11118, *b–c* BÜNNEMEIJER 9057, *d* after PRAIN).

1. Eurysolen gracilis PRAIN, Sc. Mem. Med. Offic. Ind. 11 (1898) 43; Ann. R. Bot. Gard. Calc. 9 (1906) 61, pl. 75; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 276; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 227; WU, Acta Phytotax. Sin. 8 (1959) 2; KENG, Gard. Bull. Sing. 24 (1969) 77, f. 13. — **Fig. 11.**

Herb or undershrub, 0.30–1 m. Stem and branches puberulous. *Leaves* membranaceous, ovate to rhomboid, 6–8 by 2.5–4 cm, acute or acuminate, serrate, glabrescent on both surfaces, base acute; petiole slender, 1.5–3 cm. *Flowers* 6–10(–30) in a verticillaster, in terminal or upper-axillary spikes, 8–15 cm long. *Calyx* tubular, 3–3.5 mm long, in fruit 4–4.5 mm, sparsely puberulous and papillose-glandular externally, but hardly 2-lipped. *Corolla* white, tubular, 5–6.5 mm long; limb 2-lipped; upper lip short. *Stamens* exserted. *Ovary* very shortly stalked. *Nutlets c.* 1 mm (immature).

Distr. Tropical SE. Asia; in *Malesia:* Central Sumatra (Mt Kerintji), E. Java (Mt Jang), and Lesser Sunda Is. (W. Sumbawa: Batu Lanteh, common in Flores).

Ecol. Open places in moist mountain valleys, 700–1800 m. *Fl.* Apr.–Jan. Though in Java and Sumbawa occurring in a seasonal climate region, the two rare localities in the mountains are both almost certainly local 'everwet islands'.

Note. The Malesian material slightly deviates in the more spaced verticillasters (internodes to 1.5 cm at the base of the spike) and the large number of flowers per verticillaster (30 or more).

11. LEONOTIS

R.BR. in W. T. Aiton, Hort. Kew. ed. 2, 3 (1811) 409; BTH. in DC. Prod. 12 (1848) 534; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 246.

Herbs or shrubs. *Flowers* rather large, densely crowded in axillary verticillasters. Bracts slender. *Calyx* funnel-shaped, 8–10-nerved, 8–10-toothed; mouth slightly oblique, uppermost tooth longest. *Corolla* as long as or longer than the calyx, 2-lipped; upper lip long, concave, villous, lower lip 3-lobed. *Stamens* 4, ascending under upper lip of corolla; lower pair longer; anther-cells divaricate, confluent. Disk equal. Style subulate, with the upper stigmatic segment reduced to a tiny tooth. *Nuts* oblong or obovoid, glabrous.

Distr. About 15 *spp.*, in tropical and southern Africa, one species occurring in warm parts of Asia and America as a weed, probably after having escaped from cultivation.

1. Leonotis nepetaefolia (L.) R.BR. in W.T.Ait. Hort. Kew. ed. 2, 3 (1811) 409; BTH. in Wall. Pl. As. Rar. 1 (1830) 59; Lab. Gen. Sp. (1834) 618; in DC. Prod. 12 (1848) 535; MIQ. Fl. Ind. Bat. 2 (1859) 984; HOOK. *f.* Fl. Br. Ind. 3 (1885) 8 (*'repetifolia'*); PRAIN, J. As. Soc. Beng. 74, ii (1907) 717; BOLD. Zakfl. (1916) 108; RIDL. Fl. Mal. Pen. 2 (1923) 655; DOCT.V.LEEUWEN, Trop. Natuur 14 (1925) 68, f. 1–4; BACK. Onkr. Suiker. (1931) 553, Atlas (1973) t. 525; SAYEEDUD-DIN, J. Bomb. Nat. Hist. Soc. 41 (1940) 795; STEEN. Fl. Scholen Indon. (1951) 338; BACK. & BAKH. *f.* Fl. Java 2 (1965) 622. — *Phlomis nepetaefolia* LINNÉ, Sp. Pl. (1753) 586.

Annual herb, 1–2.5 m. Stem and branches deeply furrowed, finely pubescent. *Leaves* membranaceous, oblong-ovate to ovate, 4.5–6(–12) by 3–5(–9.5) cm, acute or abruptly acuminate, base rounded to truncate, abruptly narrowed into the petiole (2–7.5 cm), coarsely crenate serrate, finely pubescent on both surfaces. *Flowers* in 2–8 distant, globose, dense verticillasters, 2.5–7 cm ∅, composed of several, vertically deflexed, 2-seriate, many-flowered cincinni. Bracts linear-subulate, 0.5–1.4 cm, pubescent, strongly deflexed, hidden by the flowers. *Calyx* 1.2–1.5 cm long, in fruit 1.5–2 cm, incurved, ribbed, short soft hairy below, and with long white hairs above; teeth 8–9, unequal, sharply pointed. *Corolla* orange, 2–2.5 cm long, the tube with 3 rings of hairs inside; upper lip arched, 1–1.2 cm long, outside densely set with orange-coloured hairs. *Nutlets* oblong-obovoid, 2.5–3 mm long, truncate above, dull black.

Distr. Native of tropical Africa, naturalized in many parts of the tropics, in *Malesia:* Sumatra, Banka, Malaya, Singapore, and Java (common in West, more rare in Central and East Java).

Ecol. A weed, found along roadsides, in waste places, fallow fields near ponds and lakes, *etc.*, 5–1350 m. Pollinated by birds (*cf.* DOCTERS VAN LEEUWEN). *Fl.* Jan.–Dec.

Vern. *Lopend vuurtje*, Dutch; *nampong*, S.

Uses. BURKILL (Dict. 1935, 1329) stated that in Malaya the leaves are medicinal for wounds. Cultivated in Malaya.

Cultivated

Leonotis leonurus (L.) R.BR. in W.T.Air. Hort. Kew. ed. 2, 3 (1811) 410; BACK. & BAKH. *f.* Fl. Java 2 (1965) 622.

A native of tropical Africa, formerly cultivated in Central Java as a hedge plant near Sĕla, on the saddle Merbabu-Merapi at *c.* 1200 m.

12. LEONURUS

LINNÉ, Gen. Pl. ed. 5 (1754) 254; Sp. Pl. (1753) 584; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 256; KENG, Gard. Bull. Sing. 24 (1969) 97.

Erect herbs. *Leaves* often lobed or palmate-pinnately dissected. *Verticillasters* of numerous flowers axillary. Bracts subulate. *Calyx* turbinate, 5-nerved and 5-toothed, teeth more or less equal, spinescent, spreading. *Corolla* naked or annulate within, 2-lipped; upper lip entire, erect, convex; lower lip 3-lobed, midlobe very large, deeply notched. *Stamens* 4, in 2 pairs, ascending under the upper lip; lower pair slightly longer; anthers 2-celled, cells parallel, connivent. Disk uniform. Style equally 2-fid, branches obtuse or subulate. *Nutlets* dry, smooth, triquetrous, truncate at apex.

Distr. About 8 *spp.*, mainly in temperate Asia and Europe, one introduced and sometimes cultivated in the tropics and *Malesia*.

1. Leonurus sibiricus LINNÉ, Sp. Pl. (1753) 584; BURM. *f.* Fl. Ind. (1768) 127; BL. Bijdr. (1826) 828; DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 397; Herb. Timor. descr. (1835) 69; ZOLL. Nat. Geneesk. Arch. N. I. 2 (1845) 591; BTH. in DC. Prod. 12 (1848) 501; MIQ. Fl. Ind. Bat. 2 (1859) 978; Sumatra (1860) 572; KURZ, Nat. Tijd. N. I. 27 (1864) 213; F.-VILL. Nov. App. (1880) 165; HOOK. *f.* Fl. Br. Ind. 4 (1885) 678; VIDAL, Phan. Cuming. Philip. (1885) 136; Rev. Pl. Vasc. Filip. (1886) 214; PRAIN, J. As. Soc. Beng. 74, ii (1907) 720; KOORD. Exk. Fl. Java 3 (1912) 147; MERR. Fl. Manila (1912) 412; Sp. Blanc. (1918) 336; En. Philip. 3 (1923) 412; RIDL. Fl. Mal. Pen. 2 (1923) 651; BACK. Onkr. Suiker. (1931) 558, Atlas (1973) t. 530; BURK. Dict. (1935) 1329; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 193; HEND. Mal. Nat. J. 6 (1950) 389, f. 358i; QUIS. Medic. Pl. Philip. (1951) 819; BACK. & BAKH. *f.* Fl. Java 2 (1965) 623; KENG, Gard. Bull. Sing. 24 (1969) 98, f. 16. — *L. tataricus* (*non* L. 1753) BURM. *f.* Fl. Ind. (1768) 127. — *L. marrubiastrum* (*non* L.) BURM. *f. l.c.* — *L. japonicus* HOUTT. Nat. Hist. Pl. 9 (1778) 366, t. 57, f. 1; HARA, J. Jap. Bot. 51 (1976) 226, *incl. f. niveus*. — *Stachys artemisiae* LOUR. Fl. Coch. (1790) 365; BLANCO, Fl. Filip. (1837) 476; ed. 2 (1845) 331 ('*Starchis*'); ed. 3, 2 (1878) 249, t. 259. — *L. heterophyllus* SWEET, Hort. Brit. (1827) 321; KUPRIANOVA, Fl. URSS 21 (1954) 156; H. W. LI, Acta Phyt. Sin. 12 (1974) 214. — *L. artemisia* (LOUR.) S.Y. HU, J. Chin. Univ. Hongkong 2 (1974) 381, f. 1, *incl. var. albiflorus*.

Annual or perennial, 0.5–1.5 m. Stem 4-angled, furrowed, softly pubescent or glabrescent. *Leaves* chartaceous, upper ones linear, 4–5 cm, lower and basal ones ovate or deltoid in outline, 5–7 by 3–4.5 cm, palmati-pinnately partite or dissected, with linear incised segments, glabrous or glabrescent above, often glaucous and pubescent on the nerved beneath; petiole 2–4 cm. Bracts subulate or spinescent, 4–10 mm. *Calyx* 4–5 mm long, in fruit 6–7 mm, glabrous or sparingly pubescent, glandular, teeth subulate. *Corolla* white, pink, or reddish, 10–11(–15) mm long; tube often obliquely annulate within; upper lip obovate, pubescent outside; midlobe of lower lip obcordate, pubescent. *Filaments* included; anthers glandular. *Nutlets* ellipsoid, brown, 2 mm.

Distr. Native in temperate Asia, now distributed in many warm and tropical countries; in *Malesia:* NE. Sumatra (Asahan), Malay Peninsula (also Singapore), Banka, Borneo (Sarawak), Philippines (Batan Is., Luzon, Mindanao), Celebes, Java (throughout), Lesser Sunda Is. (Bali, Timor), Moluccas.

Ecol. Waste places, river-banks, railway embankments, always in settled land, still local and as a whole fairly rare, sometimes cultivated as an ornamental or for medicinal purpose and escaped, under both everwet and seasonal climatic conditions, 1–2000 m. *Fl.* Jan.–Dec. (in Java).

Taxon. The specific name *Leonurus sibiricus* L. has been applied to a very widely distributed species from Siberia, China, Korea, Japan to India and Malesia. KUPRIANOVA (1954) first pointed out that two entities are involved. The northern entity occurs from Siberia, Mongolia, to N. China (Inner Mongolia, Hupeh, Shansi, and Shensi) (*fide* LI, 1974), and the southern entity is found in Amur, Ussuri, Korea, Japan, China (incl. Tibet), India, and Malesia (*fide* HARA, 1976). Thus these two entities are slightly sympatric around N. China. The northern entity differs from the southern one, as summarized by LI (1974) in the following features: (1) the more finely dissected linear leaf-segments (usually 1–3 mm wide), (2) the larger corolla (to 1.8 and sometimes even to 2.3 cm long) with soft hairs externally, (3) the lower corolla-lip about $^1/_3$ shorter than the upper one, and (4) the calyx, especially in its middle portion, being covered with soft hairs.

Since the type species of *L. sibiricus* was collected from Siberia, thus a new name for the southern entity seems to be needed. Thus far three names have been suggested. One name, *L. heterophyllus* SWEET (1827), was favoured by KUPRIANOVA (1954) and LI (1974); another, *L. japonicus* HOUTT. (1778) was favoured by HARA (1976); and a new combined name, *L. artemisia* (LOUR.) S. Y. HU (1974) was made based on *Stachys artemisia* LOUR. (1790).

It appears that the differences between the northern and southern entities as understood, are no more than ecotypical, thus they seem to warrant subspecific, rather than specific distinction. The specific name *L. sibiricus* L. is therefore maintained in this treatment. If in the future some new traits are discovered to support the segregation of these two entities into two species, then *L. japonicus* HOUTT. would seem to be an appropriate name for the southern entity.

Vern. *Lion's tail, Siberian motherwork*, E; *dĕndĕrĕman, padang dĕrman*, S. *gindjĕan*, J; Sumatra: *si saratang*, M; Mal. Pen.: *sĕranting, tĕbungaga*, M; Philippines: *kamariang-sungsong*, Tag.; Moluccas: *gofu hairan roriha*, Ternate, *laranga kohari*, Tidore.

Uses. In Java considered a substitute for opium, but its chemical properties are harmless (HEYNE, Nutt. Pl. ed. 3, 1950, 1327). An infusion in spirits is sometimes given after childbirth. In Malaya employed as a poultice against head-aches. A decoction of the leaves is used in the Philippines as a diuretic. HOOPER (Gard. Bull. S. S. 6, 1929, 82) stated it to be a general remedy in puerperal and menstrual diseases. HARTLEY (Lloydia 32, 1969, 266) listed it as anti-cancerogenous.

Doubtful

Leonurus cardiaca (*non* L.) THUNB. Fl. Jav. (1825) 15, *nomen*. Java. Identity unknown.

Leonurus cordifolia NORONHA, *L. indica* NORONHA, *L. marrubifolia* NORONHA, Verh. Bat. Gen. 5 (1790) ed. 1, art. IV, 19, repr. 79, *nomina*. Java. Identity unknown.

13. LEUCAS

R. BR. Prod. (1810) 504; BTH. in B. & H. Gen. Pl. 2 (1876) 1213; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 250; J. K. MORTON, J. Linn. Soc. Lond. Bot. 58 (1962) 263; KENG, Gard. Bull. Sing. 24 (1969) 100. — **Fig. 12–14.**

Herbs or undershrubs. Stems and leaves often villous. *Flowers* medium or small, in dense axillary, distant verticillasters; sometimes forming terminal, capitate clusters. *Calyx* 8–10-nerved, often striate; mouth equal or oblique; teeth 8–10, usually unequal, posterior one largest. *Corolla* (in Mal.) white, tube slender, often not exserted, with a hairy ring inside or not; upper lip erect, concave, the margins often fringed with dense velutinous hairs; lower lip 3-fid, spreading, midlobe very large. *Stamens* 4, didynamous; upper pair shorter; all ascending under upper lip, cells divaricate, ultimately confluent. Disk entire or lobed, uniform or enlarged anteriorly. Style subulate; upper branch minute or obsolete. *Nutlets* ovoid, triquetrous, obtuse.

Distr. About 60 *spp.*, chiefly in warm and tropical parts of Africa and Asia; in *Malesia* 6 *spp.*

KEY TO THE SPECIES

1. Verticillasters few, usually congested into a terminal cluster or clusters. Mouth of calyx tube oblique, the upper part projected forwards.
 2. Calyx tube tubular, 8–9 mm long (in flower); calyx teeth 10. Bracts lanceolate, as long as the calyx **1. L. aspera**
 2. Calyx tube turbinate, 5–7 mm long (in flower). Bracts linear, shorter than the calyx.
  3. Plant usually hispidous. Leaves elliptic or narrowly lanceolate. Calyx mouth open; teeth 8, subequal, the posterior one only slightly larger than the others. . . . . **2. L. zeylanica**
  3. Plant usually finely puberulous. Leaves generally linear-lanceolate. Calyx mouth often constricted, especially in fruit; teeth 7–10, very unequal, the posterior one much longer than the others **3. L. lavandulifolia**
1. Verticillasters few to many, on distant nodes, not congested into a terminal cluster or few clusters.
 4. Calyx tube curved, the mouth oblique with the upper part projected forwards. Plants sparsely hirsute. Flowers numerous (usually over 30) in a verticillaster . . . . . **4. L. martinicensis**
 4. Calyx tube straight, the mouth not oblique. Plants densely woolly or tomentose. Flowers relatively fewer (generally below 20) in a verticillaster.
  5. Bracts subtending the flowers nearly as long as the calyx. Stem and branches densely brownish woolly . . . . . **5. L. marrubioides**
  5. Bracts subtending the flowers minute. Stem and branches tomentose . . . . . **6. L. flaccida**

1. Leucas aspera (WILLD.) LINK, En. Hort. Berol. 2 (1822) 113; SPRENG. Syst. 2 (1825) 743; BTH. Lab. Gen. Sp. (1834) 615; in DC. Prod. 12 (1848) 532; MIQ. Fl. Ind. Bat. 2 (1859) 982; HOOK. *f.* Fl. Br. Ind. 4 (1885) 690; KOORD. Exk. Fl. Java 3 (1912) 146; MERR. En. Philip. 3 (1923) 410; BACK. Onkr. Suiker. (1931) 558, Atlas (1973) t. 527; QUIS. Medic. Pl. Philip. (1951) 828; BACK. & BAKH. *f.* Fl. Java 2 (1965) 623; KENG, Gard. Bull. Sing. 24 (1969) 101; HENTY & PRITCHARD, Bot. Bull. Lae 7 (1975) 107, fig. — *Phlomis aspera* WILLD. En. Hort. Berol. 2 (1809) 621. — *L. minahassae* KOORD. *ex* BOERL. Handl. 2, 2 (1899) 716, *nomen*; KOORD.-SCHUM. Syst. 3 (1914) 112, *nomen.*

Annual herb, 30–60 cm, often branched. Stem and branches hispid, with spreading hairs. *Leaves* membranaceous, linear-lanceolate, or narrowly lanceolate, 4–6 by 0.8–1 cm, acuminate, base attenuate, margin remotely crenate, tomentose on both surfaces, pilose on nerves; petiole 0.5–1 cm long, densely hispid. *Flowers* subsessile, in terminal verticillasters, forming a globular head 1.5–2.5 cm ∅. Bracts narrowly lanceolate, 8–10 mm long, ciliate along the margins. *Calyx* 7–10 mm (only slightly accrescent in fruit), cylindric, tube pilose, 10-nerved and 10-toothed, mouth strongly oblique, teeth erect, the posterior one longest. *Corolla* 15–16 mm long, strongly curved, with a hairy ring inside near the middle; upper lip 2 mm long, densely velutinous, lower lip 6 mm sparsely pubescent. Anthers red. *Nutlets* narrowly ovoid, 2.5 by 0.8 mm, ventral surface triquetrous, dorsal one rounded, finely granulate or nearly smooth, black.

Distr. Continental SE. Asia (India, Burma, Thailand, Indo-China) to Mauritius; in *Malesia:* Malay Peninsula (incl. Penang), Java (vicinity of Djakarta; Central–East Java; Madura I.; Kangean Is.), Philippines (Luzon, Mindoro, Mindanao), N. Celebes (Minahassa), and E. New Guinea (Morobe Distr., one coll.).

Ecol. Various habitats, mostly grassy plains, maize fields, open dry sandy soils, waste places,

teak-forest, railway embankments, dunes, locally often common, from sea-level to *c.* 500 m. *Fl.* Jan.–Dec.

It is curious to note that whereas in Java it is preferring the distinctly seasonal areas, growing in profusion in the very driest areas, it is also found in Penang and NE. Celebes with an everwet climate.

Vern. Java: *patji-patji*, M, *lènglèngan*, *ngangègan*, J; Philippines: *karukansóli sula-sulasihan*, Tag., *pansi-pánsi*, Ting., Tag., Bis., *paysi-páysi*, Bis., *sipsipan*, Pamp.

Uses. In the Philippines it is said that the crushed plant is applied hot to wounds (QUISUMBING, *l.c.* 820). TAVERA (Pl. medic. Filip. 1892, 199) stated that bruised leaves are used against bites of snakes and poisonous insects.

Note. According to BACKER (1931, *l.c.*) and ADELBERT *L. aspera* is possibly only a form of *L. zeylanica*, and can sometimes hardly be distinguished from it.

2. Leucas zeylanica (L.) R. BR. in Aiton, Hort. Kew. ed. 2, 3 (1811) 409; SPRENG. Syst. 2 (1825) 742 ('*ceylonica*'); BTH. Lab. Gen. Sp. (1834) 614; in DC. Prod. 12 (1848) 531; MIQ. Fl. Ind. Bat. 2 (1859) 982; HOOK. *f.* Fl. Br. Ind. 4 (1885) 689; HALL. *f.* Bull. Herb. Boiss. 6 (1898) 617, *incl. var.* β *latifolia* HALL. *f.*; K.SCH. & LAUT. Nachtr. Fl. Schutzgeb. (1905) 373; PRAIN, J. As. Soc. Beng. 74, ii (1907) 718; KOORD. Exk. Fl. Java 3 (1912) 146; MERR. Int. Rumph. (1917) 457; En. Philip. 3 (1923) 411; RIDL. Fl. Mal. Pen. 2 (1923) 650; BARTLETT, Pap. Mich. Ac. Sc. 6 (1926) 35; MERR. Pl. Elm. Born. (1929) 268; MANSFELD, Bot. Jahrb. 62 (1929) 378; BACK. Onkr. Suiker. (1931) 555, Atlas (1973) t. 526; BURK. Dict. (1935) 1338; HEND. Mal. Nat. J. 6 (1950) 392, t. 362; QUIS. Medic. Pl. Philip. (1951) 821; BACK. & BAKH. *f.* Fl. Java 2 (1965) 623; KENG, Gard. Bull. Sing. 24 (1969) 101. — *Phlomis zeylanica* LINNÉ, Sp. Pl. (1753) 586. — *Leonurus marrubiastrum* (*non* L.) BURM. *f.* Fl. Ind. (1768) 127. — ? *Phlomis obliqua* THUNB. Fl. Jav. (1825) 15, *nomen.* — *Phlomis cephalotes* (*non* ROTH) BL. Bijdr. (1826) 830. — *Spermacoce ? denticulata* WALP. Nov. Act. Ac. Caes. Leop.-Car. 19 (1843) Suppl. 1, p. 352; Repert. 6 (1846) 29; F.-VILL. Nov. App. (1880) 113. — *L. malayana* HANCE *ex* WALP. Ann. Bot. Syst. 3 (1852) 269; MIQ. Fl. Ind. Bat. 2 (1859) 984. — *L. bancana* MIQ. Fl. Ind. Bat. Suppl. 1 (1861) 572; KOORD.-SCHUM. Syst. Verz. 1 (1910) fam. 254, p. 3. — **Fig. 12.**

Annual herb, 20–60 cm, often branched. Stem and branches hispid. *Leaves* membranaceous, lanceolate, 4–5.5 by 1–1.3 cm, acuminate, base attenuate, entire; margin elsewhere remotely serrate, hirsute on both surfaces; petiole 0.2–0.8 cm, hispid. *Flowers* subsessile, in terminal verticillasters, usually 6–8 forming a globular head, 1.5–2 cm ∅, occasionally also axillary verticillasters occur below. Bracts linear, 4–5 mm, spinescent. *Calyx* turbinate 5–6 mm long, in fruit 7–8 mm, slightly curved, hispid, 10-nerved and 8-toothed; mouth slightly oblique, pubescent within; uppermost tooth slightly longer than the rest. *Corolla* 8 mm long, tube with a hair-ring near the middle; upper lip obovate, white-woolly; lower lip patent, 3–4 mm long, 3-lobed. Anthers red. *Nutlets* obovoid, 3 by 1 mm, apex truncate; ventral surface angular, dorsal rounded; smooth.

Distr. Throughout S. and SE. Asia, throughout *Malesia*, but rather few collections from Borneo and East Malesia, not yet collected in Celebes.

Ecol. Sunny dry localities, often on sandy soil, paddy dams, waste places, roadsides, from the lowland to *c.* 1000 m. *Fl.* Jan.–Dec. Leaf-galls occur, caused by aphids.

Vern. Malaya: *katumbit*, *ketumbak luka-luka*; Java: *patji patji*, S, *lènglèngan*, J; Philippines: *guma-guma*, Sul., *masibulan*, Gad.

Uses. In spite of the disagreeable smell of the plant and the very bitter taste, it is sometimes used in Bali as a vegetable (in *sajor*), *cf.* HEYNE, Nutt. Pl. (1927) 1327. Furthermore the sap of the leaves is used for sores of eyes and nostrils. A poultice for scabies, itches, head-aches, vertigo, and colic. Also used as a vermifuge with children.

Fig. 12. *Leucas zeylanica* (L.) R. BR. Along a roadside at Pontianak (Photogr. A. ELSENER, Febr. 1961).

3. Leucas lavandulifolia J.E. SM. in Rees, Cycl. 20 (1812) *n.* 2; PRAIN, J. As. Soc. Beng. 74, ii (1907) 719; MERR. Fl. Manila (1912) 412; Int. Rumph. (1917) 457; Sp. Blanc. (1918) 336; COSTERUS & J.J. SM. Ann. Jard. Bot. Btzg 32 (1922) 29; MERR. En Philip. 3 (1923) 411; RIDL. Fl. Mal. Pen. 2 (1923) 650; BACK. Onkr. Suiker. (1931) 557, Atlas (1973) t. 529; STEEN. Arch. Hydrobiol. Suppl. 10 (1932) 323; BURK. Dict. (1935) 1338; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 167; QUIS. Medic. Pl. Philip. (1951) 820; BACK. & BAKH. *f.* Fl. Java 2 (1965) 623; KENG, Gard. Bull. Sing. 24 (1969) 103. —*Phlomis linifolia* ROTH, Nov. Sp. (1821) 260; BL.

Bijdr. (1826) 829. — *Phlomis zeylanica* (*non* L.) BL. Cat. (1823) 15; BLANCO, Fl. Filip. (1837) 475 ('*ceilanica*'); ed. 2 (1845) 331; ed. 3, 2 (1878) 248. — *L. linifolia* (ROTH) SPRENG. Syst. 2 (1825) 743; BTH. Lab. Gen. Sp. (1834) 617, (1835) 744; HASSK. Cat. Hort. Bog. (1844) 133; ZOLL. Nat. Geneesk. Arch. N. I. 2 (1845) 591; BTH. in DC. Prod. 12 (1848) 533; MIQ. Fl. Ind. Bat. 2 (1859) 983; F.-VILL. Nov. App. (1880) 165; VIDAL, Phan. Cuming. Philip. (1885) 136; HOOK. *f.* Fl. Br. Ind. 4 (1885) 690; VIDAL, Rev. Pl. Vasc. Filip. (1886) 214; KOORD. Exk. Fl. Java 3 (1912) 146. — **Fig. 13–14.**

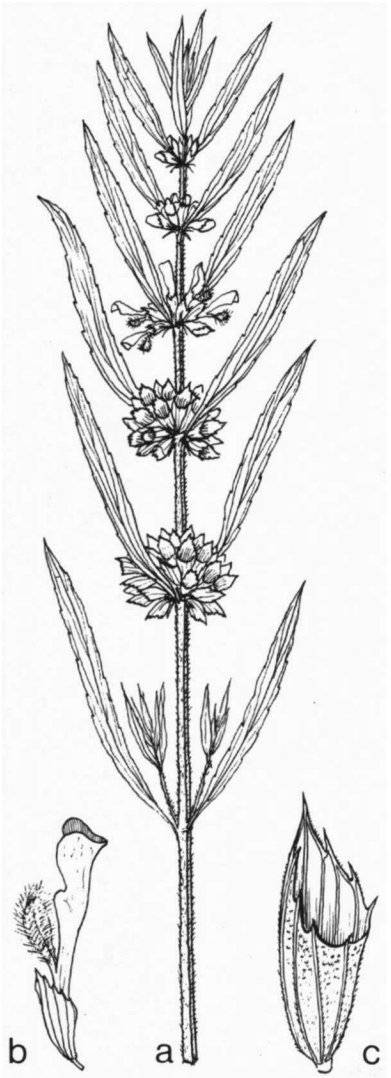


Fig. 13. *Leucas lavandulifolia* J. E. SM. *a.* Habit, × 2/3, *b.* flower, × 2, *c.* fruiting calyx, × 4 (*a*, *c* KOORDERS 23278, *b* BOERLAGE 58).

Fig. 14. *Leucas lavandulifolia* J. E. SM. Palembang (Photogr. DE VOOGD).

Erect, fetid, annual herb, 30–80 cm, often much-branched. Stem and branches pubescent, subglaucous. *Leaves* herbaceous, linear-lanceolate, rarely lanceolate, 4–6 by *c.* 0.5 cm, subsessile, acuminate, base attenuate, entire, margin elsewhere subentire or remotely and sparingly serrate. *Flowers* shortly pedicelled, in terminal and axillary, always leafy verticillasters, often congested towards apex and forming a cluster or clusters 1.5–2 cm ∅. Bracts linear, 3–4 mm, puberulous. *Calyx* obliquely turbinate, 6–7 mm long, in fruit 8–9 mm, glabrescent or puberulent; mouth oblique, pubescent within with white hairs, slightly constricted; teeth varying from 7–10, the uppermost one large and broad, others minute and spinescent. *Corolla* 10 mm long; tube annulate within near the middle; upper lip oblong, woolly; lower lip patent, the midlobe large, obovate. Anthers red-brown. *Nutlets* oblong, 2.5 by 1 mm, rounded at apex, inner surface angular, outer rounded,dark brown, pale at base.

Distr. Continental Asia (India to China) and throughout *Malesia*, though not yet collected in the Lesser Sunda Is.; once collected in Bawean I., and very rare in Borneo mainland and New Guinea (in Misool I. and once in Morobe Distr.). According to MERRILL also in the Mascarenes.

Ecol. Open waste places, coconut estates, roadsides, grassland, fallow agricultural land, paddy dams, locally often numerous, from sea-level to *c.* 1500 m. *Fl.* Jan.–Dec. Galls on young stems are caused by aphids.

Vern. *Patji-patji*, M; Sumatra: *lènggas*, M, (*daun*) *patjĕ patjĕ* or *patji-patji*, M; Java: *lènglèngan*, *lingko-lingkoan*, *nlènglèngan*, S, *lèngan*, J, *sarap nornor*, *sĕbasé*, Md; Bali: *patji patji*; Philippines: *karukansóli*, *salita*, *solasolasihan*, Tag., *pansi-pansi*, Tag., Bis., *kaskasúmba*, Ilk., *lañga-lañga*, Bik., *paysi-paysi*, Bis., *samparan*, Bul.; NE.

Celebes: *kèkombaän*, Manado; Moluccas: *daun hèran, d. sètan, gofi hairan*, Ternate, *hairani*, Halmaheira, *laranga*, Tidore, *langa-langa*, Bugin. lang.

Uses. Said to be in use for healing chronic leg sores, dermatosis, as an anthelmintic for round worms, and for appeasing affection of the nerves. In the Philippines (and also elsewhere) a poultice of fresh leaves is applied on wounds, especially on those with inflammation; in Java commonly applied on stinking wounds on animals in order to cleanse them from fly larvae, also for eye-sores and as a gargle. HEYNE, Nutt. Pl. (1927) 1326, mentioned further the use of the plant as a vegetable at Djakarta and fodder for cattle. There seems to be some application of the plant in veterinary surgery. A decoction of the roots is sometimes used for inflamed callosity.

4. Leucas martinicensis R. BR. Prod. (1810) 504; BTH. in Wall. Pl. As, Rar. 1 (1830) 60; Lab. Gen. Sp. (1834) 617; in DC. Prod. 12 (1848) 533; MIQ. Fl. Ind. Bat. 2 (1859) 983; HOOK. *f.* Fl. Br. Ind. 4 (1885) 688; PRAIN, J. As. Soc. Beng. 74, ii (1907) 718; RIDL. Fl. Mal. Pen. 2 (1923) 650.

Annual herb, 40–60 cm, often branched. Stem and branches obtusely 4-angled, hirsute. *Leaves* membranaceous, oblong or lanceolate-ovate, 5–8.5 by 2–4.5 cm, obtuse, base cuneate or rounded, entire; margin elsewhere serrate-crenate; appressed-hirsute on both surfaces; petiole 1–1.5 cm, hirsute. *Flowers* numerous (over 30), subsessile, in axillary, globose verticillasters (2–3.5 cm ∅) distributed on distant nodes. Bracts linear-lanceolate, 0.5–1 cm. *Calyx* tubular, 1–1.2 cm long, in fruit 1.4–1.6 cm, hirsute and woolly outside, 10-toothed; teeth lanceolate, ciliate, with spinescent tips, the uppermost largest, 5 mm long. *Corolla* 7–8 mm long, included in the calyx tube or barely exserted; not annulate within; the two lips subequal. *Nutlets* oblong-obovoid, *c.* 2 mm long, shining, dark-brown.

Distr. Tropical America, Africa, and continental Asia (India and Indo-China); in *Malesia:* Malay Peninsula: Perak, one collection.

Ecol. Waste places.

5. Leucas marrubioides DESF. Mém. Mus. Hist. Nat. Paris 11 (1824) 6, t. 3, f. 1; BTH. in Wall. Pl. As. Rar. 1 (1830) 61; Lab. Gen. Sp. (1834) 611; in DC. Prod. 12 (1848) 528; HOOK. *f.* Fl. Br. Ind. 4 (1885) 683; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 181; STEEN. Mt. Fl. Java (1972) pl. 25–9. — *L. javanica* BTH. *var. montana* ZOLL. Nat. Geneesk. Arch. N. I. 2 (1845) 569; MIQ. Fl. Ind. Bat. 2 (1859) 980 (ZOLLINGER 2187, *n.v.*). — *L. javanica* BTH. *f. montana* BACK. & BAKH. *f.* Fl. Java 2 (1965) 622.

Perennial herb, 0.5–1 m. Stem and branches densely brownish woolly. *Leaves* thin- to thick-membranaceous, ovate, broadly ovate or subrounded, 2.5–5 by 1.5–3.5 cm, acute or bluntly acute, base rounded or cordate, entire; margin elsewhere coarsely serrate or crenate, sericeous above, densely woolly beneath; petiole 0.2–1 cm, the upper leaves sessile. *Flowers* 10–20 in axillary verticillasters, distributed at distant nodes. Bracts linear-lanceolate, 7–10 mm, ciliate. *Calyx* tubular campanulate, straight, densely silky sericeous outside, 10–12 mm long, in fruit 11–13 mm, including the teeth; teeth 9–10, filiform, unequal, 2–3 mm, ciliate. *Corolla* tube equalling the calyx, annulate within, lower lip 4–5 mm long, woolly. *Nutlets* ellipsoid, 1.5–2 by 1 mm, obtuse at the apex, smooth.

Distr. Continental SE. Asia (Ceylon, Deccan Peninsula); in *Malesia:* eastern half of Java (Mts Lawu, Ardjuno, Tengger-Smeru, Jang).

Ecol. Mountain grasslands and tjemara forest (*Casuarina junghuhniana*), 200–2800 m. *Fl.* Jan.–Dec.

6. Leucas flaccida R. BR. Prod. (1810) 505; BTH. Lab. Gen. Sp. (1834) 609; in DC. Prod. 12 (1848) 526; MIQ. Fl. Ind. Bat. 2 (1859) 979; HOOK. *f.* Fl. Br. Ind. 4 (1885) 684; WARB. Bot. Jahrb. 13 (1891) 425; K.SCH. & LAUT. Fl. Schutzgeb. (1900) 528; MANSFELD, Bot. Jahrb. 62 (1929) 378; KENG, Gard. Bull. Sing. 24 (1969) 107. — *Phlomis chinensis* (*non* RETZ.) BL. Bijdr. (1826) 829. — *L. parviflora* BTH. in Wall. Pl. As. Rar. 1 (1830) 62. — *L. mollissima* WALL. *ex* BTH. in Wall. Pl. As Rar. 1 (1830) 62; Lab. Gen. Sp. (1834) 607; in DC. Prod. 12 (1848) 525; HOOK. *f.* Fl. Br. Ind. 4 (1885) 682; MERR. & ROLFE, Philip. J. Sc. 5 (1910) Bot. 381; MERR. En. Philip. 3 (1923) 411; Trans. Am. Phil. Soc. 24, 2 (1935) 339; HEND. J. Mal. Br. As. Soc. 17 (1939) 66; HATUS. Mem. Fac. Agr. Kagoshima Un. 5 (1966) 48; KENG, Gard. Bull. Sing. 24 (1969) 106. — *Phlomis moluccana* ROXB. (Hort. Beng. 1814, 95, *nomen*) Fl. Ind. ed. Carey 3 (1832) 11. — *L. decemdentata* (*non* R. BR.) BTH. Lab. Gen. Sp. (1834) 609; in DC. Prod. 12 (1848) 526, *p.p.*; FORBES, Wand. (1885) 354, 514. — *L. javanica* BTH. Lab. Gen. Sp. (1834) 611; HASSK. Cat. Hort. Bog. (1844) 133; ZOLL. Nat. Geneesk. Arch. N. I. 2 (1845) 591, *incl. var. littoralis* ZOLL., *excl. var. montana* ZOLL.; BTH. in DC. Prod. 12 (1848) 528; MIQ. Fl. Ind. Bat. 2 (1859) 980, *incl. var. horsfieldiana* MIQ., *excl. var. montana* ZOLL.; KURZ, Nat. Tijd. N. I. 27 (1864) 213; F.-VILL. Nov. App. (1880) 165; VIDAL, Phan. Cuming. Philip. (1885) 136; Rev. Pl. Vasc. Filip. (1886) 214; MERR. Fl. Manila (1912) 412; KOORD. Exk. Fl. Java 3 (1912) 146; MERR. En. Philip. 3 (1923) 410; BACK. Onkr. Suiker. (1931) 557, Atlas (1973) t. 528; BACK. & BAKH. *f.* Fl. Java 2 (1965) 622, *incl. f. javanica* BACK. *et f. littoralis* BACK., *excl. f. montana* BACK.; HATUS. Mem. Fac. Agr. Kagoshima Un. 5 (1966) 48; KENG, Gard. Bull. Sing. 24 (1969) 105. — *L. procumbens* (*non* DESF.) DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 398; Herb. Timor. descr. (1835) 70; MIQ. Fl. Ind. Bat. 2 (1859) 979. — *Isodeca flaccida* (R. BR.) RAFIN. Fl. Tell. 3 (1836) 88. — *L. chinensis* R. BR. β *obliganthos* HASSK. Flora 25, ii (1842) Beibl. 26. — *L. biflora* (*non* R. BR.) BTH. in DC. Prod. 12 (1848) 527; MIQ. Fl. Ind. Bat. 2 (1859) 980; KOORD.-SCHUM. Syst. Verz. 1 (1910) fam. 254, p. 3; KOORD. Exk. Fl. Java 3 (1912) 146. — *L. leucocephala* MIQ. Fl. Ind. Bat. 2 (1859) 981; KOORD. Exk. Fl. Java 3 (1912) 146. — *L. oxyodon* MIQ. Fl. Ind. Bat. 2 (1859) 981; KOORD. Exk. Fl. Java 3 (1912) 146. — *L. angularis* (*non* BTH.) HOOK. *f.* Fl. Br. Ind. 4 (1885) 684; O. K. Rev. Gen. Pl. 2 (1891) 523; KOORD. Nat. Tijd. N. I. 62 (1902) 218. — *L. marrubioides* DESF. *var. leucocephala* (MIQ.) O. K. Rev. Gen. Pl. 2 (1891) 523. — *L. marrubioides* (*non* DESF.) CERON, Cat. Pl. Herb. Manila (1892) 135. — *L. sericea* ELMER, Leafl. Philip. Bot. 1 (1908) 340.

Annual herb, 0.25–1.5 m. Stem and branches slender, covered with soft appressed or long villous hairs. *Leaves* thin- or thick-membranaceous, lanceolate to narrowly or broadly ovate, 2–3(–4) by 1–1.5(–3) cm, obtuse or acute, base rounded or cuneate, entire; margin elsewhere crenate-serrate or coarsely serrate, densely tomentose on both surfaces; petiole 0.2–1 cm. *Flowers* 2–8(–10) in spaced axillary verticillasters. Bracts linear, 2–3 mm, setose. *Calyx* tubular, 5–9 mm long, in fruit 7–10 mm, sparsely or densely tomentose outside, 10-toothed, teeth lanceolate or triangular at the base and abruptly narrowed apically. *Corolla* 13–16 mm long, tube short- or long-exserted, annulate within; lower lip slightly longer than the upper one. Filaments white; anthers red. *Nutlets* obovoid, 1.5 by 0.5 mm, subtruncate above, smooth.

Distr. Continental S. and SE. Asia (Burma, Thailand, Indo-China, S. China), Formosa, Ryukyu Is.; throughout *Malesia* (except Sumatra and Borneo) to NE. Australia.

Ecol. In open waste places, thickets and grassland, forest edges, or on limestone hills and littoral rocks, at low and high altitudes *e.g.* in tjemara forest in E. Java, from sea-level ascending to 3000 m. *Fl.* Jan.–Dec.

Vern. Java: *saja hetela*, S, *lènglèngan*, *paseg puti*, J, *patji-patji*, M, S; Lesser Sunda Is.: *bimig arial*, *daaratuk*, *kafi*; Philippines: *paling-harap*, Tag., *bagbagsangi*, *pangpangau*, Bon., *banbansit*, Ilk.; New Guinea: *maunz*, Habi'inz dial. Tairora, Kainantu.

Notes. In the precursor I have remarked under *L. javanica* (*l.c.* 106) that the species is very polymorphous. Still, I distinguished two other allied species, *L. mollissima* WALL. *ex* BTH. and *L. flaccida* R. BR., which differed mainly in the indument of the calyx, the relative length of the corolla tube, *etc.*

However, closer examination of descriptions and material has made it clear to me that these differences cannot be upheld, and that only one polymorphous, very widely distributed species is involved, the oldest name of which is *L. flaccida* R. BR.

Experimental and field work may show that here and there racial distinctions might be possible.

Excluded

Leucas chinensis R. BR.; BTH. Linnaea 6 (1831) 81; DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 398; Herb. Timor. descr. (1835) 70.

This record is based on CHAMISSO's collection from Manila, which is perhaps a form of *L. flaccida* R. BR.

Leucas pubescens BTH.; USTERI, Beitr. Kenntn. Philip. Veg. (1905) 124.

MERRILL noted that he had seen no specimens of this species, which is definitely known only from India, and that the identification of USTERI's specimen is probably wrong.

14. MELISSA

TOURN. *ex* LINNÉ, Gen. Pl. ed. 5 (1754) 257; Sp. Pl. (1753) 592; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 295; KENG, Gard. Bull. Sing. 24 (1969) 108. — **Fig. 15.**

Branched, perennial herbs. *Leaves* crenate. *Flowers* medium-sized, usually in few-flowered, axillary verticillasters. *Calyx* tubular, always 13-nerved, sometimes not very clearly so due to the reticulation of transverse veins; 2-lipped; upper lip 3-toothed, teeth broad and highly connate, often slightly recurved; lower lip 2-toothed, teeth long and subulate. *Corolla* straight or ± recurved, long and slender; upper lip emarginate or notched, erect; lower lip 3-lobed, flat and spreading. *Stamens* 4, didymous, ascending, posterior pair smaller and shorter than anterior pair; anthers 2-celled, cells divaricate. Disk equal-sided. Style lobes subequal. *Nutlets* obovoid, smooth and dark, often with a very prominent scar.

Distr. Species 3, in S. Europe and S. to SE. Asia, extending to S. China, Formosa, and *Malesia* (Sumatra, Java).

1. Melissa axillaris BAKH. *f.* in Back. & Bakh. *f.* Fl. Java 2 (1965) 629; KENG, Gard. Bull. Sing. 24 (1969) 108, f. 18; MURATA, Acta Phytotax. Geobot. 24 (1969) 84; in Hara, Fl. E. Himal. 2nd Report (1971) 115; STEEN. Mt. Fl. Java (1972) pl. 25–5. — *M. hirsuta* BL. Bijdr. (1826) 830, *non* HORNEM. 1815; BTH. Lab. Gen. Sp. (1834) 394; in DC. Prod. 12 (1848) 241. — *M. parviflora* BTH. in Wall. Pl. As. Rar. 1 (1830) 65, *non* SALISB. 1796; Lab. Gen. Sp. (1834) 394; in DC. Prod. 12 (1848) 241; HOOK. *f.* Fl. Br. Ind. 4 (1885) 651; MIQ. Fl. Ind. Bat. 2 (1859) 969; KOORD. Exk. Fl. Java 3 (1912) 149; DUNN, Not. R. Bot. Gard. Edinb. 6 (1915) 160; BÜNNEMEIJER, Trop. Natuur 7 (1918) 102, f. 14; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 96; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 227; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 100. — *Geniosporum axillare* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 18. — *Calamintha gracilis var. pilosior* MIQ. Fl. Ind. Bat. 2 (1859) 968. — **Fig. 15.**

Erect herb, up to 1 m, ± woody at the base. Branches pubescent when young. *Leaves* thin or thick membranaceous, very variable in size and

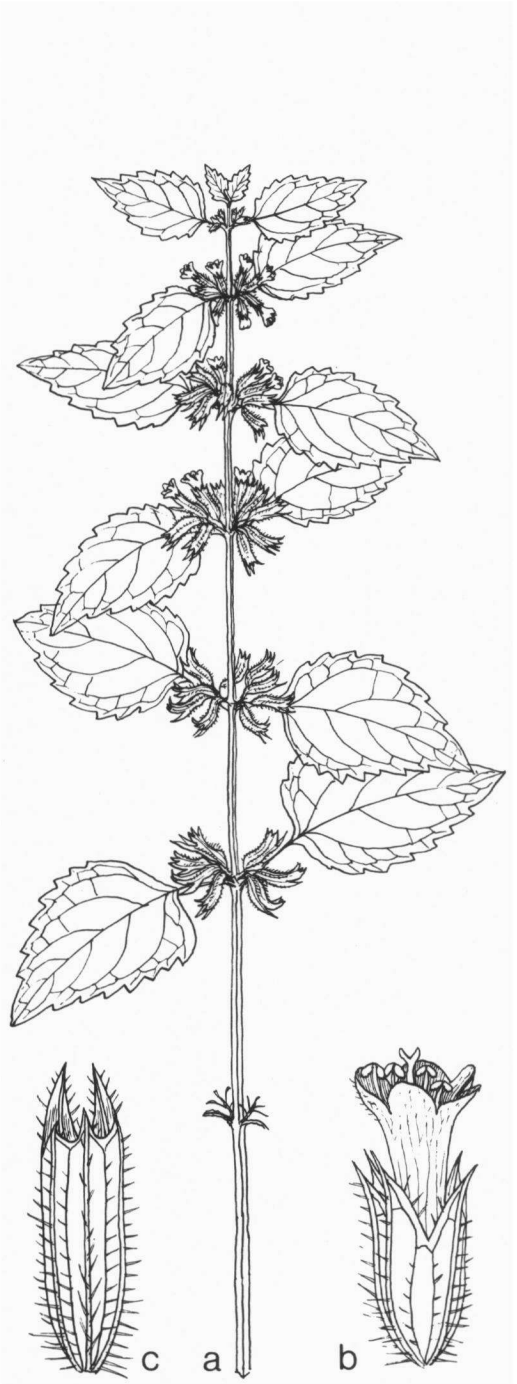


Fig. 15. *Melissa axillaris* BAKH. *f. a.* Habit, × ²/₃, *b.* flower, × 4, *c.* fruiting calyx, both × 4 (*a* COERT 352, *b–c* BACKER 21063).

shape; small ones ovate or elliptic, 1.2–3 by 0.8–1.5 cm, acute, base rounded or cuneate; larger ones lanceolate-ovate, often unequilateral, 5–7 by 2–3 cm, acuminate, at base acute; petiole 0.5–3 cm. *Flowers* usually 4–8 in axillary verticillasters. Pedicels 1–2 mm, sericeous. *Calyx* 5–6 mm long, in fruit 6–8 mm, pilose on the ribs outside; tube not inflated below. *Corolla* white, 9–10 mm long. *Stamens:* anterior pair barely exserted. *Nutlets* 8 by 2 mm, finely puberulent, with a very conspicuous scar on the ventral base.

Distr. From India to SW. China and Formosa; in *Malesia:* N.–Central Sumatra (Gajo Lands; Mt Kerintji) and W.–Central Java (Mt Patuha eastwards to Mt Merbabu).

MIQUEL (*l.c.*) and MERRILL (En. Born. 1921, 519) recorded it from Borneo, but this must rest on an error, possibly confusion with *Leucas flaccida*.

Ecol. Forest edges and along trails, open places along streams, but not on swampy soil, 1500–2600 m. *Fl.* Febr.–May.

Vern. *Djawĕr kotok*, S, *sangkĕtan*, J.

Uses. On Mt Diëng (Central Java) leaves are externally used against head-ache.

Cultivated

Melissa officinalis L. 1753; F.-VILL. Nov. App. (1880) 165; BACK. & BAKH. *f.* Fl. Java 2 (1965) 629.

MERRILL (En. Philip. 3, 1923, 422) excluded this European species from the Philippine flora on arguments unknown to me; it is certainly cultivated occasionally in the mountains of Java.

Doubtful

Melissa hortensis NORONHA, *M. longifolia* NORONHA, *M. montana* NORONHA, Verh. Bat. Gen. 5 (1790) ed. 1, art. IV, 20, repr. 79, *nomina*. Java. Their identity is unknown.

15. MENTHA

LINNÉ, Gen. Pl. ed. 5 (1754) 257; Sp. Pl. (1753) 592; BTH. in B. & H. Gen. Pl. 2 (1876) 1182; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 317; DE WOLF, Baileya 2 (1954) 3, cult. spp., key; KENG, Gard. Bull. Sing. 24 (1969) 111. — **Fig. 16.**

Perennial herbs with creeping rootstocks, often strongly scented. *Leaves* often gland-dotted. *Flowers* small, in axillary verticillasters (in Mal.) or forming terminal spicate to paniculate inflorescences. Bracts often small. *Calyx* tubular or campanulate, 10-nerved, 5-toothed, teeth subequal. *Corolla* funnel-shaped, short, 4-lobed, uppermost lobe broader than the other 3, emarginate, thus faintly 2-lipped. *Stamens* 4, slightly didynamous; anthers 2-celled, cells parallel; filaments almost free, erect. Disk entire, uniform. Style shortly subequally 2-branched. *Nutlets* ovoid, smooth or reticulate.

Distr. Thirty or more *spp.*, and many hybrids, mainly in the northern temperate regions of the Old World; in *Malesia:* 1 *sp.* possibly native, some others cultivated.

TENTATIVE KEY TO THE SPECIES

(from Flora of Java)

1. Flowers in terminal leafless racemes or panicles . . . . . **M. piperita**
1. Flowers or verticillasters axillary, or plant never flowering.
2. Leaves all or for the greater part with a rounded to truncate or shallow-cordate, rarely broadly cuneate base. Stem quadrangular, not grooved, very thinly short-hairy or glabrous . . **M. cordifolia**
2. Leaves with an acute to obtuse, cuneate, usually not very broad base. Stem more hairy than in the preceding species.
3. Verticillasters globose, dense. Calyx rather densely long-hairy, 10-nerved, *c.* 3 mm long, throat after anthesis closed by a ring of hairs . . . . . **M. pulegium**
3. Verticillasters not globose, rather dense. Calyx densely short-hairy, with 5 thick nerves and some thinner ones, *c.* 2 mm long, glabrous inside . . . . . **1. M. arvensis *var.* javanica**

1. Mentha arvensis L. ***var.* javanica** (BL.) HOOK. *f.* Fl. Br. Ind. 4 (1885) 648; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 319, *ssp. haplocalyx* BRIQ. *var. zollingeri* BRIQ., *nomen*; OCHSE & BAKH. Ind. Groent. (1931) 353, f. 223, as *M. arvensis*; BACK. Onkr. Suiker. (1931) 563, Atlas (1973) t. 534; BURK. Dict. (1935) 1454; BACK. & BAKH. *f.* Fl. Java 2 (1965) 631; KENG, Gard. Bull. Sing. 24 (1969) 111, f. 19. — *M. javanica* BL. Bijdr. (1826) 826; BTH. Lab. Gen. Sp. (1833) 183; SPANOGHE, Linnaea 15 (1841) 332; HASSK. Cat. Hort. Bog. (1844) 131; BTH. in DC. Prod. 12 (1848) 173; VIDAL, Phan. Cuming. Philip. (1885) 136; Rev. Pl. Vasc. Filip. (1886) 213; PRAIN, J. As. Soc. Beng. 74, ii (1907) 710; KOORD. Exk. Fl. Java 3 (1912) 150; MERR. Int. Rumph. (1917) 458; KOORD. Fl. Tjibodas 3 (1918) 98; MERR. En. Philip. 3 (1923) 413; RIDL. Fl. Mal. Pen. 2 (1923) 655; OCHSE & BAKH. Ind. Groent. (1931) 352, f. 223. — **Fig. 16a–d.**

Aromatic, prostrate, stoloniferous herb, often rooting below. Stem 30–60 cm, pubescent with appressed hairs. *Leaves* thin-membranaceous, lanceolate to broadly lanceolate, 2.5–4.5(–7) by 1–2.5(–3) cm, acute, base long-cuneate, entire; margin elsewhere serrate; sparingly hairy above, glabrous beneath; petiole 0.5–1 cm. *Flowers* in axillary verticillasters. Bracts linear or subulate, 2–4 mm. Pedicels 2–2.5 mm. *Calyx* tubular-campanulate, 2–2.5 mm long, in fruit 3 mm, with appressed short and long hairs, 5-toothed; teeth subequal, lanceolate or subulate, ciliate, often shorter than the tube. *Corolla* violet or lilac, 4.5–5 mm long, puberulent outside. *Stamens* either short and included or long and exserted. *Nutlets* ellipsoid, 1 mm long, finely granular, often pointed above, and with a large lateral scar below.

Distr. Ceylon and ? continental Asia; in *Malesia:* Malay Peninsula, Sumatra (also Batu Is.), Java, Lesser Sunda Is. (E. Timor), NE. Celebes, Philippines (Mindoro, Luzon, Samar), and Moluccas (Banda).

Ecol. Mostly humid, open localities, borders of paddies, *etc.*, 150–1200 m. *Fl.* Jan.–Dec.

Vern. Malay Peninsula: *pohok*, derived from the Chinese *po-ho* or *po-he*; Sumatra: *iu-iu*, West Coast Res.; Java: *bidjanggut*, *budjanggus*, *budjangkut*, S, *kidjangut*, S, J, *djanggot*, J, *daun poko*, M; Lesser Sunda Is.: *ortalàm*, Port. Timor; Philippines: *polihos*, S.L.Bis., *polio*, Tag., both corruptions from the Spanish *poleo*.

Uses. Often cultivated. HEYNE (Nutt. Pl. 1927, 1328) reported that in Java pounded leaves mixed with some chalk are used against head-ache. He gave also results of chemical analyses: oil is bitter with low menthol % and high pulegon %, and agreeable aromatic odour. OCHSE & BAKH. *l.c.* said it is used as a vegetable (*lalab*) and added to sambal

Fig. 16. *Mentha arvensis* L. *var. javanica* (BL.) HOOK. *f. a.* Habit, × 1/2, *b.* flower, *c.* calyx, *d.* nutlet, all × 6. — *M. arvensis* L. *e.* calyx, × 6 (*a–b* VAN DER GAAG 117, *c–d* BACKER 26437, all from Java, *e* HARTZ *s.n.*, from Denmark).

for fragrancy. KLOPPENBURGH-VERSTEEG (Ind. Pl. 1909) said that extractions are used against cough and indisposition of the stomach and that it possesses sudorific quality. HARTLEY (Lloydia 32, 1969, 269) listed it as a possible medicine against cancer.

Notes. The Malesian form differs from the European form mainly in the calyx teeth, which are separated by wide bays and from their triangular base soon narrow into almost filiform or mucronate teeth, a feature easily observed in fruiting calyces.

It is not quite certain that this mint is native in Malesia, though it is admittedly already recorded by BLUME. It is nowhere recorded as trulybelonging to native swamp vegetation. See also under *M.* × *cordifolia* below.

Cultivated

Mentha arvensis LINNÉ, Sp. Pl. (1753) 577; F.-VILL. Nov. App. (1880) 164; MERR. Fl. Manila (1912) 411; Sp. Blanc. (1918) 337; En. Philip. 3 (1923) 413; QUIS. Medic. Pl. Philip. (1951) 822; KENG, Gard. Bull. Sing. 24 (1969) 113. — *M. crispa* (*non* L.) BLANCO, Fl. Filip. (1837) 474; ed. 2 (1845) 530; ed. 3, 2 (1878) 246. — **Fig. 16e.**

Vern. *Yerba buena*, Sp.; Philippines: *ablebána*, If.

Note. A native of Europe. According to MERRILL it is introduced by the Spaniards and widely scattered in cultivation in the Philippines, not flowering; and as a pot plant in the Malay Peninsula and Singapore.

Mentha × **cordifolia** OPIZ *ex* FRESEN, Syll. Ratisb. 2 (1828) 232; BACK. & BAKH. *f.* Fl. Java 2 (1965) 631; CANTORIA, Philip. J. Sc. 97 (1968) 281. — *M. merdinah* BACK. *ex* OCHSE & BAKH. Ind. Groent. (1931) 354, f. 224.

Vern. *Kresmen*, S, *merdinh*, J.

Notes. A native of the northern temperate countries, cultivated in Java. It never flowers and is propagated vegetatively.

CANTORIA *l.c.* examined the Philippine material of so-called *M. arvensis* and *M. javanica* phytochemically and came to the conclusion that all this was the same species which he referred to *M.* × *cordifolia*.

He stated, however, also that in the Philippine *Menthas* no flowers were ever found. This is not true as CONKLIN & BUWAYA PNH 79601 from the Mountain Prov. in Luzon, 1200 m alt. near an irrigation canal (vern.: *amtin di olhan ietang*), which I identified as *M. arvensis var. javanica*, is in flower; obviously it does not belong to *M.* × *cordifolia*.

Mentha × **piperita** L.; FILET, Pl. Bot. Tuin Weltevreden (1855) 71; MIQ. Fl. Ind. Bat. 2 (1859) 967; PURSEGLOVE, Trop. Crops, Dicot. 2 (1968) 636.

Native of Europe; at one time obviously cultivated in Java. VAN STEENIS found this (Jan. 1954) in (Portuguese) Timor above Maubisse near Flecha, at *c.* 2000 m, often gregarious in damp places and near watercourses (*n.* 18363); it flowered seldom, and is commonly used by the Portuguese in chickenbroth.

Mentha pulegium LINNÉ, Sp. Pl. (1753) 577; BACK. & BAKH. *f.* Fl. Java 2 (1965) 631.

A native of the northern temperate countries, in Java locally cultivated in gardens as a condiment.

Excluded

Mentha sativa (*non* L. 1763) THUNB. Fl. Java (1825) 15.

Probably refers to one of the cultivated species listed above. *M. sativa* L. seems never to have been introduced.

Fig. 17. *Microtoena insuavis* (HANCE) PRAIN *ex* BRIQ. *a*. Habit, nat. size, *b*. mature bud, *c*. open flower, both × 2, *d*. anterior lip, *e*. two stamens, *f*. young anther, *g*. older stage with confluent cells, enlarged (largely after PRAIN, 1889).

16. MICROTOENA

PRAIN in Hook. Ic. Pl. 19 (1889) t. 1872; J. As. Soc. Beng. 59, ii (1890) 310; Bull. Soc. Bot. Fr. 42 (1895) 417; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 269; HSUAN, Act. Phytotax. Sin. 10 (1965) 41; KENG, Gard. Bull. Sing. 24 (1969) 117. Sometimes also wrongly spelled '*Microtaena*'. — **Fig. 17.**

Erect, branching, perennial herbs. *Flowers* in large terminal panicles and smaller axillary cymes. *Calyx* campanulate, accrescent in fruit, obscurely 10-nerved, unequally 5-toothed, the posterior tooth largest; throat glabrous within. *Corolla* tube long-exserted, 2-lipped; upper lip galeate, concave, entire; lower lip spreading, 3-fid, midlobe much narrower and longer than the lateral ones. *Stamens* 4, in 2 pairs, ascending under the upper lip, two upper ones slightly longer; anther-cells divaricate when young, at length confluent; filaments often hirsute. Disk equal-sided. Style bifid, upper branch very short. *Nutlets* minute, ovoid, ventral surface subtriquetrous, smooth or granular.

Distr. About 6 *spp.* in Indo-Himalaya, Indo-China, and S. China; in *Malesia:* 1 *sp.* in Java and Bali.

1. Microtoena insuavis (HANCE) PRAIN *ex* BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 269; KOORD. Exk. Fl. Java 3 (1912) 148; DUNN, Not. R. Bot. Gard. Edinb. 6 (1915) 188; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 183; WU, Acta Phytotax. Sin. 8 (1959) 44; HSUAN, Acta Phytotax. Sin. 10 (1965) 46; BACK. & BAKH. *f.* Fl. Java 2 (1965) 625; KENG, Gard. Bull. Sing. 24 (1969) 117, f. 21, *excl. specim. Pap.* — *Gomphostemma insuave* HANCE, J. Bot. 22 (1884) 231. — *Plectranthus patchouli* CLARKE in Hook. *f.* Fl. Br. Ind. 4 (1885) 624. — *M. cymosa* PRAIN in Hook. Ic. Pl. 19 (1889) t. 1871; J. As. Soc. Beng. 59, ii (1890) 310; *ibid.* 72, ii (1907) 709; Kew Bull. Misc. Inf. (1902) 11; RIDL. J. Mal. Br. R. As. Soc. 1 (1923) 85. — **Fig. 17.**

Herb 0.5–1 m. Stem and branches densely villose. *Leaves* chartaceous, ovate to broadly ovate, 7–10 by 4.5–7.5 cm (sometimes much smaller), serrate or crenate-serrate; adpressedly pubescent on both surfaces; acute, base rounded or subcordate, often abruptly cuneate; petiole slender, 1–7 cm. Paniculate thyrse, 10–35 cm. Bracts narrowly lanceolate, 2–5 mm. *Calyx* turbinate, 3–4 mm long, in fruit 6–7 mm, hirsute and glandular; teeth triangular, subequal. *Corolla* yellow or reddish, 12–16 mm, pubescent; upper lip reddish brown, hooded; lower lip shallowly 3-fid, the central lobe narrowly elliptic, laterally spreading. *Nutlets* ovoid, flattened, 1.5 by 1 mm, finely granular.

Distr. From India through Burma to S. China; in *Malesia:* N. Sumatra (Batak Lands), Java (rare in West Java: Preanger Mts; more common in East Java: Mts Ungaran, Lawu, N. Ardjuno, Jang, Idjen), Lesser Sunda Is. (Bali). Not in New Guinea (KENG, *l.c.*).

Ecol. Damp forests, along river-banks, waterfalls (Trawas), *c.* 1000–1700 m, but at Trawas waterfall below 1000 m. *Fl.* May–Oct.

Note. Because of the strongly scented leaves, this plant is called the Chinese Patchouli by PRAIN (1907). Other patchoulis include the Indian or original Patchouli which is *Pogostemon heyneanus* BTH. and the Malayan Patchouli which is *Pogostemon cablin* (BLANCO) BTH. PRAIN suggested that *Microtoena* was originally introduced to Java, but it is certainly truly native.

17. MOSLA

BUCH.-HAM. *ex* (BTH. in Wall. Pl. As. Rar. 1 (1830) 66, *in syn.*) MAXIM. Bull. Ac. Sc. St. Pétersb. 20 (1875) 457; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 326; KENG, Gard. Bull. Sing. 24 (1969) 119. — *Orthodon* BTH. *ex* OLIV. J. Linn. Soc. Bot. 9 (1865) 167, *non* R.BR. 1820 (*Musci*). — *Hedeoma* PERS. *sect. Mosla* BTH. Lab. Gen. Sp. (1834) 366. — **Fig. 18.**

Aromatic, annual herbs. *Leaves* usually glandular beneath. *Verticillasters* 2-flowered, secund, in terminal or axillary raceme-like inflorescence. Bracts minute or the lower ones large and leafy. *Calyx* campanulate, 10-nerved, often gibbous at base, subequally 5-toothed and 2-lipped; upper lip (in Mal. *spp.*) 3-toothed,

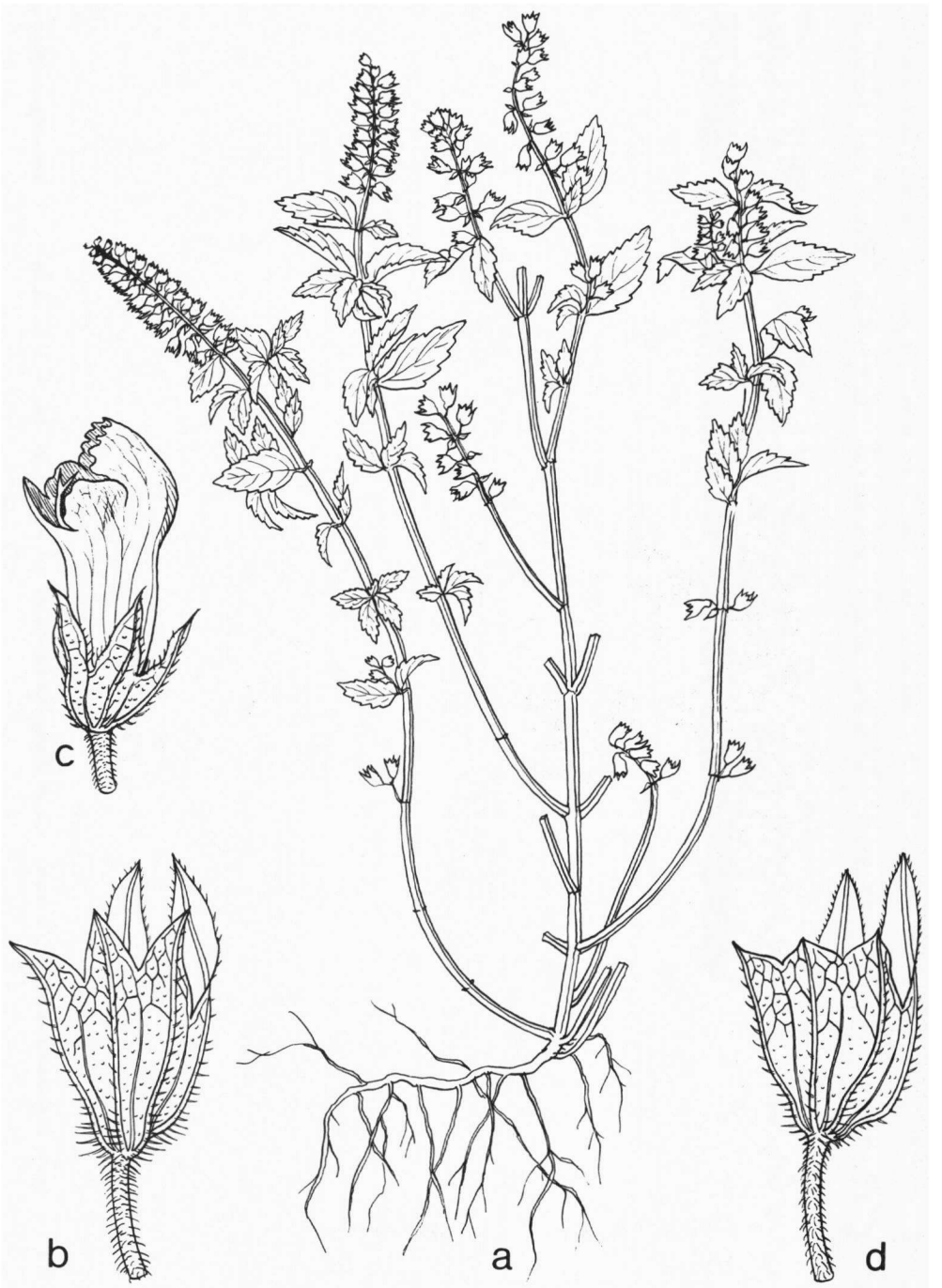


Fig. 18. *Mosla formosana* MAXIM. *a*. Habit, × $^{2}/_{3}$, *b*. fruiting calyx, × 8. — *M. dianthera* (ROXB.) MAXIM. *c*. Flower, *d*. fruiting calyx, both × 8 (*a* BS 37803, *b* PNH 42669, *c* Fl. Taiwan 17865, *d* LÖRZING 9979).

lower lip 2-toothed, generally slightly longer; throat pubescent. *Corolla* exserted; lips short, upper lip notched, lower one 3-fid. *Stamens* 4, only upper pair perfect or 2; anthers 2-celled, cells divaricate; lower pair abortive, present or absent. Disk glandular, produced in the front. Style deeply bifid. *Nutlets* (in Mal. *spp.*) reticulate.

Distr. About 10 *spp.*, in continental Asia from India to Japan and Taiwan, 2 of which in border areas of *Malesia*, *viz* N. Sumatra and N. Luzon.

Note. Proposed for conservation against *Orthodon* BTH. *ex* OLIV. (Taxon 18, 1969, 595), but unnecessarily so.

KEY TO THE SPECIES

1. Leaves rhomboid to ovate, 1–2 by 0.5–1 cm. Upper lip of calyx shallowly 3-toothed, teeth deltoid. **1. M. dianthera**
1. Leaves ovate to oblong-ovate, 2–2.5 by 0.8–1 cm. Upper lip of calyx deeply 3-toothed, teeth lanceolate **2. M. formosana**

1. Mosla dianthera (ROXB.) MAXIM. Bull. Ac. Sc. St. Pétersb. 20 (1875) 457; HOOK. *f.* Fl. Br. Ind. 4 (1885) 647; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 326, f. 98 E; DUNN, Not. R. Bot. Gard. Edinb. 6 (1915) 155; KENG, Gard. Bull. Sing. 24 (1969) 120, f. 22 a–f; H.-W. LI, Acta Phytotax. Sin. 12 (2) (1974) 231. — *Lycopus dianthera* (ROXB. Hort. Beng. 1814, 4, *nomen*) BUCH.-HAM. *ex* ROXB. Fl. Ind. 1 (1820) 145. — *Cunila nepalensis* D.DON, Prod. Nep. (1825) 107. — *M. ocymoides* BUCH.-HAM. *ex* (BTH. in Wall. Pl. As. Rar. 1 (1830) 66, *in syn.*) DUTHIE, Fl. Upper Ganget. Pl. 2 (1911) 257; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 101. — *Hedeoma nepalensis* (D.DON) BTH. Lab. Gen. Sp. (1834) 366; in DC. Prod. 12 (1848) 244. — *Orthodon punctatum* KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 80. — **Fig. 18c.**

Erect herb, 30–100 cm, branched, sparsely pubescent, often woody at base. *Leaves* membranaceous, rhomboid or ovate, 1–2 by 0.5–1 cm, acute at both ends, few-toothed; glabrous above, often glandular beneath; petiole 2–5 mm, pubescent. Paniculate *inflorescence* terminal, often profusely branched, 10–30 cm long, branches 4–15 cm long, lax-flowered. Bracts lanceolate, often minute, 1–2 mm. *Calyx* 2–2.5 mm long, in fruit 4–5 mm; throat with a ring of hairs; teeth deltoid. *Corolla* pale pinkish or pink, 3–3.5 mm, 2 fertile stamens slightly shorter than the upper corolla-lobe; staminodes generally absent. *Nutlets* ellipsoid, 1 by 0.7 mm broad, brown, reticulate.

Distr. Continental Asia: India, Burma, Thailand, Indo-China, China, Manchuria, Korea, Japan, Formosa, and *Malesia:* N. Sumatra (Toba-Batak Lands).

Ecol. Open places along trails, 1000–1250 m. *Fl.* May–July.

Note. The Malesian material differs slightly from the Indian in which the leaves are larger (1.5–3.5 by 1–2 cm) and the anterior staminodes usually present.

2. Mosla formosana MAXIM. Bull. Ac. Sc. St. Pétersb. 20 (1875) 459; MERR. En. Philip. 3 (1923) 414; KENG, Gard. Bull. Sing. 24 (1969) 122, f. 22 g–i; H.-W. LI, Acta Phytotax. Sin. 12 (2) (1974) 232. — *M. lysimachiiflora* HAYATA, Ic. Pl. Form. 8 (1919) 104. — *Orthodon formosanum* (MAXIM.) KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 79. — *Orthodon lysimachiiflorus* (HAYATA) MASAM. Trans. Nat. Hist. Soc. Form. 22 (1932) 232. — **Fig. 18a–b.**

Erect herb, 20–100 cm. Stem and branches greyish, pubescent. *Leaves* thin-membranaceous, ovate to oblong-ovate, 2–2.5 by 0.8–1 cm, acute at both ends; crenate-serrate or sharply serrate, glabrescent on both surfaces; petiole 0.5–1 cm. *Flowers* in terminal raceme-like inflorescences, 3–4 cm long. Bracts lanceolate, ± longer than the buds, often gland-dotted. *Calyx* 1.5 mm long, in fruit 4–5 mm long, glandular, hirsute on the nerves; teeth lanceolate, ciliate. *Corolla* purple, 3–4 mm long. *Nutlets* ovoid to nearly rounded, 0.8 mm ∅, brown, slightly flattened, reticulate.

Distr. Formosa and *Malesia:* Philippines (N. Luzon: Bontoc, Mts Polis & Pukis).

Ecol. Open places, along trails, on forest edges, 1000–1600 m. *Fl.* March–July.

Vern. *Holog, holò di onghab*, Ifuago.

18. PARAPHLOMIS

PRAIN (Ann. R. Bot. Gard. Calc. 9, 1901, 60, *nom. prov.*) J. As. Soc. Beng. 74, ii (1907) 791; RIDL. Fl. Mal. Pen. 2 (1923) 651; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 209; H.-W. LI Acta Phytotax. Sin. 10 (1965) 58; KENG, Gard. Bull. Sing. 24 (1969) 135. — **Fig. 19.**

Fig. 19. *Paraphlomis oblongifolia* (BL.) PRAIN *ex* KOORD. *a.* Habit, × ½, *b.* single flower, × 2. — *P. javanica* (BL.) PRAIN *ex* BACK. & BAKH. *f. c.* Calyx, × 2 (*a–b* after PRAIN, *c* BLUME 1462).


a
c
b

Herbs or shrubs. *Leaves* membranaceous, long-petioled. *Flowers* medium-sized, in dense, many-flowered verticillasters, often forming axillary, globose clusters. Bracteoles numerous, filiform. *Calyx* campanulate, 10-nerved, more or less equally 5-toothed, teeth deciduous or persistent; tube erect or slightly incurved. *Corolla* tube outside pubescent, glabrous and annulate within; limb 2-lipped; upper lip erect; lower lip spreading, 3-lobed. *Stamens* 4, ascending under the upper lip, the lower pair longer; anthers connivent, the 2 cells divaricate; filaments glabrous without basal appendages. Disk uniform, entire. Style 2-fid, lobes subequal or the upper one shorter. *Nutlets* obovoid, triquetrous below, rounded above and on the dorsal surface, glabrous; pericarp thick, more or less coriaceous.

Distr. Continental SE. Asia (E. Himalayas to S. China), Formosa, *c.* 6 *spp.*; in *W. Malesia* 2 *spp.*, not yet known from the Lesser Sunda Is., Moluccas, and New Guinea.

KEY TO THE SPECIES

1. Verticillasters only sparingly hirsute. Corolla white (to pale yellow?), 2–2.5 cm long; limb densely short-hairy outside. Fruiting calyx almost glabrous, the teeth often broken off . . . **1. P. javanica**
1. Verticillasters densely covered with long woolly hairs, golden yellow. Corolla pale yellow, 1.5–2 cm long; limb densely pilose outisde. Fruiting calyx hirsute or woolly pubescent, the teeth persistent **2. P. oblongifolia**

1. Paraphlomis javanica (BL.) PRAIN (Ann. R. Bot. Gard. Calc. 9, 1901, 59, *nom. prov.*) *ex* BACK. & BAKH. *f.* Fl. Java 2 (1965) 619; KENG, Gard. Bull. Sing. 24 (1969) 136, f. 26 a–g. — *Leonurus javanicus* BL. Cat. (1823) 83; Bijdr. (1826) 828; BTH. Lab. Gen. Sp. (1834) 522; HASSK. Cat. Hort. Bog. (1844) 132. — *Phlomis rugosa* BTH. in Wall. Pl. As. Rar. 1 (1830) 63; Lab. Gen. Sp. (1834) 634; in DC. Prod. 12 (1848) 545; HOOK. *f.* Fl. Br. Ind. 4 (1885) 693; PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 231; STAPF, Trans. Linn. Soc. Lond. 4 (1894) 216. — *Gomphostemma petiolare* MIQ. Fl. Ind. Bat. 2 (1859) 987; PRAIN, Ann. R. Bot. Gard. Calc. 9 (1901) 59; KOORD. Exk. Fl. Java 3 (1912) 143. — *Gomphostemma membranifolium* MIQ. Fl. Ind. Bat. 2 (1859) 988; RIDL. J. Fed. Mal. St. Mus. 8 (1917) 77 ('*membranifolia*'). — *Phlomis javanica* (BL.) PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 231; *ibid.* 9 (1901) 59. — *Gomphostemma rugosum* (BTH.) PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 262; KOORD. Exk. Fl. Java 3 (1923) 143. — *P. rugosa* (BTH.) PRAIN (Ann. R. Bot. Gard. Calc. 9, 1901, 60, pl. 74, *nom. prov.*) J. As. Soc. Beng. 74, ii (1907) 721; MERR. En. Philip. 3 (1923) 412; RIDL. Fl. Mal. Pen. 2 (1923) 651; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 209. — *Gomphostemma luzonense* ELMER, Leafl. Philip. Bot. 1 (1908) 339. — *Leonurus membranifolius* (MIQ.) BOLD. Zakfl. (1916) 108; MERR. Brittonia 5 (1943) 29. — *Lamium gesnerioides* HAYATA, Ic. Pl. Formos. 8 (1918) 92. — *Lamium longepetiolata* HAYATA, *l.c.* — *Gomphostemma sumatrense* RIDL. J. Mal. Br. R. As. Soc. 1 (1923) 85. — *P. brevidens* MERR. Pap. Mich. Ac. Sc. 19 (1934) 193. — **Fig. 19c.**

Undershrub, 0.5–1.8 m. Stem obtusely 4-angled, deeply furrowed, minutely hirsute. *Leaves* thin-membranaceous, elliptic, oblong-ovate or oblong-lanceolate, 15–30 by 6–12 cm, acuminate or caudate, base cuneate or truncate or rounded, entire; margin elsewhere irregularly crenate-serrate, glabrous or with minute scattered hairs on the nerves on both surfaces; petiole 4–10 cm, puberulent. *Flowers* in small distant verticillasters, axillary. Bracteoles filiform, short-hairy. *Calyx* turbinate, 0.8–1.2 cm long (in fruit about the same length, with the teeth often broken off), white or suffused with red at apex, tube slightly curved, hispid below; teeth 5, lanceolate, 2–4 mm long, triangular at base, membranaceous. *Corolla* light yellow or white, with pink or dark purple centre, 2–2.5 cm long, tube annulate within; both lips pubescent outside, upper lip narrow, rounded at apex; lower lip 3-lobed, midlobe oblong, lateral lobes lanceolate. Style branches subequal. *Nutlets* whitish, brown to black, obovoid, 6 by 3–3.5 mm, acute and triquetrous below, rounded above.

Distr. Continental SE. Asia (E. Himalayas, Thailand, Indo-China, S. China), Formosa; in *Malesia:* N. Sumatra, Malay Peninsula, Java, N. Borneo (Kinabalu), and Philippines (Luzon, Leyte).

Ecol. Open and humid places in rain-forest, from the lowland to *c.* 1800 m, mostly above 600 m. *Fl.* Jan.–Dec.

Vern. Java: *galibung bulu*, S, *tjitjabian utan*; Philippines: *botiagon*, Mbo.

2. Paraphlomis oblongifolia (BL.) PRAIN (Ann. R. Bot. Gard. Calc. 9, 1901, 59, *nom. prov.*) *ex* KOORD. Fl. Tjibodas 3 (1918) 84; BACK. & BAKH. *f.* Fl. Java 2 (1965) 619; KENG, Gard. Bull. Sing. 24 (1969) 139, f. 26 h–i; STEEN. Mt. Fl. Java (1972) pl. 25–7. — *Leonurus oblongifolius* BL. Bijdr. (1826) 828; BTH. Lab. Gen. Sp. (1834) 522; HASSK. Cat. Hort. Bog. (1844) 310; in DC. Prod. 12 (1848) 502. — *Gomphostemma macrophyllum* MIQ. Fl. Ind.. Bat. 2 (1859) 988; KOORD. Exk. Fl. Java 3 (1912) 143; KOORD.-SCHUM. Syst. Verz. 1 (1912) fam. 254, p. 2. — *Phlomis oblongifolia* (BL.) O. K. Rev. Gen. Pl. 2 (1891) 529; PRAIN, Ann. R. Bot. Gard. Calc. 3 (1891) 231; *ibid.* 9 (1901) 59, pl. 73. — **Fig. 19a–b.**

Undershrub, 1–2 m. Stem and branches soft-woolly. *Leaves* thin-membranaceous, oblong-ovate, 15–20 by 6–8 cm, acuminate or cordate, base cuneate, entire; margin elsewhere remotely toothed, springly hispid on the nerves on both surfaces; petiole very slender, 5–8 cm. *Flowers* in distant axillary verticillasters, densely covered with long golden hairs. Bracts filiform, densely woolly. *Calyx* obconic-campanulate, 1–1.2 cm long, in fruit 1.2–1.4 cm, whitish with violet teeth; tube slightly curved, hirsute; teeth subulate. *Corolla* pale yellow, 1.5–2 cm long, outside densely pubescent; upper lip obovate, boat-shaped, apex truncate; lower lip with 3 subequal rounded lobes, the middle one broader, constricted below. Posterior style branches much shorter than the anterior. *Nutlets* dark blue to black, oblong, 7–8 by 3.5 mm, subtriquetrous, glabrous.

Distr. *Malesia:* Sumatra (North: Brastagi to Merapi; South: Mt Tanggamus and near Ulu Belu, Lampongs), West Java, N. Celebes.

Ecol. Primary forest, 700–1800 m. *Fl.* Jan.–Dec.

Vern. ***Bubukuan bulu***, S; ***bubukuan*** is a common name for Strobilanthes and other Acanthaceae, alluding to swollen nodes, ***bulu*** referring to hairs.

19. POGOSTEMON, *nom. cons. prop.*

DESF. Mém. Mus. Hist. Nat. Paris 2 (1815) 154, t. 6; HASSK. Flora 25 (1842) II, Beibl. 25 (*'Pogonostemon'*); Cat. Hort. Bog. (1844) 130; BTH. in DC. Prod. 12 (1848) 151; in B. & H. Gen. Pl. 2 (1876) 1179; MIQ. Fl. Ind. Bat. 2 (1859) 961; O. K. Rev. Gen. Pl. 2 (1891) 529; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 328; KENG, Gard. Bull. Sing. 24 (1969) 151. — *Alopecuro-veronica* LINNÉ (Fl. Zeyl. 1747, 193, *descr.*) Amoen. Ac. 4 (1759) 143, *nomen valid., rejic. prop.* — *Dysophylla* BL. Bijdr. (1826) 826; BTH. Fl. Austr. 5 (1870) 81; in B. & H. Gen. Pl. 2 (1876) 1180; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 330; KENG. Gard. Bull. Sing. 24 (1969) 67. — *Eusteralis* RAFIN. Fl. Tell. 2 (1836) 95. — *Dysophylla sens.* EL-GAZZAR & L. WATSON *ex* AIRY SHAW, Taxon 16 (1967) 190, *non* BL., *homon. illeg., cf.* BAKH. *f.* & STEEN. Taxon 17 (1968) 235–236. — **Fig. 20.**

Herbs or undershrubs, usually pubescent, sometimes strongly scented. *Leaves* opposite or whorled, sessile or petiolate. *Flowers* small or minute, in simple or branched spicate-racemose inflorescences formed of many densely flowered, subcapitate, approximate or distant, verticillasters. Bracts small or minute, densely hairy. *Calyx* tubular, 5-toothed; throat naked within. *Corolla* tubular, exserted; limb subequally 4-fid or faintly 2-lipped (in the latter case upper lip 3-lobed, lower lip entire, patent). *Stamens* 4, exserted, usually straight; filaments bearded; anthers 2-celled, confluent. Disk equal, subentire. Style shortly 2-fid at the top, subequal. *Nutlets* ovoid or ellipsoid, smooth or granulate.

Distr. About 50 *spp.* throughout SE. Asia to China and Japan, southwards through the whole of *Malesia* (9 *spp.*), one extending to Australia.

Taxon. The genus is taken here in a wider sense than usual, including the whorled-leaved species of *'Dysophylla'*. The type species of *Dysophylla*, *D. auricularia*, is a true *Pogostemon*. SHAW (1967) felt induced to maintain the name in a new sense to cover the whorled-leaved species, but this is nomenclaturally untenable as *D. auricularia* is the type, and the phyllotaxis is insufficient taxonomically for a generic level. The merging of the two genera was already proposed by HASSKARL (1842), followed by MIQUEL (1859), and O. KUNTZE (1891). BENTHAM (1870) in accepting *Dysophylla* gave as the alternative that "it would at any rate form a very marked section", and this suggestion is here followed.

Nomencl. It has been overlooked that *Alopecuro-veronica* L. is an older, perfectly valid generic name, against which *Pogostemon* is proposed to be conserved.

KEY TO THE SPECIES

1. Leaves in whorls of 4–10 . . . . . **1. P. stellatus**
1. Leaves opposite.
2. Spicate racemes usually branched and forming a panicle.
3. Habit proportionally slender, verticillasters clearly to even widely spaced, with internodes always visible, less than 1 cm ∅, short appressed-hairy. Calyx 3–3.5 mm (in fr. 3.5–4 mm) long **2. P. heyneanus**

3. Habit more robust, axes not slender, verticillasters in an almost continuous thick spike 1–2 cm wide, densely patent-canescent or hirsute. Calyx 4–6 mm (in fr. 5.5–6 mm) long.
4. Leaves short appressed-hairy to glabrous. Verticillasters grey-pubescent, with dense cincinni of seriate-imbricating, lanceolate, acute bracts, not seldom more or less secund. Calyx tubular, pubescent, without bristles. Spikes several . . . . . **3. P. cablin**
4. Leaves with long bristles of *c.* 1 mm long. Verticillasters very dense, condensed and in few spikes, not secund, not in regularly seriate-imbricating cincinni, the bracts obovate-acute. Calyx somewhat inflated, the teeth not narrow, and shorter in proportion to the tube, the latter with bristle-hairs, but the teeth densely short hairy, at least their margin . . . . . **4. P. villosus**
2. Spicate racemes usually simple, terminal, solitary, rarely accompanied by 1 or 2 short spicate racemes at the base.
5. Verticillasters distinctly apart.
6. Calyx cylindric, 5–7 mm (in fr. 7–8 mm) long; teeth not spreading.
7. Calyx seemingly angled, glabrous except for very scant bristle-hairs on the calyx tube and at the apex of the teeth, and on the bracts. Leaves ovate to broadly ovate, base rounded or cordate **5. P. reticulatus**
7. Calyx terete, evenly short pubescent, as are the bracts. Bristle-hairs absent. Leaves oblong-ovate to ovate, base cuneate to rounded . . . . . **6. P. philippinensis**
6. Calyx campanulate, 4–4.5 mm (in fr. 5–5.5 mm) long; teeth often spreading **7. P. menthoides**
5. Verticillasters nearly continuous, occasionally interrupted only at the base; rachis densely tomentose or hairy.
8. Flowers relatively large; calyx 4.5–5 mm long; corolla 7–8 mm long. Verticillasters 12–20-flowered **8. P. velatus**
8. Flowers very small; calyx 1.2–1.5 mm long; corolla 2–2.5 mm long. Verticillasters ∞-flowered **9. P. auricularius**

Section Eusteralis (RAFIN.) KENG, *comb. nov.*

Eusteralis RAFIN. Fl. Tell. 2 (1836) 95. — *Dysophylla auct., excl. sp. typ. D. auricularia.*

Leaves in whorls of 4 or more.

1. Pogostemon stellatus (LOUR.) O. K. Rev. Gen. Pl. 2 (1891) 529 ('*stellatum*'). — *Mentha stellata* LOUR. Fl. Coch. 2 (1790) 361. — *Mentha verticillata* ROXB. (Hort. Beng. 1814, 44, *nomen*) Fl. Ind. ed. Carey 3 (1832) 5, *non* L. 1759. — *Dysophylla verticillata* (ROXB., *non* L.) BTH. in Wall. Pl. As. Rar. 1 (1830) 30, *nom. illeg.*; in DC. Prod. 12 (1848) 157; F.-VILL. Nov. App. (1880) 164; VIDAL, Phan. Cuming. Philip. (1885) 136; HOOK. *f.* Fl. Br. Ind. 4 (1885) 639; VIDAL, Rev. Pl. Vasc. Filip. (1886) 213; BOERL. Handl. 2 (1899) 714, *incl. var. macrostachya* (MIQ.) BOERL.; PRAIN, J. As. Soc. Beng. 74, ii (1907) 876; RIDL. Fl. Mal. Pen. 2 (1923) 648; MERR. En. Philip. 3 (1923) 416; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 81; HEND. Mal. Nat. J. 6 (1950) 394. — *Dysophylla stellata* (LOUR.) BTH. in Wall. Pl. As. Rar. 1 (1830) 30, *pro nomen*; Lab. Gen. Sp. (1833) 159; in DC. Prod. 12 (1848) 158; KENG, Gard. Bull. Sing. 24 (1969) 70. — *P. verticillatus* (ROXB., *non* L.) MIQ. Fl. Ind. Bat. 2 (1859) 965, *incl. var. macrostachya* MIQ., *nom. illeg.* — *Dysophylla benthamiana* HANCE, Ann. Sc. Nat. V, 5 (1866) 234; MERR. Trans. Am. Phil. Soc. 24, 2 (1935) 342.

See for further synonyms under the variety.

var. **stellatus.**

Annual (or sometimes perennial) herb, erect or ascending. Stem laxly or profusely branched, 10–100 cm, glabrous or very sparsely hairy. *Leaves* in whorls of 4–10, sessile or subsessile, glabrous, linear, 3–7 (or more) cm by 2–5 mm, acuminate, base attenuate; margin entire or obscurely serrate. *Flowers* in villous, cylindric, terminal spicate inflorescences, 3–6 cm long; verticillasters close-set throughout. *Calyx* campanulate, with soft, white hairs, 1–1.2 mm long; teeth subequal, triangular, spreading. *Corolla* pink, or pinkish purple, tubular, *c.* 2 mm long, lobes pubescent. Filaments exserted, hairy. *Nutlets* ellipsoid, pale brown, minute.

Distr. From India through SE. Asia and China to Japan, and through Malesia to tropical Australia; in *Malesia:* in several islands rare, not recorded from Java and the Lesser Sunda Is.

Ecol. Grasslands and garden lands, swamps, bogs, lake beds, open wet places, *e.g.* rice-fields, at low altitude, but in Celebes and New Guinea ascending to *c.* 2500 m. *Fl.* May–Jan.

Vern. New Guinea: *tsambi kumu*, Kaugel dial., Medlpa, *wamena*, Dani lang., Baliem, *weypa*, Melpa lang., Mt Hagen.

Note. The typification of *P. stellatus* has shown that BENTHAM has applied the name *Dysophylla stellata* in India for a different species, as I have demonstrated in the precursor (Gard. Bull. Sing. 24, 1969, 71).

var. **roxburgianus** (KENG) KENG, *comb. nov.* — *Dysophylla quadrifolia* (ROXB., *non* D.DON) BTH. in Wall. Pl. As. Rar. 1 (1830) 30; in DC. Prod. 12 (1848) 157; F.-VILL. Nov. App. (1880) 164; VIDAL, Phan. Cuming. Philip. (1885) 136; HOOK. *f.* Fl. Br. Ind. 4 (1885) 639; VIDAL, Rev. Pl. Vasc. Filip. (1886) 213; MERR. En. Philip. 3 (1923) 415; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 79. —

Mentha quadrifolia ROXB. (Hort. Beng. 1814, 44, *nomen*) Fl. Ind. ed. Carey 3 (1832) 4, *nom. illeg., non* D.DON, 1825. — *Dysophylla stellata* (LOUR.) BTH. *var. roxburgiana* KENG, Gard. Bull. Sing. 24 (1969) 72.

Leaves in whorls of 4, 3–6 cm long, 3–7 mm wide. Stem tomentose or pubescent.

Distr. Continental SE. Asia to *Malesia:* Philippines (Luzon, Panay, Mindanao), SW. Celebes, and New Guinea.

Ecol. Open wet places as the type variety, up to *c.* 950 m. *Fl.* Jan.–Dec.

Section Pogostemon

Leaves opposite.

2. Pogostemon heyneanus BTH. in Wall. Pl. As. Rar. 2 (1830–31) 16; Lab. Gen. Sp. (1833) 154; in DC. Prod. 12 (1848) 153; MIQ. Fl. Ind. Bat. 2 (1859) 961; F.-VILL. Nov. App. (1880) 164; PRAIN, J. As. Soc. Beng. 74, ii (1907) 707; Kew Bull. (1908) 78, with ample discussion of synonymy; MERR. Philip. J. Sc. 7 (1912) Bot. 346; En. Philip. 3 (1923) 414; RIDL. Fl. Mal. Pen. 2 (1923) 647; HEYNE, Nutt. Pl. (1927) 1332; BURK. Dict. (1935) 1783; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 71; QUIS. Medic. Pl. Philip. (1951) 830; BACK. & BAKH. *f.* Fl. Java 2 (1965) 633; KENG, Gard. Bull. Sing. 24 (1969) 152. — *P. patchouli* (*non* PELLET.) HOOK. *f.* Fl. Br. Ind. 4 (1885) 633, *excl. var. suavis* (TENORE) HOOK. *f.*

Erect branching herb, 0.5–1.5 m high. Stem and branches slender, sparingly pubescent. *Leaves* thin-membranaceous, ovate to broadly ovate, 5–8 by 3.5–5.5 cm, acute, base broadly cuneate, often slightly oblique, entire, margin elsewhere crenate or double-crenate; sparingly puberulous or sometimes almost glabrous on both surfaces; petiole 1–3 cm, puberulous. *Paniculate inflorescence* 6–10 cm long, terminal; verticillasters globular, 0.5–1.5 cm apart at the base, more approximate upwards. Bracts narrowly lanceolate, 3–3.5 mm long, acute, puberulous. *Calyx* 3–3.5 mm long, in fruit 3.5–4 mm, outside tomentose; teeth equal, triangular. *Corolla* white, or the upper lip pale violet, 4.5–5 mm long, glabrous. Filaments exserted, almost straight, all bearded. Style shortly 2-branched. *Nutlets* obliquely ovoid, 0.5–0.6 mm long, black, smooth.

Distr. Ceylon and continental SE. Asia; in *Malesia:* Sumatra, Malaya, West Java, Borneo (Sarawak; SE. Borneo), Philippines (Palawan, Panay, Mindanao). Possibly not native in Malesia. Also cultivated.

Ecol. Thickets, old clearings, coconut groves, stream banks in forest, from the lowland up to *c.* 1800 m. *Fl.* Jan.–Dec.

Vern. Sumatra: *patchouli*, M, *dukut nilam*, Karo, *babuda*, Lampongs; Malaya: *boon kalif*, *Indian patchouli*, *nilam bukit*, *pakochilam*, *poko nyao*, *ruku*, *rumput kuku*, M; Java: *dilĕm*, M, Md, *dilĕm kĕmbang*, J, *dilĕp*, S; Philippines: *kadlum*, P.Bis., *lagumtum*, *malbaka*, Sub.

Uses. According to BURKILL & HANIFF (Gard. Bull. S. S. 6, 1930, 238) a decoction of the leaves is used in Malaya against coughs and asthma. A decoction of the roots is sometimes administered for dropsy. HEYNE (*l.c.* 1332) says that flowering plants contain a volatile oil smelling like patchouli, but apparently it has never been grown for the oil. In Mindanao leaves are applied to wounds. HARTLEY (Lloydia 32, 1969, 275) listed this species as a possible anti-cancer medicine.

3. Pogostemon cablin (BLANCO) BTH. in DC. Prod. 12 (1848) 146; MIQ. Fl. Ind. Bat. 2 (1859) 964; F.-VILL. Nov. App. (1880) 164; VIDAL, Rev. Pl. Vasc. Filip. (1886) 213; PRAIN, J. As. Soc. Beng. 74, ii (1907) 708; Kew Bull. (1908) 78; MERR. Philip. J. Sc. 7 (1912) Bot. 345; Fl. Manila (1912) 411; Int. Rumph. (1917) 458; Sp. Blanc. (1918) 337; En. Philip. 3 (1923) 414; RIDL. Fl. Mal. Pen. 2 (1923) 647; MERR. Trans. Am. Phil. Soc. 24 (1935) 341; BURK. Dict. (1935) 1782; QUIS. Med. Pl. Philip. (1951) 829; PARHAM, Pl. Fiji (1964) 255; BACK. & BAKH. *f.* Fl. Java 2 (1965) 633; PURSEGLOVE, Trop. Crops, Dicot. 2 (1968) 636; KENG, Gard. Bull. Sing. 24 (1969) 154. — *Mentha cablin* BLANCO, Fl. Filip. (1837) 473. — *P. mollis* HASSK. Tijd. Nat. Gesch. Phys. 10 (1843) 123 ('*Pogonostemon*'); Cat. Hort. Bog. (1844) 310, *non* BTH. 1833. — *P. tomentosus* HASSK. Cat. Hort. Bog. (1844) 131 ('*Pogonostemon*'); BTH. in DC. Prod. 12 (1848) 153; MIQ. Fl. Ind. Bat. 2 (1859) 962; KENG, Gard. Bull. Sing. 24 (1969) 153. — *Mentha auricularia* (*non* L.) BLANCO, Fl. Filip. ed. 2 (1845) 329; ed. 3, 2 (1878) 245. — *P. petchouly* PELLET. Mém. Soc. Sc. Orléans 5 (1845) 277, t. 7; HOOK. Kew J. Bot. 1 (1849) 328, t. 11 ('*patchouli*'); MIQ. Fl. Ind. Bat. 2 (1859) 962; F.-VILL. Nov. App. (1880) 164; HOOK. *f.* Fl. Br. Ind. 4 (1885) 634, *incl. var. suavis* HOOK. *f.*; THISELTON-DYER, Kew Bull. (1888) 71; RIDL. Trans. Linn. Soc. Lond. II, 3 (1893) 336; TROMP DE HAAS, Teysmannia 15 (1904) 475; KOORD. Exk. Fl. Java 3 (1912) 151. — *P. comosus* MIQ. Fl. Ind. Bat. 2 (1859) 963; KOORD. Exk. Fl. Java 3 (1912) 152. — *P. heyneanus* BTH. *var. patchouly* (PELLET.) O. K. Rev. Gen. Pl. 2 (1891) 529. — *P. nepetoides* STAPF, Kew Bull. (1908) 116; MERR. Philip. J. Sc. 7 (1912) Bot. 347, *incl. var. glandulosus*; En. Philip. 3 (1923) 414. — *P. battakianus* RIDL. J. Mal. Br. R. As. Soc. 1 (1923) 85. — *P. javanicus* BACK. *ex* ADELB. Reinwardtia 3 (1954) 150, f. 1; BACK. & BAKH. *f.* Fl. Java 2 (1965) 632, 657.

Erect, aromatic, branched herb, 0.5–1 m. Stem and branches tomentose. *Leaves* thin- or thick-membranaceous, narrowly ovate or ovate, 5–10 (–14) by 3.5–6.5(–10) cm, with short appressed hairs; apex acute, base cuneate-rounded to truncate, sometimes oblique, always entire; margin elsewhere incisely dentate or crenate or partly double-serrate; petiole 1–3.5(–6.5) cm, tomentose. *Spicate racemes* 3 or many forming a terminal panicle, 15–30(–40) cm long; verticillasters slightly apart below, closely approximate above, grey pubescent, with dense cincinni of seriately imbricating, lanceolate, acute bracts, sometimes ± secund. *Calyx* tubular, 4–5 mm long, in fruit 5–6 mm, narrowed at both ends, pubescent, without bristles, equally 5-toothed. *Corolla* white, lavender blue, or violet, 6–7 mm long. Filaments

soft hairy. Style 2-branched at the apex. *Nutlets* ellipsoid, 0.6–1 mm long, 0.5–0.6 mm broad, subtriquetrous, smooth, black.

Distr. Ceylon and continental SE. Asia; in *Malesia:* N. Sumatra, Malaya, Java, Lesser Sunda Is. (Bali, Sumba, Sumbawa, Alor, Flores, Timor), Celebes, Philippines (Luzon, Leyte), and New Guinea (Morobe Distr.: NGF 27934). Also cultivated and occasionally escaped from cultivation, which makes it difficult to decide in which areas it is really native in Malesia. Only in Luzon it is found in forest and may be native. In Java it is never found in the flowering state.

Ecol. Garden lands and clearings and in settled areas, up to *c.* 1900 m (Sumatra). *Fl.* May–Febr.

Vern. Malaya: *nilam, patchouly,* M; Lesser Sunda Is.: *remi kawini, roo nggolé,* Sumba, *pisak,* Alor, *ugapa,* Timor; Philippines: *kabling, karlin,* Tag., *kablin,* Tag., Pamp., Ilk., *kabiling,* Pamp., *kadling,* Tag., Bis., *kadlúm,* Bik., Sul., S.L.Bis., *kadlúen,* Bis., *sarok,* Ig.

Uses. The leaves are widely extracted for the well-known patchouli oil of commerce, not to be confused with that extracted from *Microtoena insuavis* (Khasya patchouli), from *Pogostemon heyneanus* (Indian patchouli), and that of *Pogostemon hortensis.* Patchouli oil is used in perfumes and cosmetics. According to QUISUMBING (*l.c.* 830) the crushed leaves are often used for hair-washing in the Philippines. Furthermore, the leaves and innovations are employed as an insecticide against cockroaches, moths, *etc.*, and as a repellent for leeches, and they are also added to baths for their presumed antirheumatic quality. An infusion of fresh leaves is taken internally to allay painful menstruation.

4. Pogostemon villosus (ROXB.) BTH. Lab. Gen. Sp. (1833) 153; in DC. Prod. 12 (1848) 152; HOOK. *f.* Fl. Br. Ind. 4 (1885) 632; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 70. — *Elsholtzia villosa* ROXB. Fl. Ind. ed. Carey 3 (1832) 4.

Undershrub, 0.5–0.8 m. Stem and branches sparsely puberulent. *Leaves* thin-membranaceous, ovate to deltoid, (4–)7–11 by (3–)6–8.5 cm, with long bristles (*c.* 1 mm), scattered all over both surfaces; apex acute or broadly caudate, base cuneate or truncate and shortly decurrent, entire; margin elsewhere shallowly and irregularly incised, serrate-crenate on the incisions; petiole (1–)4–6.5 cm, puberulent. *Verticillasters* densely congested in terminal, few-branched spikes, 3–6 cm long, 1.5 cm ∅; peduncle 0.5–3 cm long, woolly. Bracts obovate, acute, equalling or slightly longer than the calyx, villous. *Calyx* tubular-campanulate, 4.5–5 mm long, outside with scattered bristles; teeth broadly lanceolate, margin ciliate. *Corolla* 5–6 mm long, lilac, tube very slender. Filaments shortly exserted, villous.

Distr. SE. Asia (Assam, Silhet); in *Malesia:* Central West Sumatra (Mt Kerintji), 2 collections (BÜNNEMEIJER 8811, 9612).

Ecol. Mountain forest, 1500–1900 m. *Fl.* March–April.

Notes. Its closest ally is obviously not *P. cablin* but *P. hispidus* PRAIN (Kew Bull. 1908, 254; MUKERJEE, *l.c.*), which differs (*ex descr.*) by appressed-pubescent peduncles, lax-paniculate

Fig. 20. *Pogostemon philippinensis* S. MOORE. *a.* Habit, × ²/₃, *b.* flower, × 4 (VANOVERBERGH 208).

spikes, ovate to ovate-lanceolate bracts, and a smallish calyx of 4 mm long.

Especially with regard to the heterogeneity of the WALLICH material noted by HOOKER *f.* a closer comparison with the Indian material is necessary.

5. Pogostemon reticulatus MERR. Philip. J. Sc. 8 (1912) Bot. 348; En. Philip. 3 (1923) 415; KENG, Gard. Bull. Sing. 24 (1969) 155.

Erect, branched herb, 50–75 cm. Stem and branches puberulent, scattered, with long white hairs. *Leaves* ovate to broadly ovate, thin-membranaceous, 5–10 by 3.5–7 cm, obtuse or shortly acuminate, base rounded or cordate; margin coarsely and irregularly crenate, ciliate on both surfaces; petiole 3–6 cm. *Pseudo-raceme* terminal, solitary, 6–15 cm long including the peduncle; verticillasters 3–8-flowered, internodes 1–2 cm, more or less evenly apart. Bracts filiform, 2 mm, puberulent, ciliate. *Calyx* tubular, 4.5–6 mm long, puberulent and very sparingly pilose, narrowed at both ends; teeth oblong-lanceolate, ciliate. *Corolla* lilac.

Distr. *Malesia:* Philippines (Luzon).

Ecol. Thickets and forests at low and medium altitude.

Vern. *Kadling*, Tag.

Note. Closely related to the next species. LOHER 4207 deviates from the typical form by conspicuously peduncled verticillasters; they are normally subsessile.

6. Pogostemon philippinensis S. MOORE, J. Bot. 43 (1905) 146; MERR. Philip. J. Sc. 5 (1910) Bot. 381; En. Philip. 3 (1923) 415; KENG, Gard. Bull. Sing. 24 (1969) 156. — *P. membranaceus* MERR. Philip. J. Sc. 7 (1912) Bot. 347; En. Philip. 3 (1923) 414. — **Fig. 20.**

Erect herb, 50–75 cm, branched. Stem and branches puberulent. *Leaves* thick- or thin-membranaceous, oblong-ovate to ovate, 3–9 by 2.5–5 cm, acuminate, base cuneate to rounded, entire; margin elsewhere serrate or double-serrate; glabrescent above, glandular-punctate beneath; petiole 1–3 cm, puberulent. *Spicate raceme* terminal, solitary, 4–12 cm long; verticillasters 10–∞-flowered, more or evenly apart. Bracts linear-lanceolate, pubescent, caducous. *Calyx* tubular, 5–6 mm long, in fruit 6–7 mm, sparingly pubescent and glandular-punctate. *Corolla* lavender, slender, glabrous, 9–10 mm long. Filaments exserted, bearded below the middle. *Nutlets* ovoid, 0.6–0.7 mm long, obscurely triquetrous, smooth.

Distr. *Malesia:* Philippines (Luzon, Mindoro, Panay).

Ecol. Damp ravines, alluvial forest, thickets, also in mossy forest, ascending to *c.* 2400 m. *Fl.* Aug.–March.

Vern. *Legleg, ñgiñgiyau*, Bon., *pañga-ti-núang*, Ilk., *kadlum puru*, Mang.

7. Pogostemon menthoides BL. Bijdr. (1826) 825; BTH. Lab. Gen. Sp. (1833) 156; in DC. Prod. 12 (1848) 155; HASSK. Cat. Hort. Bog. (1844) 130; MIQ. Fl. Ind. Bat. 2 (1859) 963; KURZ, Nat. Tijd. N. I. 27 (1864) 213; KOORD. Exk. Fl. Java 3 (1912) 151; Fl. Tjibodas 3 (1918) fam. 254, p. 91; BACK. & BAKH. *f.* Fl. Java 2 (1965) 632; KENG, Gard. Bull. Sing. 24 (1969) 156; MURATA, Acta Phytotax. Geobot. 24 (1969) 87; STEEN. Mt. Fl. Java (1972) pl. 25–10. — *P. fraternus* MIQ. Fl. Ind. Bat. 2 (1859) 963; KOORD. Exk. Fl. Java 3 (1912) 151. — *P. plectranthoides* (*non* DESF.) KOORD. Exk. Fl. Java 3 (1912) 153.

Erect branched herb, 0.5–1 m. Branches pubescent. *Leaves* thick-membranaceous, lanceolate to ovate, 1–5(–8) by 0.7–3(–5) cm, acute, base acute or rounded, often slightly oblique; margin often doubly serrate or incised-serrate in larger ones; sericeous on both surfaces; petiole 0.5–1 cm, pubescent. *Spicate raceme* terminal, solitary, 3–15 cm long; verticillasters 3–12-flowered, evenly apart. Bracts linear, minute. *Calyx* campanulate, strigose, 4–4.5 mm long, in fruit 5–5.5 mm, 5-(occasionally 7-)toothed; teeth lanceolate, sharply pointed, often spreading. *Corolla* white and violet, or reddish, 6–7 mm long, 2-lipped, sparingly puberulent. Filaments exserted, bearded below the middle. *Nutlets* subglobose, 0.6 by 0.5 mm, obscurely 3-angular, black, finely reticulate.

Distr. SE. Asia (Assam, Burma, Thailand, Indo-China); in *Malesia:* Java (from Mt Gedeh eastwards), Lesser Sunda Is. (Bali), Borneo (Mt Kinabalu), and Philippines (Luzon).

Ecol. In deep shade of rain-forest, often along trails, also in elfin forest and in *Casuarina* forest, 1000–2200 m. *Fl.* Jan.–Dec.

Vern. *Dilĕm, tjuwing areuj*, S.

Uses. The fragrant leaves are in Java sometimes laid between clothes as a repellent to insects.

Note. The record of *P. plectranthoides* DESF., a species of India, is evidently based on a misinterpretation or on an early collection of cultivated specimens in the Bogor Botanic Gardens. The record from Banka by KURZ seems doubtful.

8. Pogostemon velatus BTH. in DC. Prod. 12 (1848) 155; MIQ. Fl. Ind. Bat. 2 (1859) 964; F.-VILL. Nov. App. (1880) 164; VIDAL, Phan. Cuming. Philip. (1885) 136; Rev. Pl. Vasc. Filip. (1886) 213; MERR. En. Philip. 3 (1923) 415; KENG, Gard. Bull. Sing. 24 (1969) 159. — *P. williamsii* ELMER, Leafl. Philip. Bot. 9 (1934) 3197.

Perennial branching, aromatic herb or undershrub, 1 m. Stem and branches stout, densely tomentose. *Leaves* thick-membranaceous, lanceolate to broadly ovate, 3–8(–11) by 1.5–4(–5) cm, acute or acuminate, base rounded or cordate, margin remotely double-serrate, densely velutinous on both surfaces; petiole 1–3 cm. *Spicate raceme* terminal and solitary, 5–12(–15) cm long, (1–1.5–) 2–2.2 cm ∅; verticillasters 12–20-flowered, closely approximate. *Calyx* tubular, 4.5–5 mm long, in fruit 6–6.5 mm and mouth enlarged, sparingly pilose; teeth 5, broadly lanceolate, ciliate. *Corolla* dark or deep blue, slender, 7–8 mm long, pilose externally. Filaments exserted, hairy below. *Nutlets* subspherical, 0.6 by 0.5 mm, black, smooth.

Distr. *Malesia:* Philippines (Luzon).

Ecol. Primary forest, ravines and thickets, 1200–2400 m. *Fl.* Jan.–Dec.

Vern. *Dila*, Ilk., *opop*, Ig., *sipan-ti-bayungan*, Bon.

Note. The type of *P. williamsii* ELMER has the narrower spikes and leaves.

9. Pogostemon auricularius (L.) HASSK. Tijd. Nat. Gesch. Phys. 10 (1843) 127 (*'Pogonostemon'*); Cat. Hort. Bog. (1844) 131; MIQ. Fl. Ind. Bat. 2 (1859) 964; EL-GAZZAR & WATSON, Taxon 16 (1967) 188; BACK. & BAKH. *f.* Fl. Java 3 (1968) 657; KENG, Gard. Bull. Sing. 24 (1969) 180. — *Majana foetida* RUMPH. Herb. Amb. 6 (1750) 41, t. 16 f. 2. — *Mentha auricularia* LINNÉ, Mant. 1 (1767) 81. — *Mentha foetida* BURM. *f.* Fl. Ind. (1768) 126. — *Dysophylla auricularia* (L.) BL. Bijdr. (1826) 826; BTH. Lab. Gen. Sp. (1833) 158; in DC. Prod. 12 (1848) 156; F.-VILL. Nov. App. (1880) 164; VIDAL, Phan. Cuming. Philip. (1885) 136; HOOK. *f.* Fl. Br. Ind. 4 (1885) 638; VIDAL, Rev. Pl. Vasc. Filip. (1886) 213; PRAIN, J. As. Soc. Beng. 74, ii (1907) 710; KOORD. Exk. Fl. Java 3 (1912) 152; MERR. Int. Rumph. (1917) 458; En. Philip. 3 (1923) 415; RIDL. Fl. Mal. Pen. 2 (1923) 648; J. Mal. Br. R. As. Soc. 1 (1923) 84, *incl. var. montana* RIDL.; MANSFELD, Bot. Jahrb. 62 (1929) 378; BACK. Onkr. Suiker. (1931) 564, Atlas (1973) t. 535; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 79; HEND. Mal. Nat. J. 6 (1950) 393, f. 363; QUIS. Medic. Pl. Philip. (1951) 817; BACK. & BAKH. *f.* Fl. Java 2 (1965) 633; KENG, Gard. Bull. Sing. 24 (1969) 67, f. 11, a–d.

Erect annual herb. Stem simple or laxly branched, 30–80 cm, pubescent with spreading hairs. *Leaves* opposite, membranaceous, narrowly ovate to ovate, 4–6 by 2–3 cm, acute or rarely obtuse, base cuneate or rounded, entire; margin elsewhere irregularly serrate; pubescent and glandular on both surfaces; petiole 2–8 mm, hairy. *Flowers* in dense, villous, terminal, cylindric spicate inflorescences 4–7 cm long; verticillasters formed of numerous flowered cymules, close-set. Bracts narrowly elliptic, long ciliate. *Calyx* subcampanulate, gland-dotted, 1.2–1.5 mm long, 5-toothed, teeth subequal, triangular; calyx in fruit urn-shaped, teeth often incurved over the nutlets. *Corolla* lavender, pale pink, or white, 2–2.5 mm long; tube slender, exserted; lobes obtuse, pubescent. Filaments 3.5–4 mm, slender, villous. *Stamens* lilac. *Nutlets* ellipsoid, 0.6 by 0.4 mm, finely reticulate, brown.

Distr. Throughout SE. Asia to S. China, and throughout *Malesia*, but not yet recorded from the Lesser Sunda Is. and not from Australia.

Ecol. Sunny, constantly or periodically humid localities, borders of ditches, dams of paddies, grassy wastes, thickets, locally often common, from the lowland ascending to *c.* 2000 m. *Fl.* Jan.–Dec.

Vern. Sumatra: *kĕkutjing, kutjing kutjing*, M., *ajiri kutjing*, Djambi, *daun silipan*, Langkat, *angur angur*, Karo, *si-marihur-ihur-ni-asu*, Batak; Malaya: *ĕkor kuching, poko awi tana*, M; Java: *buntut sĕrot, busu, djangnan rambit, dĕlangking, majana utan*, M, *buntut sĕro, b. utjing*, S, *kĕtumpang, s(ĕ)langking*, J; Borneo: *kambing kambing*; Philippines: *buntut pusa*, Tag.; Moluccas: *maja busuk, m. hutan.*

Uses. Pounded leaves, whether or not powdered with lime, are applied as a poultice on the abdomen (RIDLEY). Poulticing is also recorded for other troubles, *e.g.* diarrhoea, colic, worms and a sore throat. BURKILL & HANIFF said that the plant is in Malaya in common use for simple disturbances of the stomach in children (Gard. Bull. S. S. 6, 1930, 238). HARTLEY listed it as potential anti-cancerogene (Lloydia 32, 1969, 265).

Imperfectly known species

Pogostemon cristatus HASSK. Tijd. Nat. Gesch. Phys. 10 (1843) 121 (*'Pogonostemon'*); Cat. Hort. Bog. (1844) 130; MIQ. Fl. Ind. Bat. 2 (1859) 962; BACK. & BAKH. *f.* Fl. Java 2 (1965) 633.

According to BACKER & BAKHUIZEN VAN DEN BRINK Jr, this species is closely allied to *Pogostemon heyneanus* BTH. "from which it may be distinguished by the larger dimensions of the flower". No materials seen.

Cultivated

Pogostemon hortensis BACK. (in Heyne, Nutt. Pl. ed. 1, 4, 1917; ed. 2, 1927, 1332, *in obs.*) *ex* ADELB. Reinwardtia 3 (1954) 152; BACK. & BAKH. *f.* Fl. Java 2 (1965) 633.

Cultivated at Bogor and at Nongkodjadjar, Mt Tengger, East Java. Only known in sterile state.

Vern. *Dilĕm djawa.*

Excluded

Pogostemon gracilis HASSK. Tijd. Nat. Gesch. Phys. 10 (1843) 126 (*'Pogonostemon'*); Cat. Hort. Bog. (1844) 130; MIQ. Fl. Ind. Bat. 2 (1859) 962.

This is probably a plant cultivated in the Bogor Botanic Gardens. I have seen no material and it is not well possible to evaluate it from the brief description.

In HASSKARL's herbarium at L there is a sheet from India labelled *Dysophylla gracilis* DALZ. in his handwriting. His name might therefore represent a new combination, but this is not likely as it does not explain why he gave a new diagnosis without reference to DALZELL.

20. SALVIA

LINNÉ, Gen. Pl. ed. 5 (1754) 15; Sp. Pl. (1753) 23; BTH. in B. & H. Gen. Pl. 2 (1876) 1194; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 270; KENG, Gard. Bull. Sing. 24 (1969) 160; FUJITA, Acta Phytotax. Geobot. 24 (1970) 113; T. C. HUANG & J. T. WU, Taiwania 20 (1975) 213. — **Fig. 21.**

Herbs, undershrubs, or shrubs. *Leaves* opposite, cauline or almost all radical, simple, 3-foliolate, pinnate or 1–2-pinnatifid. *Flowers* small to large and showy; verticillasters in terminal and axillary racemes. Bracts small or large, sometimes

brilliantly coloured in cultivated forms. *Calyx* campanulate or tubular, 9–11-nerved, 2-lipped; upper lip entire or 3-fid; lower lip notched or 2-toothed. *Corolla* 2-lipped; tube naked or annulate within; upper lip erect; lower lip 3-lobed, central lobe usually wider than the lateral ones, entire or emarginate. Fertile *stamens* 2, representing the lower pair; filaments short, articulating with a slender connective, and sometimes produced beyond the joint; connective linear, transverse, with an upper ascending arm which bears a linear fertile anther-cell, and a lower straight or deflexed branch bearing a reduced anther-cell or empty. Disk usually enlarged anteriorly. Style shortly 2-fid; the lobes usually subulate, equal or the lower larger, sometimes flattened. *Nutlets* ovoid, often triquetrous, smooth.

Distr. About 500 *spp.*, widely distributed in temperate and subtropical regions in the world, rather few in the tropics. Probably only one species is native to *Malesia*; several other species are more or less naturalized; still others are cultivated in the gardens as ornamental. Only the native and truly naturalized species are included in the following key. The key in BACK. & BAKH. *f.* Fl. Java 2 (1965) 625–628 covers also many cultivated species enumerated here at the end.

KEY TO THE SPECIES

1. Leaves mostly radical and pinnate or 1–2-pinnatifid (3 or 5 leaflets). Rhizomatous herb, usually less than 20 cm high. Style-branches nearly equal . . . . . **1. S. scapiformis**
1. Leaves cauline, entire or serrate, but not pinnatifid. Erect or procumbent herbs, usually more than 30 cm high. Style-branches very unequal.
2. Calyx fully covered with viscid, glandular hairs, less than 7 mm long in the fruiting stage. Flowers blue.
3. Stem alternately with 2 rows of hairs on the nodes in the middle of the sides. Calyx in fruit *c.* 3–4 mm. Upper lip broad, acute . . . . . **2. S. misella**
3. All four sides of the stem hairy.
4. Spurious racemes rather dense (nodes *c.* 0.5 cm), in fairly short panicles. Plant *c.* 40–70 cm. Calyx in fruit *c.* 3–4 mm, the lips and teeth acute . . . . . **3. S. plebeia**
4. Spurious racemes rather lax (nodes *c.* 1 cm), slender. Plant *c.* 0.5–1.5 m. Calyx in fruit 5.5–7 mm, upper lip short-mucronate, the two teeth of the underlip clearly mucronate . . . . **4. S. riparia**
2. Calyx covered with hispid, strigose or curly hairs, not viscid-glandular, more than 8 mm long in the fruiting stage.
5. Verticillasters distant, internodes 1–2 cm. Corolla 12–17 mm longer than the calyx. Flowers red **5. S. coccinea**
5. Verticillasters approximate, internodes 2–5 mm. Corolla 2–3 mm longer than the calyx. Flowers purplish blue . . . . . **6. S. hispanica**

1. Salvia scapiformis HANCE, J. Bot. 23 (1885) 368; Bot. Mag. (1888) t. 6980; MERR. Philip. J. Sc. 5 (1910) Bot. 228; En. Philip. 3 (1923) 413 ('*scaphiformis*'); KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 175; KENG, Gard. Bull. Sing. 24 (1969) 161, f. 29 g–i; FUJITA, Acta Phytotax. Geobot. 24 (1970) 113; J. T. WU & T. C. HUANG, Taiwania 20 (1975) 77. — **Fig. 21.**

Dwarf rhizomatous herb, 10–50 cm high. *Leaves* sparsely hairy, very variable, nearly all radical, (in Mal.) odd-pinnatifid, sometimes bipinnatifid, ovate or broadly ovate in outline, 5–10(–18) cm long; leaflets often 5, sometimes 3 or 7, rarely 3-foliolate; terminal ones largest, ovate, 1–4 by 0.8–3 cm, acute, base rounded or cordate, entire; margin crenate-serrate, or few-toothed in the lateral ones, glabrescent on both surfaces; petiole very slender, 4–10 cm. *Flowers* 4–7 in a verticillaster, the whorls 1–1.5 cm apart, in a raceme-like inflorescence borne on a terminal scape; rachis of inflorescence capitate-glandular-hairy. *Calyx* tubular-campanulate, inside strigose-hairy (hairs 0.8–1.5 mm long), 5–5.5 mm long, in fruit 7–9 mm, sparsely pilose, 2-lipped; upper lip broad deltoid, entire; lower lip sharply 2-toothed. *Corolla* purple, 8–9 mm long, exserted; tube annulate within; upper lip erect, emarginate; lower lip shorter, 3-lobed. *Stamens* exposed, lower connective-branches reduced. Style shortly 2-branched, branches nearly equal. *Nutlets* ellipsoid, 2–2.5 by 1 mm, flattened-subtriquetrous.

Distr. China, Formosa, Ryu Kyu Is.; in *Malesia:* Philippines (N. Luzon).

Ecol. On cliffs, mossy banks, boulders and in ravines along small streams, 400–1500 m. *Fl.* March–Sept.

Notes. The affinity of this species is with *S. yunnanensis* WRIGHT from Yunnan and with *S. saxicola* BTH. in WALL. from Nepal.

The Philippine specimens have, as far as we have seen, only pinnatifid leaves, whereas the 'normal' form from S. China and Formosa has cordate-ovate leaves which are coarsely crenate. In Formosa (GRESSITT 442) and the Ryu Kyu Is. (HATUSIMA 19267), however, there are also plants with 1–2-pinnate leaves of which the terminal lobe then

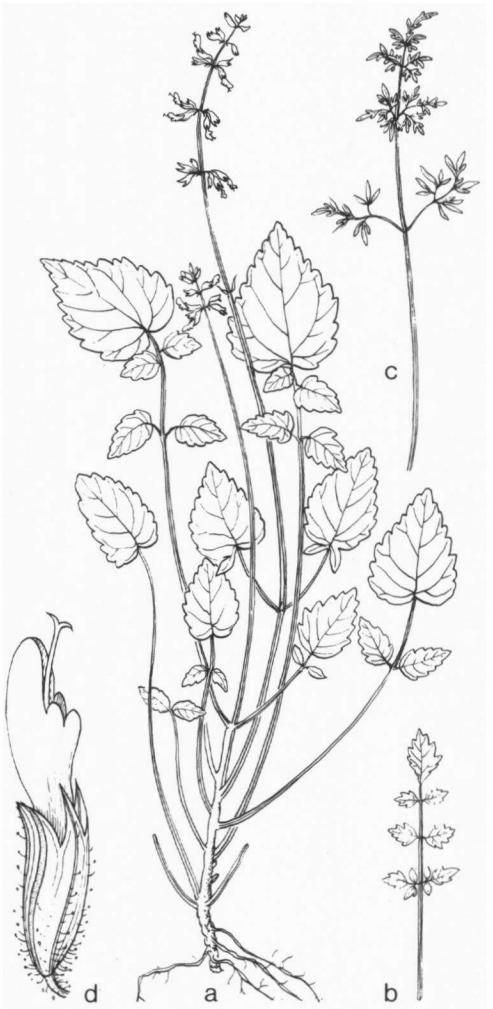


Fig. 21. *Salvia scapiformis* HANCE. *a.* Habit, *b.* partly 2-pinnate leaf, *c.* partly 3-pinnate leaf, all × ½, *d.* flower, × 4 (*a*, *d* RAMOS FB 33145, *b* BS 40256, *c* BS 40233).

± resembles in shape the 'normal' leaf. In Luzon hitherto only the pinnate-leaved specimens are found (ELMER 8637, BS 33145, 40233, PNH 17973, 19792), one of them having even distinctly bipinnate leaves (BS 40233, distributed as a *n.sp. in sched.* by MERRILL).

Pinnate leaves are peculiar to several *Salvia* species. The occurrence of pinnation in the leaves of *S. scapiformis* in Formosa and Luzon we ascribe to juvenile flowering, due to habitat (cliffs or damp dark mossy forest with poor soil). Similar pinnation is also found in Hawaiian scandent *Stenogyne*; a comparable case is found in the Composite *Ainsliaea pteropoda*; here Malesian specimens with incised leaves have been described as a distinct species, *A. reflexa*.

In a recent study of the Formosan *Salvias* T. C. HUANG & J. T. WU (Taiwania 20, 1975, 213–228) distinguished besides the simple-leaved *S. scapiformis* HANCE three allied species and did not mention the Philippine form. In trying to identify the latter with their key it appears that the differences of the Formosan taxa are minute, that the key contains discrepancies with the illustrations and descriptions, and furthermore that in the Philippine form the length of the hairs inside the calyx varies from 0.8–1.2 mm. In an other, biosystematical study (Taiwania 20, 1975, 77–98) J. T. WU & T. C. HUANG studied their cytology, palynology, hybridization, and chromosomes which supported the minuteness of the differences, one entity appearing to be a tetraploid. In my view no more than one species is concerned, possibly segregated into not even sharply distinct local races.

2. Salvia misella KUNTH in H.B.K. Nov. Gen. Sp. 2 (1818) 290; EPLING in Fedde, Rep. Beih. 110 (1938) 16; BACK. & BAKH. *f.* Fl. Java 2 (1965) 627. — *S. obscura* BTH. Lab. Gen. Sp. (1833) 245; in DC. Prod. 12 (1848) 297; STEEN. Bergcultures 12 (1938) 1936–1940.

Slender herb, creeping, decumbent, sometimes erect, to 75 cm. Stem sparsely hirsute. *Leaves* membranaceous, lanceolate-ovate or ovate, 1.5–4 (–6) by 0.8–2.5(–4) cm, acute; base cuneate, narrowed into the petiole, entire; margin elsewhere serrate, hirsute and puberulent on both surfaces; petiole 2–10 mm. *Flowers* 2–3 in a verticillaster, in terminal spikes, 6–15 cm long, very slender. Bracts lanceolate-ovate, 1.5 mm long. *Calyx* campanulate, 1.5–2 mm long, in fruit 3–4 mm, covered with both long strigose and short capitate glandular hairs, deeply 2-lipped; upper lip rounded shortly caudate, lower lip 2-toothed. *Corolla* pale violet to dark blue, 5–6 mm long; lower lip nearly twice as long as the upper one. *Nutlets* ellipsoid, 1.2–1.5 mm long.

Distr. Native of tropical America, locally naturalized in *Malesia:* W.–E. Java and Lesser Sunda Is. (Kangean Is., Sumbawa, Flores, Timor), also in Queensland, the Solomon Is. (Guadalcanal) and New Caledonia.

Ecol. A weed of open waste places, up to *c.* 1000 m. *Fl.* Febr.–Oct.

3. Salvia plebeia R. BR. Prod. (1810) 501; BTH. in DC. Prod. 12 (1848) 355; MIQ. Fl. Ind. Bat. 2 (1859) 970 ('*plebeja*'); F.-VILL. Nov. App. (1880) 165; VIDAL, Phan. Cuming. Philip. (1885) 136; Rev. Pl. Vasc. Filip. (1886) 214; PRAIN, J. As. Soc. Beng. 74, ii (1907) 713; MERR. Int. Rumph. (1917) 457; Sp. Blanc. (1918) 337; En. Philip. 3 (1923) 413; RIDL. Fl. Mal. Pen. 2 (1923) 655; QUIS. Medic. Pl. Philip. (1951) 833; KENG, Gard. Bull. Sing. 24 (1969) 162, f. 29 d–f. — *S. violacea* (*non* RUIZ & PAV. 1798) BLANCO, Fl. Filip. ed. 2 (1845) 14; ed. 3, 1 (1877) 27.

Erect herb, 40–60 cm or more. Stem 4-angled, grooved, tomentose or glabrescent. *Leaves* membranaceous, sparsely hirsute or nearly glabrous, very narrowly elliptic or narrowly ovate, 2–4 by

0.8–1.5 cm, subacute or obtuse, base usually cuneate, entire; margin elsewhere crenate; petiole 2–4 cm, hirsute. *Pseudo-racemes* terminal and in upper leaf-axils, often forming large panicles. *Flowers* 4–10 in a verticillaster. Bracts small, linear-spathulate; pedicels 1–2 mm, hairy. *Calyx* campanulate, 2 mm long, in fruit 2.5 mm, densely tomentose and glandular, 2-lipped; upper lip obtuse, often shortly 3-fid at the tip; lower 2-toothed, teeth acute. *Corolla* violet, purplish, or blue, small, 3–3.5 mm long, shortly exserted; upper lip oblong, obtuse; lower lip 3-lobed, mid-lobe exceeding the lateral ones. *Nutlets* ovoid, 1 by 0.7 mm, brown, rugose.

Distr. Continental SE. Asia (from the Deccan to Korea and Japan) to Australia; in *Malesia:* N. Sumatra (Karo-Batak Lands: Toba plateau) and Philippines (Cagayan Prov.), very rare. The New Guinea record mentioned in the precursor should be omitted; it was cultivated in a botanic garden at Lae.

Ecol. A weed of fallow land, in Sumatra at 1000–1350 m, in Luzon at low altitude in and about towns. *Fl.* Aug., Oct.

Vern. Sumatra: *ruku ruku bĕgal*, Karo.

Note. LÖRZING noted crushed leaves to be aromatic.

4. Salvia riparia KUNTH in H.B.K. Nov. Gen. Sp. 2 (1818) 300; EPLING in Fedde, Rep. Beih. 110 (1938) 16, pl. 1, f. 2; BACK. & BAKH. *f.* Fl. Java 2 (1965) 627. — *S. occidentalis* (*non* SWARTZ 1788) WELSEM, Trop. Natuur 1 (1912) 161, f. 1; *ibid.* 2 (1913) 13; BACK. Bull. Jard. Bot. Btzg II, 12 (1913) 29; BOLD. Zakfl. (1916) 110; DEN BERGER, Trop. Natuur 6 (1917) 101; HEYNE, Nutt. Pl. (1927) 1327; BACK. Onkr. Suiker. (1931) 562, Atlas (1973) t. 533; HEUBEL, Trop. Natuur 24 (1935) 119. — *S. privoides* BTH. Bot. Voy. Sulph. (1844) 150; MEER MOHR, Trop. Natuur 27 (1938) 226, f. 2 & 3; STEEN. Bergcultures 12 (1938) 1636–1640. — *S. plebeja* (*non* R. BR.) HENRY & PRITCHARD, Bot. Bull. Lae 7 (1975) 108, fig.

Erect, fetid herb, 0.5–1.5 m or more high. Stem and branches covered with both long strigose and short viscid-glandular hairs. *Leaves* membranaceous, lanceolate-ovate to ovate, 1.5–6.5(–12) by 0.6–4(–5) cm, acute or obtuse, base cuneate or attenuate, narrowed into the petiole, entire; margin elsewhere serrate; hirsute on both surfaces; petiole 0.2–1.5 cm. *Flowers* 2–3 or more in a verticillaster, in terminal spikes, 8–20 cm long. Bracts spathulate, pointed, 2–3 mm. *Calyx* campanulate, 3–3.5 mm long, in fruit 5.5–7 mm, densely covered with viscid-glandular hairs; upper lip rounded, 1-mucronate; lower lip 2-toothed. *Corolla* pale blue-violet, with white streaks on the lower lip, 5.5–6 mm long. *Nutlets* brown, ellipsoid, 1.5–2 mm long, swelling when soaked in water.

Distr. Native of America (from Mexico to Peru and the West Indies), locally naturalized in *Malesia:* Sumatra, W.–E. Java, the Lesser Sunda Is. (Bali, Sumba, Flores, Timor), and E. New Guinea.

Ecol. Sunny to moderately shaded dry localities, roadsides, forest edges, thickets, fallow agriculture fields, also in teak forests in Java; 15–1000 m. *Fl.* Jan.–Dec.

Vern. Java: *langon, legetan, l. warak, randa nunut*, J, *baluan*, Md, *tjod balu*, Balinese; *aidois*, Tetun lang., *cai fau*, Uai Uwa lang., E. Timor.

Uses. HEYNE (*l.c.*) records that this species is sometimes used as a ground-cover for heavy clay soils; the only drawback is that it cannot well stand the effect of slowly decaying leaves from surrounding shade trees.

Note. Differs from *S. misella* KUNTH merely by the larger dimension of flower parts.

5. Salvia coccinea JUSS. *ex* MURR. in Comm. Goett. 1 (1778) 86, t. 1; HASSK. Pl. Jav. Rar. (1848) 481; PRAIN, J. As. Soc. Beng. 74, ii (1907) 712; KOORD. Exk. Fl. Java 3 (1912) 148; BUYSMAN, Flora 107 (1914) 215; DEN BERGER, Trop. Natuur 6 (1917) 101, f. 1; RIDL. Fl. Mal. Pen. 2 (1923) 655; EPLING in Fedde, Rep. Beih. 110 (1938) 133; BRUGGEMAN, Ind. Tuinb. (1939) 148. — *an ? S. coccinea* BUCHOZ, Hist. Règne Vég. II Dec. 3, t. 2 (1773) (*n.v.*). — *S. pseudococcinea* JUSS. *ex* MURR. in Comm. Goett. 1 (1778) 86; JACQ. Coll. 2 (1786) 302; MANSFELD, Bot. Jahrb. 62 (1929) 378. — *S. coccinea* JUSS. *ex* MURR. *var. pseudococcinea* (JACQ.) GRAY, Syn. Fl. N. Am. 21 (1878) 368; O. K. Rev. Gen. Pl. 2 (1891) 530; BACK. Onkr. Suiker. (1934) 561, Atlas (1973) t. 532; BACK. & BAKH. *f.* Fl. Java 2 (1965) 628; KENG, Gard. Bull. Sing. 24 (1969) 162, f. 29 a–c. — *S. coccinea* JUSS. *ex* MURR. *var. lactea* ADELB. in Back. Bekn. Fl. Java (em ed.) 14 (1954) fam. 201, p. 29; BACK. & BAKH. *f.* Fl. Java 2 (1965) 628.

Slender herb, 0.5–1 m. Stems several, ascending, often branched, finely pubescent (in some cultivated forms with extremely long silky hairs). *Leaves* membranaceous, ovate or deltoid-ovate, 2.5–3.5 by 1.5–2.5 cm, acute, base truncate or cordate, margin crenate or serrate; glabrous above, finely pubescent beneath; petiole slender, 0.5–1 cm, finely puberulous. *Pseudo-racemes* terminal. *Flowers* 6–10 in a verticillaster. Bracts ovate-acuminate, caducous; pedicels 2–4 mm, slender, puberulous. *Calyx* tubular-campanulate, 7–8 mm long, in fruit 9–10 mm, hirsute, striate; upper lip entire, obtuse; lower lip 2-toothed, teeth triangular, acute. *Corolla* crimson, red, violet, blue (with white throat), or rarely white, 20–25 mm long; tube straight, much exserted, widened upwards; upper lip short, erect; lower lip spreading or recurved, 3-fid. *Nutlets* narrowly ovoid, 3 by 1.2 mm, smooth, brown, swelling when soaked in water.

Distr. Native of tropical America, cultivated in the tropics and occasionally escaping from cultivation; in *Malesia* found naturalized in Malaya (also Penang), Sumatra (Sibolangit), Java, N. Celebes, Philippines (Luzon), and E. New Guinea; also in New Caledonia and other Pacific islands.

Ecol. Weed on fallow lands, along roadsides, abandoned garden land, 600–1700 m. *Fl.* Jan.–Dec. The calyx is tinged red in the red-flowered form, but green in the white-flowered form. Flowers open in the morning, close about noon.

Vern. Java: *totongoan*, S.

6. Salvia hispanica LINNÉ, Sp. Pl. (1753) 25; KOORD. Exk. Fl. Java 3 (1912) 148; KOORD.-SCHUM. Syst. Verz. (1913) fam. 254, p. 5; BACK. Bull. Jard. Bot. Btzg II, 12 (1913) 29; BOLD. Zakfl. (1916) 110; KOORD. Fl. Tjibodas 3 (1918) fam. 254, p. 89; HEYNE, Nutt. Pl. (1927) 1327; BACK. &

BAKH. *f.* Fl. Java 2 (1965) 627. — *Kiosmina hispanica* (L.) RAFIN. Fl. Tell. 3 (1836) 92. — *S. stachyoides* KUNTH *var.* β *allodapa* HASSK. Nat. Tijd. N. I. 10 (1856) 51.

Erect or ascending herb, 0.5–1 m or more. Stem and branches villous and hispid. *Leaves* membranaceous, oblong-lanceolate to ovate, 3–7.5 by 1–4.5 cm, acute or acuminate, base obtuse and abruptly attenuate, entire; margin elsewhere serrate or serrulate; pubescent on both surfaces; petiole slender, 1–3 cm. *Flowers* 6–10 in a verticillaster, these congested into a dense, terminal false spike, 3–10(–18) cm long; internodes 2–5 mm long. Bracts ovate, pointed, 6–8 mm long. *Calyx* tubular, slightly inflated below, 6–7 mm long, in fruit 8–9 mm; densely pilose; upper lip strongly keeled, sharply pointed; lower lip 2-toothed. *Corolla* (purplish) blue, 8–9 mm long, the lips shortly exposed; upper lip rounded, sericeous outside; lower lip 3-lobed. *Stamens* barely exposed; lower connective branch swollen. Style 2-branched, upper branch long and slender (2.5 mm long), pointed, lower one short, club-shaped; the main style articulate above the base. *Nutlets* ellipsoid, 1.5 mm long.

Distr. Native in tropical America, cultivated and naturalized in *Malesia:* West Java.

Ecol. Open localities, roadsides, fallow or weed-grown agricultural fields; sometimes cultivated for the seeds; 900–1700 m. *Fl.* Jan.–Dec.

Vern. Java: *salasi huma, tjoing, tjuing,* S.

Uses. HEYNE (*l.c.*) reported that seeds are sometimes used as a surrogate for those of *selasi* (*Ocimum*).

Cultivated

A number of *Salvia* species is recorded to be or have been cultivated. Our experience in Malaya is that the cultivated species do not set viable nutlets in the lowland except for *S. coccinea.*

Salvia azurea LAMK *ssp.* **pitcheri** (TORR. *ex* BTH.) EPLING in Fedde, Rep. Beih. 110 (1938) 194; BACK. & BAKH. *f.* Fl. Java 2 (1965) 626.

Native in the southern part of North America. Corolla sky blue, rarely white. Cultivated in Java as an ornamental.

Salvia confertiflora POHL, Pl. Bras. Ic. 2 (1833) 134, t. 190; BACK. & BAKH. *f.* Fl. Java 2 (1965) 628.

Native of Brazil. Corolla bluish. Cultivated in Java, occasionally naturalized.

Salvia farinacea BTH. Lab. Gen. Sp. (1833) 274; BACK. & BAKH. *f.* Fl. Java 2 (1965) 626.

Native in the southern part of North America. Corolla bluish violet or white. Cultivated in Java as an ornamental.

Salvia fulgens CAV. Icon. 1 (1791) 15, t. 23; MIQ. Fl. Ind. Bat. 2 (1859) 970; BURK. Dict. (1935) 1979.

Native to Mexico. Corolla bluish. Cultivated in Java and Malaya.

Salvia ianthina OTTO & DIETR. Allg. Gartenz. 15 (1847) 362; BACK. & BAKH. *f.* Fl. Java 2 (1965) 628.

Native of Mexico or Peru. Corolla blue. In Java locally running wild, but not truly naturalized.

Salvia officinalis LINNÉ, Sp. Pl. (1753) 23; BURM. *f.* Fl. Ind. (1768) 13; THUNB. Fl. Jav. (1825) 15; F.-VILL. Nov. App. (1880) 165; MERR. En. Philip. 3 (1923) 413 (as *excl. sp.*); BACK. & BAKH. *f.* Fl. Java 2 (1965) 626.

Native of southern Europe. Corolla violet, rarely white. Cultivated in mountain regions in Java.

Salvia purpurea CAV. Icon. 2 (1793) 52, t. 166; BURK. Dict. (1935) 1979.

Native to Mexico and Central America. Corolla purple. Cultivated in Malaya.

Salvia splendens SELLOW *ex* NEES in Weid-Neuwied, Reise Bras. 2 (1821) 335 (*n.v.*); SCHULT. & SCHULT. Mant. 1 (1822) 185, *descr.*; KER-GAWL. Bot. Reg. (1823) t. 687: DEN BERGER, Trop. Natuur 6 (1917) 101, f. 2; BRUGGEMAN, Ind. Tuinb. (1939) 147, f. 148; BACK. & BAKH. *f.* Fl. Java 2 (1965) 628.

Native of Brazil. Corolla bright crimson. Cultivated in many parts of Malesia as an ornamental, in Java also locally naturalized.

There seems to be an older name *S. splendens* BUCHOZ, Hist. Règne Vég. II Déc. 3, t. 2 (1773) (*n.v.*). It is not certain that this is a valid name and that it is the same species.

Salvia tiliaefolia VAHL, Symb. Bot. 3 (1790) 7; BACK. Trop. Natuur Jub. no. (1936) 58; BACK. & BAKH. *f.* Fl. Java 2 (1965) 627.

Indigenous to E. Mexico and the West Indies. Corolla blue. In E. Java locally naturalized as a weed below Nongkodjadjar, 1000–1100 m.

Salvia uliginosa BTH. Lab. Gen. Sp. (1833) 251; BACK. & BAKH. *f.* Fl. Java 2 (1965) 626.

Indigenous in southeastern part of North America. Corolla sky-blue, rarely white. Cultivated in Java as an ornamental.

Salvia viridis L. *var.* **horminum** (L.) BATT. & TRABUT, Fl. Algér. (1890) 685; BACK. & BAKH. *f.* Fl. Java 2 (1965) 628.

Native of the Mediterranean region and SW. Asia. Corolla pink, violet or white. Cultivated in Java.

21. SATUREJA

LINNÉ, Gen. Pl. ed. 5 (1754) 247; Sp. Pl. (1753) 567; BTH. in B. & H. Gen. Pl. 2 (1876) 1187, in part; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 296. Sometimes wrongly spelled '*Satureia*'. — *Calamintha* MILL. Gard. Dict. ed. 4, 1 (1754); MOENCH. Meth. Pl. (1794) 408; BTH. in DC. Prod. 12 (1848) 226; in B. & H. Gen. Pl. 2 (1876) 1190; KENG, Gard. Bull. Sing. 24 (1969) 41. — *Melissa sect. Calamintha* (MOENCH.) BTH. Lab. Gen. Sp. (1834) 384. — **Fig. 22.**

(In Mal.) Often slender and prostrate herbs. *Leaves* crenate-serrate or entire. *Flowers* small or medium-sized, in dense axillary verticillasters which are often forming loose spicate or racemose inflorescences. *Calyx* campanulate or tubular, straight (slightly gibbous at the base in the fruiting stage, in Mal.); 10–13-nerved, 2-lipped; upper lip 3-toothed; lower lip 2-toothed, teeth subulate; throat naked or villous. *Corolla* tube nearly straight, with a longitudinal hairy stripe inside or not; limb 2-lipped; upper lip broad, erect, entire or emarginate; lower lip spreading, 3-lobed. *Stamens* 4, in 2 pairs, ascending under the upper lip; upper pair always smaller and often imperfect (in Mal.); anthers 2-celled, cells parallel or divaricate. Disk uniform, entire. Style lobes equal or the upper lobe smaller. *Nutlets* minute, subglobose, smooth.

Distr. About 200 *spp.* in temperate and warm regions of the northern hemisphere, 2 *spp.* extending to the mountains of *Malesia* as far as New Guinea.

Note. In my precursor I have treated the two Malesian species under the generic concept *Calamintha*. Controversial opinions have been expressed about its delimitation: KOCH (Linnaea 21, 1848, 673) merged it with *Clinopodium*, BENTHAM treated it as a section of his concept of *Melissa*. I have followed BRIQUET whose broad concept of *Satureja* includes *Calamintha* as a section.

KEY TO THE SPECIES

1. Bracteoles minute, not exceeding the pedicels, at most short-puberulous. Calyx 3 5–4.5 mm long, the lower half of the tube lax short-hairy, the teeth bristly-ciliate. Corolla 3.5–4.5 mm . . **1. S. gracilis**
1. Bracteoles involucrate, mostly far exceeding the pedicels, densely patently long-hairy. Calyx 4–10 mm long, long-hairy. Corolla 6–14 mm . . . . . **2. S. umbrosa**

1. Satureja gracilis (BTH.) LOES. Bot. Jahrb. 34 (1904) Beibl. 75, p. 13; NAKAI, J. Coll. Sc. Univ. Tokyo 31 (1911) 149; BOLD. Zakfl. (1916) 110; MERR. Brittonia 5 (1943) 29; BACK. & BAKH. *f.* Fl. Java 2 (1965) 630. — *Calamintha gracilis* BTH. in DC. Prod. 12 (1848) 232; MIQ. Fl. Ind. Bat. 2 (1859) 968, *incl. var.* γ *rubella*, *excl.* β *pilosior*; PRAIN, J. As. Soc. Beng. 74, ii (1907) 711; RIDL. Fl. Mal. Pen. 2 (1923) 648; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 99; KENG, Gard. Bull. Sing. 24 (1969) 42. — *Clinopodium gracile* (BTH.) O. K. Rev. Gen. Pl. 2 (1891) 42; H. W. LI, Acta Phytotax. Sin. 12 (2) (1974) 222. — *Calamintha moluccana* MIQ. Fl. Ind. Bat. 2 (1859) 968. — **Fig. 22.**

Slender, prostrate herb. Stem puberulous, rooting on the lower nodes. *Leaves* membranaceous, broadly ovate or subrounded, 1–2 by 0.8–1.5 cm, acute, base rounded or broadly cuneate, entire, margin elsewhere crenate-serrate, glabrous on both sides except on the nerves; petiole 0.5–1 cm, puberulous. *Flowers* in lax, many-flowered verticillasters in the axils of upper leaves, sometimes aggregated in a racemose or subcapitate terminal inflorescence. Bracts subulate, puberulous. Pedicels slender, 1–3 mm. *Calyx* tubular-campanulate, 2–3 mm long, in fruit 4–4.5 mm, sparsely hirsute; tube slightly inflated below; upper teeth recurved, highly connate, slightly shorter than the lower ones; lower teeth subulate, ciliate, slightly incurved. *Corolla* straight, violet or pink, 3–4 mm long, barely exserted. Anther-cells parallel, connivent. *Nutlets* rounded, compressed, 0.5–0.6 mm ∅, pale brown, finely reticulate.

Distr. Continental SE. Asia (Assam, Burma, Thailand, and southern China) to E. Asia (S. Japan, Formosa); in *Malesia:* Malay Peninsula, ? Central W. Sumatra, W. Java (Preanger Mts), Central & SW. Celebes (Masamba, Bonthain), ? Moluccas (Ambon). A rare plant.

In L there is a KORTHALS specimen labelled 'Melintang', a place in SE. Borneo; Mt Belintang is in Central W. Sumatra. MIQUEL recorded a KORTHALS specimen from Sumatra, but it has never been collected again in that island. Further there are abundant specimens on 3 sheets from ZIPPEL, but it remains uncertain where these were collected, notes adding either Moluccas (which must then be Ambon) or Timor; from the name *in sched.* '*Cunila moluccana* Zp.' it would appear that they came likely from Ambon if these labels belong to the material in question, Mt Salhutu attaining an altitude of *c.* 1000 m.

Ecol. Damp open places, in grassland, moist roadsides, streamside in forest, 600–1400 m. *Fl.* April–Oct. In Central Celebes the altitude is given as 2000–2400 m, but this was not ticketed by EYMA himself and is likely wrong.

2. Satureja umbrosa (BIEB.) SCHEELE, Flora 26 (1843) 577; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 302, *incl. var. javanica* BRIQ. *et var. repens* (D. DON) BRIQ.; KOORD. Exk. Fl. Java 3 (1912) 149; BACK. & BAKH. *f.* Fl. Java 2 (1965) 630; STEEN. Mt. Fl. Java (1972) pl. 25–1. — *Melissa umbrosa* BIEB. Fl. Taur.-Cauc. 2 (1808) 63. — *Thymus repens* D. DON, Prod. Fl. Nepal. (1825) 113. — *Ziziphora javanica* BL. Bijdr. (1826) 822; MIQ. Fl. Ind. Bat. 2 (1859) 971; *cf.* BACK. Bull. Jard. Bot. Btzg II, 12 (1913) 34. — *Calamintha umbrosa* (BIEB.) RCHB. Fl. Germ. Exc. 1 (1830) 329,

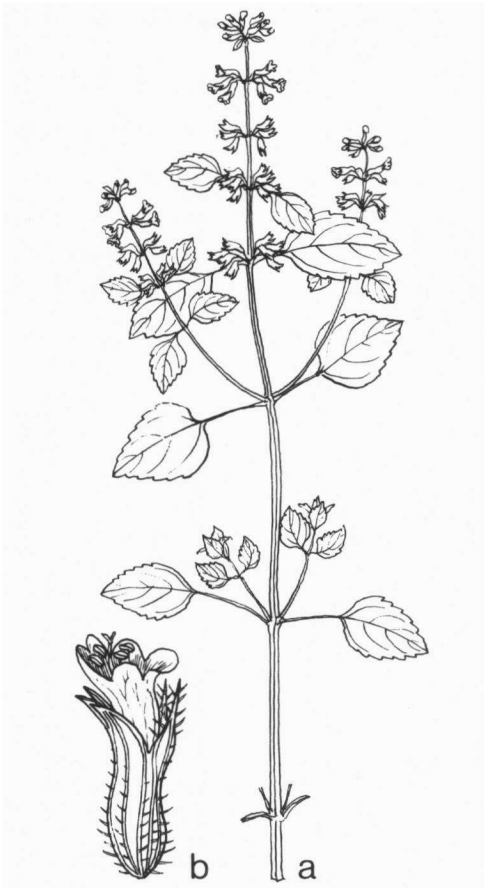


Fig. 22. *Satureja gracilis* (BTH.) LOES. *a.* Habit, × ²/₃, *b.* flower, × 8 (HOLSTVOOGD 523).

excl. descr.; FISCH. & MEY. Ind. Sem. Hort. Petrop. 6 (1840) 6; BTH. in DC. Prod. 12 (1848) 233; MIQ. Fl. Ind. Bat. 2 (1859) 968; HOOK. *f.* Fl. Br. Ind. 4 (1885) 450; BOERL. Handl. 2, 2 (1899) 715, *incl. var. javanica* (BTH.) BOERL.; MERR. & ROLFE, Philip. J. Sc. 3 (1908) Bot. 123; MERR. En. Philip. 3 (1923) 410; KENG, Gard. Bull. Sing. 24 (1969) 43, f. 7. — *Clinopodium repens* (D. DON) WALL. *ex* BTH. in Wall. Pl. As. Rar. 1 (1830) 66; H. W. LI, Acta Phytotax. Sin. 12 (2) (1974) 217. — *Clinopodium umbrosum* (BIEB.) C. KOCH, Linnaea 21 (1848) 673; O. K. Rev. Gen. Pl. 2 (1891) 514, *incl. var. repens*; MURATA, Acta Phytotax. Geobot. 24 (1969) 77; in Hara, Fl. E. Himal. 2nd Report (1971) 114. — *Calamintha repens* BTH. in DC. Prod. 12 (1848) 233, *incl. var. javanica* BTH.; MIQ. Fl. Ind. Bat. 2 (1859) 968, *incl. var.* β *javanica* BTH. *et var.* γ *colorans* MIQ. — *Stachys rubisepala* ELMER, Leafl. Philip. Bot. 1 (1908) 338. — *Leucas urticifolia* (*non* R.BR.) KOORD. Exk. Fl. Java 3 (1912) 147.

Slender herb, profusely branched, often prostrate. Stem 0.25–1 m, pubescent, often rooting on the lower nodes. *Leaves* membranaceous, puberulous, ovate to broadly ovate, 1–1.5(–4.5) by 0.8–1.2(–3) cm, acute, base rounded or cuneate, entire; margin elsewhere serrate; petiole 0.3–1 cm, pubescent. *Flowers* usually in dense whorls, subcapitate, terminal and in axils of upper leaves. Bracts subulate, hirsute, 3–4 mm, often 2–4 in groups, forming an involucre at the base of the verticillasters. Pedicels 3–6 mm, pubescent. *Calyx* 4–4.5 mm long, in fruit 4.5–6 mm, pubescent with spreading long hairs; tube slightly inflated below; upper teeth spreading, only slightly recurved; lower teeth subulate, pilose on the margins. *Corolla* reddish violet or pinkish to purple, with white spots inside the lip, 5–6 mm long, 2-lipped, straight. *Stamens* 4, only 2 larger ones functional. *Nutlets* subrounded, *c.* 0.8 mm ∅, compressed, smooth.

Distr. Continental S. Asia (Caucasus to Afghanistan and India to S. China), E. Asia (Formosa), and *Malesia:* Sumatra (Mt Kerintji), Java (from Mt Patuha in W to Mt Idjen in E), Lesser Sunda Is. (Bali, Lombok), Philippines (N. Luzon), and W. New Guinea (Lake Habbema near Mt Wilhelmina; Kokoda Distr., Lake Myola).

Ecol. Shaded ravines, glades, open slopes, moist grasslands, rocky plains, in E. Java in *tjemara* (*Casuarina*) forest and in Luzon often in pine forest and savannah; 1200–3200 m. *Fl.* March–Nov.

Vern. Java: *lĕgattan*, J, Diëng; Philippines: *pupuguk*, Ig.

Notes. The type specimen of *Melissa umbrosa* BIEB. was from Ibrice (as 'Iberiae'), Turkey. Specimens of this plant from Western Asia to the Far East and to Malesia are essentially homogeneous. In the mountains of Java at altitudes from 2000 to 3200 m, an alpine form with larger flowers (calyx 8–10 mm long at anthesis; 10–12 mm in fruit; corolla long-exserted) and larger nutlets (1–1.2 mm ∅) occurs which was recognized by BENTHAM, BOERLAGE and others as representing a distinct variety (*var. javanica* or *var. repens*).

The two specimens collected in W. New Guinea are noted by BRASS to have white flowers, the one by CROFT (LAE 61933) had purplish flowers.

Cultivated

Satureja hortensis LINNÉ, Sp. Pl. (1753) 568; BACK. & BAKH. *f.* Fl. Java 2 (1965) 629.

A native of the Mediterranean region, sometimes cultivated in the mountains of Java as a condiment.

Vern. *Bonenkruid*, Dutch.

22. STACHYS

LINNÉ, Gen. Pl. ed. 5 (1754) 243; Sp. Pl. (1753) 580; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1896) 260; KENG, Gard. Bull. Sing. 24 (1969) 172. — **Fig. 23.**

Herbs or undershrubs. *Leaves* opposite, crenate or serrate. *Verticillasters* axillary and in terminal spike-like inflorescence. *Calyx* campanulate, 10-nerved; teeth 5, unequal, less distinctly 2-lipped. *Corolla* usually with a ring of hairs within; upper lip ascending, concave, entire; lower lip spreading, 3-lobed, the midlobe the largest. *Stamens* 4, subequal ascending; anthers 2-celled, the cells divaricate (in Mal. *spp.*); filaments glabrous. Style 2-fid, the branches subequal. *Nutlets* ovoid, obtuse above, subtriquetrous below, glabrous.

Distr. One of the largest genera of the family, with *c.* 200 *spp.*, and worldwide distribution, especially developed in the Orient, the Mediterranean, the Cape, and Chile (BRIQUET, *l.c.*), absent from Australasia and the Pacific, in *Malesia* only found in two close spots in the mountains of West Java.

1. Stachys oblongifolia BTH. in Wall. Pl. As. Rar. 1 (1830) 64; Lab. Gen. Sp. (1834) 545; in DC. Prod. 12 (1848) 474; HOOK. *f.* Fl. Br. Ind. 4 (1885) 676; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 188; BACK. Bekn. Fl. Java (em. ed.) 14 (1944) fam. 201, p. 57; STEEN. Mt. Fl. Java (1972) pl. 25–6. — *S. sericea* (*non* WALL. *ex* BTH.) STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 223. — *S. melissaefolia* (*non* BTH.) BACK. & BAKH. *f.* Fl. Java 2 (1965) 624; KENG, Gard. Bull. Sing. 24 (1969) 173. — Fig. 23.

Annual herb, erect. Stem 30–60 cm, rarely branched, often densely villous. *Leaves* thick-membranaceous, narrowly elliptic or lanceolate, 4–6 by 1.5–2.5 cm, broadly acute, base truncate or subauriculate, margin crenate-serrate, densely villose on the surfaces; petiole about 0.5 cm. *Verticillasters* 4–10-flowered, in distant upper axils, forming spike-like inflorescence, to 15 cm long or more; rachis tomentose. Bracts narrowly elliptic, 6 mm long. *Calyx* campanulate, 5–6 mm long, in fruit 6–7 mm, pilose; the 3 upper teeth slightly longer; the 2 lower teeth joined (BACKER 26072) or nearly free (VAN STEENIS 11657). *Corolla* reddish violet, 10–12 mm long, strigose without, upper lip 3–4 mm long, lower lip 5–6 mm long. *Nutlets* broadly obovoid, flattened, 1.8 by 1.6 mm, subtriquetrous.

Distr. SE. Asia (Bengal, Assam, Silhet, Himalaya), ? S. China; in *Malesia:* West Java: Preanger Mts (Talun and Rantja Gedeh near Kertosari).

Ecol. Damp glades in mountain forest and along forest borders, very local but common, 1600–1750 m.

Taxon. Already HOOKER *f.* (1885) remarked on the difficulty of specific delimitation in this genus in India — 6 epithets being involved — which is also felt elsewhere in the world, even in Europe. BACKER and I (*ll.cc.*) were uncertain about the proper correlation of the Javanese specimens with those from Asia. After having now studied the types of *S. sericea*, *S. melissaefolia*, and *S. oblongifolia*, it is clear that they are very closely allied. Neither in the leaves (shape, hairiness) nor in the number of flowers or their bracteoles I can find consistent differences.

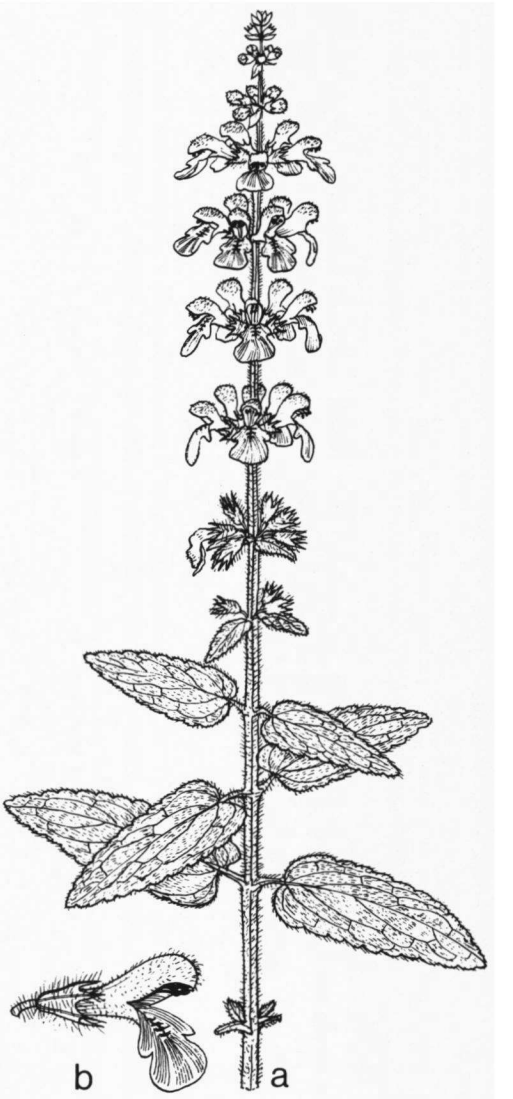


Fig. 23. *Stachys oblongifolia* BTH. *a.* Habit, × 2/3, *b.* flower, × 2 (VAN STEENIS 11657).

The conclusion is that for distinction (rather smallish) characters can only be found in the flowers, three taxa being provisionally defined as follows:

S. floccosa BTH. (*S. sericea* WALL., *homon. illeg., non* CAV.; *S. vestita* BTH., *p.p.*; *S. splendens* BTH., *p.p.*): Corolla tube rather slender, clearly exceeding the calyx tube, as high as the calyx teeth, limb mostly long densely silky hairy beneath. Calyx tube *c.* 1.5–2 times as long as the teeth, the bays between the teeth rather narrow-acute, teeth rather narrow-deltoid, with a long mucro, about as long as the limb. Calyx *c.* 7–9 mm in all.

S. melissaefolia BTH. (*S. splendens* BTH., *p.p.*): Corolla tube distinctly exceeding the calyx tube, limb hairy beneath but not prominently long-silky. Calyx tube 2–4 times as long as the unequal calyx teeth, the latter separated at the base by rounded bays, deltoid, not mucronate, the tip acutish ending in a sort of gland. Calyx *c.* 8 mm in all.

S. oblongifolia BTH.: Corolla tube slightly exceeding the calyx tube, shorter than the calyx teeth, the limb hairy beneath but not densely long-sericeous. Calyx tube *c.* 1.5–2 times as long as the teeth, the bays between the teeth rather acutish, teeth deltoid, sharply acute to shortish mucronate. Calyx *c.* 5.5–7 mm long in all.

Those who would adhere to a broader species concept would accept possibly only one species which then should bear the name *S. oblongifolia* BTH. in WALL. As specimens are scarce in the herbarium, population field studies should bring evidence for a final conclusion. Anyway the Javanese specimens are conspecific with *S. oblongifolia s. str.* although it seems that there is a small difference in having the two lower calyx teeth somewhat fused at the base.

Finally I remark that the assemblage of continental Asian specimens is heterogeneous and some forms may not be distinguishable from the European *S. alpina* L. — Ed.

Cultivated

Stachys arvensis L. This was sporadically found in ditches in the Mission Garden, Keglsugl airstrip, New Guinea, by Dr. N. M. WACE, 14 Sept. 1971 (ANU 13035). This may become naturalized. It is not known whether it was brought intentionally or came along with other seed as a weed. Identified by J. MENNEMA, Leiden.

Stachys sieboldii MIQ. Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 112; KOORD. Exk. Fl. Java 3 (1912) 147.

A Japanese species, with edible tubers. Whether this was ever cultivated in Java seems doubtful; it does not even occur in the Catalogues of the Botanic Gardens, Buitenzorg (Bogor), and there is no material to back this record which may be just based on fancy as many other records in KOORDERS's Flora.

23. ACROCEPHALUS

BTH. Bot. Reg. *sub* t. 1282, 1300 (1829–30); HASSK. Cat. Hort. Bog. (1844) 128 ('*Acrocephalium*'); BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 365; J. K. MORTON, J. Linn. Soc. Lond. Bot. 58 (1962) 239; in Hutch. & Dalz. Fl. W. Trop. Afr. ed. 2, 2 (1963) 445; ROBLJNS *f.* Bot. Notis. 119 (1966) 185; KENG, Gard. Bull. Sing. 24 (1969) 25. — **Fig. 24.**

Annual herbs. Stems quadrangular. *Leaves* opposite or seemingly whorled by the presence of the leaves of underdeveloped lateral branchlets. *Verticillasters* agglomerated into terminal or axillary globose or ovoid spurious heads or cylindric terminal and upper axillary spurious spikes. Bracts imbricate. *Flowers* very small, sessile. *Calyx* ovoid (in fruit tubular), 7-nerved, base slightly gibbous; upper lip flat, entire; lower lip (in Mal. *sp.*) generally 4-toothed; throat naked. *Corolla* tube very short, subequally 5-lobed. *Stamens* 4, declinate, the lower pair slightly longer, glabrous; filaments free, toothless, included; anthers reniform, cells confluent. Disk small, equal-sided or gibbous. Style 2-fid. *Nutlets* minute, ellipsoid, smooth or glandular.

Distr. Uncertain in Africa, ? *c.* 130 *spp.* (see note), anyway *c.* 5–6 *spp.* in continental SE. Asia, of which 1 *sp.* in *Malesia.*

Note. In the old circumscription the genus comprised some 130 *spp.* MORTON (*l.c.*) recently split it up, separating the African species, but ROBLJNS *f.* maintains that the segregated genera cannot satisfactorily be demarcated.

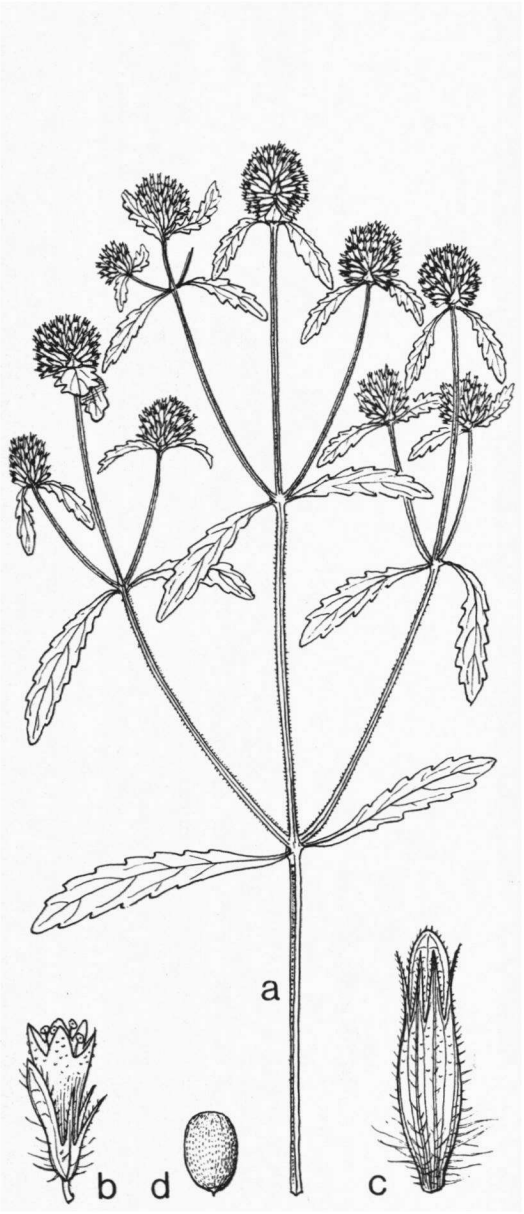


Fig. 24. *Acrocephalus indicus* (BURM. *f.*) O. K. *a.* Habit, × 2/3, *b.* flower, *c.* fruiting calyx, both × 8, *d.* nutlet, × 20 (J. DORGELO 7362).

1. Acrocephalus indicus (BURM. *f.*) O.K. Rev. Gen. Pl. 2 (1891) 511; MERR. Philip. J. Sc. 7 (1912) Bot. 101; En. Philip. 3 (1923) 421; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 109; BACK. Onkr. Suiker. (1931) 570, Atlas (1973) t. 541; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 29; BACK. & BAKH. *f.* Fl. Java 2 (1965) 638; KENG, Gard. Bull. Sing. 24 (1969) 26, f. 2, *incl. f. spicatus* (C.B.ROB.) KENG. — *Prunella indica* BURM. *f.* Fl. Ind. (1768) 130. — *Ocimum capitellatum* LINNÉ *f.* Suppl. (1781) 276. — *Ocimum capitatum* ROTH, Nov. Pl. Sp. (1821) 276. — *Lumnitzera capitata* (ROTH) SPRENG. Syst. 2 (1825) 687. — *Ocymum acrocephalum* BL. Bijdr. (1826) 834. — *Origanum benghalense* (*non* BURM. *f.*) BL. Bijdr. (1826) 831. — *A. capitatus* (ROTH) BTH. Bot. Reg. *sub* t. 1282, 1300 (1829–30); in Wall. Pl. As. Rar. 2 (1830–31) 18; Lab. Gen. Sp. (1832) 23; in DC. Prod. 12 (1848) 47; MOR. Syst. Verz. (1846) 55; MIQ. Fl. Ind. Bat. 2 (1858) 941; F.-VILL. Nov. App. (1880) 163; HOOK. *f.* Fl. Br. Ind. 4 (1885) 611; RIDL. Fl. Mal. Pen. 2 (1923) 644. — *A. blumei* BTH. Bot. Reg. *sub* t. 1300 (1830); Lab. Gen. Sp. (1832) 23; HASSK. Cat. Hort. Bog. (1844) 128; ZOLL. Nat. Geneesk. Arch. N. I. 2 (1845) 591. — *Pogonostemon plectranthoides* (*non* DESF.) HASSK. Cat. Hort. Bog. (1844) 131; MIQ. Fl. Ind. Bat. 2 (1859) 961. — *Lumnitzera acrocephala* BL. *ex* MIQ. Fl. Ind. Bat. 2 (1858) 941, *in syn.* — *A. spicatus* C.B.ROB. Philip. J. Sc. 6 (1911) Bot. 356; MERR. En. Philip. 3 (1923) 421. —**Fig. 24.**

Slender annual herb, up to 1 m. Stem quadrangular, glabrous, often branched from the base; branches often ascending. *Leaves* elliptic to narrowly lanceolate, 2–5.5 by 0.5–1 cm, acute, base attenuate, margin remotely serrate, glabrous or glabrescent on both surfaces, glandular beneath; petiole 0.2–1 cm. *Flowers* in terminal and upper axillary spurious heads or short dense spikes, 5–15 mm across, up to 3 or 4 cm long, subtended at the base with 2 or several leafy bracts; flowering bracts suborbicular, 2–3 mm ∅, shortly acuminate, each bract subtending 3–6 flowers. *Calyx* tubular, 2–2.5 mm long, in fruit 4.5–5 mm, pubescent externally, 2-lipped; upper lip entire, rounded; lower lip with 4 lanceolate teeth, shorter than the upper lip. *Corolla* white or pale purple, tubular, 3 mm long, suberect, inconspicuously 2-lipped; upper lip shortly 4-lobed, lower lip entire, longer than the upper lip. *Stamens* 4, in 2 pairs, epicorolline. *Nutlets* minute, oblong-ellipsoid, 0.7 by 0.4 mm, compressed, smooth.

Distr. Continental SE. Asia (India, Assam, Thailand, Indo-China to S. China) and throughout *Malesia*.

Ecol. In open vegetation and in grassland, also in fallow fields and paddies, largely below 800 m, ascending in N. Sumatra (Toba) to 1250 m, rather rare, but locally common; sometimes in both everwet and strongly seasonal climates. *Fl.* Jan.–Dec.

Vern. *Aäntingan*, M, *bĕbĕrtéh*, Atjeh, *sangkĕtan* rambat, J.

24. BASILICUM

MOENCH, Suppl. Meth. Pl. (1802) 143; O.K. Rev. Gen. Pl. 2 (1891) 512; J. K. MORTON, J. Linn. Soc. Lond. Bot. 58 (1962) 238; in Hutch. & Dalz. Fl. W. Trop. Afr. ed. 2, 2 (1963) 454; KENG, Gard. Bull. Sing. 24 (1969) 38. — *Moschosma* REICHB. Consp. (1828) 171, *in adnot.*; BTH. Lab. Gen. Sp. (1832) 24; in DC. Prod. 12 (1848) 48; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 368. — **Fig. 25.**

Erect, annual or perennial herbs, branched. *Verticillasters* 6-flowered, secund, in axillary and terminal raceme-like inflorescences. *Flowers* very small. Bract minute. *Calyx* campanulate, 10-nerved, 5-toothed, the uppermost tooth often very broad and forming the upper lip, the 2 lateral teeth often associated with the 2 lower teeth and forming the lower lip; throat of calyx naked. *Corolla* tubular-campanulate, tube short, limb 2-lipped; upper lip (in Mal. *sp.*) clearly 3-lobed, midlobe entire or shallowly notched; lower lip entire, auriculate at base. *Stamens* 4, declinate; filaments not appendiculate; anthers 2-celled. Disk equal-sided. *Nutlets* ovoid, compressed, smooth.

Distr. About 6–7 *spp.* in the tropics of the Old World, in Africa, Asia, Malesia, and N. Australia; in *Malesia* 1 *sp.*, in N. Australia an endemic species closely allied to it.

Nomencl. MAHESHWARI has proposed to conserve *Moschosma* (Taxon 19, 1970, 481), but this has not been accepted.

1. Basilicum polystachyon (L.) MOENCH, Suppl. Meth. Pl. (1802) 143; O.K. Rev. Gen. Pl. 2 (1891) 512; MORTON in Hutch. & Dalz. Fl. W. Trop. Afr. ed. 2, 2 (1963) 454; KENG, Gard. Bull. Sing. 24 (1969) 39, f. 6. — *Ocimum tenuiflorum* (*non* L. 1753) BURM. *f.* Fl. Ind. (1768) 129. — *Ocymum polystachyon* LINNÉ, Mant. 2 (1771) 567. — *Lumnitzera polystachyum* (L.) JACQ. *f. ex* SPRENG. Syst. 2 (1825) 687. — *Ocymum polystachyum* L. *var.* BL. Bijdr. (1826) 834. — *Moschosma polystachyum* (L.) BTH. in Wall. Pl. As. Rar. 2 (1830–31) 13; in DC. Prod. 12 (1848) 48; DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 397; HASSK. Cat. Hort. Bog. (1844) 129; MIQ. Fl. Ind. Bat. 2 (1858) 942; F.-VILL. Nov. App. (1880) 163; HOOK. *f.* Fl. Br. Ind. 4 (1885) 612; VIDAL, Phan. Cuming. Philip. (1885) 135; Rev. Pl. Vasc. Filip. (1886) 212; K.SCH. & LAUT. Fl. Schutzgeb. (1900) 529; MERR. Sp. Blanc. (1918) 339; En. Philip. 3 (1923) 421; RIDL. Fl. Mal. Pen. 2 (1923) 644; MANSFELD, Bot. Jahrb. 62 (1929) 380; BACK. Onkr. Suiker. (1931) 570, Atlas (1973) t. 542; BURK. Dict. (1935) 1498; QUIS. Medic. Pl. Philip. (1951) 824; BACK. & BAKH. *f.* Fl. Java 2 (1965) 638 ('*polystachyon*'). — *Moschosma tenuiflorum* [*non* (L.) HEYNH. 1840] MERR. Fl. Manila (1912) 408. — **Fig. 25.**

Erect herb, 0.4–1 m. Stem much branched, ± glabrous, prominently 4-angled. *Leaves* thin-membranaceous, ovate to oblong-ovate, 2–5 by 1–3.5 cm, acuminate or caudate, base acute or attenuate, irregularly serrate, glabrous on both surfaces; petiole slender, 1–4 cm. Raceme-like *inflorescence* 3–6 cm long (in fruit over 10 cm). Bracts minute, lanceolate, aristate, 1–2 mm. Pedicels 1–2 mm, persistent. *Calyx* campanulate, pubescent, 1.5–2 mm long (in fruit 3–3.5 mm, slightly inflated at base); upper lip broad, entire, reflexed; lower lip 4-toothed, 2 lateral teeth ovate, and 2 lower teeth cuspidate. *Corolla* pale lilac to purple or flesh-coloured, sometimes white, 2–2.5 mm long. *Stamens* 4, in 2 pairs, included. *Nutlets* minute, broadly ellipsoid, compressed, smooth.

Distr. Tropics of Africa, SE. Asia (incl. Ceylon), throughout *Malesia* to New Britain and Queensland.

Ecol. Fallow rice-fields, watersides, swampy grasslands, open waste places, largely in settled areas, with a preference for seasonal climatic conditions, therefore in Java largely in areas subject to a dry climate, and scarce in most of Sumatra, Malay Peninsula, and Borneo. *Fl.* Jan.–Dec.

Flowers are often galled, and inflorescences bear sometimes large red galls, caused by a gall-midge.

Vern. *Musk basil*, E; Sumatra: *main-main, sulasĕh dulang, tapua djattĕn*, M; Java: *surawung gunung, s. leuweung, wanggung langit*, S, *bajĕm bali*, M, *sangkĕt(an), wangon, wangun*, J; Philippines: *loktokong, pansi-pansi*, Tag., *bauing*, Mag., *lodokong*, Pang.

Uses. According to HEYNE (Nutt. Pl. ed. 3, 1950, 1335) the crushed leaves are used in Java for sprains. Decoctions are used externally and internally for epilepsy, palpitations of the heart, neuralgia and convulsions.

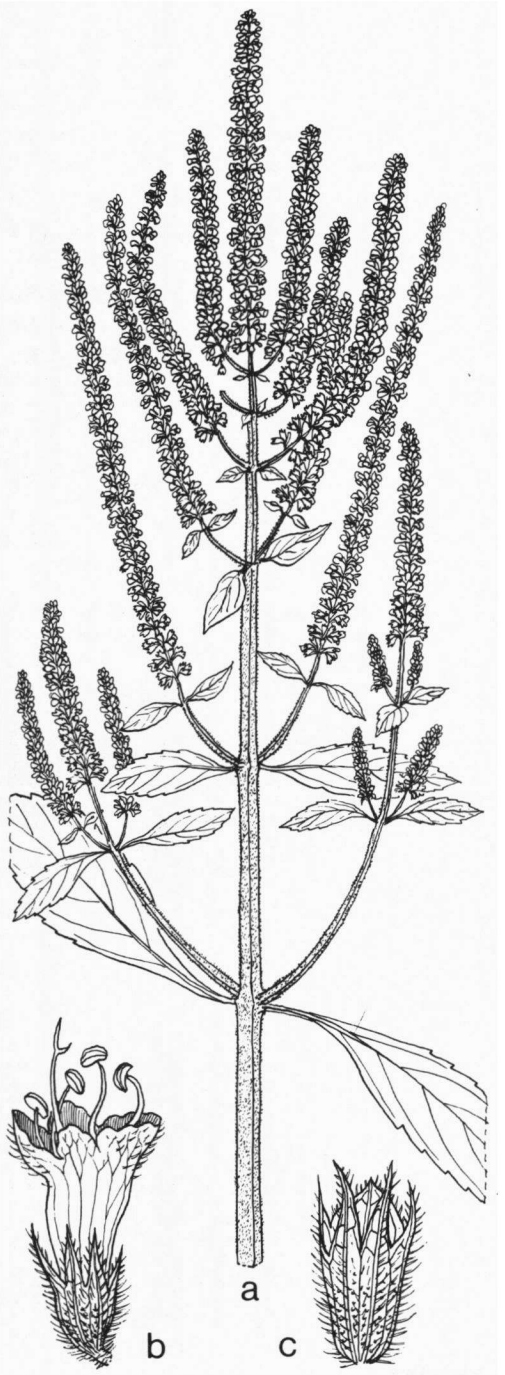


Fig. 25. *Basilicum polystachyon* (L.) MOENCH. *a*. Habit, × $^2/_3$, *b*. flower, *c*. fruiting calyx, both × 12 (*a* RAHMAT SI BOEEA 463, *b–c* BACKER 35568).

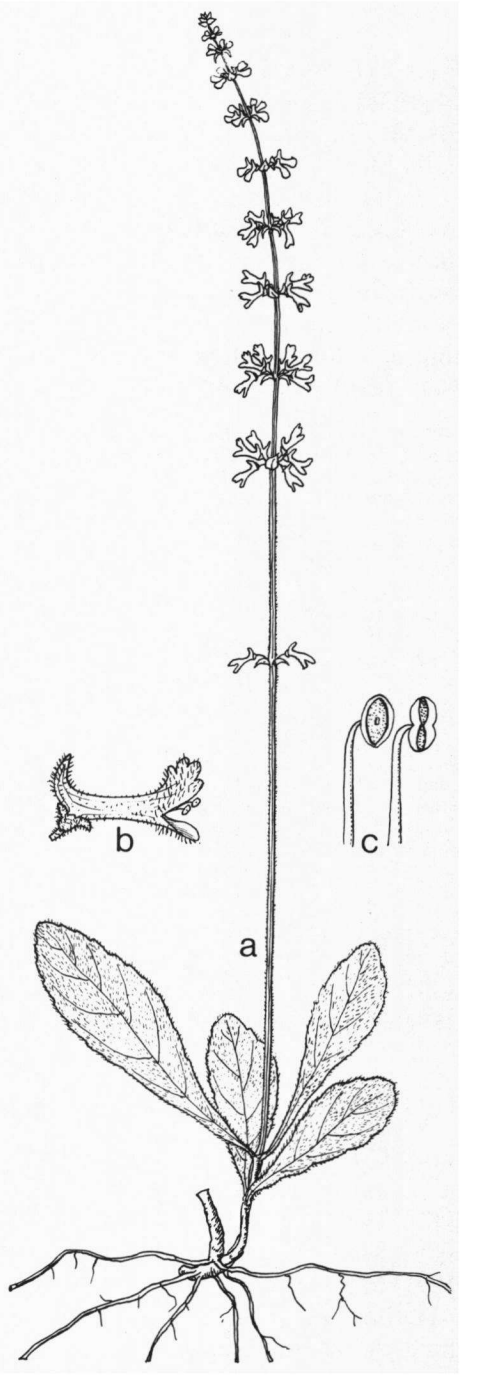


Fig. 26. *Ceratanthus longicornis* (F.v.M.) G. TAYLOR. *a*. Habit, × $^2/_3$, *b*. flower, × 3, *c*. stamens, thecae finally confluent, × 14 (BRASS 8403).

25. CERATANTHUS

F.v.M. (Fragm. Phyt. Austr. 5 (1865) 52, *in obs., nom. prov.*) *ex* G. TAYLOR, J. Bot. 74 (1936) 35; KENG, Gard. Bull. Sing. 24 (1969) 46. — *Plectranthus sect. Cornigera* F.v.M. Fragm. Phyt. Austr. 5 (1865) 51. — *Hemsleia* KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 142, *non Hemsleya* COGN. 1889. — **Fig. 26.**

Herbs. *Leaves* opposite (or basal ones subverticillate). *Flowers* usually small, in few-flowered verticillasters, forming a terminal raceme-like inflorescence. *Calyx* turbinate (more or less saccate in fruit), 5-toothed, 2-lipped; upper lip 3-lobed, lower lip obtuse, strongly incurved and gibbous in fruit. *Corolla* tube exserted, spurred at the base; limb 2-lipped, upper lip 3–4-lobed, recurved, lower lip entire, concave. *Stamens* 4, in 2 pairs; filaments free, inserted at two levels. Style shortly 2-fid. *Nutlets* orbicular, often finely pitted.

Distr. About 10 *spp.*, largely in continental SE. Asia (Thailand, Indo-China, and SW. China), 1 *sp.* in *Malesia* (S. New Guinea) and Queensland.

Note. LAM (Proc. 7th Pac. Sc. Congr. 5, 1953, 9) has suggested that the genus would be an artificial assemblage of *Plectranthus* species with spurred corolla, which would then explain the Malesian disjunction. As the genus is differing from that genus by more characters, however, I find this unlikely; there are more genera showing this disjunction, especially those bound to a seasonal climate, such as *Anisomeles malabaricus, Germainia, etc.*

1. Ceratanthus longicornis (F.v.M.) G. TAYLOR, J. Bot. 74 (1936) 39, f. 2; KENG, Gard. Bull. Sing. 24 (1969) 46, f. 8. — *Plectranthus longicornis* F.v.M. Fragm. Phyt. Austr. 5 (1865) 51; BTH. Fl. Austr. 5 (1870) 76; F. M. BAILEY, Queensl. Fl. 4 (1901) 1189; DOMIN, Bibl. Bot. 22 (Heft 89) (1929) 1117, *incl. var. scapiger* DOMIN; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 222. — **Fig. 26.**

Perennial herb, 25–45 cm. Stem unbranched, rarely branched from the base, tomentose or pubescent, thickened (sometimes nodiferous) and scaly in underground portion. *Leaves* usually 2–3 pairs, linear oblanceolate, obovate or oblong, 2.5–3.5(–5) by 1–1.5 cm, obtuse or rounded, base attenuate, margin sinuate or coarsely toothed or subentire, hirsute on both surfaces; petiole 0.2–0.5 cm. *Verticillasters* (4–5–)6–8-flowered, forming a terminal, slender raceme 10–15 cm. Bracts cordate, acuminate. Pedicels 2–3 mm. *Calyx* turbinate, widely opened, 1.5–2.5 mm long, upper lip formed of a broad, truncate and emarginate upper tooth with 2 smaller lateral teeth at its base, lower lip obtuse and emarginate. *Corolla* blue, violet or deep purple, obliquely campanulate, produced at the base a narrow conical, recurved spur; upper lip erect, broad, shortly 3-lobed; lower lip oblong, concave. *Stamens* included, 2 upper ones inserted near the mouth, 2 lower ones near the base of the corolla tube; anthers 2-locular, later confluent and 1-celled, reniform, dorsifixed. *Fruiting calyx* accrescent, inflated, 2.5–3 mm long and broad; upper tooth recurved at the top and decurrent at the base; lower lip strongly concave and saccate. *Nutlets* globular, flattened, 1 mm ∅, glandular.

Distr. NE. Queenland, in *Malesia:* SE. New Guinea (Oriomo, Middle Fly and Wassi Kussa R. areas).

Ecol. Locally common in seasonally dry lowland grasslands and savannahs.

26. HYPTIS

JACQ. Collect. 1 (1786) 101, 103, *nom. cons.*; BTH. in B. & H. Gen. Pl. 2 (1876) 1178; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 333; EPLING, Kew Bull. (1936) 378; Rev. Mus. La Plata n.s. 7, Bot. (1949) 153; KENG, Gard. Bull. Sing. 24 (1969) 90. — *Mesosphaerum* P. BROWNE, Hist. Jamaica (1756) 257; O. K. Rev. Gen. Pl. 2 (1891) 525. — *Schaueria* HASSK. Flora 25 (1842) II, Beibl. 25, *nomen.* — **Fig. 27.**

Herbaceous or shrubby, often aromatic. *Leaves* serrate, gland-dotted. *Flowers* small or medium, variously arranged in densely spicate or densely capitate inflorescences or in few-flowered clusters, often secund. Bracts subulate or setaceous. *Calyx* tubular or campanulate, straight or oblique, 10-nerved; teeth 5, subequal, acute or awned, erect. *Corolla* 5-lobed, 2-lipped; upper lip 2-lobed, lobes erect or

spreading or reflexed; lower lip 3-lobed, the midlobe abruptly deflexed, with thickened margins, sometimes saccate at the base. *Stamens* 4, declinate; filaments free, without basal appendages; anther-cells confluent. Disk entire, equal-sided. Style subentire or shortly 2-fid. *Nutlets* oblong or ovoid, smooth or rugose sometimes only one or two developed.

Distr. Species over 300, all American. The following 5 *spp.* naturalized as weeds in the Old World tropics.

KEY TO THE SPECIES

1. Flowers in many-flowered verticillasters, congested into globoid or ellipsoid spurious heads (or dense spikes).
2. Spurious heads axillary, globose or subglobose.
3. Spurious heads 0.8–1.2 cm (in fr.) ∅. Peduncles 0.5–1 cm long . . . . . **1. H. brevipes**
3. Spurious heads 1.5–2 cm (in fr.) ∅. Peduncles 3–5(–8) cm long . . . . . **2. H. capitata**
2. Spurious heads (or dense spikes) terminal, oblong or ellipsoid, (in fr.) 3–5 cm long. . **3. H. spicigera**
1. Flowers in few-flowered short cymes, axillary or in terminal spurious racemes or panicles.
2. Cymes 6–15-flowered, comb-shaped, in terminal spurious racemes or panicles. Calyx tubular, 3–4 mm long in fruit. . . . . **4. H. pectinata**
2. Cymes 2–5-flowered, clustered in leaf-axils or racemosely disposed. Calyx obliquely campanulate, 8–10 mm long in fruit . . . . . **5. H. suaveolens**

1. Hyptis brevipes POIT. Ann. Mus. Hist. Nat. Paris 7 (1806) 465; BTH. Lab. Gen. Sp. (1833) 105; in DC. Prod. 12 (1848) 107; MOR. Syst. Verz. (1846) 54; MIQ. Fl. Ind. Bat. 2 (1858) 959; F.-VILL. Nov. App. (1880) 164; VIDAL, Phan. Cuming. Philip. (1885) 135; HOOK. *f.* Fl. Br. Ind. 4 (1885) 630; VIDAL, Rev. Pl. Vasc. Filip. (1886) 213; BRIQ. Ann. Cons. Jard. Bot. Genève 2 (1898) 227, *incl. var. serrata* BRIQ.; MERR. Philip. J. Sc. 1 (1906) Suppl. 122; PRAIN, J. As. Soc. Beng. 74, ii (1907) 704; KOORD. Exk. Fl. Java 3 (1912) 153; MERR. Fl. Manila (1912) 409; Sp. Blanc. (1918) 338; COSTERUS & SMITH, Ann. Jard. Bot. Btzg 32 (1922) 28; MERR. En. Philip. 3 (1923) 416; RIDL. Fl. Mal. Pen. 2 (1923) 645; MERR. Pl. Elm. Born. (1929) 268; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 147; BACK. Onkr. Suiker. (1931) 565, Atlas (1973) t. 536; STEEN. Trop. Natuur 25 (1936) 4, f. 6; Gard. Bull. S. S. 9 (1938) 67, pl.; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 62; EPLING, Rev. Mus. La Plata n.s. 7, Bot. (1949) 443; HEND. Mal. Nat. J. 6 (1950) 390, f. 360; BACK. & BAKH. *f.* Fl. Java 2 (1965) 634; KENG, Gard. Bull. Sing. 24 (1969) 90. — *H. acuta* BTH. Linnaea 6 (1831) 82. — *Thymus biserratus* BLANCO, Fl. Filip. (1837) 478. — *Mentha javanica* (*non* BL. 1826) SPANOGHE, Linnaea 15 (1841) 332. — *Leucas globulifera* HASSK. Cat. Hort. Bog. (1844) 133; MIQ. Fl. Ind. Bat. 2 (1859) 984; PRAIN, J. As. Soc. Beng, 74, ii (1907) 705. — *Pycnanthemum subulatum* BLANCO, Fl. Filip. ed. 2 (1845) 333; ed. 3, 2 (1878) 251, t. 204. — *Mesosphaerum brevipes* (POIT.) O. K. Rev. Gen. Pl. 2 (1891) 525. — **Fig. 27a–c.**

Erect herb, 0.5–1.5 m, not aromatic. Stem shortly branched, glabrous or pilose. *Leaves* membranaceous, narrowly lanceolate or ovate-oblong, 4–8 by 1–2.5 cm, acute or acuminate, base long cuneate, entire, margin elsewhere serrate, sparsely hispid on nerves on both surfaces; petiole 0.5–1 cm, hispid. *Flowers* in dense spurious heads, 0.6–0.8 cm ∅, in fruit 0.8–1.2 cm ∅, on axillary, hispid slender peduncles, 1–1.2 cm long. Subtending bracts lanceolate or subulate, 4–6 mm long, setaceous. *Calyx* subtubular, 2.5–3 mm long, in fruit 3–4 mm; teeth erect, subulate, 1–1.4 mm long, sparsely ciliate. *Corolla* white, 3–4 mm long; lips glandular, the lower lip yellowish. Anthers purple. *Nutlets* ovoid, 0.7 mm long, dark brown, minutely rugose, not swelling when soaked in water.

Distr. Native of Mexico, since long naturalized in and now found throughout *Malesia* and other tropics.

Ecol. Waste places, often abundant in fallow rice-paddies, mainly under everwet climatic conditions, rather rare in seasonally drought areas, ascending to *c.* 1200 m. *Fl.* Jan.–Dec.

Once this species has been found at *c.* 3100 m on the summit of Mt Agung, Bali, in small, condensed but flowering specimens, near fumaroles which act as 'open glasshouses' (VAN STEENIS, 1936, *l.c.*), together with some other medium altitude plants. This is explained by exozoic dispersal of seed by either game or monkeys, or by Balinese who annually pilgrimage this sacred summit.

Vern. Malaya: *ati-ati putĕh, gantanggau, kanching baju, sawi ĕnggang, s. hutan*, M; Java: *boborondongan, boborongan, djukut pĕndjul, gèng-gèjan, kanĕju, ki heuleud, mata munding*, S, *godong pusĕr*, J; Sumatra: *ane-ane*, M; Borneo: *kumpai huluman*; Philippines: *lombar-kombáran, liñga-liñgalingáhan, pansi-pansi, pompul-pompúlan*, Tag., *albaka*, Sul., *lubulan*, Sub., *niog-niógan*, Bik., P.Bis., *pulipul*, If.; Celebes: *pupulut alus, tutumbalen*, Minahassa.

Uses. In Malaya the leaves are sometimes eaten. A decoction of the leaves is considered a protective medicine after childbirth; also used to drive out worms in children by application to the abdomen (BURK. Dict. 1935, 1220).

2. Hyptis capitata JACQ. (Ic. Rar. 1, 1781–87, t. 114, *sine descr. et anal., inval.*) Collect. 1 (1786) 102; BTH. in DC. Prod. 12 (1848) 106; MIQ. Fl. Ind. Bat. 2 (1858) 958; F.-VILL. Nov. App. (1880) 164;

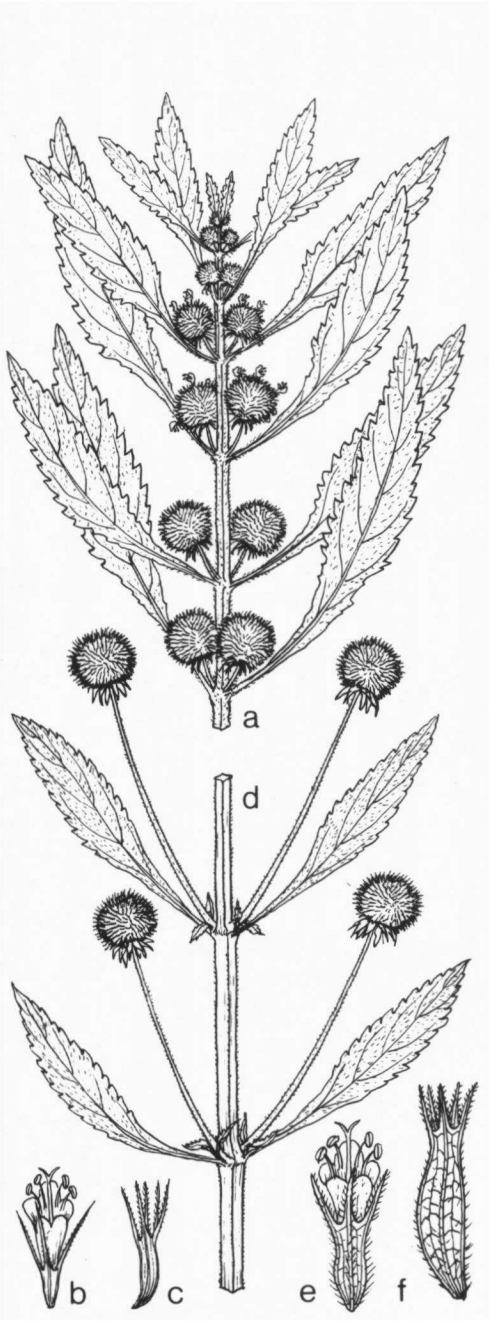


Fig. 27. *Hyptis brevipes* POIT. *a*. Habit, × ²/₃, *b*. flower, *c*. fruiting calyx, both × 4. — *H. capitata* JACQ. *d*. Habit, × ²/₃, *e*. flower, *f*. fruiting calyx, both × 4 (*a–c* SCHIFFNER 2471, *d* SCHIFFNER 2868, *e–f* SCHIFFNER 2484).

VIDAL, Phan. Cuming. Philip. (1885) 136; Rev. Pl. Vasc. Filip. (1886) 213; BRIQ. Ann. Cons. Jard. Bot. Genève 2 (1898) 225, *pro var. mariannarum* BRIQ.; MERR. Philip. J. Sc. 1 (1906) Suppl. 122; *ibid.* 5 (1910) Bot. 381; Fl. Manila (1912) 409; KOORD. Exk. Fl. Java 3 (1912) 153; MERR. Philip. J. Sc. 11 (1916) Bot. 311; Sp. Blanc. (1918) 338; En. Philip. 3 (1923) 416; DAMMERMAN, Nat. Tijd. N. I. 86 (1926) 75, 93; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 147; BACK. Onkr. Suiker. (1931) 566, Atlas (1973) t. 537; HOLTH. & LAM, Blumea 5 (1942) 237; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 63; EPLING, Rev. Mus. La Plata n.s. 7, Bot. (1949) 470; QUIS. Medic. Pl. Philip. (1951) 817; BACK. & BAKH. *f.* Fl. Java 2 (1965) 634. — *Thymus virginicus* (*non* L. 1771) BLANCO, Fl. Filip. (1837) 478. — *Pycnanthemum decurrens* BLANCO, Fl. Filip. ed. 2 (1845) 333; ed. 3, 2 (1878) 251, t. 294. — *H. celebica* ZOLL. *ex* KOORD. Med. Lands Pl. Tuin 19 (1898) 561; BOERL. Handl. 2 (1899) 714. — *H. lanceolata* (*non* POIR. 1813) BRIQ. Ann. Cons. Jard. Bot. Genève 2 (1898) 225 (*quoad* CUMING 591); MERR. En. Philip. 3 (1923) 416. — *Mesosphaerum capitatum* JENNINGS, Ann. Carneg. Mus. 11 (1917) 246. — *H. decurrens* (BLANCO) EPLING in Fedde, Rep. 34 (1933) 120. — *H. rhomboidea* (*non* MART. & GAL. 1844) EPLING, Kew Bull. (1936) 278; Rev. Mus. La Plata n.s. 7, Bot. (1949) 468; KENG, Gard. Bull. Sing. 24 (1969) 92, f. 15; HENTY & PRITCHARD, Bot. Bull. Lae 7 (1975) 105, fig. — *H. mariannarum* (BRIQ.) EPLING, Rev. Mus. La Plata n.s. 7, Bot. (1949) 471. — **Fig. 27d–f.**

Stout, erect annual herb, 0.5–2.5 m, not aromatic. Stem and branches (often very short) densely or sparsely pubescent on the angles. *Leaves* lanceolate or rhomboid-elliptic, 6–10(–14) by 1.5–4(–6) cm, acute or acuminate, base cuneate and decurrent; margin crenate-serrate or serrate, sparsely pubescent on the nerves of lower surfaces; petiole 2–3 cm. *Flowers* ∞ in crowded verticillasters forming axillary, solitary globular heads, 0.8–1 cm ∅ (1.5–2 cm ∅ in fruit); peduncle 3–5(–8) cm, basal involucral bracts linear-lanceolate, hairy, 3–6 mm long. *Calyx* 3–4 mm long, in fruit 6–8 mm; teeth subulate, erect, as long as or shorter than the tube. *Corolla* white, violet-dotted, 5–6 mm long. Anthers purple. *Nutlets* ovoid, compressed 1.2–2 mm long, round-truncate above, subtriquetrous below, sparingly puberulent, brown, pericarp not swelling when soaked in water.

Distr. Native of tropical America, since long naturalized in all tropics, and throughout *Malesia*, also in Hainan, Micronesia and the Solomons.

Specimens in Guam have already been collected by GAUDICHAUD and Philippine records date from BLANCO, so that the import in the Old World may well have occurred along the old Spanish trans-pacific galleon route.

Ecol. Open, sunny to slightly shaded waste places, along water courses, on fallow paddies, also in teak-forest, in East Java under seasonal conditions and sometimes gregarious, from sea-level to *c.* 1300 m. *Fl.* Jan.–Dec.

Vern. Sumatra: *morroguni, wurakapiki, sec.* DAMMERMAN; Borneo: *lubok bulu*, Sarawak, *dan buku napsu, oaga bini*, Brunei, *tembuku-tembuku, timan-timan*; Lesser Sunda Is.: *abpoanam, ilite bublong, merara welana, tatabak*; NE. Celebes: *aring kaming, kan-i-lamperan-sela, kide, penten-*

gipus, rumput kembang gros, r. (ne) membe, tutumbalen, t. sela, Minahassa; Philippines: *botonesan, kambali, kombar-kombaran, linga-lingahan, turukan,* Tag., *bababanga, leng-lenga, tetetei,* Bon., *palapasagi,* P. Bis., *pansi-pansi, tarotabako,* Bik., *palopalot, tultulisan,* Ilk., *tabaku-tabaku,* Sul.; New Guinea: *pupu.*

Uses. In the Philippines a decoction of the leaves is used for cleansing wounds and against amenorrhoea (QUIS. *l.c.* 817).

Notes. EPLING (1933, *l.c.*) first referred the Malesian specimens to *H. decurrens* (BLANCO) EPLING, but in his monograph of 1949 he reduced this to *H. rhomboidea* MART. & GAL. which name I used also in my precursor. However, after a close study of many specimens from various parts of the world, I agree with BENTHAM, MIQUEL, and MERRILL to accept the name *H. capitata,* although EPLING (1949, *l.c.*) maintains that this is central American (Mexico to Peru) and that the Old World weed belongs to the Mexican *H. rhomboidea* JACQ.; but in his key (1949, *l.c.* 459) the reverse is said. The only true differences which I can distract from his key and descriptions are that in *H. rhomboidea* the stem is distinctly hairy on the angles (indistinctly so or glabrous in *H. capitata*) and that in flowering heads the calyx tube is 2 mm with teeth of 2 mm (in *H. capitata* 1.5 mm and 1.5 mm respectively). Apart from the minuteness of these characters for specific distinction, I have found them to be inconstant by intermediates as to the degree of hairiness of the ribs and to the size of the calyx teeth. Besides, these two characters occur in several specimens in all combinations in Javanese material.

I have also reduced *H. mariannarum* (BRIQ.) EPLING and believe that *H. macrocephala* MART. & GAL. is also conspecific, which EPLING himself suggests. There may be many more reductions necessary in *subsect. Genuinae* before a tolerable specific concept is reached, as at least EPLING's key is very shaky and characters used do not appear to have great taxonomic value.

3. Hyptis spicigera LAMK, Encycl. 3 (1789) 185; BTH. in DC. Prod. 12 (1848) 87; MIQ. Fl. Ind. Bat. 2 (1858) 958; F.-VILL. Nov. App. (1880) 164; MERR. Philip. J. Sc. 1 (1906) Suppl. 122; Fl. Manila (1912) 409; Sp. Blanc. (1918) 338; En. Philip. 3 (1923) 417; EPLING, Rev. Mus. La Plata n.s. 7, Bot. (1949) 253; KENG, Gard. Bull. Sing. 24 (1969) 95. — *Pycnanthemum elongatum* BLANCO, Fl. Filip. ed. 2 (1845) 333; ed. 3, 2 (1878) 252. — *Mesosphaerum spicigerum* (LAMK) O. K. Rev. Gen. Pl. 2 (1891) 527.

Erect annual herb, 1–1.5 m high. Stem scabrous: branches glabrous or only slightly pubescent. *Leaves* herbaceous, lanceolate to elliptic-lanceolate, 2.5–6 by 1.2–3 cm, acute or acuminate, base acuminate, decurrent; margin serrulate, glabrous or glabrescent on both surfaces; petiole 0.5–2.5 cm. *Verticillasters* many-flowered, forming a dense spike-like or head-like inflorescence, 1–1.5 cm long, in fruit 3–4.5 cm, terminal and in upper leaf-axils. Bracts subulate, 3–4 mm long, setaceous. *Flowers* purplish, pale blue or violet. *Calyx* tubular, 4–5 mm long, in fruit 6–7 mm, ribbed, reticulate; teeth subulate, 2 mm long, setaceous. *Nutlets* ellipsoid, compressed, 1.2 mm long, finely granulate.

Distr. Native of tropical America, naturalized in various tropical countries, in *Malesia:* Lesser Sunda Is. (Sumba, Alor, Timor), SE. Borneo, Philippines (Luzon, Mindoro, Palawan, Mindanao), Celebes (incl. Buton & Muna Is.), Moluccas (Buru). Also in the Marianas.

Ecol. Waste places, wet rice-paddies, coastal coral limestone, open dry grasslands, locally sometimes abundant, from the lowland to 900 m. *Fl.* Jan.–Dec.

Obviously well standing a dry season; EYMA noted that in Kolonedale (Celebes) leaves are shed in the dry season.

Vern. Lesser Sunda Is.: *mossolan,* Alor; Philippines: *ikugkuting,* Sul., *kalu-ui,* C.Bis.; Celebes: *babalu bugis.*

4. Hyptis pectinata (L.) POIT. Ann. Mus. Hist. Nat. Paris 7 (1806) 474, t. 30; BTH. Lab. Gen. Sp. (1833) 127; MIQ. Fl. Ind. Bat. 2 (1858) 960; ? F.-VILL. Nov. App. (1880) 164; BACK. Ann. Jard. Bot. Btzg Suppl. III (1909) 404; KOORD. Exk. Fl. Java 3 (1912) 153; BACK. Onkr. Suiker. (1931) 567, Atlas (1973) t. 538; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 46; EPLING, Rev. Mus. La Plata n.s. 7, Bot. (1949) 268; PARHAM, Pl. Fiji (1964) 254; BACK. & BAKH. *f.* Fl. Java 2 (1965) 634; KENG, Gard. Bull. Sing. 24 (1969) 96; HENTY & PRITCHARD, Bot. Bull. Lae 7 (1975) 104, fig. — *Nepeta pectinata* LINNÉ, Syst. Nat. ed. 10 (1759) 1097. — *Mesosphaerum pectinatum* (L.) O. K. Rev. Gen. Pl. 2 (1891) 525.

Erect, perennial, aromatic herb, often shrubby, 0.5–2.5 m. Stem and branches glabrous or pubescent. *Leaves* herbaceous, ovate or elliptic, 2–3 by 1–1.5 cm, acute or acuminate, base rounded or truncate, entire; margin elsewhere serrate or more often crenate, glabrous or glabrescent above, sparsely or densely tomentose and glaucous beneath; petiole 0.5–1 cm. *Spurious racemes* 4–8(–15) cm long, consisting of 10 to many secund cymes, densely congested toward apex, generally forming large, terminal panicles; cymes 6–15-flowered, subcapitate, secund, pectinate, incurved. Bracts crinite and setaceous. *Calyx* tubular, 2–2.5 mm long, in fruit 3–4 mm, tomentose; teeth subulate, setaceous, slightly longer than the calyx-tube. *Corolla* violet or pale mauve fading to cream, 3–3.5 mm long. *Nutlets* small, oblong, 1.5–2 mm long, smooth, black; pericarp slightly swelling when soaked in water.

Distr. Native of the American tropics, introduced and naturalized in many other parts of the world, in *Malesia:* West Java (area between Bandung and Djakarta), New Guinea (Morobe Distr.). Also in Burma, New Caledonia, and the Marianas.

F.-VILLAR recorded this species from the Philippines, but MERRILL doubted this disposition and indeed hitherto no collections are known from there.

In 1888 already BOERLAGE collected it at Bogor in the Botanic Gardens and this was probably the source for the West Javanese establishment.

Ecol. Waste places, sunny localities, borders of watercourses, scattered but locally gregarious, from sea-level to *c.* 700 m. *Fl.* April–Dec.

5. Hyptis suaveolens (L.) POIT. Ann. Mus. Hist. Nat. Paris 7 (1806) 472, t. 29, f. 2; BTH. Lab. Gen.

Sp. (1833) 124; HASSK. Cat. Hort. Bog. (1844) 130; BTH. in DC. Prod. 12 (1848) 126; TEYSM. Nat. Tijd. N. I. 11 (1856) 193; MIQ. Fl. Ind. Bat. 2 (1858) 959; F.-VILL. Nov. App. (1880) 164; VIDAL, Phan. Cuming. Philip. (1885) 136; HOOK. f. Fl. Br. Ind. 4 (1885) 630; VIDAL, Rev. Pl. Vasc. Filip. (1886) 213; K.SCH. & LAUT. Nachtr. Fl. Schutzgeb. (1905) 372; PRAIN, J. As. Soc. Beng. 74, ii (1907) 705; KOORD. Exk. Fl. Java 3 (1912) 153; MERR. Fl. Manila (1912) 409; Sp. Blanc. (1918) 338; En. Philip. 3 (1923) 417; RIDL. Fl. Mal. Pen. 2 (1923) 645; DAMMERMAN, Nat. Tijd. N. I. 86 (1926) 44, 75; BARTLETT, Pap. Mich. Ac. Sc. 6 (1926) 59; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 147; BACK. Onkr. Suiker. (1931) 567, Atlas (1973) t. 539; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 63; EPLING, Rev. Mus. La Plata n.s. 7, Bot. (1949) 261; HEND. Mal. Nat. J. 6 (1950) 391, f. 361; QUIS. Medic. Pl. Philip. (1951) 817; BACK. & BAKH. f. Fl. Java 2 (1965) 634; HATUS. Mem. Fac. Agr. Kagoshima Un. 5 (1966) 48; KENG, Gard. Bull. Sing. 24 (1969) 96; HENTY & PRITCHARD, Bot. Bull. Lae 7 (1975) 106, fig. — *Ballota suaveolens* LINNÉ, Syst. Nat. ed. 10 (1759) 1100. — *H. ebracteata* R.BR. in W. T. Aiton, Hort. Kew. ed. 2, 3 (1811) 391; BTH. Linnaea 6 (1831) 82. — *Marrubium indicum* (*non* BURM. f.) THUNB. Fl. Jav. (1825) 15, 21; BLANCO, Fl. Filip. (1837) 477; ed. 2 (1845) 352; ed. 3, 2 (1878) 250. — *Bysteropogon graveolens* (*non* L'HÉRIT.) BL. Bijdr. (1826) 824. — *Schaueria graveolens* HASSK. Flora 25 (1842) II, Beibl. 25. — *Mesosphaerum suaveolens* (L.) O. K. Rev. Gen. Pl. 2 (1891) 525.

A strongly aromatic, almost fetid, much-branched herb, 0.5–2 m high. Stem hirsute, 4-angled. *Leaves* firmly herbaceous, ovate to broadly obovate, 3–5 by 2–4 cm, subacute, base rounded, truncate, often slightly oblique; margin irregularly serrulate; sparsely pilose above, densely pubescent beneath; petiole slender, 0.5–3 cm, sparsely pubescent. *Flowers* in lax, 2–5-flowered secund cymes, arranged racemosely towards the ends of branches in the axils of smaller leaves. Peduncles pubescent, 0.5–1 cm long. Bracts minute, setaceous. *Calyx* campanulate, 5–5.5 mm long, in fruit 8–10 mm, strongly ribbed; mouth villous; teeth erect, setaceous. *Corolla* blue or bluish violet; tube slender. Anthers purple. *Nutlets* narrowly oblong, 1.2–1.5 mm long, often emarginate at the top, faintly rugose, dark brown; pericarp swelling to a gelatinous mass when soaked in water.

Distr. Native of tropical America, naturalized in all tropical countries and throughout *Malesia*, though rare in forest-clad islands (*e.g.* Borneo). Also in New Ireland, Marianas, Carolines, *etc.*

Ecol. Usually in dry open localities, along streams, roadsides, in dunes, fallow agriculture fields, lalang wastes, in all waste places, along the sea-shore, coconut plantations, tobacco and rubber estates, clearings, garden regrowths, raised coral limestone, teak- and Eucalypt savannahs, even on kĕrangas in Brunei, often gregarious and forming dense stands, under both everwet and seasonal conditions, from sea-level to *c.* 1300 m. *Fl.* Jan.–Dec.

In the dry season shedding its leaves, as does *Lantana*.

Vern. *Bush tea-bush*, E.; Malaya: *lĕrkuing, malbar hutan, pohok kĕmangi, p. p. hutan, rukuruku, sĕlaséh hutan, sĕpulut*, M; Sumatra: *dĕrĕngdĕrĕng, sĕlasie*, M; Java: *babadotan, djukut bau, karang bau, sumengit*, S. *bandotan, basinan, bĕrokan, lampĕsan, sangkètan, sĕlangking, susurawungan, tobil*, J. *komandhin, mang kamang, srĕngèngè*, Md, *ruku ruku hutan, sĕlasi hutan*, M; Timor: *jagalètte, kunfa matè, kunu busuk, k. fui*; Alor: *kawada*; Flores: *kasi kamba*; Sumba: *khalawau*; Philippines: *kabling kabáyo, pansi-panslan, suag-kabáyo, suob k.*, Tang., *saneeg*, Cebu, *bauing*, Sul., *amotan, kolongkógong*, Bik., *loko-lóko*, Bis., *pilodo*, P.Bis., *bangbangsit, litalit*, Ilk.; Ambon: *solasi bankit*; New Guinea: *samsir*, Wapi lang., Pultalul.

The names derived from *sĕlasi* refer to the likeliness of the nuts with those of *Ocimum* which swell to a gelatinous mass when soaked in water.

Uses. In Java it is considered a medicinal plant (HEYNE, Nutt. Pl. 1927, 1333). It is sometimes used as forage for cattle. It is also said to promote lactation in women.

In Peninsular Thailand the very tips of the shoots are sometimes added to food as a flavouring. Medicinally, it is a stimulant, sudorific and useful against catarrh in Malaya. Malays use it for pouliticing skin complaints (BURK. Dict. 1935, 1220).

In the Philippines the fetid-aromatic leaves are put under beds, chairs, *etc.* to drive out bedbugs (QUIS. Medic. Pl. Philip. 1951, 818). The crushed leaves are used as an antiseptic for wounds and skin-diseases (SANTOS & VALENZUELA, J. Philip. Pharm. Ass. 1, 1928, 86). The leaves are further used for the preparation of antirheumatic and antisuporific baths. Also the roots find application, *e.g.* as an appetizer, for affection of the uterus, *etc.* (*cf.* SANTOS, VALENZUELA & GUERRERO, Philip. Bur. For. Bull. 22, 1921, 233).

HARTLEY (Lloydia 32, 1969, 265) listed this species as a potential medicine against cancer.

Excluded

Hyptis atrorubens POIT.: WALP. Nov. Act. Acad. Nat. Cur. 19 (1943) Suppl. 1, p. 373; MERR. En. Philip. 3 (1923) 417.

The record of the presence of this American species in Manila is based on a specimen collected by MEYEN. MERRILL (*l.c.*) thinks this may be an erroneous identification.

Hyptis mutabilis (A. RICH.) BRIQ.; MERR. & PERRY, J. Arn. Arb. 27 (1946) 325.

Recorded from a collection of Guam; MERRILL & PERRY noted: "Like the four other species of *Hyptis* naturalized in the Old World, this is a native of tropical America. Its introduction into Guam undoubtedly was through the medium of the Acapulco–Manila galleons previous to 1815." So far, however, it has not been recorded from the Philippines or elsewhere in Malesia.

Hyptis radiata WILLD.

Recorded as from Java by O. KUNTZE (Rev. Gen. Pl. 2, 1891, 525) under the name *Mesosphaerum radiatum* O. K. Possibly due to an erroneous identification.

Hyptis spicata POIT.; BTH. Linnaea 6 (1831) 82; in DC. Prod. 12 (1848) 121; F.-VILL. Nov. App. (1880) 164; MERR. En. Philip. 3 (1923) 417.

According to MERRILL, there was no evidence that the species exists in the Philippines.

27. MESONA

BLUME, Bijdr. (1826) 838; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 365; KENG, Gard. Bull. Sing. 24 (1969) 113. — **Fig. 28.**

Annual herbs. Stems erect or procumbent, pubescent. *Verticillasters* many-flowered, forming axillary and terminal, racemose inflorescences. Bracts often caducous. *Flowers* small. *Calyx* campanulate (in fruit tubular, declinate, lower part of the fruiting calyx tube deeply pitted between the nerves and the connecting transverse bars), 8-nerved, 2-lipped, upper lip 3-fid, lower entire. *Corolla* short; throat inflated, abruptly constricted towards the base; limb 2-lipped, upper lip truncate or 3-lobed with the median lobe very broad, lower lip oblong, concave. *Stamens* 4, in 2 pairs; anther-cells confluent; filaments long-exserted, those of the posterior pair appendaged at the base. Style briefly 2-fid. Disk gibbous, produced in front. *Nutlets* ellipsoid or ovoid, minute, smooth.

Distr. About 2–3 *spp.* in continental SE. Asia (India, Himalayas, Burma, Thailand, Indo-China, S. China), Formosa, and *Malesia:* 1 *sp.*

1. Mesona palustris BL. Bijdr. (1826) 839; BTH. in DC. Prod. 12 (1848) 46; MIQ. Fl. Ind. Bat. 2 (1858) 940, *incl. var. petiolata* MIQ.; KOORD. Exk. Fl. Java 3 (1912) 157; BACK. & BAKH. *f.* Fl. Java 2 (1965) 638; KENG, Gard. Bull. Sing. 24 (1969) 114, f. 20 a–f; STEEN. Mt. Fl. Java (1972) pl. 25–3. — *Geniosporum parviflorum* WALL. (Cat. 1831, *n.* 2750, *nomen*) *ex* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 18; Lab. Gen. Sp. (1832) 20. — *M. wallichiana* BTH. in DC. Prod. 12 (1848) 46; HOOK. *f.* Fl. Br. Ind. 4 (1885) 610; BOERL. Handl. Fl. N. I. 2 (1899) 713. — *M. parviflorum* (WALL. *ex* BTH.) BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 365; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 28. — *M. philippinensis* MERR. Philip. J. Sc. 7 (1912) Bot. 101; En. Philip. 3 (1923) 420; KENG, Gard. Bull. Sing. 24 (1969) 116, f. 20 g. — Fig. 28.

Erect, aromatic herb, 30–50 cm. Stem slender, not or only sparsely branched at apex, pubescent or densely villose, glabrescent. *Leaves* membranaceous or chartaceous, oblong-elliptic or narrowly obovate-elliptic, 2–8 by 1.2–3.5 cm, acute or obtuse, crenate or serrulate, base narrowly acute or rounded; petiole 0.5–2 cm, hispid or villose. *Verticillasters* close or distant, many-(usually 12–20 or more-)flowered; inflorescence 5–20 cm; rachis villose or hirsute. Bracts lanceolate to ovate, 7–10 mm, acuminate, caducous. Pedicels 5–6 mm. *Calyx* 2–2.5(–3) mm long, covered with white hairs; upper lip 3-lobed, ciliate, lower lip oblong, rounded, often thin and transparent; in fruit tubular-urceolate, 4–5 mm long. *Corolla* pink or lilac white, 4–5 mm long. *Nutlets* ellipsoid, flattened, *c.* 1 by 0.4–0.7 mm, finely granular.

Distr. India & Burma to Indo-China, in *Malesia:* Central Sumatra (Mt Singalang), throughout Java, Lesser Sunda Is. (Bali, Lombok, Sumbawa), Celebes, Philippines (northern half of Luzon), and East New Guinea (Wau, once).

Ecol. Roadsides, along ditches, open grassy slopes, forest borders, dry rice-fields, in New Guinea on a grassy ridge with *Banksia, Grevillea* and *Vaccinium*, not a marsh plant, standing both everwet and seasonal conditions, locally sometimes rather common, 75–2300 m. *Fl.* March–Nov.

Vern. *Djangelan*, S.

Uses. In Central Java used for the preparation of a somewhat harsh, slimy cool drink. In West Java to blacken a favourite kind of titbit, called *tjintjau hitam.*

Notes. A variable species. The Philippine material has congested flowers, a less inflated fruiting calyx tube with less conspicuous cross-bars and pits. It matches some specimens from Java and there are intermediate forms in Celebes and the Lesser Sunda Is.

The Taiwan *M. procumbens* HEMSL. is possibly conspecific.

Fig. 28. *Mesona palustris* BL. *a.* Habit, × ²/₃, *b.* flower, *c.* fruiting calyx, both × 8, *d.* nutlet, × 12 (*a–b* B. J. KARSTEN 47, *c–d* COERT 1027).

Fig. 29. *Nosema cochinchinense* (LOUR.) MERR. *a.* Habit, × ²/₃, *b.* flower, *c.* calyx, both × 6. — *N. clausum* (MERR.) KENG. *d.* Flower, × 6 (*a–c* HORNER 8, *d* BS 41313).

28. NOSEMA

PRAIN, J. As. Soc. Beng. 73, ii (1904) 20; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 108; KENG, Gard. Bull. Sing. 24 (1969) 122. — **Fig. 29.**

Erect herbs, branched or not. Stem and branches slender, pubescent. *Leaves* opposite, petioled. *Verticillasters* ∞-flowered, forming terminal, cylindric, racemose inflorescences, continuous or interrupted below. *Flowers* small. Bracts leafy below, gradually diminishing in size upwards. *Calyx* obliquely ovoid, 10-nerved, 2-lipped, the upper lip oblong, entire or very shallowly 3-lobed, the lower lip round, entire, much shorter than the upper lip; fruiting calyx tube flattened cylindric, transverse veins connecting the longitudinal nerves, inconspicuous, not deeply pitted. *Corolla* short; throat inflated, abruptly constricted towards the base; limb 2-lipped, the upper lip slightly shorter, unequally 3-lobed, the median lobe often very broad; lower lip oblong, entire, concave. *Stamens* 4, in two pairs, declinate; anther-cells confluent; filaments pubescent, those of the upper pair spurred with an appendage at the base. *Nutlets* ovoid, minute, smooth.

Distr. Six or more *spp.* in continental Asia (India, Burma, Thailand, Indo-China, S. China: Kwantung, Fokien, Hainan); in *Malesia:* 2 *spp.*, one in N. Sumatra and one in the Philippines.

KEY TO THE SPECIES

1. Inflorescence 12–15 cm long, verticillasters generally 0.5–1.5 cm apart. Upper corolla lip very unequally 3-lobed, the midlobe much broader than the lateral ones. Fruiting calyx thick-coriaceous, pitcher-shaped, inflated in the middle, 6.5–7 mm long . . . . . **1. N. clausum**
1. Inflorescence 6–8 cm long, verticillasters ± continuous. Upper corolla lip equally 3-lobed. Fruiting calyx herbaceous, tubular, not or only slightly inflated in the middle, 8–8.5 mm long **2. N. cochinchinense**

1. Nosema clausum (MERR.) H. KENG, Gard. Bull. Sing. 24 (1969) 123, f. 23 a–e. — *Mesona clausa* MERR. Philip. J. Sc. 7 (1912) Bot. 345; En. Philip. 3 (1923) 420. — **Fig. 29d.**

Erect, unbranched herb, 20–30 cm. Stem densely villose. *Leaves* chartaceous, oblong or narrowly oblong, 4.5–6 by 1–2 cm, acute or obtuse, base acute, velvety on both surfaces, lateral nerves 7–8 pairs; petiole 0.5–1.5 cm, velvety. *Spurious spike* terminal, 12–15 cm long, interrupted; verticillasters 12–20-flowered, *c.* 1.5 cm ∅, 2–2.5 cm apart. Bracts 2 subtending each whorl, ovate, acuminate, 0.5–1.5 cm long, densely villous, the lowermost ones almost foliaceous. *Calyx* obliquely campanulate, 2.5–3 mm long, densely hairy, the upper lip lanceolate-oblong, obscurely 3-lobed; lower lip truncate-rounded; fruiting calyx thick-coriaceous, pitcher-shaped, 7–8 mm long, slightly inflated in the middle, the mouth nearly closed by the lid-like lower lip. *Corolla* violet, trumpet-shaped, 3.5–4 mm long, inflated from middle upwards and abruptly narrowed into a small lower tube; upper lip shortly 3-lobed, central lobe much larger than the two lateral ones; lower lip entire, concave. *Stamens* in 2 pairs, the upper pair pubescent and appendaged at the base. *Nutlets* ellipsoid, 1 mm long, smooth.

Distr. *Malesia:* Philippines (Culion), 2 collections.

Ecol. Open, damp places at low altitude. *Fl.* Oct., Dec.

2. Nosema cochinchinense (LOUR.) MERR. Trans. Am. Phil. Soc. n.s. 24 (1935) 343; WU, Acta Phytotax. Sin. 8 (1959) 62; KENG, Gard. Bull. Sing. 24 (1969) 125, f. 23 f–h. — *Dracocephalum cochinchinense* LOUR. Fl. Coch. (1790) 371; ed. Willd. (1793) 450. — *Mesona prunelloides* HEMSL. J. Linn. Soc. Bot. 26 (1890) 267. — *N. prunelloides* (HEMSL.) C. B. CLARKE *ex* PRAIN, J. As. Soc. Beng. 73, ii (1904) 21; DUNN, Not. R. Bot. Gard. Edinb. 6 (1915) 134. — *N. capitatum* PRAIN *var. javanica* C. B. CLARKE *ex* PRAIN, J. As. Soc. Beng. 73, ii (1904) 21, *in adnot.* — *Mesona capitata* (PRAIN) DOAN, Fl. Gén. I.-C. 6 (1936) 932. — **Fig. 29a–c.**

Erect herb, 30–50 cm, sparingly branched. Stem obscurely angled, densely villous. *Leaves* chartaceous, oblong or narrowly oblong, 4–6 by 1–1.5 cm, both ends acute or obtuse, margin crenulate, sparsely villous on both surfaces; petiole 0.5–1(–2) cm. *Inflorescence* terminal, 6–8 cm long; verticillasters almost continuous. Bracts subtending the lowermost whorls similar to the normal leaves but smaller, densely villous. *Calyx* obliquely campanulate, 2.5–3 mm long, densely hairy; upper lip shallowly 3-lobed; lower lip much shorter than the upper one, emarginate or notched in the middle, densely covered with long hairs outside; fruiting calyx herbaceous, tubular, 8–8.5 mm long. *Corolla* purple, mauve, blue or white, campanulate, 3–4 mm long; upper lip shortly 3-lobed, the lobes more or less equal in size; lower lip oblong, entire,

concave. *Stamens* in 2 pairs, the upper pair puberulent and appendaged at the base. *Nutlets* minute, c. 1 mm long, smooth.

Distr. Continental SE. Asia (Thailand, Indo-China to S. China: Kwantung, Hainan), in *Malesia:* N. Sumatra (Batak-Toba Lands and Padang Lawas).

Ecol. Open places, rocky habitats, grassy savannahs, open mossy ground, 100–1000 m. *Fl.* Jan.–Dec.

Note. The JUNGHUHN specimens cited in the precursor from Java, were actually collected in the Batak Lands, N. Sumatra; they were described by PRAIN as *N. capitatum var. javanica.*

29. OCIMUM

LINNÉ, Gen. Pl. ed. 5 (1754) 259; Sp. Pl. (1753) 833; BTH. Lab. Gen. Sp. (1832) 1 ('*Ocymum*'); in B. & H. Gen. Pl. 2 (1876) 1171; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 369; FURTADO, Gard. Bull. S. S. 4 (1929) 416; KENG, Gard. Bull. Sing. 24 (1969) 125. — **Fig. 30.**

Strongly scented aromatic herbs or undershrubs. Stems often much-branched. *Leaves* opposite, petioled. *Flowers* small; verticillasters 6–10-flowered, forming racemose, simple or branched inflorescences. Pedicels recurved under the calyx. Bracts minute, caducous. *Calyx* ovoid or campanulate (in fruit deflexed), 10-nerved, 2-lipped; upper lip large, broad, flat (in fruit strongly reflexed), often decurrent on the tube; lower lip usually with 4 narrow, pointed teeth. *Corolla* campanulate, not annulate within, 2-lipped; upper lip truncate, subequally 4-fid; lower lip longer, declinate, flat, entire. *Stamens* 4, declinate, in 2 pairs, exserted; filaments free (in Mal.) or the lower pair connate below, naked or the upper pair toothed or hairy below; anther-cells confluent. Disk entire or 2–4-lobed, equal-sided. Style 2-fid; branches subulate or flattened. *Nutlets* smooth or subrugose, in some species the pericarp swelling and becoming mucilaginous when moistened.

Distr. About 100–150 *spp.*, throughout the tropics, and *Malesia*, mostly developed in Africa.

KEY TO THE SPECIES

1. Two lower calyx teeth much shorter than the upper tooth; mouth of the fruiting calyx closed by the upcurved lower lip . . . . . **3. O. gratissimum**
1. Two lower calyx teeth equalling or slightly longer than the upper tooth, the lower lip not upcurved, the mouth of the fruiting calyx remaining open.
2. Pedicels as long as the calyx, finally curved patent, almost transverse to the rachis **4. O. tenuiflorum**
2. Pedicel shorter (or seemingly shorter) than the calyx, finally bent upright, appressed against the rachis.
3. Corolla 7–9 mm long, white or violet. Fruiting calyx 5–9 mm long . . . . . **2. O. basilicum**
3. Corolla 5–6 mm long, white. Fruiting calyx 4–6 mm long . . . . . **1. O. americanum**

1. Ocimum americanum LINNÉ, Cent. Pl. 1 (1755) 15; Amoen. Ac. 4 (1759) 276 ('*Ocymum*'); BACK. & BAKH. *f.* Fl. Java 2 (1965) 640; KENG, Gard. Bull. Sing. 24 (1969) 126. — *O. africanum* LOUR. Fl. Coch. (1790) 370; MERR. Trans. Am. Phil. Soc. 24, 2 (1935) 343. — *O. canum* SIMS, Bot. Mag. 51 (1823) t. 2452; BTH. Lab. Gen. Sp. (1832) 3, (1835) 707; MOR. Syst. Verz. (1846) 55; BTH. in DC. Prod. 12 (1848) 32; MIQ. Fl. Ind. Bat. 2 (1858) 936; HOOK. *f.* Fl. Br. Ind. 4 (1885) 607; K.SCH. & HOLLR. Fl. Kais. Wilh. Land (1889) 118; K.SCH. & LAUT. Fl. Schutzgeb. (1900) 530; KOORD. Exk. Fl. Java 3 (1912) 158; RIDL. Fl. Mal. Pen. 2 (1923) 644; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 113; MANSFELD, Bot. Jahrb. 62 (1929) 380; BACK. Onkr. Suiker. (1931) 573, Atlas (1973) t. 544; OCHSE & BAKH. Ind. Groent. (1931) 355, f. 225; BURK. Dict. (1935) 1574; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 17. — *O. brachiatum* BL. Bijdr. (1826) 833; HASSK. Cat. Hort. Bog. (1844) 128; Pl. Jav. Rar. (1848) 477.

Branched, erect herb, 0.30–1 m, strongly smelling of camphor. Stem and branches striate, pubescent or glabrescent. *Leaves* lanceolate to elliptic, 2.5–5 by 0.9–2.5 cm, acute, base cuneate, margin entire or remotely crenulate, glabrous and glandular-dotted on both surfaces; petiole 1–2.5 cm. *Verticillasters* in terminal, simple or branched, raceme-like inflorescences, 7–15 cm long. Bracts elliptic-lanceolate, 2–3(–5) mm long, acuminate, hairy. *Flowers* subsessile. *Calyx* 2–2.5 mm long, in fruit 3–4.5 mm, villous within, pubescent with long, white hairs outside; uppermost tooth broad and rounded, ciliate,; lower teeth lanceolate-subu-

late. *Corolla* white, 4–6 mm long, glabrescent or puberulous. *Filaments* exserted, slender, upper ones toothed above the base. *Nutlets* narrowly ellipsoid, 1.2 mm long, punctate, black, swelling in water.

Distr. Tropical Africa and continental SE. Asia; in *Malesia:* Sumatra, Malaya, West Java, Lesser Sunda Is. (Lombok), E. New Guinea.

Ecol. In Java cultivated in kitchen gardens, widely naturalized, along roadsides, in fields and humas, also in teak forest, open waste places in settled areas, up to *c.* 500 m. *Fl.* Jan.–Dec. Galls on young stems are caused by aphids.

Vern. Malaya: *kěmangi, pohok, roko roko,* M; Java: *kěmangi,* M, J, *surawung,* S, *kèmangèh, kěmangi,* Md; *hairy basil,* E.

Uses. Eaten raw as a side-dish, also an important ingredient for curries and sayor. Nutlets taken with cool sweet drinks under the names of *tjao,* M, *tjingtjao,* S, *dawet,* J. Leaves are also used in flavouring dishes with a fishy or disagreeable smell.

HARTLEY (Lloydia 32, 1969, 272) listed this species as a potential medicine against cancer. BURKILL (Dict. 1935, 1574) stated that pounded leaves are in Malaya placed on the forehead against catarrh and that a decoction is used for coughs.

Notes. According to BACKER possibly a small-flowered form of *O. basilicum.*

In Ali I. (W. Sepik) specimens have been collected of a 3 ft tall plant with very small and narrow leaves (*c.* 15 by 2.3 mm), in regrowth of an old German plantation (NGF 40930).

2. Ocimum basilicum LINNÉ, Sp. Pl. (1753) 833; BURM. *f.* Fl. Ind. (1768) 129; BL. Cat. (1823) 83; Bijdr. (1826) 832 (*'Ocymum'*, also incl. *var.* β); BTH. Lab. Gen. Sp. (1832) 4; in DC. Prod. 12 (1848) 32, *incl. var. glabratum et var. pilosum*; MIQ. Fl. Ind. Bat. 2 (1858) 937, incl. varieties; HOOK. *f.* Fl. Br. Ind. 4 (1885) 608; PRAIN, J. As. Soc. Beng. 74, ii (1907) 702; MERR. Philip. J. Sc. 3 (1908) Bot. 433; KOORD. Exk. Fl. Java 3 (1912) 158; MERR. Fl. Manila (1912) 407; Int. Rumph. (1917) 460; Sp. Blanc. (1918) 340; En. Philip. 3 (1923) 421; RIDL. Fl. Mal. Pen. 2 (1923) 634; BARTLETT, Pap. Mich. Ac. Sc. 6 (1926) 35; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 113; BACK. Onkr. Suiker. (1931) 573; BURK. Dict. (1935) 1571; HEND. Mal. Nat. J. 6 (1950) 395, f. 365; QUIS. Medic. Pl. Philip. (1951) 824; WEHRHAHN in Pareys, Blumengärten (ed. Bonstedt) 2 (1952) 312; CHALFIN, Gard. J. (1962) 87; BACK. & BAKH. *f.* Fl. Java 2 (1965) 639; PURSEGLOVE, Trop. Crops, Dicot. 2 (1968) 636; KENG, Gard. Bull. Sing. 24 (1969) 127. — *O. americanum* (*non* L.) BLANCO, Fl. Filip. (1837) 480; ed. 2 (1845) 335; ed. 3, 2 (1878) 254, t. 407. — *O. citriodorum* BLANCO, *ibid.* ed. 2 (1845) 591; ed. 3, 2 (1878) 256.

Very aromatic, lemon-scented, erect, branched herb, 0.5–1 m. Stem and branches glabrous or hispidly hairy when young. *Leaves* membranaceous, ovate or elliptic-ovate, 3–5 by 1.2–2 cm, acute, base cuneate, entire, margin elsewhere entire or few-toothed, glabrescent or hairy; petiole 1–2 cm. *Verticillasters* ∞-flowered, in simple or branched racemes 10–15 (or more) cm long. Bracts lanceolate-ovate, 2–3 mm long. Pedicels very short. *Calyx* 2–3 mm long, in fruit 5–9 mm; upper lip suborbicular; lower lip with central pair of teeth longer than the upper lip, sharply pointed. *Corolla* white, pinkish, or violet, 7–9 mm long, glabrous or hispid. *Filaments* exserted; upper ones with a tooth above the base. *Nutlets* dark brown, ellipsoid, 1.5 mm long, pitted, swelling in water.

Distr. Throughout the Old World tropics and throughout *Malesia.*

Ecol. Settled areas and open waste places, roadsides, teak forests, dry paddies, up to *c.* 450 m, in New Guinea once found at 1150 m. *Fl.* Jan.–Dec. Galls on young stems caused by aphids or coccids.

Vern. *Basil, sweet basil,* E.; Malaya: *kěmángi, puar, ruku, sělasi antan, s. hitam, s. puteh,* M; Sumatra: *hulasi, kulasa koling, leam, rudang nalopok, rudañgna, r. birong, r. lopak, sělang bano, sulasih, theulateh,* M; Java: *kěmangi, salasih, solasi, s. bodas, s. hideung, surawung, tělasi bodas,* S, *kěmangi, lampas, sělasih, s. ireng, tělasih, t. ireng, tulasih,* J, *sělasé, sělasi, s. dulang, s. hitam, s. putih,* M, *salasé,* Md; Lesser Sunda Is.: *slasih, s. tjěměng, sulakèt, sulasih,* Bali, *afi,* Timor, *'ndakébuu,* Roti, *woonènè,* Let'; Celebes: *amping, baäla, kukuru, kulasi, lasi, solasi, sulasi, tolasi, t. djating*; Ambon: *sulasi kubus*; Philippines: *balanoi,* Tag., *albaháca,* Tag., Ibn., *solási,* Tag., Pamp., *bauing, ruku ruku,* Sul., *bidai,* Ilk., *bouak,* Bis., *kalu-ui,* C. Bis., *kamañgi,* P.Bis., *samarig, samilig,* Bik., *valanoi,* Iv.

Uses. Widely used as a condiment. As of *O. americanum* the nutlets, which swell and become gelatinous in water, are added to cool sweet drinks. They are said to have stimulant, diuretic and demulcent properties. They are also used as an aphrodisiac, for gonorrhoea, diarrhoea, dysentery and constipation. They are especially prescribed in eye sores. Flowers are said to be a remedy for coughs of children.

Leaves are used in a decoction as a carminative and stimulant and as a remedy for coughs, in washing ulcers, and for hiccups. Roots are used for bowel complaints of children and as a febrifuge.

Flowers of the purple-flowered variety are sometimes deposited on tomb-stones and in offerings. A sacred plant in Hindu religion (tulsi), no doubt derived from its manyfold use.

Oils of *selasih* are used in perfumes; in Java the variety with citrus-scent is estimated (HEYNE, Nutt. Pl. 1927, 1336). There is also a form with a fennel scent.

Notes. Recently MORTON (J. Linn. Soc. Bot. 58, 1962, 232) pointed out that *O. basilicum* differs but little from *O. americanum* (= *O. canum*) except in size, though the latter is more hairy. These differences are obviously also expressed in chromosome numbers, W. African material of *O. americanum* having 2n = 24 and *O. basilicum* 2n = 48.

H. MARZELL wrote an extensive history of basil (Regn. Veget. 71, 1970, 135–143.)

3. Ocimum gratissimum LINNÉ, Sp. Pl. (1753) 832; BL. Bijdr. (1826) 832 (*'Ocymum'*); BTH. in DC. Prod. 12 (1848) 34; MIQ. Fl. Ind. Bat. 2 (1858) 938; HOOK. *f.* Fl. Br. Ind. 4 (1885) 608; PRAIN, J. As. Soc. Beng. 74, ii (1907) 702; RIDL. Fl. Mal. Pen. 2 (1923) 644; KOORD. Exk. Fl. Java 3 (1923) 158; BACK. Onkr. Suiker. (1931) 575, Atlas (1973) t. 546; BURK. Dict. (1935) 1574; CHEVALIER, Rev. Bot. Appl. Agr. Col. 18 (1938) 478; BACK. & BAKH. *f.*

Fl. Java 2 (1965) 639; KENG, Gard. Bull. Sing. 24 (1969) 128.

Perennial herb, 1–3 m high, woody at the base. Stem and branches glabrous, pubescent when young. *Leaves* membranaceous, elliptic-lanceolate, 5–10 by 2.5–4.5 cm, acute, base cuneate, entire; margin elsewhere coarsely crenate-serrate, puberulent or pubescent; petiole 2–4.5 cm, slender, pubescent. *Verticillasters* in simple or branched racemes 10–15 cm long, rachis softly pubescent. Bracts sessile, ovate, acuminate. Pedicels very short. *Calyx* 1.5–2 mm long, in fruit 3–4 mm; upper lip rounded and recurved; lower lip with central pair of teeth minute and much shorter than the upper lip. *Corolla* greenish white, 3.5–4 mm long, pubescent outside. *Filaments* distinctly exserted; upper pair with a bearded tooth at the base. *Nutlets* subglobose, 1.5 mm long, rugose; outer pericarp not slimy-swollen in water.

Distr. Pantropical; in *Malesia:* Sumatra (also Banka), Malaya, West Java, and New Britain.

Ecol. Open waste places along roadsides, *etc.* in settled areas at low altitude up to *c.* 300 m. *Fl.* Jan.–Dec. Rather rare.

Vern. *Kěmangi hutan, ruku ruku rimba, sělasi bĕsar, s. djambi, s. měka(h)*, M; Sumatra: *sělasi djambi, s. tjina* (Banka).

Uses. Also cultivated as a hedge-plant, and found in native cemeteries. Leaves when bruised strongly smelling of cloves (*f. caryophyllatum*) or of thyme (*f. graveolens*). According to HEYNE (Nutt. Pl. 1927, 1337) hardly of economic importance; an infusion of the leaves is used as a kind of tea in S. Sumatra. Also applied to ritual washing of corpses.

4. Ocimum tenuiflorum LINNÉ, Sp. Pl. (1753) 597; in Stickm. Herb. Amb. (1754) 130; Amoen. Ac. 4 (1759) 130; Syst. Nat. ed. 10 (1759) 1105; BTH. Lab. Gen. Sp. (1832) 11; in DC. Prod. 12 (1848) 39; MERR. Int. Rumph. (1917) 461; DOMIN, Bibl. Bot. 22 (Heft 89) (1929) 1116, *incl. var. anisodorum* (F.v.M.) DOMIN. — *O. sanctum* LINNÉ, Mant. 1 (1767) 85; BL. Cat. (1823) 83; THUNB. Fl. Jav. (1825) 15; BTH. Lab. Gen. Sp. (1832) 11; in DC. Prod. 12 (1848) 38; DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 397 (= Herb. Timor. descr. 1835, 69); BLANCO, Fl. Filip. (1837) 480; ed. 2 (1845) 334; ed. 3, 2 (1878) 254, t. 257; HASSK. Cat. Hort. Bog. (1844) 128; MIQ. Fl. Ind. Bat. 2 (1858) 939; Sumatra (1860) 571; F.-VILL. Nov. App. (1880) 162; VIDAL, Phan. Cuming. Philip. (1885) 135; HOOK. *f.* Fl. Br. Ind. 4 (1885) 609; VIDAL, Rev. Pl. Vasc. Filip. (1886) 212; K.SCH. & HOLLR. Fl. Kais. Wilh. Land (1889) 118; K.SCH. & LAUT. Fl. Schutzgeb. (1900) 532; PRAIN, J. As. Soc. Beng. 74, ii (1907) 701, *incl. var. ciliata* PRAIN *et var. thyrsoidea* PRAIN; MERR. Fl. Manila (1912) 408; Int. Rumph. (1917) 460; Sp. Blanc. (1918) 340; En. Philip. 3 (1923) 422; RIDL. Fl. Mal. Pen. 2 (1923) 643; BARTLETT, Pap. Mich. Ac. Sc. 6 (1926) 35; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 114; BACK. Onkr. Suiker. (1931) 574, Atlas (1973) t. 545; MERR. Contr. Arn. Arb. 8 (1934) 149; BURK. Dict. (1935) 1575; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 19; QUIS. Medic. Pl. Philip. (1951) 827; BACK. & BAKH. *f.* Fl. Java 2 (1965) 639; KENG, Gard. Bull. Sing. 24 (1969) 130. — *O. monachorum* LINNÉ, Mant. 1 (1767) 85; BL.

Fig. 30. *Ocimum tenuiflorum* L. *a.* Habit, × ²/₃, *b.* flower, *c.* fruiting calyx, both × 4 (BAKHUIZEN VAN DEN BRINK 8153).

Cat. (1823) 83; Bijdr. (1826) 831. — *O. album* (*non* L.) BLANCO, Fl. Filip. (1837) 479. — *O. flexuosum* BLANCO, Fl. Filip. (1837) 481; ed. 2 (1845) 335; ed. 3, 2 (1878) 255; MIQ. Fl. Ind. Bat. 2 (1858) 939. — *Moschosma tenuiflorum* (L.) HEYNH. Nomencl. 1 (1840) 532. — *O. nelsonii* ZIPP. *ex* SPANOGHE, Linnaea 15 (1841) 333, *nomen*; MIQ. Fl. Ind. Bat. 2 (1858) 939. — *O. virgatum* (non THUNB.) BLANCO, Fl. Filip. ed. 2 (1845) 334; ed. 3, 2 (1878) 253. — *O. brachiatum* (*non* BL.) HASSK. Pl. Jav. Rar. (1848) 471. — **Fig. 30.**

Erect, much branched herb, 30–60 cm, often woody at the base. Stem and branches soft hairy. *Leaves* membranaceous, elliptic-oblong or elliptic, 3–6 by 1–2.5 cm, obtuse or acute, base cuneate or attenuate, entire; margin elsewhere entire or remotely serrate; pubescent on both surfaces, especially on the nerves underneath; petiole 1–2.5 cm. *Verticillasters* in slender racemes or panicles 8–10 cm long. Bracts ovate, acuminate, 2–3 mm long, ciliate. Pedicels 3–4.5 mm, pubescent. *Calyx* 2.5 mm long, in fruit 3–3.5 mm; upper lip suborbicular, reflexed, shortly apiculate; lower lip longer than the upper, teeth 4, lanceolate. *Corolla* lavender or white, 3.5–4 mm long. *Filaments* exserted, slender, the upper ones with a small bearded basal appendage. *Nutlets* minute, broadly ellipsoid, 1.2 mm long, smooth, swelling in water.

Distr. Pantropical, possibly a native of tropical Asia, throughout *Malesia*.

Ecol. A weed of waste places in settled areas, often in great quantity, in grassfields, along roadsides and sunny dry places, thickets and planted in garden land and on cemeteries; up to *c.* 600 m. *Fl.* Jan.–Dec. Galls on young stems are caused by aphids.

Vern. *Sacred basil, holy basil*, E.; Malaya: *oku, ruku ruku, ruruku, salassay, sulasi*, M; Sumatra: *kĕmangi, rudjang tampua, r. taba, ruku-ruku, sĕlasi putih; sini sini*, Nias; Java: *kĕlampès, kĕmangi, ruku-ruku, r. mèrah, r. putih, sĕlasih*, M, *klampès, lampès, l. beureum, l. bodas, salasi wungu, surawung*, S, *kĕmangèn, kĕmangi, k. abang, k. putih, kumangi, lampès, l. abang, l. irèng, l. putih, tĕlasi putih*, J, *kĕmanghi, komangi, koroko, k. érèng*, Md, *kĕmangè*, Kangean; Bali: *kĕntjarum, sĕlasi mĕhik, s. miik, uku-uku*; Lombok: *kĕmangi, kumangi, rĕruku*; Sumba: *kĕndung*; Borneo: *beng, sulasi*; Moluccas: *lufé-lufé*, Ternate, *busu-busu, luluban*, Ambon, *kayu ikan manasin*, Banda; Celebes: *balakama, busu-busu, gangan bau balanda, kĕmangèn, kokuru, k. amping, k. kulo, k. kuro, k. mahamu, k. mea, k. putih, k. raindang, kukuru, kurasi, kuri mabida, k. mahèndèng, lèngid, l. budo, l. mèha, pikit, p. mopuha, p. mowuro, pongpong, p. kulo, p. putih, p. rangdang, p. rundung, tjamangi, t. balanda, tjamani balanda, ukadju tjamangi*; Philippines: *albaháca*, Span., *balanoi*, Tag., *loko-lóko*, Tag., Pamp., *bidai*, Ilk., *kamangkau*, Bik., *kamagni, kolokóko, kolon-kógon*, Bis., *katigau, lalui*, C.Bis., *luku-luku*, Sul., *magau*, Mag., *malinau*, Sub.; New Guinea: *wabkaran* (K.SCH.).

Uses. According to HEYNE (Nutt. Pl. 1927, 1328) not used as a vegetable, sometimes as a condiment, and with some minor medicinal applications: cold with children, healing wounds, promoting lactation in women, a decoction of seeds said to be a demulcent. Seeds used for cleansing eyes. In Sumatra used with ceremonial offerings to spirits. In the Philippines said that a decoction of leaves is used for aromatic baths and as a remedy against gonorrhoea. In Malaya used against rheumatism.

Notes. BENTHAM (1848) and MERRILL (1917) were well aware of the fact that *O. sanctum* and *O. tenuiflorum* are not distinct; DOMIN (1929) finally drew the nomenclatural consequence.

The commonest form has a purple calyx and corolla, other forms have a green calyx and purple corolla, still others have a green calyx and white corolla.

Cultivated

Ocimum viride WILLD.; v. BREDA DE HAAN, Teysmannia 15 (1904) 249; BURK. Dict. (1935) 1576.

Native of tropical Africa, at one time introduced and cultivated in Java, with the intention of using it against mosquito attack, but without success. Also cultivated in the Malay Peninsula, where burned leaves are used as a repellent against mosquitos (BURK. *l.c.*). The statement that mosquitos will also be repelled by the living plants is incorrect.

Excluded

Ocimum canum (*non* SIMS) F.-VILL. Nov. App. (1880) 162.

Since *O. americanum* L. (= *O. canum* SIMS) does not occur in the Philippines, this probably refers to another species of the genus.

Ocimum menthoides (*non* L.) BURM. *f.* Fl. Ind. (1768) 129.

Mentioned as occurring in "Zeylong and Java". Its exact identity is unknown.

30. ORTHOSIPHON

BTH. Bot. Reg. *sub* t. 1300 (1830); in B. & H. Gen. Pl. 2 (1876) 1174; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 372; SLEESEN, Reinwardtia 5 (1959) 37; KENG, Gard. Bull. Sing. 24 (1969) 132. — *Clerodendranthus* KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 117. — **Fig. 31.**

Herbs or undershrubs. *Leaves* serrate or crenulate or subentire. *Verticillasters* of 4–6 flowers arranged in terminal, racemose inflorescences. *Calyx* tubular campanulate (in fruit deflexed), 10-nerved, 2-lipped; upper lip broad, membranaceous,

often recurved, strongly decurrent; lower lip 4-toothed, lateral teeth oblong, aristate, central teeth subulate. *Corolla* tube slender, limb 2-lipped; upper lip 3–4-lobed; lower lip entire, concave. *Stamens* 4, declinate, included or long-exserted; filaments free, not appendaged at base; anther-cells confluent. Disk 4-lobed, produced anteriorly. Style filiform, entire; stigma capitate or clavate. *Nutlets* ovoid or globose, smooth.

Distr. About 40 *spp.* in the tropics of the Old World; in *Malesia* 2 *spp.*

KEY TO THE SPECIES

1. Flowers all cleistogamous. Corolla concealed in the calyx, not opening, 2–3 mm long . **1. O. aristatus**
1. Flowers chasmogamous, corolla opening and exceeding the calyx.
2. Stamens exserted more than 2 cm from the corolla tube, reaching far beyond the top of the lower lip; tube very slender, 10–18 mm, lips 4.5 and 10 mm respectively. Style 4.5–5 cm . . . **1. O. aristatus**
2. Stamens hardly longer than the corolla tube; tube not particularly slender, 8–10 mm, both lips *c.* 3–4 mm. Style *c.* 1 cm . . . . . **2. O. thymiflorus**

1. Orthosiphon aristatus (BL.) MIQ. Fl. Ind. Bat. 2 (1858) 943; MERR. En. Philip. 3 (1923) 422; BACK. Onkr. Suiker. (1931) 577, Atlas (1973) t. 548; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 26; QUIS. Medic. Pl. Philip. (1951) 828; SLEESEN, Reinwardtia 5 (1959) 38; KOCHUMMEN, Mal. Nat. J. 18 (1964) 73, pl. 9; BACK. & BAKH. *f.* Fl. Java 2 (1965) 640; KENG, Gard. Bull. Sing. 24 (1969) 132, f. 25. — *Clerodendron spicatum* THUNB. Fl. Jav. (1825) 22, *non O. spicatum* BTH. 1848. — *Ocymum aristatum* BL. Bijdr. (1826) 833; HASSK. Cat. Hort. Bog. (1844) 128. — *Ocymum grandiflorum* (*non* L'HÉRIT.) BL. Bijdr. (1826) 835. — *O. stamineus* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 15; Lab. Gen. Sp. (1832) 29; HASSK. Cat. Hort. Bog. (1844) 129; MOR. Syst. Verz. (1846) 55; BTH. in DC. Prod. 12 (1848) 52, *incl. var. angustifolia* BTH.; MIQ. Fl. Ind. Bat. 2 (1858) 943; F.-VILL. Nov. App. (1880) 163; VIDAL, Phan. Cuming. Philip. (1885) 135; HOOK. *f.* Fl. Br. Ind. 4 (1885) 615; V.D. BURG, Geneesh. Ned. Ind. 3 (1885) 539; VIDAL, Rev. Pl. Vasc. Filip. (1886) 212; PRAIN, J. As. Soc. Beng. 74, ii (1907) 703; KOORD. Exk. Fl. Java 3 (1912) 159; BUYSMAN, Flora 117 (1915) 362; RIDL. Fl. Mal. Pen. 2 (1923) 645; MANSFELD, Bot. Jahrb. 62 (1929) 381. — *O. tomentosus* (*non* BTH.) T. & B. Cat. Hort. Bog. (1866) 132. — *O. grandiflorum* BOLD. Zakfl. (1916) 110, *non* TERRAC. 1892; HEYNE, Nutt. Pl. (1927) 1338; BACK. Onkr. Suiker. (1931) 577; BURK. Dict. (1935) 1592; BRUGGEMAN, Ind. Tuinb. (1939) 137; MERR. Brittonia 5 (1943) 29. — *Clerodendranthus stamineus* (BTH.) KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 117. — *O. spicatus* (THUNB.) BACK., BAKH. *f.* & STEEN. Blumea 6 (1950) 359, *non* BTH. 1848. — *Clerodendranthus spicatus* C.-Y. WU *ex* H.-W. LI, Acta Phytotax. Sin. 12(2) (1974) 233. — **Fig. 31.**

Slender, ascending herb, 0.25–2 m. Stem 4-angled, sparingly pubescent in young shoots. *Leaves* chartaceous or membranaceous, lanceolate, ovate or rhombic, 3–9 by 2–4.5 cm, acuminate, base cuneate, decurrent, entire; margin elsewhere coarsely serrate, puberulous or pubescent on the nerves and glandular on both surfaces; petiole 1–2(–4.5) cm, puberulent. *Verticillasters* distantly apart below, arranged in lax terminal racemes 10–15(–20) cm long. Bracts sessile, ovate, 1–2 mm long. *Calyx* curved campanulate, 2.5–4.5 mm long, in fruit 6.5–12 mm, puberulous on the nerves, outside gland-dotted or warted. *Corolla* white, pale lilac or lilac, 10–16(–20) mm long; tube slender, 10–12 mm, straight; upper lip shallowly 4-lobed, recurved; lower lip straight, concave. *Filaments* glabrous, filiform, coiled in bud, projecting *c.* 2 cm beyond the corolla-throat. Style 5–6 cm, the tip enlarged, club-shaped, very shortly 2-fid; branches clasped. *Nutlets* broadly oblong, compressed, 1.5 mm long, rugose.

Distr. Throughout continental SE. Asia to tropical Australia, throughout *Malesia*, but at L not represented from the Moluccas, in Celebes and Borneo very rare.

Ecol. In thickets and along forest borders in shaded not too dry localities, along roadsides and ditches, and in teak- and bamboo-forests, in rubber estates, among sago palms, on levees, in grassland, in regrowths and old garden land, from sea-level to *c.* 1000 m. *Fl.* Jan.–Dec.

Flowers are occasionally cleistogamous; the corolla remains then concealed inside the calyx base, stamens are very short and the style is tortuous; yet the ovary and nutlets are normal.

Root galls are caused by nematodes.

Vern. *Kattesnor*, D.; Sumatra: *giri giri marèh*, Djambi, *sĕsungui*, Simalur, M; Java: *kumis kutjing*, M (the common name), *kumis utjing*, *singkir*, S, *rĕmudjung*, *rĕmu(k)h djung*, J, *se salasèjan*, *songot kotjèng*, Md; Philippines: *kabling-gubát*, *kabling paráng*, Tag; Moluccas: *lupu mangu-umi*, Halmaheira; New Guinea: *tjikupi-tjikupi*, Kaisah village, *mangkat kwabon*, Kaliki village, S. Irian.

Confusingly the name *kumis kutjing* (cat's whiskers) is also sometimes by error used for the Capparidaceous *Gynandropsis*.

Uses. Often cultivated in gardens for ornamental and medicinal purposes.

As VAN DER SLEESEN remarked (*l.c.* 39–41) it is very strange indeed that this plant, which is showy as an ornamental, was not collected or mentioned by botanists and explorers before 1777 from Malesia when THUNBERG collected it in Java. And

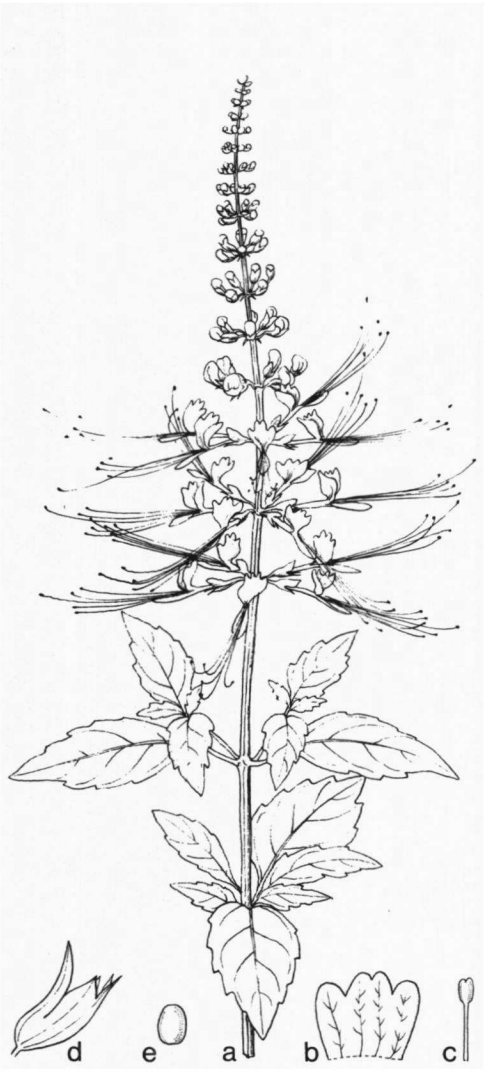


Fig. 31. *Orthosiphon aristatus* (BL.) MIQ. *a.* Habit, × 1/2, *b.* upper lip of corolla, × 1 1/2, *c.* style and stigma, *d.* fruiting calyx, × 2, *e.* nutlet, × 3.

its medicinal use was not mentioned before 1885 from Java, and in SE. Asia still later. As it is also not known to occur in genuinely native forest vegetation, it would even seem to be an introduced plant of which the Eurasians and Europeans detected the medicinal value in the latter half of the 19th century. Propagation is easy from cuttings.

Its medicinal use is now universal throughout Malesia, leaves being used as a strong diuretic in infusa (tea) against various kinds of kidney complaints and illness, renal calculi, phosphatury catarrh of the bladder, gout, *etc.* and also, together with *Phyllanthus urinaria* and *Desmodium gangeticum* against gall stones and podagra.

Although the plant has repeatedly been under thorough phytochemical and pharmocological investigation (see references in VAN DER SLEESEN, *l.c.* 41) a specific constituent responsible for its medicinal value has not been found.

Notes. BACKER (1931, *l.c.* 576) distinguished in Java two forms (by him accepted as species *O. aristatus* and *O. grandiflorus*) distinct by minor differences in hairiness and upper calyx lobe which are, however, not sharply separated.

MERRILL has proposed to use as correct name *O. spiralis* (LOUR.) MERR. Lingn. Agric. Rev. 2 (1923) 137; Trans. Am. Phil. Soc. 24, 2 (1935) 344, based on *Trichostema spiralis* LOUR. Fl. Coch. (1790) 371, of which LOUREIRO mentions the stamens to be "*longissima*". However, as VAN DER SLEESEN pointed out, his phrase "*folia integerrima tomentosa*" rather defeats this reduction, because though the dentation of the leaf margin varies, the leaves are never tomentose, but glabrous and at most sometimes sparsely short-hairy. The impression is that LOUREIRO's plant was a mixture. There is no LOUREIRO specimen in the BM.

2. Orthosiphon thymiflorus (ROTH) SLEESEN, Reinwardtia 5 (1959) 42, *incl. var. viscosus* (BTH.) SLEESEN; BACK. & BAKH. *f.* Fl. Java 2 (1965) 640; KENG, Gard. Bull. Sing. 24 (1969) 135. — *Ocimum thymiflorum* ROTH, Nov. Pl. Sp. (1821) 269. — ? *an Ocimum viscosum* ROTH, *l.c.* 274. — *Ocimum tomentosus* (*non* LAMK) BTH. in Wall. Pl. As. Rar. 2 (1830–31) 14; Lab. Gen. Sp. (1832) 27; in DC. Prod. 12 (1848) 51, *incl. var. parviflorus* BTH.; HASSK. Nat. Tijd. N. I. 10 (1856) 49; BACK. Onkr. Suiker. (1931) 578, as *var. glabratus* (BTH.) BACK. — *Ocimum glabratus* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 14; Lab. Gen. Sp. (1832) 28; in DC. Prod. 12 (1848) 50; MIQ. Fl. Ind. Bat. 2 (1858) 942; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 23. — *O. viscosus* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 14; Lab. Gen. Sp. (1832) 27; MOR. Syst. Veg. (1846) 55; BTH. in DC. Prod. 12 (1848) 50; MUKERJEE, Rec. Bot. Surv. India 14 (1930) 23. — *O. petiolaris* MIQ. Fl. Ind. Bat. 2 (1858) 943. — *O. tomentosus* BTH. *var. viscosus* (BTH.) HOOK. *f.* Fl. Br. Ind. 4 (1885) 614.

Erect or ascending herb, 30–50 cm. Stem often glandular-pubescent. *Leaves* ovate or broadly ovate, 3–4.5(–7) by 2.5–3(–4.5) cm, obtuse or subacute, base rounded or truncate, (usually not decurrent), entire; margin elsewhere crenate or wavy, glabrescent above, viscous and glandular-punctate below; petiole 1–2.5(–5) cm, pubescent. *Verticillasters* 5–6-flowered; racemose inflorescence terminal, 5–8(–12) cm. Bracts ovate, acuminate, 2–5 mm long. Pedicels 2–3 mm, shortly pubescent. *Calyx* tubular, 4–5 mm long, in fruit 7–8 mm, puberulous outside; upper lip broadly triangular; lower lip with 4 filiform teeth. *Corolla* pale pink, 11–14 mm long, tube slightly incurved, puberulous. *Stamens* included. Style 9–10 mm long. *Nutlets* subglobose, compressed, minutely glandular.

Distr. Ceylon to Indo-China; in *Malesia:* Central and East Java, very rare.

Ecol. Only from 3 localities, *viz* Kediri, Nusa

Barung, and G. Sadeng near Puger, all, it seems, in dry calcareous localities under seasonal climatic conditions. *Fl.* Dec.

Note. In Asia several varieties are distinguished. From Java a viscous-haired *var. viscosus* (BTH.) SLEESEN was reported by MORITZI, *l.c.* as *O. viscosus* BTH. (ZOLLINGER 1873) which I have not seen.

31. PLATOSTOMA

BEAUV. Fl. Owar. 2 (1805) 61, t. 95; BTH. in DC. Prod. 12 (1848) 46; in B. & H. Gen. Pl. 2 (1876) 1172 (*'Platystoma'*); BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 365.

Annual herbs. *Leaves* serrate, petiolate. *Flowers* small, in verticillasters in a terminal racemose inflorescence. Bracts narrowly elliptic. *Calyx* urceolate-campanulate, deeply 2-lipped; upper lip rounded, strongly deflexed in fruit, with a broad deltoid lobe on each side at the base; lower lip ovate, slightly concave. *Corolla* tubular-campanulate, upper lip 3-lobed, the median lobe deeply 2-fid, thus seemingly 4-lobed; lower lip shorter, entire, boat-shaped. *Stamens* 4, declinate, shortly exposed, inserted at two different levels of the corolla tube; filaments dilated below, but not appendaged; anther-cells confluent. Disk swollen, glandular. Style briefly 2-fid. *Nutlets* ovoid, minutely reticulate.

Distr. About 5 *spp.*, in tropical Africa and India, in Malesia 1 *sp.* (Sumba).

1. Platostoma africanum BEAUV. Fl. Owar. 2 (1805) 61, t. 95; BTH. in DC. Prod. 12 (1848) 47; BAKER, Fl. Trop. Afr. 5 (1900) 349; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 34 (*'Platystoma'*). — *Ocimum flaccidum* A. RICH. Tent. Fl. Abyss. 2 (1847) 179. — *P. flaccidum* BTH. *ex* HOOK. *f.* Fl. Br. Ind. 4 (1885) 611 (*'Platystoma'*).

Branched, slender herb, 30 cm or more high. Stem and branches sparingly puberulent. *Leaves* thin membranaceous, rhomboid to ovate, sparingly puberulent on both surfaces, 1.2–3.5 by 0.5–1.5 cm, acute, base cuneate or attenuate, entire, margin elsewhere serrate; petiole 0.5–1 cm. *Verticillasters* several to many-flowered, in terminal, often simple racemose inflorescence, 2 or more cm long. Bracts narrowly elliptic, 4–5 mm, glandular and hirsute. *Flowers* on 2–3 mm long pedicels. *Calyx* 2–2.5 mm long, in fruit 3–4 mm, sparingly puberulent; upper lip rounded, strongly deflexed backwards in fruit; lower lip ovate, flat or slightly concave. *Corolla* 3–4 mm long, pale lilac (*fide* BAKER). *Nutlets* ovoid, minute, brown to black, finely reticulate.

Distr. Tropical Africa and S. Asia (India: Deccan Peninsula); in *Malesia:* Lesser Sunda Islands (Sumba), once collected.

32. PLECTRANTHUS *sens. lat.*

L'HÉRIT. Stirp. Nov. (Mar. 1788) 84, t. 41, 42, *nom. cons.*; R. BR. Prod. (1810) 505; BL. Bijdr. (1826) 835; BTH. in B. & H. Gen. Pl. 2 (1876) 1175; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 352; BULL. & KILLICK, Taxon 6 (1957) 239; J. K. MORTON, J. Linn. Soc. Lond. Bot. 58 (1962) 231; LAUNERT, Mitt. Bot. München 7 (1968) 295, pl. 1–3; KENG, Gard. Bull. Sing. 24 (1969) 141; S. T. BLAKE, Contr. Queensl. Herb. 9 (1971) 1; CODD, Mitt. Bot. München 10 (1971) 245; Bothalia 11 (1975) 372. — *Germanea* LAMK, Encycl. 2 (Apr. 1788) 690. — *Coleus* LOUR. Fl. Coch. (1790) 372; BTH. in B. & H. Gen. Pl. 2 (1876) 1176; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 359; KENG, Gard. Bull. Sing. 24 (1969) 48. — *Solenostemon* SCHUMACHER in Schumacher & Thonn. Beskr. Guin. Pl. (1827) 271; BTH. in B. & H. Gen. Pl. 2 (1876) 1175; BRIQ. in E. & P. Nat. Pfl. Fam. 4, 3a (1897) 359; J. K. MORTON, J. Linn. Soc. Lond. Bot. 58 (1962) 251; CODD, Mitt. Bot. München 10

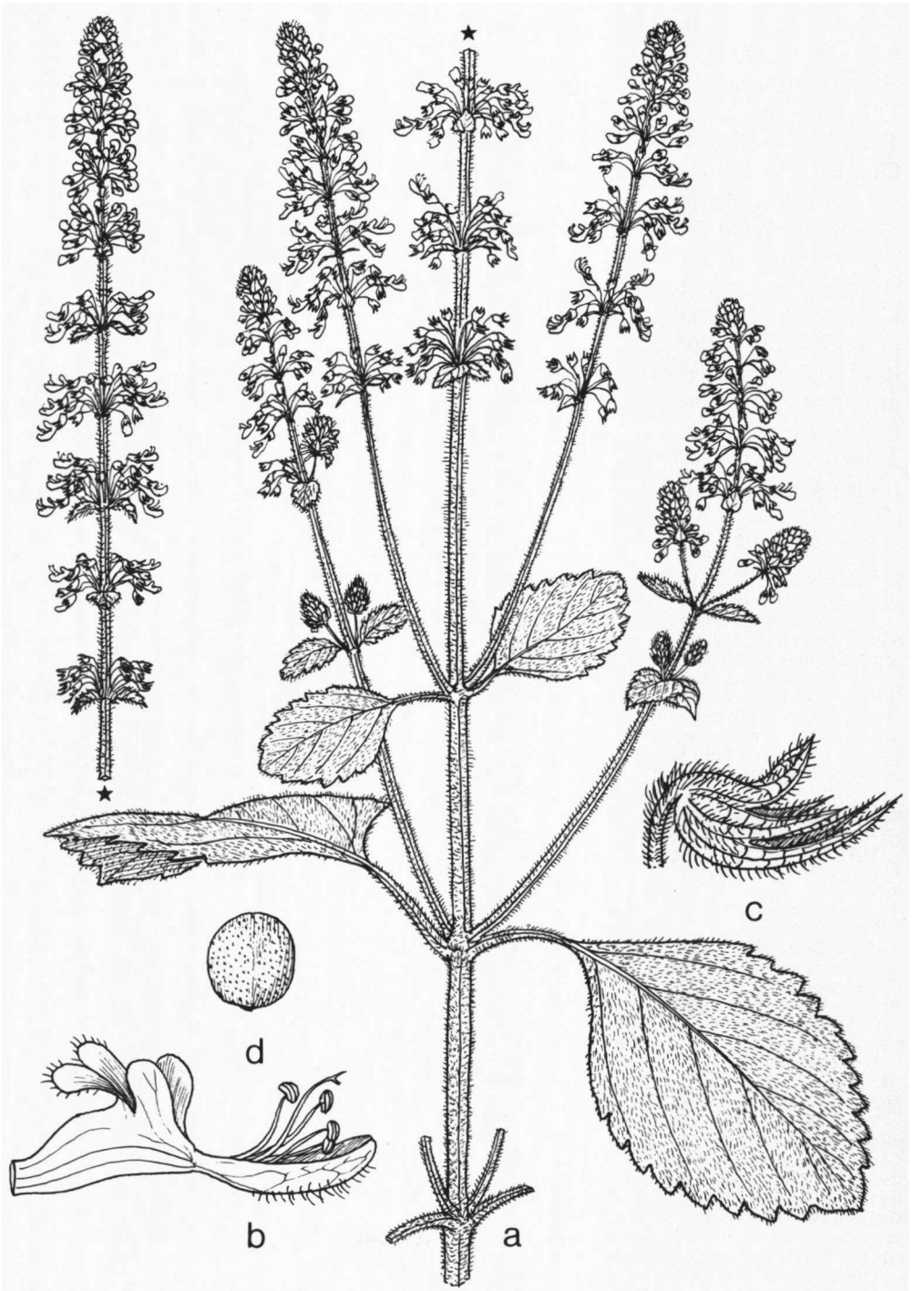


Fig. 32. *Plectranthus steenisii* KENG. *a.* Habit, × 2/3, *b.* corolla, *c.* fruiting calyx, both × 6, *d.* nutlet, × 9 (VAN STEENIS 7111).

(1971) 249; S. T. BLAKE, Contr. Queensl. Herb. 9 (1971) 6. — *Rabdosia* HASSK. Flora 25 (1842) II, Beibl. 25; HARA, J. Jap. Bot. 47 (1972) 193; CODD, Bothalia 11 (1975) 436. — *Majana* (RUMPH.) O. K. Rev. Gen. Pl. 2 (1891) 523. — *Isodon* (BTH. Lab. Gen. Sp., 1832, 40, as *Plectranthus sect. Isodon*) KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 118; CODD, Taxon 17 (1968) 239; S. T. BLAKE, Contr. Queensl. Herb. 9 (1971) 4. — **Fig. 32.**

Herbs or undershrubs. *Leaves* opposite. *Flowers* usually small, in lax or dense, 6-many-flowered cymes or verticillasters which are arranged in terminal and axillary spurious spikes, racemes or panicles. *Calyx* tubular or campanulate, straight or declinate, often accrescent; limb 5-toothed, subequal or 2-lipped. *Corolla* tube exserted, long or short, decurved or straight, sometimes having a spur or angle on the upper side; limb 2-lipped, the upper lip short, 3–4-fid, recurved, the lower lip entire or notched, long boat-shaped. *Stamens* 4, declinate; filaments free or connate below into a sheath around the style or adnate to the corolla tube but free from each other; anther-cells usually confluent. Disk usually produced anteriorly, there nearly to fully as long as the ovary. Style briefly 2-fid. *Nutlets* orbicular or occasionally oblong or ovoid, smooth, granulate or punctate.

Distr. About 200 *spp.* in the tropical and subtropical regions of the Old World, many in Africa; throughout *Malesia.*

Taxon. There is no unanimity of opinion about generic delimitation in the *Coleus-Plectranthus* complex, there being, for Malesia, at least four names concerned. MORTON and LAUNERT are being inclined to recognize only few genera or only one in this complex, but CODD and BLAKE suggest there are more.

About *Ceratanthus* there is not much trouble; its distinctly spurred corolla and the insertion of the stamens (the posterior pair near the base of the corolla tube, the anterior pair near the mouth) are two good characters for its distinction.

As to *Coleus* it has been held that this was distinct by the fused bases of the stamens. As MORTON pointed out — and both LAUNERT and CODD agree — this is an unreliable character in some species, and in degree even variable in the type species of *Coleus, C. amboinicus.* I must maintain, however, that in that species there is always a fusion. However, in closely related species such as *Plectranthus apoensis, P. congestus, etc.* which share the calyx characters, the stamens are free. And thus *Coleus* — as to the type species — cannot be divorced from *Plectranthus.*

There remains then the question whether there are sharply defined taxa within *Plectranthus* (incl. *Coleus*), for which only two characters could be used, *viz* the structure of the calyx and of the inflorescence, and also whether the bracts are differentiated from the leaves or not, and whether the peduncles are developed or not. Apart from our view that the latter characters are not particularly important, calyx and inflorescence characters cannot be correlated.

As to the calyx there are three main types which are quite distinct in extreme form, *viz:*

Solenostemon SCHUMACHER & THONN. *em.* MORTON (*Coleus sect. Solenostemon* (SCHUMACHER) BTH., *Coleus sect. Solenostemoides* BRIQ.): Calyx distinctly 2-lipped, upper lip large reflexed, lower lip 2-fid to various degree, with narrow segments, lateral teeth very short and rounded.

Coleus amboinicus group: Upper lip as in *Solenostemon,* but all four other lobes equally large, narrow pointed.

Plectranthus sens. str. (*Isodon* (BTH.) KUDO; *Plectranthus sect. Isodon* BTH.; *Plectranthus subg. Isodon* (BTH.) BRIQ.; *Elsholtzia sect. Rabdosia* BL.; *Rabdosia* (BL.) HASSK.): all 5 calyx segments about equal, fairly short in proportion to the tube.

In checking these characters with the species, it appears, however, that these extremes are connected by intermediate structures. In *Coleus scutellarioides sens. str.* the lateral lobes are stunted and rounded, but in *C. galeatus* and *C. sparsiflorus* they are triangular, pointed and somewhat larger, though still smaller than the other teeth. *Plectranthus congestus* belongs to the *amboinicus* type, but the lateral lobes are very wide and almost rounded. In the Papuan specimens of *Coleus scutellarioides* the lateral teeth are half as long as those of the lower lip and obliquely truncate. In *C. galeatus* the acute-triangular teeth are almost as long as the upper lip, the lower lip being longest. In *Plectranthus teysmannii* and *P. javanicus* the teeth are almost equal, but in *P. apoensis, congestus,* and *parviflorus* the upper lip is wider than the others.

The only conclusion can be that in this complex the calyx structure is variable and one is unable to sharply define taxa within it, and the inflorescence structures (namely whether of stalked cymes or in verticillasters) are not always correlated with the calyx characters, which of course defeats distinction of more than one genus.

Chromosomes. DE WET (S. Afr. J. Sc. 54, 1958, 153) published an account of chromosome numbers of South African species, but there are obviously at least three base numbers and from these no evidence can be produced for sustaining generic distinction.

KEY TO THE SPECIES

1. Calyx subequally 5-toothed, not 2-lipped.
2. Basic inflorescence a stalked cyme. Flowers small (calyx less than 2 mm, corolla 5–6 mm long); calyx teeth deltoid.
3. Stamens long-exserted. Fruiting calyx 3.5–4 mm long. Corolla white, the tube gibbous above. Upper leaves sessile or even amplexicaulous . . . . . **1. P. teysmannii**
3. Stamens included in lower lip of corolla. Fruiting calyx 4.5–5 mm long. Corolla violet-blue, the tube not gibbous above. Upper leaves petioled . . . . . **2. P. javanicus**
2. Basic inflorescence a verticillaster. Flowers proportionally large (calyx 4–4.5 mm, corolla 10–12 mm long); calyx teeth lanceolate. Corolla blue, prominently gibbous above. Aromatic . . **3. P. steenisii**
1. Calyx unequally 5-toothed, distinctly 2-lipped (the upper tooth generally larger and much broader than the others and forming the upper lip, and the others forming the lower lip).
4. Median teeth and lower teeth similar in shape and length, free, and all with narrow, acute or acicularly acuminate apices. Inflorescence a verticillaster.
5. Flowering calyx (and entire inflorescence) densely covered with long greyish arachnoid pubescence, strongly declinate, the teeth all claw-like curved. Corolla tube shorter than the calyx. Inflorescence paniculate . . . . . **4. P. petraeus**
5. Flowering calyx glabrescent or sparsely hairy, nearly straight, the teeth erect or reflexed, quite apart. Corolla tube longer than the calyx. Spurious spike solitary, or with 1 or 2 branches at the base, rarely paniculate (in *P. apoensis* and *P. congestus*).
6. Corolla tube curved and declinate or constricted near the median portion. Leaves orbicular or reniform in outline, more rarely ovate.
7. Corolla tube not constricted in the middle, ± trumpet-like widened; filaments fused at the base into a tube around the style-base, exposed. Flowers 10–20 or more in a verticillaster **5. P. amboinicus**
7. Corolla tube constricted near the median portion; filaments adnate to the throat of the corolla tube, enclosed. Flowers 6–8 in a verticillaster . . . . . **6. P. apoensis**
6. Corolla tube straight or bent near the base, neither strongly declinate nor constricted near the median portion. Leaves ovate or broadly ovate in outline.
8. Median and lower calyx teeth lanceolate, the median ones becoming broader and blunt in fruiting stage. Flowers numerous (usually over 20) in a verticillaster; inflorescence paniculate **7. P. congestus**
8. Lower and median calyx teeth subulate, sharply pointed. Flowers less than 12 in a verticillaster; inflorescence a spurious spike, solitary or with 1 or 2 branches below . . . **8. P. parviflorus**
4. Median and lower teeth dissimilar in shape and length; median teeth shorter than the lower ones, with acute, rounded or truncate tip; lower teeth connate to various degree.
9. Median teeth usually much shorter ($^1/_2$ or less) than the lower ones, with rounded or truncate apices (rarely mucronate in 2 varieties of *P. scutellarioides*).
10. Fused 2 lower calyx teeth with an almost truncate apex with the dents wide apart. Roots with sessile tubers . . . . . **9. P. rotundifolius**
10. Lower teeth deeply bifid at apex, but the teeth close, almost parallel. No tubers on roots.
11. Corolla *c.* 1 cm long (in some New Guinea specimens up to 18 mm), the tube with a curve, slender below the curve, rather suddenly widening above it. Flowers usually in verticillasters **10. P. scutellarioides**
11. Corolla *c.* 2 cm long, straight, the tube rather gradually widening, narrow funnel-shaped. Flowers in stalked cymes . . . . . **11. P. merrillii**
9. Median teeth slightly shorter ($^2/_3$ to $^3/_4$) than the lower ones, with acute or acuminate apices.
12. Median teeth about $^2/_3$ as long as the lower ones, in fruiting stage about half as long as the latter. In damp mossy forests above 1000 m.
13. Spurious spikes 2–4 cm long. Flowers 1–3 . . . . . **12. P. sparsiflorus**
13. Spurious spikes 5–25(–30?) cm long. Flowers 5–8(–15) . . . . . **13. P. galeatus**
12. Median teeth about $^3/_4$ as long as the lower ones, in fruiting stage almost as long as the latter. On limestone hills in lowland below 200 m . . . . . **14. P. kunstleri**

1. Plectranthus teysmannii MIQ. Fl. Ind. Bat. 2 (1858) 944; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 223; H. J. LAM, Blumea 5 (1945) 581; BACK. & BAKH. *f.* Fl. Java 2 (1965) 636; KENG, Gard. Bull. Sing. 24 (1969) 144; STEEN. Mt. Fl. Java (1972) pl. 25–4. — *P. punctatus* (*non* L'HÉRIT.) BL. Cat. (1823) 84; FILET, Plantk. Woordenb. ed. 2 (1888) 126. — *P. zollingeri* BRIQ. Ann. Cons. Jard. Bot. Genève 2 (1898) 234.

Erect herb or undershrub, 0.5–1.5 m. Stem and branches tetragonous, slender, pubescent. *Leaves* chartaceous, ovate or elliptic-ovate, 2.5–5 by 1.5–3.5 cm, acute or acuminate, base truncate or rounded, rarely acute, entire; margin elsewhere serrate-dentate, puberulent above, densely glandular-pubescent beneath; petiole 0.2–1 cm; upper leaves sessile or even amplexicaulous. *Flowers* in lax stalked cymes disposed in lateral thyrses, and

forming a large terminal panicle 12–15(–20) cm long, 4–5 cm wide. *Calyx* subcampanulate, 1.5–2 mm long, in fruit 3.5–4 mm, densely glandular-villous, subequally 5-toothed, teeth deltoid, blunt or rounded. *Corolla* white with small lilac dots on upper lip, 5–6 mm long, the tube straight, gibbous above. Filaments long exserted. *Nutlets* ovoid, 0.8–1 mm long.

Distr. N. Thailand; in *Malesia:* Java (from Priangan Mts Tilu & Papandajan eastwards), Lesser Sunda Is. (Bali, Lombok, Sumbawa, Flores), and Central & S. Celebes.

Ecol. Grasslands, thickets, forest edges, also in *Casuarina* forest, never in marshy places, 1400–2700 m, in the Lesser Sunda Is. and Celebes as low as *c.* 1000 m. *Fl.* Jan.–Dec.

Vern. Java: *slanghet*, J, *djongè*, S.

Note. Possibly wider spread in continental SE. Asia.

2. Plectranthus javanicus (BL.) BTH. Lab. Gen. Sp. (1832) 45; HASSK. Cat. Hort. Bog. (1844) 129; BTH. in DC. Prod. 12 (1848) 69; MIQ. Fl. Ind. Bat. 2 (1858) 946; KOORD. Exk. Fl. Java 3 (1912) 155; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 222; BACK. & BAKH. *f.* Fl. Java 2 (1965) 636; KENG, Gard. Bull. Sing. 24 (1969) 142; STEEN. Mt. Fl. Java (1972) pl. 25–2. — *P. virgatus* REINW. *ex* BL. Cat. (1823) 84, *nomen.* — *Ocymum tenuiflorum* (*non* L.) BL. Cat. (1823) 83, *nomen.* — *Elsholtzia javanica* BL. Bijdr. (1826) 825. — *Rabdosia javanica* (BL.) HASSK. Flora 25 (1842) II, Beibl. 25. — *P. menthoides* (*non* BTH.) MOR. Syst. Verz. (1846) 55. — *P. intermedius* ZOLL. & MOR. in Mor. Syst. Verz. (1846) 55; KOORD.-SCHUM. Syst. Verz. 1 (1910) fam. 254, p. 8; KOORD. Exk. Fl. Java 3 (1912) 154. — *P. rufescens* BTH. in DC. Prod. 12 (1848) 59; MIQ. Fl. Ind. Bat. 2 (1858) 945; KOORD. Nat. Tijd. N. I. 62 (1902) 218; KOORD.-SCHUM. Syst. Verz. 1 (1910) fam. 254, p. 8; KOORD. Exk. Fl. Java 3 (1912) 154. — *P. benthamianus* MIQ. Fl. Ind. Bat. 2 (1858) 946; KOORD. Exk. Fl. Java 3 (1912) 155. — *P. diffusus* MERR. Philip. J. Sc. 1 (1906) Suppl. 235; *ibid.* 5 (1910) Bot. 382; En. Philip. 3 (1923) 418; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 222. — *Moschosma philippinense* ELMER, Leafl. Philip. Bot. 10 (1939) 3809, *nomen.*

Herb or undershrub, 0.8–2 m, often much-branched, fetid when bruised but not aromatic. Stem and branches angled, slender, pubescent. *Leaves* membranaceous, ovate to oblong-ovate or rhomboid, 2–5(–8) by 1–2.5(–5) cm, acuminate, base acute or rounded, entire; margin elsewhere prominently serrate; crisped hairy on both surfaces; petiole 0.5–1 cm long. *Flowers* in lax, lateral stalked cymes and forming large compound terminal panicles, 20–30 (or more) cm long. Bracts foliaceous, gradually reduced upwards. *Calyx* 1.5–2 mm long, in fruit 4.5–5 mm, sparingly hirsute, subequally 5-toothed, teeth deltoid, acute. *Corolla* violet-blue to pale blue, 5–6 mm long, straight, the limb not conspicuously gibbous, 2-lipped. *Stamens* free, filaments pubescent below, included in the lower lip of corolla. *Nutlets* ovoid or ellipsoid, *c.* 1 mm long, glabrous, smooth, brown to black.

Distr. *Malesia:* N. Sumatra (Karo, Mt Kerintji), Java (from Mt Gedeh eastwards), Lesser Sunda Is. (Bali, Lombok, Sumbawa, Flores, Timor), and the Philippines (N. Luzon).

Ecol. Forest edges and secondary growths, clearings, grassland, also in *Casuarina* forest, along streams, and in glades, (850–)1000–2400 m. *Fl.* Jan.–Dec.

Vern. *Rheumatiek plant*, D.; Sumatra: *latĕng ajam*, M; Java: *surawung langit*, *tjuru*, S, *sangkĕtan*, *jangĕlan*, J; Bali: *sangket sangket*; Philippines: *bungbungtit*, Ig.

3. Plectranthus steenisii H. KENG (in Back. & Bakh. *f.* Fl. Java 3, 1968, 658, *nomen*) Gard. Bull. Sing. 24 (1969) 145, f. 27. — **Fig. 32.**

Erect, aromatic herb. Stem and branches densely villose. *Leaves* membranaceous, ovate or spathulate-obovate, 5–9 by 4–6.5 cm, acute or rounded, base acute or acuminate, entire; margin elsewhere crenate-dentate; hirsute on both surfaces, especially densely on the nerves; petiole 1–3 cm. *Flowers* 20–30 in a verticillaster, arranged in spurious spikes and disposed in a large terminal panicle 25–30 cm long. Pedicels 2–4 mm. *Calyx* campanulate, 4–4.5 mm long, in fruit 5.5–6 mm, the teeth subequal, lanceolate. *Corolla* blue, 10–12 mm long, tube erect, prominently gibbous in the medium portion above; upper lip 4-lobed, lower lip concave. Filaments inserted at the base of corolla tube, free above the point of insertion. Style briefly 2-fid. *Nutlets* subrotundate, flattened, 1.2 mm long and wide.

Distr. *Malesia:* East Java (Mts Ardjuno, Tengger, Idjen), 3 collections.

Ecol. Stony slopes in *Casuarina* forest, 2000–2650 m; on Mt Idjen above Bajeman said to have been collected by BACKER between 50–600 m which I think is an error. *Fl.* April, June, Oct. Locally on Mt Ardjuno gregarious in one place.

Note. Manifestly different from other Malesian species by the very long corolla (10–12 mm) and the gibbous corolla tube.

4. Plectranthus petraeus BACK. *ex* ADELB. (Bekn. Fl. Java (em. ed.) 14, 1954, fam. 201, p. 47, *descr. neerl.*) Reinwardtia 3 (1954) 152, f. 3; BACK. & BAKH. *f.* Fl. Java 2 (1965) 636; KENG, Gard. Bull. Sing. 24 (1969) 145; BLAKE, Contr. Queensl. Herb. 9 (1971) 54, f. 2 N, 4 H, pl. 27, map 36.

Undershrub, 1–1.5 m, very fragrant. Stem and branches slender, nearly terete. *Leaves* membranaceous, elliptic or ovate, 4–10 by 3–6 cm, acute or obtuse, base cuneate or shallowly cordate, entire; margin elsewhere crenate-serrate; petiole 1–3 cm. *Flowers* in verticillasters arranged in spurious spikes disposed in large terminal panicles 15–20 cm long. Bracts rhomboid, sessile, 2.5 mm long and wide. Pedicels 2–3 mm. *Calyx* campanulate, curved, 3–3.5 mm long, in fruit 4–5 mm, 5-toothed, teeth all subulate, claw-like curved, densely covered with long greyish arachnoid pubescence. *Corolla* white with violet-tinged upper lip, 7–8 mm long, tube shorter than the calyx, limb 2-lipped, the lips pubescent and with yellow glands outside. *Stamens* included in the lower lip of corolla. *Nutlets* rounded, flattened, *c.* 1 mm ∅.

Distr. *Malesia:* East Java (Mt Idjen).

Ecol. Between grass, herbs and seedling trees (amongst which *Casuarina*, *Harmsiopanax*, *Trema*, *Wightia*) on old lavastreams (*rĕdjĕngans*), in

exposed places, locally common, 1100–1450 m. *Fl.* April–July, Nov.

5. Plectranthus amboinicus (LOUR.) SPRENG. Syst. 2 (1825) 690; LAUNERT, Mitt. Bot. München 7 (1968) 298, pl. 2; ADAMS, Fl. Jamaica (1972) 645. — *Coleus amboinicus* LOUR. Fl. Coch. (1790) 372; MIQ. Fl. Ind. Bat. 2 (1858) 948; F.-VILL. Nov. App. (1880) 163; GÜRKE, Bot. Jahrb. 19 (1894) 210, *incl. var. violaceus* GÜRKE; KOORD. Exk. Fl. Java 3 (1912) 155; MERR. Philip. J. Sc. 7 (1912) Bot. 344; Fl. Manila (1912) 410; Int. Rumph. (1917) 459; Sp. Blanc. (1918) 338; WEEHUIZEN, Nat. Tijd. N. I. 78 (1919) 124; MERR. En. Philip. 3 (1923) 418; OCHSE & BAKH. Ind. Groent. (1931) 350, f. 221; BURK. Dict. (1935) 634; MERR. Addisonia 20 (1937) 11; VOOGD, Trop. Natuur 27 (1938) 61, f. 4; QUIS. Medic. Pl. Philip. (1951) 813; BACK. & BAKH. *f.* Fl. Java 2 (1965) 637; PURSEGLOVE, Trop. Crops, Dicot. 2 (1968) 634; KENG, Gard. Bull. Sing. 24 (1969) 50. — *Coleus aromaticus* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 16; Bot. Reg. *sub* t. 1520 (1832); Lab. Gen. Sp. (1832) 51; in DC. Prod. 12 (1848) 72. — *P. aromaticus* (BTH.) ROXB. Fl. Ind. ed. Carey 3 (1832) 22, *non* ROXB. 1814, *nomen.* — *Coleus suganda* BLANCO, Fl. Filip. (1837) 438; ed. 2 (1845) 337; ed. 3, 2 (1878) 259; BTH. in DC. Prod. 12 (1848) 71; MIQ. Fl. Ind. Bat. 2 (1858) 948. — *Coleus carnosa* HASSK. Flora 25 (1842) II, Beibl. 25; Cat. Hort. Bog. (1844) 130; BTH. in DC. Prod. 12 (1848) 79 (as *sp. dubia*); MIQ. Fl. Ind. Bat. 2 (1858) 953; RIDL. Fl. Mal. Pen. 2 (1923) 646. — *Coleus suborbicularis* ZOLL. & MOR. in Mor. Syst. Verz. (1846) 54. — *Majana amboinica* (LOUR.) O. K. Rev. Gen. Pl. 2 (1891) 524.

A more or less succulent herb, non-tuberous, 0.3–1 m. Stem and branches subterete, densely pubescent when young, glabrescent when old. *Leaves* thick, fleshy, broadly ovate, suborbicular or reniform, 5–7 by 4–6 cm, obtuse or rounded, base rounded or truncate, often long-attenuate, sparsely pubescent above and hirsute on the nerves beneath; margin coarsely crenate to dentate-crenate except in the basal part; petiole 2–4.5 cm, pubescent. *Flowers* in dense, 10–20(or more)-flowered cymes forming subglobose verticillasters disposed in terminal spike-like inflorescences, rachis 10–20 cm, fleshy and pubescent. Bracts broadly ovate, 3–4 cm long, acute. *Calyx* campanulate, 2–4 mm long, hirsute and glandular, subequally 5-toothed, upper tooth broadly ovate-oblong, obtuse, abruptly acute, lateral and lower teeth acute. *Corolla* blue, curved and declinate, 8–12 mm long, tube 3–4 mm long, ± trumpet-like widened; limb 2-lipped, upper lip short, erect, puberulent, lower lip long, concave. Filaments fused below into a tube around the style. *Nutlets* smooth, pale-brown, roundish flattened, *c.* 0.7 by 0.5 mm.

Distr. Possibly native in India, cultivated and introduced in many warmer parts of the world, almost pantropic, throughout *Malesia.*

LAUNERT *l.c.* remarked on this widely spread popular spice which is commonly used in tropical Africa that it may well be native in tropical Africa and spread from there in early times.

Ecol. Along roadsides, old garden lands, riverbanks, cliffs along roads in settled areas, up to *c.* 1500 m. *Fl.* Jan.–Dec. In Java flowering rarely, not known to flower in the Philippines. Propagated by cuttings which readily take root.

Vern. Sumatra: *tramun*, Gajo, *daun djintĕn, tĕrbangun*, Karo; Java: *adjĕran, atjĕran, daun djintĕn*, S, *daun kutjing, iwak ira, surawung*, J, *bangun bangun, daun djintĕn, d. hati hati, sukan, tĕrbangun*, M, *daun kambing, madja nĕrĕng*, Md; Bali: *iwak*; W. Flores: *golong dj. potjo*; Timor: *kuwu ètu*; Philippines: *clavo, limon, orégano, torongil de limon*, Span., *bildu*, Sul., *latai, suganda*, Sub., *suganda*, Tag.

Uses. Cultivated for its fragrant, aromatic leaves and assumed medicinal properties. In Malaya used as a flavouring for drinks; also used for coughs of children and pains near stomach or heart. According to BURKILL (Dict. 1935, 635) leaves are mixed with rice flour for offerings when a house is built. HEYNE wrote (Nutt. Pl. 1927, 1334) that leaves are rubbed on hair and clothes during bathing. OCHSE & BAKHUIZEN (*l.c.* 350) reported that in Java fresh leaves are added to certain dishes of fish or goat's meat to remove the strong smell. In the Philippines macerated leaves are used with burns and also for bites of centipedes and scorpions; furthermore for dyspepsia, asthma, and as a medicine after childbirth.

6. Plectranthus apoensis (ELMER) H. KENG, Gard. Bull. Sing. 24 (1969) 147. — *Coleus apoensis* ELMER, Leafl. Philip. Bot. 7 (1915) 2694; MERR. En. Philip. 3 (1923) 418.

Herb, 1–2 m. Stem and branches erect and slender, obscurely angular, puberulent. *Leaves* more or less succulent, suborbicular or reniform, 4–7.5 by 5–6.5 cm, rounded, base truncate, entire; margin elsewhere irregularly crenate or double-dentate; petiole 1.5–3 cm, slender, hairy. *Flowers* 6–8 in verticillasters, forming lax spicate inflorescences disposed in a large terminal panicle 20–25 cm long, 10–12 cm wide. Pedicels divaricate, 2 mm. *Calyx* campanulate, 2.5 mm long, upper tooth broad and 3-veined, lower 4 teeth sharply pointed. *Corolla* light blue, 6–7 mm long; tube slender, constricted at about the middle, slightly gibbous near the base; limb 2-lipped, upper lip recurved, lower lip concave, notched. *Stamens* 4, attached on the throat of corolla, enclosed. Style shortly 2-fid.

Distr. *Malesia:* Philippines (Mindanao: Mt Apo), one collection.

Ecol. Associated with grasses in thickets on fertile soil, along an open ridge, 1000 m. *Fl.* Sept.

Vern. *Calalapo-bulan*, Bagobo.

Note. The four stamens are attached on the throat of the corolla nearly at the same level, but do not form a filamental tube as in *Coleus s. str.* Incidentally, ELMER described this plant under *Coleus* with uncertainty.

7. Plectranthus congestus R. BR. Prod. (1810) 506; BTH. Lab. Gen. Sp. (1832) 36; in DC. Prod. 12 (1848) 66; Fl. Austr. 5 (1870) 79; KENG, Gard. Bull. Sing. 24 (1969) 147; BLAKE, Contr. Queensl. Herb. 9 (1971) 52, f. 2 S, 4 g, 26, 36 (map).

Tall herb, 1–1.5 m. Stem and branches hoary-tomentose. *Leaves* membranaceous, ovate or elliptic, 2–6 by 1.5–4 cm, obtuse, base cuneate, entire; margin elsewhere undulate-crenate, tomentose on both surfaces; petiole 0.5–1 cm. *Flowers*

numerous (*c.* 20–30) in dense clusters, forming false spikes and disposed in terminal panicles 15 cm or more long, and 5–8 cm ∅. Pedicels subsessile, 1–2 mm long. *Calyx* villous and glandular-dotted, 2 mm long, in fruit 2.5–3 mm (the median teeth, in some fruiting specimens, *e.g.* WOMERSLEY NGF 11010, become broadened with a broadly acute to rounded tip), declinate, 5-toothed, the upper tooth broadly ovate, obtuse, not decurrent, the median and lower teeth subulate, acute, incurved. *Corolla* pale blue or lilac, with orange glands on outside surface of the lips, 6 mm long, declinate and slightly gibbous on the base of the upper side below the middle. *Stamens* epicorolline. *Nutlets* rounded, flattened, subtriquetrous, 0.8 mm ∅, glandular-dotted.

Distr. Queensland and NW. Australia; in *Malesia:* Lesser Sunda Is. (Timor) and E. New Guinea (incl. Louisiades).

Ecol. Open places and thickets, savannahs, coastal coral limestone and sea-cliffs, from sea-level to *c.* 1500 m. *Fl.* March–Aug.

8. Plectranthus parviflorus WILLD. En. Hort. Berol. 1 (1806) t. 65, *non* R. BR. 1810, *sens lat.*; BTH. Lab. Gen. Sp. (1832) 37; in DC. Prod. 12 (1848) 67; Fl. Austr. 5 (1870) 78; HILLEBRAND, Fl. Hawaii (1888) 344; MANSFELD, Bot. Jahrb. 62 (1929) 379; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 222; KENG, Gard. Bull. Sing. 24 (1969) 150; BLAKE, Contr. Queensl. Herb. 9 (1971) 35, f. 2 L, 4 A, 18, 35 (map). — *P. australis* R. BR. Prod. (1810) 506; BTH. in DC. Prod. 12 (1848) 67; DOMIN, Bibl. Bot. 22 (Heft 89) (1929) 1118. — *P. klossii* S. MOORE, Trans. Linn. Soc. Lond. II, Bot. 9 (1916) 137, *incl. var. major*; MANSFELD, Bot. Jahrb. 62 (1929) 379; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 222; KENG, Gard. Bull. Sing. 24 (1969) 150; BLAKE, Contr. Queensl. Herb. 9 (1971) 32, f. 2 B–C, 3 I, 16, 17 A–C, 36 (map).

Erect herb or semi-shrub, 0.1–1 m. Stem and branches rather fleshy, glabrescent to densely villous. *Leaves* thick- or thin-chartaceous, ovate to suborbicular, 1–2.5(–9) by 0.5–1(–5) cm, broadly acute or rounded, base rounded or subcordate, often slightly oblique, entire; margin elsewhere crenate or remotely crenulate, soft rugose or villous on both surfaces; petiole 0.5–1(–3.5) cm long, woolly. *Flowers* 6–12 in dense verticillasters, laxly disposed in terminal and upper axillary racemes 5–30(–35) cm long, simple or branched at the base. Bracts cordate, caducous. *Calyx* 1.2–2.5 mm long, in fruit 2.5–5 mm, densely villous and woolly, the upper tooth very broad, decurrent in fruit, the 4 lower teeth subulate, sharply pointed. *Corolla* white or light blue with dark markings on the throat, 3.5–5.5 mm long; lower lip boat-shaped, longer than the upper lip. *Stamens* exserted. *Nutlets* very minute, ovoid, *c.* 0.8 mm long.

Distr. Australia, Polynesia, and ? Melanesia; in *East Malesia:* Lesser Sunda Is. (Sumbawa, Wetar, Flores, Timor) and New Guinea.

The Sumatran specimens mentioned in the precursor *l.c.* 150 have here been discarded; their identity is uncertain and the material too young to place with certainty.

Ecol. Rocky, steep slopes, dry forest, savannah grassland, limestone cliffs, old garden lands, (60–)400–2200 m. *Fl.* Oct.–May. According to VAN STEENIS very aromatic.

Vern. *Kunum*, W. Timor, Dawan lang., *ahi liga inen*, Bobonero; New Guinea: *mun*, Dani lang.

Notes. BLAKE (*l.c.* 35–45) devoted a critical, lengthy synonymy and discussion to this species which he amply described from Australian specimens. He said that *P. parviflorus* is distinguished in the field by its tuberous base, the (small) tuber formed at ground level being already developed in seedlings before the second pair of leaves is developed; after flowering plants die down almost to the tuber, new shoots being later produced from it and the basal part of the stem.

I have included in this concept also *P. klossii* from New Guinea which BLAKE keeps apart as a separate species. In carefully comparing his key and descriptions it turns up that the main difference given by BLAKE is the presence of a tuberous stem-base in *P. parviflorus*. In this species also the axis of the inflorescence would have, besides normal shorter and longer hairs, also sessile glands (in his key: 'many and coloured') while in *P. klossii* there would be no or few of such sessile coloured glands. In addition, he himself says (bottom of *l.c.* 39) that the indumentum of leaves and stems is more variable than those in the other Australian species, which observation almost reduces the assumed differences between *P. klossii* and *P. parviflorus* to the tuberous stem-base. However, there are no complete collections of *P. klossii* including the stem-base, so that we are ignorant in this respect. It is remarkable that BLAKE completely ignored to mention the very close affinity.

CLAMAGIRAND 59bis, from Timor, has exceptionally long pedicels, 5–6 mm, under the fruiting calyx.

9. Plectranthus rotundifolius (POIR.) SPRENG. Syst. 2 (1825) 690; BTH. in DC. Prod. 12 (1848) 65. — *Germanea rotundifolia* POIR. Encycl. Suppl. 2 (1812) 763. — *P. tuberosus* BL. Bijdr. (1826) 838; ALSTON in Trimen, Handb. Fl. Ceyl. 6 (1931) Suppl. 236. — *Ocymum tuberosum* FÉE, Rec. Trav. Soc. Amateurs Sc. Agr. Arts Lille (1826/27) 193–212; repr. p. 8, *non* ROXB. 1832. — *Coleus tuberosus* (BL.) BTH. Lab. Gen. Sp. (1832) 59, *non* A.RICH. 1851; HASSK. Cat. Hort. Bog. (1844) 129; BTH. in DC. Prod. 12 (1848) 79; MIQ. Fl. Ind. Bat. 2 (1858) 953; F.-VILL. Nov. App. (1880) 163; HOOK. *f.* Fl. Br. Ind. 4 (1885) 625; MERR. Int. Rumph. (1917) 459; RIDL. Fl. Mal. Pen. 2 (1923) 646; HEYNE, Nutt. Pl. (1927) 1335; OCHSE & BAKH. Ind. Groent. (1931) 351, f. 222; BURK. Dict. (1935) 636. — *Coleus parviflorus* BTH. in DC. Prod. 12 (1848) 72; KOORD. Exk. Fl. Java 3 (1912) 157; BACK. &. BAKH. *f.* Fl. Java 2 (1965) 637; PURSEGLOVE, Trop. Crops, Dicot. 2 (1968) 634. — *Coleus rotundifolius* (POIR.) CHEV. & PERROT in Chev. Vég. Ut. Afr. Trop. Franç. 1 (1905) 101; CHEV. Rev. Bot. Appl. Agr. Col. 18 (1938) 482.

Decumbent or ascending herb, 0.4–1 m; lower half of stem creeping, rooting from the nodes, and some of the roots swollen into sessile, oblong, 2–4 cm long, brownish black, aromatic tubers similar to small potatoes. Stem densely pubescent on the angles. *Leaves* thick-membranaceous, juicy, faintly aromatic when bruised, ovate to broadly ovate or suborbicular, 2–5(–6) by 1.5–3.5(–4) cm, rounded, base cuneate; margin elsewhere coarsely

crenate; petiole 1–3(–5) cm. Terminal false spikes 5–15 cm long. *Flowers* 4–6 in a verticillaster. Pedicels 1–2 mm, puberulent. Bracts minute. *Calyx* campanulate; upper and lower teeth reflexed at anthesis; upper tooth oblong, acute, finely ciliate; median ones very short, with rounded apex; lower teeth highly connate forming an almost truncate apex, abruptly acute as 2 tips, widely apart. *Corolla* light or dark violet, 7–10(–12) mm long, tube strongly curved; upper lip very short. Filaments connate below into a tube enveloping the style.

Distr. ?India, frequently cultivated in Madagascar, Ceylon, throughout continental Asia and in *Malesia:* Sumatra, Malaya, Java, Philippines, Moluccas.

The native country is not definitely known; it may have originated in cultivation in ancient time. It was already well-known to RUMPHIUS.

Ecol. Cultivated only, in the lowland, rarely up to *c.* 1000 m. *Fl.* Febr.–Aug.

Vern. Sumatra: *tramun*, Gajo, *hombili, kĕmbili, kĕmili*, M; Java: *huwi kĕntang, kĕntang, k. bogor, k. djawa, k. saba, kumili djawa*, S, *daun sabrang, gombili, kĕntang djawa, ubi kĕmbili*, M, *gĕmbili, kĕntang djawa, k. djĕmbut, k. eeler, k. eereng, k. kĕntul, k. klitji, kumbili djawa*, J, *kambili, k. gangan, k. larbhat, larbha(k), obi|sola*, Md; Borneo: *gambili, gombili*, M; Bali: *sabrang*; Lombok: *sĕbrang*; Moluccas: *kombili*, M, *isahu, isiahu, katilĕn*, Ceram, *safut*, Buru, *tua*, Key Is.

Uses. The white, starchy, slightly aromatic tubers become dark with age. They are eaten cooked or steamed, sometimes even raw; they are also mixed with *sayor*. Adult tubers are also used as a substitute for potatoes, for the preparation of minced meatballs. BURKILL (Dict. 1935, 636) says they should be consumed in small quantities, as they are somewhat indigestible. HEYNE (*l.c.* 1335) says cultivation in Java is mostly in loose soil on fallow rice-fields, in West Java (Banten, Djakarta) and East Java (Bagelen, Kedum Jogja); harvested after 3–4 months. HARTLEY (Lloydia 32, 1969, 265) listed it as a potential anti-cancerogene.

Note. No fruiting specimens are ever found in Java.

10. Plectranthus scutellarioides (L.) R. BR. Prod. (1810) 506; BL. Bijdr. (1826) 837; HUNTER, J. Str. Br. R. As. Soc. *n.* 53 (1909)100. — *Ocymum scutellarioides* LINNÉ, Sp. Pl. ed. 2, 2 (1763) 834; BURM. *f.* Fl. Ind. (1768) 130. — *Polypodium ovatum* BURM. *f.* Fl. Ind. (1768) 223; *cf.* STEEN. Bull. Jard. Bot. Btzg. III, 13 (1934) 288. — *P. aromaticus* ROXB. Hort. Beng. (1814) 45, *nom. valid.*, based on RUMPH. Herb. Amb. 5, t. 101, *non* (BTH.) ROXB. 1832. — *P. ingratus* BL. Bijdr. (1826) 836. — *P. laciniatus* BL. Bijdr. (1826) 838. — *Coleus scutellarioides* (L.) BTH. in Wall. Pl. As. Rar. 2 (1830–31) 16; Lab. Gen. Sp. (1832) 53; in DC. Prod. 12 (1848) 73; MIQ. Fl. Ind. Bat. 2 (1858) 949, *incl. var. ingratus* (BL.) MIQ., *var. gracilis* MIQ., *var. laciniatus* (BL.) MIQ., *var. blumei* (BTH.) MIQ. *et var. celebica* MIQ.; Sum. (1860) 571, *incl. var. gracilis* MIQ.; F.-VILL. Nov. App. (1880) 163; K.SCH. & LAUT. Fl. Schutzgeb. (1900) 528; KOORD. Exk. Fl. Java 3 (1912) 156; MERR. Int. Rumph. (1917) 460; KOORD. Fl. Tjibodas 3 (1918) fam. 254, p. 93; MERR. En. Philip. 3 (1923) 420 (as excl. sp.); BACK. Onkr. Suiker. (1931) 569; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 288; BACK. & BAKH. *f.* Fl. Java 2 (1965) 637; KENG, Gard. Bull. Sing. 24 (1969) 51, f. 9, *incl. var. crispipilus* (MERR.) KENG, *var. grandifolius* (BTH.) KENG, *var. integrifolius* (ELMER) KENG *et var. gibbsiae* (S. MOORE) KENG. — *Coleus atropurpureus* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 16, *incl. var. ramosior* BTH.; Lab. Gen. Sp. (1832) 54; in DC. Prod. 12 (1848) 74, *incl. var. densiflorus* BTH. *et var. javanicus* BTH.; MIQ. Fl. Ind. Bat. 2 (1858) 951; F.-VILL. Nov. App. (1880) 163; PRAIN, J. As. Soc. Beng. 74, ii (1907) 706; KOORD. Exk. Fl. Java 3 (1912) 156; RIDL. Fl. Mal. Pen. 2 (1923) 646; MERR. En. Philip. 3 (1923) 418; BARTLETT, Pap. Mich. Ac. Sc. 6 (1926) 59; BURK. Dict. (1935) 635; DOAN, Fl. Gén. I.-C. 4 (1936) 950; HEND. J. Mal. Br. R. As. Soc. 17 (1939) 65; Mal. Nat. J. 6 (1950) 396, f. 366; QUIS. Medic. Pl. Philip. (1951) 815. — *Coleus acuminatus* BTH. Linnaea 6 (1831) 81 (type in Leningrad); in DC. Prod. 12 (1848) 73; MIQ. Fl. Ind. Bat. 2 (1858) 950; F.-VILL. Nov. App. (1880) 163; VIDAL, Phan. Cuming. Philip. (1885) 135; Rev. Pl. Vasc. Filip. (1886) 213; MERR. En. Philip. 3 (1923) 418. — *Coleus ingratus* (BL.) BTH. Lab. Gen. Sp. (1832) 53; HASSK. Cat. Hort. Bog. (1844) 129; MOR. Syst. Verz. (1846) 54; BTH. in DC. Prod. 12 (1848) 73; KOORD. Exk. Fl. Java 3 (1912) 156. — *Coleus grandifolius* BTH. Lab. Gen. Sp. (1832) 54; DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 398; Herb. Timor. Descr. (1835) 70; SPANOGHE, Linnaea 15 (1841) 333; BTH. in DC. Prod. 12 (1848) 73; MIQ. Fl. Ind. Bat. 2 (1858) 952. — *Coleus secundiflorus* BTH. Lab. Gen. Sp. (1832) 55; DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 398; Herb. Timor. Descr. (1835) 70; BTH. in DC. Prod. 12 (1848) 75; MIQ. Fl. Ind. Bat. 2 (1858) 952. — *Coleus blumei* BTH. Lab. Gen. Sp. (1832) 56; HASSK. Cat. Hort. Bog. (1844) 129; BTH. in DC. Prod. 12 (1848) 75; F.-VILL. Nov. App. (1880) 163; KOORD. Exk. Fl. Java 3 (1912) 157; MERR. Fl. Manila (1912) 410; Int. Rumph. (1917) 460; Sp. Blanc. (1918) 339; En. Philip. 3 (1923) 419; RIDL. Fl. Mal. Pen. 2 (1923) 646; BURK. Dict. (1935) 635; QUIS. Medic. Pl. Philip. (1951) 815. — *Coleus laciniatus* (BL.) BTH. Lab. Gen. Sp. (1832) 56; HASSK. Cat. Hort. Bog. (1844) 129; BTH. in DC. Prod. 12 (1848) 76; KOORD. Exk. Fl. Java 3 (1912) 156; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 56. — *Coleus multiflorus* BTH. Lab. Gen. Sp. (1832) 55; WALP. Nov. Act. Ac. Caes. Leop.-Car. 19 (1843) Suppl. 1, 373; Repert. 3 (1845) 517; BTH. in DC. Prod. 12 (1848) 75; MIQ. Fl. Ind. Bat. 2 (1858) 951; F.-VILL. Nov. App. (1880) 163; MERR. En. Philip. 3 (1923) 419; *non P. multiflorus* HOCHST. *ex* BTH. in DC. Prod. 12 (1848) 49. — *Coleus pumilus* BLANCO, Fl. Filip. (1837) 482; ed. 2 (1845) 336; ed. 3, 2 (1878) 257; BTH. in DC. Prod. 12 (1848) 78; MIQ. Fl. Ind. Bat. 2 (1858) 956; MERR. Fl. Manila (1912) 410; Sp. Blanc. (1918) 339; En. Philip. 3 (1923) 420; STAPF in Curtis, Bot. Mag. 150 (1924) t. 9034. — *Coleus grandifolius* BLANCO, Fl. Filip. (1837) 482; ed. 2 (1845) 336; ed. 3, 2 (1878) 258, t. 208; F.-VILL. Nov. App. (1880) 163; *non* BTH. Lab. Gen. Sp. (1832) 54. — *Coleus verschaffeltii* LEM. Illustr. Hort. 8 (1861) t. 293. — *P. monadelphus* LLANOS *ex* F.-VILL. & NAVES in Blanco, Fl. Filip. ed. 3, 4 (1880) 105; *non* ROXB. 1832. — *Majana scutellarioides* (L.) O. K. Rev. Gen. Pl. 2 (1891) 524,

incl. var. atropurpureus (BTH.) O. K. *et var. blumei* (BTH.) O. K. — *Coleus hybridus* Hort. *ex* VILM. Blumengärtnerei ed. 3, Voss & Sieb. 1 (1896) 844; BRUGGEMAN, Ind. Tuinboek (1939) 111. — *Coleus igolotorum* BRIQ. Ann. Cons. Jard. Bot. Genève 2 (1898) 236; MERR. En. Philip. 3 (1923) 419. — *Coleus gaudichaudii* BRIQ. Ann. Cons. Jard. Bot. Genève 2 (1898) 237. — *Coleus formosanus* HAYATA in Matsum. & Hayata, En. Pl. Formos. (1906) 320; KUDO, Mem. Fac. Sc. & Agr. Taihoku Un. 2, 2 (1929) 145; HATUS. Mem. Fac. Agr. Kagoshima Un. 5 (1966) 48. — *Coleus macranthus* MERR. *var. crispipilus* MERR. Philip. J. Sc. 1 (1906) Suppl. 234. — *Coleus pubescens* MERR. Philip. J. Sc. 3 (1908) Bot. 432; En. Philip. 3 (1923) 420. — *Coleus crispipilus* MERR. Philip. J. Sc. 5 (1910) Bot. 382; En. Philip. 3 (1923) 419. — *Coleus zschokkei* MERR. Philip. J. Sc. 5 (1910) Bot. 382; En. Philip. 3 (1923) 420. — *Solenostemon blumei* (BTH.) MAZA in Maza & Roig. Fl. Cuba (Bot. Ser. Agr. Commer. Trab. Cuba *n.* 22) (1914) 127, *in obs.* — *Coleus rehneltianus* A. BERGER, Bot. Jahrb. 54 (1915) Beibl. 120, p. 71; ALSTON in Trimen, Handb. Fl. Ceyl. 6 (1931) Suppl. 236; BACK. & BAKH. *f.* Fl. Java 2 (1965) 637. — *Coleus integrifolius* ELMER, Leafl. Philip. Bot. 7 (1915) 2696; MERR. En. Philip. 3 (1923) 419. — *Coleus sp.* MERR. Philip. J. Sc. 11 (1916) Bot. 311. — *Coleus gibbsiae* S. MOORE in Gibbs, Arfak (1917) 178. — *P. blumei* (BTH.) LAUNERT, Mitt. Bot. München 7 (1968) 301; ADAMS, Fl. Jamaica (1972) 645. — *Solenostemon scutellarioides* CODD, Bothalia 11 (1975) 439.

Erect or ascending branched herb, 0.5–1.5 m, aromatic, without tubers. Stem and branches finely pubescent or glabrous. *Leaves* membranaceous, very variable in size, shape and colour, generally ovate in outline, blade 1–15 (usually 4–7) by 1–10 (usually 3–5) cm, acute or acuminate, base rounded or cuneate, entire, margin elsewhere crenate, serrate, remotely crenate or sometimes laciniate, pubescent on the main and secondary veins; petiole 1–5(–8) cm. *Flowers* in verticillasters or in irregularly branched cymes disposed in simple or branched thyrses 5–10(–25) cm long, 3–5(–8) cm ∅; peduncles of the lateral cymes short or elongated. Bracts ovate-acute, pubescent, 2–3 mm long, caducous. *Calyx* obliquely campanulate, 10-nerved, 2–2.5 mm long, in fruit 4–6 mm, hirsute and sparingly gland-dotted, unequally 5-toothed; upper tooth broadly ovate, subacute; two lateral teeth very short, oblong-obtuse, truncate or rounded, occasionally mucronate with a tiny apiculate apice; two lower teeth subulate, connate. Pedicels 3–4 mm, pubescent. *Corolla* boat-shaped, blue or violet, with whitish tube, upper lip often paler than the lower one, 8–13 mm long (rarely 15–18 mm in some Papuan specimens), puberulent, tube abruptly decurved, upper lip short, erect, lower lip long, concave, enclosing the stamens and most of the style. *Stamens* in 2 pairs; filaments connate beyond the point of attachment to the corolla tube. *Nutlets* broadly ovate or orbicular, brown, shining, 1–1.2 mm long.

Distr. Continental SE. Asia (India, Burma, Thailand, Indo-China, S. China), Formosa, throughout *Malesia* to Australia, Melanesia (Solomons) and Polynesia. In Malesia also frequently cultivated for ornamental purpose and here and there subspontaneous.

Ecol. On all sorts of habitats from the lowland to the mountains, in rain-forest, along shaded stream-banks and other watercourses, on rice-field dykes, in thickets, in Malaya also on limestone hills, in secondary forest, mossy forest, *etc.* up to *c.* 2900 m. *Fl.* Jan.–Dec.

Taxon. Recently LAUNERT (Mitt. Bot. München 7, 1968, 301) dropped the Linnean basionym and coined a new combination for the Malesian plant, without giving evidence in what respect *P. blumei* differs from *P. scutellarioides.*

Vern. Sumatra: *aram gara*, (*daun*) *ati ati*, *hatisolo*, *poko ati ati*, *singgelam*, *tinggĕlan*, M, *saribotong uding*, Simalur, *bangun bangun na gerger*, *b. b. na rata*, (*bunga*) *piladan(g)*, *si grĕsing*, Batak; Java: *djawĕr beureum*, *d. kotok*, *si grĕsing*, S, *daun bunga*, *d. pinang*, *d. pupur*, *d. wangi*, *dilam*, *majana*, *m. mas*, *m. mèrah*, *miara mas*, *mijana*, *nilam*, *n. bunga*, *n. pinang*, M, *iler*, *kĕntangan*, J, *arak*, *daun dhilĕm*, *d. dhilĕp*, *dhin kamadhinan*, Md; Lesser Sunda Is.: *arak*, *dĕlĕm*, *dilĕm*, *miana*, *m. irĕng*, *m. muk*, *m. nila*, *m. tjĕmĕng*, Bali, *kunu wangi*, Timor, *kunu roto*, Sawu; Borneo: *sa-mayuk*, Sg. Segaliud, Sabah, *ati ati*, Kedayan lang.; Philippines: *malamayana*, Tag., *badiara*, *maliana*, *mayana*, Tag., Bis., Pamp., *dapomaya*, *lampunaga*, *lapunaya*, *tapomaya*, Bis., *maryana*, *maryapa*, Pamp., *sahemaya*, *saymayu*, Sul., *salumaya*, Sub., *aga dinokud*, *kodalita*, If., *myana*, Cebu; Moluccas: *até até*, *a. a. mahamu*, *a. a. mopura*, *atei*, *ati ati*, *atoi mapuha*, *daun dilam*, *mayana*, *m. hitam*, *pantji-pantji*, *pupuru*, *rangon tati*, *salbu kero*, *salĕbung*, *s. kero*, *saru-saru*, *sĕrĕwung*, *s. mea*, *s. raindang*, *s. rangdang*, *s. rundang*; *ton kau*, Ceram; New Guinea: *amaneh*, Kompiai, *budimu* (*pap*), Merauke, *bungu*, Onjob lang., Cape Vogel, *edomani*, Enga lang., Wabag, *doraim*, Chimbu, Masul, *kondu*, Hagen, *ib'kombi*, *kabwe*, *karap*, *kombil*, Mendi lang., *kumberumi*, Kaugel dial., Medlpa, *maifĕrai*, Dunantina, *moipaherra*, Asaro, Kefamo, *ngondum*, Waghi, Minj, *nump*, Yoowi dial., Chimbu, Hagen lang., *nongu nongu*, Tifal lang., Telefomin, *oiabua*, Minufia lang., Kabubu, *porbagu*, Kutubu lang., Wasemi I., *ekinarò*, *kiena-èro*, *uwoije*, Kapauko lang., *waokum*, Dani lang., Baliem, *mun*, Dani lang., *nogoipa*, Kukubari, Tari Subdistr., *ljamun*, *tagau*, *kapugund*, Kepilam, Enga lang., *apiuna*, Kainantu.

Uses. Except cultivation for ornamental purpose this species is also assumed to have medicinal use. BURKILL (Dict. 1935, 635) says it is employed for dyspepsia and ophthalmia. In Java and Sumatra it is used as an abortivum and also as a repellent for intestinal worms. In the Philippines sometimes used for head-aches and bruises. In Java many minor uses, see HEYNE, Nutt. Pl. (1927) 1334.

Notes. From the complicated synonymy it is already clear that this is a common variable species. In the precursor I distinguished four varieties, mostly based on formerly described species. But as more specimens were available it became clear that they are connected by too many intermediate specimens. Leaf-colour, -size and -shape vary enormously, especially in cultivation. Thus I agree with BACKER, who also took (1965) a broad view of its delimitation. Some forms — often in cultivation — with laciniate leaves, the main characters for distinguishing *P. laciniatus* BL. = *Coleus laciniatus* (BL.) BTH., are genetically

apparently based on minor differences. KUSWATA (unpubl.) could raise from seed of a form with shallowly dentate leaf margin and regular venation another form with laciniate leaves and irregular venation. RIFE (Proc. Summerschool Bot. 1960, 334–340) has shown that the laciniate form differs in only a single gene from that with the normal leaf shape. Also the flower colour is variable.

In New Guinea this common species is very variable: BW 14029, from Anggi Gita Lake, Arfak (vern. *armessèssa*, Manikiong lang.) and LAE 54026, from Mt Suckling, have very small and narrow leaves, 10–20 by 4–7 mm; in KOSTERMANS 567 from Baliem Valley, leaves and stems are densely tomentose; in NGF 21345 from Finisterre Mts (vern. *mowdarapo*, Sewe), calyx and corolla are unusually large; in ROBBINS 1022 and ANU 5822, from Kainantu, leaves are thick and densely hairy; NGF 38843 has hairy leaves; BRASS 22157 from Milne Bay Distr., has unusually narrow, lanceolate, hairy leaves.

11. Plectranthus merrillii H. KENG, *nom. nov.* — *Coleus macranthus* MERR. Philip. J. Sc. 1 (1906) Suppl. 234; *ibid.* 5 (1910) Bot. 382; En. Philip. 3 (1923) 419; KENG, Gard. Bull. Sing. 24 (1969) 59, *non P. macranthus* HOOK. *f.* 1885.

Erect, branched herb, 1–2 m, rather fetid-aromatic. Stem and branches rusty pubescent when young. *Leaves* membranaceous, ovate, oblong-ovate or narrowly rhomboid, 4–12(–15) by 1.5–5(–7) cm, acute or broadly acute, base rounded, subtruncate or acute, always entire and decurrent; margin elsewhere serrate or remotely dentate; puberulent on both surfaces but with more punctate glands beneath; petiole 2–6(–7) cm, slender. *Flowers* 5–9 (rarely more) in stalked cymes arranged in terminal or subterminal thyrses, 15–25 cm long, 4–5 cm ∅, in fruit to 30 cm long; rachis glandular-puberulent. Bracts lanceolate, 2–3 mm, caducous. *Calyx* campanulate, glandular-puberulent without, 4–7 mm long, in fruit 8–12 mm, upper tooth broadly ovate, acute, lateral teeth short and ovate with rounded apex, the lower teeth linear-lanceolate, connate, longer than the rest. *Corolla* lavender or white, 1.5–2 cm long, slightly puberulent, the tube rather gradually widening, narrowly funnel-shaped; upper lip short and 3-lobed, lower lip concave. *Nutlets* ovoid, 1.2–1.6 mm long, glabrous.

Distr. *Malesia:* Philippines (N. Luzon, Mountain Prov.).

Ecol. Primary forest, mossy forest, 1200–2460 m. *Fl.* Febr.–April, Sept.–Oct.

Vern. *Bungbungtit*, Ig.

12. Plectranthus sparsiflorus (ELMER) H. KENG, *comb. nov.* — *Coleus sparsiflorus* ELMER, Leafl. Philip. Bot. 7 (1915) 2699; MERR. En. Philip. 3 (1923) 420; KENG, Gard. Bull. Sing. 24 (1969) 60. — *Coleus scutellarioides* ELMER, Leafl. Philip. Bot. 7 (1915) 2697, *non* (L.) BTH. 1830.

Suberect herb, 30–40 cm, often branched below. Stem and branches glabrous, rooting in the lower part. *Leaves* membranaceous, oblong-lanceolate or elliptic, 3–10 by 1.5–4 cm, acute or caudate, base cuneate, entire; margin elsewhere crenate-serrate or subentire; glabrous on both surfaces, nerves hirsute or puberulent; petiole 1–2.5 cm, slender. *Flowers* 1–3 in cymules disposed in short thyrses; thyrses terminal or in the upper leaf axils, 2–4 cm long and ∅; rachis puberulent, 3–5-branched. Bracts ovate, 8–10 mm long, acute, caducous. *Calyx* turbinate, 3.5–4 mm long, in fruit 5–6 mm, glandular and hirsute; upper tooth rounded, 5-nerved (3 main nerves and 2 additional lateral ones); lateral teeth deltoid, pointed; lower teeth lanceolate, pointed, connate below, longer than the rest. *Corolla* pale violet or violet, 10–18 mm long, tube decurved, limb 2-lipped. *Stamens* in 2 pairs. *Nutlets* (? immature, ELMER 13614) oblong-cylindric, 1.4 mm long.

Distr. *Malesia:* Philippines (Mindanao).

Ecol. In damp, mossy forest, 1000–1900 m. *Fl.* March–Sept.

Vern. *Manangid-ta-usá*, Bag., *nabioda*, Mbo., *handamy*, Cebu, *sliyav*, *sulumayas*, Sindangan dial.

13. Plectranthus galeatus VAHL, Symb. Bot. 1 (1790) 43; BL. Bijdr. (1826) 836. — *Germanea galeatus* (VAHL) POIR. in Lamk, Encycl. Suppl. 2 (1812) 763. — *P. macrophyllus* BL. Bijdr. (1826) 835. — *P. bicolor* BL. *l.c.* 837, incl. variety. — *Coleus galeatus* (VAHL) BTH. Lab. Gen. Sp. (1832) 56; HASSK. Cat. Hort. Bog. (1844) 129, *incl. var. rubrinervis* HASSK.; BTH. in DC. Prod. 12 (1848) 76; MIQ. Fl. Ind. Bat. 2 (1858) 955; KOORD. Exk. Fl. Java 3 (1912) 156; Fl. Tjibodas 3 (1918) fam. 254, p. 93; BACK. & BAKH. *f.* Fl. Java 2 (1965) 637; KENG, Gard. Bull. Sing. 24 (1969) 60, *incl. var. borneensis* KENG; STEEN. Mt. Fl. Java (1972) pl. 24–5. — *Coleus bicolor* (BL.) BTH. Lab. Gen. Sp. (1832) 55; HASSK. Cat. Hort. Bog. (1844) 129; BTH. in DC. Prod. 12 (1848) 75; MIQ. Fl. Ind. Bat. 2 (1858) 954; KOORD. Exk. Fl. Java 3 (1912) 156. — *Coleus macrophyllus* (BL.) BTH. Lab. Gen. Sp. (1832) 55; HASSK. Cat. Hort. Bog. (1844) 129, *incl. var. concolor* HASSK.; BTH. in DC. Prod. 12 (1848) 75; MIQ. Fl. Ind. Bat. 2 (1858) 951. — *Coleus spectabilis* MIQ. *l.c.* 951. — *Coleus remotiflorus* MIQ. *l.c.* 954; RENDLE, J. Bot. 63 (1925) Suppl. 82. — *Coleus puberulus* MIQ. Fl. Ind. Bat. 2 (1858) 955; BOERL. Handl. 2 (1899) 714. — *Coleus macropus* MIQ. Fl. Ind. Bat. 2 (1858) 956.

Erect or ascending, sparsely branched, slender herb, up to 1.5 m. Stem and branches rusty pubescent when young, often with purple dots. *Leaves* varying from oblong to broadly ovate, mostly ovate, 6–12(–18) by 3–8(–13) cm, acute or acuminate, base rounded or shortly cuneate, subentire, margin elsewhere irregularly crenate, glabrous above, pubescent on the nerves below; petiole 3–10 cm, very slender, puberulous. *Flowers* 5–8 (rarely up to 15) in short, stalked cymes disposed in terminal and axillary thyrses; these 5–15 by 4–5.5 cm, often branched at the base; rachis rusty-sericeous. Bracts subulate, 2–3 mm, caducous. *Calyx* subcampanulate, sericeous and gland-dotted, 3–5 mm long, in fruit 7–8 mm, unequally 5-toothed; upper tooth ovate, subacute, often strongly reflexed in fruiting stage, many-nerved, lateral teeth deltoid, acute at apex, lower teeth lanceolate-subulate, connate, longer than the rest, accrescent in fruit. *Corolla* purplish blue or white with purple lower lip, 1.5–2 cm long, puberulous, tube very slender below, slightly gibbous at the base, abruptly decurved above; limb 2-lipped; upper lip short and erect, lower lip concave; filaments partly exserted. *Nutlets* broadly ovoid, 1 mm long.

Distr. *Malesia:* Sumatra (rare), Java (becoming rare in East Java), Lesser Sunda Is. (Bali), Borneo (Kinabalu area and E. Kutei).

Ecol. Fago-Lauraceous rain-forests, in Borneo also in Dipterocarp forest; also in mossy elfin forest, (450–)1000–2400 m. *Fl.* Jan.–Dec. Leaf-galls caused by mites. In E. Java sometimes found at 600 and 800 m, and in E. Kutei (Borneo) found along streamsides at 450–700 m; also in Bali at 450 m, but these low localities are exceptional. The species prefers wet forest and damp soils; it does not occur in *Casuarina* forest and in E. Java only in the ever-wet enclaves.

Vern. Java: *miara, sělasih hutan,* M, *djawěr gědéh, d. gunung, d. konèng, d. kotok,* S, *dhin-kamandhinan,* Md.

14. Plectranthus kunstleri PRAIN, J. As. Soc. Beng. 66, ii (1897) 521; *ibid.* 74, ii (1907) 706; Ann. R. Bot. Gard. Calc. 9 (1906) 55, pl. 70; RIDL. Fl. Mal. Pen. 2 (1923) 646; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 222; KENG, Gard. Bull. Sing. 24 (1969) 151.

Erect herb, 0.5–1 m high. Stem and branches finely puberulous. *Leaves* thin-membranaceous, ovate to broadly ovate, 6–12 by 4–6 cm, acute, base truncate or cuneate, entire, margin elsewhere remotely crenate, very sparsely pubescent on the main and secondary veins on both surfaces; petiole 1–4.5 cm. *Flowers* in terminal panicles, 10–15 cm long, the lower branches 5–6 cm. Bracts ovate, acute, 2–3 mm long, caducous. *Calyx* obliquely campanulate, 2–2.5 mm long, in fruit 6–7 mm, shortly hirsute and sparingly gland-dotted, unequally 5-toothed; upper tooth broadly ovate, subrounded; two lateral teeth shorter (about $^3/_4$) than the lower teeth (later almost equal in fruit); two lower teeth subulate, connate beneath. Pedicels 3–4 mm long, glandular-puberulent. *Corolla* boat-shaped, pinkish purple, 7–8(–10) mm long, puberulent, tube decurved, only slightly gibbous near the base, upper lip short, erect, lower lip concave, enclosing the stamens and style. *Stamens* in 2 pairs; filaments free from each other from the point of attachment to the corolla tube. *Nutlets* oblong ovoid, black, 1 mm long.

Distr. *Malesia:* Malay Peninsula (Perak: Kula Dipang, 2 coll.) and recently Pulau Langkawi (Kedah).

Ecol. On limestone rocks, in shade, at 50–200 m.

Cultivated

Plectranthus caninus ROTH, Nov. Pl. Sp. (1821) 279. — *Ocimum monadelphum* ROTH, *l.c.* 267. — *Coleus spicatus* BTH. in Wall. Pl. As. Rar. 2 (1830–31) 15; HOOK. *f.* Fl. Br. Ind. 4 (1885) 624; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 52, *non Plectranthus spicatus auct. al.* — *Coleus heynii* BTH. Lab. Gen. Sp. (1832) 50. — *P. monadelphus* ROXB. Fl. Ind. ed. Carey 3 (1832) 22.

Procumbent herb. Leaves thick, fleshy, obovate-spathulate, 3–5 by 2–4 cm, crenate or remotely dentate, apex rounded, base narrowly attenuate. Thyrse terminal cylindric, to 12 cm long, peduncled. Corolla bright blue-mauve, 2.5 cm long, gibbose. Filaments high-fused.

Native of India, cultivated and probably run wild in the highlands of New Guinea (Toromambuna Mission Station, BORGMANN 342; Kainantu Subdistr., Aiyura H.A.E.S., in nursery plots, NGF 42901).

If the synonymy provided by Hooker *f.* is correct this name must be accepted as the valid name for what was currently called *Coleus spicatus* in India, of which I have not seen material. If the species would also occur in E. Africa, as HOOKER *f.* suggested with a question mark and with reference to *Ocimum zatarhendii* FORSSK., the name *Plectranthus zatarhendii* (FORSSK.) BRUCE, Kew Bull. (1935) 590, should be accepted.

Doubtful & Excluded

Coleus ? blancoi BTH. in DC. Prod. 12 (1848) 79; MIQ. Fl. Ind. Bat. 2 (1858) 957.

This was re-named for *Coleus grandifolius* BLANCO, Fl. Filip. (1837) 482, a later homonym of *C. grandifolius* BTH. 1832. BLANCO stated that it is common in the Philippines. According to MERRILL (1923) and QUISUMBING (1951), it is a synonym of *Coleus blumei* or *Plectranthus scutellarioides* (L.) R. BR.

Coleus grandifolius (*non* BTH. 1832) KOORD. Minahassa (1898) 561.

Recorded as wild and cultivated at Manado, Celebes. Probably refers to either *Plectranthus scutellarioides* (L.) R. BR. or its form, earlier recognized as *Coleus scutellarioides var. grandifolius* (BTH.) H. KENG.

Coleus macrostachys BTH. Lab. Gen. Sp. (1832) 57; in DC. Prod. 12 (1848) 76; MIQ. Fl. Ind. Bat. 2 (1858) 952; KOORD. Exk. Fl. Java 3 (1912) 156.

Based on COMMERSON's collection, also listed two Zollinger numbers (928 and 1970), all from Java. '*Verticillastri* 10–15-*flori* . . . *calyx* . . . *dentes laterales acuti et infimi* . . .'. Exact identity unknown.

Coleus persoonii BTH. 1832; G. DON, Gen. Hist. 4 (1838) 683.

A native of Madagascar. Erroneously recorded as occurring also in Luzon, the Philippines.

Coleus savannicola K.SCH. in K.Sch. & Laut. Fl. Schutzgeb. (1900) 529; MANSFELD, Bot. Jahrb. 62 (1929) 380.

Type specimen was from New Guinea (Kaiser Wilhelms Land, Bismarck Mts, 500–1000 m, LAUTERBACH 2777). According to MANSFELD probably merely a form of *Coleus scutellarioides* = *Plectranthus scutellarioides* (L.) R. BR.

Coleus verschaffeltii LEM. Illustr. Hort. 8 (1861) t. 293.

Originally described as '*Plectranthus blumei var.*' by J. VERSCHAFFELT in Bull. Compte-rendu expos. de la Soc. royale d'Agric. et de Bot. de Gand, 23–24 juin 1861. It is most likely a synonym of *Plectranthus scutellarioides* (L.) R. BR.

Plectranthus australis (*non* R. BR. 1810) DECNE, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 397; Herb. Timor. Descr. (1835) 69.

Based on GAUDICHAUD's collection from Timor. Probably refers to *P. parviflorus* WILLD.

Plectranthus coetsa BUCH.-HAM. *ex* D. DON 1825; G. DON, Gen. Hist. 4 (1838) 680.

Mentioned the occurrence of this species in Java. As it resembles *P. teysmannii* MIQ. in inflorescence and flower, it is possibly due to an erroneous identification of the latter species.

Plectranthus crassifolius HASSK. Flora 40 (1857) 652, *non* BTH. 1832.

HASSKARL received this plant labelled as '*P. patchouli*'. Exact identity unknown, possibly refers to either *Pogostemon cablin* (BLANCO) BTH. or, more likely, to *Plectranthus amboinicus* (LOUR.) SPRENG.

Plectranthus leschenaultii BTH. Lab. Gen. Sp. (1832) 34; in DC. Prod. 12 (1848) 64; MIQ. Fl. Ind. Bat. 2 (1858) 947; KOORD. Exk. Fl. Java 3 (1912) 155.

Based on LESCHENAULT's collection from Java. Exact identity unknown.

Cultivated

Cedronella canariensis (L.) WEBB & BERTH.: BACK. & BAKH. *f.* Fl. Java 2 (1965) 621.

Native of the Canaries; locally cultivated in Java as a garden ornamental. Flowers white, the upper lip tinged with red.

Lavandula officinalis CHAIX: BACK. & BAKH. *f.* Fl. Java 2 (1965) 621.

Native of the Mediterranean region; cultivated in the mountains of Java as an ornamental. Flowers blue or violet.

Majorana hortensis MOENCH: BACK. & BAKH. *f.* Fl. Java 2 (1965) 630. — *Origanum majorana* L.: CHEV. Rev. Bot. App. & Agr. Col. 18 (1938) 485.

Native of SW. Asia and N. Africa; cultivated in the mountains of Java. Flowers white or pale pink.

Marsypianthes chamaedrys (L.) O. K.: BACK. & BAKH. *f.* Fl. Java 2 (1965) 635; *ibid.* 3 (1968) 658. — *M. hyptoides* MART. *ex* BTH.: BUYSMAN, Flora 107 (1914) 218.

Native of Brazil; cultivated in E. Java, locally run wild there (Mt Tengger; Tretes).

Nepeta cataria L.: BACK. & BAKH. *f.* Fl. Java 2 (1965) 621.

Native of Europe; cultivated in Java as an ornamental. Corolla white, red-dotted.

Perilla frutescens (L.) BRITT. Mem. Torr. Bot. Cl. 5 (1894) 277; HAND.-MAZZ. Act. Hort. Gothob. 13 (1939) 350; MURATA in Hara, Fl. E. Himal. (1966) 280. — *Ocimum frutescens* LINNÉ, Sp. Pl. (1753) 597. — *P. ocimoides* LINNÉ, Gen. Pl. ed. 6 (1764) 578; HOOK. *f.* Fl. Br. Ind. 4 (1885) 646; BURK. Dict. (1935) 1694; DOAN, Fl. Gén. I.-C. 4 (1936) 983; MUKERJEE, Rec. Bot. Surv. India 14 (1940) 85. — *?Perilla sp.* CHEVALIER, Rev. Bot. Appl. & Agr. Col. 18 (1938) 481.

Native of SE. Asia; stated to occur in Java (DOAN) and in the Philippines (CHEVALIER). Tallish plant with violet flowers. The leaves serve as a flavouring for food and the oil extracted from the seeds is used for cooking, for burning, and a little in the arts (BURKILL, *l.c.*).

It was not cultivated in the Bogor Botanic Gardens and is to our knowledge not found elsewhere, unless a sterile specimen collected in a clearing in Enggano I. (SW. Sumatra: LÜTJEHARMS 4919) would belong to it. *Perilla* is not taken up in the Key to the Genera.

Perilla sp. is mentioned from W. Java by MORITZI, Syst. Verz. (1846) 55; the identity of this collection (ZOLLINGER 822) is uncertain. Also the provenance is uncertain as ZOLLINGER included plants received from Japan in his collection.

Pycnostachys speciosa GÜRKE: BACK. & BAKH. *f.* Fl. Java 2 (1965) 635.

Native of tropical Africa; cultivated in Java as a garden ornamental. Flowers blue.

I have not seen material from Java to which BACKER refers. In his description he said that the leaves are linear-lanceolate, tapering towards the ends, 5–15 by 0.5–2.8 cm, the petiole being 0–5 mm. This does not agree with BAKER's description in Fl. Trop. Afr. in which he defines the leaves as large, lanceolate and amplexicaul. So the identity of BACKER's record remains uncertain; his description seems to fit in more with that of *P. aff. stuhlmannii* (see below).

Pycnostachys *aff.* stuhlmannii GÜRKE in Engl. Pfl. Ost-Afr. C (1895) 349; BAKER, Fl. Trop. Afr. 5 (1900) 380.

Leaves linear-lanceolate, subsessile, *c.* 7–8 by 1 cm, puberulous. Flowers pale blue.

A native of tropical Africa, introduced in Malaya and obviously locally run wild, collected 2 miles E of Brinchang village, forming a dispersed patch on a roadside waste (H. M. BURKILL 2889, Oct. 1961, at 1500 m).

Pycnostachys urticifolia HOOK. Bot. Mag. 89 (1863) t. 5365; BAKER, Fl. Trop. Afr. 5 (1900) 386.

Leaves ovate, broad at base, long-petioled, 5–7 by 3–4 cm. Flowers bright blue.

A native of East and South Africa, cultivated and run wild in Malaya in the Cameron Highlands, first collected in 1951, now well established (H. M. BURKILL 761); also cultivated in the Botanic Gardens at Lae (NGF 10541) and those at Tjibodas (VAN OOSTSTROOM 14178).

Rosmarinus officinalis LINNÉ: THUNB. Fl. Jav. (1825) 15; BLANCO, Fl. Filip. (1837) 20; ed. 2 (1845) 15; ed. 3, 1 (1877) 28, t. 94; F.-VILL. Nov. App. (1880) 165; MERR. Fl. Manila (1912) 407; Int. Rumph. (1917) 456; Sp. Blanc. (1918) 336; En. Philip. 3 (1923) 409; Trans. Am. Phil. Soc. 24, 2 (1935) 339; QUIS. Medic. Pl. Philip. (1951) 831; BACK. & BAKH. *f.* Fl. Java 2 (1965) 618.

Native of the Mediterranean region; in Java in the mountain districts locally cultivated as an ornamental. Aromatic shrubby herb with bluish flowers.

Also cultivated in gardens for medicinal purposes and commonly sold in the markets in the Philippines, where it is used to bathe women in the puerperal state and against rheumatism and catarrhs; macerated in alcohol it is in use as a hair lotion, said to prevent baldness.

Vern. Philippines: *roméro*, Span., Tag., *duméro*, Tag., *rosmiro*, Bontoc; *rosemary*, E.

Thymus vulgaris LINNÉ: F.-VILL. Nov. App. (1880) 165; BACK. & BAKH. *f.* Fl. Java 2 (1965) 631.
Native of S. Europe; stated to be cultivated in the Philippines and in Java. Corolla small, pale red or lilac.
Recently collected by J. M. B. SMITH (ANU 15359) at Keglsugl (Mt Wilhelm), New Guinea, at 2600 m on disturbed ground next to burnt remains of old shelter. Identified by J. MENNEMA, Leiden.

Doubtful & Excluded

Several of the names mentioned below were included in a list of *nomina nuda* of NORONHA, which were published under his name in the Verh. Bat. Genootschap 5 (1790) ed. 1, art. IV, a volume later reprinted with a different pagination. Unfortunately the names were all taken up in Index Kewensis and have thus come into 'circulation', the reason we account for them. HASSKARL has endeavoured by means of the vernacular names, added to the Latin plant names in NORONHA's list, to evaluate the latter. This interpretation was used by Index Kewensis. This is especially in *Labiatae* a hazardous proceeding. It could be possible, in studying NORONHA's mss in Paris, to come to a more definite conclusion, but this is, it seems, a waste of time as the names have no botanical value.
The same can be said of names listed by THUNBERG in his Florula Javanica (1825). Also these names could be evaluated in studying his collections at Uppsala.

Anisochilus siamensis RIDL. Erroneously mentioned from the Malay Peninsula in Index Kewensis; it was described from Lower Thailand.

Ballota verticillata NORONHA, *l.c.* 8, repr. 69, *nomen.*

Craniotome versicolor RCHB.: STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 221; *cf.* KENG, Gard. Bull. Sing. 24 (1969) 150.
The record of this SE. Asian species is based in 2 collections (BÜNNEMEIJER 8459 & 8720) made on Mt Kerintji. I have these tentatively reduced to *Plectranthus parviflorus* in my precursor, but cannot fully endorse this now. Unfortunately the specimens at L are too young and do not carry flowers for re-examination.

Galeopsis magnifolia NORONHA, *l.c.* 16, repr. 76, *nomen.*

Lavandula bipinnata (*non* ROTH) O. K.: KOORD. Exk. Fl. Java 3 (1912) 145.
Erroneously recorded from Java.

Lavandula burmanni (*non* BTH.) BOERL. Handl. 2, 2 (1899) 714. Erroneously recorded for Malesia.

Molucella spinosa (*non* L.) BURM. *f.* Fl. Ind. (1768) 128; O. K. Rev. Gen. Pl. 2 (1891) 527.
Erroneously recorded for the Moluccas.

Phlomis zeylanica (*non* L.) THUNB. Fl. Jav. (1825) 15, *nomen* ('*ceylanica*').
Probably referring to *Leucas zeylanica* (L.) R. BR.

Prunella bicolor NORONHA, *P. violacea* NORONHA, *l.c.* 8, repr. 70, *nomina* ('*Brunella*').

Rosmarinus communis NORONHA, *l.c.* 25, repr. 83. An culta?

Sideritis rigida NORONHA, *l.c.* 27, repr. 85, *nomen.*