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- Volume VII** Flowering Plants. Dicotyledons: Lamiales (except Acanthaceae including Avicenniaceae)
Edited by J.W. Kadereit (2004)

Slide

The Families and Genera of Vascular Plants

Edited by K. Kubitzki

VII *Flowering Plants · Dicotyledons* *Lamiales (except Acanthaceae including Avicenniaceae)*

Volume Editor:
J.W. Kadereit

With 60 Figures, 8 in Color



Springer

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Preface

This volume, the seventh in this series, deals with the families of the Lamiales, a group of the asterids or Sympetales, which was recognised by early workers such as Bartling and Lindley under the name Labiatiflorae or Personatae, and which has only moderately been modified in circumscription over time. Nevertheless, our considerably increased knowledge of the group and the results of molecular studies provide a more detailed basis for understanding relationships among and evolution within the families of the Lamiales, although, as J.W. Kadereit emphasises in his introduction, in this connection and also in relation to family delimitation, many questions remain currently unanswered.

My sincere thanks go to all authors for their scholarly treatment of families in this volume. In particular, the authors/organisers who handled the four large families with more than 100 genera, Bignoniaceae, Gesneriaceae, Labiatae and Scrophulariaceae, deserve special mention for their herculean work. The authors also emphasised the various themes of diversification, differing from group to group, that are so important for the understanding and interpretation of taxonomic diversity, such as phytochemical diversification in Labiatae and pollinator interactions in Gesneriaceae, to cite only two salient examples. In the circumscription of Scrophulariaceae, a pragmatic position has been taken; since this series aims primarily at providing baseline information for families and genera, the problem of a phylogenetically satisfactory classification of the Scrophulariaceae complex that avoids paraphyly at our present state of knowledge must be left undecided, and indeed is not the primary focus of this volume. Sincere thanks are also extended to Professor J.W. Kadereit for patiently bringing his work on the present volume to an end, in spite of all discouraging vicissitudes.

I am most grateful to all copyright holders for so generously authorising the use of their precious illustrative material. Finally, it is a pleasure to thank, also in the name of Professor Kadereit, the staff of Springer-Verlag and ProEdit, Heidelberg, for their dedicated work on the present volume. I would like to express special thanks to the copy editor, Monique Delafontaine, for the many improvements she made to the manuscript.

Hamburg, December 2003

K. KUBITZKI

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Labiatae

R.M. HARLEY,¹ S. ATKINS, A.L. BUDANTSEV, P.D. CANTINO, B.J. CONN, R. GRAYER, M.M. HARLEY, R. DE KOK, T. KRESTOVSKAJA, R. MORALES, A.J. PATON, O. RYDING and T. UPSON

Labiatae Adans., *Fam. Pl.* 2: 180 (1763).
Lamiaceae Martynov (1820), nom. alt.

Trees, shrubs, subshrubs or perennial or annual herbs, rarely climbers, aromatic or not. Roots rarely tuberous. Stems often quadrangular, erect to prostrate, sometimes forming stolons or large or slender rhizomes. Indumentum usually present, of glandular and non-glandular trichomes, often hair-like, rarely scale-like, usually multicellular-uniseriate, simple, branched, dendroid or stellate, sometimes gland-tipped, large-headed subsessile glands rarely absent.

Leaves opposite, often decussate, sometimes whorled, very rarely alternate, simple, entire, toothed or lobed, sometimes compound and then digitate or pinnate, petiolate or sessile, rarely forming a basal rosette, stipulate. Inflorescence often bracteate, bracts sometimes conspicuous, persistent or deciduous, rarely (*Lavandula* and *Scutellaria*) spirally arranged, composed of cymes, bracteolate or not, and often arranged in a terminal, lax or congested, indeterminate thyrse which may be paniculate, raceme-like with cymes often 1-flowered, or spike-like, or rarely congested into a capitulum, with or without a distinct involucre of bracteoles. Flowers hypogynous, usually bisexual, or less often unisexual due to gynodioecy or gynomonoecy, very rarely due to dioecy. Perianth biseriata, sepals 4–5(–9), connate, actinomorphic to zygomorphic, sometimes 2-lipped, lobes 2–many, often 5, equal or unequal, rarely obsolete, some lobes often fused, or lips entire, calyx-tube (5–)10–15-nerved, straight or curved, throat hairy or glabrous, calyx often accrescent, rarely inflated or fleshy in fruit. Petals (4–)5(–16) connate, actinomorphic to more often slightly to strongly zygomorphic, often 2-lipped, rarely 1-lipped, lobes (2–)4–5(–16), equal or unequal, porrect to patent, one or other lip often concave to galeate, corolla-tube short to elongate, rarely spurred, often with

annulus of hairs or appendaged within, rarely corolla resupinate. Stamens attached within corolla-tube, usually 4 or 2 by abortion and then staminodes often present, or stamens 5–8(–16), when 4 often didynamous (rarely a fifth, posterior vestigial staminode present), free or rarely monodelphic, filaments short or often elongate, usually exerted from corolla-tube and sometimes long-exserted from corolla; parallel, divergent or ascending and sometimes included within or lying under the posterior corolla-lip, or declinate and then sometimes included within the anterior corolla-lip, anthers usually dithecal, tetrasporangiate or monothealous by abortion, thecae parallel or divergent, occasionally widely separated by an elongate connective, or apically confluent or synthealous, opening by longitudinal slits or rarely by pores. Disc at base of ovary often present, usually fleshy, entire or irregularly or often 4-lobed, anterior lobe sometimes longer than others, nectariferous. Gynoecium 2-carpellate, often 4-locular by intrusion of carpel wall forming "false septum", or rarely imperfectly 2-locular and free towards apex, ovary usually 4-ovuled, 2-locular ovaries generally with loculi 2-ovuled, and 4-locular ovaries with 1 ovule per loculus, ovary entire or lobed, with terminal style, or more often deeply 4-lobed, the loculi often separated and with style gynobasic, style usually with 2 equal or unequal stigma-lobes, rarely entire with 1 stigma-lobe vestigial, or stigma capitate or very rarely 4-lobed. Ovules anatropous to hemianatropous, usually basal or sub-basal, erect, rarely orthotropous, apical, pendulous, borne laterally or submarginally on the placenta, unitegmic, tenuinucellate. Fruit drupaceous, often with pyrenes, or dry, indehiscent, or separating into two 2-seeded or frequently, four 1-seeded mericarps, sometimes fewer by abortion. Mericarps (nutlets) often with sculptured, tuberculate, hairy or rarely winged pericarp, mucilage cells often present. Seeds albuminous or exalbuminous, epigeal. Embryo straight or bent, investing or spatulate.

The family contains 236 genera and about 7173 species, almost cosmopolitan, but absent from the coldest regions of high latitude or altitude.

¹ For details of authorship see p. 275.

² In the generic descriptions, calyx and corolla-lobe numbers of zygomorphic flowers are often represented by a formula, with the number of lobes in the posterior lip followed by that of the anterior lip, e.g. 3/2.

cymes; calyx actinomorphic, campanulate, 5-lobed, lobes equal, subtriangular, not spinescent, strongly accrescent in fruit; corolla weakly 2-lipped, 5-lobed (2/3), rose or white, lobes scarcely differentiated, rather short; stamens included in corolla-tube; filaments short, thecae distinct; stigma-lobes equal; nutlet usually only one per fruit, broadly obovoid, rounded at apex. One species, *P. parviflora* (Benth.) Vved. Rocky mountain slopes, NE Iran, Afghanistan, Uzbekistan, Pakistan, NW India (W Himalayas). Some authors include *Phlomidioschema* in *Stachys*.

102. *Prasium* L.

Prasium L., Sp. Pl. 2: 601 (1753).

Small shrub, usually glabrous or very sparsely pubescent with simple hairs; leaves toothed, petiolate; inflorescence lax, racemoid or rarely thyrsoïd, cymes up to 2-flowered; bracteoles at base of pedicels; calyx broadly campanulate in fruit, slightly 2-lipped, 5-lobed (3/2), lobes equal or subequal, shortly spinose; corolla strongly 2-lipped, 4-lobed (1/3), white to pale cream, posterior lip long, hooded; stamens not exerted from corolla, thecae weakly distinct, divergent; stigma-lobes equal or subequal; nutlets drupaceous, rounded at apex, black, glabrous. $2n = 34, 36$. One sp., *P. majus* L., dry places, mainly coastal, Canary Islands, Iberian Peninsula, Morocco and Mediterranean area.

103. *Sideritis* L. *R. Noxates*

Fig. 21G

Sideritis L., Sp. Pl. 2: 574 (1753); Pérez de Paz & Negrin, Phanerog. Monogr. 20: 1-327, plates 1-22 + 48 figs. (1992), rev. of subg.; Obón de Castro & Rivera, Phanerog. Monogr. 21: 1-640 (1994), rev. of section.
Leucophaea Webb & Berthel. (1845).

Annual or perennial, sometimes rhizomatous herbs or shrubs, with simple and sometimes branched hairs, usually aromatic; leaves often narrow, usually toothed, sessile to petiolate; inflorescence thyrsoïd or sometimes racemoid, often dense; bracteoles present or absent; calyx zygomorphic or almost regular, 5-lobed, lobes subequal or unequal (1/4), mostly triangular, often spinose, tube often barbate in throat; corolla 2-lipped, 4-5-lobed (1-2/3), usually yellow or white, sometimes purple, posterior lip flat or almost so, deeply emarginate to entire, tube shorter than calyx; stamens included in corolla-tube, thecae confluent; stigma-lobes unequal; nutlets rounded at apex. $2n = 20, 22, 24, 26, 28, 30,$

32, 34, 36, 38, 40, 42, 44, 46, 50, 56. About 140 spp., various habitats, Macaronesia, Mediterranean region to Russia, Tibet and W China. Mendoza-Heuer (1977) recognises two subgenera: subg. *Sideritis* and subg. *Marrubiastrum*, the latter endemic to Macaronesia.

104. *Haplostachys* (A. Gray.) W.F. Hillebr.

Haplostachys (A. Gray.) W.F. Hillebr., Fl. Hawaii Isl.: 346 (1888); Wagner et al., Manual of the Flowering Plants of Hawaii 1: 798-801 (1990), rev.
Phyllostegia Benth. sect. *Haplostachys* A. Gray

Perennial woody herbs, with simple hairs; leaves coriaceous; inflorescence racemoid; bracts mostly distinctly smaller than the leaves; bracteoles present at base of pedicels; calyx 5-lobed, lobes equal, short, throat \pm closed in fruit; corolla 2-lipped, 4-lobed (1/3), white to sometimes purple, posterior lip moderately long, undulate, crisped, entire; stamens equal or posterior pair slightly longer, not exerted from corolla, thecae weakly distinct; style included in corolla-tube, with stigma-lobes shortly clavate; nutlets dry, hairy at apex. Five spp. (four of these probably extinct), in dry forests and shrubland at low elevations, Hawaii.

105. *Phyllostegia* Benth.

Phyllostegia Benth., Edward's Bot. Reg. 15: t. 1292 (1830); Wagner et al., Manual of the Flowering Plants of Hawaii 1: 810-826 (1990), reg. rev.; Wagner, Novon 9: 265-297 (1999), nomencl.

Perennial herbs, lianas or subshrubs, with simple hairs; leaves simple or sometimes irregularly pinnatisect; inflorescence thyrsoïd or racemoid; calyx 5-lobed, becoming broader, often broadly campanulate in fruit, lobes equal or subequal (3/2) sometimes irregularly so, occasionally dentate-serrate; corolla 2-lipped, 4-lobed (1/3), white to purple, posterior lip moderately long, shorter than lower lip, shallowly hooded or almost flat, entire or emarginate, corolla-tube usually curved; stamens equal or posterior pair slightly longer, not or only shortly exerted, thecae weakly distinct; stigma-lobes short, \pm clavate, subequal or anterior broader; nutlets spreading and exerted from calyx at maturity, obliquely attached at base, fleshy, with slightly winged margins, rounded at apex, glabrous. $2n = 64, 66$. About 34 spp., in mesic to moist forest, Hawaii, with one species (*P. tahitensis* Nadeaud) in Tahiti and one (*P. tongaensis* H. St. John) in Tonga Is.

106. *Stenogyne* Benth., nom. cons., non Cass.

Stenogyne Benth., Edward's Bot. Reg. ad. t. 1292 (1830); Weller and Sakai in Wagner et al. (eds.) Manual of the Flowering Plants of Hawaii 1: 831-843 (1990), rev.

Vines or rarely erect, perennial herbs, with simple hairs; leaves sometimes palmately lobed in young plants; inflorescence thyrsoïd or racemoid, not terminal; calyx 5-lobed, becoming wider, often broadly campanulate in fruit, lobes equal or unequal (3/2), sometimes irregularly so; corolla 2-lipped, 4-lobed (1/3), red to pink, purple, white or green, posterior lip moderately long, usually longer than lower lip, shallowly hooded or almost flat, entire to 2-lobed, corolla-tube often long and falcate, often strongly dilated distally; stamens equal or posterior pair slightly longer, exerted or not, thecae weakly distinct; stigma-lobes subequal or slightly unequal; nutlets obovoid, often very large, fleshy, margins slightly winged, obliquely attached at base, rounded at apex, glabrous. $2n = 32, (34), 64$. About 20 spp., in forests and subalpine shrubland, Hawaii. Some species apparently pollinated by honeycreepers.

107. *Chamaesphacos* Schrenk ex Fisch. & C.A. Mey.

Chamaesphacos Schrenk ex Fisch. & C.A. Mey., Enum. Pl. Schrenk. 1: 27 (1841).

Annual herb, subglabrous or very sparsely pubescent with simple hairs; leaves petiolate, spinose-aristate; inflorescence thyrsoïd, with up to 3-flowered cymes; calyx weakly 2-lipped, 5-lobed (3/2), lobes spinose; corolla 2-lipped, 5-lobed (1-2/3), purple, posterior lip long, flat or shallowly hooded, anterior lip deflexed, tube very long, straight, floccose-villous within at throat; stamens not exerted, filaments pubescent, thecae weakly distinct; stigma-lobes subequal; nutlets oblong, rounded at apex, smooth, narrowly membranous-winged. One sp., *C. ilicifolius* Schrenk. Sandy areas, Iran to Kazakhstan and W China (Xinjiang).

108. *Lagochilus* Bunge ex Benth.

Lagochilus Bunge ex Benth., Lab. Gen. et Sp. 640 (1834).
Chlainanthus Briq. in Engler & Prantl (1896).
Lagochilopsis Knorring (1966).

Shrubs, subshrubs or perennial herbs with woody rootstocks, with or without spines in leaf-axils, glabrous or sparsely hirsute with simple hairs; leaves entire or mostly palmatifid with spinose-

mucronate or rounded lobes; inflorescence thyrsoïd or racemoid, with up to 5-flowered cymes, bracteoles spinescent; calyx slightly zygomorphic, (4-5)-lobed, lobes subequal or unequal (3/2), posterior often longer, lobes spreading or erect, oblong to broadly ovate, often spinose-mucronate, equalling or longer than tube; corolla strongly 2-lipped, 5-lobed (2/3), white, yellowish-white, rarely pink, posterior lip long, straight, shallowly hooded, densely villous outside, 2-lobed, lobes sometimes 2-toothed, anterior lip with lateral lobes acute or emarginate, median lobe obcordate, tube densely pilose-annulate inside; stamens not or shortly exerted from corolla-tube, filaments complanate, anthers glabrous or hairy, thecae distinct; stigma-lobes equal; nutlets trigonous, obovoid, apex truncate or rounded, glabrous, pilose or glandular. $2n = 22, 34$. About 40 species. Dry slopes, valleys, deserts of Iran to Mongolia, Russia (S. Siberia), NW China and N. Pakistan. Some medicinal, ornamental.

109. *Roylea* Wall. ex Benth.

Roylea Wall. ex Benth. in Edward's Bot. Reg. 15: t. 1289 (1829).

Shrub with simple hairs; leaves petiolate, blade ovate, deeply crenate; inflorescence lax, thyrsoïd, cymes up to 6-flowered; calyx tubular, 5-lobed, lobes equal or subequal, oblong-elliptic, narrowed at base; corolla strongly 2-lipped, 4-lobed (1/3), pink to white, posterior lip long, hooded, densely pubescent outside; stamens not exerted from corolla, thecae weakly distinct; stigma-lobes shortly subequal; nutlets rounded at apex, smooth. $2n = 34$. One sp., *R. cinerea* (D. Don) Baill., NW India, Nepal.

110. *Stachyopsis* Popov & Vved.

Stachyopsis Popov & Vved., Trudy Turkest. Nauch. Obsch. 1: 120 (1923).

Perennial herbs with short simple hairs; leaves toothed; inflorescence thyrsoïd with many-flowered cymes; calyx actinomorphic, obconical-campanulate, 5-lobed, lobes equal, triangular, spinose; corolla strongly 2-lipped, 5-lobed (2/3), purplish to lilac-pink, posterior lip deeply hooded, erect, entire, densely villous, anterior lip with median lobe orbicular to obovate, reflexed, emarginate, much larger than lateral lobes, tube rather broad, slightly curved, annulate; thecae distinct; stigma-lobes subequal; nutlets oblong, triquetrous, apex obliquely truncate, glabrous.

24, 26, 28, 30, 32, 34, 36, 38, 42, 44, 46, 48, 60, 66, 84, 86, 240. At least 900 species, open to forest and montane habitats, almost cosmopolitan with main centres of diversity in SW Asia and Central and South America. Especially the Mediterranean *S. officinalis* L. widely used as potherb, also many ornamentals, such as *S. microphylla* Kunth and *S. splendens* Sellow & Nees from the New World.

The infrageneric classification proposed, especially by Briquet (1897), largely based on staminal structure, is outdated, although the neotropical subgenera *Calosphace* Benth. and *Audibertia* (Benth.) Epling appear to be monophyletic. Pobedimova (1972) recognised the segregate genus *Arischrada* Pobed. for species with two fertile anther-thecae, but the separation seems unjustified. Hedge (1974, 1982) has informally recognised various smaller groups of closely related species.

132. *Rosmarinus* L. *R. herales*

Rosmarinus L., Sp. Pl. 1: 23 (1753).

Shrubs, sometimes gynodioecious, strongly aromatic, with simple and dendroid hairs; leaves linear to lanceolate, revolute, entire, sessile; inflorescences as short, 5–15-flowered racemes in axils of upper leaves; bracts inconspicuous, bracteoles absent; flowers pedicellate; calyx 2-lipped, 3 or 5-lobed (1–3/2), campanulate to infundibuliform, widening above, posterior lip curved upwards, triangular, tube 11–12-nerved, accrescent; corolla strongly 2-lipped, 5-lobed (2/3), violet to white, posterior lip with lobes spreading, anterior lip with lateral lobes, shorter, median lobe rounded, concave, toothed, tube short, exannulate; stamens 2, posterior pair absent or rudimentary, anterior pair long-exserted, ascending, much shorter in male-sterile flowers, anthers elongate, with single fertile theca separated by an elongate, downward-curving connective from the sterile theca represented by small, tooth-like appendage, connective not articulating with filament and appearing continuous; style curved, exserted, stigma-lobes short, unequal; disc 4-lobed, anterior lobe largest; nutlets ovoid, smooth, abscission-scar large with central pore, not mucilaginous, pseudostrophio-late. $2n = 24$. Three species, with natural hybrids, in the Mediterranean region and Caucasus. *Rosmarinus officinalis* L. has been widely cultivated since antiquity as an ornamental. The genus is scarcely separable from *Salvia*.

133. *Lepechinia* Willd.

Lepechinia Willd., Hort. Berol. 1: 21, t. 21 (1803); Epling, Brittonia 6: 352–364 (1948); Hart, Ph.D. Diss., Harvard, Cambridge, Mass., U.S.A. (1983), rev. *Sphacele* Benth. (1829).

Perennial herbs to shrubs, rarely gynodioecious, or dioecious (sect. *Parviflorae* Epling; see Hart 1985); often aromatic; leaves entire to toothed, often rugose; inflorescence terminal and often axillary, a panicle thyrs of lax, (1–)3- to many-flowered cymes, or spiciform of \pm congested, usually sessile, 6- to many-flowered verticillasters; bracts usually small, bracteoles inconspicuous; flowers large to very small; calyx \pm actinomorphic to weakly 2-lipped, 5-lobed (3/2), lobes deltoid to subulate or aristate, tube campanulate, 10–15-nerved, often accrescent and inflated, lobes spreading to connivent, throat exannulate; corolla weakly 2-lipped, 5-lobed (2/3), white, yellowish, purplish to red or blue, lobes often subequal, or anterior lobe larger, tube cylindrical to campanulate, sometimes shorter than calyx, usually annulate within; stamens 4, didynamous, included to long-exserted, anterior pair usually longer, ascending, thecae 2, divergent to divaricate, elongate to oblong, sometimes confluent; stigma-lobes short, subequal; disc 4-lobed, nutlets ovoid, smooth, brown or black, abscission-scar minute, not mucilaginous. $2n = 32, 66$. About 40 species, often montane, Andes from Argentina and Chile northwards to Mexico and U.S.A. (California), with outlying species in Brazil and Hawaii, the Chilean *L. chamaedryoides* (Balbis) Epling naturalized in Réunion Is. Some species used medicinally or as ornamentals. Epling (1948) recognised eight sections, based mainly on inflorescence structure and floral morphology. Hart (1983) recognised two: sect. *Lepechinia* and sect. *Parviflorae*, considering the former to be polyphyletic.

134. *Chaenostoma* Donn. Sm.

Chaenostoma Donn. Sm., Bot. Gaz. 20: 9, t. 3 (1895).

Shrub, cauliflorous, densely hairy, with dendroid and simple hairs; leaves bullate, serrate, petioles unwinged; inflorescences axillary, borne on bare stems below leaves, forming short, racemoid thyrses, cymes single-flowered; bracts caducous, bracteoles inconspicuous; flowers medium-sized, pedicellate; calyx actinomorphic to weakly 2-lipped, 5-lobed, bright blue, lobes subequal, deltoid, tube broadly campanulate, membranous,

accrescent; corolla 2-lipped, 5-lobed (4/1), ?red, posterior lip with 2 median lobes, separated by short sinus, lateral lobes rounded, almost obsolete, anterior lip rounded, tube short, exannulate; stamens 4, didynamous, ascending, long-exserted, filaments curved, thecae 2, strongly divergent, confluent, elongate; stigma-lobes short, subequal; disc fleshy, scarcely lobed; nutlets ovoid, smooth, black, with minute basal scar. One species: the rarely collected *C. mecistandrum* Donn. Sm. is known only from S Mexico (Chiapas) and Guatemala.

VII.2.B. SUBTRIBE MENTHINAE (Dumort.) Endl. (1838).

Perennial or annual herbs or shrubs. Hairs simple or rarely branched. Leaves various, rarely hastate, petiole unwinged, lamina rarely finely rugose. Flowers with calyx-tube 5- to 15-nerved; stamens 4, anterior pair usually longer than posterior, or stamens divergent, subequal, or stamens 2 with posterior pair reduced to staminodes or absent; stamens usually 2-theous, thecae usually ellipsoid, distinct to confluent, parallel to divaricate, connective often conspicuous; nectary-disc entire or often 4-lobed, with lobes usually subequal. Nutlets often areolate.

135. *Lycopus* L.

Lycopus L., Sp. Pl. 1: 21 (1753); L., Gen. Pl. ed. 5: 12 (1754); Henderson, Am. Midl. Nat. 68: 95–138 (1962), rev.

Perennial herbs, with horizontal rhizomes or runners, sometimes tuberiferous, weakly or not aromatic, with simple hairs; leaves opposite, petiole or sessile, ovate to lanceolate or linear, variously toothed or pinnatifid; inflorescence of tight, axillary verticillasters; flowers sessile to subsessile; calyx actinomorphic to weakly zygomorphic, not accrescent, tubular-campanulate to campanulate, 4–5-nerved, 4–5-lobed, lobes \pm equal, ovate to lanceolate-subulate or aristate, throat glabrous; corolla white, usually weakly zygomorphic, occasionally \pm actinomorphic or 2-lipped, lobes usually 4, posterior and sometimes anterior lobes larger than lateral ones, all entire or posterior lobe bifid, tube straight; stamens 2 (posterior pair reduced to staminodes or absent), exserted or included, filaments glabrous, thecae parallel to divergent, separate at dehiscence; style often expanded near base to form flange covering top of ovary, stigma-lobes equal or unequal; disc symmetrical; nutlets

obovoid-tetrahedral, often with conspicuously toothed to tuberculate apical crest, glabrous, inner and upper faces often densely glandular. $2n = 22$. About 14 species of wet habitats, mostly in the north-temperate zone (one species in Australia).

136. *Hyssopus* L. *R. herales*

Hyssopus L., Sp. Pl. 2: 569 (1753).

Perennial subshrub, aromatic; leaves simple, entire, usually glabrous; inflorescence of 6–many-flowered verticillasters merging to form a terminal, usually \pm secund, spiciform thyrs; bracts leaf-like; flowers very shortly pedicellate, bracteolate; calyx 2-lipped (3/2), \pm tubular, 15-nerved, lobes equal, deltoid, acuminate or aristate, ciliate, with thickened fold at each sinus; corolla 2-lipped, 5-lobed (2/3), violet to whitish, posterior lip deeply emarginate, concave, patent, anterior lip with median lobe \pm suborbicular, emarginate, curved downwards, lateral lobes rounded and smaller, tube cylindrical; stamens 4, inserted in middle of tube, curved, exserted, thecae divergent, confluent, connective \pm triangular; stigma-lobes equal, \pm acicular; nutlets \pm ovoid, smooth to papillose, puberulent, with mucilaginous cells. $2n = 12$. Two species in Europe, NW Africa, Central and SW Asia, including China.

137. *Mentha* L.

Mentha L., Sp. Pl. 2: 576 (1753); Harley, Flora Europaea 3: 183–186 (1972), reg. rev.; Harley, in P.H. Davis (ed.) Flora of Turkey 7: 384–394 (1982), reg. rev. *Pulegium* Mill. (1753). *Preslia* Opiz (1824).

Perennial, rarely annual herbs, subshrubs or shrubs, usually gynodioecious, strongly aromatic; stems often rhizomatous; inflorescence of few- to many-flowered axillary cymes, pedunculate or not, often forming either dense verticillasters along stem, in axils of leaf-like bracts, or congested into terminal spiciform thyrses in axils of reduced bracts, bracteoles inconspicuous, rarely broader or digitately lobed; calyx \pm actinomorphic, 5-(rarely 4-)lobed, lobes subequal, triangular to subulate or acicular, or slightly 2-lipped, (3/2), anterior lobes often longer, tube cylindrical to infundibuliform, 10–15-nerved, throat hairy or glabrous; corolla \pm actinomorphic, 4-lobed, lilac, pink or white, lobes spreading, subequal, or posterior lobe slightly broader, often emarginate, corolla-tube \pm cylindrical or rarely gibbous on anterior side, usually included within calyx-tube; stamens 4, subequal,

exserted, divergent (included in male-sterile plants), anthers ellipsoidal, thecae parallel, distinct; stigma-lobes subequal, shortly spreading; disc \pm symmetrical; nutlets ovoid, smooth to rugose, pale to dark brown, not mucilaginous; $2n = 18, 20, 24, 36, 40, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 108, 120, 132$. About 20 species in damp, open habitats, often by water, especially Mediterranean and Australasian (one species in New Zealand), but extending through Europe, Asia and Africa to the Cape, and with one species in North America. Some species cultivated since antiquity as potherbs and now introduced worldwide. Hybrids are of frequent occurrence in sect. *Mentha* (Harley and Brighton 1977). These can persist and spread widely by vegetative means. *Mentha spicata* L. and its hybrids, including *M. x piperita* L. and, in the subtropics, *M. canadensis* L., are of commercial importance. No modern infrageneric classification has yet been published, while previous systems such as those by Briquet (1897) are unsatisfactory.

138. *Thymbra* L. *R. Morales*

Thymbra L., Sp. Pl. 2: 569 (1753); Morales, An. Jard. Bot. Madrid 44, 2: 349–380 (1987), rev.
Coridothymus Rchb. f. (1857).

Subshrubs, aromatic; leaves entire, usually conduplicate, young leaves in axillary fascicles; inflorescence a condensed, terminal, spiciform or capituliform thyrse, composed of congested verticillasters; bracts not leaf-like, ovate-lanceolate or lanceolate, sometimes coloured, bracteoles elliptic to lanceolate; calyx 2-lipped, 5-lobed (3/2), cylindrical, with two \pm conspicuous lateral keels, scarcely accrescent, 12–23-nerved, posterior lobes short, triangular, anterior lobes lanceolate, upcurved, throat bearded; corolla 2-lipped, 4-lobed (1/3), cream to purple, posterior lobe \pm rounded, straight, emarginate, anterior lip with lobes suborbicular, median lobe downcurved; stamens 4, inserted in middle of tube, filaments curved, exserted, thecae divaricate, confluent; stigma-lobes equal to subequal; disc entire; nutlets ovoid, \pm smooth. $2n = 30$. Four species, Mediterranean region, Anatolia and N Iraq.

139. *Thymus* L. *R. Morales*

Thymus L., Sp. Pl. 2: 590 (1753); Jalas & Kaleva, Feddes Rep. 81: 93–106 (1970); Jalas, Bot. J. Linn. Soc. 64: 247–271 (1971), reg. rev.; Morales, Ruizia 3: 1–324 (1986), reg. rev.

Subshrubs or shrubs, often herbaceous above, usually gynodioecious, aromatic; stems usually

\pm quadrangular, hairy all round, on two opposite sides or only on angles; leaves small, usually entire, frequently revolute; inflorescence of verticillasters forming a terminal, condensed, often spiciform or interrupted thyrse; bracts leaf-like or not, sometimes coloured, bracteoles inconspicuous; calyx 2-lipped, 5-lobed (3/2), sometimes nearly actinomorphic, \pm campanulate or cylindrical, 10-nerved, lobes triangular or setaceous (in *T. mastichina* L.), rarely posterior lip entire, anterior lip upcurved or spreading, throat bearded; corolla 2-lipped, or rarely nearly actinomorphic, 4-lobed (1/3), white, cream, pink or violet, posterior lip \pm rounded, emarginate, straight, anterior rectangular to suborbicular, rounded, spreading, tube \pm cylindrical, sometimes very long (to 20 mm); stamens 4, exserted or not, thecae parallel, distinct; stigma-lobes \pm equal; nutlets ovoid, smooth. $2n = 24, 26, 28, 30, 32, 42, 48, 50, 52, 54, 56, 58, 60, 84, 90$. About 220 species, open areas, Europe, Mediterranean region and Macaronesia, Asia, N Africa and mountains of Ethiopia, S Greenland. Aromatic, ornamental and medicinal plants used as flavouring, source of essential oils and honey. Many hybrids have been recorded. Sectional classification after Jalas (1971): *Micantes* Velen., *Mastichina* (Mill.) Benth., *Piperella* Willk., *Pseudothymbra* Benth., *Thymus*, *Teucrioides* Jalas, *Hyphodromi* (A. Kerner) Halácsy and *Serpyllum* (Mill.) Benth.

140. *Origanum* L.

Origanum L., Sp. Pl. 2: 588 (1753); Ietswaart, Leiden Bot. Ser. 4: 1–153 (1980), rev.
Majorana Mill. (1754).
Amaracus Hill (1756).
Dictamnus Hill. (1756).

Subshrubs or perennial herbs, sometimes gynodioecious, aromatic, branched hairs in *O. dictamnus* L.; leaves rather small, entire or toothed, hairy or glabrous, rarely glaucous; inflorescence branched, sometimes paniculate to corymbose, spicate or spiciform, spikes elongate to subglobose, erect or nodding, often pedunculate, sometimes lax or few-flowered, or compact with bracts imbricate, often showy or brightly coloured; bracteoles absent; flowers subsessile, single, or rarely in 2–8-flowered cymes in axils of all but lowest bracts; calyx actinomorphic and 5-lobed to strongly zygomorphic and 5- to 1-lobed: either 2-lipped, 3/2 to 1/2, lobes broadly triangular to lingulate, sometimes reduced, or calyx 1-lipped with posterior lip entire, rounded, bract-like with calyx-tube split almost to base, calyx-tube, when present, cylindrical

cal to campanulate, 10–13-nerved, pilose in throat; corolla 2-lipped, usually 5-lobed (2/3), white, pink or purple, lobes subequal, tube straight or curved, sometimes ventrally saccate, short or to 3 cm in *O. amanum* Post; stamens 4, sometimes reduced or absent, usually unequal, ascending to divergent, anterior longer, usually exserted, posterior exserted to included, thecae divergent to divaricate, distinct; stigma-lobes subequal; disc \pm symmetrical; nutlets ovoid to apiculate, smooth. $2n = 30$ (32). About 40 species, especially Mediterranean, extending through temperate Eurasia and N Africa, from Azores to Taiwan. Cultivated widely as culinary and medicinal herbs, especially *O. vulgare* L., *O. onites* L. and *O. majorana* L., some ornamental. Many hybrids recorded. Ietswaart (1980) recognises 10 sections.

141. *Zataria* Boiss.

Zataria Boiss., Diagn. Pl. Or. Nov. ser. 1, 5: 18 (1884).

Subshrub, apparently gynodioecious, aromatic, with whitish hairs; stems densely white-pilose; leaves small, densely gland-dotted, subentire, \pm orbicular to elliptic, often with densely white-hairy, rounded buds in axils; inflorescence of few-flowered verticillasters congested to form short, spiciform thyrses, usually shortly pedunculate in axils of leaf-like bracts, reduced towards stem-apex; bracteoles inconspicuous; flowers very small, subsessile; calyx ovoid-cylindrical, actinomorphic, equally 5-lobed, lobes short, broadly triangular, hairy within, tube 5-nerved, intercostal nerves \pm obsolete, 5-angled, glands on calyx and bracteoles turning reddish orange; corolla weakly 2-lipped, 5-lobed (2/3), white, lips spreading, lobes subequal, corolla-tube scarcely exserted from calyx, exannulate but hairy within; stamens in hermaphrodite flowers slightly exserted from corolla-tube, thecae slightly divergent, distinct; disc \pm equal, with anterior side slightly swollen; stigma-lobes short, flattened, subequal; nutlets ovoid, smooth, often only 1 developing. One species, *Z. multiflora* Boiss. Open, rocky areas, often near seasonal streams, S Iran, E Afghanistan, Pakistan.

142. *Pentapleura* Hand.-Mazz.

Pentapleura Hand.-Mazz., Öst. Bot. Zeitschr. 63: 225 (1913); Rechingher, Flora Iranica 150: 553 (1982), reg. rev.; Davis, Flora of Turkey 7: 313 (1982), reg. rev.

Small, fastigiate shrub, aromatic; leaves simple, entire, subsessile; inflorescence of 2–8-flowered

axillary cymes, shortly pedunculate or sessile, forming dense verticillasters on upper part of stem, in axils of leaf-like bracts, often somewhat congested; bracteoles inconspicuous; flowers subsessile; calyx long-cylindrical, actinomorphic, equally 5-lobed, lobes subulate, tube 10-nerved, 5-angled, 5 main nerves along crest of narrow wings, alternating with 5 weaker nerves in lower half of membranous intercostal furrows, throat hairy within; corolla \pm actinomorphic to weakly 2-lipped, 5-lobed (2/3), pink, lobes subequal, corolla-tube cylindrical, very narrow, slightly longer than calyx, exannulate; stamens 4, subequal, included in corolla, filaments straight, anterior slightly longer, anthers ellipsoidal, thecae \pm parallel, distinct; stigma-lobes subequal; nutlets oblong, glabrous. One sp., *P. subulifera* Hand.-Mazz., dry limestone slopes, 400–1000 m, N Iraq and SE Turkey.

143. *Satureja* L. *R. Morales*

Satureja L., Sp. Pl. 2: 567 (1753); Doroszenko, Doct. Thesis, Edinburgh University: 175–205 (1985), rev.
Euhesperida Brullo & Furnari (1979).

Perennial or annual herbs or subshrubs, aromatic; leaves entire or scarcely toothed, usually conduplicate, glandular-punctate, young leaves in axillary fascicles; inflorescence of 2–many-flowered axillary verticillasters or cymes; bracts usually leaf-like, bracteoles inconspicuous; calyx 2-lipped or almost actinomorphic, campanulate, 10–13-nerved, rarely appearing 5-nerved, 5-lobed (3/2), posterior lobes straight to upcurved, anterior lobes longer, calyx-throat bearded; corolla 2-lipped, 4-lobed, white, lilac, pink or pale-purple; posterior lobe concave, \pm rounded, emarginate, anterior lip with median lobe oblong, spreading, tube \pm cylindrical, straight; stamens 4, scarcely didynamous or anterior pair longer, filaments exserted, curved; thecae \pm divaricate or parallel, ellipsoidal, confluent; disc subequal; stigma-lobes subequal; nutlets ovoid, sometimes elongate or apiculate, smooth or muricate, sometimes hairy. $2n = 30$. About 38 species in the Mediterranean Region, N Africa: Morocco and Libya, Caucasus and W Asia: Saudi Arabia, Iran and Iraq. Aromatic and medicinal plants used as flavouring, source of essential oils and ornamental. Divided into two sections: *Satureja* and *Salzmannia* G. López, following López (1981).

144. *Gontscharovia* Boriss.

Gontscharovia Boriss., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk. SSSR 15: 321–324 (1953).

Low subshrub, aromatic; leaves elliptic to linear-oblong, flat, entire, gland-dotted especially on abaxial surface, subsessile, palisade layer isolated; inflorescence of verticillasters, cymes shortly pedunculate, 1–6-flowered, in axils of reduced bracts and forming a lax, terminal, spiciform thyrse; bracteoles inconspicuous; calyx \pm actinomorphic, 5-lobed, lobes equal, triangular-lanceolate, calyx-tube cylindrical-campanulate, straight, 15-nerved, glabrous in throat; corolla pale pink, 2-lipped, 5-lobed (2/3), posterior lip straight, flat, anterior lip spreading, 3-lobed, equalling or slightly shorter than posterior, corolla-tube exannulate; stamens 4, didynamous, filaments straight, rather short, anterior pair longer and slightly exerted from tube, ascending under posterior lip of corolla, thecae slightly divergent, separate; stigma-lobes equal, subulate, nutlets oblong, apiculate, glabrous. One species, *G. popovii* (Fedtsch. & Gontsch.) Boriss. Pamir-Alai: Uzbekistan, Tajikistan, Kazakhstan, Afghanistan, Pakistan (Chitral), India: Kashmir. Dry limestone slopes.

145. *Saccocalyx* Coss. & Durieu

Saccocalyx Coss. & Durieu, Ann. Sci. Nat. Bot. Ser. 3, 20: 80 (1853), nom. cons.

Small shrub, strongly aromatic; older stems often decumbent and rooting at base, with longitudinally fissured bark; leaves small, remote, \pm spatulate, sessile, entire, canaliculate, conspicuously gland-dotted, margin ciliate with long, white hairs in lower half, cauline leaves with axillary fascicles of smaller leaves; inflorescence of verticillasters, cymes sessile, 1–3-flowered in axils of leaf-like bracts; bracteoles inconspicuous; flowers minute; calyx urceolate, actinomorphic, 5-lobed, lobes broadly deltate, slightly spreading, calyx-tube ca. 13-nerved with inconspicuous nerves, densely spreading-hairy outside, annulate at throat within, tube strongly accrescent in fruit, becoming globose-urceolate, inflated; corolla purplish-pink, \pm actinomorphic, very small, 5-lobed, lobes subequal, erect, corolla-tube shortly campanulate-cylindrical, glabrous within; stamens 4, subequal, \pm included within corolla, filaments glabrous, very short, thecae weakly divergent, separate, connective small; stigma-lobes slightly unequal, posterior lobe shorter; disc with elongate anterior lobe; nutlets oblong, apiculate, smooth, mucilaginous when wetted. One species, *S. saturoides* Coss. & Durieu, Algeria. Sandy margins of salt lakes, in desert.

146. *Micromeria* Benth. *R. Morales*

Micromeria Benth., Edwards's Bot. Reg. 15: t. 1282 (1829); Pérez de Paz, Monografías Secc. 4, Ciencias Naturales 16: 1–306 (1978), reg. rev.; Morales, Bot. Complutensis 18: 157–168 (1993), reg. rev.

Perennial or annual (*M. cymuligera* Boiss. & Haussk.) herbs, subshrubs or shrubs, often aromatic; leaves entire or toothed, linear to ovate, flat or revolute; inflorescence in axillary verticillasters, 2–20-flowered, or sometimes flowers solitary in leaf-axils, bracts \pm similar to leaves, bracteoles often present; flowers (possibly resupinate in *M. cymuligera*) pedicellate or not, pedicels sometimes very long; calyx actinomorphic to weakly 2-lipped, campanulate or cylindrical, scarcely accrescent, 13–15-nerved, 5-lobed, lobes \pm equal or (3/2), anterior often longer, sometimes curved, spreading, throat bearded or not; corolla usually small, white to yellowish, mauve, pink or purple, 2-lipped, 4-lobed (1/3), posterior lip emarginate, \pm straight, anterior lip spreading, tube cylindrical, sometimes hairy in throat; stamens 4, didynamous, included or exerted from tube, filaments straight or connivent, thecae divaricate, ellipsoidal, confluent; stigma-lobes subequal, subulate; nutlets ovoid, sometimes apiculate, \pm smooth, sometimes hairy, mucilage cells present. $2n = 20, 22, 30, 50, 60$. About 70 species, Europe, Mediterranean region, Macaronesia, N Africa, Asia, mountains of E and S Africa, and W tropical Africa, Madagascar. Aromatic and medicinal plants used as flavouring and source of essential oils. Of the six sections recognised by Morales (1993), only four are included in *Micromeria* as delimited here: *Pseudomelissa* Benth., *Micromeria*, *Pineolentia* P. Pérez, *Cymularia* Boiss. The supposedly resupinate nature of the flower of *M. cymuligera* has been questioned. *Xenopoma* *linopodium* *glabrothyrsus*?

147. *Bystropogon* L'Hér.

Bystropogon L'Hér., Sert. Angl. 19, t. 22, 23 (1788), nom. cons.; La-Serna, Revisión del género *Bystropogon*, J. Cramer, Vaduz (1984), rev.

Shrubs, strongly aromatic, frequently gynodioecious; leaves petiolate, crenate, dentate to subentire; inflorescence in compound, terminal or axillary, dichasial, pedunculate, few to many-flowered, often corymbiform cymes, lax or congested, in axils of leaf-like bracts, often forming spherical glomerules, often with solitary, terminal flower at lowest cyme-branch; bracteoles in-

conspicuous, lowest sometimes leaf-like; calyx cylindrical-campanulate, \pm actinomorphic, equally 5-lobed, lobes triangular-subulate, sometimes plumose, tube 10-nerved, often long-pilose, throat hairy; corolla white, pink or lilac, weakly 2-lipped, 5-lobed (2/3), posterior lip emarginate to 2-fid, anterior lip with median lobe broader, tube included in calyx; stamens 4, shorter than corolla, didynamous, anterior pair longer, spreading, filaments glabrous, thecae parallel or divergent, distinct, connective slightly dilated; stigma-lobes unequal to subequal, long-subulate, anterior lobe broader; disc symmetrical, reddish-orange; nutlets oblong-ovoid, smooth or finely tuberculate. $2n = 42, 48$. Seven species, endemic to Canary Is. and Madeira. Mountain slopes and clearings. Hybrids have been reported. La Serna (1984) recognised two sections. Sect. *Bystropogon*, flowers in dichasial cymes, calyces with lobes narrow, subulate, plumose, nutlets smooth, 4 spp. Canary Is. Sect. *Canariense* La-Serna, flowers in congested glomerules, calyces with lobes short, triangular-acuminate, not plumose, nutlets somewhat tuberculate, 3 spp. Madeira and Canary Is.

148. *Cuminia* Colla

Cuminia Colla, Mem. Acad. Sci. Torino 38, 6: 139 (1835); Harley, Kew Mag. 3, 4: 151–156 (1986), rev. *Skottsbergiella* Epling (1937), non Petrak (1927). *Johowia* Epling & Looser (1937).

Small tree or shrub, aromatic, gynodioecious or gynomonocious; leaves petiolate, sharply and irregularly serrate; inflorescence of compound, dichasial, pedunculate cymes in axils of, and shorter than, large, leaf-like bracts; bracteoles inconspicuous; calyx tubular-campanulate, rather fleshy, actinomorphic, 5-lobed, lobes triangular-lanceolate, ciliate, often slightly spreading, calyx-tube obscurely 12–14-nerved, exannulate, becoming distended at base to accommodate nutlets, throat glabrous; corolla white to lavender or dark purple, \pm actinomorphic, 5-lobed, lobes rounded, posterior pair erect, tube hairy outside, longer than calyx, annulate within; stamens 4, subequal, included in corolla-tube, filaments short, thecae divergent, distinct; stigma-lobes slightly unequal, posterior shorter; disc symmetrical, fleshy; nutlets ovoid-trigonus, fleshy with thickened angles, rather large. $2n = 46, 44$. One species, *C. eriantha* (Benth.) Benth., in lower montane forest, 200–450 m, Chile: Masatierra Is., Robinson Crusoe (Juan Fernandez) Archipelago.

149. *Minthostachys* (Benth.) Spach

Minthostachys (Benth.) Spach, Hist. Veg. Phan. 9: 164 (1840); Epling, Feddes Rep. Spec. Nov. Beih. 85: 162–168 (1936), rev. *Bystropogon* sect. *Minthostachys* Benth. (1834).

Weak-stemmed, often semi-scandent shrubs, aromatic, gynodioecious; leaves shallowly toothed to subentire; inflorescence of compound, congested, sometimes 2–3, often pedunculate cymes, in axils of leaf-like bracts, these becoming reduced towards stem-apex, upper cymes often forming a terminal, spiciform thyrse; bracteoles inconspicuous; calyx cylindrical, \pm actinomorphic, 5-lobed, lobes subulate to narrowly triangular, calyx-tube often externally long-pilose, 13(–12)-nerved, throat hairy; corolla white, or pale lilac, 2-lipped, 5-lobed (2/3), anterior lip with median lobe larger, corolla-tube hairy within, longer to shorter than calyx; stamens 4, didynamous, shorter than corolla, slightly exerted from tube, thecae slightly divergent, distinct, connective slightly dilated; stigma-lobes long, unequal, anterior longer; disc symmetrical, reddish orange; nutlets ovoid, finely reticulate. $2n = 46$. Probably less than twelve spp., montane, Andes from Venezuela to Argentina. Species limits are very poorly understood.

150. *Clinopodium* L.

Fig. 28

Clinopodium L., Sp. Pl. 2: 587 (1753); L., Gen. Pl. ed. 5: 256 (1754); Cantino & Wagstaff, Brittonia 50: 63–70 (1998), reg. consp.; Harley & Granda Paucar, Kew Bull. 55: 917–927 (2000), reg. consp. *Calamintha* Mill. (1754). *Acinos* Mill. (1754). *Gardoquia* Ruiz et Pav. (1794). *Xenopoma* Willd. (1811). *Antonina* Vved. (1961).

Perennial, rarely annual herbs and shrubs, aromatic, with simple or branched hairs; leaves petiolate to subsessile, simple, variously toothed or entire, margin sometimes revolute; inflorescence of axillary cymes, these sometimes reduced to solitary flowers or merging to form a terminal, paniculiform to spiciform, verticillate, or subcapitate thyrse; calyx actinomorphic to 2-lipped, not accrescent, usually cylindrical to tubular-campanulate, straight to sigmoid, sometimes gibbous, usually 13- (11-, 15-)nerved, 5-lobed, lobes often upcurved, posterior 3 often partially fused to form a lip, anterior 2 usually free above tube, throat hairy or not; corolla white to blue, lavender, red, or orange (rarely yellow), 2-lipped (2/3), posterior lip usually notched, tube straight or curved; stamens

usually 4 (rarely the posterior pair reduced to staminodes), didynamous, included or exerted, filaments usually glabrous, thecae parallel to divaricate, separate at dehiscence; stigma-lobes equal or unequal; disc usually symmetrical; nutlets ellipsoid to ovoid, obloid, obovoid, or subglobose, often somewhat trigonal, smooth or minutely sculptured, glabrous or puberulent. $2n = 10-72$ (most frequently 18 or 20). About 100 spp., mostly in the New World (both temperate and tropical) and temperate Eurasia, but a few in Africa, tropical Asia and Indomalaysia. As delimited here, *Clinopodium* includes most of the native New World species of *Satureja* sensu Epling and Játiva (1964, 1966), see Cantino and Wagstaff (1998).

151. *Cyclotrichium* (Boiss.) Manden. & Scheng.

Cyclotrichium (Boiss.) Manden. & Scheng., Not. Syst. Leningrad 15: 332-337 (1953).
Calamintha sect. *Cyclotrichium* Boiss. (1879).

Perennial subshrubs, hairs simple or dendroid; leaves entire or toothed; inflorescence of axillary cymes, sometimes very shortly pedunculate, forming terminal thyrse of 6-many-flowered, usually remote verticillasters; bracts, at least the lowest, leaf-like, upper small, inconspicuous, bracteoles \pm inconspicuous, smaller than to equalling calyx; calyx weakly 2-lipped, 5-lobed (3/2), lobes triangular-subulate, posterior lobes usually shorter than anterior, calyx-tube cylindrical, straight or shortly curved, 13-nerved, throat hairy; corolla resupinate, 2-lipped, 4-lobed (3/1), white or lilac, posterior (lower) lip entire or emarginate, anterior (upper) lip 3-lobed, slightly deflexed, median lobe larger, corolla-tube twisted, annulate near middle; stamens 4, \pm equal, long-exserted, anthers ellipsoid, thecae 2, parallel, distinct with short connective; stigma-lobes unequal, \pm subulate, posterior lobe longer; disc weakly 4-lobed; nutlets ovoid, smooth, glabrous. About eight species in SW Asia.

152. *Obtegeria* P.D. Cantino & Doroszenko

Obtegeria P.D. Cantino & Doroszenko, Novon 8: 1-3 (1998).

Low, ericoid shrub with simple hairs; stems transversely ridged at nodes; leaves subsessile, stiffly ascending, linear-oblong, entire, replicate (abaxial surface hidden); flowers axillary, solitary, with 2 lanceolate bracteoles near base of pedicel; calyx strongly zygomorphic, not accrescent, tubular-

campanulate, downcurved, 11-13-nerved, 5-lobed (3/2), lobes usually slightly upcurved, posterior lobes deltoid-cuspidate, fused to form a lip, anterior lobes lanceolate-subulate, free above tube, throat densely villous; corolla usually blue to pink, 2-lipped, posterior lip deeply bifid, anterior lip 0.8 \times to as long as tube, 3-lobed, median lobe largest, notched, tube \pm straight; stamens 4, didynamous, included, filaments glabrous, thecae divaricate, separate at dehiscence; stigma-lobes unequal; disc symmetrical; nutlets ellipsoid, smooth, glabrous. One species, *O. caerulescens* (Benth.) Doroszenko & P.D. Cantino, N Colombia.

153. *Kurzamra* Kuntze

Kurzamra Kuntze, Rev. Gen.: 520 (1891).
Soliera Clos (1849) non J.G. Agardh (1842).

Dwarf, mat-forming perennial herb, aromatic; stems procumbent, often rhizomatous, subterranean at base, with reduced scale-leaves; leaves, small, entire, densely hairy; inflorescence of 1(-2)-flowered cymes, sessile, subtended by leaf-like bracts and crowded towards shoot-apex; bracteoles paired, inconspicuous; calyx \pm actinomorphic, 5-lobed, lobes equal, triangular, with apex long-subulate, plumose, curved, more than 2 \times as long as tube, spreading in fruit, calyx-tube shortly cylindrical-infundibuliform, 15-nerved, externally patent-hairy, throat annulate within; corolla lilac, 2-lipped, 5-lobed (2/3), posterior lip shallowly lobed, shorter than anterior lip, corolla-tube long-exserted from calyx, narrow at base, gradually widening towards throat, straight, glabrous within, stamens 4, didynamous, exerted from corolla-tube, divergent, anterior pair longer, thecae weakly divergent, separate, connective small; stigma-lobes flattened, slightly unequal, posterior shorter; disc \pm symmetrical; nutlets oblong, mid-brown, smooth, not mucilaginous. One species, *K. pulchella* (Clos) Kuntze, Chile: Atacama and Coquimbo and adjacent Argentina.

154. *Ziziphora* L. *Z. horeales*

Ziziphora L., Sp. Pl. 1: 21 (1753); Hedge, Notes Roy. Bot. Gard. Edinburgh 23: 209-221 (1961); Reehinger f., Fl. Iranica 150: 480 (1982), reg. rev.
Faldermannia Trautv. (1839).

Annual or perennial herbs or subshrubs, aromatic; leaves \pm entire, subsessile to shortly petiolate; inflorescence of 2-12-flowered verticillasters, of

sessile or pedunculate cymes in axils of leaf-like bracts, forming a terminal, spiciform or capituliform thyrse; bracts patent or imbricate, \pm conspicuous, bracteoles inconspicuous; flowers shortly pedicellate, pedicels sometimes flattened; calyx \pm actinomorphic, 5-lobed (\pm 3/2), lobes triangular, posterior lobes shorter than straight or curved anterior lobes, calyx-tube cylindrical, sometimes curved, gibbous below, 13-nerved, accrescent, throat bearded, closed; corolla 2-lipped, \pm 4-lobed (1/3), white, rose-red or purple, posterior lip rounded, sometimes emarginate, straight, anterior lobes \pm rounded, corolla-tube cylindrical, short, sometimes scarcely exerted from calyx, exannulate; stamens 2 (posterior pair staminodal or absent), anterior pair ascending under posterior corolla-lip, exerted from tube, anthers often cohering at margins, with fertile theca ellipsoidal, divaricate, becoming confluent, or often dimidiate, lower theca sterile and forming a small appendage; stigma-lobes unequal; disc symmetrical; nutlets ovoid to trigonous, smooth or granulate. $2n = 12, 16, 18, 24, 32, 36$. About 20 species in S Europe, NW Africa and Asia to Himalayas and Altai mountains. Open, usually xeric habitats. Aromatic and medicinal plants used as flavouring and as source of essential oils.

155. *Stachydeoma* Small

Stachydeoma Small, Fl. S. E. United States 1040, 1337 (1903).

Low shrubs or subshrubs, aromatic, conspicuously glandular and setose; leaves opposite, subsessile, ovate to elliptical, entire or few-toothed, usually revolute; inflorescence a terminal thyrse or raceme; calyx zygomorphic, not accrescent, campanulate, 13-nerved, glandular-punctate, 5-lobed (3/2), setose, posterior lobes triangular, largely fused to form a shallowly lobed lip, anterior lobes subulate, slightly upcurved, free above tube, throat hairy; corolla purplish, 2-lipped (1/3), posterior lip entire, anterior lip with median lobe notched, tube straight; fertile stamens 2 (posterior pair reduced to staminodes), included to slightly exerted, filaments glabrous, thecae nearly parallel, asymmetrical (one theca attached higher than other), separate at dehiscence; stigma-lobes unequal; disc symmetrical; nutlets subglobose, smooth, glabrous. $2n = 18$. One species, *Stachydeoma graveolens* (A. Gray) Small, Florida. Differs from *Hedeoma* in chromosome number and asymmetrical anthers.

156. *Hedeoma* Pers.

Hedeoma Pers., Syn. Pl. 131 (1807); Irving, Sida 8(3): 218-295 (1980), rev.
Pseudocunila Brade (1944).

Annual or perennial herbs or subshrubs, strongly aromatic; leaves entire or toothed; inflorescence of few- to many-flowered, pedunculate to subsessile cymes, or flowers rarely solitary, in axils of often leaf-like bracts, upper cymes often congested in a terminal spiciform thyrse; bracteoles inconspicuous; flowers sometimes cleistogamous; calyx \pm actinomorphic, subequally 5-lobed, or 2-lipped (3/2) with lobes unequal, posterior somewhat connate, deltoid to subulate, anterior lobes usually longer, tube 13-nerved, cylindrical to infundibular, often gibbous at base, throat densely hairy within; corolla white, lilac, pink or orange-red, 2-lipped (2/3), posterior lip sometimes subentire, concave to flat, erect or spreading, median anterior lobe usually larger, often emarginate, tube short to elongate, widening upwards, annulate or not within; stamens 2, posterior pair staminodal, anterior pair ascending under posterior corolla-lip, included to exerted, thecae \pm parallel to widely divaricate, distinct, connective well developed; stigma-lobes unequal, \pm subulate, posterior very small; disc symmetrical; nutlets ovoid to oblong, usually 1.5 mm long or less, areolate to foveate, sometimes glaucous, often mucilaginous. $2n = 34, 36, 44, 72, 76, 144$. About 42 species, from Canada southwards to Mexico, Central and Southern S America, from Peru and Bolivia to S Brazil, Uruguay and Argentina. Open montane or submontane, sometimes xeric habitats. Irving (1980) recognises four subgenera, based mainly on habit and reproductive characters.

157. *Rhododon* Epling

Rhododon Epling, Rep. Spec. Nov. Regn. Veg. Beih. 115: 14 (1939).

Annual herbs; leaves subsessile, entire with margins long-ciliate; inflorescence of verticillasters, cymes 1-4-flowered, in axils of leaf-like bracts, forming terminal spiciform, congested or interrupted thyrse; bracteoles long-ciliate, curved, purple-tinged; calyx often purple-tinged, 2-lipped, 5-lobed (3/2), lobes elongate, long-ciliate, anterior narrower with deeper sinus, tube 15-nerved, conspicuously ribbed, cylindrical, weakly gibbous, slightly curved, annulate at throat; corolla lilac to purple, 2-lipped, 5-lobed (2/3), posterior lip flat, anterior longer and broader, tube narrowly cylin-

montane forests. Many species have restricted ranges with specialised soil conditions. Epling (1925) divided the genus into two subgenera: subg. *Monardella* (as subg. *Pycnanthae*) and subg. *Macranthae* Briq., based on relative length of corolla lobes and tube and on calyx length.

171. *Pycnanthemum* Michx.

Pycnanthemum Michx., Fl. Bor.-Am. 2: 7 (1803), nom. cons.; Grant & Epling, Univ. Calif. Publ. Bot. 20: 195-240 (1943), rev.
Koellia Moench (1794).

Rhizomatous perennial herbs, strongly aromatic, with simple hairs; leaves sessile or short-petiolate, ovate to lanceolate, elliptical or linear, variously toothed or entire; inflorescence of verticillasters, or capitate, or corymbiform, composed of compact or loose, terminal and upper-axillary glomerules (paired cymes); calyx actinomorphic to zygomorphic, not accrescent, cylindrical to tubular-campanulate, 10-13-nerved, 5-lobed, lobes triangular to ovate, lanceolate or aristate, all similar or anterior 2 more deeply cleft than posterior 3, throat glabrous; corolla usually white to lavender with purple spots, 2-lipped, posterior lip entire or emarginate, anterior lip 3-lobed, tube \pm straight; stamens 4, didynamous or subequal, exerted or included, filaments glabrous, thecae parallel, separate at dehiscence; stigma-lobes unequal to subequal (rarely equal); disc symmetrical; nutlets ovoid to obloid, \pm trigonal, smooth or rugose, glabrous or pubescent. $2n = 36, 38, 40, 72, 76, 78, 80, ca. 108, 120$ ($x = 18, 19, 20$). Seventeen to 21 species, SE Canada, E and central United States, one disjunct species in California; centre of diversity in SE U.S. Most species occur in disturbed sites, naturally open habitats or forest edges.

172. *Acanthomintha* (A. Gray) Benth. & Hook. f.

Acanthomintha (A. Gray) Benth. & Hook. f., Gen. Pl. 2, 2: 1192 (1876); Gray, Syn. Fl. N. Am. 2, 1: 365 (1878), rev.; Jøkerst, Madroño 38: 278-286 (1991), rev.

Annual herbs, aromatic; leaves petiolate, coarsely toothed to subentire; inflorescence of verticillasters with cymes 3-5-flowered, in the axils of leaf-like bracts, toothed and often apically spinose; in a terminal, congested or interrupted spiciform thyrses; bracteoles conspicuous, 2 per cyme, broadly ovate to rotund, spinose-dentate, subsessile, green or straw-coloured, equalling or overtopping calyx; calyx 2-lipped, 5-lobed (3/2), lobes subequal, triangular-lanceolate, spinose-tipped,

posterior lip longer than anterior with shallower sinus between teeth, tube 13-nerved, cylindrical-campanulate, exannulate within; corolla white or pink, 2-lipped, 4-5-lobed (1-2/3), posterior lip concave, erect, anterior lip usually longer, broad, spreading, median lobe longer than laterals, often emarginate, tube narrowly cylindrical, equalling to long-exserted from calyx; stamens 4, didynamous with posterior pair shorter, or 2 and then posterior pair staminodal, anterior pair ascending, included under posterior corolla-lip, filaments glabrous, thecae divergent, distinct, sometimes unequal, glabrous or hairy, connective apparent; disc symmetrical; style hairy to glabrous, stigma-lobes unequal, subulate, posterior shorter; nutlets obovoid-oblong, smooth, mucilaginous. $2n = 19$. Four species, U.S.A. (California), one extending into Mexico (Baja California). Open areas in rocky or clay soils.

173. *Monarda* L.

Monarda L., Sp. Pl. 1: 22 (1753); Gen. Pl. ed. 5: 14 (1754); Scora, Univ. Calif. Publ. Bot. 41: 1-59 (1967), rev.

Rhizomatous perennial herbs or taprooted annuals or biennials (rarely low shrubs), aromatic, with simple hairs; leaves petiolate to subsessile, ovate to lanceolate, elliptical or linear, serrate to denticulate (rarely entire); inflorescence terminal or in verticillasters, of involucrate glomerules; bracts sometimes brightly coloured; flowers subsessile, ebracteolate; calyx actinomorphic, not accrescent, cylindrical, 13-15-nerved, 5-lobed, lobes lanceolate to subulate or aristate, often setose, throat usually hairy; corolla white to purple, red, or yellow, 2-lipped, posterior lip narrow, concave, entire or bifid, sometimes apically bearded, anterior lip 3-lobed, median lobe longest, tube straight or curved, corolla in bud falcate; fertile stamens 2 (posterior pair reduced to staminodes or absent), included or slightly exerted, filaments usually pubescent, anthers usually lightly fused (coherent but easily separated), thecae divaricate, separate at dehiscence; stigma-lobes usually unequal; disc symmetrical; nutlets ovoid to obloid, obscurely trigonal, smooth, glabrous. $2n = 18, 22, 36$ (rarely 24, 32, 34). About 20 species, S Canada to S Mexico; some widely grown as ornamentals. Two subgenera are recognised (McClintock and Epling 1942; Scora 1967). Glomerules usually solitary (rarely two), terminal; upper lip of corolla straight to only slightly arcuate; stamens exerted; rhizomatous perennial herbs: subgenus *Monarda*. Glomerules several, in verticillasters; upper lip of corolla

strongly arcuate; stamens usually included; taprooted annuals, biennials, short-lived perennials, or low shrubs: subgenus *Cheilyctis* (Raf.) E.M. McClint. and Epling.

174. *Blephilia* Raf.

Blephilia Raf., Am. Monthly Mag. & Crit. Rev. 4: 190 (1819); Simmers & Kral, Rhodora 94: 1-14 (1992), new sp.

Rhizomatous or stoloniferous perennial herbs, weakly to strongly aromatic; leaves petiolate, ovate to lanceolate or elliptic, serrate to serrulate; inflorescence a verticillate thyrses of terminal and subterminal glomerules, each subtended by an involucre of ovate to lanceolate bracts; flowers subsessile, ebracteolate; calyx zygomorphic, not accrescent, cylindrical, 13-nerved, 5-lobed (3/2), lobes lanceolate-attenuate to subulate, setose, posterior lobes partially fused to form long upper lip, anterior lobes shorter, free above tube, throat sparsely hairy; corolla purple to white, 2-lipped (1/3), posterior lip entire, anterior lip 3-lobed, median lobe narrower than other 2, tube curved, corolla in bud falcate; fertile stamens 2 (posterior pair reduced to staminodes), exerted, filaments glabrous, thecae divaricate, separate at dehiscence; stigma-lobes unequal; disc symmetrical; nutlets ellipsoid to ovoid, obscurely trigonal, smooth, glabrous. Three species, eastern North America.

175. *Prunella* L. *r. Morales*

Prunella L., Sp. Pl. 2: 600 (1753).
Brunella Mill. (1754).
Prunellopsis Kudo (1920).

Perennial herbs, rhizomatous, not aromatic; leaves entire, serrate, lacinate to pinnatifid; inflorescence of usually 6-flowered verticillasters, in a terminal, condensed, spiciform thyrses, pedunculate or not; bracts imbricate, broadly ovate-acuminate, bracteoles present or not; calyx 2-lipped, tubular-campanulate, accrescent, 10-nerved, sometimes with 2 lateral keels, 5-lobed (3/2), posterior lip \pm truncate, lobes short, mucronate, anterior lip with lobes triangular, upcurved, throat not barbate, \pm closed in fruit; corolla 2-lipped, 4-lobed (1/3), purple, blue, cream or white, posterior lip hooded, concave, \pm rounded, anterior lip with median lobe concave, usually dentate, lateral lobes obliquely truncate, tube \pm infundibular, annulate within, contracted at throat; stamens 4, didynamous, exerted from tube, ascending under posterior lip, filaments curved, bifurcating at apex to form a

subulate appendage, thecae 2, divaricate, distinct, \pm parallel to filament; stigma-lobes shortly subulate; disc unlobed; nutlets ovoid, apiculate or rounded, \pm angulate, mucilaginous. $2n = 28, 30, 32$. About seven species in Europe, NW Africa and Asia. *Prunella vulgaris* L. widely naturalized in temperate and montane regions of N and S America, Africa and Australasia.

176. *Cleonia* L. *r. Morales*

Cleonia L., Sp. Pl. 2 ed. 2: 837 (1763).

Annual herb, weakly aromatic; leaves simple, crenate to dentate or pinnately lobed; inflorescence of 6-flowered verticillasters, merging to form a terminal, subcapitate thyrses; bracts conspicuous, ciliate, pectinate-pinnatifid, segments aristate; calyx 2-lipped (3/2), campanulate, 10-nerved; posterior lobes deltoid, anterior lobes longer, all straight; corolla 2-lipped (1/3), violet-purple to whitish, posterior lobe emarginate, vertical, anterior lip with median lobe whitish, \pm suborbicular, emarginate, horizontal, lateral lobes suborbicular, truncate, tube \pm infundibular; stamens 4, didynamous, posterior shorter, anterior pair exerted from tube, filaments glabrous, thecae ellipsoidal, confluent, connective appendaged; stigma-lobes 4, short, subequal; nutlets ovoid, smooth. $2n = 20$. One species: *C. lusitanica* L., frequently on gypsiferous soils, Iberian peninsula, NW Africa.

177. *Horminum* L. *r. Morales*

Horminum L., Sp. Pl. 2: 596 (1753).

Perennial herb with basal rosettes of leaves, rhizomatous; leaves simple, crenate, long-petiolate; inflorescence of 2-6-flowered verticillasters forming a lax, secund, spiciform thyrses, scapose, or sometimes a few pairs of leaves present on flowering stem; bracts not conspicuous, ovate, acute, as long as or shorter than calyx; ebracteolate; calyx 2-lipped (3/2), campanulate, 13-nerved, posterior lobes deltoid, upcurved, anterior lobes long-deltoid, straight, throat glabrous; corolla 2-lipped, 4-lobed (1/3), violet, posterior lip semi-orbicular, emarginate, anterior lip with lobes \pm rounded, truncate, reflexed, tube \pm cylindrical, hairy in throat; stamens 4, didynamous, posterior pair shorter, inserted in middle of tube, exerted, anthers cohering in pairs, thecae confluent; stigma-lobes shortly subulate; nutlets ovoid, \pm papillate. $2n = 12$. One species: *H. pyrenaicum* L.,

calicicole in mountains of Europe, Alps, Pyrenees, Cantabrian mountains.

VII.2.C. SUBTRIBE NEPETINAE Coss. & Germ. (1845).

Calyx-tube 15-nerved. Corolla strongly 2-lipped (2/3), often bluish. Stamens 4 (rarely anterior pair absent in some species of *Nepeta*), posterior pair longer than anterior, both usually ascending under posterior corolla-lip, sometimes exerted. Stigma-lobes subulate. Nectary disc 4-lobed or 4-horned. Nutlets elliptic to oblong, rarely curved and globose, abscission-scar usually with well-defined areole.

178. *Nepeta* L.

Nepeta L., Sp. Pl. 2: 570 (1753); Budantsev, Bot. Zhurn. 78, 1: 91-105 (1993), rev.
Kudrjaschevia Pojark (1953).
Pitardia Batt. ex Pit. (1918).

Subshrubs or annual or perennial herbs, aromatic, sometimes gynodioecious; leaves simple; inflorescences thyrsoid, cymes lax to congested, pedunculate or sessile, axillary, distant, or crowded into spike-like or ovoid heads; bracts leaf-like or reduced, sometimes longer than calyx, bracteoles inconspicuous; calyx tubular to campanulate, actinomorphic to strongly 2-lipped, 5-lobed (3/2), or rarely with lips entire, lobes subequal to unequal, throat straight to strongly oblique; corolla 2-lipped, 5-lobed (2/3), blue, violet, pink, yellow or white, posterior lip straight or curved, anterior lip with median lobe concave or \pm flat, undulate or entire, tube included in or exerted from calyx, straight or curved, gradually or \pm abruptly dilating upwards; stamens of hermaphrodite flowers 4, rarely 2 with anterior pair absent, usually shorter than corolla, filaments parallel, thecae divergent at 180° (stamens of male-sterile flowers rudimentary); stigma-lobes subequal; disc 4-lobed; nutlets ellipsoid to obovoid, rounded to acuminate, smooth to tuberculate, glabrous or hairy at apex, mucilaginous or not. $2n = 14, 16, 18, 30, 32, 34, 36, 54$. Over 200 species. Mainly in mountains, semi-deserts and steppes of Eurasia, extending into North Africa. Some cultivated for medicinal use or ornament. For a synopsis of infrageneric classification, see Budantsev (1993).

179. *Drepanocaryum* Pojark.

Drepanocaryum Pojark., Fl. U.R.S.S. 20: 516 (1954); Budantsev, Bot. Zhurn. 77, 12: 118-128 (1992), rev.

Annual herbs, not aromatic; leaves simple, petiolate; inflorescence thyrsoid, cymes axillary, long-pedunculate, distant; bracts similar to the leaves, bracteoles subulate to acerose, inconspicuous; calyx markedly oblique-gibbous at base, weakly 2-lipped, 5-lobed (3/2), lobes subequal or anterior lobes slightly longer, triangular, throat \pm straight; corolla slightly exceeding calyx, 2-lipped, 5-lobed (2/3), blue-lilac, anterior lip with median lobe concave, margin undulate, tube gradually widening above; stamen-filaments parallel, thecae glabrous, divergent at 180°; stigma-lobes subequal; disc 4-horned; nutlets globose, tuberculate, mucilaginous, areole large, curved. One species, *D. sewerzowii* (Regel) Pojark. Mountains, W and C Asia.

180. *Lophanthus* Adans.

Lophanthus Adans., Fam. Pl. 2: 194 (1763); Budantsev, Bot. Zhurn. 77, 9: 69-77 (1992), rev.

Perennial herbs or subshrubs, aromatic; leaves simple; inflorescence thyrsoid, terminal, spike-like or in ovoid heads or paniculate, cymes often long-pedunculate or shortly pedunculate in axils of leaf-like bracts, bracteoles subulate, inconspicuous; flowers resupinate; calyx tubular or tubular-campanulate, indistinctly 2-lipped, 5-lobed, (3/2), lobes unequal, triangular, throat open, calyx-tube annulate within; corolla strongly 2-lipped, 5-lobed, (2/3), blue-violet or pink, anterior lip 3-lobed, median lobe concave or flat, margin undulate or entire, lateral lobes deltoid to ovate, posterior lip 2-lobed, tube gradually widening above, exerted or included in calyx; stamens exerted or included, filaments parallel, thecae parallel or divergent at acute angle; stigma-lobes subequal; disc 4-lobed; nutlets trigonous to ellipsoid, smooth or tuberculate. $2n = 16$. Circa 20 species. Mountains of Afghanistan, C Asia, Mongolia and China. Some species used medicinally.

181. *Hymenocrater* Fisch. & C.A. Mey.

Hymenocrater Fisch. & C.A. Mey., Index Sem. Hort. Bot. Petropol. 2: 39 (1835); Budantsev, Bot. Zhurn. 77, 12: 118-128 (1992), rev.

Shrubs, subshrubs or perennial herbs, aromatic; leaves simple, strongly toothed; inflorescence

thyrsoid, spike-like or interrupted, cymes long- to short-pedunculate or sessile; bracts leaf-like, oblong-elliptic to \pm ovate, bracteoles inconspicuous; flowers sometimes resupinate; calyx tubular, campanulate, straight or curved, annulate within, actinomorphic or indistinctly 2-lipped, 5-lobed (3/2), lobes subequal, broadly ovate, becoming patent, accrescent in fruit, membranous-scarious, often pale green, rose or purplish, tube funnel-shaped, distinctly ribbed; corolla 2-lipped (2/3), blue-violet, posterior lip shortly 2-lobed, anterior lip with median lobe concave or flat, margins undulate or entire, tube elongate, straight, narrow, gradually widening above; stamens exerted or included, filaments parallel, thecae divergent at 180°; stigma-lobes slightly unequal; disc 4-lobed; nutlets ovoid or elliptic, smooth or tuberculate. $2n = 18$. About ten species, Iran and Afghanistan. Some medicinal, ornamental.

182. *Marmoritis* Benth.

Marmoritis Benth., Hooker's Bot. Misc. 3: 377 (1833); Budantsev, Bot. Zhurn. 77, 12: 118-128 (1992), rev.
Phyllophyton Kudo (1929).
Pseudolophanthus Levin (1941).

Perennial herbs, aromatic; flowering stems erect or ascending, densely leafy above and bare below with small scale-leaves and long rhizomes; leaves simple, sessile or subsessile, densely imbricate, \pm orbicular to reniform; inflorescence thyrsoid, terminal, cymes few-flowered, sessile, partially obscured in axils of upper leaf-like bracts; bracteoles entire, linear, shorter than calyces; flower resupinate or not; calyx tubular or campanulate, curved or \pm straight, indistinctly 2-lipped, 5-lobed (3/2), lobes ovate to linear, posterior lobes longer, calyx-tube annulate or glabrous within; corolla strongly 2-lipped, 5-lobed (2/3), white or purplish, posterior lip short, straight, bifid, anterior lip with median lobe oblong or orbicular, lateral lobes oblong-ovate, tube gradually dilated towards apex, exerted; stamens included or exerted, filaments parallel, thecae parallel or divergent at 90°; stigma-lobes subequal; nutlets oblong, smooth, glabrous. Four or five species. High alpine screes of the Himalaya and China.

183. *Agastache* J. Clayton ex Gronov.

Agastache J. Clayton ex Gronov., Fl. Virgin.: 88 (1762); Lint & Epling, Am. Midl. Nat. 33: 207-230 (1945), rev.; Sanders, Syst. Bot. Mon. 15: 1-92 (1987), rev. section; Budantsev, Bot. Zhurn. 78, 2: 106-115 (1993), rev.
Dekinia M. Martens & Galeotti (1844).

Perennial herbs, aromatic; leaves simple, dentate; inflorescence thyrsoid, terminal, spike-like or panicle-like, cymes pedunculate or sessile; bracts reduced, lower often leaf-like, bracteoles subulate; calyx tubular or campanulate, straight, indistinctly 2-lipped, 5-lobed (3/2), lobes equal, throat open; corolla strongly 2-lipped, 5-lobed (2/3), pink, blue to violet or white, posterior lip straight, anterior lip with median lobe widest, spreading, entire or undulate, lateral lobes straight, tube gradually dilating to throat; stamens much exerted or included, filaments parallel or posterior pair antrorsely bent, thecae parallel; stigma-lobes equal, spreading; disc 4-lobed; nutlets ellipsoid to obovoid, smooth with apex hairy, areole oblong or orbicular. $2n = 18$. About 22 species. Mountains or deserts of U.S.A., southern Canada and Mexico, one species in W Asia. Sectional treatment after Sanders (1987). Sect. *Agastache*: stamens long-exserted, filaments of posterior stamens antrorsely bent, and crossing anterior pair. Seven species in U.S.A. and Canada, one species in Asia. Sect. *Brittonastrum* (Briq.) Lint & Epling: stamens included or shortly exerted under posterior lip of corolla, filaments of stamens all parallel. 14 species. SW United States and Mexico.

184. *Meehanian* Britton

Meehanian Britton, Bull. Torrey Bot. Club. 21: 32 (1894); Budantsev, Bot. Zhurn. 77, 12: 118-128 (1992), rev.

Annual or perennial, stoloniferous herbs, not aromatic; leaves simple, dentate; inflorescence thyrsoid, terminal, cymes pedunculate or sessile, few-flowered or sometimes solitary, lax, in axils of leaf-like bracts, bracteoles subulate, inconspicuous; flowers usually large; calyx tubular to campanulate, accrescent in fruit, 2-lipped, 5-lobed (3/2), lobes triangular to lanceolate, acute, those of anterior lip shorter; corolla strongly 2-lipped, 5-lobed (2/3), blue-violet to purplish, posterior lip straight, apex emarginate or 2-lobed, anterior lip with median lobe widely obovate-ovoid, concave, entire or slightly undulate, tube long-exserted, widely and abruptly dilated at throat; stamens shorter than corolla, filaments parallel, thecae parallel, papillose; stigma-lobes subequal; disc 4-lobed; nutlets orbicular to elliptic, hairy, areole orbicular. $2n = 18$. About six species. Temperate or subtropical eastern Asia, one species in N America.

185. *Glechoma* L.

Glechoma L., Sp. Pl. 2: 578 (1753); Budantsev, Bot. Zhurn. 77, 12: 118–128 (1992), rev. *Meehaniopsis* Kudó (1929).

Stoloniferous perennial herbs, not aromatic, often gynodioecious; leaves simple; inflorescence of distant, few-flowered cymes, shortly pedunculate to sessile, in axils of leaf-like bracts, bracteoles subulate, inconspicuous; calyx tubular to campanulate, slightly curved near throat, indistinctly 2-lipped, 5-lobed (3/2), lobes equal, broadly triangular to linear; corolla strongly 2-lipped (2/3), blue-violet, lilac or pink, posterior lip straight, 2-lobed, anterior lip with median lobe flat or concave, flabellate or reniform, margin undulate or entire, tube longer than calyx, gradually or abruptly dilated towards throat; stamens of hermaphrodite flowers exerted from tube, included under lip of corolla, inserted near throat, filaments parallel, thecae divergent at 90°; nutlets oblong-ovoid, smooth, areole basal, orbicular or elliptic. $2n = 18, 24, 36$. Four to eight species. Mostly in grasslands, forest margins and stream sides of temperate Eurasia; cultivated in N and S America.

186. *Dracocephalum* L.

Dracocephalum L., Sp. Pl. 2: 594 (1753); Budantsev, Bot. Zhurn. 72, 2: 260–267 (1987), rev. *Moldavica* Fabr. (1759).

Herbs, annual or perennial, or subshrubs, aromatic; leaves entire, dentate or pinnatisect; inflorescence thyrsoid, terminal, usually condensed, spike-like or capitate, cymes sessile or peduncles very short; bracts entire or lobed, usually aristate, sometimes coloured or leaf-like, bracteoles often similar to bracts but smaller, or subulate, often aristately toothed; calyx tubular to campanulate, straight or slightly curved, 2-lipped, 5-lobed (3/2), lobes often aristate, upper lip with lobes equal or median lobe clearly larger than laterals, lower lip with lobes shorter, sinuses between lobes with swollen folds at base, throat glabrous within; corolla 2-lipped, 5-lobed (2/3), blue to violet, pink or white, posterior lip straight or slightly concave, subentire or bifid, anterior lip with median lobe largest, tube gradually or abruptly widening from base; stamens included under posterior corolla-lip, rarely exerted, parallel, thecae pilose or glabrous, divergent at 180°; stigma-lobes subequal; disc 4-lobed; nutlets ovoid-oblong, weakly trigonous, apically truncate-rounded or slightly flattened, smooth, mucilaginous or not; areole arcuate. $2n = 10, 12, 14, 18, 20, 36, 72$. About 70 species. Usually montane, Eurasia, N Africa (one species), N America (one species). Some species medicinal, ornamental or bee plants. Three subgenera after Budantsev (1987): *Dracocephalum* (stamens included, anthers glabrous – seven sections), *Fedtschenkiella* (Kudr.) Schischk. (stamens exerted, anthers glabrous), *Ruy-schiana* (Mill.) Briq. (stamens included, anthers pubescent).

187. *Lallemantia* Fisch. & C.A. Mey.

Lallemantia Fisch. & C.A. Mey., Index Sem. Hort. Bot. Petropol. 6: 52 (1839).

Annual or biennial herbs; leaves simple; inflorescence thyrsoid, terminal, spike-like or oblong, often interrupted, cymes few-flowered, sessile or rarely on very short peduncles in axils of leaf-like bracts, bracts ovate to linear, weakly toothed to entire, rarely aristate above, bracteoles ovate to rotund or sometimes linear, aristate-toothed; pedicels flattened, erect; calyx tubular, straight or curved, 2-lipped, 5-lobed (3/2), lobes unequal, triangular, aristate, posterior lip with median lobe broadest, sinus between calyx-lobes with a thickened fold or not, throat closed by connivent lips in fruit; corolla strongly 2-lipped (2/3), posterior lip with 2 longitudinal folds inside, anterior lip with lateral lobes directed downwards, tube widening above; stamens included under corolla-lip, filaments parallel, thecae glabrous, divergent at 180°; stigma-lobes subequal; disc 4-lobed; nutlets oblong, trigonous, smooth, mucilaginous. $2n = 14$. Five species. Mediterranean, SW and C Asia. Some medicinal, seed oils.

188. *Cedronella* Moench

Cedronella Moench, Meth. Pl.: 411 (1794); Budantsev, Bot. Zhurn. 78, 2: 106–115 (1993), rev.

Perennial herbs, aromatic; leaves 3(–5)-foliolate, dentate; inflorescence thyrsoid, terminal, spike-like or ovoid, cymes shortly pedunculate to sessile; bracts usually small, linear, coloured, bracteoles inconspicuous; calyx tubular, slightly curved and dilated towards throat, actinomorphic, campanulate in fruit, 5-lobed, lobes equal, narrowly triangular, acute, ± spine-tipped, throat open, slightly oblique; corolla strongly 2-lipped, 5-lobed (2/3), pinkish, posterior lip ± flattened, emarginate, anterior lip with median lobe larger, obovate, margin undulate, concave, tube exerted from calyx,

abruptly dilated towards throat; stamens attached near throat, included under posterior lip of corolla, filaments parallel, thecae distinct, parallel; stigma-lobes subequal; disc 4-lobed; nutlets elliptic, smooth, glandular-pubescent, areole orbicular. $2n = 10$. One species, *Cedronella canariensis* (L.) Webb & Berth., Canary Is. and Madeira.

189. *Schizonepeta* (Benth.) Briq.

Schizonepeta (Benth.) Briq. in Engler & Prantl, Nat. Pflanzenfam. IV, 3a: 235 (1896); Budantsev, Bot. Zhurn. 78, 2: 106–115 (1993), rev.

Annual or perennial herbs, aromatic; leaves entire to bipinnate; inflorescence thyrsoid, cymes sessile, terminal, crowded into spike-like, usually unbranched heads; bracts, except sometimes the lowest, reduced, sometimes broadly ovate, coloured, or subulate, inconspicuous, bracteoles subulate, inconspicuous; calyx straight or weakly oblique, actinomorphic or 2-lipped, 5-lobed, lobes ovate-oblong to lanceolate, acute or attenuate into spinulose awns, sinuses between anterior teeth with swollen folds at base; corolla strongly 2-lipped, 5-lobed (2/3), white or blue-violet, posterior lip straight, anterior lip with median lobe flat or scarcely concave, entire to crenate, tube included or scarcely exerted from calyx, gradually widening above; stamens with anterior pair antorsely bent, posterior pair arcuate-ascending under upper lip, thecae divergent at 90° or at an acute angle; stigma-lobes subequal; disc 4-lobed; nutlets oblong to elliptic, smooth, mucilaginous or not. $2n = 12$. Three species. Steppes of southern Siberia, Mongolia and China.

VII.2.D. TRIBE MENTHEAE: INCERTAE SEDIS**190. *Melissa* L.**

Melissa L., Sp. Pl. 2: 592 (1753).

Perennial herbs, ± rhizomatous, aromatic; leaves simple, toothed; inflorescence of axillary verticillasters, widely spaced, with 2–16 flowers per verticillaster; bracts leaf-like, bracteoles small, patent; flowers with curved pedicels; calyx 2-lipped, 5-lobed (3/2), ± campanulate, lobes upcurved, ciliate, posterior lip with lobes very short, lower lip with lobes long-triangular, tube 13-nerved; corolla 2-lipped, hairy, white, cream or reddish, posterior lip shorter, with lobe rounded and emarginate, anterior lip with median lobe semi-orbicular, deflexed, lateral lobes very small, ± triangular, corolla-tube

dilated at throat; stamens 4, didynamous, exerted from tube, anterior pair longer, filaments ± straight, thecae divergent, confluent at base; stigma-lobes subulate, subequal; nutlets ovoid, smooth, mucilaginous. $2n = 32, 34, 64$. Four species, usually in forests, Europe, N Africa, Macaronesia and Asia. Plants used as a source of essential oils, both medicinally and as flavouring.

191. *Heterolamium* C.Y. Wu

Heterolamium C.Y. Wu, Acta Phytotax. Sin. 10: 254 (1965).

Slender perennial herb; leaves cordate, toothed, long-petiolate; inflorescence secund, of 1–3-flowered cymes, shortly pedunculate to sessile, in axils of reduced bracts, forming an elongate, terminal thyrse; bracteoles inconspicuous; calyx often purple-tinged, cylindrical to campanulate, strongly 2-lipped, 5-lobed (3/2), posterior lip with median lobe broadly ovate, rounded at apex, slightly spreading and weakly decurrent on tube at base, lateral lobes shortly triangular-acuminate, anterior lip longer, with sinus between lobes shorter, tube slightly gibbous at base, 15-nerved, annulate within, below throat; corolla white, strongly 2-lipped, 5-lobed (4/1), posterior lip of 4 short, rounded, subequal lobes, anterior lip longer, with lobe slightly concave, rounded, tube narrowly cylindrical, straight, exerted from calyx, and abruptly expanded above, exannulate; stamens 4, didynamous, long-exserted, ascending under upper lip, later becoming slightly divergent, posterior pair longer at early anthesis, anterior pair apparently extending later, anthers 2-theous, thecae elliptic, widely divaricate, confluent at apex; style exerted, stigma-lobes subequal, subulate, spreading; disc 4-lobed, anterior lobe elongate; nutlets oblong-ovoid, smooth to finely striate, with small, elliptic areole. One species, *H. debile* (Hemsl.) C.Y. Wu, with several varieties, China.

VII.3. TRIBE OCIMEAE Dumort. (1829).

Aromatic herbs, shrubs or rarely trees. Stamens declinate to porrect (Fig. 29), anthers synthecous, dorsifixed. Disc with lobes alternate to or opposite ovary-lobes.

1. Inflorescence congested, spiciform, terminal at the end of a long axis (but see *Hyptis*). Posterior calyx-lobe often appendaged. Stamens included in corolla-tube. Disc-lobes opposite ovary-lobes. a. *Lavandulinae*: 192. *Lavandula* – Inflorescence thyrsoid. Posterior lobe sometimes larger than others, sometimes decurrent on tube, but not appendaged. Stamens exerted from tube (except *Endoste-*

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Authorship

(Genera indicated by number)

Harley, R.M.: *Introduction, but see also Grayer and Harley, M.M., *Symphorematoideae: 1–3, Nepetoideae: *Elsholtziaceae: 122–126, Mentheae: *Salviaceae: 127–131, 132 (joint), 133–134, *Menthinae: 137, 140–145, 147–149, 151, 153–154, 156–165, 170, 172, Mentheae: inc. sed.: 191. *Hyptidinae 196–203, Labiatae inc. sed. 236. Atkins and Kok: *Viticoideae: 4–13. Labiatae inc. sed.: 227–229. Budantsev: Lamiioideae: 75, 82, 94, 96, 101,

107–108, 110, 112–113, 117, *Nepetinae: 178–189. Cantino: *Ajugoideae: 14–37, *Scutellarioideae: 54–57, 58 (joint), Lamiioideae 76–80, Menthinae: 135, 150, 152, 155, 166–169, 171, 173–174, Labiatae inc. sed.: 230–235. Conn: *Prostantheroideae: 38–53. Grayer: Introduction: chemistry. Harley, M.M.: Introduction: pollen (incl. plate). Krestovskaja: Lamiioideae: 97–100. Morales: Lamiioideae: 103, Salviaceae: 132 (joint), Menthinae: 136, 138–139, 143, 146, 154, 175–177, Mentheae: inc. sed.: 190. Paton: Scutellarioideae: 58 (joint), *Hanceolinae: 193–195, *Ociminae: 204–215, *Plectranthinae: 216–226. Ryding: *Lamiioideae: 59–74, 81, 83–93, 95, 104–106, 109, 111, 114–116, 118–121. Upson: *Lavandulinae: 192.

* Principal author of section indicated.

102: ?? auto
Pteridium