

## Computer-Generated Keys to the Flora of Egypt. 8. The Lamiaceae

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**M**ANUALLY-constructed keys to many groups of the Egyptian flora are in urgent need of improvement and updating. To construct a conventional substitute of the key to representatives of the Lamiaceae, a data matrix was compiled to include 48 characters recorded for each of the 52 species (with three subspecies and one variety) belonging to 24 genera which represent this family in the flora of Egypt. The 48 characters were accurately defined to cover as much of the easily observable aspects of vegetative and floral variation in the plants as possible. The data matrix was analyzed using the key-generating package of programs DELTA. The analysis produced a conventional key with a detailed description of every species in terms of the 48 characters. The key is decidedly a marked improvement over its predecessors in that it is strictly comparative. Updating the nomenclature of the plants led to the first recording of the genus *Thymbra* in the flora of Egypt.

**Keywords:** Conventional key, DELTA, Egypt, Flora, Lamiaceae, *Thymbra*.

### Introduction

The Lamiaceae Lindl. (*nom.altern.* Labiatae Juss.) is a relatively large family with 240-255 genera encompassing 6900-7200 species (Bergianska, 2014 and Chase et al., 2016). The plants are predominantly annual or perennial herbs, but may be shrubs or small trees (e.g., most *Hyptis* spp.). The stem is usually erect but may be prostrate or rhizomatous (e.g., some *Mentha* spp.); young stems are quadrangular in cross-section; pith solid or hollow; nodes are consistently unilacunar with 1-2 traces per leaf gap. The density of indumentum on vegetative organs ranges from entirely glabrous to thickly pilose or white-tomentose. Epidermal trichomes frequently found in various combinations on vegetative and floral parts are uni- or multicellular, glandular or eglandular, simple, branched, stellate, or 'dendroid'. The leaves are usually opposite decussate, whorled only in *Dysophylla* (El-Gazzar & Watson, 1967), consistently ex-stipulate, petiolate or sessile, simple to variously dissected, flat or ericoid with recurved margins as in some *Lavandula* spp. and *Rosmarinus officinalis* (El-Gazzar & Watson, 1970). The inflorescence is a terminal spike, a globose aggregate of cymes or a lax-dense

verticillasters in acropetal succession where the number of flowers per bract axil varies from 1 to many. Bracts are usually broad and leafy; bracteoles are often absent. The flower is hermaphrodite, pentamerous, hypogynous and strongly zygomorphic. Calyx of 5 united persistent sepals, usually 2-lipped, with 2-5 teeth, or with 10 teeth in some *Leucas* and *Marrubium* species; teeth are rarely equal and the calyx is regular (e.g., in *Mentha*). Corolla of 5 united petals, often showy, 2-lipped, configuration is often characteristic of most genera; upper lip of two lobes, commonly vaulted (e.g., *Lamium*, *Salvia*), glabrous or with a thick tuft of hairs on its outer surface (e.g., in *Lamium*, *Phlomis*), but may be short or absent (e.g., in *Teucrium* and *Ajuga*). Lower lip consists of 3 unequal and variously shaped lobes. Stamens 2 or 4, epipetalous, the posterior stamen is usually absent or present as a minute staminode (e.g., in *Rosmarinus*), exserted or included in corolla; filaments hairy or glabrous, straight or curved and included in the vault of the upper or lower corolla lip; anthers usually dithecal or monothecous, thecae divaricated or parallel. In *Salvia*, filaments of the two stamens are short and the two lobes of each anther are widely separated by a long filiform connective which forms a lever-like structure

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with the staminal filament thus giving the stamen a high degree of versatility suited for pollination by insects (El-Gazzar et al., 1968 and Walker & Sytsma, 2007). Gynoecium is 2-carpellate, usually 4-locular by intrusion of carpel wall forming 'false septum'. Ovary is often 4-locular with 1 ovule per locule, glabrous or hairy, with a gynobasic style, or entire and 4-ovuled (e.g., in *Ajuga*, *Teucrium*) with a terminal style. Ovary usually on a fleshy, entire, irregularly or often 4-lobed nectariferous disc, usually anterior lobe is longer than others. Style is glabrous or hairy, usually with 2 equal or unequal stigmatic arms, sometimes entire with 1 stigma-lobe vestigial, or stigma capitate or very rarely 4-lobed. A 4-loculed ovary develops into four 1-seeded mericarps (nutlets), sometimes fewer by abortion; mericarps often with sculptured, tuberculate, hairy or rarely winged pericarp, mucilage cells often present. An entire ovary develops into a drupe.

The Lamiaceae are cosmopolitan but with a marked absence in areas with extremely harsh environmental conditions in the Arctic Circle, the African Sahara, central Arabia and the expanses of the Mongolian desert. Most genera and species show a marked preference for the temperate environment (Watson & Dallwitz, 1992 onwards).

Numerous members of Lamiaceae are rich in strongly aromatic essential oils in their shoot system (Guenther, 1974 and Hegnauer, 1966), while others have copious amounts of fixed oils in their seeds (Hagemann et al., 1967). Species of many genera (e.g., *Lavandula*, *Mentha*, *Origanum*) derive their economic importance from their production of essential oils which are the main constituents of perfumes, toothpastes and food and drink flavoring additives. Species of other genera (e.g., *Rosmarinus officinalis*, *Salvia officinalis*) are commonly used as culinary herbs. Essential oils of many species have for centuries been used worldwide to treat various ailments (Balali et al., 2012 and Mikaili et al., 2013), as antioxidants (Hussain et al., 2011 and Delnavazi et al., 2014), antibacterial (Stefanakis et al., 2013), antifungal (Medjahed et al., 2016), insecticides (Mossa, 2016) and several medicinal applications (e.g., Caldas et al., 2014). A few herbaceous species (e.g., *Salvia splendens*, *Salvia coccinea*, *Molucella laevis*) are grown as garden ornamentals.

The Lamiaceae are represented in the flora

of Egypt by 23 genera and 54 species (Boulos, 2002), including *Clerodendrum acerbianum* which traditionally belonged in the Verbenaceae but was among the taxa transferred to Lamiaceae by Cantino (1992). Manually constructed keys to these taxa were provided by Muschler (1912), Montasir & Hassib (1956), Täckholm (1956, 1974), El-Husseini (1986) and Boulos (2002). The same as all manually constructed keys, those of the Lamiaceae (and several other families with relatively large representation in the local flora) are in urgent need for updating and improvement. Hence, the ongoing work on benefiting from the inherent versatility of the package of key-generating computer programs DELTA in constructing much improved identification keys to these groups. Previous studies in this series dealt with the Leguminosae (Mimosoideae and Caesalpinioideae), Chenopodiaceae, Pantaginaceae, Solanaceae, Leguminosae-Papilionoideae, Boraginaceae and Acanthaceae *s.l.* (El-Gazzar et al., 2008 a, b; 2009 a, b; 2012 and 2015 a, b, respectively).

### **Materials and Methods**

Specimens of 52 species (with three subspecies and one variety) belonging to 24 genera of the Lamiaceae were obtained from the herbarium of the Faculty of Science, Cairo University. Identification of all taxa was accurately scrutinized according to El-Gazzar (1969) and El-Husseini (1986), and updated according to the two major nomenclatural databases [<http://www.theplantlist.org/>] and [<http://www.tropicos.org/>].

Available specimens of the 54 taxa (52 species, three subspecies and one variety) were examined in detail for any easily observable and seemingly stable aspects of variation in vegetative and floral morphology. The 48 characters which met these two basic criteria were recorded comparatively for every species in a data matrix which was subjected to analysis under the program suit DELTA (Dallwitz et al., 2000) to generate a conventional identification key and detailed description of every taxon in terms of the recorded characters.

### **Results**

#### *The characters*

The 48 characters recorded comparatively for the 54 taxa belonging to 24 genera representing the Lamiaceae in the flora of Egypt are listed in

Table 1. The numbers of qualitative, multistate and quantitative characters in that list are 38, 7 and 3, respectively. The wide range of variation in leaf morphology provided a wealth of potentially useful characters. Thus, leaf blades may be simple (Figs. 1-7), 3-lobed (Fig. 8), partially pinnate (Fig. 9), pinnate (Fig. 10) or bi- to tri-pinnate with filiform to broad pinnae and pinnules (Fig. 11). The following shapes of leaf blades were observed:

- 1- Linear-lanceolate, the blade is at least 6 times as long as broad (Fig. 1),
- 2- Oblong-ovate, with acute or obtuse apex and

- rotund to cuneate base (Figs. 2-4),
- 3- Cordate, similar to the preceding but with deep base (Fig. 5), and
- 4- Fan-shaped (Fig. 7).

The leaves are sessile-subsessile (Figs. 1, 6) or conspicuously petioled (Figs. 2-5, 7-11), uninerved (Fig. 1), or with palmate (Figs. 7 and 8) or pinnate venation (Fig. 5). The leaf margin ranges from entire (Figs. 1, 3, 6) to finely or coarsely denticulate-serrate (Figs. 2, 4), or irregularly sinuate (Fig. 5). Leaf surface is either smooth (Figs. 3, 4), white tomentose (Fig. 7) or rugose (Figs. 2, 5).

**TABLE 1. List of the 48 characters and character-states recorded comparatively for 24 genera and 54 taxa representing the Lamiaceae in the flora of Egypt and used to construct a conventional key to them [\*= Multistate character; \*\*= Quantitative character].**

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#1. Plant/1. herbaceous/2. woody/
#2. Stem/1. hairy/2. glabrous/
#3. Stem/1. square/2. terete/
#4. Stem/1. erect/2. prostrate/
#5. Stolons/1. present/2. absent/
#6. Leaves/1. petioled/2. sessile-subsessile/
#7. Leaves/1. simple/2. 3-lobed/3. partially pinnate/4. uni- to bi-pinnate/*
#8. Leaf blade/1. linear-lanceolate/2. oblong-ovate/3. cordate/4. orbicular/5. fan-shaped/*
#9. Leaf blade/cm long/**
#10. Leaf blade/cm broad/**
#11. Leaf veins/1. prominent/2. not prominent/
#12. Leaf veins/1. black/2. not black/
#13. Leaf margin/1. entire/2. denticulate-serrate/3. sinuate/*
#14. Leaf margin/1. revolute/2. flat/
#15. Leaf apex/1. acute/2. obtuse/
#16. Leaf surface/1. smooth/2. rugose/
#17. Leaves/1. white-tomentose/2. not white-tomentose/
#18. Leaf/1. uninerved/2. venation palmate/3. venation pinnate/*
#19. Inflorescence/1. lax verticillasters/2. dense spike-like/3. terminal globose aggregate/*
#20. Flowers/1. pedicelled/2. sessile/
#21. Calyx/1. bilabiate/2. nearly regular/
#22. Calyx/1. funnel-shaped/2. not funnel-shaped/
#23. Calyx veins/1. prominent/2. not prominent/
#24. Calyx teeth/1. 5 or less/2. 8-10/
#25. Calyx teeth/1. hooked/2. not hooked/
#26. Calyx teeth/1. spiny-tipped/2. not spiny-tipped/
#27. Posterior sepal/mm long/**
#28. Veins in calyx tube/1. 5/2. 10/3. 13/4. 15/*
#29. Outer surface of petal lobes/1. hairy/2. glabrous/
#30. Upper lip of corolla/1. vaulted/2. flat-deflexed/3. nearly equal to lower lip/4. reduced/*
#31. Corolla tube/1. included in calyx/2. much longer than calyx/
#32. Stamens/1. 2/2. 4/
#33. Stamens/1. exerted/2. included/

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TABLE 1. Cont.

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#34. Staminal filaments/1. hairy/2. glabrous/
#35. Filament-connective attachment/1. lever-like/2. not lever-like/
#36. Ovary/1. hairy/2. glabrous/
#37. Style/1. hairy/2. glabrous/
#38. Style/1. terminal/2. gynobasic/
#39. Stigma/1. capitate/2. 2 elongate arms/
#40. Stigmatic lobes/1. equal/2. unequal/
#41. Fruit/1. 4 nutlets/2. drupe/
#42. Glandular hairs on leaves/1. present/2. absent/
#43. Sessile glandular hairs on leaves/1. present/2. absent/
#44. Stalked glandular hairs on leaves/1. present/2. absent/
#45. Branched hairs on leaves/1. present/2. absent/
#46. Sessile glandular hairs on calyx/1. present/2. absent/
#47. Stalked glandular hairs on calyx/1. present/2. absent/
#48. Branched hairs on calyx/1. present/2. absent/

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**Figs. 1-11. Images illustrating the variation in leaf morphology of Lamiaceae. 1. *Ajuga iva*: Linear, uninerved; 2. *Phlomis floccosa*: Oblong with rotund base; 3. *Ziziphora capitata*: Oblong with cuneate base; 4. *Otostegia fruticosa*: Ovate; 5. *Salvia spinosa*: Ovate with cordate base; 6. *Mentha longifolia*: Sessile, entire margin; 7. *Marrubium alysson*: Fan-shaped, white-tomentose, palmate venation, veins black; 8. *Ajuga chamaepytis*: 3-lobed; 9. *Salvia palaestina*: Partially pinnate; 10. *Lavandula canariensis*: Pinnate; 11. *Eremostachys laciniata*: Tri-pinnate.**

The DELTA package produces conventional keys and detailed descriptions of the taxa in natural language. When those keys and descriptions become in need of updating by adding more taxa and/or characters, the original data matrix will be

required; copies of the list of characters and the data matrix are available on request from A.A. El-Kady (alaa.elkady885@yahoo.com) or B.S. El-Saeid (baraa\_elsaeid@yahoo.com).

**The bracketed Key**

*Characters:* 48 indata, 45 included, 37 in key.

*Items:* 54 indata, 54 included, 54 in key.

*Parameters:* Rbase = 1.40 Abase = 2.00 Reuse = 1.01 Varywt = 0.80

*Characters included:* 1–8 11–26 28–48

*Character reliabilities:* 1–48,5

- |        |  |  |
|--------|--|--|
| 1.     | Upper lip of corolla vaulted .....   | 2  |
|        | Upper lip of corolla flat-deflexed .....   | 11   |
|        | Upper lip of corolla nearly equal to lower lip .....   | 34   |
|        | Upper lip of corolla reduced .....   | 37   |
| 2(1).  | Leaf margin entire .....   | 3  |
|        | Leaf margin denticulate-serrate .....  | 4  |
|        | Leaf margin sinuate .....  | 9  |
| 3(2).  | Leaf veins prominent; Leaf surface rugose; Leaves not white-tomentose;<br>Calyx nearly regular.....                      | <i>Phlomis aurea</i> Decne.  |
|        | Leaf veins not prominent; Leaf surface smooth; Leaves white-tomentose;<br>Calyx bilabiate .....                          | <i>Salvia multicaulis</i> Vahl   |
| 4(2).  | Veins in calyx tube 10 .....   | 5  |
|        | Veins in calyx tube 13 .....   | 8  |
|        | Veins in calyx tube 15 .....   | <i>Phlomoïdes laciniata</i> (L.) Kamelin & Makhm.                                  |
| 5(4).  | Leaf apex acute; Leaf venation pinnate; Stamens 2; Filament-connective attachment lever-like .....                       | 6  |
|        | Leaf apex obtuse; Leaf venation palmate; Stamens 4; Filament-connective attachment not lever-like .....                  | 7  |
| 6(5).  | Leaf veins prominent; Leaf blade oblong-ovate; Leaves white-tomentose;<br>Flowers sessile .....                          | <i>Salvia dominica</i> L.  |
|        | Leaf veins not prominent; Leaf blade cordate; Leaves not white-tomentose;<br>Flowers pedicelled .....                    | <i>Salvia spinosa</i> L.   |
| 7(5).  | Leaf surface smooth; Leaves white-tomentose; Calyx bilabiate;<br>Calyx teeth 5 or less .....                             | <i>Otostegia fruticosa</i> (Forssk.) Schweinf. ex Penzig ssp. <i>fruticosa</i>     |
|        | Leaf surface rugose; Leaves not white-tomentose; Calyx nearly regular;<br>Calyx teeth 8-10 .....                         | <i>Phlomis floccosa</i> D. Don   |
| 8(4).  | Leaf veins prominent; Leaf apex acute; Leaves partially pinnate; Leaf margin flat .....                                  | <i>Salvia verbenaca</i> L.   |
|        | Leaf veins not prominent; Leaf apex obtuse; Leaves simple;<br>Leaf margin revolute .....                                 | <i>Salvia lanigera</i> Poir. in Lam.   |
| 9(2).  | Leaf veins prominent; Veins in calyx tube 10; Leaves simple; Corolla tube included in calyx .....                        | 10   |
|        | Leaf veins not prominent; Veins in calyx tube 13; Leaves partially pinnate;<br>Corolla tube much longer than calyx ..... | <i>Salvia palaestina</i> Benth.  |
| 10(9). | Leaf apex acute; Plant herbaceous; Leaf surface rugose; Leaves not white-tomentose .....                                 | <i>Salvia sclarea</i> L.   |
|        | Leaf apex obtuse; Plant woody; Leaf surface smooth;<br>Leaves white-tomentose .....                                      | <i>Otostegia fruticosa</i> (Forssk.) Penzig ssp. <i>schimperi</i> (Benth.) Sebald. |
| 11(1). | Veins in calyx tube 5 .....  | <i>Origanum syriacum</i> L. ssp. <i>sinaicum</i> (Boiss.) Greuter & Burdet         |
|        | Veins in calyx tube 10 .....   | 12   |
|        | Veins in calyx tube 13 .....   | 23   |
|        | Veins in calyx tube 15 .....   | 28   |

12(11). Leaf blade linear-lanceolate .....	13
Leaf blade oblong-ovate .....	16
Leaf blade cordate .....	21
Leaf blade orbicular .....	22
Leaf blade fan-shaped .....	<i>Marrubium alysson</i> L.
13(12). Leaf margin entire; Inflorescence terminal globose aggregate .....	14
Leaf margin denticulate-serrate; Inflorescence dense spike-like .....	<i>Leucas neuflizeana</i> Courbon
Leaf margin sinuate; Inflorescence lax verticillasters .....	<i>Salvia deserti</i> Decne.
14(13). Leaf apex acute; Stigma capitate; Stigmatic lobes equal; Branched hairs on calyx absent .....	15
Leaf apex obtuse; Stigma 2 elongate arms; Stigmatic lobes unequal; Branched hairs on calyx present .....	<i>Thymbra capitata</i> (L.) Cav.
15(14). Leaves white-tomentose; Leaf uninerved; Calyx nearly regular; Calyx funnel-shaped .....	<i>Thymus decussatus</i> Benth.
Leaves not white-tomentose; Leaf venation pinnate; Calyx bilabiate; Calyx not funnel-shaped .....	<i>Thymus bovei</i> Benth.
16(12). Leaf veins black .....	17
Leaf veins not black .....	19
17(16). Leaf venation palmate; Inflorescence lax verticillasters; Calyx not funnel-shaped; Calyx teeth hooked .....	<i>Marrubium vulgare</i> L.
Leaf venation pinnate; Inflorescence dense spike-like; Calyx funnel-shaped; Calyx teeth not hooked .....	18
18(17). Calyx teeth spiny-tipped; Corolla tube included in calyx; Staminal filaments glabrous; Stigmatic lobes unequal .....	<i>Ballota saxatilis</i> Sieber ex C. Presl
Calyx teeth not spiny-tipped; Corolla tube much longer than calyx; Staminal filaments hairy; Stigmatic lobes equal .....	<i>Ballota kaiseri</i> Täckh.
19(16). Leaf veins prominent; Leaf surface rugose; Leaf venation palmate; Inflorescence dense spike-like .....	<i>Ballota pseudodictamnus</i> (L.) Benth.
Leaf veins not prominent; Leaf surface smooth; Leaf venation pinnate; Inflorescence lax verticillasters .....	20
20(19). Leaf margin entire; Leaf apex acute; Plant woody; Leaves white-tomentose .....	<i>Ocimum forsskaolii</i> Benth.
Leaf margin denticulate-serrate; Leaf apex obtuse; Plant herbaceous; Leaves not white-tomentose .....	<i>Orthosiphon pallidus</i> Royle ex Benth. in Hook.
21(12). Leaf veins prominent; Plant woody; Leaf surface rugose; Inflorescence dense spike-like.....	<i>Ballota undulata</i> (Sieber ex Fresen.) Benth.
Leaf veins not prominent; Plant herbaceous; Leaf surface smooth; Inflorescence lax verticillasters .....	<i>Lamium amplexicaule</i> L.
22(12). Leaf margin entire; Leaf apex acute; Stem erect; Leaf surface rugose .....	<i>Leucas inflata</i> Benth.
Leaf margin denticulate-serrate; Leaf apex obtuse; Stem prostrate; Leaf surface smooth .....	<i>Ballota damascena</i> Boiss.
23(11). Inflorescence lax verticillasters .....	24
Inflorescence dense spike-like .....	26
Inflorescence terminal globose aggregate .....	<i>Ziziphora capitata</i> L.
24(23). Leaf veins prominent; Leaves petioled; Flowers pedicelled; Sessile glandular hairs on leaves absent .....	25
Leaf veins not prominent; Leaves sessile-subsessile; Flowers sessile;	

- Sessile glandular hairs on leaves present ..... *Micromeria sinaica* Benth.
- 25(24). Stigmatic lobes equal ..... *Micromeria imbricata* (Forssk.) C. Chr.  
Stigmatic lobes unequal ..... *Micromeria nervosa* (Desf.) Benth.
- 26(23). Leaf veins prominent; Leaves petioled; Leaf blade oblong-ovate; Flowers pedicelled ..... 27  
Leaf veins not prominent; Leaves sessile-subsessile; Leaf blade linear-lanceolate;  
Flowers sessile ..... *Ziziphora tenuior* L.
- 27(26). Leaf margin entire; Plant woody; Stem hairy;  
Leaf margin revolute ..... *Micromeria myrtifolia* Boiss. & Hohen. in Boiss.  
Leaf margin denticulate-serrate; Plant herbaceous; Stem glabrous;  
Leaf margin flat ..... *Prasium majus* L.
- 28(11). Leaf margin entire ..... 29  
Leaf margin denticulate-serrate ..... 31  
Leaf margin sinuate ..... *Salvia aegyptiaca* L.
- 29(28). Leaf apex acute; Leaf uninerved; Corolla tube much longer than calyx;  
Staminal filaments glabrous ..... *Lavandula atriplicifolia* Benth.  
Leaf apex obtuse; Leaf venation pinnate; Corolla tube included in calyx; Staminal filaments hairy..... 30
- 30(29). Plant herbaceous; Leaves petioled; Leaf blade oblong-ovate;  
Inflorescence dense spike-like ..... *Lallemantia royleana* (Benth.) Benth. in DC.  
Plant woody; Leaves sessile-subsessile; Leaf blade linear-lanceolate;  
Inflorescence lax verticillasters ..... *Stachys aegyptiaca* Pers.
- 31(28). Inflorescence lax verticillasters ..... 32  
Inflorescence dense spike-like ..... 33
- 32(31). Leaf apex acute; Leaves uni- to bi-pinnate; Leaf venation pinnate;  
Flowers sessile ..... *Lavandula coronopifolia* Poir. in Lam.  
Leaf apex obtuse; Leaves simple; Leaf venation palmate;  
Flowers pedicelled ..... *Nepeta septemcrenata* Ehrenb. ex Benth.
- 33(31). Leaves petioled; Calyx bilabiate; Calyx veins prominent;  
Eglandular hairs on leaves absent ..... *Lavandula pubescens* Decne.  
Leaves sessile-subsessile; Calyx nearly regular; Calyx veins not prominent;  
Eglandular hairs on leaves present ..... *Lavandula canariensis* (L.) Mill.
- 34(1). Leaf veins prominent; Flowers sessile; Eglandular hairs on leaves present ..... 35  
Leaf veins not prominent; Flowers pedicelled; Eglandular hairs on leaves absent ..... 36
- 35(34). Leaves petioled; Stalked glandular hairs on  
leaves present ..... *Mentha longifolia* (L.) Huds. ssp. *typhoides* (Briq.) Harley  
Leaves sessile-subsessile; Stalked glandular hairs  
on leaves absent ..... *Mentha longifolia* (L.) Huds. var. *schimperii* (Briq.) Briq.
- 36(34). Leaf apex acute; Plant woody; Stem hairy; Stem erect ..... *Clerodendrum acerbianum* (Vis.) Benth.  
Leaf apex obtuse; Plant herbaceous; Stem glabrous; Stem prostrate ..... *Mentha pulegium* L.
- 37(1). Leaf margin entire ..... 38  
Leaf margin denticulate-serrate ..... *Teucrium decaisnei* C. Presl  
Leaf margin sinuate ..... 39

- 38(37). Inflorescence lax verticillasters .... *Ajuga chamaepitys* (L.) Schreb. ssp. *tridactylites* (Ging. ex Benth.) P.H. Davis  
 Inflorescence dense spike-like ..... *Ajuga iva* (L.) Schreb.  
 Inflorescence terminal globose aggregate ..... *Teucrium brevifolium* Schreb.
- 39(37). Plant herbaceous; Outer surface of petal lobes glabrous;  
 Stamens included; Branched hairs on leaves present ..... *Teucrium polium* L.  
 Plant woody; Outer surface of petal lobes hairy; Stamens exerted;  
 Branched hairs on leaves absent ..... *Teucrium leucocladum* Boiss.

#### Detailed descriptions

The detailed descriptions are the sets of characters-states of the 48 characters found in each taxon as recorded in the original data matrix, used in the process of key generation and retrieved from the computer.

*Ajuga chamaepitys* (L.) Schreb. ssp. *tridactylites* (Ging. ex Benth.) P.H. Davis Plant woody. Stem hairy. Stem square. Stem prostrate. Stolons absent. Leaves sessile-subsessile. Leaves 3-lobed. Leaf blade linear-lanceolate. Leaf blade 2–2.5cm long. Leaf blade 1–1.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves not white-tomentose. Leaf uninerved. Inflorescence lax verticillasters. Flowers sessile. Calyx nearly regular. Calyx funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–5 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla reduced. Corolla tube included in calyx. Stamens 4. Stamens exerted. Staminal filaments hairy. Filament-connective attachment not lever-like. Ovary glabrous. Style hairy. Style terminal. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit drupe. Eglandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Ajuga iva* (L.) Schreb. Plant herbaceous. Stem hairy. Stem square. Stem prostrate. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 3–3.5cm long. Leaf blade 0.2–0.3cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin entire. Leaf margin revolute. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf uninerved. Inflorescence dense spike-like.

Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 1–4 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla reduced. Corolla tube much longer than calyx. Stamens 4. Stamens exerted. Staminal filaments hairy. Filament-connective attachment not lever-like. Ovary glabrous. Style hairy. Style terminal. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit drupe. Eglandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Ballota damascena* Boiss. Plant woody. Stem hairy. Stem square. Stem prostrate. Stolons absent. Leaves petioled. Leaves simple. Leaf blade orbicular. Leaf blade 0.7cm long. Leaf blade 1.3cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation palmate. Inflorescence dense spike-like. Flowers pedicelled. Calyx nearly regular. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 4–7 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. Eglandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves present. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Ballota kaiseri* Täckh. Plant herbaceous. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 1.8–2cm long. Leaf blade 0.9–1.2cm broad. Leaf veins prominent. Leaf veins black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers sessile. Calyx nearly regular. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 8–10. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 6–8 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments hairy. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. Eglandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves present. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx present. Branched hairs on calyx present.

*Ballota pseudodictamnus* (L.) Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 2.5cm long. Leaf blade 2cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf venation palmate. Inflorescence dense spike-like. Flowers sessile. Calyx nearly regular. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 8–10. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 5–9 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments hairy. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. Eglandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Ballota saxatilis* Siebr ex C. Presl Plant herbaceous. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 1.2cm long. Leaf blade 0.9cm broad. Leaf veins prominent. Leaf veins black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers sessile. Calyx nearly regular. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 8–10. Calyx teeth not hooked. Calyx teeth spiny-tipped. Posterior sepal 5–9 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. Eglandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves present. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx present. Branched hairs on calyx absent.

*Ballota undulata* (Sieber ex Fresen.) Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade cordate. Leaf blade 2.5cm long. Leaf blade 2.5cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf venation palmate. Inflorescence dense spike-like. Flowers pedicelled. Calyx nearly regular. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 8–10. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–8 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments hairy. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. Eglandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves present. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Clerodendrum acerbianum* (Vis.) Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade cordate. Leaf blade 2.7–3.2cm long. Leaf blade 0.9–2.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers pedicelled. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–6 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla nearly equal to lower lip. Corolla tube much longer than calyx. Stamens 4. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style terminal. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit drupe. E glandular hairs on leaves absent. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Phlomooides laciniata* (L.) Kamelin & Makhm. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves uni- to bi-pinnate. Leaf blade oblong-ovate. Leaf blade 9.5–11cm long. Leaf blade 4–4.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers pedicelled. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 12–16 mm long. Veins in calyx tube 15. Outer surface of petal lobes hairy. Upper lip of corolla vaulted. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Lallemantia royleana* (Benth.) Benth. in DC. Plant herbaceous. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 0.9cm long. Leaf blade 0.2cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers sessile. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 4–7 mm long. Veins in calyx tube 15. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments hairy. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Lamium amplexicaule* L. Plant herbaceous. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade cordate. Leaf blade 2–2.5cm long. Leaf blade 2.2–2.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves not white-tomentose. Leaf venation palmate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 4–7 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves absent. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Lavandula atriplicifolia* Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 4.5cm long. Leaf blade 2.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves white-tomentose. Leaf uninerved. Inflorescence dense spike-like. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 1–5 mm long. Veins in calyx tube 15. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma capitate. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Lavandula canariensis* (L.) Mill. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves uni- to bi-pinnate. Leaf blade oblong-ovate. Leaf blade 1.8–2.8cm long. Leaf blade 1–1.6cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–5 mm long. Veins in calyx tube 15. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma capitate. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Lavandula coronopifolia* Poir. in Lam. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves uni- to bi-pinnate. Leaf blade oblong-ovate. Leaf blade 2.5–2.7cm long. Leaf blade 2–2.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–5 mm long. Veins in calyx tube 15. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma capitate. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Lavandula pubescens* Decne. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves uni- to bi-pinnate. Leaf blade oblong-ovate. Leaf blade 1.7cm long. Leaf blade 0.9cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers sessile. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–6 mm long. Veins in calyx tube 15. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma capitate. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves absent. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves present. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx present. Branched hairs on calyx absent.

*Leucas inflata* Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade orbicular. Leaf blade 1.2–1.6cm long. Leaf blade 0.8–1.1cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation palmate. Inflorescence dense spike-like. Flowers sessile. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 8–10. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–6 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. Eglandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves present. Branched hairs on leaves present. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx present. Branched hairs on calyx present.

*Leucas neuflyzeana* Courbon Plant herbaceous. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 1.8–2cm long. Leaf blade 0.5cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation palmate. Inflorescence dense spike-like. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 8–10. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–6 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. Eglandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Marrubium alysson* L. Plant herbaceous. Stem

hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade fan-shaped. Leaf blade 2.2cm long. Leaf blade 2.5cm broad. Leaf veins prominent. Leaf veins black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf venation palmate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx nearly regular. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 6–10 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. Eglandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Marrubium vulgare* L. Plant herbaceous. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 3–3.5cm long. Leaf blade 3.2–3.5cm broad. Leaf veins prominent. Leaf veins black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf venation palmate. Inflorescence lax verticillasters. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 8–10. Calyx teeth hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–6 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. Eglandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves present. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Mentha longifolia* (L.) Huds. var. *schimperi*

(Briq.) Briq. Plant herbaceous. Stem glabrous. Stem square. Stem erect. Stolons present. Leaves sessile-subsessile. Leaves simple. Leaf blade oblong-ovate. Leaf blade 5.5–6.5cm long. Leaf blade 2–2.6cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 1–4 mm long. Veins in calyx tube 10. Outer surface of petal lobes glabrous. Upper lip of corolla nearly equal to lower lip. Corolla tube much longer than calyx. Stamens 4. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Mentha longifolia* (L.) Huds. ssp. *typhoides* (Briq.) Harley Plant herbaceous. Stem glabrous. Stem square. Stem erect. Stolons present. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 3.6–4.2cm long. Leaf blade 1.7–2cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 1–4 mm long. Veins in calyx tube 10. Outer surface of petal lobes glabrous. Upper lip of corolla nearly equal to lower lip. Corolla tube much longer than calyx. Stamens 4. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves present. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Mentha pulegium* L. Plant herbaceous. Stem glabrous. Stem square. Stem prostrate. Stolons present. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 1.5–2.5cm long. Leaf blade 0.7–1.2cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx nearly regular. Calyx funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–3 mm long. Veins in calyx tube 10. Outer surface of petal lobes glabrous. Upper lip of corolla nearly equal to lower lip. Corolla tube included in calyx. Stamens 4. Stamens exerted. Staminal filaments hairy. Filament-connective attachment not lever-like. Ovary glabrous. Style hairy. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves absent. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Micromeria imbricata* (Forssk.) C. Chr. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 0.7–0.9cm long. Leaf blade 0.2–0.4cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin entire. Leaf margin revolute. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–4 mm long. Veins in calyx tube 13. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Micromeria myrtifolia* Boiss. & Hohen. in Boiss. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 0.6cm long. Leaf blade 0.1cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin entire. Leaf margin revolute. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers pedicelled. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–4 mm long. Veins in calyx tube 13. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Micromeria nervosa* (Desf.) Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 1.1cm long. Leaf blade 0.6cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin entire. Leaf margin revolute. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–4 mm long. Veins in calyx tube 13. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Micromeria sinaica* Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade oblong-ovate. Leaf blade 0.7–0.8cm long. Leaf blade 0.4–0.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin revolute. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 1–3 mm long. Veins in calyx tube 13. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Nepeta septemcrenata* Ehrenb. ex Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 1.7cm long. Leaf blade 1.6cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation palmate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 4–6 mm long. Veins in calyx tube 15. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 4. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Ocimum forsskaolii* Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 2.5–2.8cm long. Leaf blade 1.8–2cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–5 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens exserted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Origanum syriacum* L. ssp. *sinaicum* (Boiss.) Greuter & Burdet Plant herbaceous. Stem glabrous. Stem square. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade oblong-ovate. Leaf blade 1.4–1.6cm long. Leaf blade 0.8–1cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence terminal globose aggregate. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 1–3 mm long. Veins in calyx tube 5. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma capitate. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves present. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Orthosiphon pallidus* Royle ex Benth. in Hook. Plant herbaceous. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 0.8–1.8cm long. Leaf blade 0.5–1.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–2.5 mm long. Veins in calyx tube 10. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens exserted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma capitate. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves absent. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx present. Branched hairs on calyx absent.

*Otostigia fruticosa* (Forssk.) Scheinf. ex Penzig ssp. *fruticosa* Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 2.6cm long. Leaf blade 2cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation palmate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx bilabiate. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 6–9 mm long. Veins in calyx tube 10. Outer surface of petal lobes glabrous. Upper lip of corolla vaulted. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves present. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Otostegia fruticosa* (Forssk.) Penzig ssp. *schimperii* (Benth.) Sebald Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 3–3.5cm long. Leaf blade 2–2.3cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin sinuate. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation palmate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx bilabiate. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 4–10 mm long. Veins in calyx tube 10. Outer surface of petal lobes glabrous. Upper lip of corolla vaulted. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Phlomis aurea* Decne. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 6.7cm long. Leaf blade 2.6cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx nearly regular. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 8–10. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 9–16 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla vaulted. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves absent. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves present. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Phlomis floccosa* D. Don Plant woody. Stem

hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 7–9cm long. Leaf blade 2.5–3cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf venation palmate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx nearly regular. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 8–10. Calyx teeth hooked. Calyx teeth not spiny-tipped. Posterior sepal 14–18 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla vaulted. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style hairy. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves present. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Prasium majus* L. Plant herbaceous. Stem glabrous. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 2.5–3cm long. Leaf blade 1.7–1.9cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers pedicelled. Calyx bilabiate. Calyx funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 10–12 mm long. Veins in calyx tube 13. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style hairy. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves absent. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Salvia aegyptiaca* L. Plant woody. Stem

hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 2.5–3.2cm long. Leaf blade 0.5cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin sinuate. Leaf margin revolute. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–5 mm long. Veins in calyx tube 15. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 2. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment lever-like. Ovary hairy. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx present. Branched hairs on calyx absent.

*Salvia deserti* Decne. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 1.6–1.9cm long. Leaf blade 0.4cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin sinuate. Leaf margin revolute. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–4 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 2. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves present. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Salvia dominica* L. Plant woody. Stem hairy.

Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 3–6.3cm long. Leaf blade 1.5–2.9cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface rugose. Leaves white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers sessile. Calyx bilabiate. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 7–10 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla vaulted. Corolla tube included in calyx. Stamens 2. Stamens included. Staminal filaments hairy. Filament-connective attachment lever-like. Ovary glabrous. Style hairy. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves present. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx present. Branched hairs on calyx absent.

*Salvia lanigera* Poir. in Lam. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 3.5cm long. Leaf blade 1.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin revolute. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers sessile. Calyx bilabiate. Calyx funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–5 mm long. Veins in calyx tube 13. Outer surface of petal lobes hairy. Upper lip of corolla vaulted. Corolla tube much longer than calyx. Stamens 2. Stamens included. Staminal filaments glabrous. Filament-connective attachment lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Salvia multicaulis* Vahl Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent.

Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 11cm long. Leaf blade 7cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 7–10 mm long. Veins in calyx tube 13. Outer surface of petal lobes glabrous. Upper lip of corolla vaulted. Corolla tube much longer than calyx. Stamens 2. Stamens included. Staminal filaments glabrous. Filament-connective attachment lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx present. Branched hairs on calyx absent.

*Salvia palaestina* Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves partially pinnate. Leaf blade oblong-ovate. Leaf blade 9.5cm long. Leaf blade 5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin sinuate. Leaf margin flat. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth spiny-tipped. Posterior sepal 15–20 mm long. Veins in calyx tube 13. Outer surface of petal lobes glabrous. Upper lip of corolla vaulted. Corolla tube much longer than calyx. Stamens 2. Stamens included. Staminal filaments glabrous. Filament-connective attachment lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Salvia sclarea* L. Plant herbaceous. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves

petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 6–10.5cm long. Leaf blade 6–11cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin sinuate. Leaf margin flat. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers pedicelled. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth spiny-tipped. Posterior sepal 10 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla vaulted. Corolla tube included in calyx. Stamens 2. Stamens included. Staminal filaments glabrous. Filament-connective attachment lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Salvia spinosa* L. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade cordate. Leaf blade 14.5cm long. Leaf blade 9.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth spiny-tipped. Posterior sepal 15–20 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla vaulted. Corolla tube included in calyx. Stamens 2. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves present. Branched hairs on leaves present. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Salvia verbenaca* L. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves partially pinnate. Leaf blade

oblong-ovate. Leaf blade 7.5–11.5cm long. Leaf blade 5.8–7.5cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers sessile. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 5–8 mm long. Veins in calyx tube 13. Outer surface of petal lobes glabrous. Upper lip of corolla vaulted. Corolla tube included in calyx. Stamens 2. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Stachys aegyptiaca* Pers. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 2.5–3cm long. Leaf blade 0.5–0.7cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence lax verticillasters. Flowers pedicelled. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 5–8 mm long. Veins in calyx tube 15. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments hairy. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves absent. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves present. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Teucrium brevifolium* Schreb. Plant woody. Stem hairy. Stem terete. Stem prostrate. Stolons absent. Leaves sessile-subsessile. Leaves

simple. Leaf blade linear-lanceolate. Leaf blade 0.7–0.8cm long. Leaf blade 0.15cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf uninerved. Inflorescence terminal globose aggregate. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–5 mm long. Veins in calyx tube 10. Outer surface of petal lobes glabrous. Upper lip of corolla reduced. Corolla tube included in calyx. Stamens 4. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style terminal. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit drupe. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Teucrium decaisnei* C. Presl Plant woody. Stem hairy. Stem terete. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 0.5–1.2cm long. Leaf blade 0.2–0.3cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin denticulate-serrate. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence terminal globose aggregate. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 1.5–3 mm long. Veins in calyx tube 10. Outer surface of petal lobes glabrous. Upper lip of corolla reduced. Corolla tube included in calyx. Stamens 4. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style terminal. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit drupe. E glandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Teucrium leuocladum* Boiss. Plant woody.

Stem hairy. Stem terete. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 0.9–1.1cm long. Leaf blade 0.2–0.4cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin sinuate. Leaf margin flat. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf uninerved. Inflorescence terminal globose aggregate. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–4 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla reduced. Corolla tube included in calyx. Stamens 4. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style terminal. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit drupe. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Teucrium polium* L. Plant herbaceous. Stem hairy. Stem terete. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 1.8cm long. Leaf blade 0.4–0.5cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin sinuate. Leaf margin flat. Leaf apex obtuse. Leaf surface rugose. Leaves not white-tomentose. Leaf uninerved. Inflorescence terminal globose aggregate. Flowers sessile. Calyx nearly regular. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–4 mm long. Veins in calyx tube 10. Outer surface of petal lobes glabrous. Upper lip of corolla reduced. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style terminal. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit drupe. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves present. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Thymbra capitata* (L.) Cav. Plant woody. Stem

hairy. Stem square. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 0.4–0.8cm long. Leaf blade 0.1–0.2cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex obtuse. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence terminal globose aggregate. Flowers sessile. Calyx bilabiate. Calyx funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–5 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens exerted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Thymus bovei* Benth. Plant woody. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 1–1.2cm long. Leaf blade 0.2–0.3cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence terminal globose aggregate. Flowers sessile. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 2–4 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma capitate. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves absent. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Thymus decussatus* Benth. Plant woody. Stem

hairy. Stem square. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 0.2–0.6cm long. Leaf blade 0.1cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves white-tomentose. Leaf uninerved. Inflorescence terminal globose aggregate. Flowers sessile. Calyx nearly regular. Calyx funnel-shaped. Calyx veins prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 3–4 mm long. Veins in calyx tube 10. Outer surface of petal lobes hairy. Upper lip of corolla flat-deflexed. Corolla tube included in calyx. Stamens 4. Stamens exserted. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma capitate. Stigmatic lobes equal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

*Ziziphora capitata* L. Plant herbaceous. Stem hairy. Stem square. Stem erect. Stolons absent. Leaves petioled. Leaves simple. Leaf blade oblong-ovate. Leaf blade 2.4–2.6cm long. Leaf blade 1–1.2cm broad. Leaf veins prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex acute. Leaf surface smooth. Leaves white-tomentose. Leaf venation pinnate. Inflorescence terminal globose aggregate. Flowers pedicelled. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 6–9 mm long. Veins in calyx tube 13. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 2. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves absent. Stalked glandular hairs on leaves present. Branched hairs on leaves absent. Sessile glandular hairs on calyx absent. Stalked glandular hairs on calyx absent. Branched hairs on calyx present.

*Ziziphora tenuior* L. Plant herbaceous. Stem

hairy. Stem square. Stem erect. Stolons absent. Leaves sessile-subsessile. Leaves simple. Leaf blade linear-lanceolate. Leaf blade 1.7–1.9cm long. Leaf blade 0.2–0.3cm broad. Leaf veins not prominent. Leaf veins not black. Leaf margin entire. Leaf margin flat. Leaf apex acute. Leaf surface rugose. Leaves not white-tomentose. Leaf venation pinnate. Inflorescence dense spike-like. Flowers sessile. Calyx bilabiate. Calyx not funnel-shaped. Calyx veins not prominent. Calyx teeth 5 or less. Calyx teeth not hooked. Calyx teeth not spiny-tipped. Posterior sepal 5–8 mm long. Veins in calyx tube 13. Outer surface of petal lobes glabrous. Upper lip of corolla flat-deflexed. Corolla tube much longer than calyx. Stamens 2. Stamens included. Staminal filaments glabrous. Filament-connective attachment not lever-like. Ovary glabrous. Style glabrous. Style gynobasic. Stigma 2 elongate arms. Stigmatic lobes unequal. Fruit 4 nutlets. E glandular hairs on leaves present. Sessile glandular hairs on leaves present. Stalked glandular hairs on leaves absent. Branched hairs on leaves absent. Sessile glandular hairs on calyx present. Stalked glandular hairs on calyx absent. Branched hairs on calyx absent.

#### Discussion

The present key is based on a much wider range of characters from vegetative and floral morphology than in any previous floristic treatment. The characters were recorded and used in key generation in a strictly comparative way, so that alternative entries of any couplet in the key are distinguished from each other by means of contrasting character-states of the same character or set of characters. The prelude to the key shows that of the 48 characters recorded for each of the 54 taxa, only 37 were sufficient to generate the key successfully with a surplus of 11 characters. All 48 characters are included in the detailed description of every taxon, thus serving the all-important function of confirming the identity of these taxa.

Comparison between the DELTA-generated key to the Lamiaceae and its manually constructed counterparts shows that the former is a clear improvement over the latter. Among the numerous advantages of the key provided in the present study: (i) Instead of the user having to go through a manually constructed key to the genera of a given family and then through another key to the species and infra-specific taxa of a given genus,

the computer-generated key is compact and leads directly to the full scientific names of plants and their respective author citations, (ii) Character definition can be manipulated easily to ensure that they are clearly and accurately observable with the maximum contrast between states of the same character, (iii) The distinction between a pair of alternative entries in the same couplet is strictly comparative, (iv) Most of the couplets in the key are diagnosed by combinations of correlated characters instead of single characters, (v) Character-states separating alternative entries of the same couplet are listed in the same order, thus facilitating the user's task of deciding which entry applies to the unknown plant specimen being identified, and (vi) The flora is so dynamic that some species may disappear and others may invade the country and, unlike the manually-constructed fixed keys, the computer-generated keys are equally flexible to cater for such changes.

There are some discrepancies between the taxa representing the Lamiaceae in the present study and those reported by Boulos (2002) in the latest comprehensive account of the flora of Egypt. Instances of these discrepancies are:

- (i) *Thymus capitatus* (L.) Link was always recorded in Egypt by this name (e.g., Täckholm, 1956, 1964 and Boulos, 2000), with *Satureja capitata* L. as basionym and *Coridothymus capitatus* (L.) Rechb.f. as synonym, thus omitting the other synonym *Thymbra capitata* (L.) Cav. But this neglected synonym is shown in the database of the Plant List [<http://www.theplantlist.org/>] to be the accepted name of this species and we used it in the present study. This is the first representation of the genus *Thymbra* in Egypt and the number of genera of Lamiaceae reported by Boulos has been consequently increased to 24.
- (ii) The three species *Leucas urticifolia* (Vahl) R.Br. (from Gebel Elba), *Micromeria serbaliana* Danin & Hedge and *Origanum isthmicum* Danin (both from Sinai) included in Boulos' (2002) flora are not found in the present key to the labiates of Egypt because no specimens of them were located in any of the local herbaria. Flexibility of the DELTA suite of key-generating programs is such that whenever any specimens of these species is re-discovered, they can be added easily to

the data matrix and a re-run of the program would update the present key.

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## بناء مفاتيح لتعريف نباتات الفلورة المصرية باستخدام الحاسب الآلي. ٨. الفصيلة الشفوية

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مفاتيح تعريف النباتات في العديد من مجموعات الفلورة المصرية في حاجة ماسة إلى التحسين والتحديث. ومن أجل بناء مفتاح حديث لنباتات الفصيلة الشفوية في مصر تم تصميم مصفوفة بيانات تشتمل على 48 صفة سُجّلت لكل واحد من الأنواع التي تمثل هذه الفصيلة في مصر وعددهم 52 نوع (وبهم ثلاثة تحت أنواع وصنف واحد) وينتمون إلى 24 جنس. تم تحديد الصفات وحالاتها بكل دقة كي تعبر عن أكبر عدد ممكن من أوجه التباين في صفات الأعضاء الخضرية والزهرية للنباتات بحيث تكون سهلة المشاهدة ولا تتغير كثيراً بتغير الظروف البيئية ويكون الفارق بين حالات كل صفة أكبر وأوضح ما يمكن. تم تحليل مصفوفة البيانات باستخدام إحدى أقوى حزم برامج الحاسب الآلي المتخصصة في بناء مفاتيح تعريف النباتات وهي حزمة برامج «دلنا». أنتج التحليل العددي لمصفوفة البيانات مفتاح لتعريف النباتات مصحوباً بوصف تفصيلي لكل نوع وتحت نوع وصنف على أساس الصفات المُسجّلة لكل منهم. المفتاح الناتج من هذه الدراسة أفضل علمياً وعملياً بكثير من كل سابقه من حيث أنه يشتمل على المقارنة الدقيقة بين كل مداخلة ومزدوجاته المتضادة. وبتحديث الأسماء العلمية للنباتات تمت إضافة جنس ثيمبرا لأول مرة إلى نباتات الفصيلة الشفوية في مصر.