

Karel H r u b ý :

**Key to the Supraspecific Taxa of the Genus *Salvia* L.**

(Department of Genetics, Faculty of Science, Charles University, Praha)

Till the present time there have been described more than one thousand taxa on species level within the huge genus *Salvia* L. The actual number of species is certainly not so large and a thorough revision will show many of them being synonyma only; undoubtedly, however, the number of real species exceeds six hundred. It is obvious that such an immense quantum does need further classification into a lot of supraspecific taxonomical units. A general revision of the whole genus must be preceded inevitably by a detailed revision of individual sections, series and groups. In order to facilitate the correct arrangement of different species, the present key has been compiled.

The classification of J. BRIQUET (1897) is used in general, sometimes even more detailed. According to this system the genus *Salvia* is composed of eight subgenera. In the following systematical survey, as well as in the proper key, the sections are marked with Roman numerals, subsections with Arabian figures, series with capital letters of the Latin alphabet, subseries with small letters of the same, and groups with small letters of the Greek alphabet.

**Survey of the system used**Genus: *Salvia* LINNÉ (Genera Plantarum ed. 1. n. 16., 1737) emend.Subgenus *Schraderia* (MOENCH) BRIQ.I. *Hymenosphace* BENTH.II. *Nactosphace* BRIQ.Subgenus *Salvia* (L.) BENTH.III. *Eusphace* BENTH.1. *Simplicifoliae* BOISS.2. *Pinnatae* BOISS.A. *Fruticulosae* BOISS.a. *Trilobae* (L.f.) HBÝ.b. *Caespitosae* (MONTBR. & AUCH.) HBÝ.B. *Herbaceae* BRIQ.a. *Ringentes* (SIBTH. & SM.) HBÝ.b. *Trichocladae* (BENTH.) HBÝ.IV. *Drymosphace* BENTH.Subgenus *Sclarea* (MOENCH) BENTH.V. *Horminum* (MOENCH) BENTH.VI. *Stenarrhena* (DON.) BRIQ.1. *Homalosphaceae* (BOISS.) BRIQ.2. *Gongrosphaceae* (BOISS.) BRIQ.VII. *Plethiosphace* BENTH.1. *Algerienses* BATT. & TRAB.2. *Euplethiosphaceae* BRIQ.3. *Stenophyllae* BRIQ.Subgenus *Jungia* (MOENCH) BRIQ.

VIII. *Calosphace* BENTH.

1. *Microsphaceae* BRIQ.
  - A. *Misellae* BRIQ.
  - B. *Privoideae* BRIQ.
2. *Micranthae* BENTH.
  - A. *Hypolipontes* BRIQ.
  - B. *Phthartae* BRIQ.
    - a. *Tiliaefoliae* (VAHL) HBÝ.
    - b. *Lanceolatae* (BROUSS.) HBÝ.
3. *Membranaceae* BENTH.
4. *Brachyanthae* BENTH.
  - A. *Angustifoliae* BENTH.
  - B. *Vulgares* BENTH.
    - a. *Densiflorae* (BENTH.) HBÝ.
    - b. *Longispicatae* (MART. & GAL.) HBÝ.
  - C. *Axilliflorae* BENTH.
  - D. *Candicantes* BENTH.
  - E. *Scorodoniae* BENTH.
    - a. *Scorodoniaefoliae* (POIR.) HBÝ.
    - b. *Cuspidatae* (RUIZ & PAV.) HBÝ.
  - F. *Cordifoliae* BENTH.
  - G. *Rudes* BENTH.
    - a. *Procurrentes* (BENTH.) HBÝ.
    - b. *Rigidae* (BENTH.) HBÝ.
5. *Erianthae* BENTH.
  - A. *Laxae* BRIQ.
    - a. *Lineatae* HBÝ.
    - b. *Sordidae* (BENTH.) HBÝ.
  - B. *Confertae* BRIQ.
6. *Bracteatae* BENTH.
7. *Longiflorae* BENTH.
  - A. *Elongatae* BENTH.
    - a. *Velutinae* (BENTH.) HBÝ.
    - b. *Flavorubrae* HBÝ.
    - c. *Atrorubrae* HBÝ.
    - d. *Rubrae* HBÝ.
  - B. *Biflorae* BRIQ.
  - C. *Luteae* BENTH.
    - a. *Multiflorae* BRIQ.
    - b. *Solitariae* BRIQ.
  - D. *Corrugatae* BENTH.
  - E. *Leonuroideae* BENTH.
  - F. *Nobiles* BENTH.
    - a. *Coccineae* BENTH.
    - b. *Coeruleae* BENTH.
  - G. *Secundae* BENTH.
  - H. *Inflatae* BENTH.
  - I. *Fulgentes* BENTH.
  - K. *Cyaneae* BENTH.
    - a. *Roseae* HBÝ.
    - b. *Eucyaneae* HBÝ.
  - L. *Tubiflorae* BENTH.
    - a. *Angustatae* HBÝ.
      - α. *Violaee* HBÝ.
      - β. *Sanguineae* HBÝ.
    - b. *Cordatae* HBÝ.
      - α. *Cyanescentes* HBÝ.
      - β. *Erythrae* HBÝ.
  - M. *Hastatae* BENTH.

Subgenus *Leonia* (LLAV. & LEX.) BENTH.

IX. *Echinosphace* BENTH.

X. *Pycnosphace* BENTH.

XI. *Heterosphace* BENTH.

1. *Triangulares* (THUNB.) HBÝ.

2. *Lyratae* (L.) HBÝ.

XII. *Notiosphace* (BENTH.) BUNGE

Subgenus *Viasala* BRIQ.

XIII. *Neosphace* BRIQ.

XIV. *Eremosphace* BUNGE

Subgenus *Allagospadonopsis* BRIQ.

XV. *Allagospadon* MAXIM.

XVI. *Gymnosphace* (BENTH.) BRIQ.

Subgenus *Covola* (MEDIK.) BRIQ.

XVII. *Hemisphace* BENTH.

There may arise the question whether some subgenera should be maintained within the genus *Salvia* or separated as small genera like *Salviastrum* SCHEELE and *Polakia* STAFF, for which the generic status is recognized. It can be suggested that especially the subgenera *Allagospadonopsis* BRIQ. and *Covola* (MEDIK.) BRIQ. would be worth an elevation to generic level, as in these the characters of stamens — very important taxonomically in the whole family *Lamiaceae* — are markedly different from other subgenera. Since a detailed morphological analysis and moreover a cytological one is lacking hitherto, I prefer in the meantime to maintain them within the single genus *Salvia* L. on subgeneric level. The raising of separate genus *Schraderia* MEDIK., proposed by POBEDIMOVA (1954) seems not to be fully justified, as correctly pointed out already by HEDGE (1959). Making of small genera at any cost does not contribute to improving of the phylogenetic system particularly in cases of naturally homogeneous, though large, groups.

#### The Key

- 1a Anterior stamens developed, posterior reduced to staminodes or absent — 2.
- b Posterior stamens developed, anterior reduced or absent — Subg. *Allagospadonopsis* BRIQ. — 60
- 2a Connective hinged on filament — 3
- b Connective immobile, its anterior joint short awl-shaped, directed downwards along the filament — Subg. *Covola* (MEDIK.) BRIQ. — 61
- 3a Nectary in the tube of corolla formed by a ring of hairs — 4
- b Nectary absent, at most formed by a small hairy scale — 6
- 4a Anterior joints of the connectives bear fertile anthers and do not hang together — Subg. *Leonia* (LLAV. & LEX.) BENTH. — 55
- b Anterior joints of connectives hang terminally together and bear  $\pm$  rudimentary anthers — 5
- 5a Calyx teeth at fruiting time distant, coriaceous, distinctly ribbed — Subg. *Schraderia* (MOENCH) BRIQ. — 8
- b Calyx teeth at fruiting time not altered or only little — Subg. *Salvia* (L.) BENTH. — 9
- 6(3)a Anterior joints of connectives bear fertile anthers and do not hang together — Subg. *Viasala* BRIQ. — 59
- b Anterior joints of connective sterile, hanging together — 7
- 7a Anterior joints of connectives cochleariform, held together by a glutinatorium — Subg. *Sclearia* (MOENCH) BRIQ. — 14
- b Anterior joints of connectives linear or oar-like enlarged,  $\pm$  hanging together along their length, but without a differentiated glutinatorium — Subg. *Jungia* (MOENCH) BRIQ. — 19
- 8(5)a Upper lip of corolla compressed, bent or falcate; corollar tube narrow. Mostly shrubs or semi-shrubs. South-African species, one species in Canary Islands — II. *Nactosphace* BRIQ.
- b Upper lip of corolla very little compressed or not at all, upright or slightly bent; corollar tube broad. Mostly perennial herbs, rarely shrubs or semi-shrubs; Oriental species — I. *Hymenosphace* BENTH.
- 9(5)a Upper lip of corolla falcate, sometimes compressed. Big herbaceous plants, often glandular, sticking — IV. *Drymosphace* BENTH.

- b Upper lip of corolla upright, nearly straight, concave. Shrubs or semi-shrubs very rarely herbs — 10
- 10a Leaf blade undivided — III. *Eusphace* BENTH. 1. *Simplicifoliae* BOISS.
- b Leaves pinnate or palmate — 11
- 11a Shrubs — 12
- b Herbaceous plants — 13
- 12a Floral leaves much shorter than flowers — III. *Eusphace* BENTH. 2. *Pinnatae* BOISS. A. *Fruticosae* BOISS. a. *Trilobae* (L. f.) HBÝ.
- b Floral leaves large, longer than flowers — III. *Eusphace* BENTH. 2. *Pinnatae* BOISS. A. *Fruticosae* BOISS. b. *Caespitosae* (MONTBR. & AUCH.) HBÝ.
- 13(11)a Floral leaves shorter than flowers, deciduous, as a rule — III. *Eusphace* BENTH. 2. *Pinnatae* BOISS. B. *Herbaceae* BRIQ. a. *Ringentes* (SIBTH. & SM.) HBÝ.
- b Floral leaves large persisting, longer than flowers — III. *Eusphace* BENTH. 2. *Pinnatae* BOISS. B. *Herbaceae* BRIQ. b. *Trichocladae* (BENTH.) HBÝ.
- 14(7)a Annual herbs; calyx tubular, its upper lip bitten out, teeth slightly distant. Monotypic section — V. *Horminum* (MOENCH) BRIQ.
- b Mostly perennial plants — 15
- 15a Teeth of calyx upper lip upright or slightly converging, the middle one often very small. Upper lip of corolla falcate, compressed. Herbaceous plants, very rarely semi-shrubs — 16
- b Upper teeth of calyx short, converging. Calyx ovate, its upper lip concave, binervate. Corollar upper lip concave or falcate and compressed. Nectary formed by hairy scale on the lower part of corollar tube, but most frequently entirely absent — 17
- 16a Corollar tube without nectary, gradually expanding towards the throat — VI. *Stenarrhena* (DON.) BRIQ. 1. *Homalosphaeae* (BOISS.) BRIQ.
- b Nectary in corollar tube formed by hairy scale or a small brush. The tube suddenly expanded into an underneath bag-like throat — VI. *Stenarrhena* (DON.) BRIQ. 2. *Gongrosphaeae* (BOISS.) BRIQ.
- 17(15)a The middle tooth of the calyx upper lip short, the lateral ones long awned, corolla large — VII. *Plethiosphaeae* BENTH. 1. *Algerienses* BATT. & TRAB.
- b Upper teeth of calyx very short — 18
- 18a Leaves cordate or ovate, entire till pinnatisect, never linear or lanceolate — VII. *Plethiosphaeae* BENTH. 2. *Euplethiosphaeae* BRIQ.
- b Leaves linear or lanceolate, corolla large — VII. *Plethiosphaeae* BENTH. 3. *Stenophyllae* BRIQ.
- 19(7) The only section — VIII. *Calosphaeae* BENTH.
- a Indumentum of calyx woolly. Shrubs with wrinkled leaves. Both arms of the stigma pointed — 21
- b Calyx not woolly, if so, then other characters differ — 20
- 20a Corolla large — 23
- b Corolla of medium size — 29
- c Corolla small — 24
- 21(19)a Verticils crowded into a dense ovate spicastris — 5. *Erianthae* BENTH. B. *Confertae* BRIQ.
- b Verticils loose — 22
- 22a Leaves linear of linear-lanceolate — 5. *Erianthae* BENTH. A. *Laxae* BRIQ. a. *Lineatae* HBÝ.
- b Leaves ovate-lanceolate or ovate — 5. *Erianthae* BENTH. A. *Laxae* BRIQ. b. *Sordidae* (BENTH.) HBÝ.
- 23(20)a Verticils densely crowded, floral leaves large, either green and persisting or coloured and falling off. Flowers blue or purple — 6. *Bracteatae* BENTH.
- b Plants of other characters — 37
- 24(20)a Both arms of the stigma pointed — 26
- b At least one stigma arm flattened. Floral leaves small, deciduous — 25
- 25a Both stigmatic arms rounded, flattened — 1. *Microsphaeae* BRIQ. A. *Misellae* BRIQ.
- b Posterior arm of the stigma pointed, anterior flat — 1. *Microsphaeae* BRIQ. B. *Privoideae* BRIQ.
- 26(24)a Floral leaves persisting, nearly circular, coriaceous, ribbed, equaling the calyx or exceeding it — 3. *Membranaceae* BENTH.
- b Floral leaves membranaceous, not coriaceous — 27
- 27a Floral leaves persisting — 2. *Micranthae* BENTH. A. *Hypolipontes* BRIQ.
- b Floral leaves falling off — 28
- 28a Leaves broad circular, cordate or ovate — 2. *Micranthae* BENTH. B. *Phthartae* BRIQ. a. *Tiliaefoliae* (VAHL) HBÝ.

- b Leaves lanceolate or linear — 2. *Micranthae* BENTH. B. *Phthartae* BRIQ. b. *Lanceolatae* (BROUSS.) HBÝ.
- 29(20)a Verticils axillar without bracts (floral leaves) — 4. *Brachyanthae* BENTH. C. *Axilliflorae* BENTH.
- b Verticils normal with bracts — 30
- 30a Leaves wrinkled — 31
- b Leaves not wrinkled — 32
- 31a Leaves very much wrinkled, net-like ribbed, Mexican species — 4. *Brachyanthae* BENTH. E. *Scorodoniae* BENTH. a. *Scorodoniaefoliae* (POIR.) HBÝ.
- b Leaves less wrinkled, species from Peru and Mexico — 4. *Brachyanthae* BENTH. E. *Scorodoniae* BENTH. b. *Cuspidatae* (RUIZ & PAV.) HBÝ.
- 32(30)a Leaves underneath felty whitish — 4. *Brachyanthae* BENTH. D. *Candicantes* BENTH.
- b Leaves beneath green, not felty — 33
- 33a Leaves linear or lanceolate, cuneate narrowed at base — 4. *Brachyanthae* BENTH. A. *Angustifoliae* BENTH.
- b Leaves cordate — 4. *Brachyanthae* BENTH. F. *Cordifoliae* BENTH.
- c Leaves reniform, circular or ovate — 34
- 34a Verticils loose, markedly distant — 4. *Brachyanthae* BENTH. B. *Vulgares* BENTH. b. *Longispicatae* (MART. & GAL.) HBÝ.
- b Verticils crowded in terminal spicastris — 35
- 35a Stem procumbent — 4. *Brachyanthae* BENTH. G. *Rudes* BENTH. a. *Procurrentes* (BENTH.) HBÝ.
- b Stem upright — 36
- 36a Central-American species — 4. *Brachyanthae* BENTH. B. *Vulgares* BENTH. a. *Densiflorae* (BENTH.) HBÝ.
- b South-Brazilian species — 4. *Brachyanthae* BENTH. G. *Rudes* BENTH. b. *Rigidae* (BENTH.) HBÝ.
- 37(23)a Calyx inflate — 7. *Longiflorae* BENTH. H. *Inflatae* BENTH.
- b Calyx normal, not inflate — 38
- 38a Verticils in terminal spicastris — 42
- b Verticils axillar — 39
- c Verticils dorsiventral — 40
- 39a Flowers yellow, verticils with two flowers — 7. *Longiflorae* BENTH. *Luteae* BENTH. b. *Solitariae* BRIQ.
- b Flowers scarlet — 7. *Longiflorae* BENTH. E. *Leonuroideae* BENTH.
- 40(38)a Verticils two-flowered — 7. *Longiflorae* BENTH. B. *Biglora* BRIQ.
- b Verticils multi-flowered — 41
- 41a Corolla deep blue — 7. *Longiflorae* BENTH. F. *Nobiles* BENTH. b. *Coeruleae* BENTH.
- b Corolla red or violet — 7. *Longiflorae* BENTH. G. *Secundae* BENTH.
- 42(38)a Leaves coriaceous, much wrinkled, corolla deep blue — 7. *Longiflorae* BENTH. D. *Corrugatae* BENTH.
- b Leaves membranaceous, not wrinkled — 43
- 43a Leaves mostly sagittate or edged cordate, corolla blue, stamens and style  $\pm$  exposed — 7. *Longiflorae* BENTH. M. *Hastatae* BENTH.
- b Plants of other characters — 44
- 44a Flowers entirely yellow, verticils with 6—10 flowers — 7. *Longiflorae* BENTH. C. *Luteae* BENTH. a. *Multiflorae* BRIQ.
- b Flowers never absolutely yellow (white, yellowish-red) — 45
- 45a Leaves membranaceous, dark green, flowers scarlet — 7. *Longiflorae* BENTH. F. *Nobiles* BENTH. a. *Coccineae* BENTH.
- b Plants of other characters — 46
- 46a Flowers white or yellowish-red — 47
- b Flowers else coloured — 48
- 47a Corolla with white felty indumentum — 7. *Longiflorae* BENTH. A. *Elongatae* BENTH. a. *Velutinae* (BENTH.) HBÝ.
- b Corolla with yellow indumentum, inside red — 7. *Longiflorae* BENTH. A. *Elongatae* BENTH. b. *Flavorubrae* HBÝ.
- 48(46)a Style hairy — 49
- b Style glabrous — 50
- 49a Corolla magenta scarlet — 7. *Longiflorae* BENTH. A. *Elongatae* BENTH. c. *Atrorubrae* HBÝ.
- b Corolla bright scarlet — 7. *Longiflorae* BENTH. A. *Elongatae* BENTH. d. *Rubrae* HBÝ.
- 50(48)a Tube of corolla bellow inflate — 51

- b Tube of corolla regular, not inflate — 52
- 51a Corolla scarlet — 7. *Longiflorae* BENTH. I. *Fulgentes* BENTH.
- b Corolla pink or purple — 7. *Longiflorae* BENTH. K. *Cyaneae* BENTH. a. *Roseae* HBÝ.
- c Corolla blue or violet — 7. *Longiflorae* BENTH. K. *Cyaneae* BENTH. b. *Eucyaneae* HBÝ.
- 52(50)a Leaves at base cuneate narrowed — 53
- b Leaves at base cordate — 54
- 53a Flowers violet — 7. *Longiflorae* BENTH. L. *Tubiflorae* BENTH. a. *Angustatae* HBÝ.
- α. *Violeae* HBÝ.
- b Flowers red — 7. *Longiflorae* BENTH. L. *Tubiflorae* BENTH. A. *Angustatae* HBÝ. β. *Sanguineae* HBÝ.
- 54(52)a Flowers blue — 7. *Longiflorae* BENTH. L. *Tubiflorae* BENTH. b. *Cordatae* HBÝ. α. *Cyanescentes* HBÝ.
- b Flowers scarlet — 7. *Longiflorae* BENTH. L. *Tubiflorae* BENTH. b. *Cordatae* HBÝ. β. *Erythraeae* HBÝ.
- 55(4)a Floral leaves and bracts imbricate, persisting — 56
- b Floral leaves small, not imbricate, falling off — 57
- 56a Floral leaves and calyx teeth sharply cuspidate — IX. *Echinosphace* BENTH.
- b Floral leaves not cuspidate, calyx teeth awl-shaped — X. *Pycnosphace* BENTH.
- 57(55)a Upper calyx lip tridentate — 58
- b Upper calyx lip entire — XII. *Notiosphace* (BENTH.) BUNGE
- 58a South-African species — XI. *Heterosphace* BENTH. 1. *Triangulares* (THUNB.) HBÝ.
- b North-American species — XI. *Heterosphace* BENTH. 2. *Lyratae* (L.) HBÝ.
- 59(6)a Teeth of upper calyx lip converging — XIV. *Eremosphace* BUNGE
- b Teeth of upper calyx lip distant — XIII. *Neosphace* BRIQ.
- 60(1)a Herbs with leaves pinnatifid, glandulose hairy — XV. *Allagospadon* MAXIM.
- b Herbs with leaves circular cordate, glabrous — XIV. *Gymnosphace* (BENTH.) BRIQ.
- 61(2) Only one section — XVII. *Hemisphace* BENTH.

## References

- BENTHAM G. (1832—1836): *Labiatarum Genera et Species*. — London.
- BENTHAM G. & HOOKER J. D. (1873—1876) *Genera plantarum* II : 1194—1196. London.
- BOISSIER E. (1879): *Flora Orientalis* IV : 590—636. Geneva et Basilea.
- BRIQUET J. (1897): *Salvia* in ENGLER—PRANTL: *Die Natürlichen Pflanzenfamilien* IV. 3a : 270—286. Leipzig.
- HEDGE I. C. (1959): *Studies in East Mediterranean species of Salvia* II. — *Notes Roy. Bot. Garden Edinburgh* XXII (5) : 47—69.
- HRUBÝ K. (1934): *Zytologie und Anatomie der mitteleuropäischen Salbei-Arten*. — *Beih. Botan. Centralblatt* 52-A : 298—380.
- HRUBÝ K. (1955): *Anatomické znaky při taxonomickém hodnocení* (*Anatomical characters from the taxonomical point of view*). — *Preslia* 27 : 348—353.
- POBEDIMOVA E. G. (1954): *Šalfej — Salvia* L. — *Flora SSSR* 21 : 244—374.