

STUDIES IN THE GENUS *SILENE*

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FOREWORD

During the last century both Rohrbach (1868) and Williams (1896) revised the genus *Silene*, but so many new species have been described since then that their revisions are already out of date. The present account has been extracted and condensed from a thesis submitted by Dr. P. K. Chowdhuri for the degree of Ph.D. at Edinburgh University.* The work falls into two parts: a review of the generic limits of *Silene* on a world basis, and a detailed revision of the species that occur in the Orient (defined here as extending from Turkey to Afghanistan and Egypt, but excluding the U.S.S.R.).

With regard to the intergeneric review, it must be said that the version presented here differs considerably from that in the original thesis. In particular, *Melandrium* has been entirely sunk into various parts of *Silene* (instead of maintaining part of it, *Wahlbergella* (*Gastrolychnis*), as a separate genus) and *Heliosperma* has shared a similar fate. Generic limits in the Caryophyllaceae, notoriously difficult, have generated considerable taxonomic heat on both sides of the Atlantic, and for these modifications of Chowdhuri's thesis my powers of persuasion are largely responsible.

The intergeneric discussion is followed by a key to the 44 sections of *Silene* recognised by Chowdhuri, their annotation, description, typification, content and distribution. By, we hope, the strict application of nomenclatural types, we have avoided the impedimenta of "sensu" and "emend." that so often clutter up sectional names. It was found impossible to recognise any satisfactory subgenera.

P. H. DAVIS

INTERGENERIC RELATIONSHIPS

No revision of *Silene* can be attempted without taking into account the genera closely related to it. These genera belong to the Subtribe *Silenoideae* Williams, and it has been found necessary to re-examine and re-assess them in the light of the recent work of a number of critical students. Their limits have always been rather artificial, and have rested chiefly on the number of parts of the floral organs.

The following characters appear to have taxonomic value in the limitation of genera:

- i. The position of the carpels relative to the segments of the calyx (opposite or alternate).
- ii. Nature of the fruit (whether a capsule or berry-like).
- iii. Character of the capsule valves (entire or cleft).

* A Taxonomic Study of *Silene* and Related Genera. 555 pp. (1955).

- iv. Character of the seed coat.
- v. Character of the calyx (inflated or not; membranous or not); character of the calyx nerves.
- vi. Number of carpels (with restricted use).
- vii. General habit.

The internal structure of the ovary, with or without dissepiments, has been found to have little or no taxonomic value as will be shown in discussing the genus *Melandrium*. The characters of the genera related to *Silene* are annotated and discussed below.

In *Agrostemma* the carpels alternate with the segments of the calyx, while in other genera, except *Uebelinia* Hochst. (often excluded from the *Silenoideae*), they are opposite. Apart from this, the calyx is coriaceous with foliaceous teeth, the anthophore is absent and the petals are entire and eligulate. In habit and character of calyx (except the teeth) it comes near to *Lychnis* subgenus *Coronaria* (L.) Engler & Prantl, but the characters mentioned are sufficient to keep *Agrostemma* as an independent genus (with the type species *A. Githago* L.).

Cucubalus, as circumscribed by Linnaeus, included a number of species of *Silene* with very much inflated calyces, but since then has been restricted to *Cucubalus bacciferus* L. in which the fruit, although not a typical berry, is black with a somewhat fleshy mesocarp, and does not open by valves. The plant's scrambling habit is not paralleled in *Silene*. *Silene ampullata* Boiss. approaches it in having an indehiscent fruit, but this is dry and 1-2-seeded; the two species are certainly not related to one another. On fruit and habit the recognition of *Cucubalus* as a monotypic genus seems justified.

The remaining two of the four Linnaean genera in this group, *Lychnis* and *Silene*, present more serious problems and have suffered much violence at the hands of different workers. The limits between these two genera are less natural and less accurately defined than those of the other genera accepted here. The character of 3 styles in *Silene*, and 5 in *Lychnis*, although not quite constant, was the only distinction between them recognised by Linnaeus. To this character (reflecting the number of carpels) another important diagnostic was added later: the nature of the capsule valve, which is split in *Silene* but entire in *Lychnis*. Specimens of many species of *Silene* frequently develop 4 or even 5 carpels; similarly the number of carpels in some species of *Lychnis* is variable, being frequently 4 or 3, so that carpel number does not provide a decisive character for diagnosing the genera. The characters of the capsule valve, on the other hand, give a satisfactory segregation of the ambiguous species in a way which agrees with general resemblances in habit.

Lychnis L. (including *Viscaria*) is therefore retained as a distinct genus and the characters limiting it are as follows: calyx clavate or shortly campanulate, more or less narrow, never conspicuously inflated, usually firm in texture; nerves of the calyx 10, more or less anastomosed above, but not bifurcating so as to increase the number of nerves; carpels usually 5; capsule 5-dentate, teeth not splitting. The type species is *Lychnis Flos-Cuculi* L.

This *Silene-Lychnis* complex has been made more complicated by the creation of a third, less well-defined genus, *Melandrium* Rohl. *Melandrium*, apart from having 5 carpels, has inflated calyces, and teeth or valves of the

capsule that split. In addition a new character—the absence of dissepiments in the ovary—has been recognized by later workers. Consequently, most of the species of *Silene* with a variable number of carpels and a unilocular ovary have at times been included under *Melandrium*.

I have analysed the available herbarium material in order to test the constancy of these characters. From the analysis, it is found that the species of *Melandrium* fall into 2 distinct groups. In one group—exemplified by *M. apetalum* (L.) Fenzl—the species are of dwarf, tufted habit, and are characterised by a membranous and very much inflated, campanulate calyx, and large, compressed, more or less reniform seeds with an inflated testa. The primary calyx nerves usually bifurcate, the veinlets becoming reticulately anastomosed. The inflorescence is either raceme-like and few-flowered or more usually consists of a solitary terminal flower. Apart from these characters, the number of carpels is generally 5, seldom 4 or 3. This group of species therefore shows a fairly constant correlation of morphological characters. It is found scattered throughout the northern hemisphere, and is certainly a natural group.

The second group of species (typified by *M. dioicum* and including *M. Elizabethae*) is largely centred in China and North America, has a variable number of carpels (usually 3 throughout, but 4 or 5 are not uncommon), calyx inflated, semi-inflated or not inflated, and the seed like those of *Silene* being usually without an inflated testa. The majority of the species are tall, leafy and not tufted. The group is heterogeneous, especially when we consider the form and venation of the calyx, the inflorescence and petal limb.

Before determining the status of these two groups, let us see what taxonomic value can be given to those morphological characters which have been used to support the treatment of *Melandrium* as a separate genus.

Rohrbach recognised the number of carpels, the presence and absence of dissepiments in the ovary and the nature of the capsule valve as diagnostic for the delimitation of allied genera, and on these criteria he circumscribed the limits of the genus *Silene*. Thus delimited, the genus included many species both from North America and from the Old World which later on were transferred to *Melandrium*.

Two examples will serve to show that carpel number should not be the sole criterion for the distribution of species in such complex genera. *Silene Drummondii* Hook. is in habit and morphology strikingly similar to *S. Scouleri* Hook. and some other closely related species; but because of the prevalence of 5 carpels it was transferred to *Lychnis*, where it was out of place. While supporting this transfer, Hitchcock and Maguire (Univ. Washington Publ. Biol. xiii: 1947) wrote:

"in fact, *L. Drummondii* seems much closer phylogenetically to these species of *Silene* than to any American congener in *Lychnis*. [This refers to their concept of *Lychnis*, based on style number, not on capsule teeth.] But because of the prevalence of 5 styles, Watson transferred *S. Drummondii* to *Lychnis*. It is accepted by the present writer with reluctance because of the general similarity with the species of *Silene* pointed out above, and because commonly there are but 4 styles developed and occasionally only 3."

Melandrium album (Miller) Garcke was replaced in *Lychnis* by Hitchcock and Maguire, but this plant is often confused with *Silene noctiflora* L. as the habit and floral characters, except for the number of styles and the unisexuality of the flowers, are so similar.

Turning to the presence or absence of dissepiments in the ovary, it is difficult to find taxonomists in agreement. *Silene noctiflora* L. has been described by Boissier as having a unilocular capsule, and my own observations and those of the majority of Continental botanists support this view. But Hitchcock and Maguire state that the capsule in *S. noctiflora* is trilocular. *S. viscosa* (L.) Pers. was retained in *Silene* by Rohrbach, as this species has the facies of a true *Silene*, 3 carpels, and must have been thought to possess a trilocular ovary as it was kept within the limits of that genus. But later on Williams and others have found this species to have a unilocular ovary. The same has been the case with *S. aprica* Turcz., *S. Olgae* Rohrb. and many other species. We may conclude that there are two tendencies present: one leading to unilocular ovaries by loss of dissepiments, and one leading from the 5-carpelled to the 3-carpelled condition.

In the genera *Lychnis* and *Petrocoptis* (and in *Silene* Sect. *Heliosperma*), dissepiments are usually found in the young ovary, though they are always thin and slender and have generally disappeared by the time the flower has expanded. The ovary of open flowers shows the remains of such dissepiments on the inner face. Throughout the subtribe there may be dissepiments in the young ovary, especially at the base, and these may persist or disappear at maturity. Hence the division of the ovary into cells can be regarded as a residual character. The presence or absence of dissepiments, however, cannot be regarded as diagnostic for the separation of Caryophyllaceous genera. In support of my views I may quote Robinson (in A. Gray, Synoptical Flora of N. America: 1897):

"the partial septation of the capsule, usually adduced as the strongest character for the division of *Silene* and *Melandrium*, is wholly untrustworthy in American species. Thus *S. virginica*, generally referred by Continental authors to *Melandrium*, often shows the partial septation of a *Silene*, while *S. multinervia*, a good *Silene* by habit and affinity to others of the *Coniomorpha*, has often no trace of septation."

Rohling recognised the importance of the capsule valve in the delimitation of the genera. In true species of *Silene* the capsule teeth or valves are cleft or split so as to become double in number to the styles. A capsule dehiscent by 3 valves is normally never seen in *Silene*. In the species of *Melandrium* the capsule dehisces by 10, 8 or 6 teeth—double in number to the styles, as in *Silene*. On the other hand, in good species of *Lychnis* the capsule opens by 5 valves, and we hardly ever find 10 teeth in the natural state. This shows that the splitting of the capsule valve is a character of considerable taxonomic value. American authors seem to have ignored it altogether, and to have transferred the species of *Melandrium* with usually 5 carpels to *Lychnis*, making the latter genus unnatural.

With these considerations in view, let us see how much taxonomic value can be attributed to the generic characters limiting the two groups included under *Melandrium*. As stated in the previous paragraphs, the characters delimiting the first group of species (*M. apetalum* and its allies) are not confined to this group alone. The inflation of the calyx and duplication of the nerves occur in some sections of *Silene* (Sect. *Graminifoliae*, *Odontopetalae*). The first group of species in *Melandrium* contains species without an inflated testa (*M. brachypetalum* Fenzl and *M. triste* (Bunge) Fenzl—*fide* Rohrbach) in addition to the general run of species with an inflated testa. In the polymorphic genus *Silene*, seeds of diverse shape and ornamentation are found, and in three N. American species (*S. caroliniana*

Walt., *S. Spaldingii* Wats. and *S. oregana* Wats.) the seeds actually have an inflated testa. The remaining diagnostic, the inconspicuous petals, is not restricted to this group of *Melandrium*, but is met with in a few sections of *Silene*, e.g. *Graminifoliae*.

It is therefore apparent that all the diagnostic characters that might be chosen to separate this group of *Melandrium* species from *Silene* break down, though usually individually. Furthermore, the general facies of the group is similar to that of certain species of *Silene* belonging to sections *Chloranthae*, *Graminifoliae*, *Odontopetalae* and *Quadridentae*. Thus the first group of *Melandrium* cannot be maintained as a distinct genus. I therefore advocate treating it as a section of *Silene* (Sect. *Gastrolychnis* (Fenzl) Chowdhuri), but as this, to be fully effective, would entail numerous new names and combinations, I have only established it here by choosing as the lectotype *Silene Wahlbergella* Chowdhuri (see p. 237).

The second group (the true *Melandrium*—type *M. dioicum*), which possesses a variable number of carpels, I also propose to sink in *Silene*. Rohrbach, while discussing the crossing between *Melandrium dioicum* and *Silene viscosa* (Sect. *Chloranthae*), and between *M. pratense* and *S. viscosa*, remarked that there is a greater sexual affinity between *Melandrium* and *Silene* than between *Lychnis* and *Silene*. *Melandrium dioicum* is also said to hybridise with *Silene noctiflora*. These results, however, are in need of confirmation and extension.

In transferring this heterogeneous group of *Melandrium* to *Silene*, the species, primarily on characters of inflorescence, petals and calyx, can be comfortably accommodated in 8 different sections of the genus: Sect. *Melandrifformes*, Sect. *Cucubaloideae* Subsect. *Sinenses* (composed largely of Chinese species that were originally described in *Silene* and later transferred to *Melandrium*), Sect. *Quadrilobatae*, Sect. *Occidentales*, Sect. *Rupifraga*, Sect. *Odontopetalae* Subsect. *Dentatae*, Sect. *Spergulfoliae* Subsect. *Olgae*, Sect. *Graminifoliae* and Sect. *Chloranthae* Subsect. *Ecoronatae*. As all the species concerned already have names available in *Silene*, no new combinations are required.

The two familiar British species, *Melandrium dioicum* and *M. album*, are placed beside *S. noctiflora* in Sect. *Melandrifformes*, where their correct names are as follows:

Silene dioica (L.) Clairv., Man. Herb. Suisse Valais, 146 (1811), quoad syn. p. 6, haud descr.

Syn.: *Lychnis dioica* L., Sp. Pl. 437 (1753), p.p.; Miller, Gard. Dict. ed. 8 (1768).

Melandrium dioicum (L.) Coss. & Germ., Fl. Env. Paris, 28, 28 (1845).

Melandrium rubrum Garcke, Fl. Deutschl. ed. 4, 55 (1858).

Silene alba (Miller) Krause in Sturm, Fl. Deutschl. ed. 2, v, 98 (1901).

Syn.: *Lychnis alba* Miller, Gard. Dict. ed. 8 (1768).

Melandrium album (Miller) Garcke, Fl. Deutschl. ed. 4, 55 (1858).

There are four other genera of *Silenoideae*, described since Linnaeus, that must be considered briefly. *Petrocoptis* A. Br. (type: *P. Lagascae* Willk.) is evidently near to *Lychnis* subgen. *Coronaria* (L.) Engler & Prantl, but differs in the imbricate aestivation of the corolla and in the seed having

a bearded hilum. Largely on the special type of seed (unique in the *Silenoideae*) and to some extent on the habit of the plants, this group is retained here as a distinct genus.

Heliosperma Reichb. (type: *H. quadrifidum* (L.) Reichb.), with the capsule teeth of *Silene*, differs from the latter only in 1 character: the seed is crested on the dorsal surface. The habit and flowers of *Heliosperma* are virtually indistinguishable from those of *Silene* Sect. *Rupifraga*. The seeds of *Silene* show a wide range of form and ornamentation, so that the seed of *Heliosperma* might be considered an extreme, but distinct, development. Following Boissier and Hayek, I have sunk the genus *Heliosperma* in *Silene*, treating it as a separate section closely related to (and probably derived from) Sect. *Rupifraga* which also has a species in the same area (S.E. Europe).

Eudianthe Reichb. consists of three species: *E. coelirosa* (L.) Fenzl (type of genus), *E. laeta* (Ait.) Willk. and *E. nivalis* (Kit.) Williams. Both Rohrbach and Engler & Prantl sunk this genus in *Silene*, but they differed in the disposition of the species. Their relationship therefore deserves discussion.

The annual *Eudianthe coelirosa* has 5 carpels, but in other characters scarcely differs from certain species of *Silene* (e.g. *S. squamigera* Boiss.). *E. coelirosa* often develops papilliferous scales on the calyx nerves—a character diagnostic of *Silene* Sect. *Lasiocalycinae* Subsect. *Squamatae*. *E. laeta* is an annual herb from the same area as *E. coelirosa*, and though it differs from it in shape and size of calyx, and in its long pedicels, the two species have similar calyx teeth and nervation, and similar petals and seeds. *E. laeta* may even develop scales on the calyx nerves, though they are usually inconspicuous. Considering these features, I believe that the two species are related to one another, and that their 5 styles do not justify their exclusion from *Silene*. I therefore follow Rohrbach and Engler & Prantl in including them in *Silene*, but place them here in Sect. *Lasiocalycinae* as Subsect. *Eudianthe*.

The perennial *E. nivalis*, however, is certainly not related to other species of *Eudianthe*. It resembles *Lychnis* in its habit, calyx nervation, carpel number and capsule valve, so that I assign it to that genus.

Viscaria Rohl. (type: *V. viscosa* (Scop.) Aschers.) was proposed for a few species of *Lychnis* in which the capsule is shortly divided at the base into 5 cells. These species otherwise have the same facies as those of certain species of *Lychnis* (e.g. *L. sibirica* L.). The capsule dehisces by 5 valves or teeth—like those of true *Lychnis*. Therefore I propose to sink *Viscaria* in *Lychnis*.

Key to the accepted genera of Subtribe Silenoideae

- 1a. Fruit a capsule (rarely indehiscent); plants not scrambling:
 - 2a. Capsule dehiscent by teeth equal in number to the styles:
 - 3a. Carpels alternating with the calyx segments; anthophore absent; petal entire, eligulate; calyx with 5 long foliaceous teeth
Agrostemma
 - 3b. Carpels opposite the calyx segments; anthophore usually conspicuous; petal usually bipartite, ligulate; calyx teeth short:
 - 4a. Seed not bearded at the hilum; aestivation contorted *Lychnis*
 - 4b. Seed bearded at the hilum; aestivation imbricate *Petrocoptis*

- 2b. Capsule dehiscing by twice as many teeth as there are styles. Calyx variable. Petals bilobed (sometimes fimbriate) or entire. Anthophore usually conspicuous. Carpels opposite the calyx segments. Seeds variable, but never bearded *Silene*
- 1b. Fruit berry-like; plants scrambling *Cucubalus*

KEY TO THE SECTIONS OF *SILENE* *

- 1a. Calyx 20-30- or 60-nerved, ovate- or cylindrical-conical; nerves more or less prominent, parallel, greenish; inflorescence a dichasial cyme, seldom passing into a monochasial cyme; plants annual 44. *Conoimorpha*
- 1b. Calyx usually 10- seldom 20-nerved, not conical; nerves usually reticulately anastomosed, sometimes more or less simple and thick; when 20-nerved, nerves not parallel, nor plants annual nor calyx conical at or after anthesis; plants perennial to annual 2
- 2a. Inflorescence racemosely paniculate, seldom passing into a dichasial cyme. Lateral cymules usually long, opposite, seldom alternate, 3-5-flowered, rarely reduced to 1 flower; sometimes cymules short, bearing 1-3 flowers, or a cluster of flowers at nodes in a pseudoverticillaster, rarely main axis very much condensed bearing flowers in a capitate cyme; sometimes entire inflorescence reduced, 1- or 2-flowered; plants perennial with suffruticose base, sometimes caespitose 3
- 2b. Inflorescence not a panicle, flowers in a dichasial or monochasial cyme 18
- 3a. Calyx membranous, sometimes subcoriaceous, pubescent or glandular-puberulent or glabrescent; base umbilicate or truncate 4
- 3b. Calyx coriaceous, glabrous, often glaucous, clavate or cylindrical-clavate, base pseudo-umbilicate with annular ring. Inflorescence a panicle, sometimes reduced; plants glabrous, seldom puberulent below 5. *Sclerocalycinae*
- 4a. Inflorescence racemosely paniculate, lax or more or less congested, not pseudo-verticillate nor capitate; petal bipartite or multipartite, sometimes entire, ligulate 5
- 4b. Inflorescence simple or compound; lateral cymules very short, forming clusters of flowers at nodes, or main axis (becoming very short) bearing flowers in a capitate cyme; petals entire, usually eligulate. Plants dioecious- or monoecious-polygamous, seldom with hermaphrodite flowers 17
- 5a. Main axis of the inflorescence long; lateral cymules opposite 6
- 5b. Main axis of the inflorescence short; lateral cymules opposite, or often alternate, more or less erect, 3-5(-7)-flowered (rarely 1-flowered), lax or more or less congested. Pedicels short or long, with two bracteoles in the upper part 14
- 6a. Inflorescence usually a spreading panicle; cymules long, spreading, seldom diffuse with 3-7 (rarely 1) flowers; if inflorescence raceme-like (*S. olympica* & *S. saxatilis*), then claw and filament ciliate 7

* Throughout the key the terms ligule, limb and claw refer to those parts of the petal.

6b. Inflorescence narrowly racemiform; cymules short, ascending, 1-2- or 3-flowered, lower 1-3 pairs often $\pm$ long, 3-5- or 7-flowered; sometimes entire inflorescence reduced to one or two flowers. Calyx subcoriaceous or membranous, glabrous or puberulent; petals usually yellowish and bipartite 11

7a. Caudical and lower cauline leaves rosulate, persisting in flowering shoots; other cauline leaves usually reduced, often remote, sometimes many, large, conspicuous, gradually reduced above, sometimes with sterile leafy shoots in axils; leaves linear, lanceolate to oblong or ovate to ovate-lanceolate; if linear-subulate (*S. struthioloides*) then leaves glabrous, more or less coriaceous, calyx more than 10 mm. in length 8

7b. Caudical and lower cauline leaves small, rosulate, more or less ephemeral; other cauline leaves several, conspicuous, gradually reduced upwards, fasciculate; leaves linear-subulate, canescent-puberulent. Calyx 3-4.5 mm. long, ovate, subcoriaceous; branches of the panicle and pedicels slender; limb entire, eligulate

6. Tunicoideae

8a. Calyx obconical or obconical-cylindrical, firm, glabrescent, seldom with nerves scabrous; flowers rather small, erect or nodding at anthesis; filaments pilose at the base (except *S. Parrowiana* & *S. Manissadjiana*); claw ciliate; panicle passing into a raceme

4. Lasiostemones

8b. Calyx cylindrical-clavate or clavate or broadly cylindrical, membranous, thin, pubescent, glandular-puberulent, often viscid, rarely glabrescent; flowers large; filaments smooth, if pilose at the base then limb multipartite 9

9a. Flowers nodding at anthesis; claw smooth; limb bipartite (multipartite in *S. stellata*); filaments smooth 3. *Siphonomorpha*

9b. Flowers erect at anthesis; claw smooth or ciliate; limb bipartite, multipartite or entire; filaments smooth or pilose 10

10a. Calyx cylindrical-clavate or clavate, in fruit usually more or less constricted below the capsule; claw exauriculate or nearly so, smooth or ciliate; filaments glabrous; plants of the Old World

1. Paniculatae

10b. Calyx broad, cylindrical or cylindrical-campanulate, in fruit not constricted below the capsule; claw usually auriculate and ciliate; filaments usually pilose; plants of the New World

2. Occidentales

11a. Caudical and lower cauline leaves small, usually disappearing from the old plant; other cauline leaves conspicuous, more or less closely spaced, with short sterile leafy shoots in axils. Calyx slightly inflated at or after anthesis 8. *Tataricae*

11b. Caudical and lower cauline leaves large, rosulate, persistent on the flowering shoots; other cauline leaves much reduced, remote, often bract-like 12

- 12a. Calyx subcoriaceous, cylindrical-clavate or clavate, not inflated, adpressed in fruit; claws smooth (except *S. viscosa*); filaments generally smooth 7. *Chloranthae*
- 12b. Calyx membranous, campanulate or ovate-campanulate, inflated, usually not adpressed in fruit, claw sometimes ciliate, filament smooth or pilose 13
- 13a. Styles generally 3; petal conspicuous and exserted; calyx not adpressed in fruit 9. *Graminifoliae*
- 13b. Styles generally 5; petal inconspicuous, often included; calyx sometimes adpressed in fruit 10. *Gastrolychnis*
- 14a. Plants dwarf, caespitose; caudical and lower cauline leaves large, rosulate, persistent in the flowering stem; other cauline leaves gradually reduced upwards or abruptly reduced and bract-like. Flowers hermaphrodite and pedicellate.(5b) 15. *Caespitosae*
- 14b. Plants generally tall, usually with suffruticose base; caudical and lower cauline leaves usually small, often disappearing in the old plant; other cauline leaves usually large, conspicuous, gradually reduced above.(5b) 15
- 15a. Cymules lax; flowers hermaphrodite, usually large and conspicuous, pedicellate; calyx cylindrical-clavate, with more or less prominent nerves; claw smooth and often auriculate 16. *Suffruticosae*
- 15b. Cymules congested; flowers hermaphrodite or unisexual (dioecious, monoecious-polygamous), rather small, subsessile; calyx cylindrical-or oblong-clavate with prominent or obscure nerves; claw ciliate or smooth, exauriculate 16
- 16a. Calyx cylindrical-clavate or clavate, usually not conspicuously inflated in fruit; capsule many-seeded, dehiscent. 13. *Spergulifoliae*
- 16b. Calyx oblong, becoming ovate or subglobose and much inflated in fruit; fruit 1-2-seeded, indehiscent 14. *Ampullatae*
- 17a. Caudical and lower cauline leaves large, rosulate; other cauline leaves gradually reduced upwards, sometimes all reduced and remote; calyx obconical, adpressed in fruit. Stem simple or branched.(4b) 11. *Otites*
- 17b. Caudical and lower cauline leaves usually rather small; other cauline leaves large, conspicuous, with short, sterile, leafy shoots in axils; calyx clavate, usually slightly inflated at or after anthesis.(4b) 12. *Holopetalae*
- 18a. Inflorescence a dichasial cyme, lax or more or less congested; branches of the dichasium equal or unequal, sometimes passing into a monochasial cyme especially in the upper part of the inflorescence, often with flowers solitary or 2-3 in a simple dichasium. Calyx usually 10- (sometimes 20-) nerved, simple or inflated; plants perennial to annual.(2b) 19
- 18b. Inflorescence a monochasial cyme with the axis simple or 1-3-forked below, with or without an alar flower (rarely a dichasium below). (2b) 39

- 19a. Calyx conspicuously inflated at anthesis or nearly so, 10–20-nerved; nerves reticulately anastomosed; plants perennial 20
- 19b. Calyx not inflated at anthesis, 10-nerved; nerves reticulately anastomosed, sometimes more or less simple and prominent; plants perennial, biennial or annual 23
- 20a. Calyx glabrous and glaucous, 10–20-nerved; if puberulent, limb emarginate. Caudex slender; stem branched usually from the middle upwards; cauline leaves large and conspicuous, gradually reduced above, glabrous, rarely puberulent or hirsute; limb emarginate to deeply cleft; ligules usually small 20. *Inflatae*
- 20b. Calyx pubescent, glandular-puberulent, often more or less hirsute and viscid, 10–20-nerved 21
- 21a. Caudex stout, strongly woody, erect, in plants more than one year old covered with bases of old leaves or showing leaf scars, leafy at crown; cauline leaves $\pm$ reduced; limb 1–2 cleft; plants dwarf 22
- 21b. Caudex slender, often procumbent or ascending; stem leafy, branched above; limb multipartite. Cauline leaves large, gradually reduced upwards; plants $\pm$ tall 19. *Fimbriatae*
- 22a. Calyx campanulate or ovate-campanulate; limb bipartite, often with two lateral teeth on the side; claw auriculate (except *S. Elizabethae*); stem scapiform or leafy, few–1-flowered; cauline leaves oblong-linear, lanceolate or ovate-lanceolate, base not cordate; caudex branched, each branch with 1–5 stems 17. *Odontopetalae*
- 22b. Calyx cylindrical- or oblong-clavate; limb bipartite (quadripartite in *S. lazica*) without lateral teeth; claw exauriculate; stem leafy, many-flowered; cauline leaves ovate or lanceolate with cordate base, large and conspicuous; caudex stout, simple or sparingly branched, each branch many-stemmed 18. *Cordifoliae*
- 23a. Plants perennial; stems with 1–2 or 3 (sometimes many) flowers; alpine or subalpine 24
- 23b. Plants annual or biennial, rarely perennial with stem always many-flowered; plants from low altitude or sea side; caudex short, usually not strongly woody 32
- 24a. Caudices stout, strongly woody, erect, in plants more than one year old covered with bases of old petioles or (in old part) showing leaf scars; caudical and lower cauline leaves large, rosulate; other cauline leaves reduced, often remote; stem branched above or simple, rarely subscapiform. Flowers small, usually many, sometimes reduced to one 21. *Brachypodae*
- 24b. Caudices slender, long, prostrate or ascending, or more or less erect, usually covered with leaf bases; cauline leaves usually gradually reduced upwards, sometimes conspicuous, or reduced and bract-like; stem leafy, sometimes scapiform, 1–few-flowered 25
- 25a. Flowers small, many, in a lax dichasium; stem slender, branched, leafy, glabrescent; calyx obconical or shortly clavate 26

- 25b. Flowers usually large or nearly so, seldom small, solitary or 2-5 in a dichasium; calyx cylindrical-clavate, clavate or campanulate. Stem leafy or scapiform, sparingly branched above . . . 27
- 26a. Seeds not crested on the dorsal surface . . . 28. *Rupifraga*
- 26b. Seeds crested on the dorsal line . . . 29. *Heliosperma*
- 27a. Calyx campanulate, 4-8 mm. long, glabrous; petals entire or emarginate. Capsule subsessile . . . 26. *Nanosilene*
- 27b. Calyx cylindrical-clavate or clavate, rarely oblong or ovate-campanulate, calyx puberulent or glandular-puberulent, limb bipartite 28
- 28a. Leaves linear-subulate, triquetrous, apex indurate, usually pointed, straight or falcate; claw auriculate . . . 22. *Pinifoliae*
- 28b. Leaves neither linear-subulate nor triquetrous, or if linear-subulate (*S. Urvillei*) then leaves fasciculate, not triquetrous, and claw exauriculate . . . 29
- 29a. Claw with conspicuous auricles (except *S. microphylla*); plants hairy. Stem subscapiform or leafy, 1-2-flowered, rarely 3-5-flowered; cauline leaves gradually reduced above, sometimes abruptly reduced and bract-like . . . 23. *Auriculatae*
- 29b. Claw without an auricle; or if auriculate, plants glabrous . . . 30
- 30a. Caudex slender, leafy, erect or more or less prostrate, not compact, sparingly branched; leaves ovate or ovate-lanceolate, often 3-5-nerved, sometimes fasciculate; stem leafy, usually tall . . . 27. *Cucubaloideae*
- 30b. Caudex slender, ascending or erect, branched, more or less compact often suffruticose; stem subscapiform or leafy . . . 31
- 31a. Leaves linear or linear-lanceolate or lanceolate; limb bipartite; claw smooth or nearly so; plants dwarf and caespitose; plants from the Old World . . . 25. *Macranthae*
- 31b. Leaves lanceolate or oblanceolate; limb bipartite or quadripartite, when bipartite lobes emarginate or with lateral outgrowths; claw ciliate; plants from the New World . . . 24. *Quadrilobatae*
- 32a. Dichasium condensed into a capitate or umbellate cyme; petals entire or emarginate; plants glabrous and glaucous. (23b) 30. *Compactae*
- 32b. Dichasium not a capitate or umbellate cyme; petals usually bipartite; plants pubescent, glandular-puberulent or often hirsute, viscid. (23b) . . . 33
- 33a. Plants succulent, maritime or psammophytic; stem prostrate or ascending, branched, leafy; dichasium passing into a monochasium; leaves fleshy; plants annual or perennial . . . 31. *Succulentae*
- 33b. Plants not succulent or maritime; stem usually erect, branched and leafy; branches of the dichasium (inflorescence) equal or unequal, often passing into a monochasial cyme, especially in the upper part; leaves usually not fleshy; plants mostly annual, rarely biennial or perennial . . . 34

- 34a. Seed deeply reniform, compressed with flat face, back deeply and acutely grooved between two wings; calyx slightly inflated in fruit; capsule sessile 33. *Saponarioideae*
- 34b. Seed widely reniform, scarcely compressed, never with two wings; calyx not inflated in fruit; capsule subsessile or stipitate 35
- 35a. Calyx apex not contracted in fruit 36
- 35b. Calyx apex contracted in fruit 37
- 36a. Plants rigid with stiff and filiform branches and pedicels; branches of the dichasium equal; seed with flat face. Cauline leaves usually fasciculate 34. *Rigidulae*
- 36b. Plants tender, scarcely rigid; branches of the dichasium equal or unequal, often passing into a monochasial cyme; seed with concave or convex face 35. *Atocion*
- 37a. Calyx glabrous and often glaucous, or viscid; nerves slender, more or less branched and anastomosed; plants glabrous or sparingly puberulent below, always glabrous above 36. *Behenantha*
- 37b. Calyx hairy; plants pubescent or glandular-puberulent 38
- 38a. Calyx glandular-puberulent; nerves anastomosed 32. *Melandrifformes*
- 38b. Calyx scabrous, bristly; nerves thick, greenish, simple, bearing papillae, or bulbous or scaly hairs 37. *Lasiocalycinae*
- 39a. Plants perennial; caudex elongated and strongly woody, in plants more than one year old covered with leaf bases or scars.(18b) 38. *Fruticulosae*
- 39b. Plants annual, rarely biennial or short-lived perennial; caudex short, not strongly woody.(18b) 40
- 40a. Seed deeply reniform with flat face, back deeply and acutely grooved between two wavy wings 43. *Dipterospermae*
- 40b. Seed widely reniform, sometimes more or less compressed, never with two wings 41
- 41a. Pedicels showing movements at or after anthesis; calyx with prominent, greenish, more or less simple nerves, in fruit constricted below the capsule and apex contracted. Capsule ovoid or ovoid-conical; seed with flat face and grooved back 42
- 41b. Pedicels not showing movements; calyx with nerves not so prominent, usually reticulately anastomosed, in fruit constricted or not constricted below the capsule 43
- 42a. Pedicels long, erect or ascending, becoming arcuately erect or deflexed in fruit; calyx oblong-clavate, becoming ovate and inflated in fruit; calyx nerves glandular-puberulent; petals pink 39. *Erecto-refractae*
- 42b. Pedicels short, slender, spreading or horizontal at anthesis, becoming more or less stout and erect in fruit; calyx adpressed to the capsule, cylindrical-clavate, becoming ovate-clavate in fruit; calyx nerves with crisp or papillose hairs; petals usually white 40. *Dichotomae*

- 43a. Calyx apex contracted in fruit; capsule ovate-globose, subsessile, seldom stipitate 42. *Silene*
- 43b. Calyx apex not contracted in fruit; capsule oblong or ovate-oblong, subsessile or stipitate 41. *Scorpioidae*

ENUMERATION OF THE SECTIONS OF *SILENE*

In contrast to Rohrbach, Williams and Pax & Hoffmann, no subgenera of *Silene* are recognised by the author, since the limits between them are artificial. The 44 sections recognised here are natural, convenient and, except for a few of the largest sections whose relationships remain obscure, homogeneous.

Space has only allowed descriptions to be included of the new sections and subsections; for those already described, reference must be made to the original authority, and to the key to the sections and their listed content. For spatial economy, the species contained in each section and subsection are referred to by numbers; these can be identified by reference to the index on p. 249 which will also enable the reader to find out to which section a species belongs. Where no numbers are cited, it can be assumed that the section or subsection only contains the type species. As the subsections are arranged as far as possible in order of increased specialisation, the subdivision containing the type of the section is not necessarily the first to be cited. Species that it has not been possible to examine have mostly been omitted, since their status and sectional position could not be confirmed.

In the annotation of the Sections and Subsections given below the groups are arranged as far as possible in a progressional series. In this connection the following criteria have been taken into consideration.

- i. The open panicle of bilateral cymes is considered more primitive than the contracted cyme, unilateral cyme or single flower.
- ii. Perennials have given rise to biennials and annuals.
- iii. The hermaphrodite condition is more primitive than the unisexual.
- iv. The 10-nerved calyx has given rise to the multinerved through the branching of median or commissural nerves.
- v. Five-carpelled ovaries have given rise to the 3-carpelled condition.
- vi. Many-seeded capsules are more primitive than few-seeded ones.

1. Section **Paniculatae** Boiss., Fl. Or. i, 574 (1867).

Syn.: Series *Italicae* Rohrb., Monogr. Sil. 77 (1868).

Lectotype: *S. italica* (L.) Pers.

1a. Subsection **Patulae** Chowdhuri, subsect. nov.

Caules 30–100 cm. alti, tenues vel crassiusculi, superne vel in regione inflorescentiae paniculati. Folia caudicalia et caulina inferiora magna, rosulata, petiolata; caulina altera sessilia gradatim redacta, raro numerosa, conspicua, fasciculata, interdum superiora pauca, parva. Petala bipartita, ligulata; unguis glabri raro ciliolati et auriculati. Capsula ovoideo-oblonga.

Type: *S. italica* (L.) Pers.

Species No. 137, 144, 151, 152, 169, 186, 250, 262, 298, 302, 310, 324, 341, 345, 354, 369, 383, 387, 388.

DISTR.: Mediterranean, S.E. Europe.

1b. Subsection **Sclerophyllae** Chowdhuri, **subsect. nov.**

Caules 20–60 cm. alti, tenues, glaberrimi raro puberuli, simplices vel sparsim ramosi, ramis paucis elongatis. Folia monomorphica, coriacea, caudicalia plus minus parva; caulina plerumque numerosa, conspicua, raro fasciculata. Petala integra vel emarginata; unguis glabri, exauriculati. Capsula ovoidea.

Type: *S. Alexandri* Hillebrand

Species No. 10, 187, 200, 393, 402.

DISTR.: Japan and Hawaiian Islands.

1c. Subsection **Laciniatae** (Boiss.) Chowdhuri, **comb. et stat. nov.**

Syn.: Sect. *Laciniatae* Boiss., Fl. Or. i, 575 (1867).

Type: *S. odoratissima* Bunge

Species No. 19, 142, 277, 279, 291.

DISTR.: Siberia, China and N. America.

2. Section **Occidentales** Chowdhuri, **sect. nov.**

Herbae perennes, pubescentes, glanduloso- vel hirtello-pubescentes. Radix lignosa, tenuis vel crassa, elongata, multiceps. Caudex lignosus, tenuis vel crassiusculus, foliosus, ramosus. Caules elati, erecti, ascendenti-erecti vel ascendentes, foliosi, ramosi, saepe subsimplices. Folia caudicalia rosulata, petiolata; folia caulina conspicua, superne gradatim redacta; omnia magna, rotundata, ovata, ovato-lanceolata, lanceolata vel oblanceolata raro linearia plerumque uninervia. Inflorescentia racemoso-paniculata. Flores hermaphroditi, erecti, pedicellati. Calyx membranaceus, late cylindricus raro tubuloso-campanulatus, glanduloso-puberulus. Petala plerumque multipartita raro bipartita vel integra; unguis ciliolatus, auriculatus interdum glaber et exauriculatus. Filamenta glabra vel pilosa. Styli 3–4 (–5). Capsula ovoidea vel conico-ovoidea, stipitata, in calyce inclusa. Semina forma variantia.

Type: *S. montana* Wats.

Species No. 56, 122, 195, 205, 252, 269, 275, 283, 319, 333, 346, 385, 394, 429, 434.

DISTR.: N. America and China.

3. Section **Siphonomorpha** Otth in DC., Prodr. 1, 377 (1824).

Syn.: Sect. *Viridiflorae* Boiss., Fl. Or. i, 574 (1867).

Series *Nutantes* Rohrb., Monogr. Sil. 76 (1868).

Genus *Evactoma* Raf., Aut. Bot. 23 (1840).

Lectotype: *S. nutans* L.

Species No. 15, 69, 128, 147, 215, 242, 265, 271, 290, 390, 427, 433.

DISTR.: W. & S. Mediterranean, Siberia, China and N. America.

4. Section **Lasiostemones** Boiss., Fl. Or. i, 574 (1867); Rohrb., Monogr. Sil. 76 (1868).

Lectotype: *S. longipetala* Vent.

Species No. 7, 23, 193, 219, 233, 236, 264, 281, 299, 325, 352, 358.

DISTR.: S.E. Europe, Orient, Russia to Japan.

5. Section **Sclerocalycinae** Boiss., Fl. Or. i, 575 (1867); Rohrb., Monogr. Sil. 73 (1868).

Lectotype: *S. bupleuroides* L.

5a. Subsection **Longiflorae** Schischkin ex Chowdhuri

Syn.: Sect. *Sclerocalycinae* subsect. *Longiflorae* Schischkin in Komarov, Fl. U. R. S. S. vi, 636 (1936), descr. russ.

Folia caudicalia et caulina inferiora numerosa, rosularia, linearia vel lineari-lanceolata; folia caulina superiora similia, pauca, gradatim redacta, raro parva, remota, bracteiformia. Caules plerumque superne vel in regione inflorescentiae ramosi (raro e basi ramosi—*S. bupleuroides* subsp. *ramosa* Chowdhuri). Planta glabra, raro inferne puberula.

Type species: *S. bupleuroides* L.

Species No. 30, 37, 65, 218, 223, 230, 303, 347, 380.

DISTR.: S.E. Europe (Russia), Orient and N. Africa.

5b. Subsection **Chlorifoliae** Schischkin ex Chowdhuri

Syn.: Sect. *Sclerocalycinae* subsect. *Chlorifoliae* Schischkin in Komarov, Fl. U. R. S. S. vi, 636 (1936), descr. russ.

Folia caudicalia et caulina inferiora parva, rosularia, sub anthesi emarcida, caulina alternata gradatim sursum increscentia, superne gradatim redacta, ovata, lanceolata vel lineari-lanceolata, acuta vel acuminata. Caules ramosi, rarius simplices. Planta glabra.

Type: *S. chlorifolia* Sm.

Species No. 53, 78, 164, 202, 209, 232, 273, 364, 371, 372, 401.

DISTR.: Orient and Caucasus.

6. Section **Tunicoideae** Boiss., Fl. Or. i, 577 (1867).

Type: *S. tunicoides* Boiss.

DISTR.: Greece and Turkey.

7. Section **Chloranthae** Rohrb., Monogr. Sil. 74 (1868); Williams in Journ. Linn. Soc. xxxii, 34 (1896); Schischkin in Komarov, Fl. U.R.S.S. vi, 616 (1936).

Lectotype: *S. chlorantha* (Willd.) Ehrh.

7a. Subsection **Ecoronatae** Schischkin ex Chowdhuri

Syn.: Sect. *Chloranthae* subsect. *Ecoronatae* Schischkin in Komarov, Fl. U. R. S. S. vi, 616 (1936), descr. russ.

Folia caudicalia et caulina inferiora ampla, rosulata, lanceolato-spathulata; folia caulina altera sessilia, pauca, remota, plerumque parva, bracteiformia. Inflorescentia racemiformis, elongata, multiflora, cymulis 1-3 (-5)-floris, inferioribus longis. Calyx oblongo-clavatus vel clavatus, nervis anastomosantibus haud prominentibus, inter nervos haud sulcatus. Petala eligulata. Capsula oblonga.

Type: *S. chlorantha* (Willd.) Ehrh.

Species No. 77, 143, 257, 436.

DISTR.: S.E. Europe extending to Turkey and India.

7b. Subsection **Coronatae** Chowdhuri, subsect. nov.

Folia caudicalia et caulina inferiora rosulata, obovato- vel lanceolato-spathulata; folia caulina alternata pauca, linearia. Inflorescentia racemi-

formis, pauciflora; flores in cymulos 1-3-floros dispositi. Flores hermaphroditi. Calyx clavatus, nervis 10 plus minus crassis prominentibus provisus, inter nervos saepe subsulcatus. Petala ligulata. Capsula ovoideo-oblonga.

Type: *S. Reichenbachii* Vis.

Species No. 150, 221, 280, 330, 334.

DISTR.: Greece and Turkey.

8. Section **Tataricae** Chowdhuri, **sect. nov.**

Syn.: Sect. *Chloranthae* subsect. *Tataricae* Schischkin in Komarov, Fl. U. R. S. S. vi, 619 (1936), descr. russ.

Herbae perennes, pubescentes vel glabrescentes. Radix lignosa, elongata. Caudex lignosus, simplex vel furcatus. Caules elati, simplices vel raro superne sparsim ramosi. Folia monomorphica, linearia vel lineari-lanceolata vel oblongo-lanceolata; folia caulina numerosa, conspicua, fasciculata. Inflorescentia racemiformis; cymuli breves, oppositi, inferiores 3-5-vel 7-flori, superiores 1 (-2-3)-flori. Flores hermaphroditi, pedicellati, erecti. Calyx oblongo-clavatus, raro subamplius, in fructu clavatus infra capsulam leviter constrictus. Petala alba, bipartita, ligulata; unguis et filamenta glabra. Capsula oblonga. Semina dorso canaliculata, faciebus plana.

Type: *S. tatarica* Pers.

Species No. 79, 130, 141, 231, 318, 384, 403.

DISTR.: Siberia extending S.W. to Bulgaria, Turkey and N. Persia.

9. Section **Graminifoliae** Chowdhuri, **sect. nov.**

Syn.: Sect. *Chloranthae* subsect. *Graminifoliae* Schischkin in Komarov, Fl. U. R. S. S. vi, 625 (1936), descr. russ.

Herbae perennes, caespitosae, pubescentes vel glabrescentes. Caudex simplex vel ramosus, foliosus, lignosus, tenuis vel crassiusculus. Caules erecti vel ascendenti-erecti, foliosi, superne paullum ramosi. Folia caudicalia numerosa, magna, rosulata, petiolata vel subsessilia, lanceolata vel lineari-lanceolata; folia caulina pauca, gradatim redacta vel bracteiformia. Inflorescentia racemiformis, plus minus brevis, cymulis oppositis 1-2-floris. Flores hermaphroditi, fere subnutantes. Calyx membranaceus, campanulatus raro tubuloso-campanulatus. Petala bipartita, ligulata, lobis interdum emarginatis; unguis plerumque ciliolatus et exauriculatus. Filamenta glabra. Styli 3-4 (-5). Capsula ovoidea vel conico-ovoidea, stipitata, calyce inclusa. Semina dorso canaliculata, faciebus plana.

Type: *S. tenuis* Willd.

Species No. 50, 74, 120, 121, 188, 226, 300, 362, 368, 373, 408.

DISTR.: Siberia, China, India and N. America.

10. Section **Gastrolychnis** (Fenzl) Chowdhuri, **comb. nov.**

Syn.: *Lychnis* sect. *Gastrolychnis* Fenzl in Endl., Gen. Pl. 974 (1840).

Wahlbergella Fries in Bot. Notiser, 1843, 143 (1843).

Gastrolychnis (Fenzl) Rupr. in Beitr. Pflanzenk. russ. Reich. ii, 24 (1845); Reichb. in Heynhold, Nomencl. Bot. ii, 225 (1846).

Melandrium sect. *Wahlbergella* (Fries) Boiss., Fl. Or. i, 661 (1867).

Vahlenbergella Blytt, Norges Fl. iii, 1070 (1876).

Melandrium sect. *Gastrolychnis* (Fenzl) Pax in Engl. & Prantl,

Nat. Pflanzenf. iii, Abt. 1, 76 (1889).

Melandrium subgen. *Gastrolychnis* (Fenzl) Schischkin in Kom., Fl. U.R.S.S. vi, 714 (1936).

Lectotype: *Silene Wahlbergella* Chowdhuri *

Containing numerous species described in *Melandrium* for which no names are yet available in *Silene*.

DISTR.: Europe, Asia and N. America.

11. Section **Otites** Otth in DC., Prodr. i, 369 (1824), pro parte.

Syn.: Sect. *Otiteae* Boiss., Fl. Or. i, 571 (1867); Rohrb., Monogr. Sil. 75 (1868).

Lectotype: *S. Otites* (L.) Sm.

Species No. 63, 105, 167, 239, 289, 343, 378, 428.

DISTR.: S. & S.E. Europe, Orient.

12. Section **Holopetalae** Schischkin ex Chowdhuri

Syn.: Sect. *Holopetalae* Schischkin in Komarov, Fl. U. R. S. S. vi, 676 (1936), descr. russ.

Herbae perennes, pubescentes vel puberulentes. Radix lignosa, elongata. Caudex brevis, erectus, simplex vel furcatus, foliatus. Caules elati, foliosi, simplices vel superne sparsim ramosi. Folia monomorphica, lineari-oblonga vel ovato-lanceolata; folia caulina numerosa, conspicua, fasciculata, superne gradatim redacta. Inflorescentia simplex vel ramosa, e cymulis congestis (inter se distantibus) breviter pedunculatis composita. Flores dioici, pedicellati, rarius hermaphroditi, erecti. Calyx tubuloso-clavatus, in fructu ovatus, interdum plus minus subinflatus. Petala alba (raro purpurascens), integra vel emarginata, plerumque eligulata; unguis et filamenta glabra. Capsula plerumque ovoidea, breviter stipitata, in calyce inclusa. Semina dorso canaliculata, faciebus plana.

Type: *S. holopetala* Bunge

12a. Subsection **Sibiricae** Schischkin ex Chowdhuri

Syn.: Sect. *Holopetalae* subsect. *Sibiricae* Schischkin in Komarov, Fl. U. R. S. S. vi, 676 (1936), descr. russ.

Folia omnia linearia vel lineari-oblonga. Petala alba, eligulata. Flores dioici. Caules plerumque simplices.

Type: *S. holopetala* Bunge

Species No. 136, 149, 173, 382.

DISTR.: Siberia, extending to India.

12b. Subsection **Ligulatae** Chowdhuri, subsect. nov.

Folia ovato-lanceolata vel lanceolata. Petala purpurea, ligulata. Flores hermaphroditi. Caules sparse ramosi.

Type: *S. confertiflora* Chowdhuri

DISTR.: Syria.

13. Section **Spergulfoliae** Boiss., Fl. Or. i, 572 (1867); Rohrb., Monogr. Sil. 72 (1868).

Lectotype: *S. spergulfolia* (Desf.) M.Bieb.

* *Silene Wahlbergella* Chowdhuri, nom. nov.

Syn.: *Lychnis apetalata* L., Sp. Pl. i, 437 (1753)—non *Silene apetalata* Willd. (1799).
Melandrium apetalum (L.) Fenzl in Ledeb., Fl. Ross. i, 326 (1842).

13a. Subsection **Polyphyllae** Schischkin ex Chowdhuri

Syn.: Sect. *Spergulfoliae* subsect. *Polyphyllae* Schischkin in Komarov, Fl. U. R. S. S. vi, 652 (1936), descr. russ.

Caules suffrutescentes, stricti, ramosi. Folia linearia, acuminata, plerumque recurva et fasciculata. Flores hermaphroditi, raro dioici. Calyx vix inflatus. Ungues petalorum ciliolati. Capsula ovoideo-conica haud trisulca.

Type: *S. spergulfolia* (Desf.) M.Bieb.

Species No. 31, 386, 391.

DISTR.: Orient and Caucasus.

13b. Subsection **Repentes** Schischkin ex Chowdhuri

Syn.: Sect. *Spergulfoliae* subsect. *Repentes* Schischkin in Komarov, Fl. U. R. S. S. vi, 654 (1936), descr. russ.

Caules herbacei, ramosi vel simplices, erecti. Folia lanceolata vix fasciculata. Flores hermaphroditi vel dioici. Calyx plus minus inflatus. Ungues petalorum glabri. Capsula ovoideo-conica, haud trisulca.

Type: *S. repens* Patr.

Species No. 71, 337.

DISTR.: Orient, Siberia, China to N. America.

13c. Subsection **Olgae** Chowdhuri, **subsect. nov.**

Caules herbacei, elati, ramosi. Folia ovato-lanceolata, acuminata, superne gradatim redacta. Calyx tubuloso-campanulatus haud inflatus. Petala bipartita, ligulata; lobis plerumque emarginatis; unguis glabri. Capsula ovoidea haud trisulca.

Type: *S. Olgae* Rohrb.

Species No. 201, 278, 293, 309, 435, 442.

DISTR.: Siberia and China.

13d. Subsection **Brachycarpae** Chowdhuri, **subsect. nov.**

Caules caespitosi, pumili vel elati, erecti vel arcuato-erecti. Folia lineari-lanceolata. Flores dioici. Ungues petalorum glabri. Calyx haud inflatus. Capsula ovoideo-conica, trisulca.

Type: *S. brachycarpa* Boiss. & Bal.

Species No. 47, 64.

DISTR.: Orient.

14. Section **Ampullatae** Boiss., Fl. Or. i, 571 (1867).

Type: *S. ampullata* Boiss.

DISTR.: Turkey.

15. Section **Caespitosae** Chowdhuri, **sect. nov.**

Herbae perennes, caespitosae, pumilae, pubescentes interdum superne glabrescentes. Radix lignosa, multiceps. Caudex brevis, tenuis, lignosus, foliosus, ramosus. Caules tenues, erecti, simplices vel in regione inflorescentiae paulum ramosi. Folia caudicalia et caulina inferiora rosulata, conspicua, petiolata, linearia vel lineari-lanceolata; folia caulina altera similia, sessilia, gradatim redacta, vel parva, remota, bracteiformia. Inflorescentiae racemiformes vel paniculato-racemiformes, racemi ramis brevibus oppositis 1-3-floris. Flores hermaphroditi, pedicellati raro subsessiles. Calyx tubuloso-clavatus vel ovato-campanulatus. Petala alborosea, bipartita, ligulata; unguis ciliolati raro glabri. Filamenta glabra.

Capsula oblonga rarius ovoidea, in calyce inclusa. Semina dorso canaliculata, faciebus plana.

Type: *S. tenella* C. A. Mey.

15a. Subsection **Dianthoideae** Chowdhuri, **subsect. nov.**

Folia caudicalia et caulina inferiora numerosa, rosulata; folia caulina altera parva, remota, bracteiformia. Rami inflorescentiae 1-3-flori. Calyx ovato-campanulatus, in fructu turbinatus. Petala eligulata. Capsula obovata vel oblongo-obovata.

Type: *S. dianthoides* Pers.

Species No. 113, 234.

DISTR.: Turkey and Caucasus.

15b. Subsection **Stenophyllae** (Boiss.) Chowdhuri, **comb. et stat. nov.**

Syn.: Sect. *Stenophyllae* Boiss., Fl. Or. i, 576 (1867).

Lectotype: *S. tenella* C. A. Mey.

Species No. 55, 211, 213, 217, 308, 405.

DISTR.: Greece, Turkey and Caucasus.

16. Section **Suffruticosae** (Rohrb.) Chowdhuri, **comb. et stat. nov.**

Syn.: *Botryosilene* series *Suffruticosae* Rohrb., Monogr. Sil. 74 (1868).

Lectotype: *S. suffrutescens* M. Bieb.

16a. Subsection **Supinae** Chowdhuri, **subsect. nov.**

Syn.: Sect. *Spergulifoliae* subsect. *Supinae* Schischkin in Komarov, Fl. U. R. S. S. vi, 655 (1936), descr. russ.

Folia caulina linearia vel lineari-lanceolata vel lineari-spathulata. Flores erecti. Calyx tubulosus vel anguste tubuloso-clavatus, in fructu clavatus haud inflatus, nervis plerumque non prominentibus. Ungues petalorum exauriculati.

Type: *S. supina* M. Bieb.

Species No. 48, 100, 400.

DISTR.: S.E. Europe, Orient.

16b. Subsection **Aucherianae** Chowdhuri, **subsect. nov.**

Syn.: Sect. *Auriculatae* subsect. *Aucherianae* Schischkin in Komarov, Fl. U. R. S. S. vi, 657 (1936), descr. russ.

Folia lanceolata vel oblongo-lanceolata, 1-vel 3-5-nervia. Flores erecti. Calyx tubuloso-clavatus vel clavatus; in fructu clavatus, interdum plus minus inflatus, nervis prominentibus. Ungues petalorum auriculati.

Type: *S. suffrutescens* M. Bieb.

Species No. 29, 45, 131, 171, 180, 254, 270, 285, 306, 398.

DISTR.: Orient and Caucasus.

16c. Subsection **Tomentellae** Schischkin ex Chowdhuri

Syn.: Sect. *Suffruticosae* subsect. *Tomentellae* Schischkin in Komarov, Fl. U. R. S. S. vi, 648 (1936), descr. russ.

Folia lineari-lanceolata, uninervia, inferiora plus minus conferta. Flores subnutantes. Calyx tubuloso-clavatus, haud inflatus. Ungues petalorum et filamenta ciliolati.

Type: *S. tomentella* Schischkin

Species No. 377, 413.

DISTR.: Russia,

17. Section **Odontopetalae** Schischkin ex Chowdhuri

Syn.: Sect. *Odontopetalae* Schischkin in Komarov, Fl. U. R. S. S. vi, 602 (1936), descr. russ.

Herbae perennes, suffrutescentes, pluricaules, pubescentes, glanduloso-vel hirtello-pubescentes, raro glabrescentes. Radix lignosa multiceps. Caudex lignosus, erectus, ramosus, superne foliatus. Caules pumili, erecti vel ascendent-erecti, simplices vel paullum ramosi, foliosi. Folia caudicalia numerosa, plus minus magna, rosulata, petiolata, lineari-lanceolata, lanceolata vel ovato-lanceolata vel oblongo-lanceolata; folia caulina sessilia, lanceolata vel ovato-lanceolata vel lineari-lanceolata, superne gradatim redacta. Flores solitarii vel in dichasia 2-20-flora dispositi, pedicellati, erecti vel subnutantes. Calyx membranaceus, inflatus, campanulatus vel ovato-campanulatus vel tubuloso-campanulatus, puberulus vel glanduloso-vel papilloso-vel hirtello-puberulus, 10-nervius. Petala bipartita, ligulata; unguis auriculati, glabri vel ciliolati. Capsula ovoidea vel ovoideo-globosa, stipitata, in calyce inclusa. Semina faciebus plana.

Type: *S. odontopetala* Fenzl

17a. Subsection **Dentatae** Chowdhuri, **subsect. nov.**

Caules erecti, plus minus crassiusculi. Flores erecti. Calyx campanulatus vel ovato-campanulatus, dentibus acutis vel acuminatis. Lamina bipartita e basi dentata, unguis glabri. Capsula ovoidea vel ovoideo-globosa, anthophoro 1-3-plo longior.

Type: *S. odontopetala* Fenzl

Species No. 4, 25, 36, 60, 92, 109, 127, 247, 272, 276, 284, 329, 338, 335, 419, 443.

DISTR.: S. Europe through Orient to China.

17b. Subsection **Lychnideae** Schischkin ex Chowdhuri

Syn.: Sect. *Auriculatae* subsect. *Lychnideae* Schischkin in Komarov, Fl. U. R. S. S. vi, 662 (1936), descr. russ.

Caules tenues, ascendentes. Flores subnutantes. Calyx tubuloso-campanulatus raro clavatus, dentibus obtusis. Dentes ad basin laminae deficiunt; unguis ciliolati. Capsula ovoidea, anthophoro 1-1½-plo longior.

Type: *S. lychnidea* C. A. Mey.

Species No. 192, 222, 307.

DISTR.: Siberia, China and Tibet.

18. Section **Cordifoliae** Chowdhuri, **sect. nov.**

Herbae perennes, caespitosae, pluricaules, glanduloso-vel hirtello-pubescentes vel pubescentes. Caudex erectus, lignosus, brevis, simplex vel furcatus, superne foliatus. Caules erecti, foliosi, superne sparse ramosi. Folia caudicalia numerosa, petiolata, spathulata vel ovato-lanceolata, acuminata; folia caulina plerumque numerosa, conspicua, superne gradatim redacta, cordato-ovata rarius ovato-lanceolata, acuminata. Flores pauci in dichasia dispositi, erecti, pedicellati. Calyx clavatus, inflatus, glanduloso-pubescent, rarius hirsutus, dentibus acuminatis.

Petala emarginata vel bipartita vel quadripartita, ligulata; unguis glabri, exauriculati (excl. *S. melandrioides* Lange). Capsula oblonga, stipitata, in calyce inclusa. Semina forma variantia.

Type: *S. cordifolia* All.

Species No. 2, 97, 140, 203, 241.

DISTR.: S. Europe, Turkey and Caucasus.

19. Section **Fimbriatae** Boiss., Fl. Or. i, 574 (1867).

Lectotype: *S. multifida* (Adams) Rohrb.

Species No. 59, 194, 256, 311, 365.

DISTR.: Orient and Caucasus.

20. Section **Inflatae** Boiss., Fl. Or. i, 573 (1867).

Lectotype: *S. Cucubalus* Wibel

20a. Subsection **Latifoliae** Chowdhuri, **subsect. nov.**

Plantae glabrae. Caules erecti vel ascendentes, rarius prostrati. Folia caulina magna, lanceolata, ovato-lanceolata vel ovata vel obovata. Calyx ovato-campanulatus vel ovato-cylindricus, glaber. Lamina petalorum bipartita.

Type: *C. Cucubalus* Wibel

Species No. 54, 103, 104, 133, 134, 156, 351, 409, 411, 421, 426.

DISTR.: Mediterranean.

20b. Subsection **Procumbentes** Chowdhuri, **subsect. nov.**

Syn.: Sect. *Procumbentes* Schischkin in Komarov, Fl. U. R. S. S. vi, 601 (1936), descr. russ.

Planta pubescenti-scabrida. Caules procumbentes. Folia anguste lanceolata vel lineari-lanceolata. Calyx campanulatus, hirsutus vel puberulus. Lamina petalorum emarginata.

Type: *S. procumbens* Murr.

DISTR.: Siberia.

21. Section **Brachypodae** Boiss., Fl. Or. i, 575 (1867).

Lectotype: *S. grisea* Boiss.

21a. Subsection **Nutantes** Chowdhuri, **subsect. nov.**

Flores breviter pedicellati; pedicelli floriferi erecti, fructiferi nutantes.

Type: *S. grisea* Boiss.

Species No. 72, 163, 253, 286.

DISTR.: Mostly from Orient.

21b. Subsection **Erectae** Chowdhuri, **subsect. nov.**

Flores longe pedicellati, solitarii vel pauci; pedicelli floriferi et fructiferi erecti.

Type: *S. flavescens* Waldst. & Kit.

Species No. 93, 138, 139, 206, 410.

DISTR.: Greece and Orient.

22. Section **Pinifoliae** Chowdhuri, **sect. nov.**

Herbae perennes, suffrutescentes, pubescentes vel glanduloso-pubescentes. Radix lignosa, elongata, plerumque multiceps. Caudex lignosus, ramosus, foliosus. Caules elati vel pumili, caespitosi, simplices vel sparse ramosi. Folia caudicalia lineari-subulata, triquetra, plerumque aceroso-

pungentia, erecta vel patenti-recurva, interdum falcata vel subfalcata; folia caulina plerumque pauca, redacta, bracteiformia, rarius similia gradatim redacta. Flores hermaphroditi, pedicellati, solitarii vel in dichasia 2-7-flora dispositi. Calyx tubuloso-clavatus raro subinflato-oblongus. Petala alba vel purpurea, bipartita, ligulata; ungues glabri, auriculati. Capsula ovoideo-oblonga vel oblonga, stipitata, in calyce inclusa rarius tota ex calyce exserta. Semina dorso canaliculata, faciebus plana.

Type: *S. Echinus* Boiss. & Heldr.

22a. Subsection **Fruticosae** Chowdhuri, **subsect. nov.**

Syn.: Sect. *Suffruticosae* subsect. *Fruticosae* Schischkin in Komarov, Fl. U. R. S. S. vi, 646 (1936), descr. russ.

Caudex lignosus, crassiusculus, brevis, rectus, simplex vel furcatus, foliosus. Caulis superne sparse ramosi. Folia monomorphica. Flores in dichasia 2-7-flora dispositi raro solitarii. Calyx haud inflatus.

Type: *S. goniocaula* Boiss.

Species No. 11, 16, 158, 268, 415.

DISTR.: Orient and S. Russia.

22b. Subsection **Echinus** Chowdhuri, **subsect. nov.**

Caudex lignosus, elongatus, tenuis, valde ramosus, foliosus. Caulis scapiformes. Folia caulina redacta, remota, bracteiformia. Flores solitarii. Calyx tubuloso-clavatus, haud inflatus.

Type: *S. Echinus* Boiss.

Species No. 68, 125, 135, 237, 396.

DISTR.: Orient.

22c. Subsection **Pungentes** Chowdhuri, **subsect. nov.**

Caudex lignosus, elongatus, tenuis, valde ramosus, foliosus. Folia caulina caudicalibus similia, gradatim redacta. Flores solitarii vel bini. Calyx subampliatio-oblongus.

Type: *S. pungens* Boiss.

DISTR.: Turkey.

23. Section **Auriculatae** Boiss., Fl. Or. i, 572 (1867).

Lectotype: *S. brevicaulis* Boiss.

23a. Subsection **Scapiformes** Chowdhuri, **subsect. nov.**

Caulis scapiformes. Folia caudicalia numerosa, rosulata, linearia vel lineari-lanceolata raro lanceolata; folia caulina pauca, redacta, remota, bracteiformia, 3-nervia. Flores solitarii vel in dichasia 2-3 (-5)-flora dispositi.

Type: *S. rhynchocarpa* Boiss.

Species No. 27, 220, 342.

DISTR.: Orient.

23b. Subsection **Brevicaules** Chowdhuri, **subsect. nov.**

Caulis foliosi. Folia caulina caudicalibus similia, sessilia, gradatim redacta. Flores solitarii vel bini.

Type: *S. brevicaulis* Boiss.

Species No. 21, 46, 49, 70, 89, 107, 111, 129, 246, 248, 295, 296, 301, 326, 425.

DISTR.: S. Europe, Orient and N. Africa.

24. Section **Quadrilobatae** Chowdhuri, **sect. nov.**

Herbae perennes, caespitosae, pubescentes vel glanduloso-pubescentes. Radix lignosa, tenuis, multiceps. Caudex brevis, foliosus, ramosus. Caules erecti, ramosi, foliosi. Folia omnia lineari-lanceolata, lanceolata, oblanceolata, inferiora petiolata. Flores hermaphroditi, pedicellati, erecti, in dichasio simplici vel composito dispositi. Calyx tubuloso-clavatus vel tubuloso-campanulatus, interdum subinflatus, puberulus vel glanduloso-puberulus. Petala ligulata, bipartita, lobis emarginatis, lateralibus plerumque minoribus; unguis obscure auriculati, ciliolati. Filamenta glabra. Styli 3-4 (-5). Capsula ovoideo-oblonga, stipitata, in calyce inclusa. Semina plerumque dorso canaliculata, faciebus plana.

Type: *S. Grayi* Wats.

Species No. 162, 175, 356, 399, 439.

DISTR.: N. America.

25. Section **Macranthae** (Rohrb.) Chowdhuri, **stat. nov.**

Syn.: Sect. *Dichasiosilene* series *Macranthae* Rohrb., Monogr. Sil. 70 (1868).

Sect. *Auriculatae* subsect. *Macranthae* (Rohrb.) Schischkin in Komarov, Fl. U. R. S. S. vi, 664 (1936).

Lectotype: *S. Saxifraga* Linn.

25a. Subsection **Dianthifoliae** Chowdhuri, **subsect. nov.**

Caudex tenuis, lignosus, brevis, ramosus, foliosus. Folia caudicalia numerosa, rosulata; folia caulina redacta, remota, plerumque bracteiformia. Flores solitarii vel bini. Calyx obconico-cylindricus. Ungues petalorum glabri interdum auriculati. Planta glabra.

Type: *S. dianthifolia* J. Gay

Species No. 112, 181, 317, 366.

DISTR.: Orient.

25b. Subsection **Saxifragae** Chowdhuri, **subsect. nov.**

Caudex lignosus, tenuis, elongatus, ramosus, foliatus. Folia caudicalia rosulata, linearia vel lineari-lanceolata; folia caulina caudicalibus similia, superne gradatim redacta. Calyx clavatus rarius clavato-campanulatus. Ungues petalorum interdum ciliolati. Planta puberulo-scabridula.

Type: *S. Saxifraga* L.

Species No. 58, 62, 86, 145, 159, 229, 255, 288, 313, 359, 367, 422.

DISTR.: S.E. Europe and Turkey.

25c. Subsection **Pulvinatae** Chowdhuri, **subsect. nov.**

Caudex lignosus, tenuis, ramosus, valde compactus, foliosus. Caules scapiformes. Folia caudicalia numerosa, rosulata, linearia vel lanceolata; folia caulina redacta, remota, bracteiformia. Calyx clavatus. Ungues petalorum glabri, exauriculati. Planta glanduloso-puberula.

Type: *S. oreades* Boiss. & Heldr.

Species No. 38, 168, 282, 441.

DISTR.: Greece and Turkey.

26. Section **Nanosilene** Otth in DC., Prodr. i, 367 (1824).

Syn.: Sect. *Pumilio* Reichb., Fl. Germ. Excurs. 822 (1832).

Gen. *Xamilenis* Raf., Aut. Bot. 24 (1840).

Type: *S. acaulis* Linn.

DISTR.: Circumboreal.

27. Section **Cucubaloideae** Edgew. & Hook. in Hook., Fl. Br. India, i, 221 (1875).

Lectotype: *S. khasiana* Rohrb.

27a. Subsection **Schaftae** (Boiss.) Chowdhuri, **comb. et stat. nov.**

Syn.: Sect. *Schaftae* Boiss., Fl. Or. i, 577 (1867).

Lectotype: *S. Schafta* Gmel.

Species No. 176, 228, 363.

DISTR.: Orient and Caucasus.

27b. Subsection **Sinenses** Chowdhuri, **subsect. nov.**

Caudex lignosus, erectus, foliosus. Caulis elati, ramosi, foliosi. Folia caudicalia numerosa, magna, rosulata; folia caulina superne gradatim redacta; omnia ovata vel ovato-lanceolata saepe lineari-lanceolata vel lanceolata, acuminata, plerumque 3–5-nervia. Flores plures, in dichasium compositum dispositi. Calyx tubuloso-clavatus. Petala bipartita, ligulata; lobis plerumque emarginatis.

Type: *S. khasiana* Rohrb.

Species No. 3, 33, 43, 52, 66, 132, 161, 189, 238, 251, 344, 349, 353, 404, 423.

DISTR.: China and India.

28. Section **Rupifraga** Otth in DC., Prodr. i, 375 (1824), pro parte.

Syn.: Sect. *Dichasiosilene* series *Brachyanthae* Rohrb., Monogr. Sil. 71 (1868).

Genus *Anotites* Greene, Leaflets Bot. Obs. i, 97 (1905).

Lectotype: *S. rupestris* Linn.

Species No. 102, 119, 207, 225, 244, 350, 375, 438.

29. Section **Heliosperma** Reichb., Fl. Germ. Exc. 87 (1832).

Lectotype: *S. quadrifida* L.

Species No. 13, 81, 328, 414.

DISTR.: S. Europe.

30. Section **Compactae** Boiss., Fl. Or. i, 569 (1867).

Lectotype: *S. compacta* Fisch.

Species No. 32, 34, 90, 340, 424.

DISTR.: N. & E. Mediterranean, Orient and Russia.

31. Section **Succulentae** Boiss., Fl. Or. i, 576 (1867).

Lectotype: *S. succulenta* Forsk.

Species No. 214, 397, 412, 431.

DISTR.: Mediterranean.

32. Section **Melandrifformes** Boiss., Fl. Or. i, 568 (1867).

Type: *S. noctiflora* L.

Species No. 9, 117, 266.

DISTR.: Europe and Orient.

33. Section **Saponarioideae** Boiss., Fl. Or. i, 568 (1867).

Type: *S. nana* Kar. & Kir.

DISTR.: Orient and Russia.

34. Section **Rigidulae** Boiss., Fl. Or. i, 571 (1867).Lectotype: *S. picta* Pers.*Species* No. 26, 75, 124, 177, 179, 184, 190, 210, 243, 312, 314, 316, 339, 392.

DISTR.: Mediterranean and Orient, extending to Russia and India.

35. Section **Atocion** Otth in DC., Prodr. i, 383 (1824), pro parte.Syn.: Sect. *Atocieae* Boiss., Fl. Or. i, 570 (1867).Sect. *Dichasiosilene* series *Atocia* Rohrb., Monogr. Sil. 71 (1868).Lectotype: *S. Atocion* Jacq. (= *S. aegyptiaca* (L.) L. fil.).35a. Subsection **Rubellae** (Battand.) Chowdhuri, **comb. nov.**Syn.: Subsect. *Siphonomorpha* 3 *Rubellae* Battand. in Battand. & Trabut, Fl. de l'Alg. i, 137 (1888).

Caules superne ramosi, ramis brevibus, strictis. Inflorescentia corymbiformis. Flores calyce brevius pedicellati. Petala integra. Capsula ovoidea vel oblongo-ovoidea. Semina dorso canaliculata, faciebus curvato-excavata.

Lectotype: *S. rubella* L.*Species* No. 28, 41, 146, 323, 348, 376, 418, 437.

DISTR.: Mediterranean.

35b. Subsection **Delicatulae** Chowdhuri, **subsect. nov.**

Caules superne ramosi vel e basi ramosi, ramis strictis. Inflorescentia corymbiformis. Flores calyce brevius pedicellati. Petala integra vel bipartita. Capsula ovoidea, stipitata. Semina subglobosa, profunde umbilicata.

Type species: *S. aegyptiaca* (L.) L. fil.*Species* No. 6, 110, 182.

DISTR.: Mediterranean and Orient.

35c. Subsection **Divaricatae** (Battand.) Chowdhuri, **comb. nov.**Syn.: Subsect. *Siphonomorpha* 5. *Divaricatae* Battand. in Battand. & Trabut, Fl. de l'Alg. i, 138 (1888).

Caules tenues, ramosi; ramis divaricatis. Inflorescentia diffusa rare scorpioidea. Flores longe pedicellati. Calyx oblongus, in fructu clavatus. Petala integra vel emarginata. Capsula oblonga, stipitata. Semina dorso canaliculata, faciebus plana.

Lectotype: *S. divaricata* Clem.*Species* No. 118, 165, 183, 196, 240, 305, 374, 432.

DISTR.: Mediterranean.

36. Section **Behenantha** Otth in DC., Prodr. i, 376 (1824).Syn.: Sect. *Leicalycinae* Boiss., Fl. Or. i, 583 (1867).Lectotype: *S. Behen* L.36a. Subsection **Creticae** Chowdhuri, **subsect. nov.**

Caules tenues, e basi ramosi, rarius simplices. Folia caudicalia numerosa, rosulata; folia caulina redacta, pauca, remota. Flores longe pedicellati, in dichasia dispositi. Calyx tubuloso-clavatus rare tubuloso-campanulatus; nervis 10, plus minus crassis, prominentibus. Lamina petalorum ampla,

integra vel emarginato-biloba. Capsula ovoideo-oblonga. Planta inferne puberula superne glabra.

Type: *S. cretica* L.

Species No. 67, 101, 407, 420.

DISTR.: N.E. Mediterranean.

36b. Subsection **Muscipulae** Chowdhuri, **subject. nov.**

Caules superne ramosi, foliosi. Folia caudicalia rosulata, plus minus parva; folia caulina plerumque conspicua, numerosa, superne gradatim redacta. Flores calyce brevius pedicellati, in dichasia dispositi, ramis aequalibus vel inaequalibus, rarius inflorescentia superne scorpioidea. Calyx ovato-campanulatus vel tubuloso-campanulatus vel clavatus. Lamina petalorum plus minus parva, emarginata vel bipartita. Capsula ovoidea. Planta glabra.

Type: *S. Behen* L.

Species No. 20, 39, 160, 174, 198, 260, 335.

DISTR.: Mediterranean.

37. Section **Lasiocalycinae** Boiss., Fl. Or. i, 569 (1867).

Lectotype: *S. squamigera* Boiss.

37a. Subsection **Papillosae** Chowdhuri, **subject. nov.**

Flores breviter pedicellati, in dichasia dispositi, dichasii ramis aequalibus. Calyx ad nervos papillosus vel papilloso-scabriusculus; pilis basi non bulboso-incrassatis.

Type: *S. papillosa* Boiss.

Species No. 99, 212, 297.

DISTR.: S.E. Europe and Orient.

37b. Subsection **Squamatae** Chowdhuri, **subject. nov.**

Flores in dichasia dispositi; dichasia ramis valde inaequalibus; interdum inflorescentia superne scorpioidea vel floribus in cincinnis. Calyx squamatus vel ad nervos pilis basi bulboso-incrassatis.

Type: *S. squamigera* Boiss.

Species No. 123, 287, 360, 389, 416, 430.

DISTR.: Mediterranean.

37c. Subsection **Eudianthe** (Reichb.) Chowdhuri, **comb. nov.**

Syn.: *Eudianthe* Reichb., Nom. 206 (1841).

Type: *S. coelirosa* (L.) A.Br.

Species No. 87, 197.

DISTR.: W. Mediterranean, extending to Greece.

38. Section **Fruticulosae** (Rohrb.) Chowdhuri, **stat. nov.**

Syn.: Sect. *Cinnnosilene* series *Fruticulosae* Rohrb., Monogr. Sil. 69 (1868).

Lectotype: *S. Burchellii* Otth

Species No. 35, 42, 51, 80, 82, 98, 126, 172, 185, 204, 259, 320.

DISTR.: Africa, one species in S. Europe and one in India.

39. Section **Erecto-refractae** Chowdhuri, **sect. nov.**

Herbae annuae, pubescentes vel glanduloso-pubescentes. Radix tenuis, elongata. Caudex brevis, simplex vel ramosus, foliosus. Caulis erecti vel ascendentes, valde ramosi, rarius simplices, foliosi. Folia inferiora rosulata; folia superiora numerosa, lineari- vel ovato-lanceolata vel lanceolata, superne gradatim redacta. Flores in dichasia laxa vel in cincinnos dispositi. Pedicelli plerumque longi, floriferi erecti vel erecto-patuli, fructiferi horizontales, penduli, patulo-refracti vel arcuato-erecti rarius suberecti. Calyx oblongo- vel ovato-clavatus, glanduloso-puberulus, nervis virescentibus prominentibus superne coniunctis, in fructu ovato-amplius ad apicem contractus. Petala rosea, bipartita, ligulata. Capsula ovoideo-conica, stipitata. Semina faciebus plana.

Type: *S. Boissieri* J. Gay

Species No. 5, 12, 44, 304, 332.

DISTR.: W. Mediterranean (*S. pendula* L. extending to Russia and India).

40. Section **Dichotomae** (Rohrb.) Chowdhuri, **stat. nov.**

Syn.: Sect. *Cininosilene* series *Dichotomae* Rohrb. Monogr. Sil. 67 (1868).

Lectotype: *S. dichotoma* Ehrh.

Species No. 114, 166, 199, 292, 336.

DISTR.: E. Mediterranean and Orient, extending to S. Russia.

41. Section **Scorpioideae** (Rohrb.) Chowdhuri, **stat. nov.**

Syn.: Sect. *Cininosilene* series *Scorpioideae* Rohrb., Monogr. Sil. 67 (1868).

Lectotype: *S. hirsuta* Lag.

41a. Subsection **Pubicalycinae** Chowdhuri, **subsect. nov.**

Calyx tubulosus vel tubuloso-clavatus, glanduloso-puberulus vel pubescens, in fructu clavatus. Capsula ovoideo-oblonga vel oblonga, stipitata.

Type: *S. hirsuta* Lag.

Species No. 8, 76, 84, 106, 115, 170, 178, 245, 249, 263, 274, 294, 315, 361, 370.

DISTR.: Mediterranean, Orient and Abyssinia.

41b. Subsection **Cinereae** (Battand.) Chowdhuri, **comb. nov.**

Syn.: Subsect. *Stachymorpha* b. *Cinereae* Battand, in Battand. & Trabut, Fl. de l'Alg. i, 131 (1888).

Lectotype: *S. cinerea* Desf.

Species No. 61, 83, 85, 191, 235, 379, 381.

DISTR.: W. Mediterranean and S. Europe (*S. setacea* Viv. extending to Orient).

41c. Subsection **Nocturnae** (Battand.) Chowdhuri, **comb. nov.**

Syn.: Subsect. *Stachymorpha* e. *Nocturnae* Battand. in Battand. & Trabut, Fl. de l'Alg. i, 132 (1888).

Type: *S. nocturna* Linn.

Species No. 267, 332.

DISTR.: Mediterranean.

42. Section **Silene**

Syn.: Sect. *Stachymorpha* Otth in DC., Prodr. i, 371 (1824), pro parte.

Subsect. *Stachymorpha* d. *Gallicae* Battand. in Battand. & Trabut, Fl. de l'Alg. i, 131 (1888).

Lectotype: *S. gallica* L. (*S. anglica* L.).

Species No. 40, 57, 73, 116, 148, 153, 331.

DISTR.: Mediterranean (*S. gallica* L. cosmopolitan).

43. Section **Dipterospermae** (Rohrb.) Chowdhuri, **stat. nov.**

Syn.: Sect. *Cincinnosilene* series *Dipterospermae* Rohrb., Monogr. Sil. 69 (1868).

Lectotype: *S. colorata* Poir.

Species No. 22, 88, 108, 154, 155, 157, 216.

DISTR.: S. & E. Mediterranean.

44. Section **Conoimorpha** Otth in DC., Prodr. i, 367 (1824).

Syn.: Sect. *Conoimorphae* and Sect. *Ammophilae* Boiss., Fl. Or. i, 568 (1867).

Sect. *Conosilene* Rohrb., Monogr. Sil. 67 (1868).

Gen. *Pleconax* Raf., Aut. Bot. 24 (1840).

Lectotype: *S. conica* L.

Species No. 16, 17, 94, 95, 96, 224, 227, 258, 357, 395, 406.

DISTR.: Mediterranean (2 species circumboreal).

INDEX OF ACCEPTED SPECIES

The running number is that quoted in the enumeration of the sections.

The number following the specific name refers to the section or subsection to which the species belongs.

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| 2 | <i>acutifolia</i> Link, 18. | 46 | <i>Boryi</i> Boiss., 23b. |
| 3 | <i>adenantha</i> Franch., 27b. | 47 | <i>brachycarpa</i> Boiss. & Bal., 13d. |
| 4 | <i>adenopetala</i> H. Raik, 17a. | 48 | <i>brahuica</i> Boiss., 16a. |
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| 7 | <i>afghanica</i> Rohrb., 4. | 50a | <i>bupleuroides</i> L., 5a. |
| 8 | <i>affinis</i> Boiss., 41a. | 51 | <i>Burchellii</i> Otth, 38. |
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| 10 | <i>Alexandri</i> Hilleb., 1b. | 53 | <i>caesarea</i> Boiss. & Bal., 5b. |
| 11 | <i>Alexandrae</i> Keller, 22a. | 54 | <i>caesia</i> Sibth. & Sm., 20a. |
| 12 | <i>Almolae</i> J. Gay, 39. | 55 | <i>caespitosa</i> Stev., 15b. |
| 13 | <i>alpestris</i> Jacq., 29. | 56 | <i>californica</i> Durand, 2. |
| 14 | <i>altaica</i> Pers., 22a. | 57 | <i>calycina</i> Salzm., 42. |
| 15 | <i>amana</i> Boiss., 3. | 58 | <i>Campanula</i> Pers., 25b. |
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| 17 | <i>amphorina</i> Pomel, 44. | 60 | <i>candicans</i> Celak., 17a. |
| 18 | <i>ampullata</i> Boiss., 14. | 61 | <i>canopica</i> Boiss., 41b. |
| 18a | <i>anglica</i> L. (= <i>gallica</i>), 42. | 62 | <i>capillipes</i> Boiss. & Heldr., 25b. |
| 19 | <i>anisoloba</i> Schrenk, 1c. | 63 | <i>capitellata</i> Boiss., 11. |
| 20 | <i>Antirrhina</i> L., 36b. | 64 | <i>cappadocica</i> Boiss. & Heldr., 13d. |
| 21 | <i>antitaurica</i> Chowdhuri, 23b. | 65 | <i>caramanica</i> Boiss., 5a. |
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| 26 | <i>arenosa</i> Koch, 34. | 69 | <i>catholica</i> Ait., 3. |
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| 29 | <i>arguta</i> Fenzl, 16b. | 72 | <i>cephalenia</i> Heldr., 21a. |
| 30 | <i>armena</i> Boiss., 5a. | 73 | <i>cerastioides</i> L., 42. |
| 31 | <i>armeniaca</i> Rohrb., 13a. | 74 | <i>chamarensis</i> Turcz., 9. |
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| 35 | <i>atlantica</i> Coss. & Dur., 38. | 78 | <i>chlorifolia</i> Sm., 5b. |
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- 88 *colorata* Poir., 43.
 89 *commelinifolia* Boiss., 23b.
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 92 *conformifolia* Preobr., 17a.
 93 *congesta* Sibth. & Sm., 21b.
 94 *conica* L., 44.
 95 *coniflora* Nees, 44.
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 99 *crassipes* Fenzl, 37a.
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 101 *cretica* L., 36a.
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 107 *Davisii* Chowdhuri, 23b.
 108 *decipiens* Barc., 43.
 109 *Delavayi* Franch., 17a.
 110 *delicatula* Boiss., 35b.
 111 *depressa* M. Bieb., 23b.
 112 *dianthifolia* J. Gay, 25a.
 113 *dianthoides* Pers., 15a.
 114 *dichotoma* Ehrh., 40.
 115 *discolor* Sibth. & Sm., 41a.
 116 *disticha* Willd., 42.
 117 *diurna* Godr., 32.
 118 *divaricata* Clem., 35c.
 119 *Dorrii* Kell., 28.
 120 *Douglasii* Hook., 9.
 121 *Drummondii* Hook., 9.
 122 *dumicola* W. W. Sm., 2.
 123 *echinata* Otth, 37b.
 124 *echinosperma* Boiss. & Heldr., 34.
 125 *Echinus* Boiss. & Heldr., 22b.
 126 *elegans* Link, 38.
 127 *Elizabethae* Jan, 17a.
 128 *epilosa* W. W. Sm., 3.
 129 *eremicana* Stapf, 23b.
 130 *eremitica* Boiss., 8.
 131 *ericalycina* Boiss., 16b.
 132 *esquamata* W. W. Sm., 27b.
 133 *Fabaria* Sibth. & Sm., 20a.
 134 *fabarioides* Hausskn., 20a.
 135 *falcata* Sibth. & Sm., 22b.
 136 *Falconeriana* Royle, 12a.
 137 *Fenzlii* Boiss. & Bal., 1a.
 138 *flammulifolia* Steud., 21b.
 139 *flavescens* Waldst. & Kit., 21b.
 140 *foetida* Link, 18.
 141 *foliosa* Maxim., 8.
 142 *Fortunei* Vis., 1c.
 143 *Friwaldzkyana* Hampe, 7a.
 144 *fruticosa* L., 1a.
 145 *fruticulosa* Sieber, 25b.
 146 *fuscata* Link, 35a.
 147 *galataea* Boiss., 3.
 148 *gallica* L., 42.
 149 *Gebleriana* Schrenk, 12a.
 150 *genistifolia* Halacsy, 7b.
 151 *gibraltarica* Boiss., 1a.
 152 *gigantea* L., 1a.
 153 *Giraldii* Guss., 42.
 154 *glaberrima* Faur. & Maire, 43.
 155 *glabrescens* Coss., 43.
 156 *glareosa* Jord., 20a.
 157 *glauca* Pourr., 43.
 158 *goniocala* Boiss., 22a.
 159 *gracillima* Rohrb., 25b.
 160 *graeca* Boiss. & Sprun., 36b.
 161 *grandiflora* Franch., 27b.
 162 *Grayi* Wats., 24.
 163 *grisea* Boiss., 21a.
 164 *Haradjianii* Chowdhuri, 56.
 165 *Haussknechtii* Heldr., 35c.
 166 *Heldreichii* Boiss., 40.
 167 *Hellmannii* Claus., 11.
 168 *heterodonta* Williams, 25c.
 169 *hifacensis* Rouy, 1a.
 170 *hirsuta* Lag., 41a.
 171 *hirticalyx* Boiss. & Hausskn., 16b.
 172 *Hochstetteri* Rohrb., 38.
 173 *holopetala* Bunge, 12a.
 174 *Holzmannii* Heldr., 36b.
 175 *Hookeri* Nutt., 24.
 176 *humilis* C. A. Mey., 27a.
 177 *Hussoni* Boiss., 34.
 178 *imbricata* Desf., 41a.
 179 *inaperta* L., 34.
 180 *incurvifolia* Kar. & Kir., 16b.
 181 *infidelium* Post, 25a.
 182 *insularis* Barbey, 35b.
 183 *integripetala* Bory & Chaub., 35c.
 184 *intricata* Post, 34.
 185 *intrusa* Wight & Arn., 39.
 186 *italica* (L.) Pers., 1a.

- 187 japonica Rohrb., 1b.
 188 jeniseensis Willd., 9.
 189 khasiana Rohrb., 27b.
 190 Kotschy Boiss., 34.
 191 Kremeri Soy.-Will. & Godr.,
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 192 kubanensis Som. & Lev., 17b.
 193 kunawarensis Royle, 4.
 194 lacera Sims, 19.
 195 laciniata Cav., 2.
 196 laconia Boiss. & Orph., 35c.
 197 laeta (Ait.) A. Br., 37c.
 198 laevigata Sibth. & Sm., 36b.
 199 lagenocalyx Fenzl, 40.
 200 lanceolata Gray, 1b.
 201 langkongensis Franch., 13c.
 202 laxa Boiss. & Ky., 5b.
 203 lazica Boiss., 18.
 204 legionensis Lag., 38.
 205 Lemmonii Wats., 2.
 206 leptoclada Boiss., 21b.
 207 Lerchenfeldiana Baumg., 28.
 208 leucophylla Boiss., 3.
 209 libanotica Boiss., 5b.
 210 linearis Decne., 34.
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 212 linicola C. C. Gmel., 37a.
 213 linifolia Sibth. & Sm., 15b.
 214 littorea Brot., 31.
 215 longicilia Otth, 3.
 216 longicaulis Pourr., 43.
 217 longidens Schischkin, 15b.
 218 longiflora Ehrh.
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 219 longipetala Vent., 4.
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 221 lycanica Chowdhuri, 7b.
 222 lychnidea C. A. Mey., 17b.
 223 lycica Chowdhuri, 5a.
 224 lydia Boiss., 44.
 225 macedonica Form., 28.
 226 Macounii Wats., 9.
 227 macrodonta Boiss., 44.
 228 macronychia Boiss., 27a.
 229 macropoda Velen., 25b.
 230 macrosolen Steud., 5a.
 231 macrostyla Maxim., 8.
 232 makmeliana Boiss., 5b.
 233 Manissadjianiana Freyn, 4.
 234 Marcowiczii Schischkin, 15a.
 235 maroccana Coss., 41b.
 236 Marschallii C. A. Mey., 4.
 237 masmenaea Boiss., 22b.
 238 Maximowicziana Rohrb., 27b.
 239 media (Litw.) Kleop., 11.
 240 mekinensis Coss., 35c.
 241 melandryoides Lange, 18.
 242 mellifera Boiss. & Reut., 3.
 243 mentagensis Coss., 34.
 244 Menziesii Hook., 28.
 245 micropetala Lag., 41a.
 246 microphylla Boiss., 23b.
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 248 minutifolia Chowdhuri, 23b.
 249 mogadorensis Coss., 41a.
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 251 Monbeigii W. W. Sm., 27b.
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 254 Montbretiana Boiss., 16b.
 255 multicaulis Guss., 25b.
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 257 multiflora (W. & K.) Pers., 7a.
 258 multinervia Wats., 44.
 259 Mundiana Eckl. & Zeyh., 38.
 260 Muscipula L., 36b.
 261 nana Kar. & Kir., 33.
 262 nevadensis Boiss., 1a.
 263 nicaeensis All., 41a.
 264 Niederi Heldr., 4.
 265 nivea Otth, 3.
 266 noctiflora L., 32.
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 268 nodulosa Boiss., 22a.
 269 nuda (Wats.) H. & M., 2.
 270 nurensis Boiss. & Hausskn.,
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 271 nutans L., 3.
 272 oblanceolata W. W. Sm., 17a.
 273 obtusidentata B. Fedtsch., 5b.
 274 obtusifolia Willd., 41a.
 275 occidentalis Wats., 2.
 276 odontopetala Fenzl, 17a.
 277 odoratissima Bunge, 1c.
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 279 Olgiana B. Fedtsch., 1c.
 280 oligantha Boiss. & Heldr., 7b.
 281 olympica Boiss., 4.
 282 oreades Boiss. & Heldr., 25c.
 283 oregana Wats., 2.
 284 oreina Schischkin, 17a.
 285 oreophila Boiss., 16b.

- 286 oreosinaica Chowdhuri, 21a.
 287 oropediorum Coss., 37b.
 288 Orphanidis Boiss., 25b.
 289 Otites (L.) Sm., 11.
 290 otodonta Franch., 3.
 291 ovata Pursh, 1c.
 292 oxydonta C. & W. Barbey, 40
 293 pachyrrhiza Franch., 13c.
 294 palaestina Boiss., 41a.
 295 palinotricha Fenzl, 23b.
 296 papillifolia Williams, 23b.
 297 papillosa Boiss., 37a.
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 299 Parrowiana Boiss. & Hausskn.,
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 301 parvula Coss., 23b.
 302 pauciflora Salzm., 1a.
 303 peduncularis Boiss., 5a.
 304 pendula L., 39.
 305 pentilica Boiss., 35c.
 306 persica Boiss., 16b.
 307 petraea Adams, 17b.
 308 pharnaceifolia Fenzl, 15b.
 309 phinicotonta Franch., 13c.
 310 phrygia Boiss., 1a.
 311 physalodes Boiss., 19.
 312 picta Pers., 34.
 313 pindicola Hausskn., 25b.
 314 pinetorum Boiss. & Heldr., 34
 315 pompeipolitana J. Gay, 41a.
 316 portensis L., 34.
 317 Porteri Post, 25a.
 318 praemixta M. Pop., 8.
 319 praticola W. W. Sm., 2.
 320 primuliflora Eckl. & Zeyh., 38.
 321 procumbens Murr., 20b.
 322 psammitis Link, 39.
 323 pseudo-atocion Desf., 35a.
 324 pseudo-nutans Panc., 1a.
 325 puberula Boiss., 4.
 326 pulchella Chowdhuri, 23b.
 327 pungens Boiss., 22c.
 328 quadrifida L., 29.
 329 Raddeana Trautv., 17a.
 330 radicosa Boiss. & Heldr., 7b.
 331 ramosissima Willk., 42.
 332 reflexa (L.) Ait., 41c.
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 339 reticulata Desf., 34.
 340 Reuteriana Boiss. & Bl., 30.
 341 rhodopea Janka, 1a.
 342 rhynchocarpa Boiss., 23a.
 343 Roemerii Friv., 11.
 344 rosiflora K. Ward, 27b.
 345 rosulata Soy.-Will. & Godr.,
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 346 rotundifolia Nutt., 2.
 347 Rouyana Battand., 5a.
 348 rubella L., 35a.
 349 rubicunda W. W. Sm., 27b.
 350 rupestris L. 28.
 351 rupicola Bor., 20a.
 352 Ruprechtii Schischkin, 4.
 353 salweenensis W. W. Sm., 27b.
 354 Salzmannii Badaro, 1a.
 355 samarkandensis Preobr., 17a.
 356 Sargentii Wats., 24.
 357 Sartorii Boiss. & Heldr., 44.
 358 saxatilis Sims, 4.
 359 Saxifraga L., 25b.
 360 scabrida Soy.-Will. & Godr.,
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 361 scabriflora Brot., 41a.
 362 scaposa Robinson, 9.
 363 Schafta G. Gmel., 27a.
 364 Schimperiana Boiss., 5b.
 365 schizopetala Bornm., 19.
 366 Schlumbergeri Boiss., 25a.
 367 Schmuckeri Wettst., 25b.
 368 chunglienensis W. W. Sm., 9.
 369 Schwarzenbergeri Halacsy, 1a.
 370 Schweinfurthii Rohrb., 41a.
 371 sclerophylla Chowdhuri, 5b.
 372 sclerophylloides Chowdhuri,
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 373 Scouleri Hook., 9.
 374 sedoides Poir., 35c.
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 376 segetalis Duf., 35a.
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| 384 Skorpii Velen., 8. | 414 Tommasinii Vis., 29. |
| 385 Spaldingii Wats., 2. | 415 Tragacantha Fenzl, 22a. |
| 386 spergulifolia M. Bieb., 13a. | 416 trinervia Seb. & Maur., 37b. |
| 387 spinescens Sibth. & Sm., 1a. | 417 tunicoides Boiss., 6. |
| 388 splendens Boiss., 1a. | 418 turbinata Guss., 35a. |
| 389 squamigera Boiss., 37b. | 419 turcomina Schischkin, 17a. |
| 390 stellata Ait., 3. | 420 Ungerii Fenzl, 36a. |
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| 392 striata (Ehrbg.) Rohrb., 34. | 422 Urvillei Schott, 25b. |
| 393 struthioloides A. Gray, 1b. | 423 vagans C. B. Clarke, 27b. |
| 394 subciliata Robinson, 2. | 424 Vandasii Nabelek, 30. |
| 395 subconica Friv., 44. | 425 vallesia L., 23b. |
| 396 subulata Boiss., 22b. | 426 variegata Boiss. & Heldr., 20a. |
| 397 succulenta Forsk., 31. | 427 velutinoides Pomel, 3. |
| 398 suffrutescens M. Bieb., 16b. | 428 ventricosa Adams, 11. |
| 399 Suksdorfii Robinson, 24. | 429 verecunda Wats., 2. |
| 400 supina M. Bieb., 16a. | 430 vesiculifera J. Gay, 37b. |
| 401 swertiifolia Boiss., 5b. | 431 villosa Forsk., 31. |
| 402 Tanakae Maxim., 1b. | 432 virescens Coss., 35c. |
| 403 tatarica Pers., 8. | 433 viridiflora L., 3. |
| 404 Tatarinowii Regel, 27b. | 434 virginica L., 2. |
| 405 tenella C. A. Mey., 15b. | 435 viscidula Franch., 13c. |
| 406 Tempiskyana Freyn & Sint., 44. | 436 viscosa (L.) Pers., 7a. |
| 407 tenuiflora Guss., 36a. | 437 volubilitana Br.-Bl. & Maire,
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| 408 tenuis Willd., 9. | 438 Williamsii Britt., 28. |
| 409 thebana Orph., 20a. | 439 Wrightii Gray, 24. |
| 410 thessalonica Boiss. & Heldr.,
21b. | 440 Wahlbergella Chowdhuri, 10. |
| 411 Thorei Duf., 20a. | 441 xylobasis Freyn, 25c. |
| 412 thymifolia Sibth. & Sm., 31. | 442 yunnanensis Franch., 13c. |
| | 443 Zawadskii Herbich, 17a. |

NEW AND NOTEWORTHY SPECIES IN THE ORIENT

In this annotation of Oriental species of *Silene*, only new taxa, significant synonymy and a few species that particularly require discussion have been included. They are referred to the sections defined above. All specimens cited, unless otherwise indicated, have been examined.

1A. SECT. PANICULATAE SUBSECT. PATULAE

S. gigantea Linn., Sp. Pl. 418 (1753).

Key to the varieties

Caudical leaves ovate- or obovate-spathulate; cauline leaves oblong-spathulate, more or less tomentellous; cymes short, forming pseudoverticillaster cymes; calyx glandular-puberulent . . . var. *gigantea*

Caudical leaves spathulate-lanceolate or oblong-spathulate; cauline leaves lanceolate, scabrous-puberulent; cymules more or less long, loose; calyx puberulent, sparingly glandular, sometimes glabrous . . . var. *incana*

var. *incana* (Griseb.) Chowdhuri, **comb. nov.**

Syn.: *S. italica* (L.) Pers. var. *incana* Griseb., Spicil. Fl. Rum. i, 173 (1843).

S. gigantea L. var. *viridescens* Boiss., Fl. Or. i, 646 (1867).

S. pseudo-nutans Panc., Add. Fl. Serb. 116 (1884).

Syntypes: Macedonia, *Frivaldski, Friedrichsthal* (n.v.).

TURKEY. Prov. Antalya, dt. Kemer (Lycia); Teke dağ, nr. Ovacik, 1200 m., 12 July 1949, *Davis* 15216. Prov. Manisa: Magnesia, Sipylos, June 1855, *Balansa*.

4. SECT. LASIOSTEMONES

S. olympica Boiss., Diagn. Pl. Nov. Or., Ser. I (1), 24 (1842).

Key to the subspecies

Plants glabrous, leaves lanceolate to linear-lanceolate; inflorescence spicate; calyx 5–7 mm. long; petal ligulate; capsule 3–4 times as long as anthophore, exerted by $\frac{1}{3}$ subsp. *olympica*

Plants tomentellous to puberulent, especially the lower parts; leaves spathulate-lanceolate; calyx 8.5–11 mm. long; petal eligulate; capsule $1\frac{1}{2}$ –2 times as long as anthophore, included subsp. *lasiantha*

subsp. *lasiantha* (Koch) Chowdhuri, **comb. et stat. nov.**

Syn.: *S. lasiantha* Koch in Linnaea, xv, 712 (1841).

S. olympica var. *pubescens* Boiss., Fl. Or. i, 610 (1867).

S. Marschallii var. *lasiantha* (Koch) Rupr., Fl. Cauc. 195 (1869).

S. asperifolia Freyn in Bull. Herb. Boiss. iii, 97 (1895).

S. longipetala var. *asperifolia* (Freyn) Williams in Journ. Linn. Soc. xxxii, 165 (1896).

TURKEY. In Armenia occidentali, *Koch* (holo. B?). Armenia, sine loco. *Zohrab*; *ibid.* *Calvert & Zohrab*. Prov. Erzerum: Erzerum, *Zohrab* 169; *ibid.*, *Zohrab* 153; Tech dağ, above Erzerum, 6–7000 m., July 1853, *Huet*. Prov. Kayseri: Erciyas dağ, 20 July 1856, *Balansa* 675. Prov. Van, dt. Şatak: Kavuşahap dağ, 3300 m., 23 July 1954, *Davis* 23207.

PERSIA. Totschal, 3700–3800 m., 8 July 1902, *Bornmüller* 6380; *ibid.*, 3150 m., July 1935, *Lindsay* 538.

5A. SECT. SCLEROCALYCINAE SUBSECT. LONGIFLORAE

S. bupleuroides L., Sp. Pl. 421 (1753).

Key to the subspecies

1a. Stem simple below, branched above; cauline leaves reduced; pedicels 1–3.5 cm. long, slender; limb obcordate- or obovate-cuneate, bipartite to the middle;

- 2a. Stem usually 40–87 cm. tall, caudical leaves lanceolate or oblong-lanceolate; cauline leaves gradually reduced above; inflorescence lax; lower cymules long, 3–7-flowered; capsule as long as anthophore subsp. *bupleuroides*
- 2b. Stem of medium stature, 23–48 cm. tall; caudical leaves linear or linear-lanceolate; cauline leaves much reduced and remote; inflorescence very narrow; cymules short, 1- or 2-flowered; capsule shorter than anthophore subsp. *staticifolia*
- 1b. Stem branched throughout; branches more or less divaricate; cauline leaves, though somewhat reduced, still conspicuous; pedicels 4–10 cm. long, stout; limb obovate-cuneate, bipartite to $\frac{1}{3}$ of its length subsp. *ramosa*

subsp. *bupleuroides*Syn.: *S. longiflora* Ehrh., Beitr. vii, 144 (1792).*S. viscariæifolia* Boiss., Diagn. Pl. Nov. Or., Ser. I (1), 30 (1842).*S. megalocalyx* Freyn in Bull. Herb. Boiss. iii, 82 (1895).subsp. *staticifolia* (Sibth. & Sm.) Chowdhuri, **comb. nov.**Syn.: *S. staticifolia* Sibth. & Sm., Fl. Graec. Prodr. i, 301 (1806).*S. juncea* Roth, Catal. i, 54 (1797).*S. longiflora* var. *juncea* (Roth) Otth in DC., Prodr. i, 328 (1824).*S. pallida* Schur, Sert. Fl. Transs. 12 (1853).*S. longiflora* var. *pallida* Schur, ibid.*S. longiflora* var. *linearifolia* Heuff., Enum. Banat. 36 (1858).*S. longiflora* var. *alpina* Boiss., Fl. Or. i, 179 (1867).*S. longiflora* var. *staticifolia* Boiss., Fl. Or. Suppl. 103 (1888).*S. tenuicaulis* Freyn in Österr. Bot. Zeitschr. xl, 400 (1890).*S. othryana* Form. in Deutsch. Bot. Mon. xv, 198 (1897).subsp. *ramosa* Chowdhuri, **subsp. nov.**

Affinis *S. bupleuroides* subsp. *bupleuroides* sed caulibus laxe et divaricatis ramosis, foliis caulinis numerosis, pedicellis 4–10 cm. longis crassiusculis, lamina petalorum obovata minus bipartita recedit.

Caules erecti vel adscendentes, superne laxe et divaricatis ramosi, foliosi. *Folia* caudalia 5–12.2 cm. longa, 5–9 mm. lata, oblanceolata vel lanceolato-spathulata, in petiolum attenuata; folia caulina numerosa, conspicua, 3.7–8.5 cm. longa, 6–9 mm. lata, lanceolata vel lineari-lanceolata, sessilia, omnia acuta vel obtusa. *Inflorescentia* laxa, paniculata, multiflora. *Pedicelli* 4–10 cm. longi, plus minus crassiusculi. *Dentes* calycis lanceolati alternatim acuminati et obtusi. *Lamina petalorum* obovato-cuneata minus bipartita. *Capsula* anthophoro aequilonga, in calyce inclusa.

PERSIA. Aschabad, Suluklu, 13 July 1900, *Sinten* 905 (holo. K; iso. BM).

Silene bupleuroides was described by Linnaeus in his *Species Plantarum* (1753) with the following polynomial taken from his *Hortus Cliffortianus*, "Caule folioso herbaceo, foliis lanceolatis acutis glabris, calycibus erectis. Hab. in Persia." This 'description' of Linnaeus is insufficient to diagnose a species of *Silene*, and it is fortunate that the specimen in the Clifford Herbarium (British Museum) can be accepted as the type of the Linnaean

species. It seems probable that neither Boissier nor Rohrbach saw the type of *S. bupleuroides*; their descriptions of that species are based on material from Turkish Armenia.

Silene longiflora was proposed by Ehrhart (1792), and the specimen on which his species is based probably came from Hungary. *S. longiflora*, as accepted by Rohrbach, spreads over a wide area—extending from Austria to Iran.

The characters used by those authors who maintain both *S. bupleuroides* and *S. longiflora* as distinct species have been investigated, and it has become clear that they have no value for differentiation at specific or even varietal level. The calyx teeth of *S. bupleuroides*, described as acute by both Boissier and Rohrbach, vary greatly. In the type specimen, out of the 13 or 14 flowers on the sheet, 11 have acute and obtuse teeth alternating, and differ in size and in the angles they subtend at their apices. The nature and the angle of the calyx teeth depend on the degree to which the white membranous margin is developed, which in turn appears to be modified by nutrition. The length of the calyx, which varies greatly in both *S. bupleuroides* and *S. longiflora*, has a range of variation that overlaps. Apart from these characters the general habit, nature of stem, size and shape of leaves, nature of inflorescence, and shape of bracts and bracteoles are shared by both taxa. Therefore there can be little doubt that *S. bupleuroides* and *S. longiflora* represent variation within one species.

There is very little basis for maintaining *S. megalocalyx* Freyn and *S. bupleuroides* as separate entities. In describing *S. megalocalyx*, Freyn stated that it differed from both *S. swertiifolia* and *S. caramanica*—from the former by its leaves and larger flower and from the latter by its calyx teeth (which are said to be acute) and size and form of seed. Williams recognized *S. megalocalyx* and described the nerves as 'evenius.' I have examined an isotype and found that the calyx teeth are alternately obtuse and acute and the nerves are more or less anastomosed. Considering the variability of the calyx teeth and length and size of calyx, I am unable to accept *S. megalocalyx* as a distinct species.

I have recognized 3 subspecies; subsp. *bupleuroides* spreads from Turkey to Persia while subsp. *staticefolia* is restricted to the Mediterranean region of Turkey. Subsp. *ramosa* is found only in N.E. Persia.

S. lycica Chowdhuri, sp. nov.

Affinis *S. bupleuroides* subsp. *staticefoliae* (Sibth. & Sm.) Chowdhuri et *S. armenae* var. *scabridulae* (Boiss.) Williams; a priore caulibus superne viscidis, forma foliorum basaliu diversa, floribus minoribus, laminis petalorum cuneatis (nec obcordatis); ab altera habitu et indumento diverso, forma foliorum, bracteis lanceolatis caudato-acuminatis tota longitudine albo-marginatis differt.

Herba perennis, compacta, pulvinari-caespitosa, multicaulis, basi suffrutescens, inferne ut folia leviter et laxiuscule papillosa, pilis longis patentibus, superne glabrescens et viscida. *Caudex* decumbens vel semi-erectus, 0.5–2.7 cm. longus, 2–5 mm. latus, ramosus, ligneus, superne foliosus. *Caules* floriferi numerosi, 27–45 cm. alti, erecti, teretes, pallide virescentes, remote foliosi, simplices vel in regione inflorescentiae breviter

1-2-ramosi; ramis alternatis; nodis plus minus incrassatis; internodiis mediis 5.3-10 cm. longis. *Folia* caudicalia numerosa, conferta, conspicua, 3.1-5.3 cm. longa, 3-5.5 mm. lata, anguste lanceolata vel lineari-lanceolata vel oblanceolata, in petiolum longe attenuata, basi pallide membranaceo-dilatata, marcescentia, acuta; folia caulina pauca, remota, redacta, bractei-formia, erecto-patentia, 1.5-2.3 cm. longa, lineari-subulata, superiora lanceolata acuminata, tota longitudine membranaceo-marginata, ciliolata. *Flores* solitarii vel 2-5 ad apicem ramulorum, hermaphroditi. *Bracteae* et bracteolae subaequales, 9-13 $\times$ 2.3-3 mm., foliis caulinis similes, basi trinerves. *Calyx* 1.5-1.8 cm. longus, 3-3.5 mm. diametro, tubuloso-clavatus, subcoriaceus, glaber, 10-nervius (nervis brunnescentibus vel purpurascentibus, superne anastomosantibus), in fructu clavatus, basi annulo circulari pseudo-umbilicatus; dentes 2.8-3.5 $\times$ 1.8-2.3 mm., ovati, alternatim acuti et obtusi, albo-marginati ciliolati. *Petala* 1.3-1.65 cm. longa, in sicco brunnescenti-flavescentia; unguis 7.5-9 mm. longus, superne dilatatus, exauriculatus, glaber; lamina 5.5-7.5 $\times$ 2.5-3 mm., cuneata, ultra medium in lobos oblongos rotundatos bipartita; ligulae binae, 0.7-1 mm. longae, triangulares, acutae. *Filamenta* 1.1-1.35 cm. longa, exserta, glabra. *Styli* tres, 7-8.5 mm. longi, minute pubescentes. *Anthophorus* 5-7 mm. longus, glaberrimus. *Capsula* 9-12 $\times$ 4.5-5 mm., oblonga, anthophoro duplo longior, calycem paulo superans. *Semina* brunnea, 0.9-1.3 mm. longa, compressa, dorso canaliculata, faciebus plana striata.

TURKEY. Prov. Muğla: Girdev dağ (Eren dağ) south side, 2000 m., 5 Aug. 1949, Davis 13826 (holo. K; iso. E).

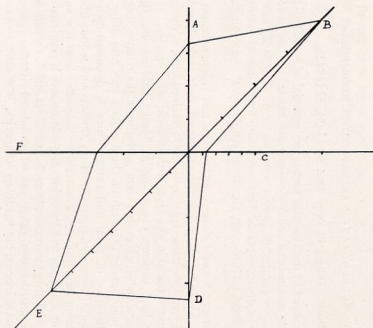
5B. SECT. SCLEROCALYCINAE SUBSECT. CHLORIFOLIAE

S. swertiifolia Boiss., Diagn. Pl. Nov. Or., Ser. 1 (1), 32 (1842).

An extensive study of the available herbarium material of *S. chlorifolia*, *S. swertiifolia*, *S. makmeliana* and *S. Schimperiana* has led me not to consider these taxa as conspecific nor as varieties of *S. chlorifolia*, but to recognize them as distinct species. This conclusion finds support not only from morphological features, but also from geographical and ecological considerations.

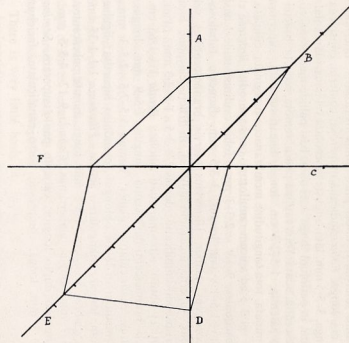
Rohrbach reduced *S. swertiifolia*, *S. makmeliana* and *S. Schimperiana* to varieties of *S. chlorifolia*. Williams also supported their varietal ranks. Boissier in his *Flora Orientalis* (vol. i, 640: 1867) retained them as distinct species. Post and Schischkin also treated them as separate species.

All 4 species have to some extent similar floral characters, but they differ in the character of leaves and stem, and also in the relative length of capsule and anthophore. Apart from these criteria they also differ in the detailed character of petal and calyx, which is discussed below. *S. chlorifolia* and *S. swertiifolia* grow in stony thickets and woods, their distributional range being entirely coextensive. *S. makmeliana* is a sub-alpine plant from Lebanon and Palestine. *S. Schimperiana* is restricted to Arabia Petraea and grows in rocky places. *S. chlorifolia* and *S. swertiifolia*, having the same distributional range, can be considered either as synonymous or as separate species, but hardly as subspecies. The other two taxa have distinct geographical distributions and ecological preferences.

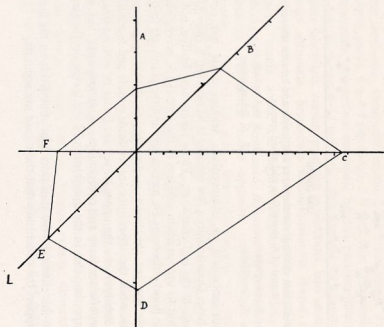
FIG. 1. Mean polygonal graph : *S. chlorifolia*

- A. Length of petal in cm.
D. Length of petal lamina in cm.

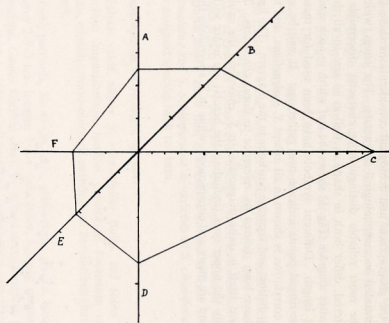
- B. Length of calyx in cm.
E. Diam. of calyx tube in mm.

FIG. 2. Mean polygonal graph : *S. swertiiifolia*

- C. Length/breadth ratio of leaf.
F. Capsule/anthophore ratio.

FIG. 3. Mean polygonal graph : *S. makmeliana*

- A. Length of petal in cm.
- D. Length of petal lamina in cm.

FIG. 4. Mean polygonal graph : *S. Schimperiana*

- B. Length of calyx in cm.
- C. Length/breadth ratio of leaf.
- E. Diam. of calyx tube in mm.
- F. Capsule/anthophore ratio.

Apart from the geographical and ecological considerations these taxa are well differentiated on morphological characters. The leaves, which I consider as the most reliable distinguishing character discernible in herbarium material, differ both in shape as well as in size in all the 4 species. The scatter diagram (Fig. 5) shows the leaf width in each species plotted against length. Different symbols have been used for these 4 species and the ringed points indicate two gatherings. It will be seen that a positive correlation is shown in all except *S. makmeliana*, and that the taxa occupy distinct and separate positions in the diagram. The limits between taxa have been defined by reference to floral characters. The shape of the leaf itself is quite diagnostic. In *S. chlorifolia* the cauline leaves, especially the upper ones (including the bracts) are ovate with a cordate base, and are many and conspicuous; while in *S. swertiifolia* these

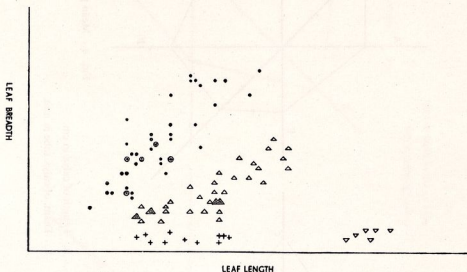


FIG. 5. Scatter diagram showing correlation of leaf length and breadth (flowering stems) of *S. swertiifolia* and allied species.

● <i>S. chlorifolia</i>	+ <i>S. makmeliana</i>
△ <i>S. swertiifolia</i>	▽ <i>S. Schimperiana</i>

leaves are ovate-lanceolate or oblanceolate, seldom ovate but never with a cordate base. Occasionally a few specimens lie between *S. chlorifolia* and *S. swertiifolia* in the leaf character. These plants may be due, not to hybridization, but to the variation inherent in the species (*S. swertiifolia*), since the specific floral differences are maintained and the plants are fertile.

S. makmeliana has got the lower cauline leaves closely spaced and linear-lanceolate, while the upper ones are reduced, remote and bract-like. Whereas in *S. Schimperiana* the upper leaves are linear or oblong-linear, and like *S. chlorifolia* are many and conspicuous. *S. makmeliana* thus not only in leaf shape, but also in the distribution of the leaves on the stem, stands apart.

In addition to this character, the statistical data obtained from the floral parts readily support the conclusion that these taxa are separate.

The biometric data are obtained from the following variables:

- i. Length & breadth ratio of the middle cauline leaves.
- ii. Length of calyx tube.
- iii. Diameter of the calyx tube.
- iv. Length of the petal (average for each flower).
- v. Length of the lamina (" " " ").
- vi. Relative length of capsule & anthophore (average for each gathering).

The means of these variables are plotted for each species in the form of a polygonal graph (figs. 1-4). It will be seen that these taxa differ in all the characters considered, except for *S. makmeliana* and *S. Schimperiana* which nearly coincide in the length of the calyx tube. Thus these diagrams clearly show that it would be unwise to treat *S. swertiifolia*, *S. makmeliana* and *S. Schimperiana* as varieties of *S. chlorifolia*. I have therefore assigned specific rank to them.

***S. sclerophylla* Chowdhuri, sp. nov.**

Habitu valde affinis *S. swertiifoliae* Boiss. sed foliis oblanceolatis, calycibus angustioribus, laminis petalorum roseorum cuneatis minus bifidis, capsulis ovato-oblongis anthophoro brevioribus (haud longioribus) differt.

Herba perennis, 30-45 cm. alta, glaberrima, glauca, basi suffrutescens. *Caudex* 2.5-7 cm. longus, 2.3-6 mm. latus, ligneus, ramosus, erectus vel ascendens. *Caules* floriferi erecti vel e basi arcuato-erecti, foliosi, teretes, pallide virides, inferne aliquantum violascentes, simplices, nodis plus minus incrassatis, internodiis mediis 2.7-4.5 cm. longis. *Folia* caudicalia conferta, parva, 2.6-3.7 cm. longa, 5-8 mm. lata, oblanceolata vel lineari-oblanceolata, sub anthesi emarcida, basibus persistentibus; folia caulina 3.4-5.6 cm. longa, 6-12 mm. lata, oblanceolata vel anguste oblanceolata saepius lanceolata, sursum gradatim incrementia, basi sensim in petiolum brevem attenuata, brevissime vaginato-connata ibique membranaceo-marginata, erecto-patentia, plus minus crassiuscula, subcoriacea, superiora redacta, omnia acuta, cartilagineo-marginata, serrulato-ciliata; costa mediana pallida subtus prominens. *Inflorescentia* pauciflora, cymose vel dichotome paniculata, ramis oppositis erecto-patentibus paucifloris. *Bracteae* 7-16 × 1.3-1.8 mm., lineari-lanceolatae vel lineares, acutae; bracteolae anguste lineari-subulatae albo-marginatae. *Pedicelli* 0.8-3.6 cm. longi, erecti vel ascendent-erecti. *Flores* hermaphroditi, centralis longe et laterales breviter pedicellati. *Calyx* 2.3-2.85 cm. longus, 3.5-4 mm. diametro, tubuloso-clavatus, coriaceus, 10-nervius (nervis extus haud prominentibus superne anastomosantibus), in fructu clavatus, basi annulo circulari pseudo-umbilicatus; dentes 2.8-3.3 × 2.3-2.8 mm., ovati, alternatim acuti et obtusi, albo-marginati, superne minute et parce ciliolati. *Petala* 2-2.3 cm. longa, rosea; unguis 1.1-1.2 cm. longus, supra medium dilatatus, glaber, exauriculatus; lamina 9-11 × 5.5-6.3 mm., obovato-cuneata, usque ad $\frac{1}{3}$ in lobos obtusos bipartita; ligulae binae e basi obliquae, ovatae, obtusae. *Stamina* exserta; filamenta 1.2-1.5 cm. longa, glabra. *Styli* tres, 6-7.3 mm. longi, crassiusculi, inclusi. *Anthophorus* 1.7-1.85 cm. longus, glaber. *Capsula* 1-1.2 × 0.45-0.55 cm., ovato-

oblonga, anthophoro sesquibrevior, in calyce inclusa. *Semina* brunnea, 1.8–2.3 mm. longa, dorso canaliculata, faciebus plana striata.

TURKEY. Prov. Hakkâri: Cilo dağ, in Diz deresi, 1710 m., gravel terraces, flowers pink, 6 Aug. 1954, *Davis & O. Polunin* (D. 23921—holo. K; iso. E).

S. sclerophylloides Chowdhuri, sp. nov.

Cum facie *S. sclerophyllae* Chowdhuri sed foliis angustioribus acuminatis, floribus unisexualibus, forma inflorescentiae, petalis virescenti-albidis ultra medium bipartitis differt.

Herba perennis, glabra, plus minus glauca, basi ramosa, suffrutescens, ut videtur dioica. *Caudex* 10 cm. longus, tenuis, ramosus, erectus vel ascendens. *Caules* 15–30 cm. alti, erecti, teretes, foliosi, pallide virescentes, simplices vel in regione inflorescentiae ramulosi, nodis plus minus incrassatis, internodiis mediis 1.8–3.5 cm. longis. *Folia* caulina numerosa, conspicua, sursum gradatim increscentia, 2.1–3.7 cm. longa, 3–5.5 mm. lata, anguste lanceolata vel lineari-lanceolata, apice basique attenuata, sessilia, erecto-patentia, basi brevissime vaginato-connata ibique membranaceo-marginata, ciliata, superiora redacta, omnia acuminata, uninervia, serrulato-ciliata, costa mediana pallida subtus prominente; folia caudicalia parva, conferta, foliis caulinis similia, sub anthesi emarcida. *Inflorescentia* racemiformis pauciflora, ramis alternatis brevibus unifloris. *Bracteae* et bracteolae aequales, herbaceae, acuminatae vel subulatae, basi albo-marginatae sparsim ciliolatae. *Pedicelli* 6–13 mm. longi, erecti, stricti. *Flores* breviter pedicellati, unisexuales. *Calyx* 2.75–2.9 cm. longus, 4–5 mm. diametro, tubuloso-clavatus, coriaceus, glaber, 10-nerviis (nervis virescentibus vel purpurascens superne anastomosantibus), in fructu clavatus, infra capsulam leviter constrictus, basi annulo circulari pseudo-umbilicatus; dentes 2.5–3 × 2.3–2.5 mm., ovati, alternatim acuti et obtusi, albo-marginati et ciliolati. *Petala* 1.9–2.4 cm. longa, viridi-albescentia; unguis 1.2–1.3 cm. longus, supra medium dilatatus exauriculatus glaber; lamina 7–11 × 4.5–5.3 mm., cuneata, ultra medium bipartita, lobis plus minus divaricatis lineari-oblongis ad apicem obtusis vel rotundatis; ligulae binae, 1–1.3 mm. longae, oblongae, obtusae vel emarginatae. *Stamina* abortiva. *Styli* tres, 9–11 mm. longi, exserti, superne paulum dilatati pubescentes, ad apicem recurvi. *Anthophorus* 1.6–1.8 cm. longus, glaber. *Capsula* 8.5–15 × 4.5–6.5 mm., oblonga, anthophoro duplo vel triplo brevior, in calyce inclusa. *Semina* brunnea, 0.8–1.3 mm. longa, plus minus compressa, dorso canaliculata, faciebus plana vel plus minus concava, striata.

TURKEY. Prov. Bitlis: Kambos dağ above Hürmüz, 1800 m., 31 June 1954, *Davis & O. Polunin* (D. 23495—holo. K; iso. E).

S. sclerophylloides, unlike other species of the section, bears unisexual flowers, but is undoubtedly related to and probably derived from *S. sclerophylla* Chowdhuri. It resembles that species in the shape of its calyx, but it differs in its narrower acuminate leaves, in the inflorescence, which is raceme-like with a few alternate shortly-peduncled flowers, in the shape and colour of the petal lamina and apparently in the size of its seeds.

S. Haradjianii Chowdhuri, sp. nov.

Affinis *S. makmelianae* Boiss. et *S. Schimperianae* Boiss.: ab ambobus dentibus calycis elongatis alternatim breviter et longe acuminatis, anthophoro puberulo, caulibus inferne pruinoso-scabridulis superne glabris viscidis; insuper a priore caulibus elongatis superne racemoso-paniculatis recedit; ab altera foliis oblanceolatis distinguitur.

Herba perennis, 30–80 cm. alta, ima basi suffrutescens. *Caudex* 3–8 mm. latus, brevis, simplex vel furcatus, erectus vel ascendenti-erectus, superne foliatus. *Caules* floriferi erecti vel arcuato-erecti, teretes, inferne simplices pruinoso-scabridi pallide violascentes, superne glabri viscidi racemoso-paniculati, ramis elongatis oppositis plus minus divaricatis, nodis plus minus incrassatis, internodiis mediis 2.3–4.7 cm. longis. *Folia* caudicalia numerosa, 1.9–7 cm. longa, 4.5–7.8 mm. lata, lanceolata vel oblanceolata, in petiolo gradatim attenuata, basi plus minus trinervia, anguste vaginato connata ibique membranaceo-marginata, minute ciliolata, plus minus indurata, persistentia; folia caulina 2.3–8.5 cm. longa, 5–12 mm. lata, plus minus crassiuscula, infima caudicalibus similia sensim increscentia, superiora lineari-lanceolata subsessilia basi attenuata, omnia acuta, plus minus fasciculata, pruinoso-scabrida, serrulato-ciliata. *Inflorescentia* laxe racemoso-paniculata, ramis primariis oppositis elongatis, cymis 1–3 floris. *Bractee* subaequales, foliis caulinis conformes; bracteolae inaequales, lineares, basi trinerves, late membranaceo-marginatae, ciliolatae. *Pedicelli* 1.9–3.7 cm. longi, erecti vel erecto-patentes. *Flores* hermaphroditi. *Calyx* 2.7–2.9 cm. longus, 3.5–4 mm. diametro, cylindrico-clavatus, coriaceus, pallide rubro-suffusus, glaberrimus, 10-nerviis (nervis superne anastomosantibus), in fructu clavatus, infra capsulam constrictus, basi annulo circulari pseudo-umbilicatus; dentes 4.5–6 × 1.8–2 mm., lanceolati, alternatim breviter et longe acuminati, albo-marginati, minute ciliolati. *Petala* 2.5–3.1 cm. longa, in sicco sordide purpurascentia; unguis 1.5–1.6 cm. longus, exsertus, ad medium dilatatus, exauriculatus; lamina 1–1.5 × 0.5–0.63 cm., cuneata, bipartita, lobis oblongo-ovatis obtusis; ligulae binae, 0.3–0.5 mm. longae, lineares. *Stamina* exserta; filamenta glabra. *Styli* tres, 1.4–1.7 cm. longi, superne paulum dilatati pubescentes. *Anthophorus* 1–1.3 cm. longus, brevissime subretrosum puberulus. *Capsula* 1.1–1.35 × 0.45–0.53 cm., oblonga, anthophorum aequans, calycem paulo superans. *Semina* brunnea, 1.3–1.5 mm. longa, plus minus compressa, dorso canaliculata, faciebus plana.

TURKEY. Mt. Amanus: Kusliji dağ, 1500–1950 m., Aug. 1908, *Haradjian* 2482; Mt. Amanus, 1200 m., Aug. 1906, *Haradjian* 469 (holo. K).

7A. SECT. CHLORANTHAE SUBSECT. ECORONATAE**S. lycaonica Chowdhuri, sp. nov.**

Affinis *S. radicosae* Boiss. & Heldr. (incl. *S. oligantha* Boiss. & Heldr.) sed habitu basi valde compacto, indumento parvisimo pruinoso, foliis caulinis minutissimis linearibus acuminatis manifeste trinerviis, calyce fructifero tubuloso-clavato, dentibus ovatis obtusis, filamentis glabris capsula ovata anthophorum aequante differt.

Herba perennis, caespitosa, 20–25 cm. alta. *Radix* lignea, recta, elongata, multiceps. *Caudex* 3–6.5 cm. longus, 3–6 mm. latus, ramosus, foliosus. *Caules* floriferi tenues, erecti, teretes, paucinosi, virides vel pallide purpurascens, simplices vel superne breviter 1–3-ramosi, ut folia inferne pruinoso-scabridi, superne glabri et viscidis, nodis minus incrassatis, internodiis mediis 6–8.5 cm. longis. *Folia* caudicalia numerosa, rosularia, crassiuscula, 2.3–4.8 cm. longa, 3.5–8 mm. lata, obovata, lanceolata vel oblanceolata rarius linearilanceolata, in petiolum longe attenuata, basi brevissime vaginato-connata ibique membranaceo-marginata, ciliolata, marcescentia, ad apicem obtusa, saepius acuta, costa mediana subtus prominente; folia caulina pauca, remota, redacta, bracteiformia, linearilanceolata vel linearia, acuminata, sessilia, obscure trinervia, tota longitudine albo-marginata, ciliolata. *Bracteae* et bracteolae subulato-lanceolatae, membranaceo-marginatae, ciliolatae. *Pedicelli* 1.2–2.3 cm. longi, tenues. *Flores* hermaphroditi in racemum 2–5 (–7)-florum dispositi vel raro ad florem solitarium redacti. *Calyx* 1.4–1.6 cm. longus, 3–3.5 mm. diametro, tubuloso-clavatus, subcoriaceus, glaberrimus, inter nervos subsulcatus, in fructu clavatus, basi truncato-umbilicatus, nervis 10 violascentibus medianis ad apicem latis, commissuralibus superne in venulas plures abeuntibus; dentes 1.5–2.3 × 1.8–2 mm., ovati, obtusi, fere emarginati, late membranaceo-marginati, ciliolati. *Petala* 1.7–1.9 cm. longa, in sicco brunnescentia; unguis 9.5–11 mm. longus, ad medium dilatatus, exauriculatus, glaber; lamina 7.5–8 × 3.5–4.3 mm., cuneata, ultra medium bipartita, lobis obovato-oblongis vel oblongis; ligulae binae, 1.3–1.5 mm. longae, lanceolatae, acutae. *Stamina* exserta; filamenta 11–13 mm. longa, glabra. *Styli* tres, 7–9 mm. longi, exserti, superne minute pubescentes, ad apicem recurvi. *Anthophorus* 6–7.3 mm. longus, glaberrimus. *Capsula* 7–8.3 × 4–4.3 mm., ovata, anthophorum aequans, in calyce inclusa. *Semina* brunnea, 1.3–1.5 mm. longa, dorso canaliculata, faciebus plana, tuberculata.

TURKEY. Prov. Konya: between Sau'cak yaylâ & Uç Pinar (south of Bozkir), 2000 m., 2 Sept. 1947, Davis 14586 (holo. K).

12B. SECT. HOLOPETALAE SUBSECT. LIGULATAE

S. confertiflora Chowdhuri, sp. nov.

Affinis *S. sibiricae* (L.) Pers. et *S. holopetalae* Bunge sed caulibus longioribus, indumento multo densiore, foliis caulinis lanceolatis vel oblongo-lanceolatis vel ovato-lanceolatis, ramis inflorescentiae glaberrimis viscidis, floribus hermaphroditis, dentibus calycis alternatim acutis et obtusis, petalis roseis coronatis unguibus paulum dilatatis ciliolatis differt.

Herba perennis, 60–130 cm. alta, basi lignosa. *Radix* elongata, verticalis, lignea, in caudicem abrupte dilatata. *Caudices* breves, foliosi, simplices vel rarius 1–2 furcati, erecti. *Caules* floriferi erecti, teretes, foliosi inferne simplices vel paulum ramosi, ad medium vel supra parce ramosi, pallide virescentes, inferne retrorse pubescentes, interdum pallide viridi-purpurascens, superne viscido-glabrescentes, nodis manifeste incrassatis, internodiis mediis 4.2–7.5 cm. longis. *Folia* caudicalia rosularia, 2.5–4.6 cm. longa, 5–9 cm. lata, lanceolata vel oblanceolata, in petiolum gradatim

attenuata, basi brevissime vaginato-connata ibique membranaceo-marginata, ciliolata, marcescentia; folia caulina inferiora 3.7-6.3 cm. longa, 8-14 mm. lata, caudicalibus similia sed breviter petiolata, gradatim sursum increscentia, basi membranaceo-dilatata, superiora sessilia, lineari-lanceolata, in axillis ramulos steriles vel fasciculos foliosos emittentia, foliis ramulorum sterilium angustioribus lanceolatis vel lineari-lanceolatis vel linearibus, omnia acuta, basi plus minus trinervia, hirtello-scabridula, in sicco pallide purpureo-violascentia. *Inflorescentia* paniculata, ramis gracilioribus viscidis. *Bracteae* infimae lineari-lanceolatae, superiores lineares, basi trinerves, puberulae, anguste membranaceo-marginatae, ciliolatae. *Pedicelli* 6-14 mm. longi, filiformes, puberuli, basi prophyllis binis praediti. *Flores* hermaphroditi, in ramos remote verticillastriferos dispositi. *Calyx* 6.5-7.5 mm. longus, 3.3-4 mm. diametro, clavatus, plus minus ampliatus, puberulus, nervis 10 virescentibus et anastomosantibus munitus, in fructu ovatus, infra capsulam constrictus, basi truncatus; dentes inaequales, 2-2.8 x 1.5-2 mm., alternatim triangulares acuti et ovati, obtusi, late membranaceo-marginati ciliolati. *Petala* 6.5-7.3 mm. longa, purpurea; unguis 3.5-4.5 mm. longus, supra medium dilatatus, ciliolatus; lamina 3-3.5 x 1-1.3 mm., spathulato-elliptica, integra; ligulae binae, 0.3-0.5 mm. longae, lineares, acutae. *Filamenta* 3.8-4.3 mm. longa, glabra, inclusa. *Styli* tres, 3.5-4 mm. longi, exserti, puberuli. *Anthophorus* 2.5-3 mm. longus, 1-1.5 mm. latus, brevissime puberulus. *Capsula* 6.8-8.3 x 4.3-5 mm., ovoidea-oblonga, anthophoro 3-4-plo longior, calycem superans. *Semina* brunnea, 1-1.3 mm. longa, plus minus compressa, dorso canaliculata, faciebus plana, striata.

TURKEY. Mt. Amanus: Kusliji dağ, 750-1500 m., Aug. 1908, *Haradjian* 2471; Mt. Amanus, Aug. 1906, *Haradjian* 470; Mt. Amanus, Gaiour dağ, 1200-1500 m., Aug. 1892, *Post*.

SYRIA. Phurunluq nr. Kasseb, 16 miles S. of Mt. Cassius, 450 m., on shady bank near stream on serpentine; in forest of *Platanus*, *Alnus* and *Quercus* (rainfall 2000 mm.) 9 Sept. 1952, *H. G. Mooney* 4580 (holo. K).

16A. SECT. SUFFRUTICOSAE SUBSECT. SUPINAE

S. supina M. Bieb., Fl. Taur. Cauc., i, 336 (1808) & iii, 304 (1819).

Key to the subspecies and varieties

- 1a. Plant and leaves puberulent below, becoming glandular-puberulent above; calyx 1.7-2.1 (-2.3) cm. long; cymules 1-3-flowered
subsp. *supina*
- 1b. Plant and leaves grey, retrorsely puberulent, often tomentellous or hirtellous above; calyx (0.9-) 1.1-1.6 cm. long; cymules 3-7-flowered, congested
subsp. *pruinosa* (Boiss.) Chowdhuri
- 2a. Flowers white:
 - 3a. Plants tall, erect or ascending, usually many-flowered
var. *pruinosa*
 - 3b. Plants, dwarf, few-1-flowered, decumbent
var. *alpina* Boiss.
- 2b. Flowers reddish; plants dwarf
var. *rubra* Gilliat-Smith

subsp. *pruinosa* (Boiss.) Chowdhuri, stat. nov.

Syn.: *S. pruinosa* Boiss., Diagn. Pl. Nov. Or., Ser. I (1), 23 (1842).

?*S. involuta* Forsk., Fl. Aeg-Arab., Suppl. 210 (1775), *species dubia*.

S. virgata Stapf in Denkschr. Akad. Wien, li, 283 (1886).

S. supina var. *pruinosa* (Boiss.) Rohrb., Monogr. Sil. 208 (1868).

S. pruinosa var. *macrocalyx* Bornm. & Freyn in Österr. Bot. Zeitsch. xl, 400 (1890).

Type: in Syria prope Aintab et Cappadocia ad Euphratem, Aucher 480 & 458 (holo. G; iso. K!, BM!).

Widespread in Turkey.

16B. SECT. SUFFRUTICOSAE SUBSECT. AUCHERIANAE

S. Montbretiana Boiss., Diagn. Pl. Nov. Or., Ser. I (1), 26 (1842).

Syn.: "*S. Aucheriana* Boiss.," Fl. Or. i, 617 (1867); non Boiss., Diagn. Pl. Nov. Or., Ser. I (1), 27 (1842).

S. Montbretiana was originally based on a specimen of Aucher's number 459 with the habitat "Ak dagh." A specimen with this designation is in the Kew Herbarium, and I think it is identical with that on which Boissier based his description of *S. Montbretiana*. On the following page, Boissier described *S. Aucheriana* from a specimen collected "in montibus Ellwind et Dalmkou [Persia]—Aucher no. 459,459 bis et ter, 4208". No. 4208 is the plant from Dalmkou, which is in the Kew Herbarium and agrees absolutely with the plant mentioned above bearing the label "Ak dagh, 459." It is very strange that a plant of Aucher's numbered 459,459 (bis) and 459 (ter), provided with an original label from Montbret and collected on the Ak dagh is nothing but Fenzl's *S. arguta* which was originally based on a plant collected by Kotschy from the same locality. Rohrbach, as well as Boissier, mention in their works that they have seen Aucher 459 and confess that it is true *S. arguta* (vide Rohrb., Monogr. Sil. 135: 1868; Boiss., Fl. Or. i, 618: 1867). It is, therefore, evident that some thorough confusion was made in distributing the plants.

I would prefer to interpret the matter in the following way. Aucher and Montbret collected a plant on the Ak dagh, in the eastern Taurus, and numbered it 459,459 (bis) and 459 (ter). This plant is *S. arguta* Fenzl, which was collected later on by Haussknecht in the very same mountain range, on the Beryt dagh. In the same year (1842) Boissier published a description of his *S. Aucheriana* which perfectly fits *S. arguta*, and indeed quotes Aucher 459,459 bis and 459 ter. But by some mistake he indicates the locality as "Ellwind" [in Persia], and at the same time combines with it a plant from Dalmkou (Aucher 4208). This latter plant, however, is a different species (*S. Montbretiana*). Later (Fl. Or. i, 617: 1867), Boissier altered his description so as to make it fit the Dalmkou plant, and omits the habitat "Ellwind" altogether, along with Aucher 459,459 bis and 459 ter. But the Dalmkou plant was, I am convinced, also distributed under the number 459 and bearing the locality "Ak dagh"; this specimen formed the basis for *S. Montbretiana* Boiss. and is therefore to be maintained for the

plant from Dalmkou and "*S. Aucheriana*" of Flora Orientalis has to be sunk under it; whilst the true *S. Aucheriana* Boiss. goes as a synonym of *S. arguta* Fenzl.

S. Montbretiana occurs in Turkey, Iraq, Iran and the Caucasus.

S. persica Boiss., Diagn. Pl. Nov. Or., Ser. I (1), 27 (1842).

Key to the subspecies and varieties

Plants retrorsely puberulent, often hirtellous, not at all glandular; calyx 1.7–2.1 cm. long, puberulent and hirtellous; capsule 8–9.5 mm. long

subsp. *persica*

Plants (8.7–) 10–25 cm. tall; cauline leaves 2.5–6.3 mm. wide, lanceolate to linear-lanceolate; calyx 1.6–1.8 cm. long var. *persica*

Plants 4–10 cm. tall; cauline leaves 2–2.5 mm. wide, linear-lanceolate to linear; calyx 2.1–2.3 cm. long — var. *angistoma*

Plants retrorsely puberulent, becoming glandular and hirtellous above; calyx (2.1–) 2.3–2.9 cm. long, glandular-puberulent and more or less hirtellous; capsule 9–13 mm. long subsp. *Moorcroftiana*

subsp. *Moorcroftiana* (Rohrb.) Chowdhuri, **comb. et stat. nov.**

Syn.: *S. Moorcroftiana* [Wall. Cat., 626: (1828), nom. nud. ex] Rohrb., Mon. Sil. 129 (1868); Blatter, Beaut. Fl. Kashm., i, t.14, fig. 2 (1928).

TIBET. In Tibet occid., 3000–4800 m., *Hooker & Thomson*.

AFGHANISTAN. Summit of Kaloo pop, *Griffith* 1637, 1638, 1639; summit of Akrohet pop, below Kaloo pop, 2150 m., *Griffith* 1662; Safedkuh, 2700–3000 m., 8 Aug. 1879, *Aitchison*; Paghman, 2400 m., 22 June 1935, *Hay* 252.

S. oreophila Boiss., Fl. Or., i, 617 (1867).

var. *latifolia* Chowdhuri, **var. nov.**

A typo foliis majoribus (4.3–7.9 cm. longis, 4–9 mm. latis) oblongo-lanceolatis acutis in petiolum longe attenuatis, differt.

IRAQ. Penjwin, 1000 m., 23 Apr. 1947, *Rawi* 8810 (holo. K).

17A. SECT. ODONTOPETALAE SUBSECT. DENTATAE

S. odontopetala Fenzl, Pugill. Pl. 9 (1842).

This is a wide-spread and highly polymorphic species. The variation within it is more or less continuous, but extreme variants occur. These are connected with the more common forms by intergradations. Boissier and Williams have held that *S. odontopetala* has 3 varieties—var. *cerastiifolia* *latifolia* and *congesta*. Post and Bornmüller added 3 more. Thus, altogether six varieties have been recognized.

Scatter diagrams and maps were made to show the variation in leaf shape, form of the calyx teeth, and presence or absence of lateral outgrowths on the petal lamina—characters used for varietal separation. But in every case the results were similar: the variation was found to be

almost continuous and did not have a distinct geographical basis. After careful analysis, it was decided to recognize four varieties (one of them new) in addition to the type. These have a more or less well-marked geographical basis, though the range of var. *latifolia* Boiss. is so disjunct as to raise the possibility of polytopic origin. As var. *perlata* has not been examined it has been omitted from this account.

Key to the varieties

- 1a. Caudical leaves lanceolate, acute; cauline leaves lanceolate or linear-lanceolate, acute or acuminate:
 - 2a. Flowers 1-many in a lax dichasial cyme, pedicellate:
 - 3a. Plants pubescent, or more or less hirtellous, usually glandular above:
 - 4a. Plants pubescent or hirtellous, glandular-puberulent and viscid above; flowers few or solitary var. *odontopetala*
 - 4b. Plants pubescent or more or less hirsute, neither viscid nor glandular; flowers many, more or less congested var. *canescens* Chowdhuri
 - 3b. Plants glabrous and more or less glaucescent, rarely sparingly puberulent above var. *glabrifolia* Blakelock
 - 2b. Flowers few, sessile, in a capitate cyme var. *congesta* Boiss.
- 1b. Caudical leaves oblanceolate, obtuse or mucronate; cauline leaves ovate or oblong-ovate, obtuse or nearly so var. *latifolia* Boiss.

var. *canescens* Chowdhuri, var. nov.

Caules 12-25 cm. alti, foliosi, simplices vel parce ramosi, ut folia canescentes, hirtello- vel tomentoso-pubescentes, haud viscid. *Folia* caudicalia, 2.7-5.9 cm. longa, 4-7 mm. lata, oblanceolata vel lanceolata; caulina oblongo- vel lineari-lanceolata. *Inflorescentia* plus minus congesta. *Flores* breviter pedicellati. *Calyx* 1.2-1.5 cm. longus, campanulatus, albidus, hirsutus vel tomentosus, haud viscosus. *Capsula* 5-7 mm. longa, anthophoro duplo longior.

SYRIA. Yebrud, 1440 m., 10 Aug. 1945, Davis 9904. Anti-Lebanon, West of Ein en Sur (above Bludan), shady vertical rocks, 2100 m., 7 Aug. 1956, Davis 9879 (holo. K; iso. E).

20A. SECT. INFLATAE SUBSECT. LATIFOLIAE

S. Czerei Baumg., Enum. Stirp. Transs. iii, 345 (1816).

Key to the subspecies

- Caudical leaves obovate; cauline ovate or ovate-lanceolate or oblong-lanceolate; capsule 5-6 times as long as anthophore; seed 0.6-1 mm. long subsp. *Czerei*
- Caudical leaves orbicular-spathulate; cauline ovate or ovate-oblong; capsule subsessile; seed 1-1.5 mm. long subsp. *aeoniopsis*

subsp. *aconiopsis* (Bornm.) Chowdhuri, **comb. et stat. nov.**

Syn.: *S. aconiopsis* Bornm. in Fedde, Repert. Beih. lxxxix, 112 (1936).

TURKEY. Prov. Ankara: Kalecik, in valley Keci-deresi, 7–800 m., 7 July 1929, Bornmüller 13884 (holo. B, iso. K!, BM!).

21A. SECT. BRACHYPODAE SUBSECT. NUTANTES

S. oreosinaica Chowdhuri, **sp. nov.**

Affinis *S. griseae* Boiss. sed floribus subsessilibus ad apicem ramorum et caulium congestis, petalorum unguibus plerumque auriculatis, capsula ovoideo-oblonga anthophoro glabro suffulta, seminibus dorso convexis differt.

Herba perennis, caespitosa, 20–35 cm. alta. *Caudex* ligneus, brevis, simplex vel ramosus, erectus vel ascendens, superne dense foliosus. *Caules* floriferi erecti vel e basi arcuato-erecti, teretes, inferne simplices ut folia griseo-puberuli, superne alternatim ramosi ut folia glanduloso-tomentosi viscidii; internodiis mediis 4.5–5.7 cm. longis. *Folia* caudicalia numerosa, rosularia, petiolata, 3–6.2 cm. longa, 4.5–8 mm. lata, oblongo-lanceolata vel oblanceolata, in petiolum brevem attenuata, basi brevissime vaginato-connata ibique membranaceo-marginata, ciliolata, marcescentia; folia caulina sessilia, 1.6–4 cm. longa, 3–6.5 mm. lata, lanceolata vel lineari-lanceolata, omnia acuta, uninervia, plus minus crassa. *Bracteeae* aequales, foliis caulinis similes, e basi anguste albo-marginatae, ciliolatae. *Pedicelli* 1.5–2 mm. longi. *Flores* hermaphroditi, cernui, ad apicem ramorum et caulium congesti. *Calyx* 1–1.3 cm. longus, 3–3.5 mm. diametro, cylindrico-obconicus, hirtello-glandulosus, viscidus, nervis 10 virescentibus et anastomosantibus, in fructu oblongo-clavatus infra capsulam leviter constrictus, basi truncatus; 3–3.5 × 1.3–2 mm., lanceolati acuti membranaceo-marginati, ciliolati. *Petala* 1.2–1.3 cm. longa, in sicco brunnescentia; unguis 7.5–8 mm. longus, glaber, acute vel obtuse auriculatus; lamina 4.5–5 × 1.5–2.3 mm., oblonga, ultra medium bipartita, lobis oblongo-linearibus; ligulae binae, 0.9–1.3 mm. longae, oblongae, obtusae. *Filamenta* exserta, glabra. *Styli* tres, exserti, puberuli. *Anthophorus* 2.5–3 mm. longus, glaber. *Capsula* 6–8.3 × 4–4.5 mm., ovoideo-oblonga, anthophoro 2–3-plo longior, in calyce inclusa. *Semina* 0.9–1.3 mm. longa, brunnea, dorso papillosa convexa, faciebus plana.

SINAI. In rupium fissuris montis St. Catharinae, 27 Mai et 17 Jul. 1835, Schimper 296? et 352 (holo. K).

S. sinaica was described by Boissier (Diagn. Pl. Nov. Or., ser. I (1), 25: 1842), the description being based on specimens collected by Schimper from Sinai (no. 296 & 352). Subsequently Boissier reduced this species to a variety of *S. odontopetala* Fenzl (var. *congesta* Boiss.). I have seen both the holotype at Geneva and the "isotype" at Kew. The two specimens differ markedly. The holotype of *S. sinaica* is dwarf, with a cluster of flowers at the apex of the simple stem, and the flowers are erect and sessile, the calyx is obconical or campanulate and conspicuously inflated. The "isotype" is tall and alternately branched, the stem and branches ending in clusters of flowers. The flowers are subsessile, crowded on the apex

of stem and branches, subnodding or nodding at anthesis; the calyx is cylindrical-obconical at anthesis, becoming ovoid-oblong after anthesis and not at all inflated. Moreover, the petal lamina is oblong, bipartite into oblong-linear lobes.

It is clear that these two specimens bearing the same number (296 & 352) cannot belong to the same taxon. Boissier's original description fits well the specimen at Geneva, which must now be referred to as *S. odonto-petala* var. *congesta* Boiss. The specimen at Kew is a new species, and, considering its close similarity to *S. grisea* Boiss., I have included it in the section *Brachypodae*.

22A. SECT. PINIFOLIAE SUBSECT. FRUTICOSAE

S. goniocaula Boiss., Diagn. Pl. Nov. Or., Ser. I (1), 31 (1842).

Key to the varieties

Plants glabrous below, sparingly glandular-puberulent in the region of pedicel; calyx teeth lanceolate, acute var. *goniocaula*
Plants glandular-puberulent at the base, the indumentum thinning out above; calyx teeth ovate, obtuse var. *glandulosa*

var. *glandulosa* Chowdhuri, var. nov.

Planta inferne brevissime glanduloso-puberula, superne parce puberula. Dentes calycis ovati, obtusi. Petala rosea; lamina cuneata vel obcordato-cuneata.

PERSIA. Schir kuh (near Yezd), 3750 m., in rocky places and crevices of rocks, 26 July 1932, *Balls* 141 (holo. E).

22B. SECT. PINIFOLIAE SUBSECT. ECHINUS

S. masmenaea Boiss., Diagn. Pl. Nov. Or., Ser. II (5), 57 (1856).

Key to the varieties

Plant usually glabrous below, becoming glandular and puberulent and more or less viscid above; calyx glandular-puberulent and viscid; claw slightly exerted var. *masmenaea*
Plant retrorsely puberulent throughout, not viscid; calyx pubescent and more or less hirtellous, not glandular and viscid; claw conspicuously exerted var. *eglandulosa*

var. *eglandulosa* Chowdhuri, var. nov.

Planta puberula vel hirtello-puberula, haud glandulosa vel viscida. Folia caudicalia stricta, erecta, raro subfalcata; folia caulina bractei-formia. Calyx hirtello-puberulus, haud glandulosus et viscidus. Ungues petalorum exserti.

TURKEY. Prov. Isparta, dt. Sütçüler: Dedegöl dağı, above the tarn Dedegöl, 2700 m., 3 Aug. 1949, *Davis* 16019 (holo. K, iso. E). Prov. Antalya (Lycia): Çabali dağı, 14 July 1949, *Davis*.

23A. SECT. *AURICULATAE* SUBSECT. *SCAPIFORMES*

S. argaea Fisch. & Mey. in Ann. Sc. Nat., Ser. 4, i, 36 (1854).

Key to the subspecies

Calyx 2.4–2.6 cm. long; anthophore 1–1.5 cm. long; capsule 10–13 × 4.5–5 mm., as long as anthophore; plants 1.5–4.3 cm. tall subsp. *argaea*

Calyx 3–3.2 cm. long; anthophore 2.5–2.7 cm. long; capsule 5–7.5 × 4–5 mm., 4–5 times shorter than anthophore; plants 1.5–2.5 cm. tall, often more or less pulvinate subsp. *delectabilis*

subsp. *delectabilis* (Turrill) Chowdhuri, **comb. et stat. nov.**

Syn.: *S. delectabilis* Turrill in Kew Bull. 1929, 225.

PERSIA. Near the top of Mishou dag, cracks in the rocks, 29 July 1928, Gilliat-Smith 2359 (holo. K).

S. lucida Chowdhuri, **sp. nov.**

Ab omnibus speciebus sectionis habitu valde compacto, indumento multo densiore, caulibus haud viscosis, foliis caudicalibus brevioribus sed anguste linearibus, calycibus angustioribus, pilis eglandulosis et glandulosis intermixtis differt.

Herba perennis, pumila, dense caespitosa, 5–15 cm. alta. *Radix* lignea, elongata, verticalis, multiceps. *Caudices* numerosi, tenues, lignei, ramosi. *superne* foliati. *Caules* floriferi tenues, teretes, erecti vel ascendenti-erecti saepius basi arcuati, remote foliosi, simplices vel supra 1–2-ramosi, ut folia canescentes et subretrorse pubescentes superne parce glandulosi, internodiis mediis 2–4.3 cm. longis. *Folia* caudicalia conferta, 0.8–2.4 cm. longa, 1.5–2.3 mm. lata, lineari-spathulata in petiolum paulum attenuata, basi brevissime vaginato-connata ibique anguste membranaceo-marginata et ciliata, marcescentia; folia caulina plus minus remota, bracteiformia, 6–10 mm. longa, 2–3 mm. lata, ovato-lanceolata vel lineari-lanceolata, acuminata, subtus prominenter trinervia, basi anguste membranaceo-marginata et ciliata. *Flores* hermaphroditi, solitarii vel 2–3 irregulariter et subdichotome dispositi. *Bractae* 4.5–7 × 2–3 mm., foliis caulinis similes, puberulae, tota longitudine anguste albo-marginatae ciliolatae, interdum parce glandulosae. *Pedicelli* 0.6–2.5 (–3.7) cm. longi, erecti vel ascendentes, glanduloso-puberuli. *Calyx* 1.6–2 cm. longus, 3.5–4.3 mm. diametro, cylindricus, albo-membranaceus, nervis 10 intense purpurascensibus superne paulum anastomosantibus praeditus, glanduloso-puberulus, in fructu clavatus infra capsulam attenuatus, basi truncato-umbilicatus; dentes 1.3–2.0 × 1.5–2.0 mm., ovati, obtusi vel submarginati, late albo-marginati, ciliolati. *Petala* 1.5–1.75 cm. longa, alba, in sicco purpurea; unguis 9–10 mm. longus, paulo exsertus, glaber, superne dilatatus et obtuse auriculatus; lamina 6–7.5 × 3–3.5 mm., cuneata bipartita, lobis oblongis ad apicem rotundatis praedita; ligulae binae, 0.7–1 mm. longae, oblongae, obtusae. *Filamenta* 11–13 mm. longa, glabra, exserta. *Styli* tres, 7–9 mm. longi, exserti, superne minute pubescentes. *Anthophorus* 7–9 mm. longus, puberulus. *Capsula* 7.5–9 × 3.5–4 mm., ovoideo-oblonga, anthophorum aequans, in calyce inclusa. *Semina* brunnea, 1–1.5 mm. longa, dorso canaliculata, faciebus plana.

TURKEY. Prov. Hakkâri: Cilo dağ, 10 km. west of Cilo Tepe, 3600 m., scree, 9 Aug. 1954, *Davis & O. Polunin* (D. 24182—holo. K, iso. E); Prov. Van, dt. Gevaş: Artos dağ, 3150 m., southern slope, 15 July 1954, *Davis & O. Polunin* (D. 22874).

23B. SECT. AURICULATAE SUBSECT. BREVICAULES

S. Davisii Chowdhuri, sp. nov.

Affinis *S. brevicaulis* Boiss. sed indumento parcissimo, caulibus et calycibus haud viscosis, calyce fructifero superne subgloboso-inflato dentibus late triangularibus, capsula subglobosa anthophoro 2-3-plo brevior, seminibus majoribus recedit.

Herba perennis, humilis, saxatilis, caespitosa, basi multicipiti-suffruticosa. *Caudex* 3-15 cm. longus, 3-9.5 mm. latus, ligneus, ramosus, superne dense foliatus. *Caules* floriferi 4-10 cm. longi, numerosi, teretes, erecti vel arcuato-erecti, simplices, foliosi, pallide virides, ut folia pilis albidis eglandulosis retrorsis sparsim pubescentes, internodiis infimis abbreviatis, mediis 1.2-2.4 cm. longis. *Folia* caudicalia rosularia, 1.8-4 cm. longa, 3-5.5 mm. lata, oblanceolata vel lineari-oblanceolata, vel anguste obovata, in petiolum aequilongum sensim attenuata, basi brevissime vaginato-connata ibique membranaceo-marginata ciliata, marcescentia; folia caulina numerosa, conspicua, oblonga vel lineari-oblanceolata, sessilia, patula, in petiolum brevem attenuata, omnia acuta, uninervia, costa mediana tenui pallescente. *Flores* hermaphroditi, ad apicem caulis solitarii, breviter pedicellati. *Bractee* lineari-lanceolatae, acuminatae, puberulae, basin versus anguste membranaceo-marginatae, sparsim ciliolatae. *Pedicelli* 2-5 mm. longi, erecti. *Calyx* 2.6-3 cm. longus, 6-7 mm. in diametro, tubuloso-clavatus, albido-membranaceus, nervis 10 vire-scentibus superne anastomosantibus praeditus, basi truncato-umbilicatus; dentes 3.5-4.3 × 3-4 mm., late triangulares, acuti, albo-marginati, ciliolati. *Petala* 1.4-1.6 cm. longa, in sicco pallide brunnescentia; unguis 7.5-9.5 mm. longus, glaber, superne dilatatus et obtuse auriculatus; lamina 6.5-7.5 × 4.3-5.0 mm., obovato-cuneata, ad medium in lobos obovatos bipartita; ligulae binae, 0.3-0.5 mm. longae, parvae, obtusae. *Filamenta* 1.1-1.3 cm. longa, exserta, glabra. *Styli* tres, 7-9 mm. longi, exserti, pubescentes. *Anthophorus* 1.8-2.4 cm. longus, glaber. *Capsula* 7-9 × 6-7.5 mm., subglobosa 3-4-plo brevior, in calyce inclusa. *Semina* 1.3-2 mm. longa, dorso canaliculata, faciebus plana.

TURKEY. Prov. Hakkâri: Cilo dağ, between Diz deresi & Cilo yayla, 2400 m., limestone cliff of gorge, 10 Aug. 1954, *Davis & O. Polunin* (D. 24245, holo. K, iso. E); Cilo dağ, 1620 m., crevices of conglomerate rocks, 6 Aug. 1954, *Davis & O. Polunin* (D. 23918). Prov. Van, dt. Başkale: Ispiriz dağ, 2700 m., crevices of serpentine rocks, 31 July 1954, *Davis & O. Polunin* (D. 23720).

This new species is closely allied to *S. brevicaulis* Boiss., but differs from it in the following diagnostics: plant sparsely puberulent, eglandular and not at all viscid; calyx tubular-clavate and white with greenish nerves, in fruit inflated and subglobose with attenuated or narrow base; calyx teeth broad, triangular; petal limp obcordate-cuneate.

***S. pulchella* Chowdhuri, sp. nov.**

Affinis *S. depressae* M. Bieb. (praesertim var. *Meyeri* Fenzl) sed indumento paginae foliorum glanduloso-puberulo, calyce post anthesin superne ovato-clavato subinflato infra capsulam attenuato, dentibus calycinis late triangularibus, laminis petalorum obcordato-bifidis recedit.

Herba perennis, pumila, 4-9.5 cm. alta, basi multicipiti-caespitosa. *Caudex* 3-15 cm. longus, 2.5-6 mm. latus, tenuis, ligneus, ramosus, ad apicem foliatus. *Caules* numerosi, tenues, teretes, erecti, vel basi arcuato-erecti, simplices vel saepius supra breviter 1-2-ramosi (ramulis unifloris), ut folia glanduloso-puberuli, superne dense glanduloso-pubescentes viscidii; nodi plus minus incrassati; internodia infimi abbreviata, media 0.8-2.1 cm. longa. *Folia* caudicalia rosulata, 1.3-2.5 cm. longa, 3-5 mm. lata, oblanceolata vel lineari-oblanceolata vel obovata, in petiolum fere aequilongum sensim attenuata, basi brevissime vaginato-connata ibique membranaceo-marginata, ciliolata, marcescentia, ad apicem obtusa vel mucronulata rarius acuta; folia caulina sessilia vel breviter petiolata, 1.3-3 cm. longa, 3-6 mm. lata, caudicalibus similia, sursum paulum increscentia, erecto-adpressa, omnia canescentia, viridia, uninervia, costa mediana subtus prominente. *Flores* hermaphroditi, solitarii vel 2-3 irregulariter subdichotome dispositi, breviter pedicellati. *Bractee* aequales, 6-9 mm. longae, 2-3.5 mm. latae, lanceolatae vel oblanceolatae, acutae, basin versus anguste membranaceo-marginatae ciliolatae, glanduloso-puberulae. *Pedicelli* 2-4 mm. longi, stricti, erecti, glanduloso-puberuli. *Calyx* 2.6-2.8 cm. longus, 8-10 mm. diametro, elongato-clavatus, superne subinflatus, rubello- vel albido-membranaceus, nervis 10 purpurascensibus superne anastomosantibus praeditus, glanduloso-puberulus viscidus, in fructu superne ovato-clavatus subinflatus infra capsulam attenuatus, basi truncato-umbilicatus; dentes 3.5-4.3 x 4.5 mm., late ovato-triangulares, obtusi, late hyalino-marginati ciliolati. *Petala* alba vel pallide rosea, 1.3-1.5 cm. longa, in sicco purpurea; unguis 7.5-8 mm. longus, breviter exsertus, glaber, superne dilatatus et obtuse auriculatus; lamina 6-7 x 7-8 mm., obcordata, ad medium in lobos oblongos ad apicem rotundatos bipartita; ligulae binae, 1.3-1.8 mm. longae, oblongae, obtusae, crenulatae vel denticulatae. *Filamenta* 1-1.2 cm. longa, glabra, exserta. *Styli* tres, 6-8 mm. longi, exserti, puberuli. *Anthophorus* 1.7-1.9 cm. longus, basi brevissime puberulus, superne glaber. *Capsula* 6-9 x 4.3-5 mm., ovoideo-oblonga, anthophoro duplo vel triplo brevior, in calyce inclusa. *Semina* brunnea, 1-1.3 mm. longa, dorso canaliculata, faciebus plana.

TURKEY. Prov. Van, dt. Baskale: Ispiriz dağ, 3200 m., among limestone rocks, 31 July 1954, *Davis & O. Polunin* (D. 23775—holo. K, iso. E); Ereğ dağ, 2400 m., shady volcanic cliff, 18 July 1954, *Davis & O. Polunin* (D. 22940). Prov. Hakkâri: Cilo Tepe, 3000 m., cliff ledge, 8 Aug. 1954, *Davis & O. Polunin* (D.24032).

***S. antitaurica* Chowdhuri, sp. nov.**

Affinis *S. Boryi* Boiss. sed habitu valde compacto, foliis caulinis confertis internodiis multo longioribus, ungue petalino obtuse auriculato recedit.

Herba perennis, pumila, saxatilis, basi multicipiti-subcaespitosa, caudicibus brevibus lignosis ramosissimis dense compactis arcuatis vel geniculato-erectis praedita. *Caules* floriferi erecti vel ascendenti-erecti, simplices vel subramosi, 3.1–4.9 cm. alti, 0.7–1.5 mm. lati, teretes, ut folia leviter glanduloso-pubescentes, superne dense glanduloso-puberuli, haud viscid; nodi incrassati; internodia infima abbreviata, media 3–8.5 mm. longa. *Folia* caudicalia emarcida sed persistentia; caulina numerosa, conferta, erecta, viridi-flavescentia, omnia lanceolata vel lineari-lanceolata, 2–3.75 cm. longa, 2–3.5 mm. lata, basin calycis valde superantia, basi in petiolum gradatim attenuata, ciliata, ad apicem acuta vel acuminata, subtus prominenter 3–5-nervia, basi membranaceo-dilatata, villosa, costa mediana pallida. *Bractee* aequales, anguste ovato-lanceolatae, 1.9–2.38 cm. longae, 2.5–2.8 mm. latae, basi trinerves, anguste membranaceo-marginatae ciliolatae, pilis longis glanduloso-villosis et pilis brevibus glandulosis puberulae. *Pedicelli* stricti, erecti, breves (2–2.8 mm. longi), glandulosi. *Flores* solitarii, hermaphroditi. *Calyx* 2.7–3 cm. longus, 3.3–4 mm. diametro, cylindrico-clavatus, membranaceus, nervis 10 purpurascens superne anastomosantibus praeditus, minute pubescens, glanduloso-pilosus, in fructu infra capsulam paulum constrictus, ad apicem haud contractus, basi truncato-umbilicatus; dentes anguste triangulares vel ovato-triangulares, inferne subconstricti, acuti. *Petala* rosea, 1.7–1.9 cm. longa; unguis 9–10.5 mm. longus, breviter exsertus, glaber, superne dilatatus et obtuse auriculatus; lamina 7.5–9 × 5–6.3 mm., cuneato-obcordata, ad $\frac{2}{3}$ bipartita, lobis 3–4.3 × 3–3.5 mm. oblongis ad apicem rotundatis praedita; ligulae binae, 0.9–1.5 × 0.7–1 mm., oblongae, obtusae, crenulatae vel denticulatae. *Filamenta* 9–13 mm. longa, exserta, glabra. *Styli* tres, 6–6.5 mm. longi, exserti, superne paulum minuti-pubescentes. *Anthophorus* 1.8–2.15 cm. longus, brevissime puberulus. *Capsula* 8–9.7 × 3.5–4.5 mm., ovoideo-oblonga, anthophoro duplo vel triplo brevior, calyce brevior in calyce inclusa. *Semina* brunnea, 0.9–1.3 mm. longa reniformia, paulum compressa, dorso leviter canaliculata papillosa, faciebus plana.

TURKEY. Prov. Maraş, dt. Göksun: Hobek dağ (S.W. of Göksun), 1820–2000 m., on vertical limestone cliff, 21 July 1954, Davis, Dodds & Çetik (D. 20179—holo. K; iso. E).

In addition to the differentiae cited above, the species generally differs from *S. Boryi* in having smaller caudical and lower cauline leaves, often disappearing from the matured plants; other cauline leaves are crowded and bracts nearly equal the calyx. The leaves in this species vary from linear-lanceolate to lanceolate and the number of nerves varies from 3 to 5, and moreover the plants, represented by one gathering of four sheets, are not at all viscid. Further studies may prove that *S. antitaurica* is only a subspecies of *S. Boryi* Boiss. In habit *S. antitaurica* resembles *S. brevicaulis* Boiss., but differs from the latter primarily in its more abundant upper cauline leaves, long bracts that exceed the calyx, pink petals, hairy anthophore, and in plants not being viscid.

S. minutifolia Chowdhuri, sp. nov.

Affinis *S. microphyllae* Boiss. sed foliis minutissimis, bracteis ovatis, floribus angustioribus, dentibus calycis ovatis obtusis, laminis petalorum purpurascens oblongis emarginatis, unguibus auriculatis recedit.

Herba perennis, caespitosa, humilis, multicaulis. *Radix* crassa, verticalis, elongata, lignea. *Caudices* numerosi, breves filiformes, foliosi, simplices, decumbenti-ascendentes. *Caules* floriferi tenues, 4.5-8.1 cm. alti, 0.3-1.5 mm. lati, teretes, violascentes, e basi arcuato-erecti, simplices, vel a medio vel supra 1-2 ramosi, sparse glandulosi et subretorse puberuli, superne dense glanduloso-pubescentes. *Folia* omnia parva, uninervia, subcarnosa; inferiora anguste lanceolata, 4.5-6.3 mm. longa, 1.3-1.5 mm. lata, subsessilia, ad apicem obtusa vel rotundata, canescenti-puberula; superiora ovato-lanceolata, 4.5-6 mm. longa, 2-2.8 mm. lata, sessilia, acuta, canescenti-tomentella et glanduloso-puberula. *Bractae* aequales, ovato-acuminatae, 3.5-5 × 1.8-3 mm., crispule puberulae, tota longitudine anguste membranaceo-marginatae, villosae. *Pedicelli* stricti, 4-12.5 mm. longi, glanduloso-pubescentes. *Flores* hermaphroditi, 1-3 in apice caulis vel ramulorum terminales longe pedicellati, laterales brevissime pedicellati. *Calyx* 1.5-1.65 cm. longus, 3-3.5 mm. diametro, tubulosus, membranaceus, glanduloso-puberulus, basi truncatus, 10-nervius, nervis violascentibus, medianis ad apicem latis, commissuralibus superne in venulas plures abeuntibus; dentes 1.8-2.5 × 1.5-1.8 mm., ovati, obtusi, saepius ad apicem emarginati, late membranaceo-marginati, ciliolati, in fructu ad apicem haud contracti. *Petala* 1.2-1.35 cm. longa, rosea, subtus viridia; unguis calycem non vel vix superans, superne dilatatus et obtuse auriculatus, glaber vel minute ciliolatus; lamina 5.3-6 × 3.5-4 mm., oblonga, emarginata; ligulae binae, 1-1.5 × 0.5-0.8 mm., oblongae, denticulatae. *Stamina* exserta; filamenta 1.3-1.43 cm. longa, glabra. *Styli* tres, 4.5-7 mm. longi, exserti, pubescentes, ad apicem recurvi. *Anthophorus* 7-8.5 mm. longa, glaber. *Capsula* ignota.

PERSIA. Barf Kanneh, Yezd, 3900 m., in clay soil at the top of granite screes with thyme, etc., 22 July 1932, *Balls* 131 (holo. E).

25A. SECT. MACRANTHAE SUBSECT. DIANTHIFOLIAE

S. dianthifolia J. Gay in Tchihat., *Asie Min. Bot.* i, 193 (1860).

Key to the varieties

Plants 30-50 cm. tall; stem branched above, 2-5-flowered; caudical leaves 2.5-6.7 cm. long, linear-lanceolate *var. dianthifolia*
Plants below 20 cm. in height; stem simple, 1-flowered; caudical leaves 1.5-2.5 cm. long, narrowly lanceolate or oblanceolate *var. pumila*

var. pumila Chowdhuri, *var. nov.*

Planta 7-20 cm. alta. Caules simplices. Folia caudicalia 1.5-2.5 cm. longa, lanceolata vel oblanceolata, raro obovata, plus minus obtusa. Flores solitarii vel etiam bini. Capsula in calyce inclusa.

TURKEY. Prov. Maraş, dt. Çardak: Berit dağ, 2800 m., 27 July 1952, *Davis* 20294; *ibid.* 2900 m., 29 July 1952, *Davis* 20356; dt. Göksun: Binboğa dağ, on Işık dağ, above Karliya, 27-2800 m., 15 July 1952, *Davis* 20019. Cilician Taurus: Bulgarmaden, 1855, *Balansa* 804 (holo. K). Bulgar Magara, Cilician Taurus, 1895, *Siehe* 533; between Bulgar Magara and

Maaden, 180 m., July and Aug. 1853, *Kotschy* 104. Prov. Mersin: Fills-spallin, 2700 m., Kysel depe, 1895, *Siehe* 568.

Var. *dianthifolia* is known only from the type locality (Bulgardagh above Bulgarmaden) whereas var. *pumila* is more common in the Cilician Taurus and Anti-Taurus.

34. SECT. RIGIDULAE

S. Kotschy Boiss., Diagn. Pl. Nov. Or., Ser. I (1), 40 (1842).

Key to the varieties

1a. Flowers pink:

2a. Caudal & lower cauline leaves linear-lanceolate, often plicate, pruinose, or more or less hirtellous; calyx 1-1.3 cm. long, with pink nerves; petal 1-1.4 cm. long; capsule ovoid-oblong:

3a. Plants above 10 cm. in height; leaves pruinose var. *Kotschy*

3b. Plants below 10 cm. in height; leaves hirtellous

var. *maritima* Boiss.

2b. Caudal & lower cauline leaves obovate-lanceolate, flat, tomentellous; calyx 7-9 mm. long, with greenish nerves; petal 6.5-8 mm. long; capsule ovoid

var. *exsudans* (Boiss. & Heldr.) Williams

1b. Flowers white:

4a. Stem dichotomously branched from the base upwards; branches more or less divaricate, diffuse, rough-papillose below; pedicels longer than calyx var. *cassia* (Boiss.) Williams

4b. Stem dichotomously branched from the middle upwards, branches ascending, puberulent below; pedicels as long as or shorter than calyx var. *stenocalyx* (Lindberg)

Chowdhuri

var. *stenocalyx* (Lindberg) Chowdhuri, **comb. et stat. nov.**

Syn.: *S. stenocalyx* Lindberg in Act. Soc. Sci. Fen., N.S., B ii (7), 15 (1946).

CYPRUS. Famagusta, in colle arenoso juxta mare, *Lindberg* (iso. K!).

35B. SECT. ATOCION SUBSECT. DELICATULAE

S. aegyptiaca (L.) L. fil., Suppl. Pl. 241 (1781).

Key to the varieties

Seed 1-1.3 mm. long; plants 20-37 cm. tall, crisp-puberulent, more or less glandular throughout; calyx 1.3-2.1 cm. long var. *aegyptiaca*

Seed 0.5-0.8 mm. long; plants 6-15 cm. tall, puberulent throughout, glandular above; calyx 0.7-1.5 cm. long var. *atocioides*

var. *atocioides* (Boiss.) Chowdhuri, **comb. et stat. nov.**

Syn.: *S. atocioides* Boiss., Diagn. Pl. Nov. Or., Ser. I (5), 83 (1844).

TURKEY. Caria, a. 1843, *Pinard* (holo. G; iso. K! BM!) Pamphylia, March 1845, *Heldreich*. Prov. Anatolia: Bozburun dağ, 600 m., 25 July

1949, *Davis* 15672; Bozburun dağ, between Taşlı yayla and Tozlu dere, 27 April 1949, *Davis* 15772; Mt. Techary Klar, nr. Antalya, 20 April 1860, *Bourgeau* 49; sine loco, *Forbes* 154; Belkis, 150 m., 29 March 1936, *Tengwall* 218.

Although *S. atocioides* (from S. W. Anatolia) has been said to differ from *S. aegyptiaca* because of its herbaceous bracts, smaller and shorter capsule and smaller seeds, examination of these characters shows that *S. atocioides* is untenable as a species. I have examined a sufficient quantity of material at Kew collected from different countries. The herbaceous bract is not usually confined to *S. atocioides* from Turkey alone. The bracts in this species, as well as in *S. aegyptiaca*, vary from ovate and membranous to ovate and herbaceous, and from lanceolate and membranous to lanceolate and herbaceous. Plants with different types of bracts occur together in different countries of the Orient, without any geographical correlation.

The difference claimed in the size and shape of the capsule is not true. The length of capsule in both taxa varies from 5–8.5 mm. Similarly the length of the calyx also varies in both species, and the range overlaps. The only really significant difference is the size of the seed.

43. SECT. DIPTEROSPERMAE

S. colorata Poir., *Voy. Barb.*, ii, 163 (1789).

Key to the varieties

Leaves obovate- or lanceolate-spathulate, seldom linear-lanceolate; plant erect, ascending or decumbent; calyx usually red-nerved

var. *colorata*

Leaves linear-lanceolate or linear, sometimes oblong; plant erect or ascending; calyx red- or green-nerved:

Calyx usually red-nerved; petal pink; capsule shorter than anthophore
var. *longipes* (Post) Dinsmore

Calyx usually green-nerved; petal white; capsule as long as or longer than anthophore . . . var. *Olivieriana* (Otth) Chowdhuri

var. *Olivieriana* (Otth) Chowdhuri, **comb. nov.**

Syn.: *S. Olivieriana* Otth in DC., *Prodr.* i, 373 (1824); Bouloumoy, *Fl. Lib. Syr.*, t.47, fig. 2 (1930).

S. colorata ssp. *Olivieriana* (Otth) Rohrb., *Monogr. Sil.* 116 (1868).

S. sericea spp. *Olivieriana* (Otth) Williams in *Journ. Linn. Soc.* xxxii, 72 (1896).

S. bipartita var. *Olivieriana* (Otth) Post, *Fl. Syr. Pal. & Sinai*, i, 139 (1896).

Type: Circa Alep et Mossul, *Olivier*.

DISTR. Syria, Palestine and Iraq.

S. colorata Poir. is often confused with *S. sericea* All. Indeed, the habit of the two plants is so similar that resort to the seed character is necessary for identification. Whereas *S. colorata* has flat reniform seeds that

are deeply and acutely grooved at the back and provided with two wavy wings, in *S. sericea* All. the seed is widely reniform with concave face and obtusely grooved back, without wings. Other floral characters—shape of calyx, petal and capsule—are similar in the two. The var. *Olivieriana*, with its linear or linear-lanceolate and green-nerved calyx, is very similar to *S. setacea* Viv., but differs from the latter by its seed, shape of petal and of calyx in flower.

SECT. 44. CONOIMORPHA

S. ammophila Boiss. & Heldr. subsp. *carpathae* Chowdhuri, subsp. nov.

A subsp. *ammophila* statura majore, calycibus 7-9.5 mm. longis superne paulo constrictis, lamina petalorum 3-4 mm. longa obovato-cuneata, ungue exserto, capsula longiore differt.

Herba annua, 10-15 cm. alta, laxa, puberula, inferne sparsim et superne dense glandulosa, viscosa. *Radix* tenuis. *Caules* teretes, foliosi, ramosi, ramis divaricatis prostratis vel ascendenti-erectis; nodis infimis plus minus incrassatis, internodiis mediis 1-2.5 cm. longis. *Folia* caudicalia rosularia 2.3-4.7 cm. longa, 3.5-4.3 mm. lata, oblongo-lanceolata vel spatulata, in petiolum brevem attenuata basi vaginato-connata ibique membranaceo-marginata ciliata, ad apicem obtusa; folia caulina redacta sessilia, paulum recurva, obtusiuscula. *Flores* hermaphroditi, pedicellati, in dichasia laxa dispositi. *Bracteae* aequales ovato-lanceolatae, acutae, basi 3-nerviae, anguste membranaceo-marginatae ciliolatae. *Pedicelli* 7-18 mm. longi, stricti, erecti vel ascendenti-erecti. *Calyx* 7-9.5 mm. longus 2.5-3 mm. diametro, cylindricus, glanduloso-puberulus, viscosus, leviter umbilicatus, nervis 15-20, purpurascensibus haud anastomosantibus, in fructu clavatus supra subconstrictus infra capsulam sensim leviter constrictus; dentes 2.5-3.5 × 1-1.3 mm., ovato-lanceolati, albo-marginati, ciliolati. *Petala* 1.2-1.45 cm. longa, in sicco purpurascens; unguis 9-10.5 mm. longus, glaber, obtuso-auriculatus; lamina 3-4 × 2.5-5.3 mm., obovato-cuneata, integra; ligulae binae, 1.3-1.5 × 0.5-0.8 mm., oblongae, denticulatae. *Filamenta* 1.2-1.35 cm. longa, exserta, glabra. *Styli* tres, 5-6.5 mm. longi, exserti, pubescentes. *Anthophorus* 1.5-2.3 mm. longus, puberulus. *Capsula* 5-7 × 3-3.5 mm., ovoidea, anthophoro 3-4 plo longior, in calyce inclusa. *Semina* brunnea, 0.9-1.3 mm. longa, dorso leviter canaliculata, faciebus plana.

KARPATOS. Pigadia, 20 Apr. 1883, Pichler 115 (holo. K).

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