

Silene fetlerii (Caryophyllaceae), a new species from Bulgaria

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A new species, *Silene fetlerii* D. Pavlova (Caryophyllaceae), found in the Eastern Rhodope Mts., Bulgaria is described. It is distributed in a limited area, mainly in screes and rocky places, and appears to be a new addition to the remarkable serpentine flora. *Silene fetlerii* belongs to the section *Spergulifoliae* and is morphologically defined mainly by the following features: anthophore shorter than capsule; small pyriform or 3-sulcate capsules; viscid stem nodes; and a greenish-yellow corolla. The plant is hermaphroditic. The differences between *S. fetlerii* and the morphologically similar species are discussed.

Silene (Caryophyllaceae) is a large genus comprising ca. 700 species, about half of which occur in the Mediterranean area (Greuter 1995). The south Balkans and southwest Asia are considered the main centres of its diversity (Greuter 1995). The section *Spergulifoliae* of *Silene* contains ca. 20 species distributed mainly in southwest Asia, extending to east Europe and Korea, Japan and NW parts of North America. The section was divided by Chowdhuri (1957) into four subsections: *Polyphyllae*, *Brachycarpae*, *Repentes* and *Olgae*, based primarily on characters of stems, leaves, calyx, petals and fruits.

According to Jordanov and Panov (1963) and Petrova (1992), the section *Spergulifoliae* in the Bulgarian flora is represented by *S. thymifolia* and *S. supina*. While *S. thymifolia* is found in sandy habitats along the Black Sea coast, *S. supina* was reported from Northeastern Bulgaria, Znepole region and Tundza hilly region, growing mainly on limestone. *Silene thymifolia* is

characterized mainly by its prostrate-ascending shoots, short, fleshy and ovate leaves, and few flowers in the inflorescence. *Silene supina* is quite a variable species (Greuter 1997) and some similar taxa (*S. pruinosa* and *S. virgata* from Anatolia and western Iran; *S. soskae* from the Balkan Peninsula) were included in it in some floras (e.g., Schischkin 1936, Coode & Cullen 1967). The variation in *S. supina* was discussed more recently and a new subspecies from Romania was described by Ciocârlan (2006). The species was taxonomically variously treated in some floristic publications (Chater & Walters 1964, Chater *et al.* 1993), or regarded as a synonym of *S. spergulifolia* (Chater *et al.* 1993, Micevski 1993, Niketić & Stevanović 2012), or *S. spergulifolia* was a synonym of *S. supina* (Chater & Walters 1964, Marhold 2011). The taxonomical status of *S. supina* was presented differently in the Bulgarian floristic treatments (Delipavlov & Chechmedziev 2003, Assyov *et al.* 2006,

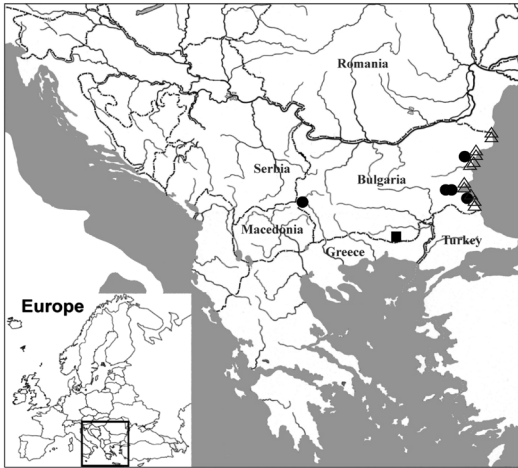


Fig. 1. Distribution map of *Silene fetlerii* (■), *S. supina* (●) and *S. thymifolia* (△) in Bulgaria.

Assyov & Petrova 2012). *Silene spergulifolia* was accepted in the Bulgarian floristic literature only by Delipavlov and Chechmedziev (2003), probably following Chater *et al.* (1993), but the material in the Bulgarian herbaria (SO, SOM, SOA) was not revised. That taxonomical concept was not accepted in modern floristic and chorological literature, where only *S. supina* has been reported in Bulgaria (Assyov *et al.* 2006, Assyov & Petrova 2012).

After revision of the material kept in the Bulgarian herbaria in my opinion *S. spergulifolia* is not present in Bulgaria. The populations of *S. supina* and *S. thymifolia* are ecologically well differentiated. *Silene thymifolia* is widely distributed on maritime sands along the Black sea coast while *S. supina* inhabits sandy or calcareous stony places, with a more or less rich vegetation. The populations of *S. supina* distributed in western Bulgaria (Rudina Mt.) differ somewhat in their morphology (inflated calyx with reticulate veins above, linear leaves, shorter stem) from those in eastern Bulgaria, but this needs more detailed analyses.

On the basis of the habit, leaf shape, calyx length and number of the flowers in the inflorescence Greuter (1997) recognized both *S. supina* and *S. spergulifolia* and reported them for Greece. He paid attention to the fairly westward, isolated populations of the otherwise Asiatic *S. spergulifolia* (Thraki, Nom. Evrou, northeastern

Greece), its habitat (stony or rocky ground in clearings of deciduous oak woods, on siliceous substrates at 100–750 m a.s.l.) and propounded that those populations may represent an undescribed species.

In Bulgaria such plants in anthesis were found for the first time in June 2002 on the serpentines SW of Fotinovo village, and determined as *S. spergulifolia*. The population grows ca. 85 km northwest of the locality reported by Melzheimer and Greuter (1979) in Greece. In 2010 the same plant was found in another place, ca. 5 km further south, near the village of Chichevo (Kirkovo municipality), also on serpentine. After a detailed morphological analysis of both populations, comparisons with specimens of other species (*S. supina*, *S. thymifolia*, *S. spergulifolia*) of sect. *Spergulifoliae* in several herbaria (SO, SOA, SOM, ATH, MA, B), with my own collections, and consulting *Flora NR Bulgaria* (Jordanov & Panov 1966), *Flora Hellenica* (Greuter 1997), *Flora USSR* (Schischkin 1936), *Flora of Turkey* (Coode & Cullen 1967), *Flora Iranica* (Melzheimer 1988), and *Flora Europaea* (Chater *et al.* 1993), it became clear the populations represented an undescribed species.

Silene fetlerii D. Pavlova, *sp. nova* (Figs. 1–3)

HOLOTYPE: Bulgaria. Eastern Rhodope Mts.: southwest of Fotinovo village, ultramafic rocks; 400 m a.s.l.; 41°22'31.44"N, 25°19'18.35"E.; with flowers, UTM Grid, LF-68, 24 June 2002, D. Pavlova DP 02101, 107611 SO (isotype D. Pavlova 102484 SO).

ETYMOLOGY: The specific epithet refers to the Fetler hamlet, Kirkovo municipality, where the specimens were collected.

Subshrub, with spreading vegetative shoots and ascending to erect, simple stems 10–25 cm long, densely and very shortly retrorsely eglandular-pubescent, reddish at least in lower part; lower nodes usually viscid. Leaves narrowly linear, to 12 mm long, slightly broader at base; usually with sterile shoots in their axils, lower leaves covering stem, ciliate and ± scabrid; middle and upper leaves 6–12 mm long and 0.5–1 mm broad, grading into herbaceous lanceolate, ciliate, 3–5 × 1.5–2 mm bracts. Inflo-

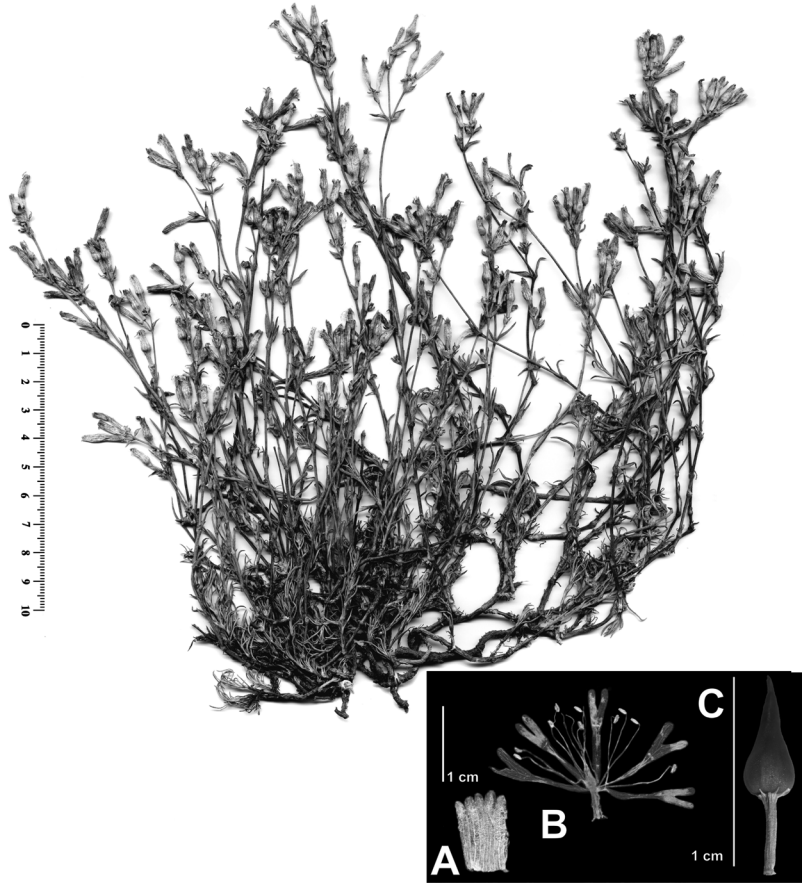


Fig. 2. *Silene fetlerii* (holotype). — **A:** Calyx. — **B:** Flower. — **C:** Capsule.

rescence without glandular hairs, paniculate with 3 (rarely 5) flowers in a terminal dichasium and paired or single-flowered lateral dichasia, solitary or paired in 1–2 preceding nodes, sessile or on 1–2 mm long pedicel. Calyx 6–10 mm long, narrowly cylindrical at anthesis, sometime reddish, with 10 not anastomosing veins, densely glandular; teeth obtuse, ovate, glandular-setose, ciliate. Anthophore 2–4 mm, puberulent. Petals exceeding calyx, greenish-yellow beneath and cream to pale greenish-yellow on upper surface, 2/3 to 1/2 bifid, limb 5–7 mm; coronal scales reduced to small rims; claw smooth, exceeding calyx. Entirely hermaphroditic. Styles shorter than petals. Stamens not exceeding petals, filiform. Capsule 5–6 mm, with a rounded base, narrowed into an acute neck or 3-sulcate, included in calyx, slightly longer to twice as long as anthophore. Seeds reniform, 1–1.32 × 0.56–0.82 mm, grey to dark reddish-brown; flanks

flat to convex; back usually flattish, ca. 0.67 mm broad; testa cells almost flat, the longest cells ca. 0.16 mm, with sinuous margins; hilum cells with a small papilla in the centre of each cell. Flowering in mid-May–June, fruiting in June–July.

Silene fetlerii is morphologically very similar to the polymorphic Irano-Turanian species *S. spergulifolia* and they both clearly belong to sect. *Spergulifoliae*, but there are several diagnostic characters useful in distinguishing the species (Table 1). These two species are quite distinct from *S. supina* and *S. thymifolia*, representatives of the same section distributed in Bulgaria, mainly by their linear leaves, dense inflorescence, shape of the capsules, shorter calyces and shorter capsules.

The polymorphism in the flowers of *S. spergulifolia* related to their sex (Coode & Cullen 1967) is not present in *S. fetlerii*, because the flowers of the latter are exclusively hermaphro-

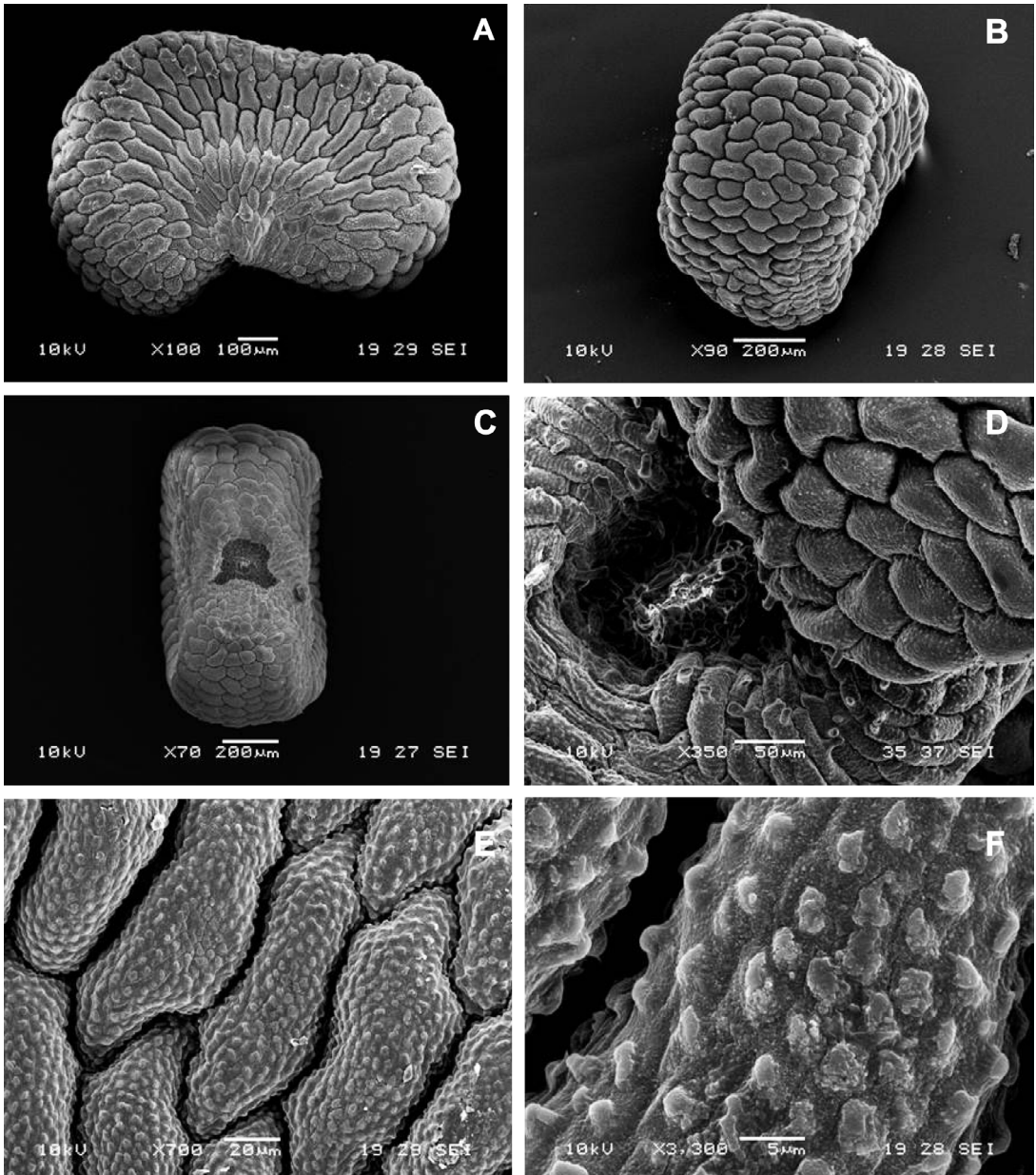


Fig. 3. SEM micrographs of *Silene fetlerii* seeds. — **A:** Lateral surface. — **B:** Back side. — **C:** Hilum. — **D:** Papilla (stipitate “gland”) in hilum area. — **E:** Testa cells in flanks. — **F:** Surface detail of testa cells.

ditic. Such an entirely hermaphroditic population of *S. spergulifolia* was, however, reported from northern Greece (Melzheimer & Greuter 1979, Greuter 1997). The plants from Greece have the anthophore and capsule of equal length, or the anthophore is slightly longer, glandular hairs restricted to inflorescence, triangular-subulate

bracts, styles that are longer than petals, a white corolla and a higher number of flowers in the terminal dichasia. Although that population was treated as representing *S. spergulifolia*, in my opinion it is morphologically closer to *S. fetlerii*. Although the seed morphology of *S. spergulifolia* was studied by Yıldız and Çırpıcı (1998)

there is no information of papillate cells (stipitate “gland”, Greuter 1995) in the hilum area, characteristic of *S. fetlerii*. More investigations of the seeds of *S. spergulifolia* may confirm this feature to be diagnostic.

The chromosome number of *S. fetlerii* is $2n = 24$ (Pavlova 2008, as *S. spergulifolia*). The same number was also published for *S. spergulifolia* (Goukasian & Safarian 1990, Goukasian & Nerserian 1992, Nerserian & Goukasian 1995, Yıldız & Çirpıcı 1996, Greuter 1997) for populations from Armenia, Turkey and Greece.

HABITAT: *Silene fetlerii* grows on rocky serpentine slopes with western or southwestern exposure in the Eastern Rhodope Mts. It is a typical serpentinophyte. The vegetation is composed of xerothermic communities of sub-mediterranean type; it includes also some local serpentine endemics (*Aethionema rhodopaeum*, *Onosma pavlovae*), the Balkan endemics *Saponaria stranjensis*, *Micromeria dalmatica* subsp. *bulgarica*, *Anthemis rumelica*, *Verbascum humile*, *Thymus bracteosus*, *Convolvulus bois-*

sieri subsp. *parnassicus*, and some rare species in the Bulgarian flora such as *Orchis papilionacea*. *Silene fetlerii* is a remarkable member of the local serpentine flora and parts of its vulnerable populations are currently included in a newly protected area. The same habitat is also included in the electronic version of the Red Data Book of the natural habitats in Bulgaria (Biserkov 2012) and categorized as vulnerable.

ADDITIONAL SPECIMENS EXAMINED: — *Silene fetlerii* (paratypes). **Bulgaria.** Eastern Rhodope Mts., Chichevo, *D. Pavlova 12102* (SO), Fotinovo, *D. Pavlova 102485 & 102486* (SO). — *Silene supina*. **Bulgaria.** Black Sea coast, Varna region, *N. Vihodcevski & B. Ahtarov 93802 & 95464* (SOM), “supra pagum Gebedze”, *B. Davidov 23451 & 23452* (SOM), Gebedze, *B. Davidov 23454 & 23456* (SOM), *B. Davidov 84880* (SO), Gebedze, *A. Yavashov 23453* (SOM), Gebedze, *D. Jordanov 21334–21336* (SO), Beloslav, *I. Penev 21337* (SO), northern Black Sea coast, *N. Andreev 135521* (SOM), *J.R. Akeroyd 149330* (SOM) (as *S. spergulifolia*), Black Sea coast, near Sozopol, *V. Velchev, P. Vassilev & Y. Yanev 123917* (SOM), Aitos, *S. Kozuharov & A. Petrova 490* (SOM), Sotirja village, *S. Georgiev 21181* (SO), Rudina Mt., Trekljano village, *B. Ahtarov 23509–23514* (SOM), *B. Ahtarov 23505–23508* (SOM), Suchitza village, Kjustendil region, *D. Jor-*

Table 1. Diagnostic morphological characters of *Silene fetlerii*, *S. spergulifolia* and *S. supina*.

Characters	<i>S. fetlerii</i>	<i>S. spergulifolia</i>	<i>S. supina</i>
Lower stem nodes	usually viscid	never viscid	never viscid
Leaves (middle and upper)	narrowly linear, ca. 1 mm broad	filiform, ca. 1 mm broad	oblanceolate to linear spatulate, more than 1 mm broad
Bracts	lanceolate	narrowly triangular-subulate	ovate lanceolate to elliptic
Inflorescence	paniculate with 3- rarely 5-flowered terminal dichasium and paired or single-flowered lateral dichasia, solitary or paired at 1–2 preceding nodes	dense paniculate with 5–7 flowered terminal dichasium and 3- or single-flowered lateral dichasia, solitary or paired at 1–2 preceding nodes	lax, usually with 3-flowered terminal dichasium and single-flowered lateral dichasia, solitary at 1–4 preceding nodes
Calyx length (mm)	6–10	10–12	14–19
Calyx veins	not anastomosing	not anastomosing	anastomosing
Anthophore length (mm)	2–4	3–6	6–8
Petal color	greenish-yellow	white to pale yellow	cream to pale greenish yellow
Coronal scales	reduced	reduced	ca. 1 mm, well developed
Capsule length (mm)	5–6	3–5	7–8
Capsule:anthophore ratio	2:1 or 1.5:1	1:1 or 1.2:1	1:1 or 1.2:1
Capsule shape	rounded base, narrowed into acute neck or 3-sulcate	pyriform	acuminate-fusiform
Seed color	grey to dark reddish-brown	grey to black	reddish-brown

- danov & A. Yanev 95571 & 95572 (SO). — *Silene thymifolia*. **Bulgaria**. Durankulak, B. Davidov 23488 (SOM), B. Kitanov 82079 (SO), Shabla, N. Vihodcevski 93844 & 93825 (SOM), D. Jordanov 21341 (SO), Zlatni pjasatzi, N. Vihodcevski & B. Ahtarov 106184 (SOM), Varna, B. Davidov 84877 (SO), B. Davidov 23489 (SOM), B. Davidov 23492 & 23493 (SOM), Galata, B. Davidov 23485 (SOM), Kamchia, A. Yanev 82976 (SO), Primorsko, B. Assyov 161248 (SOM), Slanchev brjag, A. Petrova & T. Meshinev 152549 (SOM), Nessebar, R. Tsonev 99024 (SO), Burgas, D. Jordanov 21332 & 21338 (SO), S. Vassileva 32877 (SO), Tzarevo, D. Boteva 98 789 (SO), Pomorie, G. Ganchev 21350 (SO), I. Ganchev 84 878 (SO), Lozenetz village, S. Vassileva & N. Vihodcevski 21351 (SO), Ropotamo, B. Kuzmanov 146668 (SOM). — *Silene spergulifolia*. **Greece**. Thraki, Pessani, E. Stamatiadou 15278 & 15242 (ATH), E. Stamatiadou 15242 (B-WILLD), Thraki, Alexandroupolis–Esimi, Goulimis 3266 (ATH), Thraki, W. Greuter 15953 (B-WILLD), Thraki, Eparhia Soufli, Dadia, W. Greuter et al. 23328 (B-WILLD), Thraki, Eparhia Soufli, Dadia, D. Pavlova DP201401 (SO). **Turkey**. Ankara, Keçiören, G. Akaydin 103252 (SO), Erzincan–Yaylabari köyü, S. Yıldirimli 103954 (SO), Kars, S. Yıldirimli 103955 (SO), Erzurum, S. Yıldirimli 103956 (SO), Bitlis, S. Yıldirimli 103957 (SO). **Iran**. Montes Sahand, ad pagum Kandavan, K.H. Rechinger 417702 (MA), inter Shahpur et Rezaiyeh, K.H. Rechinger 420220-1 & 2 (MA), Kiyamaki Dagh, K.H. Rechinger 418095 (MA), inter Shahreza et Semirum, K.H. Rechinger 420221-1&2 (MA), inter Marand et Sufian, K.H. Rechinger 417931-1&2 (MA), inter Hayran et Ardabil, K.H. Rechinger, 417932-1&2 (MA), Gandza, Kolakovskiy & A. Grossheim 6448 (SOA). **Armenia**. Typus: “Vieweg” [Gundelsheimer ex] 8600-01 (B-WILLD), Ararat, Aruni Dzor, V. Vasak 642319 (MA), Prov. Erevan, Alagez, Sosnowsky 573540 (MA), Razdanskii rajon, V. Avetisjan & E. Avetisjan 241856 (MA). **Georgia**. Tbilisi, Sosnowsky 573120 (MA).
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