

## *Silene cirpicii* (Caryophyllaceae), a new species from Turkey

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*Silene cirpicii* K. Yıldız & Dadandı *sp. nova* (Caryophyllaceae) is described and illustrated from N Anatolia, Turkey. Diagnostic morphological characters for distinction from the similar *S. falcata*, *S. caryophylloides* and *S. argaea* are given along with their chorological characteristics. Ultrastructure of the seeds and pollen grains was examined using SEM.

Key words: Caryophyllaceae, new species, *Silene*, taxonomy

*Silene* is one of the largest genera of flowering plants in the world, consisting of ca. 700 species. The majority of them are distributed in the Mediterranean region (Greuter 1995). Since 1967, 17 new species and three subspecies have been described from Turkey. Thus, the total number of *Silene* taxa in Turkey is ca. 160 and the endemism percentage is approximately 48% (Coode & Cullen 1967, Davis *et al.* 1988, Güner *et al.* 2000, Vural & Dönmez 2002, Duran & Menemen 2003, Aytaç & Duman 2004, Deniz & Düsen 2004, Özgökçe *et al.* 2005, Genç *et al.* 2007, Ecevit *et al.* 2007, Tugay & Ertuğrul 2008, Bağcı 2008).

The specimens reported here were collected from Akdağ near the radio-link station (Amasya) in 2005 and stored at the Celal Bayar University and MUFÉ. They were first provisionally identified as an intermediate taxon between *Silene falcata*, *S. caryophylloides* and *S. argaea*.

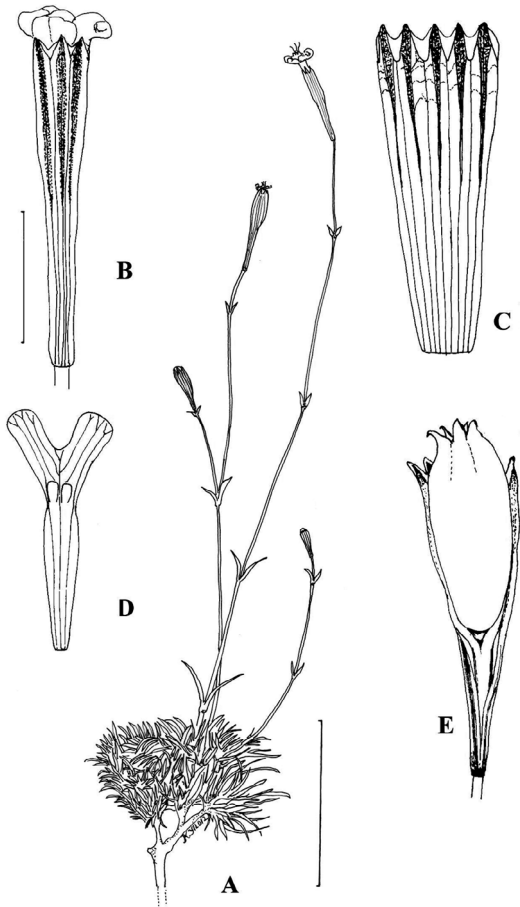
The specimens were compared with specimens of the three species mentioned above

stored at EGE, ISTE, ISTF, ISTO, MUFÉ, GAZI, ANK and HUB, and with various floras (Hayek *et al.* 1927, Chowdhuri 1957, Conert *et al.* 1959–1979, Chater & Walters 1964, Zohary 1966a, 1966b, Meikle 1977, Melzheimer 1988, Greuter 1997). The seed and pollen morphology of the new species was examined by SEM.

***Silene cirpicii*** K. Yıldız & Dadandı, *sp. nova* (sect. *Pinifolia* Chowd.) (Figs. 1 and 2)

*Planta* 10–25 cm, *caespitosa*, *perennis*. *Folia basalia* 7–21 × 0.5–1 mm, *folia caulina* *marginè ciliata*. *Calyx glaber usque ad viscidus*, 20–30 mm *longus*, *petala* 5–15 mm *longa*. *Anthophorum glabrum*, 12–17 mm *longum*. *Capsula* 16–17 × 6–7 mm, *in calyce inclusa velem paulo superans*.

TYPE: Turkey. A5 Amasya, Akdağ, near the radio-

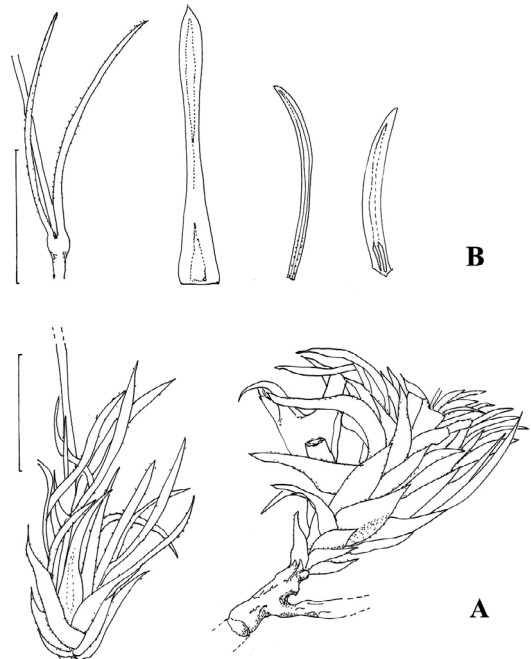


**Fig. 1.** *Silene cirpicii* (from the holotype). — **A:** Habit (scale 5 cm). — **B:** Calyx (in flower). — **C:** Calyx (opened). — **D:** Petal. — **E:** Capsule. Scale for **B–E** 1 cm.

link station, 1800–1900 m. 40°46'783''N, 35°55'624''E, 25.VII.2005 *K. Yıldız 041-1* & *M.Y. Dadandı* (holotype MUF 12096; isotypes Herbaria of Celal Bayar University Department of Biology and Erciyes University Department of Biology). — PARATYPES: A5 Amasya, Akdağ, near Radio Link Station, 1800–1900 m, 21.VIII.2006 *K. Yıldız 0178-1* & *M. Y. Dadandı* (UFE 12386). A5 Amasya, Akdağ, above Eğribük village, Sivrikaya location, 14.VIII.1977, 1600 m, *K. Alpınar* (ISTE 38485!).

**ETYMOLOGY:** Named in honour of the Turkish botanist Prof. Dr. Ali Çırpıcı (Marmara University, Department of Biology), an expert on Turkish Ranunculaceae and Caryophyllaceae.

Caespitose, perennials. Stems erect, glabrous, 10–25 cm. Basal leaves linear, lanceolate, 7–21 × 0.5–1 mm, falcately curved, sometimes flat, rigid, acute, glabrous, no veins, margins partly ciliate. Cauline leaves falcate, rigid, margins

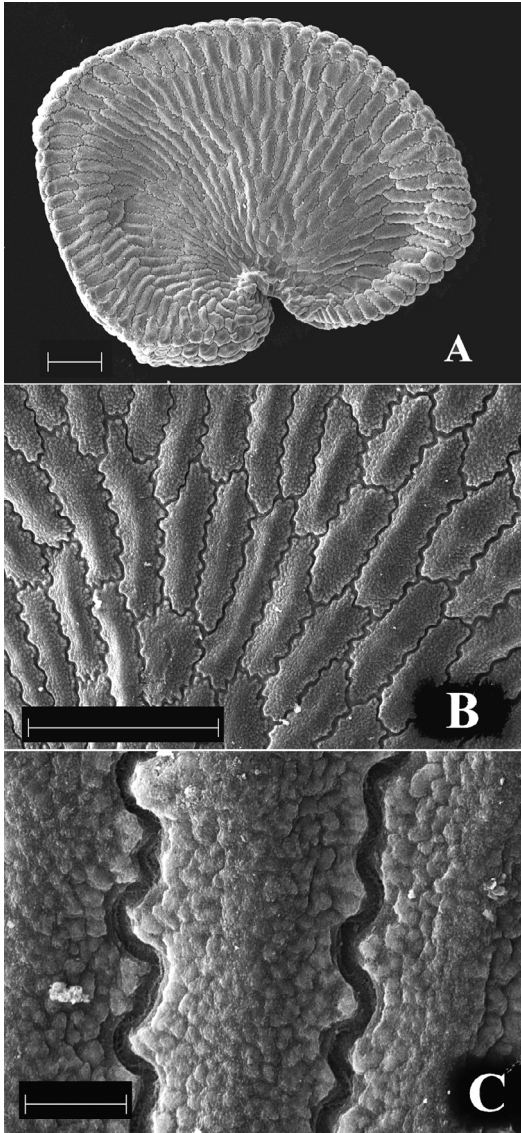


**Fig. 2.** *Silene cirpicii* (from the holotype). — **A:** Base of plant. — **B:** Cauline leaves. Scales 1 cm.

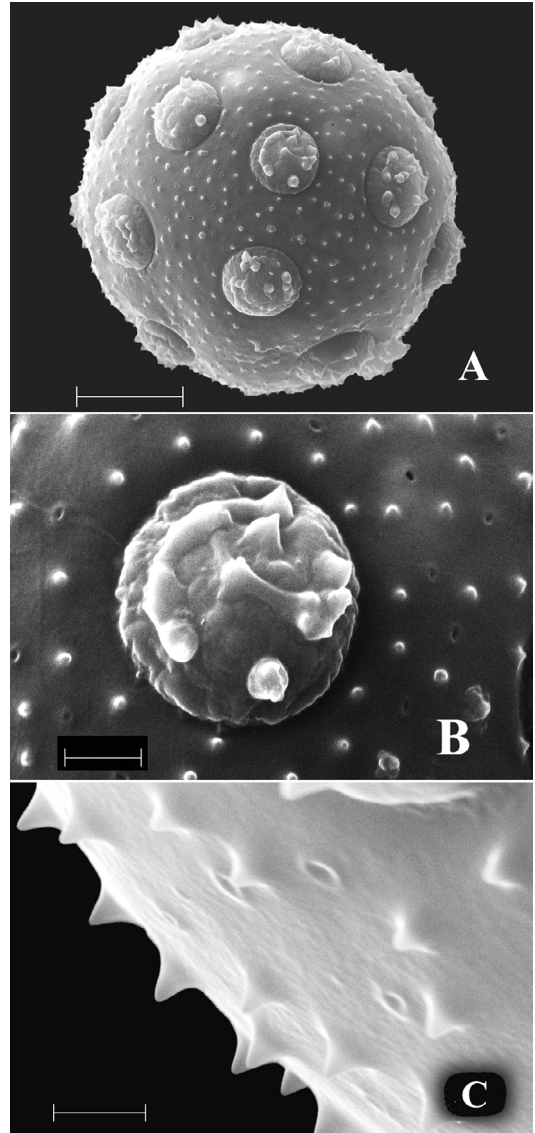
hyaline, only lower part of margins puberulous. Flowers frequently solitary, sometimes 2-flowered. Pedicel erect, 15–40 mm. Calyx tubular, glabrous, 20–30 mm, inflated in fruit, 10-veined, veins thick, upper anastomosing, with 5 long teeth, teeth margins hyaline. Petals 5, 5–14 mm, glabrous, creamy, not auriculate, petal limb bipartite to middle into oblong lobes, coronal scales oblong, limbs with prominent anastomosing veins, exerted from calyx. Stamens 10, filament glabrous. Styles 3. Anthophore glabrous, 12–17 mm. Capsule 16–17 × 6–7 mm, ovoid, completely included in or slightly exerted from the calyx. Seeds reniform (Fig. 3). Pollen grains tectate, spheroidal, microperforate microechinate (Fig. 4). Flowering in July–August.

*Silene cirpicii* belongs to the sect. *Pinifoliae*, which includes ten taxa at species and subspecies rank, mainly distributed in Anatolia and reaching disjunctly westward to Mt. Athos in Greece (*S. falcata*), eastward to NW and W Iran and southward to Lebanon.

**HABITAT:** Limestone rocks, cliffs and walls, frequently in sunny SE and SW, rare on N facing slopes, between 1600–1900 m.



**Fig. 3.** SEM of seed morphology of *Silene cirpicii* (from the holotype). — **A:** General appearance. — **B:** Plates (testa cells). — **C:** Surface granulation and suture outline. Scale 200  $\mu\text{m}$ .



**Fig. 4.** SEM of pollen morphology of *Silene cirpicii* (from the holotype). — **A:** General appearance (scale 10  $\mu\text{m}$ ). — **B:** Pore (scale 2  $\mu\text{m}$ ). — **C:** Ornamentation (scale 1  $\mu\text{m}$ ).

The seed and pollen characters are given in Tables 1 and 2. *Silene cirpicii* and the morphologically similar species can be identified with the following key:

- 1. Capsules completely exserted from calyx ..... *Silene falcata*
- 1. Capsules included in or slightly exserted from calyx ..... 2.
- 2. Stem glabrous, 10–25 cm. Calyx completely glabrous ..

- ..... *S. cirpicii*
- 2. Stem glandular, pilose, 4–20 cm. Calyx pubescent, with or without glands ..... 3.
- 3. Stem up to 5 cm, pilose. Calyx pubescent, without glands ..... *S. argaea*
- 3. Stem 4–20 cm, pilose, often glandular. Calyx pubescent, often with glands ..... *S. caryophylloides*

*Silene cirpicii* is restricted to Akdağ, N Anatolia, (A5 Amasya: Irano-Turanian element).

Akdağ is located in the middle of N Anatolia, which belongs to the Euxine province of the Euro-Siberian phytogeographical region. The flora of Akdağ (Amasya) was studied by Baytop and Alpınar (1980) and 11 *Silene* spe-

cies were reported. Among them, one specimen was erroneously identified as *Silene bupleuroides* (ISTE 38485) that in fact is *S. cirpicii*. *Silene manissadjianii* is a local endemic for Akdağ, Amasya (Coode & Cullen 1967, Davis *et al.* 1988, Güner *et al.* 2000). *Silene cirpicii* is now only known from two localities of Akdağ and together with *S. manissadjianii* is a local endemic there.

The new species is related to *S. falcata*, *S. caryophylloides* and *S. argaea*. The differences are given in Table 3.

**Table 1.** Seed characters of *Silene cirpicii*.

Character	Properties
Seed type	Reniform
Seed back	Concave, a little flat
Seed surface type	Flat, a little concave
Seed granulation	Medium-coarse
Seed tubercle shape	Rounded or low rounded
Hylar zone type	Recessed
Suture outline	Sinuate, sometimes digitate
Seed length and width (mm)	1.35–1.63 × 0.92–1.16
Seed length/width ratio	1.16–1.78
Testa cell length and width (mm)	0.99–1.89 × 0.34–0.53
Testa cell length/width ratio	1.88–5.38
Number of suture point per plate	15–22
Suture length and width (μm)	14–15 × 7–7.5
Tubercle length (μm)	10–11

**Table 2.** Pollen characters of *Silene cirpicii*.

Characters	Properties
Pollen type	Spheroidal
Ornamentation	Microechinate, microperforate
Pollen structure	Tectate
Diameter of pollen (μm)	34.29–37.41
Number of pores per pollen	23–28
Diameter of pores (μm)	5.26–6.9
Distance between two pores (μm)	3.94–6.84
Number of granules on pore	9–15
Spinule length and width (μm)	0.46 × 0.45–0.56
Diameter of microperforations (μm)	0.13–0.27

**Table 3.** Comparison of *Silene cirpicii* with three morphologically similar species.

Characters	<i>S. cirpicii</i>	<i>S. falcata</i>	<i>S. caryophylloides</i>	<i>S. argaea</i>
Stem	10–25 cm, glabrous	3–15 cm, glandular-pilose	4–20 cm, often glandular, pilose	to 5 cm, pilose
Basal leaves	7–21 × 0.5–1 mm, linear, lanceolate, falcate, ± fleshy	12–15 × 0.5–1 mm, falcately curved to linear, rigid-setaceous	15–20 × 1–1.5 mm, triquetrous, pointed, slightly curved or straight	5 × 0.75 mm, linear
Cauline leaves	linear, generally falcate, only margins pubescent and hyaline	lanceolate, generally falcate, distant, all sparsely pubescent and long eglandular ciliate toward base, not hyalin	lanceolate to linear, pubescent, not hyaline	very narrowly elliptic, all ± ciliate, not hyaline
Calyx	20–30 mm, glabrous	18–25 mm, glandular pubescent	20–35 mm, hairy, often glandular	24–25 mm, puberulous
Petal	creamy, not auriculate	whitish, auriculate	white, greenish white or pink, auriculate	pink, auriculate
Anthophore	12–17 mm, glabrous	15–21 mm, slightly pubescent, glabrous at base	10–20 mm, glabrous	11–12 mm, glabrous
Capsule	included in, or slightly exserted from the calyx	completely exserted from the calyx	included in, or slightly exserted from the calyx	included in the calyx
Altitude	1600–1900 m	2000–2500 m	1580–2800 m	ca. 3000 m
Distribution	A5 Amasya (Turkey)	A2 Bursa B2 Kütahya (Turkey and Greece)	A5–A8, B1, B5–B7, C2–C3, C5, C6 (Turkey)	B5 Kayseri, (Turkey)



ADDITIONAL SPECIMENS EXAMINED: — *Silene falcata*. **Turkey.** A2(A). Bursa, Uludağ, Kuşaklıkaya summit, M. Başarman, *Appr. J. Cullen & N. Coode 1965* (ISTF 4493); Bursa, Uludağ, ridges on the North sides of Zirvetepi, A. J. Byfield, *R. Ritzgerald B 1142* (ISTE 67264); Bursa, Uludağ, West of summit, H. Demiriz (ISTF 682). B2. Kütahya, Gediz, Saphane, G. Görk, L. Bekat 16789 (EGE 31977); Kütahya distr. Gediz: Saphane Dağ, P. H. Davis 18450 (E 00232660); Uludagh, P. H. Davis 14845 (E 00232661). — *Silene caryophylloides* subsp. *stentoria*. **Turkey.** B6. Kayseri, Bünyan, above Ortaköy, N. Çelik 2633 (CUM 33084). B7. Erzincan, Refahiye-Erzincan 21 km, K. Yıldız 049-5 & M. Y. Dadandı. B7. Erzincan, Refahiye-Erzincan 32 km, alpine steppe, NW slopes, K. Yıldız 050-3 & M. Y. Dadandı (Celal Bayar University Biology Department). — *Silene caryophylloides* subsp. *echinus*. **Turkey.** C2. Denizli, Honaz Dağı, Kabardıç plateau, L. Bekat 3292 (EGE 18876). — *Silene caryophylloides* subsp. *eglandosa*. **Turkey.** B1. İzmir, Kemalpaşa, Nif Dağı, Ö. Seçmen 4910 (EGE 19506). — *Silene caryophylloides* subsp. *subulata*. **Turkey.** A6. Tokat, Akdağ, K. Yıldız 036 (Celal Bayar University Biology Department). B6. Sivas, Ulaş, Tecer Dağı, Başgözler location, B. Yıldız 4078 & N. Çelik (EGE 32552). A4. Kastamonu: N side of Ilgaz Dag, Davis D. 38382, Coode & Yaltrık (E 00232658). A5. Amasya, Akdağ, around the summit, SE and SW slopes of the mountain, K. Yıldız 041-2 & M. Y. Dadandı (MUFE 12097). — *Silene argaea*. **Turkey.** B5. Kayseri, Erciyes Dağı, K. Alpınar, H. Yıldız 036 t Hart (ISTE 62308). B5. Kayseri, Erciyes (EGE 31591); Kayseri, Erciyes Dağı, Balansa 1042 (E 00232663).

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