

Two new records and a confirmation for the vascular flora of Turkey

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Abstract: *Campanula raddeana* Trautv. (Campanulaceae), based on samples collected from Çıldır (A9 Ardahan), and *Galatella cretica* Gand. (Asteraceae), based on samples collected from Marmaris (C1 Muğla), were recorded as new findings for the *Flora of Turkey*. In addition, *Silene samia* Melzh. & Christod. (Caryophyllaceae) was confirmed in Turkey based on samples from four localities in southwest Anatolia. Detailed descriptions, locality information, and distribution maps of the cited taxa were also given in the present study.

Key words: *Campanula*, *Galatella*, *Silene*, taxonomy

1. Introduction

Campanula L. includes about 420 species, which are widely distributed in temperate and subtropical zones of the northern hemisphere (Lammers, 2007), and it is represented by 127 species in Turkey, about half of which are endemic (İkinci, 2012; Yıldırım, 2013; Yıldırım and Şenol, 2014; Mutlu and Karakuş, 2015). In June 2015 during fieldwork in Ardahan Province (northeast Anatolia, Turkey), the first and second authors collected *Campanula raddeana* Trautv., which had not been recorded from Turkey previously. *Galatella* Cass. (Asteraceae) consists of approximately 45 species distributed mainly throughout Turkey, Europe, Iran, and Russia and from India to western China (Tzvelev, 1959; Nesom and Robinson, 2007). It is represented by 5 species in Turkey (Ekim, 2012; Hamzaoğlu et al., 2013). In June 2014 and 2015, *Galatella cretica* Gand., which had not been recorded from Turkey previously, was also collected from several localities in the Marmaris Peninsula, southwest Anatolia, by the authors. *Silene* L., the largest genus in Caryophyllaceae, comprises about 700 species and is distributed in northern temperate regions, South America, and Africa (Melzheimer, 1988). It is represented by 148 species in Turkey (Yıldız, 2012). During fieldwork in 2014 in Muğla, Burdur, and İzmir provinces, *Silene samia* Melzh. & Christod. was collected from several localities by the authors. *S. samia* was recorded from southwest Anatolia by Carlström (1987); however, this record was neglected by Yıldız (2012) during preparation of the checklist of *Silene* in Turkey. The present

study aimed to report and confirm the presence of three taxa for the *Flora of Turkey*.

2. Materials and methods

Plant materials for this study were collected from İzmir, Muğla, Burdur, and Ardahan provinces during fieldwork in 2014–2015 and compared with specimens stored in national (ANK, E, EGE, G, GAZI, HUB, NGBB, ISTE, ISTF) – international (K and W) herbaria. Additionally, all specimens were checked according to the relevant literature (Boissier, 1867; Tzvelev, 1959; Chater and Walters, 1964; Rechinger and Schimann, 1965; Coode and Cullen, 1967; Tutin et al., 1968; Davis, 1975; Fedorov and Kovanda, 1976; Merxmüller et al., 1976; Damboldt, 1978; Davis et al., 1988; Melzheimer, 1988; Greuter, 1997; Güner et al., 2000; Tan and Vural, 2000). Herbarium materials belonging to the new findings were deposited in EGE (Ege University Herbarium). Morphological features were obtained in field and laboratory studies.

3. Results and discussion

Campanula raddeana Trautv. in Bull. Acad. Imp. Sci. Saint-Petersbourg, sér. 3, 10: 395 (1866) (Figure 1).

Syn.: *Campanula brotheri* Sommier & Levier in Nuovo Giorn. Bot. Ital., ser.2, 4: 199 (1897). *Campanula kemulariae* Fomin in Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 3: 289 (1937).

Subglabrous perennial herbs. Stems 10–23 cm, rather thin, erect or ascending-erect, simple or paniculately

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Figure 1. *Campanula raddeana*: A- habit, B- herbarium specimen (H.Yıldırım 3125), C- flowers.

branched, borne on rather thin, slightly creeping rhizome covered with squamous remnants of petioles. Basal leaves 5–37 × 4–34 mm, deeply cordate-ovate or triangular, acute, petioled, sometimes hirsute on margins; petiole 0.5–12 cm. Cauline leaves 3–25 × 3–23 mm, ovate or triangular, short-petioled, glabrous; petiole 0.4–3.7 cm. Upper leaves 5–14 × 2–7 mm, acuminate, sessile. Flowers recurved, solitary in axils of upper leaves, pedicellate and bracteate. Pedicel 2–35 mm, glabrous to minutely papillate. Bract linear-lanceolate, 2–7 mm long, sub-glabrous. Corolla 9–15 × 4–11 mm, violet to dark violet, campanulate, bearded inside; corolla lobes 2–6 × 1–4 mm, triangular. Calyx lobes 3–9 × 1–4 mm, triangular, acute, covered with transparent bristles on broadened base. Appendages 1–5 × 1–3 mm in flowering

time, 4–7 × 2–4 in fruiting time, triangular-lanceolate, hirsute on margin, recurved. Anthers orange. Style exserted. Ovary glabrous, with several hirsute hairs on prominent ridges. Capsule hemispherical to pyramidal, opening by 3 basal pores, slightly hirsute on prominent ridges, 3.5–5.5 × 3–3.5 mm. Seed narrowly ellipsoid to narrowly oblong, 0.8–1 × 0.3–0.5 mm, lightly brown to dark brown. On volcanic rock cliffs. Flowering and fruiting July to September.

A9 Ardahan: Çıldır, on the way from Çıldır lake to Mazeret pass, Karaçay valley, on volcanic rock cliffs, 41°09'39"N, 43°08'19.2"E, 2100 m, 24.07.2014, H. Yıldırım 3125 (EGE!); Çıldır, Karaçay valley, near Şeytan castle, on volcanic rock cracks, 41°08'45.45"N, 43°07'45.05"E, 1941 m, 10.09.2015, H. Yıldırım 3699 (Figure 2).

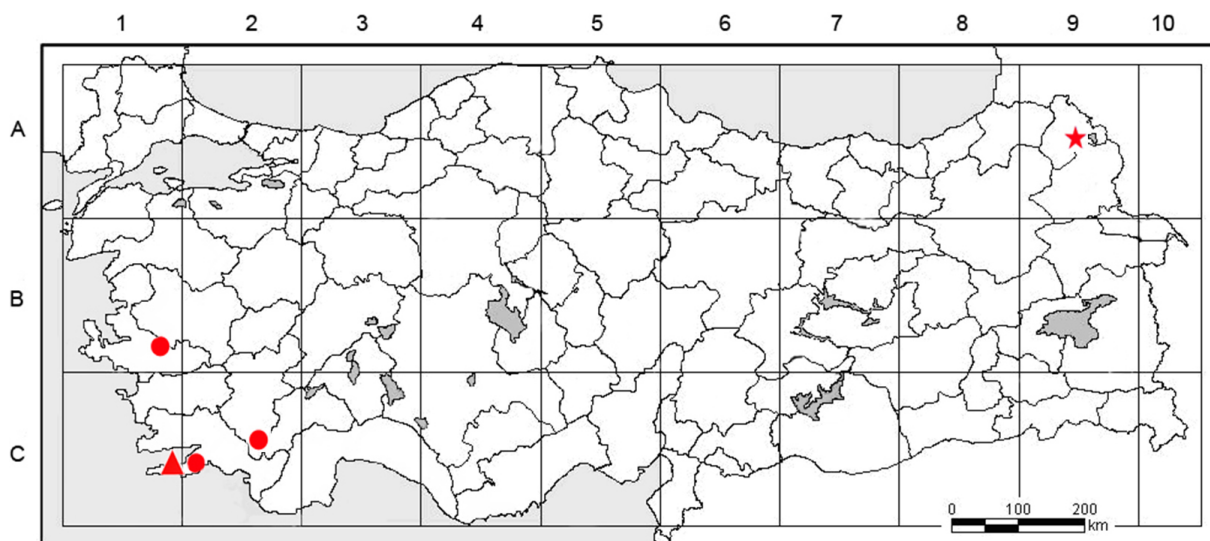


Figure 2. Distribution of *Campanula raddeana* (★), *Galatella cretica* (▲), and *Silene samia* (●) in Turkey.

Campanula raddeana grows on volcanic rock cliffs, and specimens were collected during the flowering and fruiting periods from natural populations near Çıldır Lake in Ardahan Province, Turkey. *C. raddeana* is treated under subg. *Campanula* sect. *Symphandriiformes* (Fomin) Charadze. It is related to *C. betulifolia* C.Koch and *C. troegerae* Dambolt. It can be easily distinguished from them by its erect or ascending-erect stems; moderately smaller, glabrous or subglabrous habit; glabrous and violet to dark violet petal; deeply cordate-ovate or triangular basal leaves. To date, *C. raddeana* is known as a local endemic plant of Georgia (Fedorov, 1957). With this paper, *C. raddeana* is recorded for the first time in Turkey, and its distribution area was expanded.

Carlström (1987) carried out a detailed floral study on the Marmaris Peninsula and 3 Greek islands (Rhodes, Symi, and Tilos). In the study, she recorded *Galatella cretica* (without any detailed location or collection information) and *Silene samia* on the Marmaris Peninsula. However, after this study, 2 supplemental volumes (10 and 11) to the *Flora of Turkey and the East Aegean Islands* (Davis et al., 1988; Güner et al., 2000) and 6 checklists were published (Özhatay et al., 1994, 1999, 2011; Özhatay and Kültür, 2006; Özhatay et al., 2009; Güner et al., 2012); *G. cretica* and *S. samia* in Turkey were not mentioned in these works.

Galatella cretica Gand. in Fl. Cret. 59, No. 1044 (1916); et in Bull. Soc. Bot. France, 1916, ixiii. 235 (1919) (Figures 3A–3C).

Syn: *Aster creticus* (Gand.) Rech.f. in Phytion (Horn) 1: 211, cum descr. ampl. (1949); *Crinitaria cretica* (Gand.) Soják, in Čas. Nár. Muz. Praze, Rada Přír. 148(2): 77. 1980 [1979 publ. 1980].

Perennial herbs, stems 12–40 cm, decumbent to erect, covered with arachnoid floccose hairs, subglabrous above, leafy up to the capitula. Leaves alternate, 2–32 × 0.3–2 mm, sessile, ending abruptly in a sharp point (mucronate), eglandular, 1-veined. Involucre 4–8 mm, cylindrical to obconical; phyllaries 2–3 seriate; the outer lanceolate, acute; the inner oblong-linear, subacute, reddish. Capitula discoid, ray flowers absent. Disc flowers 4–9 mm long, hermaphrodite, yellow, orange or reddish; tubes slender, limbs narrowly campanulate; lobes 5, lanceolate; anthers 1.6–2.3 mm, not appendiculated at base; filaments 0.8–1.2 mm long; style 5–10 mm long. Achenes 3–4 mm, obovate; pappus 2–5 mm long, nearly equal. On serpentine or calcareous slopes. Flowering and fruiting November–December.

C1 Muğla: Marmaris, Söğüt village, on the Taşlıca road, 150 m, 07.11.2015, *H. Yıldırım* 3756 (EGE!); Between Datça and Aktur, 1 km before Aktur, 10 m, in maquis, serpentine soil, 4.12.2014, *R. Gül* 2650a (EGE!); Datça, on solid waste center way, in maquis, 200 m, calcareous soil, 4.12.2014, *R. Gül* 2651 (EGE!) (Figure 2).

Carlström (1987) carried out a detailed floristic study on the Marmaris Peninsula and in the Greek islands (Rhodes, Symi, and Tilos). The study recorded *Galatella cretica* without any detailed locality information. However, this taxon was not included in the supplement to *Flora of Turkey and the East Aegean Islands* (Davis et al., 1988; Güner et al., 2000) or the Checklist of Vascular Plants of Turkey (Ekim, 2012).

Carlström (1987) evaluated the genus *Galatella* under *Aster* L. She indicated that *Galatella cretica* [as *Aster creticus* (Gand.) Rech.f.] is distributed in open phrygana, frequently on sandstone cliffs on the islands of Crete,

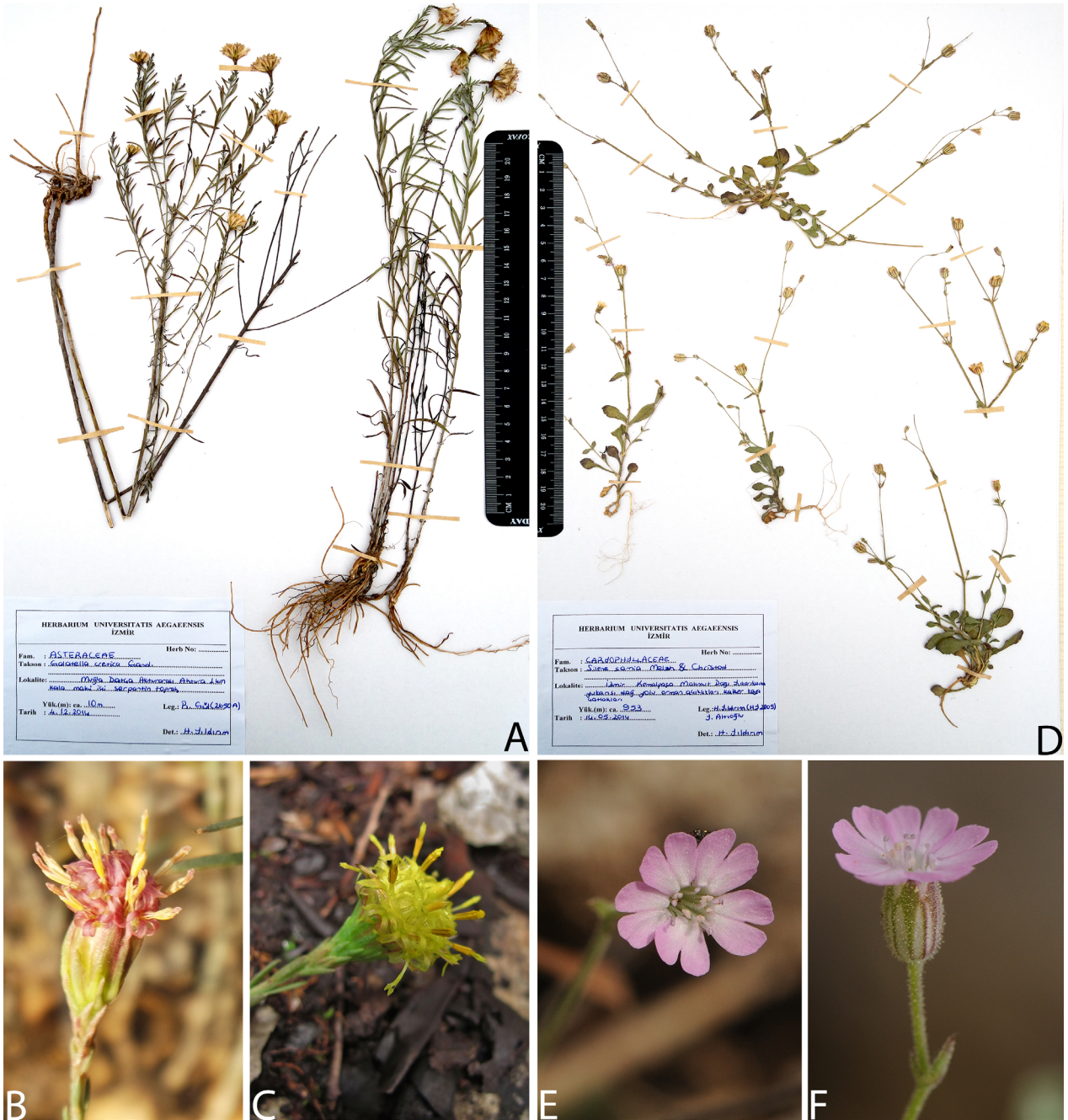


Figure 3. *Galatella cretica*: A- herbarium specimen (R.Gül 2650A); B, C- capitula; *Silene samia*: D- herbarium specimen (H.Yıldırım 2805); E, F- flower.

Karpatos, and Rhodes and on the Marmaris Peninsula. Moreover, she emphasized that *G. cretica* grows mainly on calcareous substrate on Rhodes Island but only grows on ultramafic soils on the Marmaris Peninsula. Although she pointed out the presence of *G. cretica* on the Marmaris Peninsula in Turkey, she did not give a detailed location,

author collection number, or any herbaria. Carlström carried out this floristic study in the Marmaris Peninsula in 1983 (19–23 April and 15–29 May), 1984 (30 April–15 May), and 1985 (8–16 April); however, the flowering time of *G. cretica* is September to November. *G. cretica* was likely observed only during its vegetative period.

Galatella cretica slightly resembles *G. anatolica* and *G. angustissima*. It differs by the absence of ray flowers and 2- or 3-row phyllaries.

Silene samia Melzh. & Christod. in Bot. Chron. 28(1): 50 (1982) (Figures 3D–3F).

Annual with basal leaf rosette and a single or few erect stems up to 8–27 cm: lowermost leaves sparsely eglandular-pubescent with stout, conical hairs, cauline leaves mostly eglandular-pubescent, inflorescence glandular-pubescent. Leaves thin: rosular ones 1.8–5 × 5–10 cm, rounded-spathulate, distinctly petiolate, apiculate; cauline leaves sessile, much shorter (8.71–22 × 1.30–2.67 mm), grading into lanceolate bracts; bracts 1.4–5.4 mm. Inflorescence an asymmetrical few-flowered dichasium, usually branched 2–3 times, very lax; flowers usually cleistogamous, hermaphrodite, erect; pedicels straight, 4–30 mm. Calyx 5–10 mm, glandular-pubescent, broadly ovoid in fruit, rounded at base, not narrowed above, with distinct, simple veins. Anthophore absent or very short, glabrous. Petals usually included in calyx; claw glabrous; coronal scales minute or absent, white or ±tinged pink; limb 1–2.4 mm, oblong-cuneate, bilobed, light pink, paler beneath. Filaments glabrous, up to 4.27 mm; anthers included, up to 1.1 mm, pollen yellow. Capsule 5–8 mm, broadly ovoid, firm, equaling or somewhat exceeding calyx. Seeds 1.3–2.1 mm, reniform, grayish-brown to black, with flat to concave sides and flat back; testa cells with mammillae in concentric rows. On serpentine or calcareous slopes. Flowering and fruiting from May to June.

C1 Muğla: Marmaris, Kocadağ, 3 km NE of Sindiköy, Carlström 12256; **Muğla:** Datça, Kocadağ, open serpentine soil slopes, 500 m, 2.5.2014, *R.Gül* 2149 (EGE!); **Muğla:** Datça, Kocadağ, on radio transmitter way, 700 m, 23.5.2014,

R.Gül 2327 (EGE!); **Burdur:** Tefenni, Boncuk mountain, above Ballık village, calcareous soil slopes, 1020 m, *R.Gül* 3210 (EGE!); **B1 İzmir:** Kemalpaşa, Mahmut Dağı, above Yukarı Kızılca village, forest opening, in calcareous rock cracks, N: 38°21'27.0"N, 27°29'26.9"E, 953 m, 14.05.2014, *H. Yıldırım* 2805 (EGE!) (Figure 2).

Carlström (1987) recorded *Galatella cretica* without any detailed locality information but reported *Silene samia* from the Marmaris Peninsula. However, it was not included in the supplement to *Flora of Turkey and the East Aegean Islands* (Davis et al., 1988; Güner et al., 2000) or Checklist of Vascular Plants of Turkey (Yıldız, 2012). Before the collection of *Silene samia* on the Marmaris Peninsula by Carlström (1987), it was known only at the type locality, the Aegean island of Samos (Greuter, 1997). After the collection by Carlström (1987), *S. samia* was collected from the same locality and two new localities on the Marmaris Peninsula by the present authors. Additionally, two new populations were discovered on Mahmut mountain (İzmir) and Boncuk mountain (Burdur).

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