

Taxonomic and Biogeographic Contributions to Some Genera of *Caryophyllaceae* Family in Turkey

Türkiye'deki *Caryophyllaceae* Familyasının Bazı Cinslerine Taksonomik ve Biyocoğrafik Katkıları

Research Article

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ABSTRACT

In this study, 8 taxa of *Caryophyllaceae*, belonging to the genera *Minuartia* L., *Moehringia* L., *Petrorhagia* (Ser.) Link and *Silene* L., have been discussed in taxonomic, biogeographical and endemism points of view. Three species belonging to the genera *Minuartia* (*M. bulgarica*, *M. setacea*) and *Petrorhagia* (*P. wheeler-hainesii*) are given as new records for the Turkish flora. *Moehringia grisebachii* was published as a new record for the Turkish flora previously. However, neither the supplements of the Flora of Turkey nor recently published checklists considered this species. Furthermore, *Minuartia garckeana*, *Silene frivaldszkyana*, *S. manissadjianii* and *Petrorhagia peroninii* are discussed here in the light of the new data.

Key Words

Caryophyllaceae, *Minuartia*, *Petrorhagia*, Turkey.

ÖZET

Bu çalışmada, *Caryophyllaceae* familyasından *Minuartia* L., *Moehringia* L., *Petrorhagia* (Ser.) Link ve *Silene* L. cinslerinden 8 takson taksonomi, biyocoğrafya ve endemizm özellikleri bakımından tartışılmıştır. *Minuartia* (*M. bulgarica*, *M. setacea*) ve *Petrorhagia* (*P. wheeler-hainesii*) cinslerinden üç tür Türkiye için yeni kayıt olarak verilmiştir. *Moehringia grisebachii* daha önce Türkiye florası için yeni kayıt olarak verilmesine rağmen sonradan yayınlanan Flora'nın ek ciltleri ve Tür Listesi yayınlarında gözden kaçmıştır. Diğer yandan bu makalede *Minuartia garckeana*, *Silene frivaldszkyana*, *S. manissadjianii* ve *Petrorhagia peroninii* türlerine yeni bulgular eklenmiştir.

Anahtar Kelimeler

Caryophyllaceae, *Minuartia*, *Petrorhagia*, Türkiye.

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INTRODUCTION

Intensive studies on the Turkish flora and taxonomic revisions have been appeared in recent years. For instance the family *Brassicaceae*, the floristic results have been published as synopsis [1] and checklist series [2-6]. These publications and the other taxonomic publications have been appeared in various periodicals, showing clearly that floristic and taxonomic studies are very active and the flora of Turkey has still promising taxonomic novelties. On the other hand, some of the described taxa require further studies in considering of the enormous herbarium collections deposited mainly at European herbaria and literature by specialized taxonomists to each genus.

In this paper, evaluation of the collected plant material from Turkey has provided some new findings for the family *Caryophyllaceae*. The specimens mentioned in this paper have been collected during the field trips carried out in Turkey for various taxonomic revisions and floristic studies. Following the identification of the collected materials, the results have been checked against the samples found in various herbaria of Turkey, and the herbaria of E, G, K and W for more accuracy.

The following eight species have been given under the current names, their type specimens with the deposited herbarium acronyms (if available), and their distribution patterns mostly referring to threat status. Moreover, a map is also given for collection sites of the specimens and their taxonomic discussion.

MATERIAL AND METHODS

The plant materials have been collected throughout Turkey due to field trips for various revisionary and floristic works. The taxa mentioned in this paper have been given according the order of Turkish Flora. Materials of this work have been deposited at the herbarium of Hacettepe Universtiy, HUB.

RESULTS

Minuartia garckeana (Aschers. & Sint. ex Boiss.) Mattf. in Bot. Jahrb. Syst. 57. Beibl. 126, 33 (1921), Figure 1.

Lectotype (designed by Kamari 1997:183): Turkey: B1 Balıkesir, Mt. Ida (Kaz Mountain), prope, Kareikos, 04. 07. 1883, *Sintenis* 457 (G!; isotypes: BM, JE, K!, WU).

Cushion form, perennial herbaceous. Sterile shoot many and short, rarely reached up to 12 cm, sparsely glabrous to eglandular, puberulent. Flowering stem 5-20(-30) cm, erect to semi-decumbent, usually branched at upper part, puberulent to velutinous below, glandular pubescent above. Leaves \pm lax, decumbent, (3-)5-13(-18) mm, filiform, prickly, indistinctly 1-3 nerved, usually falcate, with small leaf clustered at non-flowering shoot axils. Inflorescence lax, usually 3-8 flowered. Bracts 2.5-4(-5) \times 0.7-1 mm, lanceolate, scarious margins almost absent, densely glandular haired. Pedicel 5-16 mm, usually very longer than calyx, densely glandular hairy. Sepals 3.5-5.3 \times 0.9-1.4 mm, 3-nerved, oblong to lanceolate, obtuse, scarious margined widening towards point, densely glandular hairy. Petals longer than 1-1.3 \times sepals, obovate to oblanceolate. Capsule equal or slightly longer than sepals, usually minute papillose above. Seeds 0.75-1.0 mm, small tuberculate.

Examined specimens: B1 Balıkesir: Edremit, Zeytinlik, Kazdağı, around the Sarıkız, serpentine, step, 39°42'174"K, 026°52'072"D, 1745 m, 05. 07. 2003, A.A.Dönmez 11563 & J. Milton (HUB).

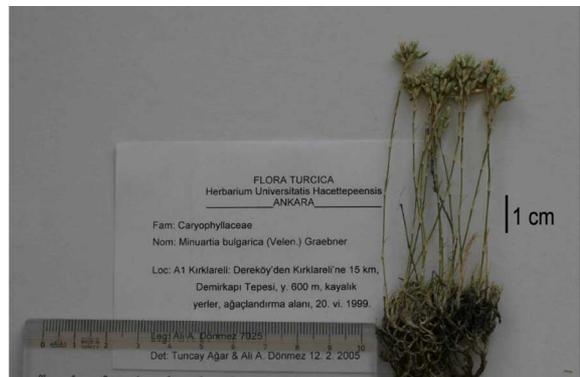


Figure 1. *Minuartia garckeana* (from A.A.Dönmez 11563).

Conservation status: Type specimen of the species is collected from Turkey and it is also found in South Balkans [7,8]. The species has a healthy population at the type locality and the area has National Park status. The Kazdağlı population of the species does not face significant threat because there are effective conservation measurements in the park. Due to its extensive distribution area, involving Balkans and Turkey, the species is assigned to the LC category.

Minuartia bulgarica (Velen.) Graebner in Asch. & Graebn., Syn. Mitteleur. Fl. 5: (1):727 (1918). ≡ *M. recurva* subsp. *bulgarica* (Velen.) Stoj. & Stefanov. Figure 2.

Type: Unknown

Densely cushion form perennial; stem woody and usually black below; flowering stem usually reaches up to 12 cm; plant sparsely glandular hairy at least upper part. Leaves 4-10 mm, 3 nerved, falcate. Cymes compact and many flowered, pedicels shorter than calyx; calyx 3-4 mm, ovate-lanceolate, 3-9-nerved, slightly longer than petals. Petal and capsule slightly smaller than calyx. Seeds 1.2 mm, small tuberculate (Figures. 3a-b).

Examined specimens: A1 Kırklareli: From Dereköy to Kırklareli 15 km, Demirkapı hill, c. 600 m, rocky places, afforestation area, 20. vi. 1999, A.A.Dönmez 7025 (HUB).

Conservation status: This species is known from central and south Bulgaria [9, 10]. Presence



Figure 2. *Minuartia bulgarica* (from A.A.Dönmez 7025).

of this species (Figure 2) in Turkey is determined for the first time. The species has a restricted distribution pattern involving Bulgaria and the Thracian part of Turkey. However, this is not a prominent threat to the species and therefore it is assigned to the LC category.

Minuartia setacea (Thull.) Hayek, Fl. Steiermark 1: 271 (1911). Figures 4a-b-c, 5a-b-c. ≡ *Arenaria setacea* Thuill., Fl. Env. Paris, ed. 2: 220 (1800). ≡ *Alsine setacea* (Thuill.) Mert. & W.D.J. Koch in Röhling, Deutschl. Fl., ed. 3, 3: 286.

Type: [France, near Paris] "à Fontainebleau, rocher du Cuvier", Thuillier (G?-not seen).

Perennial laxly to densely caespitose. Flowering stem suberect, to 30 (-40) cm long, glabrous throughout or crispate-puberulent to velutinoso below. Leaves of flowering stems 6-16 mm long, 3-veined below, usually erect, linear-setaceous, ciliate below or rarely throughout. Fascicles of erect or usually falcate leaves present in axils of main leaves. Uppermost bracts 2-3 × 1 mm, lanceolate, long-acuminate. Inflorescence usually lax, 1 to many-flowered. Pedicels usually longer than sepals, to 13 mm, often slender, glabrous. Sepals (2-)4-6.5 × 0.8-1.5 mm, 1-veined, ovate-lanceolate to linear-lanceolate, acuminate, glabrous, with scarious margins extending nearly to midvein. Petals 0.7-1.2 times as long as sepals, 1.5-2 mm broad, obtuse. Capsule 3.3-4.0 × 1.7-2.2 mm, usually to 0.8 times as long as sepals. Seeds (0.5-) 0.7-0.8 mm, brown, with rounded tubercles to 0.07 mm long mainly on dorsal ridge. 2n= 30.

Minuartia setacea (Thull.) Hayek is a correct name [8,9] and it is assigned to the species which is naturally distributed from France to the Caucasus and southwards through the Balkan Peninsula to Mt. Olimbos (in Greece). The circumscription of this polymorphic species is rather large and it is not clearly delimited. On the other hand, *Minuartia erythrosepala* (Boiss.) Hand.-Mazz. is a very difficult species in respect of taxonomy and it is also endemic to Turkey with an arguable note [10]. Descriptions of these two species do not clearly differ from each other, at least by diagnostic characters. Examination of

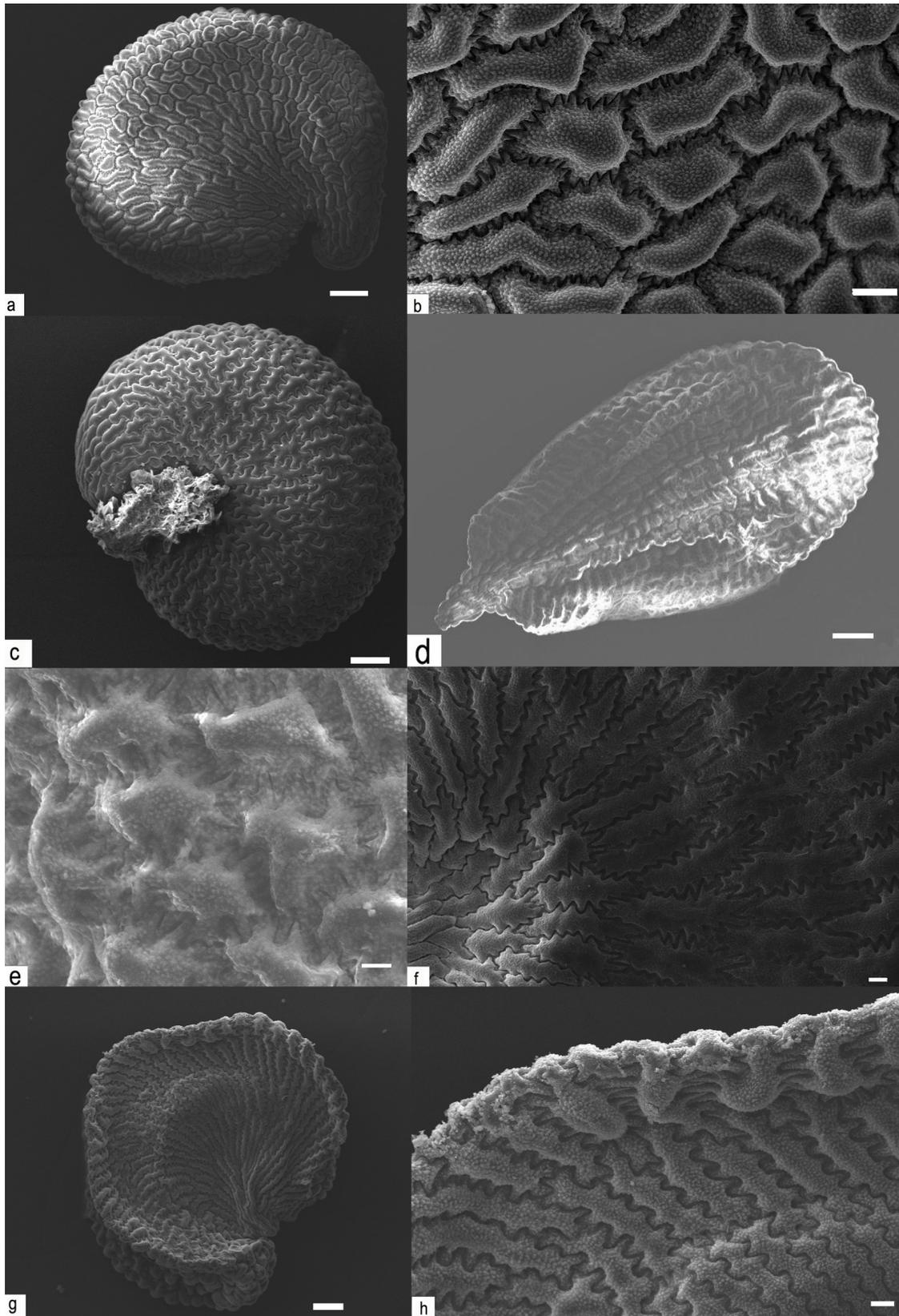


Figure 3. Seed morphology and ornamentalions of various taxa of Caryophyllaceae: a-b: *Minuartia bulgarica*, c: *Moehringia grisebachii*, d-e: *Petrorhagia peroninii*, f: *Silene manisadjanii*, g-h: *Silene frivaldszkyana* (Scales; a-c-g=100 µm, b-d-h=20 µm, e =10 µm).

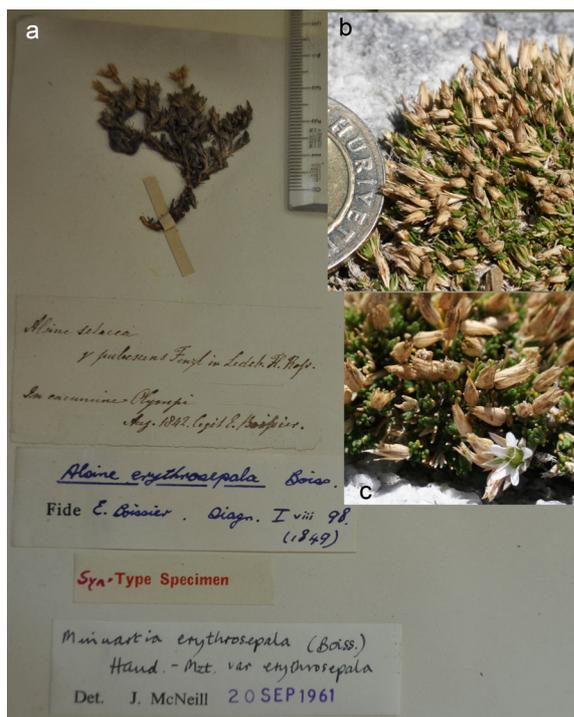


Figure 4. a: Syntype of *Minuartia erythrosepala* (Boiss.) Hand.-Mazz. var. *erythrosepala* sensu McNeill in Fl. Turkey 2: 61, b: habit of *Minuartia setacea*, c: flower and capsule of *Minuartia setacea* (b-c from A.A.Dönmez 11551).

the numerous herbarium specimens from various herbaria (such as E, G and W) has revealed that *Minuartia erythrosepala* is not a species just confined to Turkey while *Minuartia setacea* is not confined to Europe. These two species have not been evaluated together in respect of taxonomy, except Boissier (1875) [12] under *Alsine* generic name. One of the original collections of Boissier has been accepted syntype of *Minuartia erythrosepala* (Boiss.) Hand.-Mazz. var. *erythrosepala* by McNeill (1967). Beside this, the specimen is identified as *Alsine setacea* γ *pubescens* Fenzl by Boissier. This type specimen which is collected by Boissier is identical to our Kazdağı collection (A.A.Dönmez 11551) (Figures 4, 5). The protolog of *Alsine setacea* and taxonomic circumscription are accepted under the name of *Minuartia setacea* in various floristic publications [8,9,12,13]. The necessity of the further studies, including taxonomy and nomenclature for clarification, on *Minuartia erythrosepala* and *Minuartia setacea* is not arguable. The description of *Minuartia setacea* given Flora Hellenica [8] and Flora Europaea [9,11] will involve the materials collected by Boissier and ourselves. Furthermore, usage

of the name *Minuartia setacea* by Boissier also supports this view and the specimens collected from Turkey (A.A.Dönmez 11551 & J.Milton (Figure 5); Tmolus supra Bozdagh, 07 1842, Boissier; Uludağ; Bursa (08. 1842, Boissier) will be identified as *Minuartia setacea* (Figures 4, 5).

Minuartia setacea is compared with other closely related species which are *Minuartia nifensis* McNeill and *Minuartia leucocephala* (Boiss.) Mattf. to clarify its identification. And some of their specimens are also mentioned below.

Selected specimens examined:

Minuartia setacea (Thull.) Hayek

A2 Bursa: in cacumine Olympi, 08. 1842, Boissier (E!-syntype). Balkesir: Edremit, Zeytinlik, Kazdağı, around Sarıkız district, limestone, steppe, 39°42'403"K, 026°51'396"D, 1706 m, 05. 07. 2003, A.A.Dönmez 11551 & J.Milton (Figure 4); Sarıkız, limestone, 1700 m, 05. 07. 2004. İzmir: Kemalpaşa, Nif Mt., 25.07. 1997, Ö.Seçmen 4907 (EGE!).

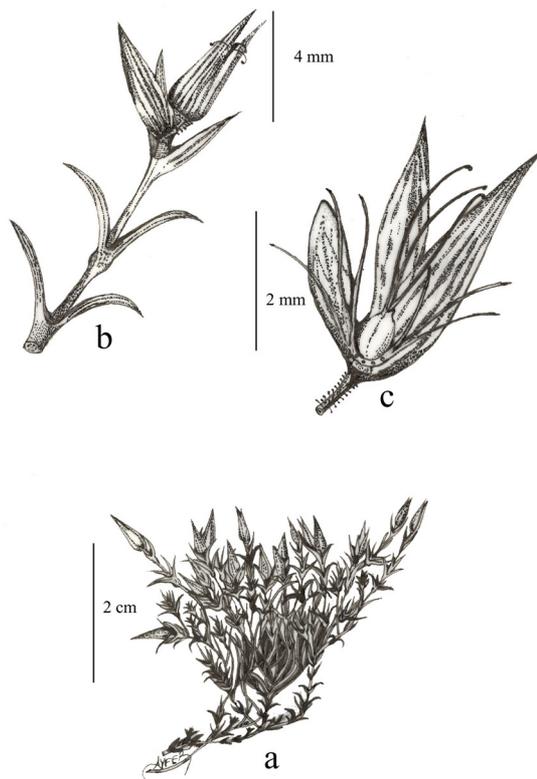


Figure 5. *Minuartia setacea* (from A.A.Dönmez 11551). a: habit, b: inflorescence with exserted styles, c: dissected flower.

M. erythrosepala (Boiss.) Hand.-Mazz. var. *erythrosepala*.

A2 Bursa: Ulu Da., 2500 m, 13.09.1947, *P.H.Davis* 14831 (E!) & *P.H.Davis* 14853 (E!) (clearly different from *P.H.Davis* 14853). A4 Zonguldak: Keltepe, 1950 m, 03.08.1962, *P.H.Davis* & Coode 38953 (E!). A5 Kastamonu: Tosya, Büyük Ilgaz Dag, 2710 m, *Sint.* 1892: 4789 (E!). A7 Gümüşane: Karağöldağ, *Sint.* 1894: 7301 (E!). A8 Erzurum: Erzurum to Ispir, 2180 m, *Hub.-Mor* 15196 (G!). B2 İzmir: Tmolus supra Bozdagh, 07. 1842, *Boissier* (G!). B2 Kütahya: Gediz to Kütahya, 1030 m, *Hub.-Mor.* 12617 (G!). B5 Kayseri: Ercias Da., *Bal.* 1060 (E!). B6 Yozgat: Akdağmadeni, 06. 06.1965, *Coode & Jones* 2047 (E!). B7 Erzincan: Keşiş Da. above Cimin, 27. 07. 1957, 2900 m, *P.H.Davis* 31624 (E!). B9 Van: d. Başkale, Ispiriz Da., 3500 m, *P.H.Davis* 23757 (E!). B9 Van: Artos dağ. N. slopes above Gevaş, 3000 m, 02. 09. 1956, *McNeill* 772 (E!) (type of *M. erythrosepala* var. *anatolica*). C1 İzmir: Ödemiş, mt. Bozdağ, 1900 m, 16. 08. 1950, *P.H.Davis* 18210 (E!). C2 Antalya: Elmali, *Bourgeau* 31 (E!). C3 Antalya: Tahtali Da. Kemer, 16. 08. 1947, 2200-2300 m, *P.H.Davis* 14122 (E!). C3 Isparta: Sütçüler, above Dedegöl mt, 02. 08. 1249, *P.H.Davis* 15974 (E!) & 16050 (E!). C4 Antalya: Geyik Da., 2500 m, *P.H.Davis* 14573 (E!). C5 Mersin: Cilician Tarsus, Exp. 1934, *E.K.Balls* 1278 (E!). C6 Niğde: Bulgharmaden, 18. 07. 1855, *Bal.* (E!). C6 Maraş: Berit Da., *Hauskn.* (E!).

Minuartia nifensis McNeill

İzmir: Kemalpaşa, Nif Dağı, open rocky and gravelly places on top of Nif Dağ, 30. 05. 1966;



Figure 6. *Moehringia grisebachii* (A.A.Dönmez 8758).

R.Alava 4908, *G.Bocquet*, *C.von Regel*; 18. 06. 1968, *A.Pamukçoğlu sn.*(HUB!).

Minuartia leucocephala (Boiss.) Mattf.

Konya: Akşehir, Sultan Dağ, 2080 m, *Hub-Mor* 8049 (G!). Konya: Beyşehir, Kurucaova, 2000-2500 m, *H.Peşmen* 2276-A. *Güner* (HUB!). Denizli: cadmus supra Co lossam, 06. 1842, *Boissier.* Antalya: Ak Dağ, *Bourgeu* 32. Antalya: Alanya, above Sapadere village, Koçdavut Pass, 36°33'165"N 032°19'685"E, 1261 m, 14.6.2006, *A.A.Dönmez* 13634 *et al.* (HUB!). Antalya: Gazipaşa, Macar village- 2000-2100 m, 13. 07. 1982, *H. Sümbül* 1273 (HUB!). İçel: Mut, Kızıldağ, 17. 06. 1970, *A. Pamukçoğlu sn.* (HUB!). Adana: Karaisalı, Karsanti, 23. 06. 1970, *A. Pamukçoğlu sn.* (HUB!).

Moehringia grisebachii Janka, *Österr. Bot. Zeitschr.* 23: 194 (1873). Figure 6.

Type: Unknown

Caespitose perennial, stem 5-13 cm, glaucous, profusely branched, densely pubescent. Leaves (6-)9-33 × 0.5-0.8 (-2.3) mm, linear-lanceolate or oblong, sessile, slightly fleshy, pubescent acuminate or acute. Inflorescence a simple (3-)7 to 10-flowered cyme. Flowers 5-merous; sepals 1.8-2.5 mm, glabrous, obtuse with broad scarious margins; petals 2-2.5 mm, obtuse; Styles 3. Capsule 1.5 × 2.5 mm, subglobose, generally included within sepals. Seeds 0.9 mm, black, dull, tuberculate; straphiole papillate, small (Figure 3c).

Damp, rocky areas; calcifuge. N.E. part of Balkan peninsula; E. former Romania. Bulgaria and Turkey.

Examined specimens: A1 Kırklareli: Kofçaz, 5 km from Elmacık to Kırklareli, rock crevices, 41°49'615"K, 27°11'217"D, 420 m, 09. 05. 2001, *AAD* 8758 (HUB); Kofçaz, 5 km from Elmacık to Kırklareli, rock crevices, 11. 08. 2010, *A.A.Dönmez* 15467-Z. *Uğurlu* (HUB). This species is known from Bulgaria and the former Romania [14]. The species is given as a new record for the Flora of Turkey [15, 9]. However, in the literature on the supplements of the Flora of Turkey [16,17] and the following checklists (mentioned above) the species is not mentioned.



Figure 7. *Petrorhagia wheeler-hainesii* (from A.A.Dönmez 12120).

Conservation status: The species naturally grows in NE Bulgaria (Şumen region) and the former Southeast Romania and it has been mentioned in the Red Data Book of Bulgaria [18]. According to the given data involving ecology, biogeography and conservation issues, it has not any specific threat in Bulgaria. Observation on the Turkish population also supports the Bulgarian view, and *Moehringia grisebachii* currently does not require conservation measurements. Hence, it is assigned to the LC category.

Petrorhagia wheeler-hainesii Rech. f., Bot. Jahrb. 107: 52 (1985). Figure 7.

Type: Iraq: Kapi Qaradagh, R. Wheeler-Haines (E!, K!)

Many stemmed suffruticose at base, short glandular puberulous. Stem erect, slender, compact branched at the below of the middle part, decumbent to erect; flowering branches 15-40 mm length, flowers usually solitary. Leaves fall after flowering, 10-30 × 1,5-2 mm below, more wide in the middle, base long, mucronate, change

to short-attenuate, flat, main nerve slender, distinct, not clustered, base enclose stem like membranous sheath; middle leaves reduced, lanceolate-filiform; upper leaves grows from the base of inflorescence, small scarious, ± degraded membranous. Bracts absent or minute, membranous. Calyx 8-10 × 2-3 mm at the flowering stage, tubular, narrow at base, slender, whitish membranous; 5-nerved, glandular puberulous, slender 3-nerved, teeth short, obtuse triangular, 1,5 mm length. Petals 13-15 mm in length, oblong to lanceolate, pale purplish nerved when dried, rotundate or subemarginate at apex. Capsule oblong.

Examined specimens: C9 Siirt: From Siirt to Eruh 5 km, right-left sides of the road, limestone, 18. 06. 2003, A.A.Dönmez 11176 & B. Mutlu (HUB). C9 Siirt: Eruh, above Gölgekonak village, *Quercus brantii* opening, limestone crevice, 37°45'079''K, 42°08'114''D, 930 m, 19. 06. 2005, A.A.Dönmez 12120 & I. Al-Shehbaz, M. Menke (HUB).

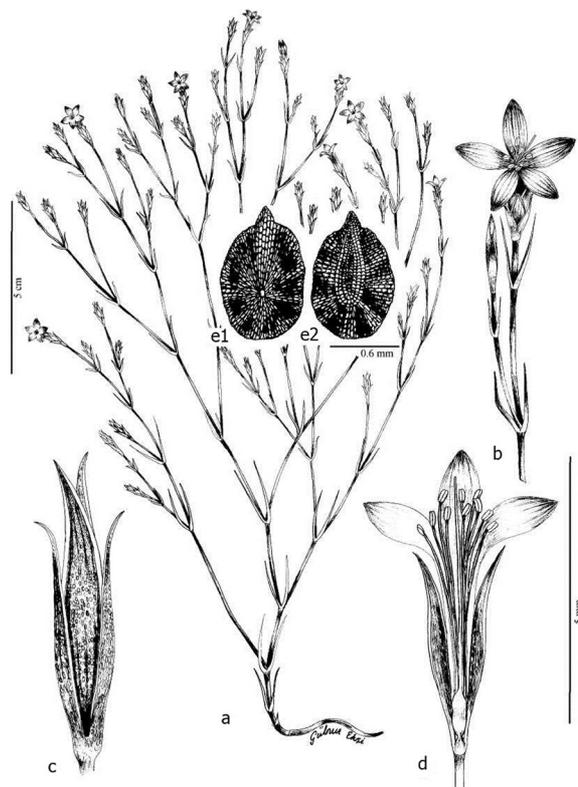


Figure 8. The Illustration of *Petrorhagia peronii* (from A.A.Dönmez 13912): a; habit, b; inflorescence, c; bracteoles, d; flower (partly dissected), e1; ventral view of the seed, e2; dorsal view of the seed.

The species is recently described from North Iraq [19], based on the materials of 3 different collections from the same country. The Turkish materials have been collected from two different localities in Siirt as seen in the map. The genus *Petrorhagia* has 9 species in Turkey, and the number is now 10 for the Turkish flora with addition of *P. wheeler-hainesii*.

Conservation status: The species has been known from at least five different localities of two countries. Distribution range of the species involves mountains, and human activities in the area do not damage the species. In consideration of extensive distribution area, growing in two different countries and absence of harmful human activities to the species, this poorly known species is assigned to the NT category.

Petrorhagia peroninii (Boiss.) Ball & Heywood in Bull. Brit. Mus. (Nat. Hist.) 3: 159 (1964). Figures. 8a-b-c-d-e1-e2.

Type: Turkey: C4 İçel, in montibus ad cacumen urbis Ananour Ciliciae, Trachaeae sitis, *Péronin* (BM, K!).

Annual herbs, 15-35(-60) cm. Stem branched from base, puberulent, soon glabrous. Leaves linear to narrowly lanceolate, lower 10-25 × 0.5-1.5 mm; shortening gradually above, ciliate and membranous at margins, 3 nerved; leaf sheaths shorter than stem diameter just below the node. Inflorescence freely branched, flowers solitary, rarely in pairs pedicels up to 7 mm. Bracteoles (2-)3(-4) pairs, densely verruculose, 3-nerved, membranous margins, aristate, equal or shorter than calyx. Calyx verruculose, 6-7 × 1.4-1.6 mm, subcylindrical, reddish-brown at upper half; tube nervose; teeth 1.5-2 × 0.4-0.6 mm, acute to acuminate, 3-nervose. Petal whitish pink, entire or eroded, barbate; limb 2-3 mm length, narrowly oblong; claw 4-4.5 mm length. Capsule, 3-4 × 1.3-1.7 mm, opened by 4 teeth. Styles 2, 2.5-3.5 mm. Stamens 4.5-5.5 mm. Seeds peltate with facial hilum, 1.2-1.5 × 0.5-0.75 mm, mucronate at apex, hilum orbicular to oblong, testa covered with papillae raised from stelliform plates, number of suture points per plate 9-14 on the middle of dorsal (Figures. 2d-e).

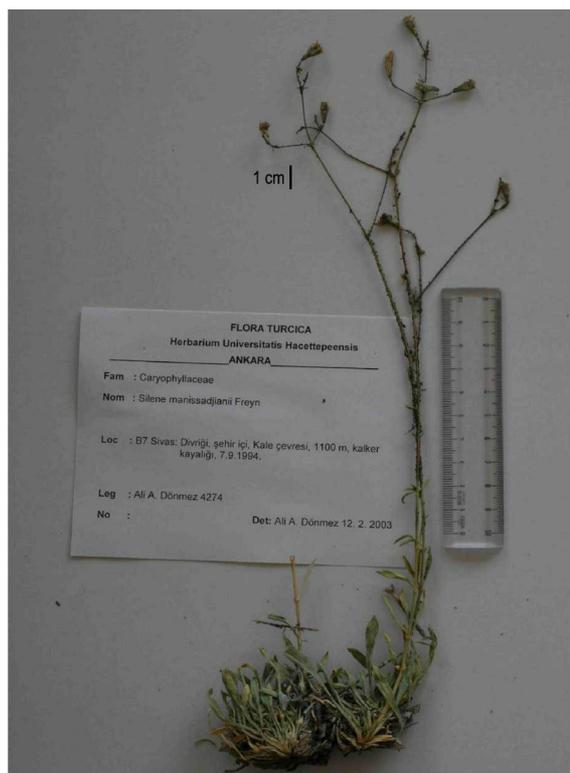


Figure 9. *Silene manissadjianii* (from A.A.Dönmez 4274).

Ecology and phenology: The specimens grow under *Pinus brutia* Ten. and in openings of deciduous scrub. Flowering: June to August.

Examined specimens: Antalya, Alanya, opposite Sapadere village, under *Pinus brutia* forest, 36°30'N 032°18'E, 300 m, 22. 07. 2006; A.A.Dönmez 13912 & B.Mutlu & T.Ağar (HUB); Demirtaş, Çamlıca village, Beslenği district, *Pinus brutia* opening, 36°27'684"N, 032°14'131"E, 99 m, 14. 06. 2006, AAD 13560 & B. Mutlu & T. Ağar (HUB) and A.A.Dönmez 13998 & B. Mutlu, T. Ağar (HUB); 3 km SE of Alanya, between Mahmutlar and Gözüküçüklü, dry open places, 27. 09. 1998, Z. Aytaç s.n (HUB). Gazipaşa, Sugözü village road, among *Erica* scrub, 36°17'N 032°19'E, 82 m, 17. 09. 2006, A.A.Dönmez 14181 & T.Ağar (HUB).

Conservation status: The specimens of the species were collected from three localities in the valley of Demirtaş and Gazipaşa (Antalya). Previous collections were made from Alanya and İçel, and all of them were mentioned in the *Petrorhagia* account of the Turkish Flora [20].

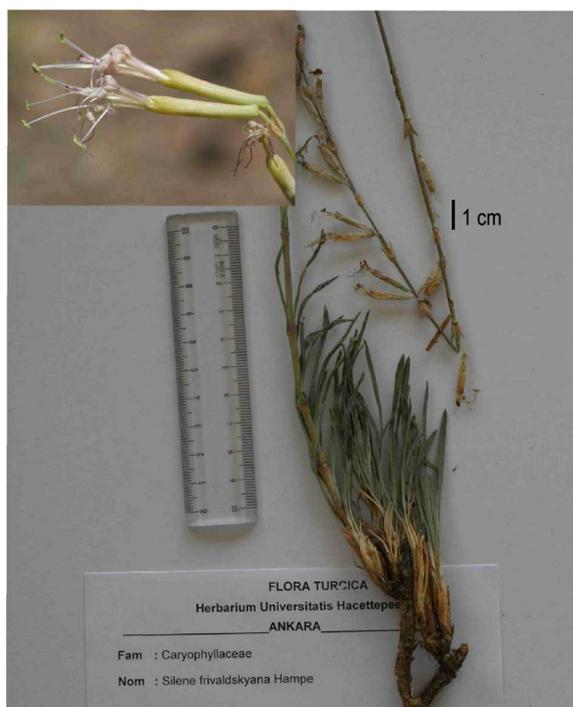


Figure 10. *Silene frivaldszkyana* (from A.A.Dönmez 7216); the flower (from A.A.Dönmez 14998).

The populations in each location are very dense and more than 20.000 individuals have been estimated for all locations. There is no special threat to all the populations, and we could not evaluate any of the IUCN threat categories [21]. Therefore, the species is assigned to the NT category. For

further discussion on ecology and phenology see to Aktaş et al. (2010) [22].

Silene manissadjianii Freyn, Bull. Herb. Boiss. 3:83 (1895). Figure 9.

Type: Turkey: Amasya (Pontus galaticus, Amasia), in pascuis montanis montis Ak Dagħ, 10. 09. 1892, *Manissadjian* 942 (iso. K!).

Perennial, 20-40 cm, mostly glabrous. Basal leaves oblanceolate to spatulate, stem leaves linear to lanceolate, glabrous except for minutely ciliate margins, glaucous and fleshy. Inflorescence paniculate with long lower branches, few flowered. Flowers nodding at anthesis. Calyx 10-11 mm, glabrous or scabrous on the nerves. Petals greenish, the limb bipartite to $4/5 \times$ of its length. Filaments glabrous. Anthophore 4-5 mm. Capsule ellipsoid.

Examined specimens: A5 Sivas: Divriği, around the Divriği Castle, c. 1100 m, limestone rocky, 07. 09. 1994, A.A.Dönmez 4274 (HUB).

Conservation status: *Silene manissadjianii* has been known only from the type specimen from Amasya [19]. The recent collection of the species (Figure 9) was from Divriği (Sivas) and identification of the specimen was confirmed by

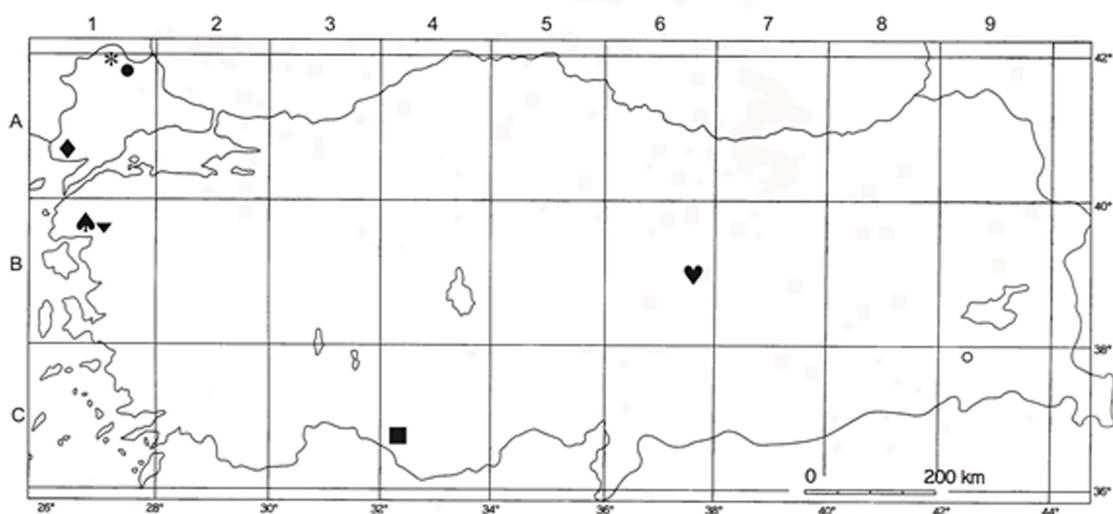


Figure 11. First or new collection sites in Turkey for the species given in this article: ◐: *Minuartia garckeana*, ◐*: *Minuartia bulgarica*, ▴: *Minuartia setacea*, *: *Moehringia grisebachii*, ◐: *Petrorhagia wheeler-hainesii*, ■: *Petrorhagia peronii*, ♥: *Silene manissadjianii*, ♦: *Silene frivaldszkyana*.

comparison with the type specimen in Kew. The species is evaluated as "EN" according to the IUCN 1994 [23]. *S. manissadjianii* is known only from two collections which are far away from each other. The recent collection was made from the Divriği Castle, near the city. During our several field trips to Divriği, we have noticed that there is no new locality for the species. Hence, threat category of the species is kept as EN according to the updated version of IUCN threat categories (IUCN 2001)[21].

Silene frivaldszkyana Hampe, Flora 20: 226 (1837). Figure 10.

Lectotype: [Bulgaria] "Rumelia", 1834, [Hinke & Manolesko in] *Frivaldsky* (K! [ex herb. Hooker]; iso- GOET ["Carlovo", comm. Meisner], K! [ex herb. Bentham]).

Glabrous and usually glaucous, laxly caespitose perennial herb with branched woody underground stock short erect vegetative shoots ending in tufts of leaves and few to several branched stems 50-100 cm; upper internodes viscid. Basal leaves linear to linear-lanceolate, acute; cauline leaves gradually shorter and narrower, bracts small, ovate-subulate, with stiffly ciliate, narrow membranous margins. Flowers, hermaphrodite, in dichasium, patent at anthesis, 8-12 pairs forming a narrowly racemes, inflorescence secund; pedicels 5-15 mm, bibracteolate at base (bracteoles concealed by bracts), erect and appressed to axis, straight in bud and fruit, sharply bent apically at anthesis. Calyx 12-14 mm, cylindrical at anthesis, fusiform-clavate in fruit, umblicate at base, irregularly 10-15 veined, veinless at anthesis; teeth irregular, acute, densely ciliate-villous apically, sinuses glabrous. Anthophore 3-4 mm, somewhat pubescent. Petal claw long-exserted, glabrous, not auriculate; coronal scales minute or absent; limb 5-7 mm, deeply bifid, with linear lobes, white to cream or pale pinkish. Stamens much exceeding petals, with glabrous, white to violet filaments; anthers greenish-yellow. Capsule 8-10 mm, narrowly ellipsoid, 3-4 times as long as anthophore. Seeds (immature) orbicular-reniform with flat or concave sides, furrowed back and prominently keeled shoulders; testa cells flat (Figures 3g-h).

2n = 24.

Examined specimens: A1 Edirne: Chaduma nr. Edirne, *Formanek*. A1 Edirne: Keşan, near Mecidiye Military Camp, beach, c.1m, 14. 07. 1999, AAD 7216 (Figure 10). Edirne: Enez, around Gülçavuş village, sandy areas among *Pinus pinaster*, 40°36'866"N 026°04'935"E, 25 m, 05. 08. 2008, A.A.Dönmez 14998 & B.Mutlu (HUB).

Type specimen of the species is given in "Turkey: *Frivaldsky*" in the Turkish Flora [19]. Beside this, lectotypification of the name with an orthographic correction shows that the type has been collected from Bulgaria [8].

The species is known from the former Albania, Bulgaria, Greece and Turkey. The population in Turkey (Figure 11) is abundant at seashore. The species has an extensive distribution in several countries, but the Turkish populations are under threat due to intensive tourism activities.

DISCUSSION

Caryophyllaceae is one of the largest families among the top ten families in respect of species number. It comprises 32 genera and 530 species in Turkey, with two endemic genera. Since the publication of the family in Turkish flora the taxon number has increased by description of the new taxa and new records for the flora. Taxonomic studies of the nine genera are still under revision by the Turkish taxonomists.

Thirteen new taxa of *Caryophyllaceae* are listed in the recent Check-List for the Flora of Turkey [6]. In addition of these taxa given this paper, species number of the family is 543. Also first or new collection sites are given in the paper (Figure 11). Beside this, the recent changes made by the international taxonomy community have not been implemented for the taxonomy of *Caryophyllaceae* or other families.

All the taxonomic publications show that it is still essential to conduct extensive field trips and taxonomic revisions in Turkey.

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