

## *Draba cemileae* (Brassicaceae), a new species from NE Anatolia, Turkey

Fergan Karaer

Faculty of Education, Department of Science, Ondokuz Mayıs University, 55139 Kurupelit/Samsun, Turkey (e-mail: fergankaraer@hotmail.com)

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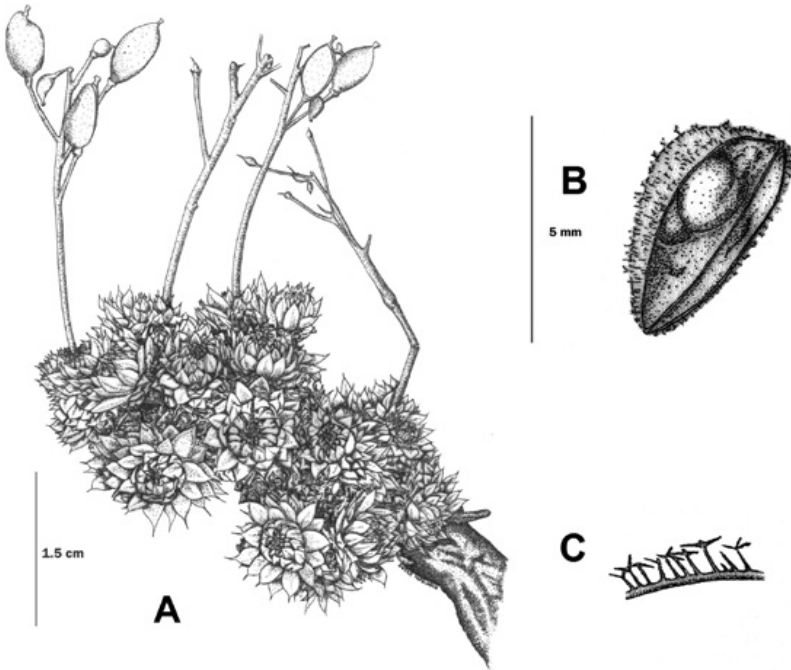
*Draba cemileae* Karaer *sp. nova* (Brassicaceae) is described and illustrated. It is confined to NE Anatolia in Turkey. The diagnostic morphological characters from closely similar species in the sect. *Chrysodraba* are discussed. Notes are also presented on its ecology and biogeography. The ultrastructure of the seed coat surface of *D. cemileae* and the similar species was examined by SEM.

The genus *Draba* (Brassicaceae) is a conspicuous element of the arctic, subarctic, alpine and subalpine floras, and well known for its taxonomic complexity. *Draba* consists of approximately 370 species, being the largest genus in the mustard family. *Draba* is distributed mainly in the Mediterranean and SW and central Asia (Rollins 1993, Al-Shehbaz *et al.* 2006). In Turkey, the first revision of *Draba* was carried out by Coode and Cullen (1965), who had recognised 16 species and five subspecies. After the revision, some new combinations were made and new taxa described (Leonard 1977, Butler 1986, Yıldırım 2000, Koch & Al-Shehbaz 2002, Al-Shehbaz & Koch 2003, Parolly *et al.* 2007, Al-Shehbaz *et al.* 2007, Duran *et al.* 2008, Karabacak & Behçet 2009).

*Draba cemileae* was first collected by E. K. Balls in May 1933 and then in July 1955 by A. Huber-Morath, but those specimens were originally identified as *D. polytricha* (herbaria G, K). However, Huber-Morath's specimens were regarded as being similar to *D. cappadocica* by Coode and Cullen (1965). They made an impor-

tant note under *D. cappadocica* about Huber-Morath's specimens: "Another specimen, Huber-Morath, 13759 from A7 Giresun: 9–11 km N of Şebinkarahisar, 1300–1330 m, is similar to *D. cappadocica* but has longer fruits, very acuminate at the apex; in this character it resembles *D. vesicaria* from W Syria. Unfortunately, the specimen is in very old fruit and its exact identification is impossible. It may represent a new taxon, and should be looked for again". Between 2002 and 2004, I and F. Celep collected *Draba* specimens from the same area. After extensive field, herbarium and literature studies, I concluded that the specimens should be described as a new species. The total number of *Draba* taxa in Turkey is now 25 species with seven subspecies.

During the field studies, living plants of the new species were examined in the field and observations on their ecology were made. The specimens were cross-checked with the keys provided by Coode and Cullen (1965) and the *Draba* accounts given in other literature including *Flora Iranica* (Hedge 1968), *Flora of the USSR* (Tolmachev 1970), *Flora Orientalis*



**Fig. 1.** *Draba cemileae* (from the holotype). — **A:** Habit. — **B:** Fruit and ovules. — **C:** Fruit hairs.

(Boissier 1867, 1888), *Flora Europaea* (Walters & Akeroyd 1993), *Flora Hellenica* (Tan & Stevanović 2002) and *Flora of Iraq* (Townsend 1980). The specimens were also cross-checked with the material housed at the herbaria ANK, E, G, GAZI, HUB, K and VAN (the herbarium acronyms are according to Holmgren *et al.* 1990). For recording gross morphology and size parameters (length and width) at least 15 specimens per species (*D. cemileae*, *D. cappadocica*, *D. acaulis* and *D. vesicaria*) were measured. The seed micromorphology of *D. cemileae* and the similar species was examined with SEM. At least 15 mature seeds per taxa were measured. The descriptive terminology of Brochmann (1992) and Stearn (2004) was followed.

***Draba cemileae* Karaer, sp. nova** (Figs. 1–4)

TYPE: Turkey. A7 Giresun: 6–12 km N of Şebinkarahisar, Şaplıca and Tamzara village (NE Anatolia) 1300–1500 m, 40°20'41"N, 38°26'27"E, volcanic rocky slopes, 24.VII.2003 *F. Karaer 10135* & *F. Celep* (holotype OMUB). — PARATYPES: Turkey. A7 Giresun: Schlucht des Aslanyurdu dereşi 11 km N of Şebinkarahisar, 1350 m, slopes, 1.VII.1955 *A. Huber-Morath 13759* (G!); A6 Sivas: between Zara and Suşehri, 1500 m, 16.V.1933 *Balls 252* (K!).

ETYMOLOGY: This species is named in honor of Cemile Karaer, Fergan Karaer's mother.

Herbs perennial, 2–6 cm tall; stems erect, much branched from base, forming rounded tufts; caudiculi leafy only near top; pubescent with stellate trichomes rarely mixed with simple ones. Basal leaves sessile, ovate to ovate-obclavate, 1.5–4.5 × 0.75–2.25 mm, simple (not soft), and stellate-hairy, stellate trichomes with 2–4-rayed, upper surface pubescent and hairs loss later, margins ciliate and with stellate hairs, apex acute. Racemes (4–)8–10(–12)-flowered, ebracteate, elongated in fruit, scapes (1.5–)2–5(–6) cm straight; fruiting pedicels 3–10 mm long, erect or curved rarely straight, with simple and branched hairs. Sepals oblong, 1.5–3 × 0.5–1.6 mm, base of lateral pair not saccate, margin membranous, adaxially with sparse stellate hairs, petals bright yellow (often drying white), spatulate, 3–5 × 1.5–2.5 mm, apex retuse, obscurely clawed at base; adaxially with sparse stellate hairs; filaments slender, 3–4 mm, without appendages, broadened toward base, ovules 20 to 27 per ovary. Siliculae (fruits) oblong-linear, ca. 1.5–2 × longer than broad, often erect, 2.5–3.3 × (4–)5–7 mm, very acuminate at apex,

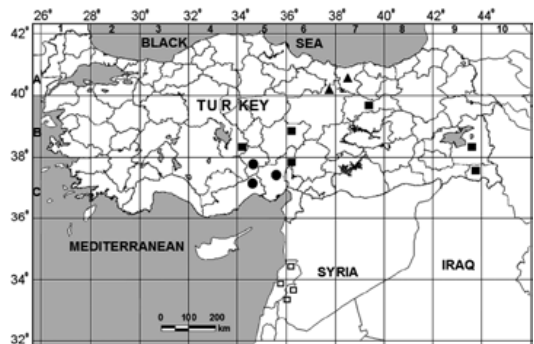


**Fig. 2.** Fruits and flowers of *Draba cemileae* in the natural habitat.

valves simple, forked and stellate-hairy, stellate trichomes 2–4-rayed, style 0.5–0.7 mm long; seeds brown, broadly elliptical,  $1.4\text{--}1.8 \times 0.5\text{--}0.76$  mm, seed coat ornamentation reticulate, reticulum wall  $10\ \mu\text{m}$  thick, almost smooth and lengthwise hexagonal, wart completely covered with lumen area, is slightly separated from reticulum wall. Flowering in May–June, fruiting in June–August.

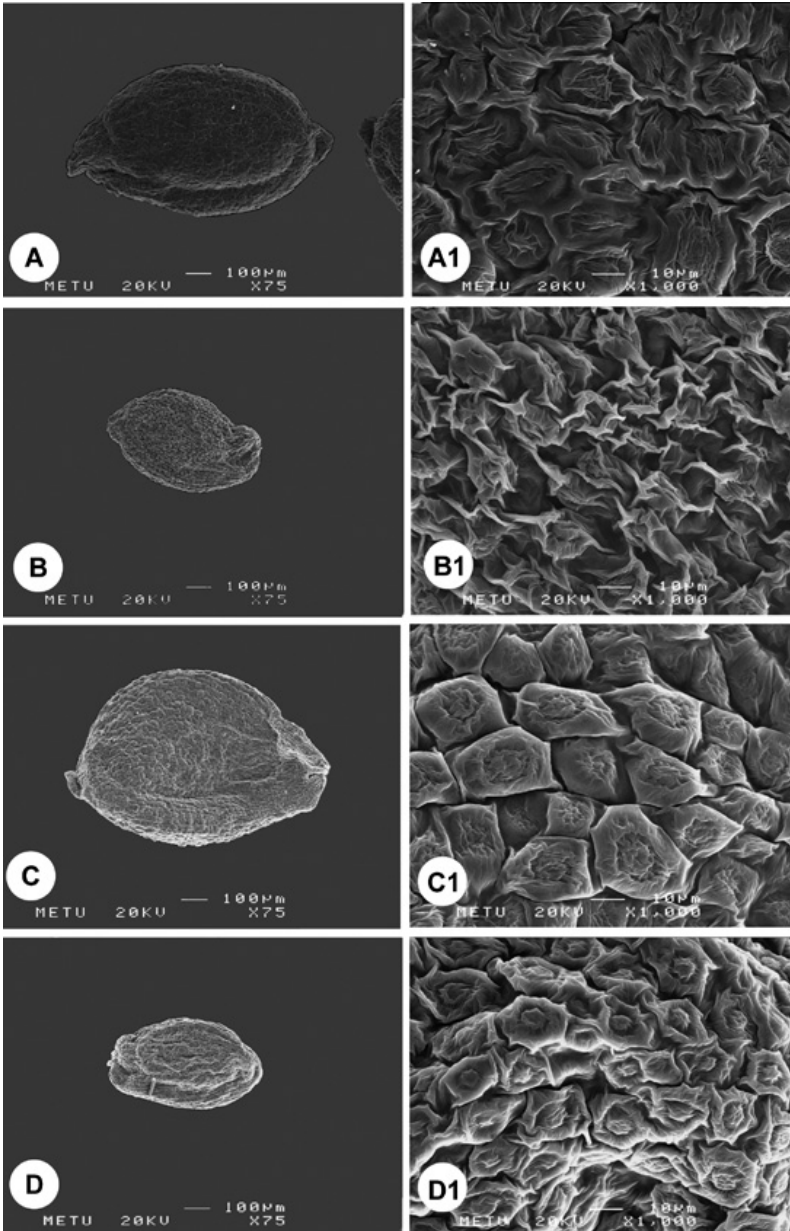
*Draba cemileae* is currently only known from two localities in the NE Şebinkarahisar (Giresun) and Sivas (an area known as Kelkit valley). It is an Irano-Turanian element. These two localities are separated by a distance of ca. 20 km and are represented by the same symbol in the distribution map (Fig. 3).

*Draba cemileae* grows at an altitude of 1300–1600 m on volcanic rocky slopes and in cracks, crevices, and ledges on near-vertical and horizontal cliffs of the SE and E parts of the Aslanyurdu valley in Şebinkarahisar (Giresun). *Draba cemileae* apparently favors environmentally harsh, sparsely degraded forests and steppe areas. The soil is likely well drained. Crevices can also serve as catchments for the available water (Fig. 2). Degraded forest vegetation is especially widespread in the upper part of the valley and includes species of the *Quercetea pubescentis* class, such as the shrubs *Crataegus microphylla*, *C. monogyna*, *Acer campestre*



**Fig. 3.** Distribution of *Draba cemileae* (▲), *D. cappadocica* (■), *D. acaulis* (●), and *D. vesicaria* (□).

subsp. *campestre*, *Juniperus oxycedrus* subsp. *oxycedrus*, *Quercus pubescens*, and *Sorbus torminalis* var. *torminalis*. Steppe vegetation is especially widespread in the lower parts of the valley and includes species of the *Astragalo-Brometea* class. *Draba cemileae* prefers sunny places on the open, dry and slightly inclined slopes, but it is also found in some volcanic hollows. It is a hemicryptophyte, the most important associated taxa of which are (taxa endemic to Turkey in boldface) *Erysimum thyrsoideum* subsp. **ponticum**, *Sedum obtusifolium*, *S. hispanicum* var. *hispanicum*, *S. album*, *Rosularia sempervivum* subsp. *pestalozzae*, ***Sempervivum gillianae* subsp. *brevipilum***, *Thesium billardieri*, *T. divar-*



**Fig. 4.** SEM micrographs of seed morphology of *Draba cemileae* and the morphologically similar taxa. — **A:** *D. cemileae* seed, general appearance, **A1:** Seed surface. — **B:** *D. cappadocica* seed, general appearance, **B1:** Seed surface. — **C:** *D. acaule* seed, general appearance, **C1:** Seed surface. — **D:** *D. vesicaria* seed, general appearance, **D1:** Seed surface. Scale bars: **A–D:** 100 μm, **A1–D1:** 10 μm.

*icatum*, *Arenaria acutisepala*, *Morina persica*, *Linaria corifolia*, *Verbascum cherianthifolium* var. *asperulum*, *Muscari armeniacum*, *Euphorbia cordiophylla* and *Scutellaria salviifolia*.

*Draba cemileae* is similar to *D. vesicaria*, *D. cappadocica* and *D. acaulis*, but differs from them in several characters (see Table 1 and Fig. 4). The two last-mentioned taxa are endemic in Turkey.

*Draba cemileae* and the three morphologically similar species can be identified using the following key:

1. Ovary with 40–60 ovules ..... *D. vesicaria* (W Syria, Lebanon)
1. Ovary with (12–)16–30(–32) ovules ..... 2
2. Fruit about 2–3× longer than broad, elliptical; leaves persisting over whole length of caudiculi, scape up to 1 cm ..... *D. acaulis*

**Table 1.** Comparison of *Draba cemileae* with the three morphologically similar species.

Character	<i>D. cemileae</i>	<i>D. cappadocica</i>	<i>D. acaulis</i>	<i>D. vesicaria</i>
Leaf shape	ovate, ovate to obclavate	linear to linear obovate	lanceolate to linear obovate	oblong lanceolate acutish
Leaf length (mm)	1.5–4.5 × 0.75–2.25	3–5 × 1.5– 2.5	3–6 × 1.5–3	3–4(–6) × 1.5–2(–3)
Leaf indumentum	simple, not soft, forked stellate-hairy, hairs fugacious	simple, soft, forked stellate-hairy, hairs not fugacious	simple, soft, forked hairy, hairs not fugacious	simple, lanate, forked hairy, hairs not fugacious
Caudiculi	leafy only near top	leafy only near top	leafy throughout	leafy, densely imbricate
Scape length (cm)	(1.5–)3–4(–6)	up to 2	up to 1	3–5
Flower number	(4–)8–10(–12)	2–5	2–5	6–8
Fruit (mm)	1.5–2× longer than broad, acuminate at apex, oblong-linear	as long as broad, ovoid	2–3 × longer than broad, elliptical	3–4 × longer than broad, acuminate at apex, ovate, ventricose
Number of ovules	20–27	16–24	20–32	40–60
Seed (mm)	1.4–1.8 × 0.5–0.76	0.6–0.8 × 0.33–0.45	1.2–1.6 × 0.6–0.8	0.5–0.6 × 0.3–0.4
Seed color	brown	light brown	greenish brown	dark brown
Reticulum shape	hexagonal–polygonal	obscurely reticulate–verrucate	pentagonal–hexagonal	pentagonal–hexagonal
Reticulum wall	thin	obscure	thick	thick
Distribution	A6, A7 (NE Anatolia)	B5–B7, B9, C6 (central and E Anatolia)	C5, C6 (S Anatolia)	N, E and SE Lebanon, W and S Syria

2. Fruit about 1–2× longer than broad, ovoid or oblong-linear, leaves only persisting in upper part of the caudiculi, scape (1.5–)2–4(–6) cm ..... 3
3. Fruit 1.5–2× longer than broad, with a very acuminate apex, oblong-linear; leaves linear to linear-oblong, seed broadly elliptic, brown, reticulum shape hexagonal .....  
..... *D. cemileae*
3. Fruit about as long as broad, apex not very acuminate, ovoid; leaves linear to linear- obovate, seed narrowly elliptic, light brown, reticulum shape pentagonal .....  
..... *D. cappadocica*

ADDITIONAL SPECIMENS EXAMINED: — *Draba vesicaria*. **Syria.** Top of Mount Hermon, 2742 m, *Lowne 1863-4* (E); Mount Hermon, 2742 m, *Guipssi 52* (K), and 2860 m, *Bornmüller 81* (E); Mount Bin ansaw, 2132 m, *Davis 6152a* (E); above Hermon to Qormet Quehara, 2437–2860 m, *Davis 10177* (K). **Lebanon.** Ras Dahr el Khadib jugi Djebel Makmel, 2900 m, *Samuelsson 6073* (K); Mount Lebanon, 2000 m, *Albury, Cheese & Watson 960* (K). — *Draba cappadocica*. **Turkey.** B5 Niğde: Hasan Dağ, 2700–2900 m, *Davis 18955, Dodds & Çetik* (E, K); B6 Kayseri: Argea montis, 2300–2600 m, *Bornmüller 1632, 1633* (K); B7 Erzincan: Keşiş Dağı, 2800–2900 m, *Davis 31803 & Hedge* (E); B9 Van: Başkale, Ispiriz Dağ, 3400 m, *Davis 23685 & Polunin* (E, K); C6 Niğde: Cimbar boğazı, 3199 m, *Scott & Maryosch 128* (K); C9 Hakkari, Sat Dağ, 2742 m, *Rix 108* (K). — *Draba acaulis*. **Turkey.** C5 Niğde: Aladağ, 3000–3450 m, *Parry 200* (E); C5 Niğde: Aladağ, 3595 m, *Wood & Gibson 79* (E). C5 Niğde/İçel: Bolkar Dağları, 3000–3500 m, *Görk, Hartvig & Strid 24051* (E); C5 Adana (Seyhan): Karaisalı

Bulgar Dağ, 1750 m, *Davis 16546* (E, K); C5 İçel: Dümbelek pass, 2500 m, *Siehe 102* (E); C5 İçel: Bolkar Dağları, 3700 m, *Peat et al. 163-9-76* (E); C5 Adana: İter Cilician in Tauri alpes, 2500–3046 m, *Kotschy 124* (K).

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