

## *Onopordum hasankeyfense* (Asteraceae), a new species from south-eastern Turkey

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**Abstract:** *Onopordum hasankeyfense* Pinar & Behçet (Asteraceae: Cardueae) from south-eastern Anatolia, Turkey, is described. This species grows on the rocky slopes beneath the Hasankeyf castle in the Hasankeyf District (C8, Batman province). Morphologically, the new species is related to *Onopordum anatolicum* (Boiss.) Boiss. & Heldr. ex Eig, a species endemic to central and western Anatolia, and *O. acanthium* L. This new species differs from the others in its indumentum, capitulum shape, phyllary colour and shape, unequal corolla lobes, and pappus. The ecology and phenology of the new species, as well as its etymology and diagnostic features, are presented and discussed. Images of the new species are provided and compared with *O. anatolicum* and *O. acanthium*. In addition, the pollen characteristics and achene features of the species were examined using both light and scanning electron microscopy. The conservation status of *O. hasankeyfense* was assessed according to IUCN criteria. A distribution map of *O. hasankeyfense* and related species is also presented.

**Key words:** Compositae, palynology, conservation status assessment, taxonomy

### 1. Introduction

*Onopordum* L. is distributed throughout West and Central Asia, Europe, North Africa, and the Canary Islands. This genus includes almost 60 taxa (Susanna & Garcia-Jacas, 2007). The first thorough analysis of the genus was conducted by de Candolle (1838). According to his system, the genus was divided based on the number and positioning of the capitula and the form of the phyllaries. Boissier's (1875) division of the genus was based on phyllary positioning, as well as the spination and pappus. The other comprehensive revision of *Onopordum* was done by Rouy (1896), whose study was based on characters such as the capitula, involucre, phyllaries, and pappus. Further taxonomic revision of *Onopordum* in Palestine, Syria, and adjacent countries was later made by Eig (1942). In this genus, size and structure of the pappus, phyllaries, and capitula are the most significant characteristics used for species distinction.

Danin (1975) provided the account for the *Flora of Turkey*, according to which the genus was represented by 17 species. Since then, 1 new taxon and 3 new records have been added (Davis et al., 1988; Tuzlacı, 2000; Özhatay et al., 2009). *Flora of Turkey* also included plants growing in the East Aegean Islands. Because *O. rhodense* is found outside of the country border of Turkey, this species was removed from the *Flora of Turkey* (Güner et al., 2012). Currently,

the genus *Onopordum* is represented by 19 species and 2 varieties, of which 6 taxa are endemic to Turkey.

Within the scope of the first author's PhD thesis, specimens were collected from different localities for a taxonomic revision of *Onopordum* in Turkey. Palynological characters of the species were also used to supplement the morphological findings. The overall purpose of our study was to describe a new species identified as belonging to the genus *Onopordum* according to the specified taxonomic research and parameters.

### 2. Materials and methods

During field trips in the 2010 and 2011 growing seasons, several interesting specimens, representing a new species of *Onopordum*, were found in the Hasankeyf District (Batman Province) (Figures 1 and 2). This species was then compared with the relevant literature (Eig, 1942; Tamamschyan, 1963; Danin, 1975; Amaral, 1976; Feinburn-Dothan, 1978; Rechinger, 1979). Further studies were conducted on specimens in the VANF, EGE, GAZI, HUB, ISTE, KNYA, AEF, and ANK herbaria. These collections were compared with the type images of *O. anatolicum* (Boiss.) Boiss. & Heldr. ex Eig and *O. acanthium* L., based on materials in E, K, and BM. Based on these comparisons, we concluded that the present specimens belong to a new species, which is similar to *O.*

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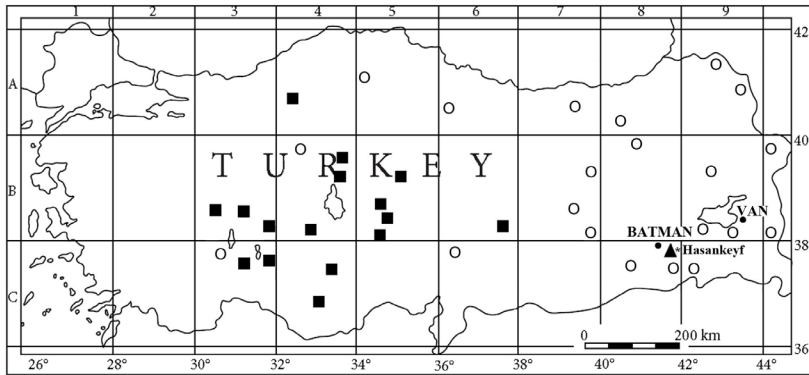


Figure 1. Distribution map of *Onopordum hasankeyfense* (▲), *O. anatolicum* (■), and *O. acanthium* (○).

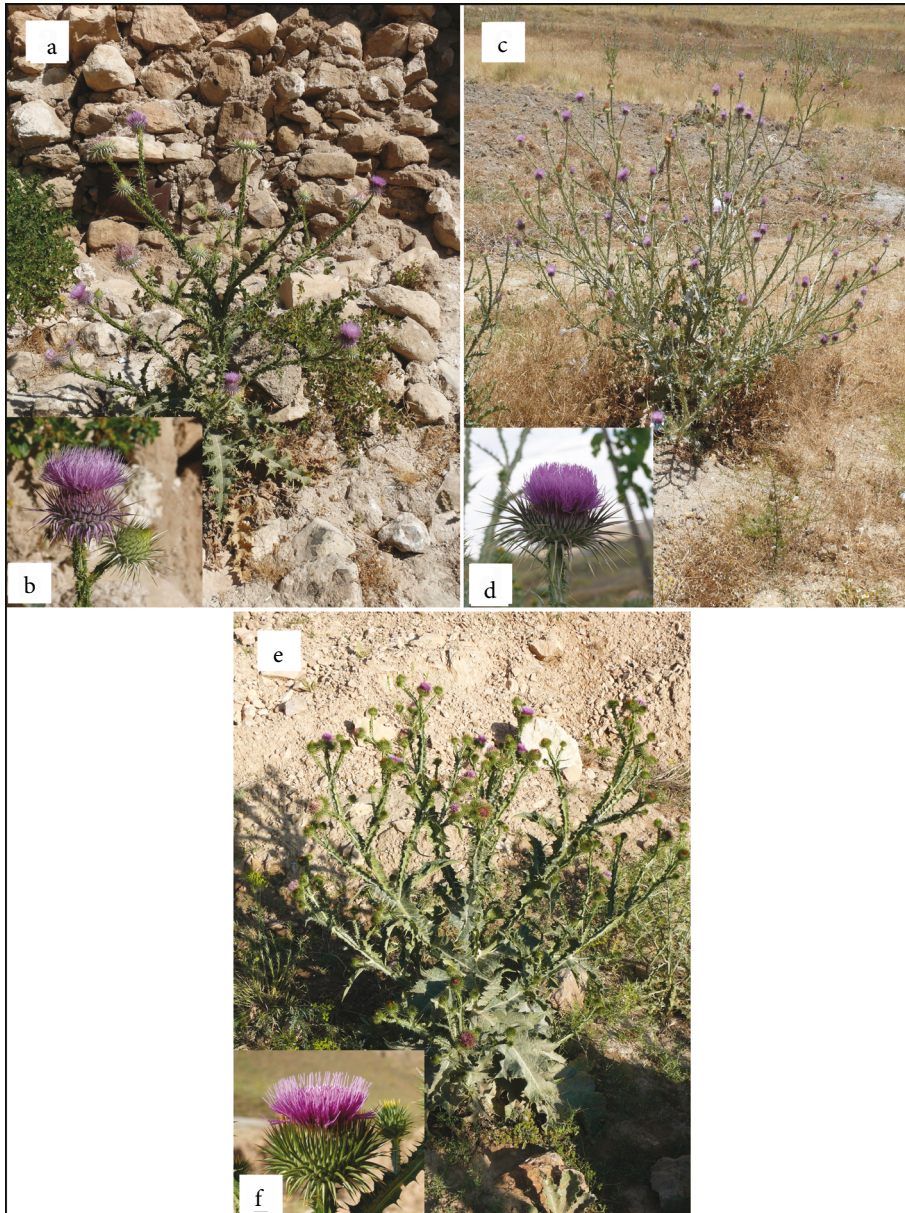


Figure 2. General habitus and capitula of *Onopordum hasankeyfense* (a, b), *O. anatolicum* (c, d), and *O. acanthium* (e, f) (photos by SM Pinar).

*anatolicum* and *O. acanthium*. Representative specimens of *O. anatolicum* and *O. acanthium* from other localities are cited in the Appendix.

Palynological investigations and achene studies were conducted using both a light microscope (LM) and a scanning electron microscope (SEM). For the LM studies, the pollen slides were prepared using the technique described by Wodehouse (1935). The material used to prepare the slides was glycerine jelly mixed with 1% safranin. The prepared slides were viewed under an Olympus CX31 LM using oil immersion. The measurements were based on 30 readings from each specimen. The descriptive terminology established by Erdtman (1969), Faegri and Iversen (1975), and Punt et al. (2007) was employed.

For the achene studies, morphometric data from cleaned and mature achenes were obtained using a stereomicroscope with a micrometre. The achene length and width were measured at the widest point. The terminology used here follows that of Koul et al. (2000), Tantawy et al. (2004), and Hacıoğlu et al. (2012). For the SEM investigations, the achenes and pollen were transferred to aluminium stubs, coated with gold in a sputter-coater, and examined under an LEO 440 SEM. The averages and standard deviations of the measurements were calculated.

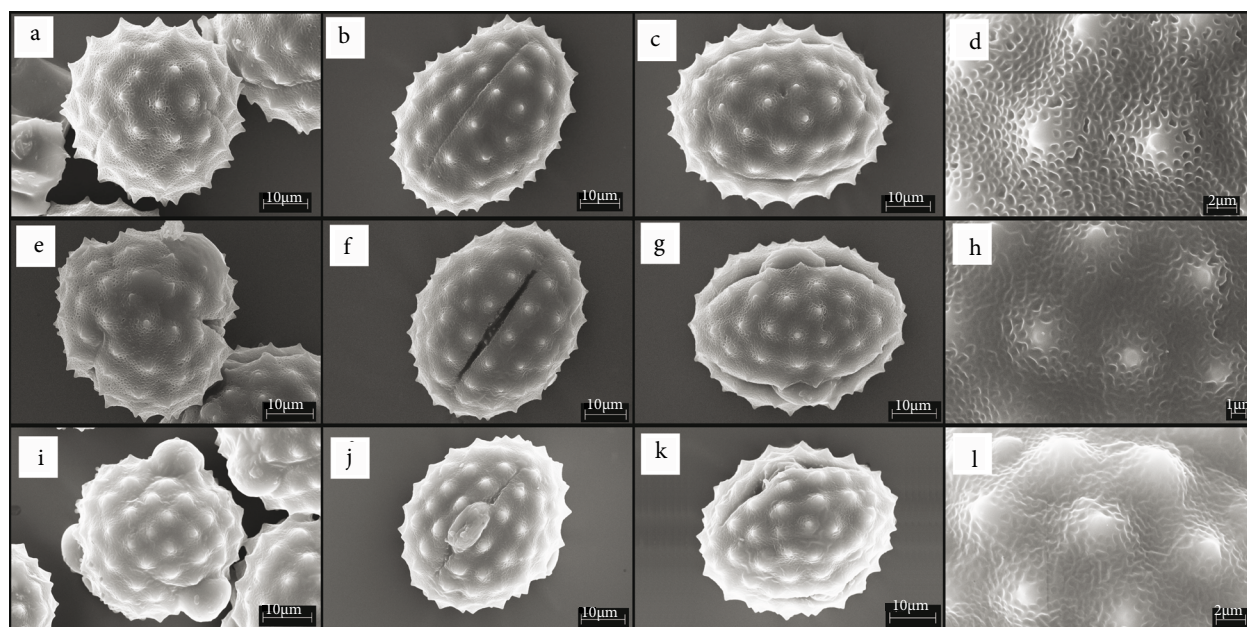
### 3. Results

*Onopordum hasankeyfense* Pinar & Behçet sp. nov. (Figures 1–5).

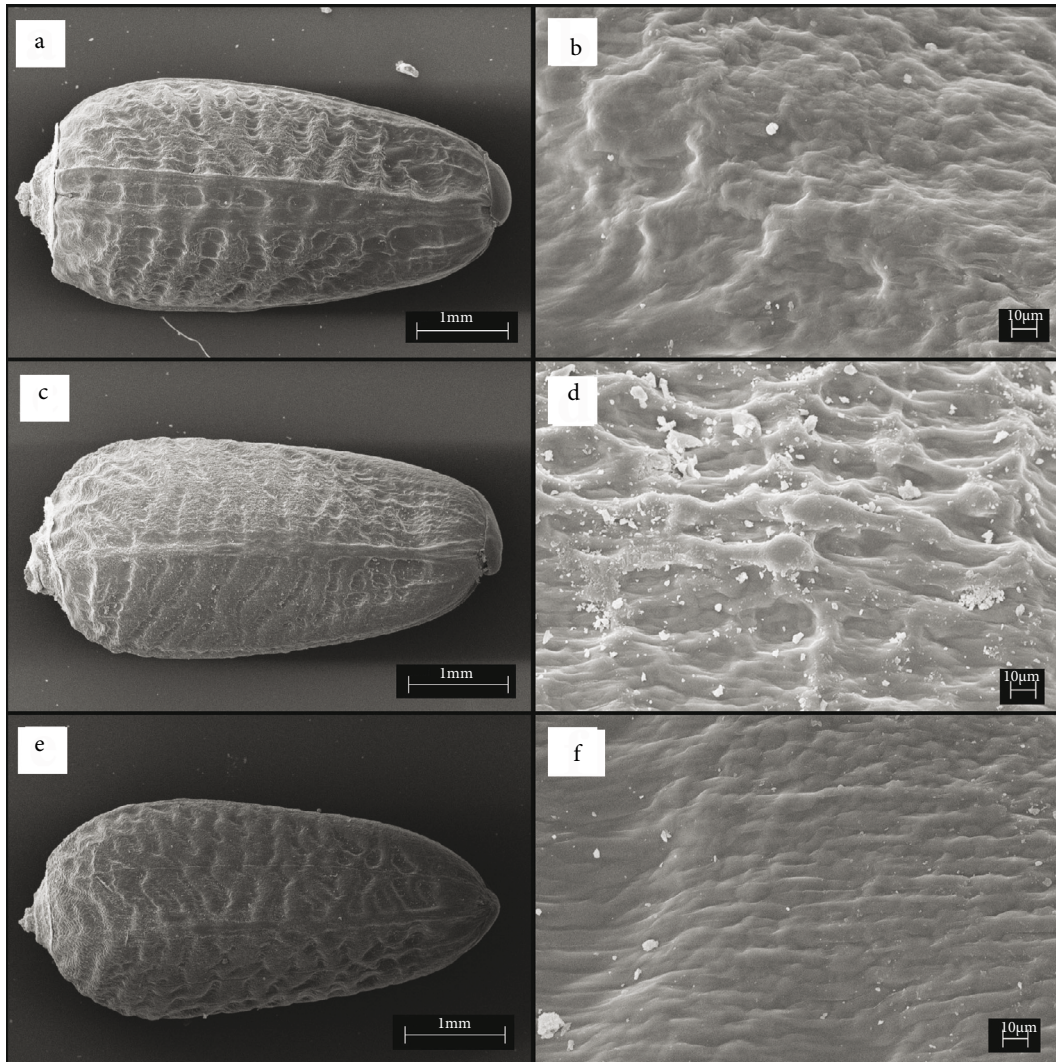
**Type:** Turkey. C8 Batman: Hasankeyf castle, 510 m, rocky slopes, 30.vi.2011, 37°42'443"N, 41°24'396"E, *M. Pinar* 3109 (holotype: VANE, isotypes: GAZI, ANK, Bingöl Univ. Herb.).

**Diagnosis:** *Onopordum hasankeyfense* is related to *O. anatolicum*. It mainly differs from *O. anatolicum* in its sparsely arachnoid hairy and dense sessile glands (not densely arachnoid hairy and eglandular), corolla lobes eglandular (not glandular), corolla lobes unequal length; 1st and 4th corolla lobes equal, 9–10 mm; 2nd and 3rd corolla lobes equal, 7–8 mm; 5th corolla lobe longer, 10–11 mm (not 4 corolla lobes equal, 7–8 mm; 5th lobe longer, 9–10 mm), pappus barbellate (not plumose).

**Description:** Biennial, up to 120 cm tall, 2–2.5 cm diameter at base, sparsely arachnoid with hairy and dense sessile glands, greenish-yellow or green. Stem mostly branched from base, leafy and winged throughout, 4–6 wings, sinuate and spinose, 2–27 mm wide (including spines), spines 1–17 mm. Basal leaves large, broadly elliptical-lanceolate, pinnatipartite, 30–50 × 10–18 cm (including spines), spines 3–10 mm, median stem leaves elliptical-oblong, 15–20 × 5–15 cm (including spines), spines 2–10 mm, upper stem leaves narrowly lanceolate, 2–8 × 1–3 cm (including spines), spines 1–5 mm, spines straw-coloured, leaves smaller closer to capitula; upper surface of leaves more sparsely arachnoid-pubescent than lower surface, both surfaces densely covered in sessile glands. Capitula discoid and homogamous, solitary on leafy peduncles 2–15 cm long; involucre globose, 2.5–3 × 5–9 cm (including spines), involucre 2.5–4.5 cm diam. excluding spines, base concave; phyllaries 6–8 seriate, imbricate, purple-coloured in flower, outer and median phyllaries sparsely arachnoid-pubescent, sessile glandular, scabrid, inner phyllaries glabrous, scabrid, outer phyllaries linear-lanceolate, recurved, 16–20 × 3–4 mm (including



**Figure 3.** SEM photos of the pollen grains. *Onopordum hasankeyfense*: a- polar view, b and c- equatorial view, d- ornamentation. *O. anatolicum*: e- polar view, f and g- equatorial view, h- ornamentation. *O. acanthium*: i- polar view, j and k- equatorial view, l- ornamentation.



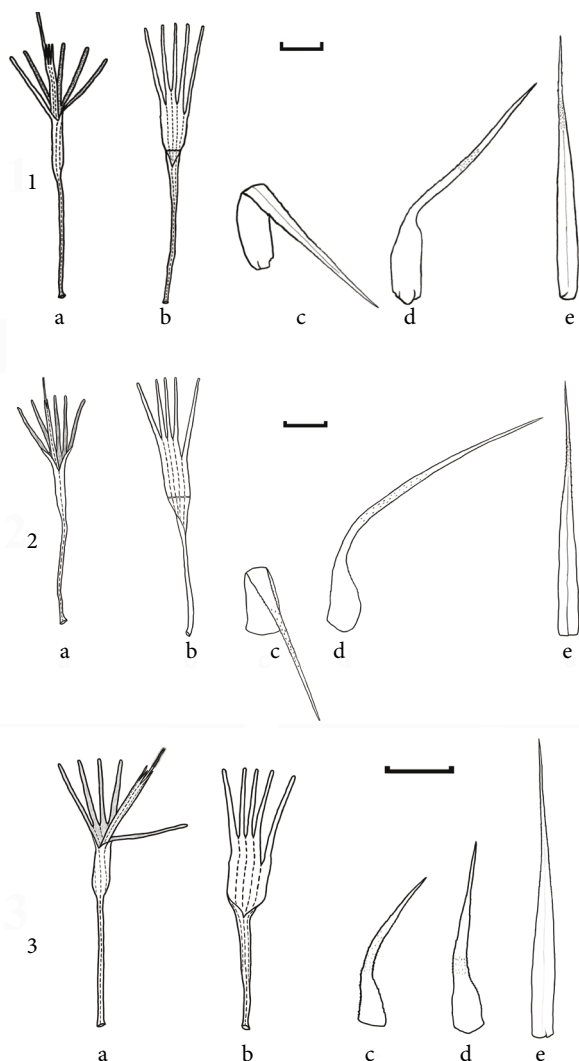
**Figure 4.** SEM photos of the achenes. *Onopordum hasankeyfense*: a- general view, b- surface. *O. anatolicum*: c- general view, d- surface. *O. acanthium*: e- general view, f- surface.

spines), spines 10–15 mm, median phyllaries lanceolate, reflexed, 20–35 × 3–5 mm (including spines), spines 15–25 mm, inner phyllaries linear, erect, 20–35 × 2–3 mm (including spines), spines 5–10 mm; receptacle deeply pitted, pits tetragonal, 2–3 mm deep, margins lacerate. Florets hermaphroditic, corollas pinkish-lilac, 25–30 mm long, 5 lobes, linear, eglandular, 1st and 4th corolla lobes equal, 9–10 mm; 2nd and 3rd corolla lobes equal, 7–8 mm; 5th corolla lobe longer, 10–11 mm. Achenes are greyish, obovate, 5.0–5.6 × 2.4–2.7 mm, ornamentation is deeply transverse rugose, surface finely and irregularly undulate; pappus setae of 2 lengths, thick hairs up to 15 mm long and thin hairs, 8–15 mm long, barbellate, cream-coloured (lateral projections 1–2× as long as rachis width). Pollen grains are trizonocolporate, oblate-spheroidal (P/E: 0.96), echinate, and the ornamentation is microreticulate.

**Distribution and ecology:** *Onopordum hasankeyfense* grows on rocky slopes in south-eastern Turkey, at elevations between 500 and 600 m. This species is found in areas also containing *Parietaria judaica* L., *Eruca sativa* Mill., *Nepeta italica* L., *Centaurea hyalolepis* Boiss., and *Centaurea solstitialis* L. subsp. *solstitialis*.

**Phenology:** Flowering occurs from May to July.

**Conservation status:** *Onopordum hasankeyfense* is classified as ‘Critically Endangered’, CR(A3c; B2a; C2a(ii)), based on the IUCN criteria (IUCN, 2011). In the next few years, the new species growing in this field will be inundated by the Ilisu dam (criterion A3c). This species is known to inhabit 1 locality (criterion B2a), with an estimated area of occupancy of less than 10 km<sup>2</sup> [criterion B2ab(i)]. The population is under threat, with less than 100 individuals remaining [criterion C2a(ii)].



**Figure 5.** Shapes of corollas and phyllaries. *Onopordum hasankeyfense* (1), *O. anatolicum* (2), *O. acanthium* (3). a- corolla, b- corolla opened out, c- outer phyllary, d- median phyllary, e- inner phyllary. Scale bar: 5 mm.

**Etymology:** The specific epithet is derived from the name of the Hasankeyf District in Batman, where this species was collected.

**3.1. Key to *Onopordum hasankeyfense* and related taxa**

1. Phyllaries gradually attenuate, linear-subulate, 3–30 mm, 2–3 mm broad at base, 1–6 mm spine
  2. Involucre globose; outer and median phyllaries reflexed to patent, inner erect, indumentum sparsely to densely arachnoid.....*O. acanthium*
  2. Involucre ovoid; outer phyllaries patent to ±reflexed, median and inner phyllaries erect, indumentum sparsely arachnoid or glabrous and with dense sessile glands.....*O. sirsangense*

1. Phyllaries linear-lanceolate or ovate-lanceolate, 16–40 mm, 2–5 mm broad at base, abruptly tapering to a rigid up to 30 mm spine
  3. Indumentum sparsely arachnoid and with dense sessile glands; 5 corolla lobes unequal, 1st and 4th corolla lobes equal, 2nd and 3rd corolla lobes equal, 5th corolla lobe longer, pappus barbellate.....*O. hasankeyfense*
  3. Indumentum densely or sparsely arachnoid, eglandular; 4 corolla lobes equal, 5th corolla lobe longer, pappus plumose, scabrous or barbellate
    4. Pappus hairs shortly plumose, with lateral projections 2-4× as long as rachis width; phyllaries with basal parts compactly imbricate, glabrous to very sparsely arachnoid.....*O. anatolicum*
    4. Pappus hairs scabrous or barbellate, with lateral projections as long as or shorter than rachis width; phyllaries loosely imbricate, densely arachnoid .....*O. sibthorpiatum*

**4. Discussion**

The area is one of the important floristic regions in Turkey in terms of endemic plants. Recently, some new endemic species have been described, such as *Cicer uludereensis* Dönmez (Dönmez, 2011), *Allium shirnakiense* L.Behçet & Rüstemoğlu (Behçet & Rüstemoğlu, 2012), *Asperula anatolica* M.Ozturk (Öztürk, 2013), *Dianthus vanensis* Behçet & İlçim (İlçim et al., 2013), and some new records, namely *Lathyrus atropatanus* (Grossh.) Şirj. (Güneş & Çırpıcı, 2012), *Allium giganteum* Regel, *Grammosciadium scabridum* Boiss., and *Ferula angulata* Boiss. subsp. *carduchorum* (Boiss. & Hausskn) D.F.Chamb. (Behçet et al., 2012), were reported from this region.

*Onopordum hasankeyfense*, which is very similar to *O. anatolicum*, is distributed in the Hasankeyf District (C8, Batman) of south-east Anatolia but is only found in the type locality. This species differs from the Turkish endemic *O. anatolicum* in terms of many distinctive characters, such as the indumentum, capitulum shape, phyllary colour, phyllary shape and size, unequal corolla lobes, pappus, achenes size and surface, and pollen grains. In addition, the new taxon grows on rocky slopes at an altitude of 500–600 m, whereas *O. anatolicum* grows on steppe, though rarely on saline steppe, and in fallow fields, at altitudes between 100–1400 m. *O. hasankeyfense* also differs from *O. acanthium* in its indumentum, involucre size, phyllary colour, phyllary shape and size, phyllary spine length, corolla length and lobes, achenes size and surface, and pollen grains. Comparisons of morphological, palynological, and achene properties of the related taxa of *O. hasankeyfense*, *O. anatolicum*, and *O. acanthium* are shown below (Tables 1–3; Figures 2–5).

**Table 1.** Comparisons of the pollen characters of *Onopordum hasankeyfense*, *O. anatolicum*, and *O. acanthium*.

Characters	<i>Onopordum hasankeyfense</i>	<i>Onopordum anatolicum</i>	<i>Onopordum acanthium</i>
	Min–Max (mean ± SD)	Min–Max (mean ± SD)	Min–Max (mean ± SD)
Polar diameter (P) (µm)	50.15–52.57 (51.89 ± 0.75)	49.66–52.15 (51.01 ± 0.76)	43.99–46.35 (45.02 ± 0.68)
Equatorial diameter (E) (µm)	51.85–55.24 (53.98 ± 0.56)	51.66–54.96 (53.03 ± 0.72)	45.29–47.96 (46.46 ± 0.80)
P/E ratio	0.94–0.98 (0.96 ± 0.01)	0.94–0.98 (0.96 ± 0.01)	0.95–0.99 (0.97 ± 0.01)
Exine thickness (µm)	8.45–9.15 (8.87 ± 0.23)	8.25–8.63 (8.43 ± 0.12)	5.76–6.99 (6.48 ± 0.21)
Colpus length (Clg) (µm)	30.75–33.56 (32.85 ± 0.50)	29.86–32.05 (30.87 ± 0.66)	27.32–29.10 (27.94 ± 0.48)
Colpus width (Clw) (µm)	17.95–19.12 (18.85 ± 0.45)	16.78–18.56 (17.80 ± 0.46)	15.02–16.34 (15.68 ± 0.33)
Spine length (µm)	1.97–2.43 (2.23 ± 0.08)	1.79–2.24 (1.96 ± 0.10)	1.78–2.10 (1.93 ± 0.08)

Abbreviations: Max: maximum, Min: minimum, SD: standard deviation.

**Table 2.** Comparisons of the achene characters of *Onopordum hasankeyfense*, *O. anatolicum*, and *O. acanthium*.

Characters	<i>Onopordum hasankeyfense</i>	<i>Onopordum anatolicum</i>	<i>Onopordum acanthium</i>
	Min–Max (mean ± SD)	Min–Max (mean ± SD)	Min–Max (mean ± SD)
Length (mm)	5.0–5.6 (5.50 ± 0.12)	4.8–5.7 (5.16 ± 0.24)	5.0–5.6 (5.27 ± 0.18)
Width (mm)	2.4–2.7 (2.50 ± 0.08)	2.0–3.0 (2.48 ± 0.20)	2.5–3.0 (2.86 ± 0.16)
Shape	obovate	oblong-obovate	obovate
Surface ornamentation	deeply transverse rugose	transversely rugose	transversely rugose
Colour	greyish	greyish brown	greyish brown

Abbreviations: Max: maximum, Min: minimum, SD: standard deviation.

As a result of this study, with the addition of the new species described here, the number of species in the *Onopordum* genus is increased to 20 (total: 21 taxa), while the number of endemic taxa is increased to 7 in Turkey.

## Appendix

**Additional examined specimens.** – *Onopordum anatolicum*: Lectotype: [Turkey C3 Konya] *Pisidia* ad Beycher (Beyşehir), 1845, *Heldreich* 1237 (isolectotypes: BM photo!, K photo!); A4 Bolu: 15 km from Gerede to Kızılcahamam, 1350 m, 05.viii.1984, *Ö. Seçmen* 35, *Y. Gemici*, *H. Tabat-Yasuda* (EGE); B3 Konya: Konya-Afyon, around Argıthani, edge of field, 1090 m, 25.vii.2009, 38°17'790"N, 31°40'740"E, *M. Pınar* 2864 (VANF); B3 Afyon: Karakuyu, *Davis* 13225 (E photo!); Afyon-Uşak, Balmahmut, edge of field, 1080 m, 25.vii.2009, 38°47'840"N, 30°21'784"E, *M. Pınar* 2888 (VANF); B4 Konya: Cihanbeyli, 15 km S. of Cihanbeyli, Kırkkışla, saline steppe, 955 m, 21.vii.2001, 38°29'735"N, 32°50'516"E, *M. Pınar* 3227 (VANF); B4 Ankara: Şereflikoçhisar, north of Tuz Gölü, saline steppe,

## Acknowledgments

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910 m, 21.vii.2011, 39°07'649"N, 33°20'696"E, *M. Pınar* 3250 (VANF); B4 Kırıkkale: Keskin, Böbrek Dağı, İğdebeli district, 630 m, 19.vii.1972, *Ü. Güler* 1953 (GAZI); B5 Kayseri: Sultan Sazlığı, Sinderhöyük, Kayseri-Develi, 1671 m, roadside, 25.vi.1994, *M. Öztekin* 1536 (HUB); B5 Niğde: Acıgöl-Nevşehir, Karacaören, roadside, 1300 m, 25.vii.2011, 38°33'158"N, 34°34'432"E, *M. Pınar* 3315 (VANF); B5 Nevşehir: Nevşehir-Acı Göl, 1400 m, potato field, 30.viii.1957, *Davis* 32784, *Hedge* (ANK); Ürgüp, Üçhisar, edge of field, 1350 m, 25.vii.2011, 38°36'443"N, 34°47'568"E, *M. Pınar* 3339 (VANF); B6 Kahramanmaraş: Elbistan-Malatya, 10 km from Elbistan, Söğütlü, roadside, 1200 m, 24.viii.2011, 38°13'341"N, 37°18'484"E, *M. Pınar* 3524 (VANF); C3 Konya: Beyşehir, Eylikler village, slopes,

**Table 3.** Comparisons of the diagnostic characters of *Onopordum hasankeyfense*, *O. anatolicum*, and *O. acanthium*.

Characters	<i>O. hasankeyfense</i>	<i>O. anatolicum</i>	<i>O. acanthium</i>
Indumentum	sparsely arachnoid hairy and dense sessile glands	sparsely or densely arachnoid hairy and glands absent	sparsely or densely arachnoid hairy and glands absent
Stem colour	green or greenish-yellow	green or whitish-green	green or whitish-green
Involucre			
Size (cm)	2.5–3 × 5–9 (excluding spines 3.5–4.5)	2–3.5 × 3–8 (excluding spines 2–3.5)	2–3 × 4–7 (excluding spines 2–5)
Shape	globose	flattened globose	globose
Phyllary colour	purple in flower	upper side purple in flower	green in flower
Outer phyllaries			
Size (mm)	16–20 × 3–4 (spines 10–15)	20–30 × 3–4 (spines 10–20)	12–17 × 3–4 (spines 3–6)
Shape	linear-lanceolate	narrowly ovate-lanceolate	linear-subulate
Indumentum	sparsely arachnoid hairy and sessile glands	sparsely arachnoid hairy	sparsely arachnoid hairy, scabrous
Median phyllaries			
Size (mm)	20–35 × 3–5 (spines 15–25)	30–40 × 3–5 (spines 15–30)	15–20 × 3–4 (spines 3–6)
Shape	lanceolate	narrowly ovate-lanceolate	linear-subulate
Indumentum	sparsely arachnoid hairy and glands	sparsely arachnoid hairy or glabrous	sparsely arachnoid hairy, scabrous
Inner phyllaries			
Size (mm)	20–35 × 2–3 (spines 5–10)	25–35 × 2–3 (spines 4–6)	25–30 × 2–3 (spines 2–4)
Shape	linear	linear-lanceolate	linear-lanceolate
Corolla			
Length (mm)	25–30	25–33	20–25 mm
Lobes	eglandular	glandular	glandular
Lobe lengths (Mm)	1st and 4th lobes equal; 9–10 2nd and 3rd lobes equal; 7–8 5th lobe long; 10–11	4 lobes equal; 7–8 5th lobe long; 9–10	4 lobes equal; 5–7 5th lobe long; 8–9
Pappus	barbellate	plumose	barbellate

1140 m, 22.vii.2011, 37°43'453"N, 31°46'069"E, *M.Pınar* 3260 (VANF); C3 Isparta: Eğridir, 5 km to Eğridir, slopes, 1000 m, 22.vii.2011, 37°51'131"N, 30°51'077"E, *M.Pınar* 3282 (VANF); C4 Karaman: Mut–Karaman, 15 km to Karaman, Tarlaören village, edge of field, 1240 m, 24.vii.2009, 37°05'849"N, 33°14'801"E, *M.Pınar* 2846 (VANF); C4 Konya: Karapınar, south-west slopes of Karacadağ, 1150 m, 10.vii.1981, *R.Çetik*, *M.Vural*, *H.Dural* 2601 (KNYA);– *Onopordum acanthium*: A5 Kastamonu: Zincirlikuyu-Tosya, around Yavuz Selim, edge of field, 660 m, 07.vii.2012, 41°00'397"N, 34°03'593"E, *M.Pınar* 3569 (VANF); A6 Amasya: Amasya-Tokat, Aydınca, edge of field, roadside, 730 m, 08.vii.2012, 40°34'157"N, 36°07'448"E, *M.Pınar* 3588 (VANF); A7 Gümüşhane: Torul, N of Torul, roadside, 985 m, 06.vii.2012, 40°33'559"N, 39°18'029"E, *M.Pınar* 3551 (VANF); A8 Bayburt: Çoruh valley, Darıca (Tanzut) village, 1720–1850 m, 26.vii.1991, *A.Güner* 9715, *T.Ekim*, *M.Koyuncu*, *H.Karaca* (GAZI, HUB);

A9 Ardahan: Posof, Doğrular–Özbaşı, around Yolağzı, 1700–2000 m, 30.x.1986, *N.Demirkuş* 3890 (HUB); A9 Kars: Arpaçay Karahan, roadside, 1700 m, 01.vii.1984, *H.Ocakverdi* 2364 (GAZI); B4 Ankara: Cihanbeyli-Ankara, 20 km from Ankara, around Gölbaşı, roadside, 1100 m, 21.vii.2011, 39°35'919"N, 32°50'882"E, *M.Pınar* 3247 (VANF); B7 Diyarbakır: Ergani, Ergani-Maden, 7 km from Ergani, rocky slopes, 1060 m, 10.vii.2012, 38°17'471"N, 39°43'335"E, *M.Pınar* 3601 (VANF); B7 Elazığ: Sivrice, edge of field, 1255 m, 10.vii.2012, 38°28'101"N, 39°17'217"E, *M.Pınar* 3606 (VANF); B7 Tunceli: Tunceli-Erzincan, Munzur valley, Pülümür-Selepür, steppe, 1700 m, 12.viii.2011, 39°32'787"N, 39°54'527"E, *M.Pınar* 3466 (VANF); B8 Erzurum: Erzurum-Bayburt, around of Aşkale, roadside, 1650 m, 13.viii.2011, 39°55'273"N, 40°42'313"E, *M.Pınar* 3488 (VANF); B9 Van: Gürpınar, Hamurkesen, steppe, 1980 m, 11.vii.2009, 38°20'557"N, 43°37'480"E, *M.Pınar* 2756 (VANF); B10 Iğdır: Doğubayazıt-Iğdır,

20 km before Iğdır, stony place, 1645 m, 12.vii.2011, 39°45'976"N, 44°08'567"E, *M.Pinar* 3154 (VANF); B10 Van: Başkale, Başkale-Hakkari, around Karasu village, 1820 m, 18.vii.2009, 37°48'481"N, 44°05'160"E, *M.Pinar* 2783 (VANF); C3 Isparta: Isparta, Campus of Süleyman Demirel University, around Arts and Sciences Faculty, 1050 m, 25.v.2011, 37°49'442"N, 30°31'463"E, *M.Pinar* 3016 (VANF); C6 Maraş: Göksun-Değirmentepe, between

Çamurlu and Yanıktepe, rocky slopes, 1600–1750 m, 20.viii.1993, *M.Ekici* 1722 (GAZI); C8 Mardin: Diyarbakır-Mardin, Mazıdağı, around Sultan village, steppe, 995 m, 11.vii.2012, 37°26'594"N, 40°37'531"E, *M.Pinar* 3611 (VANF); C8 Siirt: Siirt-Ziyaret, around Aktaş, roadside, 640 m, 11.vii.2012, 37°57'080"N, 41°48'514"E, *M.Pinar* 3620 (VANF); C9 Şırnak: Cizre, N. of Kocapınar village, steppe, 564 m, 19.v.2006, *A.Gencay* 244 (VANF).

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