

Aethionema anatolica (Brassicaceae), a new species from South Anatolia, Turkey

Osman Karabacak^{1,*}, Meryem Öztürk² & Ahmet Duran²

¹⁾ Gazi University, Polatlı Faculty of Science and Literature, Department of Biology, TR-06900 Ankara, Turkey (*corresponding author's e-mail: okarabacak35@hotmail.com)

²⁾ Selçuk University, Faculty of Science, Department of Biology, TR-42100 Konya, Turkey

Received 28 Jan. 2013, final version received 22 Mar. 2013, accepted 22 Mar. 2013

Karabacak, O., Öztürk, M. & Duran, A. 2013: *Aethionema anatolica* (Brassicaceae), a new species from South Anatolia, Turkey. — *Ann. Bot. Fennici* 50: 183–186.

Aethionema anatolica A. Duran & M. Öztürk *sp. nova* (Brassicaceae) is described and illustrated from South Anatolia, Turkey. It is similar especially to *A. demirizii*, but differs by the habit, crenate margin of the fruits, and the style that is around the same size as the sinus.

Brassicaceae are distributed across all continents except for Antarctica (Koch & Kiefer 2006). The family is monophyletic and contains about 321 genera and some 3660 species, and the number of species in *Aethionema* is ca. 45 (Al-Shehbaz 2012). Turkey is one diversity centres of the Brassicaceae. With its 571 species, Turkey is second only to the United States, where there are 653 native species in 61 genera (Al-Shehbaz *et al.* 2007, Çetin *et al.* 2012).

The genus *Aethionema* is centered in Turkey, with fewer species extending eastward into Turkmenistan and westward into Spain and Morocco (Al-Shehbaz *et al.* 2006, Al-Shehbaz 2012). *Aethionema* is taxonomically one of the most difficult Turkish genera in Brassicaceae, as both its flowering and fruiting are important for species identification and relatively few morphological characters are available (Hedge 1965). The Turkish flora comprises about 39 *Aethionema* species, of which 18 are endemic to the country (Hedge 1965, Davis *et al.* 1988, Adıgüzel 2000, Ertuğrul 2012).

Aethionema was revised by Hedge (1965), who by that time recognized 30 species in Turkey. More recently some new taxa have been added to the flora of the country, such as *A. alanya*, *A. dumanii*, *A. acarii*, and *A. karamanicum* (Adıgüzel 2000, Özhatay *et al.* 1999). With the species described in the present paper, a total of 40 *Aethionema* species are known from Turkey. This makes Anatolia an important center for the genus (Hedge 1965, Davis *et al.* 1988, Adıgüzel 2000, Ertuğrul 2012). For comparison, 22 species have been recorded for the former USSR (Bush 1970), 13 for Iran (Hedge 1968), nine for Iraq (Towsend 1980) and nine were recognized in *Flora Europaea* (Tutin *et al.* 1968).

Between 2008 and 2012, during field trips in central Anatolia (Konya Province), an unusual specimen of *Aethionema* was collected. A study of the descriptions in *Flora of Turkey and the Eastern Aegean Islands* (Hedge 1965, Davis *et al.* 1988, Adıgüzel 2000, Ertuğrul 2012), *Flora Iranica* (Hedge 1968), *Flora of Iraq* (Towsend 1980), *Flore du Liban et de la Syrie* (Bouloumoy

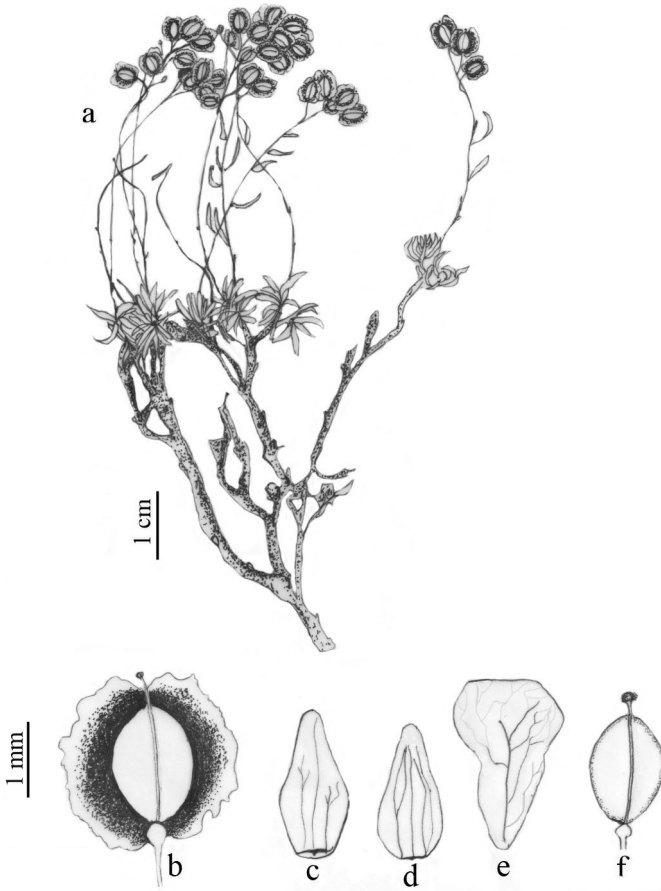


Fig. 1. *Aethionema anatolica* (from the holotype). — **a:** Habit. — **b:** Fruit. — **c:** Outer sepal. — **d:** Inner sepal. — **e:** Petal. — **f:** Pistil.

1930), *Flora of USSR* (Bush 1970), *Flora of Cyprus* (Meikle 1977), *Flora Europaea* (Tutin et al. 1968), Pavlova (2007), and Andersson et al. (1983), as well as a comparison with materials in E, B, W, GAZI, HUB, KNYA and ANK showed that the specimen represented a new taxon. In particular, it was compared with specimens of the closely similar taxa *A. demirizii* and *A. lycium*.

***Aethionema anatolica* A. Duran & M. Öztürk, sp. nova (Fig. 1).**

TYPE: Turkey. C5 Konya: Ereğli, Halkapınar, Kayasaray village, Düğünlük stream valley, 1660 m a.s.l., 22 June 2012, limestone cliffs, 37°22'056"N, 34°16'388"E, M. Özt. 1733, A. Duran & O. Karab. (holotype KNYA; isotypes GAZI, ANK).

Shrublet, many-stemmed, erect, glabrous, with remains of former branches, and thick

woody at base. Flowering stems not fragile, sparsely leafy, 6–9 cm tall with 1–4 sterile shoots at base. Basal and sterile shoots, opposite leaves, narrowly linear-oblongate, sessile, $3.5\text{--}7 \times 0.7\text{--}1.2$ mm. Cauline leaves linear to linear-oblongate, $5\text{--}8 \times 1\text{--}1.5$ mm, acute, subpetiolate or sessile, glabrous, alternate, lower cauline leaves attenuating towards base. Inflorescence (10–)15–20 flowered raceme, early anthesis condensed, scarcely elongating in fruit. Sepal 1.5–2 mm, acute, purplish. Petals purplish, 3–4 mm; blade 1.5–2 mm, claw 1.5–2 mm. Filaments straight, outer ones 0.2 mm, inner 0.5 mm; anthers yellow, 0.5 mm. Fruiting pedicel ± adpressed to flowering axis, erect, 3–4 mm. Fruit unilocular or bilocular. Silicle orbicular. $3.5\text{--}5 \times 3.5\text{--}5$ mm, ovules one or two, one-seeded, emarginate at base and apex, hyaline margin 1–1.5 mm wide, denticulate, septum $3\text{--}3.5 \times 0.5$ mm. Style 0.5 mm, generally ± same size of

Table 1. Diagnostic characters of *Aethionema anatolica* and *A. demirizii*.

Characters	<i>A. anatolica</i>	<i>A. demirizii</i>
Stem	6–9 cm tall, stout	8–13 cm tall, fragile
Cauline leaves	linear to linear-oblongate	narrowly spatulate
Inflorescence	raceme	obovate-oblong corymbose
Sepals	1.5–2 mm long	2.5–3 mm long
Pedice	adpressed to flowering axis, erect	ascending
Fruit	unilocular or bilocular, one or two ovules	unilocular, one ovule
Silicula	orbicular, 3.5–5 mm wide; emarginate, margin denticulate	suborbicular, 1.25–2.5 mm wide, subemarginate, margin entire
Style	as long as sinus	clearly exceeding sinus

sinus. Seeds elliptic, smooth, 1.5×1 mm, radicle incumbent. Flowering in June, fruiting in July.

DISTRIBUTION AND HABITAT: *Aethionema anatolica* is confined to the Aydos Mountains in Ereğli (Konya Province), representing Irano-Turanian element. It grows on limestone cliffs in rocky crevices with *Centaurea anthemifolia*, *Tanacetum argenteum* subsp. *flabellifolium*, *Silene conoidea*, *Anthemis tinctoria* var. *pallida*, *Scandix aucheri*, *Laserpitium petrophilum*, *Hesperis kotschyi*, *Helderichia rotundifolia*, *Ferula* sp., *Potentilla* sp., and *Ononis* sp.

In the delimitation of Brassicaceae taxa, fruit morphology and seed embryo type (position of the radicle in relation to the cotyledons) have been used at all taxonomic levels. However, particularly at the generic and tribal levels, floral, vegetative, and trichome characters have often been considered as far less significant. *Aethionema* has a wide variation in habit (annual herbs to shrubs), floral structure (with or without appendages) and color, fruit morphology, and heterocarpy (indehiscent one-seeded samaras or dehiscent, 1–8 seeded silicles on the same plant), and base chromosome numbers (Al-Shehbaz *et al.* 2006). There can be enormous variation among related groups or even within genera despite the conservative floral architecture of the family (Mummenhoff *et al.* 1997).

According to the key published in *Flora of Turkey* (Hedge 1965), the species described here is *A. eunomioides*. With further studies in *Flora of Turkey* supplement I (Davis *et al.* 1988) and supplement II (Adıgüzel 2000), four species, *A. lycium*, *A. munzurense*, *A. demirizii*, and *A. dumanii*, appeared morphologically close to the endemic *A. eunomioides*.

Aethionema anatolica is closely similar to *A. demirizii* but there are also clear differences (Table 1). From *A. lycium* *A. anatolica* mainly differs by its cauline leaves being subpetiolate or sessile, and linear to linear-oblongate (vs. shortly petiolate, obovate to elliptic), distinct petal claw (vs. indistinct), silicula wings with conspicuous cream to whitish tinged margin (vs. purple-tinged margin), and by the style that is $\pm$ of the same size as the sinus (vs. clearly exserted).

REPRESENTATIVE SPECIMENS EXAMINED: *Aethionema anatolica* (paratypes): **Turkey**. C5 Konya: Ereğli, Halkapınar, Kayasaray village, Düğünlük stream valley, 1650 m, 23 August 2008, limestone cliffs, *A. Duran* 8152 & *M. Öztürk*, Ö. Çetin (KNYA). — *Aethionema lycium*: **Turkey**. C2 Antalya (Lycia): Çalbalı Dag, Davis 15277 (isotype E! code E00164402, K! code K000075753); C2 Muğla: Lykische Ak Dağları, Jumru Dag oberhalb Bogazcık, *Peter Hein* A-42J-6 (as *A. eunomioides*, B photo! code B10 0157875). — *Aethionema demirizii*: **Turkey**. C5 İçel: Mersin, Findikpınarı, E. slopes, *H. Demiriz* 480 (holotype E! code E00199849); country not specified, West Asia, and Egypt, *Siehe* 280 (as *A. spicatum*, E! code E00061119).

Acknowledgments

The authors thank The Scientific Investigation Projects Coordinate Office of the Selçuk University (project no. 09101042) for the financial support.

References

- Adıgüzel, N. 2000: *Aethionema* R. Br. — In: Güner, A., Özhatay, N., Ekim, T. & Başer, K. H. C. (eds.), *Flora of Turkey and the East Aegean Islands*, Suppl. II, 11: 31–34. Edinburgh University Press, Edinburgh.

- Al-Shehbaz, I. A., Beilstein, M. A. & Kellogg, E. A. 2006: Systematics and phylogeny of the Brassicaceae (Cruciferae): an overview. — *Plant Systematics and Evolution* 259: 89–120.
- Al-Shehbaz, I. A., Mutlu, B. & Dönmez, A. A. 2007: The Brassicaceae (Cruciferae) of Turkey, updated. — *Turkish Journal of Botany* 31: 327–336.
- Al-Shehbaz, I. A. 2012: A generic and tribal synopsis of the Brassicaceae (Cruciferae). — *Taxon* 61: 931–954.
- Andersson, I. A., Carlström, A., Franzén, R., Karlen, T. & Nybom, H. 1983: A revision of the *Aethionema saxatile* complex (Brassicaceae). — *Willdenowia* 13: 3–42.
- Bouloumoy, S. J. 1930: *Flore du Liban et de la Syrie*. — Vigot Frères Editions, Paris.
- Bush, N. A. 1970: *Aethionema* R. Br. — In: Komarov, V. L. (ed.), *Flora of USSR*, vol. 8: 413–424. Israel Program for Scientific Translations, Jerusalem.
- Çetin, Ö., Duran, A., Martin, E. & Tuştaş, S. 2012: A taxonomic study of the genus *Fibigia* Medik. (Brassicaceae). — *African Journal of Biotechnology* 11: 109–119.
- Davis, P. H., Mill, R. R. & Tan, K. 1988: *Aethionema* R. Br. — In: Davis, P. H., Mill, R. R. & Tan, K. (eds.), *Flora of Turkey and the East Aegean Islands*, Suppl. I, 10: 35–39. Edinburgh University Press, Edinburgh.
- Ertuğrul, K. 2012: *Aethionema* Aiton. — In: Güner, A., Aslan S., Ekim, T., Vural, M. & Babaç, M. T. (eds.), *Türkiye Bitkileri Listesi (Damarlı Bitkiler)*: 246–248. Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını, İstanbul.
- Hedge, I. C. 1965: *Aethionema* R. Br. — In: Davis, P. H. (ed.), *Flora of Turkey and the East Aegean Islands*, vol. 1: 314–332. Edinburgh University Press, Edinburgh.
- Hedge, I. C. 1968: *Aethionema* R. Br. — In: Rechinger, K. H. (ed.), *Flora Iranica*, vol. 57: 102–110. Akademische Druck- und Verlagsanstalt, Graz.
- Koch, M. A. & Kiefer, C. 2006: Molecules and migration: biogeographical studies in Cruciferous Plants. — *Plant Systematics and Evolution* 259: 121–142.
- Meikle, R. D. 1977: *Flora of Cyprus*, vol. 1. — Royal Botanic Gardens, Kew.
- Mummenhoff, K., Franzke, A. & Koch, M. 1997: Molecular data reveal convergence in fruit characters used in classification of *Thlaspi* s.l. (Brassicaceae). — *Botanical Journal of the Linnean Society* 125: 183–199.
- Özhatay, N., Kültür, Ş. & Aksoy, N. 1999: Check-list of additional taxa to the supplement flora of Turkey II. — *Turkish Journal of Botany* 23: 151–170.
- Pavlova, D. 2007: A new species of *Aethionema* (Brassicaceae) from the Bulgarian flora. — *Botanical Journal of the Linnean Society* 155: 533–540.
- Townsend, C. C. 1980: *Aethionema* R. Br. — In: Townsend, C. C. (ed.), *Flora of Iraq*: 4: 915–922. Ministry of Agriculture, Baghdad.
- Tutin, T. G. 1968: *Aethionema* R. Br. — In: Tutin, T. G., Burges, N. A., Chater, A. O., Edmondson, J. R., Heywood, V. H., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb, D. A. (eds.), *Flora Europaea*, vol. 2: 388–390. Cambridge University Press, Cambridge.