

## *Anacyclus anatolicus* (Asteraceae), a new species from Turkey

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*Anacyclus anatolicus* L. Behçet & S. Almanar from the city of Muş, E Anatolia, Turkey, is described as a new species, illustrated and compared with its presumed closest relatives *A. nigellifolius*, *A. latealatus* and *A. clavatus*.

Key words: *Anacyclus*, Asteraceae, new species, taxonomy

Specimens of a species of *Anacyclus* were collected in 2001 in Malazgirt, city of Muş in E Anatolia. Initial attempts to name it using *Flora of Turkey* (Grierson 1975, Davis *et al.* 1988, Güner *et al.* 2000) and the monograph of the genus (Humphries 1979) were not successful and after studying herbarium specimens at Gazi University (GAZI), Ankara University (ANK), and Ege University (EGE), it was concluded that it is a species new to science. Its distribution is disjunct from the other three species of *Anacyclus* in Turkey (*A. nigellifolius* occurs in southern Anatolia, Hatay, C6 square and Urfa C7; *A. latealatus* is known only from type gathering, in western Anatolia, Burdur, C2; *A. clavatus* is distributed in western and southern Anatolia and European parts of Turkey). Likewise, there are no records of *Anacyclus* species from neighbouring areas of Iran (Podlech 1986) or from the territory of the former SU (Afanasev 1995). The worldwide distribution of this genus is in the Mediterranean phytogeographic region (Heywood 1978, Humphries

1979) and it is particularly well represented in the Maghreb countries (Humphries 1979).

***Anacyclus anatolicus* L. Behçet & S. Almanar, *sp. nova* (Figs. 1–3)**

*Species Anacyclus nigellifolio affinis, sed caulis 10–35 cm longis, ± adpressus-villoso (nec 10–20 cm, ± glabro); foliis 3–7 cm (nec 1.5–3 cm) longis; rhachi foliorum latus, tenuis et dilatatus ad basim (nec angustus et crassus); involucri phyllis 6–8 mm (nec 4.5–7 mm) longis; floribus marginalibus 10–14 (nec ca. 6), tubo et ovario villosus (nec glabro), ligulis 10–15 × 4–8 mm (nec 4.5–6 × 1–3 mm); floribus disci 5.5–7 mm (nec 3.5–4 mm) longis, tubo ciliato (nec glabro); acheniis heteromorpha (nec ± homomorpha); acheniis disci 4.8–5.3 mm (nec 4.2–4.8 mm) longis, exauriculatus (nec auriculatus); acheniis marginalibus 4 mm (nec 4.5 mm) longis, villosus, auriculatus (nec glabra, exauriculatus) differt.*



Fig. 1. Holotype of *Anacyclus anatolicus* (photo by İsmail Yıldız).

TYPE: Turkey. East Anatolia, B9 Muş, Malazgirt, E. slopes Aktuzla village, steppe, 1550 m, 12.06.2001 L. Behçet & S. Almanar 1437 (holotype VANF, isotype VANF).

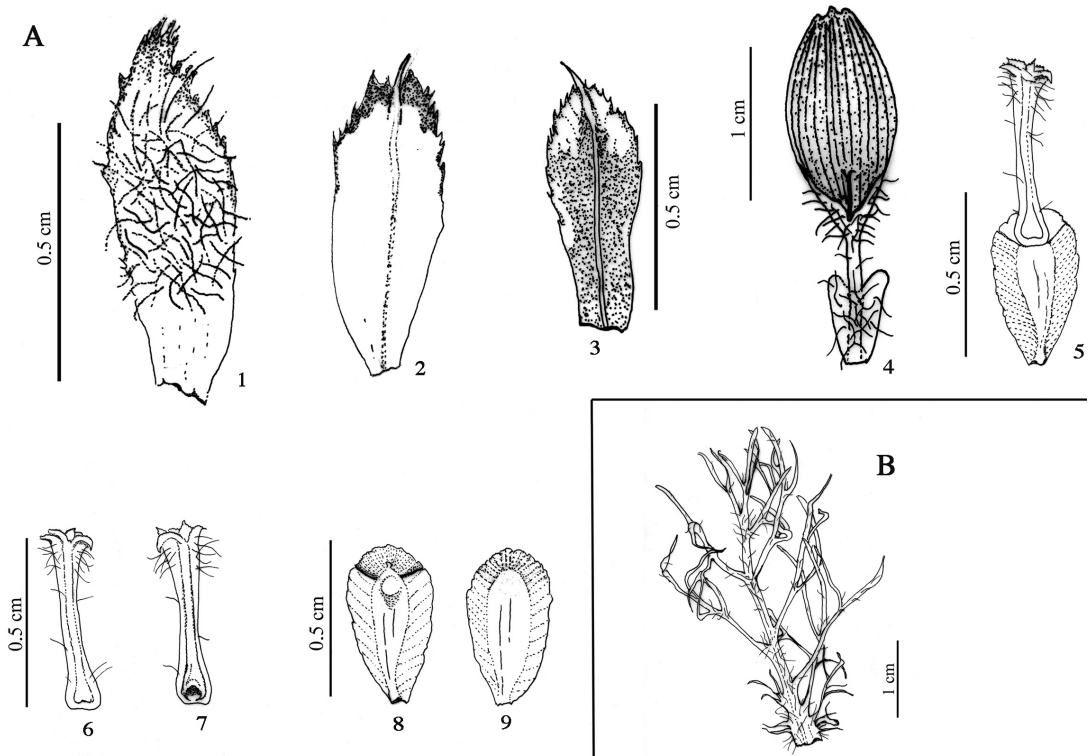
Annual herb. Stem 10–35 cm, erect, simple or branched from near base, striate-ridged, long  $\pm$  adpressed-villous. Leaves 3–7 cm, sessile, villous, rachis broadened at base, bipinnatisect, with 4–8 pairs of primary segments, lower segments usually simple, upper ones bi- to pentafid, ultimate segments linear, mucronulate,  $5\text{--}8 \times 0.3\text{--}0.6$  mm. Inflorescence a corymbose cyme or monocephalic, peduncles becoming thickened at maturity, densely villous. Capitula heterogamous, radiate, solitary at branch ends. Involucre 10–18 mm in diameter, turbinate-hemispherical; phyllaries 6–8 mm, 3-seriate, imbricate, obovate, ovate, lanceolate, acute, grey and densely villous on dorsal face, with brownish scarious denticulate margin. Palea obovate-cuneate, aristate (arista 1.2 mm long), with denticulate margin,

6–8  $\times$  ca. 2.5–3 mm. Ray flowers 10–14, white; ligules 10–15  $\times$  4–8 mm, 3 lobed at apex; tubes 3–4  $\times$  1–1.2 mm, densely villous. Disc flowers 5–7 mm (excluding achene), base broadened into circular appendage, scariously winged along tube, tube long-ciliate, 5-lobed at apex, lobes equal ca. 1 mm and densely papillose inside. Disc achenes 4.8–5.3  $\times$  2.8–3 mm, obovate, scariously winged, glabrous, unilaterally coronate; corona 1.1 mm, undulate. Ray achenes 4  $\times$  3–3.5 mm, obcuneate, broadly winged, extended above in broad triangular auricles, ecoronate, densely long-villous. Flowering and fruiting in June–July.

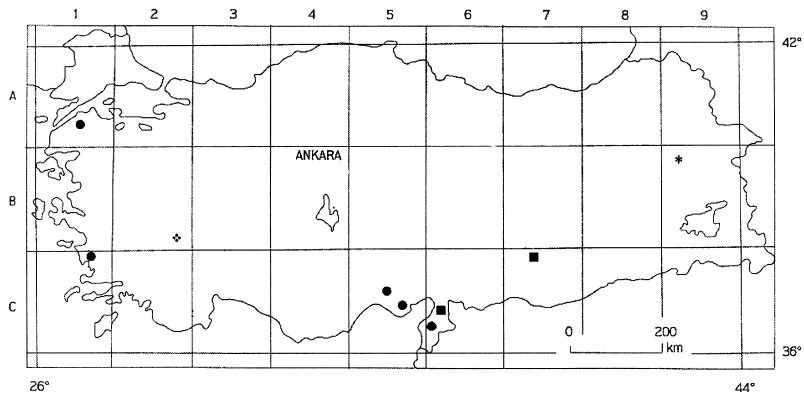
*Anacyclus anatolicus* is similar to *A. nigellifolius*. In both species the tubes of disc corolla become expanded into a flattened disc at the base of the dorsal margin, and the leaves are bipinnatisect. It also resembles *A. latealatus* in the bipinnatisect leaves as well as the width of rachis in bases of median and upper leaves. Our new species should also be compared with *A. clavatus*, which is principally distributed in Mediterranean Europe and Africa, being rare in various parts of Russia and northern Europe. *Anacyclus anatolicus* shares with *A. clavatus* the involucre width and the number and size of ray flowers. Further, *A. ciliatus*, distributed in Caucasus and Georgia (Afanasev 1995) but not in Turkey, has similarly ciliate disc flower tubes as *A. anacyclus*, but according to Humphries (1979) *A. ciliatus* actually belongs in *Anthemis*. Table 1 provides a closer comparison of *A. anatolicus* with its presumed closest relatives *A. nigellifolius*, *A. latealatus* and *A. clavatus*.

Four species of *Anacyclus* are now known from Turkey. They can be distinguished as follows.

- |   |                         |
|---|-------------------------|
| 1. Lower leaves tripinnatisect, achenes (1.5–)2.5–3.5(–5) mm long .....   | <i>A. clavatus</i>      |
| 1. Lower leaves bipinnatisect or pinnatisect, achenes 4–6 mm long .....   | 2                       |
| 2. Disc corolla-tubes articulating normally with ovary; achenes with a lacerate corona .....  | <i>A. latealatus</i>    |
| 2. Disc corolla-tubes expanded into a flattened disc at base of dorsal margin; achenes ecoronate or with an undulate corona .....   | 3                       |
| 3. Rachis of leaves narrow, thickened; disc corolla 3.5–4 mm long, tube not ciliate; ray flowers ca. 6, tube and ovary glabrous, ligules 4.5–6 $\times$ 1–3 mm; achenes $\pm$ monomorphic ..... | <i>A. nigellifolius</i> |



**Fig. 2.** *Anacyclus anatolicus* (from holotype). — **A:** Parts of dissected capitulum: (1) outer phyllary, (2) inner phyllary, (3) paleae, (4) ray flower, (5) disc flower, (6) corolla of disc flower (anterior view), (7) corolla of disc flower (posterior view), (8) disc achene (anterior view), and (9) disc achene (posterior view). — **B:** Leaf.



**Fig. 3.** Distribution of *Anacyclus* in Turkey. \* *A. anatolicus*, ■ *A. nigellifolius*, ◆ *A. latealatus*, ● *A. clavatus*.

3. Rachis of leaves broadened at base; disc corolla 5–7 mm, tube long-ciliate; ray flowers 10–14, tube and ovary densely villous, ligules 10–15 × 4–8 mm; achenes dimorphic ..... *A. anatolicus*

*Anacyclus anatolicus* is known only from the type location in E Anatolia. It is isolated geographically and ecologically from the other

Turkish *Anacyclus* species (Fig. 3).

Also the ecology of *Anacyclus anatolicus* is different from its Turkish congeners, since it grows on lime-poor brown soil in a region that has relatively long winters with snow cover, and the summer drought from June to mid-October limits plant growth in the area. The dominant

type of vegetation in the area is steppe. The following taxa are common in the type locality of *A. anatolicus*: *Achillea tenuifolia*, *A. vermicularis*, *Artemisia austriaca*, *A. spicigera*, *Astragalus*

*gummifer*, *A. kurdicus* var. *mushianus*, *A. lagurus*, *Centaurea virgata*, *Eryngium billardieri*, and *Salvia multicaulis*.

The new species is known only from the

**Table 1.** Comparison of *Anacyclus anatolicus* with *A. nigellifolius*, *A. latealatus* and *A. clavatus*.

Characters	<i>A. anatolicus</i>	<i>A. nigellifolius</i>	<i>A. latealatus</i>	<i>A. clavatus</i>
Stem	Simple or branched from near base, ± adpressed villous	Simple or sparsely branched from or above middle, ± glabrous	Divaricately branched from base, sparsely villous to glabrescent	Usually much branched from base or middle, sparsely to densely adpressed-villous
Leaves	Bipinnatisect, 3–7 cm long, 4–8 pairs of primary segments, ultimate segments 5–8 × 0.3–0.6 mm; rachis flat and dilated at base	Bipinnatisect to pinnatisect, 1.5–3 cm long, 5–6 pairs of primary segments, ultimate segments 2–12 × 0.3–1 mm; rachis cuneate, thickened toward base	Lower and median ones bipinnatisect, with narrow rachis, (upper ones pinnatisect, often dilated at base) 2–4 cm long, 2–4 pairs of primary segments, ultimate segments 3–5 × 0.25 mm	Tri- to bipinnatisect, (1.5–)2.5–11.5 cm long, 3–12 pairs of primary segments, ultimate segments 3–7 × ca. 0.5 mm; rachis flat, ± cuneate at base
Involucre (diam.)	10–18 mm	5–13 mm	10–13 mm	(5–)8–18 mm
Palea	Obovate-cuneate, aristate, glabrous, 7 (excluding 1.2 mm arista) × 2.7 mm	Obovate, acuminate, glabrous, 5–7 × 2–2.8 mm	Lanceolate acuminate, 7–8 × ca. 1.5 mm, lightly villous	Obovate-cuneate, mucronate, glabrous, 1.7–5 × ca. 2.5 mm
Ray flower number	10–14	ca. 6	8–13	8–18
Ligule size	10–15 × 4–8 mm	4.5–6 × 1–3 mm	8–9 × 2–3 mm	5.5–16.5 × 2–7 mm
Indumentum of tube and achene of ray flower	Densely villous	Glabrous	Glabrous	Glabrous
Indumentum of tube of disc flower	Long ciliate	Glabrous	Glabrous	Glabrous
Disc flowers—corolla (excluding ovary) length and form of base of tube	5–7 mm, tube expanded into an orbicular disc at base of dorsal margin	3.5–4 mm, tube expanded into an orbicular disc at base of dorsal margin	3–4 mm, tube not expanded at base	3.5–5 mm, tube not expanded at base
Morphology, size and indumentum of achenes	Dimorphic: obovate, exauriculate, glabrous and 4.8–5.3 × 2.8–3 mm in disc flowers; obcuneate, auriculate, densely villous and 4 × 3–3.5 mm in ray flowers	± monomorphic, somewhat rounded to obovate, auriculate, glabrous and 4.2–4.8 × 3–3.6 mm	Slightly dimorphic, broadly obovate (in disc flower) to obcuneate, auriculate (in ray flower), glabrous, 4–6 × 5–8 mm	± monomorphic, broadly obovate, auriculate, glabrous (1.5–)2.5–3.5(–5) × (0.4–)1.5–4.7 mm

type locality and it occupies less than 10 km<sup>2</sup>. Since the area is heavily grazed by animals, the species should be regarded as “critically endangered” (CR; criteria B2, B2a and B2b(i) of IUCN 2001).

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