

## Two new species in *Acantholimon* sect. *Staticopsis* (Plumbaginaceae) from Turkey

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*Acantholimon köycegizicum* Doğan & Akaydın *sp. nova* and *A. göksunicum* Doğan & Akaydın *sp. nova* (Plumbaginaceae) are described and illustrated from Anatolia, Turkey. *Acantholimon köycegizicum* grows on serpentine mountain slopes between Köyceğiz and Kaplıcalar (C2 Muğla) in South West Anatolia, and *A. göksunicum* grows on calcareous mountain steppe in Göksun (B6 Kahramanmaraş) in SE Anatolia. The species are closely related to *A. calvertii*, an endemic confined to East Anatolia. Diagnostic morphological characters are discussed. A revised key to Turkish *Acantholimon* species with 2–5-branched terminal spikes and previous years' stem with persistent circinate leaf bases is also presented along with notes on the ecology, biogeography and conservational status of the new species.

Key words: *Acantholimon*, Plumbaginaceae, taxonomy

### Introduction

The genus *Acantholimon* was first described by Boissier (1879). It is distributed from SE Europe to Central Asia and some of the species are also found in South America. The genus has considerable ornamental importance due to the nicely coloured and long-lasting flowers.

Bokhari (1970) carried out some studies on the genus and described five new species (*Acantholimon confertiflorum*, *A. dianthifolium*, *A. halophilum*, *A. reflexifolium* and *A. strigillosum*) from Turkey. Bokhari (1972) also studied the stigma and the pollen types of Turkish *Acantholimon* for taxonomic reasons.

The first revision of the genus *Acantholimon* was done by Bokhari and Edmondson (1982) for the *Flora of Turkey and the East Aegean Islands*, in which they recognised 25 species. They also mentioned the possibility of finding some other species either imperfectly known (two species) or doubtfully recorded (nine species).

Bokhari and Edmondson (1982) placed all *Acantholimon* species found in Turkey in three sections, namely *Acantholimon*, *Tragacanthina* and *Staticopsis*. One can easily recognize the members of sect. *Tragacanthina* by their lax paniculate inflorescences and a tubular calyx. In sect. *Acantholimon*, the inflorescence is capitate and the spikelets are (1–)2–5 flowered and

2–6 bracteate. In sect. *Staticopsis*, the leaves are monomorphic and the inflorescence is a simple or branched spike. The latter section embraces 21 of the species cited in the *Flora*. The section was further divided into three subsections (*Caryophyllacea*, *Androsacea* and *Microcalycina*). The subsectional grouping is entirely based on the inflorescence type and it provides great assistance to those trying to identify *Acantholimon* specimens but, nevertheless, the infrageneric classification seems to be far from natural.

A study conducted by Muvaffak (1997) showed that there are nine species of *Acantholimon* in the Ankara province. A recent numerical taxonomic study showed that the species of *Acantholimon* found in Ankara belong to the subsections *Caryophyllacea*, *Halophiliaceae* and *Androsacea* of sect. *Staticopsis*. Subsect. *Halophiliaceae*, based on *A. halophilum*, was described for the first time (Muvaffak *et al.* 2001).

Since the year 2000, as a part of a revisional study on the genus *Acantholimon*, the authors have carried out extensive field studies in Turkey and collected a large number of specimens. Examination of these specimens revealed five new species, *A. birandii* (Doğan & Akaydın 2001), *A. avanosicum* (Doğan & Akaydın 2002a), *A. karamanicum* (Akaydın & Doğan 2002), *A. yildizelicum* (Akaydın 2002) and *A. anatolicum* (Doğan & Akaydın 2002b).

During the field studies carried out between July and September 2001, a few specimens which at first looked liked *Acantholimon calvertii* because of having a branched terminal spike and also having previous years' stems with persistent circinate leaf bases, were collected from two different areas in Turkey. However, since then we also found robust and spiny "*A. calvertii*" specimens in Köyceğiz (C2 Muğla, *sensu* Davis 1965) on serpentine rocks on the SW coast at 20 m altitude. *Acantholimon calvertii* is a highland endemic and normally grows at an altitude between 1210 and 3535 m in East Anatolia. The size of the scapes, the number of florets in each spike, the type of habitat and a few other properties of the specimens collected from Köyceğiz were indeed quite different from *A. calvertii*.

*Acantholimon calvertii* which was first

collected from B8 Erzurum (Turkey), is known from a few localities in East Anatolia. While examining its specimens for comparative study, another group of specimens was noticed. These specimens had been collected from Göksun (B6 Kahramanmaraş) where they grew on calcareous mountain steppe at 2100 m. These interesting specimens were cross-checked with some of the floras, such as *Flora Orientalis* (Boissier 1879), *Flora Iranica* (Rechinger & Schiman-Czeika 1974), *Flora Europaea* (Tutin *et al.* 1972), *Flora of USSR* (Komarov 1967), and *Flora of Syria, Palestine and Sinai* (Post 1933).

Laboratory studies showed that the two groups of specimens represented new species of subsect. *Androsacea* in sect. *Staticopsis*. Materials of *Acantholimon calvertii*, either collected by Doğan and Akaydın in the field or from the three main Turkish herbaria in Ankara (ANK, GAZI and HUB) were examined. Boissier's specimens cited in his *Flora Orientalis* were also examined at G between 12–15 March 2002, and the presence of *A. laxiflorum* in Turkey (C5 Hatay) was discovered for the first time. Therefore, *A. laxiflorum* is also included in the key because of its circinate leaf bases and placement in sect. *Staticopsis*.

The author abbreviations follow Brummitt and Powell (1992).

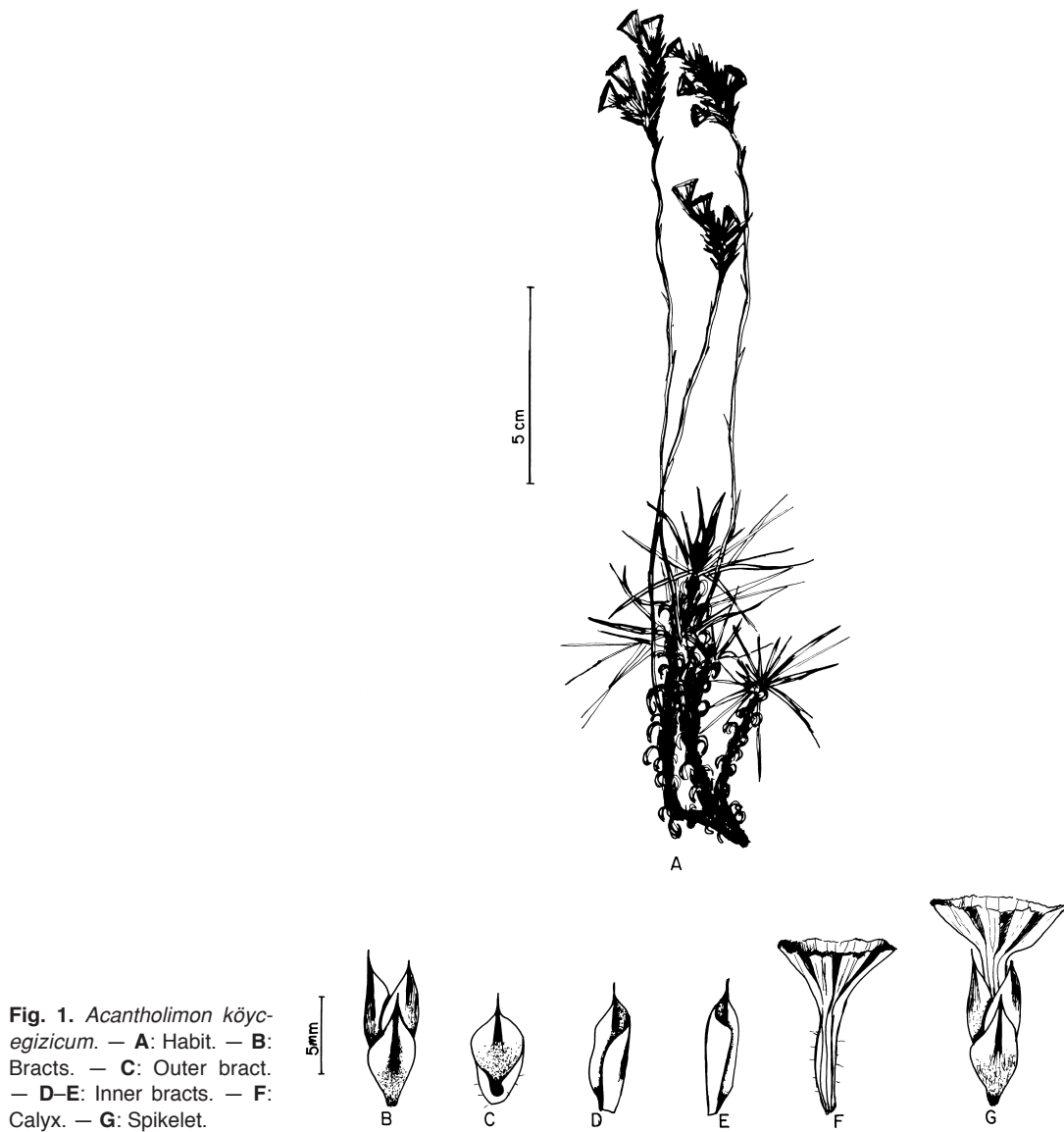
## Taxonomic treatment

***Acantholimon köyceğizicum* Doğan & Akaydın, sp. nova** (sect. *Staticopsis* subsect. *Androsacea*) (Figs. 1 and 3)

*Affinis* *A. calvertii* sed differt foliis vernalibus rigidus, glaucascentibus; caulibus e foliis exsertibus, 7–8 foliatis, 2–5 spicatis, etc.

TYPE: Turkey. C2 Muğla: Köyceğiz around Sultaniye, serpentine slopes, 20 m, 23.VIII.2001 Doğan & Akaydın 7237 (holotype ANK).

Laxly pulvinate shrublet. Bases of previous years' leaves persistent, circinate, borne on long branches. Leaves linear-triquetrous, 20–32 × 1–1.5 mm, glabrous, glaucous, erect-patent, scabridulous on margin. Scapes exceeding leaves, 17–27 cm, 7–8 scaled, puberulous. Scales 8–9.5 mm, acuminate, glabrous, brown-



**Fig. 1.** *Acantholimon köyceğizicum*. — **A:** Habit. — **B:** Bracts. — **C:** Outer bract. — **D–E:** Inner bracts. — **F:** Calyx. — **G:** Spikelet.

ish, hyaline on margins. Inflorescence a dense, terminal 2–5 branched spike. Spike densely distichous, 15–40 mm, with 8–16 spikelets. Spikelets 1-flowered, 11.5–13 mm. Bracts subequal, puberulous; outer bracts 6.5–7 mm, lanceolate, acute to cuspidate, slightly hyaline on margins; inner bracts 8–9 mm, lanceolate, acute to mucronate, broadly hyaline on margins. Calyx 11–12 mm; tube longer than limb, densely pilose; limb brown, 10-lobed; veins not excurrent, dark brown, pilose on lower half. Petals pink.

**DISTRIBUTION AND ECOLOGY:** SW Anatolia, endemic. Mediterranean element. Habitat ser-

pentine mountain slopes along the coastline, ca. 20 m. Flowers in July–August. This new species grows with various Mediterranean lowland plants in *Pinus brutia* forest.

**CONSERVATIONAL STATUS:** The specimens collected in C2 Muğla where the species seems to be very rare and local. It should be graded as Critically Endangered (CR; (IUCN 2001), because of its local distribution and rather a small population size.

**ADDITIONAL SPECIMENS EXAMINED (paratypes).** **Turkey.** C2 Muğla: Between Köyceğiz and Kaplıcalar, serpentine slopes, 20 m, 23.VIII.2001 *Doğan & Akaydin* 7238 (ANK); C2 Muğla: Köyceğiz, Sultaniye Köyü, Kersele, 20 m, 24.VII.1992 *A. Güner* 10689 (GAZI).

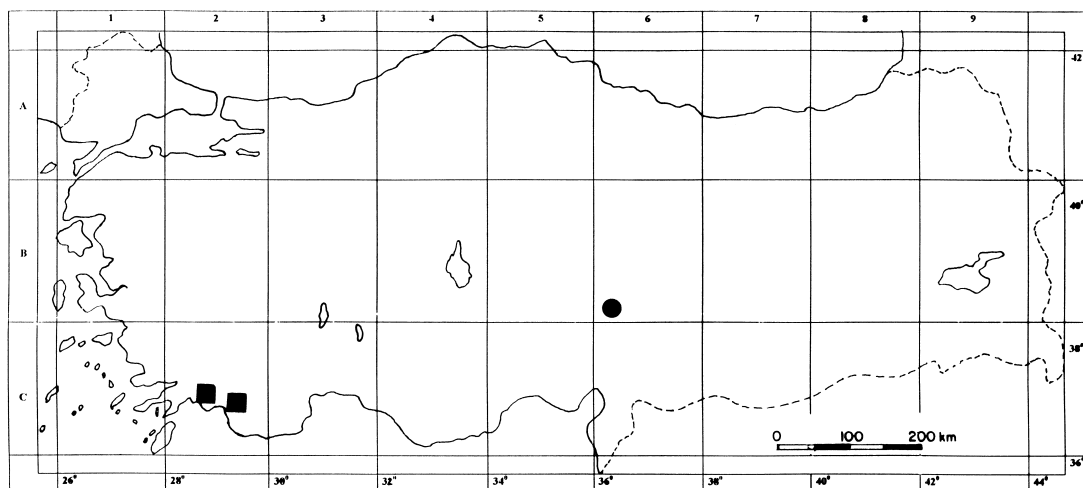
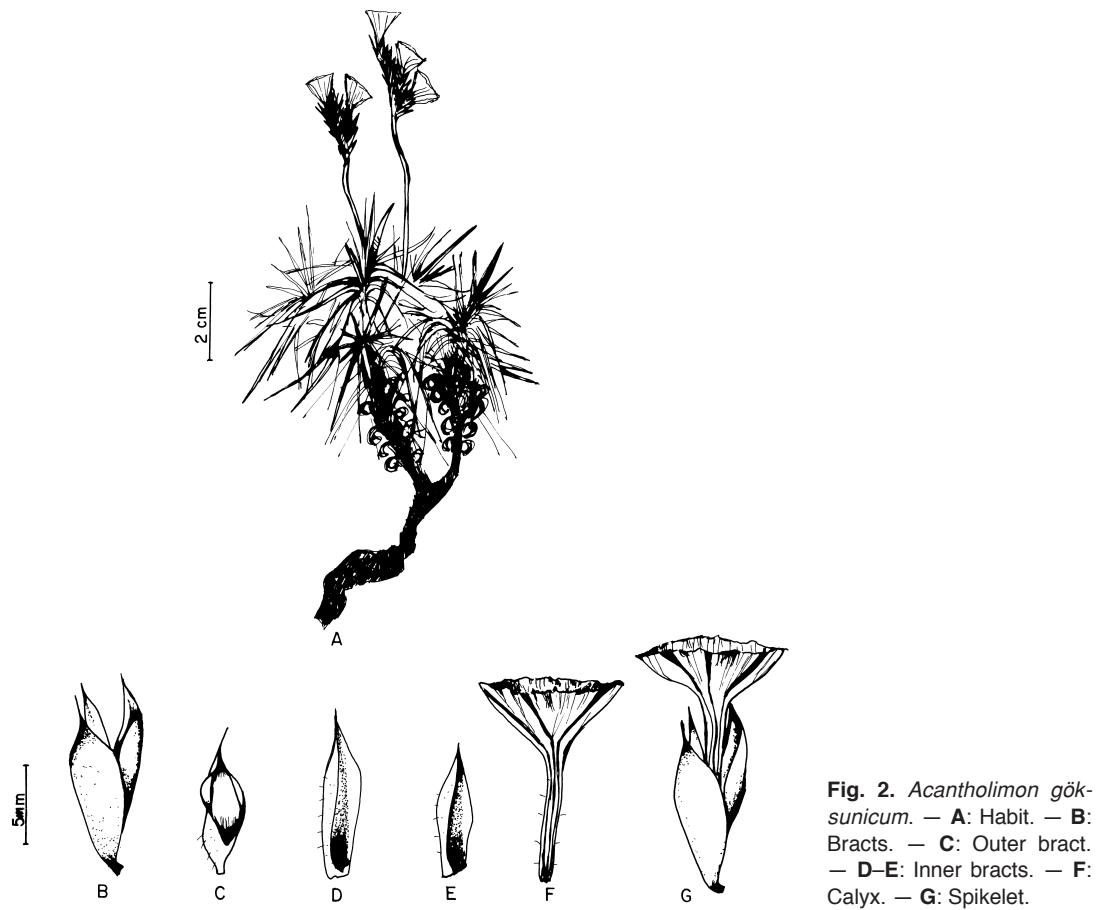


Fig. 3. Distribution of (■) *Acantholimon köycegizicum* and (●) *Acantholimon göksunicum* in Turkey.

***Acantholimon göksunicum* Doğan & Akaydin, sp. nova** (sect. *Staticopsis* subsect. *Androsacea*) (Figs. 2 and 3)*Affinis* *A. calvertii* sed differt caulibus e foliis exsertibus, fragilibus, 1-foliatis, 2-spicatis, etc.

TYPE: Turkey. B6 Kahramanmaraş: Göksun, between Kurucaova and Güneyoluk, calcareous slopes, 2100 m, 8.VII.2001 Doğan &amp; Akaydin 6797 (holotype ANK).

Laxly pulvinate dwarf-shrublet; bases of previous years' leaves persistent, circinate. Leaves

linear, flexuous, 15–31 × 0.8–1 mm, sparsely puberulent, ciliate on margins. Scapes exceeding leaves, 5–8 cm, 1-scaled, with 2-branched terminal spikes. Scales 6.5–8 mm, acuminate, sparsely puberulent, hyaline on margins in lower part. Spikes densely distichous, 15–25 mm, with 8–12 spikelets. Spikelets 1-flowered, 12–13 mm. Bracts unequal, purple-tinged, ciliate; outer bract 4.5–5 mm, ovate, acute-mucronate, broadly hyaline on margins; inner bracts 7.5–8 mm, oblong-lanceolate, acute-mucronate, hyaline except for veins; calyx 11–12 mm; tube longer

**Table 1.** Comparison of *Acantholimon köycegizicum*, *A. göksunicum* and *A. calvertii*.

	<i>A. köycegizicum</i>	<i>A. göksunicum</i>	<i>A. calvertii</i>
Habit	Laxly pulvinate shrublet	Laxly pulvinate shrublet	Laxly pulvinate shrublet
Leaves	20–32 × 1–1.5 mm, linear-triquetrous, rigid, glaucous, erecto-patent, scabridulous on margins, spiny, previous years leaf bases circinate	15–31 × 0.8–1 mm, linear, green, sparsely puberulent, flexuous, ciliolate on margins, previous years leaf bases circinate	20–35 × 0.8–1 mm, linear-triquetrous, green, margins ciliolate-scabridulous, previous years leaf bases circinate
Scapes	Exceeding leaves, 17–27 cm, with 7–8 scales, puberulous	Exceeding leaves, 5–8 cm, with 1 scale, glabrous	Exceeding leaves, 5–15 cm, with 1 scale, glabrous
Inflorescence	Dense terminal distichous spike with 2–5 branches	Dense terminal distichous spike with 2 branches	Dense terminal distichous spike with 2 branches
Spike	15–40 mm long, with 10–27 spikelets	15–25 mm long, with 8–12 spikelets	18–30 mm long, with 6–10 spikelets
Spikelets	12–13 mm, 1-flowered	12–13 mm, 1-flowered	12–17 mm, 1-flowered
Bracts	Unequal, pubescent	Unequal, puberulous	Subequal, puberulous to glabrous
Outer bract	6.5–7 mm, lanceolate, mucronate, hyaline on margin	4.5–5 mm, acute-mucronate, hyaline on margins, purple tinged	7–8 mm, triangular lanceolate, acuminate
Inner bracts	8–9 mm, lanceolate, acuminate-mucronate, broadly hyaline	7.5–8 mm, lanceolate, acuminate-mucronate, hyaline	8–10 mm, narrowly oblong-lanceolate, acuminate, broadly hyaline
Calyx	11–12 mm, densely pilose; limb brownish, 10-lobed; veins not excurrent	11–12 mm, sparsely pilose between veins; limb white, 10-lobed; veins excurrent	10–12 mm, sparsely pilose; limb white or purplish, 10-lobed; veins reaching margins or some times excurrent
Petals	Pink	Dark pink	Bright pink
Flowering time	8	7	6–8
Habitat	Serpentine mountain slopes inside <i>Pinus brutia</i> forest	Calcareous mountain slopes in <i>Astragalus</i> steppe	Igneous rocks, limestone slopes
Altitude	20 m	2100 m	1210–3535 m
Phytogeography	Mediterranean element	Irano-Turanian element	Irano-Turanian element

than limb, sparsely pilose between veins; limb white, 5-veined, 10-lobed; veins not excurrent. Petals pink.

**DISTRIBUTION AND ECOLOGY:** SE Anatolia, endemic. Irano-Turanian element. Habitat calcareous mountain slopes in *Astragalus*-grass steppe, ca. 2100 m. Flowers in July.

**CONSERVATIONAL STATUS:** This species is known only from the type locality. It should be graded as Critically Endangered (CR; IUCN 2001), because of its local distribution and excessive grazing in the area.

### A revised key to Turkish *Acantholimon* with circinate leaf bases

1. Spikes 15–30 cm; leaves 1.8–6.5 cm long *A. laxiflorum*
1. Spikes 1.5–4 cm; leaves 1.5–3.5 cm long ..... 2
2. Leaves rigid, spiny at tips; scapes 17–27 cm, with 7–8 scales; spike 2–5 branched, with 10–27 spikelets .....  
..... *A. köycegizicum*
2. Leaves not rigid, without a spine at tips; scapes 5–15 cm, with 1 scale; spike 2-branched, with 6–18 spikelets ... 3
3. Leaves puberulent; bracts unequal, purple tinged, outer bract 4.5–5 mm ..... *A. göksunicum*
3. Leaves glabrous; bracts subequal, purple-tinged, outer bract 6–10 mm ..... *A. calvertii*

*Acantholimon köycegizicum* and *A. göksunicum* are both related to *A. calvertii* (Table 1) and placed in the subsect. *Androsacea* of sect. *Statiscopsis* because of their laxly pulvinate, shrubby appearance and having the persistent bases of previous years' leaves circinate and borne on long branches. These species have dense, terminal, distichously branched spikes. However, the centre of diversity for subsect. *Androsacea* appears to lie mainly in Anatolia, where there are 13 species, nine of which are endemic.

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