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Source: Willdenowia, 34(2) : 421-425

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: <https://doi.org/10.3372/wi.34.34209>

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doi:10.3372/wi.34.34209 (available via <http://dx.doi.org/>)

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## ***Eryngium trisectum* (Apiaceae, Saniculoideae), a new species from Turkey**

### **Abstract**

Wörz, A. & Duman, H.: *Eryngium trisectum* (Apiaceae, Saniculoideae), a new species from Turkey. – Willdenowia 34: 421–425. – ISSN 0511-9618; © 2004 BGBM Berlin-Dahlem.

During the fieldwork for a monograph of the genus *Eryngium*, a new species was found. It is described as *E. trisectum* and illustrated. Only one locality, a serpentine habitat in the Central Taurus region of Turkey, is known thus far. The new species belongs to *E. sect. Palmito* and is closest related to the calcicolous *E. palmito*. For this section, a key to its now five species and a table of the most important features are presented.

### **Introduction**

The genus *Eryngium* L. (Apiaceae, Saniculoideae) comprises about 250 species, growing in Eurasia, North Africa, North and South America, and Australia. It is the most species-rich genus of the Apiaceae (Pimenov & Leonov 1993: 3) and includes about four-fifths of the species of the subfamily Saniculoideae. The most recent monograph of *Eryngium* is now over 90 years old (Wolff 1913) and outdated. Many regional treatments in “Floras” were subsequently published, among them Davis (1972) for Turkey, Pimenov & Tamamschian (1987) for the Flora Iranica area and Mathias & Constance (1941) for North America.

During the fieldwork for a new monograph, a new species, closely related to *Eryngium palmito* Boiss. & Heldr. and considered a serpentine vicariant, has been discovered and is here described as new to science.

The terminology of the inflorescences of *Eryngium* and the Saniculoideae in general poses some difficulties, since the seemingly simple umbel is actually a reduced double umbel (Froebe 1964) and, in *Eryngium*, each flower a reduced umbellule. The small leaves at the base of the flowers are thus the bracts (involucrum) of the umbel (and not bracteoles as commonly stated) and the only occasionally extant leaflets, which sometimes form a coma (as in *E. corniculatum* and *E. laevenworthii*), are the bracteoles of the umbellule. The lowermost of the bracts are usually enlarged to an additional involucrum, which together with the umbel forms the capitulum. To distinguish them from the inner bracts (as they are different and an important character), we call them involucreal leaves.

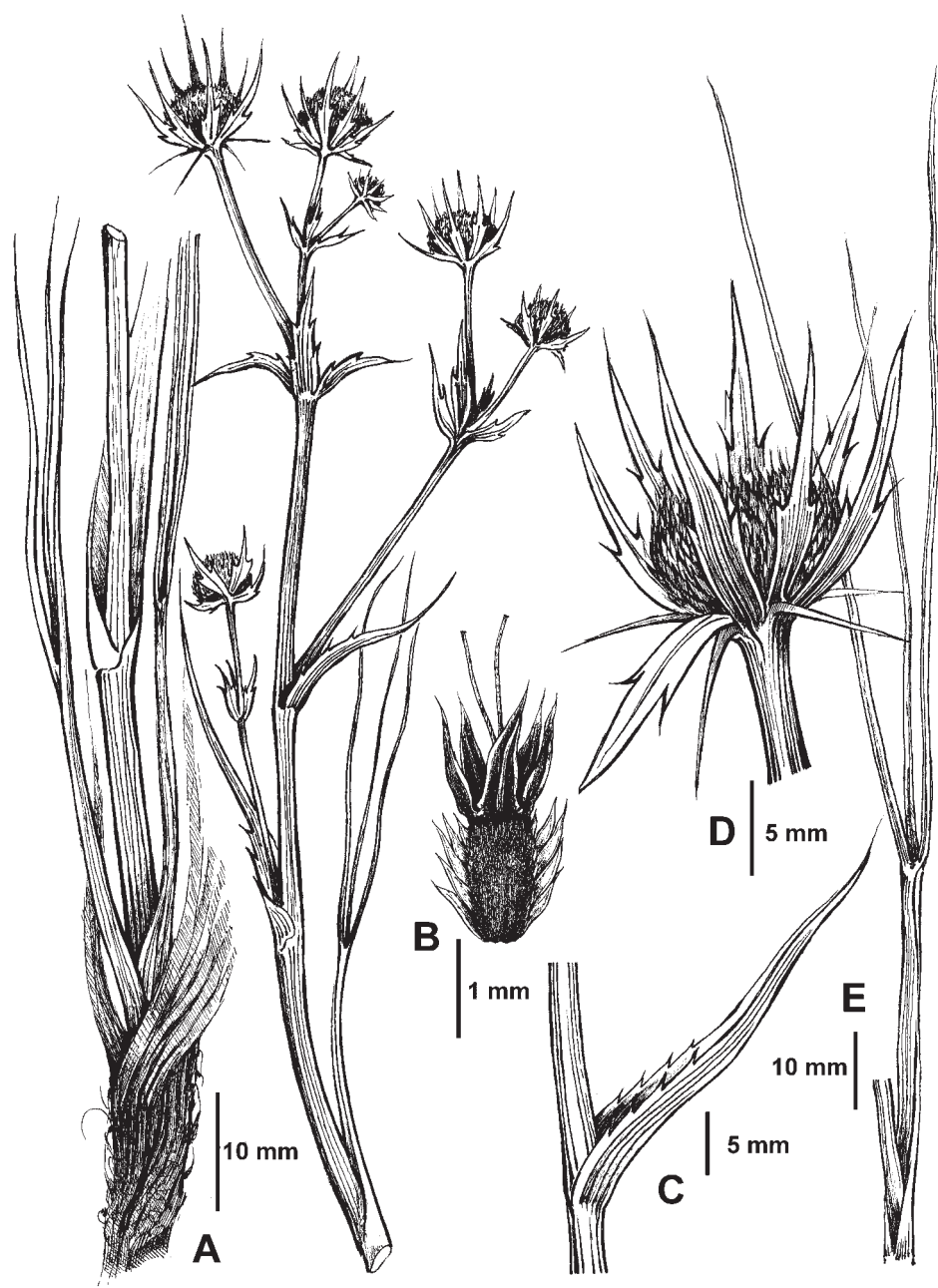


Fig. 1. *Eryngium trisectum* Wörz & Duman – A: habitus; B: fruit; C: upper cauline leaf; D: capitulum; E: lower cauline leaf. – Drawing by A. Gauss after the holotype.

*Eryngium trisectum* A. Wörz & H. Duman, **sp. nova**

Holotype: Türkei, Mittl. Taurus, Vil. Konya, Kızıl Dağ zw. Beyşehir und Akseki, Zufahrt zu Gipfel, 37°21'17.5"N 31°4'1.9"E, geröllreicher Abhang, Serpentin [= Turkey, Central Taurus, Vil. Konya, Kızıl Dağ between Beyşehir and Akseki, access road to the summit, stony slope, serpentine], 12.8.2003, A. Wörz & H. Duman W 23.8.12.01 (STU, isotype: GAZI). – Fig. 1.

Differt a *Eryngio palmito* foliis basalibus 3-4-sectis, segmentis linearibus, 2-3 mm latis, foliis caulinis trisectis, segmentis integris vel spinis brevibus armatis, capitulis longe pedunculatis, synflorescentia dichasiali vel corymbosa, extensa, rubrocaerulea.

*Derivation of the name.* – The epithet refers to the trisected cauline leaves of the species.

Perennial hemicryptophyte; green, reddish to lilac in the upper parts, 30-90 cm tall; with a fibrous taproot up to 15 mm in diam. *Basal leaves* long-petiolate, with flat petioles to 15 cm long, lamina 3-4(-5)-sected, or trisected with two small additional rudimentary segments, segments 1-3 mm broad, up to 300 mm long, giving the plant a grass-like appearance, entire, not spiny or pungent, parallel-veined. *Stem* erect, single or double, whitish, shallowly grooved, tinged lilac in the upper part, branched only in the synflorescence, with a tuft of dry leaf sheaths at the base. *Cauline leaves* parallel-veined, trisected in the lower part of the stem, similar to the basal leaves, with a flat, sheathy petiole, undivided, linear to lanceolate in the upper part of the stem, sessile with a broadened base bearing some small marginal spines; leaves subtending lower branches of the synflorescence not exceeding the branches. *Capitula* 8-15, umbels hemispherical, synflorescence dichasial or corymbose, spreading. *Involucral leaves* 10-20(-25) × 3-4 mm, 2-3× as long as umbel, 5-6 per capitulum, subulate, with 1 pair, rarely more or 0, of marginal spines, parallel-veined, pungent, mostly with a basal whorl of additional, long spines. *Bracts* entire, linear, with a broadened midrib and a white, narrow margin, pungent, about as long as the flower incl. fruit. *Sepals* ovate to oblong, acuminate, pungent, sometimes mucronate, with a white margin. *Petals* white to lilac with a long inflexed lobe, apex 2-tipped. *Fruits* ovoid, flattened, with long-acuminate to subulate appendages at the margins and the apices, shorter ones on the back.

*Biology.* – Flowering in August. Bumblebees have been observed to visit the flowers.

*Relationship.* – Closely related to *Eryngium palmito* Boiss. & Heldr., probably a serpentine vicariant. *E. trisectum* differs by its mostly three and narrower leaf segments, the shorter leaves at the base of the lower branches of the synflorescence, the long-pedunculate capitula, the dichasial or corymbose synflorescence, shorter involucral leaves (10-20(-25) mm not 20-45 mm), and the reddish lilac colour. *E. serbicum* Pančić, from the Balkans, has dentate leaf segments (entire in *E. trisectum*), 6-8 (not 5-6) involucral leaves, and blue colour. *E. ternatum* Poir., from Crete, also has trisected cauline leaves, but has undivided basal leaves and much broader, dentate leaf segments. The new species belongs to the *E.* subg. *Eryngium* (for the subgeneric classification see Wörz, in press) and to the *E.* sect. *Palmito* Wolff, which consists of four other species (*E. palmito* Boiss. & Heldr., *E. serbicum* Pančić, *E. ternatum* Poir. and *E. wanaturi* Woronow, see Table 1). All occur in small, isolated areas and must be considered typical relic endemics (for distribution maps see Wörz 2004).

*Ecology.* – *Eryngium trisectum* grows in the Taurus Mountains in southern Turkey between 1600 and 1700 m elevation, on the slope of a serpentine hill with northern exposure, under the fairly open canopy of a *Pinus nigra* Arn. forest, on more or less deep soil with some serpentine rubble on the surface. The habitat is sun-exposed and dry. Among the most important associated species are *Koeleria macrantha* (Ledeb.) Schult., *Sideritis ozturkii* Aytaç & Aksoy (local endemic), *Asyneuma rigidum* (Willd.) Grossh., *Pimpinella tragium* Vill., *Saponaria pamphylica* Boiss. & Heldr. (endemic), *Polygonum setosum* Jack., *Pelargonium endlicherianum* Fenzl, *Aethionema spicatum* Post, *Bornmuellera kiyakii* Aytaç & Aksoy (local endemic), *Prometheum chrysanthum* (Boiss.) t'Hart (endemic), *Dactylis glomerata* L. and *Solidago virgaurea* L.

Table 1. The most important features of the species of *Eryngium* sect. *Palmito*.

<i>Eryngium</i>	<i>palmito</i>	<i>trisectum</i>	<i>serbicum</i>	<i>ternatum</i>	<i>wonaturi</i>
Segments of basal leaves	5-7	3-5	4-5	1-3	1
Segments of cauline leaves	5	3	3-4	3	1
Synflorescence	paniculate racemose	dichasial corymbose	paniculate	dichasial corymbose	dichasial
Involucral leaves, number	5-6	5-6	7-8	8-9	7-8
Involucral leaves, length [mm]	20-35	10-20	10-20	20-30	25-40
Bracts	entire	entire	entire	tricuspidate	entire
Colour	blue	reddish lilac	blue	blue	glaucouscent to blue

*Distribution.* – Known only from the recent type collection from the Kızıl Dağ in the Central Taurus, Turkey. Endemic.

*Conservation status.* – This species is known from only a single locality (criterion B2 a), with an area of occupancy estimated to be less than 10 km<sup>2</sup> (criterion B2), so that it should be classified as “Critically Endangered (CR)” (IUCN 2001). The population consists of a few thousand individuals growing on the northern slope of the Kızıl Dağ.

Discussion

The close relationship between *Eryngium trisectum* and *E. palmito* and their sympatric distribution indicate a relatively recent separation of these two species. It is probably an evolution based exclusively on habitat differences.

The serpentine habitats are characterized by their lack of nutrients and their high content of heavy metals, especially nickel, which may occur in concentrations toxic to many plants. Physiological adaptations to these habitats include either tolerance, or accumulation and storing of these toxic metal ions. Hyperaccumulation of nickel is frequently observed in many Turkish species of the *Brassicaceae* (*Thlaspi*, *Cochlearia* see Reeves 1988, *Alyssum* see Reeves & al. 1983) and of *Centaurea* (Reeves & Adigüzel 2004).

The vast majority of the species of *Eryngium* prefers calcareous soil. Apart from *E. trisectum*, only *E. thorifolium* Boiss. grows exclusively on serpentine. This latter species is closely related to *E. pseudothorifolium* Contandr. & Quézel and both form the taxonomically and morphologically distinct *E. sect. Thorifolia* Wolff. They occur in SW Turkey not far from *E. trisectum* and *E. palmito*. Hence the colonization of serpentine habitats evolved at least twice within *Eryngium*.

Key to the species of *Eryngium* sect. *Palmito*

1. Leaf segments up to 3 mm broad . . . . . 2
- Leaf segments much broader . . . . . 4
2. Leaf segments entire; involucral leaves 5-6, up to 5 mm broad; S Turkey . . . . . 3
- Leaf segments with conspicuous marginal spines; involucral leaves 6-8, up to 3 mm broad; Balkans . . . . . *E. serbicum*
3. Segments of the middle cauline leaves 3, sometimes with 2 additional very small rudimentary segments; leaves subtending lower synflorescence branches equalling these in length or shorter; synflorescence dichasial or corymbose, never paniculate; upper parts of the plants reddish lilac . . . . . *E. trisectum*

- Segments of the middle cauline leaves 5 or more,  $\pm$  equal in size; leaves subtending lower synflorescence branches longer than these; synflorescence paniculate; upper parts of the plants green or blue, never reddish . . . . . *E. palmito*
- 4. Bracts of the flowers entire; basal leaves undivided, grasslike; E Anatolia . . . *E. wanaturi*
- Bracts of the flowers tricuspidate; at least some basal leaves trisected; Crete . . . *E. ternatum*

## Acknowledgements

The authors thank A. Gauss for drawing the illustration, J. Hogan for editing the English text, M. Thiv for his critical remarks on the manuscript and Prof. S. Seybold for the help with the Latin language.

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