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***Cirsium eriophorum* (Asteraceae), a new record of *Cirsium* sect. *Eriolepis* for the Bulgarian flora****Abstract**

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*Cirsium eriophorum* is reported for the first time to the Bulgarian flora. It was found in the Eastern Rhodope Mts, south of Strazhets village (Krumovgrad District), in the area of Mount Golata Chuka, adjacent to the Bulgarian-Greek border. The species occurs in middle high mountain pastures, in open *Fagus sylvatica* forests and along forest roads, mainly on serpentine substrates, at 900–1200 m altitude. The recorded localities are the southeastermost limit of the species range in Europe.

The article presents data on distribution, habitats and population of *Cirsium eriophorum* in Bulgaria. A brief review of the key features of Bulgarian representatives of *Cirsium* sect. *Eriolepis* is provided. The recently published phylogeny of *Cirsium* concerning the restoration of genera *Lophiolepis* and *Epitrachys* is also commented on.

*Key words:* Compositae, Cardueae, *Lophiolepis*, Balkans, floristics.

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**Introduction**

According to Delipavlov (2003), the genus *Cirsium* Mill. is represented by 14 species in Bulgarian flora. Two more species were later reported as new to the country—*Cirsium rivulare* (Jacq.) All. (Hájek & al. 2006) and *C. palustre* (L.) Scop. (Vladimirov & Niketić 2017) both discovered in the vicinity of the Bulgarian-Serbian border. Here, we added a new *Cirsium* record to Bulgaria, *C. eriophorum* (L.) Scop., also found in a poorly studied region of the country, the Eastern Rhodope Mts, near the Bulgarian-Greek border. The access of non-local people (including botanists) was restricted in this area between 1945 and 1990, and special permission was required from the Border authorities. For this reason, as well as due to the presence of rare and specific serpentine habitats in the Eastern Rhodope Mts, many new obligate serpentinophytes have been recorded for Bulgarian flora in recent years (Pavlova & al. 2003; Pavlova 2007, 2014; Stoyanov & Marinov 2020; Kunev 2020).

*Cirsium eriophorum* belongs to *Cirsium* sect. *Eriolepis* (Cass.) Dumort. It is a large and taxonomically intricate section represented by 29 species in Europe, accounting for half of the European members of the genus (Werner 1976). The representatives of this section are all monocarpic biennials (except *C. vulgare* (Savi) Ten.), with erect stems, branched above, coriaceous deeply pinnatifid leaves, rigid setae above, arachnoid-tomentose beneath, leaf segments in pairs (divaricate) with the basal lobe directed upwards and apical lobe  $\pm$  flat or downwards, with revolute margins and spiny apex (Tofts 1999; Del Guacchio & al. 2021). According to *Flora Europaea* account, *C. sect. Eriolepis* is represented in Bulgaria by four species: *C. bulgaricum* DC., *C. italicum* (Savi) DC., *C. ligulare* Boiss., and *C. vulgare* (Werner 1976). Later, one more species of this section was described from Bulgaria, namely *Cirsium stoyanovii* Kuzmanov (1988), so far known only for its original material. However, the taxonomic identity and status of that species needs to be clarified. It morphologically resembles *C. italicum* and probably is conspecific with the latter and therefore a further investigation is required.

*Cirsium eriophorum* was mentioned a long time ago for Bulgarian flora by the Serbian botanist Pančić (1883). However, due to the lack of a herbarium voucher Velenovský (1891) deemed this record doubtful. Subsequently, Achtarov (1950) also believed that Pančić (1883) erroneously reported this species for Bulgaria, in this case instead of *C. ligulare*.

The aim of the present article is to report the first reliable data on the occurrence of *Cirsium eriophorum* in Bulgarian flora and to provide details on the main distinguishing features of the Bulgarian members of *Cirsium* sect. *Eriolepis*.

## Material and methods

Field surveys were carried out in July–August 2022 in the Eastern Rhodope Mts. The plant materials gathered were deposited in the herbarium SOM (acronyms follow Thiers 2023+). Morphological features of *Cirsium eriophorum* were studied from the personal collections and compared with selected specimens kept in herbaria B and SOM as well as with relevant literature (Nyárády 1964; Gajić 1975; Werner 1976). Data on the population and habitats are noted in the field. Comparison of Bulgarian members of *C. sect. Eriolepis* is based on the authors' observations and presented through photos in nature. Nomenclature of *Cirsium* follows Greuter (2006+). Abbreviations of the authors of plant names are according to Brummitt & Powell (2004).

## Results and discussion

In the summer of 2022, during a botanical trip in the Eastern Rhodope Mts, a new native species for Bulgarian flora, *Cirsium eriophorum*, was discovered. By its habitus, leaf shape and large capitula (usually more than 4 cm in diameter) it is similar to *C. ligulare*, a widespread species in the country. *Cirsium eriophorum* differs from the latter species by its much denser arachnoid-lanate covering of the involucre, totally hidden phyllaries, and narrower, lanceolate to narrowly rhombic appendages (vs the phyllaries sparsely arachnoid-lanate, more or less visible, and the appendages obovate below the apex in *C. ligulare*).

In the Bulgarian flora, another member of *C. sect. Eriolepis*, a close relative of the two above-mentioned species is *C. bulgaricum*. Similar to them, it is a robust plant, usually more than 1 m tall and with non-decurrent stem leaves. *Cirsium bulgaricum* is a glaucous plant, well distinguishing by its arachnoid-tomentose stem indumentum (vs stem shortly patent-hairy in *C. eriophorum* and *C. ligulare*), smaller capitula (less than 4 cm in diameter) and sparsely arachnoid phyllaries with short, up to 5 mm appendages (vs capitula more than 4 cm in diameter, phyllaries ± densely arachnoid-lanate with appendages more than 10 mm long, ± widened below the apex in *C. eriophorum* and *C. ligulare*) (Figs. 1, 2).

*Cirsium vulgare* has been traditionally placed in *C. sect. Eriolepis*, but the most recent phylogenetic studies revealed it is nested in *C. sect. Cirsium* clade (Ackerfield & al. 2020; Del Guacchio & al. 2022). Its morphological characters also do not clearly match with the *C. sect. Eriolepis* circumscription – e.g. *C. vulgare* is a perennial plant (not a monocarpic biennial), leaves completely decurrent, with true spine above (not with rigid setae) (Fig. 3).

The placement of *C. italicum* in *C. sect. Eriolepis* is also controversial. Both phylogenetic trees (Ackerfield & al. 2020; Del Guacchio & al. 2022) separate it in a sister clade to *C. sect. Eriolepis* clade. Morphologically, *C. italicum* also has features not typical for *C. sect. Eriolepis* in general – e.g. it is an annual plant, leaves short decurrent, smaller involucre (up to 15 mm in diameter), presence of vittae on phyllaries (Fig. 4).

Since *C. sect. Eriolepis* is resolved as monophyletic in the phylogeny of Del Guacchio & al. (2022), which is congruent with earlier data from Ackerfield & al. (2020), they proposed to treat it as a separate genus *Lophiolepis* Cass. On the other hand, for *C. italicum*, which is a sister clade to *C. sect. Eriolepis* clade (such as the monotypic genera *Picnomon* Adans. and *Notobasis* (Cass.) Cass.), they proposed to segregate it into a monotypic genus *Epitrachys* (DC. ex Duby) K.Koch.

In conclusion, based on the latest re-circumscription of *Cirsium* and the transfer of most of the species of *C. sect. Eriolepis* (except *C. italicum* and *C. vulgare*) into *Lophiolepis*, many new combinations have been provided (Del Guacchio & al. 2022). Four of them concern the above-mentioned Bulgarian species of *C. sect. Eriolepis* – *Lophiolepis bulgarica* (DC.) Del Guacchio, Bureš, Iamónico & P. Caputo, *L. eriophora* (L.) Del Guacchio, Bureš, Iamónico & P. Caputo, *L. ligularis* (Boiss.) Del Guacchio, Bureš, Iamónico & P. Caputo and *Epitrachys italica* (DC.) Bureš, Del Guacchio, Iamónico & P. Caputo.

**Distribution.** – *Cirsium eriophorum* is widespread, mainly in the mountain belt of Western, Central and Southern Europe (Werner 1976). The species range in Europe is presented and commented in detail by Tofts (1999). Outside Europe, the species is known only in a few localities in Bursa Province of Turkey (Daşkın & al. 2006). In the neighboring countries, Romania and Serbia, where the northeastern periphery of its area is, *C. eriophorum* has a limited distribution (Nyárády 1964; Gajić 1975), whereas in Greece it occurs throughout the country (Dimopoulos & al. 2013).

In Bulgaria, *C. eriophorum* has been found in the Eastern Rhodope Mountains floristic region, south of Strazhets village (Krumovgrad District), in the area of Mount Golata Chuka, which orographically is middle high mountains (Table 1). It is a rare species in Bulgaria and its Bulgarian localities together with these in adjacent territories of Greek part of Rhodope are the southeasternmost limit of the species range in Europe.

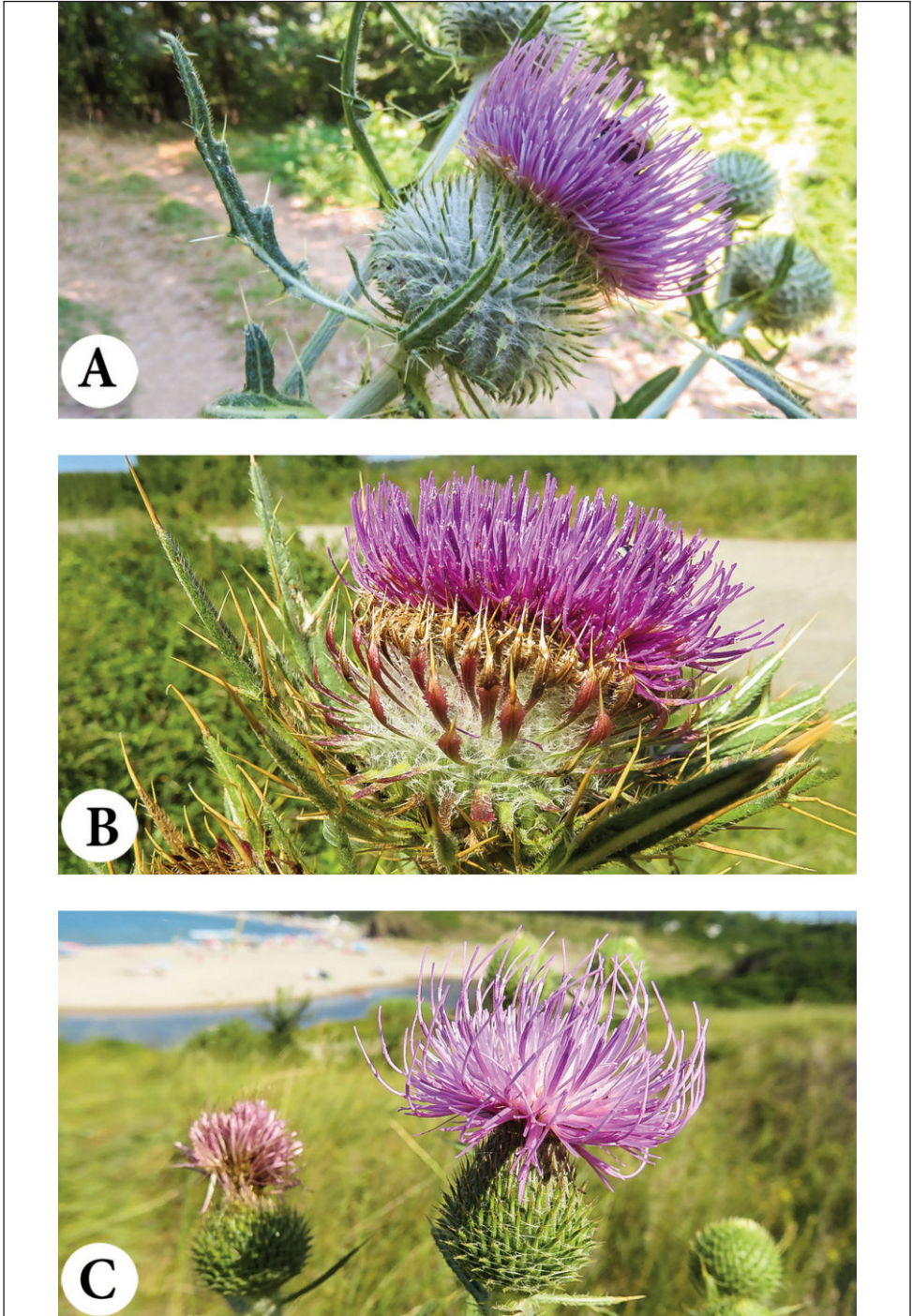


Fig. 1. Capitula of *Cirsium eriophorum* (A), *C. ligulare* (B) and *C. bulgaricum* (C).

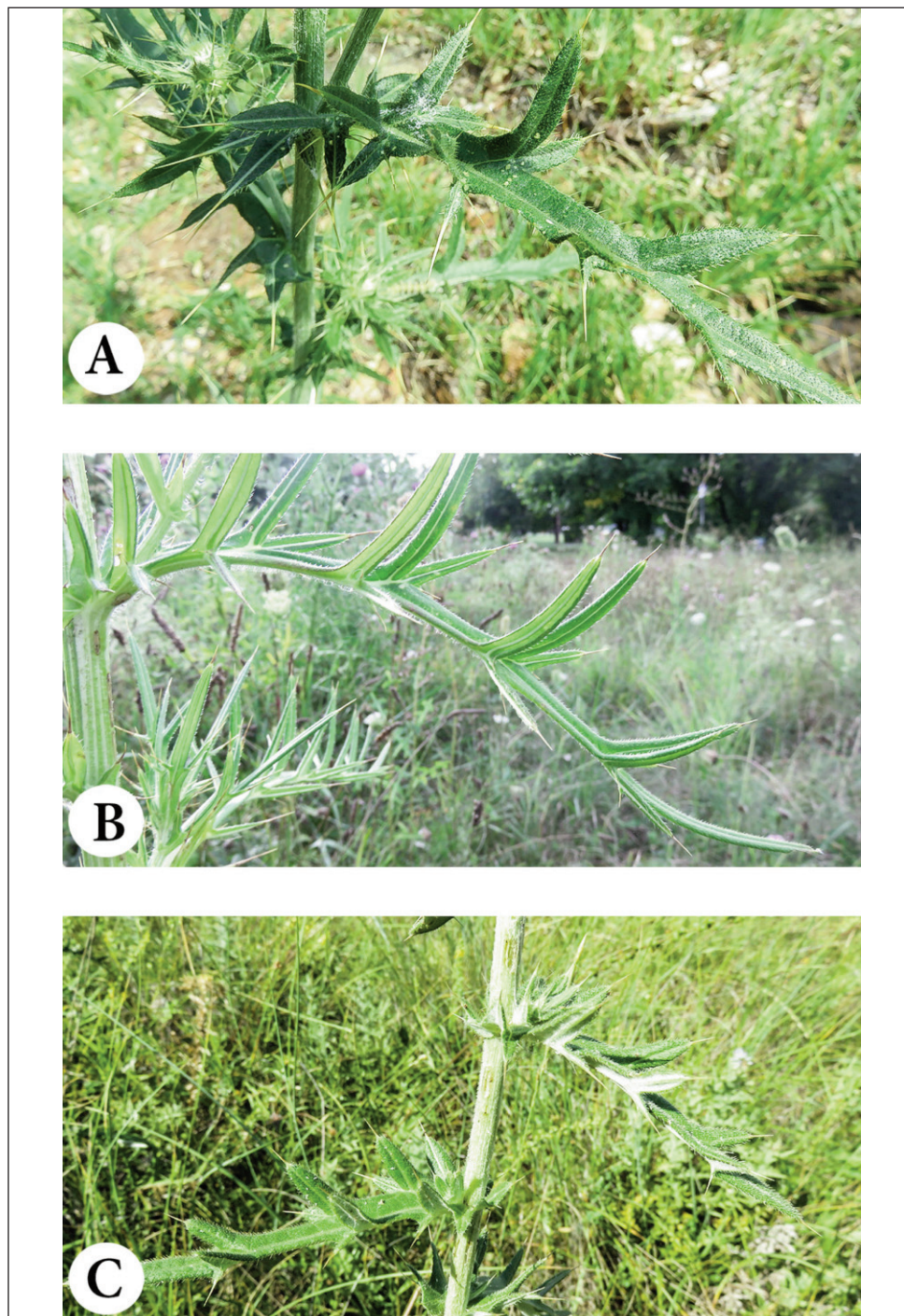


Fig. 2. Stem leaves of *Cirsium eriophorum* (A), *C. ligulare* (B) and *C. bulgaricum* (C).



Fig. 3. *Cirsium vulgare* – A. Upper part with capitulum; B. Decurrent stem leaves.



Fig. 4. *Cirsium italicum* – upper part with capitula.

Table 1. Localities and GPS data of *Cirsium eriophorum* in Bulgaria.

Locality	GPS data
Along forest road towards Mount Golata Chuka, 880 m	41.33625°N, 25.84802°E
Northern slope of Mount Golata Chuka, at the upper forest line, <i>Fagus sylvatica</i> forest glades, 990 m	41.32898°N, 25.85400°E 41.32944°N, 25.85429°E
Eastern slope of Mount Golata Chuka, clearings for wood storage, 1180 m	41.32615°N, 25.87581°E
Northeastern slope of Mount Golata Chuka, clearings for wood storage, 1130 m	41.33160°N, 25.87622°E

**Habitats and population.** – The only Bulgarian population of *C. eriophorum*, located on the northern and eastern slopes of Mount Golata Chuka, is represented by several patches including a total of *ca.* 100 individuals. Small groups, consisting of 5–10 individuals, are found mainly along the forest roadsides, as well as in trampled and ruderal clearings for wood storage. The largest subpopulation occupies an area of 0.3 ha on the northern slope of Mount Golata Chuka, near the upper forest line, and numbering *ca.* 60 individuals. Here, the species inhabits middle high mountain pastures and glades among sparse *Fagus sylvatica* L. forests, on serpentine (Fig. 5). The co-occurring species in the locality are *Allium flavum* L., *Alyssum murale* Waldst. & Kit., *Briza media* L., *Danthonia alpina* Vest, *Dorycnium herbaceum* Vill., *Filipendula vulgaris* Moench, *Fritillaria gussichiae* (Degen & Dörf.) Rix, *Genista carinalis* Griseb., *Hypericum perforatum* L., *Juniperus deltoides* R.P. Adams, *Potentilla rupestris* L., *Pteridium aquilinum* (L.) Kuhn, *Sanguisorba minor* Scop., *Sesleria latifolia* (Adamović) Degen, *Tephrosia papposa* (Rchb.) Schur, *Thalictrum aquilegifolium* L., *Thymus jalsianus* Stoyanov & Marinov, etc.

The free movement of cows in the area of Bulgarian-Greek border has probably supported expansion of the species. The presence of *C. eriophorum* in sites with nitrophilous vegetation is indicative of this process.



Fig. 5. *Cirsium eriophorum*, glades in *Fagus sylvatica* forest.



*Specimina visa*

BULGARIA: Eastern Rhodope Mountains. South of Strazhets village, Krumovgrad District, along the forest road to Mount Golata Chuka, in sparse *Quercus* forests, 41.33625°N, 25.84802°E, 880 m, 06.07.2022, S. Stoyanov & Y. Marinov (SOM 177738, 177739); *loc. ibid.* East of Mount Golata Chuka, in meadows among *Fagus sylvatica* forests, 41.32615°N, 25.87581°E, 1180 m, 31.08.2022, S. Stoyanov & Y. Marinov (SOM 177740, 177741).

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