

## New wetland vascular plants for Bulgaria

Michal Hájek<sup>1,2</sup>, Petra Hájková<sup>1,2</sup> & Iva Apostolova<sup>3</sup>

<sup>1</sup> Institute of Botany and Zoology, Faculty of Science, Masaryk University, 2 Kotlářská St., CZ-61137 Brno, Czech Republic, e-mail: hajek@sci.muni.cz

<sup>2</sup> Institute of Botany, Czech Academy of Sciences, 3b Poříčí St., CZ-60300 Brno, Czech Republic

<sup>3</sup> Institute of Botany, Bulgarian Academy of Sciences, Acad. Georgi Bonchev St., bl. 23, 1113 Sofia, Bulgaria, e-mail: iva@bio.bas.bg

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**Abstract.** *Carex appropinquata* and *Cirsium rivulare* have been recently recorded as new for Bulgaria. *Carex appropinquata* occurs in the calcium-rich lowland fen in the Sofia region and in the moderately rich fen in the Samokov basin. This species is accompanied by other extremely rare wetland species in Bulgaria (e.g. *Pedicularis palustris*, *Carex buxbaumii* s.str., *C. lasiocarpa*, *Lathyrus palustris*). *Cirsium rivulare*, the species with Alpine-Carpathian distribution, strongly dominates in the wet meadow surrounding a small, calcium-rich spring fen at the foothills of the Western Balkan Range, close to the Serbian border.

**Key words:** *Carex appropinquata*, *Cirsium rivulare*, fen, mire

### Introduction

During the field research of fens and wet meadows in the western part of Bulgaria, two vascular plant species have been recently recorded as new for the Bulgarian territory (compare Assyov & Petrova 2006). The aim of this paper is to present details about these findings. We continue the publication of the latest records of important wetland plant species in Bulgaria (Hájek & al. 2005).

### Results

#### *Carex appropinquata* A. Schumach. (Fig. 1)

Rila Mts: one km westwards of Samokov town, GM-18, 950 m, water pH 6.3, water conductivity 163  $\mu\text{s}/\text{cm}/20^\circ\text{C}$ , 29.06.2006, coll. M.Hájek, P. Hájková & I. Apostolova (SOM 163044).

Sofia region: to the south-eastwards of Tsruklevtsi village, FN-75, 800 m, water pH 6.8, water conductivity 633  $\mu\text{s}/\text{cm}/20^\circ\text{C}$ , 28.06.2006, coll. M. Hájek, P. Hájková & I. Apostolova, (SOM 163043).

This tall sedge was expected to be found on the Bulgarian territory, as it occurs in neighbouring SE part of Serbia (Jovanović-Dunjić 1976), Greece (Hayek 1933) and Romania (Șerbănescu & Nyárády 1966). The species reaches its southern distribution limit in Central Greece, North Italy and Central France (Chater 1980). The general distribution of the species includes Europe, the Caucasus, Siberia, Ural Mts, and Altai (Hegi 1939). *Carex appropinquata* is a good indicator of fens with well-developed peat layer. The species forms conspicuous tussocks, similar to those of *C. paniculata* and, therefore, it could be overlooked in the localities where these two sedges grow together. *Carex paniculata* is morphologically closest to *C. appropinquata*. There are several morphological characters that facilitate the easy determination of this species. Contrary to *C. panicula-*



Fig. 1. *Carex appropinquata* – herbarium specimen.

*ta*, which has entire basal sheets, *C. appropinquata* has black-brown shags formed by lengthwise disintegrated hair-like basal sheaths. It has narrower leaves (1–3 mm wide) and very short side branches of the panicle. It also has opaque venous fruits and ferruginous glumes without scarious margins, while the utricles of *C. paniculata* are slightly veined.

According to Charter (1980), *C. appropinquata* belongs to subgenus *Vignea* (P. Beauv. ex T. Lestib.) Kük. and to section *Heleoglochin* Dumort. Three taxa are included within this section: *C. appropinquata*, *C. paniculata* L. and *C. diandra* Schrank. The last one is not known for Bulgaria. All three species are distributed in wet places, especially in fens.

The species, in both localities, is accompanied by other extremely rare wetland species in Bulgaria. In the first locality, which is a fen fed by calcium-rich groundwater, developed in a karst terrain depression, *Pedicularis palustris*, *Lathyrus palustris* and *Carex disticha* normally also occur (Hájek & al. 2006a). The vegetation corresponds

to the *Caricion davallianae* Klika 1934 alliance. The second locality represents a rather large basin fen dominated by *Sphagnum contortum*, which can be designated as a rich fen of the *Sphagno warnstorffii-Tomenthypnion* Dahl 1957 alliance (compare Hájek & al. 2006b). Rare and relict vascular plant species, such as *P. palustris*, *C. buxbaumii* s.str., *C. hartmanii*, and *C. lasiocarpa*, occur generally in this locality. The species composition of both described communities is presented in Table 1.

Table 1. Species composition of the communities with *C. appropinquata* found in both localities\*.

| Species                         | Relevé |   |
|---------------------------------|--------|---|
|                                 | 1      | 2 |
| <i>Bryum pseudotriquetrum</i>   | +      | + |
| <i>Calliergonella cuspidata</i> | 2      | 1 |
| <i>Caltha palustris</i>         | +      | + |
| <i>Carex appropinquata</i>      | +      | 1 |
| <i>C. echinata</i>              | +      | + |
| <i>Eriophorum latifolium</i>    | 2      | + |
| <i>Festuca rubra</i>            | +      | + |
| <i>Lythrum salicaria</i>        | +      | + |
| <i>Parnassia palustris</i>      | 1      | 1 |
| <i>Pedicularis palustris</i>    | +      | + |
| <i>Phragmites australis</i>     | +      | + |
| <i>Plagiomnium elatum</i>       | 1      | 1 |
| <i>Potentilla erecta</i>        | 1      | + |
| <i>Ranunculus acris</i>         | r      | 1 |

#### Other species:

**Relevé 1:** *Agrostis canina* +; *Blysmus compressus* 2; *Campyllum stellatum* 2; *Carex acuta* 2; *C. disticha* +; *C. lepidocarpa* +; *C. panicea* 2; *Dactylorhiza incarnata* +; *Eleocharis palustris* 1; *E. quinqueflora* +; *E. uniglumis* 1; *Equisetum palustre* +; *Epipactis palustris* +; *Fissidens adianthoides* 2; *Juncus articulatus* 1; *Mentha aquatica* +; *Molinia horanszkyi* 2; *Succisa pratensis* +.

**Relevé 2:** *Ajuga reptans* +; *Aneura pinguis* 1; *Anthoxanthum odoratum* +; *Aulacomnium palustre* +; *Briza media* +; *Cardamine matthioli* +; *Carex curta* +; *C. lasiocarpa* 3; *C. paniculata* 1; *C. rostrata* 2; *Cynosurus cristatus* +; *Epilobium palustre* +; *Galium palustre* +; *Hieracium caespitosum* +; *Holcus lanatus* +; *Juncus effusus* +; *Lathyrus pratensis* +; *Leontodon hispidus* +; *Linum catharticum* +; *Lysimachia vulgaris* +; *Mentha arvensis* +; *Myosotis nemorosa* 1; *Nardus stricta* +; *Plantago lanceolata* +; *Poa sylvicola* +; *Rhinanthus rumelicus* +; *Rumex acetosa* +; *Scutellaria galericulata* +; *Sphagnum contortum* 4; *Trifolium velenovskyi* +; *Veronica scutellata* +.

1. To the south-eastwards of Tsruklevtsi village; *Caricion davallianae* alliance

2. One km westwards of Samokov town; *Sphagno warnstorffii-Tomenthypnion* alliance

\*Cover codes follow the seven-grade Braun-Blanquet scale. Nomenclature follows Asyov & Petrova (2006), for bryophytes Ganeva & Natcheva (2003).

Calcium-rich fens are fragile habitats and are considered endangered all over Europe. They host many rare species, as mentioned above. In this respect, *C. appropinquata* is included in many Red Lists of European countries, for example, as "strongly threatened" in the Czech Republic (Holub & Procházka 2000), "threat-



ened” in the Netherlands (van der Meijen & al. 1991), or as “vulnerable” in Finland (Rassi & al. 2001). Due to its very limited occurrence in Bulgaria, we strongly recommend to include the species in the recently elaborated Red List of the Threatened Vascular Plants and Fungi of Bulgaria (Project 3383/416, *Red Lists of Bulgarian Vascular Plants and Fungi* 2005).

The species is included in the diagnosis of the habitats 7160 Fennoscandian mineral-rich springs and spring fens and 7220 Petrifying springs with tufa formations (*Cratoneuron*) listed in the Annex I of the Directive 92/43 EEC.

### ***Cirsium rivulare* (Jacq.) All. (Fig. 2)**

Balkan Range (*Western*): at about 4 km northwards of Komshtitsa village, in a waterlogged, herb-rich meadow surrounding a rich spring fen, FN-67, 27.06.2006, coll. P. Hájková, M. Hájek & I. Apostolova & T. Meshinev, water pH was 6.5–6.7, water conductivity 160–182  $\mu\text{s}/\text{cm}/20^\circ\text{C}$  (SOM 163042).

*Cirsium rivulare* is one of the commonest dominant species of the waterlogged *Calthion* meadows in the

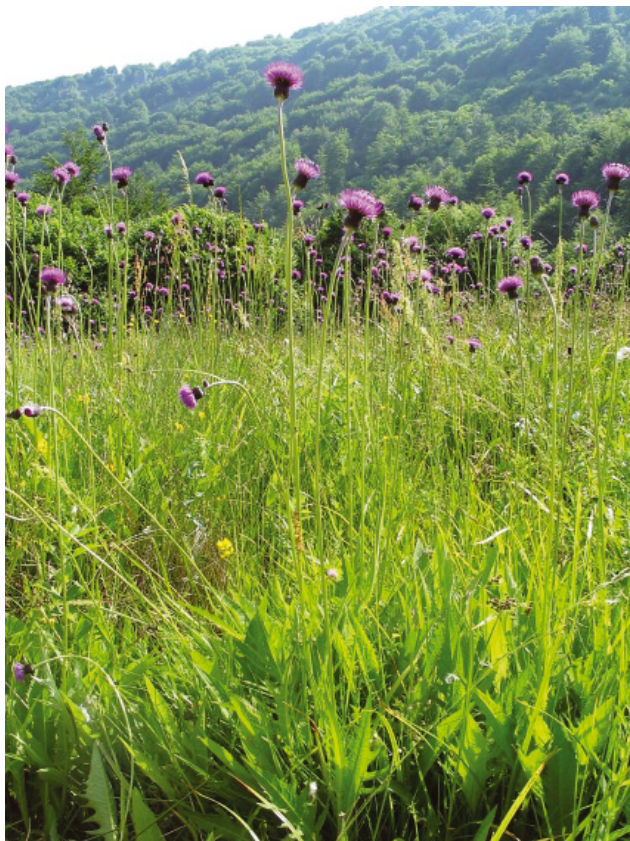


Fig. 2. *Cirsietum rivularis* meadow at Komshtitsa locality.

Alps and Carpathians (e.g. Hájková & Hájek 2005). Its finding in the Western Balkan Range confirms a close connection of this mountain range to the Carpathians. In the Komshtitsa locality, the species strongly dominates in a waterlogged meadow of the *Cirsietum rivularis* Nowiński 1927 and is also represented in the spring fen patches belonging to the *Caricion davallianae* Klika 1934 alliance dominated by *Eriophorum latifolium* and *C. lepidocarpa*. The species composition of the studied communities is presented in Table 2.

Table 2. Species composition of the communities with *C. rivulare* found in both relevés\*.

| Species                         | Relevé |   |
|---------------------------------|--------|---|
|                                 | 1      | 2 |
| <i>Ajuga reptans</i>            | +      | + |
| <i>Briza media</i>              | 1      | 1 |
| <i>Bryum pseudotriquetrum</i>   | 1      | + |
| <i>Calliergonella cuspidata</i> | 3      | 2 |
| <i>Caltha palustris</i>         | +      | + |
| <i>Carex echinata</i>           | 1      | + |
| <i>C. lepidocarpa</i>           | 2      | 1 |
| <i>Cirsium rivulare</i>         | 2      | 4 |
| <i>Climacium dendroides</i>     | 1      | 2 |
| <i>Dactylorhiza cordigera</i>   | +      | 1 |
| <i>Epilobium palustre</i>       | +      | + |
| <i>Epipactis palustris</i>      | 1      | 1 |
| <i>Eriophorum latifolium</i>    | 3      | + |
| <i>Festuca rubra</i>            | +      | + |
| <i>Galium palustre</i>          | +      | + |
| <i>Holcus lanatus</i>           | +      | + |
| <i>Juncus inflexus</i>          | +      | + |
| <i>Lythrum salicaria</i>        | +      | 1 |
| <i>Mentha longifolia</i>        | +      | 1 |
| <i>Molinia horanszkyi</i>       | 1      | + |
| <i>Palustriella decipiens</i>   | 1      | + |
| <i>Parnassia palustris</i>      | 1      | + |
| <i>Philonotis calcarea</i>      | 2      | + |
| <i>Plagiomnium elatum</i>       | 2      | 2 |
| <i>Potentilla erecta</i>        | 2      | 2 |
| <i>Rumex acetosa</i>            | +      | + |
| <i>Scirpus sylvaticus</i>       | +      | + |
| <i>Veratrum lobelianum</i>      | +      | + |

#### Other species:

**Relevé 1:** *Cynosurus cristatus* +; *Dactylorhiza saccifera* +; *Juncus articulatus* +; *Linum catharticum* +; *Mentha arvensis* +; *Myosotis nemorosa* +; *Prunella vulgaris* +; *Veronica scutellata* +.

**Relevé 2:** *Achillea millefolium* +; *Agrostis stolonifera* +; *Alchemilla glabra* 1; *Anthoxanthum odoratum* +; *Brachythecium rutabulum* +; *Carex flava* +; *C. hirta* 1; *C. pallescens* 1; *C. ovalis* +; *C. tomentosa* 1; *Cruciata laevipes* +; *Deschampsia caespitosa* +; *Festuca pratensis* +; *Filipendula vulgaris* +; *F. ulmaria* +. *Hieracium caespitosum* +; *Hypericum tetrapterum* +; *Juncus effusus* +; *Lathyrus pratensis* +; *Leucanthemum vulgare* +; *Lotus corniculatus* +; *Ononis arvensis* r; *Ranunculus repens* +; *R. acris* 1; *Trifolium pratense* +.

1. *Caricion davallianae* alliance

2. *Calthion* alliance, *Cirsietum rivularis* association

\*Cover codes follow the seven-grade Braun-Blanquet scale. Both relevés are from a locality 4 km northwards of Komshtitsa village. Nomenclature follows Assyov & Petrova (2006), for bryophytes Ganeva & Natcheva (2003).

Europe is the general distribution area of *C. rivulare*. Outside its distribution centre in the Alps and Carpathians the species occurs in the Pyrenees and Massif Central (Meusel & Jäger 1992), and in former Yugoslavia, except for Macedonia (Hayek 1928; Gajić 1975). Some uncertain reports from Albania and Greece (Werner 1976) might have been caused by misidentification of the related species *C. montanum* (Waldst. & Kit. ex Willd.) Spreng.

The taxon is included in section *Cirsium*. All representatives of this section distributed in Bulgaria [*C. appendiculatum* Griseb., *C. oleraceum* (L.) Scop., *C. pannonicum* (L. fil.) Link, *C. canum* (L.) All., *C. heterotrichum* Pančić and *C. creticum* (Lam.) D'Urv.], with the exception of *C. candelabrum* Griseb. and *C. alatum* (S.G. Gmel.) Bobrov, grow in damp or water-logged places.

*Cirsium rivulare* is a clearly distinguishable species. Its leaves are herbaceous, elliptical to oblong-lanceolate, 15–35 cm long and 2–12 cm wide (Bureš 2004), with right-angled lateral lobes. Contrary to the morphologically similar leaves of *C. erisithales* (Jacq.) Scop. (species not present in Bulgaria), interlobia are not so deep. Contrary to *C. oleraceum*, the leaves of *C. rivulare* are hairy. Capitula are solitary or in apical clusters, where some smaller lateral capitula are situated at a right-angle to the stem; corollas are purple. Involucral bracts are markedly viscid (Bureš 2004). The species is rather low, reaching up to 120 (140) cm in height (original measurements of Bureš 2004). The lower growth and the absence of a firm, recurvate and pungent spinule on the involucre reliably differentiate this species from an allied South European species *C. montanum* (Werner 1976).

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