

**Perliminary studies on the distribution of Large Golden Ringed Dragonfly (*Cordulegaster heros* Theischinger, 1979) and Golden Ringed Dragonfly (*Cordulegaster bidentata* Sélys, 1843) in the Kőszeg-mountains**

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**ABSTRACT:** In former studies the occurrence of *C. bidentata* was reported from the Kőszeg Mountainins, Bakony Mountains and Northern Mountains, *C. heros* was found in the Mecsek, the Sopron Mountains, the Órség and nowadays it has been observed in the Zselic Hills.

In the years 2008 and 2010 our examinations confirmed the occurrence of *C. heros* also in several water-flows of Kőszeg Mountains. This data provides an important piece of information considering the distribution of the species, and that was the first evidence of the co-occurrence of the two species in Hungary. The two species occupies different parts of water courses according to their different ecological requirements.

### Introduction

The great importance of *Cordulegaster* species is mirrored by the fact that they have been protected in most of the European countries and are mentioned in their Red Books. The two species of the genus are occurring in Hungary and they appear in the target list of the National Biodiversity Monitoring System. *C. heros* is the only strictly protected dragonfly species in our country, which is a Natura 2000 indicator species as well. However, we have scarce information about their distribution and ecology, which should be important from conservation point of view. The aim of this study was to clarify the distribution of *C. heros* and *C. bidentata* in the Kőszeg Mountains.

The taxonomical status of the *Cordulegaster* genus has not been clarified yet and the areas of the species (or subspecies) have been not completely defined. In the past twenty years the Hungarian distribution of the two species were investigated quite well. Nevertheless, the intensive examinations of the last 2-3 years had lot of more results such as the newly observed habitat in Zselic Hills (TÓTH 2006, 2009, CSORDÁS *et al.* 2009).

In Hungary, based on the former literatural data on distribution of the two species, they were considered to be isolated geographically. *Cordulegaster bidentata* was found in the Bakony, in the Kőszeg Mountains and in the Northern Mountains (AMBRUS *et al.* 1992b, 1994, KOVÁCS 2000, KOVÁCS *et al.* 2004, STEINMANN 1962, TÓTH 1985, 2005). *Cordulegaster heros* was known from the Sopron Mountains, from the Mecsek Mountains, from the Órség and from the Zselic Hills (AMBRUS *et al.* 1992b, 1996a, KOVÁCS *et al.* 2004, 2006, TÓTH 2004, 2006a). This species was known near the Hungarian border in Austria, Burgenland (AMBRUS *et al.* 1996b). Only AMBRUS *et al.* (1996b) reported the co-occurrence of the species *C. heros* and *C. bidentata* in Burgenland, based on larval data.

## Materials and methods

Field identification of the two species could be done precisely using ASKEW's handbook (2004) in case of the imagoes and based on AMBRUS *et al.* (1992a) in case of the larvae. In order to improve the precision of the discrimination, we tried to collect larvae, imago and exuvia from the same watercourse. It was difficult, because the exuvium were destroyed in a heavy storm which struck during the sampling period.

Imagoes were collected using 50 cm diameter net. After catching and identification, all imagoes were released. For exuvia, we checked the shoreline vegetation, tree trunks, bushes and artificial objects as well. For collection of larvae, we used 30 and 40 cm steel nets, depending on the size and depth of the waterflows. Garmin Geko 201 and Trimble Juno ST GPS receivers were used for positioning and ArcPad software for recording the data. Data were processed using ArcGIS 8.0 software.

**Abbreviations:** lv. – larva, ex. – exuvium.

## Results

In 2008 two *Cordulegaster* larvae were collected from the Cák-creek downstream Cák village. however, after a careful identification they proved to be *C. heros* larvae. Before this date only *C. bidentata* was mentioned from the Kőszeg Mountains, thus we started deeper studies in this site. The examinations were done at first between 12 and 15. June 2009, when the Hungarian Entomological Society made its field trip in the area and ensured the necessary admissions. This date was before the hatching of imagoes, thus we returned two more times during the year to observe imagoes.

### The list of data

*Cordulegaster bidentata* Selys, 1843 – Kőszeg, Hármás-creek (Eov 454918,39, 229781,60), 16.06.2010., 1 ex. 4 lv. – Kőszeg, Hétforrás (Eov 457669,54, 230400,48), 17.06.2009., 5 lv. – Kőszeg, Stájer-creek, 100 meters stage (Eov 454974,50, 228705,43), 13.06.2009., 7 lv.; 50 meters stage, (Eov 454654,25, 229515,95), 16.06.2010., 3 lv. – Velem, Borha-spring (Eov 456892,13, 226600,93), 12.06.2009., 2 lv. – Velem, Jávorkút (Eov 457094,10, 226407,12), 01.07.2009., 1 lv.

*Cordulegaster heros* Theischinger, 1979 – Bozsok, Bozsoki-creek, 100 meters stage (Eov 456767,49, 224191,15), 13.06.2009., 4 lv. – Cák, Cák-creek, 100 meters stage (Eov 458801,33, 226865,75), 13.06.2009., 59 lv. – Cák, Cák-creek (Eov 459322,06, 226225,00), 01.07.2009., 1 ex. 1 lv. – Kőszeg, Hármás-creek (Eov 455397,28, 229584,68), 12–13.06.2009., 3 lv. – Kőszeg, Hármás-creek, (Eov 454530,52, 230061,31), 16.06.2010., 1 ex. 1 lv. – Kőszeg, Stájer-creek, (Eov 454466,59, 230063,52), 16.06.2010., 1 lv. 1 ex. – Kőszeg, Vogelsangbach (Eov 453725, 231583), 14.06.2009., 3 lv. – Kőszegszerdahely, Szerdahelyi-creek (Eov 459768, 224852), 21.02.2010., 1 lv.

## Discussion

Our preliminary studies revealed:

- the presence of *Cordulegaster heros* in the Kőszeg Mountains
- that *C. heros* is occurring in the area, in some sampling points (Cák-creek) having abundant populations.

Our most important conclusion is that *Cordulegaster bidentata* is more endangered in this area than the *C. heros*. Since the larva of *Cordulegaster* species has long, even 5 year development

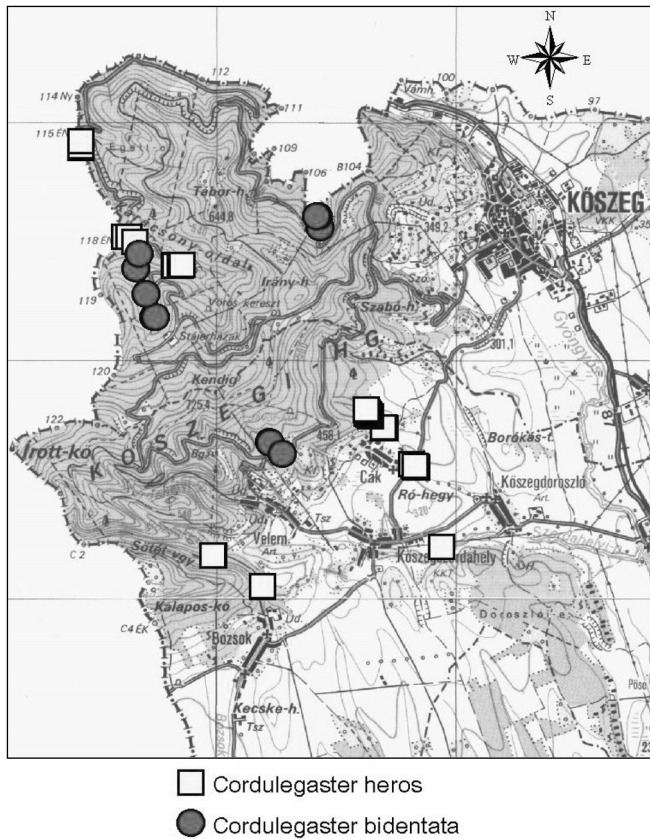


Fig. 1. Occurrence of the *Cordulegaster* species in Kőszeg Mountains

period, the species needs brooks with constant waterflow. There are only few constant springs in higher altitude regions, thus there are few available habitats for *C. bidentata*. Other problem is the heavy pollution and disturbance caused by tourism in this region. It seems that *C. heros* has wider tolerance range than *C. bidentata*, studies in other regions proved its survival under extreme conditions (eg. low oxygen concentration). Waterflows in lower altitude regions seemed more stable, they usually do not dry out, thus could ensure good habitats for *C. heros* during adverse periods.

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