

Large golden-ringed dragonfly *Cordulegaster heros* Theischinger 1979, new for the fauna of Italy (Odonata: Cordulegastridae)

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Abstract. The species has been recorded at three localities in the extreme eastern part of the Friuli-Venezia Giulia region, north-eastern Italy, thus bringing the number of Italian dragonfly species to 89. The distribution of *C. heros* in Slovenia and Italy is mapped and discussed from the zoogeographical point of view. Additionally, the collected faunistic data on other dragonfly species and sympatric occurrence of endangered frog species *Rana latastei* Boulenger are given. Due to inclusion of *C. heros* and *R. latastei* to the Annexes II and IV of the Habitat Directive of EU, the conservation of their habitats in Italy and western Slovenia is proposed within the European network of protected areas NATURA 2000.

Keywords: dragonflies, zoogeography, Habitat Directive, Natura 2000

Izveček. VELIKI STUDENČAR *CORDULEGASTER HEROS* THEISCHINGER 1979, NOVA VRSTA ZA FAVNO ITALIJE (ODONATA: CORDULEGASTRIDAE) - Vrsta je bila ugotovljena na treh lokalitetah v skrajnem vzhodnem delu Furlanije-Julijske krajine, severovzhodna Italija, kar dviguje število zabeleženih vrst kačjih pastirjev v Italiji na 89. Razširjenost vrste *C. heros* v Sloveniji in Italiji je prikazana na zemljevidih ter prediskutirana z zoogeografskega stališča. Dodatno so navedeni tudi zbrani favnistični podatki o drugih vrstah kačjih pastirjev ter podatki o simpatričnem pojavljanju ogrožene laške žabe *Rana latastei* Boulenger. Zaradi vključitve vrst *C. heros* in *R. latastei* na Dodatka II in IV Habitatske Direktive EU je predlagano, da se njuna bivališča v Italiji in zahodni Sloveniji ohranijo v okviru evropskega omrežja zavarovanih območij NATURA 2000.

Ključne besede: kačji pastirji, zoogeografija, Direktiva o habitatih, Natura 2000

Introduction

According to Utzeri (1995), altogether 88 dragonfly species occur in Italy. Despite its size, the country is odonatologically relatively well explored, and in the easternmost Italian region

of Friuli-Venezia Giulia (NE Italy) some dragonfly research has also been carried out in the past. More than 30 years ago, a comprehensive overview of dragonfly fauna of the Friuli-Venezia Giulia region was made by Kiauta (1969a), following a similar study in the neighbouring Primorska region in Slovenia (Kiauta 1969a). In addition, only a few years ago Bognolo & Pecile (1995) thoroughly studied dragonfly fauna of the Trieste and Gorizia Karst in Italy and published an annotated list of species occurring in the region. As far as the genus *Cordulegaster* is concerned, only *C. bidentata* (Selys) and *C. boltonii* (Donovan) have been recorded from Friuli-Venezia Giulia so far (Kiauta 1969a, Bognolo & Pecile 1995). Until now, however, one of the most enigmatic European dragonfly species, *Cordulegaster heros* Theischinger, escaped the notice of odonatologists and has not been reported for Friuli-Venezia Giulia or for Italy as a whole yet (Utzeri 1995, Galletti & Pavesi 1985).

According to Wasscher & Bos (2000), *C. heros* is one of the ten dragonfly species endemic to Europe. Two additional *Cordulegaster* species, viz. *C. trinacriae* and *C. helladica*, are also confined to Europe, whereby the range of the first is limited to Sicily and southern Italy and that of the later to Greece. *C. heros* also has a relatively small range, occurring in Austria, Slovenia, Hungary, Croatia, Serbia, Macedonia, Bulgaria, Romania and Greece. Recently it was discovered in Slovakia (Blaškovič et al., in print), and the present article formally extends its distribution range to Italy.

In Slovenia, the species is quite common and it has been recorded by the members of the Slovene Odonatological Society from more than 340 localities (Fig. 1), whereas development of the species has been documented in more than 260 localities (Kotarac et al. 2003). The exceptional number is even more impressive by the fact that the number of all other known European localities of the species is by far lower. If the proportion of unsuitable habitat for *C. heros* in most of the Pannonian lowlands is taken into account, the speculation that Slovenia actually represents the core area of the species' distribution range in Europe is not far from reality.

However, in western Slovenia, close to the border to Italy, where *C. heros* reaches the extreme north-western edge of its European range, the suitable habitat is much scarcer and limited only to few stream catchments in the wider surroundings of the Vipava valley. The distribution of the species in this part of Slovenia has been described in detail by Bedjanič & Pirnat (2000), gathering their observation with the faunistic data from Pirnat (1996), Červek (1997), Kotarac (1997), Šalamun et al. (1997) and Bedjanič (2000). Few additional localities

have been added by Pirker (2002), and a very comprehensive overview has been presented by Kotarac et al. (2003).

Since the distribution of any living species is rarely limited by the state borders, the idea that *C. heros* might also occur in north-eastern Italy is not new in the minds of Slovene odonatologists. Kotarac (1997) has already predicted this possibility with the following words: "We started to collect the data about *C. heros* in the eastern parts of Slovenia. In five years we harrowed the species to two spots about 1 km away from the national border with Italy. It is the turn of Italian odonatologists now." In addition, Bedjanič & Pirnat (2000) stated in a similar way: "It is interesting that so far *C. heros* has not been found in Italy, although it goes without saying that its already mentioned north-western distribution edge probably extends also to the western side of the Soča River."

Quite surprisingly, nobody took over the pleasant challenge for years and there was no other possibility than to finally clear the situation by ourselves.

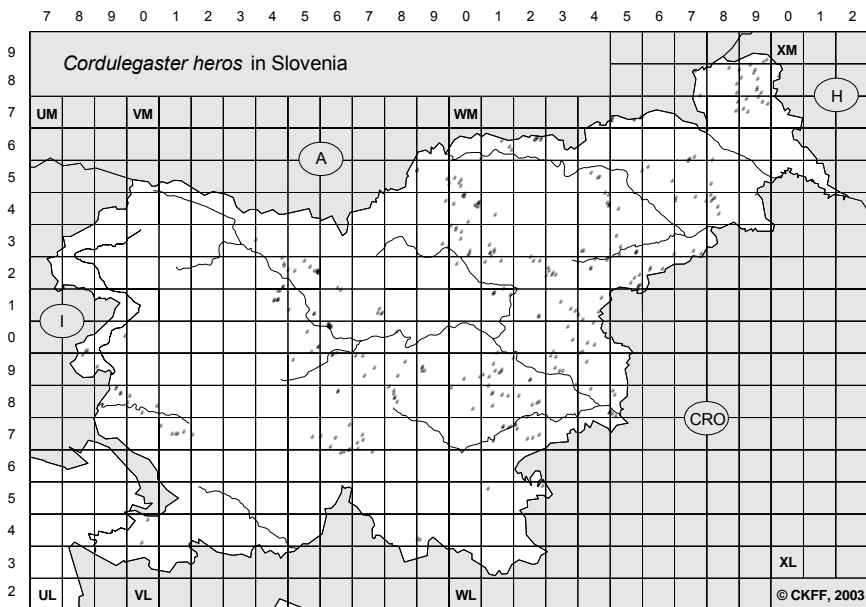


Figure 1: Distribution of *Cordulegaster heros* in Slovenia. Members of the Slovene Odonatological Society recorded the species from more than 340 localities and documented its development at more than 260 localities.

Slika 1: Razširjenost velikega studenčarja v Sloveniji. Člani Slovenskega odonatološkega društva so vrsto popisali na več kot 340 lokalitetah ter potrdili razvoj na več kot 260 lokalitetah.

Localities and faunistic data

On March 23rd, 2003, a number of streams between the Isonzo (Soča) and Iudrio (Idrija) rivers in the extreme eastern part of Friuli-Venezia Giulia (NE Italy) were systematically checked by the authors for the presence of dragonflies and frogs. Special interest was dedicated to the dragonfly species *Cordulegaster heros* Theischinger and the frog species *Rana latastei* Boulenger, which both are endangered and listed on the Annexes II and IV of the EU Habitat Directive.

The dragonfly fauna was sampled randomly at subjectively defined suitable places by the means of larvae collecting with a home-made water net. Larvae of *C. heros* were determined on the spot, checking specific characters by the help of magnifier (e.g. the presence and size of lateral spines on the ninth abdominal segment) and released afterwards. Individual frogspawns of *R. latastei* were visually counted at each locality at approximate stream length of 100-200 m. Although a number of streams were checked, only the ones with recorded presence of dragonflies and frogs are listed in further text. Beside exact geographical description, the UTM square and approximate altitude are given for each of the sites (Fig. 2).

The voucher material of *C. heros* was taken at the Rio Sniardar stream only. One dried final instar larva is deposited in the collection of the first author. The second larva from the same locality was reared in aquarium but died during the final shedding. The specimen is deposited in the second author's collection.

LOC 1A: Stream Groina (Grojnica) NW of Gorizia, 750 m above the place where it joins the Isonzo river (Soča); Gorizia (Gorica); Friuli-Venezia Giulia; NE Italy; UTM UL 99; alt. 80 m;

DRAGONFLIES: *Cordulegaster heros* 1 lar.

LOC 1B: Stream Groina (Grojnica) NW of Gorizia, 1 km above the place where it falls into the Isonzo river (Soča); Gorizia (Gorica); Friuli-Venezia Giulia; NE Italy; UTM UL 99; alt. 80 m;

DRAGONFLIES: *Somatochlora meridionalis* 1 lar.

FROGS: *Rana latastei* 25 spawns

LOC 2A: Left tributary of the stream Groina (Grojnica) close to the road to Scedina (Ščedno), 100 m above the spot where it joins the Groina; Gorizia (Gorica); Friuli-Venezia Giulia; NE Italy; UTM UL 99; alt. 80 m;

DRAGONFLIES: *Calopteryx virgo* 1 lar.

FROGS: *Rana latastei* 5 spawns

LOC 2B: Left tributary of the stream Groina (Grojnica) close to the road to Scedina (Ščedno), 700 m above the spot where it joins the Groina; Gorizia (Gorica); Friuli-Venezia Giulia; NE Italy; UTM UL 99; alt. 90 m;
 DRAGONFLIES: *Cordulegaster heros* 1 lar.
 FROGS: *Rana latastei* 10 spawns

LOC 2C: Left tributary of the Groina (Grojnica) at the bridge on the road to Scedina (Ščedno), 950 m above place where it joins the Groina; Gorizia (Gorica); Friuli-Venezia Giulia; NE Italy; UTM UL 99; alt. 90 m;
 DRAGONFLIES: *Cordulegaster heros* 1 lar.
 FROGS: *Rana latastei* 26 spawns

LOC 3: Stream Rio Sniardar (Smjardar) NE of Brazzano (Bračan), 100 m above the place where it joins the Rio Fidri stream (Fedrih); Brazzano; Cormons (Krmín); Friuli-Venezia Giulia, NE Italy; UTM UL 89; alt. 80 m;
 DRAGONFLIES: *Cordulegaster heros* 13 lar., *Calopteryx virgo* 2 lar., *Platycnemis pennipes* 1 lar.
 FROGS: *Rana latastei* 7 spawns

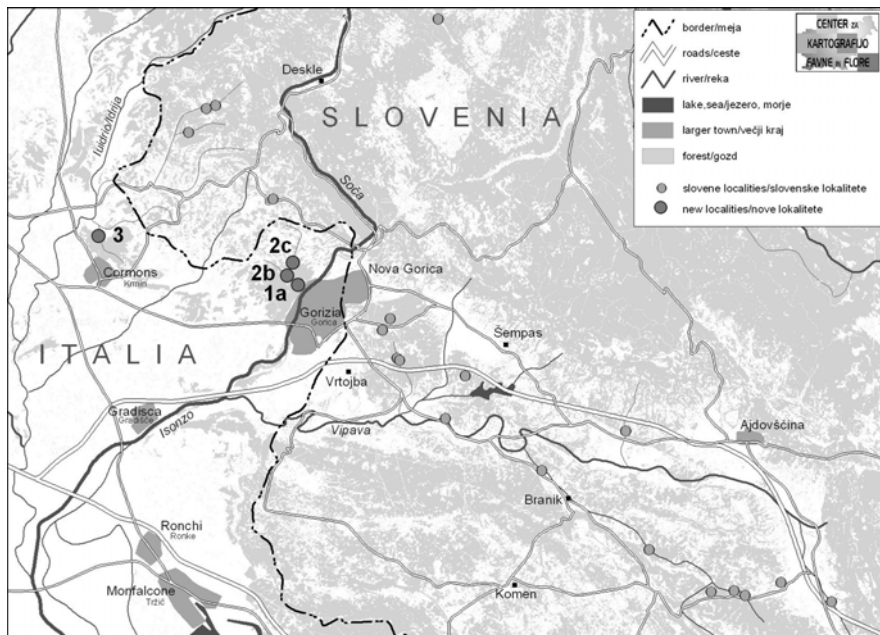


Figure 2: Distribution of *Cordulegaster heros* in western Slovenia and eastern part of Friuli-Venezia Giulia, northeastern Italy, with numbers indicating the three new Italian localities, where the species has been recorded recently.
 Slika 2: Razširjenost velikega studenčarja v zahodni Sloveniji ter vzhodnem delu Furlanije-Juljske krajine, severovzhodna Italija. Nove najdbe vrste so označene s številkami.

Discussion

As already stated in the introductory part, the occurrence of *Cordulegaster heros* in the eastern part of Friuli-Venezia Giulia has been predicted and expected and is therefore not surprising at all. Even more, based on the experience from numerous Slovenian localities, the suitable places for *C. heros* were determined with the aid of a 1:50000 map in advance with great certainty and later on merely confirmed in the field. The recipe for such "map remote sensing" planning is quite simple: (1) stream in hilly to lowland landscape, (2) only gentle slope of the field, (3) altitude 100-400 m and (4) presence of forest. Such predispositions logically originate in ecological demands of the species. *C. heros* is essentially a dragonfly of small forest streams in the hilly country down to the flatlands. The strongest populations can be found in slow to moderate flowing agitated streams, where their bottoms consist of fine sand covered by a thin layer of fine organic detritus. These structures enable the larvae to burrow themselves in the bottom and, on the other hand, ensure a rich supply of invertebrate prey. Three new localities of *C. heros* in Italy are quite different in this respect. The Groina stream near Gorizia and its tributaries seem to be a suboptimal habitat for *C. heros* due to their stony beds and their drying up in the hot summer months (Fig. 3). Scarcity of other water invertebrates and very poor dragonfly fauna, consisting of single *Calopteryx virgo* and *Somatochlora meridionalis* larvae, could confirm the last assumption. On the other hand, the Rio Sniardar stream near Brazzano is an optimal habitat for *C. heros*. Its shallow water, slow current, appropriate fine substrate, rich water invertebrate fauna and natural bank vegetation agree well with the ecological demands of the species (Figs. 4, 5). Sympatric occurrence of common dragonfly species *Calopteryx virgo* and *Platycnemis pennipes* is not surprising either.

According to literature, both other *Cordulegaster* species, viz. *C. bidenatata* and *C. boltonii*, are rare in the Friuli-Venezia Giulia region (Kiauta 1969b, Bognolo & Pecile 1995). The latter has been recorded only in the vicinity of Pontebba in the Alpine northeastern part of Friuli-Venezia Giulia, some 60 km north of newly discovered *C. heros* localities. Since *C. boltonii* and *C. heros* are closely related, it would be very interesting to work out the exact limits of their range in this part of Europe. It is worth mentioning that the well established list of Slovene odonate fauna may be incomplete in this respect. Although numerous old records of *C. boltonii* from Slovenia have been attributed only to *C. heros* described in 1979 (Kotarac 1997), it is quite possible that *C. boltonii* occurs somewhere in northwestern Slovenia.

In any case, western Slovenia and the eastern Friuli-Venezia Giulia almost definitely constitute the extreme north-western edge of *C. heros* European range. Further to the west, the landscape flows into intensively farmed deforested plains, and not far to the north there are the Alps, both with almost no suitable habitat for this particular species. Although the

three new Italian localities in the surroundings of Gorizia and Cormons are certainly not the only ones, the potential habitat of *C. heros* in Italy is very limited and the species therefore definitely rare and endangered. South of Gorizia, there are no streams due to the area's karst landscape, but to the north some streams around Corno di Rosazzo and east of Cividale look very promising - at least on the map. In the field, there is indeed "...the turn of Italian odonatologists now."



Figure 3: Groina Stream NW of Gorizia, 750 m above the place where it joins the Isonzo river (Loc 1a). Suitable *Cordulegaster heros* microhabitat in the stream is very scarce, the bottom is too stony and at least some stream sections probably dry up during the summer. (Photo: M. Bedjanič)

Slika 3: Potok Grojnica SZ od Gorice, 750 m nad izlivom v Sočo (Lok 1a). Za velikega studenčarja primernih mikrohabitatov je malo, saj je struga kamnita, vsaj nekateri odseki potoka pa se poleti verjetno posušijo. (foto: Matjaž Bedjanič)



Figure 4 (left) and Figure 5 (right): Two aspects of the Rio Sniardar stream near Brazzano (Loc 3) above the place where it joins the Rio Fidri stream. Its shallow water, slow current, appropriate fine substrate and natural bank vegetation constitute an ideal habitat for *Cordulegaster heros*. (Photo: M. Bedjanič)

Slika 4 (levo) in Slika 5 (desno): Dva pogleda na potok Smjardar pri Bračanu nad izlivom v potok Fedrih (Lok 3). Plitva voda, miren tok, droben substrat ter naravna obrežna vegetacija sestavljajo idealen habitat za velikega studenčarja. (foto: Matjaž Bedjanič)

Nature conservation aspect

As mentioned earlier, a special attention was paid, in addition to *Cordulegaster heros*, to the frog species *Rana latastei*. Both species are endangered and listed on the *Annexes II* and *IV* of the *EU Habitat Directive (The Council Directive 92/43 EEC on the Conservation of Natural Habitats and on Wild Fauna and Flora, Off. Journal of the EC, No.L.206/7)*. They are stenotopic and live or breed almost exclusively in primary habitats, such as smaller forest streams and rivulets. The inclusion of *C. heros* and *R. latastei* to the *Annexes II* of the above-mentioned directive demands conservation of their habitats and obligates all member states, including Italy and Slovenia, to ensure long-term favourable conservation status for the

species in their territories. Their sympatric occurrence can therefore be of a great nature conservation importance.

As far as the newly discovered localities of *C. heros* in Italy are concerned, the Rio Sniardar stream near Brazzano (LOC 3) can definitely be proposed as future *SITE OF COMMUNITY IMPORTANCE (SCI)*, since it presents an ideal habitat for *C. heros* and *R. latastei* as well. On the other hand, additional faunistic research is needed in order to clear the status of *C. heros* in Italy. A study of the species' occurrence in the streams around Corno di Rosazzo and east of Cividale should be accomplished as soon as possible. Only then an assessment of the size and stability of the Italian *C. heros* population as well as an evaluation of potential threats and planning of appropriate conservation measures will be possible.

According to the strict provisions of the European Habitat Directive, Italy too should provide for a long-term survival of the *C. heros* population in its territory and effectively protect the species' selected habitats. Due to the fact that the eastern Friuli-Venezia Giulia constitutes the extreme north-western edge of *C. heros* European range, this obligation is even more important. In this respect, the sympatric occurrence of *C. heros* and *R. latastei* can serve as an additional argument. It can facilitate the designation of suitable habitats of both species as *SITES OF COMMUNITY IMPORTANCE (SCI)* and herewith ensure their inclusion in European NATURA 2000 network. In this respect, the action already undertaken by Slovenia can serve as a good example (Kotarac et al. 2003, Pobljšaj & Lešnik 2003).

Povzetek

Italija je z vidika favne kačjih pastirjev razmeroma dobro raziskana in tudi v njenem severovzhodnem delu - Furlaniji-Juljski krajini - je v preteklosti potekalo nekaj odonatoloških aktivnosti (npr. Kiauta 1969b, Bognolo & Pecile 1995). Iz rodu studenčarjev *Cordulegaster* sta bila doslej v Furlaniji-Juljski krajini zabeležena le povirni studenčar *C. bidentata* in prodni studenčar *C. boltonii*. Veliki studenčar *C. heros* doslej še ni bil zabeležen v omenjeni regiji in Italiji nasploh (Utzeri 1995, Galletti & Pavesi 1985).

Veliki studenčar je razširjen na razmeroma majhnem območju, ki se razteza prek Slovaške, Avstrije, Slovenije, Madžarske, Hrvaške, Srbije, Makedonije, Bolgarije, Romunije in Grčije, s pričujočim prispevkom pa se območje znane razširjenosti vrste razteza tudi v Italijo. V Sloveniji velja veliki studenčar *C. heros* za dokaj pogosto vrsto, saj je bil doslej zabeležen na prek 340 lokalitetah (Fig. 1), njegov razvoj pa potrjen na prek 260 lokalitetah (Kotarac et al. 2003). V zahodni Sloveniji, blizu meje z Italijo, dosega veliki studenčar *C. heros* skrajno severozahodno mejo območja razširjenosti in je mnogo redkejši (Kotarac et al. 2003). Kljub temu je bila najdba vrste v Italiji pričakovana in so jo napovedovali že Kotarac (1997) ter Bedjanič & Pirnat (2000).

V okviru raziskav kačjih pastirjev in dvoživk sta avtorja 23. marca 2003 pregledala nekaj potokov med rekama Idrijo (Iudrio) in Sočo (Isonzo) v skrajnem vzhodnem delu Furlanije-Juljske krajine. Posebna pozornost je bila namenjena potrditvi pojavljanja velikega studenčarja *C. heros* in laške žabe *Rana latastei*, ki sodita med evropsko ogrožene vrste in sta uvrščena na Dodatka II in IV Habitatne direktive EU. Vrsti sta bili zabeleženi na skupno treh lokalitetah v okolici Gorice (Gorizia) in Krmina (Cormons) (Fig. 2).

Potok Grojnica (Groina; Lok. 1A-B in 2A-C; Fig. 3) in njegovi pritoki zaradi neustreznega kamnitega substrata ter zelo verjetne poletne izsušitve niso ocenjeni kot najustreznejši habitat velikega studenčarja *C. heros*. Po drugi strani je potok Smjardar (Rio Sniardar, Lok. 3; Figs. 4, 5) pri Bračanu (Brazzano) ocenjen kot optimalen habitat te vrste. Gre za razmeroma plitev in počasi tekoč nižinski potok, katerega dno je pokrito z ustreznim drobnim substratom, kar se skupaj z bogato favno vodnih nevretenčarjev ter naravno obvodno vegetacijo v celoti pokriva z ekološkimi zahtevami velikega studenčarja *C. heros*.

Po podatkih iz literature sta tako povirni studenčar *C. bidentata* kot prodni studenčar *C. boltonii* v Furlaniji-Juljski krajini zelo redka (Kiauta 1969b, Bognolo & Pecile 1995). Ker je slednji v taksonomskem oziru zelo soroden velikemu studenčarju *C. heros*, bi bilo v prihodnosti zelo zanimivo podrobneje raziskati meje območij njune razširjenosti v severovzhodni Italiji in severozahodni Sloveniji. Novo odkrite lokalitete velikega studenčarja *C. heros* v Italiji nedvomno ležijo na skrajnem severozahodnem robu območja njegove razširjenosti. Sicer pa bo treba razširjenost in ogroženost velikega studenčarja v Italiji ter potencialno možnost, da se pojavlja tudi še nekoliko severneje, v okolici Korena (Corno di Rosazzo) in Čedadada (Cividale del Friuli), preveriti z novimi raziskavami.

Z naravovarstvenega vidika je še posebej pomembno simpatrično pojavljanje velikega studenčarja *C. heros* in laške žabe *Rana latastei*. Gre namreč za evropsko ogroženi vrsti z relativno ozko ekološko valenco, ki naseljujeta skoraj izključno naravno ohranjene nižinske gozdne potoke. *Direktiva o habitatih* zavezuje Italijo in Slovenijo k ustreznemu ohranjanju njihovih bivališč in zagotavljanju dolgoročno ugodnega ohranitvenega stanja njihovih populacij. V tem oziru avtorja predlagata, da se njuna bivališča v Italiji in zahodni Sloveniji ohranijo v okviru evropskega omrežja zavarovanih območij NATURA 2000.

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