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A population of *Cordulegaster insignis* (Schneider, 1845) in Macedonia (Odonata: Cordulegastridae)

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Holuša O. & Křivan V. 2012: A population of *Cordulegaster insignis* (Schneider, 1845) in Macedonia (Odonata: Cordulegastridae). *Acta Musei Moraviae, Scientiae biologicae* (Brno) **97(2):** 1–5. – On 23 May 2010 one male and on 19 June 2011 3 males of *Cordulegaster insignis* were found in the environs of Novačani village near the town of Veles (41°45′56.348″N, 21°44′56.027″E) in central Macedonia. The occurrence of a permanent population and other *Cordulegaster* species in Macedonia is discussed.

Keywords. *Cordulegaster insignis*, Cordulegastridae, Odonata, Macedonia, faunistics, new records

Introduction

Cordulegaster insignis (Schneider, 1845) is part of the pontic faunistic element, of pontic-eastern-Mediterranean occurrence. The species is categorized in terms of its zoogeographical occurrence into Mediterranean zoogeographical groups and Balkan-Mediterranean species (Beshovski 1994). In terms of taxonomy, it belongs to the *bidentata*-group of the genus *Cordulegaster* (Boudot 2001). Imagos of this species are the smallest in the genus with regard to body size, and it is also the most variable species of the genus (several subspecies are known) (Boudot *et al.* 2009, Kalkman 2006).

The species occurs in part of the eastern Mediterranean, in the south-eastern part of the Balkan Peninsula and in Asia Minor (Boudot *et al.* 2009, van Pelt 2006). Its centre of occurrence lies in Turkey, and its western boundary around the northern and the eastern Aegean Islands (i.e. Chios, Ikaría, Lésvos, Sámos, Samothráki and Thássos) (Lopau 1995, 1999, 2010). On the continent of Europe it is known to occur in the eastern half of Bulgaria (Beshovski 1993, Marinov *et al.* 2007) and there are records from Romania, if unclear (St Quentin 1971). The current state of knowledge places the species only rarely to the west of an imaginary line: 'island of Thassos in Eastern Greece – the town of Svilengrad in south-eastern Bulgaria – the towns Sliven – Ruse in northern Bulgaria'.

The species inhabits springs and small, shallow streams in cultivated landscape and in forest complexes with rich stands of vegetation. It has only rarely been observed in still waters. The main flight period begins in the second decade of May and lasts until the beginning of August, with peak flight times throughout the month of June (Kalkman 2006, Kalkman & Van Pelt 2006, Lopau 2010). The species is classified in the Mediterranean Red List as "Endangered with unknown population trend" (Kalkman *et al.* 2010).

This paper records the westernmost occurrence of species in Europe, in central Macedonia, and thus outside its current known range.

Results

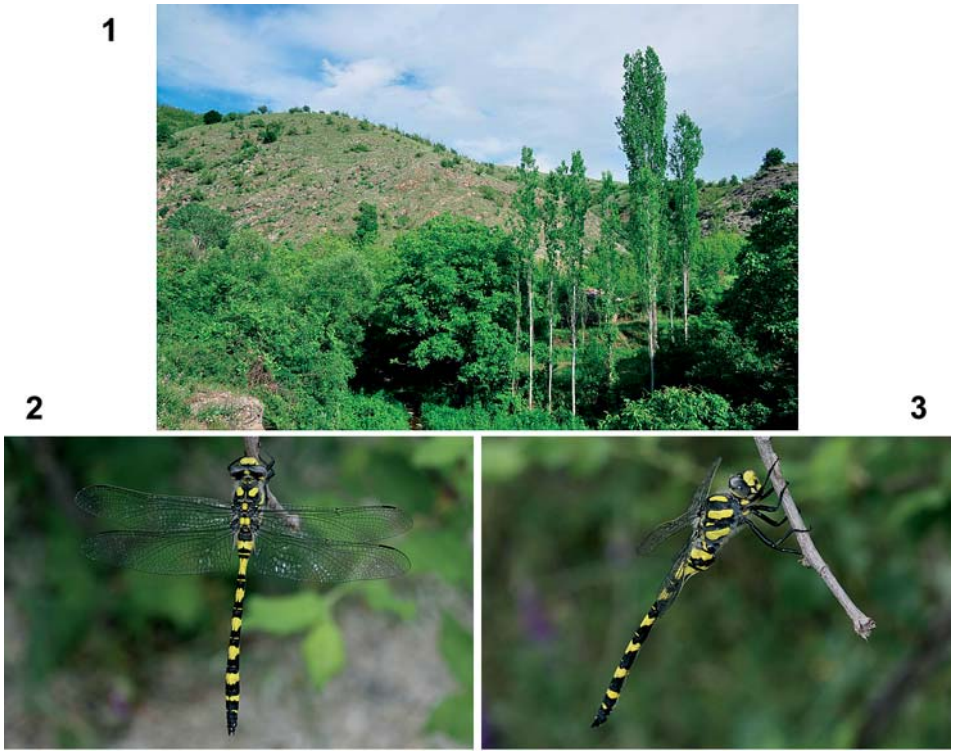
Odonatological surveys in Macedonia have included a detailed examination of the locality of Novačani village, which lies approx. 5 km north-west of the town of Veles. The locality is a narrow, deep, canyon-type creek valley in limestone bedrock. The stream is a left-hand tributary of the River Vardar (see Fig. 1.). The environs of the stream include xerothermic vegetation on steep rocky slopes, with areas of open flow accompanied by dense tree cover (*Populus* sp., *Salix* sp., *Ulmus* sp., *Castanea sativa* and *Juglans regia*) and shrubs of *Rubus* sp. The body of the stream is about 1.5 to 2 m wide, in some places less than a metre, with a depth of 10–15 cm. It lies largely in shadow with its smaller sunny sections densely overgrown with aquatic vegetation – stands of *Berula erecta* and *Rubus* sp. The substrate of the stream bed is muddy, but in some places the bottom is made up of a mixture of mud and gravel. Small pools occur here and there and on-site findings included the remnants of a millrace with slow-flowing water. The Mladost dam lies about 2 km upstream and is used for recreational purposes.

Adults specimens were sought along the stream bed, but also in gaps among the surrounding vegetation. Adults were caught or photographed for determination. Approx. 500 m of stream was examined for larvae, sought by sluicing sediments; bankside vegetation was also scrutinised for exuviae.

Material. One male of *Cordulegaster insignis* (Figs 2, 3) was found on 23 May 2010 (lgt. V. Křivan, photo P. Mückstein, document specimen in coll. O. Holuša) in the village of Novačani near the town of Veles (41°45′56.348″N, 21°44′56.027″E, altitude 218 m) in central Macedonia; 3 males were observed at the same locality on 19 June 2011 (photo Z. Hanč); The following species of dragonflies were also observed: 23 May (27 May) 2010 – *Calopteryx virgo, Coenagrion ornatum, Pyrrhosoma nymphula, Ischnura elegans, Orthetrum anceps*, 19 June 2011 – *Calopteryx splendens*, *Calopteryx virgo* and *Coenagrion ornatum.*

Discussion

The specimens were found at the beginning of the "flight activity" of *Cordulegaster insignis*, in all cases teneral imagos, confirmed by the eye colour of all the examples documented: eyes dull grey-blue (see Figs 2, 3). That more individuals were found over the course of the two years confirms the occurrence of a population of the species in the vicinity. It appears likely that the three teneral specimens of *Cordulegaster* migrated together for a considerable distance. Imagos appearing at the edge of forest-steppe vegetation with shrubs is appropriate to what is known of the behaviour of teneral individuals of *Cordulegaster* which, after emergence, tend to fly into the open and sunny places in which they mature. A permanent population probably occupies the site and its immediate surroundings, but the larva survey of streams revealed nothing. The character



Figs 1–3. 1 – View the locality of the village of Novačani near the town of Veles in central Macedonia; stream below. 2 – Male of *Cordulegaster insignis*. 3 – Lateral view of the male of *C. insignis*. All photos May 23, 2010 by Petr Mückstein.

of the stream, especially its predominance of muddy sediments, is not in accord with the ecological demands of the species. A more suitable habitat probably remains to be found somewhere nearby.

This finding is the westernmost occurrence of the species, approximately 95 km south-west of the historical record near the town of Kjustendil in western Bulgaria (Nedelkov 1923). Only Nedelkov (1923) maintains that the species occurs in the territory of Macedonia and that it reached this locality along the valley of the River Struma. However, the site lies around 260 km from the known permanent area in Greece, and is 420 km from the Bulgarian sites. A similar finding, a small area west of the main area, was made in 2007 for the related *Cordulegaster picta* (Gligorović *et al.* 2008). This is also a small, isolated area several hundred kilometres from a known main area. Both cases probably involve the occurrence of small isolated area that has hitherto escaped attention, rather than an expansion of range. The finding is very interesting with regard

to the known occurrences of species of the genus *Cordulegaster* in Macedonia, of which there are, generally speaking, very few (see Karaman 1984, 1992).

Macedonia is located in an area within the distribution ranges of *Cordulegaster bidentata* and *Cordulegaster heros* (Van Pelt 2006). *Cordulegaster bidentata* is widespread in the more hilly, colder areas (Peters & Hackenthal 1986). The range of *C. bidentata* is thus not continuous, but consists of "islands" in the highest mountains, and from a global perspective this terrain appears on the one hand in the territory of Albania and on the other in the territory of Bulgaria, where the species is known from the mountains in the west (Beshovski 1993). *C. heros*, however, is typical of lower altitudes and probably extends to suitable habitats in the lowlands, especially along the valley of the River Vardar (Holuša, unpubl.).

The habitat requirements of *C. insignis* are similar to those of *C. bidentata* but *C. insignis* species tend to occupy them at lower, warmer altitudes. Generally *C. insignis* is considered one of the rarer species in Europe, a result of its geographical occurrence and ecological demands. However, the nature of its bionomy makes it possible that it has escaped attention in many localities in Macedonia.

The species is classified as "Endangered with unknown population trend" in the Mediterranean Red List (Kalkman *et al.* 2010). For the territory of Bulgaria, Marinov *et al.* (2007) proposed its inclusion in the Red List of Bulgaria with "Critically endangered" status.

Conclusion

Cordulegaster insignis was disclosed as a new member of the dragonfly fauna of Macedonia. Observation of a number of teneral specimens over a period of two years in the same place (near the village of Novačani near the town of Veles in central Macedonia) appears to indicate a permanent population. This finding is a small area about 260 km west of the nearest known permanent occurrence, in Greece.

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