

The first findings of larvae of *Cordulegaster insignis* (Odonata: Cordulegastridae) in Macedonia

První nález larev *Cordulegaster insignis* (Odonata: Cordulegastridae) v Makedonii

Otakar HOLUŠA & Kateřina HOLUŠOVÁ

Faculty of Forestry and Wood Technology, Mendel University in Brno,
Žemědělská 3, CZ-613 00 Brno, e-mail: holusao@email.cz

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Abstract. Ten larvae of *Cordulegaster insignis* (Schneider, 1845) were found on 6th July 2012 at site Novačani village near Veles town in central Macedonia. The finding of larvae of several instars shows the permanent occurrence of the species in Macedonia.

INTRODUCTION

Cordulegaster insignis (Schneider, 1845) occurs in the southeastern part of the Balkan Peninsula and Asia Minor (BOUDOT 2001; BOUDOT et al. 2009; VAN PELT 2006). Centre of occurrence lies in Turkey, the western boundary of the occurrence lies in space of the East Egean Islands, i.e. Chios, Ikária, Lésvos, Sámos, Samothráki and Thássos (LOPAU 1995, 1999, 2010). On the continental Europe the occurrence is known from the southeastern Balkan Peninsula, i.e. eastern half of Bulgaria (BESHOVSKI 1993; MARINOV et al. 2007), and unclear record in Romania (ST QUENTIN 1971; MANCI 2012). The species inhabits springs and small shallow streams in cultural landscape or in forest complexes with rich vegetation stands. The main flight period begins in the second decade of May and lasts until the beginning of August (KALKMAN 2006; KALKMAN & VAN PELT 2006; LOPAU 2010). The species is classified as endangered with unknown population trend in the Mediterranean red list (KALKMAN et al. 2010).

As a new member of the dragonfly fauna of Macedonia, imagoes of this species were found at the site Novačani near Veles town in central Macedonia in 2010 and 2011. This record is very interesting, because known occurrence is about 260 km eastwards in Greece (HOLUŠA & KŘIVAN 2012). On the other hand, the occurrence, but only of one female, was found also in 2011 in southern Serbia in the surroundings of Sokobanjska Moravica River near Aleksinac (KULIĆ et al. 2012).

Aim of this paper is to introduce a significant finding of larvae as a confirmation of reproducing population of *Cordulegaster insignis* in Macedonia.

MATERIAL AND SITE DESCRIPTION

Ten larvae of *Cordulegaster insignis* (Fig. 1) were found on 6th July 2012 (leg. O. Holuša et K. Holušová, voucher specimen in coll. O. Holuša) in the Novačani village near Veles town (41°45'56.348''N, 21°44'56.027''E, 218 m a.s.l.) in central Macedonia. The description of the site was published by HOLUŠA & KŘIVAN (2012). Stream bed was searched on the length of 500 m. Larvae were found at two places where the stream bed was not completely overshadowed by tree vegetation, with the channel width 80–110 cm, and water column depth 1–3 cm. Those places were covered with densely overgrown vegetation with stands of *Berula erecta* (Huds.) Coville and with dense vegetation of *Rubus ulmifolius* Schott on the banks. Substrate in the stream basin was fine sand mixed with mud, some places of the bottom were made up of a mixture of gravel or small stones. Larvae were found near of the shore and also in the middle of the bed where *B. erecta* stems grow at the bottom. Plant nomenclature follows www.biolib.cz (ZICHÁ 2009).

RESULTS AND DISCUSSION

The species *Cordulegaster insignis* was found at this site for the first time in 2010, and repeatedly in 2011 (HOLUŠA & KŘIVAN 2012). In both cases teneral imagoes were found. The authors believed that a stable and reproducing population probably occurred there, although larvae had not been found in the streams. Presumptive evidence of a stable population was established on the base of finding more teneral individuals within two years. And also finding of the imagoes at the edge of forest-steppe vegetation with shrubs corresponded to the behaviour of teneral individuals of *Cordulegaster*, which after emergence fly to open and sunny places where they mature. Therefore the authors expressed assumption in larval development of more appropriate places than a survey was carried out. Character of stream, especially sediments in the surroundings, where teneral adults were found, did not correspond to ecological demands of the species (dominance of muddy sediments). At the bottom of this stream the bed was more muddy, more overshadowed with tree vegetation and the water was much deeper.

The observed character of the microhabitat where the larvae were found, fully agree with the habitats known from other parts of the species' area, e.g. habitats at Samothraki island in eastern Greece, where larvae were found in shallow parts of small streams with rich stands of *Mentha longifolia* (L.) L. Larvae were found across the width of the stream, especially in the places, where the stems of *Mentha longifolia* grew up directly across the whole bed and the water depth was 1–2 cm (Holuša O. unpubl.).

Finding more larvae of several instars indicates a stable and reproducing population of the species at this site. Because the stream is located below a dam lake, there is an assumption that water in the stream will not dry out during the whole year and therefore this will not endanger the development of larvae.

Area of *Cordulegaster insignis* probably involves more separate smaller areas as outside of the known continuous species area, i.e. southeast of Balkan Peninsula, which may be confirmed by the new record of one female in 2011 in southern Serbia in the surroundings of Sokobanjska Moravica River near Aleksinac (KULIĆ et al. 2012).

CONCLUSION

Occurrence of species *Cordulegaster insignis*, which was recently found as a „new“ member of the Odonata fauna of Macedonia (HOLUŠA & KŘIVAN 2012), was confirmed at the site Novačani near Veles town in central Macedonia. There were found 10 specimens of larvae of more instars. This fact and permanent watercourse due to location below to dam lake indicates a stable and reproducing population of *Cordulegaster insignis* at this site and also confirm this species as stable member of Odonata fauna in Macedonia.

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REFERENCES

- BESHOVSKI V. L. 1993: A critical notes on some Odonata species (Insecta, Odonata), reported by Bulgarian authors for the territories of Bulgaria, Greece and Macedonia. *Acta Zoologica Bulgarica*, 46: 39–43.
- BOUDOT J. P. 2001: Les *Cordulegaster* du Paléarctique occidental: identification et répartition (Odonata, Anisoptera, Cordulegastridae). *Martinia*, 17: 1–34.

- BOUDOT J. P., KALKMAN V., AZPILICUETA AMORÍN M., BOGDANOVIĆ T., RIVERA A. C., DEGABRIELE G., DOMMANGET J. L., FERREIRA S., GARRIGÓS B., JOVIĆ M., KOTARAC M., LOPAU W., MARINOV M., MIHOKOVIĆ N., RISERVATO E., SAMRAOUI B. & SCHNEIDER W. 2009: Atlas of the Odonata of the Mediterranean and North Africa. *Libellula Supplement*, 9: 1–256.
- HOLUŠA O. & KRIVAN V. 2012: Finding of population of *Cordulegaster insignis* (Schneider, 1845) in Macedonia (Odonata: Cordulegasteridae). *Acta Musei Moraviae, Scientiae biologicae* (Brno). 97(2): 1–5.
- KALKMAN V. J. 2006: Key to the dragonflies of Turkey. *Brachytron*, 10(1): 3–82.
- KALKMAN V. J. & VAN PELT G. J. 2006: The distribution and flight period of the dragonflies of Turkey. *Brachytron*, 10(1): 83–153.
- KALKMAN V. J., BOUDOT J. P., BERNARD R., CONZE K. J., DE KNIJF G., DYATLOVA E., FERREIRA S., JOVIĆ M., OTT J., RISERVATO E. & SAHLÉN G. 2010: European Red List of Dragonflies. International Union for Conservation of Nature, European Union, Luxembourg, 28 pp.
- KULIĆ L., GAJIĆ M. & ERIĆ K. 2012: Dragonfly fauna (Odonata) of the Sokobanjska Moravica River (E Serbia). In: JOVIĆ M., ANDUŠ L., BEDJANIĆ M. & MARINOV M. (eds.): Book of abstracts. ECOO 2012, The Second European Congress on Odonatology. Belgrade, Serbia, July 2–6 2012, Natural History Museum in Belgrade, Entomological Society of Serbia, p. 32.
- LOPAU W. 1995: Beitrag zur Kenntnis der Odonaten Fauna der griechischen Inseln Rhodos, Kos, Samos und Chios; Libellenbeobachtungen aus den Sommern 1992, 1993 und 1994 und andere naturkundliche Notizen (Libellen, Lurche, Kriechtiere). *Naturkundliche Reiseberichte*, 4: 1–60.
- LOPAU W. 1999: Die Libellenfauna der griechischen Inseln Thassos, Samothraki und Limnos. *Libellula Supplement*, 2: 43–61.
- LOPAU W. 2010: Bisher unveröffentlichte Libellenbeobachtungen aus Griechenland IV (Odonata). *Libellula Supplement*, 10: 155–260.
- MANCI C. O. 2012: Dragonfly Fauna (Insecta: Odonata) from Romania. [PhD Thesis Abstract]. „Babeş-Bolyai” University, Faculty of Biology and Geology, Cluj-Napoca, 62 pp.
- MARINOV M., BURKHARD G. & KUTSAROV Y. 2007: *Cordulegaster insignis* (Schneider, 1845) in Bulgaria with notes on its biology and ecology. In: TYAGI B. K. (ed.): *Odonata: Biology of Dragonflies*. Scientific Publishers (India), pp. 51–61.
- ST QUENTIN D. 1971: Zum Vorkommen von *Cordulegaster insignis* Schneider in Rumänien. *Studii si comunicari*, Sibiu, 16: 205–208.
- VAN PELT G. J. 2006: *Cordulegaster* Leach, 1815 – Goldenrings. In: DIJKSTRA K. D. B. & LEWINGTON R.: *Field guide to the dragonflies of Britain and Europe including western Turkey and north-western Africa*. British Wildlife Publishing, Gillingham, pp. 210–221.
- ZIČHA O. 2009: *Plantae* [online]. Dostupné z www: <http://biolib.cz/CZ/taxon/id14871> [cit. 26.X.2012].

SOUHRN

Výskyt druhu *Cordulegaster insignis*, který byl v nedávné době zjištěn jako „nový“ člen fauny vážek v Makedonii (HOLUŠA & KRIVAN 2012), byl potvrzen na lokalitě Novačani nedaleko města Veles v centrální části Makedonie. 6.VII.2012 zde bylo zjištěno 10 larev tohoto druhu ve více instarech. Tento fakt a také umístění vodního toku pod přehradou, což zaručuje přítomnost vody po celý rok, poukazuje na stálou populaci *Cordulegaster insignis* na lokalitě.

Fig. 1. Larva of *Cordulegaster insignis* female found on 6.VII.2012 at the site Novačani near Veles town in central Macedonia (photo by O. Holuša)

Obr. 1. Larva samice *Cordulegaster insignis* nalezená 6.VII.2012 na lokalitě Novačani v blízkosti města Veles v centrální Makedonii (foto O. Holuša)



Fig. 2. Detail view of the habitat of *Cordulegaster insignis* at the site Novačani in central Macedonia, in the bottom of picture is growth of *Berula erecta* with occurrence of larvae (6.VII.2012, photo by O. Holuša)

Obr. 2. Detailní pohled na biotop druhu *Cordulegaster insignis* na lokalitě Novačani v centrální Makedonii, ve spodní části obrázku je zřetelný porost *Berula erecta*, ve kterém byly nalezeny larvy (6.VII.2012, foto O. Holuša)

