

First Record of the Saproxylic Beetle *Cossonus parallelepipedus* (Coleoptera, Curculionidae) in Bosnia and Herzegovina

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ABSTRACT

Balkan Peninsula is considered to be a hotspot of beetle biodiversity. Registering occurrence of saproxylic beetles is an important first step for expanding the general knowledge about saproxylic beetles as ecologically important insect species. *Cossonus parallelepipedus* is a European saproxylic species distributed from Iberian Peninsula in the west to Russia in the east, and from the Mediterranean in the south to Fennoscandia in the north. The first, and until now the only find of this species for the Balkan Peninsula is from Croatia. We report the first find of *C. parallelepipedus* in Bosnia and Herzegovina (BiH). In April 2020, larvae, pupae and imagoes were collected, in the central part of BiH, north of Sarajevo, on Zvijezda Mt. near Vareš from decaying moist wood in the lower part of a tree trunk of European silver fir, *Abies alba*. We expect that this species has a wider presence, especially in mountain areas in the central part of the country. Due to the similar environment conditions for other two European *Cossonus* species (*C. cylindrus* and *C. linearis*) their presence is also possible.

Keywords: weevil; wood boring insect; decaying wood; biodiversity; *Abies alba*

INTRODUCTION

The genus *Cossonus* (Coleoptera, Curculionidae) in Europe is represented with three widely distributed species: *Cossonus cylindricus* Sahlberg, 1835, *C. parallelepipedus* (Herbst 1795) and *C. linearis* (Fabricius, 1775) (Löbl and Smetana 2013). *C. parallelepipedus* is a European species distributed from Iberian Peninsula in the west to Russia in the east, and from the Mediterranean in the south to Fennoscandia in the north. The first, and until now the only find of this species for the Balkan Peninsula is from Croatia (Löbl and Smetana 2013, Alonso-Zarazaga 2017, de Jong 2021). In Sweden, the species has been noted on deciduous tree species such as elm, aspen, poplar, oak, beech and willow, and in some cases on spruce (Ehnström and Axelsson 2002). In England, besides of the mentioned hosts it has also been registered on silver fir (<https://www.ukbeetles.co.uk/cossonus-parallelepipedus>). The status of the species (e.g. in Finland) is critically endangered (<https://laji.fi/en/taxon/MX.196213?showTree=true>).

The adult beetles of *C. parallelepipedus* are 4.5-6 mm in length, with long dark brown elytrae, the antennae and the legs being usually brighter (Reitter 1916). The larvae live in dead wood, mostly under bark of rotting deciduous trees (Yunakov et al. 2018). They dig tunnels in the tree trunks in various stages of decay for a duration of two years, making winding galleries (Folwaczny 1983). After pupation adult beetles stay in the wood during the winter. Regularly the adults leave the wood during the early summer and can be detected around the exit holes, but they remain hidden under bark by day. Over the years, the species can increase its population in the same trunk.

Decomposition processes is very important in the nutrient cycle of natural ecosystems where saproxylic beetles are irreplaceable (Gotelli and Colwell 2011, Kacprzy and Bilnsk 2017). The knowledge of the biology of saproxylic beetles, for example where they live, what they eat and who eats them is insufficient, so the first step would be to find and identify them. Many saproxylic beetle species remain widely

distributed in Europe, although their populations and ranges have suffered significant long-term decline (Gotelli and Colwell 2011).

According to the available data, *Cossonus* spp. have not been registered until now in Bosnia and Herzegovina (Löbl and Smetana 2013, Osella and Zuppa 2013). Our paper provides the first data on the occurrence of this saproxylic species within the territory of the country.

Since basic data on species distribution and population status of saproxylic beetles are limited, there is a clear need for drawing together information providing new data to improve the quality of information, such as in (Niето and Alexander 2010).

MATERIALS AND METHODS

Material examined: Bosnia and Herzegovina, Zvijezda Mt., Sarić, lat. 44.177174° lon. 18.406838°, 1060 m a.s.l., 5/IV/2020 (Figure 1). The larvae, pupae and the adults of insects were sampled from damp decaying wood of European silver fir, *Abies alba* Mill. Larvae, pupae and adults were collected by hand, stored in 96% ethyl alcohol and deposited in the entomological collection of the Faculty of Science, University of Sarajevo. The identification was done by using identification keys (Jordal 2014) and was confirmed by Gabor Mesároš from Protego Society (Subotica, Serbia).

RESULTS AND DISCUSSION

The specimens of *C. parallelepipedus* were found at the log warehouse at Šeirići locality (Zvijezda Mt.) (Figure 1) by the first author. They were discovered during inspection of decaying moist wood of tree trunks that were dragged from section 34. Šimin potok to the warehouse. The locality is surrounded by mixed woods of spruce, fir and beech, widely distributed forest community on Zvijezda Mt. (Figure 2). Six specimens of imagoes and larvae (Figure 3 and 4) have been found.

According to the available literature (e.g., Löbl and Smetana 2013, Osella and Zuppa 2013), this is the first finding of the species in Bosnia and Herzegovina, which after Croatia is the second country in the Balkan Peninsula where the species has been recorded. Nevertheless, this finding is not unexpected as *C. parallelepipedus* is widespread in Europe and suitable habitats are widely present in Bosnia and Herzegovina, particularly on Zvijezda Mt. where there are large complexes of preserved forests.

The Balkan Peninsula emerges as a hotspot of beetle biodiversity (Niето and Alexander 2010) and this is a contribution to knowledge of an up to now unknown species in Bosnia and Herzegovina. There are many possible reasons why this beetle was not found earlier. The secretive life cycle of the species that is nocturnal

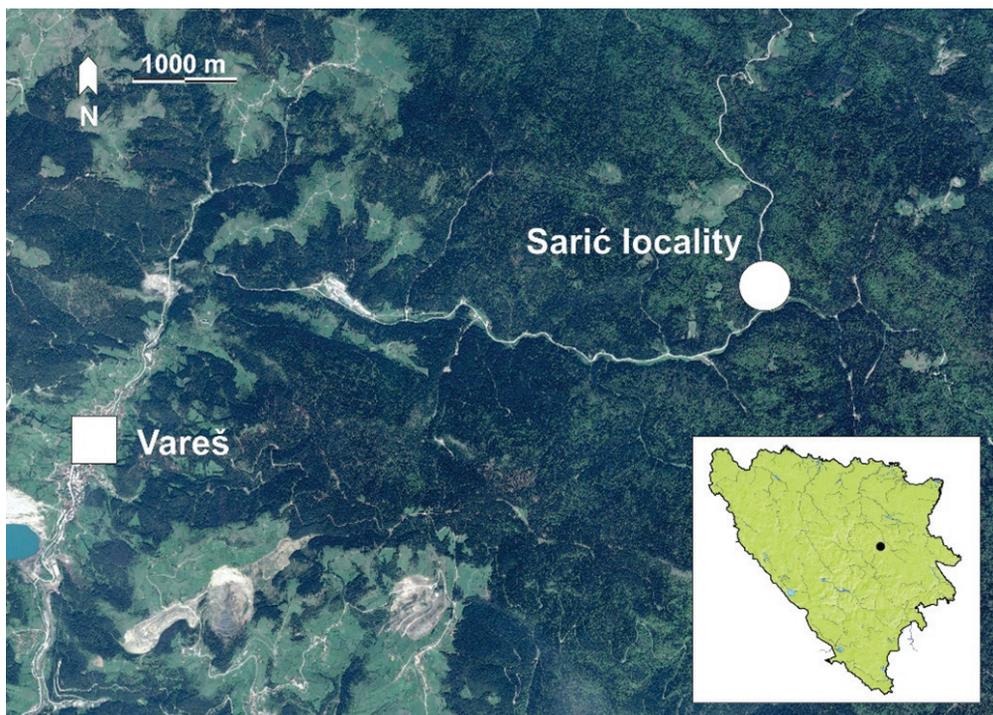


Figure 1. The location of the finding site of *Cossonus parallelepipedus*.



Figure 2. The habitats of mixed woods of spruce, fir and beech on Zvijezda Mt., near Vareš (photo: Adi Vesnić).



Figure 3. Imago of *Cossonus parallelepipedus* (Herbst, 1795) sampled on Mt. Zvijezda near Vareš (photo: Adi Vesnić).



Figure 4. The larva (a) and imago (b) of *Cossonus parallelepipedus* in a decaying tree stump (photo: Adi Vesnić).

(UK Beetles, 2019) is one possibility or it has not been studied. Saproxylic beetle fauna is insufficiently known in the country and increasingly threatened due to logging and habitat fragmentation and destruction (Kulijer and Miljević 2017), and therefore insufficiently protected.

After forest logging, the remaining branches and tree tops on the ground are forming fine wood debris that represents the habitat for many xylobiont beetles, which accelerates the process of organic matter circulation (Gunnarsson et al. 2004, Lindhe and Lindelöw 2004, Jonsell 2008, Zeniauskas and Gedminas 2010). Even under these circumstances logging and wood harvesting in Europe have so far the largest impact on both threatened and non-threatened saproxylic beetles, affecting 35 out of 75 threatened species, and 232 species in total (Nieto and Alexander 2010).

We believe that target research focusing on habitats of this species, particularly in mountain areas in central part of the country will probably result with more records. The occurrence of other two European *Cossonus* (*C. cylindrus* and *C. linearis*) is also possible due to the similar

environment conditions and the fact that they are known from neighboring countries (Löbl and Smetana 2013, Osella and Zuppa 2013), and appropriate habitats exist.

Author Contributions

AV, OM, DK, SI conceived and designed the research, AV and OM carried out the field research, AV and OM performed laboratory analysis. DK and SI processed the data and performed the literature review, MD and MP supervised the research and helped to draft the manuscript; all authors wrote the manuscript

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Conflicts of Interest

The authors declare no conflict of interest.

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