

Parasitoids of *Phloeosinus aubei* (Coleoptera: Curculionidae) from Romania

Nicolai Olenici¹, Mircea-Dan Mitroiu², Miloš Knížek³, Valentina Olenici¹

¹ Experimental Station for Norway Spruce Silviculture, Forest Research and Management Institute, Calea Bucovinei 73 bis, 725100 Campulung Moldovenesc, Romania; E-mail: olenicifp@yahoo.com

² Faculty of Biology, Alexandru Ioan Cuza University of Iași, 11 Carol I Blvd., 700506 Iași, Romania; E-mail: mircea.mitroiu@uaic.ro

³ Forestry and Game Management Research Institute, Jiloviste – Strnady, CZ-156 00 Praha 5 – Zbraslav, Czech Republic; E-mail: knizek@vulhm.cz

Abstract. *Phloeosinus aubei* (PERRIS, 1855) was previously recorded from Romania only from Orșova, the warmest area of Romania, characterised by sub-Mediterranean climate. Recently, the species was found on a dying tree of *Thuja occidentalis* L. in Solca, a locality in Northern Romania with Baltic climatic influence. From a trunk with length 1.05 m, a total of 1644 beetles were collected together with 42 adult parasitoids of *Metacolus unifasciatus* FÖRSTER, 1856, one of *Eurytoma morio* BOHEMAN, 1836, one of *Dendrosoter protuberans* (Nees, 1834) and one unidentified braconid (Hymenoptera). The parasitoid-host relations between these three identified species and *P. aubei* are new to Romania. In the new northern location, *P. aubei* has different parasitoids from the ones in the southern area of the country, with little impact on bark beetle mortality.

Keywords: *Phloeosinus aubei*, *Metacolus fasciatus*, *Eurytoma morio*, *Dendrosoter protuberans*, *Thuja occidentalis*, parasitoids

Introduction

Phloeosinus aubei (PERRIS, 1855) is a bark beetle living on several species of the family Cupressaceae. Its natural geographical range covers Mediterranean countries, southern part of Central Europe, Crimea, Caucasus, Armenia, Turkmenistan and North Africa (POSTNER 1974, PFEFFER 1995) as well as Iran, Syria and China (KNÍŽEK 2011).

During the last decades, *P. aubei* expanded its distribution northwards reaching even Berlin area (SOBCZYK, LEHMANN 2007). So far, it was found as an important pest of cypress (*Cupressus* spp.) in France (BALACHOWSKY 1949), Italy (CRIVELLARI 1950), Spain (MUÑOZ, RUPEREZ 1980), Israel (MENDEL 1984) and Tunisia (BEL HABIB *et al.* 2007); it is regarded as a threat for its hosts also because it is involved in the transmission of fungal pathogen *Seiridium cardinale* (WAGENER, 1939) SUTTON ET GIBSON, 1972 from in-

fectured trees to healthy ones (TIBERI, BATTISTI 1998).

In Romania, *P. aubei* was previously found in 1966-1967 from the neighbourhood of Orșova (44°43'31"N, 22°23'46"E; 56 m above sea level; a zone with sub-Mediterranean climate), under the trunk bark of *Platyclusus orientalis* (L.) FRANCO and *Chamaecyparis lawsoniana* (A. MURRAY) PARL. (NEGRU 1971, VASILIU *et al.* 1978). Within this area, it was parasitised by *Cerocephala cornigera* WESTWOOD, 1832 and *Cheiropachus quadrum* (FABRICIUS, 1787) as reported by TUDOR (1969) under the names *Cerocephala trichotus* (RATZEBURG, 1848) and *Cheiropachus colon* (LINNAEUS, 1758), respectively.

Recently, a tree of *Thuja occidentalis* L. was found colonised by *P. aubei* in the northern part of the country, at about 500 km from the previously known

location. There the bark beetle hosted other parasitoid species, which are presented in this paper.

Material and Methods

Phloeosinus aubei was reared in semi-natural conditions from a trunk of *Thuja occidentalis* L., collected in the town of Solca (47°42'9"N, 25°49'54"E; 522 m above sea level; Baltic climatic influence) on 24 July, 2012.

A piece (1.05 m length and 14.0 cm mean diameter) from the tree trunk base was taken and kept at Câmpulung Moldovenesc in a plank-walled store room with good natural ventilation until the beginning of April 2013. Then it was transferred to the laboratory (room temperature about 18-22°C) and all the insects that emerged from it during April-July 2013 were collected. After the insects emerged, the bark of the trunk piece was peeled off to search for insects that eventually died in or under the bark.

The identification of scolytid and parasitoid species was done using the keys by PFEFFER (1995) and by GRAHAM (1969), ZEROVA (1978), BELOKOBYL'SKII S.A. and V.I. TOBIAS (1995), respectively.

Results and Discussion

In total, 1644 *P. aubei* adults and 45 hymenopteran parasitoids were collected and because no other bark beetle species was present in the trunk piece, it can be concluded that all the obtained parasitoid wasps developed on *P. aubei*. They belonged to four species: *Metacolus unifasciatus* FÖRSTER, 1856 (Pteromalidae), *Eurytoma morio* BOHEMAN, 1836 (Eurytomidae), *Dendrosoter protuberans* (NEES, 1834) (Braconidae) and another braconid that could not be identified having the antennae broken.

The most abundant parasitoid was *M. unifasciatus* represented by 42 individuals (4♀4♂ – 5 April, 5♀6♂ – 16 May, 1♂ – 20 May, 1♂ – 27 May, 2♀3♂ – 3 June, 1♂ – 11 June, 2♀2♂ – 18 June, 3♂ – 21 June, 2♂ – 30 June, and 1♀5♂ – November, dead under the bark). One female of *D. protuberans* emerged on 13 April, and one of *E. morio* on 16 May, at the same time with the unidentified male braconid wasp. Until now, *Metacolus unifasciatus* was found from Romania only by MITROIU *et al.* (2007), being obtained from an unspecified insect host colonising twigs of *Pinus nigra* ARN. *Phloeosinus aubei* is now mentioned as a host of this species for the first time in Romania. *Metacolus unifasciatus* is the most common larval ectoparasite on *Phloeosinus armatus* REITTER, 1887; *P. aubei* and *Phloeosinus thujae* (PERRIS, 1855), feeding on species of the family

Cupressaceae in Europe and the Middle East as well as on several scolytids on pine species (MENDEL, HALPERIN 1981, KENIS *et al.* 2004). The species has Palaearctic distribution and a wide range of hosts, mainly scolytids (NOYES 2014).

Eurytoma morio is also a widespread species, from Western Europe to India and China, with numerous host species especially among bark beetles (NOYES 2014) but also among braconid wasps, thus being a hyperparasite. However, there are only a few reports on this species from Romania (POPESCU 2006). CONSTANTINEANU *et al.* (1956) described it as a new species for the Romanian fauna reared from pupae of *Aporia crataegi* (LINNAEUS, 1758) while TUDOR (1969) and ANDRIESCU (1993) mentioned it as a parasitoid of *Scolytus intricatus* (RATZBURG, 1837) and *Hylesinus varius* (FABRICIUS, 1775) [= *H. fraxini* (PANZER, 1779)], respectively. This means that *P. aubei* is a new host of *E. morio* for Romania. Mendel and Halperin (1981), similarly to our results, found that for Israel it is not a common parasitoid of scolytids living on cypress (MENDEL, HALPERIN 1981).

Dendrosoter protuberans (Nees, 1834) was recorded from almost all European countries (van ACHTERBERG 2014) as well as in Central Asia, Caucasus, Turkey, Israel (MENDEL, HALPERIN 1981, BELOKOBYL'SKII, TOBIAS 1995), North Africa (GRAF 1977) and North America (BELOKOBYL'SKII, TOBIAS 1995, van ACHTERBERG 2014). Its main hosts are scolytid beetles of many genera and some longhorn beetles, jewel beetles and leaf beetles (BELOKOBYL'SKII, TOBIAS 1995, BEYARSLAN 2015). We have not found any record of this species in Romania but, according to van ACHTERBERG (2014), it is believed to be present in Romania. Therefore, the present study is the first official report of *D. protuberans* from Romania.

The above mentioned parasitoids represented only 2.66% from all collected insects and consequently we can speculate that the bark beetle mortality caused by these wasps was very low, even though we do not know whether if hyperparasitism was present in *Metacolus unifasciatus* and whether *Eurytoma morio* acted as a primary parasitoid or as hyperparasitoid.

Conclusions

Phloeosinus aubei is reported from the northern part of Romania for the first time, where it is parasitised by four hymenopteran species: *Metacolus unifasciatus* (Pteromalidae), *Eurytoma morio* (Eurytomidae), *Dendrosoter protuberans* (Braconidae) and an unidentified braconid species. These species have not been previously recorded from *P. aubei* from

Romania. Their impact on the beetle mortality appears to be very low.

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