NYMPHAEA Folia naturae Bihariae	LI	61-69	Oradea, 2024

On the presence of the allochthonous red-headed ash borer *Neoclytus acuminatus* (Fabricius, 1775) (Coleoptera: Cerambycidae) in Romania, with a new locality record

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Abstract. An imago of the alien red-headed ash borer *Neoclytus acuminatus* (Fabricius, 1775) was collected for the first time at low altitude in northwestern Romania in 2024, possibly indicating an expansion of its range in the country or a new introduction from Hungary.

Introduction

The red-headed ash borer *Neoclytus acuminatus* (Fabricius, 1775) (Coleoptera: Cerambycidae: Clytini), a saproxylophagous and thermophilic species, is endemic to North America. It is a pest and/or secondary pest of trees and wood products, yet not throughout its entire range. Its impact on trees and shrubs depends on local climate, availability of host plants and the presence and

status of its natural enemies. *Neoclytus acuminatus* was introduced accidentally into the Adriatic region and its range continued to expand also in the rest of Europe. The larvae develop in stressed and dead trees, first under the bark and then in the sapwood, contributing in natural circumstances to the health of forests by making more nutrients and space available to healthy plants. Adults apparently do not feed and occasionally visit blooming shrubs. Especially younger trees can be more affected after attacks by *N. acuminatus*, because the tunnels gnawed by the larvae in their trunk diminish their resistance to wind breakage (Hănceanu et al. 2021, Keszthelyi 2021).

Neoclytus acuminatus is polyphagous and it feeds mostly on deciduous trees (*Acer, Betula, Castanea, Fagus, Juglans, Populus, Prunus, Quercus, Salix, Ulmus*), mainly *on Fraxinus, Quercus, Carya, Diospyros*, and *Celtis*, but other host-plants such as *Malus domestica, Cerasus avium, Prunus domestica, Vitis vinifera,* or *Morus alba* were also reported (Kovács & Hegyessy 1995, Jurc et al. 2012). The species may feed exceptionally on conifers such as *Abies, Chamaecyparis, Cryptomeria, Juniperus, Picea,* and *Tsuga*. It overwinters as a larva inside the timber, its life cycle lasts for one year or exceptionally two years in Europe, and if the infested material is sawed, stored and dried out, emergence can be delayed for several years. Adults are active between March and late July, with the main period of adult appearance being the beginning of May to the end of June (Hănceanu et al. 2021, Keszthelyi 2021). Individuals are more frequent at the height of 0.3-0.5 m (Ruchin et al. 2022). However, the results concerning this feature are contradictory: according to one study, adults are more frequent in traps placed higher in the tree crowns, while another study found out that traps placed at 1.5 m from the ground were more effective than those placed in the canopy (Olenici et al. 2022b).

The oldest European finding was in Fiume, Croatia, in 1851, and from there *N. acuminatus* spread north-, west- and southward, with populations (some established) in Dalmatia, the Istrian peninsula, northern Italy and South Tirol (Hellrigl 2006, 2010). From there, it reached then Slovenia, Greece, the Czech Republic (yet not confirmed there after 1951), Bosnia-Herzegovina,

Serbia, south-eastern Hungary, Montenegro, Bulgaria, western Romania, southern Slovakia, southern Switzerland, France, Portugal (Madeira), Germany, Great Britain, Slovakia, Russia, and in 2018 Austria (Jurc et al. 2016, Hănceanu et al. 2021, Olenici et al. 2022b). Records in southern France in the 1980s were not confirmed later (Keszthelyi 2021). In Serbia it was found again in the Fruška Gora National Park, in the north of the country, with new data in 2002 and 2003, yet still considered rare in the country (Pil 2005, Pil & Stojanović 2005a, b, 2007).

In Hungary it was first identified in the southeast, in the Körös-Maros National Park, not yet as a pest back then and with the oldest observation in the country dating back from 1985 (Hegyessy et al. 1999). Later it was also found in the Fundoklia valley protected area in central Hungary, in the Béda-Karapancsa protected area in the extreme south of the country (where it became a vine pest), and in the Hortobágy national park in eastern Hungary (Molnár et al. 2016, Merkl 2017, Kovács & Gebei 2020, Kovács 2023).

In Ukraine, *Neoclytus acuminatus* was found for the first time in 2022, in the Pannonian plain, in the extreme west of the country (Transcarpathia) which is an area that borders with north-eastern Hungary and northern Romania. It was mentioned as established here, at least confirming its northward expansion (Zamoroka 2023). Recently, in 2022, the species was found in the Republic of Moldova (Bacal 2023).

The aim of the present paper was to record a new locality for *N. acuminatus* in northwestern Romania, at low altitude, thus confirming its northward expansion.

Material and methods

On 10 April 2024 an imago of *N. acuminatus* was collected in Oradea, in Bihor County, at 142 m above sea level and 47°03'00"N 21°55'28"E (13 km from the Hungarian border), in the park of the Țării Crișurilor Museum. The collected specimen was preserved and placed in the entomological collection of the museum.

Results

The individual was identified based on the following morphological features: slender, cylindrical and elongate body, reddish antennae that are thickened distally, rounded pronotum, subparallel and apically narrowed elytrae, with characteristic reddish-brown, black and yellow stripes, and reddish-brown body. The typical coloration, as in other Clytini, is most likely due to Batesian, wasp mimicry (Manci 2005, Hănceanu et al. 2021). The individual is a male with total body length of 11.5 mm, and its pronotum is 3 mm long and maximum 2 mm wide (Fig. 1).

Fig. 1. Habitus of the imago collected in Oradea in 2024 (photo Florin Șipoș).

Discussion

The individual found in Oradea represents the first sighting of *N. acuminatus* in a lowlands habitat in Bihor county. In this county it was previously

collected in 2019 in Băiţa, in its mountainous, southern area (Hănceanu et al. 2021). Another previous, isolated, indoor occurrence in Oradea was documented on the citizen science Facebook group 'Insects of Romania and Europe', as emerging on December 1, 2021, from the wood in a terrarium brought from Budapest. The individual documented in this paper or its ancestors most likely originate from the Pannonian plain, and since the species has been found previously also in the mountainous area of Bihor county and the extreme west of Ukraine, a larger distribution in northwestern Romania was to be expected.

The first occurrence of *N. acuminatus* in Romania (a female) was in Timişoara in 2002, in the southwest (Manci 2005), possibly as an isolated find originating from south-eastern Hungary, where its populations were already established in the late 1990s (Olenici et al. 2022b). Later the species was identified, including by citizen scientists, in many locations in the southwest, northeast, and southeast of Romania (the warmest parts of the country), mostly at low altitudes, on broadleaf trees and in broadleaf log yards, thus suggesting multiple introductions with imported wood (Hănceanu et al. 2021, Olenici et al. 2022a).

Its distribution in Romania may actually be larger and current results may have been biased by the lack of pheromone traps, since other lures utilized (ethanol, alpha-pinene) and manual collecting are much less effective than the aggregation pheromone (Olenici et al. 2022b). The occurrences in western Romania may have originated from Hungary, while the apparently established populations in the eastern part of the country suggest further introductions. The distribution of *N. acuminatus* in Romania seems to be linked to warmer climate and to forests, mainly with *Fraxinus* and *Quercus*. Since it attacks weakened ash trees, it may also benefit from the ash dieback caused by the ascomycete fungus *Hymenoscyphus fraxineus* Baral et al., 2014, which is progressing westward through the country, and it may become a pest of the invasive black locust *Robinia pseudacacia*, since in North America it attacked healthy individuals (Olenici et al. 2022b).

The invasive characteristics of *N. acuminatus* were enhanced by its vagility through flight on great distances, aided by human transportation of wood material, including packaging. A major part of the established allochthonous species in general was never intercepted, and *N. acuminatus* is cited as an example (Roques 2007). Its expansion in the western Palearctic and several Neotropical habitats has intensified in recent decades, especially northward and eastward in the Palearctic, as a result of anthropic activity, climate changes and transportation of infested wood material. The fast propagation of *N. acuminatus* is supported by its polyphagous features, adaptability and the high diversity of tree habitats in the area. New habitats are likely to be identified in Europe also due to imported wood materials, mainly from the USA, so the main criterion for controlling the species is a monitoring system in areas at risk (Keszthelyi 2021). There are no quantitative data on the extent of the economic damage or ecological impact on the local fauna in Romania and the rest of Europe (Hănceanu et al. 2021, Olenici et al. 2022a).

As a secondary pest, which mainly attacks weakened and recently fallen trees, *N. acuminatus* may be favored by climate disturbances that will weaken the defence of trees, and its spread can be enhanced by transportation by humans of infested wood over long distances. Therefore, in order to avoid the damage, the presence of this species should be taken into account and monitored in forests and orchards (Olenici et al. 2022b). Chemical traps and inhibitory effects of some of their components were studied, as well as the male-produced aggregation pheromone of *N. acuminatus*, which can be useful to a monitoring system (Jurc et al. 2016, Fan et al. 2019, Keszthelyi 2021).

Acknowledgements

The author wishes to thank an anonymous reviewer, whose observations helped improve the manuscript, as well as his colleagues Cristian Bora for collecting the specimen and Florin Șipoș for taking the images.

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