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# The first record of a forest land snail *Macrogastra plicatula* in Central Ukraine (Stylommatophora, Clausiliidae)

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**ABSTRACT.** Nine specimens of *Macrogastra plicatula* were collected in the small old-growth oak-hornbeam forest surrounded by the swamps near Myrcha village in Kyiv region. This locality is more than in 300 km to south and south-east from the closest known locations of *M. plicatula* in north-western Ukraine, Belarus and Russia. Collected shells are described and illustrated. The historical biogeography, habitat preferences and conservation of this species are discussed.

## Introduction

A forest land snail *Macrogastra plicatula* (Draparnaud, 1801) is distributed mainly in the Central and Eastern Europe: from Alps in the west to Southern Scandinavia in the north, Southern Carpathians in the south, northern part of the East European Plain in north-east and with isolated localities in the Pyrenees and Crimean Mountains [Sysoev, Schileyko, 2009; Welter-Schultes, 2012]. This species lives mainly under the barks in the dead wood and in old alive trees in broadleaved forests, sometimes also on rocks [Likharev, 1962; Welter-Schultes, 2012]. On the East European Plain this species mainly known to occur in northern Belarus and in the central part of European Russia, on the south to the Smolensk, Kaluga, Tula and Oryol regions [Likharev, 1962] that are not adjacent to Ukraine. For the plains of Ukraine this species was known only by the two records in Western Ukraine: by the two shells from the western Podolian Upland that were collected near Peremyshliany (Lviv region) in 1878 [Sverlova, 2006] and by the materials from Volhynian region in north-western Ukraine [Baidashnikov, 1992, 1996; Balashov, Gural-Sverlova, 2012; Balashov, 2016b]. In Ukraine this species is considered to be vulnerable on the national level and was proposed to be included into the next edition of the Red Book of Ukraine [Balashov, 2016a].

Therefore, our new finding of *M. plicatula* in Kyiv region, relatively far from its known range, is of especial interest and importance.

## Material and methods

Nine shells of *M. plicatula* were collected on 21.04.2016 by Yehor Yatsiuk near Myrcha village (Borodianka district of Kyiv region) in the 15th subcompartment ("vydil") of 32th compartment of Myrcha forestry (50.748°N, 29.765°E). This subcompartment is a small (0.04 km$^2$) oak-hornbeam forest with the admixture of birch and pine on the flat plot that is slightly elevated above surrounding alder and birch swamps. The age of the oaks and pines in this forest is about 120-150 years, with some oaks reaching about 180 years old. The snails were collected on a rotten hornbeam stump. Six gastropod species were collected together with *M. plicatula*: *Laciniaria plicata* (Draparnaud, 1801), *Cochlodina laminata* (Montagu, 1803), *Discus ruderatus* (Férussac, 1821), *Euconulus fulvus* (Müller, 1774), *Perpolita petronella* (Pfeiffer, 1853), and *Perpolita hammonis* (Strøm, 1765).

Materials were collected, handled and identified using common methods of work with terrestrial molluscs [Likharev, 1962; Kerney *et al*., 1983; Balashov, 2016b].

All materials are stored in the Collection of terrestrial molluscs of I.I. Schmalhausen Institute of Zoology (Kyiv, hereafter IZAN) under the numbers from IZAN GT 6009 to IZAN GT 6015.

## Results

Among collected specimens of *M. plicatula* 5 are adult (Fig. 1), 2 of them were collected alive. The width of the shell in collected specimens is 3.0-3.2 mm, height – 12.1-13.2 mm. Shell is fusiform, left-coiled, rather slender with pointed apex, brownreddish, sparsely strongly ribbed, of around 11

FIG. 1. Shells of *Macrogastra plicatula* from the oak-hornbeam forest near Myrcha village (scale bar 1 mm, photo by I. Balashov).

РИС. 1. Раковины *Macrogastra plicatula* из дубово-грабового леса возле с. Мирча (масштабная линейка 1 мм, фото И. Балашов).

whorls. Basal keel on the last whorl is almost absent, basal furrow is completely absent. Superior lamella ends on the edge of aperture, gradually connected to spiral lamella. Inferior lamella is well visible through aperture, connected to its edge with two small folds, between them and superior lamella the 2-3 other small folds are placed on the edge of aperture. The end of subcolumellar lamella is partly visible through aperture. The palatal callus is present in aperture. Only one palatal plica is present – the principal one. Most importantly the lower palatal plica is clearly absent in all 5 adult shells.

Given description and photo are clearly corresponding to the descriptions of *M. plicatula* in literature [Likharev, 1962; Kerney *et al*., 1983; Balashov, 2016b]. From the similar *Macrogastra borealis* (Boettger, 1878) it differs, first of all, by absence of palatal plica. To be completely sure with identification these shells were compared with shells from the collection of IZAN that were collected by Dr. A.A.Baidashnikov during 1980s in the nearest known locations of *Macrogastra* species, in Zhytomyr region (*M. borealis*) and Volhynian region (*M. plicatula* and *M. borealis*).

## Discussion

Our finding of *M. plicatula* is more than in 300 km away from the nearest known localities of this species in Volhynian region of Ukraine, in Belarus and in Russia. It makes it to be the most south-eastern known locality of this species if to exclude isolated part of its range in the Crimean Mountains. Current finding of *M. plicatula* suggests that this species was distributed much more widely on the East European Plain, probably in the late Pleistocene or/and early Holocene [Baidashnikov, 1996] when this species invaded the Crimea, which could not happen otherwise than from the East European Plain. Therefore, revealed population is clearly a relic of this past wider distribution.

Probably the decline of *M. plicatula* in the southern part of the East European Plain during the early Holocene was mainly due to the climate change. But existence of revealed population of *M. plicatula* near Myrcha, not far from the edge of forest-steppe zone, proves that current climate at least of the Polesian Lowland matches the requirements of this species. Therefore, climate change could not be the only explanation of *M. plicatula* decline in the southern part of the East European Upland. It is highly likely that forestry activity played the major role in this process during the last several centuries.

This species is inhabitant of the dead wood and strongly depends on its amount, including old trunks. Probably it can't survive not only if a forest is completely cut down, but also if only the old trees are removed and amount of the dead wood is minimized. Such consequences are typical for the forest management, especially in the Eastern Europe, which causes high concern regarding surviving of the several mollusc species that depends on the dead wood, including *Macrogastra* species [Balashov, 2016a]. Probably *M. plicatula* cannot easily restore its occurrence in the process of metapopulation dynamics [Hanski, 1998] on the plots where it once extinct even after required conditions are restored, as more flexible species, that are less depend on the amount of dead wood, can do in this region [Balashov, 2016a].

Moreover, the habitat preferences of the land snails on the East European Plain are usually shrink to the borders of species ranges, i.e. they live in the fewer number of habitats and microhabitats in the regions where conditions are less favorable for them [Balashov, 2016b]. Therefore, in the south of the East European Plain *M. plicatula* is probably more vulnerable to the forestry activity than in Belarus or Russia.

The forest near Myrcha was probably never been totally cut down or totally cleaned of the dead wood, because of its location among the swamps, which makes it to be unsuitable for the forestry activities. So despite the absence of ancient trees in this forest, the history of its usage allows *M. plicatula* to survive here, making it to be a unique forest for Central Ukraine.

The similar situation is known in one of the most preserved oak forests on the East European Plain, the Poiaskivskyi forest (Zhytomyr region), located about 150 km to the northwest from the forest near Myrcha. This is also a forest on the slightly elevated flat plot among the swamps, but it was intentionally protected for a long time, so some ancient trees also survived here. In the Poiaskivsky forest, among other rare species, *Macrogastra borealis* that have similar preferences and distribution to *M. plicatula* (including the Crimean Mountains), survived and there are no other known populations of this species in the region, same as for *M. plicatula* [Balashov, Kobzar, 2013].

Another similar situation from the adjacent regions is with *Clausilia cruciata* (Studer, 1820) on the Slovechansko-Ovrutsky Ridge in Zhytomyr region [Balashov, 2012]. This species also strongly depends on the dead wood, lives here on the south-eastern border of its range and there are no other records of this species in the region [Balashov, 2012]. However, in the case with *C. cruciata* it lives not in the oak forest on the flat plot, but in deep ravines on the ridge with hornbeam-alder-oak forest along small streams, where species survives also thanks to the specific microclimate of such relief [Balashov, 2012].

Therefore, such "islands" of the old-growth oak forests are highly important in conservation of the forest biodiversity, especially the invertebrates that depends on the dead wood, including land snails.

This plot with population of *M. plicatula* is situated in a small (3.49 km$^2$) "landscape reserve of local importance" named "Burkovytsia". Not all forestry activities are directly forbidden in this reserve, "sanitary cutting" still could take place here and could be expected, which in Ukraine sometimes means not only removing old "ill" trees and dead wood, but also whole plots of old-growth forest, which sometimes happen in protected areas, especially such little-known small reserves. Therefore, it can't be said that *M. plicatula* is protected enough here, at least it should be directly indicated in the rules of this reserve's land management that any forestry activity is forbidden on that 0.04 km$^2$ plot where *M. plicatula* inhabits.

This species requires conservation on the national level in Ukraine, and in Kyiv region it should be considered critically endangered, since it inhabits here only one small not enough protected forest.

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# Первая находка лесной наземной улитки *Macrogastra plicatula* в Центральной Украине (Stylommatophora, Clausiliidae)

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**РЕЗЮМЕ**. Девять экземпляров *Macrogastra plicatula* были собраны в небольшом старом дубово-грабовом лесу, окруженном болотами возле с. Мирча в Киевской области. Это местонахождение расположено более чем в 300 км к югу и юго-западу от ближайших известных местонахождений *M. plicatula* в северо-западной Украине, Беларуси и России. Обнаруженные раковины описаны и проиллюстрированы. Обсуждаются историческая биогеография, биотопические предпочтения и охрана этого вида.