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Autor: Marle, Pierre / Menétrey, Nathalie

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First report of the exotic gastropod *Menetus dilatatus* (Gould 1841) in Switzerland (Gastropoda: Planorbidae)

Premier signalement du gastéropode exotique *Menetus dilatatus* (Gould 1841) en Suisse (Gastropoda: Planorbidae)

Pierre Marle[1,2*] & Nathalie Menétrey[2]

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Abstract

In 2024, the first record of *Menetus dilatatus* was reported for Switzerland as part of the biological monitoring of lakes in the Vaud Canton. Twenty eight individuals were found in samples from the littoral zone of Lake Morat. Identification criteria and ecological characteristics of the species are presented. This discovery confirms the "Three Lake Region" of Switzerland as a hotspot for aquatic invasions, with a high number of exotic species already reported.

Keywords: freshwater mollusc, lake, exotic species, Rhine River basin.

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Résumé

En 2024, le premier signalement de *Menetus dilatatus* a été rapporté en Suisse dans le cadre du suivi biologique des lacs du canton de Vaud. Vingt-huit individus de cette espèce ont été trouvés dans des échantillons de la zone littorale du lac de Morat. Les critères d'identification et les caractéristiques écologiques de cette espèce sont présentés. Cette découverte confirme que la région des Trois Lacs en Suisse est un foyer d'invasions aquatiques, avec un nombre élevé d'espèces exogènes déjà signalées.

Mots-clés: mollusque d'eau douce, lac, espèces exotiques, bassin du Rhin.

[1] Laboratory of Aquatic Ecology and Biology, Department F.-A. Forel for Environmental and Aquatic Sciences, Institute for Environmental Sciences, Faculty of Sciences, Earth and Environment Sciences, University of Geneva, Geneva, Switzerland;
[2] Aquatic Biology Section, Water Protection Division, General Environment Department, Canton of Vaud, Epalinges, Switzerland.
* Correspondance: pierre.marle@unige.ch

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Introduction

Menetus dilatatus is a freshwater snail from the family Planorbidae, native to the Eastern United States. In Europe, it was first reported in 1869 in a canal near Manchester, England (Boycott 1936; Kerney 1976). In recent decades, *M. dilatatus* established in France, Ireland, Germany, Poland, the Czech Republic, Ukraine, Belgium, the Netherlands, Portugal, and more recently in Spain and Serbia (Mouthon 1986, Neckheim 1997, Beran 2005, Devin *et al.* 2005, Müller *et al.* 2005, Bouquerel 2008, Oliveira *et al.* 2010, Stadnychenko, 2014, Kołodziejczyk & Lewandowski 2015, Anderson 2016, Holoyak *et al.* 2019, Quiñonero-Salgado & López-Soriano 2022, GBIF 2024, Gosjina *et al.* 2024).

In 2024, *M. dilatatus* was observed for the first time in Switzerland in the littoral zone of Lake Morat. Lake Morat is a small, glacial lake located in the Swiss Plateau, at an altitude of 429 meters. It has a maximum depth of 45 meters and is connected to Lake Neuchâtel via the Broye Channel, forming part of the "Three Lake Region". Lake Morat is classified as meso-eutrophic, meaning it has a medium nutrient level, which leads to abundant plant growth in the littoral and anoxic conditions in the deep zone (Lods-Crozet & Chevalley 2012).

Methods

The samples containing *M. dilatatus* were collected using a Surber net (25x25 cm) on various types of substrates, including sand, silt, living helophytes and hydrophytes, sometimes covered with filamentous algae. A total of fourteen samples were collected and distributed as follows: 8 samples between 0 and 1 m, 3 samples between 1 and 3 m, and 3 samples between 3 and 5 m depth. Most (~ 95%) of the specimens were found at depths lower than one meter. However, since these substrates were grouped by depth in a single container, it is difficult to accurately determine which specific substrate(s) the individuals were associated with.

Results

Menetus dilatatus (Gould 1841)

28 individuals, littoral zone of Lake Morat at Guévaux, Vully-les-lacs (VD), coordinates [CH1903+/LV95]: 2'570'991.44, 1'198'321.17, 09/07/2024, benthic sampling by scuba diving with a Surber net at depths between 0 and 3 m, collected by Aquatic Biology Section, Water Protection Division, General Environment Department, Canton of Vaud, identified by Pierre Marle, Collection of the Cantonal Museum of Natural Sciences in Lausanne.

Brief description: With a shell diameter reaching 2 mm and a height of about 1 mm, *M. dilatatus* is classified as a small gastropod. Its shell comprises 2.5 to 3 rapidly growing whorls. The lower surface is flat, while the upper side is distinctly convex. The umbilicus is relatively wide and deep, and the shell suture is clearly defined (figure 1).

Distinctive features: The shell is characterized by a dark brown color, with clearly visible growth lines. The aperture is distinctly flared upward, featuring a rounded and expanded upper edge (figure 1). The peristome is thin and fragile. Most of these criteria are outlined in Harman & Berg (1971). In Europe, the species can be easily separated from other planorbids using Glöer (2002, 2017).

Due to its small size and similarity to *Gyraulus crista* (without spikes), it is possible that some individuals can be misidentified. To distinguish it from *G. crista*, it is recommended to closely examine the aperture, which is significantly rounder in *M. dilatatus*. In lateral view, the shell of *G. crista* is also flatter and noticeably more elongated compared to that of *M. dilatatus*. Moreover, the base of the aperture of *M. dilatatus* is aligned with the base of the shell, whereas in *G. crista*, the aperture is positioned higher than the base of the shell (Glöer 2017).

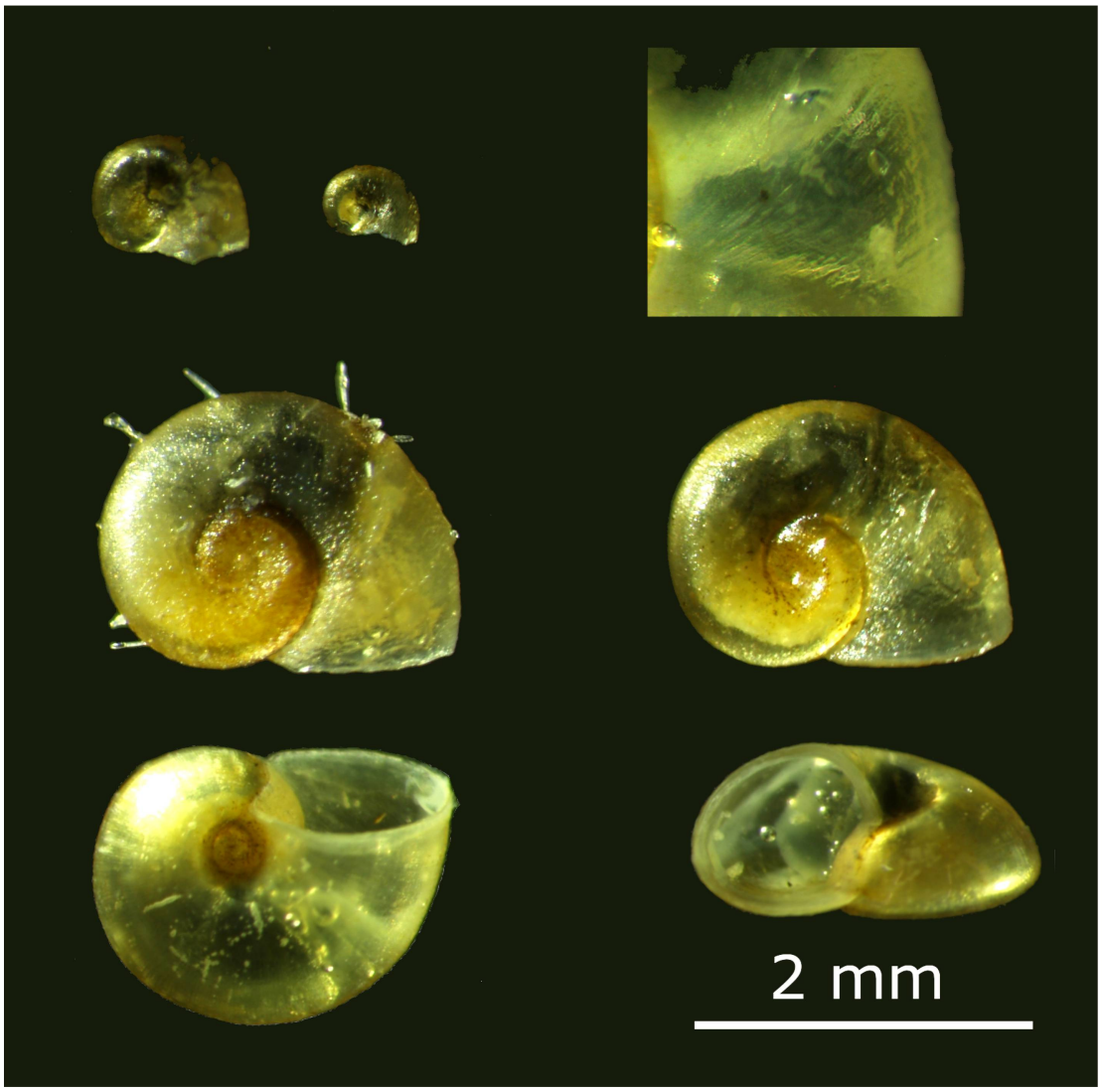

Figure 1. *Menetus dilatatus* specimens collected at Vully-les-lacs (VD), adult specimen shown in lateral, underside, and top views, with a detailed image of the shell's growth lines (up right). Pictures: Pierre Marle.

Discussion

Previous studies conducted in 2011 failed to detect the species in Lake Morat (Lods-Crozet & Chevalley 2012). Therefore, it is likely that *M. dilatatus* was only recently introduced. Based on the literature and the species assemblages recorded in the sampled area in 2024, *M. dilatatus* can be classified as a eurythermic and eurytopic species. Similar to other Planorbidae species, it inhabits calm water environments in large rivers as well as canals and littoral zones of lakes, typically characterized by a high organic matter content (Mouthon 1986).

Some authors also suggest that the species prefers environments rich in macrophytes (as in the Ebro River in Spain; Quiñonero-Salgado & López-Soriano 2022). However, its ecological impact, particularly on native species, has been very little studied. In rivers and lakes, densities typically do not exceed 5 individuals/m² (Mouthon & Dubois 2001, Beran 2005, Müller *et al.* 2005, Kołodziejczyk & Lewandowski 2015). This is substantially lower than the ~50 individuals/m² recorded in Lake Morat which indicates that the species appears locally well established in Lake Morat and creates a significant population which could potentially spread to the entire lake or adjacent water bodies. Because of the geographical proximity and existing river network, the occurrence of *M. dilatatus* in Lake Morat suggests that the species may already be present in Lake Neuchâtel and Lake Bienne, as well as in the Aare or the Swiss part of the Rhine. The update of the Swiss Red List of molluscs (Rüetschi *et al.* 2012) in 2024 could lead to the discovery of additional locations for the species.

This first record contributes to the growing list of exotic gastropods in Switzerland. For Lake Morat, *M. dilatatus* was preceded by several molluscs (*Gyraulus parvus, Dreissena polymorpha, Dreissena bugensis rostriformis, Corbicula fluminea, Potamopyrgus antipodarum*), crustaceans (*Dikerogammarus villosus, Dikerogammarus haemobaphes, Hemimysis anomala*) and oligochaetes (*Branchiura sowerbyi*). The introduction of these species may be attributed to the transport of boats from nearby regions where exotic species are numerous, such as the Saône or the Rhine River basins. This new finding confirms that the "Three Lake Region" is a significant hotspot for the introduction of aquatic exotic species in Switzerland, highlighting the need for more frequent monitoring.

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Competing Interests

The authors have no relevant financial or non-financial interests to declare.

Author contributions

Both authors were involved in the experimental design and field sampling. Pierre Marle carried out the laboratory work, took the pictures, and performed the data analysis. Pierre Marle also wrote the initial draft of the manuscript, with Nathalie Menétrey providing comments on earlier versions. Both authors reviewed and approved the final manuscript.