

New Localities of *Theodoxus transversalis* (C. Pfeiffer, 1828) within European Natura 2000 Network on the Islands of the Lower Danube River

Milena Pavlova, Mila Ihtimanska, Ivailo Dedov, Valko Biserkov, Yordan Uzunov, Luchezar Pehlivanov

Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2 Gagarin Str., 1113 Sofia, Bulgaria; E-mail: mnp.iber@gmail.com

Abstract: Two new localities of the endangered gastropod species *Theodoxus transversalis* (C. Pfeiffer 1828) listed in the Habitat Directive 92/43/EEC were recorded in Bulgarian section of Danube River. The new habitat localities were found on sand and gravel banks at Danube islands Vardim and Komluka. The area of the islands is covered respectively by the sites 'Vardim' (BG0000204) and 'Srebarna' (BG0000241), declared by the Habitat's Directive of the European NATURA 2000 Network

Key words: *Theodoxus transversalis*, NATURA 2000, Lower Danube

Introduction

The striped nerite *Theodoxus transversalis* (C. PFEIFFER 1828) is considered to be a stenobiotic organism, inhabiting river bottoms with solid substrate (SOLYMOS, FEHER 2011). The species prefers habitats, characterized by relatively high dissolved oxygen concentrations (5.5-9.5 mg/dm³) and slow water running velocity (0.29-1.01 m/s) (ANGELOV 2000). As a stenobiont, the striped nerite is a bioindicator and could be useful for recording the pollution and self-purification processes in the Danube. On the other hand the same author represents a detailed review of the systematic works on the species.

The IUCN data base refers to less than 20 sub-populations of the species in good condition. According to its distribution and zoogeographical classification, *Th. transversalis* is central-southern European species (ANGELOV 2000a). Its spread in Europe include: Danube and its tributaries in the territory of Germany, Austria, Croatia, Slovakia (considered to be extinct), Serbia, Hungary (considered to be extinct), Romania, Moldova, Ukraine, Russia

(rivers Danube and Dniester) and Bulgaria (ZHADIN 1952, LISICKÝ 1991, GLÖER 2002, SOLYMOS & FEHER 2011).

Th. transversalis is listed in the IUCN Red List as 'Endangered' according to the criteria B2 a b (ii, iii, iv) (CUTTELOD *et al.* 2011, SOLYMOS and FEHER 2011). According to the European Topic Centre on Biological Diversity (European Environmental Agency 2005), *Th. transversalis* has been recorded in 2 NATURA 2000 sites in Middle Danube within Hungary and in 1 site within Romania, in 2 sites along Lower Danube of Romanian section, and in other 3 NATURA 2000 sites along Bulgarian Danube section. The last mentioned 3 sites from Bulgarian section of Danube River do not include the loci reported in the present paper, and the cited reference data need verification.

Despite the high conservation significance of *Th. transversalis*, the information about its recent distribution, population size and conservation status along Lower Danube is quite insufficient.

Material and Methods

Macrozoobenthos samples were collected in the riparian zone of Danube with a triangular 30x30x30 cm hand dredge (mesh size 500 µm) and preserved in 70% ethylic alcohol. The two samples were collected during low water periods in 2010 from Vardim Island and in 2008 from Komluka Island. Species identification of the mollusks was made according morphometric features according to GLOER 2002. The following abbreviations were used when describing the specimen's sizes measures: H – height of shell, D – diameter of shell, W – number of whorls.

Results and discussion

Th. transversalis was found in samples collected at the foreheads of two islands (Fig. 1): Vardim Island (N 43°37'27.69" E 25°27'15.17") and Komluka Island (N 44°08'00.67" E 27°03'43.54").

The morphometry of the specimen from the locality at Vardim Island was, as follows: H – 7.08, D – 5.76, W – 2.5, 11.11.2010, leg. M. Pavlova (Fig. 2 – A). The morphometry of the specimen found at Komluka Island was, as follows: H – 6.36, D – 4.92, W – 2.5, 18.07.2008, leg. V. Peneva (Fig. 2 – B).

The species mentioned for first time in Bulgaria in BÜTTNER (1928). It was widely distributed along Bulgarian section of Danube in the middle of XX century (HUBENOV 2007), when it was a part of the dominating mollusk complex of the lithorheophilic zoocenose (RUSSEV 1998). However, no any reliable data were found on the current status of *Th. transversalis* within Bulgarian Danube section.

Summary of the reference data from Romanian section of Danube (POPA 2005) stated that the last finding of the species was in 1994. The recent search of the species along Lower Danube confirmed its presence in Danube Delta (SÎRBU et al. 2010) and between Calarasi and Braila (CSÁNYI et al. 2012). Currently, NATURA 2000 Standard Forms, which are some of the main available sources of information, are not in each case updated yet. Thus, the available data suggest that the current spatial distribution and population status of *Th. transversalis* along Lower Danube need further study.

The species is considered to be extinct from Hungarian section of Danube River (SOLYMOS AND FEHER 2011). The same finding is in the information about the distribution of the striped nerite in

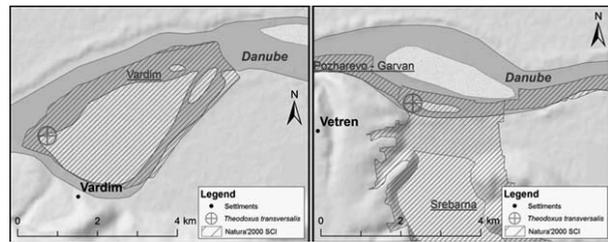


Fig. 1. Map of the Danube River and the new localities of *Theodoxus transversalis* (C. Pfeiffer 1828) with given NATURA 2000 sites on the Vardim Island (left) and Komluka Island (right).

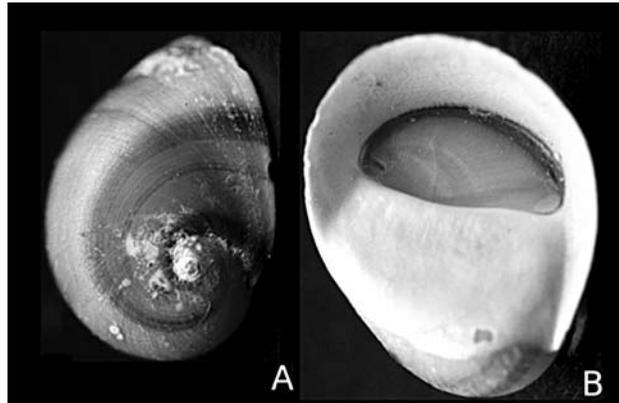


Fig. 2. *Theodoxus transversalis* (C. Pfeiffer 1828). A – Apical view of the specimen, found on the Vardim Island. B – Apertural view of the specimen, found on the Komluka Island.

the Final scientific report of the international survey Joint Danube Survey 2 (GRAF et al. 2008). The habitat decline, caused by anthropogenic impact, changes in river hydrological regime and pollution, as well as the invasion of *Theodoxus fluviatilis* (Linnaeus 1758) have been defined as the major threats to the species (SOLYMOS, FEHER 2011). The two island's foreheads are characterized by some favourable environmental conditions (lack of pollution, low current velocity or substrate for example) and could be considered unique for Lower Danube. A relation could be assumed between the presence of *Th. transversalis* and the favourable environmental conditions of these localities. Islands might be preferred habitat for *Th. transversalis*. Among NATURA 2000 sites within Danube River, which include the striped nerite in the species list, all sites besides 1 include in their boundaries islands.

The result of the study give a reason to expect finding more new localities of this species of high conservation and indicative significance on the islands of Lower Danube River, especially on

the border islands between Bulgaria and Romania, where the hydrobiological studies are insufficient due to previous access difficulties (state border). Evaluation of the population state and trends of *Th. transversalis* and its interrelations with invasive mollusks along Lower Danube are indispensable for developing further measures for protection of this species.

Acknowledgements: The investigation was carried out under the project 'Biological diversity of the aquatic ecosystems in wetlands on Lower Danube floodplain in view of optimisation of the ecosystem functions under global climate change' as funded by the National Science Fund (Contract No DO 02-352/2009). The authors would like to thank Prof. Dr. Vlada Peneva, for her kindness to provide some mollusk material. Thanks are due also to Assoc. Prof. Dr. Gergana Vasileva – the author of the photos (Creative Commons License CC BY-NC-ND 2.0) and to Dr. Svetlana Naumova for the language revision.

References

- ANGELOV A. 2000. Mollusca: Gastropoda et Bivalvia aquae dulcis. – In: GEORGIEV (Ed.): *Catalogus Faunae Bulgaricae*: 4. Pensoft, Sofia, 57.
- BÜTTNER K. 1928. Beitrag zur Molluskenfauna Bulgariens. Jahresber. – *Ver. Naturk. Zwickau*, **28**: 12-30
- CSÁNYI B., J. SZEKERES, Á. I. GYÖRGY, Z. SZALÓKY 2012. Macrozoobenthon investigations along Lower Danube between Calarasi and Braila, Romania. – *Acta Biol. Debr. Oecol. Hung.*, **28**: 47-59.
- GLÖER P. 2002. Süßwassergastropoden Nord- und Mitteleuropas. ConchBooks, Hackenheim, 327.
- GRAF W., B. CSÁNYI, P. LEITNER, M. PAUNOVIC, G. CHIRIAC, I. STUBAUER, T. OFENBÖCK, F. WAGNER 2008. Macroinvertebrates. – In: LIŠKA, I., WAGNER, F., SLOBODNIK, J. (Eds.): 2nd Joint Danube Survey. Final Scientific Report – ICPDR International Commission for the Protection of the Danube River, Wien, 41-53.
- European Topic Centre on Biological Diversity (European Environment Agency) 2005. NATURA 2000 unified site database (Special Areas of Conservation and Special Protected Areas). Available via <http://eunis.eea.europa.eu>. Cited 02 February 2012.
- HUBENOV Z. 2007. Fauna and zoogeography of marine, freshwater, and terrestrial mollusks (Mollusca) in Bulgaria. – In: FET V. and A. POPOV (Eds.): *Biogeography and ecology of Bulgaria. Monographiae Biologicae*. Springer, Heidelberg, 141-198.
- LISICKÝ M. J. 1991. Mollusca Slovenska (Mollusca of Slovakia). Veda, Bratislava, 344.
- POPA O. 2005. Contributions to the knowledge of the mollusks from the Romanian sector of the Danube. – *Trav. du Mus. Natl. d'Hist. Nat. 'Grigore Antipa'* **48**: 7-19.
- RUSSEV B. 1998. Special features and importance of the zoobenthos of the Danube River between 845 and 375 river kilometer. – In: 'Limnology of the Bulgarian part of Danube River', Bulgarian Academy of Sciences, Sofia: 145-200.
- SÎRBU I., M. SÎRBU, A. BENEDEK 2010. The freshwater mollusk fauna from Banat (Romania). – *Trav. du Mus. Natl. d'Hist. Nat. 'Grigore Antipa'*, **53**: 21-43. doi: 10.2478/v10191-010-0003-x
- SOLYMOS P., Z. FEHER 2011. *Theodoxus transversalis* (C. Pfeiffer 1828). – In: IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2. Available via www.iucnredlist.org. Cited 02 February 2012.
- ZHADIN V. I. 1965. Mollusks of fresh and brackish waters of the USSR: 365.

Received: 28.05.2012
Accepted: 26.09.2012

