



MELANOIDES TUBERCULATUS (O. F. MÜLLER, 1774) (ORTHOGASTROPODA: THIARIDAE), A GASTROPOD SPECIES NEW FOR THE FAUNA OF POLAND

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ABSTRACT: *Melanoides tuberculatus* (O.F. Müll.), a gastropod species new for the fauna of Poland, was found in discharge canals of the Pałnów and Konin power stations, situated in the Kujawy Lake District (Central Poland). The exotic gastropod, known in Europe mainly from aquaria and conservatory ponds, is the sixth invasive mollusc species recorded from heated waters of the Kujawy Lake District. The following alien mollusc species had been earlier identified in the area: bivalves *Anodonta woodiana* (Lea) and *Dreissena polymorpha* (Pall.), snails *Potamopyrgus antipodarum* (Gray), *Menetus dilatatus* (Gould), and *Ferrissia wautieri* (Miroli).

KEY WORDS: freshwater snails, *Melanoides tuberculatus*, introduced species, Poland

Melanoides tuberculatus (O.F. Müller, 1774) (Fig. 1) is a subtropical and tropical species inhabiting waters of Africa, North Australia, South Asia, and Madagascar. Its continuous range in Africa, i.e., the distribution centre of the family Thiaridae, covers almost the entire eastern part of the continent; from the mouth of the Nile to Port Elizabeth, and includes also a narrow belt between 15 and 5°N (Mauretania-Ghana-Nigeria-Chad). A larger area of occurrence, separated from the major distribution range, is known also from Algeria and Morocco. In addition, the species has been recorded from some isolated sites in North Africa, in the Sahara, and in Namibia. Most likely, the isolated sites (providing subfossil and recent records) testify to an earlier, wider distribution range of the species (BROWN 1980).

The substantial ecological plasticity and parthenogenic reproduction render *M. tuberculatus* (Müll.) capable of invading new areas. When already there, the gastropod initially colonises thermal waters and/or artificially heated reservoirs, most often fed by heated water discharged from power stations and industrial facilities. After some time, particularly in a mild cli-

mate, the species disperses into rivers and lakes characterised by normal thermal conditions. At present, the species is known from a number of sites in Europe: it has been recorded from Spain, Malta, Austria, the Netherlands, Hungary, and Germany (RICHNOVSZKY & PINTER 1979, FECHTER & FALKNER 1990, GITTENBERGER et al. 1998, GLÖER & MEIER-BROOK 1998). Due to its attractive appearance and rapid reproduction, *M. tuberculatus* (O.F. Müll.) is a popular aquarium species, commonly found also in heated ponds of conservatories and botanical gardens (ALEXANDROWICZ 1993). Numerous specimens of this species live in reservoirs of city greenhouse in Poznań (A. LESICKI personal information).

M. tuberculatus (O.F. Müll.) was found in Poland for the first time in the discharge canal of the Pałnów power station, situated within the Konin Lakes area (Fig. 2). The canal is used throughout the year to intercept the cooling water discharged by the power station. The canal has been designed for the maximum flow rate of 53 m³/s; the true flow rate is, however, lower: it ranged from 30 to 35 m³/s within 1999–2000. The canal is 4.25 km long, 4.0 m deep, and measures

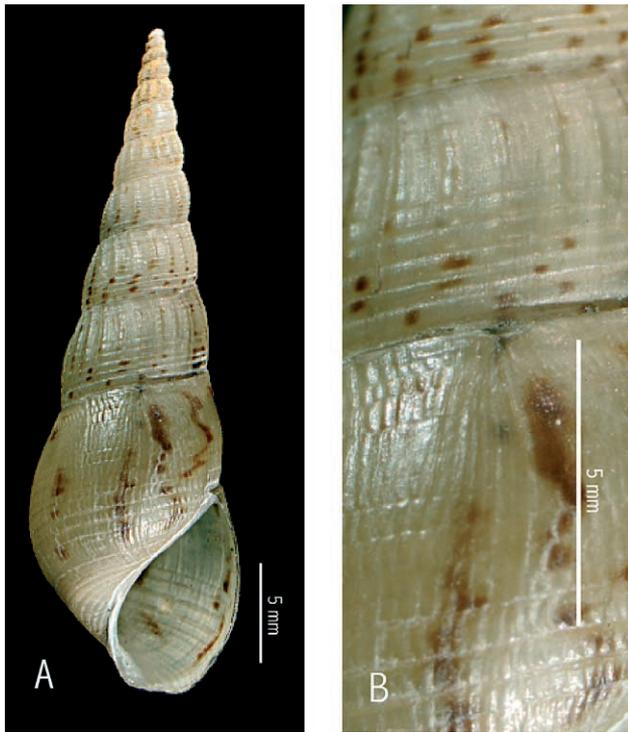


Fig. 1. *Melanoides tuberculatus*: A – shell; B – sculpture of the two terminal whorls. Photo B. WAWRZYNIAC-WYDROWSKA

20–40 m in total width. The canal's width diminishes with depth to about 16 m. The shores are reinforced with spiling. One shore is additionally protected by a levee. The canal runs along the eastern shore of Lake Goślawskie which receives, via 3 outlets, about 70% of the cooling water discharged. The remaining volume is released, as is the Konin power station cooling water, to lakes Pałnowskie, Wąsosko-Mikorzyńskie, Ślesińskie, and Licheńskie. The canal's bottom is sandy, the 0.5–1.0 mm fraction being the dominant (70%) one; the sediment organic matter content is about 0.6%. The major physical and chemical water parameters are as follows: water temperature ranges within 9.9 – 35.0°C (averaging 23.5°C in 1998–2001); the dissolved oxygen content range (1999–2001) is 8.1–9.6 mg O₂/dm³; the calcium content ranges (1999–2001) within 66.5–114.5 mg Ca/dm³.

A fairly high number of *M. tuberculatus* (O.F. Müll.) individuals were collected (leg. A. KRASZEWSKI) on 25 September 2002 in the vicinity of the Pałnów power station discharge canal's confluence with the Konin power station water intake canal (Fig. 2). The gastropod was recorded there for the first time in 2000 by Dr A. PROTASOV; subsequently, it was found there in 2001–2002 by members of a hydrobiological research team led by one of the authors (B. ZDANOWSKI). The *M. tuberculatus* collection contains both adults and juveniles, thus providing evidence of successful reproduction. The largest specimens had shells measuring 30.0–33.7 mm in height and 9.1–10.7 mm in width; the shells had 11–12 whorls; the aperture measured

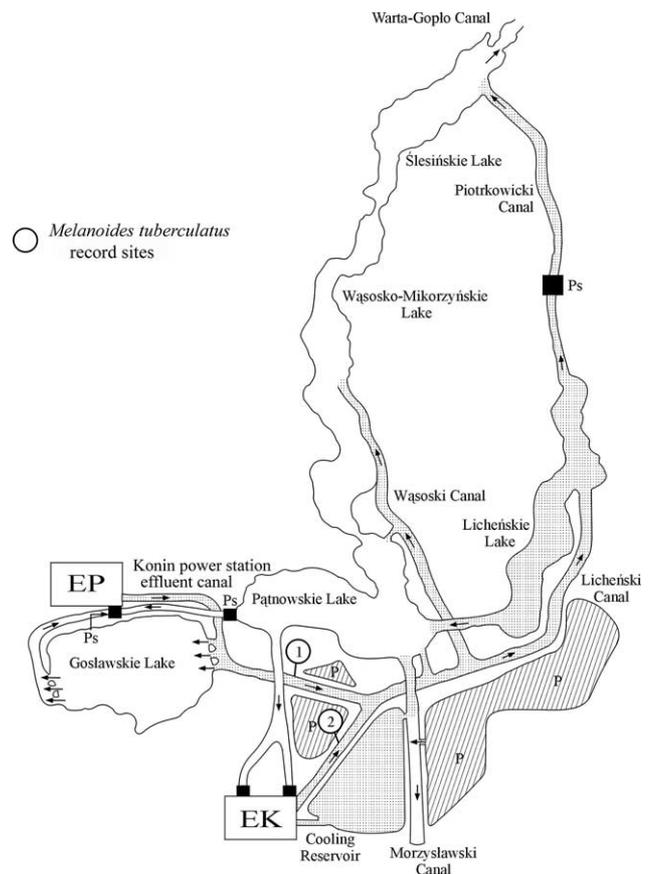


Fig. 2 Konin Lakes and *M. tuberculatus* occurrence sites

9.1–10.8 mm in height and 5.1–5.7 mm in width; the body whorl was 9.1–10.7 mm wide and 14.1–16.0 mm high. The periostracum was olive green-yellow in colour and showed conspicuous, irregularly distributed, red-brown patches. The shell surface was clearly, although not very deeply, ribbed. The ribs were most pronounced on the penultimate whorl. In addition to the ribs, the shell showed well-visible spiral lines (Fig. 1 B).

During the most recent period of study (autumn 2002), empty shells of *M. tuberculatus* (O.F. Müll.) were collected also from the Konin power station discharge canal. As they were well-preserved, it may be inferred that they are recent remains of the gastropod individuals inhabiting the canal.

The origin of the *M. tuberculatus* (O.F. Müll.) population found in the power station discharge canals has not been explained yet. The gastropod could have accompanied the fish stocked in the canals or was brought in by birds. However, an intentional or unintentional introduction by humans, e.g., aquarium fish breeders, cannot be ruled out. This interesting newcomer is likely to colonise, in a short time, the neighbouring lakes and canals. Initially, it can be expected to settle in heated reservoirs to spread, perhaps, to those of a regular thermal regime.

The appearance of the exotic *M. tuberculatus* (O.F. Müll.) in waters of the Konin Lake District is another



evidence of a unique character of that ecosystem. In addition to the ubiquitous zebra mussel [*Dreissena polymorpha* (Pall.)], present in Poland for over 150 years, the heated Konin Lakes harbour 4 other alien mollusc species: *Potamopyrgus antipodarum* (Gray), *Ferrissia wautieri* (Mirolli), *Menetus dilatatus* (Gould), and *Anodonta woodiana* (Lea) (BERGER & DZIĘCZKOWSKI 1977, 1979, PIECHOCKI 1986, ZDANOWSKI 1996). The list should be supplemented by invasive species belonging to other invertebrate taxa, e.g., the tropical flatworms *Dasyhormus lithophorus* Marcus, *Stenostomum pseudoacetabulum* Nutt. et Waters, and *Dugesia tigrina* (Girard) (KOLASA 1977), the freshwater nemertean *Prostoma kolasai* Gibson et Moore (KOLASA 1977), the neotropical-oriental oligochaete *Aelosoma bengalense* Steph. (KASPRZAK 1977), and the Pontocaspian gammarids *Chaetogammarus ischnus* (Stebbing) and *Chelicorophium curvispinum* (G.O. Sars) (JAŹDŹEWSKI & KONOPACKA 1990, 1995). The

presence of such a unique assemblage of species in heated waters of the Konin power station complex justifies efforts aimed at granting a protected area status to at least some of the water bodies of the area. It seems that the protected area status should be granted, first of all, to the following lakes: Goślawskie, Pałnowskie, and Licheńskie, and to the channels connecting them. The area merits the status of a protected natural landscape area or an ecologically valuable area. Should such legal protection be established, the area would become a natural laboratory in which to follow fates of invasive species, mostly thermophilous ones, that colonise waters of Poland.

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