

Aquatic Invasions Records

Short note on an alien *Planorbella* (Gastropoda: Pulmonata) in volcanic lakes in Central Italy

Luciana Mastrantuono*, Francesco Livretti and Teresa Mancinelli

Department of Environmental Biology, University "La Sapienza", Viale dell'Università 32, 00185, Rome, Italy

E-mail: luciana.mastrantuono@uniroma1.it (LM), francesco.livretti@yahoo.it (FL), teresa.mancinelli@poste.it (TM)

*Corresponding author

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Abstract

This brief note provides further data on the presence, abundance, and shell morphology of a snail species belonging to the genus *Planorbella*, found in central Italy in the crater lakes Albano and Nemi in 1986 and 2001, respectively. The snail is an alien species in Italy and is very interesting from a taxonomic point of view. A short history of its discovery in the two lakes is also provided.

Key words: *Planorbella*, alien species, volcanic lakes

Introduction

The gastropod specimens that are the subjects of this note came from material sampled during studies on littoral plant-associated invertebrates in the volcanic lakes Albano and Nemi, located in central Italy, about 25 km south of Rome (Mastrantuono 1990; Mastrantuono and Sforza 2008; Mastrantuono et al. 2009). These analyses were part of a series of investigations aimed at identifying the biodiversity of this community and for monitoring littoral water quality.

The gastropods found in the lakes were very common species, with the exception of one snail taxon found in Lake Albano for the first time in 1986 (reported as *Planorbidae* indet., Mastrantuono 1990) and later found in Lake Nemi in 2001 (Mastrantuono and Sforza 2008). Mastrantuono and Sforza (2008) recorded the species as *Helisoma duryi* Wetherby, 1879, according to the identification of F. Giusti (personal communication). In the checklist of the Italian pulmonate gastropods (Manganelli et al. 1995, see also Giusti et al. 1995), *H. duryi* was recorded as present in Lake Albano and in Sicily. Later, Cianfanelli et al. (2007) mentioned that the species was also present in the Liguria, Tuscany, and Apulia regions of Italy. However, the figure of the species reported in Cianfanelli et al. (2007) showed a typical specimen of

Helisoma duryi, whereas the morphology of the individuals from Lake Albano seemed notably different. The latter specimens were identified as *Planorbella duryi* by Alexandrowicz (2003), who collected the snail in 2002 from eulittoral sand, and more recently as *Planorbella duryi* forma *seminole* by Mienis (2004). This snail is an alien species in Italy and is very interesting from a taxonomic point of view. For this reason a short history of its discovery in the two lakes and further data on the presence, abundance and shell morphology are provided in this short note.

Study area

Lake Albano (41°44'N, 12°40'E, 293 m a.s.l., surface area 6.02 km², maximum depth 175 m) is one of the deeper volcanic lakes in the Latium Region (central Italy). It is located in the Monti Albani area, about 25 km south of Rome. The lake was investigated in 1986/87 (Mastrantuono 1990) and in 2008 (Mastrantuono et al. 2009). The nearby smaller volcanic Lake Nemi (41°42'N, 12°42'E, 316 m a.s.l., surface area 1.8 km², maximum depth 32.4 m) was investigated in 1981/82 (Mastrantuono 1986), and more recently in 2001/2002 (Mastrantuono and Sforza 2008). For details on numbers of sites and dates, and methods of sampling and sorting see the cited papers.

Table 1. Total number of individuals and percentages of *Planorbella duryi* forma *seminole* in Lake Albano in 1986/87. Tot. g.: Total gastropods.

Taxon	Stations										Total
	1	2	3	4	5	6	7	8	9	10	
<i>P. duryi seminole</i> (0-4m)	160	285	536	78	85	210	51	39	59	115	1,618
<i>P. duryi seminole</i> (4-8m)	799	114	388	565	214	128	0	0	0	76	2,284
Total <i>P. duryi seminole</i>	959	399	924	643	299	338	51	39	59	191	3,902
Total Gastropods	3,421	904	1,189	2,465	2,000	1,213	371	73	111	278	12,025
<i>P. duryi seminole</i> /Tot. g.	28.0	44.1	77.7	26.1	15.0	27.9	13.7	53.4	53.2	68.7	32.4

Note: Total gastropods represents the total number of individuals of all species of gastropods found in the lake (*Physa acuta* Draparnaud, 1805, *Lymnaea peregra-auricularia*, *Planorbella duryi* forma *seminole* Pilsbry, 1934, *Bithynia tentaculata* L. 1758)

Table 2. Total number of individuals and percentages of *Planorbella duryi* forma *seminole* in Lake Nemi in 2001/02. Tot. g.: Total gastropods.

Taxon	Stations						Total
	1	2	3	4	5	6	
<i>P. duryi seminole</i> (0-4m)	420	294	94	399	57	390	1,654
<i>P. duryi seminole</i> (4-8m)	92	88	42	243	333	467	1,265
Total <i>P. duryi seminole</i>	512	382	136	642	390	857	2,919
Total Gastropods	609	533	589	979	557	1,470	4,737
<i>P. duryi seminole</i> /Tot. g.	84,1	71,7	23,1	65,6	70,0	58,3	61,6

Note: Total gastropods represents the total number of individuals of all species of gastropods found in the lake (*Physa acuta* Draparnaud, 1805, *Planorbella duryi* forma *seminole* Pilsbry, 1934, *Bithynia tentaculata* L. 1758)

Results and discussion

In 1986, *Planorbella* was found for the first time in Lake Albano. A large number of *Planorbella* individuals were observed (3,902 in total, 32.4% of total gastropods; Table 1). The species was the most abundant gastropod within macrophytes and distributed throughout the whole area which was colonized by submerged plants (depth range of about 0–8 m). A similar trend was observed in Lake Nemi in 2001, when the species was first recorded in this lake. In total, 2,919 individuals were counted, corresponding to about 62% of total gastropods over the same depth range of 0–8 m (Table 2). However, a recent 2008/2009 investigation of plant-associated meio- and macrobenthic invertebrates in Lake Albano did not reveal any living *Planorbella*, which was found only as thanatocoenosis. The reason for this disappearance is unclear, but the dramatic lowering of the water level in the lake, by about 4–5 m over the last decade, probably played a significant role. This water-level reduction has largely destroyed the aquatic vegetation, which is today completely lacking over almost the entire lake perimeter and depths (Mastrantuono et al. 2009).

The individuals of *Planorbella* found during these studies (Mastrantuono 1990; Mastrantuono and Sforza 2008) belonged to a rather large planorbid species, with maximum shell height in both lakes of approximately 10–11 mm and maximum diameter of about 12 mm, based on 200 examined individuals. The very typical sinistral shell had a finely striated surface, and was characterized by differential flattening of the spires, varying from scalarid to a completely flat form, and by a carinated and defined spire margin (Figure 1). Individuals with completely flat spires represented the highest percentage in both lakes, constituting about 80% of a total of 2,200 examined individuals, whereas about 20% of the individuals had scalarid spires. Alexandrowicz (2003) noted very different proportions in the individuals collected in 2002, of about 12% with flat spires and 60% with nearly flat spires. The reason for this difference could be partly explained by the considerable polymorphism of the species, and partly by the fact that Alexandrowicz collected material on only one occasion and only from the eulittoral zone. Comparison of the figure reported by Alexandrowicz (2003) for *Planorbella* from Lake Albano with our drawings and photographs

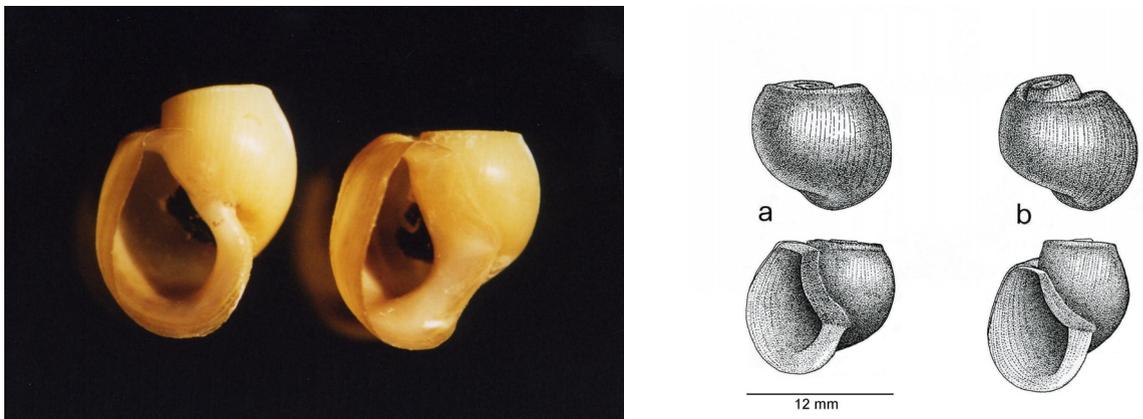


Figure 1. Photographs (by L. Mastrantuono) and drawings of *Planorbella duryi* forma *seminole* in Lake Albano (1986). a: flat form; b: scalarid form. The same morphology characterizes the individuals collected in Lake Nemi (2001).

shows a substantial resemblance but also some difference, particularly in the margins of the spires, which in our opinion appear to be slightly carinated (Figure 1).

One of the first records of a species having similar characters could be the planorbid *Paludina scalaris* Jay 1839 described from Florida (syn. *Helisoma scalare* Jay 1939 and syn. *Planorbella scalaris* Jay 1939). Many successive records of similar planorbids collected by different authors and from other sites were attributed to several genera, including *Ameria* Adams 1861, *Planorbis* Müller 1773, and some others (see Pilsbry 1934). In his early treatise, Pilsbry (1934) described in detail a pool of populations belonging to the genus *Helisoma* and proposed a reconstruction of the evolutionary trends from the Pliocene to the Pleistocene of some of these “species, subspecies, races”. Among these, the *scalaris* and *seminole* forms appeared to be related by their very similar morphology and the existence of many transition forms between them. Pilsbry (1934) also stressed that, because these two forms are so similar in external morphology, only anatomical characters can differentiate them. Obviously at that time any genetic method of identification was available. Moreover, Pilsbry grouped the *H. duryi* complex and related Pliocene species into the new subgenus, *Seminolina*. Burch (1982), in his taxonomic guide, attributed only two species, *Planorbella duryi* (syn. *Helisoma duryi* Wetherby) and *Planorbella scalaris* (syn.

Paludina scalaris Jay), to the subgenus *Seminolina* Pilsbry.

According with the Pilsbry description and due to its shell morphology, the most suitable current attribution for the specimens found in Lake Albano and Lake Nemi appears to be *Planorbella duryi* forma *seminole*, as reported by Mienis (2004), although, in our opinion, a taxonomic revision of this pool of species would be very useful.

Regarding the dispersal of *P. duryi* from Florida to other parts of the world, Alexandrowicz (2003) proposed suitable hypotheses, including possible migration routes to Europe. The author reported that the first route of the species was from Florida to other states of USA, other routes were to South Africa countries (Brown 1967; Van Bruggen 1974), to South America (Paraense 1976), to islands in the Caribbean Sea (Perera et al. 1984; Pointier 2001) and to Europe (Fechter and Falkner 1990). However, the real routes to Europe appear unknown, as *P. duryi* seemed to be arrived either from Florida and from South Africa countries. How and when *Planorbella* arrived in Lake Albano and Lake Nemi remain also unknown. Several common hypotheses seem valid. For example, juvenile and adult snails frequently become attached to the external surfaces of birds (feet or plumage). The importation of fish or aquatic plants from aquaria is probably the more frequent method of colonization. Another attractive hypothesis for the mechanism of

introduction is also possible: during the Olympic Games in 1960, international canoeing and rowing races took place on Lake Albano; it could be that the species arrived attached to the equipment of the American team. However, it is impossible to draw definite conclusions on the colonization method involved.

Our 1986 record from Lake Albano could be the first recording of the species in this lake. Cianfanelli et al. (2007) gave 1988 as the date of first finding of specimens in Lake Albano (see also Gherardi et al. 2008). Notably, in an earlier study on the littoral community of Lake Albano (Stella 1951), the presence of this planorbid was not recorded. This suggests that the snail probably arrived in the lake between 1950 and 1986. Regarding the 2001 finding in Lake Nemi, where *Planorbella* was absent in 1981 (Mastrantuono 1986), the likely possibility is that the species came from Lake Albano via birds or transferred fish.

In conclusion, we stress the following points. This species can be identified as *Planorbella duryi* forma *seminole* according to Mienis (2004). The first record of the species from Lake Albano, and probably from Italy, could have been in 1986, and the species probably arrived in Lake Albano between 1950 and 1986. The first record of the species in Lake Nemi was in 2001. By 2008, the species had disappeared from Lake Albano.

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