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DESTROYED AND THREATENED LOCALITIES OF RISSOOID SNAILS (GASTROPODA: RISSOOIDEA) IN GREECE

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ABSTRACT: In September 2003 we visited localities of rissooid snails in continental Greece, known from the literature. Nine springs (type localities included), situated in urbanized or cultivated areas, were destroyed, changed or under stress. Localities of Rissooidea in Greece need urgent protection, otherwise the snails may disappear altogether.

KEY WORDS: freshwater spring, type locality, "Hydrobioidea", *Belgrandiella, Daphniola, Graecorientalia, Grossuana, Horatia, Orientalina, Paladilhia, Pseudamnicola, Semisalsa, Trichonia*, conservation

INTRODUCTION

Studies on the rissooid fauna of Greece began in the 1850s, but our knowledge is still not complete. The literature mostly comprises species descriptions and faunistic contributions (BUTOT & WELTER-SCHULTES 1994). SCHÜTT (1980) made an attempt to gather the scattered information. Much of the territory of Greece was, and still is, not easily accessible during short visits, and for this reason most of the described localities of rissooids are situated near main roads, in towns, close to archaeological sites, etc.

The range of habitats the rissooids dwell in are associated with groundwater. The snails inhabit lakes charged with groundwater, brackish coastal aquifers, the uppermost course of streams in karst areas, or karst springs. All these freshwater and brackish water habitats are easily changed or destroyed by man (SZAROWSKA 2000).

In semiarid regions of Greece, like the eastern part of the Peloponnese, water is scarce and groundwater provides most of water supply for urban and agricultural purposes. In the last three decades extensive agriculture and rapid urbanization have increased groundwater pollution and water scarcity in this country. To satisfy the continuously growing water demands, more and more water is abstracted through new deep wells and boreholes, and the existing intakes are rebuilt so as to provide more water. The resulting overexploitation of groundwater has created environmental problems in some regions (VOUDOURIS et al. 2005).

In September 2003, in search of Greek rissooids, we visited more than 20 localities situated in the continental part of Greece. All of the localities are cited in SCHÜTT (1980), RADOMAN (1983), GITTENBERGER (1982), FALNIOWSKI & SZAROWSKA (2000). We found that some of the habitats, most of which were type localities, no longer existed, and others were changed or under stress (SZAROWSKA 2006).

DESTROYED AND THREATENED LOCALITIES

1. Spring at Perama, the northwest bank of lake Pamvotis at Janina: once a locality of *Semisalsa steindacheri* (Westerlund, 1902) (SCHÜTT 1980), the spring dried out at the beginning of the 1980s

Fig. 1. Kefalovriso, type locality of *Trichonia kephalovrissonia* Radoman, water intake built on the spring

(DUBIN et al. 2002); in 2003 there was no trace of a spring either there or on the north bank of the lake, where once were the type localities of *Paladilhia (Paladilhiopsis) janinensis* (Schütt, 1962), *Horatia (Neohoratia) epirana* Schütt, 1962, *Semisalsa steindacheri* (Westerlund, 1902), *Orientalina curta albanica* Radoman, 1973.

2. Spring at Kefalovriso, type locality of *Trichonia kephalovrissonia* Radoman, 1973: nothing was left of the spring due to a water intake built on it (Fig. 1).

3. Holy spring at Vravrona (the ancient Brauron), just east of Athens: the spring and brook were once a locality of *Pseudamnicola macrostoma* (Küster, 1853) [referred to as *Pseudamnicola* cf. *moussoni* (Calcara) in FALNIOWSKI & SZAROWSKA 1995]. KÜSTER (1852–1853) gives "Attika" as the type locality, the presumed type locality of the species is Athens or its environs; most of the other known Attic localities – Athens, Kifissia (now part of Athens), Pereas, Marathon, Phaleron (SCHÜTT 1980) – probably do not exist any more, so the locality at Vravrona used to be one of the very few *"terra typica"* localities of *P. macrostoma* left. In

Fig. 2. Kessariani at Athens, type locality of *Daphniola louisi* Falniowski et Szarowska

Fig. 3. Kessariani at Athens, the spring where we found *D. louisi* in 2003

2003 the spring was dried out by the digging of a deep and broad drainage ditch.

4. Spring at Kessariani, Athens, type locality of *Daphniola louisi* Falniowski et Szarowska, 2000; the snails once occurred in quite a number in a small, artificial pool beneath the spring (FALNIOWSKI & SZAROWSKA 2000). In 2003 there were exotic fish and no snails in the pool (Fig. 2); we only found a few specimens in the spring (Fig. 3). In the Roman period it used to be the main source of drinking water for Athens, after the emperor Hadrian ordered the build-

Fig. 4. Spring at Myli (ancient Lerna), type locality of *Semisalsa tritonum* (Bourguignat)

Fig. 5. Spring at Myli (ancient Lerna), water intake and pipes; water level lower than it used to be

Fig. 7. Spring at Vrysia, type locality of *Graecorientalia vrissiana* (Radoman) and one of localities of *Belgrandiella (Turcorientalia) hohenackeri hohenackeri* (Küster); water intake on the spring

ing of a water intake on the spring. In 2003 the water in the spring was polluted and no longer suitable for drinking (Fig. 3). It is doubtful that the topotypical population of *Daphniola louisi* will persist for long.

5. Spring at Myli (the ancient Lerna), the Peloponnese, type locality of *Semisalsa tritonum* (Bourguignat, 1852); due to the abstraction of water from the spring, combined with prolonged drought periods (LAMBRAKIS et al. 1997) the snails, though still quite numerous in 2003 (Fig. 4), were under stress, as water level in the spring was lower than it used to be (Fig. 5). The snails might easily disappear if this extraction is maintained. The spring at Myli is one of only two known localities of the species [assigned to the genus *Radomaniola* (SZAROWSKA 2006, FALNIOWSKI et al. in preparation)]. In spite of our searching, we did not find these snails at the other locality, at Kefalari.

6. Spring 5 km SW of Gytheio, type locality of *Horatia (Neohoratia) hadei* Gittenberger, 1982; a water intake had been built on the spring and the snails, if at all present yet, were not accessible.

7. Kamena Vourla spring, type locality of *Grossuana serbica vurliana* Radoman, 1966 and one of the few localities of *Semisalsa achaja achaja* (Clessin, 1879) given by SCHÜTT (1980); since the time that Radoman described the species, a huge health resort had been developed at Agios Konstantinos, over the spring. In 2003 there was a system of pumps and pipes at the place, built to satisfy the water demands of the health resort. If present, the snails were inaccessible, as no water reached the surface (Fig. 6).

8. Spring at Vrysia, type locality of *Graecorientalia vrissiana* (Radoman, 1966) and one of the localities of *Belgrandiella (Turcorientalia) hohenackeri hohenackeri* (Küster, 1853) reported by SCHÜTT (1980); due to the water intake built on the spring neither water nor snails were accessible in 2003 (Fig. 7).

Fig. 6. Kamena Vourla, type locality of *Grossuana serbica vurliana* Radoman and one of localities of *Semisalsa achaja achaja* (Clessin); system of pipes and pumps supplying the health resort in water

Fig. 8. Velestino, the huge spring that once supplied the power plant and was a locality of *Belgrandiella (Turcorientalia) hohenackeri hohenackeri* (Küster) and *Semisalsa achaja sorella* (Westerlund) has dried out

Fig. 9. Marmari, South Evia, water intake with an artificial pond, a locality of *Pseudamnicola macrostoma negropontina* (Clessin)

9. Spring at Velestino, according to SCHÜTT (1980) this locality of *Belgrandiella (Turcorientalia) hohenackeri hohenackeri* (Küster, 1853) and *Semisalsa achaja sorella* (Westerlund, 1879), used to be the main supply of water to the local power plant, but in 2003 it was dry (Fig. 8). According to information obtained locally, this spring, once big and rich in water, dried out seven years previously, soon after deep wells had been drilled to supply the nearby cotton fields with water.

CONCLUSIONS

In the 1970s, through the example of Kaaskenswater – the type locality of *Semisalsa stagnorum* (Gmelin, 1791) – BUTOT (1978) made evident the importance of type localities and the necessity of the conservation of these sites all over the world. This problem was then given attention of the 7th Congress of Unitas Malacologica in Paris 1980. Conservation of a type locality is urgent not only where the types are lost. There is a lot of confusion in the morphology-based taxonomy of Rissooidea, and resolving the phylogenetic relationships among rissooid taxa requires the use of molecular characters (WILKE et al. 2001). Most of the types of rissooid species are dry shells and the only way to maintain the stability of nomenclature is to use topotypical specimens for molecular studies.

The main conclusions are as follows: (1) the Rissooidea of Greece need urgent phylogenetic and phylogeographical study, as their localities are prone to changes and may even disappear altogether; (2) following BUTOT's (1978) suggestions some steps should be undertaken to protect what is left of the type localities of rissooid species in Greece (SZAROWSKA & FALNIOWSKI 2004); (3) the big population of *Pseudamnicola macrostoma negropontina* (Clessin, 1878) that we found in Marmari, South Evia, at a site with a water intake of an older type (water retained in an artificial pond: Fig. 9), shows that perhaps it is possible to take water from a spring in a way that is not harmful to the fauna.

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