

***Radix cf. labiata* (Gastropoda, Lymnaeidae) as an opportunistic predator and scavenger of *Rana temporaria* egg clutches**

ALEXANDRU IFTIME¹ and OANA IFTIME²

¹ “Grigore Antipa” National Museum of Natural History, Bd. Kiseleff No. 1, Sector 1, Bucharest, Romania.

² Department of Microbial Genetics and Biotechnology, Faculty of Biology – University of Bucharest, Aleea Portocalelor 1-3 060101 Sector 6, Bucharest, Romania.

BROWN frogs (*Rana* spp.) are r-strategic, explosive-breeding amphibians distributed over most of Europe. They deposit characteristic egg clutches at communal breeding sites (generally ponds, temporary or permanent, and small lakes). These egg clutches face severe mortality from weather related conditions like frost and desiccation, pathogens such as *Saprolegnia*, and predation. Such factors can have further influence recruitment and sometimes induce variation in hatching time and physiological parameters (e.g., earlier hatching [Laurila et al., 2002], altered morphology in populations exposed to egg predation [Mandrillon & Saglio, 2008], and/or reduced tadpole size following egg exposure to *Saprolegnia* [Uller et al., 2009]). Communal spawning with accumulation of individual egg clutches in large masses reduces the effect of predation (Hakansson & Loman, 2004). Knowledge of the predators of brown frogs is therefore important in relation to the conservation needs of these species and to better understand their integration in local, small-scale food chains.

Various predators have been documented to feed upon the eggs of brown frogs in Europe and Romania. These include invertebrates such as free-living flatworms, leeches, crustaceans, aquatic insects and their larvae (especially caddis-fly and dipteran larvae, aquatic heteroptera and dytiscid beetles) (Laurila et al., 2002; Kwet, 1996; Wells, 2007). Vertebrates such as fishes, sometimes with tremendous impact (Leu et al., [2009]) and newts are also predators (Kwet, 1996; Sas et al., 2006, and literature quoted therein; Denoël & Demars, 2008; Iftime et al., 2009).

Freshwater snails such as *Planorbis* and *Lymnaea* – L. (*Stagnicola*) *palustris* – are

sometimes recorded as predators of amphibian eggs (Kwet, 1996; Kuzmin, 1999, reviewed in Wells, 2007) and sometimes as competitors for tadpoles of brown frogs (Brönmark et al., 1991). They, like all known predators of European brown frog eggs, are not specialized for this type of alimentation but consume frog eggs occasionally and opportunistically (Wells, 2007).

Here we document a small lymnaeid, *Radix cf. labiata* feeding upon egg clutches of *Rana temporaria*. The snails observed were morphologically most similar to *Radix cf. labiata*, which is the most common species in montane areas in Romania – see Glöer & Sârbu (2005) for evidence of the difficulties of morphological identification in *Radix* spp. (cf. Pfenniger et al. [2006], we treat them as *Radix cf. labiata*). The *R. temporaria* egg clutches were in the process of hatching, in April 2009, in a brook, in the foothills of the Buila massif, Southern Carpathians of Romania (4 April 2009, ca. 13.50; Otăsău valley, 45°11'37" lat. N, 24°6'55" long. E; see location on map of Romania, Fig. 1, and habitat photo, Fig. 2). The snails had congregated on the surface of an egg clutch laid in a small brook-side pond (Fig. 3). The clutch provided food for the snails in the form of algal growth on the outer jelly layer of eggs, but the snails appeared to ingest the jelly layer of healthy, un-hatched eggs as well (see detail, Fig. 4), and probably also the remains of hatched eggs. Although *R. temporaria* egg clutches and *Radix cf. labiata* were present together in other small ponds, the behavior was only seen at the single location, suggesting the predatory behaviour to be uncommon.

Thus, *Radix cf. labiata* may sporadically act

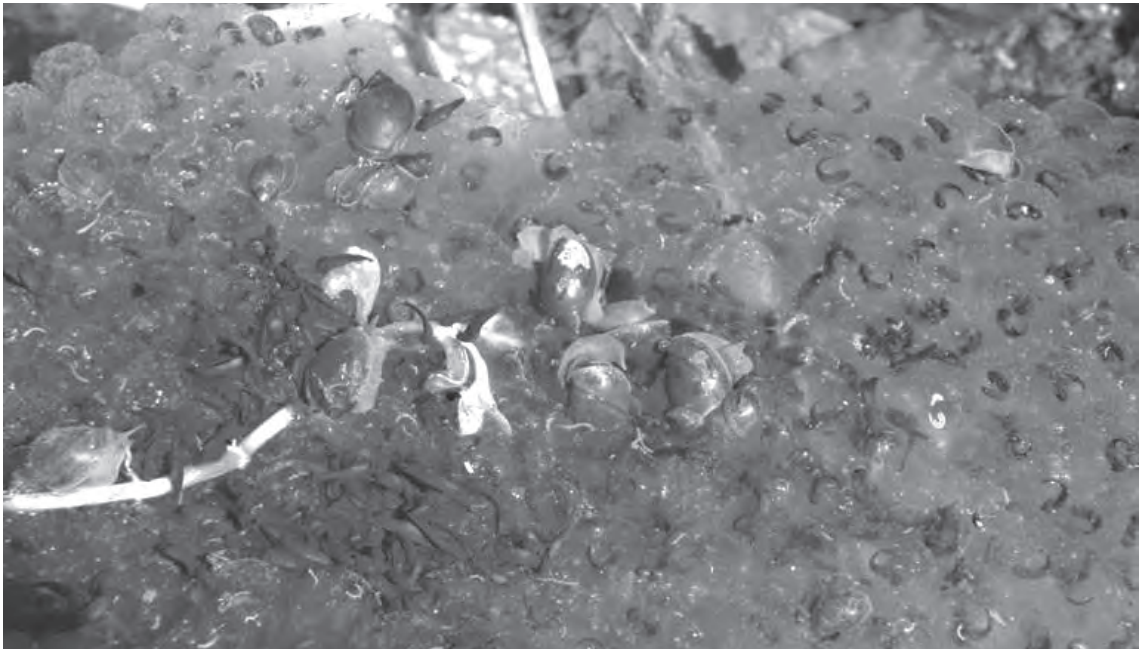
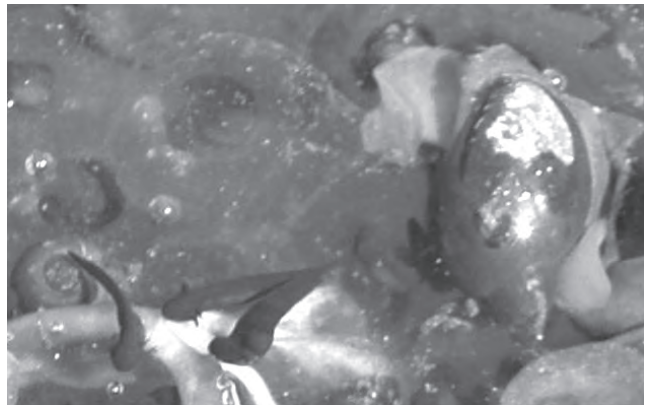


Figure 1. Study area located on the map of Romania. ▲

Figure 2. General aspect of the habitat in April 2009. ▲▶

Figure 3. *Radix* cf. *labiata* snails congregating on hatching *Rana temporaria* egg clutch. ▼

Figure 4. *Radix* cf. *labiata* snail ingesting egg jelly. ▶



as an opportunistic predator of *R. temporaria* egg clutches. While we consider that its impact upon the frog population is minimal, there is a potential for influencing the hatchling morphology because hatching is influenced by chemical cues released from crushed eggs (Mandrillon & Saglio, 2008). Our observation thus validates further studies.

REFERENCES

- Brönmark, C., Rundle, S.D., Erlandsson, A. (1991). Interactions between freshwater snails and tadpoles: competition and facilitation. *Oecologia* **87**, 8-18.
- Denoël, M., Demars, B. (2008). The benefits of heterospecific oophagy in a top predator. *Acta Oecologica* **34** (1), 74-79.
- Glöer, P. & Sârbu, I. (2005). New freshwater molluscs species found in the Romanian fauna. *Heldia* **6** (5/6), 229-238.
- Hakansson, P. & Loman, J. (2004). Communal spawning in the common frog *Rana temporaria*: Egg temperature and predation consequences. *Ethology* **110** (9), 665-680.
- Iftime, A., Iftime, O. & Pop, D. (2009). Observations on the herpetofauna of the Iezer-Păpușa Massif (southern Carpathians, Romania). *Herpetozoa* **22** (1/2), 55-64.
- Laurila, A., Pakkasmaa, S., Crochet, P.-A., Merilä, J. (2002). Predator-induced plasticity in early life history and morphology in two anuran amphibians. *Oecologia* **132**, 524-530.
- Leu, T., Lüscher, B., Zumbach, S. & Schmidt, B. R. (2009). Small fish (*Leucaspius delineatus*) that are often released into garden ponds and amphibian breeding sites prey on eggs and tadpoles of the common frog (*Rana temporaria*). *Amphibia-Reptilia* **30**, 290-293.
- Kuzmin, S.L. (1999). *The amphibians of the former Soviet Union*. Moscow: Pensoft, Sofia-Moscow.
- Kwet, A. (1996). Zu den natürlichen Feinden des Laichs von Froschlurchen. *Salamandra* **32** (1), 31-44.
- Mandrillon, A-L. & Saglio, P. (2008). Developmental windows and origins of the chemical cues mediating hatching responses to injured conspecific eggs in the Common Frog (*Rana temporaria*). *Can. J. Zool.* **86** (6), 447-455.
- Pfenniger, M., Cordellier, M. & Streit, B. (2006). Comparing the efficacy of morphologic and DNA-based taxonomy in the freshwater gastropod genus *Radix* (Basommatophora, Pulmonata). *BMC Evol. Biol.* **6**, 100.
- Sas, I., Covaciu-Marcov, S-D., Kóvacs, E-H., Radu, N-R., Tóth, A. & Popa, A. (2006). The populations of *Rana arvalis* Nills 1842 from the Ier Valley (The Western Plain, Romania): present and future. *North-West. J. Zool.* **2** (1), 1-16.
- Uller, T., Sagvik, J. & Olsson, M. (2009). Pre-hatching exposure to water mold reduces size at metamorphosis in the Moor Frog. *Oecologia* **160** (1), 9-14.
- Wells, K.D. (2007). *The Ecology and Behavior of Amphibians*. Chicago: University of Chicago Press.