## A record of Pelophylax esculentus attack on Bombina variegata

Daniel Jablonski1,\*, Petr Vlček2

In recent years numerous studies on the feeding ecology of the European water frogs of the genus Pelophylax have been published: P. ridibundus (Covaciu-Marcov et al., 2005; David et al., 2008; Mollov et al., 2010), P. lessonae (Sas et al., 2005; 2007), and P. esculentus (Ferenți et al., 2007; David et al., 2009; Sas et al., 2007; 2009; Paunović et al., 2010). Pelophyax spp. are highly opportunistic predators feeding on a wide range of invertebrates (mostly insects), small vertebrates including amphibians (Rana arvalis), reptiles (Lacerta agilis, Podarcis tauricus, Natrix natrix), and small mammals (Microtus sp., Mus sp. Myotis mystacinus) (Opatrný, 1968; Günther, 1990; Baruš and Oliva, 1992; Országhová et al., 2003; Çiçek and Mermer, 2006; Sas et al., 2009; Mollov et al., 2010). Their diet includes also toxic invertebrates such as the European hornet Vespa crabro (Günther, 1996; Kupka pers. comm.) or vertebrates, especially amphibians (e.g. Lissotriton vulgaris, Bufo viridis, Baruš and Oliva, 1992) whose skin may contain poisonous components.

Frogs of the genus *Bombina* are venomous vertebrates whose skin produces relatively toxic mucus. The hemolytic peptides bombinins and bombesin have been identified on the skin of *Bombina* spp. (Csordás and Michl, 1969; Roseghini et al., 1989). However, Baruš and Oliva (1992) reported *B. bombina* (further data unspecified) in the diet of *P. ridibundus*; Vogel and Böhme (2007) reported the attack of *P. esculentus* on *B. bombina* in the National Park Neusiedler See (Austria), although ingestion was not observed.

Herein we report an attack of *P. esculentus* on *B. variegata*. This observation occurred on 27 April 2008 in the sand pit in Horní Domaslavice village (Czech Republic). The locality (49.6943° N, 18.4741° E,

330 m a.s.l.) is formed by two flooded ponds where nine species of amphibians have been observed: *L. vulgaris, Triturus cristatus, Ichthyosaura alpestris, Bufo bufo, B. variegata, Hyla arborea, P. esculentus, P. lessonae* and *Rana temporaria.* An adult *P. esculentus* (approximately SVL 80 mm) attacked an adult *B. variegata* (approximately SVL 40 mm) immediately after the *B. variegata* appeared in the close proximity (Fig. 1A). The potential prey was caught by the rear of the body (Fig. 1B), approximately 4s after the predator dropped its prey. No visible evidence of any toxic mucus produced by the *B. variegata* was observed.

Our record and the observation of Vogel and Böhme (2007) suggest that accidental attacks of Bombina spp. by P. esculentus occur only occasionally, although in these two documented cases, they did not result in ingestion. Even though the venomous anurans e.g. Anaxyrus californicus (Griffin and Case, 2002), Anaxyrus boreas (Pearl and Hayes, 2002), B. bufo, B. viridis (Baruš and Oliva, 1992) are recorded in the diet of Ranidae, the record of only one specimen of B. bombina in diet of P. ridibundus mentioned in Baruš and Oliva (1992) is necessary to use carefully, because data are not completely specified. The presence of Bombina spp. and Pelophylax spp. on common localities occurs frequently (e.g. this study; Covaciu-Marcov et al., 2009). However, the general absence of Bombina spp. in the trophic spectrum analysis of numerous studies on Pelophylax spp. (see citation above) supports an assumption that Bombina spp. are not part of the food composition of *Pelophylax* spp. Essentially, there could be two reasons: (i) the size of Bombina spp. could be a limiting factor (cf. Toledo et al., 2007) for a smaller species or specimens of Pelophylax spp.; (ii) a toxicity of Bombina spp. associated with unpalatability and theirs distasteful for the European water frogs. Regarding unpalatability as a possible defensive strategy, known in a wide spectrums of various organisms (e.g. Bowers, 1980; Peterson and Blaustein, 1991; Grasso et al., 2010), could be the major limiting factor that *Bombina* spp. are not ingested by predators (e.g. water frogs). Finally, we believe that our contribution may be a starting point for future research

Department of Zoology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-1, 842 15, Bratislava, Slovakia; 2. Slovanská 5, 736 01 Havířov-Město, Czech Republic

<sup>\*</sup> Corresponding author, D. Jablonski, E-mail: daniel.jablonski@balcanica.cz



Figure 1A-B: *Pelophylax esculentus* attacking *Bombina variegata*: (A) just before the attack; (B) the attack of *P. esculentus* on the *B. variegata*, which was immediately released and was not ingested. Photograph by Petr Vlček.

of the prey analysis of *Pelophylax* spp. with a focus on a presence of poisonous organisms in their diet.

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