
Amplexus between two different orders of amphibians recorded in Romania

The Amphibians represent a group of animals possessing a wide spectrum of mating behaviour (Oielska 2017). The frogs generally communicate and recognize each other through visual, chemical, or acoustic signals (advertisement call) during mating (Wells 2007, Balanger & Corkum 2009, Rojas 2017). Newts also use chemical and visual signals (Spareboom 2014). However, sexual signals are not always completely efficient in the identification of a potential sexual partner and may lead to an abnormal amplexing behaviour, including misguided sexual interactions such as a multiple amplexus or males trying to pair with non-living objects (Reading 1984, Höble 2005, Mollov et al. 2010). Interactions with the same sex, or with a different species, have been observed in nature in the past (Strugariu & Gherghel 2008, Mačát & Jablonski 2017). Usually, it is considered as an overlap in breeding phenology (see Mollov et al. 2010). Overall mating success depends on the local abundance of individuals (Arak 1983), and the ability of males to recognize con-



Figure 1. Amplexus observed near the town of Bălan (A) and near the town of Azuga (B).

specific females (Marco & Lizana 2002). This can result in unproductive forms of amplexus, as described in literature (e.g. Mollov et al. 2010; Simović et al. 2014, Mačát & Jablonski 2017). Herein we report two cases of an interspecific amplexus between an adult male of *Bombina variegata* and an adult female of *Ichtyosaura alpestris* from Romania.

On 16th August 2014 was first observed an amplexing male of *B. variegata* on a female *I. alpestris* near the town of Bălan (N46.679°, E25.803°, 955 m a.s.l., the Inner Eastern Carpathians). The record was obtained near a small temporary flooded puddle. The couple stayed together and the Alpine newt did not even try to escape during whole process of photographing and observation. The second observation was made in a permanent pond near the town of Azuga (N45.445°, E25.572°, 990 m a.s.l., The Southern Carpathians), on May 13, 2017. The observation lasted for 15 minutes without interruption. In the first case, the male frog held the female newt by axillary amplexus, which is not a typical grip for the family Bombinatoridae (Fig. 1-A). In the second case, the inguinal amplexing grip was used, as typical for the Yellow-bellied toad (Fig. 1-B). Despite the fact that both species are well known mountain amphibians normally occurring in same ponds even during the mating season, the potential for interspecific interferences seems to be small, as both species have widely different reproductive behaviour. Documented cases of a frog amplexing a newt or salamander are very rare and described in Höbel (2005) and Simović et al. (2014). Nevertheless, the observation of an attempted mating between *Bombina variegata* and *Ichtyosaura alpestris* is another example of mating errors in the biology of amphibians.

Acknowledgments. The authors are grateful to Szabolcs Borbély for providing the photographic record from Bălan, to Mihai Mihalca for providing information about the sec-

ond location and Chris Raper for additional language corrections. This work was supported by Czech grant GA JU 152/2016/P provided by University of South Bohemia and the Slovak Research and Development Agency under the contract no. APVV-15-0147.

References

- Balanger, R.M., Corkum, L.D. (2009): Review of aquatic sex pheromones and chemical communication in anurans. *Journal of Herpetology* 43: 184-191.
- Höbel, G. (2005): *Rana palustris* (Pickerel Frog) and *Ambystoma maculatum* (Spotted Salamander). Reproductive behavior. *Herpetology Review* 36: 55-56.
- Mačát, Z., Jablonski, D. (2017): *Pelobates fuscus* (Laurenti, 1768) amplexing male *Bufo bufo* (Linnaeus, 1758). *Herpetozoa* 30(3/4):222-223.
- Marco, A., Lizana, M. (2002): The absence of species and sex recognition during mate search by male common toads, *Bufo bufo*. *Ethology, Ecology and Evolution* 14: 1-8.
- Mollov, I., Popgeorgiev, G.S., Naumov B.Y., Tznakov, N.D., Stoyanov A.Y. (2010): Cases of abnormal amplexus in anurans (Amphibia: Anura) from Bulgaria and Greece. *Biharean Biologist* 4: 121-125.
- Oielska, M. (2017) *Reproduction of Amphibians*. CRC Press LLC., Boca Raton.
- Reading, C. (1984): Interspecific spawning between common frogs (*Rana temporaria*) and Common toads (*Bufo bufo*). *Journal of Zoology* 203: 95-101.
- Rojas, B. (2017): Behavioural, ecological, and evolutionary aspects of diversity in frog colour patterns. *Biological Reviews* 92: 1059-1080.
- Simović, A., Anderson, N., Anđelković, M., Gvozdenović, S., Dorđević, S. (2014): Unusual amplexuses between anurans and caudates. *Herpetology Notes* 7: 25-29.
- Spareboom, M. (2014): *Salamanders of the Old World*. KNNV Publishers, Zeist.
- Strugariu, A., Gherghel, I. (2008): A preliminary report on the composition and distribution of the herpetofauna from the Lower Prut River Basin (Romania). *North-Western Journal of Zoology* 4 (Suppl. 1): S49-S69.
- Wells, K.D. (2007): *The ecology and behavior of amphibians*. The University of Chicago Press Ltd., London.

Key words: *Bombina variegata*, Carpathians, *Ichtyosaura alpestris*, mating behaviour.

Article No.: e187505

Received: 15. August 2017 / Accepted: 02. April 2018

Available online: 19. April 2019 / Printed: June 2019

Zdeněk MACÁT^{1,2}, Michal RINDOŠ^{3,4,*},
David MIHALCA⁵ and Daniel JABLONSKI⁶

1. Department of Ecology and Environmental Sciences, Faculty of Science, Palacký University, Šlechtitelů 27, 783 71, Olomouc, Czech Republic.

2. Podyjí National Park Administration, Na Vyhliďce 5, Znojmo, Czech Republic.

3. Biology Centre CAS, Institute of Entomology, Branišovská 31, CZ-37005 České Budějovice, Czech Republic.

4. University of South Bohemia, Faculty of Science, Branišovská 31, CZ-37005 České Budějovice, Czech Republic.

5. Corusu 145B, Cluj, Romania.

6. Department of Zoology, Comenius University in Bratislava, Mlynská dolina, Ilkovičova 6, 842 15 Bratislava, Slovakia.

*Corresponding authors, M. Rindoš, E-mail: michal.rindos@gmail.com