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# First record of interspecific amplexus behaviour between *Bufotes variabilis* (Pallas, 1769) and *Pelophylax ridibundus* (Pallas, 1771) with *Bufo bufo* (Linnaeus, 1758) (Anura: Bufonidae) from Turkey

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Amplexus is a mating behaviour in amphibians, which may vary within species across different geographical areas and different times according to the density of populations (Wells, 2007). There are various types of amplexus such as inguinal, axillary, cephalic, head straddle, glued and independent (Duellman and Trueb, 1986; Willaert et al., 2016), but inguinal amplexus, in which the male clasps the female around her waist, and axillary amplexus, in which the male grasps the female at her armpits, being the most widespread (Willaert et al., 2016). Since amplexus is an evolutionary conservative character, this phenomenon normally occurs between a male of one species and an alive female of the same species (Wells, 2007), but sometimes deviations can be seen in this behaviour such as multiple-individual amplexus (Ayres, 2008; Mollov et al., 2010; Oliveira et al., 2014), amplexus from the abdominal side (Mollov et al., 2010; Izzo et al., 2012), amplexus between two males (Mollov et al., 2010; Theis and Caldart, 2015), amplexus between a male and inanimate object (Mollov et al., 2010; Dordević and Simović, 2014), and amplexus between individuals from different species (Pearl et al., 2005; D'Amore et al., 2009; Mollov et al., 2010; Streicher et al., 2010; Vivek et al., 2014; Rocha et al., 2015). Various factors like fewer numbers of females (Wogel et al., 2005), confusion of chemical signal (Mollov et al., 2010), low selectivity toward females (Machado and Bernarde, 2011), long-term absence of conspecific females (Vivek et al., 2014) can cause interspecific amplexus. Males typically search

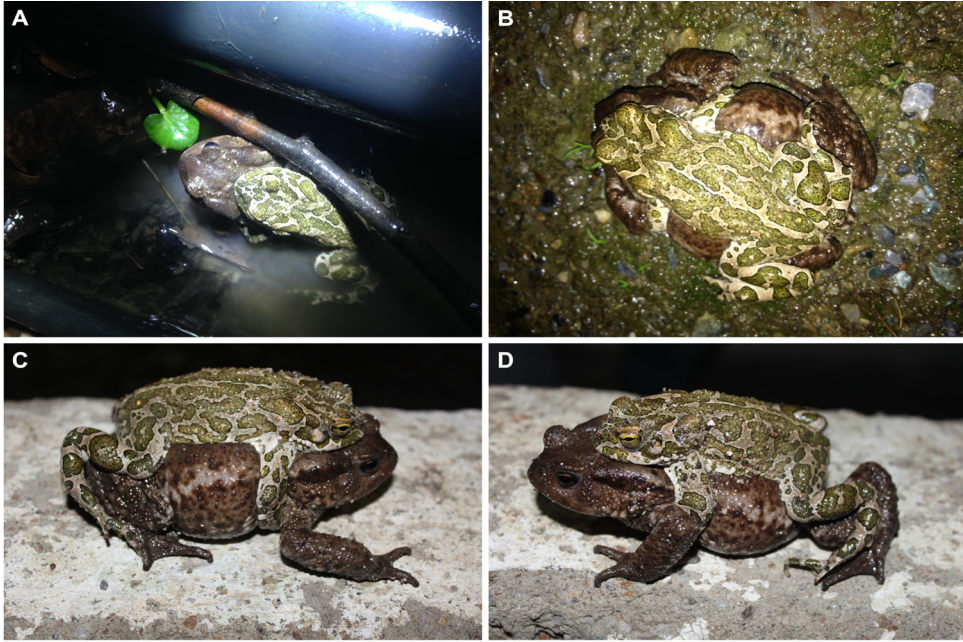
for females in the water or on land around the breeding site, and at times can seemingly not distinguish the sex or even the species of other individuals visually (Tarkhishvili, 1994). Herein, we report for the first time, interspecific amplexus between *Bufotes variabilis* ♂ (Pallas, 1769) and *Pelophylax ridibundus* ♂ (Pallas, 1771) with *Bufo bufo* ♀ (Linnaeus, 1758) in Turkey (Fig. 1-2). First, interspecific amplexus was seen between *Bufotes variabilis* and *Bufo bufo* on 11<sup>th</sup> March 2017 between 20:06h and 22:30h around an artificial pond in Şirince located about 8 kilometres east of the town Selçuk, İzmir in Turkey (37.936779° N, 27.422019° E, elevation 359 m). There was no other pairs in amplexus observed at this time, although there were individuals of *Bufotes variabilis* and *Bufo bufo* in Şirince found in a very small river that flows near a restaurant at this site.

A second record of interspecific amplexus between *Pelophylax ridibundus* and *Bufo bufo* was also observed during fieldwork on 28<sup>th</sup> April 2017, between 19:47h and 22:30h around a pond in Kocayayla located about 8 kilometres north of the town Domaniç, Kütahya in Turkey (39.864245° N, 29.639886° E, elevation 1315 m). In this locality, many *Bufo bufo* pairs in amplexus were seen because they have suitable breeding habitat in the form of a large lake in this wooded area. The climate of Şirince and Domaniç is often referred to as "Mediterranean" with an average temperature above 20°C in the warmest months, and an average between 8 to 0.4 °C in the coldest months (TSMS, 2017). Many regions with Mediterranean climates have relatively mild winters and very warm summers. On the date of observation, the daily average temperature was 10.2°C for Şirince and 10.8°C for Domaniç. The vegetation of the region is pine and scrub.

Our observations confirm the occurrence of interspecific amplexus between individuals of two

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**Figure 1** A) Amplexus of *Bufo variabilis* ♂ with *Bufo bufo* ♀ in their natural habitat of Şirince, İzmir, B) Dorsal view, C) Right lateral view and D) Left lateral view. For photos B-D, the pair was gently moved to dry land by the investigator for closer inspection and subsequently placed back in the water. Photos by Serkan Gül and Nurhayat Özdemir.



**Figure 2** A) Amplexus of *Pelophylax ridibundus* ♂ with *Bufo bufo* ♀ in their natural habitat of Domaniç, Kütahya, B) Left lateral view, C) Right lateral view and D) Dorsal view. For photos B-D, the pair was gently moved to dry land by the investigator for closer inspection and subsequently placed back in the water. Photos by Serkan Gül.

different species found in sympatry. For explosive breeders such as the species in question, competition for mates among males is high in the breeding ponds where availability of females is brief (Pearl et al., 2005). In this study, we were able to determine the sex of individuals based on the presence or absence of secondary sexual characteristics that develop during the breeding season and we determined that approximately one out of every 15 and even 20 individuals were females. Therefore, we propose that there were only very few female individuals of *Bufotes variabilis* and *Pelophylax ridibundus* at both localities during the time of recording the interspecific amplexus behaviours, and suggest that competition for females between male individuals may have spurred interspecific amplexus. However, further studies are needed to exactly understand this interspecific amplexus behaviour in amphibians in general and compare if this behaviour is more common in certain species than in other.

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