Herpetology Notes, volume 7: 287-288 (2014) (published online on 11 May 2014)

Heterospecific amplexus between the frog *Leptodactylus macrosternum* (Anura: Leptodactylidae) and the toad *Rhinella* cf. *granulosa* (Anura: Bufonidae)

Davidson Sodré[1,2], Adriano Augusto Vilhena Martins[1] and Marcelo Vallinoto[1,2]*

Most anurans have external fertilization and reproduce in aquatic environments (Duellman and Trueb, 1994), with two principal reproductive modes, explosive and prolonged (Wells, 2010). The explosive system is characterized by active searching for reproductive partners by the males during the breeding season, the success of which is determined by the density of individuals at the breeding ground (Arak, 1983) and reduced capacity of males to recognize conspecific females (Marco and Lizana, 2002). This may result in unusual forms of amplexus (Mollov et al., 2010; Brito et al., 2012). Reproduction in toads of the family Bufonidae is explosive and cases of heterospecific amplexus have been recorded (Machado and Bernarde, 2011), as well as evidence of successful hybridization (Zweifel, 1968; Blair, 1972; Masta et al., 2002; Sequeira et al., 2011; Cunha et al., 2013). This paper documents a case of heterospecific amplexus involving a male *Rhinella* cf. *granulosa* (Spix 1824) (see Narvaes and Rodrigues, 2009; Ávila-Pires et al., 2010 for details on species complex) and a female *Leptodactylus macrosternum* Miranda-Ribeiro 1926, which are both relatively common and widely-distributed species in northeastern South America.

The event reported here was observed on September 29th, 2011, at approximately 19:00 h, on a beach at Sapucuá Lake, in the municipality of Oriximiná, in the Brazilian state of Pará (-1.785688, -56.133881). Three anuran species – *Leptodactylus macrosternum*, *Rhinella marina* (Linnaeus, 1758), and *R.* cf. *granulosa* – were active in the area, although only *R.* cf. *granulosa* exhibited reproductive behaviour. Male *R.* cf. *granulosa* were found vocalizing in the vicinity of the water (Figure 1a), and one individual was observed in amplexus, in an axillary position, with a female *L. macrosternum* (Figure 1b).

A number of studies have shown that bufonid toads have only a limited capacity for the recognition of conspecific females or even to distinguish between males and females (Marco and Lizana, 2002; Yu and Lu, 2010) and other studies have shown that the selection of reproductive partners is based on body size, demonstrating a marked preference for females of larger size, which are potentially more fertile, and would thus increase the reproductive fitness of the male (Liao and Lu, 2009a; Liao and Lu, 2009b). The growing body of data available on the phenomenon of interspecific amplexing may contribute to the understanding of the factors that may determine this behaviour. The results of the present study indicate that neither the morphological differences between the two species, nor the distinct nature of their vocalizations are sufficient to avoid amplexus. It is also possible, however, that the reduced selectivity of the male was derived from intense competition among males for access to females during the breeding season (Real, 1990; Marco and Lizana, 2002). In addition, selective pressures that guarantee the recognition of potential partners by the males are likely to be weaker than those favouring indiscriminate amplexus, which commonly occurs in bufonid toads.

[1]Universidade Federal do Pará, Campus de Bragança, Laboratório de Evolução, Alameda Leandro Ribeiro s/n 68.600-000, Bragança, Pará, Brasil
[2]Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto, Vairão, Portugal.
*Corresponding author email: mvallino@ufpa.br

Acknowledgements. We are grateful to Rafael Silveira Ribeiro and Guilherme Nunes Ferreira of Eco Sistema Projetos Consultoria Ambiental Ltd. and the Rio do Norte mining company for providing logistic support for the monitoring of crocodilians at Sapucuá Lake, during which the event reported here was observed, and Marinus Hoogmoed for reviewing the manuscript.

Figure 1. (a) male of *Rhinella* cf. *granulosa* vocalizing; (b) heterospecific amplexus between a female *Leptodactylus macrosternum* and a male *Rhinella* cf. *granulosa*.

References

Arak, A. (1983): Male-male competition and mate choice in anuran amphibians. In: Mate Choice, p. 67-107. Bateson, P., Ed., Cambridge, Cambridge University Press.

Ávila-Pires, T.C.S.D., Hoogmoed, M.S., Rocha, W.D. (2010): Notes on the vertebrates of Northern Pará, Brazil: A forgotten part of the Guianan region, I. Herpetofauna. Boletim do Museu Paraense Emílio Goeldi **5**: 13-112.

Blair, W.F. (1972): Evidence from hybridization. In: Evolution of the genus *Bufo*, p. 196-232. Blair, W.F. Ed., Texas, University of Texas Press, 488 pp.

Brito, L.B.M., Joventino, I.R., Ribeiro, S.C., Cascon, P. (2012): Necrophiliac behavior in the "cururu" toad, *Rhinella jimi* Steuvax, 2002, (Anura, Bufonidae) from Northeastern Brazil. North-Western Journal of Zoology **8**(2): 365-366

Cunha, D., Sodré, D., Santos, A.C.A., Schneider, H., Sampaio, I., Sequeira, F., Vallinoto, M. (2013) A rapid method for species identification and interspecies introgression based on a pcr–RFLP: Application to the closely related neotropical toads *Rhinella marina* and *R. schneideri* (Anura: Bufonidae). Conservation Genetics Resources, 1-3.

Duellman, W.E., Trueb, L. (1994): Biology of amphibians. Baltimore, Johns Hopkins University Press, 670pp.

Liao, W.B., Lu, X. (2009a): Male mate choice in the Andrew's toad *Bufo andrewsi*: A preference for larger females. Journal of Ethology **27**: 413-417.

Liao, W.B. , Lu, X. (2009b): Sex recognition by male andrew's toad *Bufo andrewsi* in a subtropical montane region. Behavioural processes **82**: 100-103.

Machado, R.A., Bernarde, P.S. (2011): Multiple and heterospecific amplexi between the toads *Rhaebo guttatus* and *Rhinella marina* (Anura: Bufonidae). Herpetology Notes **4**: 167-169.

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.

Masta, S.E., Sullivan, B.K., Lamb, T., Routman, E.J. (2002): Molecular systematics, hybridization, and phylogeography of the *Bufo americanus* complex in eastern North America. Molecular Phylogenetics and Evolution **24**: 302-314.

Mollov, I.A., Popgeorgiev, G.S., Naumov, B.Y., Tzankov, N.D., Stoyanov, A.Y. (2010): Cases of abnormal amplexus in anurans (amphibia: Anura) from Bulgaria and Greece. Biharean Biologist **4**: 121-125.

Narvaes, P., Rodrigues, M.T. (2009): Taxonomic revision of *Rhinella granulosa* species group (Amphibia, Anura, Bufonidae), with a description of a new species. Arquivos de Zoologia **40**: 1-73.

Real, L. (1990): Search theory and mate choice. I. Models of single-sex discrimination. American Naturalist **136**(3): 376-405.

Sequeira, F., Sodré, D., Ferrand, N., Bernardi, J.A.R., Sampaio, I., Schneider, H., Vallinoto, M. (2011): Hybridization and massive mtDNA unidirectional introgression between the closely related neotropical toads *Rhinella marina* and *R. schneideri* inferred from mtDNA and nuclear markers. BMC Evolutionary Biology **11**:264.

Wells, K.D. (2010): The ecology and behavior of amphibians. Chicago, University of Chicago Press, 1400 pp.

Yu, T., Lu, X. (2010): Sex recognition and mate choice lacking in male asiatic toads (*Bufo gargarizans*). Italian Journal of Zoology **77**: 476-480.

Zweifel, R.G. (1968): Effects of temperature, body size, and hybridization on mating calls of toads, *Bufo a. americanus* and *Bufo woodhousii fowleri*. Copeia **1968**: 269-285.

Accepted by Zoltán Nagy;
Managing Editor: Christoph Liedtke