

Correspondence

First record of aggregative behaviour in the territorial poison frog *Ameerega hahneli* (Anura: Dendrobatidae): a strategy for surviving in the Central Amazonian flooded forest?

ANELISE MONTANARIN, WEZDDY DEL TORO-OROZCO & EMILIANO ESTERCI RAMALHO

Instituto de Desenvolvimento Sustentável Mamirauá, Grupo de Pesquisa em Ecologia e Conservação de Felinos na Amazônia,
Estrada do Bexiga 2584, 69553-225, Tefé/AM, Brazil

Correspondence: ANELISE MONTANARIN, e-mail: ane.montanarin@gmail.com

Manuscript received: 30 September 2015

Accepted: 5 February 2016 by STEFAN LÖTTERS

Territoriality is a typical behaviour of Neotropical poison frogs (Dendrobatoidea) and usually associated with reproduction, food, and shelter (CRUMP 1972, PRÖHL 2005, WELLS 2007). Males defend their territories by advertisement calls and eventually through physical combat with other males (ROITHMAIR 1994, PRÖHL & BERKE 2001, MONTANARIN et al. 2010). *Ameerega hahneli* (BOULENGER, 1884) is a diurnal and terrestrial frog of the family Dendrobatidae that is widespread in Amazonia (HADDAD & MARTINS 1994, GRANT et al. 2006). The species occurs in non-flooded terra firme forests and várzea floodplain forests, but there is limited information about how this species copes with these environments, especially with várzea.

We here report aggregative behaviour of *A. hahneli*, which is unexpected, given the territorial disposition described in the literature for this species. The observation was made in a várzea floodplain forest in Central Amazonia near the confluence of the Amazon and Japurá Rivers (-02.83061° S, -64.89675° W) within the limits of the Mamirauá Sustainable Development Reserve, Tefé, Brazil. The area is flooded annually for up to 175 days by > 10 m of water (RAMALHO et al. 2009, FERREIRA-FERREIRA et al. 2015), and a regular flood pulse forces organisms to develop survival strategies (JUNK et al. 1989). On 17 May 2015, 11:25 h, we observed a group of more than 15 adult individuals of *A. hahneli* ca. 18 km from the nearest non-flooded



Figure 1. *Ameerega hahneli* individuals congregated on top of a Three-Toed Sloth carcass. Photo by WDTO.

terra firme forest. The group was perched on top of a fresh wet carcass (less than one day old) of a Three-Toed Sloth (*Bradypus variegatus*) lying on a fallen tree (Fig. 1). The sloth had been killed and partially consumed by a Jaguar (*Panthera onca*).

This is the first time that a group of *A. hahneli* is reported from the várzea at the peak of the flooding season, so far away from terra firme. This observation corroborates the speculation by BANNERMAN & MARIGO (2001) that in the Mamirauá Reserve, *A. hahneli* individuals can survive flooding in the várzea saving themselves by perching on emergent or floating vegetation. Most striking in our observation is the congregation of individuals without signs of aggressive interaction.

Another noteworthy observation is that the carcass also had a large number of ants on it. Based on the diet described for *Ameerega* species (RODRÍGUES & DUELLMAN 1994, DARST et al. 2005, LÖTTTERS et al. 2007), it is possible that the group *A. hahneli* had come together in order to share the opportunistic food resource. DARST et al. (2005) characterized *A. hahneli* as a food specialist and described the main constituents of its diet, with formicid ants being the third most commonly consumed prey. For that reason, territoriality of *A. hahneli* in the várzea may be seasonally relaxed during floods when food resources (e.g., ants and other small insects) are abundant, as they become concentrated in the higher portions of the vegetation (E.E. RAMALHO pers. comm.).

Acknowledgements

We are grateful to DIOGO GRABIN for his important contribution during fieldwork, to THAÍS QUEIROZ MORCATTY and IURY VALENTE DEBIEN COBRA for useful suggestions on our observation, to ALBERTINA P. LIMA and IGOR LUIS KAEFER for valuable comments on the manuscript, STEFAN LÖTTTERS and the anonymous reviewers for their valuable contributions and suggestions. We also thank the Mamirauá Sustainable Development Institute, Ministry of Science, Technology and Innovation, for their financial support.

References

- BANNERMAN, M. & L. C. MARIGO (2001): Mamirauá: um guia da história Natural da Várzea Amazônica. – Instituto de Desenvolvimento Sustentável Mamirauá, Tefé/AM.
- CRUMB, M. L. (1972): Territoriality and mating behavior in *Dendrobates granuliferus* (Anura: Dendrobatidae). – *Herpetologica*, **28**: 195–198.
- DARST, C. R., P. A. MENÉNDEZ-GUERRERO, L. A. COLOMA, & D. C. CANNATELLA (2005): Evolution of dietary specialization and chemical defense in poison frogs (Dendrobatidae): a comparative analysis. – *The American Naturalist*, **165**: 56–69.
- FERREIRA-FERREIRA, J., T. S. F. SILVA, A. S. STREHER, A. G. AFONSO, L. F. DE A. FURTADO, B. R. FORSBERG, J. VALSECCHI, H. L. QUEIROZ & E. M. L. DE M. NOVO (2015): Combining ALOS/PALSAR derived vegetation structure and inundation patterns to characterize major vegetation types in the Mamirauá Sustainable Development Reserve, Central Amazon floodplain, Brazil. – *Wetlands Ecology and Management*, **23**: 41–59.
- GRANT, T., D. R. FROST, J. P. CALDWELL, R. GAGLIARDO, C. F. B. HADDAD, P. J. R. KOK, D. B. MEANS, B. P. NOONAN, W. E. SCHARGEL & W. C. WHEELER (2006): Phylogenetic systematics of dart-poison frogs and their relatives (Amphibia: Athesphatanura: Dendrobatidae). – *Bulletin American Museum of Natural History*, **299**: 1–262.
- HADDAD, C. F. B. & M. MARTINS (1994): Four species of Brazilian poison frogs related to *Epipedobates pictus* (Dendrobatidae): taxonomy and natural history observations. – *Herpetologica*, **50**: 282–295.
- JUNK, W. J., P. B. BAYLEY & R. E. SPARKS (1989): The flood pulse concept in river-floodplain systems. – *Canadian special publication of fisheries and aquatic sciences*, **106**: 110–127.
- LÖTTTERS, S., K.-H. JUNGFER, F. W. HENKEL & W. SCHMIDT (2007): Poison frogs. Biology, species & captive care. – Chimaira, Frankfurt am Main.
- MONTANARIN, A., I. L. KAEFER & A. P. LIMA (2011): Courtship and mating behaviour of the brilliant-thighed frog *Allobates femoralis* from Central Amazonia: implications for the study of a species complex. – *Ethology Ecology & Evolution*, **23**: 141–150.
- RAMALHO, E. E., J. MACEDO, T. M. VIEIRA, J. VALSECCHI, J. CALVIMONTES, M. MARMONTEL & H. L. QUEIROZ (2009): Ciclo hidrológico nos ambientes de várzea da Reserva de Desenvolvimento Sustentável Mamirauá Médio Rio Solimões, Período de 1990 a 2008. – *Uakari*, **5**: 61–87.
- RODRÍGUEZ, L. O. & W. E. DUELLMAN (1994): Guide to the frogs of the Iquitos region, Amazonian Peru. – The University of Kansas, Special Publications, **22**: 1–80.
- ROITHMAIR, M. E. (1994): Male territoriality and female mate selection in the dart-poison frog *Epipedobates trivittatus* (Dendrobatidae, Anura). – *Copeia*, **1**: 107–115.
- PRÖHL, H. (2005): Territorial behavior in dendrobatid frogs. – *Journal of Herpetology*, **39**: 354–365.
- PRÖHL, H. & O. BERKE (2001): Spatial distributions of male and female strawberry poison frogs and their relation to female reproductive resources. – *Oecologia*, **129**: 534–542.
- WELLS, K. D. (2007): The ecology & behaviour of amphibians. – University of Chicago Press, Chicago/IL.