Herpetology Notes, volume 10: 263-265 (2017) (published online on 20 May 2017)

Battle of giants: Predation on giant tadpole of *Pseudis platensis* (Anura: Hylidae) by a giant water bug (Hemiptera: Belostomatidae)

Karoline Ceron[1], Vanda Lúcia Ferreira[2], Walfrido Moraes Tomas[1,3] and Diego José Santana[2,*]

Amphibians contribute largely to aquatic and terrestrial food webs as prey for a wide range of invertebrates (e.g., Toledo, 2003; Pyke et al., 2013; Gambale et al., 2014; Maffei et al., 2014), vertebrates (e.g. Borteiro et al., 2009; Krawczyk et al., 2013; Weiperth et al., 2014; Bianchi et al., 2014; Bontemps et al., 2016), and even carnivorous plants (Haddad and Abe, 2000; Toledo, 2003; Toledo et al., 2007; Gambale et al., 2014). Among invertebrates, amphibians are preyed upon at all stages by generalist predators, mainly by arthropods such as water bugs and spiders (Wells, 2010). Because amphibians have a close dependence on aquatic environments, they are more vulnerable to aquatic predators (Toledo, 2003). Belostomatid bugs prey upon a large number of anuran species, and this pressure may affect the success of anuran populations (Toledo, 2003; Figueiredo-de-Andrade et al., 2010; Maffei et al., 2014). Kwet (2011) found an annual mortality from 5 to 10% in a *Dendropsophus minutus* (Peters, 1872) population caused by water bugs in Rio Grande do Sul state, Brazil.

Frogs of the Genus *Pseudis* are aquatic, widespread in South American lowlands (Garda et al., 2010), and best known by its giant tadpoles (Fabrezi et al., 2009), which can reach 27 cm of total length (Bokermann, 1967). *Pseudis platensis* Gallardo, 1961 has giant tadpoles and occurs in semi-permanent and permanent ponds in Southeastern Bolivia, Paraguay, the south-central region of Brazil, and northeastern Argentina (Garda et al., 2010). Although the adults of this species have been reportedly preyed by birds (Landgraf-Filho et al., 2011; Prado, 2003) and reptiles (Santos et al., 1996), no reports are avilable of predation on its tadpoles.

We observed a giant water bug preying upon a tadpole of *P. platensis* in a permanent pond during a field expedition to a Pantanal area at Fazenda Nhumirim (-8.986388° lat, -56.621944° long; 100 m altitude), Corumbá, Mato Grosso do Sul state of Brazil, in April 11th, 2016. The tadpole was at Gosner stage 32 (Gosner, 1960), had a body length of 9.5 mm and total length of 83.39 mm. The water bug, measuring 68 mm in total length, was identified as *Belostoma* sp. (Belastomatidae) (Rafael et al., 2012). Both specimens were collected and are housed in the Zoological Collection of the Mato Grosso do Sul Federal University (vouchers ZUFMS-HEM00235 and ZUFMS-AMP05541), in Campo Grande, Mato Grosso do Sul, Brazil (Fig. 1).

Although *P. platensis* tadpoles are known as prey for several species (e.g. Thomas, 1984; Santos et al., 1996; Gonzáles, 1997; Campos, 2003), this is the first record of their predation by a water bug, increasing the knowledge of food chains involving vertebrates and invertebrates in the Pantanal floodplain. Giant water bugs are well known as adult and anuran tadpole predators (Toledo, 2013; Gambale et al., 2014), and such interactions have been reported in different ecosystems across South America. We suggest that such interaction may be more common, as both species are very abundant in the Pantanal wetlands (Alho, 2005; Junk et al., 2006; Batzer and Boix, 2016).

[1] Programa de Pós-Graduação em Ecologia em Conservação, Universidade Federal de Mato Grosso do Sul, Cidade Universitária, 79070-900, Campo Grande, MS, Brazil
[2] Laboratório de Zoologia, Centro de Ciências Biológicas e da Saúde, Universidade Federal de Mato Grosso do Sul, Cidade Universitária, 79070-900, Campo Grande, MS, Brazil
[3] Laboratório de Vida Selvagem, Embrapa Pantanal, R. 21 de Setembro 1880, 79320-900, Corumbá, MS
* Corresponding author e-mail: santanadiegojose@yahoo.com

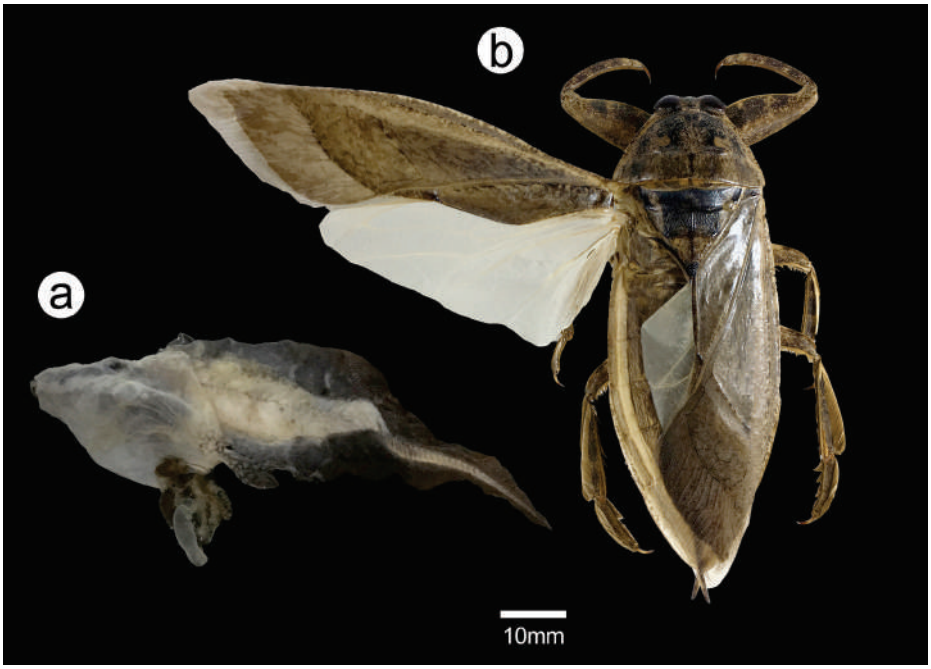

Figure 1. (a) Preyed giant tadpole of *Pseudis platensis* (ZUFMS-AMP05541, TL 83.39), and its predator (b) the giant water bug *Belostoma* sp. (Belastomatidae) (ZUFMS-HEM00235). Both collected at Fazenda Nhumirim, municipality of Corumbá, state of Mato Grosso do Sul.

References

Alho, C. J. R. (2005): The Pantanal. In: The World's Largest Wetlands: Ecology and Conservation, p. 203-272, Fraser, L. H., Keddy, P. A. (Ed.), Cambridge, Cambridge University Press.

Batzer, D., Boix, D. (2016): Invertebrates in Freshwater Wetlands: An International Perspective on Their Ecology. Switzerland, Springer.

Bianchi, R.C., Campos, R.C., Xavier-Filho, N.L., Olifiers, N., Gompper M.E., Mourão, G. (2014): Intraspecific, interspecific, and seasonal differences in the diet of three mid-sized carnivores in a large neotropical wetland. Acta Theriologica **59**: 13–23.

Bokermann, W. C. (1967). Girinos de anfíbios brasileiros-3: Sobre um girino gigante de *Pseudis paradoxa* (Amphibia: Pseudidae). Revista Brasileira de Biologia **27**: 209–212.

Bontemps, D.S., Cuevas, E., Ortiz, E., Wunderle Jr., J.M., Joglar, R.L. (2016): Diet of the non-native spectacled caiman (*Caiman crocodilus*) in Puerto Rico. Management of Biological Invasions **7**: 287–296.

Borteiro, C., Gutiérrez, F., Tedros, M., Kolenc, F. (2009): Food habits of the Broad-snouted Caiman (*Caiman latirostris*: Crocodylia, Alligatoridae) in northwestern Uruguay. Journal Studies on Neotropical Fauna and Environment **44**: 31–36.

Campos, Z. (2003): *Caiman crocodilus yacare* (Pantanal caiman). Food related movement. Herpetological Review **34**(2): 140.

Fabrezi, M., Quinzio, S., Goldberg, J. (2009): Giant tadpole and delayed metamorphosis of *Pseudis platensis* Gallardo, 1961 (Anura, Hylidae). Journal of Herpetology **43:** 228–243.

Figueiredo-de-Andrade, C.A., Santana, D.J., Carvalho-e-Silva, S.P.D. (2010): Predation on *Scinax x-signatus* (Anura: Hylidae) by the giant water bug *Lethocerus annulipes* (Hemiptera: Belostomatidae) in a Brazilian restinga habitat. Herpetology Notes **3**: 53–54.

Gambale, P.G., Batista, V.G., Oda, F.H., Campos, R.M., Takemoto, R.M., Bastos, R. P. (2014): Anuran larvae as prey and hosts of invertebrates in Neotropical aquatic habitats. Revista Chilena de Historia Natural **87**(1): 31.

Garda, A.A., Santana, D.J., São Pedro, V.A. (2010): Taxonomic characterization of Paradoxical frogs (Anura, Hylidae, Pseudae): geographic distribution, external morphology, and morphometry. Zootaxa 2666: 1–28.

Gonzáles, J.A. (1997): Seasonal variation in the foraging ecology of the wood stork in the southern Llanos of Venezuela. The Condor **99**: 671–680.

Gosner, K.L. (1960): A simplified table for staging anuran embryos and larvae with notes on identification. Herpetologica **16:** 183–190.

Haddad, C.F.B., Abe, A. (2000): Anfíbios e répteis. In: Workshop mata atlântica e campos sulinos, p. 40, Conservation International Brasil, Fundação SOS Mata Atlântica, Instituto de Pesquisas Ecológicas, Brasília, Secretarias de Meio Ambiente de São Paulo e Minas Gerais.

Junk, W. ., Da Cunha, C.N., Wantzen, K.M., Petermann, P., Strüssmann, C., Marques, M.I., Adis, J. (2006): Biodiversity and its conservation in the Pantanal of Mato Grosso, Brazil. Aquatic Sciences **68** (3): 278–309.

Krawczyk, A.J., Bogdziewcz, M. Czyz, M. J. (2013): Diet of the American mink Neovison vison in an agricultural landscape in western Poland. Folia Zoologica **62** (4): 304–310.

Kwet, A. (2001): Frösche im brasilianischen Araukarienwald - Anurengemeinschaft des Araukarienwaldes von Rio Grande do Sul: Diversität, Reproduktion und Ressourcenaufteilung. Münster (Natur und Tier Verlag), Germany.

Landgraf-Filho, P., Godoi, M.N., Aoki, C. (2011): *Pseudis platensis* (paradox frog). Predation. Herpetological Review **42**: 90.

Maffei, F., Bolfarini, M., Ubaid, F.K. (2014): Predation of *Scinax fuscovarius* (Anura: Hylidae) by two invertebrates in southeastern Brazil. Herpetology Notes **7**: 371–374.

Prado, C.P.D.A. (2003): *Leptodactylus chaquensis* (NCN), *Pseudis paradoxa* (paradox frog), and *Phrynohyas venulosa* (veined treefrog). Predation. Herpetological Review **34**: 231–232.

Pyke, G. H., Ahyong, S. T., Fuessel, A.Callaghan, S. (2013). Marine crabs eating freshwater frogs: Why are such observations so rare? Herpetology Notes **6**: 195–199.

Rafael, J. A., Melo, G. A. R., Carvalho, C. D., Casari, S. A., Constantino, R. (2012). Insetos do Brasil: diversidade e taxonomia. Ribeirão Preto, Holos.

Santos, S., M. Nogueira, M. Pinheiro, Z. Campos, Magnusson, W., Mourão, G. (1996): Diets of *Caiman crocodilus yacare* from different habitats in the Brazilian Pantanal. Herpetological Journal **6:** 111–117.

Toledo, L.F. (2003): Predation on seven South American anuran species by water bugs (Belostomatidae). Phyllomedusa **2**: 105–108.

Toledo, L.F., Ribeiro, R.S., Haddad, C.F.B. (2007): Anurans as prey: An exploratory analysis and size relationships between predators and their prey. Journal of Zoology **271**: 170–177.

Thomas, B.T. (1984): Maguary stork nesting: juvenile growth and behavior. The Auk **101**: 812–823.

Weiperth, A., Gaebele, T., Potyó, I., Puky. M. (2014): A global overview on the diet of the dice snake (*Natrix tessellata*) from a geographical perspective: foraging in atypical habitats and feeding spectrum widening helps colonisation and survival under suboptimal conditions for a piscivorous snake. Zoological Studies **53**: 42.

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

Accepted by Hendrik Müller