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Death of a snake *Philodryas nattereri* (Squamata: Dipsadidae) after predation on a large-sized lizard *Tropidurus hispidus* (Squamata: Tropiduridae)

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The New World Dipsadidae are one of the largest radiations of colubroidean snakes, with more than 700 species distributed throughout the Americas and the West Indies (Hedges, Couloux and Vidal, 2009; Zaher et al., 2009; Vidal, Dewynter and Gower, 2010). In Brazil this family represents 63.5% of the Ophidia group, with 245 species (Bérnils and Costa, 2012). There are currently 13 species of Brazilian snakes of the genus *Philodryas*, and *P. nattereri* (Paraguay Green Racer) is a medium-sized, active forager, reaching up to 180 mm in total length (Vitt, 1980). Its predominant coloring is grey, with small black stains on the scales, and it exhibits opistoglyph dentition. *Philodryas nattereri*, which occurs in arid and semiarid regions of Brazil, Paraguay and Colombia (Uetz, 2012), is one of the most common snakes in northeastern Brazil (Amaral, 1936). It is exclusively diurnal and semiarboreal, with greater activity during the hottest part of the day (Mesquita et al., 2011). Its diet is widely diversified, with reports of frogs, lizards, snakes, birds and mammals (Freitas and Silva, 2007; Mesquita, Borges-Nojosa and Monteiro, 2010). Lizards are the most common prey, and mentioned to be the exclusive food item for juvenile snakes of this species (Mesquita et al., 2011). Here we report the death of *P. nattereri* followed by predation on a large-sized lizard, *Tropidurus hispidus*.

Lizards of the genus *Tropidurus* exhibit wide geographical distribution and occur from southern Venezuela east through the Guianas to northeastern Brazil, from there west south of the Amazon region to eastern Bolivia, extreme northern Uruguay, and central Argentina (Frost et al. 2001). In Brazil this genus is found from Caatinga and Cerrado areas to the restingas (tropical coastal vegetation), Atlantic and Amazon Forest (Rodrigues, 1987; Ribeiro, Sousa and Gomides, 2009; Ribeiro and Freire, 2010). *Tropidurus hispidus* is the largest species of the genus, with specimens reaching up to 350 mm in total length (Freitas and Silva, 2005) and 45-139 mm snout-vent length (Ribeiro and Freire, 2009). It is a habitat generalist and common in a wide range of Caatinga vegetation types (Rodrigues, 1987). This lizard, which displays daytime activity, is territorialist, exhibiting sedentary and opportunistic predation (Kolodiuk, Ribeiro and Freire, 2009). Its diet consists primarily of arthropods, small vertebrates and material plants, such as leaves, flowers and seeds (Ribeiro, Gogliath and Freire, 2008; Ribeiro and Freire, 2011).

Snakes are vertebrates that normally feed on large prey in relation to their body size; this feeding behavior can be explained by the cost-benefit of eating large items infrequently (Shine, 1991). An adaptive characteristic that allows these animals to swallow large prey is the anatomy of their mandibles, which are loosely connected, and the flexible tegument of the mentum and throat, permitting mandible extremities to separate with ample maxillary movement (Pough et al., 2004).

The specimen of *P. nattereri* was found dead, with a flaccid body, at 12:30 pm on July 16th 2012 on the shoulder of the access road to the Center for the Conservation and Management of Caatinga Fauna (CEMAFAUNA-CAATINGA) (09°19'38.21"S, 40°32'51.98"W; Elevation: 385 m), on the Agrarian Science Campus of Universidade Federal do Vale do São Francisco, Petrolina, Brazil. The snake exhibited a dilated stomach region, with no signs of trauma or hematoma resulting from anthropic action or predation. After dissection in the Taxidermy Laboratory, an adult

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Figure 1. *Philodryas nattereri* dissected. Left: Lizard *Tropidurus hispidus* ingested head first. Right: Close-up of the lizard where one can observe the black stain on the ventral surface of the thigh, a trait found only in male adults, and the large volume it occupies inside the snake. Photo: L.M.N. Menezes.

male *T. hispidus* was found, practically intact, ingested with the head facing towards the snake's tail (Fig. 1). This dissection procedure also confirmed the absence of trauma in the predator's internal organs.

Morphometric measures were taken, showing a snake snout-vent length of 790 mm and total length of 1105 mm, while the lizard had a total length of 355 mm, corresponding to 32.12% of total snake length (Fig. 2). The weight of *P. nattereri* and *T. hispidus* was 206 g and 60 g, respectively, before removal of stomach contents. The weight of the snake after removal of the item was 146 g, the lizard corresponding to 41.1% of the snake weight, accounting for more than one-third of its biomass. The snake and lizard were deposited in the Herpetological Collection of the Caatinga Fauna Museum at CEMAFAUNA-CAATINGA (MFCH 1846, MFCH 921).

A record of snake death from ingesting a large prey was reported for *Micrurus ibiboboca*, which was asphyxiated during predation on *Leptodeira annulata* (Cavalcanti et al., 2012). *Tropidurus hispidus* has been reported as prey for *P. nattereri* in the semiarid region of Ceará state (Mesquita et al., 2011), but without causing the predator's death. In our case, a set of factors may

Figure 2. Side-by-side view of the snake and lizard to demonstrate the body length of *Tropidurus hispidus* (355 mm in total length) compared with *Philodryas nattereri* (790 mm SVL). Photo: L.M.N. Menezes.

have contributed to the snake's death, such as the large size of the lizard, which would have been a mechanical obstacle to respiration by exerting pressure on the internal organs, hindering lung expansion and resulting in asphyxiation. Moreover, the extra weight also may have hampered the snake's locomotion, possibly because it was found on asphalt, a substrate that easily absorbs heat, and at a time of intense sunlight, favoring hyperthermia followed by dehydration.

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References

Amaral, A. (1936): Contribuição ao conhecimento dos ofídios do Brasil. VIII - Lista remissiva dos ophidios do Brasil. Memórias do Instituto Butantan **10**: 87-162.

Bérnils, R.S., Costa H.C. (orgs.) (2012): Brazilian reptiles - List of species. Available at: http://www.sbherpetologia.org.br/?page_id=629. Last accessed on 8 March 2013.

Freitas, M.A., Silva, T.F.S. (2005): Guia ilustrado: a herpetofauna da Mata Atlântica nordestina. Pelotas. Editora USEB.

Freitas, M.A., Silva, T.F.S. (2007): Guia ilustrado: a herpetofauna das caatingas e áreas de altitudes do nordeste brasileiro. Pelotas. Editora USEB.

Frost, D.R., Rodrigues, M.T., Grant, T., Titus, T.A. (2001): Phylogenetics of the lizard genus *Tropidurus* (Squamata: Tropiduridae: Tropidurinae): direct optimization, descriptive efficiency, and sensitivity analysis of congruence between molecular data and morphology. Molecular Phylogenetics and Evolution **21**: 352-371.

Hedges, S.B., Couloux, A., Vidal, N. (2009): Molecular phylogeny, classification, and biogeography of West Indian racer snakes of the tribe Alsophiini (Squamata, Dipsadidae, Xenodontinae). Zootaxa 2067: 1-28.

Kolodiuk, M.F., Ribeiro, L.B., Freire, E.M.X. (2009): The effects of seasonality on the foraging behavior of *Tropidurus hispidus* and *Tropidurus semitaeniatus* (Squamata, Tropiduridae) living in sympatry in the Caatinga of northeastern Brazil. Zoologia **26**: 581-585.

Lawson, R., Slowinski, B., Crother, I., Burbrink, T. (2005): Phylogeny of the Colubroidea (Serpentes): New evidence from mitochondrial and nuclear genes. Molecular Phylogenetics and Evolution **37**: 581-601.

Mesquita, P.C.M.D., Borges-Nojosa, D.M., Monteiro, F.A.C. (2010): *Philodryas nattereri* (Paraguay green racer). Diet. Herpetological Review **41**: 96-96.

Mesquita, P.C.M., Borges-Nojosa, D.M., Passos, D.C., Bezerra, C.H. (2011): Ecology of *Philodryas nattereri* in the Brazilian semi-arid region. Herpetological Journal **21**: 193-198.

Pough, F.H., Andrews, R.H., Cadle, J. E., Crump, M.L., Savitzky, A.H., Wells, K.D. (2004): Herpetology. 3 ed. Pearson Prentice Hall. Upper Saddle River.

Ribeiro, L.B., Freire, E.M.X. (2009): *Tropidurus hispidus* (NCN). Minimum size at maturity; Maximum body size. Herpetological Review **40**: 350-351.

Ribeiro, L.B., Freire, E.M.X. (2010): Thermal ecology and thermoregulatory behaviour of *Tropidurus hispidus* and *T. semitaeniatus* in a caatinga area of northeastern Brazil. Herpetological Journal **20**: 201-208.

Ribeiro, L.B., Freire, E.M.X. (2011): Trophic ecology and foraging behavior of *Tropidurus hispidus* and *Tropidurus semitaeniatus* (Squamata, Tropiduridae) in a caatinga area of northeastern Brazil. Iheringia, Serie Zoologia **101**: 225-232.

Ribeiro, L.B., Gogliath, M., Freire, E.M.X. (2008): *Tropidurus semitaeniatus* (Squamata, Tropiduridae) as a seed disperser of the plant *Commiphora leptophloeos* (Burseraceae) in the Caatinga of northeastern Brasil. Cuadernos de Herpetología **22**: 91-94.

Ribeiro, L.B., Sousa, B.M., Gomides, S.C. (2009): Range structure, microhabitat use, and activity patterns of the saxicolous lizard *Tropidurus torquatus* (Tropiduridae) on a rock outcrop in Minas Gerais, Brazil. Revista Chilena de Historia Natural **82**: 577-588.

Rodrigues, M.T. (1987): Sistemática, ecologia e zoogeografia dos *Tropidurus* do grupo torquatus ao Sul do Rio Amazonas (Sauria, Iguanidae). Arquivos de Zoologia do Estado de São Paulo **31**: 105-230.

Shine, R. (1991): Intersexual dietary divergence and the evolution of sexual dimorphism in snakes. American Naturalist **138**: 103-122.

Uetz, P. (ed.) (2012): The Reptile Database. Karlsruhe: Karlsruhe Research Center. Available at: http://www.reptile-database.org. Last accessed on 22 August 2012.

Vidal, N., Dewynter, M., Gower, D.J. (2010): Dissecting the major American snake radiation: A molecular phylogeny of the Dipsadidae Bonaparte (Serpentes, Caenophidia). Comptes Rendus Biologies 333: 48-55.

Vitt, L.J. (1980): Ecological observations on sympatric *Philodryas* (Colubridae) in northeastern Brazil. Papéis Avulsos de Zoologia, **34**: 87-98.

Zaher, H., Grazziotin, F.G., Cadle, J.E., Murphy, R.W., Moura-Leite, J.C., Bonatto, S.L. (2009): Molecular phylogeny of advanced snakes (Serpentes, Caenophidia) with an emphasis on South American xenodontines: a revised classification and descriptions of new taxa. Papéis Avulsos de Zoologia 49: 115-153.

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