

***Bothrops leucurus* (Serpentes, Viperidae) preying on *Micrurus corallinus* (Serpentes, Elapidae) and *Blarinomys breviceps* (Mammalia, Cricetidae)**

Valéria Fagundes<sup>1\*</sup>, Leonardo A. Baião<sup>1</sup>, Lucas A. Vianna<sup>1</sup>,  
Clara S. Alvarenga<sup>1</sup>, Marianna X. Machado<sup>1</sup> & Sílvia R. Lopes<sup>1</sup>

**ABSTRACT:** The pitviper genus *Bothrops* belongs to the subfamily Crotalinae and has currently about 45 species distributed in the Neotropical region, mainly in South America. This genus includes the white-tailed lancehead *B. leucurus*, which has a wide geographic distribution in northeastern Brazil. We recorded an unusual predation event based on the examination of stomach contents from one specimen of *Bothrops leucurus* collected in a pitfall trap on February 17, 2009, at the Reserva Biológica do Córrego do Veado, Espírito Santo, Brazil. The snake's stomach was dissected and two prey items were found: one partially digested juvenile snake *Micrurus corallinus* (Elapidae) and one undigested rodent of the fossorial species *Blarinomys breviceps* (Cricetidae). *Bothrops leucurus* feeds on lizards, rodents and frogs, but here we report ophiophagy by this species for the first time.

**Key words:** Atlantic Forest, Brazil, natural history, ophiophagy, predation.

**RESUMO:** *Bothrops leucurus* (Serpentes, Viperidae) predando *Micrurus corallinus* (Serpentes, Elapidae) e *Blarinomys breviceps* (Mammalia, Cricetidae). O gênero de serpentes *Bothrops* pertence à família Crotalinae e possui cerca de 45 espécies distribuídas na região neotropical, principalmente na América do Sul. Uma dessas espécies é a jararaca-de-rabo-branco *B. leucurus*, que tem ampla distribuição geográfica no nordeste do Brasil. Registramos um evento raro de predação, baseado na análise do conteúdo estomacal de um exemplar de *B. leucurus* coletado em uma armadilha de queda (pitfall) em 17 de fevereiro de 2009, na Reserva Biológica Córrego do Veado, Espírito Santo, Brasil. O estômago do exemplar foi dissecado e duas presas foram encontradas: um exemplar jovem parcialmente digerido de *Micrurus corallinus* (Elapidae) e um exemplar adulto do roedor fossorial *Blarinomys breviceps*. *Bothrops*

<sup>1</sup> Departamento de Ciências Biológicas, Centro de Ciências Humanas e Naturais, Universidade Federal do Espírito Santo, Av. Fernando Ferrari s/n, Goiabeiras, 29075-010, Vitória, ES, Brazil.

\* Correspondent: vfagunde@pq.cnpq.br

Received: 24 Aug 2009. Accepted: 21 Dec 2009.

*leucurus* se alimenta de lagartos, roedores e sapos, mas o registro de ofiofagia por esta espécie é inédito.

**Palavras-chave:** Brasil, história natural, Mata Atlântica, ofiofagia, predação.

The pitvipers of the genus *Bothrops* belong to the subfamily Crotalinae and encompass about 45 species distributed in the Neotropical region, mainly in South America (Campbell & Lamar, 2004; Wüster *et al.*, 2002). The white-tailed lancehead *B. leucurus* Wagler 1824, has a wide geographic distribution in northeastern Brazil, including the states of Maranhão, Ceará, Pernambuco, Alagoas, Sergipe, Bahia, Minas Gerais, and Espírito Santo (Carvalho Jr. & Nascimento, 2005; Graziotin & Echeverrigaray, 2005; Lira-da-Silva, 2009). *Bothrops leucurus* occurs in dry or humid habitats at altitudes up to 500 meters (Campbell & Lamar, 2004) and has crepuscular and nocturnal habits (Carvalho *et al.*, 2005). Most species of *Bothrops* are generalists, feeding usually on small mammals, lizards, and frogs and shifting their diets from ectothermic to endothermic prey as they grow (Martins *et al.*, 2002). Prey items of *B. leucurus* include lizards, rodents, and frogs (Lira-da-Silva, 2009).

We recorded an unusual predation event based on the examination of one specimen of *Bothrops leucurus* collected on February 17, 2009, at Reserva Biológica do Córrego do Veado (RBCV), Pinheiros, state of Espírito Santo, southeastern Brazil (18°22'S 40°08'W). This area is one of the most important Atlantic Forest remnants in northern Espírito Santo, encompassing a small fragment (2,382 ha) of pluvial semi-deciduous broadleaf forest (MMA, 2009). This snake was collected in one of the four transects of pitfall traps established in the reserve. Each transect had 20 60-liter buckets, 10 meters apart, connected by 1 meter high plastic drift fences to increase capture rates. We found the juvenile *Bothrops leucurus* (Figure 1a) around 9:00 h in one of the buckets, and brought it to the provisional lab in the field. The specimen was killed by ether inhalation and had the snout-vent length taken (SVL = 63 cm). We also took a liver sample and fixed it in alcohol for future molecular studies.

We dissected the stomach of this *B. leucurus* using a pair of scissors by a short incision in the medium-ventral region, from the initial portion of the esophagus to the preanal region (Figure 1b) revealing two prey items. The first was found distally in the stomach (Figure 1c–d), and was a partially digested juvenile specimen of the painted coral snake *Micrurus corallinus* (Merrem, 1820) (Figure 1e). The second prey item was an adult male rodent of the fossorial species *Blarinomys breviceps* (Winge, 1887), located proximally in the stomach, therefore ingested after the coral snake (Fig. 1b–e). The rodent was covered by a gelatinous secretion (Figure 1c),

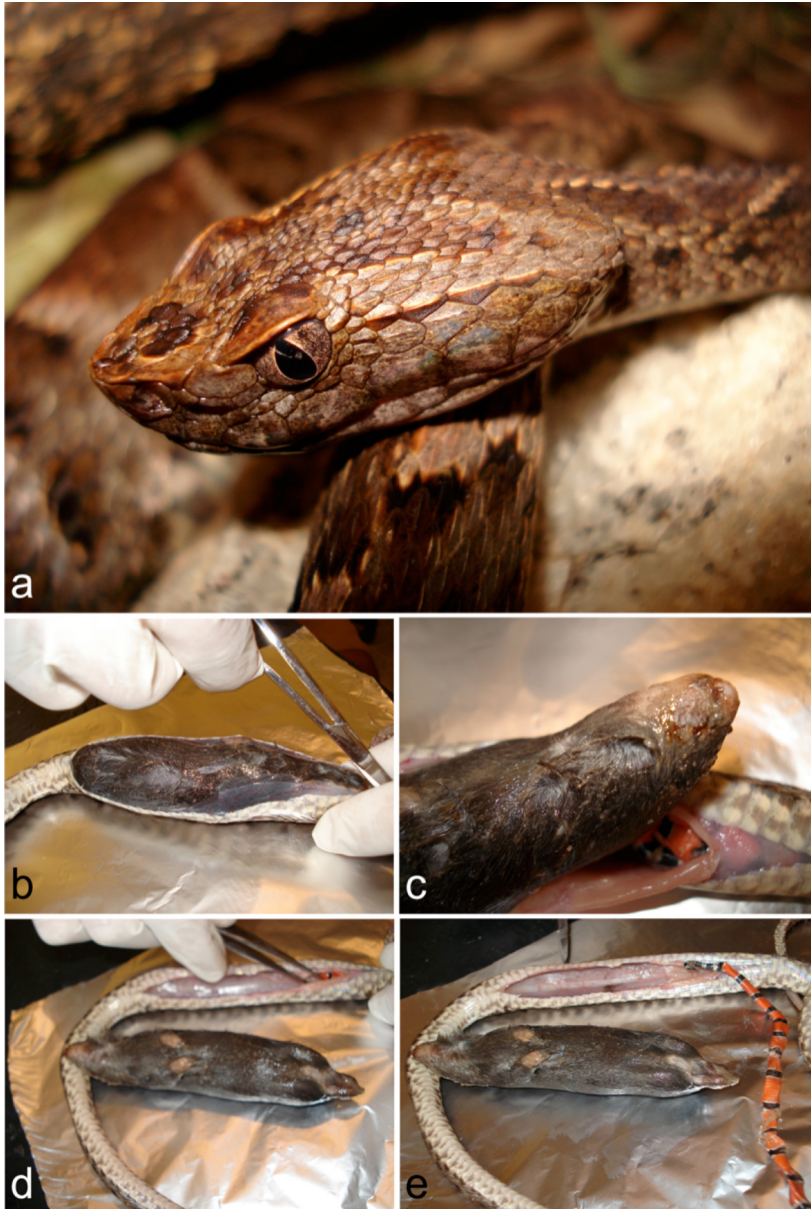
and was at an early stage of digestion, with dark brown, smelly muscles, and positioned head-first in the stomach, revealing a head-to-tail swallow (Figure 1b). The coral snake was found in an advanced stage of digestion (Figure 1e), which suggests that the pitviper had eaten the coral snake hours before the rodent. Considering the advanced stage of digestion of the coral snake, we believe that the pitviper naturally hunted the coral snake before they both got trapped in the pitfall. However, we can not discarded the hypothesis that both prey items were consumed in the pitfall trap, because the previous pitfall inspection took place 24 hours before we found the pitviper in the trap. This is reinforced by the fact that *B. leucurus* had both endo- and ectothermic prey in its stomach, indicating opportunistic predation.

Campbell & Lamar (2004) reviewed the diet of *Bothrops* spp. and found that most species feed largely on ectothermic preys as juveniles, but shift to endothermic preys when they reach a size sufficient to swallow such prey. Palmuti *et al.* (2009) registered chilopods, amphibians, lizards, snakes, birds, and mammals in the diet of 15 species of snakes, including *Bothrops*. Most snake species eat one prey category at a time, and rodents, adult anurans, and lizards are the most common prey. Literature records indicate that *Bothrops leucurus* feeds only on rats (Carvalho *et al.*, 2005), or has a mixed diet, feeding mostly on lizards, followed by rodents, and anurans (Lira-da-Silva, 2009). Ophiophagy is very common in some snakes, like the mussuranas (*Clelia* spp.) or the king cobra (*Ophiphagus hannah*), but uncommon in other groups, and rare in *Bothrops*, with only a few records (e.g., Martins & Gordo, 1993; Oliveira & Martins, 2006).

Vouchers are deposited in the Zoological Collection at Museu de Biologia Professor Mello Leitão (MBML), Santa Teresa, Espírito Santo, Brazil, as MBML 2310 (*Bothrops leucurus*) and MBML 2311 (*Micrurus corallinus*) and at the Vertebrate Collection, Universidade Federal do Espírito Santo, Vitória, Espírito Santo, Brazil (UFES 969, *Blarinomys breviceps*).

### Acknowledgements

We thank José Maria A. Poubel, manager of RBCV and its staff for helping in the field. We also thank the staff at Laboratório de Genética Animal, UFES, for helping in the field. This work was supported by Fundação de Apoio à Pesquisa do Estado do Espírito Santo (FAPES). We thank Miguel T. Rodrigues and João F. R. Tonini for identifying the snakes. Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA) provided the collecting permit (# 15558-2).



**Figure 1.** a) The pitviper *Bothrops leucurus* (MBML 2310) from Pinheiros, Espírito Santo, Brazil; b) medium-ventral incision from the initial portion of the esophagus to the preanal region showing the rodent head-to-tail; c–d) the two prey items, showing the rodent anterior to the snake in the digestive tract; e) the rodent *Blarinomys breviceps* (UFES 969) and the coral snake *Micrurus corallinus* (MBML 3211).

## References

- CAMPBELL, J. A. & LAMAR, W. W. 2004. *The Venomous Reptiles of the Western Hemisphere*. Cornell University Press, Ithaca.
- CARVALHO, C. M., VILAR, J. C. & OLIVEIRA, F. F. 2005. Répteis e Anfíbios. In C. M. Carvalho & J. C. Vilar (eds.), *Parque Nacional Serra de Itabaiana - Levantamento da Biota*. Ibama, Biologia Geral e Experimental-UFS, Aracaju, pp. 39-61.
- CARVALHO JR., R. R. & NASCIMENTO, L. B. 2005. *Bothrops leucurus* – Geographical Distribution. *Herpetological Review*, 36: 469.
- GRAZZIOTIN, F. & ECHEVERRIGARAY, S. 2005. Genetic relationships among species of the genus *Bothrops* based on RAPD markers. *Brazilian Archives of Biology and Technology*, 48: 359–365.
- LIRA-DA-SILVA, R. M. 2009. *Bothrops leucurus* Wagler, 1824 (Serpentes; Viperidae): natural history, venom and envenomation. *Gazeta Médica da Bahia*, 79 (supl. 1): 56–65.
- MARTINS, M. & GORDO, M. 1993. *Bothrops atrox* (Common Lancehead) Diet. *Herpetological Review*, 24: 151–152.
- MARTINS, M., MARQUES, O. A. V. & SAZIMA, I. 2002. Ecological and phylogenetic correlates of feeding habits in Neotropical pitvipers of the genus *Bothrops*. In G. W. Schuett, M. Höggren & H. W. Greene (eds.), *Biology of the Vipers*. Eagle Mountain Publishing, Eagle Mountain, pp. 307-328.
- MMA (MINISTÉRIO DO MEIO AMBIENTE) 2009. Plano de Manejo da Reserva Biológica do Córrego do Veado. [http://www.ibama.gov.br/siucweb/unidades/rebio/planos\\_de\\_manejo/2/html/index.htm](http://www.ibama.gov.br/siucweb/unidades/rebio/planos_de_manejo/2/html/index.htm) (accessed on 20 Dec 2009).
- OLIVEIRA, M. E. & MARTINS, M. 1996. *Bothrops atrox* (Common Lancehead) foraging behavior and ophiophagy. *Herpetological Review*, 27: 22–23.
- PALMUTI, C. F. S., CASSIMIRO, J. & BERTOLUCI, J. 2009. Food habits of snakes from the RPPN Feliciano Miguel Abdala, an Atlantic Forest fragment of southeastern Brazil. *Biota Neotropica*, 9: 263–269.
- WÜSTER, W., SALOMÃO, M. G., QUIJADA-MASCAREÑAS, J. A., THORPE, R. S. & BUTANTAN-BRITISH *BOTHRUPS* SYSTEMATICS PROJECT. 2002. Origin and evolution of the South American pitviper fauna: evidence from mitochondrial DNA sequence data. In G. W. Schuett, M. Höggren, M. E. Douglas & H. W. Greene (eds.). *Biology of the Vipers*. Eagle Mountain Publishing, Salt Lake City, pp. 111-128.