

Anecdotal predation events of some snakes in Ecuador

Ecuador is among the ten countries with the highest reptilian diversity, which includes 224 registered snake species (TORRES-CARVAJAL et al. 2016). However, information on natural history traits of Ecuadorian snakes is scarce with few detailed contributions to their dietary spectrum (e. g., DUELLMAN 1978; BOADA et al. 2005; CISNEROS-HEREDIA 2005; MEZA-RAMOS et al. 2010; MAFLA-ENDARA & AYALA-VARELA 2012; RAMÍREZ-JARAMILLO 2015). Publication of any anecdotal data helps to better understand these animals' ecology (MOCIÑO-DELOYA et al. 2014). The authors present predation events, supported by photographs, for five colubrid and one viperid species. Prey items were identified to the lowest taxonomic category possible, with the help of specialists.

Dendrophidion dendrophis (SCHLEGEL, 1837).— An individual (total length ca. 110 cm) was observed and photographed consuming the anuran *Oreobates quixensis* JIMÉNEZ DE LA ESPADA, 1872, in January, 2015, at 16:25 h, in Dayuma, Orellana (00°39'54"N, 76°48'20"W). The snake was on a low transit road and had the anuran largely swallowed, only its hind legs were exposed (Fig. 1a). This type of prey was expected for *D. dendrophis*, because it is known to be primarily anurophagous (CUNHA & NASCIMENTO 1993; MARTINS & OLIVEIRA 1998; PRUDENTE et al. 2007). The occasional presence of insects in the alimentary tract of this snake is suggested to be secondary stomach contents (MARTINS & OLIVEIRA 1998; PRUDENTE et al. 2007). The only reference for Ecuador is an adult frog *Pristimantis conspiciatus* (GÜNTHER, 1858), in the stomach contents of an adult female of this snake (DUELLMAN 1978).

Erythrolamprus epinephelus albi-ventris (JAN, 1863).— An individual (total length ca. 60 cm) was photographed (Fig. 1b) consuming the lizard *Stenocercus guentheri* (BOULENGER, 1885), in February, 2015, at 09:15 h, in Tababela, Pichincha (00°08'37"S, 78°20'56"W). Another lizard *Pholidobolus montium* (PETERS, 1863) and tadpoles and adults of *Gastrotheca riobambae*

(FOWLER, 1913), were also found as prey of this snake in Pichincha (MAFLA-ENDARA & AYALA-VARELA 2012; RAMÍREZ-JARAMILLO 2015). Data from Peru and Panama also highlight the importance of anurans (*Bufo*, *Eleutherodactylus*, *Phylllobates*) in its diet (MICHAUD & DIXON 1989).

Erythrolamprus miliaris cryso-stomus (COPE, 1868).— An individual was observed trying to ingest an armored catfish *Callichthys callichthys* (LINNAEUS, 1758), close to a small pond, ca. 50 cm deep (Fig. 1c), in December, 2013, at 21:00 h, in a forest of San Carlos community, Orellana, in buffer area of the Yasuni National Park (00°46'13"S, 75°33'39"W). At the time the event was photographed, the snake held the head of the fish, which extended its dorsal fins making the snake let go; the fish quickly plunged into the pond. The snake was collected and deposited at the Museo Ecuatoriano de Ciencias Naturales (DHMECN 10978); it measured 74.4 cm in total length.

Most information on feeding of this species comes from Brazil where prey comprises chiefly anurans, e.g., the foam nest of *Leptodactylus latrans* (STEFFEN, 1815) (referred to under *L. ocellatus* in LINGNAU & DI-BERNARDO 2006), *Lithobates catesbeianus* (SHAW, 1802) (SILVA & RIBEIRO-FILHO 2009) and *Hylodes meridionalis* (MERTENS, 1927) (LIMA & COLOMBO 2008). MARQUES & SOUZA (1993) suggested *E. miliaris* may feed on marine animals in tidal pools also, since they recorded an individual of this snake predating a Frillfin goby *Bathygobius soporator* (VALENCIENNES, 1837). MICHAUD & DIXON (1989) identified the banded knife-fish *Gymnotus carapo* LINNAEUS, 1758, as prey. Fishes seem to play an important role on the diet of this snake.

Leptodeira annulata (LINNAEUS, 1758).— An individual (total length ca. 80 cm) was photographed (Fig. 1d) consuming an anuran (*Leptodactylus* sp.) in October, 2010, in Kumpak, Morona Santiago (02°50'11"S, 77°57'57"W). This record is consistent with exclusively anuran (*Hyla*, *Eleutherodactylus* and *Phyllomedusa*) stomach contents in Ecuadorian specimens (DUELLMAN 1978) and also with MARTINS & OLIVEIRA (1998), who mentioned that *L. annulata* feeds on adults and tadpoles of anurans (*Bufo*, *Synapturanus*, *Adenomera*,



Eleutherodactylus, *Leptodactylus*, *Hyla*, *Osteocephalus*, *Scinax*) and occasionally anuran eggs and lizards.

Pseudalsophis sp. – A dead individual (total length ca. 60 cm) with a Lava Lizard incorporated (Fig. 1e) was found in June 26, 2010, on Santiago Island, Galapagos (00°17'11"N, 90°34'01"W). According to the record locality, the lizard corresponds to *Microlophus jacobii* (BAUR, 1892) (BENAVIDES et al. 2007), whereas, the snake could not be identified to species level because of its great similarity to both *P. dorsalis* (STEINDACHNER, 1876) and *P. steindachneri* (VAN DENBURGH, 1912) occurring on Santiago. The big size of the lizard, with one of its legs penetrating the snake's body wall (white arrow), and the low degree of digestion, suggest that the snake died from the oversized prey ingested. However, on Fernandina, another island of the Galapagos Archipelago, *Pseudalsophis biserialis* (GÜNTHER, 1860) feeds mainly on *Microlophus albermarlensis* (BAUR, 1890) and newborn Marine Iguanas *Amblyrhynchus cristatus* BELL, 1825, as well as marine fishes (MERLEN & THOMAS 2013).

Bothrops asper (GARMAN, 1883). – An individual (total length ca. 200 cm) was killed by inhabitants of a cocoa farm on the road from Santo Domingo to Esmeraldas (ca. 00°13'27"N, 79°09'57"W). The snake contained an adult individual of the Central American agouti *Dasyprocta punctata* (GRAY, 1842) (Fig. 1f) (picture and information by courtesy of C. MORA).

Insects, centipedes, fishes, anurans, lizards, and snakes, including congeners, birds and mammals, rodents in particular, constitute the prey of *B. asper* (CAMPBELL & LAMAR 2004; BOADA et al. 2005; SASA et al. 2009). This species also feeds on agricultural pests such as rodents and insects, a behavior that suggests this snake to be well adapted to human environments (BOADA et al. 2005; SASA et al. 2009). Adult *D. punc-*

tata, which weigh 3 to 5 kg (TIRIRA 2007), represent a "new" prey item and one of the biggest registered for *B. asper*. The largest preys recorded previously are the opossum species *Caluromys derbianus*, *Didelphis marsupialis* and *Philander opossum* and the rabbit *Sylvilagus brasiliensis* (SASA et al. 2009), mammals which usually weigh between 0.4 to 2.5 kg (TIRIRA 2007).

ACKNOWLEDGMENTS: The authors wish to thank David Salazar-Valenzuela and Jorge H. Valencia for comments on a draft version of the manuscript, J. Sicha, Glenda Pozo and César Mora for photos and information, Daniel Escobar and F. Anaguano for fish identification and Mario Yáñez and Jorge H. Valencia for herpetofaunal identification.

REFERENCES: BENAVIDES, E. & BAUM, R. & MCCLELLAN, D. & SITES Jr., J. W. (2007): Molecular phylogenetics of the lizard genus *Microlophus* (Squamata: Tropiduridae): aligning and retrieving indel signal from nuclear introns. – Systematic Biology, Oxford; 56: 776-797. BOADA, C. & SALAZAR, D. & LASCANO, A. F. & KUCH, U. (2005): The diet of *Bothrops asper* (GARMAN, 1884) in the Pacific lowlands of Ecuador. – Herpetozoa, Wien; 18: 77-79. CAMPBELL, J. A. & LAMAR, W. W. (2004): The venomous reptiles of the Western Hemisphere. Ithaca, USA (Cornell University Press), pp. 870. CISNEROS-HEREDIA, D. F. (2005): Report of molluscivory in *Atractus carrióni* PARKER, 1930. – Herpetozoa, Wien; 18: 185-186. CUNHA, O. R. & NASCIMENTO, F. P. (1993): Ofídios da Amazônia. As cobras da região leste do Pará. – Boletim do Museu Paraense Emílio Goeldi, Belém; (Série Zoologia) 9: 1-191. DUELLMAN, W. E. (1978): The biology of an equatorial herpetofauna in Amazonian Ecuador. – University of Kansas Museum of Natural History - Miscellaneous. Publications, Lawrence; 65: 1-352. LIMA, A. F. B. & COLOMBO, P. (2008): Observação do comportamento predatório de *Liophis miliaris orinus* (Serpentes, Colubridae) em *Hylodes meridionalis* (Anura, Hylodidae), Serra Geral, Rio Grande do Sul, Brasil. – Revista Brasileira de Zoociências, Juiz De Fora; 10 (1): 73-76. LINGNAU, R. & DI-BERNARDO, M. (2006): Predation on foam nests of two leptodactylid frogs by *Solenopsis* sp. (Hymenoptera, Formicidae) and *Liophis miliaris* (Serpentes, Colubridae). – Biociências, Porto Alegre; 14 (2): 223-224. MAFLA-ENDARA, P. & AYALA-VARELA, F. (2012): *Pholidobolus montium* (Lagartija Minadora). Predation. – Herpetological Review, Saint Louis; 43:137. MARQUES, O. A. V., & SOUZA, V. C. (1993): Nota sobre a atividade alimentar de *Liophis miliaris* no ambiente marinho (Serpentes, Colubridae). – Revista Brasileira de Biologia, Rio de Janeiro; 53 (4): 645-648.

Fig. 1: Snakes from Ecuador - and their prey (opposite page).

- a – *Dendrophidion dendrophis* (SCHLEGEL, 1837) - *Oreobates quixensis* JIMÉNEZ DE LA ESPADA, 1872;
b – *Erythrolamprus epinephelus albiventrís* (JAN, 1863) - *Sternocercus guentheri* (BOULENGER, 1885);
c – *Erythrolamprus miliaris chrysostomus* (COPE, 1868) - *Callichthys callichthys* (LINNAEUS, 1758);
d – *Leptodeira annulata* (LINNAEUS, 1758) - *Leptodactylus* sp.; e – *Pseudalsophis* sp. - *Microlophus jacobii* (BAUR, 1892); f – *Bothrops asper* (GARMAN, 1883) - *Dasyprocta punctata* (GRAY, 1842).

MARTINS, M. & OLIVEIRA, M. E. (1998): Natural history of snakes in forests of the Manaus region, Central Amazonia, Brazil.- *Herpetological Natural History*, Riverside; 6 (2):78-150. MICHAUD, E. J. & DIXON, J. R. (1989): Prey items of 20 species of the neotropical colubrid snake genus *Liophis*.- *Herpetological Review*, Saint Louis; 20: 39-41. MERLEN, G. & THOMAS, R. A. (2013): A Galápagos ectothermic terrestrial snake gambles a potential chilly bath for a protein-rich dish of fish.- *Herpetological Review*, Saint Louis; 44: 415-417. MEZA-RAMOS, P. & ALMENDÁRIZ, A. & YÁNEZ-MUÑOZ, M. H. (2010): Datos sobre la dieta de *Bothriechis schlegelii* (BERTHOLD, 1846) (Serpentes - Viperidae) en el Occidente del Ecuador.- *Boletín Técnico* 9, Sangolquí; (Serie Zoológica) 6: 15-18. MOCINO-DELOYA, E. & SETSER, K. & PÉREZ-RAMOS, E. (2014): Observations on the diet of *Crotalus triseriatus* (Mexican dusky rattlesnake).- *Revista Mexicana de Biodiversidad*, Ciudad de México; 85: 1289-1291. RAMÍREZ-JARAMILLO, S. (2015): Observaciones sobre la historia natural de *Erythrolamprus epinephelus albiventris* en el valle de Quito, Ecuador.- *Avances en Ciencias e Ingenierías*; Quito; 7 (1): B5-B7. PRUDENTE, A. L. C. & MASCHIO, G. F. & YAMASHINA, C. E. & SANTOS-COSTA, M. C. (2007): Morphology, reproductive biology and diet of *Dendrophidion dendrophis* (SCHLEGEL, 1837) (Serpentes, Colubridae) in Brazilian Amazon.- *South American Journal of Herpetology*, São Paulo; 2 (1): 53-58. SASA, M. & WASKO, D. K., & LAMAR, W. W. (2009): Natural history of the terciopelo *Bothrops asper* (Serpentes: Viperidae) in Costa Rica.- *Toxicon*, Oxford; 54: 904-922. SILVA, E. T. & RIBEIRO-FILHO, O. P. (2009): Predation on juveniles of the invasive American Bullfrog *Lithobates catesbeianus* (Anura, Ranidae) by native frog and snake species in South-eastern Brazil.- *Herpetology Notes*, Leiden; 2: 215-218. TIRIRA, D. (2007): Guía de campo de los mamíferos del Ecuador. Quito (Ediciones Murciélago Blanco), pp. 576. TORRES-CARVAJAL, O. & SALAZAR-VALENZUELA, D. & MERINO-VITERI, A. & NICOLALDE, D. A. (2016). ReptiliaWebEcuador (Versión 2015.0.). Quito: Museo de Zoología QCAZ, Pontificia Universidad Católica del Ecuador. WWW document available at < <http://zoologia.puce.edu.ec/Vertebrados/reptiles/reptilesEcuador> > [last accessed on March 1, 2016].

KEY WORDS: Reptilia: Squamata: Serpentes: Viperidae: *Bothrops asper*; Colubridae: *Dendrophidion dendrophis*, *Erythrolamprus epinephelus albiventris*, *Erythrolamprus mliaris crysostomus*, *Leptodeira annulata*, *Pseudalsophis* sp., *Bothrops asper*; diet, prey, feeding ecology; Ecuador, Pichincha, Galapagos Islands

SUBMITTED: March 04, 2016

AUTHORS: Héctor CADENA-ORTIZ (corresponding author < fercho_cada@yahoo.es >)¹⁾, Alexis BARAHONA-V.²⁾, Daniela BAHAMONDE-VINUEZA^{1, 3)} & Jorge BRITO M.¹⁾

¹⁾ Museo Ecuatoriano de Ciencias Naturales del Instituto Nacional de Biodiversidad. Calle Rumipamba 341 y Av. de los Shyris. Casilla: 17-07-8976. Quito, Ecuador.

²⁾ Walsh Environmental Scientists and Engineers, Miravalle 242 y Julio Zaldumbe, Quito, Ecuador.

³⁾ Ministerio de Salud Pública, Av. República del Salvador 36-64 y Suecia. Código Postal: 170515. Quito, Ecuador.