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AUTOHEMORRHAGING BEHAVIOR IN CUBAN DWARF BOAS, GENUS *TROPIDOPHIS* (SERPENTES: TROPIDOPHIIDAE)

AUTOHEMORRAGIA EN MAJASITOS CUBANOS DEL GÉNERO *TROPIDOPHIS* (SERPENTES: TROPIDOPHIIDAE)

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ABSTRACT: Many anti-predation strategies have been described among reptiles. Autohemorrhaging is a less common mechanism that consists of the voluntary expulsion of blood through the cloaca or mouth. It has been repeatedly documented in dwarf boas of the genus *Tropidophis*. Herein we describe the occurrence of this phenomenon for the first time in three Cuban dwarf boas (*Tropidophis celiae, T. hendersoni* and *T. wrighti*), and two new reports for *T. melanurus*, all endemic. The events reported here confirm that such behavior mostly occurs under stressful conditions.
KEYWORDS: Anti-predation strategy, autohemorrage, snake, stressful conditions.

RESUMEN: Numerosas estrategias anti-depredación se han descrito entre los reptiles. La autohemorragia es un mecanismo poco común que consiste en la expulsión voluntaria de sangre a través de la cloaca o la boca. Se ha reportado en reiteradas ocasiones en las boas enanas del género *Tropidophis*. En este trabajo describimos la ocurrencia de este fenómeno por primera vez para tres majasitos cubanos (*Tropidophis celiae, T. hendersoni* y *T. wrighti*) y dos reportes nuevos para *T. melanurus*, todos endémicos. Los eventos aquí reportados confirman que dicha conducta principalmente ocurre bajo condiciones estresantes.
PALABRAS CLAVE: Autohemorragia, condiciones estresantes, estrategia antidepredación, serpiente.

Individuals try to survive in a spontaneous fashion. Survival involves feeding, avoiding negative environmental conditions, and predation. The last one is a frequent challenge to individual survival and many strategies to avoid it have evolved along the tree of life. Reptiles, in particular, show many defensive and anti-predation strategies including crypsis, locomotor escape, death feigning, bluffs and threats that typically include apparent increase in size, attempts to bite and explosive noises (Greene, 1994). Another way to avoid predation is to change activity patterns including nocturnality (e.g., many geckos), adopting an aquatic lifestyle (e.g., crocodilians, many turtles), or becoming fossorial (e.g., amphisbaenians, scolecophidian snakes). Moreover, heavily armored (e.g., cordylid lizards, tortoises), or highly venomous (e.g., *Bitis*, *Naja*) species also exist (Greene, 1994; Henderson and Powell, 2009; Vitt and Caldwell, 2014). Autohemorrhaging is a less common anti-predation mechanism that consists of the voluntary expulsion of blood through the cloaca or mouth (Greene, 1994). It is usually displayed as a last-resort mechanism when a predator is very close or by physical stress. This behavior has been previously reported in snakes and lizards (Smith *et al.*, 1993; Sherbrooke, 2000; Iiftime and Iftime, 2014).

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In the dwarf boas of genus *Tropidophis* (Tropidophiidae) this behavior is associated with physical stress as manipulation (Iverson, 1986), blows (Darlington, 1927) or chemical products such as anesthetic substances (Stull, 1928; Campbell, 1951). It has been reported in *T. canus* (Rehák, 1987), *T. curtus* (Hecht *et al.*, 1955; Hoefer *et al.*, 2019), *T. feicki* (Rehák, 1987), *T. greenwayi* (Iverson, 1986; Rehák, 1987), *T. haetianus* (Rehák, 1987; Smith *et al.*, 1993), *T. jamaicensis* (Underwood, 1952), *T. melanurus* (Stull, 1928; Mertens, 1946; Rehák, 1987; Iturriaga, 2014), *T. pardalis* (Domínguez and Moreno, 2003), *T. parkeri* (Campbell, 1951; Thomas, 1963), *T. paucisquamis* (Carvalho, 1951), *T. semicinctus* (Darlington, 1927), *T. stejnegeri* (Sánchez-Muñoz, 2008), and *T. xanthogaster* (Torres *et al.*, 2013). Here, we report for the first time autohemorrhaging in *T. celiae, T. hendersoni* and *T. wrighti*, as well as two new cases in *T. melanurus.* New reports are presented chronologically.

On 13 October 2014, during a herpetological survey in Boca de Canasí Flora Reserve, Mayabeque province, we observed autohemorrhage for the first time in an adult female of *T. celiae.* The individual was found at 10:13 h under a rock, at 3 m elev. and at a distance of approximately 1.7 km east from the Canasí river mouth (Torres *et al.*, 2016). When held by the neck to take measurements it started to bleed, although the amount of blood was small (less than a drop).

On 24 June 2016, during a survey in the surroundings of Pinares de Mayarí hotel (20°28' 56.5" N; 75°48'14.6" W, WGS 84, ca. 689 m elev.), at 23.4 km southwest of Mayarí town, Holguín province, we observed four individuals of *T. wrighti* actively foraging (two on bushes, at 1 and 1.5 m height, and two on the ground) at night (21:00-23:00 h). At 18:29 h on 5 July 2016, we were measuring one of the specimens, which was being held by the neck, and after a few seconds it expelled a drop of blood from the mouth (Fig. 1) and the cavity between the eye and the spectacle filled with blood. A few seconds later the blood from the eye disappeared and the hemorrhage was arrested. The whole event had a duration of 20 seconds. This case of autohemorrhaging was very similar to that described for *T. xanthogaster* (Torres *et al.*, 2013).

At 10:47 h on 7 August 2016, we observed autohemorrhaging in an adult female of *T. hendersoni* at Cueva de Los Panaderos (21°06'21.1" N; 76°08'17.6" W; WSG 84, ca. 20 m elev.) in Gibara town, Holguín province. The trope turned onto a ball while expelling blood from the mouth (Fig. 2) at the time it was being manipulated. As in *T. celiae*, the amount of blood was small.

Although this behavior has been reported for *T. melanurus* (Stull, 1928; Mertens, 1946; Iturriaga, 2014), here we present two new observations, both at the Cienfuegos Botanical Garden. We first observed abundant blood expulsion from the mouth of an individual at 11:53 h on 28 July 2013 (Fig. 3), and a second event at 13:22 h on 18 November 2013 with a duration of approximately 2 minutes (Fig. 4). Of note is that only in the two cases above from the Cienfuegos Botanical Garden, this behavior was documented with photographs, but it was observed dozens of times during a ca. five-year period (early 2012 - late 2016) while surveying this population of *T. melanurus* (TMRC pers. obs.). In all cases this behavior was performed while the snakes were being handled to take measurements. This confirms that autohemorrhaging occurs easily under physical stress, specifically when the head is involved. Immobilizing the specimens by the body did not elicit autohemorrhaging.

Autohemorrhaging behavior in *Tropidophis* apparently is present in all species of the genus. It occurs in species of different islands (Cuba, Bahamas, Hispaniola, etc.) and in the sister genus



FIGURE 1. Individual of *T. wrighti* from Pinares de Mayarí observed expelling a drop of blood from the mouth. Notice that the eye is also full of blood (left picture). Photo by Rubén Marrero Romero.

FIGURA 1. Individuo de *T. wrighti* de Pinares de Mayarí observado expulsando una gota de sangre por la boca. Nótese que el ojo también está lleno de sangre (imagen izquierda). Foto por Rubén Marrero Romero.



FIGURE 2. Individual of *Tropidophis hendersoni* from Gibara displaying the defensive balling behavior and expelling blood from the mouth. Photo by Raimundo López-Silvero.

FIGURA 2. Individuo de *Tropidophis hendersoni* de Gibara formando una bola como mecanismo defensivo y expulsando sangre por la boca. Foto por Raimundo López-Silvero.

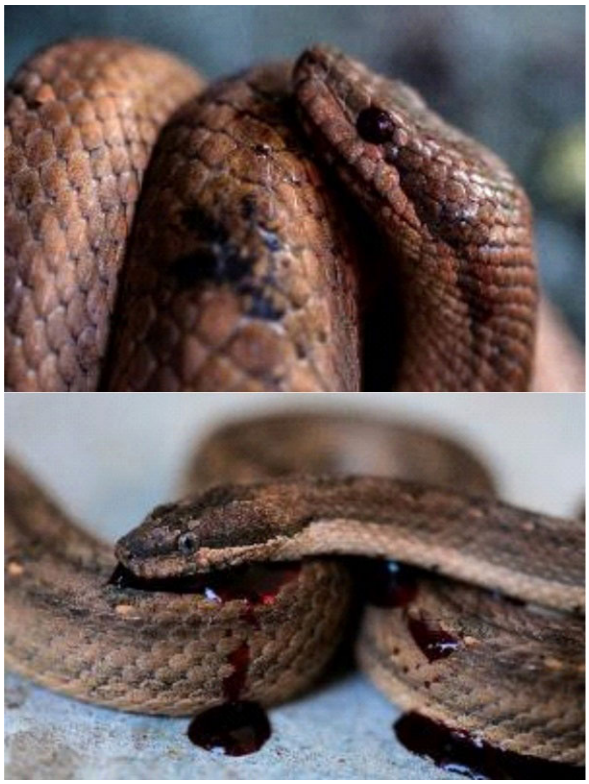


FIGURE 3. Individual of *Tropidophis melanurus* from the Cienfuegos Botanical Garden observed expelling blood from the mouth on 28 July 2013. Notice that the eye is also full of blood (above). Photo by Raimundo López-Silvero.

FIGURA 3. Individuo de *Tropidophis melanurus* del Jardín Botánico de Cienfuegos observado expulsando sangre por la boca el 28 de Julio de 2013. Nótese que el ojo también está lleno de sangre (imagen superior). Foto por Raimundo López-Silvero.



FIGURE 4. A second individual of *Tropidophis melanurus* from the Cienfuegos Botanical Garden observed expelling blood from the mouth on 18 November 2013. Notice also the musk on the snake's head expelled from the cloaca (left picture). Photo by Raimundo López-Silvero.

FIGURA 4. Individuo de *Tropidophis melanurus* del Jardín Botánico de Cienfuegos observado expulsando sangre por la boca el 18 de noviembre de 2013. Nótese también el almizcle secretado por la cloaca sobre la cabeza de la serpiente (imagen izquierda). Foto por Raimundo López-Silvero.

Trachyboa from Central and South America (Vidal and Hedges, 2009). The physiological basis of this phenomenon remains uncertain, but some authors consider that it occurs because of an increase in blood pressure associated with fright or fight behavioral response (Smith *et al.*, 1993). This

behavior may have evolved to minimize predation by vertebrates. However, in Cuba, the center of the diversification of the genus (Hedges, 2002) with 17 of the 33 described species (Díaz and Cádiz, 2020; Uetz *et al.*, 2022), there are few confirmed predators [*Chilabothrus angulifer* (Viña-Dávila and Armas, 1989), and *Coccyzus merlini* (Garrido, 1976)], contrary to what happens in continental areas. Understanding the triggering factors and physiological mechanisms underlying autohemorrhaging behavior would increase the knowledge about the natural history and ecological interactions of these species with others, as well as the main pressures that they face in their habitats.

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REFERENCES

Campbell, D.G. (1951). Notes on snakes near Malvern. *Natural History Notes of the Natural History Society of Jamaica*, 51, 54-56.

Carvalho, A.L. (1951). Observacoes sobre "*Tropidophis paucisquamis"* (Müller, 1901). *Revista Brasileira de Biologia*, 11 (3), 239-248.

Darlington, P.J. (1927). Autohemorrage in *Tropidophis semicinctus. Bulletin of the Antivenin Institute of America*, 1, 59.

Díaz, L.M. and Cádiz, A. (2020). A new species of *Tropidophis* (Squamata: Tropidophiidae) and molecular phylogeny of the Cuban radiation of the genus. *Novitates Caribaea*, 16, 1-19.

Domínguez, M. and Moreno, L.V. (2003). Serpientes del suelo. En: Rodríguez-Schettino, L. (Ed.), *Anfibios y Reptiles de Cuba* (pp. 98-109). Vaasa, Finland, UPC Print.

Garrido, O.H. (1976). Aves y reptiles de Cayo Coco, Cuba. *Miscelánea Zoológica*, 3, 3-4.

Greene, H.W. (1994). Antipredator mechanisms in reptiles. En: Gans, C. y Huey R.B., (eds.), *Biology of the Reptilia* (pp. 1-153). Washington, Branta Book.

Hecht, M.K., Walters, V. and Ramm, G. (1955). Observations on the natural history of the Bahaman Pigmy boa, *Tropidophis pardalis,* with notes on autohemorrage. *Copeia,* 1955 (3), 249-251.

Hedges, S.B. (2002). Morphological variation and the definition of species in the snake genus *Tropidophis* (Serpentes, Tropidophiidae). *Bulletin of Natural History Museum of London,* 68(2), 83-90.

Hedges, S.B. and Garrido, O.H. (2002). A new snake of the genus Tropidophis (Tropidophiidae) from eastern Cuba. *Journal of Herpetology* 36, 157-161.

Hegdes, S.B., Estrada, A.R. and Díaz, L.M. (1999). New snake (*Tropidophis*) from western Cuba. *Copeia*, 1999, 376-381.

Henderson, R.W. and Powell, R. (2009) *Natural History of West Indian Reptiles and Amphibians*. University Press of Florida. 495pp.

Hoefer, S., Mills, S. and Robinson, N.J. (2019). Autohaemorrhaging in a Bahamian pygmy boa, *Tropidophis curtus barbouri*. *The Herpetological Bulletin*, 150, 39-40.

Iiftime, A. and Iftime, O. (2014). Thanatosis and autohaemorrhaging in the Aesculapian Snake *Zamenis longissimus* (Laurenti, 1768). *Herpetozoa*, 26, 173-174.

Iturriaga, M. (2014). Autohemorrhaging behavior in the Cuban Dwarf Boa *Tropidophis melanurus* Schlegel, 1837 (Serpentes: Tropidophiidae). *Herpetology Notes*, 7, 339-341.

Iverson, J.B. (1986). Notes on the natural history of the Caicos Islands Dwarf Boa, *Tropidophis greenwayi. Caribbean Journal of Science,* 22 (3-4), 191-198.

Mertens, R. (1946) Die Warn- und Droh-Reaktionen dar Reptilien. *Abhandlungen der Seneckenbergischen Naturforschenden Gesellschaft*, 471, 1-88.

Rehak, I. (1987). Color change in the snake *Tropidophis feicki* (Reptilia: Squamata: Tropidophiidae). *Vestník Ceskoslovenské Spolecnosti Zoologické*, 51, 300-303.

Sánchez Muñoz, A.J. (2008): Father Sanchez´s Web Site of West Indian natural History. Available at: http://www.kingsnake.com/westindian/.

Sherbrooke, W.C. (2000). *Sceloporus jarrovii* (Yarrow's spiny lizard). Ocular sinus bleeding. *Herpetological Review*, 31, 243.

Smith, D.D., Pflanz, D.J. and Powell, R. (1993) Observations of autohemorrhaging in *Tropidophis haetianus, Rhinocheilus lecontei, Heterodon platyrhinos,* and *Nerodia erythrogaster*. *Herpetological Review*, 24, 130-131.

Stull, O. (1928). A Revision of the Genus *Tropidophis*. *Occasional Papers of the Museum of Zoology of the University of Michigan*, 195, 1-49.

Thomas, R. (1963). Cayman Islands *Tropidophis* (Reptilia, Serpentes). *Breviora*, 195, 1-8.

Torres, J., Torres, O.J. and Marrero, R. (2013). Autohemorrage in *Tropidophis xanthogaster* (Serpentes: Tropidophiidae) from Guanahacabibes, Cuba. *Herpetology Notes,* 6, 579-581.

Torres, J., Rodríguez-Cabrera, T.M., Marrero, R.R., Torres, O.J. and Gutiérrez, P.M. (2016). Comments on the Critically Endangered Canasí

Trope (*Tropidophis celiae*, Tropidophiidae): Neonates, *ex situ* Maintenance, and Conservation. *IRCF Reptiles & Amphibians*, 23(2), 82-87.

Uetz, P., Freed, P., and Hošek, J. (Eds). (2022). The Reptile Database, http://www.reptile-database.org, accessed on 1 April 2022.

Underwood, G. (1952). Introduction to the study of Jamaican reptiles (part X). Serpentes. *Natural History Notes of the Natural History Society of Jamaica,* 53, 97-105.

Vidal, N., and Hedges, S.B. (2009). The molecular evolutionary tree of lizard, snakes, and amphisbaenians. *Comptes Rendus Biologies*, 332,129-139.

Viña-Dávila, N. and de Armas, L.F. (1989). Depredación de *Tropidophis melanurus* (Serpentes: Tropidophiidae) por *Epicrates angulifer* (Serpentes: Boidae). *Miscelánea Zoológica,* 41, 2-3.

Vitt, L.J. and Caldwell, J.P. (2014). *Herpetology: An Introductory Biology of Amphibians and Reptiles*. Fourth Edition, Elsevier. 757pp.

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