



First record of *Oxyrhopus occipitalis* (Wied-Neuwied, 1824) in Central America
Primer registro de *Oxyrhopus occipitalis* (Wied-Neuwied, 1824) en América Central

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Abstract

The first record in Central America of the species *Oxyrhopus occipitalis* (Wied-Neuwied, 1824) (Serpentes, Dipsadidae) is presented, with a juvenile collected and photographic specimen, the latter obtained with citizen science information available on the Inaturalist platform. The two records were made in the Province of Darién, Serranía de Pirre, Republic of Panama. Pholidosis data was obtained, to compare and identify the specimen using a dichotomous key of snakes and the genus *Oxyrhopus* of Colombia. A complete count of head and body scales is presented, including a complete description of coloration. For the adult, a count and partial description of the cephalic scales is presented, including a partial description of the coloration of the head and the anterior portion of the body. With these records the number of species of the genus *Oxyrhopus* in Panama increases to two. The taxonomic status of this species has been controversial for many years and taxonomic changes can be expected in the future.

Keywords

Darien, Dipsadidae, Photograph specimen, Serranía de Pirre, Science Citizen.

Resumen

Se presenta el primer registro en Centroamérica de la especie *Oxyrhopus occipitalis* (Wied-Neuwied, 1824) (Serpentes, Dipsadidae), con un juvenil colectado y adulto fotografiado, este último obtenido con información de ciencia ciudadana disponible en la plataforma Inaturalist. Los dos registros fueron realizados en la Provincia de Darién, Serranía de Pirre, República de Panamá. Se obtuvo información de folidosis, para comparar e identificar el espécimen con las claves dicotómicas de las serpientes y del género *Oxyrhopus* de Colombia. Se presenta un conteo completo de las escamas de la cabeza y el cuerpo, incluida una descripción completa de la coloración. Para el adulto se presenta un conteo y descripción parcial de las escamas cefálicas, incluyendo una descripción parcial de la coloración de la cabeza y la porción anterior del cuerpo. Con estos registros aumenta a dos el número de especies del género



Oxyrhopus en Panamá. El estado taxonómico de esta especie ha sido controvertido durante muchos años y se puede esperar cambios taxonómicos en el futuro.

Palabras clave

Ciencia Ciudadana, Darién, Dipsadidae, espécimen fotográfico, Serranía de Pirre.

Introduction

The Yellow-headed Flame-Snake *Oxyrhopus occipitalis* is known from the humid forests of the Amazon region and adjacent foothills of the Andes in Brazil, Colombia, Venezuela, Guyana, French Guyana, Peru, Surinam and Ecuador (Lynch, 2009; MacCulloch et al. 2009; Wallach et al. 2014; Rojas-Morales et al. 2018; Quezada & Arteaga, 2020). The type locality of this species is Río Solimões or upper Amazon River, between the mouth of Río Negro and the Peruvian border, Amazonas State, North West of Brazil (Wallach et al. 2014). Bailey (1970) synonymized *O. occipitalis* with *O. formosus*, despite considering *O. formosus* as a species complex. Subsequently, *O. occipitalis* was revalidated by Hoge et al. (1972). Some species of *Oxyrhopus* resemble one another, and identification can be difficult. For example, *O. formosus* and *O. occipitalis* have long been confused (Natera Mumaw et al. 2015). Species identifications and relationships among species have traditionally been based on color patterns, although some scutellation characters have been used (Bailey, 1970). Actually, physical vouchers remain the main standard in biological research in terms of reproducibility and permanence (Ceríaco et al. 2016; Buckner et al. 2021), However, there are cases where there is no physical voucher due to circumstances such as is a protected species or too rare to obtain permits, does not exist, is difficult to collect, among other cases; photographs and molecular data can be useful (Buckner et al. 2021; Leipzig et al. 2021). Especially if there is more data associated, such as coordinates and date and time information (Leipzig et al. 2021). Photographs and molecular data are not a panacea, the addition of a physical voucher is always recommended (Buckner et al. 2021). In this work, we present the first record of *O. occipitalis* for Panama and Central America with two specimens (physical and photographic). We include scale count and description of coloration for both specimens.

Materials and Methods

The juvenile of *O. occipitalis* was observed, photographed and collected by Ángel Romero. This was deposited in Museo Herpetológico de Chiriquí (MHCH 5001; field tag AR-105). The morphological, morphometric measurements and scale count were obtained with AmScope stereoscope and caliper in millimeters (mm). Sex was determined by counting dark bands on the body and tail (Lynch, 2009). The coordinates and elevation were obtained with GPS Garmin. Liver tissue was obtained and preserved in 96 % ethanol for subsequent analysis. The adult of *O. occipitalis* was found by Macario González on iNaturalist <https://www.inaturalist.org/observations/19706875> and was sent to Digital Collection, University of Texas at Arlington (UTADC 9851; photo voucher). The scale count was obtained in the photograph. The date, time of observation, elevation and coordinates were obtained from the Inaturalist platform. The identification of family, genus and species was made with the dichotomous keys of Peters and Orejas-Miranda (1970), Lynch (2009) and Vásquez-Restrepo (2021). The elaboration of the map was made with the program QGIS v. 2017.

Results

The two observations were made in the Serranía de Pirre, Darien National Park, Province of Darien, Panama; the first specimen was found on 8 Oct 2015 in Cerro Pirre by Jonathan Newman (7.9275° N, -77.7025° W; WGS 84) at an altitude of 1400 m a.s.l., (figure 1) during the day without a specific time. The second record was made by Ángel Romero on May 24, 2023 in Cana (7.7837° N, -77.6992° W; WGS 84) at an altitude of 1130 m a.s.l., around 21:30 h (figure 1). Both snakes were observed in mature forest (figure 2).



Figure 1. Geographical distribution of *O. occipitalis* in Serranía de Pirre, Darien National Park, Panama. Red circle corresponds photographic voucher (UTADC 9851) record in 2015; Light green triangle corresponds the physical voucher (MHCH 5001) record in 2023.



Figure 2.
Aerial view of the mature forest, Cana, Darien National Park (Photo by Marcos Ponce).

Morphology and morphometry

The juvenile MHCH 5001 presents a total length of 217 mm and body length of 177 mm, tail 40 mm, 8 supralabial scales, 4 and 5 in contact with the orbit, 8 infralabial scales, loreal is longer than tall, 1 rostral scale, 2 internal scales, 2 prefrontal scales, 2 supraocular scales, 1 frontal, 2 parietal scales, nasal scale, 1 preocular scale, 2 postocular, 2 temporal scales. The morphometric measurements of the head were: 6.1 mm cephalic width, 7.8 mm cephalic length, 2.7 mm narine-eye distance, and 1.5 mm eye diameter.

The dorsal scales are smooth and arranged in 19-19-17 rows along the trunk; 202 ventral scales, 68 pairs of subcaudal scales and a single anal plate.

The count and arrangement of the head scales in the adult were as follows: 8 supralabials with 4 and 5 contacting the orbit, the infralabials are not visible in the photograph, the loreal is longer than tall, the preocular scale is in contact with the prefrontal scale and, the upper postocular scale is slightly larger than the lower one.

Color pattern

The juvenile presents in life a coloration on the head mostly white cream with a light brown spot that goes from the rostral scale to the beginning of the parietals, and mental and infralabial scales light gray

with white cream in the border (figure 3 A-B). Throughout the body presents 27 black rings and 19 black rings from the head to the cloaca. The body presents a combination of 6 cream rings to the 7 black rings, in the back half of the body, the coloration of the rings changes from cream to reddish-orange, intensifying its color until the end of the tail. The black rings are still maintained along the entire body and the ventral scales are cream-white (figure 4).

The adult includes the front half of the body with the head. The tip of the snout is yellow including supralabial and infralabial scales, the black color on the head starts from the posterior portion of the internasal scales, extending through the prefrontal, parietal scales and first four dorsal scales (figure 5). The anterior portion of the body is red with the tips of the scales black. The color of the belly is not visible and the eyes are orange bordered by a black line with black pupils (figure 5).

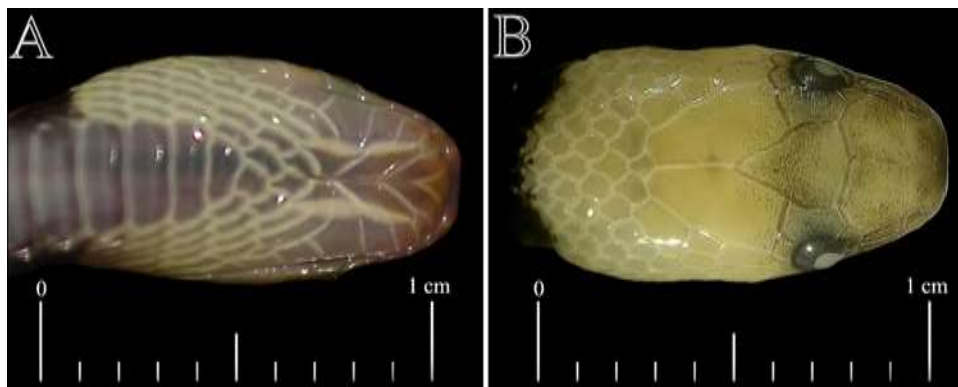


Figure 3.
Juvenile *Oxyrhopus occipitalis*. Head scales (A) ventral view in life, (B) dorsal view preserved (Photos by Angel Romero-Marcucci).



Figure 4.
Coloration in life of juvenile *Oxyrhopus occipitalis* (MHCH 5001) from the mature forest, Cana, Darien National Park, Panama (Photo by Marcos Ponce).



Figure 5.
Adult of *Oxyrhopus occipitalis* (UTADC 9851) in mature forest of Cerro Pirre, Darien National Park, Panama (Photo by Jonathan Newman).

The juvenile with three months preserved in 70 % ethanol, showed a head with a cream coloration a little darker between the rostral and frontal scales and a black eye with a white pupil (figure 6). The dorsal coloration of cream and black rings with some traces of reddish-orange in the last third of the body of the snake (figure 6).



Figure 6.
Preserved juvenile *Oxyrhopus occipitalis* MHCH5001 (Photo by Angel Romero-Marcucci).



The following characteristics allowed the identification at the species level of the juvenile: dorsal scale rows 19-19-17; dark body bands not encroaching onto ventral scutes, dark body bands present not forming triads and heads of juveniles yellow (Lynch, 2009). This does not have a yellow head in life, it is cream with a light brown snout. The adult was identified at the species level using the following characteristics of coloration: red body color pattern, yellow snout and the rest of the head black (Lynch, 2009).

Discussion

The color pattern is the same as that described by Lynch (2009) and MacCulloch et al. (2009) for *O. occipitalis* for youngs and adults from Colombian populations, characterized by having a yellow snout, black head and, body and tail red with banded black it is also considered that the collected specimen is female, because the hemipenes could not be everted at the time of its preservation and by the number of black rings it presents (Lynch, 2009). Quezada & Arteaga (2020) show photographs of specimens from the locality of Yuralpa in Ecuador, which are consistent in coloration for the juvenile and adult with those of this work. Colombian populations do not present confusion in color patterns like the populations of Brazil, Venezuela and Guyana (Lynch, 2009). The red dorsal coloration, dark head, and yellow snout form a combination unique to *O. occipitalis*, in Manaus (northern Brazil), according to Fraga et al. (2013). For *O. formosus*, the yellow color extends beyond the snout to include other parts of the head (Lynch, 2009). According to MacCulloch et al. (2009), in *O. formosus*, the body color pattern is yellow, orange, or red with black bands, and the snout color is yellow, orange or red. The proximity to the border with Colombia allows assigning the photographic specimen to *O. occipitalis*. The count and arrangement of the scales are consistent with that presented by Lynch (2009).

New country record extending their range by approximately 207 km to the west from the record in Paramillo, Department of Antioquia, Colombia (voucher number ICN 10453) (Lynch, 2009). With *Oxyrhopus petolarius* the number of species of this genus present in Panama increases to two (Ray, 2017), with a total of 153 species of snakes in Panama (Ray, 2017; Batista & Miranda, 2020; Arteaga & Batista, 2023; Ray et al. 2023). Natera Mumaw et al. (2015) and Rojas-Morales et al. (2018), mention that it is a species of nocturnal habits but it may have nocturnal and daytime activity. The type of habitat



is consistent with that described by Rojas-Morales et al. (2018), being a species with a preference for undisturbed habitats.

In terms of conservation in situ, its presence in the National System of Protected Areas is beneficial, as species with striking colors are susceptible killed (Johnson et al., 2015).

The status of these two names *Oxyrhopus occipitalis* (Wied-Neuwied, 1824) and *Oxyrhopus formosus* (Wied-Neuwied, 1820), currently is controversial (Natera Mumaw et al. 2015). This problem necessitates a range-wide approach that uses analysis of the color pattern of live individuals, pholidosis and hemipenial morphology of all available material, and DNA samples from as broad a range of populations in Darien National Park and South America as possible (Zaher & Prudente, 2003; Lynch, 2009; MacCulloch et al., 2009). While this species complex is resolved, we follow the criteria proposed by Lynch (2009) and MacCulloch et al. (2009) naming the species of this record as *O. occipitalis* until more evidence is available.

Conclusions

- Citizen science platforms are important because provide valuable information, as in this case, about a very rare species of snake from an area that is difficult to access.
- This record increases to two, the number of species of the genus *Oxyrhopus* in Panama.
- The taxonomic status of this species has been controversial for many years and taxonomic changes can be expected in the future. Tissue from a Panamanian specimen (MHCH 5001) is available for future comparative molecular analysis.
- This fortuitous observation of a species of snake that was not on previous herpetological lists for the Republic of Panama, is an indication that more studies are needed to deepen the knowledge of the biodiversity of the Darien National Park.

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