



ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/tzme20

# Re-evaluating first impressions: Melanism in Hemorrhois nummifer (Reuss, 1834) from Kurdistan **Region**, Iraq

Daniel Jablonski & Soran H. Ahmed

To cite this article: Daniel Jablonski & Soran H. Ahmed (2023) Re-evaluating first impressions: Melanism in Hemorrhois nummifer (Reuss, 1834) from Kurdistan Region, Iraq, Zoology in the Middle East, 69:3, 243-247, DOI: 10.1080/09397140.2023.2243733

To link to this article: https://doi.org/10.1080/09397140.2023.2243733



Published online: 08 Aug 2023.



Submit your article to this journal 🕝





View related articles



🌔 🛛 View Crossmark data 🗹

# Re-evaluating first impressions: Melanism in *Hemorrhois nummifer* (Reuss, 1834) from Kurdistan Region, Iraq

Daniel Jablonski<sup>a,\*</sup> and Soran H. Ahmed<sup>b</sup>

<sup>a</sup>Department of Zoology, Comenius University in Bratislava, Bratislava, Slovakia; <sup>b</sup>Department of Biology, College of Science, Sulaimani University, Sulaymaniyah, Kurdistan Region, Iraq

(Received 21 January 2023; accepted 15 June 2023; first published online 8 August 2023)

We conducted genetic and morphological investigations on a snake specimen initially identified as the venomous species *Walterinnesia morgani* (Mocquard, 1905) from the family Elapidae, primarily based on its dark colouration. However, subsequent genetic analysis revealed a clear affiliation with the family Colubridae, specifically *Hemorrhois nummifer* (Reuss, 1834), which shares a partially sympatric distribution with the previously mentioned species in Iraq. This discovery represents the first documented record of such a coloured specimen of *H. nummifer* in Iraq, raising additional questions regarding possible mimicry and the possibility of confusion in species identifications.

Keywords: Colouration; distribution; Middle East; phenotype; Walterinnesia aegyptia

## Introduction

Snakes in the Western Palearctic region display a wide array of phenotypic variations, sometimes even resembling completely distinct or previously unknown species (Jablonski et al., 2017, 2023). This variability has historically resulted in the identification of various taxa or morphs at both the species and subspecies levels. However, subsequent genetic studies have often led to the synonymization of these taxa under older, existing names (Utiger and Schätti, 2004; Fritz & Schmidtler, 2020; Jamison et al., 2020; Asztalos et al., 2021). An intriguing example of taxonomically linked melanism is observed within the population of *Hemorrhois hippocrepis nigrescens* (Cattaneo, 1985) found on the Italian island of Pantelleria. This taxon was mainly described based on its size and black colouration, which is atypical for mainland populations of the species (Cattaneo, 1985). However, as expected, this subspecies shows a strong genetic affiliation with populations from Northern Africa and the distinct phenotype is likely the result of local adaptations after the historical human-mediated introduction of snakes to the island (Faraone et al., 2020). This is the only fully melanistic population currently known in the genus Hemorrhois Boie, 1826. While melanism is observed in different snake genera in the Western Palaearctic, e.g., Eirenis, Dolichophis, Hierophis, Platyceps, Spalerosophis (Vyas, 1989; Perry, 2012; Jablonski et al., 2017; Kalaentzis et al., 2018; Kalogiannis, 2021), it has surprisingly been rarely reported in the four known species of Hemorrhois (Schätti and Agasian, 1985; Tuniyev et al., 1997).

### Methods

On 23 June 2021, the local anonymous snake hunter collected a female of a black snake (Figure 1A-E) and sold the specimen to the local animal market in Sulaymaniyah city, Kurdistan region, Iraq. The snake was collected in Panjween area, Sulaymaniyah governorate on the agricultural

<sup>\*</sup>Corresponding author. Email: daniel.jablonski@uniba.sk

<sup>© 2023</sup> Taylor & Francis



Figure 1. The melanistic specimen of *Hemorrhois nummifer* from Panjween, Sulaymaniyah governorate, Iraq (Kurdistan Region) along with its genetic affiliation. (A-C) Dorsal, ventral, and lateral view on the head; (D, E) Dorsal and ventral view on the entire body. (F) The mitochondrial tree (cytochrome *b*) of the genus *Hemorrhois*, indicating the phylogenetic position of the melanistic specimen. Numbers with nodes indicate strongly supported UFB values (G) The redrawn section of the approximate geographic distribution of *H. nummifer* according to Sindaco et al. (2013) highlighting the origin of sequences used for comparison.

field (35.6622°N, 45.9244°E, 1,242 m a.s.l.) and determined as a venomous, elapid snake *Walter-innesia morgani* (Mocquard, 1905) due to the uniform black colouration of the body. With this determination, the specimen has been provided to the Department of Biology of the University of Sulaimani for investigation by the second author of the paper (SHA). The morphological examination revealed that the specimen does not belong to the family Elapidae. Thus, the tissue sample was collected (code CUHC 11425) and genetically investigated. We amplified the isolated total

genomic DNA, particularly mitochondrial gene cytochrome b (cyt b) following Burbrink et al. (2000), and the newly obtained sequence was checked against publicly available DNA sequences using BLAST (https://blast.ncbi.nlm.nih.gov/Blast.cgi). Furthermore, we performed a thorough comparison between the newly obtained sequence and the available dataset of closely related sequences sourced from GenBank (Nagy et al., 2003, 2004, 2005; Carranza et al., 2004, 2006; Silva-Rocha et al., 2015; Beddek et al., 2018; Salvi et al., 2018; Faraone et al., 2020; Machado et al., 2021; Table S1) to show the phylogenetic position of the specimen from Iraq. The dataset was tested using IQ-TREE (maximum likelihood analysis; Trifinopoulos et al., 2016) and ultrafast bootstrap (UFB) with 1000 pseudoreplicates. The newly acquired sequence can now be accessed through GenBank under the accession number OR234367.

#### **Results and Discussion**

Genetic data showed that the specimen belongs to the family Colubridae and represents a dark-coloured *Hemorrhois nummifer* (Reuss, 1834). The sequence OR234367 nested in the clade (values 90 and above were considered well supported; Figure 1F) together with a sequence of *H. nummifer* from Armenia (AY376742 = ZISP 27709; Nagy et al. 2003; Figure 1G). The genetic distance between these two sequences is low (*p*-distance 0.72%).

The investigated specimen displayed the following morphological characters (taken by SHA): snout-vent length 895 mm, tail length 175 mm (ca 20 mm is missing), total length 1070 mm, head length 36 mm, head width 20 mm, pileus length 23 mm, pileus width 8.0 mm, rostrum height 3.0 mm, rostrum width 5 mm, distance between nostrils 6.0 mm, and eye diameter 4 mm. The specimen has 23 dorsal scales in the midbody, 216 ventral scales, and 96 subcaudal scales (tail incomplete). The specimen was uniformly black-coloured with no visibility of the dorsal pattern (Figure 1A-E). It is currently stored in the collection of the Department of Biology, University of Sulaimani.

The body colouration of snakes plays a crucial role in their initial identification, particularly when dealing with venomous species (Devkota et al., 2020). The examined specimen aligns morphologically with populations of the species found in Iraq and Iran (Schätti & Agasian, 1985). In their study, Schätti and Agasian (1985) reported that females (n=3) have (25)23–17 dorsal scales, 218–220 ventral scales, and 87-96 subcaudal scales. However, they did not provide specific information or photographic evidence regarding colouration or pattern. They did mention, though, that the species' colouration may vary and could potentially mimetic vipers, e.g., *Macrovipera lebetinus*. On the other hand, they, with no details or photographic evidence, mentioned that three specimens of *H. nummifer* from Iran "…are strongly darkened ("black"), but shimmer with the favorable incidence of light…". Our observation thus represents well-verified, photographically supported, and novel information on the colouration of *H. nummifer* from the territory of Iraq.

The intriguing question arises from the discussion provided by Schätti and Agasian (1985) and Tuniyev et al. (1997) concerning the mimetic resemblance of *Hemorrhois* to viperid snakes in areas where their distributions overlap. This discussion, when considered in the context of the data presented here, adds further depth to the topic. It remains uncertain whether the black-coloured *H. nummifer* may mimic the sympatric genus *Walterinnesia* or if the similar colouration is a result of shared environmental conditions where both genera coexist. However, drawing definitive conclusions requires better evidence and robust data, at least careful morphological evidence and diagnose. If substantiated, it is plausible that previous observations and distribution data of *Walterinnesia* could hypothetically represent *Hemorrhois* or vice versa, similarly as reported by Al-Mohanna et al. (1997) in the case of the genus *Dolichophis*. This emphasizes the

importance of exercising caution when relying solely on unverified data for species identification, especially when such data are subsequently used to determine species distribution. This is particularly relevant in the current era of citizen science.

#### Acknowledgements

We are glad to express our deepest gratitude to Mohammad Bahadin for providing the snake sample to the University of Sulaimani, Biology Department collections. We also thank two anonymous reviewers for their useful comments and recommendations.

### Funding

This study was supported by the grant of the Scientific Grant Agency of the Slovak Republic VEGA 1/0242/21.

#### **Disclosure Statement**

No potential conflict of interest was reported by the authors.

#### References

- Al-Mohanna, S., Jaman, S., & Meakins, R. (1997). First report of a melanistic Whip Snake, Coluber jugularis Linnaeus, 1758 from the Arabian Peninsula. Zoology in the Middle East, 14, 731–76.
- Asztalos, M., Ayaz, D., Bayrakci, Y., Afsar, M., Tok, C. V., Kindler, C., Jablonski, D., & Fritz, U. (2021). It takes two to tango - Phylogeography, taxonomy and hybridization in grass snakes and dice snakes (Serpentes: Natricidae: *Natrix natrix*, *N. tessellata*). *Vertebrate Zoolo*gy, 71, 813–834.
- Beddek, M., Zenboudji-Beddek, S., Geniez, P., Fathalla, R., Sourouille, P., Arnal, V., ... & Crochet, P.-A. (2018). Comparative phylogeography of amphibians and reptiles in Algeria suggests common causes for the east-west phylogeographic breaks in the Maghreb. *PLoS ONE, 13*, e0201218.
- Burbrink, F. T., Lawson, R., & Slowinski, J. B. (2000). Mitochondrial DNA phylogeography of the polytypic North American ratsnake (*Elaphe obsoleta*): a critique of the subspecies concept. *Evolution*, 54, 2107–2118.
- Carranza, S., Arnold, E. N., & Pleguezuelos, J. M. (2006). Phylogeny, biogeography, and evolution of two Mediterranean snakes, *Malpolon monspessulanus* and *Hemorrhois hippocrepis* (Squamata, Colubridae), using mtDNA sequences. *Molecular Phylogenetics and Evolution*, 40, 532–546.
- Carranza, S., Arnold, E. N., Wade, E., & Fahd, S. (2004). Phylogeography of the false smooth snakes, *Macroprotodon* (Serpentes, Colubridae): mitochondrial DNA sequences show European populations arrived recently from Northwest Africa. *Molecular Phylogenetics and Evolution*, 33, 523–532.
- Cattaneo, A. (1985). Il Colubro ferro di cavallo Dell'isola di Pantelleria: *Coluber hippocrepis nigrescens* subsp. nova. *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale in Milano, 126,* 165–184.
- Devkota, K., Mandal, D. N., Sah, G., O'Shea, M., & Kaiser, H. (2020). First report of leucism for the kraits *Bungarus* walli Wall, 1907 and *B. niger* Wall, 1908, with updates on their geographic distribution in Nepal (Serpentes, Elapidae). *Herpetology Notes*, 13, 817–825.
- Faraone, F. P., Melfi, R., Di Nicola, M. R., Giacalone, G., & Lo Valvo, M. (2020). Phylogenetic relationships of the Italian populations of Horseshoe Whip snake *Hemorrhois hippocrepis* (Serpentes, Colubridae). *Acta Herpetologica*, 15, 129–135.
- Fritz, U., & Schmidtler, J. F. (2020). The Fifth Labour of Heracles: Cleaning the Linnean stable of names for grass snakes (*Natrix astreptophora*, *N. helvetica*, *N. natrix* sensu stricto). Vertebrate Zoology, 70, 621–665.

- Jablonski, D., Szabolcs, M., Simović, A., & Mizsei, E. (2017). Color and pattern variation of the Balkan Whip Snake, *Hierophis gemonensis*. *Turkish Journal of Zoology*, 41, 363–369.
- Jablonski, D., Tzoras, E, Panagiotopoulos, A., Asztalos, M., & Fritz, U. (2023). Genotyping the phenotypic diversity in Aegean *Natrix natrix moreotica* (Bedriaga, 1882) (Reptilia, Serpentes, Natricidae). *ZooKeys*, 1169, 87–94.
- Jamison, S., Maza, E., Sinaiko, G., Tamar, K., Slavenko, A., & Meiri, S. (2020). To be or not to be *tchernovi*: a taxonomic revision of the snake genus *Micrelaps* (Squamata: Serpentes), in Israel. *Zootaxa*, 4881, 290–306.
- Kalaentzis, K., Kazilas, C., & Strachinis, I. (2018). Two cases of melanism in the Ring-headed Dwarf Snake *Eirenis modestus* (Martin, 1838) from Kastellorizo, Greece (Serpentes: Colubridae). *Herpetology Notes*, 11, 175–178.
- Kalogiannis, S. (2021). Cases of melanism in *Dolichophis caspius* (Gmelin 1789) (Squamata: Colubridae) from Greece and a new distribution record. *Parnassiana Archives*, 9, 19–22.
- Machado, L., Harris, D. J., & Salvi, D. (2021). Biogeographic and demographic history of the Mediterranean snakes *Malpolon monspessulanus* and *Hemorrhois hippocrepis* across the Strait of Gibraltar. *BMC Ecology and Evolution*, 21, 1107.
- Nagy, Z. T., Lawson, R., Joger, U., & Wink, M. (2004). Molecular systematics of racers, whipsnakes and relatives (Reptilia: Colubridae) using mitochondrial and nuclear markers. *Journal* of Zoological Systematics and Evolutionary Research, 42, 223–233.
- Nagy, Z. T., Schmidtler, J. F., Joger, U., & Wink, M. (2003). Systematik der Zwergnattern (Reptilia: Colubridae: *Eirenis*) und verwandter Gruppen anhand von DNA-Sequenzen und morphologischen Daten. *Salamandra*, 39, 149–168.
- Nagy, Z. T., Vidal, N., Vences, M., Branch, W. R., Pauwels, O. S. G., Wink, M., & Joger, U. (2005). Molecular systematics of African Colubroidea (Squamata: Serpentes). Pp. 221-228. In: *African Biodiversity*. Huber, B. A, Sinclair, B. J., & Lampe, K.-H. (Eds.), Boston (MA): Springer.
- Perry, G. (2012). On the appropriate names for snakes usually identified as *Coluber rhodorachis* (Jan, 1865) or why ecologists should approach the forest of taxonomy with great care. *IRCF Reptiles & Amphibians*, 19, 90–100.
- Salvi, D., Mendes, J., Carranza, S., & Harris, D. J. (2018). Evolution, biogeography and systematics of the western Palaearctic Zamenis ratsnakes. Zoologica Scripta, 47, 441–461.
- Schätti, B., & Agasian, A. (1985). Ein neues Konzept f
  ür den Coluber ravergieri-C. nummifer-Komplex (Reptilia, Serpentes, Colubridae). Zoologische Abhandlungen, 40, 109–123.
- Silva-Rocha, I., Salvi, D., Sillero, N., Mateo, J.A., & Carretero, M. A. (2015). Snakes on the Balearic Islands: an invasion tale with implications for native biodiversity conservation. *PLoS* ONE, 10, e0121026.
- Sindaco, R., Venchi, A., & Grieco, C. (2013). The Reptiles of the Western Palearctic 2. Annotated checklist and distributional atlas of the snakes of Europe, North Africa, the Middle East and Central Asia, with an update to the vol. 1. Latina: Societas Herpetologica Italica.
- Trifinopoulos, J., Nguyen, L.-T., von Haeseler, A., & Minh, B. Q. (2016). W-IQ-TREE: a fast online phylogenetic tool for maximum likelihood analysis. *Nucleic Acids Research*, 44, W232–W235.
- Tuniyev, B. S., Atayev, C. A., & Shammakov, S.M. (1997). On the distribution of *Coluber ravergieri* and *Coluber nummifer* in Turkmenistan and the possible evolutionary reasons of their polymorphism. *Asiatic Herpetological Research*, 7, 131–136.
- Utiger, U., & Schätti, B. (2004). Morphology and phylogenetic relationships of the Cyprus racer, *Hierophis cypriensis*, and the systematic status of *Coluber gemonensis gyarosensis* Mertens (Reptilia: Squamata: Colubrinae). *Revue Suisse de Zoologie*, 111, 225–238.
- Vyas, R. (1989). Melanistic form of the Roayal snake (Spalerosophis diadema Schlegel). Journal of the Bombay Natural History Society, 86, 112.