

A case of melanism in the horseshoe whip snake *Hemorrhois hippocrepis* from Algeria

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Snakes of the western Palearctic display a broad spectrum of phenotypic variation, sometimes mimicking other distinct species (Jablonski et al., 2017; 2023). This resemblance can lead to misidentification by local people (Beddek, 2017; Bakhouche & Escoriza, 2017). *Hemorrhois hippocrepis* (Linnaeus, 1758) has a predominantly west-Mediterranean distribution, spanning North Africa, the Iberian Peninsula, and the islands of Ibiza, Formentera, Sardinia, Pantelleria and Zembra where it was introduced (Mateo et al., 2011; Faraone et al., 2020). The dorsal colouration of *H. hippocrepis* is quite variable across its geographic range, where its ground colour can have diverse hues. A form of partial melanism, where the overall dorsal colour is blackish except for small light dots that surround the elements of the pattern, is fairly common in this species, especially in some of its eastern populations (Bruno & Hotz, 1976; Cattaneo, 1985). This dark morph appears to be purely ontogenetic, as it is exclusively present in adults, whereas juveniles are typically light coloured (Fig. 1) (Cattaneo, 1985; Feriche, 2017). Partially or totally melanistic juveniles are quite rare in *H. hippocrepis* (Garcia-Marsà et al., 2015), as is the case in juveniles and adults in congeneric species (Tuniyev et al., 1997; Jablonski & Soran, 2023). Here, we describe for the first time a melanistic juvenile *H. hippocrepis* from its African geographic range.

As part of an investigation into people's perception of snakes, we recovered the individuals killed by the local population in Algiers region. After examination, we identified 13 individuals of *H. hippocrepis* and six *Natrix maura*. In the same context, on January 2024, we found a black, small snake at the USTHB university campus in the locality of Bab Ezzouar (36° 42'47" N, 3° 10'45" E). The snake was collected for further examination, due to its unusual colouration. The observation took place in a habitat that was formerly a marshland but has since been heavily urbanised.

Upon further morphological examination, the snake was determined as *H. hippocrepis*. The specimen had a snout-vent length of 298.1 mm and tail length of 76.9 mm. Consistent with our specific determination (Feriche, 2017) the specimen had the following head scalation characters (right side):

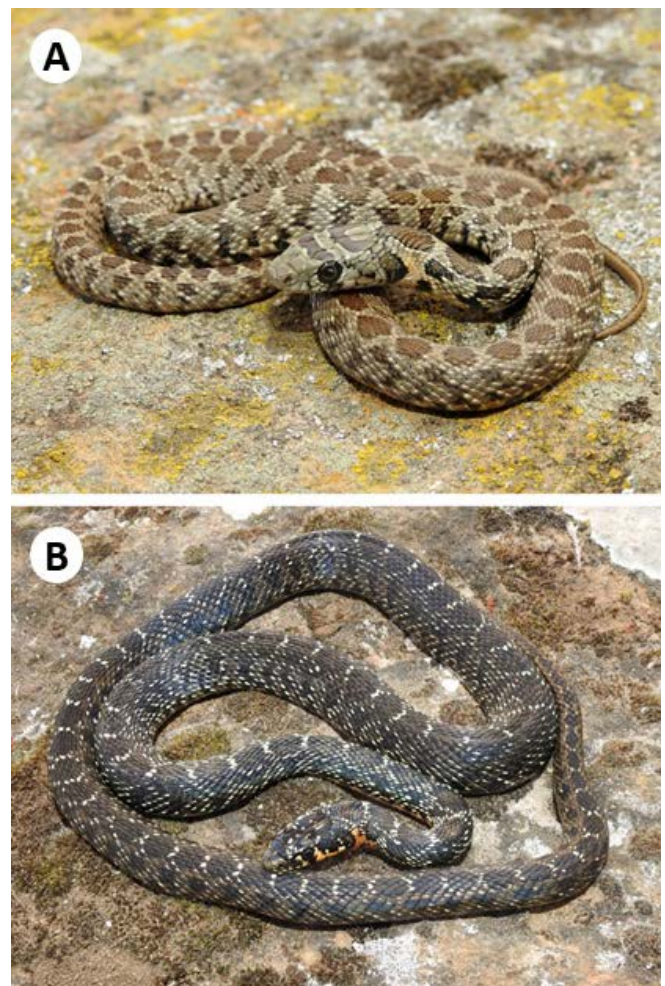


Figure 1. Recurrent colour patterns of *Hemorrhois hippocrepis* from the population of Pantelleria (Italy) – **A.** Typical juvenile, and **B.** Dark morph adult

10 supralabials, 8 infralabials, 1 preocular, 2 postoculars, 3 suboculars, 1 loreal, 2 nasals, 3 anterior temporals and 3 posterior temporals. Based on its size and according to

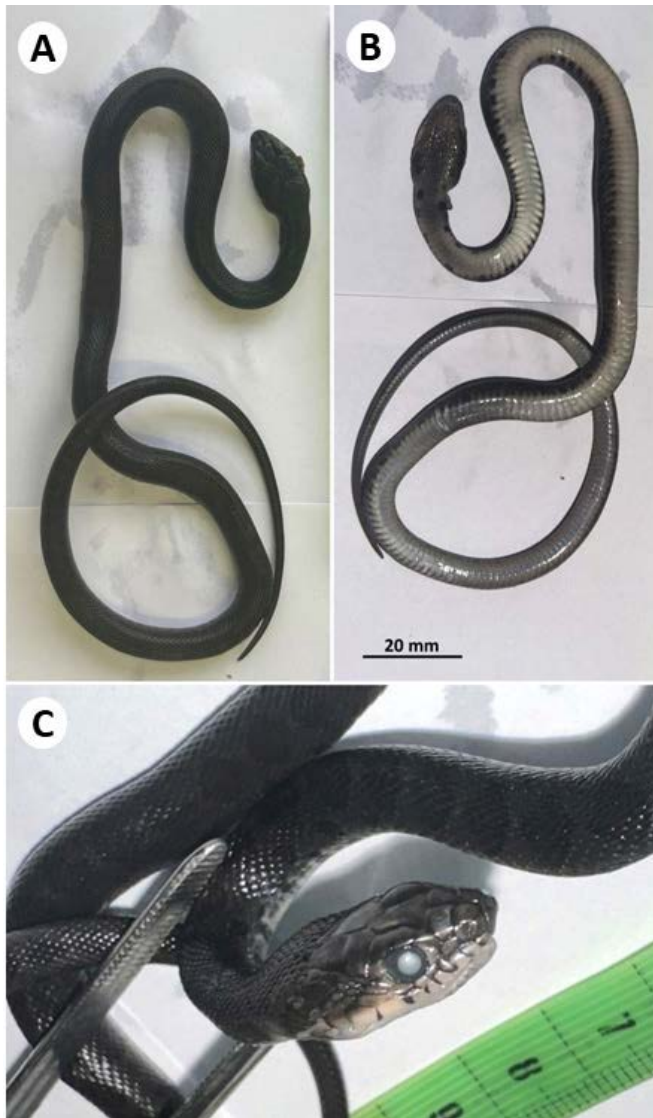


Figure 2. Melanistic juvenile *Hemorrhoids hippocrepis* from Bab Ezzouar, Algeria - **A.** Dorsal view, **B.** Ventral view, and **C.** Head and dorsal pattern detail

available data (Cattaneo, 1985; Pleguezuelos & Feriche, 1999), our specimen is likely a yearling. Its overall colouration is almost uniformly blackish (Fig. 2A). However, the typical dorsal pattern of the species is barely visible, made up of a dorsal row of large round blotches and a lateral row of small dark dots (Fig. 2C). The dorsal colour fades towards the belly, which appears uniformly whitish, except for dark spots which alternate on the external margins of the ventral scales (Fig. 2B). Similarly, the ground colour fades on the sides of the head, lightening on the supralabial scales, which are thinly outlined in black in their posterior margin (Fig. 2C). The darkening pattern of the specimen resembles the “charcoal” morph reported for the barred grass snake, *Natrix helvetica* (Di Nicola et al., 2023).

Melanism is widespread in snakes both as a rare chromatic aberration (Benito et al., 2022) and as the most frequent colour morph in a given taxon or population (Schwaner, 1989; Storniolo et al., 2023). In *H. hippocrepis* the darkening of the dorsal pattern can manifest itself both as

a widespread ontogenetic process, considered predominant and advantageous for some populations (Cattaneo, 1985), and as a rare mutation, apparently non-ontogenetic as in the present case (see also Garcia-Marsà et al., 2015). In ectothermic animals such as snakes, melanism is considered an advantageous condition as it allows greater efficiency in thermoregulation and protection against the damaging effects of UV rays (Fu et al., 2022; Goldenberg et al., 2024). On the other hand, melanistic individuals are sometimes considered to be at a disadvantage where they are less cryptic than individuals with normal colour patterns (San-Jose et al., 2008). The great diffusion of the ontogenetic form, as opposed to the rarity of the non-ontogenetic melanistic morph, probably depends on a set of these factors. In fact, in *H. hippocrepis*, as well as in other snakes, melanism is usually preceded by a cryptic or warning-coloured juvenile (Vanni & Nistri, 2006; Arquilla & Lehtinen, 2018), which could decrease mortality in the early life stages. The observation reported here expands knowledge on the phenotype variability of this species and, moreover, represents an interesting starting point to delve deeper into the function of melanism and its different variations.

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