

A case of melanism in *Dendrophidion atlantica* Freire, Caramaschi & Gonçalves, 2010 (Colubridae) from Northeastern Brazil

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Melanism is a chromatic anomaly caused by excessive concentration of melanin or black/brown pigment in the skin, and melanistic individuals exhibit darker phenotype (Gilhen and Scott, 2014). Melanism is found in different animal taxa, from ladybug beetles to reptiles (Trullas et al., 2007). In snakes, melanism is a relatively common, complex and highly variable phenomenon, with the expression of dark pigmentation varying both in terms of parts of the body affected (all body, head, dorsum or tail) and in terms of frequency among populations (Lorioux et al., 2008). The melanism have been documented in different genus of varied snake families, such as genera *Eirenis*, *Elaphe* and *Coronella* (Colubridae: Colubrinae) (Tanaka, 2005; Pernetta and Reading, 2009; Kalaentzis et al., 2018), genera *Erythrolamprus*, *Heterodon* and *Oxyrhopus* (Colubridae: Dipsadinae) (Edgren, 1957; Marques, 1991; Menezes et al., 2014; Costa-Campos et al., 2015), genera *Natrix* and *Thamnophis* (Colubridae: Natricinae) (Gibson and Falls, 1979; Bittner and King, 2003; Zadavec and Laus, 2011; Gilhen and Scott,

2014; Gvozdenović and Schweiger, 2014; Jablonski and Kautman, 2017), genera *Crotalus* and *Vipera* (Viperidae) (Silva, 1999; Nicola and Meier, 2013), and genera *Emydocephalus* and *Laticauda* (Elapidae) (Lorioux et al., 2008; Goiran et al., 2017).

Trullas et al. (2007) indicate that the dark individuals of ectothermic species can get benefits due to lower skin reflectance under conditions of low temperature, since they heat up faster than light individuals at a given level of solar radiation. Tanaka (2005) corroborates this hypothesis in a study where the increase of body temperature of the snake *Elaphe quadrivirgata* (Boie, 1826) is greater in the melanistic morph than in the striped morph. In the other hand, negative consequences of melanism can be that the black coloration of the skin often compromises the cryptic effects associated with other patterns (e.g. zigzags) and exposes more melanistic individuals to predation (Lorioux et al., 2008). Recently, the melanism in sea-snakes was correlated to water pollution. Goiran et al. (2017) found that the darker skin of melanistic individuals of *Emydocephalus annulatus* Krefft, 1869 enables these snakes to excrete trace-element pollutants by binding pollutants to melanin in the shed skin and by inducing more frequent sloughing.

Herein, we present a melanism record for a Brazilian snake, *Dendrophidion atlantica* Freire et al., 2010 (Colubridae: Colubrinae) from northeast Brazil. The snake *D. atlantica* is an endemic species of Brazil; it occurs only at the Pernambuco Center of Endemism, which is a portion of Atlantic forest north of São Francisco River (Prance, 1982). The snake is found in states of Alagoas (Freire et al., 2010), Pernambuco (Nascimento and Santos, 2016) and Paraíba (Pereira-Filho et al., 2017) and it is categorized as DD (data deficient) by the Plano de Ação Nacional para Conservação da Herpetofauna Ameaçada da Mata Atlântica Nordestina (ICMBio, 2017). The snake has a

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Figure 1. Melanistic female of *Dendrophidion atlantica* captured at Parque Estadual de Dois Irmãos, municipality of Recife, Pernambuco state, Brazil.

terrestrial to semi-arboreal habits (Freire et al., 2010). It has a lighter brown coloring in its head and in a third of its dorsum, from where it presents beige transversal lines and black side lines distributed along its dorsum and strongly keeled scales; ranging from 154 to 163 ventral scales and from 140 to 160 subcaudal scales.

On 11 August 2015, at approximately 10.50am, an adult melanistic female of *D. atlantica* (Fig. 1, body length = 550 mm, tail length = 423 mm) was captured at Conservation Unity Parque Estadual de Dois Irmãos (-8.013517 °W, -34.944669 °N; Datum WGS84), in the city of Recife, Pernambuco state. The event was registered through visual survey in a 1x5 km area of the Projeto de Pesquisa em Biodiversidade- PPBio/Mata Atlântica. The snake was documented resting over tree branches at a height of 1.50 m; then it was collected and deposited at the herpetology and paleoherpetological collection of Universidade Federal Rural de Pernambuco (CHP-UFRPE 5003).

In different species, the occurrence of melanism has only been documented in adults, although Lourioux et al. (2008) suggest that juveniles can keep a cryptic coloring until maturity. Generally the melanism is more common in temperate regions and is not as common in Neotropical snakes (Stewart and Dixon, 1989). Furthermore, no chromatic anomalies for *Dendrophidion* had been registered yet, representing the first report of melanism for this genus. Research must be stimulated in order to obtain information about the consequences associated to melanism in Neotropical snakes.

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References

- Bittner, T.D., King, R.B. (2003): Gene flow and melanism in garter snakes revisited: a comparison of molecular markers and island vs. coalescent models. *Biological Journal of the Linnean Society* **79**: 389–399.
- Costa-Campos, C.E., Sampaio, P.G.N., Corrêa, J.G., Silva, Y.B.S., Baía, R.R.J., Júnior, H.R.M.P., Furtado, M.F.M., França, P.F. (2015): *Oxyrhopus occipitalis*. Melanism. *Herpetological Review* **46**: 105.
- Edgren, R.A. (1957): Melanism in hog-nosed snakes. *Herpetologica* **13**: 131–135.
- Freire, E.M.X., Caramaschi, U., Gonçalves, U. (2010): A new species of *Dendrophidion* (Serpentes: Colubridae) from the Atlantic Rain Forest of Northeastern Brazil. *Zootaxa* **2719**: 62–68.
- Gibson, A.R., Falls, B. (1979): Thermal biology of the common garter snake *Thamnophis sirtalis* (L.) The effects of melanism. *Oecologia* **43**: 79–97.
- Gilhen, J., Scott, F.W., (2014): Melanistic diversity in the Maritime Gartersnake, *Thamnophis sirtalis pallidulus*, in Nova Scotia, Canada. *Canadian Field-Naturalist* **128**: 63–71.
- Goiran, C., Bustamante, P., Shine, R. (2017): Industrial Melanism in the Seasnake *Emydocephalus annulatus*. *Current Biology* **27**: 2510–2513.
- Gvozdenović, S., Schweiger, M. (2014): Melanism in *Natrix natrix* and *Natrix tessellata* (Serpentes: Colubridae) from Montenegro. *Ecologica Montenegrina* **1**: 231–233.
- Habiboğlu, T., Çiçek, K., Tok, C.V. (2016): A case of melanism in the Grass snake, *Natrix natrix* (L., 1758) (Reptilia: Colubridae) from Gökçeada (Imbros), Turkey. *Biharian Biologist* **10**: 60–61.
- ICMBio - Instituto Chico Mendes de Conservação da Biodiversidade. (2017): Sumário Executivo do Plano de Ação Nacional para Conservação da Herpetofauna Ameaçada da Mata Atlântica Nordeste. ICMBio. Brasília.
- Jablonski, D., Kautman, J. (2017): Melanism in *Natrix tessellata* (Serpentes: Colubridae) from Slovakia. *Herpetology Notes* **10**: 173–175.
- Kalaentzis, K., Kazilas, C., Strascinis, I. (2018): Two case of melanism in the Ring-headed Dwarf Snake *Eirenis modestus* (Martin, 1838) from Kastellorizo, Greece (Serpentes: Colubridae). *Herpetological Notes* **11**: 175–178.
- Lorioux, S., Bonnet, X., Brischoux, F., De Crignis, M. (2008): Is melanism adaptive in sea kraits? *Amphibia-Reptilia* **29**: 1–5.
- Marques, O.A.V., Puerto, G. (1991): Coloration patterns distribution and possible mimicry in *Erythrolamprus aesculapii* (Serpentes: Colubridae). *Memórias Instituto. Butantan* **53**: 127–134.
- Menezes, F.A., Toledo, D.G.P., Germano, V.J. (2014): *Erythrolamprus miliaris orinus* Cope, 1868 (Serpentes: Dipsadidae: Xenodontinae): Melanism. *Herpetology Notes* **7**: 453–454.
- Nascimento, V., Santos E.M., (2016): Geographic Distribution: *Dendrophidion atlantica*. *Herpetological Review* **47**: 261.

- Nicola, M.R.D., Meier, G.J. (2013): *Vipera aspis hugyi* (Southern Italian Asp). Melanism. *Herpetological Review* **44**: 698.
- Prance, G.T. (1982): Forest refuges: evidences from woody angiosperms. In *Biological diversification in the tropics*, pp. 137–158. Prance, G.T., Ed., Columbia University Press, New York.
- Pereira-Filho, G.A., Vieira, W.L.S., Alves, R.R.N., França, F.G.R. (2017): *Serpentes da Paraíba: Diversidade e Conservação*, 1nd Edition. João Pessoa.
- Pernetta, A.P., Reading, C.J. (2009): Observations of two melanistic smooth snakes (*Coronella austriaca*) from Dorset, United Kingdom. *Acta Herpetologica* **4**: 109–112.
- Silva, R.J. (1999): A report on a case of melanism in a specimen of *Crotalus durissus terrificus* (Laurenti, 1768). *Journal of Venomous Animals Toxins* **5**: 91–97.
- Stewart, L.A., Dixon, A.F.G. (1989): Why big species of ladybird beetles are not melanistic. *Functional Ecology* **3**: 165–171.
- Tanaka, K. (2005): Thermal aspects of melanistic and striped morphs of the snake *Elaphe quadrivirgata*. *Zoological science* **22**: 1173–1179.
- Trullas, S.C., Van Wyk, J.H., Spotila, J.R. (2007): Thermal melanism in ectotherms. *Journal of Thermal Biology* **32**: 235–245.
- Zadravec, M., Lauš, B. (2011): Melanism variations in *Natrix natrix* (Linnaeus, 1758) and *Zamenis longissimus* (Laurenti, 1768) in Croatia. *Hyla herpetološki bilten herpetological bulletin* **2**: 39–42.