

Amelanism in the Nicaraguan slider turtle *Trachemys grayi* in Costa Rica

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Species and subspecies definitions in *Trachemys* have had a complicated taxonomic history but *Trachemys grayi* was recovered by Parham et al. (2013) and endorsed by other authorities (e.g. Seidel & Ernst, 2017). *Trachemys grayi* is a large turtle with a relatively flattened carapace of 40 cm length in females, although males are smaller (Acuña-Mesén, 1998; Leenders, 2019). It has a greenish brown shell, with eye-shaped patterns formed by yellow, orange and black rounded lines (Acuña-Mesén, 1998). The plastron is light yellow, with complex dark patterns that fade with age, and the whole body gets darker as individuals age (Seidel & Ernst, 2017). The head, neck, limbs and tail are dark grey with yellow or olive stripes, including a prominent broad postorbital yellow or orange one on each side of the head (Acuña-Mesén, 1998). This stripe does not come into contact with the eyes. The eyes have round pupils with a yellow iris that has a dark horizontal stripe through its centre (Leenders, 2019). Humans hunt Nicaraguan sliders for meat and collect their eggs to eat; this has a negative impact on their populations (Mora & Ugalde, 1991).

A striking colour anomaly in vertebrates is the occurrence of white individuals. In many cases this is a result of albinism, a condition characterised by lack of retinal and integumentary pigmentation that results in white or pinkish skin and red eyes (Lamoreux et al., 2010). However, some animals are white due to amelanism; they also have red eyes due to the absence of melanin but have produced other pigments so that other colours may be present (Borteiro et al., 2021). In the literature, there are clear cases of confusion between these two anomalies (Borteiro et al., 2021). Here we present a case of amelanism in the Nicaraguan slider turtle at the Caño Negro wetlands in the northern plains of Costa Rica.

Caño Negro Wildlife Refuge (10° 53' N, 84° 47' W; 40 m a.s.l.), extends over 9,969 ha of a series of marshy, lacustrine and river-type wetlands, both temporary and permanent, with different types of plant associations (SINAC-ACAHN, 2013). Tour Pantanal is a private enterprise that offers ecotourism services and travel in Caño Negro. They informed us about a freshwater turtle incubation project, run by the ULIMA association, which over several years released thousands of turtles at Caño Negro (Table 1). They also sold many turtles to

Table 1. Estimated average clutches transferred from the field, number of turtles hatched, released and sold, and amelanistic turtles, managed during the period 1990-2013 by the ULIMA association at Caño Negro, Costa Rica

| Year | Average no. of clutches | No. hatched | No. Released 30 % | No. Sold 70 % | No. amelanistic |
|------|-------------------------|-------------|-------------------|---------------|-----------------|
| 1990 | 17 | 354 | 70 | 284 | 0 |
| 1994 | 15 | 305 | 91 | 214 | 0 |
| 1999 | 35 | 7,380 | 1,702 | 5,678 | 0 |
| 2000 | 784 | 16,468 | 3,800 | 12,668 | 1 female |
| 2001 | 4 | 7,800 | 1,800 | 6,000 | 0 |
| 2002 | 8 | 16,900 | 3,900 | 13,000 | 1 male |
| 2003 | 2,316 | 48,639 | 11,399 | 37,240 | 2 females |
| 2004 | 1,735 | 36,445 | 10,791 | 25,089 | 1 female |
| 2005 | | | | 97 | 0 |
| 2006 | 185 | 3,893 | 1,168 | 2,725 | 0 |
| 2007 | 824 | 17,303 | 3,993 | 13,310 | 0 |
| 2008 | 479 | 10,067 | 1,292 | 7,744 | 0 |
| 2012 | 80 | 16,810 | 5,043 | 11,767 | 0 |
| 2013 | 486 | 10,198 | 10,198 | 0 | 0 |

Source: adapted from SINAC-ACAHN, 2013 and adjusted from data provided by Tour Pantanal

help support the low income families who had participated in the turtle project. Tour Pantanal maintains five white turtles in captivity that we photographed in November 2020 (Fig. 1).

Colour aberrations in turtles range from the near-complete lack of color in albinos to very dark in melanistic individuals, but also other variations such as yellow, without yellow, and golden yellow ones (Jubber & Leyendecker, 2016; Cavalcante & Bruni, 2018; Devkota et al., 2020). We did not find any previously reported cases of amelanism or any other abnormal coloration in *T. grayi* under its current or previous



Figure 1. One of five *Trachemys grayi* with amelanism kept in captivity in Caño Negro, Alajuela, Costa Rica

scientific names. White turtles suffer higher mortality rates due to their lack of camouflage, greater disease susceptibility, and other health problems related to abnormal retinal pathways to the brain (Perrault & Coppenrath, 2019).

Although normally infrequent, the incidence of anomalous colouration in wild populations can increase due to environmental stress or inbreeding in isolated populations (Espinal et al., 2016). Colour anomalies may therefore signal issues that have negative impacts on turtle fitness (Krečsák, 2008). It would therefore be useful for researchers to continue collecting data on the incidence of colour anomalies at Caño Negro.

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