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First report of flavinistic albinism in *Calamaria schmidti* Marx & Inger, 1955

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Albinism is one of the most common colour anomalies, both in reptiles in general (Bechtel, 1995; Broghammer, 2000) and in snakes in particular (Prüst, 1984). Across vertebrates, it is usually defined by the total absence of pigmentation in the skin and attached structures, such as hair, feathers, or scales. In contrast to leucism, it includes not only a lack of integumentary pigmentation, but also an unpigmented retina of the eye. Within albinism, it is possible to differentiate between white albinos and chromatic albinos, which may have yellow, orange, or reddish hues (Devkota et al., 2021). As colouration can play a major role in intraspecific communication (Roulin and Bize, 2006) and predator avoidance trough aposematism or crypsis (e.g., Sweet, 1985; Wüster et al., 2004; Mappes et al., 2005; Isaac and Gregory, 2013), albinistic animals are thought to rarely survive or reproduce in the wild (Bechtel and Bechtel, 1981; Krecsák 2008).

The colubrid genus *Calamaria* currently includes 69 species (Uetz et al., 2025) of predominantly small, semi-fossorial snakes that dwell in forest leaf litter from southern China to Southeast Asia and prey mostly on earthworms (Inger and Marx, 1965). These snakes are variably coloured, not only at the species level but also by location, sex, and age (Stuebing et al., 2014). While some species or local morphs are very inconspicuous, others have brightly coloured heads, crossbars along the body, or longitudinal stripes. While function of colouration is not well understood in *Calamaria*, some morphs appear to be examples of mimicry or aposematism, potentially to avoid predation (Mouy, 2024). Despite this colour variability, albinism has never been documented in the genus until recently.

During the night of 6 January 2025 around midnight, we found an albinistic individual of *C. schmidti* in Kinabalu Park, Sabah, Malaysia (6.0076°N, 116.5425°E), not far from the park headquarters at an elevation of ca. 1500 m. The adult snake measured approximately 25 cm in total length and was found while crossing a path. After documenting the snake by taking photographs, it was released at the same locality. The species was identified by the general morphology and the number of supralabial scales (four, with the second and third touching the eye) following Stuebing et al. (2014). No samples were taken. The animal showed no dark pigmentation, and the whole body was coloured bright yellowish cream (Fig. 1A, B). Scales and skin appeared almost translucent to some degree, and organs could be seen as darker areas below the skin (Fig. 1A). The individual furthermore shows red eyes (Fig. 1B), a trait that clearly indicates a form of albinism. *Calamaria schmidti* is usually uniformly grey or blackish, with strong iridescence on the scales (Fig. 2). Only the ventral scales behind the back are sometimes yellowish or light grey, getting darker towards the tail. We also uploaded the albinistic individual to iNaturalist.

The secretive lifestyle of these snakes makes human observations relatively rare, but this particular species is quite abundant in Mt. Kinabalu National Park (Stuebing et al., 2014) and often even found by tourists. The IUCN species account for *C. schmidti* (Iskandar et al., 2012), citing Howard (2011, pers. comm), even gives a number of more than 260 individuals caught within 35 days by means of pitfall traps. This leads us to assume that albinism and other colour anomalies are truly rare in *C. schmidti* and potentially all *Calamaria* species.

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Figure 1. *Calamaria schmidti* from Kinabalu Park displaying flavinistic albinism in (A) whole body view, and (B) head in dorsolateral view. Note the translucent skin in (A), with internal organs partly visible. The red eyes, typical for albinos, are clearly visible. Photos by Oliver Christopher.

To our knowledge, this is not only the first documented case of albinism in *C. schmidti* but also just the second in the entire genus *Calamaria*. Recently, an albinistic *C. schlegeli* Duméril et al., 1854 was documented in Singapore (Goh, 2025). Like the regular morph of the species in Singapore (Charlton, 2020), this individual still showed a bright red head, which we interpret to be flavinistic (sensu Devkota et al., 2021), while the rest of the body seems to be fully without pigments. This indicates that pigment production in the head may be fully decoupled from the rest of the body, and it also shows that albinism can differ between species in *Calamaria*.

Figure 2. *Calamaria schmidti* from Kinabalu Park displaying the normal colouration of the species. Photo by Frederic Griesbaum.

While some authors have stated that colour anomalies are more abundant in nocturnal and fossorial species (Sazima and Di-Bernardo, 1991), Borteiro et al. (2021) disagreed and highlighted the lack of sufficient data to reliably answer this question. As both albinistic *Calamaria* were clearly adults of nocturnal and semi-fossorial species, this may support the idea that albinistic animals might have a higher chance to reach adulthood in the wild if their lifestyle is more secluded. Further documented cases and published field notes will be necessary to get a better understanding of the natural history of such secretive snake species.

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