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UV fluorescence in sea turtle hatchlings of *Chelonia mydas* (Linnaeus, 1758) and *Eretmochelys imbricata bissa* (Rüppel, 1835)

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The very first reports on UV fluorescence, i.e. the re-emission of longer wavelengths of light when exposed to short wave UV light, in reptiles were observations of biofluorescence in an adult wild *Eretmochelys imbricata* (Linnaeus, 1766) turtle during a survey on UV fluorescence of marine wildlife, and in a captive *Caretta caretta* (Linnaeus, 1758) (Gruber and Sparks, 2015). UV fluorescence should not be confused with UV reflectance, i.e. the reflection of the same wavelength of light, (Font and Molina-Borja, 2004; Crowell et al., 2024). Since then, many reports on UV fluorescence have been published for lizards (Prötzel et al., 2018; Top et al., 2020; Prötzel et al., 2021; Mendyck, 2021; Manunza and Columbo, 2022; Maria et al., 2022; Barends and Bester, 2023; Scanarini et al., 2023; Botelho et al., 2024; Brecko and Pauwels, 2024a, 2025; Burriel-Carranza et al., 2024; Barends et al., 2025; Câmara and Jesus, 2025) and snakes (Seiko and Terai, 2019; Eipper et al., 2020; Eto, 2020; Maria et al., 2022; Fuentes Magallon et al., 2021; Paul and Mendyk, 2021; Botelho et al., 2024; Brecko and Pauwels, 2024b). Surprisingly, no other UV fluorescence records on Testudines, neither fresh water, nor marine or land-living species, have been reported on since. This deserved our extra interest while screening our vast herpetological collection at the Royal Belgian Institute for Natural Sciences (RBINS, Brussels, Belgium) for UV fluorescence.

It is of researchers' interest to know whether UV fluorescence is still present after preservation as this might give information about the nature of the fluorescence and adds to the value and research possibilities of preserved museum specimens. We investigated several ethanol-preserved specimens of two species of marine turtles and found a striking example of UV fluorescence in *Chelonia mydas* (Linnaeus, 1758) hatchlings. These fully developed hatchlings, collected with their eggs, were found dead near their eggs and must have died shortly after hatching.

Materials and Methods

A Convoy C8 UV flashlight of 365 nm, with a ZWB2 filter, was used as a light source to examine for UV fluorescence and as a light source for the UV images. White light images were taken using a white light 4000K LED dome. Images were taken using a Canon EOS R6 Mark II camera with a 100 mm macro lens and a Canon EOS 200D with a 60 mm macro lens. A custom white balance was done to reduce the surplus of blue light.

The hatchlings of *Chelonia mydas* (RBINS-VERT-REP-18761–18763) used in this research were collected on the beach of Saziley, commune of Bandrele, Mayotte on 14 April 1994. They were found in a clutch of 133 eggs, of which 84 hatched. The three *Eretmochelys imbricata bissa* (Rüppel, 1835) (RBINS-VER-REP-13532) hatchlings were collected on the beach of Shimoni, Kwale County, Kenya in April 1972. They are preserved in 70% ethanol.

Results

All examined specimens of both species show the same fluorescence pattern. The large head scales of the *Chelonia mydas* specimens fluoresce blue, as do the large scales of the carapace, and the darker upper and bottom parts of the front and back legs (Figs. 1–3 and video: https://www.youtube.com/shorts/BIDAiBNbSXM). The egg tooth fluoresces white. The softer tissue in the neck and legs area doesn't fluoresce at all, nor does

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the region of the eye. The nares don't fluoresce either. The fronto-parietal scale fluoresces lighter than the other fluorescent scales in the examined specimens as illustrated here, its colouration under white light is less dark as well (Figs. 1A, 1C, 2A).

The *Eretmochelys imbricata bissa* hatchlings show a faint blue fluorescence (Fig. 4). It is mostly still present on the upper and lower jaws, while the rest of the body (carapace, plastron and legs) only show a light blue hue. The neck and folds between the legs and carapace, do not fluoresce. The plastron, which is dark coloured under white light exposure, shows fluorescence.

Both examined species show the same type of scale-bound fluorescence, although the intensity differs.

Discussion

Our research shows that the UV fluorescence in preserved *Chelonia mydas* hatchlings is characterised by a deep blue colouration of the darker coloured parts of the body, except for the skin of the neck region. The skin surrounding the leg joints does not fluoresce either. Overall, the creamy white colour, which is mainly found on the plastron and underside of the legs, becomes a bright white under 365nm UV light.

The preserved *Eretmochelys imbricata bissa* hatchlings show only very faint blue fluorescence, but the same general pattern as in *C. mydas* can be found. The darker areas with large scales do fluoresce, while the neck and surfaces of the leg articulations do not. The upper and lower parts of the beak fluoresce stronger than the rest of the body. As the plastron in *E. i. bissa* is dark, it fluoresces also faintly blue, while this is not the case with *C. mydas* of which the plastron is creamy white or bright white under white light and UV light respectively.

It is unknown why these hatchlings fluoresce and why these colours are very different from the two previous records of fluorescence in sea turtles, in *C. caretta* and *E. imbricata* (Gruber and Sparks, 2015). These authors

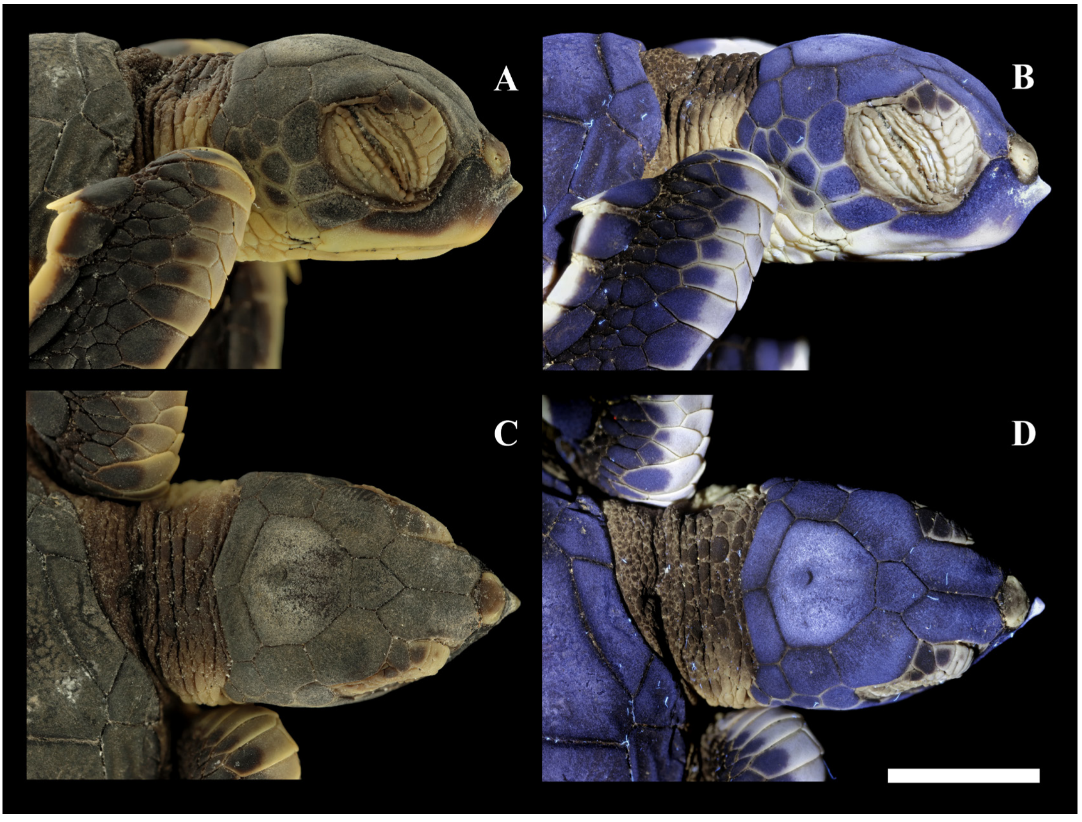

Figure 1. Dorsal and lateral views of the head of a preserved hatchling of *Chelonia mydas* (RBINS-VERT-REP-18761) under white light exposure (A, C) and UV 365 nm light exposure (B, D). Scale bar is 1 cm long. Photos by J. Brecko.

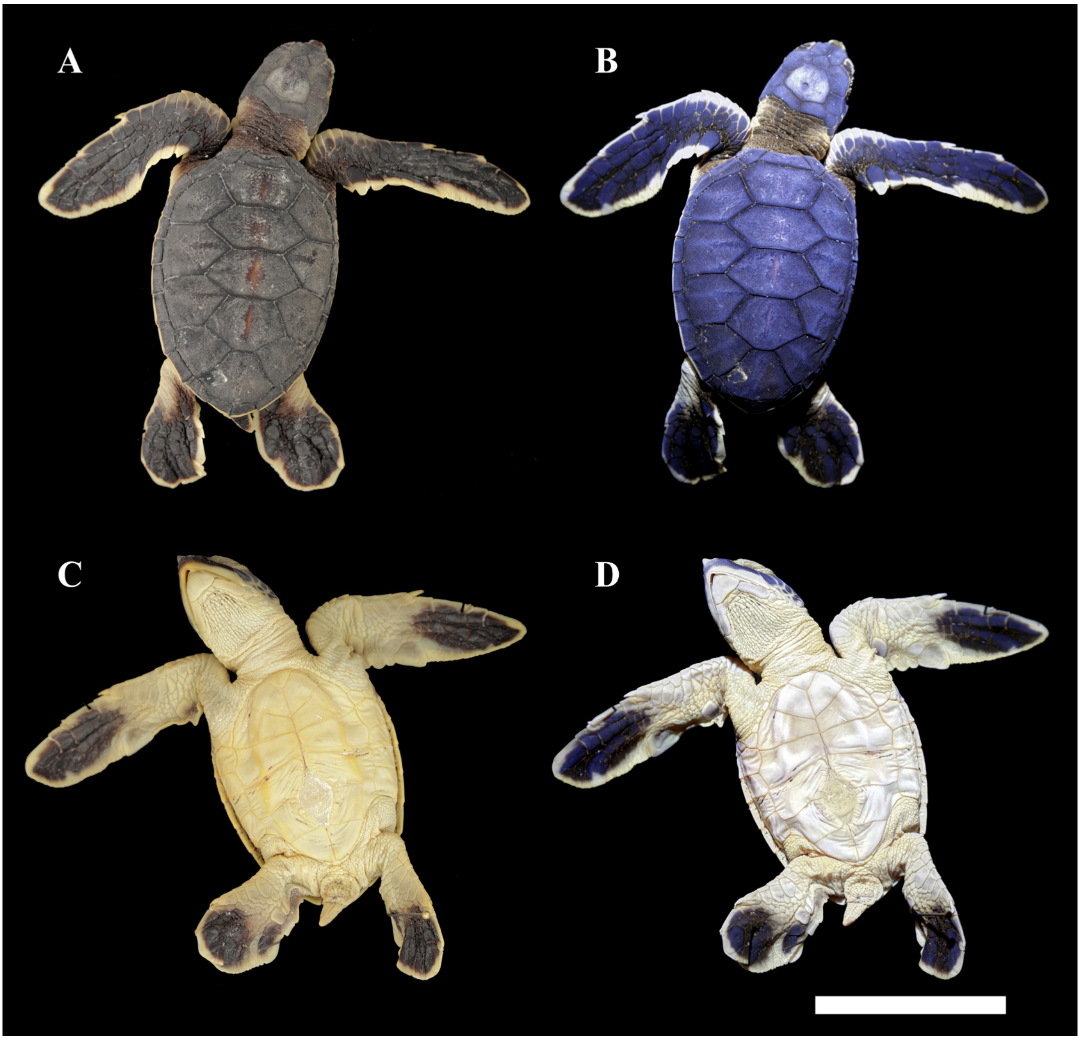

Figure 2. Dorsal and ventral views of the habitus of a preserved *Chelonia mydas* hatchling (RBINS-VERT-REP-18761) under white light exposure (A, C) and UV 365 nm light exposure (B, D). Scale bar is 5 cm long. Photos by J. Brecko.

have shown that adult, live individuals show greenish and reddish (*Eretmochelys*) or only greenish (*Caretta*) fluorescence. The potential role of this greenish or reddish fluorescence in adult *C. caretta* and *E. imbricata* is unknown; it could help to camouflage them with colours found in foraging areas along the shoreline. The dorsal blue fluorescence of hatchlings possibly helps them to blend in with the environment as they quickly leave the shoreline and go towards the open sea where they stay for several years in their pelagic phase (Francke et al., 2013; Whitherington, 2022; Phillips et al., 2025). Experimental setups are needed to see whether this fluorescence benefits to survival.

There is quite a substantial difference in fluorescence between the two species in this study. However, it is not certain whether this is also the case in live hatchlings. It is to be noted that the *E. i. bissa* specimens were preserved 22 years earlier than the *C. mydas* specimens. It is possible that the fluorescence degrades after time or that it was less well preserved from the beginning. To determine the reasoning of varying levels of UV fluorescence amongst live to preserved specimens we suggest to check the UV fluorescence of live marine turtle hatchlings to see if the differences visualised above are confirmed or if these are due to the preservation process or time.

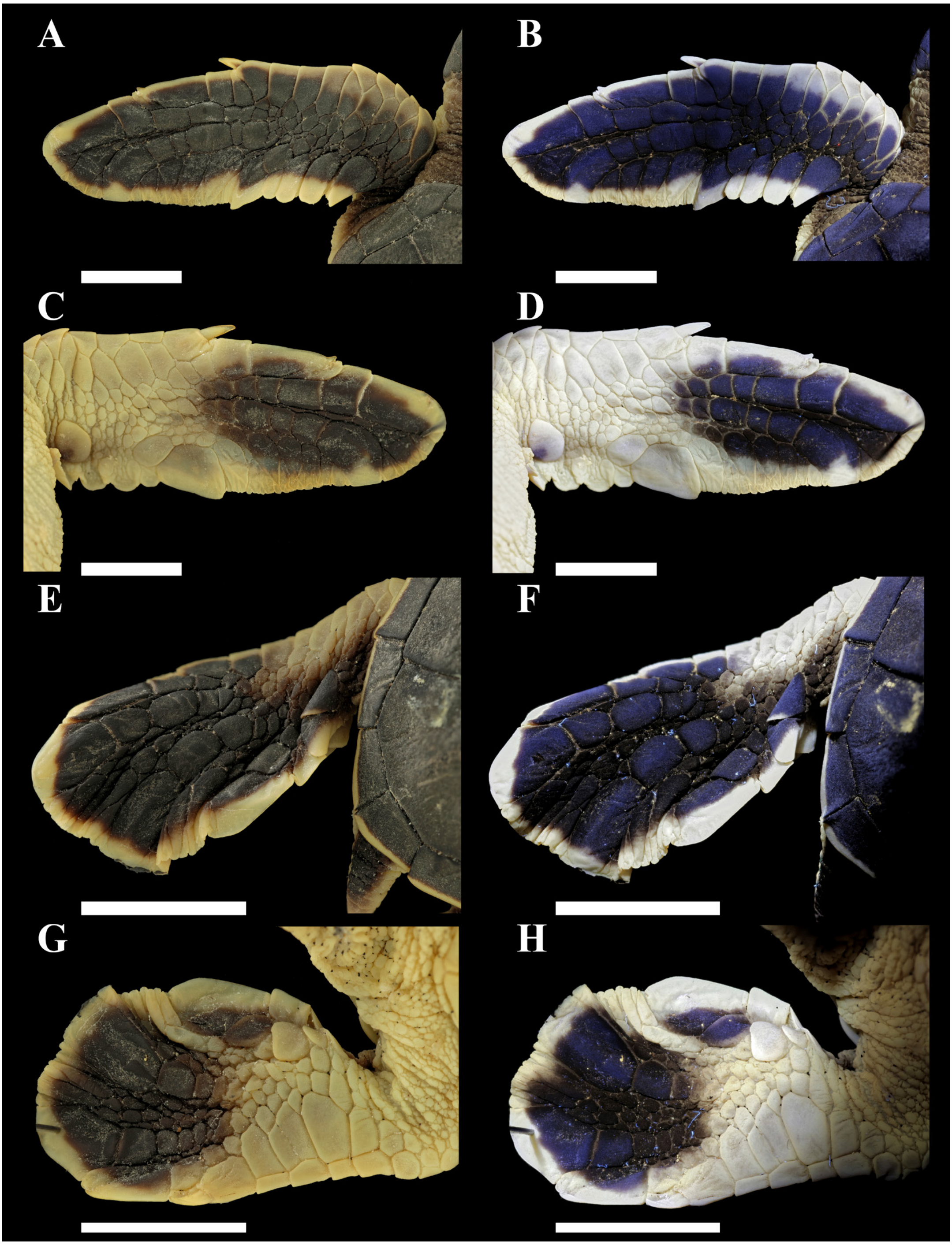

Figure 3. Details of the upper and underside of the front and back legs of a preserved *Chelonia mydas* hatchling (RBINS-VERT-REP-18761) under white light exposure (left) and UV 365 nm light exposure (right). Scale bars are 1 cm long. Photos by J. Brecko.

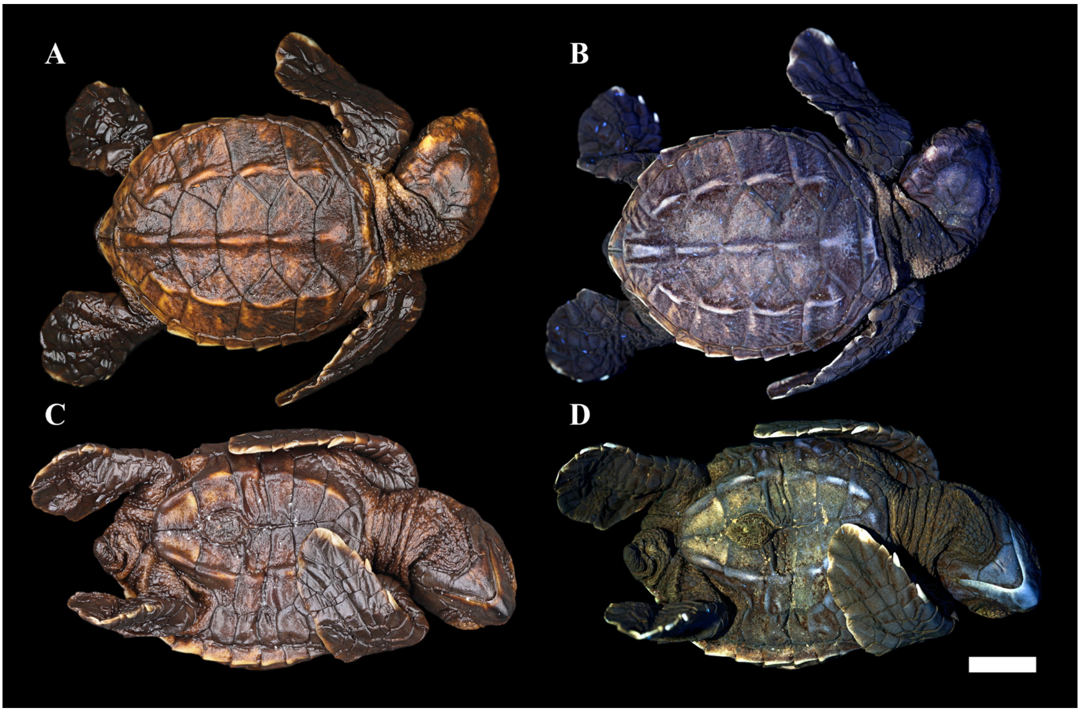

Figure 4. Preserved hatchling of *Eretmochelys imbricata bissa* (RBINS-VERT-REP-13532) under white light exposure (A, C) and UV 365 nm light exposure (B, D). Scale bar is 1 cm long. Photos by J. Brecko.

It is remarkable that our observations represent only the second report of UV fluorescence in Testudines, ten years after the first (Gruber and Sparks, 2015). While during the last decade no other reports have been made on chelonians, in other reptile groups multiple reports were published each year. Very little is still known regarding UV fluorescence and its potential function in reptile taxa.

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