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NATURAL HISTORY NOTE

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First record of ultraviolet fluorescence in the geckos *Hemidactylus turcicus* and *Tarentola mauritanica*

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Biofluorescence occurs in living organisms when they absorb short wavelengths of light and then re-emit longer wavelengths (Lamb & Davis, 2020). This phenomenon is known in many different species and has been observed recently in some frogs and salamanders (Taboada et al., 2017; Lamb & Davis, 2020) and reptiles such as sea turtles (Gruber & Sparks, 2015), chameleons (Prötzel et al., 2018), sea snakes (Seiko & Terai, 2019) and to date in six gecko species; *Chondrodactylus bibronii* (Sloggett, 2018), *Cyrtodactylus baluensis* (Jeng, 2019), *Cyrtodactylus quadrivirgatus* (Top et al., 2020), *Hemidactylus parvimaculatus* (Mendyk, 2021), *Kolekanus plumicaudus* (Pinto et al., 2021) and *Pachydactylus rangei* (Prötzel et al., 2021). The latter is an interesting case as the flourescence arises from iridophores. Here we report a study of biofluorescence in two further gecko species *Hemidactylus turcicus* (L., 1758) and *Tarentola mauritanica* (L., 1758).

The study was undertaken in Sassari province, northern Sardinia, Italy (approx. 40.711002° N, 8.568792° E) in August and September 2021. We located geckos at night (21:30 - 24:00 h) in a variety of natural and anthropogenic habitats. They were illuminated with UV torches (Alonefire SV13, 15W, 365nm) and photographed with a Nikon D4 camera with a 60 mm Nikkor lens, a Nikon D850 camera with a 105 mm lens and iPhone 11 mobile phone camera.

Both gecko species fluoresced when exposed to UV light but unlike exposure to common white lights, UV light did not seem to induce escape behaviour in either species. In UV light their eyes were black, the skin generally had an overall blue hue, while some bones flouresced. These included the skull (anterior processes of maxilla, ascending nasal processes of premaxilla, premaxillae, nasals, frontals, parietals, lower jaw), vertebral column, and all the bones of the front and hind legs. With respect to variation between the two species, juveniles showed more brilliant and evident bones than adults (the latter mainly had just skulls visible); furthermore, *H. turcicus* showed more contrasting colours than *T. mauritanica*. Some juvenile *H. turcicus* had a slightly greenish hue, which was not detected in other conspecifics. Skull bones were clearly visible in all specimens, as in other species (e.g. Sloggett, 2018), in particular on the anterior part of the head and lower jaw, thanks to their position just below the epidermis. Adult *T. mauritanica* glowed less than *H. turcicus*, probably due to more sclerotised skin, that reduces the UV radiation reaching the skeleton. Other bones, such as vertebrae and skeletal parts in both front and hind legs, were clearly visible mainly in juvenile specimens, most probably due to a more translucent skin than adults. Fluorescence of these bones corresponds to what has been observed in other species (Sloggett, 2018; Pinto et al., 2021), and in particular the appearance of *H. turcicus* under UV light clearly matches that of the conspecific *H. parvimaculatus* (Mendyk, 2021). After discovering this case of biofluorescence in the field, a video of *H. turcicus* under UV light was also found on YouTube (2019). The pattern of biofluorescence reported here is not necessarily shown by all geckos, for example in *C. quadrivirgatus* it was restricted to the top and lower margins of the head and toe articulations (Top et al., 2020).

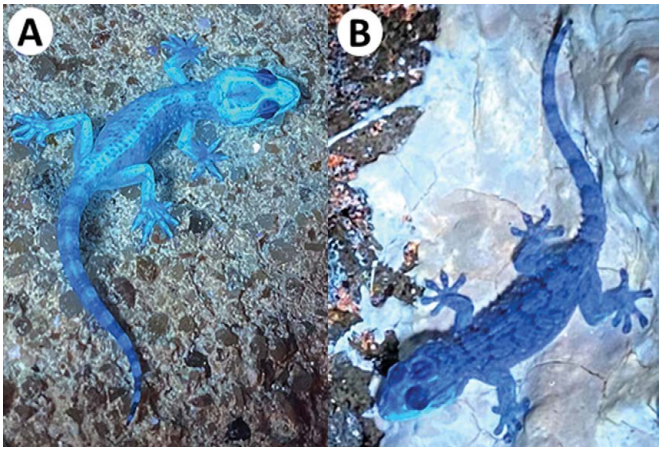

Figure 1. Bone biofluorescence in two gecko species (both adults) under UV light - **A.** *Hemidactylus turcicus* where skull, vertebral and limb bones are fluorescing, **B.** *Tarentola mauritanica* where only the skull can be seen to fluoresce

The results of this study raise the number of gecko species known to fluoresce from six to eight. However, a further as yet unidentified species is shown fluorescing under UV light in a video (YouTube, 2020). Bone fluorescence in geckos may well be purely coincidental, resulting simply from the visibility through translucent skin of bones that happen to fluoresce (Prötzel et al., 2021). However, there may be some functional significance of biofluorescence in reptiles. In chameleons, it has been demonstrated to play an important role in intraspecific communication and mate signalling (Prötzel et al., 2018). In *H. turcicus* there are UV-sensitive pigments in the eyes (less than 5 % of overall pigments) that have been suggested as involved in "a sensitive indication

of spectral conditions of illumination (direct sun/moon, sky, green light reflected from plants, etc.)" (Loew et al., 1996).

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