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The HAA is dedicated to the study and conservation of African reptiles and amphibians. Membership is open to anyone with an interest in the African herpetofauna. Members receive the Association's journal, African Journal of Herpetology (which publishes review papers, research articles, and short communications – subject to peer review, as well as book reviews) and African Herp News, the Newsletter (which includes short communications, natural history notes, bibliographies, husbandry hints, announcements and news items).

NEWSLETTER EDITOR'S NOTE

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COVER PHOTOGRAPH

Brown Reed Frog *Hyperolius castaneus*
Nyungwe National Park, Rwanda

Photograph: Andrew Turner

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EDITORIAL

It's scary how time flies. We're currently sitting in the grips of Winter, while it feels like just a few weeks ago that we were meeting in person at the HAA's 15th conference in Hoedspruit. On the bright side, the Winter solstice has passed, meaning we're back on our way to warmer weather and increased herp activity (even if the coldest days are still ahead of us!). While herp activity is down, now's a good time to snuggle up under a warm blanket or next to a toasty fire (but not too close) and jot down some of those herp observations or range extensions that you just don't get around to during the busy summer months.

As mentioned, January saw many of our members congregating in Hoedspruit for the *Herpetological Association of Africa*'s 15th conference. The conference was a big success, and a special word of thanks and congratulations need to be extended to especially Chris Cooke, Jessica Briner, Hiral Naik, and the rest of the organising committee. If you couldn't attend the conference, we have included an overview of the conference in this edition of *African Herp News*, and we have also mailed the official conference abstract booklet together with this edition of *AHN*.

Lastly, this edition of *AHN* has been somewhat delayed for various reasons, and I apologise for that. Hopefully we can get back into our regular schedule shortly.

Good luck for the final few months of Winter, and here's looking forward to a great Summer full of herps, fellow herpetologists and amazing field trips.

Darren Pietersen
Editor

Statement Regarding Taxonomic Publications

Among many herpetological topics, the *African Journal of Herpetology* publishes papers of a taxonomic nature, including taxon descriptions and other nomenclatural acts. Authors, editors and reviewers should recognize that taxonomy and nomenclature are separate but intimately intertwined disciplines. In keeping with *the International Code of Zoological Nomenclature* we recognize that "taxonomic freedom" should be respected, while nomenclature should be consistent with the latest version of the *Code*. As a publication outlet, *African Journal of Herpetology* respects differences of taxonomic opinion, but takes into account the expectations that modern works of a taxonomic nature should be peer-reviewed, should avoid conflicts of interest (or be transparent in acknowledging where conflicts might be suspected), and should be published in accredited journals or journals with clear and ethical policies with respect to plagiarism and other forms of professional malpractice. At a minimum, authors are expected to publish original results and data in an ethical manner and taking into account data integrity, sound and thoroughly explained methodology, full attribution of sources, reproducibility of results, crediting of participants in the research endeavour and their contributions, and acknowledgement of funding and any institutional support. The editors and editorial board of *African Journal of Herpetology,* comprising responsible experts who seek to maintain the integrity of the journal, reserve the right to reject submissions that are inconsistent with these principles. Within taxonomic works, the provisions of the *Code* should be followed. However, the editors of *African Journal of Herpetology* are cognizant of the issue of taxonomic vandalism which can place taxonomists in the impossible position of having to reject the words of the *Code* in order to maintain its principles. *African Journal of Herpetology* welcomes differences of taxonomic opinion by authors and reviewers but only when all participants engage in civil discourse rooted in sound and ethically conducted science.

- African Journal of Herpetology Editorial Board

10th World Congress of Herpetology 2024

The 10th World Congress of Herpetology will be held in Kuching, Malaysia, from 5–9 August 2024. This is a great opportunity to hear about the latest research, network with fellow herpetologists from around the world as well as meet up with old friends. And of course, there's always opportunity to get to see some amazing reptiles and amphibians. So, if you want to see species such as the Bornean Earless Monitor (*Lanthanotus borneensis*), Spiny Hill Turtle (*Heosemys spinosa*), Bornean Rainbow Toad (*Ansonia latidisca*), False Gharial (*Tomistoma schlegelii*), Sumatran Pit Viper (*Parias sumatranus*), Bornean Horned Lizard (*Harpesaurus borneensis*) or one of the other more than 400 reptile and amphibian species that call Borneo home, you should seriously consider attending this conference. More details can be found on the World Congress of Herpetology website at https://www.worldcongressofherpetology.org/.

15th Conference of the Herpetological Association of Africa Synopsis

General Summary

The 15th Conference of the Herpetological Association of Africa was held at the Rhino Convention Centre in Hoedspruit, Limpopo, between 15 and 19 January 2023. The four-day conference consisted of 58 full presentations (15min each), eight mini presentations (7min each), 12 posters and three workshops. The conference plenary speakers were Romulus Whitaker, Krystal Tolley, and Jeanne Tarrant. A full session consisting of nine presentations was dedicated to the late Margaretha Hofmeyr, honouring her many contributions to herpetology, and especially testudines, over many years. More than 100 delegates attended the conference, ranging from first-time students and scholars to seasoned veterans. The workshops held were a discussion around, and planning for, the forthcoming southern African amphibian conservation assessments, a photographic workshop and a reptile trade workshop, all of which were well attended. The organising committee operated within the allocated budget.

Events

After each day of excellent presentations, delegates enjoyed various fun-filled evening shenanigans. Monday 16 January saw the 'meet the experts speed dating' icebreaker held at The Brewery where a number of hall-of-famers were willingly pinned, ambushed and forced to share their intimate experiences in the field of herpetology with hordes of star-struck and somewhat merry participants.

The scientific poster session was held at the conference venue on Tuesday 17 January. Attendees enjoyed the opportunity to read, review and appreciate the works of various researchers after which some field herping was enjoyed by many.

In the evening of Wednesday 18 January, delegates experienced a spectacle of herp-style trivial pursuit and antics hosted by Maris Burger as quizmaster, during the pub quiz held at Sleepers Restaurant.

The gala dinner and award ceremony concluded the conference events and was held at Jackals and Wolf restaurant on Thursday 19 January. Delegates enjoyed good food, good company and a lekker kuier.

Grants

Five students applied for the available grants. Three students were awarded HAA grants, and two students received sponsorship from independent organizations.

The HAA grants were awarded to Kurt van Wyk from the University of the Western Cape, Riaaz Mohamed from the University of the Western Cape and Javier Lobón-Rovira from the Faculty of Science at Porto University, Portugal.

Kim Scholtz from the University of the Western Cape and Euan Genevier from the University of KwaZulu-Natal were awarded sponsorships from Hoedspruit Reptile Centre and Save the Snakes.

Awards

The photographic competition was expected to deliver and showcase the very best of the herp community's photographs and did not disappoint. Competition was fierce and eventually with the help of National Geographic filmmaker and celebrity judge Shannon Wild, the top three photographs were selected. First place went to Andrew Turner, second place went to Courtney Hundermark while third place went to Dylan Leonard.

After much deliberation the award for best poster went to "Rates of body water loss: a new currency for predicting vulnerability of lizards to warming?" by Gerhard Wiese. Francois Becker was awarded best presentation for "A musical mosaic: Cryptic speciation in barking geckos (Ptenopus: Gekkonidae), partitioned by vocalisation and soil texture".

Auction

The auction was once again a highlight of the conference, and was well attended by upcoming herpetologists and seasoned veterans alike. Aaron Bauer once again assumed the role of auctioneer, and did a sterling job. The auction resulted in a lot of laughs, some lucky individuals getting super items at bargain prices, and funds being raised for the organisation. Thank you to all the individuals and companies that sponsored items for the auction, all the bidders, and to Aaron Bauer for assuming the role of auctioneer.

Photo's: Krystal A. Tolley

The conference organisers would like to deeply thank all attendees, HAA members, committee members and all those involved in the creation, hosting and execution of a successful 15th conference of the Herpetological Association of Africa.

Chris Cooke

Conference Convenor

OBSERVATION OF BIOFLUORESCENCE IN THE HORNED ADDER (*BITIS CAUDALIS*) (SQUAMATA: VIPERIDAE) AND COMMON EGG-EATER (*DASYPELTIS SCABRA*) (SQUAMATA: COLUBRIDAE) FROM SOUTHERN AFRICA

T. DÖRNER

In 1972, Stahnke reported a game changing incident: during a night excursion in 1945 to search for fluorescent rocks with ultraviolet (UV) lights, one participant saw a bright shining rock from a distance, which quickly disappeared as it was approached. It turned out to be a scorpion of the genus *Hadrurus*.
Since then, biofluorescence has been described in many marine animals like fishes (Sparks et al. 2014), cnidarians and crustaceans. In terrestrial animals fluorescens has been described in many arthropods (Lawrence 1954) including insects (Lloyd 1983; Johnsen et al. 2006; Olofsson et al. 2010), scorpions (Kloock et al. 2010; Gaffin et al. 2012) and solifugids (Cloudsley-Thompson 1978). Furthermore, numerous studies have been conducted on vertebrates like amphibians (Taboada et al. 2017), reptiles (Odate et al. 1959; Vaz Pinto et al. 2021; Lobon-Rovira et al. 2022), birds (Hausmann et al. 2003) and mammals (Kohler et al. 2019). Biofluorescence has been recorded in reptiles since the early 1950s (Odate et al. 1959), including Gekkota (Sloggett 2018; Top et al. 2020; Prötzel et al. 2021, Vaz Pinto et al. 2021; Lobon-Rovira et al. 2022), Chamaeleonidae (Prötzel et al. 2018) and turtles (Gruber and Sparks 2015).

It is noteworthy that in snakes (suborder Serpentes), the first investigations were already conducted by Odate et al. (1959). He examined the skins of three colubrids (Japanese Ratsnake, *Elaphe climacophora,* Japanese Four-lined Ratsnake, *Elaphe quadrivirgata*, and Japanese Woodsnake, *Euprepiophis conspicillata*) and the viperid Mamushi, *Gloydius blomhoffii*, for fluorescent substances. Hulse (1971) reported the first observation of fluorescence in the Western Blind Snake, *Rena humilis*. Further observations reported fluorescence in the Blue-banded Sea Krait, *Laticauda laticauda* (Seiko and Terai 2019) and in the Colombian Long-tailed Snake, *Enuliophis sclateri* (Fuentes et al. 2021).

The observations reported in this note were conducted with a TATTU U3S LED Ultraviolet (UV) torch which uses a wavelength of 365 nm and emits a brightness of 80 lumens. Photographs were taken using a Sony Cybershot DSC-RX III with Exmore RS 1,0 ´´CMOS Sensor.

OBSERVATIONS

Common Egg-eater, *Dasypeltis scabra* (Linnaeus, 1758)

While searching for scorpions around 22h30 late in December 2022, a bright shining line was seen on the ground of a carport close to Omaruru, Erongo, Namibia. At first this line was considered to be a small piece of rope, but as it was approached the ‘rope’ tried to escape. The ‘rope’ was then identified as a juvenile Common Egg-eater, *Dasypeltis scabra*, which reflected a fluorescent blue all over the body with the lighter areas of the pattern blazing brighter when exposed to UV light (Fig. 1).

Figure 1. Left: Juvenile Common Egg-eater, *Dasypeltis scabra*, under UV light (365 nm) after it was caught in a carport in Omaruru, Erongo, Namibia. Right: The same snake photographed under natural light.

The Common Egg-eater is a nocturnal snake which is most abundant in dry thornveld. It is small and very slender and reaches a body length of up to 1160 mm (Marais 2004). The observed specimen had a body length of approximately 300 mm and was therefore considered to be a juvenile.

Horned Adder, *Bitis caudalis* (Smith, 1839)

Inspired by the observation of biofluorescence in the Common Egg-eater, a juvenile female Horned Adder, *Bitis caudalis*, from the same biotope close to Omaruru, Erongo, Namibia was examined with UV light and white light. Again, the little snake showed a bright fluorescent blue all over its body under the UV light (Fig. 2).

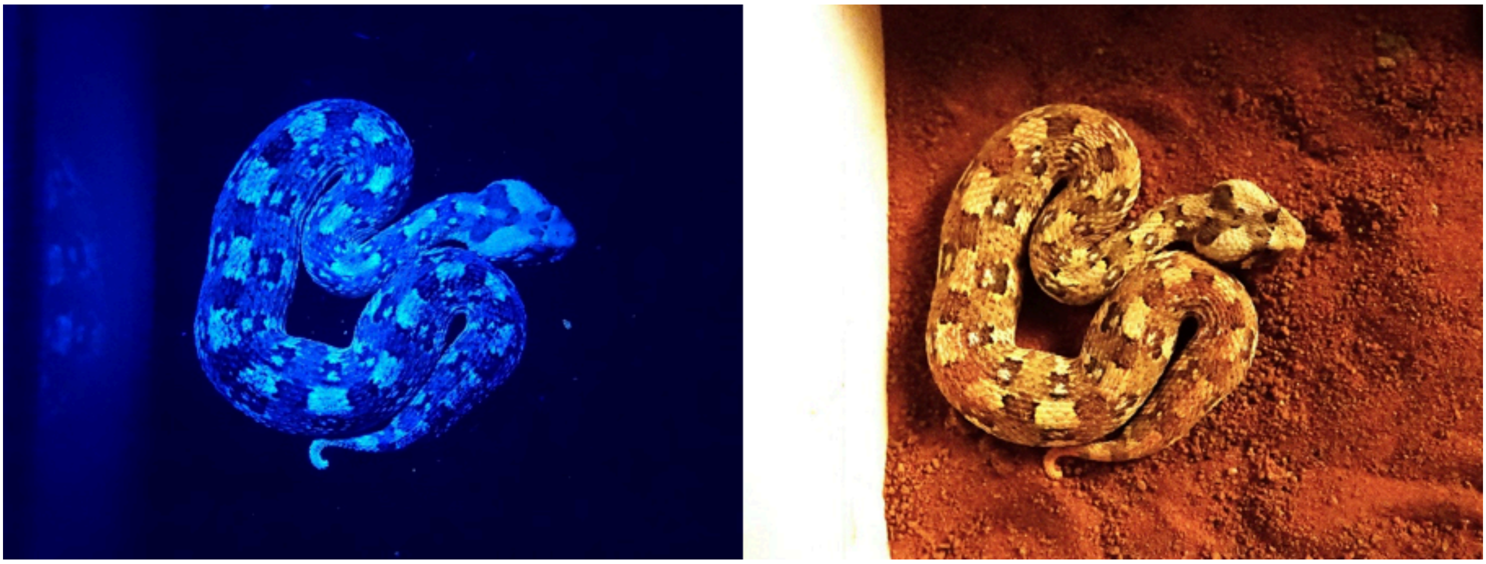

Figure 2. Left: Juvenile female Horned Adder, *Bitis caudalis*, from Omaruru, Erongo, Namibia under UV light (365 nm). Right: The same snake under natural light.

Like with the Common Egg-eater, the lighter areas of the pattern blazed brighter compared to the darker parts. This resulted in a strong accentuation of the overall appearance of the snake. This observation was later confirmed in an adult male Horned Adder, which also fluoresced under UV light (Fig. 3).

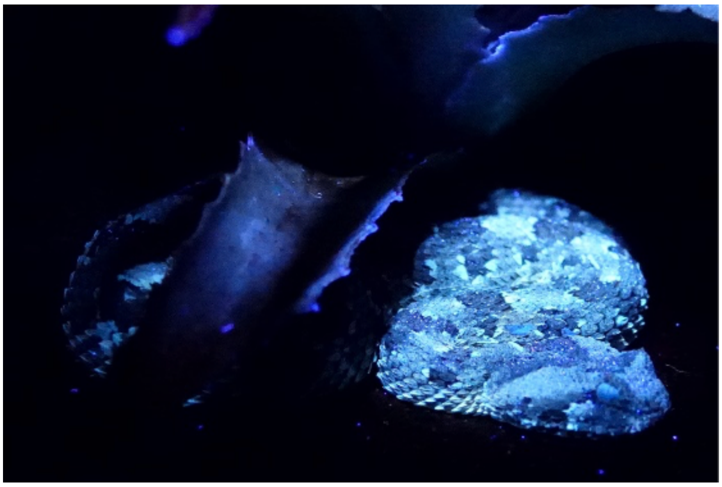

Figure 3. Adult male Horned Adder, *Bitis caudalis*, from Omaruru, Erongo, Namibia under UV light (365 nm).

To determine where the fluorescent substances are located, a one week old moulted skin of the same juvenile Horned Adder was examined. The shed skin was in perfect condition and the strong fluorescent blue light reflection was observed in the shed skin as well (Figs. 4 & 5).

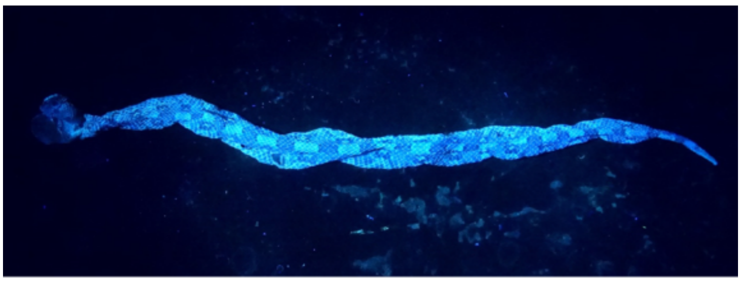

Figure 4. Shed skin of the juvenile female Horned Adder, *Bitis caudalis*, emits a bright blue light under UV light (365 nm).

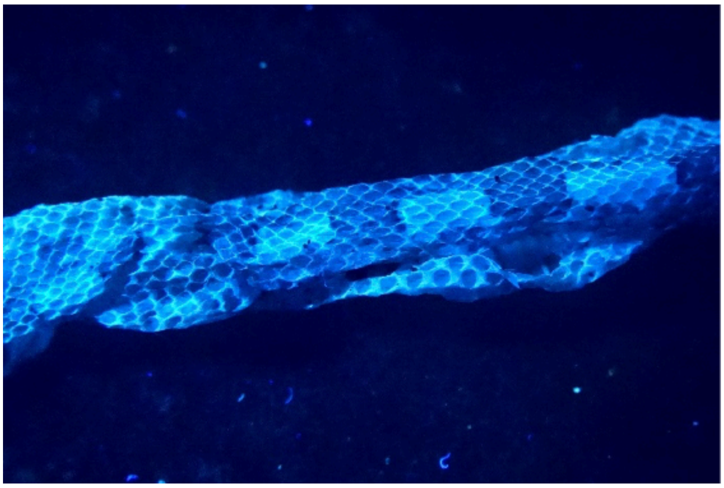

Figure 5. The less pigmentation there is in the shed skin, the brighter it shines under UV light at 365 nm. The less pigmented epidermis between the higher pigmented areas can be clearly seen.

DISCUSSION

Fluorescence is a widespread optical phenomenon that can be observed in aquatic as well as terrestrial habitats. Several mechanisms for biofluorescence have been described to date:

Bone-based fluorescence

It has long been known that bones have fluorescent qualities (Bachman and Ellis 1965). Bone fluorescence can be studied very well in geckos (Prötzel et al. 2021; Vaz Pinto et al. 2021; Lobon-Rovira et al. 2022) as their epidermis stretches thinly over the joints and the skull and the emitted blue light can shine through. In chameleons, tubercles arising from bones of the skull displace all dermal layers other than a thin, transparent layer of epidermis, creating a 'window' onto the bone (Prötzel et al. 2018). Bone-based fluorescence emits bright blue light at wavelengths of 440–500 nm. In contrast to geckos and chameleons, the epidermis of snakes is rather thick and robust so that bones cannot shine through.

Lymph- and gland secretion-based fluorescence

This mechanism of fluorescence has been described for amphibians whose skin is strongly lubricated by serous and mucous glands with pigmentary cells filtering into the skin (Taboada et al. 2017). As the skin of most amphibians is very thin, bone-based fluorescence can also be observed. The robust skin of snakes is not lubricated and possesses only a few glands compared to amphibians so that a lymph- and gland secretion-based fluorescence can be excluded as the likely mechanism for the observed fluorescence in these snakes.

Fluorescence by iridophores

While Prötzel et al. (2021) examined the Namib Web-footed Gecko, *Pachydactylus rangei*, using a UV light, they found a strong green light emission at the side and around the eyes of the gecko at a wavelength of 516 nm. Histological examination of the skin in the emitting parts of the body identified iridophores in the dermis as the source of fluorescence.

Stratum corneum-based fluorescence

In the 1950s, several investigations on reptile skin extracts provided evidence for fluorescent substances. Pteridine-derivates were found in the skins of the colubrid green snakes, *Philothamnus*, Boomslang, *Dispholidus typus* (Blair and Graham 1955), Japanese Ratsnake, Japanese Four-lined Ratsnake and Japanese Woodsnake, and the viperid Mamushi (Odate et al. 1959).

As the observed fluorescence in the Horned Adder could also be observed in the exuviae (the shed skin), the origin of this effect must be located in the stratum corneum of the epidermis or rather in the robust β-layer. McMullen et al. (2012) examined the fluorescence of different keratin tissues like hair, skin, claws, and horns of various species. They identified tryptophan and its metabolite kynurenine as major fluorophores in the epidermis. The maximum wavelength for tryptophan excitation was 290 nm and for emission 330 nm, both in the invisible light spectrum. However, the excitation peak for kynurenine was at 370 nm and the emission peak at 435 nm – in the visible blue light spectrum. These findings correspond to another tryptophan derivative molecule beta-carboline, which is responsible for the fluorescence in the cuticle of scorpions (Stachel et al. 1999).

The emission of kynurenine is strongly influenced by pigmentation. Melanin is the most abundant and widespread pigment in reptile skin yielding black, brown, grey, rufous, and buff color shades (McGraw 2006). The epidermis of snake skin is to some extent also heavily pigmented with melanin as can be seen in the exuviae of the Horned Adder. Melanin suppresses the fluorescence of tryptophan and kynurenine (McMullen et al. 2012), and for this reason the shed skin fluoresces more brightly in the areas of low pigmentation compared to areas with high pigmentation when exposed to UV-light. That is why the typical pattern of the Horned Adder can still be seen under UV light. Furthermore, the microstructure of the dark scales differs significantly from the microstructure of the pale scales. The surface of the dark scales is covered with leaf-like structures and crests which are up to three times higher than on the pale scales

(Spinner et al. 2013; Singh and Alexander 2017). Therefore, the dark scales demonstrate much lower reflectance and higher absorbance than other scales in the UV-near infrared spectral range.

To date, observations of biofluorescence in snakes are quite rare and further investigations, especially regarding the origin of biofluorescence in snakes, must be done. Furthermore, the role of fluorescence in snake biology remains to be clarified.

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GEKKONIDAE

Afrogecko porphyreus

(Daudin, 1802)

Marbled Leaf-toed Gecko

BIOFLUORESCENCE

J.M. BARENDS

In recent years, a growing number of reptile species have been reported to exhibit biofluorescence – i.e., parts of their bodies absorb ultraviolet (UV) light and re-emit visible light, usually in distinctive visual patterns (e.g., Prötzel et al. 2018; Paul and Mendyk 2021; Fisher 2022). However, despite this influx of reports, the list of reptile species confirmed to fluoresce under UV light is exceedingly limited. Moreover, the ecological functions of biofluorescence in reptiles is poorly understood. Additional observations of biofluorescence in reptiles is therefore necessary to further our understanding of this phenomenon among these animals.

Here, I report on the presence of bone-based biofluorescence in the Marbled Leaf-toed Gecko, *Afrogecko porphyreus*. On the night of 4 May 2023, at 20h05, I encountered a juvenile (total length ~ 20 mm) *A. porphyreus* within a soiled pot in my garden in Cape Town, Western Cape, South Africa (33° 58' 41" S, 18° 30' 60" E, QDGS 3318DC, 16 m a.s.l., www.inaturalist.org/observations/159819338, Fig. 1A). Upon illumination with a 3W 365 nm UV LED torch (Lightfe UV301D) the gecko fluoresced a bright electric blue colour from its skull and spine, which were visible dorsally through its skin (Fig. 1B). The fluorescence on the skull appeared to correspond with its skull structure, being strongest where the bony coverings of the skull were at their greatest at the front of the head and absent at the back of the head and the eye sockets where there are no bony coverings. No obvious fluorescence was visible elsewhere on the gecko.

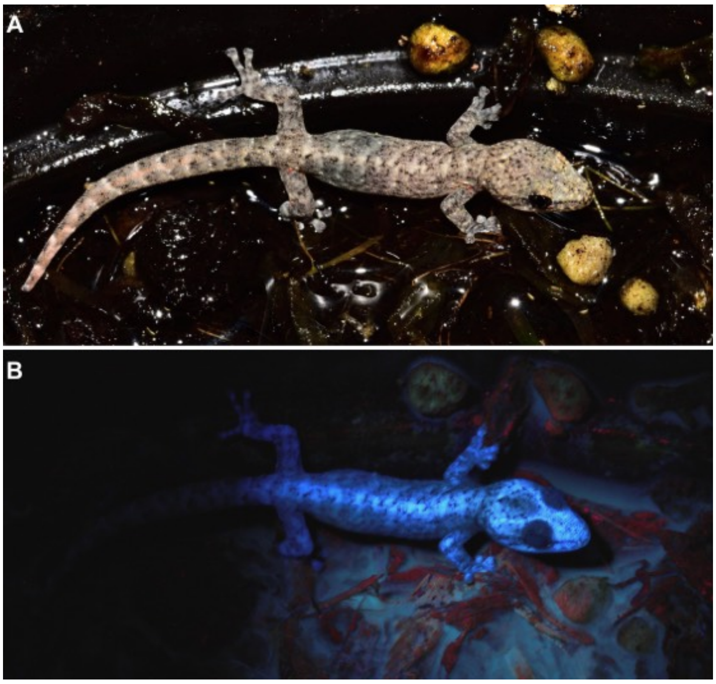

Figure 1. Juvenile Marbled Leaf-toed Gecko, *Afrogecko porphyreus*, from Cape Town, South Africa, as illuminated by A) visible light (camera flash), and B) 365 nm UV light. (Photo: Jody M. Barends)

To my knowledge, this report represents the first documented case of biofluorescence in *A. porphyreus*, thus adding to the list of gecko species confirmed to fluoresce under exposure to UV light.

Bone-based fluorescence has been reported for a few species of gecko, including Bibron's Giant Gecko, *Chondrodactylus bibronii*, (Sloggett 2018), Taylor's Bow-fingered Gecko, *Cyrtodactylus quadrivirgatus*, (Mohd Top et al. 2020), Spotted House Gecko, *Hemidactylus parvimaculatus*, (Mendyk 2021), Slender Feather-tailed Gecko, *Kolekanos plumicaudus*, (Vaz Pinto et al. 2021), and Namib Web-footed Gecko, *Pachydactylus rangei*, (Prötzel et al. 2021) among others. Dermal-based fluorescence has also been observed in the latter species.

The ecological relevance of bone-based biofluorescence in geckos is not fully understood and few hypotheses have been proposed. Potential functions include intraspecific signalling (Sloggett 2018) or prey attraction (Fisher 2022). Alternatively, Mendyk (2021) suggests that the bone-based fluorescence observed in geckos is likely a coincidence brought upon by the inherent fluorescent properties of bones combined with the translucent properties of their skins. Further investigation is required to elucidate the potential roles, if any, of biofluorescence in these and other reptiles.

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CORDYLIDAE

Platysaurus maculatus

Broadley, 1965

Spotted Flat Lizard

CAPTIVE BREEDING

F. GIRARD

On 17 December 2018 I bought one male and two female Spotted Flat Lizards, *Platysaurus maculatus lineicauda*, which were being sold as Common Flat Lizards, *Platysaurus intermedius*, from a pet shop in France. These lizards reportedly came from Mozambique, and there were several other *Platysaurus* species present in the same consignment.

The male has a greenish back with a pale green stripe starting on the tip of the snout and extending to the base of the tail, with fine pale green dots dorsally on either side of the pale stripe, forming broken stripes (Fig. 1). The tail is reddish. The other males in the shipment were not as colourful as the specimen which I purchased. The females are dark with pale dorsal and dorsolateral stripes, the dorsal stripe starting on the tip of the snout and extending onto the tail. These stripes are reddish on the head and nape, becoming whitish on the body. The dorsolateral stripes break up, and there are fine white dots dorsally between the dorsal and dorsolateral stripes. The tail is light blue with some darker infusions (Fig. 1). The male has a snout-vent length (SVL) of 70 mm and a total length (TL) of 166 mm. One of the females (F2) died on 24 January 2019, while the surviving female has a SVL of 61 mm and a TL of 156 mm

Figure 1. Wild-caught male and female breeding pair Spotted Flat Lizard *Platysaurus maculatus lineatus.*

All three individuals were housed together in a vivarium of 600 mm x 450 mm x 450 mm (length x breadth x height). A 35-watt Solar Raptor bulb provides local heat, UVB and illumination. An additional low-intensity globe provides additional light. The floor and back panel of the vivarium are covered with a piece of industrial cork. Piles of flat rocks, with narrow horizontal spaces in between, provide shelter for the animals to hide and mimics their natural habitat. The air temperature in the vivarium averages 30 °C during the day and 24 °C at night in summer, with average daytime temperatures of 23 °C and night-time temperatures of 18 °C in winter.

Platysaurus maculatus are voracious feeders and feed predominantly on crickets, but also eat flies, wax moths (Pyralidae) and buffalo worms, *Alphitobius diaperinus*. Soft Chicory, *Cichorium intybus*, or Endive, *Cichorium endivia*, leaves are offered to the animals every second day, and these are quickly eaten. A mixed vitamin and mineral powder is added to the food every two weeks. In the wild, they are known to eat insects and vegetable matter (Branch 1998). During feeding time the females are more dominant, while the males are more timid. A water bowl is provided in the vivarium and these lizards drink frequently. In addition, both juveniles and adults regularly bathe, totally immersing their bodies (except the head) in the water bowl and moving their body along the sides of the bowl, possibly assisting them with shedding their skin.

On 1 January 2019, both females (F1 and F2) laid two eggs each (Table 1). Only one clutch was successfully retrieved, while the other clutch had already dried out by the time it was discovered. The retrieved clutch was placed in a moist vermiculite-filled box inside an incubator, with the eggs totally buried in the vermiculite. It is important to totally bury the eggs to prevent them from drying out, as they require a moist environment for development. Only one egg hatched, the other egg being infertile (Table 1). The hatchling was a miniature copy of its mother, showing the same colouration as the adult female. This hatchling matured into an adult female (F3) and was introduced into the same vivarium occupied by the adults when it reached adult size after approximately one year. No clutches were noted during 2020, either because no eggs were laid or potentially because eggs were eaten by crickets that hid in the rocks.

An initial challenge that was faced was how to collect the eggs before they dried out in the vivarium, as this happens very quickly. To remedy this, I purchased a hollow artificial rock with a hole in the middle from a pet shop and filled the empty rock with wet moss. The lizards seemed to appreciate this, because in 2021 the two females each laid a clutch of two eggs in the rock in April and May, respectively (Fig. 2; Table 1) and continued to use the rock in 2022.

Figure 2. Clutch of Spotted Flat Lizard *Platysaurus maculatus lineatus* eggs laid in captivity.

The eggs are very sticky when they are deposited. In total, 13 clutches of eggs have been laid by these lizards. It was not possible to take measurements of all the eggs (Fig. 3) and hatchlings (Fig. 4),

Figure 3. Hatched and infertile Spotted Flat Lizard *Platysaurus maculatus lineatus* eggs.

Figure 4. Hatchling Spotted Flat Lizard *Platysaurus maculatus lineatus.*

but data for eggs that were measured are presented in Table 1 and the juveniles that were measured (Fig. 5) had lengths (SVL + tail) of 32 + 50 mm; 32 + 49 mm; and two individuals measuring 33 + 52 mm. The hatchlings move as quickly as the adults do and eagerly take food (micro crickets and fruit flies, *Drosophila*) two days after hatching. They do not, however, feed on vegetable matter as the adults do. The hatchlings are kept under the same conditions as described for the parents above.

Figure 5. Captive-bred juvenile Spotted Flat Lizards *Platysaurus maculatus lineatus* basking.

In March 2022 (5–6 months after hatching), the colour of the two juvenile males hatched during 2021 started to change. The reddish tail colour was the first to appear, followed by a greenish tinge on the back. Full adult male colouration was attained at the end of April, at an age of approximately 8 months. At this stage, competition was already observed between the males and the males were thus housed separately.

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Table 1. Details of the clutches laid by captive Spotted Flat Lizards, *Platysaurus m. maculatus*, in Paris, France.

Laying date (female number)	Clutch size (egg measurements [mm])	Incubation length (days) and (average temperature)	Hatching date	Number of hatchlings
01/01/2019 (F1)	2 (17 x 7; 18 x 8)	110 (26 °C)	20/04/2019	1 female (F3)
01/01/2019 (F2)	2 (desiccated)			
12/08/2019 (F1)	2 (desiccated)			
23/04/2021 (F3)	2	94 (28 °C)	26 & 27/07/2021	2 females
20/05/2021 (F1)	2	108 (initially 28 °C, then 26 °C for the last two months)	5/09/2021	2 males
		86 ***		
		83 ***		
4/04/2022 (F1)	2		29/06/2022	1 male, 1 female
15/04/2022 (F3)	2	90/92	7/07/2022	2 females
4/05/2022 (F1)	2 (desiccated)*			
27/05/2022 (F3)	2	92/94	25/27/08/2022	2 males
11/06/2022 (F1)	2 (desiccated)**	93/94		
7/07/2022 (F3)	2	103/104 (temperature very variable)	7/09/10/2022	2 males
8/07/2022 (F1)	2		9/10/10/2022	2 males
13/08/2022 (F3)	2 (16 x 8; 15 x 7)		24/25/11/2022	1 male, 1 female

*Incubation temperature was 32 °C for 10 hours and 23–27 °C (room temperature) for 14 hours per day, but at the beginning of June I switched the heater in the incubator off. The remainder of the incubation took place at room temperature (25–28 °C, but occasionally up to 30 °C in mid-summer).
**The hollow artificial rock was not available because the eggs of the previous clutch were stuck in it and it was thus placed in the incubator. These eggs detached after several weeks and were transferred to a vermiculite box, but sometimes eggs remained attached to the rock until they hatched, in which case the entire rock was placed in the incubator. Because of this, I bought a second artificial rock.
***The eggs were stuck in the artificial rock but out of the wet moss.

AHN

NATURAL HISTORY NOTES

SCINCIDAE

Trachylepis punctatissima

Smith, 1849

Speckled Rock Skink

TAIL BIFURCATION

F.M. PHAKA

Caudal autotomy is a defensive response in which extant lepidosaurs drop part of their tail in response to a threat (Etheridge 1967). Following the tail shed event, a regeneration process is initiated (Mouadi et al. 2021), although this regeneration process can sometimes be abnormal. This abnormal caudal regeneration may result from incomplete autotomy or an insufficient caudal wound causing the production of an additional tail and the phenomenon is especially common in species with reduced tail autotomy ability (Barr et al. 2019). Although known to be a common occurrence, observations of abnormal caudal regenerations are limited, and tail abnormalities are not expected in species that readily use tail autotomy (Barr et al. 2020).

Here I present an event of abnormal caudal regeneration in a lepidosaur that readily uses tail autotomy, the Speckled Rock Skink, *Trachylepis punctatissima* (Fig. 1A). The individual in question was photographed on 5 May 2020 in Dikobe Street, Ga-Rankuwa, South Africa (25° 35' 35" S, 28° 00' 16" E, QDGS 2528CA, 1214 m elevation). The type of abnormal caudal regeneration reported here (Fig. 1B) has previously been classified as tail bifurcation as there are two tails and a split occurring distal to the mid-length of the longest tail (Henle and Grimm-Seyfarth 2020).

Tail bifurcation is the most commonly reported abnormal tail regeneration (Barr et al. 2020). Other abnormal caudal regeneration classifications include trifurcations, quadruplications, quintuplications, and hexaplications (Henle and Grimm-Seyfarth 2020).

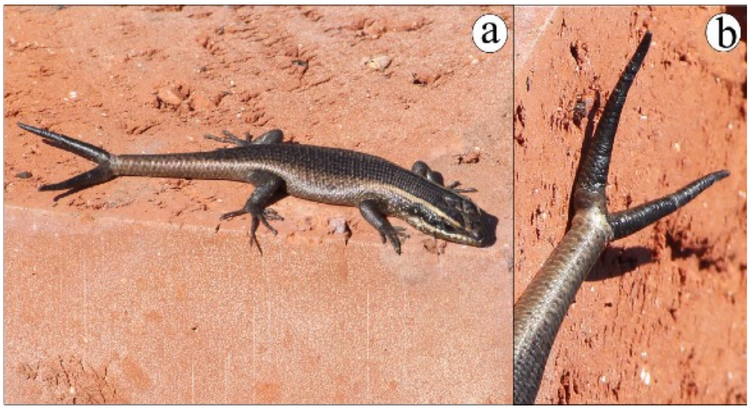

Figure 1. (a) Speckled Rock Skink, *Trachylepis punctatissima*, showing abnormal caudal regeneration, (b) close-up of the bifurcated tail. (Photo: Fortunate Phaka)

Abnormal caudal regeneration of *Trachylepis* species has previously been reported from Africa and South America (Broadley 1978; Mendes et al. 2019). African countries in general have low records of lepidosaur abnormal caudal regeneration in comparison to the rest of the world and within the African continent there are higher records of this abnormal regeneration from South Africa (Barr et al. 2020). This current record adds to at least 425 global abnormal caudal regeneration records for 175 reptile species across 20 families reported on social media, websites, and scientific articles from the 1500s to 2019 (Barr et al. 2020). Between 2020 and the time of drafting this note in January 2023, there were over 100 scientific publications on abnormal caudal regeneration indexed by Google Scholar. This number of scientific publications when compared to the 80–90 lepidosaur tail abnormality records obtained from social media, websites, and scientific articles between 2010 and 2019 by Barr et al. (2020) suggests that there is an increase in reporting abnormal caudal regeneration events.

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NATURAL HISTORY NOTES

AGAMIDAE

Acanthocercus atricollis

(Smith, 1849)

Southern Tree Agama

DUST-BATHING

R.I. STANDER

Sand-bathing or dust-bathing (as it will be referred to hereafter) is a well-documented behaviour among various mammalian and avian fauna (Rees 2002; Barandongo et al. 2018). It is common in passerine birds and is especially prevalent in terrestrial galliforms such as quails and pheasants (Statkiewicz and Schein 1980; Olsson and Keeling 2005; Wang et al. 2018). Dust-bathing is known to reduce lipid concentrations on the feathers of birds (Borchelt and Duncan 1974; van Liere 1992) in addition to effectively restraining ectoparasite loads (Martin and Mullens 2012).

Perhaps surprisingly, the behaviour has not been documented in squamates – with the recent exceptions of Broadley (2017) and Pietersen et al. (2021) – both of whom report dust-bathing in Kirk's Rock Agama, *Agama kirkii.* Broadley (2017) provides possibly the first description of dust-bathing in a squamate, noting that the behaviour is not mentioned in prominent African herpetological field guides of the last three decades. A survey of several contemporary African field guides reveals that these make no reference to the behaviour either (e.g., Alexander and Marais 2007; Largen and Spawls 2010; Spawls et al. 2018; Martinez del Marmol et al. 2019; Ping 2022).

On 2 October 2022 in the Blouberg Nature Reserve near Vivo, Limpopo province, South Africa (22° 59' 24" S, 29° 07' 06" E, QDGS 2229CC; 880 m a.s.l.), an adult Southern Tree Agama, *Acanthocercus atricollis*, was observed dust-bathing on a road adjacent to a large Baobab Tree, *Adansonia digitata*. The substrate at the site consisted of aeolian Kalahari sand. The observation was made at 16h10 while the animal was already actively engaged in the activity, which lasted another three minutes. The agama would periodically stop and raise its head, presumably scanning its surroundings (Fig. 1),

Figure 1. Southern Tree Agama, *Acanthocercus atricollis*, pausing and scanning surroundings between bouts of dust-bathing. (Photo: Remco Huiszoon)

before resuming the activity. The lizard maintained contact between its ventrum and the substrate, using all four legs to fling dust into the air and onto its flanks and dorsum (Figs. 2 & 3). The agama did not appear to be in pursuit of any prey and was never observed feeding. It also did not seem to be digging, since it would regularly reposition itself with its head held up (Fig. 3). The tree agama's behaviour was instantly recognisable as the same dust-bathing behaviour that is performed by birds.

Figure 2. Southern Tree Agama, *Acanthocercus atricollis*, dust-bathing. (Photo: Remco Huiszoon)

Figure 3. Southern Tree Agama, *Acanthocercus atricollis*, repositioning itself while dust-bathing. Note contact between the ventrum and substrate and the use of all four legs to fling dust onto the body. (Photo: Remco Huiszoon)

The reduction of lipid concentrations (birds) or behavioural thermoregulation (mammals) are unlikely ecological functions of dust-bathing in squamates. It is therefore reasonable to assume that the behaviour is an attempt to control ectoparasite numbers, although unknown functions are also possible. *Acanthocercus atricollis* is indeed known to be heavily infested with various mites and Bont-legged Ticks, *Hyalomma truncatum* (Pienaar et al. 1983; pers. obs.), which are known disease vectors (Khumalo 2021).

According to current knowledge of squamates, dust-bathing is only engaged in by agamids. The behaviour would be expected from other conspicuous lizards also known to harbour ticks and mites, such as varanids (Jacobsen 2005; Jordaan 2018; pers. obs.).

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AGAMIDAE

Agama finchi

Böhme, Wagner, Malonza, Lötters & Köhler, 2005

Finch's Agama

AND

Agama doriae

Boulenger, 1885

Benoue Agama

SYNTOPY

R.I. STANDER

On 22 May 2017, an adult Benoue Agama, *Agama doriae*, was collected from a boulder about 5 km west of the Tsore Refugee Camp at Afoda, Benishangul Gumuz-Region, Ethiopia, near its border with South Sudan (10° 13' 07" N, 34° 34' 47" E, QDGS NE_010034BA). The specimen was deposited in the collection of the Ethiopian Biodiversity Institute (EBI) and a record was uploaded to the ReptileMAP virtual museum (https://vmus.adu.org.za/?vm=ReptileMAP-174068).

What is noteworthy about this *A. doriae* record, is the fact that it was collected at a site where the most common and conspicuous species was Finch's Agama, *Agama finchi.* These taxa were not previously known to be syntopic (Largen and Spawls 2010), and significant ecological separation is thought to exist between them.

The natural habitat in the immediate vicinity of the observation is completely destroyed, and the area consists of bare, cultivated land interposed with boulders of various sizes. There were several *A. finchi* occupying the same boulder that the *A. doriae* was collected from, and no other observations of *A. doriae* were made on any of the other outcrops or boulders surveyed in the surrounds, including those about 20 km southwards at Asosa.

Agama finchi is known in Ethiopia only from scattered localities along the western border with Sudan and South Sudan, where it occupies semi-desert, savannah and forest. *Agama doriae*, however, is mainly associated (in Ethiopia) with river gorges but also occurs in grassland, semi-desert and savannah (Spawls et al. 2023). The location of this observation is the only area in Ethiopia where syntopy or sympatry is likely to occur. Areas outside of Ethiopia where this may also be the case are along the eastern portions of the Sudan-South Sudan border, and along the White Nile River in the vicinity of the South Sudan-Uganda border.

This is the first report of syntopic occurrence between the aforementioned taxa, and the area would benefit from further surveys and ecological monitoring of both species, as would the two other locations where syntopy is possible.

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COLUBRIDAE

Philothamnus hoplogaster

(Günther, 1863)

Green Water Snake

THANATOSIS (DEATH FEIGNING)

T. BRAMMER & M. LOISEAU

The Green Water Snake, *Philothamnus hoplogaster*, is a diurnal, predominantly arboreal snake with good aquatic abilities that is widespread in eastern and southern Africa. If threatened, it is known to inflate the neck region but is generally docile when handled (Spawls et al. 2002; Schmidt 2006; Broadley and Blaylock 2013; Pietersen et al. 2021). This note reports an observation of an unusual display of thanatosis in *P. hoplogaster*, and briefly discusses the form of the behaviour in relation to reports of thanatosis in other snake species.

Figure 1. Green Water Snake, *Philothamnus hoplogaster*, showing the head scalation, recorded prior to capture. (Photo: M. Loiseau)

On 31 October 2022, ML was called to remove a green snake that was discovered in an office in Blantyre, Malawi. ML arrived at 10h13 and quickly located the snake which was in front of the main entrance to the building (15° 47' 59" S, 35° 00' 37" E, QDGS 1535CC; elevation 1070 m; ambient temperature 31.1° C, minor cloud cover, no wind). ML identified the snake as an adult (total length *ca.* 600 mm) *P. hoplogaster* based on scale counts (Broadley and Blaylock 2013), with 8 supralabials (4th & 5th entering the eye), 9 infralabials, 1 preocular, 3 postoculars and 1+1 temporal scales (Fig. 1). Photographs were taken of the snake until 10h30. ML then attempted to lift the snake into a bucket with two sticks, but the snake fled and re-entered the office building. It was finally secured in the bucket at 10h39. The bucket containing the snake was carried outside and placed in front of the office where many spectators proceeded to peer into it. At this point the *P. hoplogaster* was attempting to escape from the bucket and was wriggling profusely, and it was thus decided that it was time to release it into the office garden. ML was about to pick up the bucket when he noticed a change in the snake's behaviour. The *P. hoplogaster* began to contort its body, which lasted about 3–5 seconds; when the contortions stopped it was prone with only its head angled slightly sideways. It then proceeded to slowly open its mouth until it was fully open. Once its mouth was open, the snake lifted its head and the anterior portion of its neck and then froze in this position (Fig. 2).

Figure 2. Green Water Snake, *Philothamnus hoplogaster*, showing the subject prone, rigid, mouth open and head lifted off of the substrate, recorded one minute after onset of thanatosis. (Photo: M. Loiseau)

At 10h45 the snake had not moved and was clearly displaying signs of tonic immobility, with the exception of the snake's mouth, which was opening and closing slightly (Fig. 3A, B). No defecation or oral secretions were seen or smelt. When touching the subject, ML noticed that it was rigid, comparable to holding a stick or a dried carcass. It was decided that the snake should be released to avoid stressing it further, whereupon ML lifted it out of the bucket. Although clearly alive, the snake did not move, and even after being placed on the ground it remained in its rigid state. To protect it from any potential predators, the snake was covered with leaves and small branches. Upon return at 10h49 ML found the leaves and branches undisturbed but the *P. hoplogaster* was nowhere to be found, indicating that it had moved away.

To our knowledge, this is the first report of death feigning in any *Philothamnus* species. The manner in which the *P. hoplogaster* behaved appears to differ from the descriptions of thanatosis in other southern and eastern African snakes in that it displayed body rigidity in a prone (upright), irregular extended position (Fig. 3),

Figure 3. Green Water Snake, *Philothamnus hoplogaster*, (A) recorded one minute after onset of thanatosis showing the mouth opening, and (B) closing**,** recorded 30 seconds later. (Photo: M. Loiseau)

as opposed to a supine position. In a paper that reported a case of death feigning in Striped Skaapsteker, *Psammophylax tritaeniatus*, and reviewing previous reports of thanatosis in southern and eastern African snakes, Bates and Nuttall (2013) concluded that although death feigning was known to occur in 12 species there were likely to be more species that exhibit such defensive behaviour as confirmed by our observation, which adds another species to the list. Interestingly, this is only the second colubrid from southern and eastern Africa known to exhibit thanatosis with a Herald Snake, *Crotaphopeltis hotamboeia*, being the first (Sheldon 2021). Other previously reported African species include members of the Psammophiidae, namely Spotted Skaapsteker, *Psammophylax rhombeatus* (Schmidt 1999), Kenyan Striped Skaapsteker, *Psammophylax multisquamis* (Spawls 2002), *Psammophylax tritaeniatus* (Schmidt 2006; Bates and Nuttall 2013) and Dwarf Sand Snake, *Psammophis angolensis* (Broadley and Blaylock 2013). Thanatosis is also known in several African Elapidae (e.g., in a juvenile Mozambique Spitting Cobra, *Naja mossambica*; Ping et al. 2021, and references therein) and in the Rinkhals, *Hemachatus haemachatus*, this behaviour is also well attested (e.g., FitzSimons 1962; Branch 1988). Bates and Nuttall (2013) redescribed, in detail, the foregoing accounts. In all of these cases the subjects were observed to twist their bodies in such a way that resulted in them lying motionless or twitching (e.g., Schmidt 2006) with at least a part of their bodies supine. Although there is mention of these subjects being handled or repositioned during their thanatosis display, there are no comments referring to any noticeable rigidity, which suggests that such obvious behaviour was not observed. Hence, in contrast to the above accounts, our observation is unusual. It should also be considered that snakes are known to gape and lift their heads when experiencing heat stress. Given that the temperature on this day was 31.1° C and the snake was placed in a bucket outside for roughly 6 minutes it may seem plausible to conclude that this behaviour was a result of heat stress. However, such stress does not usually result in rigidity or contortions, both of which are more indicative of thanatosis.

Body rigidity as part of thanatosis displays is described in a few snake species from other continents. The small North American colubrid Red-bellied Snake, *Storeria occipitomaculata*, may become rigid but is not known to remain prone during its thanatosis display (Jordan 1970). The small Central American colubrid Spotted Coffee Snake, *Ninia maculate*, is also known to engage in similar behaviour during thanatosis, reportedly contorting its body before becoming rigid, and it too assumes a supine position as part of its display. Likewise, the medium-sized South American colubrid Neuwied's False Boa, *Pseudoboa neuwiedii*, also becomes rigid during thanatosis but remains at least partly supine (Rogemif et al. 2021). In one of three cases of thanatosis in the small Asian colubrid Common Wolf Snake, *Lycodon* cf. *aulicus*, the subject became rigid but also adopted a supine stance (Mirza et al. 2011).

To our knowledge, this is the first report of death feigning in *P. hoplogaster*. Notable was body rigidity in an upright (prone) position during the thanatosis which has previously been scantily reported, and which is worthy of further investigation.

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GEOGRAPHICAL DISTRIBUTIONS

PSAMMOPHIIDAE

Psammophis brevirostris

Short-snouted Grass Snake

DISTRIBUTION AND DIET

M.F. BATES & B. WILSON HARTMANN

On 8 December 2021, a road-killed Short-snouted Grass Snake, *Psammophis brevirostris*, was photographed whilst 'in the act' of swallowing a Speckled Rock Skink, *Trachylepis punctatissima*, (Fig. 1) at the subway entrance to the Flamingo Casino, Sun International Hotel, Kimberley, Northern Cape province, South Africa (28° 41' 30" S, 24° 46' 34" E; QDGC 2824DB).

Figure 1. Short-snouted Grass Snake, *Psammophis brevirostris*, killed while preying on a Speckled Rock Skink, Trachylepis punctatissima, head-first (Fig. 1), at Flamingo Casino, Sun International Hotel, Kimberley. (Photo: Jaco van Wyk)

The snake was identified by a combination of its dorsal colour pattern (largely 'plain phase' pale brown), eye colour (dark brown with a paler ring around the pupil), relatively short snout (distance from front of eye to tip of rostrum in relation to distance from angle of jaws to tip of rostrum), speckled supralabials and whitish belly (see Broadley 1990), while its scincid prey was identified by its dorsal colour pattern of black with moderate, ill-defined, pale dorsolateral stripes, and keeled dorsal scales. A similar—mostly tree-living—skink, the Kalahari Tree Skink, *Trachylepis spilogaster*, has also been recorded from the Kimberley area (2824DB), but it differs in having broader stripes and whitish flecks on a dark back (Bates et al. 2014).

Psammophis brevirostris is known to prey on a variety of lizards, namely skinks (*Trachylepis*, *Panaspis*, *Acontias*), lacertids (*Ichnotropis*), gerrhosaurids (*Gerrhosaurus*), cordylids (*Chamaesaura*) and agamids (*Acanthocercus atricollis*), as well as small rodents and occasionally frogs (Maritz and Maritz 2020; Predation Records 2022). They have been recorded preying on *T. punctatissima* in Pretoria, Gauteng province and Nylsvley Nature Reserve, Limpopo province (Maritz and Maritz 2020; Predation Records 2022), but this is the first record of predation on this lizard for any other region. There is also a series of photographs, taken in 2013, on ReptileMAP (https://vmus.adu.org.za/?vm=ReptileMAP-156603) showing a *P. brevirostris* (similar to Fig. 2) from Hartswater, Northern Cape (27° 47' 42" S, 24° 49' 18" E; QDGC 2724DD), in the act of swallowing a *Trachylepis*. However, only the hindquarters and tail of the skink are visible and it is not possible to say with certainly whether it is *T. punctatissima* or *T. spilogaster* as both occur in the region (see Bates et al. 2014). A second, unharmed and more typically marked *P. brevirostris* specimen (broken pale vertebral stripe and patterned head) was captured on the same day and at the same place as the specimen reported on here, and was later relocated. On 22 November 2021, only two weeks before, another similarly-patterned individual (Fig. 2) was removed by permitted staff from elsewhere on the Casino grounds.

Figure 2. First specimen of Short-snouted Grass Snake, *Psammophis brevirostris*, observed at Flamingo Casino, Sun International Hotel, Kimberley. (Photo: Jaco van Wyk)

Although there are several records on the Facebook group *Snakes of Southern Africa* (https://www.facebook.com/groups/96621376042) that extend the range of *P. brevirostris* south and south-westwards, this is the first formal documentation of the occurrence of this species in Kimberley, the most south-westerly locality for the species, and an extension of about 100 km southwards from the nearest published locality in QDGC 2724DD at the border of North West and Northern Cape provinces (Bates et al. 2014). However, on ReptileMAP there is also a photographic record (dating to 2006) of a *P. brevirostris* from Barkly West, Northern Cape province (QDGC 2824DA; https://vmus.adu.org.za/?vm=ReptileMAP-2266), about 35 km north-west of Kimberley.

ACKNOWLEDGEMENTS

We thank the staff of Flamingo Casino, especially Jaco van Wyk, for providing photographs and information about this predation event and other records; and Tyrone Ping for confirming the identity of the participants in the drama captured in Fig. 1. Luke Kemp and an anonymous reviewer are thanked for their useful comments.

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When a note reports the collecting of a specimen(s), the appropriate permit (and where applicable ethics clearance certificate) numbers need to be cited in the text or under the Acknowledgements. As a rule of thumb, observing and/or photographing reptiles and amphibians in a wild state does not require permits. However, as soon as an individual (or life stage thereof) is transported and/or kept in captivity, this would in most cases be classified as research and would require the appropriate permits.

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Brief notes concerning the biology of the herpetofauna of the African continent and adjacent regions, including the Arabian Peninsula, Madagascar, and other islands in the Indian Ocean. A standard format is to be used, as follows:

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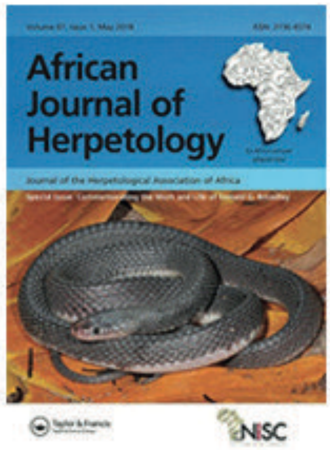

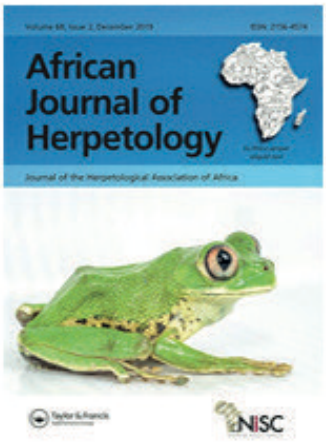

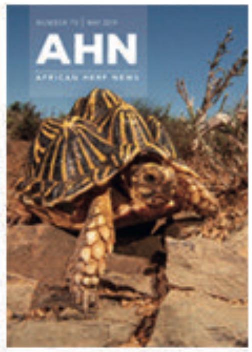

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