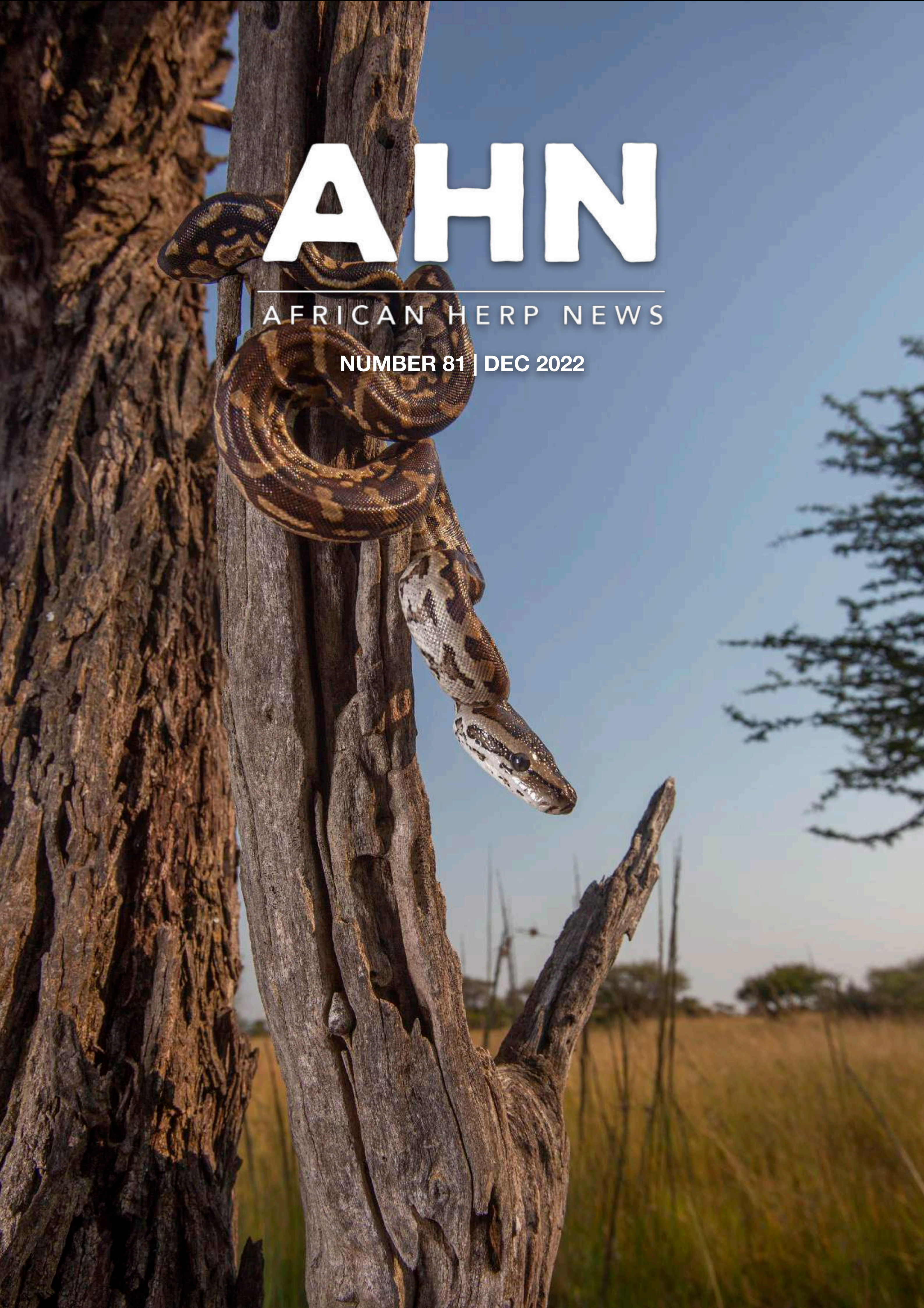
AHN

AFRICAN HERP NEWS

NUMBER 81 | DEC 2022



HAA | HERPETOLOGICAL ASSOCIATION OF AFRICA
www.africanherpetology.org

FOUNDED 1965

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

Articles shall be considered for publication provided that they are original and have not been published elsewhere. Articles will be submitted for peer review at the Editor's discretion. Authors are requested to submit manuscripts by e-mail in MS Word '.doc' or '.docx' format.

COPYRIGHT

COVER PHOTOGRAPH

Southern African Python. *Python natalensis.* Photograph: Gary Kyle Nicolau

AHN

CONTENTS

AHN

CONTENTS

NATURAL HISTORY NOTES

GEOGRAPHICAL DISTRIBUTIONS

AHN

EDITORIAL

Well, another year has flown by and we once again find ourselves in December. This has certainly been an interesting year, but in many ways also (thankfully!) a fairly normal year as we finally more or less emerge from the COVID pandemic. Most of South Africa (and hopefully the rest of Africa) has received some good rainfall, and all indications are that it will be a good rainy season – which bodes very well for both reptile and amphibian activity.

As this year draws to an end, I would like to thank each and every person who submitted notes and articles to *African Herp News* this year, and I would also like to thank all the contributors as well as the readers (and the rest of the production team) for your patience with me as I've found my footing. A special word of thanks is due to all the reviewers who have willingly given of their time and expertise to ensure that the standard of *African Herp News* is maintained. *African Herp News* is a newsletter by you, for you, and as such we rely on your submissions and support for its continuation. So, if you have a few spare moments this festive season, why not sit down and pen some of those observations or range extensions that you've been meaning to?

I wish you all happy holidays, a lovely festive season and a Merry Christmas, and I hope to see many of you at the 15th H.A.A. conference in Hoedspruit next year!

Darren Pietersen
Editor

AHN ANNOUNCEMENTS


15TH CONFERENCE OF THE HERPETOLOGICAL ASSOCIATION OF AFRICA PHOTO COMPETITION
Bring your best photos to the 15th Conference of the Herpetological Association of Africa from 16-19 January 2023
Great prizes to be won for 1st, 2nd and 3rd place
15TH CONFERENCE OF THE HERPETOLOGICAL ASSOCIATION OF AFRICA
HOEDSPRUIT 2023

TOMORROW'S HERPETOLOGISTS TODAY

RUAN STANDER

Ruan in the Karoo with a Leopard Tortoise *Stigmochelys pardalis*. Photo: Gideon Roodt

Ruan Stander is a Polokwane-based, South African naturalist, whose range of interests includes geology, dendrology, anthropology, theology, ornithology, ecology, and herpetology. By far the most serious of these is herpetology and Ruan's passion for it is innate. As a child, he was most fortunate to have this interest cultivated by his great-grandfather. Ruan has pursued the subject from an early age: he caught his first toad at age one and starting at age six, he reared African Toad *Sclerophrys* tadpoles in a splash pool, introduced Flap-neck Chameleon *Chamaeleo dilepis* to his grand-father's aviaries and marked his garden's resident Leopard Tortoises *Stigmochelys pardalis* with a permanent marker to identify each animal's favourite hiding place. The findings of those garden studies have not been published. In the early 2000s, his primary interest was making documentaries on Dwarf Geckos *Lygodactylus*, Typical African Skinks *Trachylepis* and Tree Agamas *Acanthocercus* using his grandfather's video camera. Ruan did not know anything about his subjects, other than them being 'very beautiful animals'.

Ruan examining a Waterberg Girdled Lizard *Smaug breyeri*. Photo: Juan-Merie Venter

As a teenager and young adult, Ruan was a serious collector and keeper of a variety of reptiles. His focus has shifted from husbandry to field-based research and today, Ruan is a lay herpetologist focusing largely on biogeography, ecology, and ethology. He is also an avid photographer whose work is featured in popular as well as technical books and other publications. He has conducted herpetological surveys across South Africa's Limpopo Province since 2015, began working as a field guide in 2016 and is passionate about environmental education.

When the Limpopo Valley gets too hot for reptiles, trees will do, too! Photo: Willem van der Merwe

Ruan with a Drakensberg Crag Lizard *Pseudocordylus melanotus subviridis*. Photo: Bafokeng Stander

A lifer always produces a smile. Photo: Bafokeng Stander

Ruan's past and present work is largely focused on the behaviour and distribution of reptiles in South Africa's Limpopo Province and the Horn of Africa, particularly Ethiopia. His current projects include, among others, ongoing surveys and the species assemblages and ecology of the reptiles of the Blouberg inselberg as well as the Venda region in the eastern Soutpansberg, both in northern Limpopo Province. He has taken a keen interest in the behaviour and ecology of Tiger Gecko *Pachydactylus tigrinus* and is embarking on his first taxonomic investigations into fossorial and rupicolous lizards of the greater Soutpansberg region. Furthermore, Ruan is nearing the completion of compiling a comprehensive and up-to-date resource on the reptiles of the Limpopo Province, which he began working on towards the end of 2018.

Ruan's future plans are to continue surveying poorly sampled areas in Limpopo Province in South Africa and the Horn of Africa with the aim of exposing more people, especially young enthusiasts, to the field of herpetology. Should the opportunity present itself, he also wishes to pursue herpetology in a more professional capacity. His publications can be found at https://www.researchgate.net/profile/Ruan-Stander-3 and his photography viewed at https://www.facebook.com/herpnomad.

ANTHROPOGENIC THREATS POSED TO REPTILES BY NON-ELECTRIFIED FENCING

P. BERG

Declines in reptile populations have been reported globally (Böhm et al. 2013; Saha et al. 2018; Cox et al 2022). Leading causes include habitat destruction, agricultural expansion, hunting (e.g., commercial harvest and trade), invasive species, and urban development. Urbanization is associated with profound environmental changes, with obvious challenges that reptiles face in urban areas including habitat fragmentation, road traffic and non-native predators such as domestic cats as well as human-wildlife conflict (e.g., snakes are often killed out of fear). However, different reptile species respond differently to altered environments and various urban factors (French et al. 2018) and some anthropogenic threats may be easier to prevent than others.

Below I share observations made in Erongo Park, ca. 5 km southwest of Omaruru, Namibia (21° 27' 29" S, 15° 55' 36" E). A population of Namibian Agama *Agama planiceps planiceps* inhabits rock formations next to a house and the lizards make extensive use of stone walls and paths around the building. A swimming pool poses a drowning risk, which can be reduced by the provision of life rafts (flotation objects strong enough to support an animal trapped in the pool) and offering a way out by using sticks, planks, or a rope as a form of a staircase or by covering the pool. Agamas and other reptiles and amphibians had to previously be rescued from the pool. To prevent larger animals from getting into the water, installing a fence around a swimming pool is an option for a precautionary measure. However, fencing in general can also be associated with new hazards for animals. In April 2022, newly planted trees and plants around the house were individually fenced in using a hexagonal mesh garden fence ("chicken wire") with a mesh opening of approximately 16 x 23 mm to protect them from game browsing. Within three weeks, five incidents occurred in which individuals of *A. p. planiceps* (3) and other lizards (1 Western Giant Plated Lizard *Matobosaurus maltzahni* and 1 plated lizard *Gerrhosaurus* cf. *intermedius* were caught in the new fencing (Fig. 1).

On 18 April 2022 at 14h10, a dead *A. p. planiceps* was found entangled in the wire fence. Air temperature was 32.6 °C but the animal was trapped in full sun and the body surface temperature of the dead agama was 50.7 ± 0.44 °C (mean ± SD of three measurements using an infrared Colemeter thermometer). The agama measured 232 mm in total (SVL 87 mm, tail 145 mm) and weighed 21 g. Two days earlier a slightly smaller agama had been trapped at approximately the same location in the fence but was still alive and able to bite when it was removed from the fence and released.

Figure 1. Mesh garden fences with a small mesh opening size pose an entanglement hazard to reptiles such as agamas and plated lizards.

This latter incident occurred in the afternoon when the sun was not as strong anymore (17h00, 29.7 °C ambient temperature). A week earlier, another *A. p. planiceps* that was stuck in the fence a few meters away was also alive when discovered and released. At about the same time, a *Gerrhosaurus* cf. *intermedius* got stuck with its head in the new fencing and sustained injuries in the neck region and most likely considerable stress and exhaustion. The animal was removed from the fence but subsequently died. The lizard measured 455 mm in total (SVL 135 mm, tail 320 mm) and weighed 68g.

A similarly sized *M. maltzahni* was released from the nearby garage just to be found stuck in a fence minutes later, but was released without any visible injuries.

No such incidents had been observed previously with similar fences with larger mesh apertures (27 x 46 mm). As a consequence, the smaller mesh fencing was replaced by mesh garden fences with larger opening sizes, which should prevent similar incidents in the future. Electrified fences are a known cause of reptile mortality (e.g., Holt et al. 2021). However, non-electrified fencing can also lead to mortality, as demonstrated by these observations. However, this may be averted by using mesh sizes large enough so that most lizard and snake species can pass through without getting stuck.

Not only metal but also plastic netting can pose an entanglement hazard to reptiles, in particular snakes (Stuart et al. 2001; Kapfer and Paloski 2011). For example, plastic mesh fences and blankets are widely used for erosion control and horticultural pest-exclusion in the U.S.A. Snakes were found more likely to get entangled in mesh with small apertures (Ebert et al. 2019) and using netting with large apertures or materials without plastic mesh has been suggested to reduce the threat to wildlife (Kapfer and Paloski 2011). Although still a concern, in some U.S.A. states guidelines have been put in place that minimize the risk of wildlife mortality due to plastic netting used in erosion control operations (Ebert et al. 2019), which indicates that conservation efforts can benefit from the identification of (new) hazards to reptiles and other wildlife and suggesting solutions to concerned parties and policy makers.

ACKNOWLEDGEMENTS

I am thankful to Bryan Maritz, Ruan Stander and an anonymous reviewer for helpful comments and advice on a previous version of the manuscript.

REFERENCES

Böhm M, Collen B, Baillie JE, Bowles P, Chanson J, et al. 2013. The conservation status of the world's reptiles. Biol. Conserv. 157: 372–385.

Cox N, Young BE, Bowles P, Fernandez M, Marin J, et al. 2022. A global reptile assessment highlights shared conservation needs of tetrapods. Nature 605: 285–290.

Ebert SE, Jobe KL, Schalk CM, Saenz D, Adams CK, Comer CE. 2019. Correlates of snake entanglement in erosion control blankets. Wildl. Soc. Bull. 43: 231–237.

French SS, Webb AC, Hudson SB, Virgin EE. 2018. Town and country reptiles: a review of reptilian responses to urbanization. Integr. Comp. Biol. 58: 948–966.

Holt S, Horwitz LK, Wilson B, Codron D. 2021. Leopard Tortoise *Stigmochelys pardalis* (Bell, 1928) mortality caused by electrified fences in central South Africa and its impact on tortoise demography. Afr. J. Herpetol. 70: 32–52.

Kapfer JM, Paloski RA. 2011. On the threat to snakes of mesh deployed for erosion control and wildlife exclusion. Herpetol. Conserv. Biol. 6: 1–9.

Saha A, McRae L, Dodd Jr CK, Gadsden H, Hare KM, Lukoschek V, Böhm M. 2018. Tracking global population trends: population time-series data and a living planet index for reptiles. J. Herpetol. 52: 259–268.

Stuart JN, Watson ML, Brown TL, Eustice C. 2001. Plastic netting: an entanglement hazard to snakes and other wildlife. Herpetol. Rev. 32: 162–163.

SUBMITTED BY:

Philipp Berg
Mühlheim am Main, Germany; & Erongo Park, Omaruru, Namibia.
E-mail: p.berg@cantab.net

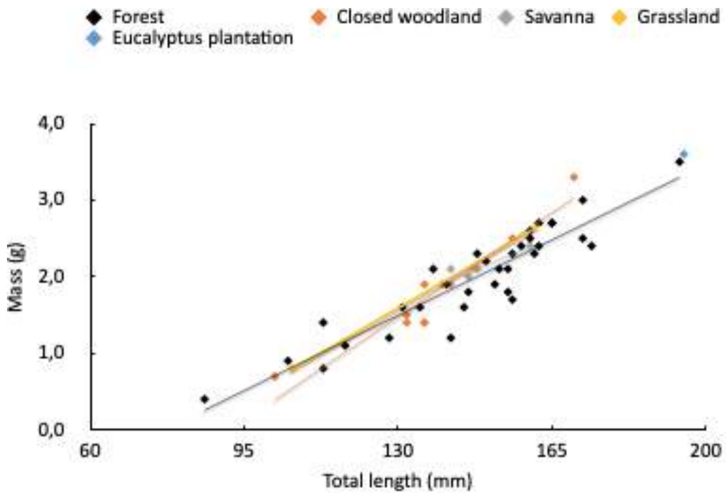
FORNASINI'S BLIND SNAKE *AFROTYPHLOPS FORNASINII* (BIANCONI, 1849): MORPHOMETRIC MEASUREMENTS, MAXIMUM SIZE RECORDS, AND HABITAT ASSOCIATED ABUNDANCE

P.R. JORDAAN & A. WILKEN

As part of a larger project to document the herpetofauna occurring in northern KwaZulu-Natal Province, South Africa, and southern Mozambique, herpetological assessments were undertaken in Tembe Elephant Park, KwaZulu-Natal Province (TEP) and Maputo National Park, Maputo Province (MNP; Maputo Special Reserve prior to 2022), Mozambique, using pitfall and funnel trap arrays (PFTAs) over the 2019 and 2020 summer (see Jordaan et al. 2020, van Huyssteen and Jordaan 2021). During these surveys, the most frequently captured reptile species was Fornasini's Blind Snake *Afrotyphlops fornasinii,* a small fossorial typhlopid snake. This species occurs in north-eastern KwaZulu-Natal Province and southern Maputo province along the Maputaland/Mozambican coastal plain (Branch 1998; Measey 2014). Whilst the species is considered common and occurs across multiple habitat types with several references noting the reliance of *A. fornasinii* on leaf litter rich environments (Bruton and Haacke 1980; Branch 1998; Measey 2014), little quantified data or morphometric measurements have been published on this species. Here, the live total length (TL, in mm), mass (M, in 0.1 g increments), and the resultant TL/M ratio of captured individuals is reported, while the relative abundance is also compared across broad vegetation types to test for habitat association. Additionally, two maximum size records obtained during the survey are also documented.

The employed PFTA design is described in Jordaan et al. (2020). During these surveys, PFTAs were installed across various savanna, closed woodland, forest, and grassland habitat designations as well as old moribund *Eucalyptus* plantations. To assess the habitat affiliation of the species, the total number of *A. fornasinii* captured across all PFTAs per habitat was totalled and divided by the total trap nights per habitat type, as a Catch Per Unit Effort (CPUE) metric. During these surveys, apart from a single individual which was captured in a terminal funnel trap, all *A. fornasinii* were captured in pitfall traps (PTs). Consequently, only PT capture effort was used to calculate CPUE, and only *A. fornasinii* PT captures were included in the analyses.

Live total body length and mass of all processed *A. fornasinii* was recorded. Total length was determined to the closest mm by pressing and stretching individuals along the edge of a robust blunt-edged metal ruler while mass was determined by placing individuals on an AE Adams GBK 8 electronic scale. The impact of habitat structure on the TL/M ratio, body length and mass of captured specimens was assessed across surveyed habitat types, comparing individual ratios using non-parametric Kruskal-Wallis and Mann-Witney U tests, as well as parametric one-way Analysis of Variances (ANOVAs). Following processing, captured specimens were released unharmed at the capture sites.



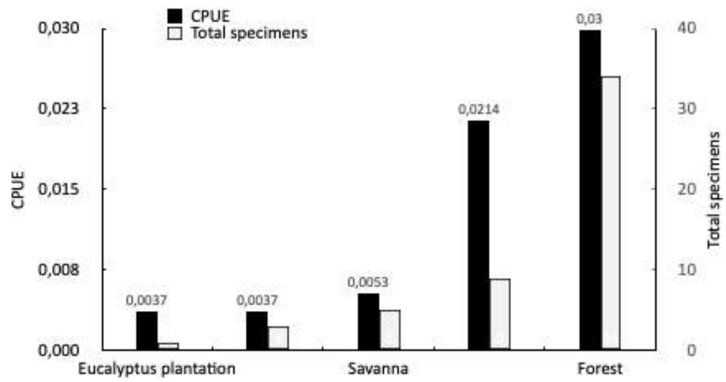


Figure 1. Total length (mm) and mass (g) of all processed Fornasini's Blind Snakes *Afrotyphlops fornasinii* captured in pitfall traps across Maputo National Park and Tembe Elephant Park between January 2019 and March 2020.

Figure 2. Fornasini's Blind Snake *Afrotyphlops fornasinii* pitfall trap capture per unit effort (CPUE) during the January 2019–March 2022 pitfall and funnel trap surveys across Maputo National Park (*Eucalyptus* plantation, grassland, savanna, and forest) and Tembe Elephant Park (savanna, closed woodland, and forest).

The average TL of processed *A. fornasinii* (n=51) was 146.4 ± 21.6 mm, with a mean mass of 2.0 ± 0.0 g (n=51; Fig. 1), resulting in a mean body condition ratio of 82.3 ± 28.7. The maximum recorded length for the species was initially reported by FitzSimons (1962) as 157 mm TL, whilst Broadley and Wallach (2009) report a maximum TL of 185 mm. During the PFTSs, two *A. fornasinii* specimens, both captured in MNP, exceeded these reported maximum lengths. The first specimen was captured in a former Eucalyptus plantation that has been rehabilitated (26° 30' 36" S, 32° 43' 04" E, 2632DA; 21 m a.s.l.), measuring 195 mm TL and weighing 3.5 g. This was also the only *A. fornasinii* specimen captured in the old Eucalyptus plantations. The second specimen measured 194 mm TL with a mass of 3.4 g and was captured in sand forest bordering Lake Max (26° 23' 15" S, 32° 49' 30" E, 2632BD; 20 m a.s.l.). There was no significant relationship between TL, M, or the body condition ratio to broad habitat categories for the sample.

The results support previous assessments of the species described as having an affinity towards leaflitter environments (Bruton and Haacke 1980; Branch 1998; Measey 2014), with low densities occurring in habitats with little detrital soil cover such as grassland and savanna, and high densities in closed woodland and especially forest habitats with higher detrital soil cover (Fig. 2). It should be kept in mind that PFTAs rely on the surface or shallow sub-surface movement of specimens and that biases in fossorial or leaflitter herpetofauna capture rates due to environmental conditions using this method have been reported (Driscoll et al. 2012). Taken into context, these results may thus only indicate that *A. fornasinii* is more mobile across the forest surface than in other environments instead of directly relating to habitat associated densities.

ACKNOWLEDGEMENTS

Joe S.R. Cutler, Megan Hudson, Daniel Snijder, and Ryan van Huyssteen are thanked for assisting with fieldwork. These surveys were conducted during the first author's employment as the Lubombo Transfrontier Conservation Area Scientific Technician for MNP and TEP, 2018–2020. The position was financed by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) through Peace Parks Foundation (PPF) in association with the Administração Nacional das Áreas de Conservação (ANAC) and Ezemvelo KwaZulu-Natal Wildlife (EKZNW). John Measey and Tyrone Ping are thanked for their comments and suggestions on this note.

REFERENCES

Branch WR. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa, 3rd edition. Cape Town, South Africa: Struik.

Broadley DG, Wallach V. 2009. A review of the eastern and southern African blind-snakes (Serpentes: Typhlopidae), excluding *Letheobia* Cope, with the description of two new genera and a new species. Zootaxa 2255: 1–100.

Bruton M, Haacke WD. 1980. The reptiles of Maputaland. In: Bruton MN, Cooper KH, editors. Studies on the Ecology of Maputaland. Cape Town, South Africa: Rhodes University and the Natal Branch of the Wildlife Society of Southern Africa.

Driscoll DA, Smith AL, Blight S, Maindonald J. 2012. Reptile responses to fire and the risk of post-disturbance sampling bias. Biodivers. Conserv. 21: 1607–1625.

FitzSimons VFM. 1962. Snakes of Southern Africa. Cape Town, South Africa: Purnell.

Jordaan PR, Cutler JSR, Snijder D. 2020. Geographical Distribution: Pygmy Wolf Snake *Lycophidion pygmaeum* Broadley, 1996. Afr. Herp News 74: 88–91.

Measey GJ. 2014. Fornasini's Blind Snake *Afrotyphlops fornasinii* (Bianconi, 1849). In: Bates MF, Branch WR, Bauer AM, Burger M, Marais J, Alexander GJ, de Villiers MS, editors. Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. Pretoria, South Africa: South African National Biodiversity Institute.

van Huyssteen R, Jordaan PR. 2021. Geographical Distribution: Lined Shovel-snout *Prosymna lineata* (Peters, 1871). Afr. Herp News 76: 37–41.

SUBMITTED BY:

PHILIPPUS R. JORDAAN
Lubombo Transfrontier Conservation Area Scientific Technician: Maputo National Park and Tembe Elephant Park, 2018–2020; & African Ecological Conservation Projects (Pty) Ltd.
Email: PRJordaan@aecproject.org

ALBERT WILKEN
African Ecological Conservation Projects (Pty) Ltd.
Email: AWilken@aecproject.org

FIRE-ASSOCIATED INJURY AND MORTALITY OF SOUTHERN AFRICAN PYTHON *PYTHON NATALENSIS* SMITH, 1840

P.R. JORDAAN & J.C.A. STEYL

The Southern African Python *Python natalensis* is the largest indigenous snake species in southern Africa (Branch 1998) with at least one individual of 5.3 m total length (TL) recorded from Maputaland, KwaZulu-Natal Province, South Africa (Bruton and Haacke 1980). When not digesting large meals, individuals are relatively mobile, capable of moving through terrestrial, arboreal, and aquatic environments. It is considered relatively abundant across northern KwaZulu-Natal Province within protected areas as well as other natural landscapes (FitzSimons 1962; Bruton and Haacke 1980; Branch 1998).

Published records and descriptions of injuries to and mortalities of *P. natalensis* caused by management burns, wildfires, or the burning of sugar cane fields are lacking, despite such events being common knowledge for conservationists, wildlife managers, farmers, and herpetologists. Only one previous record describing the mortality of a juvenile *P. natalensis* in a fire could be found (Jordaan et al. 2020). Here we describe the condition and injuries of two individuals that were caught in a management fire, encountered within 5 m of each other (27° 01' 23" S, 32° 27' 05" E, QDS 2732AB; 70 m a.s.l.), in Tembe Elephant Park (TEP), Maputaland.

The prescribed burn was conducted during the austral winter, on 30 July 2019 from 11h30 onwards. The aim of the prescribed fire was to control Silver Cluster-leaf *Terminalia sericea* and Sickle Bush *Dichrostachys cinerea* encroachment of Tembe Sandy Bushveld (Mucina and Rutherford 2006) in the central section of the protected area. A post-fire survey was conducted following the methodology of Jordaan et al. (2019a) and took place three hours after the management fire was set.

The smaller male *P. natalensis* (Fig. 1; Snout-vent Length [SVL]: 2.16 m; TL: 2.44 m; https://vmus.adu.org.za/?vm=ReptileMAP-181965), was found dead, whilst the larger female (Fig. 2; SVL: 3.6 m; TL: 4.04 m) survived the fire but sustained significant burns. The health of the female was monitored over the subsequent three days. The python's health clinically deteriorated during that time, leading PRJ to consult with the Ezemvelo KwaZulu-Natal Wildlife (EKZNW) uMkhanyakude district ecologist, the EKZNW animal scientist responsible for herpetofauna, and the head EKZNW veterinarian on the ethical course of action that should be taken as no official protocol for such circumstances exists. Based on the poor condition of the surviving female and the consensus that these injuries would cause significant suffering before inevitably resulting in delayed mortality, euthanizing the python was considered the most humane course of action.

Figure 1. Male Southern African Python *Python natalensis* which succumbed to the management fire on 30 July 2019, photographed *in situ*, Tembe Elephant Park. Photo: PR Jordaan.

Figure 2. The surviving female Southern African Python *Python natalensis* which was preparing to slough its skin, showing extensive external thermal injury, photographed *in situ*. Photo: PR Jordaan.

Here we describe the overall external condition of these two individuals along with microstructural abnormalities as observed from histopathological sample analyses (see Jordaan et al. 2019a, 2020). The male was found in a contorted position at the base of several burnt *T. sericea* bushes which were <1 m in height (Fig. 1). Its head was curved backwards with the mouth open, exposing most of its teeth, some of which were blackened from charring. The soft tissue on the inside of the mouth had detached from the right mandible and had receded, exposing the mandibular bone. The mouth was dry and blackened with ash, soot and burned leaves crusted along its lips and on the inside of the mouth. The eyes were sunken and dry. Both hemipenes were extruded with extensive burn injury. The individual was in the final preparatory stage for ecdysis, with the dead skin charred and burned along most of its body. Subcutaneous connective tissue degeneration resulted in partial dermal detachment from underlying tissue at several sites along the body, as confirmed during a histopathological assessment of selected tissue samples. Extensive congestion of alveolar capillaries and pulmonary oedema suggesting secondary heart failure with no visible myocardial injury was recorded. Tracheal epithelium remained ciliated.

The female was found on a bare sand patch at the base of a large bush, remaining stationary for the three days that she was monitored. Water was offered in a shallow dish but was ignored. This individual was also preparing to shed her skin, with fragmented, burned old skin draping around the body. The mouth was never fully closed, with charred leaves and soot stuck to her lips and in the inside of the mouth. Closer inspection revealed that the pale discoloured sections on the inside of the mouth had been severely burned. The corneas of both eyes were white, and she was unresponsive to visual stimuli, suggesting blindness. The fire presumably injured the heat-sensitive pits on the right

Figure 3. Fire-induced thermal injury to the new skin layer underlying the sloughed older layer of the female Southern African Python *Python natalensis*. Photo: PR Jordaan.

side of the snake's snout since she only responded to the body heat of conservation staff when passing along the left side of her face. Several patches of dermal necrosis (blackened, desiccated, dull skin and scales) were observed along the ventrum (Fig. 3). The posterior half of the tail was stiff with a markedly concave ventrum. Serous fluid exudation was observed on the newly formed layer of skin beneath the burnt shed skin layer. Several Banded Blowflies *Chrysomya albiceps* (Wiedemann, 1819) were constantly landing on injured segments of the body as previously described by Jordaan et al. (2019b) for a Rock Monitor *Varanus a. albigularis* Daudin, 1802 that suffered burns from a fire. Following euthanasia and dissection for necropsy, a large amount of mucus-covered soot and burnt leaves was found in the oesophagus. No visible injury was evident from histologically examined myocardial tissue and the tracheal epithelium remained ciliated. Pulmonary oedema and congestion of alveoli were pronounced to the same degree as the male specimen. Thermal injury characterised by dermal necrosis and subcutaneous vacuolisation with much protein serous exudate and early inflammation of surrounding tissues was observed.

Pulmonary oedema associated with tracheal deciliation has been reported in previous cases of fire-associated mortality in reptiles, suggesting heart failure due to heated gas inhalation owing to the vast majority of analysed specimens showing no signs of smoke inhalation (Jordaan et al. 2019a,b, 2020). The lack of deciliation in the trachea and carbon in the lung tissue of both specimens would exclude heated gas and smoke inhalation as a mechanism of injury and death. Although the pulmonary findings indicated heart failure, they were non-specific for the mechanism of heart failure. Intrinsic myocardial fibre injury could be excluded. Noxious gas and resulting hypoxia can be argued as a possible cause of the presumable instant death of the male, but for the female, prolonged distress (mainly induced by pain and exposure) is more likely to have affected cardiac function.

Most animals capable of relatively high levels of mobility avoid the direct effects of fire by moving away from the fire front or promptly seeking shelter (Engstrom 2010). However, fire-associated injury and mortality have occasionally been recorded for such fauna (Bigalke and Willan 1982; Beaupre and Douglas 2012; Jordaan et al. 2019b, 2020). Additionally, the physical condition of individuals, environmental temperatures, and regional activity patterns of species or subgroups thereof (defined by age, sex, etc.) may also contribute to the susceptibility of some reptiles to the direct effects of fire (Jordaan et al. 2019a, 2020).

The proximity of the two individuals is likely due to the breeding behaviour of *P. natalensis*, with mating taking place during the austral winter during which time receptive females are attended or followed by one or more males (Alexander 2018). The propensity of *P. natalensis* to increase basking activities in preparation for ecdysis (Branch 1998), may lead to individuals spending more time in the open, outside of refugia, potentially exposing such individuals to fire. Additionally, snakes preparing to shed their skin appear to be more susceptible to the direct effects of fire (Beaupre and Douglas 2012). This is likely the result of the soon-to-be sloughed skin covering the eyes and effectively dulling the vision of snakes during the shedding process, making the active avoidance of the fire front more difficult. The same may also be true for thermal-sensitive pits. Both *P. natalensis* were in the process of preparing for ecdysis. This was also the case for the only other record of fire-induced fatality of the species (Jordaan et al. 2020) suggesting an increased susceptibility of *P. natalensis* during shedding to the impacts of fire. In the days following the fire, several *P. natalensis* individuals, including two individuals in excess of 4 m in total length, were observed moving out of the burnt area, none of which showed any signs of external thermal damage or visual evidence of them preparing for ecdysis, illustrating that at least some large-bodied specimens can and do survive fires.

The policy of most regional conservation agencies is to only intervene in animal welfare issues when suffering is caused by anthropogenic actions and not when natural processes are at play, unless affected species are of conservation concern. Veterinary assistance may be extended in the latter cases, but rehabilitation is rarely carried out and almost never for reptiles. Whilst fire is considered a natural disturbance in fire-prone habitats (e.g., Masterson et al. 2008), management burns are set by conservation authorities with the express intention of burning a predetermined area under specific conditions to fulfil pre-set objectives. As post-fire mortality surveys are conducted to actively search for animals negatively impacted by fire, animal welfare interventions may ethically be required when encountering surviving specimens, acting in the best interest of those individuals. However, interventions should always be preceded by veterinary consultation and only be practiced by, or under, the direction of the relevant conservation authorities. Guidelines governing decision making in these instances are non-existent and the authors suggest that these be developed and published in consultation with relevant veterinary and conservation authorities.

ACKNOWLEDGEMENTS

The authors would like to thank Catariné C. Hanekom, the EKZNW uMkhanyakude district ecologist, Adrian J. Armstrong, the EKZNW animal scientist responsible for herpetofauna, and Dave Cooper, the head EKZNW veterinarian, who were consulted on the ethical protocols and the application of euthanasia described in this observation. Adrian Armstrong also offered comments on the original manuscript. Albert Wilken assisted with a pre-review of the observation. Joe S.R. Cutler is thanked for assisting with the fieldwork. Hiral Naik and an anonymous reviewer are thanked for their comments and suggestions.

REFERENCES

Alexander GJ. 2018. Reproductive biology and maternal care of neonates in Southern African Python (*Python natalensis*). J. Zool. 305: 141–148.

Beaupre SJ, Douglas LE. 2012. Responses of Timber Rattlesnakes to fire: lessons from two prescribed burns. Proc. Fourth Fire in Eastern Oak Forest Conf.

Bigalke RC, Willan K. 1982. Effects of fire regime on faunal composition and dynamics. In: Booysen P de V, Tainton N, editors. Ecological Effects of Fire in South African Ecosystems. Berlin, Germany: Springer-Verlag.

Branch WR. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa, 3rd edition. Cape Town, South Africa: Struik.

Bruton M, Haacke WD. 1980. The reptiles of Maputaland. In: Bruton MN, Cooper KH, editors. Studies on the Ecology of Maputaland. Cape Town, South Africa: Rhodes University and the Natal Branch of the Wildlife Society of Southern Africa.

Engstrom RT. 2010. First-order fire effects on animals: review and recommendations. Fire Ecol. 6(1): 115–131.

FitzSimons VFM. 1962. Snakes of Southern Africa. Cape Town, South Africa: Purnell and Sons.

Jordaan PR, Green AN, Woolcock AB, Steyl JCA. 2019b. Fire-associated injury in the Southern Rock Monitor (*Varanus albigularis albigularis*). Biawak 13(1): 43–45.

Jordaan PR, Steyl JCA, Hanekom CC, Combrink X. 2020. Fire-associated reptile mortality in Tembe Elephant Park, South Africa. Fire Ecol. 16: 3.

Jordaan PR, van der Goot AC, Muller HP, Steyl JCA. 2019a. Fire-induced reptile mortality following a management burn on Lapalala Wilderness (Limpopo Province, South Africa) with notes on the mechanisms of mortality. Herpetol. Notes 12: 1173–1177.

Masterson GPR, Maritz B, Alexander GJ. 2008. Effects of fire history and vegetation structure on herpetofauna in a South African grassland. Appl. Herpetol. 5: 129–143.

Mucina L, Rutherford MC, editors. 2006. The Vegetation of South Africa, Lesotho, and Swaziland. Strelitzia 19. Pretoria, South Africa: South African National Biodiversity Institute.

SUBMITTED BY:

PHILIPPUS R. JORDAAN
Lubombo Transfrontier Conservation Area Scientific Technician: Maputo Special Reserve and Tembe Elephant Park 2018–2020; & Tshwane University of Technology, Department of Nature Conservation.
E-mail: PRJordaan@aecproject.org

JOHAN C.A. STEYL
Department of Paraclinical Sciences, Faculty of Veterinary Science, University of Pretoria.
E-mail: Johan.steyl@up.ac.za

TESTUDINIDAE

Chersobius boulengeri

(Duerden, 1906)

Karoo Padloper

SEVERE POPULATION DECLINE

V.J.T. LOEHR

The Karoo Padloper *Chersobius boulengeri* was categorised as Endangered by Hofmeyr et al. (2018), in part because surveys from 2005 to 2017 had located just a single population (i.e., an area containing adult males and females as well as juveniles, as opposed to scattered sightings of single individuals). This population was located on a hill slope in the Nama Karoo biome of the Northern Cape Province of South Africa (due to the sensitivity of this population the coordinates are withheld here, but are recorded on the biodiversity database of CapeNature, Western Cape Province, South Africa). A mark-recapture study of this population from 2018–2020 revealed that the population consisted of adult individuals, whereas juveniles were virtually absent (Loehr and Keswick 2022). About a third of the individuals in the population were considered old, as indicated by shell wear. Due to the lack of recruitment of juveniles into the adult age class, this population was predicted to be in decline (Loehr and Keswick 2022). Given the fact that this is the only known Karoo Padloper population, it is important that additional studies monitor it.

In April 2022 I briefly revisited the population, compiling 61 person-hours of fieldwork.
I examined all dead tortoises that I recovered for signs of previous markings (i.e., notches in the marginal scutes, see Loehr and Keswick 2022). Of 74 tortoises that were marked from 2018–2020 and that comprised most of the population at that stage, 16 (22%) had died by April 2022 (Table 1). All recovered (i.e., dead) tortoises were adult individuals, 38% of which were categorised as old based on the wear on the carapace. The revisit in April 2022 was too brief to thoroughly survey the entire site, and some deceased tortoises may have been washed away by the heavy rain showers that fell between October 2021 and March 2022 as their carapaces are light-weight, most dead tortoises were found in the open, and this population occurs on a hillside. Furthermore, some dead tortoises may have been removed by predators or scavengers. Thus, the proportion of the population that had died by April 2022 is almost certainly an underestimation.

Loehr and Keswick (2022) argued that White-Necked Ravens *Corvus albicollis* and Pied Crows *Corvus albus* may have been responsible for the lack of juveniles in the population. They found several Karoo Padloper hatchlings, but size classes between hatchlings and adults were missing.

Table 1. Number of unique Karoo Padloper *Chersobius boulengeri* that were marked between 2018–2020, and the number of individuals that were recovered (i.e., found dead) in 2018–2022. Survey effort was 478, 457, 473 and 61 person-hours in 2018–2020 and 2022, respectively.

	Marked			Recovered		
Year	Male	Female	Juvenile	Male	Female	Juvenile
2018	27	25	1	0	1	0
2019	7	5	0	2	2	0
2020	7	2	0	0	3	0
2022				3	5	0
Total	41	32	1	5	11	0

These authors suggested that these 'missing' age classes might have been killed and removed from the site by these corvids, although the prevailing drought conditions may have also played a role (Loehr and Keswick 2022). Examination of the adult carcasses in April 2022 showed that most had a large hole in the carapace, intact plastron, and limbs still present (Fig. 1). Some lacked the hole and were broken in two pieces, presumably having been smashed on rocks from the air. Comparison with shells of North American Desert Tortoises *Gopherus agassizii* killed by Common Ravens *Corvus corax* suggested that Karoo Padlopers had been depredated by corvids.

Figure 1. Adult female Karoo Padloper *Chersobius boulengeri*, presumably depredated by a White-necked Raven *Corvus albicollis*.

Tortoise life-histories are characterised by slow growth to maturity, high survival, and low fecundity. Speckled Padloper *Chersobius signatus* females require 11–12 years to mature (Loehr et al. 2007). It is unlikely that the Karoo Padloper population will be able to sustain a >22% decrease of adult individuals in just four years, especially in the absence of juveniles to replace the deceased adults. It appears that conservation action is urgently required to reduce mortality in this Karoo Padloper population. Analogues to extensive experience with management of Common Ravens in the United States of America, conservation action could involve reducing local populations of White-Necked Ravens and Pied Crows by a reduction of anthropogenic resources provided to them (e.g., nesting sites, food, water; Boarman 2003), and active control (e.g., killing eggs with mineral oil [Shields et al. 2019] or actively controlling the adult population).

ACKNOWLEDGEMENTS

This study would not have been possible without the following donors: Zoo Knoxville, Turtle Conservation Fund/Conservation International, Holohil Grant Program, Turtle Survival Alliance Europe, Dutch-Belgian Turtle and Tortoise Society, British Chelonia Group, Crocodile Zoo Prague, and several private individuals. In addition, I would like to thank Sheryl Gibbons, Courtney Hundermark, Andreas Iosifakis, Mark Klerks, On Lee Lau, Clara Lemyre, Esther Matthew, Olda Mudra, Sharon Pavoni, Susannah Peel, Bonnie Schumann, Sérgio Silva, Paul van Sloun, and Carlos Voogdt for their help in the field. Special thanks are extended to Toby Keswick for his assistance in setting up the study and conducting fieldwork. The Northern Cape Department of Environment and Nature Conservation and the Senate Research Committee of the University of the Western Cape are thanked for providing research permits (FAUNA 0950/2017, FLORA 0066/2017 and FLORA 0067/2017) and ethical clearance (registration no: 04/4/11), respectively, and Cora Stobie and an anonymous reviewer are thanked for their helpful comments.

REFERENCES

Boarman WI. 2003. Managing a subsidized predator population: reducing common raven predation on desert tortoises. Environ. Manage. 32: 205–217.

Hofmeyr MD, Loehr VJT, Baard EHW, Juvik JO. 2018. Karoo Dwarf Tortoise *Chersobius boulengeri*. The IUCN Red List of Threatened Species. [accessed 31 August 2021]. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T170521A115656360.en

Loehr VJT, Hofmeyr MD, Henen BT. 2007. Growing and shrinking in the smallest tortoise, *Homopus signatus signatus*: the importance of rain. Oecologia 153: 479–488.

Loehr VJT, Keswick T. 2022. Structure and projected decline of a Karoo Dwarf Tortoise population. J. Wildl. Man. 86: e22159.

Shields T, Currylow A, Hanley B, Boland S, Boarman W, Vaughn M. 2019. Novel management tools for subsidized avian predators and a case study in the conservation of a threatened species. Ecosphere 10: e02895.

SUBMITTED BY

VICTOR J.T. LOEHR
Dwarf Tortoise Conservation, Kwikstaartpad 1, 3403ZH IJsselstein, Netherlands.
E-mail: loehr@dwarftortoises.org

SCINCIDAE

Scelotes bidigittatus

(FitzSimons, 1930)

Lowveld Dwarf Burrowing Skink

REPRODUCTION

T. J. PING

There are few documented reproductive records of *Scelotes* in southern Africa, and particularly in relation to neonate size of the Lowveld Dwarf Burrowing Skink *Scelotes bidigittatus*. The only reproductive data available for the genus *Scelotes* in eastern southern Africa are for *S. bidigittatus*: 1–2 young born in late summer or early autumn; Zululand Dwarf Burrowing Skink *S. arenicola*: 2–4 young (43–52 mm total length) born February–March; and Mozambique Dwarf Burrowing Skink *S. mossambicus*: 2–3 young born in late summer (Pienaar et al. 1983; Branch 1998).

Figure 1. Gravid adult female Lowveld Dwarf Burrowing Skink *Scelotes bidigittatus* from St Lucia, KwaZulu-Natal Province, South Africa. Photo: Tyrone Ping.

On the afternoon of 7 February 2021, at approximately 17h39, the author unearthed a *S. bidigittatus* which appeared to be gravid (Fig. 1) from beneath a mound of concrete embedded in a grassed lawn in St Lucia, KwaZulu-Natal Province, South Africa (28° 22' 19" S, 32° 24' 51" E, QDS 2832AD; 28 m a.s.l.). The identification of the species was supported by the lack of forelimbs, and each hindlimb having two minute toes (Branch 1998, Ping 2022). The skink was placed in a container with soil from beneath the rock and kept overnight to measure and photograph the following morning. The record was uploaded to iNaturalist and can be viewed at https://www.inaturalist.org/observations/106380564.

This individual was an adult female with a partly regenerated tail and measured 71 mm snout-vent length (SVL) + 42 mm tail length (TL) = 113 mm in total. She gave birth to two neonates measuring 33 mm SVL + 22 mm TL = 55 mm total length, and 30 mm SVL + 22 mm TL = 52 mm total length (Fig. 2), respectively. Both neonates had distinct straw-coloured dorsolateral stripes, a pale dorsal band with dark-edged scales, and dark blue (nearly black) tails. Both young were only discovered prior to release as they

Figure 2. Neonate Lowveld Dwarf Burrowing Skinks *Scelotes bidigittatus* from St Lucia, KwaZulu-Natal Province, South Africa. Photo's: Tyrone Ping.

Figure 3. Adult female and neonate Lowveld Dwarf Burrowing Skinks *Scelotes bidigittatus* from St Lucia, KwaZulu-Natal Province, South Africa. Photo: Tyrone Ping.

were buried under the soil in the container. None of the animals were weighed as a suitable scale was not available. Shortly after the measurements and photographs were taken, the skinks were released at the original capture site.

There is very little previously reported reproductive data available for *S. bidigittatus*, with Pienaar et al. (1983) merely mentioning that 1–2 young are born in late summer or early autumn. Available literature suggests that as a whole, members of the genus *Scelotes* give birth to one or two (Branch 1998), or 1–4 (Alexander & Marais 1998) offspring at a time. In this instance, the female had a clutch size of two, with neonates being born in February, which confirms the mentioned timings of late summer or early autumn (Pienaar et al. 1983) and extends the timing of "December–January" mentioned by Branch (1998).

ACKNOWLEDGEMENTS

I would like to thank Aaron Bauer and Philip Jordaan for their comments and suggestions on this note.

REFERENCES

Alexander G., Marais J. 1998. A Guide to the Reptiles of Southern Africa. Cape Town, South Africa: Struik.

Branch WR. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa, 3rd edition. Cape Town, South Africa: Struik.

Pienaar U de V, Haacke WD, Jacobsen NHG. 1983. The Reptiles of the Kruger National Park. Pretoria, South Africa: National Parks Board of South Africa.

Ping TJ. 2022. A Field Guide to Snakes and Other Reptiles of KwaZulu-Natal. Cape Town, South Africa: Pachydactylus Press.

SUBMITTED BY:

TYRONE JAMES PING
7 Oak Tree Avenue, Glen Anil, KwaZulu-Natal Province, South Africa
E-mail: contact@tyroneping.co.za

AHN
NATURAL HISTORY NOTES

AGAMIDAE

Acanthocercus atricollis

Smith, 1849

Southern Tree Agama

DIET

E.A. JACKSON & G.K. NICOLAU

The lizard family Agamidae includes 64 genera and approximately 550 species that are found throughout Africa, Europe, Asia and Australia (Uetz et al. 2022). These lizards range greatly in size and occupy a wide variety of habitats. Many members of this group feed primarily on invertebrates (Znari and El Mouden 1997; Dusen and Oz 2001; Heideman 2002; Ibrahim and El-Naggar 2013; Tan et al. 2020), while some are predominantly herbivorous (Cunningham 2001; Herrel and De Vree 2009). Thus, the documentation of vertebrates included within the natural diets of most Agamidae is uncommon. This is especially the case for African species; however, sporadic records have shown that some species will prey upon vertebrates, these generally being lizards (Smolensky and Hibbitts 2011; Akani et al. 2013; Von Stade 2018; Barlow 2020; Gerrets 2020).

The Southern Tree Agama *Acanthocercus atricollis* is a medium sized lizard (120–167 mm SVL), which is distributed throughout south-eastern Africa: Botswana, eSwatini, Malawi, Mozambique, South Africa and Zimbabwe (Branch 1998; Wagner et al. 2021). This predator is predominantly arboreal, where they will often forage and bask in tree canopies (Reaney and Whiting 2002, 2003; Tan et al. 2020). *Acanthocercus atricollis* diet has been documented to comprise of a variety of invertebrate species, with ants (Hymenoptera: Formicidae) appearing to be their main food source (Reaney and Whiting 2002; Tan et al. 2020), although vegetation is also consumed (Broadley 2008; Tan et al. 2020).

On 15 February 2021, at approximately 09h20, an adult *A. atricollis* was observed catching a juvenile Giant Bullfrog *Pyxicephalus adspersus* off the ground at the base of a large tree. This foraging event was observed in the Nylsvley Nature Reserve, Limpopo Province, South Africa (24° 38' 46" S, 28° 40' 13" E, QDS 2428DA, 1 117 m a.s.l.) during the wet season, when juvenile *P. adspersus* were abundant. The agama carried the prey item back up into the tree canopy to finish consuming the meal (Fig. 1) and the predation event lasted approximately 4 minutes.

Figure 1. Adult Southern Tree Agama *Acanthocercus atricollis* predating on a juvenile Giant Bullfrog *Pyxicephalus adspersus* in the Nylsvley Nature Reserve, Limpopo Province, South Africa. Photo: Gary Nicolau

This record builds on the growing number of observations of *A. atricollis* predating on vertebrates (Jacobsen 1989; Spawls et al. 2018; Von Stade 2018). It is also likely that this is the first documented predation event for an African agamid species predating on an anuran. This record expands the known dietary breadth for this species and provides further insight into the role that amphibian breeding events have within an ecosystem.

ACKNOWLEDGEMENTS

Thank you to Ryan van Huyssteen and an anonymous reviewer for feedback and improvements on the manuscript.

REFERENCES

Akani GC, Petrozzi F, Rugiero L, Segniagbeto GH, Luiselli L. 2013. Effects of rainfall and geography on the comparative diets of eight rainbow lizard populations across Togo, Benin and Nigeria (West Africa). Amphib-Reptil. 34: 185–192.

Barlow C. (2020). Predation Records - Reptiles and Frogs (Sub-Saharan Africa). [accessed 4 May 2022]. https://web.facebook.com/photo/?fbid=2905030466200625&set=gm.2738526069516562

Branch WR. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa, 3rd edition. Cape Town, South Africa: Struik.

Broadley S. 2008. Natural History Note: Southern Tree Agama *Acanthocercus atricollis* (A. Smith, 1849) – *Acacia* gum diet. Afr. Herp News 46: 15.

Cunningham PL. (2001). Notes on the diet, survival rate, and burrow specifics of *Uromastyx aegyptius*. Asiat. Herpetol. Res. 9: 30–33.

Dusen S, Oz M. 2001. A study on the feeding biology of *Laudakia* (=*Agama*) *stellio* (L. 1758) (Lacertilia: Agamidae) populations in the Antalya Region. Turk. J. Zool. 25: 177–181.

Gerrets J. (2020). Predation Records - Reptiles and Frogs (Sub-Saharan Africa). [accessed 4 May 2022]. https://web.facebook.com/photo/?fbid=10208488404073891&set=pcb.1190711260964725

Heideman NJL. 2002. A comparison of the breeding and non-breeding season diets of *Agama aculeata* and *Agama planiceps* (Reptilia: Agamidae) in Windhoek, Namibia. J. Herpetol. 36: 515–520.

Herrel A, De Vree F. (2009). Jaw and hyolingual muscle activity patterns and bite forces in the herbivorous lizard *Uromastyx acanthinurus*. Arch. Oral Biol. 54(8): 772–782.

Ibrahim AA, El-Naggar MH. 2013. Diet and reproductive biology of the Starred Agama, *Laudakia stellio* (Linnaeus, 1758) (Squamata: Agamidae), in the northern Sinai, Egypt. Zool. Middle East. 59: 136–143.

Jacobsen NHG. 1989. A herpetological survey of the Transvaal. [Ph.D. thesis]. Pietermaritzburg, South Africa: University of Natal.

Reaney LT, Whiting MJ. 2002. Life on a limb: ecology of the tree agama (*Acanthocercus a. atricollis*) in southern Africa. J. Zool. 257: 439–448.

Reaney LT, Whiting MJ. 2003. Picking a tree: habitat use by the tree agama, *Acanthocercus atricollis atricollis*, in South Africa. Afr. Zool. 38: 273–278.

Smolensky NL, Hibbits TJ. 2011. Natural History Note: Rainbow Lizard *Agama agama agama* (Linnaeus, 1758) – Diet. Afr. Herp News 53: 50–51.

Spawls S, Howell K, Hinkel H, Menegon M. 2018. Field Guide to East African Reptiles, 2nd edition. London, U.K.: Bloomsbury Publishing.

Tan WC, Herrel A, Measey J. 2020. Dietary observations of four southern African agamid lizards (Agamidae). Herpetol. Conserv. Biol. 15: 69–78.

Uetz P, Freed P, Aguilar R, Hošek J. 2022. The reptile database. [accessed 26 February 2022]. http://www.reptile-database.org

Von Stade CN. (2018). Predation Records - Reptiles and Frogs (Sub-Saharan Africa). [accessed 4 May 2022]. https://web.facebook.com/photo/?fbid=1834059906667750&set=gm.1580200495349131

Wagner P, Butler BO, Ceríaco LMP, Bauer AM. 2021. A new species of the *Acanthocercus atricollis* complex (Squamata: Agamidae). Salamandra 57(4): 449–463.

Znari M, El Mouden E. 1997. Seasonal changes in the diet of adult and juvenile *Agama impalearis* (Lacertilia: Agamidae) in the central Jbilet Mountains, Morocco. J. Arid Environ. 37: 403–412.

SUBMITTED BY:

EMILY JACKSON
Rhodes University, Makhanda, 6140, Eastern Cape Province, South Africa.
E-mail: emilyjackson.research@gmail.com

GARY KYLE NICOLAU
Rhodes University, Makhanda, 6140, Eastern Cape Province, South Africa.
E-mail: garykylenicolau@gmail.com

COLUBRIDAE

Dasypeltis fasciata

Smith, 1849

Central African Egg-eater

DEFENSIVE BEHAVIOUR

P. J. SENTER

There are 17 recognized species in the genus *Dasypeltis*, the egg-eating snakes (Bates and Broadley 2018; Trape et al. 2021). In those species of *Dasypeltis* for which defensive behaviour has been documented, it includes a display in which the body is arranged in concentric C-shaped folds with the head in the centre. The snake rubs the folds upon each other, producing a hissing sound as the keeled scales of the flanks rasp against each other (Gans and Richmond 1957; Pitman 1974; Broadley 1983). Although this display is sometimes described as typical for the genus (e.g., Gans 1961; Branch 1998; Spawls et al. 2018; Chippaux and Jackson 2019), it is undocumented in most species of *Dasypeltis*. The written literature describes the behaviour most fully in the Common Egg-eater *D. scabra* (Gans and Richmond 1957; Rose 1962; Pitman 1974; Broadley 1983; Young et al. 1999a; Marais 2004). In *D. scabra*, the display is accompanied by neck inflation, striking (Gans and Richmond 1957; Rose 1962; Broadley 1983), and hissing by means of forced expiration (Gans and Richmond 1957). Gans (1961) also mentioned that the display is accompanied by flattening the head, but he did not specify the species. Young et al. (1999b) documented head flattening in the defensive display of *D. scabra*.

YouTube videos document the defensive display of scale rasping with moving, concentric C-shaped folds in the Egyptian Egg-eater *D. bazi (e.g.,* https://www.youtube.com/watch?v=vVTdI50DIis) and and Gans's Egg-eater *D. gansi* (e.g., https://www.youtube.com/watch?v=ZllJRjiePRI).

The videos show that neck inflation occurs in both species during the display, and striking and head flattening occur in *D. gansi*. Published photographs additionally document the display in the Southern Brown Egg-eater *D. inornata* and a Confusing Egg-eater *D. confusa* from Angola (Bates 2009). In both photographs, the snakes' bodies are configured in concentric C-shaped folds with the head in the centre, and the display is accompanied by head flattening. In the photo of *D. inornata*, its throat is inflated. The display is also documented in the East African Egg-eater *D. medici*, which is known to strike while producing a hissing sound by rubbing the scales of adjacent body folds together (Marais 2004). Here, I add one more species to the list of *Dasypeltis* for which the defensive display is documented: the Central African Egg-eater *D. fasciata*. Cansdale (1961) noted that he collected four *D. fasciata* and that "the scales are so rough that they rub against each other with a hissing sound," but he did not specifically mention said rubbing as a defensive display, nor did he give further details such as concentric C-shaped folds, neck inflation, head flattening, or striking.

On 11 August 1986, Sam Wiah, an acquaintance of mine, found a *D. fasciata* in a garbage bin at his home in Yekepa, Nimba County, Liberia (7°35' N, 8°32' W, NW007008DA; ca. 520 m a.s.l.). It was an adult, 610 mm long, and of unknown sex. He put on a glove, put the snake into a can, and brought it to me that morning. I kept it on the porch of my home (house 4 of Area J, Yekepa) in a cage that contained two small branches, for the next four days. According to my written records, the snake explored the cage upon entry and then rested upon a branch for a time. Later the same morning, after the snake had crawled down from the branch, I reached into the cage to pick the snake up. Its response was to hiss by forced expiration and to assume the position described for *D. scabra* – a series of concentric C-shaped folds with the head in the centre – without adding the scale-rasping display. In the following days, the snake would freeze when approached. The texture and colour pattern of its skin, and the fact that its keeled scales collected dust, made it look very much like a stick, and the freezing upon approach added to the effect of the camouflage. When annoyed by a human, the snake would swell its throat. When annoyed further, it would adopt the position previously described – a concentric series of C-shaped folds with the head in the centre – and would rub the folds together and on the substrate, which produced a loud hissing sound, as in *D. scabra* (Gans and Richmond 1957; Pitman 1974; Broadley 1983). During this display, it would also strike. My records of the snake's behaviour do not mention head flattening.

The scale-rasping defensive display with moving, concentric C-shaped coils is present in at least one other West African species of *Dasypeltis*. In April or May of 1984, I observed the display on the porch of my home in Yekepa (7°35'10" N, 8°32'01" W, NW007008DA; 519 m a.s.l.). A wild *Dasypeltis* sp. that was found on the porch did the display there when approached. The markings of the snake, which included a dark V on the nape, were consistent with *D. confusa* and the Cryptic Egg-eater *D. parascabra* (see Trape et al. 2012) but not with *D. fasciata*. The display (scale rasping by means of moving, concentric C-shaped coils) was more vigorous in this specimen than in the *D. fasciata* whose behaviour is described above.

This paper increases the number of *Dasypeltis* species for which documentation of the defensive display exists in the written literature from four to seven. In the *Dasypeltis* defensive display, the snake positions itself so that its head is in the centre of a series of concentric C-shaped folds, and it moves adjacent folds in opposite directions so that its keeled scales rasp upon each other to produce a hissing sound. In five of the seven species (*D. bazi, D. fasciata, D. gansi, D. inornata,* and *D. scabra*), neck inflation is known to accompany this movement. In four of the seven (*D. gansi, D. inornata, D. scabra,* and *D. confusa*), head flattening is also known to accompany it. Although the display remains undocumented in several of the species of the genus, I argue that it is now documented in a high enough number of *Dasypeltis* species to be considered characteristic of the genus.

ACKNOWLEDGEMENTS

Many thanks to Sam Wiah for providing the *D. fasciata* specimen and to Shai Meiri and Michael Bates for providing helpful reviews that improved this manuscript.

REFERENCES

Bates MF. 2009. The egg-eating snakes of Africa. Culna 64: 2–4.

Bates MF, Broadley DG. 2018. A revision of the egg-eating snakes of the genus *Dasypeltis* Wagler (Squamata: Colubridae: Colubrinae) in north-eastern Africa and south-western Arabia, with descriptions of three new species. Indago 34: 1–95.

Branch WR. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa, 3rd edition. Sanibel Island, U.S.A.: Ralph Curtis.

Broadley DG. 1983. Fitzsimons' Snakes of Southern Africa. Johannesburg, South Africa: Delta Books.

Cansdale GS. 1961. West African Snakes. Essex, U.K.: Longman.

Chippaux J-P, Jackson K. 2019. Snakes of Central and Western Africa. Baltimore, U.S.A.: Johns Hopkins University Press.

Gans C. 1961. Mimicry in procryptically colored snakes of the genus *Dasypeltis*. Evolution 15: 72–91.

Gans C, Richmond ND. 1957. Warning behavior in snakes of the genus *Dasypeltis*. Copeia 1957: 269–274.

Marais J. 2004. A Complete Guide to the Snakes of Southern Africa, 2nd edition. Cape Town, South Africa: Struik Nature.

Pitman CRS. 1974. A Guide to the Snakes of Uganda, revised edition. Codicote, U.K.: Wheldon & Wesley.

Rose W. 1962. The Reptiles and Amphibians of Southern Africa, revised edition. Cape Town, South Africa: Maskew Miller.

Spawls S, Howell K, Hinkel H, Menegon M. 2018. Field Guide to East African Reptiles, 2nd edition. London, U.K.: Bloomsbury Publishing.

Trape J-F, Mediannikov O, Chirio A, Chirio L. 2021. Une nouvelle espèce de serpent mangeur d'œufs du genre *Dasypeltis* Wagler (Squamata: Colubridae: Colubridae) en Afrique centrale. Bull. Soc. Herpetol. Fr. 177: 65–80.

Trape S, Mediannikov O, Trape J-F. 2012. When colour patterns reflect phylogeography: new species of *Dasypeltis* (Serpentes: Colubridae: Boigini) from West Africa. C. R. Biol. 335: 488–501.

Young BA, Lalor J, Solomon J. 1999b. The comparative biomechanics of an ophidian defensive behaviour: head triangulation in Hognose Snake (*Heterodon*) and an Egg-eating Snake (*Dasypeltis*). J. Zool. 248: 169–177.

Young BA, Meltzer K, Marsit C. 1999a. Scratching the surface of mimicry: sound production through scale abrasion in snakes. Hamadryad 24: 29–38.

SUBMITTED BY:
PHILIP J. SENTER
Department of Biological and Forensic Sciences, Fayetteville State University, Fayetteville, NC 28301, U.S.A.
E-mail: psenter@uncfsu.edu

ELAPIDAE
Naja haje
(Linnaeus, 1758)
Egyptian Cobra
SCAVENGING BEHAVIOUR

F. JIMÉNEZ-CAZALLA & L. GARCÍA-CARDENETE

Until recently, scavenging was neglected as a feeding strategy in wild snakes, although this behaviour is often observed in captive individuals and attributed to captive conditions (Schmidt 1995). Nonetheless, records of snakes scavenging in the wild have been known since at least 1946 (Devault and Krochmal 2002). In fact, new evidence supports that this behaviour can be generalized and highly relevant for the feeding ecology of some species; for instance, Lillywhite et al. (2002, 2008) demonstrated that scavenging is a deliberate feeding strategy in insular populations of Cottonmouth *Akistrodon piscivorous,* where their main food source is fish dropped or regurgitated by nesting birds.

Carrion consumption has been described for at least nine snake families: Acrochordidae, Boidae, Colubridae, Natricidae, Elapidae, Viperidae (Devault and Krochmal 2002), Pythonidae (Trembath et al. 2007), Psammophiidae (Ventura 2012) and Dipsadidae (Ucha and Santos 2017). In elapids there are references to King Brown Snake *Pseudechis australis* (Bedford 1991) and more recently for Black Spitting Cobra *Naja nigricincta woodi* (Loehr 2005), Cape Cobra *Naja nivea* (Phelps 2006) and Common Krait *Bungarus caeruleus* (Monapatra 2011; Deshmukh et al. 2016) scavenging. Here, we contribute another example of carrion consumption in an elapid species.

The Egyptian Cobra *Naja haje* is the only cobra species inhabiting the northern Sahara Desert (Sindaco et al. 2013) and is also present in the southern Sahara Desert (Trape et al. 2009). It is considered an active forager and its food spectrum is well known, comprising small mammals, birds (and their eggs), amphibians and reptiles (including snakes and conspecifics; Schleich et al. 1996).

While conducting a herpetological survey close to the Labyar River in Guelmin Province in the south of Morocco (28° 56’ N, 10° 27’ W) on 25 September 2012, we found a dead juvenile *N. haje* with a total length of 431 mm that had fallen into a dry cistern for watering livestock of approximately 2 x 5 m and 2.5 m deep with vertical walls, which represent fatal traps for many vertebrates (García-Cardenete et al. 2014). The specimen had died trying to ingest a toad (either a Mauritanian Toad *Sclerophrys mauritanica* or an African Green Toad *Bufotes boulengeri*), which was in an advanced state of decomposition with a total length of 58

Figure 1. Egyptian Cobra *Naja haje* that died after trying to ingest a toad carcass.

mm (Fig. 1). There was no live potential prey in the cistern at the time of our discovery. The surrounding habitat was arid Macaronesian scrubland.

Our observation extends previous evidence of snakes scavenging and provides additional information on the feeding strategy of *N. haje*. In addition, interestingly, the advanced state of decomposition did not motivate the snake to refuse the prey. Teshera et al. (2021) suggest that putrescent odours indicate to the snake that an easily digestible meal within a relatively close proximity can be obtained with minimal risk and effort. Overall, we speculate that this behaviour may represent an occasional strategy in natural conditions for *N. haje* in this region due to the low availability of live prey, although the possibility that this was an extreme attempt at survival given the absence of other suitable prey in the cistern cannot be entirely discounted.

REFERENCES

Bedford GS. 1991. Two records of road kill predation by Mulga Snakes (*Pseudechis australis*). Herpetofauna 21(2): 39–40.

Deshmukh RV, Deshmukh SA, Badhekard SA. 2016. A second record of scavenging behavior in Common Indian Krait, *Bungarus caeruleus* (Schneider, 1801) from India. Reptiles Amphib. 23(3): 169–170.

Devault TL, Krochmal AR. 2002. Scavenging by snakes: an examination of the literature. Herpetologica 58: 429–436.

García-Cardenete L, Pleguezuelos JM, Brito JC, Jiménez-Cazalla F, Pérez-García MT, Santos X. 2014. Water cisterns as death traps for amphibians and reptiles in arid environments. Environ. Conserv. 41: 341–349.

Lillywhite HB, Sheehy III CM, McCue M. 2002. Scavenging behaviors of Cottonmouth snakes at island bird rookeries. Herp. Rev. 33: 259–261.

Lillywhite HB, Sheehy III CM, Zaidan III F. 2008. Pitviper scavenging at the intertidal zone: an evolutionary scenario for invasion of the sea. BioScience 58: 947–955.

Loehr VJT. 2005. Natural History Note: Black Spitting Cobra *Naja nigricollis woodi* Pringle, 1955 – Scavenging. Afr. Herp News 38: 27.

Monapatra PP. 2011. Common Krait *Bungarus caeruleus* – Scavenging. Herpetol. Rev. 42: 436–437.

Phelps T. 2006. Natural History Note: Cape Cobra *Naja nivea* (Linnaeus, 1758) – Scavenging. Afr. Herp News 40: 24.

Schleich HH, Kästle W, Kabisch K. 1996. Amphibians and Reptiles of North Africa. Koenigstein, Germany: Koeltz Scientific Books.

Schmidt D. 1995. Breeding and Keeping Snakes. New Jersey, U.S.A.: T.F.H. Publications.

Sindaco R, Venchi A, Grieco C. 2013. The Reptiles of the Western Palearctic, vol. 2: Annotated Checklist and Distributional Atlas of the Snakes of Europe, North Africa, Middle East and Central Asia. Latina, Italy: Edizioni Belvedere.

Teshera MS, Clark RW, Wagler AE, Greenbaum E. 2021. Foraging and scavenging behaviour of the prairie rattlesnake (*Crotalus viridis*): no evidence that envenomation cues facilitate kleptoparasitism of struck prey. Amphib-Reptil. 42(4): 491–501.

Trape JF, Chirio L, Broadley DG, Wüster W. 2009. Phylogeography and systematic revision of the Egyptian Cobra (Serpentes: Elapidae: *Naja haje*) species complex, with the description of a new species from West Africa. Zootaxa 2236: 1–25.

Trembath DF, Blackburn JL, Rowley JL. 2007. Roadkill predation by a Children's Python *Antaresia childreni* (Serpentes: Boidae) at Adelaide River, Northern Territory. North. Territ. Nat. 19: 58–59.

Ucha JL, Santos T. 2017. Death and life on the roadway: scavenging behaviour of the Green Racer Snake *Philodryas patagoniensis* (Girard, 1858) (Dipsadidae). Herp. Notes 10: 439–441.

Ventura F. 2012. Comportamiento carroñero en *Malpolon monspessulanus.* Bol. Asoc. Herpetol. Esp. 23(1): 8–9.

SUBMITTED BY:

FRANCISCO JIMÉNEZ-CAZALLA
Sociedad de Estudios Ambientales, C. Perú 4, 41 100, Seville, Spain.
E-mail: fjimenezcazalla@gmail.com

LUIS GARCÍA-CARDENETE
CL Carrera de S. Agustín 24, 18 300, Loja, Granada, Spain.
E-mail: luisgcardenete@yahoo.es

CROCODYLIDAE
Crocodylus niloticus
Laurenti, 1768
Nile Crocodile

R.I. STANDER

The Nile Crocodile *Crocodylus niloticus* is a widespread species known from nearly all major river systems in the east of the African continent. In Ethiopia, among other locations, *C. niloticus* is known from the Abay (Blue Nile) River and most of its major tributaries such as the Baro and Akobo Rivers (Largen and Spawls 2010). However, there are apparently no records from the Didessa River, a tributary on the south bank of the Abay roughly 660–700 km downstream from its source at Lake Tana. Previous surveys at the bridge between Nekemte and Gimbi (9° 01' 49" N, 36° 09' 17" E, QDS NE_009036AA; 1 140 m a.s.l.) have failed to locate *C. niloticus* in the Didessa River (Stephen Spawls, pers. comm.). The first report of *C. niloticus* in the Didessa River (77 km north of the Nekemte-Gimbi bridge) is presented herein.

On 19 May 2017, an adult *C. niloticus* was observed basking on the western bank of the Didessa River in the Benishangul-Gumuz Region of Ethiopia (9° 41' 10" N, 36° 01' 30" E, QDS NE_009036CA; 860 m a.s.l.). The animal was identified by its large size (2.5–3.5 m in length), bony scutes (Largen and Spawls 2010) and comparatively slender snout. The crocodile was photographed and the record accessioned to the ReptileMAP Virtual Museum https://vmus.adu.org.za/?vm=ReptileMAP-164940.

The nearest confirmed records of *C. niloticus* to the aforementioned location are about 125 km to the east at Lake Chomen, and 188 km to the north at Aysid. Also, at its closest point, the Baro River lies 199 km to the southwest in Gambella National Park (Largen and Spawls 2010; GBIF 2022).

Though there are no actual records of *C. niloticus* from the confluence of the Didessa and Abay Rivers (roughly 50 km downstream from the observation reported here), the area is almost certainly inhabited by crocodiles. Furthermore, the lower-lying sections of the Birbir River (a tributary of the Baro) more than likely support populations of *C. niloticus* as well (Tilahun et al. 2014; Abeje Kassie, pers. comm.). The Birbir River's closest point (below 1 300 m a.s.l.) to this observation is about 88 km to the southwest. The observation reported here highlights the need for the continued sampling of Ethiopia's herpetofauna.

Figure 1. Nile Crocodile *Crocodylus niloticus* on the bank of the Didessa River, Benishangul-Gumuz Region, Ethiopia. Photo: Ruan Stander

ACKNOWLEDGEMENTS

Stephen Spawls is thanked for sharing useful information as did Abeje Kassie (Ethiopian Biodiversity Institute) who also provided assistance in the field and with logistics. Israel Sahle, Chris Wilson and Gebreegziabher Hailay are thanked for their companionship and assistance in the field. Florian Finke is thanked for reviewing the draft of this note.

REFERENCES

Global Biodiversity Information Facility (GBIF). 2022. *Crocodylus niloticus* Laurenti, 1768. [accessed 17 July 2022] https://www.gbif.org/species/2441341

Largen M, Spawls S. 2010. The Amphibians and Reptiles of Ethiopia and Eritrea. Frankfurt am Main, Germany: Edition Chimaira.

Tilahun Z, Jiregna D, Solomon K, Haimanot D, Girma K, Abebe O, Sanbata T. 2014. Prevalence of bovine trypanosomosis, its vector density and distribution in Dale Sadi District, Kellem Wollega Zone, Ethiopia. Acta Parasitol. Glob. 5(2): 107–14.

SUBMITTED BY:

RUAN I. STANDER
Polokwane, Limpopo Province, South Africa.
E-mail: reptileruan@gmail.com

AMPHISBAENIDAE

Geocalamus acutus

Sternfeld, 1912

Voi Wedge-snouted Worm Lizard

R.M. KIMANI, P.K. MALONZA & B.A BWONG

The family Amphisbaenidae is divided into four groups based on their head shapes, *viz.* round-headed, spade-snouted, keel-snouted and shovel-snouted genera (Kearney 2003). The family comprises of a group of reptiles commonly known as worm lizards due to their worm-like appearance and limbless nature, and indeed at times they can be misidentified as earthworms. They are fossorial, thus making it hard to find them regularly. This results in them being one of the least known reptile families in East Africa (Spawls et al. 2018). They belong to the same order as lizards (Order Squamata), however studies have been conducted over time on whether to place them in their own order but these have not been conclusive (Gans 1978; Mott and Vieites 2009). For a while, this family has been treated separately from both snakes and lizards but after some molecular studies they were observed to be closely related to the family Lacertidae (Townsend et al. 2004).

East Africa has four worm lizard genera distributed between Kenya, Somalia and Tanzania (Gans and Kraklau 1989; Spawls et al. 2018; Uetz et al. 2022). The genus *Geocalamus* comprises of worm lizards that have a compressed snout that is highly modified into a wedge, and as such they are commonly known as wedge-snouted worm lizards (Gans and Kraklau 1989). The genus *Geocalamus* contains only two species: *G. modestus* that is endemic to Tanzania and *G. acutus* distributed in Kenya and Tanzania and endemic to East Africa (Gans and Kraklau 1989; Spawls et al. 2018). *Geocalamus acutus* is a fossorial species which burrows in loose sandy soil and is easily found during the wet season. In Kenya, *G. acutus* occurs in the south-eastern parts, including the Tsavo plains (e.g., Voi, Kasigau, Sagalla lowlands) and the dry parts of Arabuko Sokoke forest in Kilifi County (Spawls et al. 2018).

During a herpetological survey in the Tana Delta in Tana River County on 8 August 2020, a team of two investigators (R.M. Kimani and J. Nyamache) recorded a new locality for *G. acutus* at Lake Shakababo-Ngao (2° 25' 33"S, 40° 09' 48"E, QDS 0240AC; 17 m a.s.l.). This record is more than 100 km north-east of the nearest previous record at Arabuko-Sokoke Forest and is the first record of this species in the Tana Delta area. Two specimens were collected during this survey and are deposited in the National Museums of Kenya Herpetology reference collection, with accession numbers NMK-440L and NMK-441L.

Morphometric and meristic analyses were used to identify the specimens using the description in Spawls et al. (2018). One of the specimens was cut into two pieces during collection and was thus not an ideal specimen for morphometric investigations. The other specimen was in perfect condition and was used for morphometric investigations. The number of caudal annuli in the current specimen (8) was much lower than the range (19–26) provided in Spawls et al. (2018) and may indicate that the tail is truncated. There are 18 dorsal and 16 ventral segments per annulus. The total length of this new specimen (180 mm) is shorter than the specimens recorded from Arabuko Sokoke Forest. Due to their smaller size and the time of collection (dry season), the current specimens are assumed to be young individuals.

The two specimens were collected in woodland on the outskirts of Lake Shakababo in the Tana River Delta. The surrounding vegetation consists of segments of shrubland, open marshy areas and woodland on sandy soils. The specimens were dug up from a decaying log and upon exposure they immediately tried to escape by burrowing into the soil. The soil under the log was moister than the surrounding surface soil, which was dry and hot due to the high temperatures during the day. The oxbow lake where the specimens were found was dry since it is dependent on overflow water from the Tana River to fill it up. The woodland area is also undergoing deforestation by the locals for agricultural practices with the claim that it is their ancestral land. This new range extension definitely shows that *G. acutus* may occur in suitable sites in the intervening lands of Tsavo plains and Tana Delta such as Galana-Galole-Bura plains and possibly further afield.

ACKNOWLEDGMENTS

RMK wishes to acknowledge Joash Nyamache (Herpetology section, National Museums of Kenya) and Kennedy Otoi (local contact person at Tana River Delta) for their immense contribution during field data collection. We also wish to acknowledge Mohammed Bin Zayed Species Conservation Fund (MBZ) who funded the data collection through a grant awarded to RMK (project number 190522493). The authors also wish to acknowledge Stephen Spawls and Florian Finke for reviewing the article.

REFERENCES

Gans C. 1978. The characteristics and affinities of the Amphisbaenia. Trans. Zool. Soc. Lond. 34: 347–416.

Gans C, Kraklau DM. 1989. Studies on amphisbaenians (Reptilia) 8: two genera of small species from East Africa (Geocalamus and Loveridgea). Am. Mus. Novit. 2944: 1–28

Kearney M. 2003. Systematics of the Amphisbaenia (Lepidosauria: Squamata) based on morphological evidence from recent and fossil forms. Herpetol. Monogr. 17: 1–74.

Mott T, Vieites DR. 2009. Molecular phylogenetics reveals extreme morphological homoplasy in Brazilian worm lizards challenging current taxonomy. Mol. Phylogenet. Evol. 51: 190–200.

Spawls S, Howell K, Hinkel H, Menegon M. 2018. Field Guide to East African Reptiles, 2nd edition. London, U.K.: Bloomsbury Publishing.

Townsend TM, Larson A, Louis E, Macey JR. 2004. Molecular phylogenetics of Squamata: the position of snakes, amphisbaenians, and dibamids, and the root of the squamate tree. Syst. Biol. 53: 735–757.

Uetz P, Freed P, Aguilar R, Hošek J. 2022. The reptile database. [accessed 1 April 2022]. http://www.reptile-database.org.

SUBMITTED BY:

RONNIE MWANGI KIMANI
Herpetology Section, National Museums of Kenya, 40658 – 00100, Museum Hill, Nairobi, Kenya.
E-mail: ronniemwangik@gmail.com, ronnmwas270@gmail.com

PATRICK KINYATTA MALONZA
Head of Section, Herpetology Section, National Museums of Kenya, 40658 – 00100, Museum Hill, Nairobi, Kenya.
E-mail:
kmalonza@museums.or.ke, malonzapk@gmail.com

BERYL AKOTH BWONG
Senior Research Scientist, Herpetology Section, National Museums of Kenya, 40658 – 00100, Museum Hill, Nairobi, Kenya.
E-mail: akothbwong@gmail.com

SCINCIDAE
Trachylepis spilogaster
(Peters, 1882)
Kalahari Tree Skink

B. LUMB & T. J. PING

The Kalahari Tree Skink *Trachylepis spilogaster* has a broad geographic distribution and is commonly found in the arid savannah regions of South Africa, Botswana, Namibia and Angola (Branch 1998; Broadley 2000; Marques et al. 2018). Within South Africa it inhabits the arid north-west, with the southernmost records being in the region of Copperton and Omdraaisvlei in the Northern Cape Province (Masterson 2014).

On 31 March 2022, BL observed five *T. spilogaster* in Oudtshoorn, Western Cape Province, South Africa (33° 35' 34" S, 22° 13' 06" E, QDS 3322CA; 372 m a.s.l.) of which four were captured and photographed, and the photographs uploaded to iNaturalist (Table 1). All individuals were found in an urbanised area surrounded by retail and residential properties, with several scattered trees and dry grass in the vicinity. The first three individuals were found basking on the ground amongst small dry shrubs, while the fourth individual was found beneath a small dead log sheltering next to a juvenile Common Dwarf Gecko *Lygodactylus capensis*. The fifth individual was seen basking on the base of a tree and was not captured. All these individuals were found within a 20 m radius of each other. All captured individuals were measured using a standard metal ruler (Table 2) and photographed (Fig. 1) before being released where they were caught.

Trachylepis spilogaster is easily confused with other *Trachylepis* species (Stephens et al. 2022). The current individuals were identified as *T. spilogaster* on the basis of having three keels on each dorsal scale, the dorsal scales being in 32–36 rows at midbody, the presence of pale spots between the pale dorsolateral stripes, irregular black speckling on the throat and ventrum, and dark-edged upper and lower labials (Fig. 1), which distinguished them from other skink species (Branch 1998; Broadley 2000).

Figure 1. (A) Lateral view of head showing dark-edged upper and lower labials; (B) Ventral view showing dark speckles on throat and ventrum; (C) juvenile and; (D) adult Kalahari Tree Skink *Trachylepis spilogaster in situ*. All individuals were photographed in Oudtshoorn, Western Cape Province, South Africa. Photographs: B. Lumb.

Table 1. Mensural data for four Kalahari Tree Skinks *Trachylepis spilogaster* captured in Oudtshoorn, Western Cape Province, South Africa. SVL = Snout-vent length; Tail = Tail length; TL = Total length. All measurements are in mm.

Individual ID	SVL	Tail	TL
Adult	64	88	152
Subadult	55	86	141
Juvenile 1	30	48	78
Juvenile 2	30	47	77

After these initial observations, BL surveyed two additional sites in search of this species. On the afternoon of 6 May 2022, two *T. spilogaster* were observed 280 m from the site where this species was initially detected (33° 35' 32" S, 22° 13' 12" E, QDS 3322CA; 366 m a.s.l.; Table 1), while on 12 May 2022, BL observed one *T. spilogaster* at a third site (33° 35' 39" S, 22° 12' 57" E, 3322CA; 368 m a.s.l.), which was 650 m from where this species was first detected (Table 1).

On 2 June 2022, BL revisited each of the sites where this species was previously recorded and observed 32 individuals (consisting of adults, subadults and juveniles) at the initial detection site, four individuals (two adults, a subadult and a juvenile) at the second site and nine adults and subadults at the third site (Table 1).

These separate observations (totalling ~52 individuals) are the first records of *T. spilogaster* in the Western Cape Province and are approximately 400 km south of the nearest recorded locality in the Copperton region, Northern Cape Province, South Africa (Fig. 2). The Oudtshoorn population is believed to represent an anthropogenic introduction, as is also often seen with species such as *L. capensis*, Common Tropical House Gecko *Hemidactylus mabouia* and Eastern Cape Dwarf Chameleon *Bradypodion ventrale*, which are found in new areas where they did not previously occur thanks to mass transportation of goods and people (Rebelo et al. 2019; Tolley 2020; Agarwal et al. 2021).

The aforementioned records, which were made at three separate sites and which comprised of adults and juveniles, lead the authors to conclude that these observations represent an established and self-sustaining introduced population.

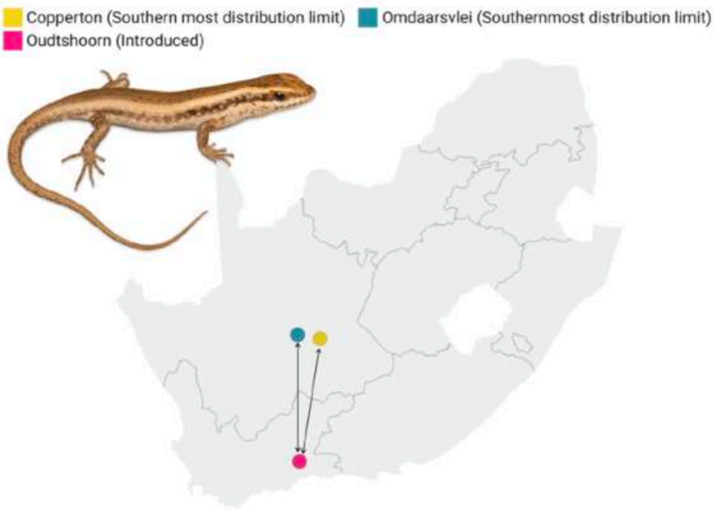


Figure 2. Geographic location of the newly reported anthropogenic introduction of Kalahari Tree Skinks *Trachylepis spilogaster* in Oudtshoorn, Western Cape Province, South Africa (pink circle) in relation to the southernmost naturally recorded distribution. Map: T. Ping.

ACKNOWLEDGEMENTS

The authors would like to thank Werner Conradie and Adriaan Jordaan for their comments and suggestions on this note.

Table 2. Metadata for sightings of Kalahari Tree Skinks *Trachylepis spilogaster* in Oudtshoorn, Western Cape Province, South Africa.

Date	Latitude	Longitude	Site	Hyperlink
31 March 2022	33° 35' 34" S	22° 13' 06" E	1	www.inaturalist.org/observations/110017518
31 March 2022	33° 35' 34" S	22° 13' 06" E	1	www.inaturalist.org/observations/110017125
31 March 2022	33° 35' 34" S	22° 13' 06" E	1	www.inaturalist.org/observations/110017375
31 March 2022	33° 35' 34" S	22° 13' 06" E	1	www.inaturalist.org/observations/110017746
6 May 2022	33° 35' 32" S	22° 13' 12" E	2	www.inaturalist.org/observations/115860314
6 May 2022	33° 35' 32" S	22° 13' 12" E	2	www.inaturalist.org/observations/115860379
12 May 2022	33° 35' 39" S	22° 12' 57" E	3	www.inaturalist.org/observations/116708659
2 June 2022	33° 35' 34" S	22° 13' 06" E	1	www.inaturalist.org/observations/119892093
2 June 2022	33° 35' 34" S	22° 13' 06" E	1	www.inaturalist.org/observations/119902644
2 June 2022	33° 35' 32" S	22° 13' 12" E	2	www.inaturalist.org/observations/119901634
2 June 2022	33° 35' 32" S	22° 13' 12" E	2	www.inaturalist.org/observations/119902079

REFERENCES

Agarwal I, Ceríaco LMP, Metallinou M, Jackman TR, Bauer AM. 2021. How the African House Gecko (*Hemidactylus mabouia*) conquered the world. R. Soc. Open Sci. 8: 210749.

Branch WR. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa, 3rd edition. Cape Town, South Africa: Struik.

Broadley DG. 2000. A review of the genus *Mabuya* in southeastern Africa (Sauria: Scincidae). Afr. J. Herpetol. 49(2): 87–110.

Marques MP, Ceríaco LMP, Blackburn DC, Bauer AM. 2018 Diversity and distribution of the amphibians and terrestrial reptiles of Angola: atlas of historical and bibliographic records (1840–2017). Proc. Calif. Acad. Sci. 4(65): 1–501.

Masterson G. 2014. Kalahari Tree Skink *Trachylepis spilogaster* (Peters, 1882). In: Bates MF, Branch WR, Bauer AM, Burger M, Marais J, Alexander GJ, de Villers MS, editors. Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. *Suricata* 1. Pretoria, South Africa: South African National Biodiversity Institute.

Rebelo AD, Bates MF, Burger M, Branch WR, Conradie W. 2019. Range expansion of the Common Dwarf Gecko, *Lygodactylus capensis*: South Africa's most successful reptile invader. Herpetol. Notes 12: 643–650.

Stephens K, Alexander GJ, Makhubo BG, Telford NS, Tolley KA. 2022. Mistaken identity: challenges with specimen identification for morphologically conservative skinks (*Trachylepis*) leads to taxonomic error. Afr. J. Herpetol 71(2): 101–118.

Tolley KA. 2020. Cham-Aliens: present and historical translocations of chameleons (*Bradypodion*). Afr. Herp News 74: 54–64.

SUBMITTED BY:

BERKELEY WILLIAM LUMB

The River Farm, Matjiesvlei, Western Cape Province, South Africa
Email: berkeleylumb@icloud.com

TYRONE JAMES PING
37 Beach Road, Cape Town, Western Cape Province, South Africa
Email: contact@tyroneping.co.za

AHN

INSTRUCTIONS TO AUTHORS

AFRICAN HERP NEWS

African Herp News publishes manuscripts in four categories, namely **Articles, Herpetological Surveys, Natural History Notes, and Geographical Distributions**.

CONTRIBUTIONS SUBMITTED IN AN INCORRECT STYLE (SEE GUIDELINES BELOW) WILL BE RETURNED TO THE AUTHORS

The type of submission (e.g., Article, Natural History Note, Geographical Distribution) should be clearly indicated in the file name. As a general guideline, always use the latest issue of *African Herp News* for instructions.

All submissions should be typewritten in English (U.K. spelling), set in 11 pt. Calibri with 1.5 line spacing and a single open line (but no additional space) between paragraphs. Words should not be divided at the right-hand margin. Use the active voice in the first person where possible (except for submissions for Tomorrow's Herpetologists Today). Formatting should be achieved with paragraph settings rather than tabs or spaces. Sentences should be separated by a single space (character). Genus and species names must be italicised. The International System of Units (Systeme Internationale; SI) should be followed. For fractional numbers, use decimal points rather than commas. Measures should be in mm, m or km rather than cm or dm. Integers less than 10 should be spelled out, while those greater than 10 (including 10) should be given numerically. Group integers of thousands together with a space (e.g., 10 500 and 1 230). Use an En-dash to indicate a range of values. Coordinates must be presented in DD° MM' SS" format, rounded to the nearest second. Dates should be presented in the format dd month year. Use the 24-hour clock in the format 14h32; 08h15. All statistical symbols should be italicised. Follow the Fourth Edition (1999) of the International Code of Zoological Nomenclature (available online at www.iczn.org/the-code/the-code-online). Every word in English common names should start with a capital letter (e.g., Namaqua Dwarf Adder; Guttural Toad). Place a full-stop between letters in abbreviations where each letter is pronounced (e.g., U.S.A., U.K., a.s.l.), but not between letters where the abbreviation is pronounced as a word (e.g., CITES). Appendices, Material Examined, Tables, Figure legends and Figures must follow the References.

Common names

Mention both the common and scientific names of a species when first mentioned (unless these are already mentioned in the article heading, such as Natural History and Geographical Distribution notes), thereafter either can be used (but preferably the scientific name), as long as it is consistently used throughout.

Reptiles

For **southern Africa**, use the English common names as they appear on the African Snakebite Institute list (available online at https://www.africansnakebiteinstitute.com/resources).

For **East Africa**, use the common names used in Spawls et al. (2018). Field Guide to East African Reptiles, 2nd edition.

For **Central and West African** snakes, use the common names used in Chippaux & Jackson (2019). Snakes of Central and Western Africa.

For all other reptiles, use the common names as used in the relevant IUCN Red List™ assessments.

Amphibians

For **southern Africa**, use the common names used in du Preez & Carruthers (2017). Frogs of Southern Africa: A Complete Guide, 2nd edition.

For the rest of Africa, use the common names used in Channing & Rödel (2019). Field Guide to the Frogs and Other Amphibians of Africa.

Do not worry if you do not have access to any of the above-mentioned resources – the Editor will standardise the common names as per the above guidelines upon acceptance of your manuscript.

Specimens, photographs and permits

Geographical distribution notes should always refer to either a curated specimen deposited in a recognised national institution (in which case the institution's name and the specimen accession number should be cited) and/or a record submitted to a curated citizen science platform (such as iNaturalist [www.inaturalist.org] or The Biodiversity and Development Institute-FitzPatrick Institute of African Ornithology Virtual Museums [vmus.adu.org.za]. If a note refers to a submission in one of these curated citizen science platforms, a link to the relevant record must be included in the text. *African Herp News* welcomes photographs that can be published together with the relevant note, but the inclusion of photographs does not negate the requirement that photograph(s) should also be submitted to a curated citizen science platform.

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.

ARTICLES

African Herp News publishes longer contributions of general interest that would not be presented as either Natural History Notes or Geographical Distributions. A standard format is to be used, as follows:

TITLE (upper case, bold, centred)
AUTHOR(S) (initials, separated by a full stop, followed by surname; upper case, bold, centred)
HEADINGS (upper case, bold, centred)
Subheading 1 (bold, aligned left, lower case except first letter of first word) as required
Subheading 2 (bold, italics, aligned left, lower case except first letter of first word) as required
Body text (justified)
ACKNOWLEDGEMENTS (upper case, bold, centred)
REFERENCES (upper case, bold, centred),
following the standardised formats described below
SUBMITTED BY: (upper case, bold, aligned left), following the standardised format described below

HERPETOLOGICAL SURVEYS

African Herp News publishes succinctly annotated species lists resulting from local surveys of amphibians and reptiles on the African continent and adjacent regions, including the Arabian Peninsula, Madagascar, and other islands in the Indian Ocean. The area surveyed may be of any size but should be defined as a geographic unit of special relevance to the herpetological community. For example, surveys should address declared or proposed conservation areas, poorly explored areas, biogeographically important localities or administrative zones. The relevance of survey results should be judged by the extent that these records fill distributional gaps or synthesise current knowledge. As far as possible, survey records should be based on accessible and verifiable evidence (specimens deposited in public collections, photographs submitted to curated citizen science platforms and illustrating diagnostic features, call recordings and sonograms submitted to appropriate citizen science platforms, or DNA sequences accessioned into international databases).

Survey results should be presented in the same format as used for Articles (described above), and must additionally include:

SYSTEMATIC ACCOUNT (upper case, bold, aligned left)
Species' name.- (comprising both the common and scientific names and the author citation), immediately followed after the dash by the species account that should include the location, habitat, evidence (including registration numbers and location of voucher specimens and/or links to curated citizen science records), and comments (where required).

NATURAL HISTORY NOTES

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:

FAMILY (upper case, bold, centred)
Scientific name (bold, italicised, centred)
Author citation (centred; separate author and year with a comma)
English Common Name (centred, all words starting with a capital letter)
KEYWORD(S) (upper case, bold, centred)
AUTHOR(S) (initials, separated by a full stop, followed by surname; upper case, bold, centred)
Body text (justified)
ACKNOWLEDGEMENTS (upper case, bold, centred), if applicable
REFERENCES (upper case, bold, centred), following the standardised formats described below
SUBMITTED BY: (upper case, bold, aligned left), following the standardised format described below

The Keyword(s) should be one or two words best describing the topic of the note (e.g., Reproduction, Avian predation, etc.).

The body of the note should include information describing the locality (country; province; location; coordinates; quarter-degree locus; elevation above sea level [a.s.l.]), providing the date, naming the collector(s) or observer(s), and stating the place of deposition and museum accession number of any specimen(s) or providing a link to a photograph(s) in a curated citizen science platform.

INSTRUCTIONS TO AUTHORS

GEOGRAPHICAL DISTRIBUTIONS

Brief notes of new geographical distributions of amphibians and reptiles on the African continent and adjacent regions, including the Arabian Peninsula, Madagascar, and other islands in the Indian Ocean. Records should be based on specimen(s) deposited in a recognised collection or to photograph(s) submitted to a recognised, curated citizen science platform. A standard format is to be used, as follows:

FAMILY (upper case, bold, centred)
Scientific name (bold, italicised, centred)
Author citation (centred; separate author and year with a comma)
English Common Name (centred, all words starting with a capital letter)
AUTHOR(S) (initials, separated by a full stop, followed by surname; upper case, bold, centred)
Body text (justified)
ACKNOWLEDGEMENTS (upper case, bold, centred), if applicable
REFERENCES (upper case, bold, centred), following the standardised formats described below
SUBMITTED BY: (upper case, bold, aligned left), following the standardised format described below

The body of the note should include information describing the locality (country; province; location; coordinates; quarter-degree locus; elevation above sea level [a.s.l.]), providing the date, naming the collector(s) or observer(s), and providing museum accession numbers to any specimen(s) and/or links to supporting material lodged with a curated citizen science platform. The body should also include information on the size, colour and taxonomic characters (e.g., scalation, webbing) used to identify the specimen, as well as the distance to the nearest published locality.

HERPS MAKING HEADLINES

This section features the latest research and news relating to African herpetology, with the intent of making the *African Herp News* readership more aware of some of the cutting-edge research, discoveries and on-the-ground work being done both locally and abroad on African herps. A standard format is to be used, as follows:

TITLE (upper case, bold, centred)
AUTHOR(S) (initials, separated by a full stop, followed by surname; upper case, bold, centred)
Body text [justified]
Study citation (italics), if applicable

AHN

INSTRUCTIONS TO AUTHORS

TOMORROW'S HERPETOLOGISTS TODAY

This is a popular style article showcasing the work and/or research of young, upcoming herpetologists across the African continent. Unlike any of the other submissions, this section should be written in the third person. It could feature work that has already been published and/or which is ongoing. Photographs to accompany the article are highly encouraged and may include study specimens, the study area, and/or the researchers.

A general format should be followed:

AUTHOR NAME (in full; upper case, bold, centred)

Original text (justified)

ACKNOWLEDGEMENTS

Acknowledgements should be brief and should not list titles or institutions, but should include the first name and surname in full. Institutions should only be listed where individuals are cited as pers. comm. in the text. Authors must acknowledge collecting permits and animal care protocols together with which author they were granted to, by mentioning the author's initials only (e.g., G.J.A. for Graham J. Alexander). It is recommended that authors acknowledge reviewers by name if they waive anonymity – this is not a requirement but would be greatly appreciated.

REFERENCES

References should be listed in alphabetical order and should only refer to publications cited in the text. Abbreviate journal names in the standard way. Standard abbreviations can be found at various web sites, such as: https://www.ncbi.nlm.nih.gov/nlmcatalog/journals. Insert an empty line between successive references.

References should be in the following format:

Article:

Branch WR. 2007. A new species of tortoise of the genus *Homopus* (Chelonia: Testudinidae) from southern Namibia. Afr. J. Herpetol. 56: 1–21.

For online-only publications without volume or page numbers, cite the article number if available, otherwise the DOI, and if neither is available cite the URL.

African Herp News Article:

Rebelo AD. 2021. Natural History Note: Karoo Caco *Cacosternum karooicum* (Boycott, de Villiers & Scott, 2002) – Defensive secretion. Afr. Herp News 76: 27–28.

Nicolau GK, Kemp L, Conradie W. 2018. Geographical Distribution: Wahlberg's Snake-eyed Skink *Panaspis wahlbergii* Smith, 1849. Afr. Herp News 69: 26–30.

Book:

Spawls S, Howell K, Hinkel H, Menegon M. 2018. Field Guide to East African Reptiles, 2nd edition. London, U.K.: Bloomsbury Publishing.

Branch WR. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa, 3rd edition. Cape Town, South Africa: Struik.

Chapter in a collection:

Bruford MW, Hanotte O, Brookweld JFY, Burke T. 1992. Singlelocus and multilocus DNA fingerprinting. In: Hoezel AR, editor. The South American Herpetofauna: Its Origin, Evolution, and Dispersal. Molecular Genetic Analysis in Conservation. Oxford, U.K.: IRL Press.

de Villiers AL. 2004. Micro Frog *Microbatrachella capensis* (Boulenger, 1910). In: Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ, Kloepfer, D, editors. Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. SI/MAB Series #9, p. 241–244. Washington, U.S.A.: Smithsonian Institution.

Tolley KA. 2014. Midlands Dwarf Chameleon *Bradypodion thamnobates* Raw, 1976. In: Bates MF, Branch WR, Bauer AM, Burger M, Marais J, Alexander GJ, de Villers MS, editors. Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. *Suricata* 1. Pretoria, South Africa: South African National Biodiversity Institute.

Thesis:

Russell AP. 1972. The foot of gekkonid lizards: a study in comparative and functional anatomy. [Ph.D. thesis]. London, U.K.: University of London.

IUCN Red List Species Account:

IUCN SSC Amphibian Specialist Group. 2020. *Cardioglossa occidentalis*. The IUCN Red List of Threatened Species. [accessed 17 July 2022]. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T76317566A76317888.en.

Spawls S, Msuya CA, Malonza PK. 2021. Keelbelly Ground Lizard *Gastropholis vittata*. The IUCN Red List of Threatened Species. [Accessed 17 July 2022]. https://dx.doi.org/10.2305/IUCN.UK.2021-2.RLTS.T13151928A13151932.en.

Website:

Wilgenbusch JC, Warren DL, Swofford DL. 2004. AWTY: a system for graphical exploration of MCMC convergence in Bayesian phylogenetic inference. [accessed 15 April 2011]. http://ceb.csit.fsu.edu/awty.

Uetz P, Freed P, Aguilar R, Hošek J. 2021. The reptile database. [accessed 3 December 2021]. http://www.reptile-database.org.

R Core Team. 2021. R: a language and environment for statistical computing, v4.1.0. Vienna, Austria: R Foundation for Statistical Computing.

Unpublished reports are cited as personal communications. Cite unpublished data as e.g., Alexander (in press), which then appears in the list of references, or as G.J. Alexander (pers. comm.), in which case Graham J. Alexander's name and institutional affiliation should appear under Acknowledgements.

In-text citations should be in chronological order (Jacobs 1952, 1966; Edwards and Holmes 1965; Rosen et al. 1990). When a publication with more than two authors is cited, only the first author appears in the text followed by et al. (e.g., Taylor et al. 1993). If a publication has more than 10 authors, only the first five should appear in the references followed by et al.

AUTHOR AFFILIATIONS

Authors' full names and affiliations should be provided at the end of the submission, as follows:

SUBMITTED BY:
AUTHOR ONE'S NAME (upper case, bold, aligned left)
Address or affiliation.
E-mail: example@gmail.com (hard return)

AUTHOR TWO'S NAME (upper case, bold, aligned left), address or affiliation 1; & address or affiliation 2.
E-mail: author2@gmail.com (hard return)

TABLES

Tables should have 1.5 line spacing, with each table placed on a separate page and with the legend placed above the table. Only horizontal lines are allowed, and these should only be used to separate the headings from the remainder of the table, and to indicate the end of the table. Do not use vertical lines. Table formatting is most convenient when 'table commands' are used to separate columns. All tables must be mentioned in the text and numbered consecutively using Arabic numerals.

FIGURES AND PHOTOGRAPHS

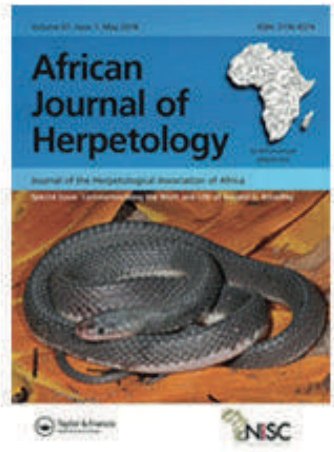
The same data should not be presented as both a graph and a table. Do not include background horizontal lines in graphs. Photographs and figures should be provided at high resolution (minimum of 600 dpi for colour images). Figures and photographs should be saved and submitted as one of the following file formats: Tagged Image File Format (TIFF; preferred), PostScript or Encapsulated PostScript (EPS), Scalable Vector Graphic (SVG) or Joint Photographic Experts Group (JPEG). Please submit line art in Encapsulated PostScript (EPS) or Portable Document (PDF) format. Labelling in figures should be in lower case, except for the first letter of the first word. All figures must be mentioned in the text and must be numbered consecutively using Arabic numerals. Use "Fig." in the text, but "Figure" in the legend. Include the photographer(s) name and surname at the end of figure legends, as appropriate.

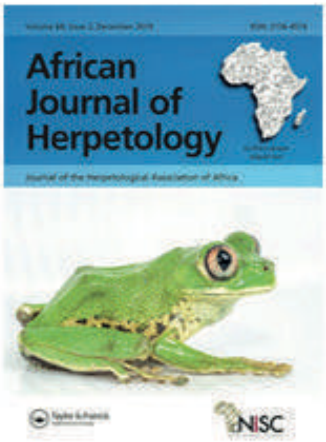
VIDEOS

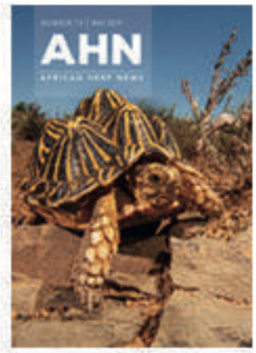
All videos referred to in submissions should be deposited in a public repository such as YouTube (www.youtube.com) or DRYAD (datadryad.org/stash), and a link to the relevant video included in the submission.

AHN

HAA MEMBERSHIP







HAA MEMBERSHIP INCLUDES

2 hard copy issues of AJH per year
Online access to all AJH issues through Taylor & Francis
3 electronic issues of AHN per year (one year embargo waived)
Reduced conference fees
Eligibility for HAA research grants
Priority access to webinars
Notifications of jobs offers, field trips, publications & general herp news
Access to the HAA Collaborative Skills Development (HAA-CSD) initiative via Slack

Ex Africa semper aliquid novi

HERPETOLOGICAL ASSOCIATION OF AFRICA

Founded 1965

HAA MEMBERSHIP

HAA MEMBERSHIP FEES

African Membership	**1 Year**	**R 200**	**3 Years (10% discount)**	**R 540**
Senior Citizens	**1 Year**	**R 100**	**3 Years (10% discount)**	**R 270**
Students & Scholars	**1 Year**	**R 150**	**3 Years (11% discount)**	**R 400**
International Membership	**3 Years**	**$60 or €50 or R775**		

BANKING DETAILS

ACCOUNT NAME	**Herpetological Association of Africa**
ACCOUNT NUMBER	**62614292910**
BANK	**First National Bank**
BRANCH	**Woodlands Boulevard (230732)**
SWIFT CODE	**FIRNZAJJ**

IMPORTANT TO REMEMBER

NOTICE REGARDING ELECTRONIC PAYMENTS

It is essential that your membership reference number (or initials and surname, if you are a new member) be used as a reference for electronic payments, and that you let the HAA Treasurer, Jens Reissig (treasurer@africanherpetology.org), know when you authorise the payment, so that it can be traced.

BANK FEES

Please note that all bank fees for electronic payments to the HAA must be borne by you, the payee. Thus, please ensure that you add an extra 5% to cover bank charges, or that these come directly off your account when electronically transferring money, and NOT off the amount received by the HAA.