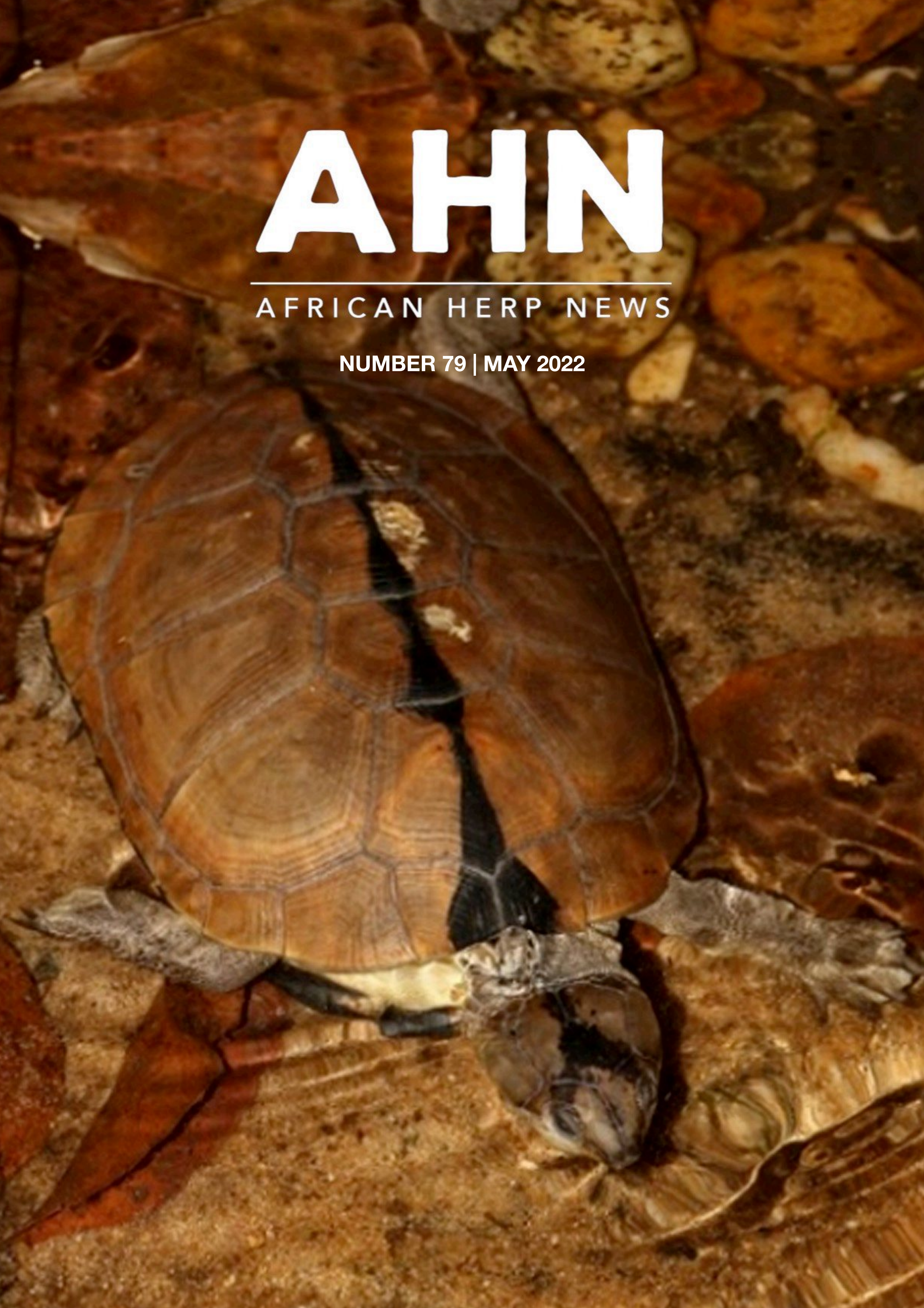
AHN

AFRICAN HERP NEWS

NUMBER 79 | MAY 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

Pelusios gabonensis (Mwinilunga, Zambia)
Image courtesy: Leslie Reynolds

:: COMMITTEE OF THE HAA ::

AHN

CONTENTS

AHN

CONTENTS

NATURAL HISTORY NOTES

GEOGRAPHICAL DISTRIBUTIONS

AHN

EDITORIAL

This marks the first newsletter which I have done (mostly) on my own since taking over as newsletter editor from Dr Jessica da Silva, and boy do I have big shoes to fill! During her tenure as newsletter editor, Jess gave the newsletter a facelift, introduced several new valuable features, and her and her team also ensured that all past issues of African Herp News are freely available on the Herpetological Association of Africa website (with a one-year embargo). Several other initiatives that Jess initiated are still in process as well, so look out for these.

It has been a bit of a bumpy start for me, but Jess (and the rest of the committee) have always been willing to assist and guide me, for which I am very grateful. As I find my feet, the newsletter should return to its more 'normal' format, including featuring both the *Tomorrows Herpetologists Today* and *Tracks in the Sand* sections, among others. In this regard, if you are a young or up-and-coming herpetologist, please reach out to me so that we can feature you in *Tomorrows Herpetologists Today*. We all know that students can be shy, so if you know of any blossoming herpetologists or if you have any students that you are supervising, please let me know so that I can approach them to be featured.

At the beginning of 2022 the new HAA committee took over, and although many of the 'old' faces remain, there are also some new additions to the committee. I would particularly like to welcome Jody Barends (Student Support) and Nick Evans (Webpage and Social Media) to the committee. I would also like to acknowledge those persons who have stepped down from the committee – Ché Weldon, Jeanne Tarrant and Hanlie Engelbrecht – and thank them for the time and effort that they invested in the running of the Herpetological Association of Africa during their tenure. The entire committee list, together with the dedicated e-mail address for each portfolio, can be found on page 2 of each newsletter. If you have any comments, concerns, queries or suggestions, please feel free to reach out to one of the committee members.

AHN EDITORIAL

Most of you would have heard about the sudden passing of Donald Strydom at the end of March. Donald was active in the herpetological arena for many years, and is probably best known for establishing what was then known as Swadini Snake Park near Hoedspruit, Limpopo Province, South Africa. In 2019, Donald moved down to the KwaZulu-Natal Province South Coast, where he ran the Green Lizard Reptile Research and Rescue centre until his passing.

We are now less than a year away from the next Herpetological Association of Africa conference, which will be held in picturesque Hoedspruit in the foothills of the northern Drakensberg Mountains, Limpopo Province, South Africa. With the COVID pandemic (hopefully) subsiding and travel becoming easier again, I hope to see many of you in person again at the conference, and to meet all of you who I have not yet had the pleasure of meeting.

Until the next newsletter, stay safe and happy herping.

Darren Pietersen
Editor

Changes relating to the African Journal of Herpetology

To get the year off to a good start, we have made some improvements relating to the manuscript submission and review processes of the African Journal of Herpetology (AJH).

For those of you who have not yet noticed, a Mendeley referencing style has been created for the journal, and we hope this will help you in your journal submissions going forward. You can access the referencing style from the HAA website (https://africanherpetology.org/about-african-journal-of-herpetology/), where detailed instructions on how to download and install the style onto your Mendeley account are also provided. We are greatly appreciative to Matthew Adair, one of our student members, for creating this resource.

The next change relates to the allocated timing throughout the review process. During the publication survey that was sent to members last year, many people were displeased by the turnaround times from submission to final decision. One of the ways the Editorial team is trying to address this is through reducing the allocated times associated with each phase of the review process. Provided everything goes to schedule, authors should receive a response within 2–2.5 months from submission; however, the greatest limiting step in this process is finding reviewers. We always strive to find the best reviewers for your submissions in terms of expertise and ability to provide constructive feedback. In an ideal world these reviewers would accept every request to review, but in the real-world people are bombarded by such requests and therefore cannot accept them all. This seems to have been exacerbated within the past two years. I therefore ask for your patience and urge you to contact me should you have any concerns regarding your submission and where it is within the review process.

We are also working to add more Associate Editors to help with the workload and increase the expertise available within our Editorial team. I thank the current AEs – Courtney Cooke, Edward Stanley, Graham Alexander, Luis Ceríaco, and Shelley Edwards – for their time and continued commitment to the journal.

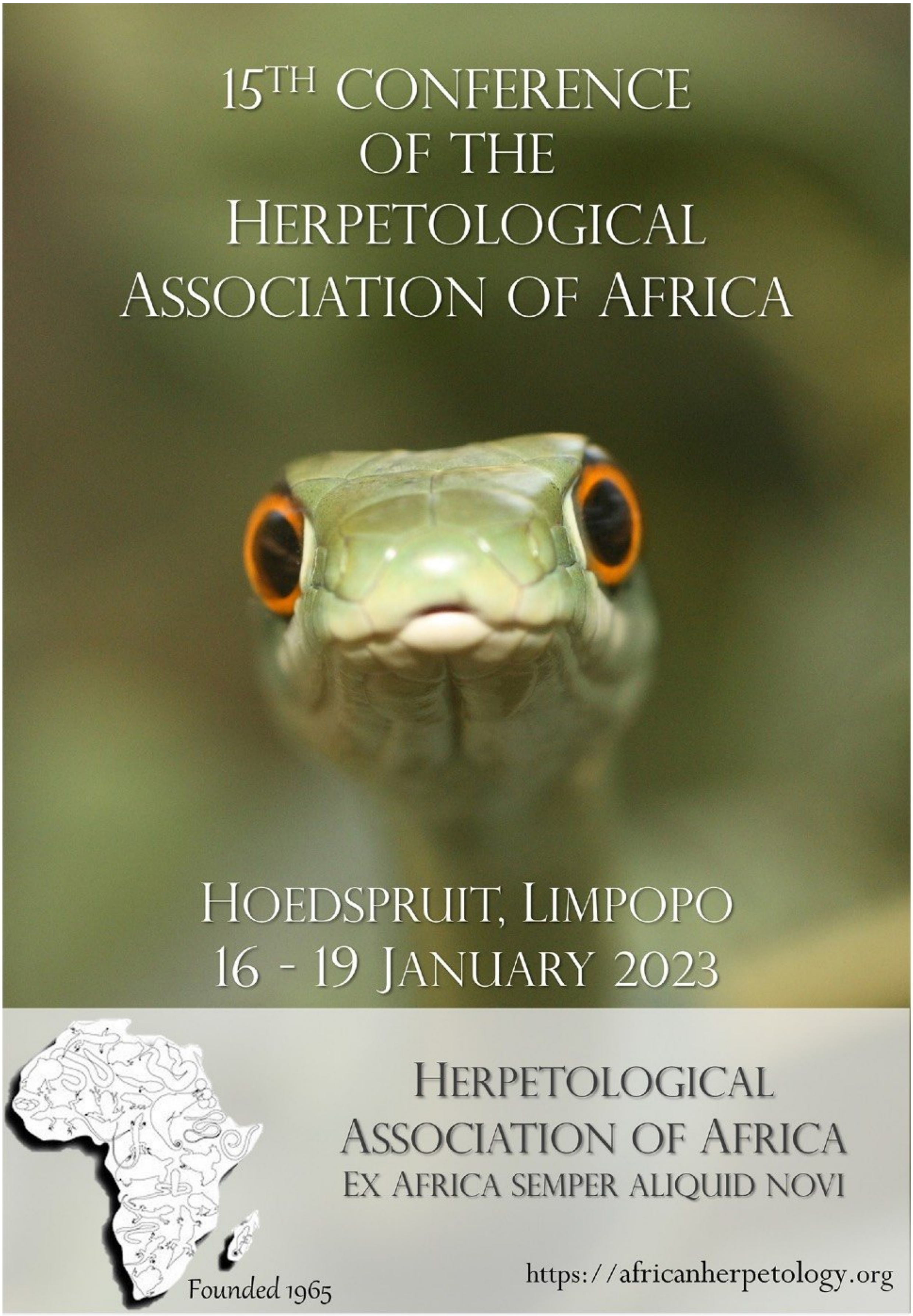
Jessica da Silva
Journal Editor

Book reviews are moving!

Following a decision taken by the H.A.A. Committee at the beginning of the year, going forward book reviews will be published in the African Journal of Herpetology instead of African Herp News. Book reviews will be solicited by the journal editor, however if you would like to submit a book review to the African Journal of Herpetology, please contact the journal editor beforehand to express your intent to do so (contact details can be found on page 2 of this newsletter).

Announcements of new books (field guides or any other books relating to African herpetology) will still be published in African Herp News, and we request that if you have (co)-authored such a book, or if you are aware of any recently published books relating to African herpetology, that you please bring this to the attention of the newsletter editor so that an announcement can be included in the next newsletter.

Darren Pietersen
Editor


15TH CONFERENCE
OF THE
HERPETOLOGICAL
ASSOCIATION OF AFRICA
HOEDSPRUIT, LIMPOPO
16 - 19 JANUARY 2023
HERPETOLOGICAL
ASSOCIATION OF AFRICA
EX AFRICA SEMPER ALIQUID NOVI
Founded 1965
https://africanherpetology.org

Recipients of the 2022 HAA Student and Professional Grant Awards

We are pleased to announce that the recipient of the HAA Student Grant for 2022 is **KATHLEEN WEBSTER** for her proposed work entitled **"Assessing the Vulnerability of Island Endemic Herpetofauna to Environmental Change in the Comoros Archipelago".**

Congratulations Kathleen!

In total, we received seven student applications which were independently assessed by five reviewers. No professional grant applications were received so those funds will not be awarded this year.

Bryan Maritz
Awards portfolio

An obituary for a legend of southern African herpetology: Wulf Dietrich Haacke (1936–2021)

M.F. Bates

Wulf Haacke in 2013 at the 11th conference of the Herpetological Association of Africa in Pretoria. Photo: W.R. Schmidt.

Wulf Dietrich Haacke was born in Windhoek, Namibia on 15 December 1936 and passed away in Pretoria on 30 June 2021, aged 84. His parents were from Germany and immigrated to the former South West Africa (now Namibia) in 1929, marrying there in 1930. Wulf spent the first 20 years of his life in Namibia. His first job was as an assistant to the mineralogist at Tsumeb Mine in 1955, but he relocated to South Africa in 1957 to study for a B.Sc. degree at the University of Pretoria. He worked at the Section of Locust Control and Research at the Department of Agriculture from February 1960, but in June 1961 he was appointed head of the Department of Lower Vertebrates and Invertebrates at the Transvaal Museum (now Ditsong National Museum of Natural History). The latter was later re-named the Department of Herpetology and Wulf remained its head for over 40 years, from 1961–2002. During his time at the museum, the reptile and amphibian collections increased in size from 26 000 to 85 000 specimens.

Wulf was also appointed Assistant Director of the Transvaal Museum in June 1988, then Deputy Director from August 1991 to June 1992, and co-ordinator of vertebrate studies from December 2000 until his retirement in January 2002. A couple of years later, in February 2004, he was appointed as Honorary Curator of Herpetology. After retirement he was active as a freelance environmental consultant and prepared over 400 environmental impact assessment reports.

In his first few years at the museum, Wulf had the opportunity to get to know the famous herpetologist, Dr Vivian FitzSimons, who was Director at that time. FitzSimons had only one functional eye, and Wulf assisted him by proofing and editing two editions of his *Field Guide to the Snakes of Southern Africa*, and also an Afrikaans version of the book. Wulf spoke highly of FitzSimons, referring to him as “a very dignified and approachable man, who I admired and respected”.

While at the museum, Wulf completed his Masters degree on the taxonomy and ecology of the burrowing geckos of southern Africa. This study resulted in a five-part series of papers published in the *Annals of the Transvaal Museum* in 1975 and 1976, which cemented his reputation as an expert on geckos.

Wulf authored about 80 scientific, semi-scientific and popular articles, mostly on lizards and snakes. He co-authored two books, *Reptiles of the Kruger National Park* with Pienaar and Jacobsen (1983) and a small book titled *Frogs* with Lomi Wessels (1987). His first paper, which appeared in 1963 in the *IUCN Bulletin*, was on the discovery of the first live specimen of the Namib Golden Mole. Although his interest was largely focussed on the taxonomy, ecology and biogeography of the reptiles of the south-western arid region of the subcontinent, especially Namibia, he also published on the herpetofauna of other regions, including a few studies on frogs. He presented papers in either English, German or Afrikaans at more than 20 national and international conferences.

The following reptile taxa were described by Wulf as sole author: *Ptenopus kochi* and *Typhlosaurus braini* in 1964, *Afroedura africana tirasensis* and *Rhoptropus bradfieldi diporus* in 1965, *Pachydactylus tsodiloensis* in 1966, *Bitis xeropaga* in 1975, *Chondrodactylus angulifer namibensis* and *Colopus wahlbergii furcifer* in 1976, *Typhlosaurus lomii* in 1986, *Afrogecko swartbergensis* in 1996, *Typhlacontias rudebecki* in 1997, *Afrogecko plumicaudus* in 2008, and finally *Telescopus finkeldeyi* in 2013. Wulf was also co-author on the descriptions of *Kaokogecko vanzyli* with Steyn in 1966, and *Lygosoma miopus* from Somalia with Greer in 1982 (later assigned to the genus *Haackgreerius* which was named in honour of the authors).

Wulf's role in southern African herpetology went far beyond publications. He advised many young and established herpetologists, refereed manuscripts, examined dissertations, presented slide shows, was an expert guest on radio and television shows, and generously shared his excellent photographic images which have appeared in the publications of several colleagues. The large collections of reptiles and amphibians he made in Namibia, Botswana and Angola are legendary. His expeditions were usually conducted using a Land Rover which he rebuilt and maintained himself.

Wulf was a long-standing member of the Herpetological Association of Africa. He was journal editor from 1980 to1982, and also served on the journal's editorial committee. He was an Honorary Life Member of the Transvaal Herpetological Association (also a founder member and past chairman), East Rand Herpetological Association and Herpetological Association of Africa, and the South African representative on the Council of the World Congress of Herpetology from 1994 to1998.

In recognition of his many contributions to southern African herpetology, Wulf had four lizard species named after him, namely *Afroedura haackei*, *Pachydactylus haackei*, *Pedioplanis haackei* and *Afroedura wulfhaackei*. He also collected invertebrates in his early years at the museum and had a grasshopper, tenebrionid beetle, solifugid, scorpion and snail named after him.

At its 10th conference in Cape Town in 2011, the Herpetological Association of Africa presented Wulf with its highest honour, the *Exceptional Contribution to African Herpetology* award. Anyone who was present that night will remember that he was so overcome with emotion that he had to cut short his appreciation speech and return later to finish it. For the rest of the night he occupied the dance floor, celebrating a very special evening.

While at the Transvaal Museum, Wulf suffered two strokes, one of which affected his leg and his ability to walk. He also suffered a third stroke several years after his retirement, and in the last few years of his life he made use of a walker ring. Wulf was admitted to hospital on 28 June 2021 and passed away two days later. He is survived by his wife Maureen, son and daughter Karl and Ingrid, and two grandsons. Southern Africa has lost an irreplaceable giant in the field of herpetology. He will be greatly missed.

SUBMITTED BY:
MICHAEL F. BATES
Division of Herpetology, Department of Animal and Plant Systematics, P.O. Box 266, Bloemfontein 9300, South Africa; and Department of Zoology & Entomology, University of the Free State, P.O. Box 339, Bloemfontein 9300, South Africa.
E-mail: herp@nasmus.co.za

KIM JENNILEE SCHOLTZ

Using faecal DNA to investigate the diets of the Cross-marked Sand Snake (*Psammophis crucifer*) and Spotted Skaapsteker (*Psammophylax rhombeatus*)

As predators, snakes probably impact faunal communities and ecosystems in a variety of ways. They represent the dominant predatory species in the food chains of many terrestrial communities and occupy intermediate trophic positions in several others. However, the diets of most African snakes are incompletely sampled, primarily because of the challenges of studying snake ecology. Fortunately the last few years have seen improvements in alternative, indirect, methods for the identification of prey consumed by predators, including PCR-based species tests, faecal DNA analysis and DNA metabarcoding, which has resulted in these methods gaining popularity.

Kim Scholtz is a proud female of colour who was born in Ravensmead, Cape Town, Western Cape Province, South Africa. Growing up, media played an important role in shaping her understanding of what science is and what scientists do. Her grade eleven educator was another big influence in developing that passion. After matriculating in 2014, Kim pursued a career in science at the University of the Western Cape. She has since completed her BSc undergraduate and BSc(Hons) degrees in Biodiversity and Conservation Biology. During her Honours research in 2018, she developed a molecular method to identify prey species of the Cross-marked Grass Snake (*Psammophis crucifer*) and presented her results at the 14th HAA conference held at Cape St Francis in 2019.

In 2019, Kim began her MSc thesis entitled "Using faecal DNA to investigate the diet of the snakes, *Psammophis crucifer* and *Psammopylax rhombeatus*" under the supervision of Drs. Bryan and Robin Maritz.

Kim Scholtz removing a Spotted Skaapsteker (*Psammophylax rhombeatus*) from its enclosure. Photo: A. Rawoot.

Kim Scholtz checking traps at Tswalu Kalahari Reserve. Photo: B. Maritz.

Kim Scholtz with a Mole Snake (*Pseudaspis cana*) at Tswalu Kalahari Reserve. Photo: R. Mohamed.

She also worked in collaboration with co-supervisor Prof. Marshall Keyster, who trained her to use a host of microbiology techniques, including DNA cloning. Her MSc dissertation demonstrates that prey DNA can be amplified from the faecal remains of both wild-caught and captive-fed snakes, as Kim was able to recover prey DNA in 75% of faecal samples using prey-specific primers. Using a subsample of these positive samples, she recovered prey DNA in 58% of cloned samples using universal primers. Her analysis of the faecal content of wild-caught individuals revealed one case of *P. rhombeatus* feeding on a Short-legged Seps (*Tetradactylus seps*).

Her findings provide a clearer picture of predator-prey interactions and the opportunity to overcome the biases of traditional dietary analysis.

Kim also formed part of a research team that conducted a herpetological survey in the North West Province, South Africa, in 2019. Some of the findings of the field trip were published in Herpetology Notes in 2020. Her MSc dissertation is currently under examination, and she looks forward to publishing the results of her MSc in the near future.

Kim is the product of a community filled with poverty and gangsterism and would like to help the next generation of scientists through learning and teaching. Her ambition in life is to one day be a researcher and academic at an institution of higher learning. Her interactions with students and researchers, laboratory experiences and scientific engagements played a significant part in guiding her career path. Kim plans to start with her PhD in the next few months, which will focus on the interaction between Cape Cobras (*Naja nivea*) and Sociable Weavers (*Philetairus socius*). As preparatory work for her PhD, Kim was involved in reptile sampling at Tswalu Kalahari Reserve in 2021. Kim wishes to gain much more knowledge and experience in the future working with herps.

Dr. Robin Maritz and Kim Scholtz inspecting a Sociable Weaver (*Philetairus socius*) colony. Photo: B. Maritz

PRACTICAL CONSIDERATIONS FOR CONDUCTING STRUCTURED HERPETOLOGICAL SURVEYS IN THE PRESENCE OF POTENTIALLY DANGEROUS WILDLIFE: NOTES FROM FIELDWORK IN PROTECTED AREAS ACROSS MAPUTALAND

P.R. JORDAAN

INTRODUCTION

Effective field-based research relies on good logistical planning and a robust but adaptable study design to meet objectives whilst adhering to budgetary constraints in a safe and responsible manner (Daniels and Lavallee 2014; Fisher 2016). Traditionally, the surveying, handling, and processing of venomous or otherwise dangerous reptiles are generally considered the predominant safety concern with regards to herpetological surveys, especially if one or more potentially harmful species are the subject of investigation (e.g., Fisher 2016; SANBI 2020). Fieldwork, however, takes place within the larger environment which may pose a variety of complex and occasionally unforeseen obstacles and hazards, potentially influencing the practical or logistical feasibility of a study. Despite academic field protocols and labour practices transitioning towards accountable health and safety standards to promote risk identification, management, and mediation (Daniels and Lavallee 2014; SANBI 2020), the significant effects that hazardous conditions, safety considerations, and practical factors may impose on the design or execution of a survey are rarely mentioned or reported on in published literature.

The interactions between field methodologies and their supporting logistics with various facets of environmental conditions dictate the nature of practical and organisational challenges, and the associated severity of potentially hazardous circumstances. For instance, when conducting field-based research in populated landscapes, people who may harbour opportunistic or nefarious ambitions are considered the preeminent concern for the safety of survey personnel (Rinkus et al. 2018; Spawls et al. 2018) and equipment (Corn et al. 2000; Browning et al. 2017; Wearn and Glover-Kapfer 2017), necessitating increased protection and anti-theft or vandalism measures. Similarly, when conducting field assessments in natural landscapes across sub-Saharan Africa, the possible presence of potentially dangerous wildlife (P.D.W.) may significantly impact field research (Carruthers 2001; Wearn and Glover-Kapfer 2017; Broadley 2018; Spawls et al. 2018). As with many factors affecting fieldwork (Fisher and Foster 2012), the practical considerations pertaining to these animals are frequently underestimated or overlooked when researchers initially plan and design field studies from the comfort of an office or laboratory. This is especially the case when prospective researchers, consultants, or academic supervisors lack actual field experience working with or around P.D.W. and the various field protocols imposed by conservation authorities to maintain safety standards and limit their legal liability. Published accounts discussing the strategies implemented to mitigate challenges and conditions experienced during herpetological field studies in wildlife areas are generally rare, even though such reports could potentially better inform and support future research planning.

This communication is based on the experience of the author who conducted a variety of herpetological field assessments across several protected areas in Maputaland, both in northern KwaZulu-Natal Province, South Africa, and southern Maputo Province, Mozambique. It aims to illustrate various practical factors to consider when conducting herpetological sampling, with a particular emphasis on pitfall and funnel trap surveys (P.F.T.S.s), in areas housing P.D.W. Some additional notes on practical factors associated with surveys or operations within protected wildlife landscapes are also provided.

It should be noted that variations in wildlife assemblages, security conditions, terrain, political aspects, local cultural practices, management regimes, legislation, internal regulations, and even the personalities of authority figures are all likely to differ between regions and conservation areas, resulting in each landscape posing unique and oftentimes complex challenges for conducting fieldwork. For more general discussions on planning herpetological fieldwork, see Fisher and Foster (2012) or Fisher (2016), and for safety and logistical planning of biological fieldwork refer to Witmer (2005), Manley et al. (2006), Daniels and Lavallee (2014) and SANBI (2020). Additionally, Green et al. (2010) and Fisher (2016) offer overviews of biosecurity issues pertaining to surveying herpetofauna.

POTENTIALLY DANGEROUS WILDLIFE IN CONTEXT

The conservation of large-bodied wildlife species is ecologically essential since they act as drivers and habitat facilitators across natural landscapes (e.g., Nasseri et al. 2010; Foster et al. 2020; Somaweera et al. 2020). These species also contribute disproportionately to the financial support of protected areas and general habitat conservation due to their broad ecotourism and social development potential (Taylor et al. 2021), which most herpetofauna lack (Branch 2014). However, multiple safety, law enforcement, social, political, legal, and managerial challenges arise when protected areas or private concessions contain certain species of large game or P.D.W. (e.g., Garai 2005; Cousins et al. 2010; Hoare 2012).

Within the context of conducting fieldwork, the greatest concern relating to large game or P.D.W. is the physical harm these animals can inflict on researchers. This is followed by the potential damage to, and destruction of, survey equipment. Such threats are evident when taking human-wildlife conflict into account from a variety of sources describing wildlife-associated hazards, injury, mortality, property damage, restrictions, or other obstacles (Durrheim and Leggat 1999; Dunham et al. 2010; Clarke 2013; Pooley 2015; Wearn and Glover-Kapfer 2017; Broadley 2018). This in turn affects the capacity of ecologists and researchers to effectively conduct assessments and research on other ecological components around these animals. Depending on the specific field conditions, various strategies, contingencies, and protocols may need to be put in place to conduct assessments practically and safely in areas where these animals occur.

Here, the term P.D.W. refers to large wildlife species which are known to frequently inflict serious injuries or mortality during encounters, and/or which can inflict significant equipment damage (Dunham et al. 2010; Clarke 2013). These include the Savanna Elephant (*Loxodonta africana*), Cape Buffalo (*Syncerus caffer*), African Lion (*Panthera leo*), Leopard (*Panthera pardus*), Black Rhinoceros (*Diceros bicornis*) (collectively known as the big five), White Rhinoceros (*Ceratotherium simum*), Spotted Hyena (*Crocuta crocuta*), Hippopotamus (*Hippopotamus amphibius*) and Nile Crocodile (*Crocodylus niloticus*). The distribution and level of confinement of these species vary across southern Africa as influenced by biogeographical factors and habitat preferences (aquatic habitat, vegetation type, geological barriers, etc.) and several human-induced factors (translocation, legal restrictions, development, anthropogenically induced extinction, etc.). Whilst some P.D.W. are strictly confined to protected areas (either state or privately owned), such as both African rhinoceros species, the occurrence and confinement of others, such as the Savanna Elephant, varies across southern Africa. Whereas Savanna Elephants are strictly confined to conservation areas in South Africa as governed by permitting and legal regulations (Garai 2005), significant free-ranging populations still occur in portions of southern and northern Mozambique. A similar situation is true for the confinement of wild African Lion populations. Additionally, Leopard and Spotted Hyena may occur in inhabited landscapes alongside human settlements outside of protected areas to varying degrees, including on agricultural farms and rangelands.

Several other game and wildlife species may also prove dangerous or problematic under certain circumstances. These species include Honey Badger (*Mellivora capensis*), Bushpig (*Potamochoerus larvatus*), Cape Porcupine (*Hystrix africaeaustralis*), Bushbuck (*Tragelaphus scriptus*) and baboons (*Papio* spp.). Many of these species, such as Bushpigs, Cape Porcupines and baboons, are not restricted to natural landscapes and are often prevalent among human habitation including urban or agricultural areas (Estes 1991). Additionally, high game densities may occur on game ranches, increasing the chances of potentially dangerous game encountering field personnel or survey equipment.

FIELDWORK SAFETY AND POTENTIALLY DANGEROUS WILDLIFE

The risks of physical injury posed by P.D.W. to field staff should be considered a high-level risk when planning or conducting fieldwork in relevant wildlife landscapes throughout sub-Saharan Africa. Harmful encounters with wildlife may result in tissue trauma, broken or fractured bones, and ragged open wounds which are prone to infection, potentially resulting in hospitalisation, disability, or fatality (Mitchell et al. 2011). The creation of an emergency evacuation plan, including contingencies to communicate distress (Witmer 2005), should be included in the research project planning process from its inception. A first aid kit which should be regularly inspected and restocked must always accompany researchers in the field and it is recommended that at least one person per group be trained and accredited to administer first aid (Witmer 2005). Medical evacuation insurance and services should be considered when they can be afforded. A detailed description and procedure of what to do and how to act in such circumstances should ideally be included in field inductions.

Concerns regarding the safety of researchers may prompt the mediation of wildlife-associated risk by regulations and restrictions set by the landowners or conservation authorities which grant permission to conduct field-based studies. This may include logistical limitations surrounding safety measures and the indemnification of the relevant conservation authority from liability. Regarding the latter, liability is usually addressed with indemnity documents which need to be signed as a prerequisite for the lead researcher(s) and their support staff to enter the field, however the legality of such documents may be dubious dependant on whether the actions of management or conservation authorities could be considered negligent under specific circumstances. Legal advice should be sought both when drafting, defending, or contesting indemnity.

Whilst some herpetological assessments can be conducted from vehicles (road riding/cruising, see Dodd 2016; SANBI 2020), most herpetological fieldwork, at least to some degree, relies on researchers walking through natural landscapes to either actively search for animals (frogging, flipping cover objects, walking visual encounter transects, etc.) or checking passive trapping systems. In areas with P.D.W., the risk of harmful wildlife encounters significantly increases when leaving the safety of a vehicle (Durrheim and Leggat 1999). The practice of assigning armed field rangers to researchers conducting fieldwork on foot appears to generally be considered adequate protection by most conservation authorities, academic institutions, and labour organisations. It should, however, be kept in mind that most protected areas, whether state-owned or privately managed, often lack either adequate staff and/or the funding to appoint permanent field rangers, or other resources, exclusively for the protection of visiting researchers for the duration of prolonged field studies. Oftentimes when field rangers are assigned as protection, they are withdrawn from their normal duties to accommodate researchers, potentially interfering with important activities such as anti-poaching operations or field patrols.

Alternatively, when on-duty field rangers or game scouts are unavailable, retired or off-duty personnel may be willing to accompany researchers into the field. Such arrangements will likely incur additional fees as compensation for their time, which could potentially impact the project budget if not planned for in advance. Where no field rangers are available, ecological service staff employed by the protected area, such as ecologists, field technicians, or ecological monitors, who are trained, licenced, and equipped with a firearm may be available to accompany researchers during fieldwork. Some volunteer service organisations, such as the Honorary Officers, which operate in game and nature reserves managed by Ezemvelo KwaZulu-Natal Wildlife (EKZNW), may also be able to assist if trained and accredited members are available. Field guides from local lodges or tourist operations registered and licenced to carry firearms when conducting guided walks in specific protected areas could also be a potential option although, once again, these services may come at an additional cost. Budgetary constraints should be considered when opting to engage private field guides as high rates may drastically deplete research funds. It should, however, be acknowledged that a series of regulatory, political, and liability considerations may influence the viability of any of these options for specific conservation areas. It is unlikely that protected areas will allow visiting researchers to carry private firearms for protection in the field even if licenced to do so.

Often, the option of armed protection will be unavailable to researchers who may need to be content with continuing their fieldwork unaccompanied by an armed escort. This is not recommended, especially if researchers lack experience conducting fieldwork in wildlife areas with high densities of P.D.W. and in thick vegetation where visibility is restricted. It should also be noted that many academic institutions will not permit students to conduct fieldwork in areas housing P.D.W. without an armed escort or other adequate protection measures. Academics and students affiliated with such institutions may need to obtain concrete confirmation from conservation authorities, concession holders, or landowners that armed protection will be provided and whether there are any costs associated with securing such services. Similar considerations may be relevant with regards to labour regulations for environmental consultants.

During the author's field research in Maputaland, armed protection was the exception rather than the rule. Field rangers were generally withdrawn following the installation of survey structures if any were supplied at all. Prolonged sampling or the daily inspection of pitfall and funnel trap arrays (P.F.T.A.s) was generally conducted without being accompanied by field rangers or any armed personnel.

Training or induction programmes for personnel and field assistants, not only with regards to the field techniques, study objectives, and the identification of targeted, common, or dangerous species (Fisher and Foster 2012), but also safety, emergency, and field protocols and how to act in the event of encountering P.D.W., is strongly advised (Witmer 2005). Whereas assistants with no fieldwork experience may need to be trained and continuously reminded to stay focussed and vigilant, fieldworkers accustomed to natural landscapes with few or no P.D.W. may become frustrated with restrictive regulations in protected areas. Problematic or new field assistants can be assigned to, or paired with, more experienced personnel to ensure the quality of work (Daniels and Lavallee 2014) and the adherence to safety protocols. To promote optimal group dynamics, cooperation, and safety, the expectations, ability, and level of experience of field personnel may need to be continuously assessed and managed, particularly when involving inexperienced students (Fisher and Foster 2012).

It should be kept in mind that academic titles do not automatically translate into practical skills which is occasionally even evident in Ph.D. and post-doctoral candidates new to fieldwork. Ultimately, the efficiency and safety of field staff depends on the ability of the research coordinator or fieldwork leader to select competent personnel and instruct, direct, and train the group to perform tasks to a desirable standard (Fisher and Foster 2012). This may not always be realistically feasible, especially as academic researchers may need to settle for whoever is available as support staff, again highlighting the value of thorough induction protocols and staff management.

A strategic retreat may occasionally be required when P.D.W. are encountered under certain conditions. Instructing field staff on the appropriate behaviour during wildlife encounters, safety measures, and how to identify and react to aggressive behaviour as a group should be included during the induction process. Periods of increased sexual arousal (e.g., elephant bulls in musth), injury, the presence of predators or young, being surprised, and various smells such as that of blood, are all factors which may affect the behaviour and level of threat posed by wildlife towards people, vehicles, and survey equipment (Estes 1991; Clarke 2013). Additionally, local sources should be consulted as to the temperament and tolerance of P.D.W. which may be affected by the specific history (e.g., impacted by poaching, hunting, war, introduction problems, etc.) of the population or individual animals (e.g., Garai 2005; Shannon et al. 2013). Non-lethal deterrents, such as pepper spray, may be employed to ward off curious or threatening wildlife. The use of firearms by field rangers to protect researchers against aggressive wildlife encounters will and should generally only be considered as a last resort based on the practiced discretion and training of the assigned armed escorts.

When research relies on relatively long-term fieldwork conducted on foot, the presence of dangerous wildlife may affect the placement of sampling sites, potentially altering the initial timing (see Nasseri et al. 2010) or design of a study to aid in its feasibility. On one occasion, the author was forced to relocate a P.F.T.A. due to several close encounters with a particular Black Rhinoceros which took up residence in the immediate area around the sampling site. The risk of repeated encounters with this particular animal was also compounded due in part to the low visibility in the area, which was heavily encroached by woody shrubs and bushes, obscuring even large animals at close range. The deployment of P.F.T.A.s over game trails or in areas with high game and wildlife traffic, such as around waterholes, should be avoided when possible due to safety considerations and the potential impact of animals on survey equipment. Conservation authorities may also formally request that the placement of frequently inspected survey structures (e.g., P.F.T.A.s) avoid such areas or be located close to road access to facilitate a rapid retreat when necessary. However, when alterations to the original layout of a field study are required, researchers should ensure that such adjustments can still fulfil the set objectives of the study whilst eliminating or minimising bias (Vonesh et al. 2010).

As encounters with P.D.W. during fieldwork are actively avoided, the physical presence of these animals close to survey sites may prevent the planned inspection of traps regardless of an armed escort. This may delay field inspections which could prolong the time captured animals spend in traps and may occasionally alter the daily operational schedule. The presence of African Lion, Cape Buffalo and especially Savanna Elephants close to or in the immediate vicinity of survey sites have prevented the author from accessing trap arrays on multiple occasions. Such delays may influence the sequence of checking sites, potentially complicating logistical considerations pertaining to allowed travel times, fuel expenditure, and other cost or time-sensitive factors.

When fieldwork in and close to watercourses are planned, such as night-time amphibian assessments (frogging), the presence of Nile Crocodiles and Hippopotami in targeted systems must be ascertained and the necessary safety precautions taken (Carruthers 2001; SANBI 2020). A minimum distance of 5 m should be maintained from the waters' edge to limit the possibility of a Nile Crocodile attack. Wading in shallow waters where Nile Crocodiles are present is dangerous and the obvious fact, that the chances of being attacked by a Nile Crocodile drastically increase when in or close to water, particularly at night (Pooley 2015; SANBI 2020), bears repeating (for additional information on crocodile safety, see www.crocodile-attack.info).

At least for the eastern portion of southern Africa, Nile Crocodile attacks are also more prevalent during the summer rainfall period (Pooley 2015), which coincides with peak frogging conditions for the region. When surveying at night in areas with Hippopotami, it should be kept in mind that they graze on land (predominantly) at night, potentially approaching water from the shore, and despite their bulk, they can move with considerable speed when out of the water (30 $km.h^{-1}$; Estes 1991). Both Nile Crocodiles and Hippopotami can travel long distances overland and may colonise waterbodies overnight, making aquatic sites which were safe to survey the previous day potentially dangerous the next. When conducting nocturnal surveys on foot along the shores of relevant waterbodies and wetlands, dedicated personnel should be appointed to constantly shine spotlights and be on the lookout for Nile Crocodiles and/or Hippopotami (SANBI 2020).

Even away from water, nocturnal fieldwork conducted on foot should preferably be avoided in areas containing P.D.W. In the author's experience, encounters with Savanna Elephants have impacted fieldwork the most of all P.D.W. Despite their size, Savanna Elephants can be stealthy and are able to sneak up on researchers during periods of decreased vigilance, such as when focussing on collecting, photographing, or measuring specimens in the field. On more than one occasion, field personnel have been forced to retreat when Savanna Elephants have interrupted pitfall trap installations, Nile Crocodile capture, fossorial herpetofaunal surveying and night-time vehicle-based chameleon surveys. Even when large groups of people are present, the approach of Savanna Elephants may only be noticed when they are close by.

Potentially dangerous wildlife may occasionally cause damage to vehicles used in wildlife areas, with impacts ranging from minor damage – such as African Lions or Spotted Hyenas chewing on tyres, door handles, licence plates, or car bumpers – to severe – such as Savanna Elephants rolling or trampling a vehicle – potentially affecting the safety of field staff and the execution of fieldwork. Road or driving conditions may compound possible hazardous encounters as can the physical terrain. Additionally, watercraft can also be damaged by Hippopotami and Nile Crocodiles. When possible, regional drivers with experience operating around wildlife should be assigned or employed to facilitate or advise on transport.

Researchers should also be aware of indirect hazards associated with the presence of large animals such as poaching or hunting activities. On one occasion, our survey group was forced to evacuate an area while conducting a fossorial quadrat survey when gunfire was exchanged between poachers and field rangers close to the survey site. Access to the area could only be regained the following day which resulted in the exclusion and replacement of the quadrat from the larger survey due to the interruption, prolonging the survey period.

The presence of stationary traps in the field, including hunting pits and spring-loaded traps (e.g., gin traps) installed by either poachers or rural hunters, may also be a safety risk during fieldwork. When any traps, snares, poached animals or poacher's camps are encountered in protected areas during fieldwork, these should immediately be reported to the relevant authority. Surveys conducted on hunting concessions require coordinated communication strategies with hunting operators to assist researchers to avoid areas where hunting is scheduled to take place, preventing accidental injury. Similarly, when anti-poaching operations are planned in or around survey sites, conservation authorities should inform researchers as soon as possible to ensure that they avoid these areas or allow for the deactivation or removal of survey structures in time.

WILDLIFE IMPACTS ON PITFALL AND FUNNEL TRAP ARRAYS

The purchase and maintenance of specialised survey equipment may account for a considerable part of the budget for fieldwork activities, especially if large quantities of survey materials are required. As such, the damage and subsequent replacement of survey equipment may have significant implications for conducting or completing projects. Several P.D.W. species are known to interact with, and damage, stationary survey equipment. For instance, camera traps and acoustic monitoring sensors are frequently targeted by wildlife, necessitating steel boxes and cables to prevent tampering, removal, or the destruction of units (Corn et al. 2000; Browning et al. 2017; Wearn and Glover-

Kapfer 2017). Similarly, P.F.T.A.s, which are deemed the standard passive survey technique for terrestrial herpetofauna (Willson 2016; SANBI 2020), can significantly be impacted by P.D.W. and other game species. The nature and occurrence of wildlife damage to P.F.T.A.s, as well as the measures implemented by the author to mediate those impacts, are documented and discussed below.

The P.F.T.A.s discussed here generally followed the structure described in Jordaan et al. (2020) as adapted from the initial design described in Verburgt et al. (2018) and SANBI (2020). Briefly, the P.F.T.A. consisted of three 10 m-long corru-board drift fence arms radiating from a central point (Fig. 1) with each array containing four pitfall traps, with three terminal funnel traps and several double-sided funnel traps positioned along each arm (see Jordaan et al. 2020). Individual drift fence arms were constructed by connecting a series of eight sections of 1.25 m corru-board sheets, originally using canvas strips attached with contact adhesive which were later replaced with Velcro® which were stapled in place (see below).

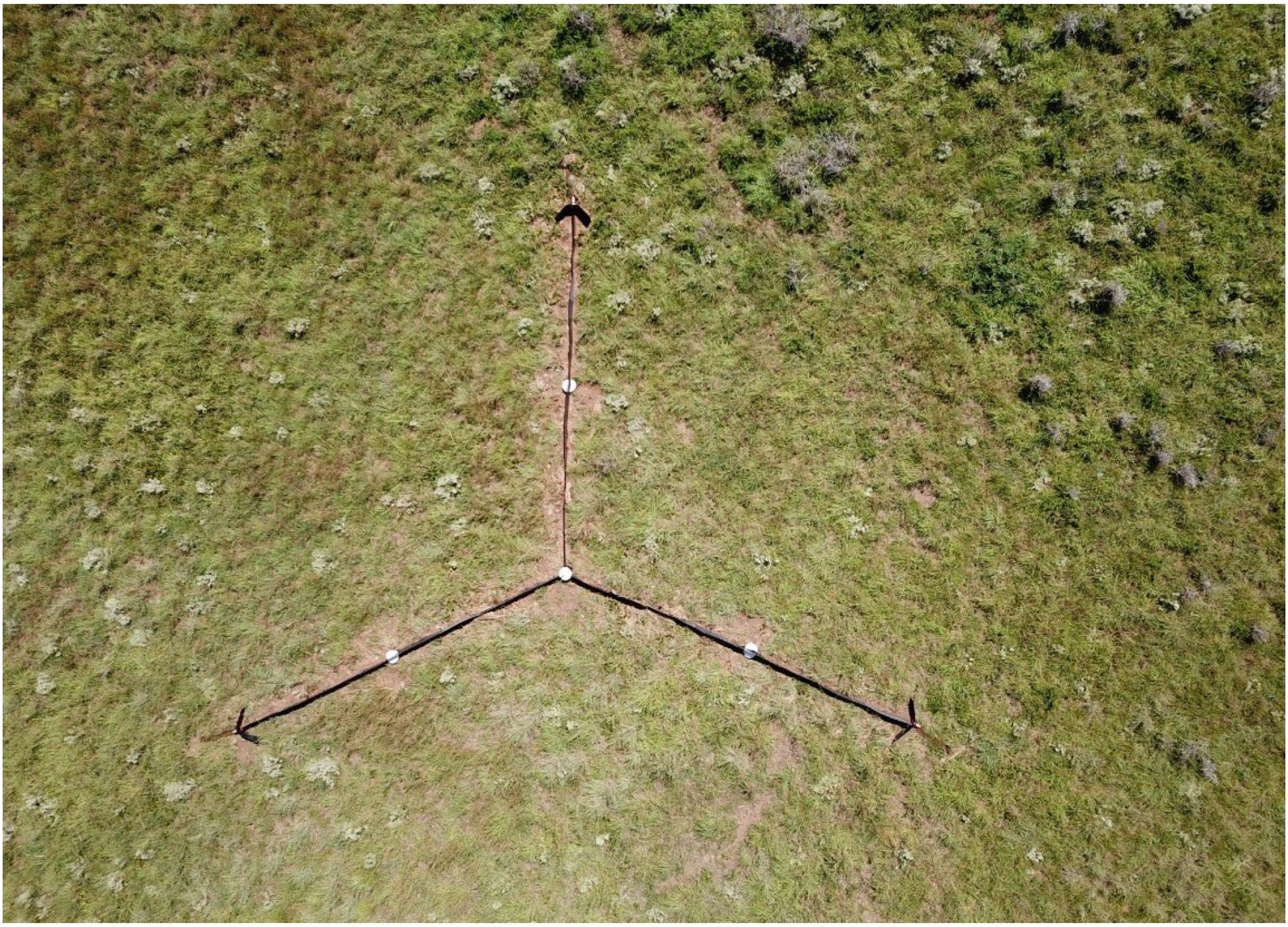


Fig 1. Aerial view of a pitfall and funnel trap array installed in coastal grassland, Maputo National Park, Maputo Province, Mozambique, in 2020. Photo: P.R. Jordaan.

During the author's fieldwork in this region, most detrimental impacts derived from P.D.W. on P.F.T.A.s was inflicted by Savanna Elephants, which are known for investigating and occasionally damaging new or foreign objects placed in the field (e.g., Davison 1967; Wearn and Glover-Kapfer 2017). Even when surrounded by large groups of people during the installation of P.F.T.A.s, Savanna Elephants, particularly single bulls, directly and deliberately approached survey sites. Following an especially close encounter when an elephant bull interrupted a P.F.T.A. installation, the bull milled around the abandoned survey site whilst stepping on and breaking some installed pitfall buckets but ignored all additional equipment which the group had left behind. During another P.F.T.S., when buckets were deactivated/ closed and left in the ground for future repeated assessments, Savanna Elephants removed large logs covering the buried traps and pulled several buckets out of the ground. Afterwards, these buckets were also damaged by African Lions. Consequently, all deactivated pitfall traps were removed, ultimately leading to the reassessment efforts being abandoned due to concerns over the accidental activation and excessive destruction of the buckets by Savanna Elephants. The corru-board backing of terminal funnel traps were also occasionally disturbed and damaged by Savanna Elephants (Fig. 2). Despite these instances of relatively minor damage to P.F.T.A.s, the most significant Savanna Elephant-induced impact (E.I.I.) was sustained by the P.F.T.A. corru-board drift fences.

Fig 2. Mild Savanna Elephant (*Loxodonta africana*) impact of a terminal funnel trap in Maputo National Park, Maputo Province, Mozambique, in 2020. Photo: P.R. Jordaan

Savanna Elephants actively damaged drift fences by ripping them out of the ground, standing on sections of corru-board, and using predominantly their trunks and feet to tear through the material. Attempts to damage the drift fence lasted until there was at least one break in the drift fence. In cases where canvas and contact glue-linked drift fences were targeted by Savanna Elephants, the connection points generally proved strong enough to withstand normal tearing but prompted Savanna Elephants to stab corru-board sheets using their tusks, before ripping them, damaging individual sheets beyond repair. Detached broken sections of corru-board were oftentimes carried or tossed over the larger surrounding area by Savanna Elephants (Fig. 3). Those sections of drift fencing which were relatively undamaged after E.I.I. had to be removed from the site for repairs (applying contact adhesive under pressure) resulting in the closure of trap arrays and the temporary loss of trap nights. Severe damage resulted in a decrease in the amount of available material to construct survey arrays, affecting the number of P.F.T.A.s which could be maintained.

Fig 3. Remnants of a pitfall and funnel trap corru-board drift fence structure constructed with canvas and contact adhesive following Savanna Elephant (*Loxodonta africana*) damage, illustrating the tearing, dismemberment and spreading of corru-board fragments. Tembe Elephant Park, KwaZulu-Natal Province, South Africa, 2019. Photo: P.R. Jordaan.

On one occasion, after two separate cases of severe E.I.I. damage on the same day, both arrays were abandoned due to a lack of replacement materials, altering the extent of the study.

When glued canvas links were substituted with Velcro® attached to the corru-board with staples, irreparable elephant damage to individual sheets drastically decreased. This was primarily due to the weaker attachment points which readily separated during E.I.I., causing breaks when the Velcro® strips separated (Fig. 4). This simple adjustment, suggested by JSR Cutler who was assisting with a 2019 Tembe Elephant Park (T.E.P.) survey, saved a significant amount of drift fencing materials and facilitated array repairs in the field following damage-causing events. Duct tape has also been used to link corru-board sheets to provide weak enough connections to ensure that individual sections can detach during E.I.I. or any other wildlife interactions, preventing undue damage, although this may not be suitable for sites which are exposed to high temperatures in direct sunlight as the adhesive of some tapes may melt.

Fig 4. Savanna Elephant (*Loxodonta africana*) damage to a pitfall and funnel trap array drift fence, connected with Velcro® links, Tembe Elephant Park, KwaZulu-Natal Province, South Africa, 2019. Note the affected corru-board sheets are merely detached and not torn. Photo: P.R. Jordaan.

The extent of E.I.I. to drift fences was not uniform across all habitat types or protected areas. Whilst significant Savanna Elephant damage was inflicted during the 2019 P.F.T.S. in T.E.P. (nine incidents over 18 arrays), comparatively few incidents and of a lower magnitude were experienced during a larger 2020 survey on the neighbouring Maputo National Park (M.N.P., previously Maputo Special Reserve; three incidents over 26 arrays). During these surveys, incidence of Savanna Elephant damage was restricted to sites installed in open habitat such as woody or coastal grassland and sparse woodland. Neither did all Savanna Elephant encounters with P.F.T.A.s result in damage. During the 2020 P.F.T.S. in M.N.P., a sampling site located under a fruiting Marula Tree (*Sclerocarya birrea*) was visited by a breeding herd of Savanna Elephants seeking fallen fruit which collected along the drift fences and inside pitfall traps. No significant damage was caused to the array structure except for one terminal funnel trap sock (the anterior portion of the structure) which was stepped on whilst some of the Velcro® links of the drift fences were slightly pushed apart by their trunks when collecting fruit along it.

The difference in the frequency and severity of E.I.I. to P.F.T.A.s between neighbouring M.N.P. and T.E.P. may be influenced by the relationship of each population to humans. M.N.P. has several small local communities, which are mildly hostile towards Savanna Elephants, resident within the protected area, whereas T.E.P. has no resident communities within its borders and encounters with humans are generally restricted to tourists confined to vehicles. The reprisal of subsistence farmers in M.N.P. to crop damage may make Savanna Elephants more cautious around objects carrying human scent whilst the more habituated T.E.P. population currently has little reason to fear or avoid the smell of humans. The comparatively lower density of Savanna Elephants in M.N.P. may have also limited their encounters with P.F.T.A.s.

In an attempt to protect several P.F.T.A.s during a survey on Phinda Private Game Reserve, KwaZulu-Natal Province, South Africa, strings coated in chilli powder were placed around P.F.T.A.s to keep Savanna Elephants away in a similar way as has been applied around subsistence crops to prevent Savanna Elephant raids (e.g., Sitati and Walpole 2006). These measures appeared to work well with only one line out of 15 breached by Savanna Elephants following a rainstorm which likely diluted the chilli on the string. This measure, however, did not succeed in keeping Hippopotami and Cape Buffalo away from arrays, which visited and ran through drift fencing on several occasions.

Additional damage to P.F.T.A. structures was caused by several other wildlife species. A Hippopotamus accidentally masticated a terminal funnel trap sock whilst grazing. Another terminal funnel trap sock was removed by an African Lion, presumably with something captured inside of it. African Wild Dogs (*Lycaon pictus*) chased antelope through the drift fences twice and several double-sided funnel traps and a terminal funnel trap sock were additionally damaged or destroyed by Honey Badgers. The most significant damage to funnel traps were, however, not caused by wildlife but rather by large solifuges (Solifugae) which created large holes in the sides of traps when attempting to chew through the enamelled steel mesh. Such damage could not be repaired and required many traps to be replaced (Fig. 5).

Fig 5. Damage inflicted to the enamelled steel mesh of a double-sided funnel trap by a large solifuge (Solifugae). Phinda Private Game Reserve, KwaZulu-Natal Province, South Africa, 2017. Photo: P.R. Jordaan.

CONCLUDING REMARKS

The difficulty with which field research is conducted in wildlife areas differs considerably between protected areas depending on the broader physical and political environment and how these factors interact with the methodology and objectives of a particular study. Reports and references which discuss the logistics and feasibility of planning herpetological or ecological field research in general is largely focussed on ethical, bureaucratic, or legal aspects and the necessary cultural permissions to facilitate such studies (e.g., Fisher and Foster 2012; Dodd 2016), with few comments on the practical considerations and alterations which may affect the feasibility of field-based assessments.

Potentially dangerous wildlife affect field assessments either directly (personnel injury, the damage of equipment) or indirectly (required safety protocols, field restrictions, etc. impacting time and financial aspects). The diversity of wildlife, their density, the size of the area, movement patterns and routes, sites of congregation, the nature of survey equipment, and the site-specific relationship of these animals towards humans are all likely to affect surveys and fieldwork in one way or another. These factors should ideally all be considered and ascertained from conservation or ecological authorities during the planning stages of projects to better inform practical logistics. This may not only be advisable in protected areas, but in any landscape where P.D.W. may occur. When feasible, preliminary site visits or scouting expeditions to inspect the actual circumstances and conditions of a survey area may greatly facilitate project planning. A series of alternative biological threats and challenges other than P.D.W. may be present in environments intended to be surveyed, such as domesticated, feral, or rabid animals, and disease vectors associated with natural landscapes and wildlife. Venomous, poisonous, acid-spraying and biting invertebrates are also likely to impact fieldwork conditions and may require additional protective measures or personal protective equipment (Manley et al. 2006).

In the experience of the author, Savanna Elephants have proven to be a personal bane of herpetological fieldwork in wildlife areas, as has briefly been described above. Many encounters with Savanna Elephants, however, resulted in no contact or damage, with most herds avoiding P.F.T.A.s, research equipment and field staff. The damage or destruction of P.F.T.A. equipment by P.D.W., or other environmental conditions, should be anticipated and surplus traps and materials for repair and replacement kept on-hand in case of such eventualities (Witmer 2005).

Practical constraints imposed by P.D.W. are likely to discourage some researchers from conducting structured assessments in wildlife areas, however this need not be the case if adequate provisions are included during the planning process. This should include built-in financial, logistical, and operational contingencies for possible alterations to the survey. The inclusion of practical challenges during fieldwork in academic literature or the publication of field reports to better inform the planning of prospective research is likely to promote realistic and adaptable strategies to fulfil the objectives of structured herpetological sampling and other ecological research among P.D.W.

ACKNOWLEDGEMENTS

Many assistants contributed to the studies discussed above. The author would particularly like to thank P Calverley, JSR Cutler, T Dando, PU Els, AN Green, R Green, R Hills, M Hudson, A Hunnicut, B Lavin, L Muller, FC Retief, D Snijder, M Sibiya, Y Spierenberg, R Steyn, R van Huyssteen and A Wilken for their assistance and contributions. CC Hanekom procured permits and coordinated research administration for fieldwork at T.E.P. C Sholto-Douglas and the Phinda Habitat team organised access to, and facilitated the installation of, pitfall arrays on Phinda Private Game Reserve. The 2019 T.E.P. and 2020 M.N.P. surveys were conducted as part of the author's tenure as the Lubombo Transfrontier Conservation Area Scientific Technician between M.N.P. and T.E.P. 2018–2020, which was funded by the *Deutsche Gesellschaft für Internationale Zusammenarbeit* through Peace Parks Foundation in cooperation between *Administração Nacional das Áreas de Conservação* (ANAC) and EKZNW. Corru-board for the drift fences were donated by Wild Tomorrow Fund South Africa and the pitfall buckets were donated by MJP Moolman. J Martin, HP Muller, GK Nicolau, FC Retief, J Scheun, E Strydom, and A Wilken are thanked for commenting on the initial manuscripts preceding the official peer review process. Ruan Stander is thanked for reviewing the article.

REFERENCES

Branch WR. 2014. Conservation status, diversity, endemism, hotspots, and threats. In: Bates MF, Branch WR, Bauer AM, Burger M, Marais J,

Branch WR. 2014. Conservation status, diversity, endemism, hotspots, and threats. 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.

Broadley DG. 2018. A quest for African herpetology. Frankfurt am Main, Germany: Edition Chimaira.

Browning E, Gibb R, Glover-Kapfer P, Jones KE. 2017. Passive acoustic monitoring in ecology and conservation. WWF Conservation Technology Series 1(2). Woking, U.K.: WWF-UK.

Carruthers V. 2001. Frogs and frogging in southern Africa. Cape Town, South Africa: Struik.

Clarke J. 2013. Save me from the lion's mouth: exposing human-wildlife conflict in Africa. Cape Town, South Africa: Struik.

Corn PS, Muths E, Iko WM. 2000. A comparison in Colorado of three methods to monitor breeding amphibians. Northwest. Nat. 81: 22–30.

Cousins JA, Sadler JP, Evans J. 2010. The challenge of regulating private wildlife ranches for conservation in South Africa. Ecol. Soc. 15(2). https://www.jstor.org/stable/26268142.

Daniels LD, Lavallee S. 2014. Better safe than sorry: planning for safe and successful fieldwork. Bull. Ecol. Soc. Am. 95(3): 264–273.

Davison T. 1967. Wankie: the story of a great game reserve. Cape Town, South Africa: Books of Africa.

Dodd K, editor. 2016. Reptile ecology and conservation: a handbook of techniques. Oxford, U.K.: Oxford University Press.

Dunham KM, Ghiurghi A, Cumbi R, Urbano F. 2010. Human-wildlife conflict in Mozambique: a national perspective, with emphasis on wildlife attacks on humans. Oryx 44(2): 185–193.

Durrheim D, Leggat PA. 1999. Risk to tourists posed by wild mammals in South Africa. J. Travel Med. 6: 172–179.

Estes RD. 1991. The behaviour guide to African mammals including hoofed mammals, carnivores, and primates. Los Angeles, U.S.A.: University of California Press.

Fisher RN, Foster MS. 2012. Study design and sampling. In: McDiarmid RW, Foster MS, Guyer C, Gibbons JW, Chernoff N. Reptile Biodiversity: Standard Methods for Inventory and Monitoring. Los Angeles, U.S.A.: University of California Press.

Fisher RN. 2016. Planning and setting objectives in field studies. In: Dodd K, editor. Reptile Ecology and Conservation: A Handbook of Techniques. Oxford, U.K.: Oxford University Press.
Foster CN, Banks SC, Cary GJ, Johnson CN, Lindenmayer DB, Valentine LE. 2020. Animals as agents in fire regimes. Trends Ecol. Evol. 35(4): 347–356.
Garai ME. 2005. The elephant. In: Bothma J du P, van Rooyen N, editors. Intensive Wildlife Production in Southern Africa. Pretoria, South Africa: Van Schaik Publishers.
Green DE, Gray MJ, Miller DL. 2010. Disease monitoring and biosecurity. In: Dodd CK, editor. Amphibian Ecology and Conservation. Oxford, U.K.: Oxford University Press.
Hoare R. 2012. Lessons from 15 years of human-elephant conflict mitigation: management considerations involving biological, physical and governance issues in Africa. Pachyderm 51: 60–74.
Jordaan PR, Cutler JSR, Snijder D. 2020. Geographical Distributions. Lamprophiidae *Lycophidion pygmaeum* BROADLEY 1996 - Pygmy Wolf Snake. Afr. Herp News 74: 88–91.
Manley PN, van Horne B, Roth JK, Zielinski WJ, McKinzie MM, Weller TJ, Weckerly FW, Vojta C. 2006. Multiple species inventory and monitoring technical guide. General Technical Report WO-73. Washington, D.C., U.S.A.: United States of America Department of Agriculture, Forest Service.
Mitchell KB, Kotecha V, Chandika A. 2011. Bush animal attacks: management of complex injuries in a resource-limited setting. World J. Emerg. Surg. 6: Article no. 43.
Nasseri NA, McBrayer D, Schulte BA. 2010. The impact of tree modification by African elephant (*Loxodonta africana*) on herpetofaunal species richness in northern Tanzania. Afr. J. Ecol. 49: 133–140.
Pooley S. 2015. Using predator attack data to save lives, human and crocodilian. Oryx 49(4): 581–583.
Rinkus MA, Kelly JR, Wright W, Medina L, Dodson T. 2018. Gendered considerations for safety in conservation fieldwork. Soc. Nat. Resour. DOI: 10.1080/08941920.2018.1471177.
Shannon G, Slotow R, Durant SM, Sayialel KN, Poole J, Moss C, McComb K. 2013. Effects of social disruption in elephants persist decades after culling. Front. Zool. 10(62): 1–10.
Sitati N, Walpole MJ. 2006. Assessing farm-based measures for mitigating human-elephant conflict in Transmara District, Kenya. Oryx 40(3): 279–286.
Somaweera R, Nifong J, Rosenblatt A, Brien ML, Combrink X, Elsey RM, Grigg G, Magnusson WE, Mazzotti FJ, Pearcy A, Platt SG, Shirley MH, Tellez M, van der Ploeg J, Webb G, Whitaker R, Webber BL. 2020. The ecological importance of crocodylians: towards evidence-based justification for their conservation. Biol Rev. 95(4): 936–959.
South African National Biodiversity Institute (SANBI). 2020. Species environmental assessment guideline. Guidelines for the implementation of the terrestrial fauna and terrestrial flora species protocols for environmental impact assessments in South Africa. Pretoria, South Africa: South African National Biodiversity Institute. Version 1.2020.
Spawls S, Howell K, Hinkel H, Menegon M. 2018. Field guide to East African reptiles. London, U.K.: Bloomsbury Wildlife.
Taylor WA, Child MF, Lindsey PA, Nicholson SK, Relton C, Davies-Mostert HT. 2021. South Africa's private wildlife ranches protect globally significant populations of wild ungulates. Biodivers. Conserv. 30: 4111–4135.
Verburgt L, Verburgt UK, Branch WR. 2018. A new species of *Scolecoseps* (Reptilia: Scincidae) from coastal north-eastern Mozambique. Afr. J. Herpetol. 67(1): 86–98.
Vonesh JR, Mitchell JC, Howell K, Crawford AJ. 2010. Rapid assessments of amphibian diversity. In: Dodd CK, editor. Amphibian Ecology and Conservation. Oxford, U.K.: Oxford University Press.
Wearn OR, Glover-Kapfer P. 2017. Camera-trapping for conservation: a guide to best practice. WWF Conservation Technology Series 1(1). Woking, U.K.: WWF-UK.
Willson J. 2016. Surface dwelling reptiles. In: Dodd CK, editor. Reptile Ecology and Conservation. Oxford, U.K.: Oxford University Press.
Witmer GW. 2005. Wildlife population monitoring: some practical considerations. Wildl. Res. 32: 259–263.

SUBMITTED BY:

PHILIPPUS RUDOLPH JORDAAN
African Ecological Conservation Projects (Pty) Ltd.; & Tshwane University of Technology, Department Nature Conservation; & Lubombo Transfrontier Conservation Area Scientific Technician for M.N.P. and T.E.P. 2018–2020.
E-mail: PRJordaan@aecproject.org

Chersobius solus

BRANCH, 2007

Nama Dwarf Tortoise

TWO-EGG CLUTCHING

E.A.M. SCHLEICHER

Dwarf tortoises (genus *Chersobius*) typically lay single-egg clutches (Boycott and Bourquin 2000; Hofmeyr and Branch 2018) but here I report evidence of two-egg clutches.

I cared for Nama Dwarf Tortoises (*Chersobius solus*) in outdoor enclosures in Windhoek, Namibia, with most individuals being in my care for more than 25 years. Five wild adults (3 males and 2 females) were presented to me by the Ministry of Environment, Forestry and Tourism (MEFT) of Namibia, and their age is not known. The tortoises are kept in three different enclosures, each of which encompasses approximately 7 m² of mostly natural habitat. Both females and males shelter under overlapping rocks, succulent plants or small shrubs. All tortoises and their enclosures are checked frequently (ca. daily). In the first few years I incubated all eggs in an incubator, but for the past two decades I left the nests undisturbed, allowing incubation under natural conditions.

All clutches discovered and measured from 1995–2021 contained one egg, with one exception.
During September 1999, a long-term captive female produced a two-egg clutch. However, one egg was visibly smaller and deformed but contained yolk. The normal-sized egg measured 38.5 x 27.5 mm, weighed 18 g and hatched successfully after an incubation period of 93 days.

On 25 February 2021, two unusually small *C. solus* hatchlings (see Schleicher and Loehr 2001, and Schleicher 2004 for comparison) were found next to each other on a wet and misty morning at a nesting site of a different female to the one mentioned above, which had been captive since 2010. Each hatchling weighed 9 g and had a straight carapace length, carapace width and shell height of 35.5 x 27.5 x 17.0 mm and 34.5 x 28.5 x 16.5 mm, respectively (Fig. 1).

Fig 1.

This suggests that both eggs were from a single clutch laid by the only female inhabiting the enclosure. However, she may have laid both eggs consecutively but in one location, with the hatchlings emerging simultaneously, assuming the possibility of embryonic diapause during development. This apparent two-egg clutch followed a three-year drought, during which the females produced extremely few eggs, and the drought may therefore have contributed to the production of two eggs.

Tortoise egg size correlates with female size and body condition in southern Africa (Hofmeyr et al. 2005; Loehr et al. 2009). The female that laid the second two-egg clutch measured 111.5 x 80.0 x 43.5 mm, and weighed 225 g, indicating a body condition of 1.11 g per cubic centimetre (cc, see formula in Loehr et al. 2004).

Two smaller females which produced exclusively single egg clutches had shell dimensions of 108.5 x 85.0 x 43.0 mm and 101.5 x 78.5 x 39.0 mm, and body masses of 193 and 172 g, respectively. Their size and body condition indices (0.93 and 1.06g per cc, respectively) were lower than that of the female that produced two eggs.

Furthermore, I was able to obtain an X-ray of a Speckled Padloper (*Chersobius signatus*) female, which measured 94.0 x 72.0 x 39.0 mm and weighed 165 g, which clearly contains two eggs (Fig. 2). If two eggs fit in the body of a *C. signatus* (which are typically much smaller than *C. solus*), then they will certainly fit in an adult *C. solus* as well. These data, supported by data for a fully grown *C. signatus* (van Loon 2018), suggest that favourable weather may combine with female size and body condition to increase production of two-egg clutches in *Chersobius* species.

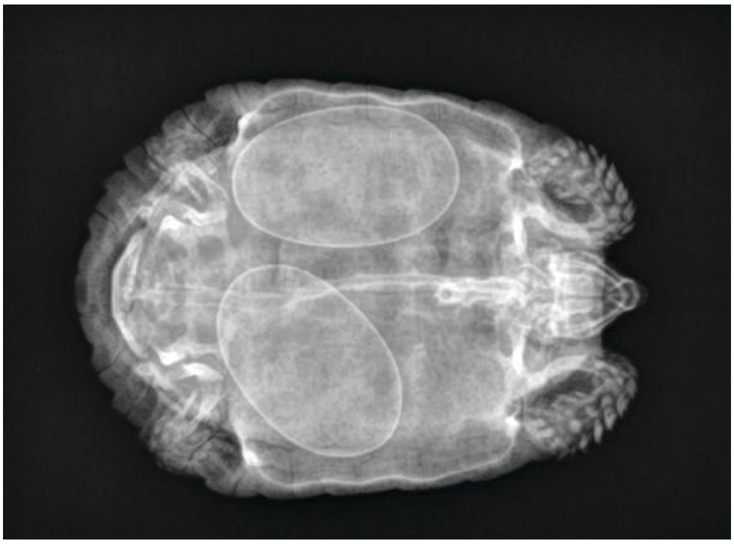


Fig 2.

ACKNOWLEDGEMENTS

The Ministry of Environment, Forestry and Tourism (MEFT) and the National Commission on Research, Science and Technology (NCRST) in Namibia are thanked for providing the necessary research and possession permits (permit number AN20171002). Olda Mudra (Czech Republic) is thanked for providing data and the X-ray of a gravid *Chersobius signatus.*

REFERENCES

Boycott RC, Bourquin O. 2000. The southern African tortoise book. Pietermaritzburg, South Africa: Interpak.

Hofmeyr M, Branch W. 2018. The padloper's tortuous path (Chelonia: Testudinidae): two genera, not one. Afr. J. Herpetol. 67(2): 99–112.

Hofmeyr MD, Henen BT, Loehr VJT. 2005. Overcoming environmental and morphological constraints: egg size and pelvic kinesis in the smallest tortoise, *Homopus signatus*. Can. J. Zool. 83(10): 1343–1352.

Loehr VJT, Henen BT, Hofmeyr MD. 2004. Reproduction of the smallest tortoise, the Namaqualand Speckled Padloper, *Homopus signatus signatus*. Herpetologica 60(4): 444–454.

Loehr VJT, Hofmey MD, Henen BT. 2009. Small and sensitive to drought: consequences of aridification to the conservation of *Homopus signatus signatus.* Afr. J. Herpetol. 58(2): 116–125.

Schleicher A, Loehr VJT. 2001. Husbandry, behaviour and captive breeding of the Nama Padloper, *Homopus bergeri*, from southwestern Namibia. Chelonian Conserv. Biol. 4: 165–170.

Schleicher A. 2004. Experiences with keeping and breeding the Namibian Cape Tortoise *Homopus* sp. ("*Homopus bergeri*") in a Namibian outdoor enclosure. Radiata (English edition) 13(4): 3–12.

van Loon FHA. 2018. *Homopus signatus* GMELIN, 1789: two-egg clutching. Afr. Herp News 67: 25–26.

SUBMITTED BY:

ALFRED E. SCHLEICHER

P.O. Box 30566, Windhoek, Namibia.
E-mail: kidogo@iway.na

Varanus niloticus

LINNAEUS, 1766

Nile Monitor

PREDATION BY CHEETAH

P.R. JORDAAN

Reptiles are generally included as an opportunistic food source in the diets of large African mammalian carnivores such as African Lion (*Panthera leo*), Leopard (*Panthera pardus*), and Spotted Hyena (*Crocuta crocuta*; Estes 1991; Skinner and Chimimba 2005; Branch 2016). Evidence of Cheetah (*Acinonyx jubatus jubatus*) feeding on reptiles, however, is largely lacking despite the suspicions of some authors (Janzen 1976) with the only confirmed record in print derived from scat analyses for the Asiatic Cheetah (*A. j. venaticus*) in Iran (Farhadinia et al. 2012). This observation documents circumstantial evidence of *A. j. jubatus* predation on a Nile Monitor (*Varanus niloticus*) based on the condition of an observed carcass and tracks and signs surrounding it.

The *V. niloticus* carcass, estimated at <1 m in total length, was encountered close to a dirt track 50 m south of the resting position of three recently emancipated sub-adult *A. j. jubatus* during normal radio-tracking monitoring activities. The carcass was found in the south-eastern corner of Mkhuze Game Reserve, KwaZulu-Natal Province, South Africa, on 15 August 2014, at 06:40 AM and exhibited obvious signs of predation. *Acinonyx j. jubatus* tracks were observed leaving the dirt track in the direction of the dead *V. niloticus*, with some tracks also present on bare soil around the carcass.

The carcass was fresh and positioned on its back, lying on a thick layer of grass, with the tail folded over the exposed gut (Fig. 1) and the ventral skin ragged and pushed back under the body towards the dorsum (Fig. 2).

Figure 1. Nile Monitor (*Varanus niloticus*) carcass predated on by Cheetah (*Acinonyx j. jubatus*) in its original position, Mkhuze Game Reserve, KwaZulu-Natal Province, South Africa. Photo: P.R. Jordaan.

Figure 2. Dorsal view of the Nile Monitor (*Varanus niloticus*) carcass. Photo: P.R. Jordaan.

The face and tail were undamaged and uneaten. All four limbs were removed from the body, with a humerus and femur lying approximately 0.4 m from the carcass next to three vertebrae which originated from the lumbar spine. The pubic bone was removed, and the posterior body severely damaged through mastication. The skin from the limbs was still attached to the dorsal skin of the body but was either turned inside-out or torn into strips. The trachea was largely exposed but still present. Sections of the lungs and the entire heart were absent. The liver, colon, stomach, and intestines were intact and uneaten. The sternal ribs and plate were absent, and the vertebral ribs were bitten off of the carcass to varying degrees. Several small pieces of miscellaneous flesh were strewn around the body.

The feeding characteristics observed on the carcass fit some of the diagnostic patterns described in Hodkinson et al. (2007) for *Acinonyx jubatus* in larger prey. Additionally, *Acinonyx j. jubatus* tracks were observed on open soil patches close to and around the carcass, including in the road. Whilst the actual predation event was not witnessed, the circumstantial evidence provided by the proximity of the three *Acinonyx j. jubatus*, presence of tracks, and the feeding pattern on the carcass very strongly point towards *A. j. jubatus* predation on this *V. niloticus*.

ACKNOWLEDGEMENTS

This observation was made during the tenure of the author as a relief priority species monitor for Wildlife ACT.

REFERENCES

Branch WR. 2016. Natural History Notes: Pythonidae *Python natalensis* SMITH, 1840 Southern Rock Python predation by carnivores. Afr. Herp News. 63: 2–8.

Estes RD. 1991. The behaviour guide to African mammals including hoofed mammals, carnivores, and primates. Los Angeles, U.S.A.: University of California Press.

Farhadinia MS, Hosseini-Zavarei F, Nezami B, Harati H, Absalan H, Fabiano E, Marker L. 2012. Feeding ecology of the Asiatic Cheetah *Acinonyx jubatus venaticus* in low prey habitats in north-eastern Iran: implications for effective conservation. J. Arid Environ. 87: 1–6.

Hodkinson C, Komen H, Snow T, Davies-Mostert H, editors. 2007. Predators and farmers. Johannesburg, South Africa: Endangered Wildlife Trust.

Janzen DH. 1976. The depression of reptile biomass by large herbivores. Am. Nat. 110 (973): 371–400.

Skinner JD, Chimimba CT. 2005. The mammals of the southern African subregion. Cambridge, U.K.: Cambridge University Press.

SUBMITTED BY:

PHILIPPUS RUDOLPH JORDAAN

Tshwane University of Technology

Email: jordaanpr@gmail.com

Dispholidus typus
SMITH, 1828
Boomslang
FORAGING

A.M. LOWNEY, T. BECK AND O.OLUBODUN

Boomslang (*Dispholidus typus*) are large-bodied diurnal snakes that mainly feed on lizards, particularly chameleons (Branch 1998; Maritz and Maritz 2020), and fledgling birds (Covas 2002; Smith et al. 2019; Maritz and Maritz 2020). They are largely arboreal but come to the ground to cross open spaces (Broadley 1983; Branch 1998). Boomslang have a wide sub-Saharan distribution that extends from South Africa, northwards to East, Central, and West Africa (Broadley 1983), and can be found in a wide range of habitats that include forests, scrublands, and savanna (Marais 2014). Additionally, recent studies have provided insights into diet, niche use and ontogenetic shifts in colouration (Smith et al. 2019; Maritz and Maritz 2020). Here we add to this body of growing literature by documenting nocturnal predation by a Boomslang on a Pygmy Falcon (*Polihierax semitorquatus*) nestling under natural light conditions.

Authors AML and OO are part of a research group that monitor the breeding success of Pygmy Falcons. As part of the falcon monitoring, all adults and chicks are ringed within the study site, with each individual receiving a uniquely engraved alpha-numeric metal ring. Adults also receive a unique combination of three coloured plastic rings, which allows individuals to be recognised through binoculars or a spotting scope (Lowney et al. 2017; Bolopo et al. 2019). Pygmy Falcons do not build their own nests but breed and roost in the nests of other species (Maclean 1970). In southern Africa, Pygmy Falcons exclusively use nesting chambers within large colonial nest structures built by Sociable Weavers (*Philetairus socius*; Maclean 1970). Each Sociable Weaver colony can contain between two and 250 chambers and each nest chamber is accessed through its own entrance tunnel situated on the underside of the colony (Fig. 1a; Lowney et al. 2020). All falcons are captured and ringed at their host colonies and are located within the colony structure as they mark their chambers with a conspicuous white faecal mat (Fig. 1b; Krochuk et al. 2018; Lowney et al. 2020). It was within one of these colonies where our observation took place.

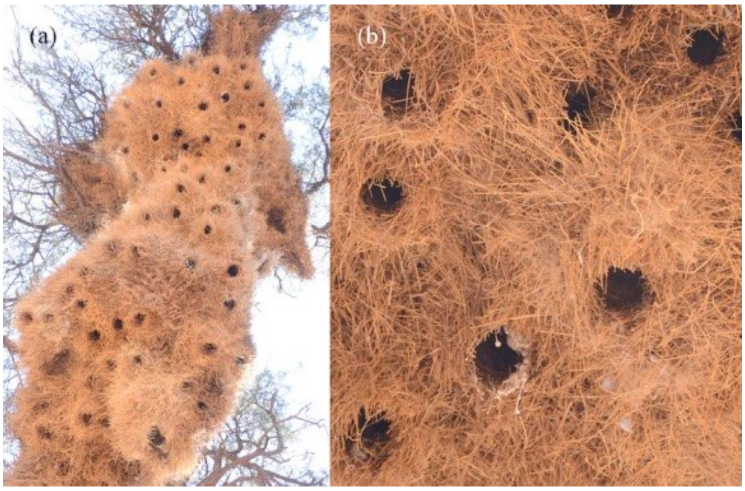


Figure 1. The underside of a Sociable Weaver (*Philetairus socius*) colony. (a) These structures contain many nesting chambers that are entered through the underside of the colony. (b) Those occupied by Pygmy Falcons (*Polihierax semitorquatus*) are conspicuous due to the chalk-like faecal mat pasted around the entrance. Photo's: A.M. Lowney.

Our observation was made between 5 and 6 November 2020 at Tswalu Kalahari Reserve in the Northern Cape Province of South Africa (27° 19' 34.20" S, 22° 30' 34.20" E, 2722BC; 1 258 m a.s.l.), in an area in which anthropogenic light is absent. Tswalu Kalahari Reserve is situated in a semi-arid area characterised by savanna vegetation and scattered trees (Bolopo et al. 2019). At the colony where the predation occurred, three Pygmy Falcon chicks were ringed on 3 November 2020 (ring numbers DH16762–16764). We revisited the colony at 19:23 PM on 5 November (sunset on this date was 18:53 PM) and used a torch to scan the colony to confirm that the adults were present so that they could be caught before sunrise the next morning. While at the colony, we noticed a Boomslang climbing the tree towards the colony. Once at the colony, the Boomslang appeared to be searching for an entrance to one of the nest chambers, however it failed to locate an entrance and eventually climbed to the top of the colony, out of sight. Before we left, we confirmed that both adult falcons and chicks were still present in their respective chambers. We returned the next morning at 4:45 AM (sunrise was at 5:35 AM), to find that the falcon chambers were now empty. The adjacent chambers, which previously contained adult Sociable Weavers, were now also empty. On the ground below the colony was a dead falcon chick (Figure 2a). The other two falcon chicks were not located. The dead chick appeared to have injuries sustained from a snake bite (puncture wounds to the chest and bleeding from the mouth) and had a metal ring with the number DH16764, confirming that this was a chick from this colony. We did not see the Boomslang, but at 5:45 AM (ten minutes after sunrise) the two adult falcons (identified by their colour rings) landed on a nearby tree. Later that morning TB visited the colony tree to locate and catch the Boomslang we had observed the night before. TB caught a female Boomslang in the same tree that hosts the weaver colony, which had a clear bulge, suggesting that it had recently consumed prey (Fig. 2b & c). The Boomslang was kept in captivity for a week until, on 13 November, a metal ring with the inscription DH16763 passed through

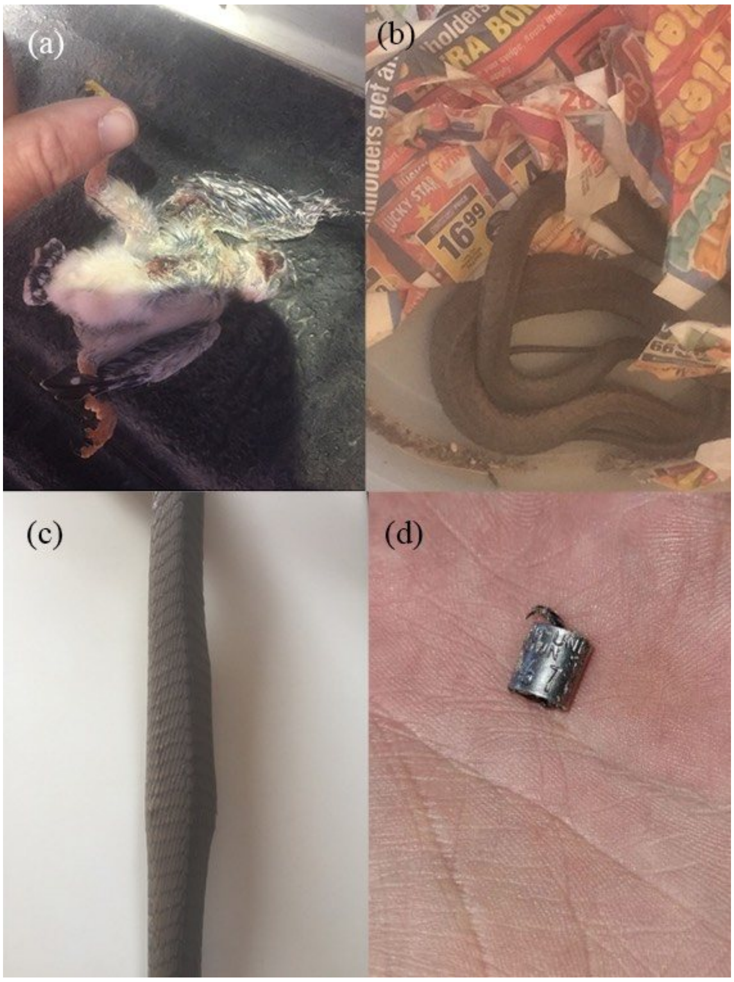


Figure 2. Evidence of Pygmy Falcon (*Polihierax semitorquatus*) predation by a Boomslang (*Dispholidus typus*). (a) The dead falcon chick that was found under the colony with clear injuries to its chest. This bird had the ring number DH16764, confirming that it was from this colony. (b & c) Captured Boomslang with an obvious bulge, suggesting that it had recently fed. (d) The metal ring that passed through the digestive system of the Boomslang, identifying the individual Pygmy Falcon that was consumed. Photo's: T. Beck.

its digestive system (Fig. 2d), confirming that one of the Pygmy Falcon chicks had been consumed. The Boomslang was subsequently released where it was found.

This observation demonstrates that Boomslang can forage at night under natural light conditions. The night of 5 November had clear skies and the moon was in a waning gibbous phase with 77.9% visibility (www.mooncalc.org; 100% visibility represents full moon conditions). The incident occurred away from any anthropogenic light and as moonrise was not until 23:17 PM, our original observation of the Boomslang approaching the colony occurred during almost complete darkness. However, as the predation event took place between visits, we are unable to determine under exactly what light conditions the foraging and predation took place.

Sociable Weaver colonies provide thermal insulation against extreme ambient temperatures, with chambers being cooler than ambient temperatures in summer and warmer than ambient temperatures during winter, thus providing a thermal refuge for the multiple species that use them (Lowney et al. 2020; Lowney and Thomson 2021). Boomslang and Cape Cobras (*Naja nivea*) have been observed resting in Sociable Weaver chambers (Maclean 1973). Therefore, it is possible that this snake was going to use the weaver colony as a place to rest and that the predation attempt was more opportunistic than the result of a concerted hunting effort. However, the chamber that contained the falcon chicks was not at the edge of the colony and, therefore, the Boomslang had passed other occupied chambers before finding the chamber that contained the falcon chicks, and subsequently the only birds in the colony that could not fly away. Furthermore, the Boomslang was not in any of the colony chambers when we returned in the morning, suggesting that it did not use the colony as a refuge, but solely for foraging.

Boomslang are described as diurnal, but this observation provides a first report of deviation from this activity pattern. Diurnal species have been reported being active during bright nights (Gustin et al. 2014; Carnevali et al. 2016; Brisbane and van den Burg 2020), or when influenced by the presence of anthropogenic light (Garber 1978; Perry and Fisher 2006; Perry et al. 2008; Brown and Arrivillaga 2017). However, this observation occurred in complete darkness, and to the best of our knowledge this is the first reported observation of nocturnal behaviour by Boomslang, but the benefits and costs gained by foraging at night remain unclear. It may simply be that nocturnal foraging increases foraging success. Boomslang have been reported as being resident in particular weaver colonies, where the same individuals have been repeatedly observed within the same colonies (Braine and Braine 1968). Furthermore, weaver colonies are hotspots of animal activity, conspicuous within a landscape, and can persist for more than 100 years (Friedmann 1930; Lowney and Thomson 2021, in press), which would be an easy resource to locate at night, especially if a Boomslang is familiar with a particular colony, having visited it on numerous previous occasions. Boomslang also have large eyes for a diurnal snake, and this may help with locating resources during low light conditions (FitzSimons 1962). Foraging at night could also be a means to evade high daytime temperatures. However, at the time of the observation it was not a particularly hot day in the Kalahari with a maximum air temperature of 28.2 °C. Foraging at night could be an anti-predator strategy, allowing Boomslang to avoid Cape Cobras, which also forage in Sociable Weaver chambers and also prey on other snakes (Layloo et al. 2017; Maritz et al. 2019). Therefore, foraging at night may reduce the likelihood of encountering a Cape Cobra and reducing the likelihood of becoming prey. However, we have also observed Cape Cobras active at Sociable Weaver colonies at night. Nocturnal activity by Boomslang may instead be a tactic to avoid aerial raptors, including Pale Chanting Goshawks (*Melierax canorus*), Black-chested Snake-eagles (*Circaetus pectoralis*) and Brown Snake-eagles (*C. cinereus*), which are all frequently observed at this study site (pers. obs.). Furthermore, Pygmy Falcons act aggressively towards nest predators (pers. obs.), therefore this Boomslang may be foraging at night to reduce its chances of being attacked by a defensive parent. This behaviour occurs in Rat Snakes (*Pantherophis obsoletus*), which are largely active during the day, but 80% of nest predation occurs after dark (DeGregorio et al. 2015). These elements would be interesting to investigate in future studies.

ACKNOWLEDGEMENTS

We thank the Oppenheimer family, Tswalu Foundation and Tswalu Kalahari Reserve for permitting us to conduct research on their property. We also thank Bryan Maritz, Graham Alexander, Rikki Gumbs, and Robert Thomson for valuable input and Leuan Rose for assistance in the field. This observation was carried out by members of the Kalahari Endangered Ecosystem Project (KEEP) and was supported by its sponsors.

REFERENCES

Bolopo D, Lowney AM, Thomson RL. 2019. Helpers improve fledgling body condition in bigger broods of cooperatively breeding African Pygmy Falcon. Behav. Ecol. Sociobiol. 73: 1–9.

Braine JWS, Braine SG. 1968. The Pygmy Falcon. Bokmakierie. 20: 2–3.

Branch WR. 1998. Field guide to snakes and other reptiles of southern Africa, 3rd edition. Cape Town South Africa: Struik.

Brisbane JLK, van den Burg MP. 2020. No need for artificial light: nocturnal activity by a diurnal reptile under lunar light. Neotrop. Biodivers. 6: 193–196.

Broadley DG. 1983. FitzSimons' snakes of southern Africa. Johannesburg, South Africa: Delta Books.

Brown TW, Arrivillaga C. 2017. Nocturnal activity facilitated by artificial lighting in the diurnal *Norops sagrei* (Squamata: Dactyloidae) on Isla de Flores, Guatemala. Mesoam. Herpetol. 4: 637–639.

Carnevali C, Lovari S, Monaco A, Mori E. 2016. Nocturnal activity of a "diurnal" species, the Northern Chamois, in a predator-free Alpine area. Behav. Processes. 126: 101–107.

Covas, R. 2002. Life-history evolution and cooperative breeding in the Sociable Weaver. [PhD thesis]. Cape Town, South Africa: University of Cape Town.

DeGregorio BA, Sperry JH, Ward MP, Weatherhead PJ. 2015. Wait until dark? Daily activity patterns and nest predation by snakes. Ethology 121: 1–10.

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

Friedmann H. 1930. Birds collected by the Childs Frick expedition to Ethiopia and Kenya Colony. Part 1: Non-passerines. Bull. U.S. Nat. Mus. 153: 1–516.

Garber SD. 1978. Opportunistic feeding behavior of *Anolis cristatellus* (Iguanidae: Reptilia) in Puerto Rico. Trans. Kansas. Acad. Sci. 81: 79–80.

Gustin M, Ferrarini A, Giglio G, Pellegrino C, Frassanito A. 2014. First evidence of widespread nocturnal activity of Lesser Kestrel (*Falco naumanni*) in southern Italy. Ornis Fennica 91: 256–260.

Krochuk BA, Bolopo D, Lowney AM, Meyers PR, Spottiswoode CN, Raman RMG, Thomson RL. 2018. Why defaecate on your doorstep? Investigating an unusual behaviour in Africa's smallest falcon. Ostrich 89: 1–8.
Layloo L, Smith C, Maritz B. 2017. Diet and feeding in the Cape Cobra, *Naja nivea*. Afr. J. Herpetol. 66: 147–153.
Lowney A, Green K, Bonginkosi PN, Thomson RL. 2017. Mortal combat: intraspecific killing by an African Pygmy-falcon (*Polihierax semitorquatus*) to acquire new mate and territory. J. Raptor Res. 51: 89–91.
Lowney AM, Bolopo D, Krochuck BA, Thomson RL. 2020. The large communal nests of Sociable Weavers provide year-round insulated refuge for weavers and Pygmy Falcons. Front. Ecol. Evol. 8: 357.
Lowney AM, Thomson RL. 2021. Ecological engineering across a temporal gradient. J. Anim. Ecol. 90: 2362–2376.
Lowney AM, Thomson RL. in press. Ecological engineering across a spatial gradient: sociable weaver colonies facilitate animal associations with increasing environmental harshness. J. Anim. Ecol.
Maclean GL. 1970. The Pygmy Falcon *Polihierax semitorquatus*. Koedoe 13: 1–21.
Maclean GL. 1973. The Sociable Weaver, part 4: predators, parasites, and symbionts. Ostrich 44: 241–253.
Marais J. 2014. *Dispholidus typus* (A. Smith, 1828) – Boomslang. In: Bates MF, Branch WR, Bauer 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.
Maritz B, Alexander GJ, Maritz RA. 2019. The underappreciated extent of cannibalism and ophiophagy in African cobras. Ecol. 100: e02522.
Maritz RA, Maritz B. 2020. Sharing for science: high-resolution trophic interactions revealed rapidly by social media. PeerJ 8: e9485.
Perry G, Fisher RN. 2006. Night lights and reptiles: observed and potential effects. In: Rich C, Longcore T, editors. Ecological Consequences of Artificial Night Lighting. Washington, U.S.A.: Island Press.
Perry G, Buchanan BW, Fisher RN, Salmon, M. Wise, SE. 2008. Effects of artificial night lighting on amphibians and reptiles in urban environments. In: Mitchell JC, Brown RE, Bartholomew B, editors. Urban Herpetology. Herpetological Conservation, Number 3. Salt Lake City, U.S.A.: Society for the Study of Amphibians and Reptiles.
Smith CC, Layloo I, Maritz RA, Maritz B. 2019. Sexual dichromatism does not translate into sex-based difference in morphology or diet for the African Boomslang. J. Zool. 308: 253–258.

SUBMITTED BY:

ANTHONY M. LOWNEY
FitzPatrick Institute of African Ornithology, DST-NRF Centre of Excellence, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa; & Animal and Agricultural Research Centre, Hartpury University, Gloucester, U.K.
E-mail: Anthonym.lowney@gmail.com

THILO BECK
School of Animal, Plant and Environmental Sciences, University of the Witwatersrand, Johannesburg, South Africa.
E-mail: Thilo.Florian.Beck@web.de

OLUFEMI OLUBUDON
FitzPatrick Institute of African Ornithology, DST-NRF Centre of Excellence, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa.
E-mail: olubodun.olufemi@gmail.com

Dispholidus typus

SMITH, 1828

Boomslang

COMBAT

P.J. SENTER & T. NATHAN

Male-male combat (MMC) has been recorded in numerous snake species (Shine 1994; Senter 2022) but has not previously been described in the Boomslang (*Dispholidus typus*). In most snake species, MMC takes the form of a combat dance, in which combatants coil around each other with their heads raised high, and each tries to hook its neck around that of its opponent so as to push its opponent's head downward (Shaw 1951; Carpenter 1977; Abu Baker et al. 2021; Senter 2022). Beyond that phylogenetically widespread similarity, further details of stereotyped MMC behaviour differ between snake clades. For example, coiling during MMC is less prevalent in the Crotalinae than in other snake clades, low head-raising has replaced high head-raising in the combat dance of the elapid genus *Micrurus* and the colubrid clade Lampropeltini, and in the latter clade, two features have been added: pinning the head of the more ventrally positioned opponent, and the use of a vertical neck loop to throw off the more dorsally positioned opponent (Senter 2022). MMC is phylogenetically widespread among snakes and appears to be nearly ubiquitous among pythons, boas, vipers, elapids, and colubrids (Senter 2022), but it is infrequently observed. Its apparent rarity in some species, e.g., *D. typus* (Smith et al. 2019), may be an artifact of the rarity of catching it in the act. Here, we provide the first written description of observed MMC in *D. typus*.

In December 2013, one of us (TN) observed and filmed a pair of *D. typus* in MMC north-east of Plettenberg Bay, Western Cape Province, South Africa, at a private residence (33° 57' 53.3" S, 23° 27' 04.1" E, 3323CD; 225 m a.s.l.). The two snakes had similar dorsal coloration, which appears blackish-grey in the footage, although the low resolution and the play of light and shadow in the footage may have distorted the colour somewhat. Each snake had a different ventral coloration: it was pale and whitish in one snake and bright yellow with a bold black border on each ventral scale in the other individual. Hereafter, for concision, we call the two snakes PB (pale belly) and YB (yellow belly). PB was approximately 40–50% longer than YB.

The MMC took place on and near the railing of the residence's elevated wooden porch. The railing consists of a series of vertical posts that are spaced 1 m or more apart and are topped with a horizontal wooden beam, beneath which is a series of three horizontal metal wires that are evenly spaced (a few centimetres apart). Between and around the metal wires protrude the branches of trees that are rooted beneath and beside the porch. In this setting, TN filmed the MMC in a series of six short clips that are now posted as a single video on YouTube (Nathan 2020).

In the first clip (10 s), the footage begins with the two snakes on the porch, violently coiling around each other. They decouple and move forward, off the edge of the porch and into the branches of a tree, with their heads held high. As they leave the porch, YB is ahead of PB, who pursues him into the tree (Fig. 1a), where they coil around each other again while continuing to move forward. In the second clip (5 s), the snakes continue to coil around each other, producing vigorous movements of the tree branches. In the third clip (4 s), the two snakes move forward, toward the viewer's right (here and below, "left" and "right" refer to the view from within the house), along the topmost of the three metal wires of the porch railing. In the fourth clip (16 s), PB inflates his

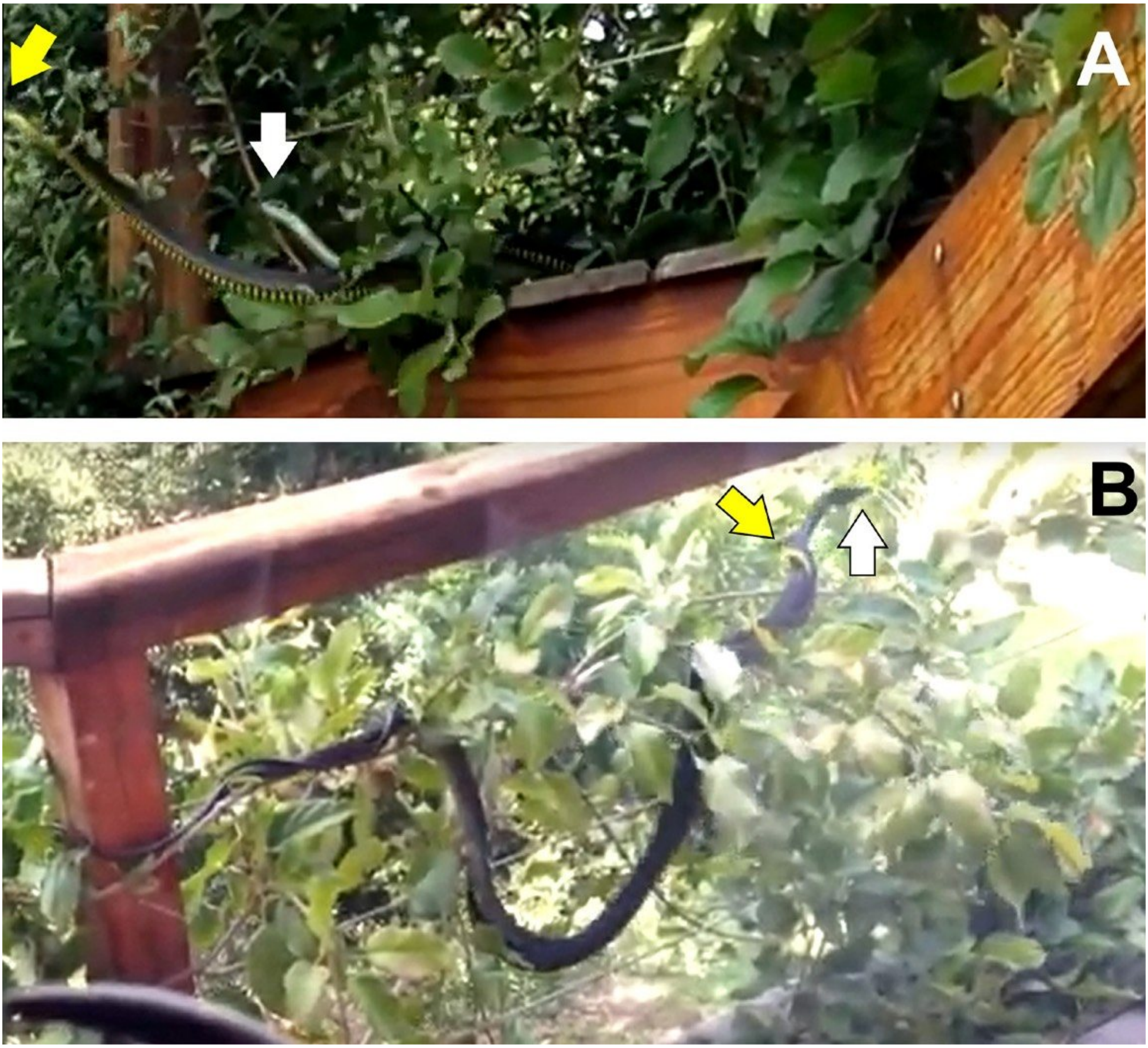


Figure 1. Cropped stills from video footage of a pair of Boomslang *Dispholidus typus* in combat. White and yellow arrows indicate the heads of the pale-bellied individual (PB) and the yellow-bellied individual (YB), respectively. A. PB pursues YB from an elevated porch into a tree. B. The snakes coil around each other with heads raised, along the railing of the porch, immediately before YB pushes PB's head downward.

throat, then separates himself from YB as he moves to the right of a vertical post, sliding along the topmost wire and the vegetation that rests upon it with his throat deflated. He then re-inflates his throat as he turns around and moves back toward YB, who is amid branches to the left of the post. The two lose their balance as they coil around each other, falling to the porch. The fifth clip (35 s) begins with the two snakes on the right of the aforementioned post, supported by the topmost wire, with their heads held high, each coiled with three full turns around the other, with their midsections draped downward in a U-shape (Fig. 1b). YB successfully pushes PB's head downward. Their coiling then quickly generates at least eight full turns for each snake around the other, soon after which their necks and midsections fall to the porch while their tails remain on the wire. Their necks briefly separate, and PB inflates his throat and moves his foreparts toward the edge of the porch, with YB's foreparts in pursuit. YB hooks his neck around that of PB as the foreparts of the two snakes glide crosswise across the bottommost wire and lean over the edge of the porch. Downward pushing of necks is then discernible through gaps in the leaves that partially hide the snakes' foreparts from view. The two snakes then glide around the near side of the aforementioned post and ascend to the level of the middle wire. They raise their heads higher than the topmost wire, and PB inflates his throat as YB attempts to hook his neck around PB's. YB then loses his balance and falls, hooking his neck around PB's midsection as PB moves upward and to the left to escape around the far side of the next post, gliding along the topmost wire with his throat inflated. YB pursues and coils around him, and the two snakes fall onto a branch as active coiling continues. The sixth clip (17 s) begins with the two snakes coiling around each other and rolling in place about their long axes on the porch for about 14 s, amid branches that extend onto the porch. It ends with the combatants moving off camera to the right, still coiling and rolling about their long axes. The final outcome of the combat is unknowable, because after filming ceased and before the combat ended, the snakes were captured and moved off the property.

The incident described here demonstrates that MMC in *D. typus* involves high head raising, mutual coiling that begins with the hooking of one snake's neck by the other, and downward pushing. It also demonstrates that such combat may occur in tree branches or on a flat substrate. It further shows that the snakes' roles – aggressor (pursuer) vs. defender (escape attempter) – may become reversed in mid-combat. Previous reports show that a *D. typus* may inflate its throat in response to its reflection in a windowpane (Smith et al. 2019). The use of the throat inflation display in MMC, as documented in this study, suggests that such behaviour in response to a reflection may represent an attempt at MMC. As the MMC incident reported here shows, the throat inflation display may be employed by the aggressor (e.g., in the fourth clip) or by the defender (e.g., in the fifth clip).

ACKNOWLEDGEMENTS

Many thanks to the owner of the residence at which the combat occurred, who provided its geographical coordinates. Thanks also to an anonymous reviewer for providing helpful input.

REFERENCES

Abu Baker MA, Al-Saraireh M, Amr ZS, Senter PJ. 2021. Male-male combat in the large whip snake, *Dolichophis jugularis* (Serpentes: Colubridae). Herpetol. Notes 14: 735–744.

Carpenter CC. 1977. Communication and displays of snakes. Amer. Zool. 17: 217–223.

Nathan T. 2020. Boomslang (tree snakes) rival combat dance. Filmed and edited by Tessa Nathan, identified by Philip Senter. [accessed 21 October 2021]. https://www.youtube.com/watch?v=ZDl4NEsUNSo.

Senter P. 2022. Phylogeny of courtship and male-male combat behavior in snakes: an updated analysis. Curr. Herpetol. 41: 35–81.

Shaw CE. 1951. Male combat in American colubrid snakes with remarks on combat in other colubrid and elapid snakes. Herpetologica 7: 149–168.

Shine R. 1994. Sexual size dimorphism in snakes revisited. Copeia 1994: 326–346.

Smith, CCD, Layloo I, Maritz RA, Maritz B. 2019. Sexual dichromatism does not translate into sex-based difference in morphology or diet in the African Boomslang. J. Zool. 308: 253–258.

SUBMITTED BY:

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

TESSA NATHAN, Los Angeles, C.A, U.S.A.
E-mail: ozgood222@me.com

PELOMEDUSIDAE

Pelusios gabonensis

DUMÉRIL, 1856

Forest Hinged Terrapin

L. N. REYNOLDS

Seven species of terrapins are known to occur in Zambia, although most species' occurrence in the region are known from relatively few records and/or localities (Broadley 1971; Pietersen et al. 2021).

On 30 August 2021, the author found an adult Forest Hinged Terrapin (*Pelusios gabonensis*) in the Jimbe River in the Ikelenge District of Zambia's North-Western Province (10° 57' 07" S, 24° 05' 00" E, 1024CC; 1 250 m a.s.l.). The species was quite easily determined based on this individual's very distinctive markings, consisting of a reddish ground-colour on the carapace with a black line extending down the centre of the back and being widest on the anterior marginals (Branch 2008; Spawls et al. 2018). A black Y-shape was present on the head, with each arm of the 'Y' arising above the orbits and merging on the back of the head (Figure 1a). The plastron was broad, with the hinge situated approximately halfway down, and was black in colour with paler seams (Figure 1b). The plastron was estimated to be 180 mm long, which is within the average size

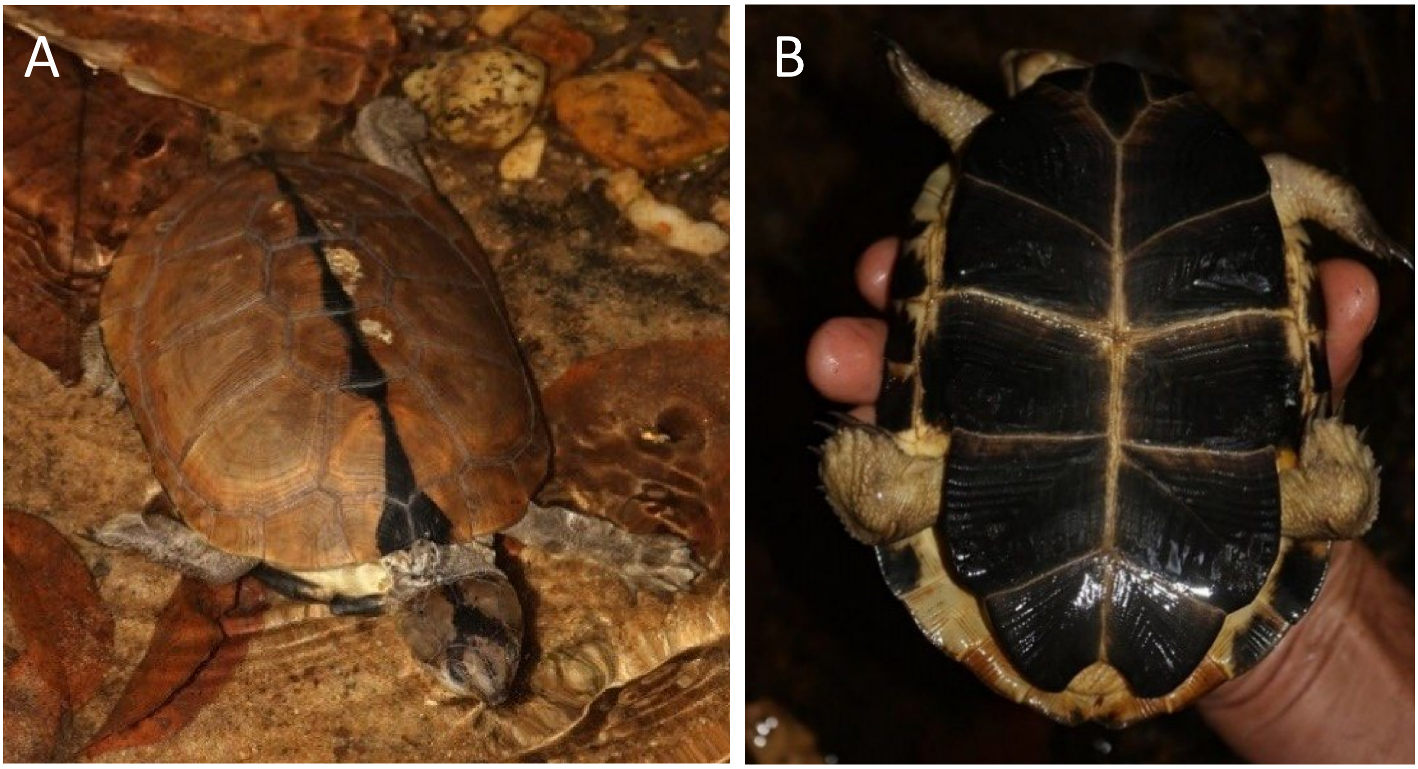


Figure 1. (a) Dorsal and (b) ventral views of the Forest Hinged Terrapin (*Pelusios gabonensis*) found in the Jimbe River in north-western Zambia. Photo: L.N. Reynolds.

range for the species (Branch 2008; Spawls et al. 2018). After being caught and positively identified, the individual was photographed and released at the capture site.

The Jimbe River is lined by well-developed riparian forests as well as intermittent, and sometimes fairly extensive, swamp forests or *mushitu*, while the broader landscape consists of open to dense Miombo (*Brachystegia-Julbernardia*) woodland punctuated by rivers and streams. *Pelusios gabonensis* is widely distributed in the forests of Central Africa (Branch 2008; Rhodin et al. 2021), entering Angola in the Cabinda Enclave (Marques et al. 2018). Its presence elsewhere in Angola has been in a state of flux until recently. Broadley (1981) assigned five specimens collected by Laurent (1954, 1964) at Dundo in Lunda Norte Province, north-eastern Angola, to his newly described *Pelusios rhodesianus*, although he did not examine these specimens. This assignment was followed by Marques et al. (2018), but not by Rhodin et al. (2017, 2021) who continued to plot the Dundo specimens as *P. gabonensis*. This latter assignment was confirmed by Ceríaco et al. (2020), who re-examined all the extant specimens in the Dundo Museum in Angola and assigned all Laurent's specimens from Dundo to *P. gabonensis*.

This is the first record of *P. gabonensis* from Zambia (Broadley 1971, 1981; Branch 2008; Pietersen et al. 2021; Uetz et al. 2021). The nearest published records are from Dundo, Lunda Norte Province, in extreme north-eastern Angola (Ceríaco et al. 2020; Rhodin et al. 2021) which is 520 km north-west of the present record, and Nyonga on the western shore of Lake Upemba in the Democratic Republic of the Congo (de Witte 1933), approximately 350 km north-east of the current record. It is surprising that a new terrapin species has been found in the Ikelenge Pedicle, as this area has been subjected to several previous in-depth surveys by herpetologists (see for example Broadley 1971, 1991; Haagner et al. 2000; Pietersen et al. 2021). The fact that the last records of this species in Angola date back to 1964 and those from the nearest locality in the Democratic Republic of the Congo date back to 1933 may suggest that this species occurs at low densities and/or is cryptic. This, however, contradicts Branch's (2008) assertion that this species is "still relatively common". It is possible that this species is still fairly common in the core of its range, but may occur at much lower densities towards the peripheries. This new record also raises the possibility that *P. gabonensis* is more widespread in suitable habitat in the south-western Democratic Republic of the Congo, and that it may inhabit well-vegetated streams in addition to lowland forest. These hypotheses should be tested with wide-ranging targeted surveys for this species.

ACKNOWLEDGEMENTS

Thanks to Darren Pietersen for proofreading and amending the text, and to Frank Willems for helping with identification in the field.

REFERENCES

Branch B. 2008. Tortoises, terrapins and turtles of Africa. Cape Town, South Africa: Struik Nature.

Broadley DG. 1971. The reptiles and amphibians of Zambia. Puku 6: 1–143.

Broadley DG. 1981. A review of the genus *Pelusios* WAGLER in southern Africa (Pleurodira: Pelomedusidae). Occas. Pap. Natl. Mus. Rhod. B., Nat. Sci. 6(9): 633–686.

Broadley DG. 1991. The herpetofauna of northern Mwinilunga District, northwestern Zambia. Arnoldia Zimb. 9(37): 519–538.

Broadley DG, Cotterill FPD. 2004. The reptiles of southeast Katanga, an overlooked 'hot spot'. Afr. J. Herpetol. 53(1): 35–61.

Ceríaco LM, Marques MP, André I, Afonso E, Blackburn DC, Bauer AM. 2020. Illustrated type catalogue of the "lost" herpetological collections of Museu do Dundo, Angola. Bull. Mus. Comp. Zool. 162(7): 379–440.

de Witte G-F. 1933. Reptiles récoltés au Congo Belge par le Dr H. Schoutenden et par M. G.-F. de Witte. Ann. Mus. Congo Zool. 1(3): 55–100.

Haagner GV, Branch WR, Haagner AJF. 2000. Notes on a collection of reptiles from Zambia and adjacent areas of the Democratic Republic of the Congo. Ann. East. Cape Mus. 1: 1–25.

Laurent RF. 1954. Reptiles et batraciens de la région de Dundo (Angola). Publicações Culturais da Companhia de Diamantes de Angola 23: 35–84.

Laurent RF. 1964. Reptiles et Amphibiens de l'Angola (Troisème contribution). Publicações Culturais da Companhia de Diamantes de Angola 67: 1–165.

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)II: 1–501.

Pietersen D, Verburgt L, Davies J. 2021. Snakes and other reptiles of Zambia and Malawi. Cape Town, South Africa: Struik Nature.

Rhodin AGJ, Iverson JB, Bour R, Fritz U, Georges A, Shaffer HB, van Dijk PP. 2017. Turtles of the world: annotated checklist and atlas of taxonomy, synonymy, distribution, and conservation status, 8th ed. In: Rhodin AGJ, Iverson JB, van Dijk PP, Saumure RA, Buhlmann KA, Pritchard PCH, Mittermeier RA, editors. Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. Chel. Res. Mon. 7: 1–292.

Rhodin AGJ, Iverson JB, Bour R, Fritz U, Georges A, Shaffer HB, van Dijk PP. 2021. Turtles of the world: annotated checklist and atlas of taxonomy, synonymy, distribution, and conservation status, 9th ed. In: Rhodin AGJ, Iverson JB, van Dijk PP, Stanford CB, Goode EV, Buhlmann KA, Mittermeier RA, editors. Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. Chel. Res. Mon. 8: 1–472.

Spawls S, Howell K, Hinkel, H, Menegon, M. 2018. Field guide to East African reptiles. London, U.K.: Bloomsbury Publishing.

Uetz P, Freed P, Aguilar R, Hošek J. 2021. The reptile database. [accessed 10 September 2021]. http://www.reptile-database.org.

SUBMITTED BY:
LESLIE REYNOLDS
Lapwing Safaris, Zambia
E-mail: lapwingsafaris@gmail.com

CHAMAELEONIDAE
Trioceros melleri
GRAY, 1865
Giant One-horned Chameleon

P.R. JORDAAN & A. WILKEN

The biodiversity of Mozambique north of the Zambezi River has been poorly surveyed due to past regional political instability and ongoing occasions of localised unrest (Branch and Bayliss 2009; Conradie et al. 2018, and references therein). As such, recent surveys of the regional herpetofaunal diversity have yielded both undescribed species and new geographical distribution records for many taxa (Branch et al. 2005; Jones et al. 2017; Conradie et al. 2016, 2018; Bittencourt-Silva et al. 2020). Despite the recent increased interest in surveying the biodiversity of the region, there remains an extensive dearth of records with even large charismatic species being overlooked or unreported.

Chipanje Chetu (centred on 12° 08' 52" S, 35° 31' 34" E) is a human populated natural landscape approximately 650 000 ha in size. The area is located in the north-western corner of Niassa Province, Mozambique, and is situated between the Rovuma River on the Tanzanian border in the north, stretching south to the Sanga area, with Niassa hunting block E forming its eastern limit and the Messinge River its western border. The terrain varies between mountainous rocky areas and extensive seasonal floodplains, with several rivers and waterways flowing through the area, draining into the Rovuma River to the north. A range of habitat types including miombo woodland, forest, *dambo* grasslands, and wetlands are present. The area is currently in the process of being formally registered as a community conservation area.

As is the case for many natural landscapes in the region, limited ecological studies have been undertaken in Chipanje Chetu, however Jones et al. (2017) have conducted brief faunal assessments on the southern border of the area. In an effort to further document the regional biodiversity, reptiles and amphibians in Chipanje Chetu were photographically documented during a site visit from 24 May–7 June 2021. This included two records of Giant One-horned Chameleons (*Trioceros melleri*) which were located by local community members and the Lipilichi Wilderness Anti-Poaching Unit, respectively.

The first individual (Fig. 1) was found in an isolated tree growing along the main road in the middle of Lilumba village (12° 23' 43.58" S, 35° 22' 31.62" E, 1235AD; 1 107 m a.s.l.) on 1 June 2021 (Fig. 2). The record was uploaded to ReptileMAP and can be viewed at https://vmus.adu.org.za/?vm=ReptileMAP-179567. A second individual (Fig. 3) was located by the Lipilichi Wilderness Anti-Poaching Unit in Miombo woodland (12° 08' 30.50" S, 35° 31' 22.15"

E, 1235BA; 723 m a.s.l.) on 4 June 2021 (Fig. 2). The record was uploaded to ReptileMAP and can be viewed at https://vmus.adu.org.za/?vm=ReptileMAP-179568. Both individuals exceeded 300 mm in total length. Interviewed members of the resident community considered *T. melleri* the most frequently encountered chameleon species in the Chipanje Chetu area.

Trioceros melleri is the largest chameleon species occurring within continental Africa (Spawls et al. 2018). Its known distribution stretches along the Tanzanian coast (Spawls et al. 2018; Tilbury 2018) southwards across the Rovuma River to Palma in the Cabo Delgado Province of Mozambique, across northern Mozambique (Spawls et al. 2018) to southern Malawi north of the Zambezi and east of the Shire rivers (Tilbury 2018), with some records extending as far east as Mt. Mabu (Bayliss et al. 2014) and the Zambezia Province coast in Mozambique (Tilbury 2018).

Records contained in iNaturalist (https://inaturalist.ca/taxa/32835-Trioceros-melleri) and the Global Biodiversity Information Facility (GBIF; https://www.gbif.org/species/7858801) extend the distribution of the species as plotted by Tilbury (2018). Despite Spawls et al. (2018) referring to the distribution of *T. melleri* as extending across northern Mozambique, and the extrapolated distribution in Tolley (2014) including western Niassa Province in this species' distribution, actual records of the species between northern Cabo Delgado Province and southern Malawi (Tilbury 2018) have not been included in printed or digital resources.

This makes the two individuals from Chipanje Chetu some of the first documented records of *T. melleri* in Niassa Province. It should, however, be noted that two additional references, Themido (1941), and Jones et al. (2017) have reported the species in Niassa Province, but these records have not been included in published distributions of *T. melleri* to date. These records taken together suggest a distributional link or continuation between the two main (northern and

Figure 1. Giant One-horned Chameleon (*Trioceros melleri*) found by community members in Lilumba village, Chipanje Chetu, northern Mozambique. Photo: P.R. Jordaan.

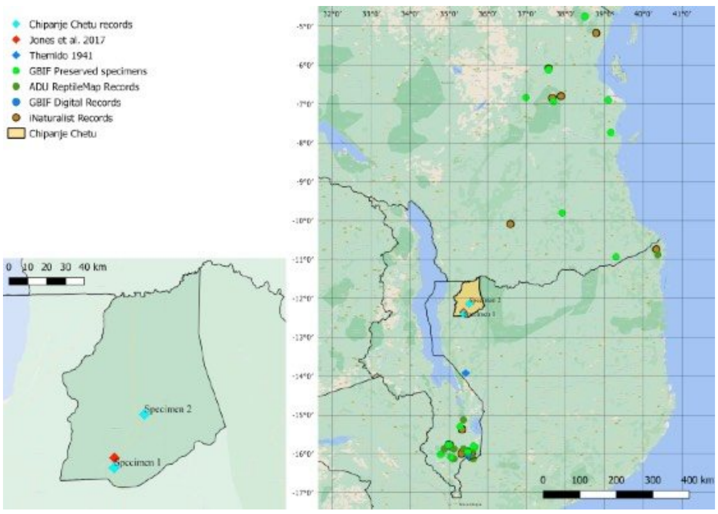


Figure 2. New records of Giant One-horned Chameleons (*Trioceros melleri*) from Chipanje Chetu, northern Mozambique, in the context of previously published and museum records.

southern) disjunct geographical clusters, which will significantly increase the accepted or known distribution of this species.

Figure 3. Giant One-horned Chameleon (*Trioceros melleri*) located by the Lipilichi Wilderness Anti-Poaching Unit in Miombo woodland in Chipanje Chetu, northern Mozambique. Photo: P.R. Jordaan.

Whilst the monetization of specimen collection has been promoted in the past among rural community members (e.g., Broadley 2018), such practices are no longer supported (SANBI 2020). However, the inclusion and goodwill of local communities can significantly contribute to attaining relevant information regarding the location or presence of species of interest. The general lack of herpetofaunal records for the Niassa Province, including even this large charismatic and apparently common chameleon species, acts as another example to illustrate the general void of biodiversity information and faunal inventories for the region.

ACKNOWLEDGEMENTS

We thank M. Issufo, the Lipilichi Wilderness Community Educator, for acting as a translator and coordinating with both community informants and the Lipilichi Wilderness Anti-poaching unit. O. Muinama and C. Cussimo accompanied the author for protection against potentially dangerous wildlife encounters in the field. Additional records were provided by Colin Tilbury. Krystal Tolley and Colin Tilbury are thanked for their insights and comments which significantly augmented the initial draft.

REFERENCES

Bayliss J, Timberlake J, Branch W, Bruessow C, Collins S, Congdon C, Curran M, de Sousa C, Dowsett R, Dowsett-Lemaire F, Fishpool L, Harris T, Herrmann E, Georgiadis S, Kopp M, Liggitt B, Monadjem A, Patel H, Ribeiro D, Spottiswoode C, Taylor P, Willcock S, Smith P. 2014. The discovery, biodiversity, and conservation of Mabu forest - the largest medium-altitude rainforest in southern Africa. Oryx 48(2): 177–185.

Bittencourt-Silva GB, Bayliss J, Conradie W. 2020. First herpetological surveys of Mount Lico and Mount Socone, Mozambique. Amphib. Reptile Conserv. 14(2): 198–217.

Branch WR, Bayliss J. 2009. A new species of *Atheris* (Serpentes: Viperidae) from northern Mozambique. Zootaxa 2113: 41–54.

Branch WR, Rödel M-O, Marais J. 2005. Herpetological survey of the Niassa Game Reserve, northern Mozambique – part I: reptiles. Salamandra 41(4): 195–214.

Broadley DG. 2018. A quest for African herpetology. Frankfurt am Main, Germany: Edition Chimaira.

Conradie W, Bittencourt-Silva GB, Engelbrecht HM, Loader SP, Menegon M, Nanvonamuquito C, Scott M, Tolley KA. 2016. Exploration into the hidden world of Mozambique's sky island forests: new discoveries of reptiles and amphibians. Zoosyst. Evol. 92(2): 163–180.

Conradie W, Bittencourt-Silva GB, Farooq HM, Loader SP, Menegon M, Tolley A. 2018. New species of Mongrel Frogs (Pyxicephalidae: *Nothophryne*) for northern Mozambique inselbergs. Afr. J. Herpetol. 67(1): 61–85.

Jones SEI, Clause JK, Geeraert L, Jamie GA, Sumbane E, van Berkel T, Jocque M. 2017. The Njesi Plateau expedition: a biological assessment of Mt Chitagal, Mt Sanga and the Njesi Plateau in Niassa Province, Mozambique. BES Report 6.3 (25 October 2017). Biodiversity Inventory for Conservation. Glabbeek, Belgium, 80 pp.

South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline: guidelines for the implementation of the terrestrial fauna and terrestrial flora species protocols for environmental impact assessments in South Africa. Pretoria, South Africa: South African National Biodiversity Institute. Version 1.2020.

Spawls S, Howell K, Hinkel H, Menegon M. 2018. Field guide to East African reptiles, 2nd ed. London, U.K.: Bloomsbury Publishing.

Themido AA. 1941. Répteis e batráquios das colónias Portuguesas (Catálogo das colecções do Museu zoológico de Coimbra). Memórias e Estudos do Museu Zoológico da Universidade de Coimbra 119: 1–28.

Tilbury C. 2018. Chameleons of Africa. Frankfurt am Main, Germany: Edition Chimaira.

Tolley, K. 2014. *Trioceros melleri*. The IUCN Red List of Threatened Species. [accessed 23 October 2021]. https://dx.doi.org/10.2305/IUCN.UK.2014-3.RLTS.T172576A1346077.en.

SUBMITTED BY:
PHILIPPUS RUDOLPH JORDAAN
African Ecological Conservation Projects Pty (Ltd).
E-mail: PRJordaan@aecproject.org

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

LAMPROPHIIDAE

Lamprophis guttatus

SMITH, 1843

Spotted Rock Snake

P.L. CUNNINGHAM JNR., R.VAN VUUREN & M.VAN VUUREN

Dwarf house snakes (*Lamprophis*) contain only four species, which are largely restricted to South Africa, Lesotho and Eswatini (Branch et al. 2014; Kelly et al. 2011). Only the Spotted Rock Snake (*Lamprophis guttatus*) is found outside this area, with a range that appears to follow the Great Escarpment although also extending into southern Namibia, and marginally into southern Mozambique (Branch 1998; Branch et al. 2014).

At 09:40 AM on 26 May 2021, a medium-sized (ca. 320 mm total length) *L. guttatus* was discovered among plant debris in an ephemeral river west of the Tiras Mountains on the farm Kanaan in the Karas District of Namibia (25° 53' 23.7" S, 16° 09' 08.7" E, 2516CC; 1 046 m a.s.l.). It was discovered in a grassy *Stipagrostis*-dominated plain in an open sandy river under a Camelthorn (*Vachellia erioloba*) tree. The habitat at this site is unusual for *L. guttatus* since there were no rocky outcrops – a habitat typically frequented by *L. guttatus* – in the immediate vicinity. The nearest rocky habitat is ca. 1.4 km to the south-west. Although it is possible that this individual was washed down from the Tiras Mountains during an extreme weather event, the last heavy rains fell several months before and it is therefore most likely that this is a normal, natural occurrence. The individual was disturbed from debris when a fence was removed from the river during maintenance work. It exhibited a very placid demeanour when handled and was identified by the small, slightly alternating, dark dorsal blotches which were most prominent anteriorly and faded posteriorly. These blotches were ringed by paler yellowish ovals arranged longitudinally. The rest of the body was a pale sand-brown colour with a pinkish hue. The head was noticeably darker than the rest of the body whilst the ventral surface was pinkish-white (Figs. 1 & 2).

This sighting represents the north-westernmost confirmed record of *L. guttatus* in Namibia and is only the third confirmed record from Namibia. Previous records in Namibia include an unconfirmed sighting at Sesriem Canyon (2415DB) and two confirmed sightings, one from the Tiras Mountains (2616AB) and one from Rooikoppe (2718BD; Griffin 2003). This Kanaan individual was found approximately 20 km north-west of the nearest record from the Tiras Mountains.

Figure 1. Spotted Rock Snake (*Lamprophis guttatus*) from the Farm Kanaan, Karas District, Namibia. Photo: P.L. Cunningham.

Figure 2. Close up showing the head scalation of the Spotted Rock Snake (*Lamprophis guttatus*) from the farm Kanaan. Note the clearly separated dark blotches ringed with yellowish, longitudinally arranged, ovals. Photo: P.L. Cunningham.

ACKNOWLEDGEMENTS

I would like to thank Peter Cunningham Snr. for introducing me to African Herp News and for his editorial help.

REFERENCES

Branch WR. 1998. Field guide to snakes and other reptiles of southern Africa, 3rd ed. Cape Town, South Africa: Struik.

Branch WR, Harvey J, Maritz B, Marais J, Burger M, Masterson G, Bates MF. 2014. Chapter 22: Family Lamprophiidae. 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. Pretoria, South Africa: South African National Biodiversity Institute.

Griffin M. 2003. Annotated checklist and provisional national conservation status of Namibian reptiles. Windhoek, Namibia: Namibia Scientific Society.

Kelly CMR, Branch WR, Broadley DG, Barker NP, Villet MH. 2011. Molecular systematics of the African snake family Lamprophiidae FITZINGER, 1843 (Serpentes: Elapoidea), with particular focus on the genera *Lamprophis* FITZINGER 1843 and *Mehelya* CSIKI 1903. Mol. Phylogenetics Evol. 58: 415–426.

SUBMITTED BY:

PETER LOW CUNNINGHAM JNR
Kanaan research coordinator, N/a'an ku sê Foundation, Windhoek, Namibia.
E-mail: petercunningham625@yahoo.com

DR. RUDIE VAN VUUREN
Director, N/a'an ku sê Foundation, Windhoek, Namibia
E-mail: rudie@naankuse.com

MARLICE VAN VUUREN
Executive Director, N/a'an ku sê Foundation, Windhoek, Namibia
E-mail: marlice@naankuse.com

PSAMMOPHIIDAE

Psammophis trigrammus

GÜNTHER, 1865

Western Sand Snake

R. VAN HUYSSTEEN, C.R. HUNDERMARK & M. PETFORD

The Western Sand Snake (*Psammophis trigrammus*) is considered a peripheral species in South Africa, occurring along the Orange River in the far north of the Northern Cape Province (Branch 1998; Broadley 2002; Bates et al. 2014) and is currently only known from the Richtersveld region (Bauer and Branch 2001). The species has a much wider distribution in Namibia, occurring further east along the north bank of the Orange River (Manamela & Ranwashe 2020, Ueda 2020). In this note, we report two observations of *P. trigrammus* which indicate that this species has a wider range in South Africa than previously recorded.

While on a hike at Aggeneys, Northern Cape Province, South Africa (29° 11' 38.5188'' S, 18° 52' 12.2808'' E, QDS 2918BB, 932 m a.s.l.) at approximately 22:30 PM on 14 October 2020, RVH and MP came across a dead *P. trigrammus* on the track (Fig. 1). The snake appeared to have been recently killed (as indicated by the fresh blood and the fact that *rigor mortis* had not set in) by a mammalian predator based on the damage inflicted. The snake was identified as *P. trigrammus* by the distinct longitudinal stripes; the yellowish belly; the 5th and 6th supralabials touching the eye; and a divided anal scale (Branch 1998; Broadley 2002; Marais 2004). This record was uploaded to iNaturalist and can be viewed at https://www.inaturalist.org/observations/63960597.

On the afternoon of 28 October 2017, CRH and Tristan Russell recorded a dead *P. trigrammus* (Fig. 2) in the parking area at Augrabies Falls National Park reception (28° 35' 35.4"S, 20° 20' 15.2" E, QDS 2820CB, 626 m a.s.l.), presumably killed by a vehicle. This individual was identified using the same characteristics as the previous record. This record was uploaded to the ReptileMAP virtual Museum and can be viewed at http://vmus.adu.org.za/?vm=ReptileMAP-162974.

Figure 1. Dead Western Sand Snake (*Psammophis trigrammus*) from Aggeneys, showing striping and diagnostic head scalation. Photo: R. van Huyssteen and M. Petford.

The Aggeneys record represents a range extension of 45 km from the nearest Namibian record (Ueda 2020) and is 189 km east of the nearest South African record in the Richtersveld National Park (https://vmus.adu.org.za/?vm=ReptileMAP-8412). It is also the most southerly record for the species. CRH initially suspected that the Augrabies Falls National Park record was a potential translocation as it was found within the car park, which is frequently visited by travellers, and was 310 km east of the Richtersveld records (which at the time were the nearest South African records). However, the Aggeneys record suggests that the Augrabies Falls National Park record, which is 157 km to the east, likely represents a valid range extension. Therefore, the Augrabies Falls National Park record is now the easternmost record of this species in South Africa. These two new records indicate that *P. trigrammus* is not solely restricted to the Richtersveld in South Africa, with the now most easterly record 310 km away, and is likely to be more widespread in the arid regions of the Northern Cape Province than previously thought.

Figure 2. Dead Western Sand Snake (*Psammophis trigrammus*) from Augrabies Falls National Park, as found in the reception parking area. Photo: C.R. Hundermark.

ACKNOWLEDGEMENTS

We thank Ruan Stander and an anonymous reviewer for corrections and suggestions during the review process.

REFERENCES

Bates MF, Branch WR, Bauer AM, Burger M, Marais J, Alexander GJ, de Villiers MS. 2014. Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Pretoria, South Africa: South African National Biodiversity Institute.

Bauer AM, Branch WR. 2001 [2003]. The herpetofauna of the Richtersveld National Park and the adjacent northern Richtersveld, Northern Cape Province. Herpetol. Nat. Hist. 8: 111–160.

Branch WR. 1998. Field guide to snakes and other reptiles of southern Africa, 3rd ed. Cape Town, South Africa: Struik.

Broadley DG. 2002. A review of the species of *Psammophis* BOIE found south of latitude 12° S (Serpentes: Psammophiinae). Afr. J. Herpetol. 51(2): 83–119.

Manamela K, Ranwashe F. 2020. Ditsong National Museum of Natural History Collection: 1805–2008. Version 1.4. South African National Biodiversity Institute occurrence dataset accessed via GBIF.org. [accessed 17 November 2020]. https://www.gbif.org/occurrence/1300121717.

Marais J. 2004. A complete guide to the snakes of southern Africa. Cape Town, South Africa: Struik.

Ueda K. 2020. iNaturalist research-grade observations. iNaturalist.org occurrence dataset [accessed 2 April 2021]. https://www.inaturalist.org/observations/48544666.

SUBMITTED BY:

RYAN VAN HUYSSTEEN
Department of Biodiversity and Conservation Biology, University of the Western Cape, Bellville, South Africa; & Department of Geography, Environmental Studies and Tourism, University of the Western Cape, Bellville, South Africa.
E-mail: ryanvanhuyssteen@gmail.com

COURTNEY R. HUNDERMARK
College of Agriculture and Environmental Sciences, University of South Africa, Pretoria, South Africa.
E-mail: 63086786@mylife.unisa.ac.za

MELISSA PETFORD
South African National Biodiversity Institute, Kirstenbosch Research Centre, Cape Town, South Africa; & School of Animal, Plant and Environmental Sciences, University of the Witwatersrand, Johannesburg, South Africa.
E-mail: melissa.petford@outlook.com

AHN

INSTRUCTIONS TO AUTHORS

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 note, always use the latest available issue of AHN for instructions. All authors jointly take responsibility for all permits, permission to use data and ethical clearance required to perform the work as and when appropriate.

All submissions should be typewritten in English (UK spelling), set in 10 pt Calibri. 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. Authors should consult the *Council of Biology Editors Style Manual,* 5th edition (1994) for style and abbreviations. Sentences should be separated by a single space (character). Genus and species names must be italicised. Centre major headings in small caps. Subheadings are in bold and left justified (*also in title case*). Footnotes are not accepted. The International System of Units (Systeme Internationale; SI) should be followed. 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, while those greater than 10 (including 10) should be given numerically. Group integers of thousands together with a space and do not use a comma (e.g. 10 500 and 1 230). All statistical symbols should be italicised. Follow the Fourth Edition (1999) of the International Code of Zoological Nomenclature.

For current common names for reptiles, please refer to Bill Branch's (1998) Field Guide to Snakes and other Reptiles of Southern Africa, third edition. For amphibians, please consult du Preez and Carruthers (2009) A Complete Guide to the Frogs of Southern Africa.

Every word of the English common name should start with a capital letter (e.g. Namaqua Dwarf Adder).

Appendices, Material Examined, Tables, legends to Figures, and Figures must follow the References. For current common names for reptiles, please refer to Bill Branch's (1998) Field Guide to Snakes and Other Reptiles of Southern Africa, third edition. For amphibians, please consult Du Preez & Carruthers' (2009) A Complete Guide to the Frogs of Southern Africa.

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 style should be written in the third person. It could feature work already published or ongoing work. Photographs to accompany the article are highly encouraged. These may include study specimens, study area, and/or researchers.

A general format should be followed:

Author name ([in full], centred, upper case)

Original text (aligned left)

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 (bold, centred, upper case);

AUTHOR(S) (initials and surname, bold, centred)

HEADINGS (bold, centred, upper case)

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

ACKNOWLEDGEMENTS (bold, centred)

REFERENCES (bold, centred), following the standardised formats described below.

SUBMITTED BY: (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 reserves, 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.

INSTRUCTIONS TO AUTHORS

As far as possible, survey records should be based on accessible and verifiable evidence (specimens deposited in public collections, photos submitted illustrating diagnostic features, call recordings and sonograms, 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 a systematic account.

(bold, aligned left): comprises Scientific name (including author citation), location and habitat, evidence (including registration numbers and location of vouchers), 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 (bold, centred, uppercase)
Scientific name (bold, italicised, centred)
Author citation (centred)
English Common Name (centred, all words starting with a capital letter)
KEYWORD (bold, centred)
AUTHOR(S) (initials and surname, bold, centred)
[Original text] (left aligned)
ACKNOWLEDGEMENTS (bold, centred), if applicable
REFERENCES (bold, centred), following the standardised formats described below
SUBMITTED BY: (bold, aligned left), following the standardised format described below The Keyword 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; quarter-degree locus; location; latitude and longitude in D° M' S" format; elevation above sea level), providing the date (day, month, year), naming the collector(s), and stating the place of deposition and museum accession number or describing the fate of the animal.

AHN

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 submitted should be based on specimens deposited in a recognised collection. A standard format is to be used, as follows:

FAMILY (bold, centred, uppercase)

Scientific name (bold, italicised, centred)

Author citation (centred)

English Common Name (centred, all words starting with a capital letter)

AUTHOR(S) (initials and surname, bold, centred)

Original text (left aligned)

ACKNOWLEDGEMENTS (bold, centred), if applicable

REFERENCES (bold, centred), following the standardised formats described below

SUBMITTED BY: (bold, aligned left), following the standardised format described below

The body of the note should include information describing the locality (country; province; quarter-degree locus; location; latitude and longitude in D° M' S" format; elevation above sea level), providing the date (day, month, year), naming the collector(s), and stating the place of deposition and museum accession number, or fate of the animal. 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.

ACKNOWLEDGMENTS

Acknowledgements should be brief and should not list titles and 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. Any mention of authors should refer to them by initials only (e.g. GJA 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

Reference formatting is similar to African Journal of Herpetology. As of 2019, extensive changes have been made to simplify its appearance. However, as always, references should be listed in alphabetical order and should refer only to publications cited in the text. Abbreviate journal names in the References in the standard way. Standard abbreviations can be found at various web sites such as: www.bioscience.org/atlases/jourabbr/list.html or home.ncifcrf.gov/research/bja/

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.

Book: Spawls S, Howell K, Drewes R, Ashe J. 2002. A field guide to the reptiles of East Africa. London: Academic Press.

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: IRL Press.

Thesis: Russell AP. 1972. The foot of gekkonid lizards: a study in comparative and functional anatomy. [PhD thesis]. London: University of London.

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.

In text citations should be in chronological order: (Jacobs 1952, 1966; Edwards and Holmes 1965; Rosen et al. 1990). When a paper with more than two authors is cited, only the first appears in the text (Taylor et al. 1993). If a paper has more than ten authors, only the first five should appear in the references followed by et al. Cite unpublished data as e.g. Alexander (in press), which then appears in the list of references, or as G. J. Alexander (pers. comm. 2020), in which case Graham J. Alexander's name and institutional affiliation should appear under Acknowledgements. Unpublished reports are cited as personal communications.

AUTHOR AFFILIATIONS

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

SUBMITTED BY: [for each author]

AUTHOR'S NAME (bold, upper case),

Address or affiliation.

E-mail: example@gmail.com

(hard return)

TABLES

Tables should be in Arabic numerals, double spaced and on separate pages with a legend at the top. Lines should only be used to separate headings. Table formatting is most convenient when 'table commands' are used to separate columns. Do not use vertical lines. All tables must be mentioned in the text and numbered consecutively (Arabic numerals).

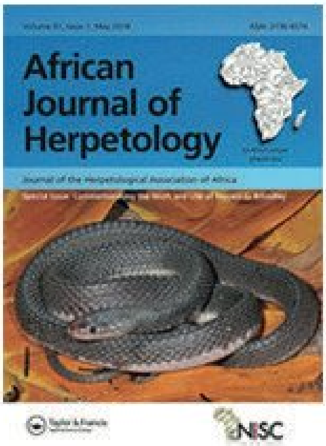
FIGURES AND PHOTOGRAPHS

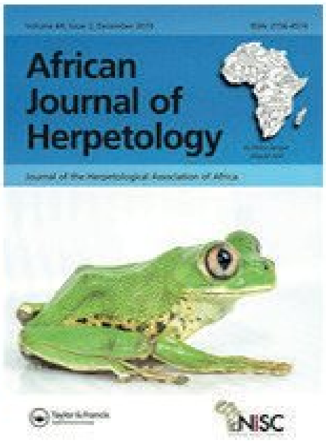
Figures must be restricted to the minimum needed to clarify the text. The same data should not be presented in both graph and table form. Photographs and figures should be provided at high resolution (minimum of 600 dpi for colour images). Lower resolutions are not acceptable. Files should be saved and submitted as one of the following file formats:

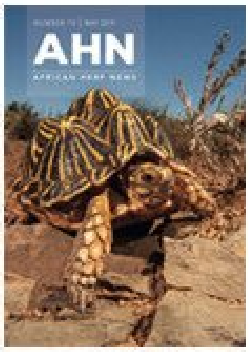
TIFF (Tagged Image File Format; preferred), PostScript or EPS (Encapsulated PostScript). Please submit line art as a scalable vector diagram (EPS). Labelling in figures should be in lower case, except for the first letter of the first word. All figures must be mentioned in the text and numbered consecutively (Arabic numerals).

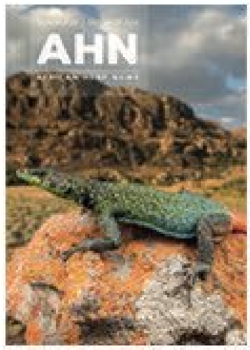
AHN

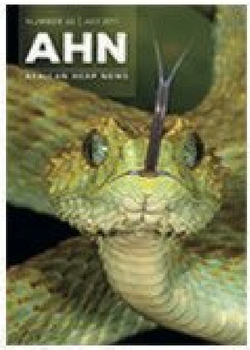
HAA MEMBERSHIP











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

AHN

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.