AHN

AFRICAN HERP NEWS

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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) and African Herp News, the Newsletter (which includes short communications, natural history notes, book reviews, 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.

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COVER PHOTOGRAPH

Amnirana lepus (Cameroon)
Image Courtesy: Luke Verburgt

:: COMMITTEE OF THE HAA ::

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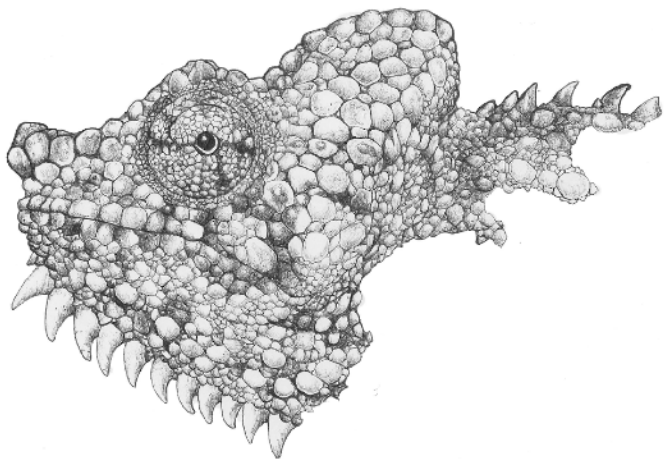

Trioceros hoehnelii
Drawing by Maggie Gericke

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EDITORIAL

Welcome to the diamond issue of the newsletter – AHN 75!

I thought the 75th issue should be special and different. I'm sure we've all had our share of change this year, and not much of it positive, but I hope that's not the case for the newsletter.

One of the most obvious changes you'll notice is the overall appearance. Please let me know what you think and if you'd like to continue into the future.

The next change is the addition of a new section entitled *Tracks in the Sand*. This section will showcase professional herpetologists and educate the reader on how they got to where they are – the paths they chose, the challenges they experienced – and provide some advice to those who might be interested in following in their path. Our first feature is Chris Cooke who does a brilliant job taking us on his journey in animal husbandry and being a curator of a reptile park.

The next change is something that I would like to see emphasized more extensively in issues going forward, but it is something the membership and authors need to take the lead on – a wider African representation. In his article comparing the outputs of the HAA and the British Herpetological Society (which extensively publishes content on African herpetology), Jens Reissig showed that over the past decade the HAA has predominantly focused on southern African content, with some additional content relating to East Africa. The BHS has the majority of its publications focusing on North Africa, followed by East Africa as well. There is a considerable gap in Central and West Africa, which I would like to see our organization help fill. With that said, I am very pleased that AHN 75 has content from various countries, including an article looking at the diversity of anurans in Nigeria. I hope many more of such articles and notes get submitted and published going forward. In honour of this, the stunning *Amnirana lepus* from Cameroon captured by Luke Verburgt was selected as the cover image for this issue. The beauty and diversity of African herpetology is unprecedented in my mind. Let's tell the world about it…let's learn more about it. For those of you with friends and colleagues, collaborators and students, conducting herpetological work in any of Africa's regions, please spread the word and encourage them to submit to AHN (as well as AJH), and better yet also become members of the HAA.

Until next year, keep your submissions coming and stay healthy and safe.

Jessica da Silva
Editor

15th Conference of the Herpetological Association of Africa

Kimberley, Northern Cape South Africa

September 2021

Further details will be announced as they become available!

HAA Professional Research Grant 2021

The Herpetological Association of Africa proudly announces that applications for the HAA Research Grant (for ZAR 15 000) are now open to all HAA professional and postdoctoral members (regardless of country of residence) in good standing (affiliated with a recognised research institution and proof of status will be required) who are working in any field of original research on African herpetology (Africa taken to include the continent of Africa, Madagascar, the Canary Islands, Cape Verde Islands, Gulf of Guinea islands, Mascarenes and Seychelles). Applications must include a curriculum vitae and a maximum three-page (single-spaced) statement of the research project including the following:

The title of the project.

A project outline, including the project objectives/goals/hypotheses, the methods to be used, key references and any figures that may help to elucidate the project.

A budget (presented in ZA Rand) outlining how the money will be spent. Grant money may be used to purchase equipment or supplies, to fund travel to field sites (airfare, petrol, etc.) or other direct costs incurred by the proposed research. Funds may not be used to cover meeting or conference attendance, or associated travel nor may they be used as salary.

Please note: the awarded funds will be paid to the relevant institution, and that a financial and operating report should be submitted to the HAA by end November 2021.

Applications will be due on 31 January 2021 and will be evaluated by a committee of HAA members. A single award will be given based solely on the merits of the proposal as judged by the review panel. Announcement of the award will be circulated via email and posted on the HAA Facebook page and website by 1 March 2021.

Applications should be clearly marked as professional award application, are to be sent to awards@africanherpetology.org and should be received before 23:59 CAT on January 31st 2021.

Bryan Maritz
HAA Committee (Awards Portfolio)

HAA Student Research Grant 2021

The Herpetological Association of Africa proudly announces that applications for the HAA Student Research Grant 2021 (for ZAR 15 000) are now open to all HAA student members (regardless of country of residence) in good standing (must be currently enrolled in a university degree program, proof of student status will be required) who are working in any field of original research on African herpetology (Africa taken to include the continent of Africa, Madagascar, the Canary Islands, Cape Verde Islands, Gulf of Guinea islands, Mascarenes and Seychelles). Applications must include a curriculum vitae and a maximum three-page (single-spaced) statement of the research project including the following:

A statement of the degree program and institution as well as the academic mentor/advisor's name and contact details.
The title of the project.
A project outline, including the project objectives/goals/hypotheses, the methods to be used, key references and any figures that may help to elucidate the project.
A budget (presented in ZA Rand) outlining how the money will be spent. Grant money may be used to purchase equipment or supplies, to fund travel to field sites (airfare, petrol, etc.) or other direct costs incurred by the proposed research. Funds may not be used to cover meeting or conference attendance, or associated travel nor may they be used as salary.

Please note: the awarded funds will be paid to the relevant institution, and that a financial and operating report should be submitted to the HAA by end November 2021.

Applications will be due on 31 January 2021 and will be evaluated by a committee of HAA members, none of whom have students in the competition. A single award will be given based solely on the merits of the proposal as judged by the review panel. Announcement of the award will be circulated via email and posted on the HAA Facebook page and website by 1 March 2021.

Applications should be clearly marked as student award application, are to be sent to awards@africanherpetology.org and should be received before 23:59 CAT on January 31st 2021.

Bryan Maritz
HAA Committee (Awards Portfolio)

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TRACKS IN THE SAND

Following the journeys of professional herpetologists

CHRIS COOKE

TRACKS IN THE SAND

Following the journeys of professional herpetologists

CHRIS COOKE

I started catching snakes when I was 2 years old. I caught my first Black Mamba when I was 6…well, not really. These are the sort of things one always hears when asking reptile experts how they got started. I wouldn't say I started off as a typical herper at all. In fact, it wasn't until I was 17 years old when I first truly fell in love with 'cold blooded creepy crawlies' after getting my first snake, Nando, the Yellow Ratsnake *(Pantherophis obsoleta quadrivittata)*. I was instantly hooked and soon my mother came up with the brilliant idea that I should work at a pet store, to help rid myself of this latest obsession. I guess she was hoping this fad would work itself through.

My first job was at a typical reptile pet store, the kind which had a constant smell which tends to happen with large collections that are not cleaned properly and regularly. I quickly fell in love with the animals and I couldn't wait to get to work every day. I never knew what exciting animals would be arriving; hundreds of exotic animals came through the doors from all around the world. I was told that the high death rate of animals coming into the store was normal and that it was all part of the way things were done. Nevertheless, it bothered me. It was always heartbreaking unpacking shipments to find the majority were carcasses. I justified to my guilt-ridden conscious that I would give the best care possible to the animals that had survived, and I started doctoring the sick and trying my best to save what I could. I hung on the gospel bestowed upon me by the all-knowing pet store 'experts'. I also had to triage the dead animals that arrived at the store after being collected in South Africa to be sent abroad. This was my turning point. If most of the animals that were destined overseas died before they even left the country, how many had died before ever arriving at another pet store? What was all of this doing to wild populations? We were told that bringing animals into captivity was to save them from habitat destruction and certain death in the wild. As a young impressionable herp enthusiast, I was angered and embarrassed by my gullibility.

TRACKS IN THE SAND

Following the journeys of professional herpetologists

I knew then I wanted to spend my life working with and protecting reptiles and amphibians, but what was my next step? I called various snake parks and zoos inquiring about positions and internships. The response was always the same. It seemed impossible to get a job with reptiles, there were so few available. I started volunteering for S.A.I.R.C.A (Southern African Indigenous Reptile Conservation Association, which no longer exists) and after two years assisting with various conservation talks and snake handling courses I built up my confidence with handling skills and public speaking.

However, I could not be a volunteer forever, so I eventually decided to enroll for a National Diploma in Game Ranch Management – my career back-up plan. A week before my final exam, my mother came across an advert for the position of Curator at Swadini Reptile Park. This was exactly what I had always wanted, a real job at a real snake park. I graduated, packed my car and relocated to Hoedspruit.

TRACKS IN THE SAND

Following the journeys of professional herpetologists

I started at Swadini Reptile Park (which had then changed its name to Khamai Reptile Park) in December 2007. I spent the next four years as the curator of the Centre, and I can easily say I had the best time of my life! My days were filled with caring for animals, conducting tours, snake capture training and various educational programs, feeding the animals and of course, cleaning up a lot of snake poop. From school groups to snake necropsies with university students, photographic safaris to wildlife film making, the Centre exposed me to the huge variety of ways in which reptile education could be applied.

This was true conservation and education in action. I felt invigorated. To wake up every day knowing that what I was doing was making a difference to the way people viewed snakes was truly enriching. A change in mind set is the most critical component in snake conservation and in my opinion, that little reptile park did more education work than any other Centre of its kind anywhere in the country. It was here that I decided, like many others, one day I would have my very own reptile park. I had found my life's calling and I knew exactly where I wanted to be. The question was, how on earth could I possibly achieve this?

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TRACKS IN THE SAND

Following the journeys of professional herpetologists

In 2011, I began working at the National Zoological Garden's reptile section, a much larger and much older institution. Then in 2012, I moved to the Reptiles and Amphibians section at Johannesburg Zoo. Working in government facilities had its own unique set of challenges. No matter the institution though, much of the work remained the same; animal husbandry is always an important part of any zookeeper's day. The bigger institutions also exposed me to the more technical side of managing a large collection of animals; daily return slips, vet request forms, diet sheets, enrichment plans, animal management protocols and preventative breeding policies aka a ton of paperwork. I learnt a lot and every day I filled in my little book of ideas which I dubbed 'my snake park bible'. I recorded all the things that worked and all the things that did not. When the time would eventually come, I wanted to make sure I could build a perfect reptile facility and did not want to make the same mistakes others had.

In 2013 I started at Montecasino Bird Gardens. The reptile collection was a fair size and consisted mostly of specimens that had been confiscated from intercepted shipments containing poached animals. Here, again, I was reminded of the harsh reality of the international pet trade and the animals that paid its price.

During my time at Monte I was privileged to assist researchers from the Alexander Herp Lab at Wits University. I've always had a love for research and was thrilled to be able to assist wherever possible. I was also asked to act as a 'technical expert' for PAAZA (Pan-African Association of Zoos and Aquaria) during the accreditation process for other reptile institutions in 2013 and 2014. In 2016, I was asked to join the Animal Ethics Screening Committee at Wits University which I gladly accepted. Then in 2017 I left my comfort zone and took up a position focusing on snake awareness in occupational health and safety for the mining sector, a far cry from my typical herp career.

The job paid well allowing me to save, something that is not always possible with most conservation jobs. And, in the background, there was a bigger picture and a bigger plan unfolding. The next two years were hell. I spent months on end at different open cast coal mines and experienced firsthand the destructive side-effects of mining. It was during this period that I become aware of the potential sale of Kinyonga Reptile Centre (previously known as Khamai Reptile Park), the very same reptile park where my dreams had started. Initially, I wasn't interested; I had been fantasizing for the last decade about building the perfect reptile facility from the ground up. However, as the months passed, the possibility of this new venture became more and more realistic. Finally, in December 2019, a lifelong dream was realized when I took over the Centre renaming it for the final time as Hoedspruit Reptile Centre (HRC). Beyond education and research, the vision of HRC is to reestablish the confidence of the scientific communities and conservation authorities, just as the old Transvaal Snake Park once had. Long have reptile parks in South Africa been poorly maintained and outdated, and some are even fronts for illegal activities.

HRC aims to assist researchers and other reptile and amphibian conservationists wherever possible and will be an institutional hub for education and conservation programs throughout Southern Africa.

Whilst my herpetological journey continues with undoubtably many challenges laying ahead, one thing I have learnt through my journey is that it is entirely possible to make a career in herps. If these wonderful fascinating animals are your passion and calling in life, then never give up. Explore all aspects of professional herpetology and see what speaks to you the most and always remember to take every opportunity, network and communicate with like-minded people and do not underestimate the importance of following your dreams.

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TOMORROW'S HERPETOLOGISTS TODAY

CORA SABRIEL STOBIE

Molecular analysis in herpetology: An invaluable tool for museum taxonomists

Dr Cora Stobie preparing samples of *Pseudocordylus* for Polymerase Chain Reaction (PCR) to amplify a mitochondrial gene.

Photo: Zoe Yannikarkis.

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TOMORROW'S HERPETOLOGISTS TODAY

CORA SABRIEL STOBIE

In the last few decades, molecular analyses have become increasingly popular in answering questions relevant to biological studies. These analyses are particularly useful when morphological variation is limited and species are difficult to distinguish, but also when morphological variation is extreme and it is difficult to identify where a species complex begins and ends.

Traditional phylogenetic analyses generally make use of mitochondrial and nuclear genetic markers. Mitochondrial markers are powerful tools which may more clearly show differences between populations or species than nuclear markers, but they trace only maternal heritage and comprise a single linked locus. This means that using only mitochondrial markers may lead to erroneous conclusions. Nuclear markers, in comparison, may be less sensitive to recent changes due to their comparatively reduced mutation rate and increased effective population size. They may also assist in identifying instances of hybridisation, which is often a confounding factor for mitochondrial analyses. There has therefore been a trend for some time now to use a combination of nuclear and mitochondrial markers to obtain a more holistic understanding of the phylogeny of a group.

DNA barcoding is a technique involving the sequencing of one or more (typically mitochondrial) markers across a large number of individuals, including samples of known and unknown species. It is one of the most popular and effective methods of molecular analysis. The divergence of sequences between different known species and unknown samples are assessed and used to categorise samples as belonging to a particular species, or possibly even to a novel species not included in the analyses based on the level of divergence observed. There has also been a recent shift towards using automatic species delimitation methods to uncover cryptic species, or validate species boundaries for species distinguished only by morphological characters. However, these methods will struggle to correctly separate samples when intraspecific divergence is high or when species divergence is recent.

Dr Cora Sabriel Stobie is employed as a Senior Museum Scientist in the Herpetology Department at the National Museum in Bloemfontein, where she is applying her background in genetics to assist in answering questions about phylogeny. Cora's PhD research focussed on population genetics and phylogeography of yellowfish (*Labeobarbus*), but her BSc Honours work was on the use of nuclear markers in southern African frogs. One of the projects she is currently involved with involves crag lizards (*Pseudocordylus*) – six species of rupicolous lizards found in high elevation areas of South Africa, Lesotho and Eswatini.

Some of these species are morphologically highly variable across their distribution, which may complicate traditional morphological approaches to identification, and some are currently divided into subspecies. Previous research by Dr Michael Bates suggested the presence of a cryptic species within the genus.

For the *Pseudocordylus* study, a collaboration with Dr Bates, two mitochondrial genes (*16S* and *ND2*) and a nuclear marker (*MYH2*) were sequenced and analysed for representative samples of each species. Results were consistent across a phylogenetic Bayesian chronogram using mitochondrial markers, a nuclear probabilistic assignment of individuals to genetic clusters in STRUCTURE, and three different automatic species delimitation methods using mitochondrial data. Time calibrations using estimated mutation rates were used to date the radiation of species within *Pseudocordylus*, and species delimitation analyses were used to test our current understanding of species boundaries. Relationships recovered between some populations were unexpected and contrary to what had been predicted based on morphological evidence, with the possibility of new species. The results of part of this study are currently being written up and should be available in 2021.

Another research project Cora is involved in applies genetic techniques to answer questions of phylogeny and population genetics across the range of the Common Girdled Lizard (*Cordylus vittifer*). This project aims to assess whether geographically-constrained morphotypes identified by previous workers constitute distinct species, and will investigate the possibility of additional unique lineages.

Northern Crag Lizard (Pseudocordylus transvaalensis) from near Haenertsburg, Limpopo. Photo: Michael F. Bates.

Cora is also working on a citizen science outreach project mapping current reptile and amphibian distributions in Free State Province using photographic records from social media, focussing on records obtained through a Facebook group. The records provided by social media represent a valuable resource which may be assessed, following expert confirmation of identification, to examine the contemporary distribution of a given species contrasted against historical literature records.

Common Girdled Lizard (Cordylus vittifer) found on Farm Dipka near Vrede, Free State. Photo: Michael F. Bates.

Museum taxonomists have a few new weapons in their arsenal in the form of molecular analyses, and they're not afraid to use them!

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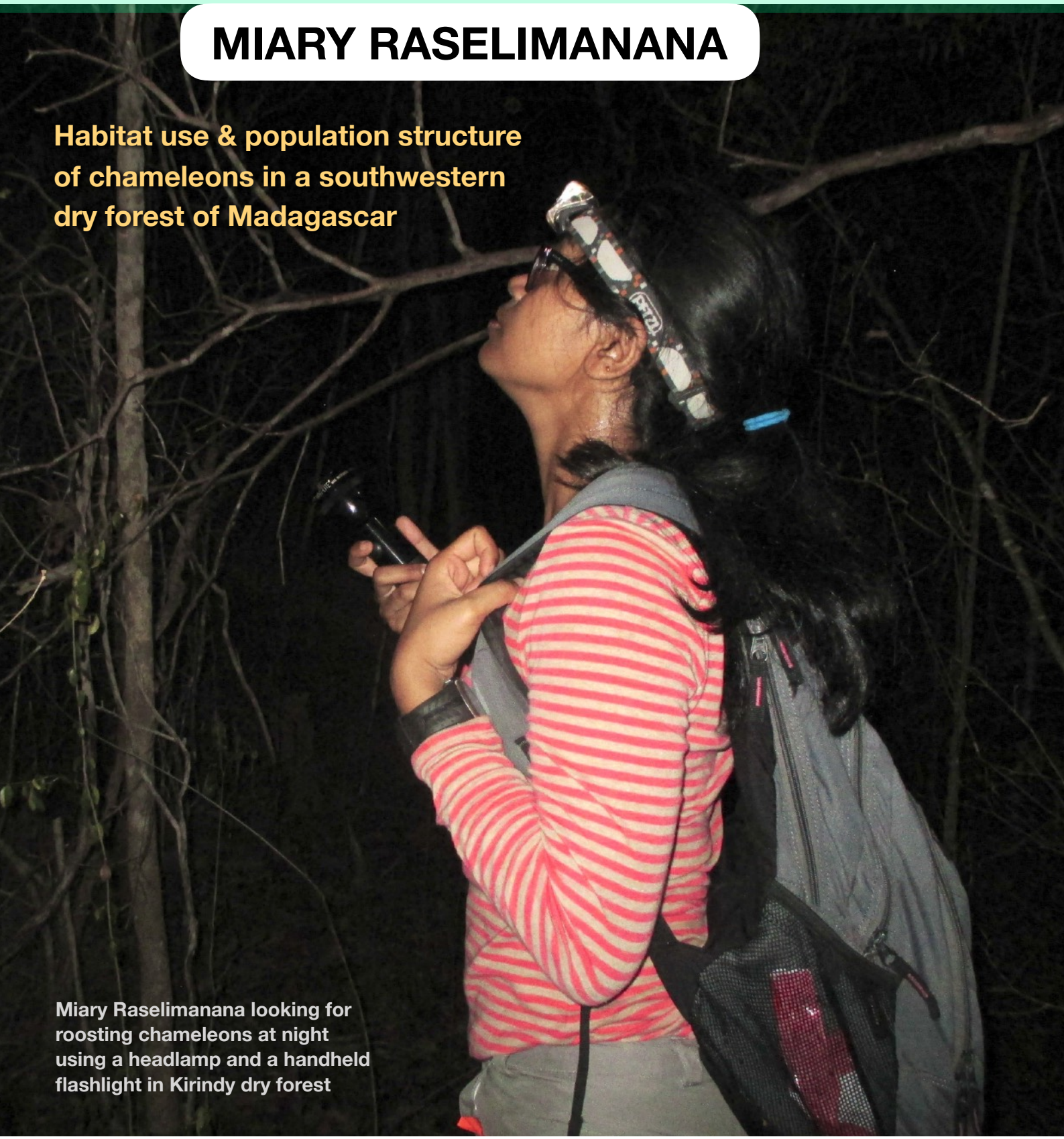
TOMORROW'S HERPETOLOGISTS TODAY

MIARY RASELIMANANA

Habitat use & population structure of chameleons in a southwestern dry forest of Madagascar



Miary Raselimanana looking for roosting chameleons at night using a headlamp and a handheld flashlight in Kirindy dry forest

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TOMORROW'S HERPETOLOGISTS TODAY

MIARY RASELIMANANA

The early isolation and extreme ecological variation across Madagascar brought about remarkable reptile diversity and endemism on the island. This is especially apparent for chameleons. Nearly half of the world's described chameleon species are found in Madagascar (96 out of 217 species), including the smallest species, *Brookesia micra* (30mm total length), and the largest one, *Furcifer oustaleti* (700mm total length). This chameleon diversity has made Madagascar a hotspot for tourists and herpetologists alike; however, amongst locals, chameleons are often viewed negatively.

Chameleons are carefully avoided because in Malagasy tradition they are associated with bad luck and cultural taboos. A common belief, for example, is that their tongue could make you blind and their grip could make you bald. Such beliefs do not deter all of the locals however. For a few, these slow, calculating reptiles are an inspiration.

Miary Raselimanana has always had an endless fascination for chameleons, which prompted her to conduct a master's study on this taxonomic group and begin her journey to becoming a herpetologist.

Gravid female of Labord's Chameleon from Kirindy dry forest. Photos: Miary Raselimanana

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TOMORROW'S HERPETOLOGISTS TODAY

Considering women rarely pursue science in Madagascar, a woman herpetologist is as rare as a red diamond or a Chapman's pygmy chameleon. During her Master's degree at the University of Antananarivo, Madagascar, Miary studied the habitat use and population structure of chameleons in a neglected dry forest of southwestern Madagascar, within the protected area of Menabe Antimena: Kirindy CNFEREF.

The majority of information known about the biology and ecology of Malagasy chameleons has typically come from studies on eastern rainforest species. As such, very little is known about chameleon within its western dry forests, despite the fact that they contain a heterogeneous range of habitats that shelter numerous chameleon species, many of which are micro-endemic (e.g., *Furcifer antimena, F. belalandaensis, F. labordi*). Moreover, they are among the most fragmented ecosystems in Madagascar due to large-scale deforestation. Menabe Antimena has already lost over 19% of its forest cover from 2000-2015, and given the current deforestation rate within this protected area (≤1500ha/year), Kirindy dry forest is likely to disappear in the next 20 years.

Gravid female of Brygoo's Leaf Chameleon (*Brookesia brygooi)*

Adult male of Labord's Chameleon (*Furcifer labordi*)

Adult female of Oustalet's Giant Chameleon (*Furcifer oustaleti*)

Adult male of Nicosia's Chameleon (*Furcifer nicosiai*)

Hatchling Nicosia's Chameleon from Kirindy dry forest.

Juvenile Nicosia's Chameleon from Kirindy dry forest.

With the help of local funding and logistical support from the Association Vahatra and the Deutsches PrimatenZentrum, Miary conducted three months of field surveys in Kirindy dry forest. During this time, she sampled four chameleon species, including a dwarf chameleon, *Brookesia brygooi*, and three arboreal species, *F. oustaleti, F. labordi, and F. nicosiai* – the latter two are classified as threatened (Vulnerable and Endangered, respectively). For each chameleon found, she collected ecological (ecological integrity, microhabitat, perch characteristics) and biological (age class, sex) data, which she used to assess the ecological preference of each chameleon species present in the forest patch. This was then used to evaluate their tolerance to habitat destruction, which was particularly critical for *F. labordi* and *F. nicosiai*, to assess their resilience, and to effectively manage their habitat.

The study found that habitat selection was not random, with each species showing specific ecological preferences that likely aid in partitioning the available niche between the four species. It also showed that the abundance of each species was highest in less disturbed habitats, except for *F. oustaleti*, which is typically found in open-canopy systems. Her study also provided the first information on the perch ecology of the two threatened species.

Of the four species in Miary's study, one in particular caught her attention, *Furcifer labordi*. Its entire lifecycle was observed within her three-month field survey. Indeed, this species has the shortest lifespan among tetrapods (4 to 9 months). Moreover, it is characterized by an unusual annual life history: embryonic diapause during austral winter, synchronous hatching at the onset of the rainy season, and fast post-hatching growth that produces sexually mature adults in less than two months. The entire population consists of a single synchronous age cohort, which has severe implications for its conservation. The resilience of *F. labordi* is therefore of particular concern.

Land use and climate change are considered as the main drivers of the current alarming biodiversity loss. Climate change is apparent in southwestern Madagascar, with evidence of shifts in the rainy season (i.e., 10-day shift over a few decades). Miary, in collaboration with Dr Falk Eckhardt (University of Göttingen, Germany) and Dr Benjamin Rice (University of Princeton, USA), is currently working on a manuscript that describes how such climatic variations could affect the phenology and growth of *F. labordi*.

This work has sparked her interest in studying how global climatic changes induce spatial and temporal shifts in tropical species, especially neglected species such as Africa's herpetofauna. Miary is also interested in studying how plasticity and natural selection interact to permit populations to persist in heavily modified habitats, which she wants to pursue further as a PhD.

Gravid female of Brygoo's Leaf Chameleon

BIBLIOGRAPHY AND ANALYSIS OF PUBLICATIONS RELEVANT TO AFRICAN HERPETOLOGY PUBLISHED BY THE BRITISH HERPETOLOGICAL SOCIETY COMPARED TO THE HERPETOLOGICAL ASSOCIATION OF AFRICA, DURING THE LAST DECADE

J. REISSIG

Publications on African herpetology are published by many organisations around the world. Many of these do not necessarily reach all researchers in their respective fields. The British Herpetological Society (BHS) is one of these organisations which publish various articles relevant to African herpetology. Founded in 1947, the society currently has three official publications: *The Herpetological Journal*, *The Herpetological Bulletin* and *The Natterjack*. *The Herpetological Journal* is the society's prestigious quarterly scientific journal, which is published in January, April, July and October. *The Herpetological Bulletin*, which publishes full-length papers, natural history notes, book reviews and various other relevant articles appears quarterly and is published in spring, summer, autumn and winter. *The Natterjack*, is the society's internal newsletter.

Over the last decade, a total of 65 articles relevant to African herpetology have been published by the BHS (Fig.1).

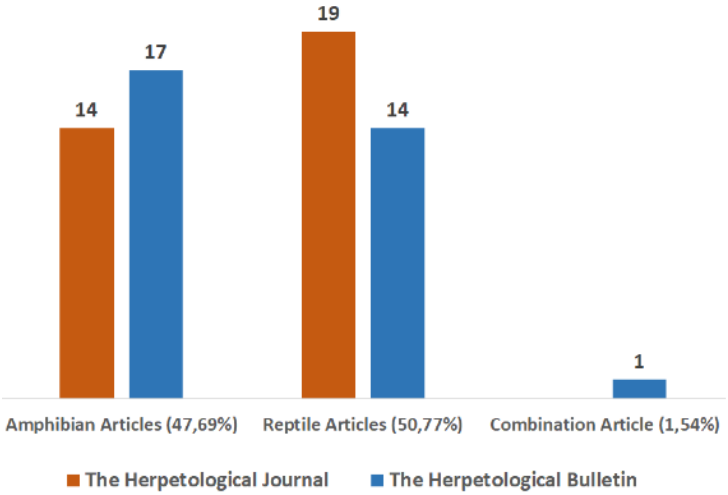

Figure 1. Graph showing the split of the 65 articles of the British Herpetological Society, into the two publications, and their primary subject.

The Herpetological Journal published a total of 33 articles; 19 (58%) of these were reptile related and 14 (42%) were amphibian related. *The Herpetological Bulletin* published a total of 32 articles; 14 (44%) of these were reptile related, 17 (53%) were amphibian related and 1 (3%) was a herpetological survey covering both reptiles and amphibians. These articles are well distributed throughout the last 10 years (Fig. 2). A total of 192 authors contributed to these 65 articles, of which 10 were also members of the Herpetological Association of Africa.

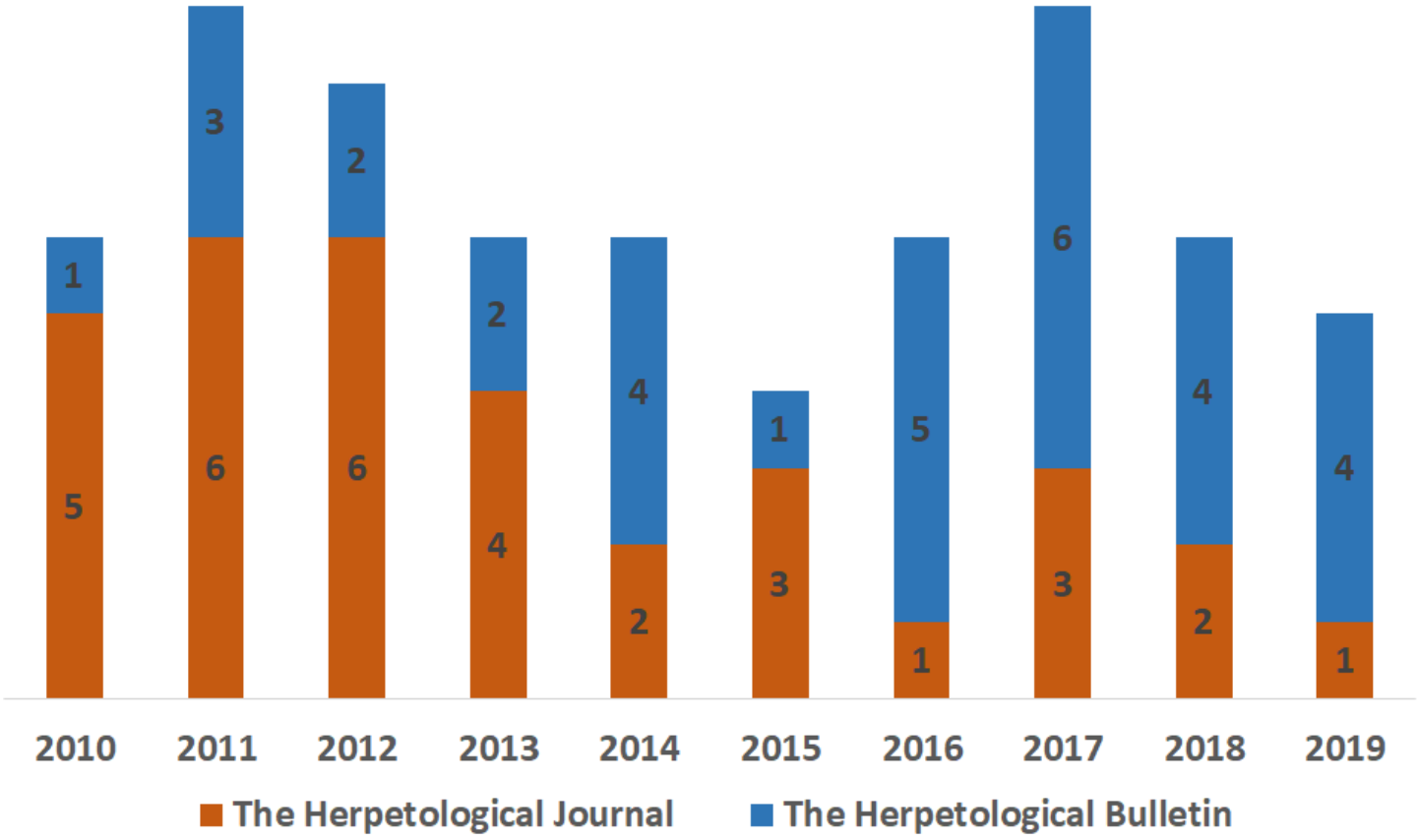

Figure 2. Graph showing annual articles published in the two publications of the British Herpetological Society.

A total of three new amphibian species from Africa were described in two articles published by the BHS. Lehtinen et al. (2011) described the ring-wearing tree frog (*Guibemantis annulatus*) and the watterson's tree frog (*Guibemantis wattersoni*) from Madagascar. Baratt et al. (2017) described the ruvu spiny reed frog (*Hyperolius ruvuensis*) from Tanzania. No new reptile species from the continent were described for this period.

In comparison, the Herpetological Association of Africa (HAA), founded in 1965, publishes the *African Journal of Herpetology* and *African Herp News*. The *African Journal of Herpetology* is published twice per year and *African Herp News* generally gets published three times per year, however, only two volumes were published in 2013. Unfortunately 2014, 2015 and 2016 only delivered one volume per year.

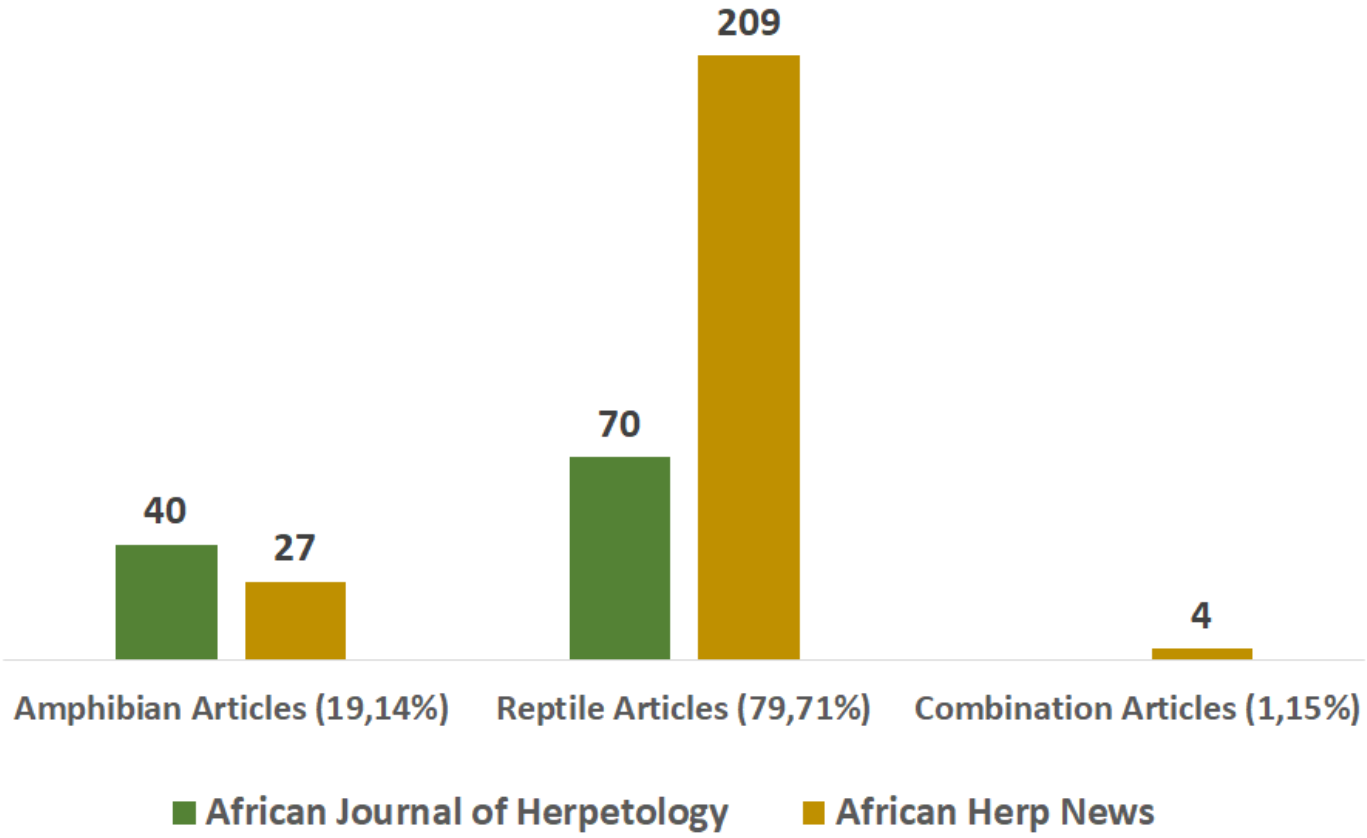

Figure 3. Graph showing the split of the 350 articles of the Herpetological Association of Africa, into the two publications, and their primary subject.

Over the last decade, a total of 350 articles relevant to African herpetology have been published by the association (Fig.3).

The *African Journal of Herpetology* published a total of 110 articles; 70 (64%) of these were reptile related and 40 (36%) were amphibian related. *African Herp News* published a total of 240 articles; 209 (87%) of these were reptile related, 27 (11%) were amphibian related and 4 (2%) were herpetological surveys covering both reptiles and amphibians.

These articles are well distributed throughout the last 10 years (Fig. 4). A total of 450 authors contributed to these 350 articles, of which 86 were also members of the Herpetological Association of Africa.

New descriptions by the HAA included a total of 12 new amphibian species in five articles as well as 13 new reptile species and three new reptile genera in 13 articles.

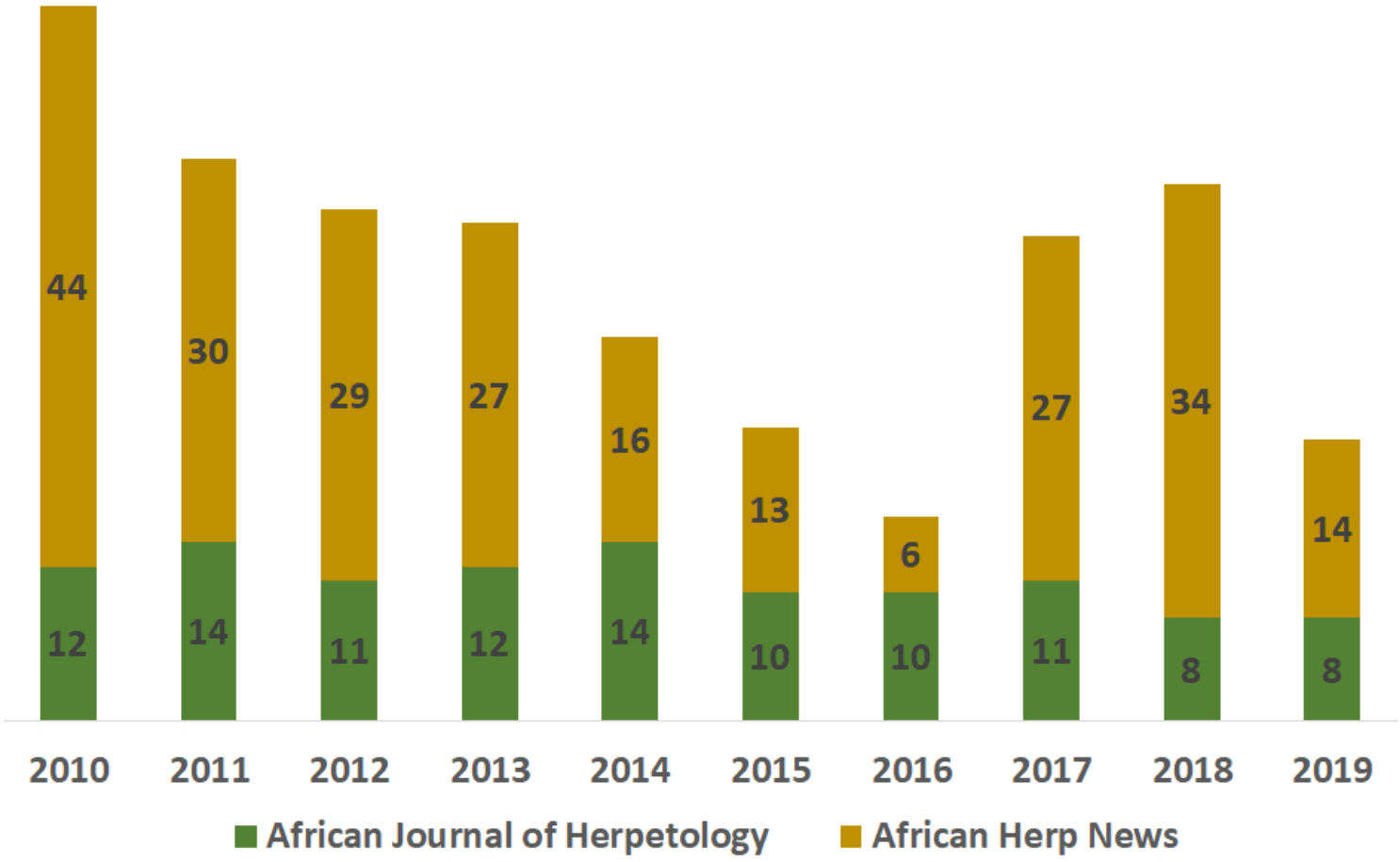

Figure 4. Graph showing annual articles published in the two publications of the Herpetological Association of Africa

An analysis of geographic areas covered by all the articles of the two associations uncovered some interesting differences. For this article, Africa has been subdivided into the five geographic regions of the African Union: Central Africa – Burundi, Cameroon, Central African Republic, Chad, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Republic of the Congo, São Tomé and Príncipe; East Africa – Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, South Sudan, Sudan, Tanzania and Uganda; North Africa – Algeria, Egypt, Libya, Mauritania, Morocco, Sahrawi Arab Democratic Republic and Tunisia; Southern Africa – Angola, Botswana, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe; and West Africa – Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. The BHS had the majority of its publications focusing on North Africa (31 %), followed by East Africa (23%) (Fig. 5); whereas, the HAA had the majority of its articles focusing on Southern Africa (70%), also followed by East Africa (11%) (Fig. 6).

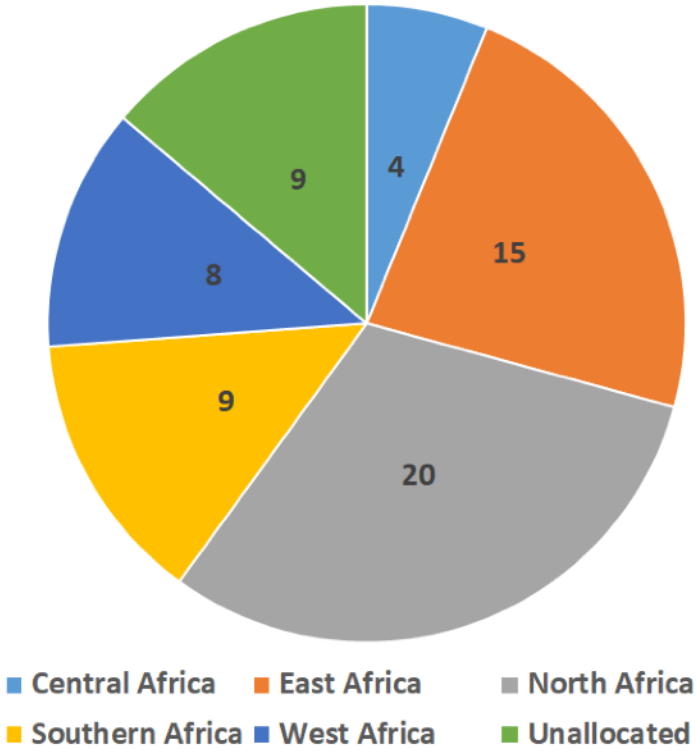

Figure 5. Graph showing the geographical coverage, of the 65 articles, published by the British Herpetological Society.

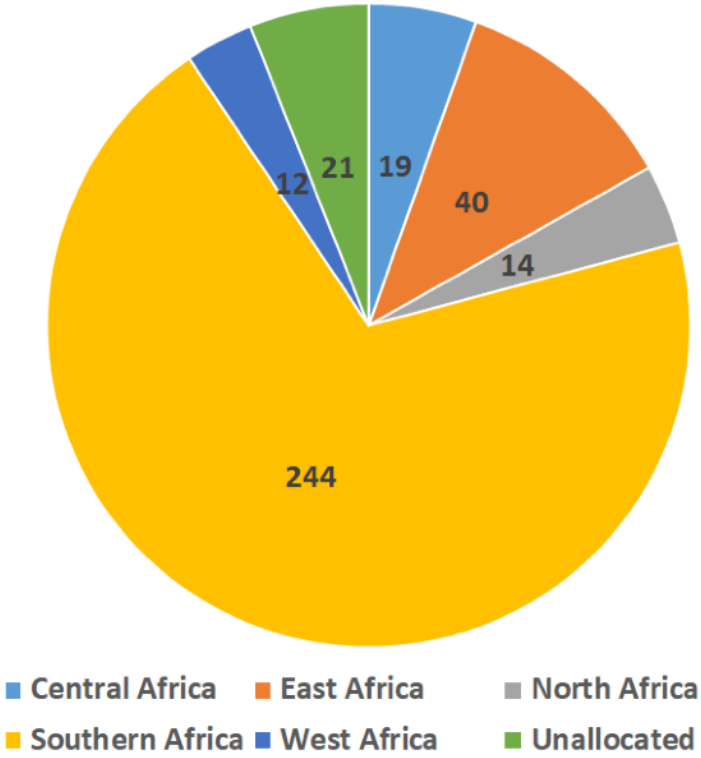

Figure 6. Graph showing the geographical coverage, of the 350 articles, published by the Herpetological Association of Africa.

The articles listed as unallocated relate to papers covering multiple African regions, methods or captive husbandry, which cannot be directly categorized into any of the five geographic regions as outlined above. Furthermore, only publications that can be classified as articles, natural history notes or geographic distributions have been used for the comparative work, thus omitting obituaries, bibliographies, book reviews, conference reports and abstracts, and association specific announcements.

With so many herpetological publications by the various scientific journals and associations throughout the world, it can be very difficult to keep track of what gets published relating to the field of African herpetology. It is extremely important that all researchers look for references from far and wide when conducting their work. The HAA would benefit greatly from researchers, from around the world, publishing some of their work in the association's publications and thus also covering wider areas of the African continent.

Below is a complete alphabetical bibliography of the 65 articles published in *The Herpetological Journal* (Herpetol. J.) and *The Herpetological Bulletin* (Herpetol. Bull.), from the beginning of 2010 till the end of 2019.

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SUBMITTED BY:

JENS REISSIG,
Ultimate Creatures, P.O.Box 62, Kelvin, 2054.
Gauteng, South Africa.
E-mail: jens@ultimatecreatures.com

THE VALUE OF CITIZEN SCIENCE IN EVALUATING CURRENT-DAY DISTRIBUTION OF REPTILES & AMPHIBIANS: AN EVALUATION FOR FREE STATE PROVINCE, SOUTH AFRICA

C.S. STOBIE & M.F. BATES

Facebook and other social media platforms serve as valuable tools for the modern biologist as they provide numerous photographic and videographic images of animals, plants and other life forms that can be identified by experts and catalogued (e.g. locality, date, and habitat). Maritz & Maritz (2020) demonstrated the utility of this approach with a Facebook group for predation records of amphibians and reptiles from sub-Saharan Africa. These authors found that dedicated citizen science platforms like iNaturalist contributed far fewer records than Facebook despite being specifically designed to share records (photographs with associated locality and other information). They attribute this to Facebook's ease-of-use, a much greater proportion of active users compared to platforms designed specifically for citizen science, the potential to directly contact observers for additional information or discussion, and an ease of discussion with experts in a form of 'expert crowdsourcing' for identifications. On platforms like iNaturalist and ReptileMap, observers are required to follow a specific format and provide certain details, especially regarding the locality. While these are often also requested by Facebook groups like *Snakes of Southern Africa*, they are not strictly required, and members of the public may often feel more at ease simply uploading their photographs directly onto the Facebook group from their cell phone, and providing only basic information.

The herpetofauna of Free State Province, South Africa was comprehensively surveyed by Schalk de Waal (1978, 1980a,b) in the 1970s, with later updates by Bates (1995, 1996). However, most of these earlier records refer to specimens collected over 40 years ago, and the continuation of farming activities, urbanisation and other landscape-altering activities in many parts of the Free State has almost certainly caused local extirpations in some areas. To investigate current-day distribution of reptiles and amphibians in Bloemfontein, capital city of the Free State, we set up a Facebook group (Fig. 1) originally named *Bloemfontein Reptile and Amphibian Atlas.* After only 2-3 months we realised that the group was rapidly collecting records for the entire province, and we therefore renamed it *Free State Reptiles and Amphibians*. Recently we modified our coverage to include surrounding areas (especially peripheral regions in the Northern Cape, North West and Gauteng provinces) and Lesotho (mountainous kingdom to the east of the Free State), as we decided that our investigations on distribution should cover central South Africa and Lesotho. The latter is an especially poorly known area in

terms of its reptiles and amphibians, although a provisional checklist is in preparation (Bates *et al*. in prep.).

The group is now named *Free State Reptiles and Amphibians (including adjacent areas and Lesotho)* (https://www.facebook.com/groups/FreeStateHerps/).

Since December 2019, over 1 000 photographic records of 82 species have been posted on the group's page. Many of these have been shared from posts on other established groups, especially *Snakes of Southern Africa.*

All of these records have been compiled in a database which we use to complement our investigations into the current-day distribution of species in the Free State as well as, at a finer scale, in the city of Bloemfontein.

The database is formatted to record the species, date, locality, description of specimen, observer/s, mapping co-ordinates, altitude, quarter-degree grid cell, whether a photograph was taken, permalinks to the post in our group and any original posts, source of the record, and time/weather/habitat.

A version of this database, or parts thereof, will be made available as an appendix in future publications, similar to what was done by Maritz & Maritz (2020). The project is ongoing and effectively 'open ended', allowing a continuous evaluation of species distributions into the future. To our knowledge this is the first deliberate attempt to investigate reptile and amphibian distribution in southern Africa using Facebook records as a major source of data.

Figure 1. The Free State Reptiles and Amphibians (including adjacent areas and Lesotho) Facebook group with photographs of a few species common to the Free State: Common Caco *(Cacosternum boettgeri*), Brown House Snake *(Boaedon capensis)* and Common Dwarf Gecko *(Lygodactylus capensis)*. (Photos: Werner Conradie, Tyrone Ping and Michael F. Bates respectively. Background photograph by Andres de Wet)

We are currently finalising our investigations into historical and contemporary distributions of Rinkhals (*Hemachatus haemachatus*), Cape Cobra (*Naja nivea*) and Puff Adder (*Bitis arietans*) in the Free State and Lesotho. Our maps combine literature records (using symbols in one colour with different coloured rings denoting different time periods, starting with records recorded by FitzSimons 1962) with contemporary records (another colour) from our Facebook group, as well as dedicated online citizen science platforms like iNaturalist and ReptileMap (post-Bates *et al*. 2014), and unpublished museum records (each differentiated by a different colour ring). For the Facebook records we attempt to contact the person who submitted the original post so as to validate or improve the given locality name and co-ordinates.

Regarding photographs of Rinkhals in the Free State and Lesotho, posted on Facebook, we have thus far contacted 110 people privately on Facebook Messenger. Most of these individuals are responsible for a single post, but some have posted several photographs at different times, with one person having posted 12 different Rinkhals records. Of these 110 individuals, 52 (i.e. 47% success) responded on Facebook Messenger either confirming the locality, adding additional information, promising further information to follow, or saying they could not help us. This has resulted in approximately 58 records having their localities refined. If we cannot refine a record to a town/city (and preferably exact co-ordinates, street, farm or suburb) the record is not used for mapping purposes. Currently we are able to use all 146 of 163 Facebook records for Rinkhals archived on Free State Reptiles and Amphibians (including adjacent areas and Lesotho) as each of these is referable to at least a town/city.

The Facebook records have proved to be of considerable value, providing numerous new records of common as well as rarely reported species, filling in gaps in their known distribution, extending the known ranges of some taxa and importantly, providing an indication of their current-day distribution.

To demonstrate the use of different symbols, we present a map showing the distribution of the Water Monitor (*Varanus niloticus*) in the Free State and on its periphery (Fig. 2). Most species have more records available than this species, but the latter was chosen, for the purposes of this note, to make interpretation easier. The use of different symbols indicates how valuable the Facebook records are, and how significantly they contribute to the map when compared to dedicated citizen science platforms. With reference to one of the three species we have looked at in detail so far, namely the Rinkhals, it is noteworthy that as many as 163 (93%) of all citizen science records were derived from Facebook, and this represents 61% of all known records for this species in the Free State and Lesotho, including literature records. Use of different symbols for different periods of time will allow us to visually demonstrate apparent changes in species distributions over time, or identify where gaps have been filled in, based on new records. The number of records observed in particular areas may also provide a rough indication of areas where different species are abundant.

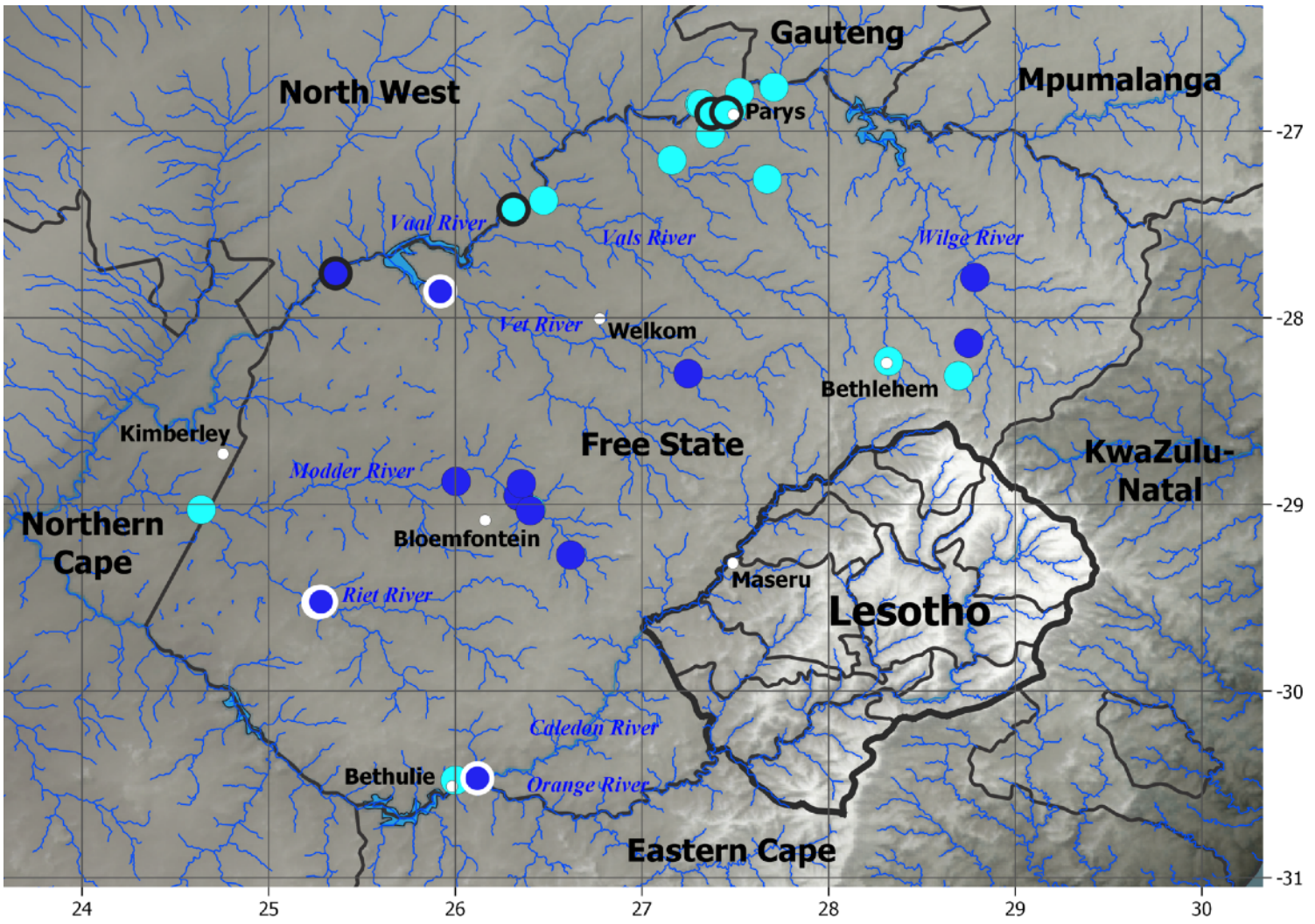

Figure 2. Distribution map of the Water Monitor (*Varanus niloticus*) in Free State Province, South Africa. Literature records are shown in dark blue and are divided into records published by De Waal (1978) (no edge), Bates (1996) (white edge) and Bates (2010) (black edge). New records are shown in pale blue and are separated into Facebook records (no edge) and other online records from iNaturalist and Flickr (black edge). A few records along the Vaal River were sighted on the North West Province side, and one record is from the Modder River (which flows eastwards from the Free State) in the Northern Cape (i.e. about 2 km west of the Free State border). This map was produced using QGIS (QGIS Development Team, 2020) and Natural Earth (free vector and raster map data @ naturalearthdata.com). An additional river layer was sourced from the Food and Agriculture Organisation of the United Nations (FAO) Rivers of Africa project (http://www.fao.org/geonetwork/srv/en/metadata.show?id=37333&currTab=simple). Elevation was shown using the Global Multi-resolution Terrain Elevation Data 2010 (GMTED2010) (Danielson & Gesch, 2020).

Bloemfontein is a large area of at least 236 km^2 (Statistics South Africa, 2011) that has seen much change in land use as a result of urbanisation over the last few decades, as new suburbs have developed and businesses expanded. We suspected that these changes may have resulted in shifts in reptile and amphibian species distributions since the surveys of De Waal (1978) and later updates (Bates 1995, 1996), and therefore decided to investigate current distributions in this area. New records were plotted, together with literature and museum records, to produce Bloemfontein-specific species distribution maps (Fig. 3). So far we have prepared maps for 10 common species for which we have a reasonable number of records, namely Puff Adder (*Bitis arietans*), Common Egg-Eater (*Dasypeltis scabra*), Cape Cobra (*Naja nivea*), Brown House Snake (*Boaedon capensis*), Leopard Tortoise (*Stigmochelys pardalis*), Giant Bullfrog (*Pyxicephalus adspersus*), Mole Snake (*Pseudaspis cana*), Speckled Rock Skink (*Trachylepis punctatissima*), Cape Gecko (*Pachydactylus capensis*), and Raucous Toad (*Sclerophrys capensis*). These maps, which have been posted on the *Free State Reptiles and Amphibians* group, represent records at suburb, 'section' or small holding level. We chose this level because contributors often preferred not to provide exact localities for privacy reasons.

Maps are posted on the group from time to time, and will be updated regularly depending on how many new records become available.

Once we have accumulated more records we will use different colours or markers to indicate areas with the highest frequency of records, as well as the time periods when sightings were made (e.g. 2000-2004, 2005-2009 etc.). Unfortunately, most museum and literature records for the area are simply given as 'Bloemfontein', so for the most part we are restricted with regard to how much we can say about past and present occurrence, and changes in distribution patterns, within the boundaries of the city.

At some point in the future, depending on the availability of records, we will prepare a manuscript for publication on the distribution of reptiles and amphibians in Bloemfontein, and this will include a database of all records collected to date. As in the case of Free State records, the collecting of detailed distribution data for Bloemfontein is ongoing and continuous.

We encourage anyone with photographic records of herpetofauna observed in Free State Province surrounding areas and Lesotho to post their records to our Facebook group: https://www.facebook.com/groups/FreeStateHerps/.

Any additional information such as the date of observation, locality and habitat will be welcomed. Information on how to post is available on the group's page.

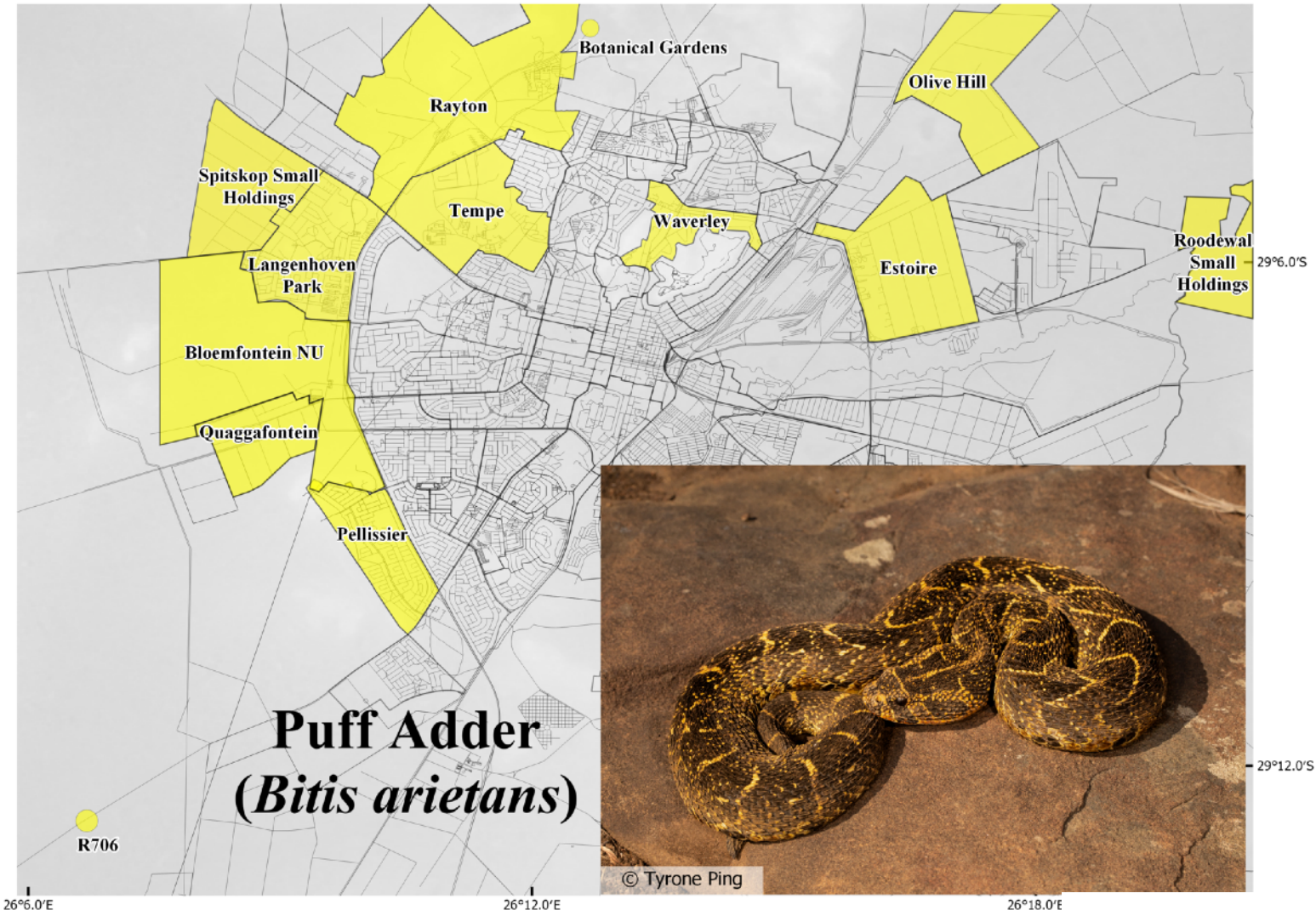

Figure 3. Distribution map of the Puff Adder (*Bitis arietans*) in Bloemfontein, mapped at the level of suburb, 'section' and small holding. This map was produced using QGIS (QGIS Development Team, 2020). Base map data © OpenStreetMap contributors. OpenStreetMap data is available under the Open Database License (https://www.openstreetmap.org/copyright). Suburb boundaries were sourced from Frith (2013).

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SUBMITTED BY:

CORA S. STOBIE,
Department of Herpetology, National Museum, P.O. Box 266, Bloemfontein 9300, South Africa.
Email: cora@nasmus.co.za

MICHAEL F. BATES,
Department of Herpetology, National Museum, 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.
Email: herp@nasmus.co.za

CITIZEN SCIENCE MAKES A MARK FOR AFRICAN HERPETOLOGY

K.A. TOLLEY & A. REBELO

Citizen science is widely acknowledged as a powerful tool to increase research capacity and expand datasets (McKinley et al. 2017). It also provides an opportunity for the public to gain a sense of stewardship and an outlet for individuals to advance science. There are many types of citizen science and ways for people to contribute, either directly (by collecting data for targeted research projects) or indirectly (by contributing records *ad hoc* to global databases). Citizen science has long been a component of diverse fields of research, such as astronomy, Earth sciences and natural history. In terms of herpetology, one of the most valuable contributions are distribution data (e.g. photographic records) for poorly documented regions and species. These data are used by many scientists and can be invaluable in terms of interpreting species distributions as well as shifts or other changes in distributions over time. Citizen science records also have weighed heavily in the interpretation of range maps for southern African reptiles and amphibians for their IUCN Red List assessments.

There are a few different platforms where citizen scientists can upload their records to databases. For example, iNaturalist (https://www.inaturalist.org) and ReptileMap (http://vmus.adu.org.za) are convenient platforms that compile observational records which can then be queried and used by researchers and others. It should be noted that these platforms are databases where records are stored indefinitely along with important metadata for the records. Furthermore, the data from iNaturalist are freely available through a very handy function to download the records as a spreadsheet. Other online platforms such as Instagram or Facebook are not databases and while these platforms do allow for an esteemed status to be conferred to the contributor, the actual data/record is not catalogued and compiled nor can relevant associated metadata be accessed from those platforms. Thus, we strongly encourage citizen scientists to use a data gathering and dissemination platform such as iNaturalist or ReptileMap as a means to make a meaningful contribution to the much needed accumulation of natural history records.

Recently, herpetologists and enthusiasts were challenged to upload their photographic records to citizen science databases, in particular iNaturalist (AHN 74, August 2020). This platform was chosen due to the ease of acquiring the records at a later stage. We are pleased to report back the preliminary results of the two individual challenges that were issued.

Challenge #1: New records of Jalla's Sand Snake (*Psammophis jallae*)

Not surprisingly, there were no new records of this species added. It has only been recorded four times since the 1990's and is potentially in decline across parts of the range. Gathering new records of this species remains a challenge!

Challenge #2: Herpetofauna of the southern Drakensberg and adjacent Lesotho

Taking the lead on this challenge was HAA member Gary Nicolau who contributed eight new observations of eight different species to the region. A very honourable mention goes to Courtney Hundermark who also contributed several additional records. The total records added was 12 observations of nine species since 1 September 2020. Given that there were very few records from this area, these contributions are indeed significant. Gary's record of the Spotted Rock Snake (*Lamprophis guttatus*) comes out as our 'favourite'.

Figure 1. Spotted Rock Snake (*Lamprophis guttatus*) recorded from the Mount Frere area in the Eastern Cape Province, South Africa in September 2020. Photo: Gary Nicolau

Here are the most popular herpetological observations from iNaturalist records from Africa since 1 September 2020, ordered by the number of 'favourite' votes received.

Continuing the Challenge

The existing challenges continue! Please upload your records for Jalla's Sand Snake and for the Lesotho/southern Drakensberg region to an online citizen science platform. We would also like to issue an additional challenge to those who dare.

Challenge #3: The elusive *Tetradactylus breyeri*, Breyer's Long-tailed Seps

This species has seldom been recorded. It is a South African endemic that has a patchy distribution in high elevation mountainous grassland regions. There are only 20 verified records and of these, only six have been made within the last 20 years. Could this species be in decline? It is currently listed as Near Threatened on the IUCN Red List and the lack of recent records are not encouraging. A congener, *Tetradactylus eastwoodae*, is listed as Extinct, having last been recorded in the 1920s. It is possible that seps are particularly sensitive to habitat degradation and loss. Urgent confirmation of the persistence of Breyer's Long-tailed Seps is needed, particularly from the south-central Drakensberg and the KwaZulu-Natal Midlands.

How to participate

To contribute to these challenges, you will need to sign up on iNaturalist (https://www.inaturalist.org/signup) using your email address or Facebook account. Once you have logged in please join the project *AfriHerps* if you wish to receive notifications regarding HAA related content. To add observations, you can choose to use either the iNaturalist smartphone app or the website upload page. Each observation requires either a photograph or sound recording, a date and an accurate map location. Please make sure to post each individual separately, but to merge photographs of the same individual into one observation before submission. Your observations will be automatically added to the HAA challenge projects if they meet the project criteria. You can view the current HAA challenges by clicking on the links from the *AfriHerps* project page. Note that any contributions are welcome on other platforms such as ReptileMap as well, but future report backs on these challenges will be made using the iNaturalist platform.

SUBMITTED BY:

KRYSTAL A. TOLLEY
Kirstenbosch Research Centre, South African National Biodiversity Institute, Private Bag X7, Claremont, 7735, Cape Town, South Africa.
E-mail: k.tolley@sanbi.org.za

ALEX REBELO
Independent Researcher, Pretoria, South Africa.
E-mail: arebelo23@gmail.com

DIVERSITY AND ABUNDANCE OF ANURANS IN THE NORTHERN GUINEA SAVANNA OF NIGERIA

E.U. ANELE, I.H. NOCK, I.M.K. GADZAMA, A.B. ONADEKO & M.S.O. AISIEN

Amphibians are a unique group of vertebrates containing over 8200 known species (AmphibiaWeb 2018; Frost 2020) of which nearly 90% are anurans (frogs and toads; Frost 2020) with representatives in all terrestrial and freshwater habitats. Tropical habitats are richest in anuran diversity (Stuart et al. 2008). In Africa, amphibians are used for medicinal purposes, sale in the international pet trade and as an essential source of animal protein (Gonwouo and Rödel 2008; Mohneke et al. 2009, 2010). Intensive harvest of amphibians may contribute to their decline (Mohneke et al. 2009). Much is known about anuran diversity in the south of Nigeria (Onadeko and Rödel 2009; Mohneke et al. 2009, 2010; Ajibola et al. 2014; Aisien et al. 2015). There is a low tempo of research and reporting on anurans in the north of Nigeria due to insecurity and inaccessibility of some regions. An increased effort to assess the anuran fauna of many parts of Nigeria seems extremely pressing (Onadeko and Rödel 2009). This research is therefore geared towards enriching the pool of information on anurans in Nigeria, and northern Nigeria in particular

Sampling was carried out in Kaduna State which lies within the Guinea savanna vegetation zone of Nigeria with six months of rainy season. The coordinates of the 12 sampled locations were taken with a GPS Garmin eTrex (Table 1, Fig. 1) and a brief habitat description is given in Table 1. Opportunistic searches were carried out for three days every month (from January 2016–November 2016) during the day (06:00am-10:00am) and night (18:00-22:00pm). This was done independent of the prevailing weather condition by visual scanning of the particular environment and careful examination of suspected hiding places (Rödel et al. 2005; Ogoanah 2011; Onadeko et al. 2013). Information about date of capture, location, habitat and colour of each anuran was recorded on a data sheet; digital photos were also taken (Onadeko and Rödel 2009; Ogoanah 2011). Snout-vent length (SVL) of each live anuran was taken using a ruler (in mm) and body weight (BW) was recorded to nearest 0.1 g using an electronic balance (Bennett 1999; Hegde and Krishnamurthy 2014). Voucher specimens of all species were collected, anaesthetized with chloroform and subsequently preserved in 10 % formalin (Onadeko and Rödel 2009); these were deposited in the Museum of Natural History in the Department of Zoology, Ahmadu Bello University, Zaria. Sex of each anuran was determined by the presence of ovary or testes following dissection (Kuperman et al. 2004) of one hundred and fifty frogs to check for internal adult helminths.

Location	GPS Coordinates	Habitat description
URE	11°08'03"N 7°39'16"E	Large reservoir surrounded by tall grasses.
UBG	11°08'45"N 7°39'16"E	Enclosed man-made forest, with large trees and thick leaf litter.
USP	11°08'16"N 7°39'27"E	Sewerage treatment ponds surrounded by grasses.
UAA	11°08'38"N 7°39'38"E	Slow flowing stream that forms a temporary pond during the dry season.
UBZ	11°09'41"N 7°37'50"E	Small body of water in a plastic water reservoir.
BLK	11°11'11"N 7°37'23"E	Large reservoir surrounded by grasses and irrigation farming.
MFF	11°02'17"N 7°50'41"E	Fish farm, reservoir surrounded by grasses and irrigated farms.
ZRE	11°07'54"N 7°45'37"E	Large reservoir surrounded by sparse vegetation and irrigated farms on the other side.
DQ1	10°52'52"N 7°39'38"E	Pond formed as a result of intense quarrying activities, surrounded by rock and grass.
DQ2	10°52'56"N 7°39'24"E	Pond formed as a result of intense quarrying activities, surrounded by rock.
UIR	11°09'02"N 7°38'48"E	Annual stream that flows at the peak of the rainy season but forms smaller pools and eventually dries up at the peak of the dry season surrounded by sparse vegetation.
UFB	11°08'52"N 7°39'10"E	Concrete fountain with water reservoir.

Table 1. GPS coordinates and habitat description of sampling locations; URE= University Reservoir, USP= University Sewage pond, UIR= University ICSA/RAMAT, UBG= University Botanical Garden, UFB= University FirstBank, UAA= University Area A, UBZ= University BZ, BLK= Bomo Lake, MFF= Maigana Fish Farm, ZRE= Zaria Reservoir, DQ1= Dunmbi Quarry Pond1, DQ2=Dunmbi Quarry Pond 2

Anurans were identified to species level using Greenbaum and Carr (2005), Rödel and Spieler (2000), Rödel et al. (2005), Onadeko and Rödel (2009), AB Onadeko (Pers. comm.), M-O Rödel (Pers. comm.), MSO Aisien (Pers. comm.).

A total of 191 anurans belonging to seven families and nine species were identified during the study period (Table 2).

The seven families were Bufonidae, Hyperoliidae, Pipidae, Pyxicephalidae, Hoplobatrachidae, Ranidae and Ptychadenidae.

The species include: *Sclerophrys regularis*, *Kassina senegalensis*, *Afrixalus vittiger*, *Xenopus fischbergi*, *Xenopus tropicalis*, *Pyxicephalus* cf. *edulis*, *Hoplobatrachus occipitalis, Amnirana galamensis* and *Ptychadena pumilio*.

Anurans encountered were predominantly frogs spread across six families (Hyperoliidae, Pipidae, Pyxicephalidae, Hoplobatrachidae, Ranidae and Ptychadenidae) and a toad belonging to the family Bufonidae. *Xenopus fischbergi* was the highest recorded anuran species with a total of 76 (39.79%) individuals from the University Reservoir (URE). *Afrixalus vittiger* was the least recorded species with only one individual collected from University BZ (UBZ) (Table 2)

The Shannon-Weiner diversity index (*H'*) was used to determine the diversity of anuran species using PAST software version 3.0. A student t-test was used to compare the number of anurans collected in the rainy and dry season using Microsoft Excel.

Species composition, abundance and diversity differed significantly among the locations. Species composition was greater at the University Reservoir (URE), Maigana Fish Farm (MFF) and Zaria Reservoir (ZRE) with five anuran species in each of these locations (Table 2). However, abundance was highest in URE with 64 (33.51%) individuals. The most diverse habitats were ZRE (Shannon (*H'*) = 1.583) followed by MFF (Shannon (*H'*) = 1.469). Of the total collection during the study period, 83 (43.46%) anurans were collected during the dry season belonging to four families and seven species.

Xenopus fischbergi was the most frequently encountered species during the dry season with a total of 34 (40.96%) individuals having the highest number at the URE 25 (30.12%). *Afrixalus vittiger* was the least recorded with only a single individual collected (1.20%) at UBZ, while *K. senegalensis* and *Pyxicephalus* cf. *edulis* were not encountered during the dry season. The wet season collection consisted 108 (56.54%) anurans with five families and seven species, *Xenopus fischbergi* had the highest number of individuals 42 (38.89%) at the URE 39 (36.11%) and *Pyxicephalus* cf. *edulis* was the least recorded with 2 (1.85%) individuals at MFF, while *A. vittiger* and *P. pumilio* were not encountered. There was no significant difference between the number of anurans collected in the dry and rainy season (p=0.33).

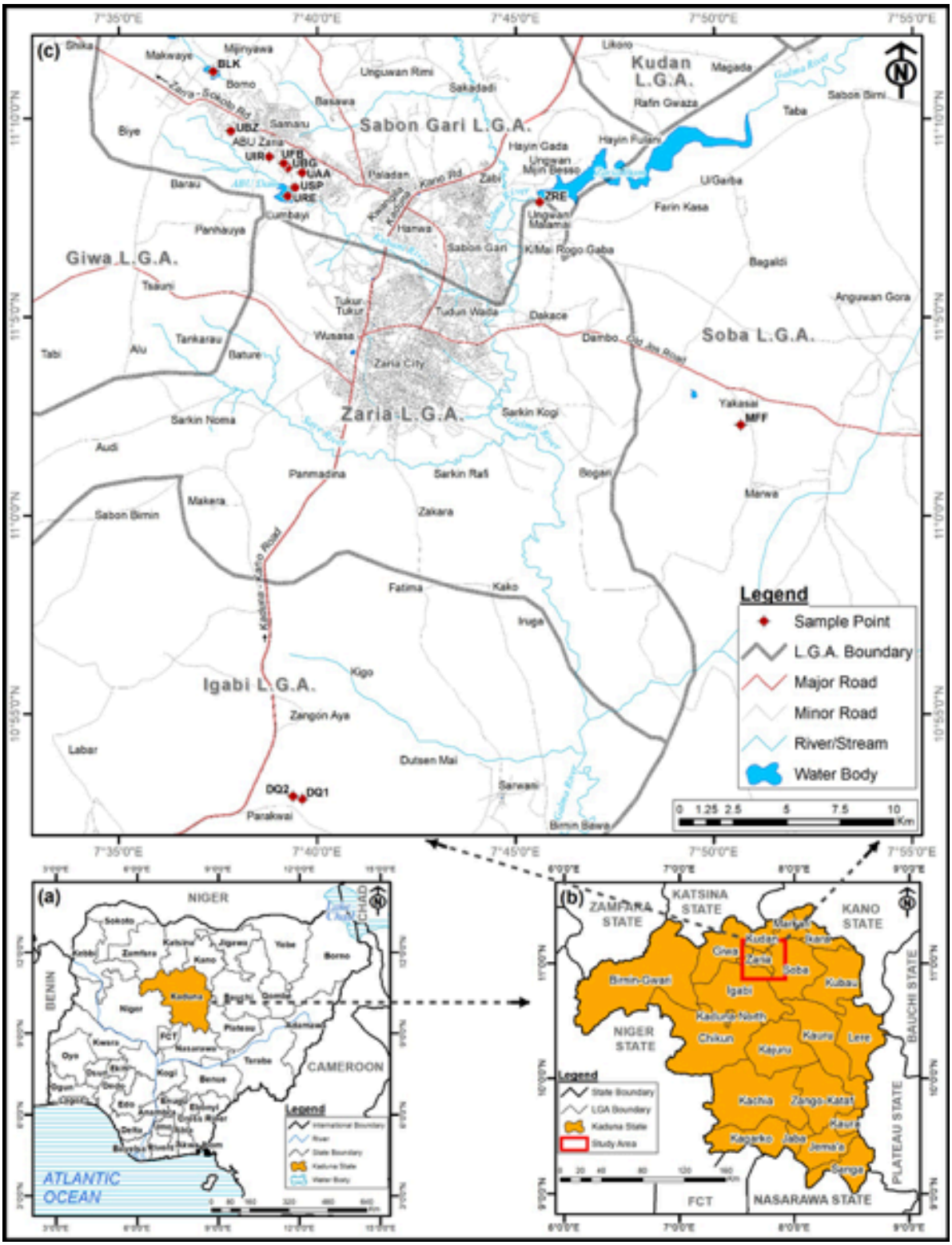

Figure 1. Sampled locations in Kaduna State (a) Nigeria showing Kaduna State, (b) Kaduna State showing Study Area, (c) Study Area showing Sample Points. Source: Fieldwork/Map Gallery, Geography Department, ABU Zaria URE=University Reservoir, UBG=University Botanical Garden, USP=University Sewerage Pond, UAA=University Area A, UBZ=University BZ, BLK=Bomo lake, MFF=Maigana Fish farm, ZRE=Zaria Reservoir, DQ1=Dumbi Quarry pond 1, DQ2=Dumbi Quarry pond 2, UIR=University ICSA/Ramat, UFB=University Firstbank

Table 2. Species composition and distribution of anurans

		Location												
Family	**Species**	**URE**	**USP**	**UIR**	**UBG**	**UFB**	**UAA**	**UBZ**	**BLK**	**MFF**	**ZRE**	**DQ1**	**DQ2**	**Total**
Bufonidae	*Sclerophrys regularis* (Reuss, 1833)	4	0	4	3	0	0	0	0	5	6	0	0	22
Hyperoliidae	*Kassina senegalensis* (Dumeril and Bibron, 1841)	0	0	0	0	0	0	0	0	0	3	0	0	3
	Afrixalus vittiger (Peters, 1876)	0	0	0	0	0	0	1	0	0	0	0	0	1
Pipidae	*Xenopus tropicalis* (Gray, 1864)	1	3	0	0	0	2	0	0	0	0	0	0	6
	Xenopus fischbergi Evans et al. 2015	36	4	1	0	7	6	0	8	7	6	1	0	76
Pyxicephalidae	*Pyxicephalus* cf. *edulis* Peters,1854	0	0	0	0	0	0	0	0	2	0	0	0	2
Hoplobatrachidae	*Hoplobatrachus occipitalis* (Gunther, 1858)	22	8	1	0	3	4	0	4	5	5	5	3	60
Ranidae	*Amnirana galamensis* (Duméril and Bibron, 1841)	0	0	0	0	0	0	0	0	12	0	0	0	12
Ptychadenidae	*Ptychadena pumilio* (Boulenger, 1920)	1	0	0	0	0	0	0	0	0	5	3	0	9
Total No. of individuals		**64**	**15**	**6**	**3**	**10**	**12**	**1**	**12**	**31**	**25**	**9**	**3**	**191**
No. of species		**5**	**3**	**3**	**1**	**2**	**3**	**1**	**2**	**5**	**5**	**3**	**1**	
Shannon_*H'*		**0.99**	**1.01**	**0.87**	**0.00**	**0.61**	**1.01**	**0.00**	**0.64**	**1.47**	**1.58**	**0.94**	**0.00**	

One hundred and ninety-one (191) individual anurans were collected from seven families and nine species. This is an indication of low species composition when compared with similar studies in the south of Nigeria: Onadeko (2007) recorded 29 amphibian species; Onadeko and Rödel (2009) recorded 35 and 38 species in the three south-western states of Nigeria; Imasuen and Aisien (2012) recorded 24 species in Edo State, Nigeria. The difference observed may be attributed to the low humidity and type of vegetation cover in Zaria especially during the dry season. The species of anurans recorded in this study were recorded in similar studies by Greenbaum and Carr (2005) in Upper National Park, Guinea; Rödel et al. (2005) in forested parts of south western Ghana; Assemian et al. (2006) in Banco National Park, Cote d'Ivoire; Onadeko and Rödel (2009) in Lagos, Ogun and Oyo States; Imasuen and Aisien (2012) in Edo State; Aisien et al. (2015) in the Niger Delta. This is an indication that anurans are able to thrive in several vegetation types. *Xenopus fischbergi* recorded in this study is a newly described species by Evans et al. (2015). The high species richness and abundance observed at the URE, MFF and ZRE could be due to the availability of water all year round coupled with the availability of insects and other food sources. The high Shannon-Weiner diversity indices observed at ZRE and MFF could also be attributed to availability of water and food throughout the year.

The preponderance of anurans during the wet season was not significant ($p=0.33$) and this could be attributed to the fact that during the dry season anurans were restricted to water bodies. The number of females collected was higher in the wet season compared to the dry season although the difference was not significant ($p=0.45$). This could be attributed to the fact that anurans breed mainly during the rainy season when males tend to migrate in search of mates. Intensive surveys of anurans in other savanna zones of Nigeria are recommended.

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SUBMITTED BY:

EMMANUELA UCHECHI ANELE
Department of Zoology, Ahmadu Bello University, Zaria, Nigeria
Email: deciella@yahoo.com

ISHAYA HARUNA NOCK
Department of Zoology, Ahmadu Bello University, Zaria, Nigeria
Email: nockih@gmail.com

IBRAHIM MADU KATSALLAH GADZAMA
Department of Biology, Ahmadu Bello University, Zaria, Nigeria
Email: ibskatsallah@gmail.com

ABIODUN B. ONADEKO
Department of Zoology, University of Lagos, Nigeria
Email: onadeko2002@yahoo.com

MARTINS SIAKA OZEMOYA AISIEN
Department of Animal and Environmental Biology, University of Benin, Nigeria
Email: aisien@uniben.edu

ENVENOMATION BY THE MANY-HORNED ADDER
Bitis cornuta (Squamata: Serpentes)

A CASE REPORT WITH COMMENTS ON COAGULATION AND OTHER EFFECTS OF DWARF *Bitis* VENOMS

C. R. TILBURY & R. DEANS

INTRODUCTION

Although human victims have almost certainly occurred in the past, no envenomations from *Bitis cornuta* are recorded. Although it has a large distribution, this small viper is restricted to arid, rupicolous biomes in Western South Africa and Namibia where the human population is thinly dispersed. This tends to limit human/snake interactions.

Case Report:

Species: *Bitis cornuta* (Fig. 1)

Figure 1. *Bitis cornuta* Credit: C. Tilbury

The patient, a well-nourished 38-year old male, weight 94kg, was not on anti-coagulant therapy and had no history of liver disease, previous snake envenomation or other significant previous medical history.

The snake, a specimen approximately 40cm in total length, was being examined, when a single fang scratched and penetrated the skin over the dorsum of the middle finger of the left hand, followed by immediate minor discomfort and a warm sensation on digit. Swelling commenced within minutes. A small clot formed over the puncture wound with no oozing of blood. A sensation of 'light-headedness' was noted, and local pain only mild. By 20 minutes, the whole finger was swollen with discomfort at the base of the finger and the immediate area around the bite site was tinged blue.

Figure 2. Bite site with small clot and slight bluish discoloration at 20 minutes. Credit: R. Deans

By 40 minutes, the dorsum of the hand was noticeably swollen and the two adjacent fingers had also started to swell. By 70 minutes, swelling of the hand had progressed to the wrist and the skin was tender to touch.

Figure 3. Swelling of the hand and fingers at one hour. Credit: R. Deans

The sensation of light-headedness was persistent and not related to posture. By two hours, swelling had progressed to involve the distal forearm and pain noticeably more intense.

Two and a half hours after the bite, tenderness noticeable in the axilla and hand also very painful. T = 280 minutes, swelling noted to be no longer progressing, but onset of non-spasmodic epigastric discomfort with associated nausea.

Treatment involved moderate elevation of the arm, and a single dose of Tramahexal 50mg was taken for pain relief at T= 300minutes. At no time were there any other symptoms that might have been related to the central or peripheral nervous systems such as blurred vision, alterations in taste or smell, drooping eyelids, dysphagia, dysarthria, numbness around the lips, or sweating. Twenty four hours after the bite, swelling of the arm was noted to extend to the axilla, and epigastric discomfort (acidity) had resolved. By 48 hours swelling was notably reduced and pain levels also significantly down.

No subcutaneous bruising was noted anywhere in the arm and the bite site was unchanged with no discolouration or blister formation. Six days after the bite, when swelling and pain had already completely resolved, local itch and a recurrence of swelling of the finger was noted on awakening. This responded well to a short course of antihistamine and a non-steroidal anti-inflammatory. Laboratory tests done at nine and 34 hours after envenomation, and measurements of fixed points on both arms at 34 and 60 hours, are indicated in Table 1.

DISCUSSION

In summary, investigations showed the following: Urine Dipstix - a trace of haematuria confirmed on microscopy, mild elevation of the total leucocyte count, and a minor and temporary elevation of the prothrombin time (PT). The activated partial thromboplastin generation time (aPTT) was marginally over the upper limit of normal, and platelets were normal. In the absence of genetic syndromes, significant liver disease, malnutrition or other auto-immune conditions, the above laboratory abnormalities would be consistent

Table 1. Laboratory investigations and evolution of swelling over time

Lab results		
Lab Parameter	*9 Hours post bite*	*34 Hours post bite*
Total WBC (n/r 3.92-9.88)	10.1	
Platelets (n/r 150-450 x10^9)	252	
Prothrombin Time (PT) (n/r 7.3-10.3 sec)	10.9 sec	10.4
PT Control	10.2 sec	10.2
INR n/r 0.8-1.1	1.1	1
aPTT	26.3 sec	
aPTT control	26.0 sec	
Creatine Phosphokinase (CPK), (n/r 39-308 U/L)	120	
Urine dipstix blood	1+	trace
Urine urobilinogen	not elevated	not elevated
Urine protein	negative	negative
Urine microscopy	n/d	3rbc/hpf
Extent and resolution of oedema		
Site of measurement	*Left*	*Right*
Mid-forearm at T=34hrs	30.5cm	28cm
Mid-biceps at T=34hrs	35cm	34cm
Mid-forearm at T=60hrs	28cm	28cm
Mid-biceps at T=60hrs	34cm	34cm

with the presence of a low dose of a circulating anticoagulant.

Little is known of the venom constituents of *Bitis cornuta*. The earliest publication that examined the effects of *cornuta* venom was that of Christensen (1955). It was evident from his studies that far from the perception that it is a relatively harmless snake with a presumed low venom toxicity, *Bitis cornuta* has a rather potent venom.

Using rather crude but simple experiments, Christensen (1955) demonstrated that the venom contains approximately 31% 'solids' with a maximum dry venom yield of 0.087gm (average 0.045gm). In addition, the venom was found to have significant proteolytic (gelatinase) and renin-like activity. Of perhaps more significance is that the venom was shown to have both haemolytic and anticoagulant effects. In terms of its ability to inhibit the clotting of recalicified plasma, it was more than twice as potent as *Bitis arietans* and *B. caudalis*.

Part of the anticoagulant effect was attributed to its fibrinolytic properties as evidenced by digestion of carmine-stained fibrin.

While the venom of *Bitis caudalis* is known to have potent PLA_2 anticoagulants (Zingali 2006), of all the documented bites from Southern African dwarf adders, only a single case report on *Bitis atropos* envenomation (Hurwitz & Hull 1971) has recorded marginal aberrations in prothrombin time and fibrinogen levels.

The venoms of the larger species of *Bitis* (*arietans*, *gabonica*, *rhinoceros* and *parviocular*) are known to cause clinically significant platelet aggregation with thrombocytopenia and other coagulopathic effects in bite victims.

More recently the venoms of 14 of the 18 described *Bitis* species (excluding *B. harennae, heraldica, inornata & albanica*) were analysed for coagulation effects on human plasma. *B. worthingtoni* (in keeping with its unique phylogenetic position within *Bitis*), was shown to have a procoagulant venom, while all other species of *Bitis* had anticoagulant venoms. *B. atropos* and *B. cornuta* (Luderitz) venom exhibited fibrinogenolytic effects by cleaving fibrinogen in a destructive non-clotting manner. The venoms of *B. cornuta, atropos, xeropaga* and *caudalis* also inhibited prothrombinase complex formation. No direct effect of venom on the clotting of fibrinogen was observed in the above species, but the venoms of *Bitis schneideri, peringuei* and *caudalis* (from Namaqualand and Musina) were shown to target fibrinogen in a pseudo-procoagulant manner, causing unstable and weak fibrin clots (Youngman et al. 2019).

The venoms of both *Bitis caudalis* and *Bitis atropos* contain significant concentrations of potent PLA_2 pre-synaptic neurotoxins (Lee et al. 1979, 1982; Van Zyl and Müller 1997) and unpublished anecdotal accounts of envenomation by *Bitis xeropaga* and *Bitis peringuey* suggest a significant neurotoxic component in the symptomatology (Müller et

al. 2012). Several bites from *Bitis schneideri* have been recorded (Hurrell 1981; Maritz 2008) and bites from this species would appear to be relatively innocuous.

Well-documented case histories for 'rare envenomations' are few and far between and there are many venomous species of snakes for which there are no published case reports at all.

While clinical signs are valuable, laboratory data also provide valuable insights into the biochemical effects on human physiology and should be considered following any unusual bite.

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SUBMITTED BY:

COLIN R. TILBURY
Dept of Botany & Zoology, University of Stellenbosch, P.O. Box 347, Nottingham Road, 3280, KZN
Email: sacoltil@mweb.co.za

ROBERT DEANS
P.O. Box 101, Warner Beach, 4140, KZN
Email: robwdeans@gmail.com

Pythonodipsas carinata (Günther, 1868)
Western Keeled Snake
REPRODUCTION

R. DEANS

Pythonodipsas carinata is a poorly known snake with little information on reproduction available. These snakes are known from rocky desert areas in southern Namibia, extending northward into southern Angola (Marais 2004). Branch et al. (1997) reported neonates of 160 mm from the PE Museum (PEM R8325) and the State Museum Windhoek (SWM 2309) providing an estimate of hatchling size, and the date of collection (1 June) for one of these provides insights into breeding times for the species. Branch (1998) and Marais (2004) both suggested the species is probably oviparous.

Prof. W. R. Branch had a particular interest in the species and publicly sought answers on all aspects of its reproduction. It is unfortunate those questions would only be answered soon after his passing.

Cimatti (2004) reported egg-laying by a captive female *Pythonodipsas carinata* at the Living Desert Snake Park in Swakopmund, this appears to represent the first confirmation of Branch et al' hypothesis. These eggs however did not hatch.

On 24 December 2019 a captive pair of *Pythonodipsas carinata* (Female total length [TL]: 710mm , Male TL: 470 mm) were left together overnight in an enclosure.

Upon inspection at 08h00 the following morning it was found that the two snakes were mating (Fig. 1).

Fig 1. Mating pair of *Pythonodipsas carinata*

They remained coupled until final inspection at around 21h00 on the same day indicating copulation lasted at least 13 hours. The male was returned to his enclosure the following morning.

The female shed her skin on 05 February 2020 and laid 16 eggs on 18 February 2020. The eggs were laid in a clump in the corner of the laying box and measured on average 14x24mm (Fig. 2).

Fig. 2: Clump of eggs in laying box.

Fig. 3: Hatchling emerging from egg. (Photo J. Marais)

The clump of eggs was placed into an incubator set to 28° C. The first hatchling emerged unassisted on 8 May 2020 (Fig. 3), indicating an incubation period of 80 days, with 14 hatchlings emerging over the following three days (Fig. 4). The hatchlings averaged a total length of 165mm. Sex ratio: 7 males, 8 females.

This note reports the first record of reproduction in *Pythonodipsas carinata*

Fig. 4. One day old hatchling

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SUBMITTED BY:

ROB DEANS
P.O. Box 101, Warner Beach, 4140, KwaZulu-Natal, South Africa.
Email: robwdeans@gmail.com

CORDYLIDAE
Chamaesaura macrolepis (Cope 1862)
Large Scale Grass Lizard

P.R. JORDAAN

Lizards of the genus *Chamaesaura* Schneider 1801 have been observed fleeing from and succumbing to the effects of fire (Bruton and Haacke 1980; De Villier and De Villiers 2004; Du Toit 2004). High mortalities have also resulted from vehicular trauma when areas close to or adjacent to roads are burnt, prompting large numbers of *Chamaesaura* onto the surfaces of roads during escape attempts from the fire front (Coombs 2015). Such a fire driven roadside mortality event was observed on two stretches of tar road, each 2 km in length, along the newly constructed highway between Maputo City, Mozambique and the Kosi Bay/ Farazela border post with South Africa south of the Maputo Special Reserve traffic gate.

The fire which prompted this mortality event was noticed on 24 July 2019, when secondary grassland and thicket vegetation on the western side of the tar road was burned. Mortalities were observed the next morning (25 July) soon after the fire reached the western shoulder of the two surveyed stretches of road. In total 37 *Chamaesaura* mortalities were recorded with 34 specimens (92%) having experienced some degree of vehicular trauma, but no external thermal damage was evident.

Three specimens located on the western shoulder of the road exhibited no external damage, from vehicular traffic or from the fire, and were identified as *Chamaesaura macrolepis* (Cope 1862) using Branch (1998). Photos of one of these records have been uploaded to the Animal Demographic Unit Virtual Museum (nttp://vmus.adu.org.za) and catalogued under ReptileMap No. 174344 (location: 26°39'25.30"S 32°46'52.22"E). The three undamaged individuals were not deposited in a museum collection as they were used in a histopathology study which largely consumed the specimens.

Despite suspicions that this species occurs in southern Mozambique (Bates 2014), this is the first record confirming its presence. Bates (2014) considered *C. macrolepis* to be Near Threatened because of high frequency fire regimes affecting recolonization, with over grazing, agricultural development and forestry negatively impacting the preferred grassland habitat of this species. These threats are present in the extreme south of Mozambique where these specimens were observed, although relatively large sections of habitat are formally protected in Maputo Special Reserve. High fire frequencies are however the norm even within these protected areas because of community activities.

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SUBMITTED BY:

PHILIPPUS RUDOLPH JORDAAN
Lubombo Transfrontier Conservation Area Scientific Technician: Maputo Special Reserve and Tembe Elephant Park.
Email: jordaanpr@gmail.com

GEOGRAPHICAL DISTRIBUTIONS

PYXICEPHALIDAE
Strongylopus grayii (Smith, 1849)
Clicking Stream Frog in Namibia

A. CHANNING

When Herrmann and Branch (2013) reviewed the Namibian herpetology, they listed 50 species of amphibians from the country, with the possibility of a few more, which may extend from the Richtersveld of South Africa into southern Namibia. Of these, Poynton (1964) had listed six species occurring in southern Namibia. While Griffin and Channing (1991) and Channing and Griffin (1991) only listed nine species occurring in the Fish River system, seasonal wetlands in the southern third of the country, and ephemeral eastward flowing rivers, with *Sclerophrys gutturalis* expected to extend northwards from the Gariep River system.

There are many records for *Amietia poyntoni* in the Naukluft Mountains and along the Fish River. Channing and Griffin (1993) remarked that the Fish River downstream of the Hardap Dam near Mariental is much drier than before the dam was completed in 1963. Poynton (1999) listed 11 species from his South West Arid region, which includes southern Namibia and extends into northern South Africa. Amphibians known to occur in southern Namibia are: *Poyntonophrynus hoeschi, Vandijkophrynus robinsoni, Kassina senegalensis, Breviceps macrops, Phrynomantis annectens, Xenopus laevis, Amietia poyntoni, Cacosternum, boettgeri, Cacosternum namaquense, Tomopterna ahli, and Tomopterna tandyi* (Channing and Baptista 2013, Channing and Rödel 2019, Channing and Becker 2019).

The Clicking Stream Frog *Strongylopus grayii* (Smith, 1849) is widespread in South Africa, but presently not known to occur in Namibia (Du Preez & Carruthers 2017; Channing & Rödel 2019). There was one record of the species from Mariental (Poynton 1964; Mertens 1971, Channing 1991), which was based on a tadpole lot housed in the McGregor Museum in Kimberley. An examination of the tadpoles showed that they were *Amietia poyntoni*, probably collected in the Fish River at Mariental.

The Naukluft Mountains are separated by approximately 600 km from the confirmed nearest *Strongylopus grayii* habitat along the Gariep River (200 km Naukluft–Mariental; 400 km Mariental–Gariep River). The shortest path directly south from the Naukluft Mountains is very arid, fringing the Namib Desert, and unlikely to be a route for dispersal of *Strongylopus.*

The Namib-Naukluft National Park was proclaimed in August 1979, joining the Naukluft Mountain Zebra Park and the Namib Desert Park, with the addition of Diamond Area number 2 and part of Diamond Area

number 1 in 1986. As part of a survey, I accompanied Dr Jan Jurgens of Stellenbosch University to join a team from Namibian Nature Conservation in the Naukluft Park. We flew in to Zais on Tuesday 6 February 1979, and returned to Stellenbosch on Thursday 8 February. The farm Lemoenputs is on the west of the Naukluft Mountains, and is the source of the Tsams River, which occasionally flows west to Tsams Vlei (Fig. 1). At the farm Lemoenputs (24.2666°S, 16.05°E), on 6 February, I recorded *Strongylopus grayii* calling from the edge of a perrenial stream (Fig. 2), using a Uher CR-210 cassette recorder and directional microphone. Calls of at least ten different males were recorded at one spot. The calls of three males can be discerned on the spectrogram (Fig. 3) produced by Raven Pro 1.6. The clicking calls of ten males show a mean dominant frequency of 2628 Hz, with a range of 2583–3014 Hz. The following night was spent at the main Naukluft campsite, where *Poyntonophrynus hoeschi* was calling and recorded, but no *Strongylopus* were present.

Subsequent attempts (see below) over the last decade have failed to re-establish the presence of this species. The Naukluft River flooded on 20 January 2006. During the evening of 23 January 2006, I recorded *Poyntonophrynus hoeschi* breeding in pools in the stream running past the campsite (24.2651°S, 16.2391°E) (Fig. 1), with *Tomopterna ahli* and *Amietia poyntoni* calling. No *Strongylopus* were present.

At the Naukluft campsite on 13 November 2007, no *Strongylopus* were present, but *Xenopus laevis* was found in the river. *Amietia poyntoni* was present and calling. At Tsams Ost (24.2488°S, 16.1046°E) on 14 November 2007, many *Amietia poyntoni* were found. No *Strongylopus* were seen or heard. Tsams Ost is on the same drainage as Lemoenputs. *Amietia* and *Strongylopus* occupy similar habitats and would be expected to occur together. The farm Büllsport is east of the Naukluft Mountains. It has a campsite at an Old Police Post (24.1422°S, 16.3447°E). On 18 November 2014, Nick Telford and I found *Amietia* in pools in the stream running east from the mountains, but no *Strongylopus.* The Naukluft hiking trails pass many pools and streams. Francois S Becker (pers comm) hiked the trails in 2007, 2015 and 2017, recording many *Amietia* but finding no *Strongylopus.*

Two questions arise: How did the stream frogs reach the Naukluft Mountains? And are they still present? Possible answers to the first question include movement up the Fish River and its tributaries, moving across the catchment divide to the Tsauchab drainage and its tributaries in the Naukluft Mountains. Alternatively, it is possible that the frogs were introduced to the permanent pools of the Naukluft system.

The Tsams River catchment is very small, originating in the western Naukluft Mountains, and running west to Tsams Vlei

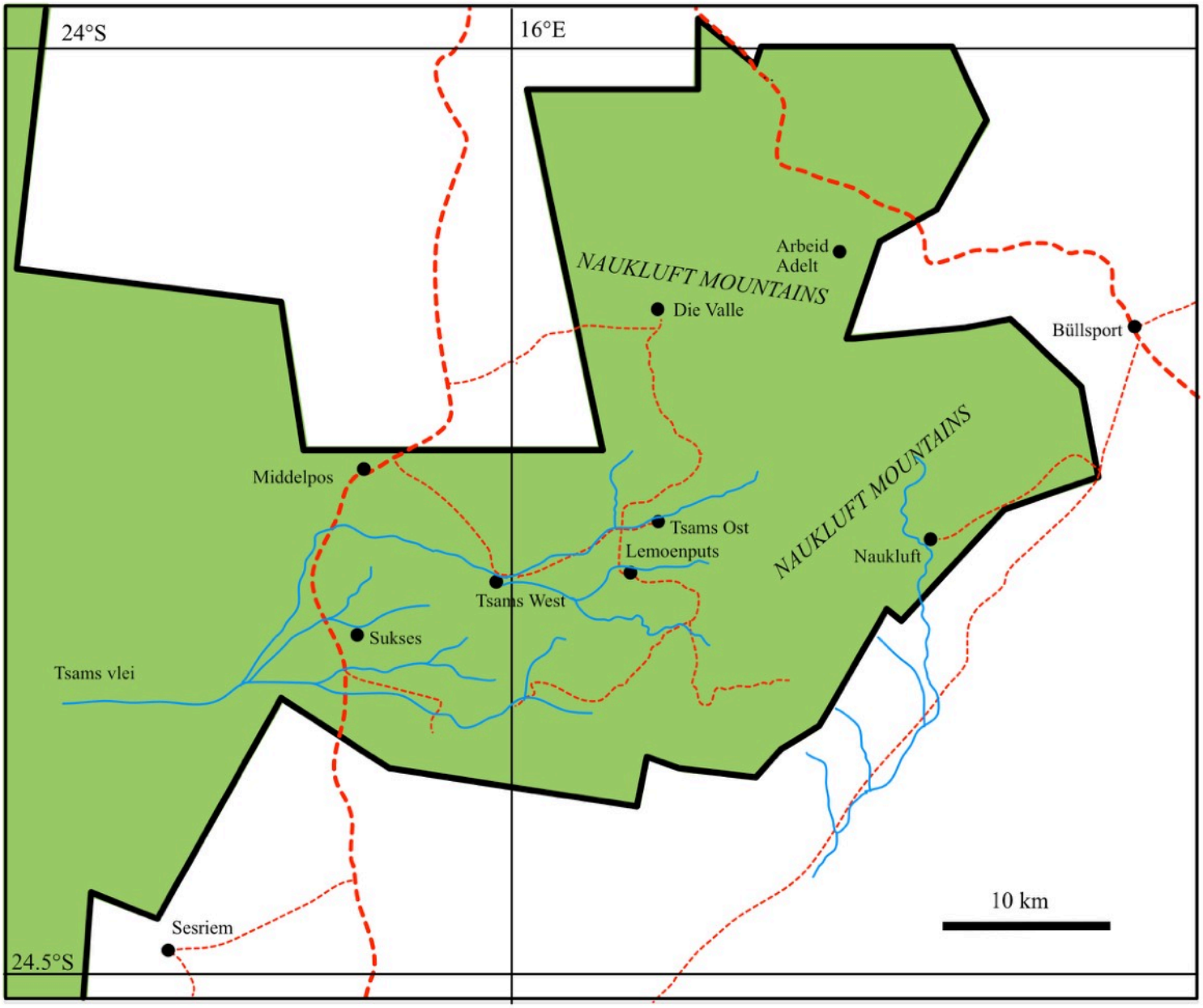

Figure 1. Map showing localities mentioned in the Namib-Naukluft National Park, Namibia. Red dashed lines are roads, part of Namib-Naukluft National Park shown in green, seasonal streams shown in blue.

at the edge of the Namib Desert dunes. It is situated between the major Tsondab and Tsauchab catchments (running into the Tsondab Vlei and Sossus Vlei respectively) (Strohbach 2008), adjacent to the Fish River catchment which drains into the Gariep River on the southern border of Namibia. The pools of the eastern Naukluft Mountains drain into the Tsauchab River, with a gap of about 800 m between streams of the Naukluft and Tsams drainages (Topographical sheet 2416 Mariental, 1977). The Fish River catchment is separated by less than 800 m from tributaries of the Tsauchab catchment, on the farm Harughas 11 (Topographical sheet 2416 Mariental, 1977). There are many springs in the catchment which could provide suitable habitat for *Strongylopus* and *Amietia* between wet intervals when they could move along the drainages. The Naukluft River is a tributary of the Tsauchab, with many permanent pools. It runs past the main campsite on the eastern side of the Naukluft Mountains (Fig. 1).

There is anecdotal evidence that trout were introduced on the farm Naukluft in the 1950's (Mike Griffin, pers. comm.), and if this is true, frogs might have been brought along, either by accident, or as a food source. Trout were bred from about 1894 in Jonkershoek, outside Stellenbosch (Stander et al. 2011) and it is not unreasonable that fingerlings may have been procured from there. *Strongylopus grayii* are very common in the Stellenbosch area. The lack of any other

Figure 2. Stream on the farm Lemoenputs, now incorporated in the Namib-Naukluft National Park.

confirmed records of *Strongylopus* from southern Namibia, including the Fish River, the Hardap Dam and Hardap Irrigation Scheme near Mariental, may reflect a lack of work by herpetologists, or suggests that the frogs did not migrate to the Naukluft Mountains, but were transported there. An introduction is further supported as *Strongylopus grayii* is only known from a single locality, while *Amietia* is widespread and common on the Naukluft Mountains.

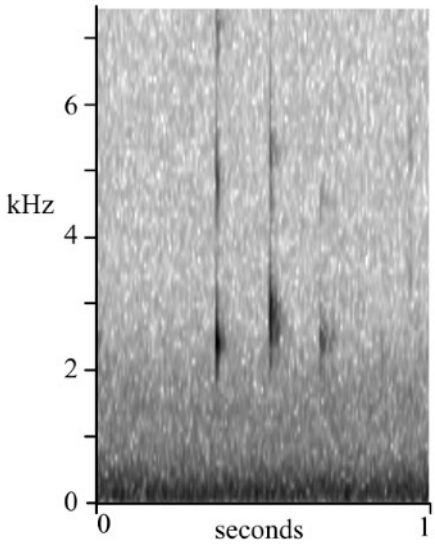

Figure 3. Sound spectrogram of the calls of three males of *Strongylopus grayii*, recorded at Lemoenputs, 6 February 1979. X- axis is time in seconds, y-axis is frequency in kHz.

Additional fieldwork is required. A visit to Lemoenputs after the rains, when there is water in the Tsams River, should easily cast more light on this problem. The clicking calls are easy to identify and are audible from a distance.

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SUBMITTED BY:

ALAN CHANNING
Unit for Environmental Sciences and Management, North-West University, Potchefstroom, 2520, South Africa.
Email: amietia2@gmail.com

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

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).

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INSTRUCTIONS TO AUTHORS

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 Keywords 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

English common name (using Bill Branch's Field Guide to Snakes and Other Reptiles of Southern Africa, third edition, 1998, for reptiles; and Du Preez & Carruthers' A Complete Guide to the Frogs of Southern Africa, 2009, for amphibians as far as possible).

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.

HERPS MAKING HEADLINES

This section features the latest research and news relating to African herpetology, with the intent of making the AHN readership more aware of some of the cutting-edge research, discoveries and on-the-ground work being done both locally and abroad on African herps.
A standard format is to be used, as follows:
TITLE (bold, centred, upper case)
AUTHOR(S) (initials and surname, bold, centred) Original text [left aligned]
Study citation (italics), if applicable.

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)

TITLE (bold, centred, upper case)

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/

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INSTRUCTIONS TO AUTHORS

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 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).

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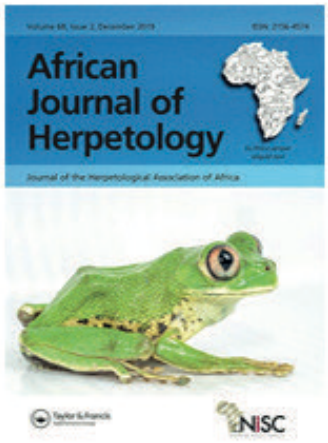

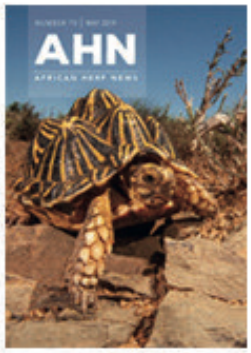

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IMPORTANT TO REMEMBER

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.