NUMBER 74 | AUGUST 2020

AHN

AFRICAN HERP NEWS

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.

COVER PHOTOGRAPH:
Rinkhals *(Hemachatus haemachatus)*
Photograph by: Luke Kemp, 3rd place winner of the HAA photographic competition

COMMITTEE OF THE HAA

AHN CONTENTS

AHN CONTENTS

AHN EDITORIAL

Membership. That is the focus of this Editorial and, in many ways, the focus of this issue. A solid and engaged membership base is essential to every association but attracting and retaining members continues to be one of the main challenges faced by organisations all over the world, including the HAA. This is largely because in the information age we are in, digital spaces and online communities are replacing the need for membership, offering access to valuable information and networking opportunities without having to pay annual fees. Because of this, associations, like the HAA, need to remain current by being innovative and open to understanding the needs and wants of its members. Gone are the days when the key benefits of an HAA membership are access to the newsletter and journal; yet how many of you truly know what benefits your membership offers? To make this clear to everyone, we now provide a list of member benefits at the end of the newsletter (see page ##). However, other key benefits not mentioned on that list is the opportunity to get involved in the association's committees, inner workings and activities, as well as having access to fellow members. These benefits can only be acquired if you reach out and tap into them. Get involved!

One way to get involved is to realise that as members your opinions do matter and we (the HAA Executive Committee) will strive to do our best to listen and assist you every way we can. Some examples of this are provided in a communication by the Executive Committee (pages 6-7 of this issue). Additionally, many of you recently completed a Member Survey, the results of which are synthesized on pages 8-18. Similar surveys will be sent out in future, so I encourage you to share your thoughts and impressions, so that the HAA can better serve you.

From a newsletter standpoint, I have tried to assist with connecting members through sections such as Tomorrow's Herpetologists Today. This section gives you an opportunity to meet young herpetologists in Africa. But many of you might also like to hear from the experts – herpetologists working in various fields throughout the continent. You might want to know: What exactly does their work entail? How did they get there? What are the challenges and benefits of their work? So, as of AHN75, the newsletter will feature a new section entitled *Tracks in the Sand: Following the journeys of professional herpetologists.*

It is up to all of us to keep this association going and growing.

Jessica da Silva
Editor

AHN

FROM THE COMMITTEE

Since the founding of the Herpetological Association of Africa (HAA) in the 1960s, the society has grown from a small group of close colleagues that kept up to date on interesting findings by periodically publishing a brief newsletter and small journal, to a much larger international society with a broad membership and glossy publications that are peer-reviewed to international standards. Our current membership includes professionals, academics, enthusiasts, students, interns and young hopeful herpetologists from across Africa, as well as from four other continents. In keeping up with the times, the HAA has more recently offered student support to attend the HAA conference, student research funding and funding for established members of the society as part of our transformation agenda. Our conferences have grown from that small group of colleagues who met periodically to a broader group that includes both long-time colleagues as well as newcomers, usually students and interns. Many newcomers are still finding their feet in terms of a career, and some stay with the society while others leave for different careers. Because our membership base has broadened in scope and number, and we are committed to ensure that all members feel welcome, in 2019 we adopted a Code of Conduct that plainly states the society's ethos of non-discrimination and fair treatment.

We recently followed up with a membership survey (see pages 8–19 in this issue) in order to get a better grip on what members expect from the HAA, and whether they are currently satisfied with the society. In general, the responses were positive suggesting that the average member is happy with the current direction of the society and is supportive of our transformation over the last decade. Indeed, both the executive committee and conferences have been enriched with broader demographic representation over the last decade, and all members of the executive now have specific portfolios which compels the committee members to be proactive on matters. However, we recognise there is still work to do. Firstly, our representation from other African countries has been lacking. To address this, we recently made a concerted effort to bring in new members to the Editorial Board and team of Editorial Associates for the African Journal of Herpetology (AJH), and we hope this will improve submissions to our journal and newsletter from researchers across Africa. To improve our representation across Africa, we have formed a group of 'regional representatives' that will liaise with the executive committee with the aim of gaining better representation across the continent and the Indian Ocean Islands in our membership, but also to promote submissions to our journal and newsletter. We recognise there is a wealth of studies being carried out across Africa that are submitted to other herpetological outlets and we wish to draw those in to our own publications.

Despite these measures, we recognise that some members (or potential members) might still fall through the cracks. By no means is the society aiming to be exclusionary or unsupportive, in fact, the aim is quite the opposite. For example, the last conference (Cape St. Francis, 2019) had a number of ice-breaker activities that were meant to make the younger attendees feel comfortable, specifically because we appreciate how difficult it is to break in to a new field of work. Recent conferences include 'speed talks' where students can present their work without the pressure of a full oral presentation. We also have a competition in the AJH for the best student paper. However, there remain some challenges, as indicated by our membership survey and by the opinion piece (see pages 8–19, 40–43 this issue). A few of our members have felt unwelcome or treated unfairly, and as individuals we should not disregard this. As the HAA, we will continue to work toward being inclusive and supportive for all members.

Many of our transformative measures have been mentioned here, but the executive committee does not have all the answers. To better improve our understanding of the issues that members might be facing, we now provide an outlet for feedback on our website, and these comments will directly reach the committee. If you wish to provide anonymous comments for us, please visit the site and use this option. We particularly welcome suggestions on how to ensure that the HAA is inclusive or your own observations regarding this issue. Although we are striving to move forward, ultimately this comes down to introspection and behavioural reformation at the individual level.

Please note that an opinion piece regarding these and other issues (pages 40–43) follows this commentary and was unsolicited by the HAA. Although we take this opinion piece seriously, the HAA committee was not involved in the conceptualisation or writing of the piece.

THE HERPETOLOGICAL ASSOCIATION OF AFRICA'S MEMBERSHIP SATISFACTION SURVEY REPORT

As part of an ongoing process of transformation within the Herpetological Association of Africa (HAA), the HAA committee undertook a membership satisfaction survey between the 27th April and the 18th May 2020. The overall aim of the survey was to gauge members' current perception of the Association and to gain a deeper understanding of what members expect from their membership. The survey responses will be used by the committee to develop action plans tailored to our members preferences and will be used as a baseline for future reference.

METHODOLOGY

The HAA membership satisfaction survey was created in Google Forms with eight main sections: membership benefits, student involvement, contacting members, social media, conferences, the association overall, renewal and discrimination. In addition to this, there was a section at the end of the survey for respondents to add anything else that they wanted to mention about their membership or the association. Prior to these eight main sections were questions relating to respondent demographics including how long they had been a member, whether they were an African or Overseas member and their occupation. Only those who selected students in the occupation section were directed to the student involvement questions. Likewise only respondents who had attended the 2019 Cape St. Francis conference were directed to the conference questions, only those who follow our association on Facebook were directed to answer questions relating to our social media content and only those who stated that they felt discriminated against were directed to further questions relating to that topic. Within each section, questions were asked to gauge how the respondents felt about particular aspects of their membership. Questions ranged between multiple choice, single choice, Likert-scales and text options. Exact questions asked within the survey can be found on our website. The survey was sent out to all of our members (187) via email on the 27th April 2020. A reminder email was sent out on the 12th May 2020 and the survey closed on the 18th May 2020. All responses were anonymous.

RESULTS

OVERVIEW OF RESPONSES

Of all HAA members, 36.9% (n=69) responded to the survey. Of these, over half (62.3%, n=43) were African members and most respondents had been members for five years or more (58%, n=40) (Fig. 1). Participants came from a wide variety of occupational backgrounds although the two sectors with the largest responses were those from academic researchers based at an institution (31.9%, n=22) and students (26.1%, n=18) (Fig. 2).

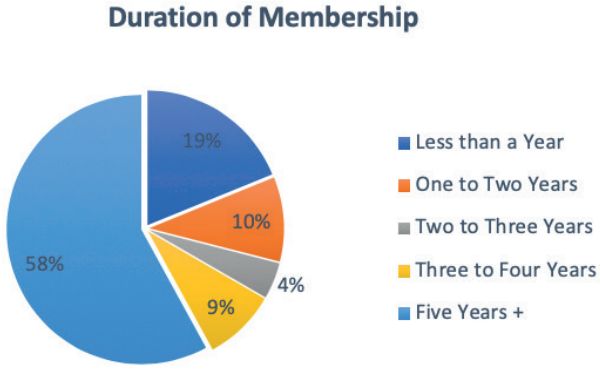


Figure 1. Survey responses by all participants on their duration of membership (n=69).

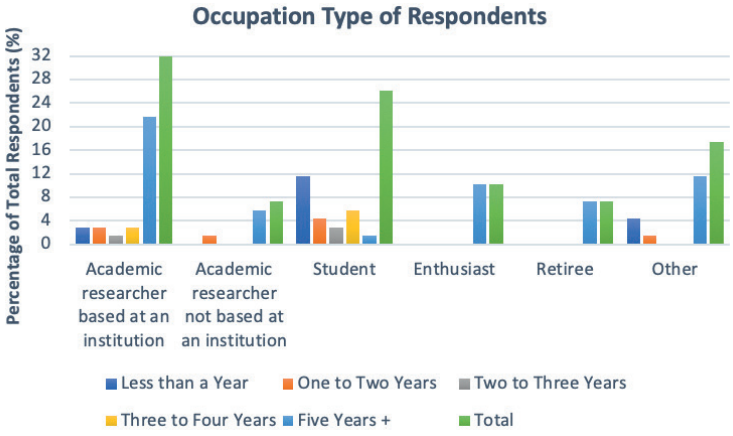


Figure 2. Survey responses on the occupation types of the participants split by duration of membership (n=69).

MEMBERSHIP BENEFITS

The majority of participants were happy with the member benefits that they receive from the association with 85.5% (n=59) selecting positive responses (Fig. 3). Of all member benefits, the two which respondents considered the most valuable were African Herp News (88.4%, n=61) and online access to African Journal of Herpetology (65.2%, n=45) (Fig. 4). Conversely, the benefit that most participants felt was the least valuable was herpetological content shared on our social media platform (26.1%, n=18) (Fig. 5).

The majority of participants stated that they read the issues of African Herp News (89.9%, n=62) and African Journal of Herpetology (81.2%, n=56) (Fig. 5). Participants were also asked if there was any additional content that they would like to see included in the African Herp News. Of the suggested content, the most common were as follows:

- Field trip reports
- Identification tips
- Summary of recently published contributions to African herpetology

Participants were also asked if there were any additional member benefits that they would like to see the HAA implement. Most respondents stated that there was not, yet some of the ideas were as follows:

- Webinars
- That the HAA conference be SACNASP registered

The final question members were asked in relation to member benefits was whether they had any recommendations on how the HAA could improve the current benefits. Three main issues were raised:

- Online access to AJH needs to be easier – some members are having constant issues
- Overseas payments need to be easier
- That the newsletter content be more accessible and easily searchable

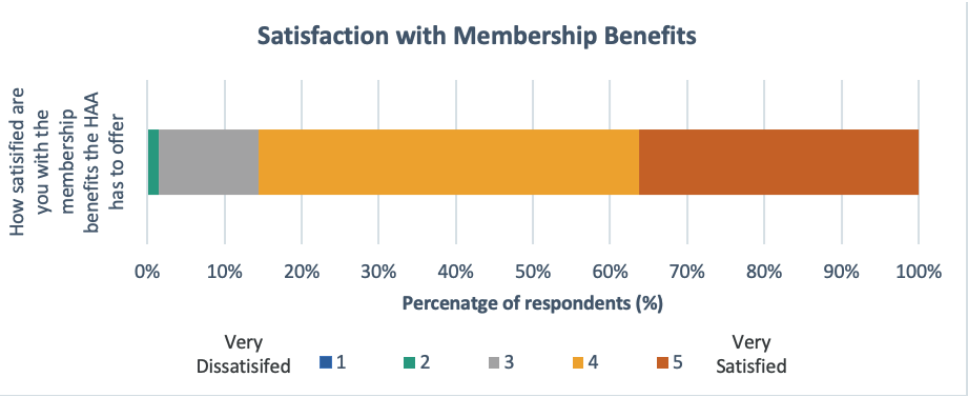


Figure 3. Survey responses by all participants on their satisfaction with the membership benefits of the HAA (n=69). Respondents answered the questions on a five-level Likert scale from one (very dissatisfied) to 5 (very satisfied).

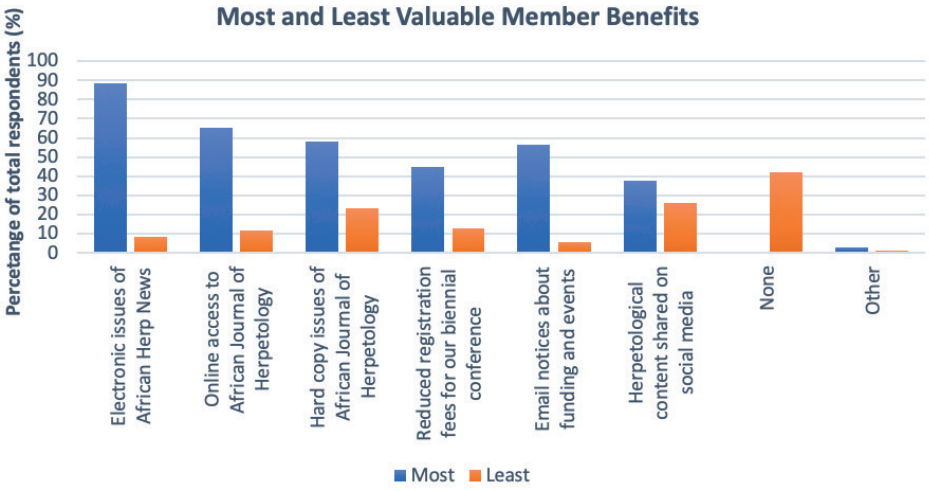


Figure 4. Survey responses by all participants on the membership benefits they find the most and least beneficial (n=69). Respondents could select more than one option.

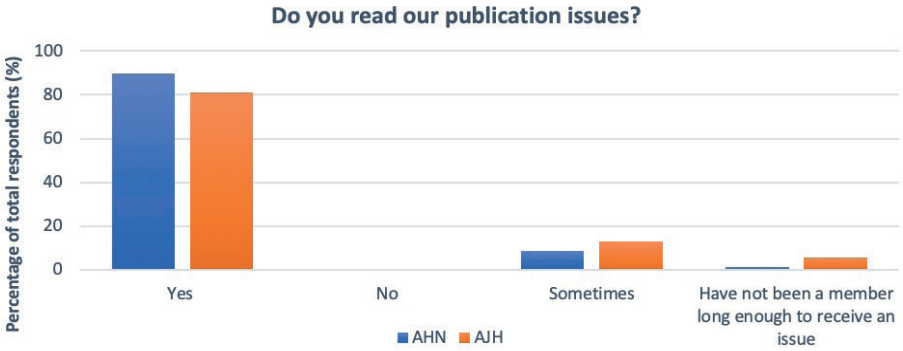


Figure 5. Survey responses by all participants on whether they read the issues of the HAA's two publications: African Herp News (AHN) and African Journal of Herpetology (AJH) (n=69).

STUDENT INVOLVEMENT

Overall, student respondents (26.1%, n=18) felt that the HAA had provided them with knowledge-based resources but to a lesser extent had increased their academic interaction with the herpetological community (Fig. 6). Student members were also asked what they would like the HAA to implement in order to increase student involvement. Of the points raised, the most common were as follows:

- Cheaper conference fees
- Webinars
- Training workshops
- More interaction with academics
- More information available on "what's next" for those who wish to continue in herpetology

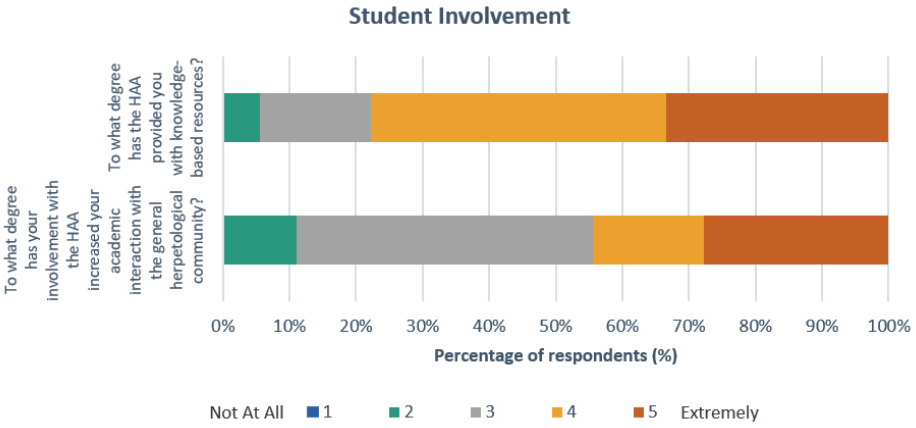


Figure 6. Survey responses by student members on how the association has aided their involvement in the herpetological community (n=18). Respondents answered the questions on a five-level Likert scale ranging from one (not at all) to five (extremely).

CONTACTING MEMBERS

The majority of respondents prefer to hear from the association via email (71%, n=49), with the remaining 29% (n=20) stating that they prefer for communications to be broadcasted by both email and social media. When asked about the frequency of email contact from the association, most participants were happy with the current levels (69.6%, n=48) (Fig. 7). The remaining respondents were mixed between feeling that they are emailed a bit too much and that they could hear from us a bit more often (Fig. 7). When asked whether there was any additional content that participants would like to see shared via email, the most common ideas were as follows:

- Funding and research opportunities
- Jobs
- Workshops and courses

In terms of our website, participants had most commonly accessed the site within the last six months (34.8%, n=24) or within the last month (27.5%, n=19). Of the respondents who had accessed the website, the majority were satisfied with its content (Fig. 8).

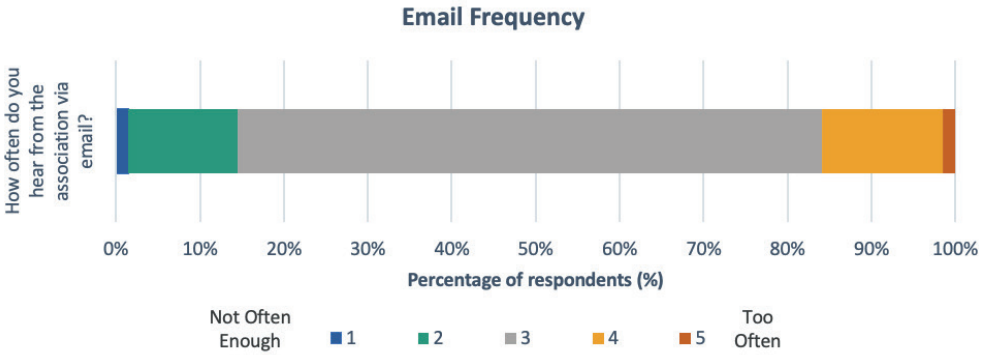


Figure 7. Survey responses by all participants on the frequency of email contact (n=69). Respondents answered the questions on a five-level Likert scale ranging from one (not often enough) to five (too often).

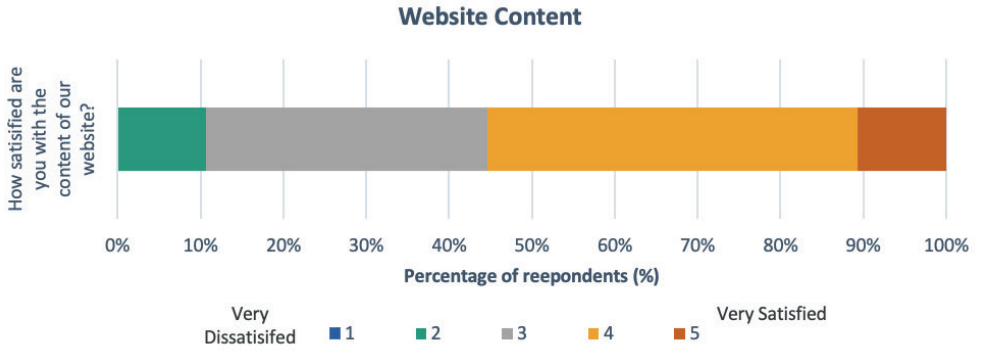


Figure 8. Survey responses by participants who have used the website on how satisfied they are with its content (n=56). Respondents answered the questions on a five-level Likert scale ranging from one (very dissatisfied) to five (very satisfied).

SOCIAL MEDIA

Of the respondents, 50.7% (n=35) follow the Association on Facebook, whilst 4.8% (n=4) were not aware that we have a Facebook page. Of those that do follow the Association, 48.6% (n= 17) were satisfied with the content (Fig. 9). When asked what additional content participants would like to see on the associations Facebook page the most common responses were as follows:

- Job vacancies
- More publicity for members, including posts by members
- More frequent posts

Several respondents stated that they would like to see the Association open up accounts on different platforms with 41.9% (n=13) requesting an Instagram account, 25.8% (n=11) Twitter and 22.6% (n=7) LinkedIn. The remaining 35.5% (n=11) did not want to see the association on any other social media platform.

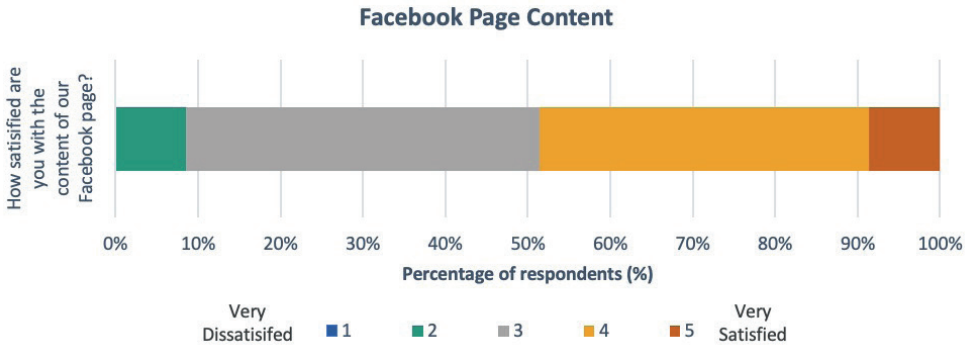


Figure 9. Survey responses by all participants on how satisfied they are with the content of the HAA Facebook page (n=35). Respondents answered the questions on a five-level Likert scale ranging from one (very dissatisfied) to five (very satisfied).

CONFERENCES

Just under half of the survey respondents had attended the 2019 conference in Cape St Francis (47.8%, n=33). Of those that had attended, 34.4% (n=11) had stated that this was their first HAA conference. Out of the last three conferences, the 2019 conference

was the one they enjoyed the most for 25% (n=8). Nearly all of respondents felt that they were satisfied with the conference (93.9%, n=31) with the remaining 6.1% (n=2) somewhat satisfied. When asked what they enjoyed the most about the 2019 conference, the most common responses were as follows:

- The sense of community and networking
- Icebreakers
- Presentations

When asked what they enjoyed the least, the most common responses were as follows:

- Costs
- Venue (i.e location)
- Excessive conference bag contents

The last question in relation to the conference asked respondents what they would like to be repeated or done differently. Some of the responses were as follows:

- Keep icebreakers
- Photography competition split based on camera budget
- Make the conference bag optional
- More skills workshops
- Lower registration fees

THE ASSOCIATION OVERALL

The majority of respondents were satisfied with the Association as a whole (86.9%, n=60), with no participants reporting that they were not satisfied (Fig. 10). The cost of membership was generally seen as satisfactory (Fig. 10). In addition to this, 10.1% (n=7) stated that they were dissatisfied with the renewal/joining process (Fig. 10). When asked how satisfied members were with how the association addressed their concerns, 24 respondents stated that this was not applicable. Of the remaining 45 participants, 62.2% (n=28) were very satisfied, 28.9% (n=13) were somewhat satisfied and 8.9% (n=4) were neither satisfied nor dissatisfied. When asked if the respondents were likely to recommend the association to an appropriate friend/colleague, the majority of participants stated that

they were likely to do so (89.9%, n=62).

When asked how the association could improve any issues relating to the association as a whole, cost of membership, the renewal/joining process or addressing concerns, the most common responses were as follows:

- Platform to provide feedback be introduced
- To make overseas payments easier

The most common reasons that the respondents had become members were to stay up to date with information regarding herpetology in Africa (71%, n=49) and the subscriptions to the journal and newsletter (69.6%, n=48).

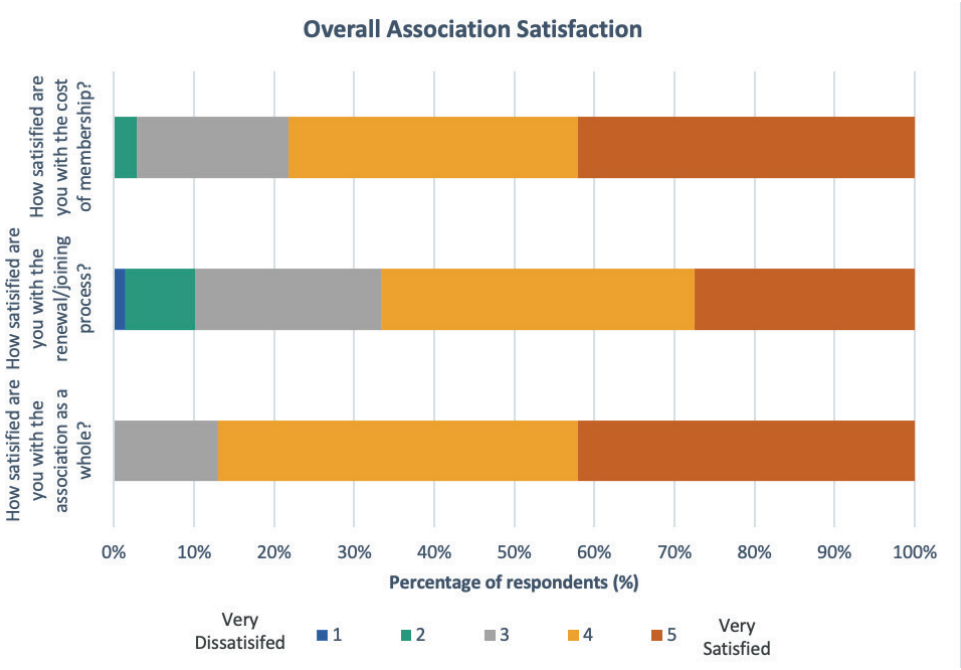


Figure 10. Survey responses by all participants on how satisfied they are with the association as a whole, the renewal/joining process and cost of membership (n=69). Respondents answered the questions on a five-level Likert scale ranging from one (very dissatisfied) to five (very satisfied).

DISCRIMINATION

Three percent (n=2) of all respondents felt that they have been discriminated or treated unfairly by a member of the association in the past, with an additional participant mentioning that they had previously felt unwelcome at a conference in a separate comment. Of these responses, none were attributed to race, gender, sexual orientation or religion but instead were for other reasons which can be defined in a broad category of social exclusion. Of these two respondents, one suggested that they do not think the HAA is currently well equipped to deal with issues of discriminatory behaviour whilst the other selected 'maybe'.

RENEWAL

The majority of participants stated that they are likely to renew their membership with the association (94.2%, n=65), whilst 4.3% (n=3) are unsure and 1.4% (n=1) are not likely to renew. Most respondents stated that they will be likely to choose the three-year membership option (79.7%, n=55) with the remaining 20.3% (n=14) likely to select the one-year option. Of all respondents, 69.6% (n=48) were aware that the three-year membership includes a 10% discount. Of those members that are likely to choose a one-year membership, the main factor influencing this decision was due to financial constraints (64.3%, n=9).

ANYTHING ELSE?

At the end of the survey, respondents were asked if there were any additional points they would like the association to be aware of. The vast majority of these comments were positive and some were also constructive. Some of the constructive comments were as follows:

- Include non-academic communications – majority are directed towards academia
- More contributions from all over Africa – very South African focused

CONCLUSIONS

Overall, the majority of responses were positive in all eight main sections of the survey. The main sections where satisfaction could be improved are within student involvement and social media. Most specifically in terms of increasing academic involvement with the

herpetological community for students and the content shared on our Facebook page. Discrimination is a further area the association needs to improve upon with two respondents stating that they have felt discriminated against or been treated unfairly by a member of the association and a further member voicing concerns that they did not feel welcomed whilst attending a conference. Both in light of this survey and the opinion piece included in this issue of African Herp News (see pages 40—43), the Association has already put in place some new mitigation practices in the hope that the HAA will be better equipped to deal with these issues moving forward. Details of these can be found in issues moving forward, including introducing an anonymous feedback platform.

Two other important issues were raised by several respondents in terms of the difficulty with making overseas payments for renewals, and regarding ease of online access to the African Journal of Herpetology, with several members stating that they are having constant issues with the latter. The issue with overseas payments is one that the committee is aware of and we are in the process of investigating ways to take card payments, we are also trialling alternative methods in the interim that we hope will make overseas payments easier in the short term. In terms of online access to our journal, if members are having issues please contact the secretary who can liaise with Taylor & Francis directly. Further inputs and constructive comments in relation to all other sections have been taken on board by the association and we hope to implement some new processes and benefits in the future based on these survey results.

ACKNOWLEDGEMENTS

Thank you to all of our members who responded to the survey. Your feedback and constructive comments have been invaluable.

CONFERENCE REPORT

Herpetological Association of Africa

14th Biennial Conference and Special Tribute to William R. Branch (1944-2018)

9-13 September 2019, Cape St. Francis

The 14th conference of the Herpetological Association of Africa (HAA) took place in September 2019 at the Cape St. Francis Resort in the Eastern Cape Province, South Africa. The conference began with a special session dedicated to the life of William R. Branch, with a heartfelt plenary by Aaron Bauer that covered Bill's life and work, and the session was attended by Bill's family. The session continued with scientific talks that were related to Bill in some way, either work in which Bill had a vested interest or studies on which he was a co-author. In addition, the conference included two scientific plenaries (Graham Alexander and Hannes van Wyk) and one plenary travelogue (Luke Verburgt). The conference also included a total of 81 regular oral presentations and 13 poster presentations.

Prior to the regular program, there were also two workshops (Trade in South African Reptiles presented by Shivan Parusnath and Krystal Tolley and Amphibian Conservation Research Strategy for southern Africa presented by Jeanne Tarrant and John Measey) and

both workshops drew a full compliment of attendees. The conference also included a number of evening ice-breakers, several of which were specially designed to enable students and young researchers to have friendly exchanges with the more established herpetologists. A special feature was the "Herpeto-phile Auction" with Aaron Bauer as the Master of Ceremonies, made complete by Aaron modelling several of the items in order to push up the bidding.

Students featured heavily at the conference, with 42% of the oral presentations and 38% of the poster presentations. The HAA also gave out cash prizes to students for the Best Oral Presentation in the PhD category awarded to Shivan Parusnath, Best Oral Presentation in the MSc category awarded to Jackson Phillips, and the Best Poster Presentation at any level awarded to Miary Raselimanana. In addition, there was a herpetological photo competition, with the winners being Gary Nicolau (Maluti River Frog, first prize; Berg Adder, second prize) and Luke Kemp (Rinkhals, third prize) , and their photos will appear as cover images in the African Herp News. There were also four students that were supported to attend the conference (Marianna Marques, Samuel Tebogo Peta, Frans Reynecke and Silindokuhle Tokota).

Overall, the conference drew 100 herpetologists, of which 52 were professionals and 48 were students. Participants came from three continents (Africa, Europe and North America) and six countries (Germany, Portugal, Madagascar, Namibia, South Africa, USA). The talks and posters had a broad range of topics including ecology and life history, biogeography, health and disease, parasitology, phylogenetics, taxonomy, invasion biology and herpetological surveys.

CONFERENCE FINANCIAL REPORT

The financial breakdown for this conference spans three financial years and thus this report was finalized as all invoices and payments had been cleared. During the 2018 Financial Year we paid the venue a deposit, and the last attendee payment was received during the 2020 Financial Year. Most of the conference financial activity however took place during the 2019 Financial Year.

Financial Summary:

	Debit	Credit
FY 2018	R 57,345.64	R 0.00
FY 2019	R 296,103.42	R 354,065.00
FY 2020	R 0.00	R 3,200.00
Totals	**R 353,449.06**	**R 357,265.00**

Details of outgoing payments and income received in connection with the conference:

Expenses (Debits)		Income (Credits)	
Awards	R 11,460.00	Auction	R 26,275.00
Bank Fees	R 1,557.06	Conference Fees	R 316,675.00
Conference Venue/catering	R 278,560.00	Meals	R 2,190.00
Conference Bags	R 10,800.00	Membership[1]	R 775.00
Lasers Pens	R 13,920.00	T- Shirts	R 11,350.00
Refunds	R 16,160.00		
Stationary	R 596.00		
Plenary Speaker support	R 5,000.00		
T- Shirts	R 15,396.00		
Total	**R 353,449.06**	**Total**	**R 357,265.00**

[1]One member renewed their membership at the conference and thus is included as part of the financials.

All in all, the 2019 Conference of the Herpetological Association of Africa was a great success! Financially speaking we covered our bases although we did not show a big profit (R 3,815.94), which is exactly what we try and achieve with these conferences, to enable our members to benefit from the Association!

We hope to see you all at the 15th Conference of the Herpetological Association of Africa, which will be in Kimberley, South Africa and is tentatively planned for September 2021. The conference organizing team is headed by Beryl Wilson from the McGregor Museum (berylwa@gmail.com). Contact Beryl to volunteer or for other conference related queries.

FINANCIAL STATEMENTS

Herpetological Association of Africa (NPO)
(A NON-PROFIT ORGANIZATION)

28 February 2019

CONTENTS

Van Vollenhoven & Co

CHARTERED ACCOUNTANTS (SA)
REGISTERED ACCOUNTANTS AND AUDITORS

PO Box 1170	49 Manie Road	Partners:
WINGATE PARK, 0153	Waterkloof Agricultural Holdings	D C Snyman
South Africa		Hons B.Compt.(Unisa) C.A.(S.A.)
Tel:+2711 892-3200	Practice number:	B G van Vollenhoven
Fax:+2711 892-5126	193348	C.A.(S.A) AEP (Unisa)

To the Board of Trustees
Herpetological Association of Africa (NPO)
Pretoria
South Africa

Report on the Financial Statements
We have reviewed the accompanying financial statements of the Herpetological Association of Africa (a non-profit organization) which comprise the statements of financial position as of 28 February 2019 and the related statements of activities, functional expenses and cash flows for the year then ended and the related notes to the financial statements.

Management's Responsibility for the Financial Statements
Management is responsible for the preparation and fair presentation of these financial statements in accordance with the accounting principles generally accepted in South Africa; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility
Our responsibility is to express an opinion on these financial statements based on our audits. We conducted out audits in accordance with auditing standards generally accepted in South Africa. These standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's presentation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control.

Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the review evidence we have obtained is sufficient and appropriate to provide a basis for our opinion. It needs to be stated that the Association's records have been destroyed at the premises of their accountants and as such our review was limited to a reconstruction of the accounting records using the bank account as only source.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Herpetological Association of Africa for the year ended on 28 February 2019 and the changes in its net assets and its cash flows for the years then ended in conformity with accounting principles generally accepted in South Africa.

Per:

Van Vollenhoven & Co
Registered Accountants & Auditors
South Africa
10 June 2020

Herpetological Association of Africa (NPO)
TRUSTEES REPORT - for the year ended
28 February 2019

The trustees submit their report for the year ended 28 February 2019.

1. Review of activities
Main business and operations
The body corporate is engaged in non profit organisation and operates principally in South Africa .
The operating results and state of affairs of the body corporate are fully set out in the attached annual financial statements and do not in our opinion require any further comment.

2. Going concern
The annual financial statements have been prepared on the basis of accounting policies applicable to a going concern. This basis presumes that funds will be available to finance future operations and that the realisation of assets and settlement of liabilities, contingent obligations and commitments will occur in the ordinary course of business.

3. Events after the reporting period
The trustees are not aware of any matter or circumstance arising since the end of the financial year that has a material impact on the annual financial statements.

4. Trustees
The trustees of the Association during the year and to the date of this report are as follows:

Name	Designation	Change	Date
Buyisile Makhubo	Secretary	No change	
Jens Reissig	Treasurer	Appointed	1-Mar-18
Krystal Tolley	Chairman	Appointed	1-Mar-18

Herpetological Association of Africa (NPO)
STATEMENT OF FINANCIAL POSITION as at
28 February 2019

	2019	2018
ASSETS		
Fixed Assets & Long term investments	-	-
Current Assets	583 099	619 064
Cash & cash Equivalents	583 099	619 064
Current Account 1 - Absa	-	1 028
Savings Account - Standard Bank	-	-
Current Account 2 - Absa	-	44 792
First National Bank	583 099	573 245
Cash on hand	-	-
Other current assets	-	-
Accounts receivable		
Deposits		
TOTAL ASSETS	**583 099**	**619 064**
Current Liabilities	156 400	150 000
Accounts Payable	156 400	150 000
Revenue Services	-	-
Reserves		
Distributable Reserves	426 699	469 064
- From prior years	469 064	479 500
- Retained Surplus for the year	-42 365	-10 436
TOTAL LIABILITIES AND RESERVES	**583 099**	**619 064**

Herpetological Association of Africa (NPO)
STATEMENT OF RECEIPTS & EXPENSES for the year ended
28 February 2019

	2019	2018
Revenues		
Memberships & subscriptions	26 410	40 904
Conferences	-	-
Royalties received	28 047	-
Other income (Auction)	-	-
Gross Revenue received	**54 457**	**40 904**
Expenses & Disbursements	**96 823**	**51 361**
Audit fee	6 400	-
Auction	-	500
Awards	-	-
Bank charges	1 779	4 128
Courier costs	-	-
Conferences expenses	59 704	-
Graphic design	17 050	-
Printing & Stationary	-	3 800
Postage	-	-
Publication & license fees	6 411	42 932
T-shirt design	-	-
Web design/hosting fees	5 478	-
Surplus before investment activities	-42 365	-10 457
Prior year adjustment - write off of Standard bank savings account	-	-
Interest received	-	21
(Deficit)/Retained Surplus for the year	**-42 365**	**-10 436**

Herpetological Association of Africa (NPO)
CASH FLOW STATEMENT for the year ended
28 February 2019

	2019	2018
Cash flows from receipts & expenses	-42 365	-10 457
Cash flows from changes in:	6 400	150 000
Accounts receivable	-	-
Deposits	-	-
Accounts Payable	6 400	150 000
Revenue Services	-	-
Cash flows from financing activities	-	21
Net Increase in Cash & Cash Equivalents	**-35 965**	**139 565**
Cash & Cash Equivalents - beginning of year	619 064	479 500
Cash & Cash Equivalents - end of year	583 099	619 064
Net (Decrease)/Increase in Cash & Cash Equivalents	**-35 965**	**139 565**

Herpetological Association of Africa (NPO)
ACCOUNTING POLICIES
28 February 2019

1. Presentation of Annual Financial Statements
The annual financial statements have been prepared in accordance with the International Financial Reporting Standard for Non-Profit Organisations. The annual financial statements have been prepared on the historical cost basis, and incorporate the principal accounting policies set out below. They are presented in South African Rands.

These accounting policies are consistent with the previous period.

1.1 Property, plant and equipment
Property, plant and equipment is carried at cost less accumulated depreciation and accumulated impairment losses.
Cost includes all costs incurred to bring the asset to the location and condition necessary for it to be capable of operating in the manner intended by management.

Costs include costs incurred initially to acquire or construct an item of property, plant and equipment and costs incurred subsequently to add to, replace part of, or service it. If a replacement cost is recognised in the carrying amount of an item of property, plant and equipment, the carrying amount of the replaced part is derecognised.

The residual value, depreciation method and useful life of each asset are reviewed at each annual reporting period if there are indicators present that there has been a significant change from the previous estimate.
Gains and losses on disposals are determined by comparing the proceeds with the carrying amount and are recognised in profit or loss in the period.

1.2 Financial instruments
Initial measurement
Financial instruments are initially measured at the transaction price. This includes transaction costs, except for financial instruments which are measured at fair value through surplus or deficit.

Financial instruments at amortised cost
Debt instruments, as defined in the standard, are subsequently measured at amortised cost using the effective interest method. Debt instruments which are classified as current assets or current liabilities are measured at the undiscounted amount of the cash expected to be received or paid, unless the arrangement effectively constitutes a financing transaction.

At the end of each reporting date, the carrying amounts of assets held in this category are reviewed to determine whether there is any objective evidence of impairment. If so, an impairment loss is recognised.

1.3 Tax
Current tax assets and liabilities
Current tax for current and prior periods is, to the extent unpaid, recognised as a liability. If the amount already paid in respect of current and prior periods exceeds the amount due for those periods, the excess is recognised as an asset.

Tax expenses
Tax expense is recognised in the same component of total comprehensive income (i.e. continuing operations, discontinued operations, or other comprehensive income) or equity as the transaction or other event that resulted in the tax expense.

The Association is taxed in terms of Section 10(1)(e) of the Income Tax Act.

Herpetological Association of Africa (NPO)
ACCOUNTING POLICIES
28 February 2019

2. Cash and cash equivalents
Cash and cash equivalents consist of all liquid instruments and physical cash.

3. Taxation
No provision has been made for taxation as the Association is exempted from income tax in terms of the Income Tax Act.

AHN
ANNOUNCEMENTS

15th Conference of the Herpetological Association of Africa

Kimberley, Northern Cape South Africa

September 2021

Further details will be announced as they become available!

AHN

ANNOUNCEMENTS

CITIZEN SCIENCE AND THE HAA

Distribution data for African herpetofauna remains poorly documented for a remarkable number of species and regions. Moreover, many species that were detected and reported decades ago, have not been re-detected or reported in recent years, limiting our ability to infer geographic range changes or population declines. The Herpetological Association of Africa (HAA) recognizes the potential value offered by citizen science in attempting to redress these sampling gaps. Accordingly we are pleased to endorse the use of the iNaturalist platform to help improve our current understanding of herpetofauna in Africa. We encourage members to contribute records to this globally-recognized platform in an ethical and sensible manner.

In order to facilitate participation in this citizen science drive, the HAA will be partnering with the *AfriHerps* project on iNaturalist to acknowledge contributions from citizen scientists. There will be two reporting periods per annum, and each will promote new initiatives. The top contributors for the initiative (i.e., the most observations or most identifications) in each reporting period will be featured in the newsletter of the HAA, *African Herp News* (AHN). Additionally, the most valuable or novel record in each reporting period (chosen by the standing HAA committee) will be featured in the AHN. Finally, as citizen scientists become more active post-COVID-19 lockdown, we will be trialling region-specific citizen science *HerpBlitz* projects. More details will be reported on the HAA Facebook Page, website, and via email.

In light of the above, we are pleased to announce our first two challenges. These will run from August 2020 through January 2021 (COVID-19 restrictions dependent). In addition to these specific challenges, we also encourage everyone to submit any herpetological record from Africa to iNaturalist or other citizen science platforms.

AHN ANNOUNCEMENTS

CHALLENGE #1: NEW RECORDS OF JALLA'S SAND SNAKE (*PSAMMOPHIS JALLAE*)

This snake is considered widespread in southern Africa, occurring in Angola, Namibia, Botswana, Zambia and northern regions of South Africa. However, there are fewer than 90 records in total of this seldom-encountered snake and currently no records available on iNaturalist. It has only been recorded four times since the 1990s, with two records from South Africa and one record each from Namibia and Angola. This challenge aims to increase the representation of this elusive animal on iNaturalist.

CHALLENGE #2: HERPETOFAUNA OF THE SOUTHERN DRAKENSBERG AND ADJACENT LESOTHO

Records of reptiles and amphibians from Lesotho and the southern Drakensberg area of South Africa (Quarter Degree Grids: 3028BB, 3028BC, 3028BD, 3028CB, 3028CD, 3028DA, 3028DB, 3028DC, 3028DD, 3029AA, 3029AB, 3029AC, 3029AD, 3029CA, 3029CB, 3029CC, 3029CD, 3028AB, 3028AD,3028BA) are surprisingly scarce. This challenge aims to add as many records as possible to this poorly sampled but interesting region.

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 animal separately, but to merge photographs of the same animal 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.

AHN

ANNOUNCEMENTS

WORLD CONGRESS OF HERPETOLOGY NEWSLETTER

The first issue (2020 June) of the World Congress of Herpetology newsletter has been published.

It is available online at http://www.worldcongressofherpetology.org/newsletter-1

Highlights from the first issue:

- History of the World Congress of Herpetology
- Overviews of WCH7, WCH8 and WCH9
- Next World Congress (Kuching, Malaysia, 2024)
- Interview with Professor David Wake
- Outcomes and experiences from the WCH student scholarships
- Herpetology during the COVID-19 pandemic
- Herp news around the world

You can also join our subscribers list on this link to receive our newsletter biannually in June and December: http://www.worldcongressofherpetology.org/newsletter

Secretary General
Judit Vörös
Hungarian Natural History Museum
Budapest (Hungary)

JODY MICHAEL BARENDS

AUTECOLOGY OF THE RHOMBIC EGG-EATER AND ITS ROLES WITHIN ECOSYSTEMS

One of the most interesting aspects of snake ecology is the fact that these animals are gape-limited predators that have remarkably large gape sizes. This allows for individuals of several snake species to perform extraordinary feats of ingestion and consume prey items considerably larger than themselves. As a result, despite all snakes being mechanically constrained by prey size to some degree, the range of possible prey available to any one species has the potential to be extremely diverse. Consequently, many snake species possess broad, generalist diets comprised of a wide array of different prey types across numerous taxonomic groups. Given their extraordinary ingestion ability, diverse dietary niches, and the abundances at which some snake species occur within some areas, these animals are extremely likely to play important predatory roles within ecosystems.

One way in which snakes could influence ecosystems is by controlling the populations of ecosystem engineers via top-down predation. For example, many bird species act as important contributors towards ecosystem functioning as they directly alter their environments through seed dispersal, soil formation, pollination, and the creation of nests and nesting holes. Predation on these birds by snakes could potentially disrupt these ecological processes and consequently suppress resource availability and habitat structuring across various landscapes. Although only a few southern African snake species consume birds and even fewer consume bird eggs, egg-eaters of the genus *Dasypeltis* are bird egg specialists that feed exclusively on bird eggs. The rhombic egg-eater, *Dasypeltis scabra* is the most widespread member of the genus and can occur in high densities in some areas. Like all members of the genus, *D. scabra* has an exceptional ability to consume large bird eggs but the full extent of their feeding behaviour remains unknown and it is unclear to what degree these snakes may be affecting ecosystems across their range.

Jody Michael Barends is currently investigating several aspects of the evolutionary ecology, natural history, and foraging behaviour of the rhombic egg-eater for his PhD research at the University of the Western Cape (UWC) with his supervisor Dr. Bryan Maritz. Jody was first introduced

Juvenile *Dasypeltis scabra* from Koeberg Nature Reserve, Western Cape.

to the world of herpetology during his Honours degree at UWC in 2016 which led to his first foray into herpetological research in the following year when he embarked on a Masters project which included investigating patterns of sampling bias within reptile occurrence data for the Kruger National Park. This study revealed that at a biologically relevant spatial resolution of 1 km x 1 km, approximately 92% of the park was deficient of reptile occurrences. Moreover, the 7000+ records were highly biased towards areas associated with high levels of human presence such as the popular tourist camps and publically accessible roads. He has recently published this work along with Darren Pietersen, Donovan Tye, Guinevere Zambatis, and Bryan Maritz in the journal Koedoe.

After completing his Masters degree, Jody embarked on his PhD research focussing on *Dasypeltis*. Jody is currently attempting to answer several questions relating to the biology, ecology, and evolutionary origins of rhombic egg-eaters in the hopes of increasing our understanding of the roles of these snakes within contemporary ecosystems in southern Africa. Part of this research includes investigations into the relationship between the maximum ingestion ability of rhombic egg-eaters and spatio-temporal patterns of bird egg abundances across South Africa. While adult egg-eaters are renowned for ingesting remarkably large bird eggs, hatchlings and juveniles are mechanically constrained in the sizes of eggs that they can ingest. Moreover, because bird diversity is not uniformly distributed across South Africa and egg sizes vary per species, the abundances of appropriately sized bird eggs for different ages of egg-eaters are likely to differ across the country. These variances could have a profound impact on the feeding patterns and prolonged periods of fasting of egg-eaters of differing ages and consequently affect the rates at which they

control bird populations and recruitment. Jody has presented the preliminary findings of this study at the 14th HAA conference held in Cape Saint Francis in 2019.

Jody's research also seeks to elucidate on the evolutionary and biogeographical context for the adaptation towards the bird-egg specialist lifestyle of egg-eaters. This includes attempting to uncover the timing of the origin of *Dasypeltis*, identifying the biogeographical regions and habitats in which they arose, and identifying the drivers that led to their dietary adaptation towards bird egg specialization. Interspecific competition for food and resource partitioning between ancestral lineages is suspected to have played a prominent role in the diversification of *Dasypeltis* along with increases in ecological opportunity. Moreover, these developments may have directly impacted on the degree to which egg-eaters influence contemporary communities and ecosystems.

In South Africa, rhombic-egg-eaters are out-sized by their most relevant snake competitors. These include species such as boomslang, cape cobras, and mole snakes, all of which can grow to approximately double the size of rhombic egg-eaters in relative terms. Although larger, these species

Jody holding an individual *Dasypeltis scabra*

lack the unique morphological adaptations associated with bird egg consumption and it remains to be seen how rates of predation on bird eggs differ between these species in areas where they occur sympatrically. Using fixed videography, Jody will attempt to film predation events of bird nests at Koeberg Private Nature Reserve in the Western Cape of South Africa to quantify rates of nest predation between these disproportionally sized competing snakes. In completing this research, Jody hopes to contribute towards filling in gaps relating to the functional roles of snakes like egg-eaters in ecosystems and shedding light on what might occur should these species be lost.

AHN Opinion

J. MEASEY

MAKE EVERYONE WELCOME IN OUR HAA

When you read the new HAA Code of Conduct last year, did you think that it was addressing an active problem in our society? Did you feel that it meant you'd have to change your behaviour at HAA (or other) meetings? When I made comments on the draft code after it was circulated in April 2019, I knew that it was well intentioned, but I wasn't sure that it was needed. As a result of talking about these issues with colleagues, and becoming more aware of how a mainstream culture has suppressed a huge diversity of people in many sectors of science, technology, engineering and mathematics (STEM disciplines), I now see that the Code of Conduct is needed for the HAA, and more broadly to make our working environment more professional. Moreover, many of us need to reflect on our own past behaviours to make the HAA a more welcoming place to a greater diversity of people. In this piece, I aim to place some of these issues into the context of how the HAA Code of Conduct is applicable to each one of us. The mainstream culture that permeates STEM disciplines affects behaviours still seen in our meetings, interactions through peer review and our collaborative circles.

As I talked to more colleagues I became aware that at our own African herpetological meetings, comments are made that make people feel uncomfortable and unwelcome. When I first heard these points being raised, I did so with the feeling that they surely couldn't have come from the same HAA meetings that I attended. Could it really be that in the same herp community others were experiencing comments that they thought were snide, unwelcoming, or ignorant asides? For example, having an encyclopaedic knowledge of African herpetofauna, as some of our members do, should never be used as a barrier to exclude others from conversations or discussions. Instead, that knowledge should be used to encourage others to join our HAA community. Comments on how someone's appearance isn't appropriate for African herping might not make you feel unhappy, or be the one thing that you remember at the end of the day's meeting, but they do to other people. That funny picture that you included in your presentation of a bunch of scantily clad people in the field: did it make everyone laugh? Or did you just alienate half of your audience?

Our new code-of-conduct, ratified by the HAA membership, is very clear in this regard. The following section is taken from the section on "Courtesy and respect" (HAA 2019:19)

> "The HAA characterises unwelcome behaviours as those which are offensive, intimidating, malicious or insulting, an abuse or misuse of power through means intended to undermine, humiliate, denigrate or injure the recipient, or sexual advances and other actions that cause embarrassment, fear, humiliation or distress."

This isn't an attempt to take all the fun or laughs out of our meetings, but more thought, care and reflection is needed on how we conduct ourselves, as it does affect how other people feel (no matter what was intended). Instead, we need a culture that welcomes and unites in our strengths, interests, and generates enthusiasm for African reptiles and amphibians. Knowing that there are these problems at our meetings is important, because once we acknowledge the presence of a problem, we can start to tackle the issues involved. Societies all over the world are losing members, and this is also true of our own HAA membership. If we want to retain as many people as possible, then we need to make every single person feel welcome within our organisation.

The problem is clearly widespread, and permeates a number of aspects of academia. On December 12th 2019, a study published in *PeerJ* unveiled an inconvenient truth about peer review. Silbiger & Stubler (2019) obtained responses from >1000 scientists in STEM disciplines about their experience with unprofessional peer reviews, showing that 58% had received such responses. Their questionnaire went on to ask what impact scientists felt that such reviews had had on their aptitude, productivity and career advancement. The results were fascinating, and they throw some important light on a real problem that we have in our own area of science. Essentially, people with demographics over-represented in STEM disciplines had little or no problem with the comments, but under-represented groups perceived them as being negative.

So, why do scientists make disparaging or unprofessional remarks to their colleagues in peer review? Whenever two or three scientists get together, you hear tales of recent woes associated with peer review. The retelling of such stories is all part of the collective, cathartic unburdening of what can be a traumatic experience especially when we put so much effort into each piece of work (see Hyland & Jiang 2020). Reading through a lot of these reviewers' comments, I can see that there is an attempt at humour (see https://shitmyreviewerssay.tumblr.com/). This humour is not appreciated by those who receive the reviews. Perhaps I understand the humour, because I also come from that same culture that dominates STEM, but that is not understood or even recognised as humour by others. Writing humorous reviews is unprofessional, especially if it is used to accentuate negative aspects. Needless to say, we could all do without unprofessional reviews. But this problem with peer review is illustrative of the problems at our meetings; we need to be more inclusive.

Last year, I was privileged to attend a presentation in which Karen Warkentin (2019) talked about the amazingly diverse world of herpetology, and how diversity enriches not just what we study, but increases the perspectives and insights of what we choose to study and how we study it. I was personally inspired by her call to collaborate diversely to produce diversity within our own research. It was one of those presentations that made me reflect, recognise times when I might have been not-inclusive and decide to change, and also to encourage others to make a change toward inclusivity. We all need to think more about welcoming everyone into the wonderful world of herpetology. We need as many members as we can find.

At the heart of our actions should be the science that we do, and sharing the knowledge base that is so rich in our association. I have benefitted massively from local knowledge, and from HAA members that had already spent a lifetime working with this diverse but polyphyletic group. I feel very privileged to be employed to work on these animals, and I receive monthly reminders in the form of pay-checks that underline exactly how fortunate I am. Being employed comes with the responsibility to act as a professional first, at the cost of sharing a joke at a meeting or an attempt at humour in peer review. The upside is that there is more to be gained from being inclusive, and profiting from the diversity of herpetologists as there is in being engaged in the amazing diversity of African herpetology.

In the HAA, we cannot afford for those under-represented in STEM subjects, especially our junior members, to be repelled and estranged at our meetings, excluded from collaborations or alienated by peer review. Humour can do this, because what you find funny might well be offensive or misunderstood by someone else. We want to retain our image as a friendly and welcoming association, but not at the cost of the diversity of African herpetologists, or through leaving behind our professionalism. And before you dismiss this article and feel that it must apply to someone else, please reflect and think again.

REFERENCES

HAA 2019. HAA Code of Ethics and Conduct. African Herp News. 71: 18-20.

Hyland K, Jiang FK. 2020. “This work is antithetical to the spirit of research”: An anatomy of harsh peer reviews. J. Eng. Acad. Purp. 46: https://doi.org/10.1016/j.jeap.2020.100867

Silbiger NJ, Stubler AD. 2019. Unprofessional peer reviews disproportionately harm underrepresented groups in STEM. PeerJ 7: e8247. https://doi.org/10.7717/peerj.8247

Warkentin K. 2019. Queering Herpetology: On human perspectives and the study of diverse animals – Plenary for the Brazilian Congress of Herpetology, Campinas, SP, Brazil, July 2019 [accessed 30 April 2020] https://youtu.be/i1rMxE9H6Qg

SUBMITTED BY:

JOHN MEASEY, Centre for Invasion Biology, Department of Botany and Zoology, Stellenbosch University, Stellenbosch, South Africa.
E-mail: jmeasey@sun.ac.za

Since writing this piece in April 2020, a number of global and regional events have highlighted the need for awareness of the inequalities still present in herpetological communities. While at the HAA we may not need to change the name of our journal, the Board of Governors of ASIH voted to change the name of their society journal from Copeia to Ichthyology & Herpetology. We should still use this time individually and collectively to reflect on how the inequalities of the past can be corrected to improve our association today.

INCREASING REPRESENTATION OF WOMEN AUTHORS IN THE JOURNAL OF THE HERPETOLOGICAL ASSOCIATION OF AFRICA (1990–2019)

C.S. STOBIE

There has been interest lately in male-skewed gender imbalances in the biological sciences and other fields (Wilson 1998; Larivière et al. 2013; Filardo et al. 2016; Bendels et al. 2017; Lerchenmuller et al. 2018; Taylor 2019), particularly given the current climate of the global pandemic (Amano-Patiño et al. 2020; Andersen et al. 2020; Gabster et al. 2020; Pinho-Gomes et al. 2020; Viglione 2020). This is surprising given the fact that in the United States in 2016, the majority of Bachelor's and Master's degrees in biological sciences were awarded to women (National Science Foundation, 2019), and that there have been growing trends of increased participation by women in other fields in recent years (Filardo et al. 2016). Although an ideal unbiased representation of 50% would be preferred, the theory of critical mass suggests that 30-35% threshold occupancy should trigger cultural and societal changes resulting in increased influence and career options for women (Helitzer et al. 2017). This has been shown to not be the case in certain academic circles, perhaps due to the importance of "critical actors" (Childs and Krook 2008) and how despite meeting net numbers of females these changes are often not reflected at senior management levels (Larivière et al. 2013; Filardo et al. 2016; Helitzer et al. 2017; Lerchenmuller et al. 2018) – something which has been referred to in academia as the "leaky pipe" metaphor where the academic pipeline of progression from junior to senior faculty leaks female scientists (Larivière et al. 2013; Pettorelli et al. 2013; Bendels et al. 2017). Other factors are more insidious – Moss-Racusin et al. (2012) demonstrated how faculty (irrespective of gender) who were tasked with hiring a laboratory manager were more likely to hire male applicants with identical qualifications as there was an underlying assumption that men were more competent and hireable than the "more likeable" female applicant.

The COVID-19 pandemic has been shown to have reduced the representation of female authors in a variety of fields and ways (e.g. Amano-Patiño et al. 2020; Andersen et al. 2020; Viglione 2020), particularly in medical research surrounding COVID-19 itself – Pinho-Gomes et al. (2020) found 34% of authors participating in this research to be female. The pandemic is therefore seen as enhancing problems that were already at play for female researchers, and in introducing some new ones such as difficulties in managing familial responsibilities because of gendered

domestic labour. Even in households where both parents work as academics, it has been found that women are more involved with household tasks, and, possibly, childcare (Viglione 2020). This may therefore be a pertinent time to assess what has been achieved in our discipline to date.

Herpetology has long been viewed as a male-dominated discipline (Adler 1989), but it too has experienced an increase in participation by women in recent years (e.g. Wilson 1998; Taylo 2019). Several symposia at recent conferences have focussed on issues facing female herpetologists. For example, the 2019 Joint Meeting of Ichthyologists and Herpetologists hosted a symposium, "Professional Women in Herpetology: Lessons and Insights", which has since sparked some insightful discussions and analyses, such as those by Taylor (2019), which have inspired this article. Herein I seek to examine the findings of previous studies and contrast them with data from an African context to investigate aspects of the gender balance in herpetology in Africa.

Taylor and colleagues have presented some of their work in a blog (Taylor 2019). They assessed gender contributions of herpetological articles in international journals, and are currently preparing a manuscript for publication. The main findings of their work are as follows:

- Depending on the herpetofaunal taxa under examination, female authors made up 29–38% of all authors in studies published in the last decade (2010–2019).
- This proportion has increased steadily over the last 30 years, from about 15% in the 1990s.
- There was a greater proportion of female students (55%) at the Joint Meeting of Ichthyologists and Herpetologists in 2017, but a lower proportion of female professors (29%).

Another study by Wilson (1998) similarly assessed author contribution by gender in three herpetological journals – *Copeia*, *Herpetologica* and *Journal of Herpetology*. This study raised several other key points:

- Women publishing as first-authors in these journals (considered together) increased from 8% in 1973–1982 to 15% in 1983–1993.
- Women may be more likely to work on "non-dangerous" animals and amphibians in particular.
- Average productivity differences between men and women could bias results as more productive members are counted multiple times within periods (discussed further below).

These studies prompted me to wonder what the situation is like for female herpetological researchers in Africa, particularly South Africa. As a newcomer to the herpetological community I was pleasantly surprised at how well represented women were in the field – from top researchers in the field, to snake re-locators, identification specialists, and

those with a casual interest in sightings and identifications made on several Facebook pages (one of which I curate - https://www.facebook.com/groups/FreeStateHerps/). As an example of this, examining the preferred pronoun use of individual observers who shared photographs of herpetofauna found in the Free State to various Facebook pages shared in our group (N = 567) showed that 46% of posters used feminine pronouns (260), 54% masculine (306), and 0.2% nonbinary (1). In addition, I attended my first Herpetological Association of Africa (HAA) conference last year and felt genuinely welcomed by everyone I met. The conclusion to my question was therefore obvious. I would need to sink my teeth into some hard data of original research articles published in the HAA's journal, *African Journal of Herpetology*, and investigate some of the questions posed by Taylor (2019) and Wilson (1998) in an African context.

Therefore, I considered the situation in African herpetology, as represented by the *African Journal of Herpetology* (*Journal of the Herpetological Association of Africa* from 1965–1995). I examined original research articles (excluding short notes such as Geographical Distribution and Life History Notes, Book Reviews, Responses/Errata/Corrigendum and Editorials but including Short Communications, Forums and Reviews) published over the last three decades (1990 to 2019) by referring to the Taylor and Francis host website (https://www.tandfonline.com/loi/ther20), and extracted author names, article titles, and number of reads for each paper (N = 362). Research articles are one of the major ways to determine researcher productivity, and are therefore used here to extrapolate active researchers publishing in this journal. Broadening the scale of time examined to the past three decades grants much more data to be examined and introduces a historical element. Article titles, and in some cases, abstracts were used to assign a study organism to the articles – these were classified into the categories Anura, Caudata, Gymnophiona, Amphisbaenia, Crocodylia, Lizards (Lacertilia), Snakes (Serpentes), Testudines, Other, Broad Herpetofauna, Broad Amphibians, and Broad Reptiles (the latter three used in cases where a paper addressed topics relating to the group as a whole and not a specific species/genus/order). Different categories were summed to also assess Amphibians, Reptiles and Herpetofauna as a whole (Total Amphibians, Total Reptiles, and Total Herpetofauna).

The next step involved assigning gender to the authors of the article, a task which was greatly complicated, especially further back in time as the journal moved through several periods of preferentially using initials for authors. Google searches were used to identify authors. Unfortunately, for this study a binary gender distribution of male or female was assumed, which I acknowledge is not representative of reality as gender is more complex than that (Richards et al. 2016). Gender was then assigned to individual authors by given name (as per Wilson 1998), pronoun use or title in social media resulting from Google search, or even in a small number of

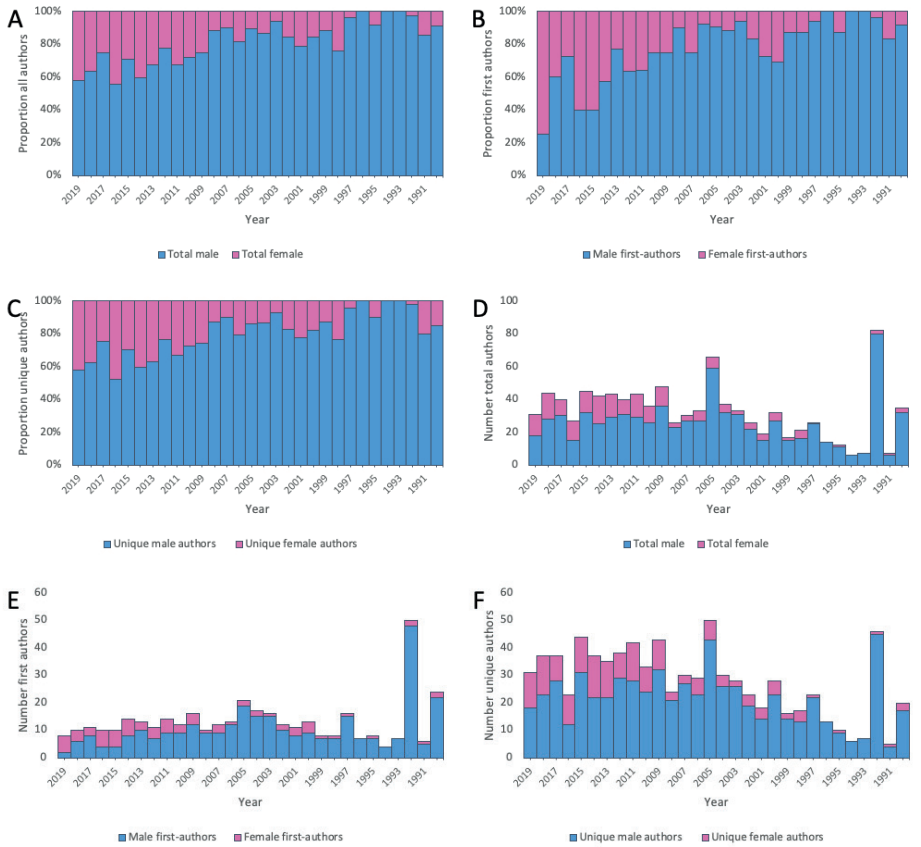


Figure 1. Assessment of authors in *African Journal of Herpetology* over the last three decades (1990 to 2019) as either (A–C): male to female proportions or (D–F): count data. Data was divided between total authors on all original research papers (A and D), first-authors only (B and E), or unique authors where authors were only counted for their first publication each year (C and F). The results show an improvement through time, with total authors and unique authors showing similar trends.

individuals by gender cues (such as apparel or other physical performative signifiers) in photographs. Of the 496 unique authors who published in this time period, 495 were assigned to a gender, while one could not be assigned and was removed from the study.

Because a variable number of studies and authors were published each year, gender proportions over the last three decades were visualised using stacked box plots to determine relative proportions (Fig. 1 A–C), although the number of authors was also included as this is helpful to explain some trends in the data (Fig. 1 D–F). The contribution by gender was assessed for all authors (A and D), first-authors (B and E) and unique authors where authors were only counted once each year and any

additional publications after the first were not included (C and F). This last category was included as it was suspected that more prolific authors might be biasing the dataset, but despite this, the data pattern appears highly similar between all authors and unique authors. The trend across all graphs showed a definite increase since 1990 (from 8.6% total female authors, 8.3% female first-authors, and 15% of all unique authors for the year being female – implying most men published more than once that year alone) in the number of women contributing to original research articles published in *African Journal of Herpetology* – currently 32–40% average contribution over the last decade (and a ~20% average across the entire three decades). This 32–40% is comparable to the global average of 32% female contribution over the last decade found by Taylor (2019), but obviously still has room for improvement in that true gender equality would be achieved at 50%. The representation of female authors found in this study is also comparable to the rate of first-authors across science publications at 34% (Larivière et al. 2013), current medical papers on COVID-19 at 34% (Pinho-Gomes *et al.* 2020), academic research on epilepsy at 40% (Bendels et al. 2017), and superior to the 20% female representation of the last few years in economics (Amano-

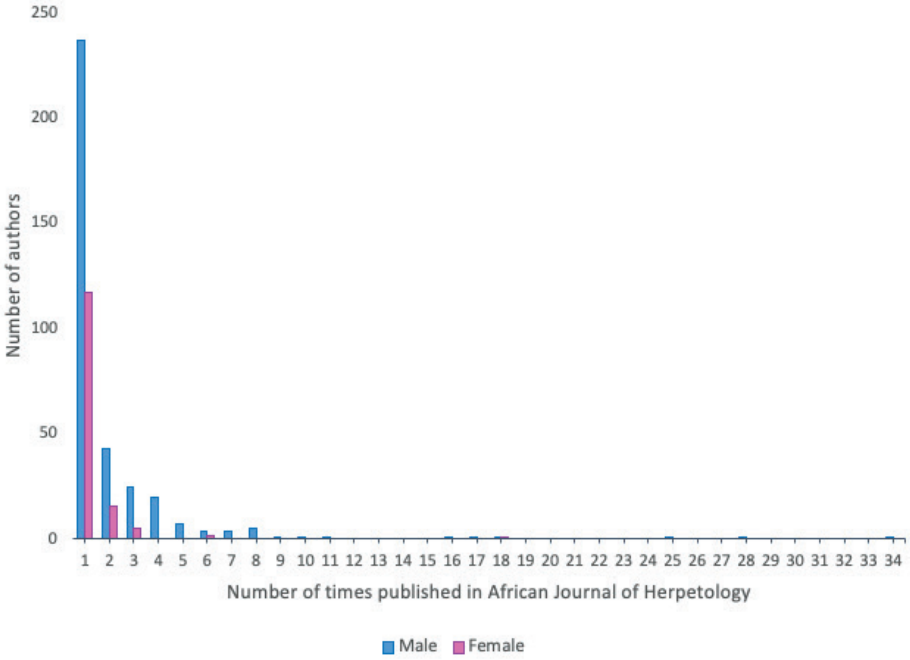


Figure 2. The frequency of publication by authors in *African Journal of Herpetology* over a thirty-year period (1990–2019), separated by gender.

Patiño et al. 2020). The visible improvement through time in the field of herpetology gives hope that we are approaching a stage of equality, and bodes well for the future of African herpetological research. Research on epilepsy had previously forecast an improvement from 40% representation of women to 49.6% by the year 2026 (Bendels et al. 2017). Although the influence of COVID-19 may have deferred this point somewhat from previous expectations, I hope that a similar situation can be reached for herpetology in the near future.

Although the previous assessment

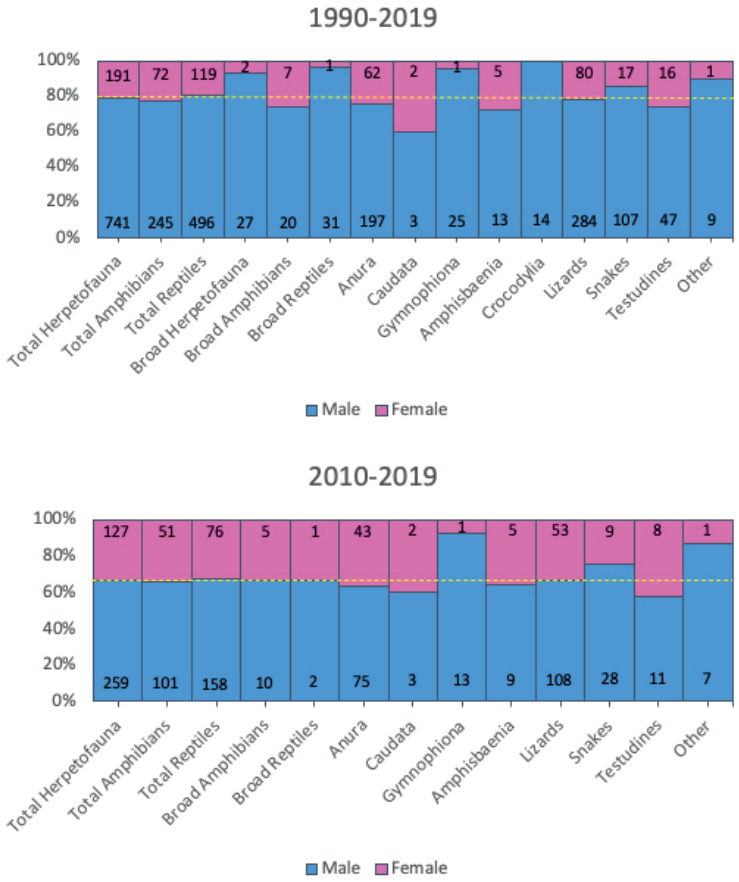


Figure 3. Gender proportion across various herpetological study groups for two time periods, 1990–2019 and 2010–2019. "Broad" categories indicate papers with a broad focus on a particular group which cannot be confined to a lower category, whereas "total" categories are summed results from other lower categories. The number of authors contributing to each category is indicated by numbers at the top (female) and bottom (male). Yellow lines indicate the overall gender proportion to provide a reference for each taxonomic category.

separating out total authors and unique authors indicated similar trends, there were some minor differences in the pattern, particularly when assessing the count data. This may be due to a slight bias by differences in average productivity between genders alluded to by Wilson (1998) and Bendels et al. (2017). Wilson suspected that highly prolific authors of a particular gender may artifically boost the results for that gender by publishing multiple papers within a short period of time. However, with no good way to account for this given the large dataset involved, it was suggested that the average productivity should remain relatively similar between genders, and this was not investigated further. Given the nature of the current dataset, I decided to assess the number of times each author published in the journal during this three-decade time period (Fig. 2). The results showed a similar pattern for both genders in the unimodal distributions produced, though men represented a greater number of authors and had more "outliers" with a very large publication count (with one individual accruing 34 articles during this period). On average, men were authors on 6.09 articles (SD = 6.58), and women were authors on 3.26 articles (SD = 3.48). Thus, although most authors (no matter the gender) published only one paper during this period with this journal, there does appear to be a trend for some predominantly male individuals to publish many papers throughout this period which may have a slight biasing effect on the results obtained.

The next claim to be investigated is whether women are more likely to focus on study taxa that are typically viewed as "less threatening", possibly as a result of socialisation (Wilson 1998) or difficulties entering traditionally more male-

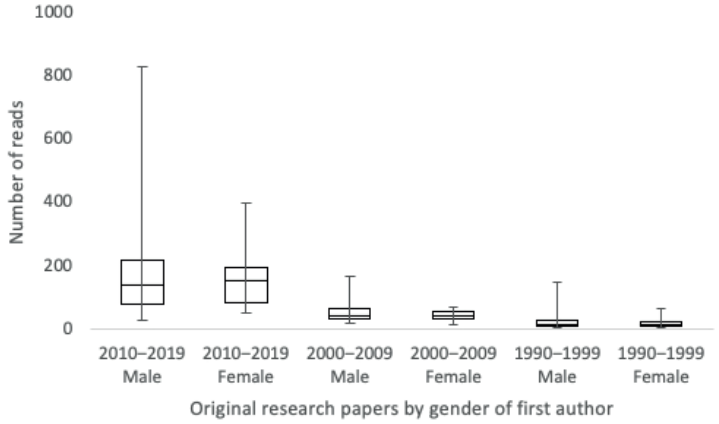


Figure 4. Number of reads for articles published in *African Journal of Herpetology* separated by gender of first-author, for each of the last three decades. Box-and-whisker plots were used to show the first quartile, median and third quartile (boxes), and the minimum and maximum (whiskers).

dominated fields. Unfortunately our data for many of these study taxa are quite minimal, and therefore no statistical tests were conducted and trends should be interpreted with caution. One remarkable result was how overall participation by female herpetologists increased rapidly from the past to the present. The total dataset from 1990–2019 has an average female participation at 20% across all herpetofaunal taxa, whereas in just the last decade we see this rise to 34% (Fig. 3, yellow lines). Remarkably, this average appears largely consistent across almost all groups assessed in this study at both time scales, with some exceptions. Of note is Crocodylia which is entirely male-dominated (but has a very small sample size, n = 14 authors), Gymnophiona which is almost entirely male-dominated, and Other/Theory papers which have a heavy male bias. There also appear to be fewer women in publications about Snakes, but again the sample size is too small for meaningful conclusions. Therefore, there may be a trend for women to favour "less threatening" taxa for a wealth of reasons as Wilson (1998) suggested (such as socialisation, social pressure, or a dominance of male authority figures in this area making entry difficult), but we would need additional data to examine this further.

The final analysis performed on the dataset was to examine a claim that citation of publications authored by women occurs about half as often as citation of publications authored by men (Primack and O'Leary 1989). This previous study is dated, and it is hoped that this trend no longer exists in herpetology, although a bias for male authors to be cited more often than their female peers was observed recently in studies on epilepsy research (Bendel et al. 2017). As a proxy for citations, I instead assessed the number of total reads for each original research paper published in the *African Journal of Herpetology* and assessed these by gender. The number of reads a paper receives on the publisher's website is not an absolute metric or replacement for citations – this number is conflated by multiple downloads of a paper by a single individual, for example. Despite these limitations I chose to use number of reads as proxy for citations to investigate the hypothesis that papers first authored by women are cited or read less than papers first authored by men. Given my familiarity with the data I saw, there was a need to control for the confounding factor of time, as I have demonstrated previously that the number of female authors has increased markedly in the last decade, and this coupled with a bias for more recent papers to have a greater number of reads since journal articles were published online recently means that the results would be artificially raised for women if assessed over the entire time period. Results were shown in the form of a box-and-whisker plot (Fig. 4), where the box shows the first quartile, median and third quartile, while the whiskers denote the minimum and maximum. Splitting the publications by decade and gender of first-author of the publication resulted in similar trends for both genders across time, indicating that

the genders have similar numbers of reads per paper and that time plays a much larger factor in terms of number of reads given for a paper. Therefore, the assertion that women receive less citations or reads does not appear to remain in this day, age, region and discipline.

Most of the data in this investigation of publications in the *African Journal of Herpetology* appears to conform to expectations at a global level, though there are some caveats to the present study. One of the greatest caveats is the scope of this study – although it would be preferable to explore gender biases in African herpetology as a whole across a wide range of journals, the analysis here is limited to just the papers published in a single flagship journal for African herpetology. This will have biasing effects on the data produced which affects the applicability of our findings to a broad context of African herpetology (McKechnie and Amar 2018). An example of this was obvious in the analysis of gender proportions by study organism, where both Dr Michael Bates and Dr Robin Maritz informed me that the data on Crocodylia did not reflect the contributions of prominent researcher Dr Alison Leslie, who has worked extensively on Crocodilia but has not published with the *African Journal of Herpetology* during this time period. This may point towards differences between gender and choice of publication – perhaps women are more likely to be attracted to answering broader questions that are more relevant for journals with a wider scope than the *African Journal of Herpetology*. Differences in choices of where to publish and determining whether the trends observed in our analysis are applicable in a broader African context despite the biases inherent to using only publications from a single journal are both very interesting avenues for further research, but go beyond the scope of the current paper. It is therefore important to bear in mind that the data assessed here shows results specific to publication trends in the *African Journal of Herpetology* and may not be broadly applicable to African herpetology as a whole.

The last HAA conference in 2019 comprised 35% of all presentations being presented by a female delegate (out of 99 total presentations). Despite conference presentation statistics being potentially different from publication trends, the proportions are similar to the representation of female authors seen in publication trends during the past decade as per the *African Journal of Herpetology* (34%) and the representation of women in herpetological publications worldwide. There is still a way to go before we reach the ideal of 50%, but current trends are promising in this regard. In addition, the composition of the HAA committee is currently at an impressive 67% female – which is important as we need to have role models for women entering the field to help address the "leaky pipe" problem with "critical actors". I for one have felt most welcomed by the herpetological community at large, and I cannot wait to see how the trends assessed here grow into the future.

ACKNOWLEDGEMENTS

Michael F. Bates, Cheryl Stobie and Zoe Yannikarkis are thanked for commenting on earlier versions of this piece. I also thank Krystal Tolley and Jessica da Silva for their encouragement to write on this topic. Robin Maritz and Jeanne Tarrant are thanked for their excellent comments and suggestions while reviewing this manuscript.

REFERENCES

Adler K. (ed.). 1989. Contributions to the History of Herpetology (Vol. 2). Canterbury: Society for the Study of Amphibians and Reptiles Publications.

Amano-Patiño N, Faraglia E, Giannitsarou C, Hasna Z. 2020. The unequal effects of Covid-19 on economists' research productivity. CWPE 2038: 1-12.

Andersen JP, Nielsen MW, Simone NL, Lewiss RE, Jagsi R. 2020. Meta-Research: COVID-19 medical papers have fewer women first authors than expected. eLife 9: e58807.

Bendels MH, Wanke E, Schöffel N, Bauer J, Quarcoo D, Groneberg DA. 2017. Gender equality in academic research on epilepsy—a study on scientific authorships. Epilepsia 58: 1794-1802.

Childs S, Krook ML. 2008. Critical mass theory and women's political representation. Polit. Stud. 56: 725-736.

Filardo G, da Graca B, Sass DM, Pollock BD, Smith EB, Martinez MAM. 2016. Trends and comparison of female first authorship in high impact medical journals: observational study (1994-2014). Br. Med. J. 352: 1-8.

Gabster BP, van Daalen K, Dhatt R, Barry M. 2020. Challenges for the female academic during the COVID-19 pandemic. Lancet 395: 1968-1970.

Helitzer DL, Newbill SL, Cardinali G, Morahan PS, Chang S, Magrane D. 2017. Changing the culture of academic medicine: critical mass or critical actors? J. Womens Health (Larchmt) 26: 540-548.

Larivière V, Ni C, Gingras Y, Cronin B, Sugimoto CR. 2013. Bibliometrics: Global gender disparities in science. Nature 504: 211-213.

Lerchenmüller C, Lerchenmueller MJ, Sorenson O. 2018. Long-term analysis of sex differences in prestigious authorships in cardiovascular research supported by the National Institutes of Health. Circulation 137: 880-882.

McKechnie AE, Amar A. 2018. Missing the bigger picture: A response to Beale (2018). Ostrich 89: 151–152.

Moss-Racusin CA, Dovidio JF, Brescoll VL, Graham MJ, Handelsman J. 2012. Science faculty's subtle gender biases favor male students. PNAS 109: 16474-16479.

National Science Foundation, National Center for Science and Engineering Statistics. 2019. Women, minorities, and persons with disabilities in science and engineering: 2019. Special Report NSF 19-304. Alexandria, VA. [[accessed 05 June 2020]]. https://www.nsf.gov/statistics/wmpd.

Pettorelli N, Evans DM, Garner TWJ, Katzner T, Gompper ME *et al*. (2013). Addressing gender imbalances in *Animal Conservation*. Anim. Conserv. 16: 131-133.

Pinho-Gomes AC, Peters S, Thompson K, Hockham C, Ripullone K, Woodward M, Carcel C. 2020. Where are the women? Gender

inequalities in COVID-19 research authorship. BMJ Glob. Health 5: e002922.

Primack RB, O'Leary V. 1989. Research productivity of men and women ecologists: a longitudinal study of former graduate students. Bull. Ecol. Soc. Am. 70: 7–12.

Richards C, Bouman WP, Seal L, Barker MJ, Nieder TO, T'Sjoen G. 2016. Non-binary or genderqueer genders. Int. Rev. Psychiatry 28: 95–102.

Taylor E. 2019. Women in herpetology. Ophidiophilia – adventures in herpetology. [[accessed 05 June 2020]]. http://snakeymama.blogspot.com/2019/12/women-in-herpetology.html

Viglione G. 2020. Are women publishing less during the pandemic? Here's what the data say. Nature 581: 365-366.

Wilson DS. 1998. Patterns in publishing in three North American herpetological journals: Gender biases. Herpetologica 54: 35–42.

SUBMITTED BY

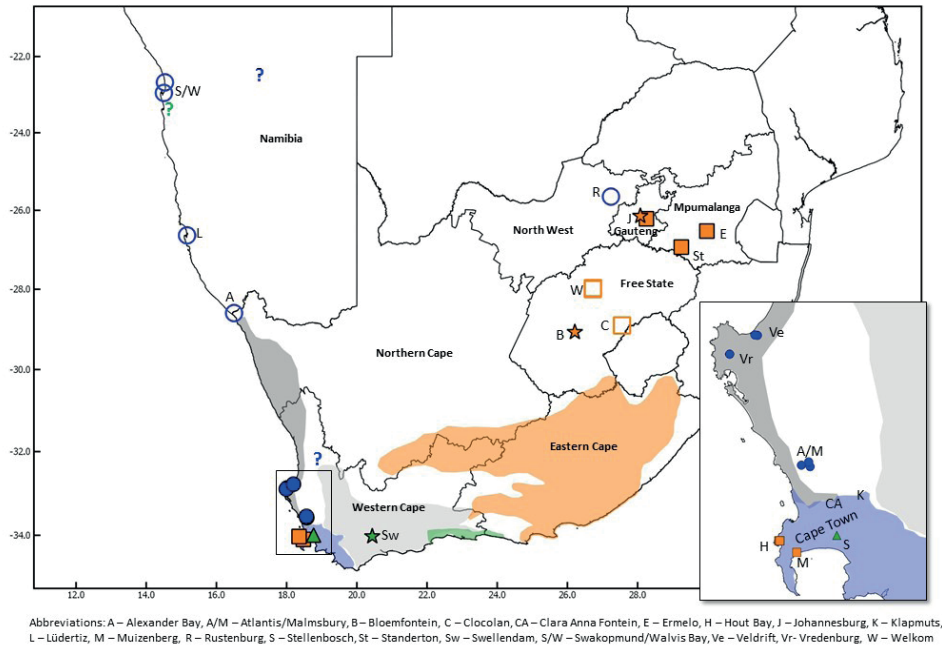
CORA S. STOBIE, Department of Herpetology, National Museum, P.O. Box 266, Bloemfontein 9300, South Africa.
Email: cora@nasmus.co.za

CHAM-ALIENS: PRESENT AND HISTORICAL TRANSLOCATIONS OF CHAMELEONS (*BRADYPODION*)

K.A. TOLLEY

Dwarf chameleons (*Bradypodion*) are popular with the general public as attractive additions to backyard gardens, and sought after by hobbyists as pets (Douglas 1992, 1997; Jenkins et al. 2013; Measey et al. 2020). There are currently 17 species in the genus, all with allopatric distributions in South Africa, with just two species extending marginally into Eswatini or Mozambique. Although a few species have natural ranges that come into close contact, the species are not sympatric (Tolley and Burger 2007). Therefore, none of these species occupy the same locality within their natural ranges. Because *Bradypodion* species are popular as pets (Jenkins et al. 2013) and relatively easy to find and collect, they can be the target of both pre-meditated and impromptu translocations, despite this being prohibited in most provinces and in contravention of national regulations for threatened species (DEA 2011). There have been a number of anecdotal reports from the public regarding capture and release of chameleons in back gardens that are both within, and outside of their natural ranges. Until recently, most of these instances have gone undocumented but with the advent of citizen science databases, new instances of translocations are being recorded.

Three citizen science platforms



Abbreviations: A – Alexander Bay, A/M – Atlantis/Malmsbury, B – Bloemfontein, C – Clocolan, CA – Clara Anna Fontein, E – Ermelo, H – Hout Bay, J – Johannesburg, K – Klapmuts, L – Lüdertiz, M – Muizenberg, R – Rustenburg, S – Stellenbosch, St – Standerton, Sw – Swellendam, S/W – Swakopmund/Walvis Bay, Ve – Veldrift, Vr- Vredenburg, W – Welkom

Figure 1. Extra-limital records of *Bradypodion*. Closed symbols represent recent records (multiple records since 2018 or at least one record since 2005) and open symbols represent historical records (no reports since 1996). Green triangles – *B. damaranum*, blue circles – *B. pumilum*, orange squares – *B. ventrale*. Stars represent established populations, and question marks represent anecdotal or questionable accounts (colour coded to species). The natural ranges of these same and potentially syntopic species are shown by coloured polygons (green – *B. damaranum*, light grey – *B. gutturale*, dark grey – *B. occidentale*, blue – *B. pumilum*, orange – *B. ventrale*).

(iNaturalist, iSpot and ReptileMap) and literature were queried for any and all records of *Bradypodion*, which were then tabulated and mapped (Fig. 1, Table 1). Together, these sources showed at least 14 extra-limital localities recently recorded (2005 – 2020) for *B. damaranum*, *B. pumilum* and *B. ventrale*, but only seven extra-limital localities recorded for these species between the 1950s and the 1990s, most of which have not been recorded again in recent years (Table 1). Using these data, the context and background to these introductions has been detailed for each species.

BRADYPODION DAMARANUM

Bradypodion damaranum may have been historically translocated to Walvis Bay, Namibia in 1972 (Griffin 2003, Table 1). The translocated individuals were recorded as *B. pumilum*, but the source of the chameleons was clearly indicated as Knysna (Griffin 2003). Thus, the identification of those individuals is likely to have been in error, as Knysna is well within the natural range of *B. damaranum*, not *B. pumilum* and the

Table 1. Extra-limital records and corresponding identification numbers of *Bradypodion damaranum* from citizen science (iNaturalist and iSpot), museums (NMB: National Museum, Bloemfontein, JEM: Ellerman Collection – Stellenbosch University, PEM: Port Elizabeth Museum, TM: Ditsong Museum) and literature sources. Asterisks indicate records with approximate coordinates georeferenced using GoogleEarth and "?" indicates anecdotal or questionable accounts.

Source	ID number	Genus	species	Date observed	Lat	Long	Locality	Province	Country
iNaturalist	41519427	*Bradypodion*	damaranum	2020/01/25	-34.026	20.438	Swellendam	Western Cape	South Africa
iNaturalist	41519428	*Bradypodion*	damaranum	2020/01/22	-34.026	20.438	Swellendam	Western Cape	South Africa
iNaturalist	27681516	*Bradypodion*	damaranum	2019/06/25	-33.997	18.766	Stellenbosch	Western Cape	South Africa
iNaturalist	10867286	*Bradypodion*	damaranum	2013/01/28	-34.027	20.446	Swellendam	Western Cape	South Africa
SANBI	KTH06-59	*Bradypodion*	*damaranum**	2006	-34.028	20.440	Swellendam	Western Cape	South Africa
SANBI	HLS2	*Bradypodion*	*damaranum**	2003	-34.026	20.438	Swellendam	Western Cape	South Africa
SANBI	HB091	*Bradypodion*	*damaranum**	Post-2003	-34.026	20.438	Swellendam	Western Cape	South Africa
Literature	Griffin 2003	*Bradypodion*	*damaranum**	1972	-22.970	14.510	Walvis Bay (?)	Erongo	Namibia
iNaturalist	43285703	*Bradypodion*	pumilum	2020/04/25	-32.901	17.988	Vredenburg	Western Cape	South Africa
iNaturalist	43383029	*Bradypodion*	pumilum	2020/04/25	-33.584	18.572	Malmesbury	Western Cape	South Africa
iNaturalist	43078175	*Bradypodion*	pumilum	2020/04/24	-32.901	17.988	Vredenburg	Western Cape	South Africa
iNaturalist	43079590	*Bradypodion*	pumilum	2020/04/24	-32.901	17.988	Vredenburg	Western Cape	South Africa
iNaturalist	43385518	*Bradypodion*	pumilum	2020/04/24	33.881	-78.512	Brunswick	North Carolina	United States
ReptileMap	157906	*Bradypodion*	pumilum	2015/11/24	-32.787	18.191	Velddrif	Western Cape	South Africa
ReptileMap	153762	*Bradypodion*	pumilum	2014/12/05	-32.784	18.173	Velddrif	Western Cape	South Africa
iSpot	610522	*Bradypodion*	pumilum	2014/09/26	-33.555	18.562	Atlantis	Western Cape	South Africa
iSpot	574301	*Bradypodion*	pumilum	2014/04/10	-33.575	18.511	Atlantis	Western Cape	South Africa
specimen	PEM R9259	*Bradypodion*	*pumilum**	1993/01/10	-28.600	16.500	Alexander Bay	Northern Cape	South Africa
Literature	Griffin 2003	*Bradypodion*	*pumilum**	1993	-26.640	15.160	Lüdertiz	Karas	Namibia
specimen	TM 55114	*Bradypodion*	pumilum	1981/07	-22.570	14.300	Walvis Bay	Erongo	Namibia
specimen	TM 56687	*Bradypodion*	pumilum	1983/03/27	-22.570	14.300	Walvis Bay	Erongo	Namibia
Literature	Griffin 2003	*Bradypodion*	*pumilum**	1950s	-22.960	14.500	Walvis Bay	Erongo	Namibia
Literature	Griffin 2003	*Bradypodion*	*pumilum**	1950s	-22.683	14.529	Swakopmund	Erongo	Namibia
Literature	Branch 1998	*Bradypodion*	*pumilum**	No date	-32.176	18.892	Clanwilliam (?)	Western Cape	South Africa
Literature	Griffin 2000	*Bradypodion*	*pumilum**	No date	-22.560	17.065	Windhoek (?)	Khomas	Namibia
specimen	JEM 89394	*Bradypodion*	*pumilum**	No date	-25.650	27.240	Rustenberg	North West	South Africa

Table 1 continued...

Source	ID Number	Genus	species	Date Observed	Lat.	Long.	Locality	Province	Country
iNaturalist	41768278	*Bradypodion*	*ventrale*	2020/04/09	-34.030	18.344	Hout Bay, Cape Town	Western Cape	South Africa
iNaturalist	41748257	*Bradypodion*	*ventrale*	2020/04/09	-34.030	18.352	Hout Bay, Cape Town	Western Cape	South Africa
iNaturalist	41693048	*Bradypodion*	*ventrale*	2020/04/08	-34.030	18.352	Hout Bay, Cape Town	Western Cape	South Africa
iNaturalist	41762726	*Bradypodion*	*ventrale*	2020/03/24	-34.030	18.352	Hout Bay, Cape Town	Western Cape	South Africa
iNaturalist	38835249	*Bradypodion*	*ventrale*	2020/02/19	-29.075	26.211	Bloemfontein	Free State	South Africa
iNaturalist	37066344	*Bradypodion*	*ventrale*	2019/12/29	-29.082	26.207	Bloemfontein	Free State	South Africa
iNaturalist	42154867	*Bradypodion*	*ventrale*	2019/12/13	-26.146	28.073	Norwood, Johannesburg	Gauteng	South Africa
iNaturalist	42154928	*Bradypodion*	*ventrale*	2019/12/13	-26.146	28.073	Norwood, Johannesburg	Gauteng	South Africa
iNaturalist	24720532	*Bradypodion*	*ventrale*	2019/05/07	-29.083	26.209	Bloemfontein	Free State	South Africa
iNaturalist	10371289	*Bradypodion*	*ventrale*	2018/03/23	-26.530	29.973	Ermelo	Mpumalanga	South Africa
iNaturalist	48260644	*Bradypodion*	*ventrale*	2017/07/16	-34.098	18.475	Muizenberg, Cape Town	Western Cape	South Africa
iNaturalist	44855712	*Bradypodion*	*ventrale*	2015/01/09	-26.938	29.245	Standerton	Mpumalanga	South Africa
ReptileMAP	6783	*Bradypodion*	*ventrale*	2010/11/01	-26.146	28.077	Norwood, Johannesburg	Gauteng	South Africa
ReptileMAP	290	*Bradypodion*	*ventrale*	2005/09/11	-26.217	28.250	Boksburg, Johannesburg	Gauteng	South Africa
specimen	NMB R07473	*Bradypodion*	*ventrale*	1996/09/26	-29.125	26.125	Bloemfontein	Free State	South Africa
specimen	NMB R07029	*Bradypodion*	*ventrale*	1994/03/23	-29.125	26.125	Bloemfontein	Free State	South Africa
specimen	NMB R06862	*Bradypodion*	*ventrale*	1992/09/25	-29.125	26.125	Bloemfontein	Free State	South Africa
specimen	NMB R07030	*Bradypodion*	*ventrale*	1992/03/09	-29.125	26.125	Bloemfontein	Free State	South Africa
specimen	NMB R06092	*Bradypodion*	*ventrale*	1989/10/19	-29.125	26.125	Bloemfontein	Free State	South Africa
specimen	NMB R06078	*Bradypodion*	*ventrale*	1989/08/26	-29.125	26.125	Bloemfontein	Free State	South Africa
specimen	NMB R05950	*Bradypodion*	*ventrale**	1989/04/13	-27.973	26.730	Jan Cilliers Park, Welkom	Free State	South Africa
specimen	NMB R05951	*Bradypodion*	*ventrale**	1989/04/13	-27.973	26.730	Jan Cilliers Park, Welkom	Free State	South Africa

Table 1 continued...

Source	ID Number	Genus	species	Date Observed	Lat.	Long.	Locality	Province	Country
specimen	NMB R05952	*Bradypodion*	*ventrale**	1989/04/13	-27.973	26.730	Jan Cilliers Park, Welkom	Free State	South Africa
specimen	NMB R05953	*Bradypodion*	*ventrale**	1989/04/13	-27.973	26.730	Jan Cilliers Park, Welkom	Free State	South Africa
specimen	NMB R05954	*Bradypodion*	*ventrale**	1989/04/13	-27.973	26.730	Jan Cilliers Park, Welkom	Free State	South Africa
specimen	NMB R05938	*Bradypodion*	*ventrale*	1989/03/29	-29.125	26.125	Bloemfontein	Free State	South Africa
specimen	NMB R05939	*Bradypodion*	*ventrale*	1989/03/29	-29.125	26.125	Bloemfontein	Free State	South Africa
specimen	NMB R05944	*Bradypodion*	*ventrale*	1989/03/29	-29.125	26.125	Bloemfontein	Free State	South Africa
specimen	NMB R05940	*Bradypodion*	*ventrale**	1989/03/26	-27.999	26.724	Naudesville, Welkom	Free State	South Africa
specimen	NMB R05941	*Bradypodion*	*ventrale**	1989/03/26	-27.999	26.724	Naudesville, Welkom	Free State	South Africa
specimen	NMB R05942	*Bradypodion*	*ventrale**	1989/03/26	-27.999	26.724	Naudesville, Welkom	Free State	South Africa
specimen	NMB R05943	*Bradypodion*	*ventrale**	1989/03/26	-27.999	26.724	Naudesville, Welkom	Free State	South Africa
specimen	NMB R05946	*Bradypodion*	*ventrale**	1989/03/26	-27.999	26.724	Naudesville, Welkom	Free State	South Africa
specimen	NMB R05947	*Bradypodion*	*ventrale**	1989/03/26	-27.999	26.724	Naudesville, Welkom	Free State	South Africa
specimen	NMB R05948	*Bradypodion*	*ventrale**	1989/03/26	-27.999	26.724	Naudesville, Welkom	Free State	South Africa
specimen	NMB R05949	*Bradypodion*	*ventrale**	1989/03/26	-27.999	26.724	Naudesville, Welkom	Free State	South Africa
specimen	NMB R05932	*Bradypodion*	*ventrale**	1989/03/12	-28.909	27.555	Clocolan	Free State	South Africa
specimen	NMB R05933	*Bradypodion*	*ventrale**	1989/03/12	-28.909	27.555	Clocolan	Free State	South Africa
specimen	NMB R05934	*Bradypodion*	*ventrale**	1989/03/12	-28.909	27.555	Clocolan	Free State	South Africa
specimen	NMB R05935	*Bradypodion*	*ventrale**	1989/03/12	-28.909	27.555	Clocolan	Free State	South Africa
specimen	NMB R05936	*Bradypodion*	*ventrale**	1989/03/12	-28.909	27.555	Clocolan	Free State	South Africa
specimen	NMB R05937	*Bradypodion*	*ventrale**	1989/03/12	-28.909	27.555	Clocolan	Free State	South Africa
specimen	NMB R05927	*Bradypodion*	*ventrale**	1989/03/06	-28.909	27.555	Clocolan	Free State	South Africa
specimen	NMB R05929	*Bradypodion*	*ventrale**	1989/03/06	-28.909	27.555	Clocolan	Free State	South Africa

Table 1 continued...

Source	ID Number	Genus	species	Date Observed	Lat.	Long.	Locality	Province	Country
specimen	NMB R05930	*Bradypodion*	*ventrale**	1989/03/06	-28.909	27.555	Clocolan	Free State	South Africa
specimen	NMB R05931	*Bradypodion*	*ventrale**	1989/03/06	-28.909	27.555	Clocolan	Free State	South Africa
specimen	NMB R05945	*Bradypodion*	*ventrale**	1989/03/06	-28.909	27.555	Clocolan	Free State	South Africa
specimen	NMB R05147	*Bradypodion*	*ventrale*	1983	-29.125	26.125	Bloemfontein	Free State	South Africa
specimen	NMB R04952	*Bradypodion*	*ventrale*	1982/11/10	-29.125	26.125	Bloemfontein	Free State	South Africa

two species can be confused. Assuming this introduction was authentic, it appears that a population did not establish as there are no other records of *B. damaranum* from Walvis Bay (see Irish 2012). Given that *B. pumilum* also has been reported from Walvis Bay (see below), there are two possibilities: either the original source (Knysna) was in error and *B. damaranum* was never introduced there, or the *B. pumilum* records from Walvis Bay represent a different translocation event. Unfortunately, neither literature nor databases have enough relevant information to distinguish between these scenarios.

There have been repeated reports of *B. damaranum* in Swellendam since at least 2003 to present day (Table 1), and the population is assumed to be established (Tolley 2020). The Swellendam population is approximately 200 km outside the natural range (Fig. 1), and while sympatric with the congener *B. gutturale*, the established population is only known from the peri-urban habitat in town. It has not yet been recorded from the natural fynbos vegetation where *B. gutturale* occurs. Thus, there are no syntopic records of the two species to date and it is unlikely that *B. damaranum*, a forest specialist, will expand into fynbos (Tolley 2020). The Swellendam area is climatically suitable for *B. damaranum* (Houniet et al. 2009) and given that the peri-urban gardens provide vegetation structure similar to forests (trees, bushes), that population (first recorded in 2003) is likely to persist.

There is one recent citizen science record of *B. damaranum* from 2019 near Stellenbosch, nearly 400 km from the native range (Fig. 1, Table 1). This record is sympatric and probably syntopic with *B. pumilum*, a species that is similar in appearance and ecology to *B. damaranum*. Both are colourful, ornamented species that prefer thick vegetation habitats. In addition, the Stellenbosch area is climatically suitable for *B. damaranum* (Houniet et al. 2009). Although there is only one record of *B. damaranum* from this area and this could represent an isolated event, both the vegetation and the climate are suitable for *B. damaranum*, and it is possible that the species could establish there.

BRADYPODION PUMILUM

There are several historical records of *B. pumilum* from extra-limital localities in South Africa and Namibia (Table 1, Fig. 1). Documented occurrences from Namibia (Lüderitz, Walvis Bay, Swakopmund; Griffin 2003) have not been confirmed in recent years (Irish 2012), nor has an anecdotal observation from Windhoek (Griffin 2000). From South Africa, there are historical extra-limital observations of *B. pumilum* from Alexander Bay (Northern Cape Province) and Rustenburg (North West Province). Both are represented by museum specimens so should be considered valid records (Table 1). Furthermore, there is an anecdotal account of *B. pumilum* in Clanwilliam (Western Cape Province) without any accompanying data or validation (Branch 1998). While it is uncertain whether any of these localities have extant populations, the lack of subsequent records suggest that

populations did not persist.

In addition to the historical records, there are recent records of *B. pumilum* slightly north of the natural distribution, ranging from 30 km (Atlantis and Malmesbury) to 140 km north of Cape Town (Veldrift, Vredenburg). The records appear to be from peri-urban areas with ample vegetation for this species rather than from natural vegetation (renosterveld) of that area. Thus, these populations could be restricted within peri-urban boundaries. While the *B. pumilum* 'renosterveld morph' (Tolley and Burger 2007) might have originally inhabited some areas north of Cape Town, much of the renosterveld has been transformed to agriculture which has reduced the habitat extensively, with small patches just north of Cape Town (e.g. records from Clara Anna Fontein Nature Reserve and Klapmuts; Fig. 1) and areas near Atlantis and Malmesbury. The renosterveld morph could still be present in some patches, but to date, all extra-limital records are of the typical morph and therefore represent introductions, rather than observations of the renosterveld morph.

Most of the recently recorded *B. pumilum* are neither sympatric nor syntopic with *B. occidentale*, except for individuals from Veldrift and Vredenburg. These records come from more than 100 km north of the natural distribution of *B. pumilum* and are well within the range of *B. occidentale*. The citizen science photos show there are several different individuals, which suggests either multiple human-mediated translocations or that breeding populations are present. Finally, there is a citizen science record from 2020 of *B. pumilum* from North Carolina, USA. Given that all *Bradypodion* are listed on CITES Appendix II, and CITES permits are required to export this species from South Africa, this record is particularly curious. CITES trade database statistics show that in the last 10 years, over 200 *B. pumilum* have been imported into the USA and 100 of these imported in the last 5 years (UNEP-WCMC 2020). It is possible that some of these exported individuals were released or escaped captivity but the extent of this is not known.

BRADYPODION VENTRALE

Bradypodion ventrale has the most numerous and widespread introductions historically and in recent years. Confirmed records show at least eight introductions of *B. ventrale* in South Africa in four provinces between 1982 and 2020. All records are from peri-urban habitats, ranging from 200 to more than 500 km from the natural distribution. In most cases, the introductions do not overlap with the native range of any *Bradypodion* species (but see below).

Some historical extra-limital localities (Free State Province) have not been confirmed in recent years (Fig. 1), while other new localities have surfaced from citizen science databases. There is a record from Boksburg (Johannesburg) from 2005, two localities from Mpumalanga Province from 2015 and 2018, and relatively new records from Cape Town (2017 and 2020). While the introduction of *B. ventrale* at most

localities is not sympatric with any native *Bradypodion*, the recent introductions to Cape Town suburbs of Muizenberg and Hout Bay are exceptions. These are most likely syntopic with *B. pumilum*, which are reasonably common in the same neighbourhoods (pers. obs.). Most of these new records are isolated occurrences, and longer-term data will be needed to assess whether any of these populations establish.

There appears to be two established *B. ventrale* populations in South Africa. Specifically, *Bradypodion ventrale* from Norwood (Johannesburg) was first recorded in 2005 with additional records from 2019, and records from Bloemfontein date back to the early 1980s with many additional records since that time, the most recent from 2019. The long timeline of repeated observations at these two localities suggests there are either repeated introductions to the same localities over the years, and/or that these populations are established. In both cases, populations have not spread out of the peri-urban habitat.

DISCUSSION

Historical records suggest that *Bradypodion* translocations have been occurring for decades, but the scope and scale of previous translocations is not known, as the historical data are scanty and often anecdotal. In contrast, over just a few years, citizen science platforms have provided important information to assist in tracking the presence of *Bradypodion* translocations and establishment of populations. The historical and recent records point to several translocations that have led to established populations in Bloemfontein, Johannesburg and Swellendam (see Tolley 2020). In contrast, historical records from several other localities have not been re-confirmed, with no additional records since they were initially reported (i.e. Alexander Bay, Clanwilliam, Clocolan, Lüderitz, Swakopmund, Rustenburg, Walvis Bay, Welkom, Windhoek). These could have been single individuals, or populations that did not establish. Clearly, citizen science platforms should be monitored for new records in these areas to assess whether populations persist.

The invasion potential of these species is not known, but might be low given that most species are habitat specialists and do not appear to thrive in alternative habitats. This might restrict introduced populations to peri-urban habitats, particularly where the climatic envelope is similar to the native range. The potential exception is *B. ventrale*, which has a very wide climatic envelope (Houniet et al. 2009), and can tolerate a wide range of vegetation types. The high proportion of introduced populations of this species further suggest that it might persist and thrive outside its native range, whereas other *Bradypodion* species might struggle to cope in alternative environments and therefore do not gain a foothold to establish.

Although most *Bradypodion* populations are not expected to expand out of the peri-urban areas, there is a risk of hybridisation and introgression, as well as disease or pathogen transmission where introduced

species occur syntopically with native species. For example, native *B. pumilum* are likely syntopic with introduced *B. ventrale* in Cape Town and *B. damaranum* in Stellenbosch. However, successful hybridisation would depend on there being weak pre- and post-zygotic mating barriers. Given that signalling is important for mate recognition within species of *Bradypodion* studied to date (Stuart-Fox and Whiting 2005), it is possible that incompatible signals are sufficient to curb inter-specific mating. Unfortunately, these aspects of chameleon life-history are essentially unknown, with no research on whether mate recognition occurs inter-specifically in *Bradypodion*, or whether post-zygotic barriers are in place.

The effects of introgressive hybridisation are difficult to predict, but one outcome could be swamping of the original gene pool with novel and/or deleterious alleles and unpredictable effects on fitness (Largiadèr 2008, Rhymer and Simberloff 1996) including maladaptation of the native species (Todesco et al. 2016). Furthermore, introgression can boost the invasion potential of the introduced species by introducing alleles for local adaptations to their gene pool, generating novel genotypes (Riley et al. 2003; Largiadèr 2008, Fitzpatrick et al. 2010; Todesco et al. 2016). This could potentially provide the very adaptive potential needed for these species to expand beyond the peri-urban area. While many factors contribute to whether an introduced species becomes established or invasive (see van Wilgen et al. 2020), a better understanding of *Bradypodion* life-history, behaviour and disease transmission would be essential to assess whether these introductions pose a risk to native species.

ACKNOWLEDGEMENTS

Thanks to Carmen Stuart, Devon Main, Shivan Parusnath and the iNaturalist and iSpot contributors for reporting on the recent extra-limital records of *Bradypodion*, and to Graham Alexander, Werner Conradie, Darren Pietersen and Josh Weeber for brainstorming the idea to get these records together. Aaron Bauer and two reviewers provided very helpful comments for improving the manuscript.

REFERENCES

Branch B. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa. Cape Town: Struik Publishers Ltd.

DEA (South African Department of Environmental Affairs). 2011. National Environmental Management: Biodiversity Act 10 of 2004: Threatened or Protected Species Regulations. Government Gazette No. 29657, Amended by notice no. R. 576.

Douglas R. 1992. The genera of *Bradypodion* and *Chamaeleo* in the Orange Free State. J. Herpet. Assoc. Afr. 37:55–56.

Douglas R. 1997. The reptile and frog invaders. Culna 51:25–27.

Fitzpatrick BM, Johnson JR, Kump DK, Smith JJ, Voss SR, Shaffer HB. 2010. Rapid spread of invasive genes into a threatened native species. Proc. Nat. Acad. Sci. USA 107:3606–3610.

Griffin M. 2000. The species diversity, distri-

bution and conservation of Namibian reptiles: a review. SWA Wiss. Ges. 48:116–141.

Griffin M. 2003. Annotated checklist and provisional conservation status of Namibian reptiles. Namibia Scientific Society. Biodiversity Inventory, Ministry of Environment and Tourism, Windhoek, 168 pp.

Houniet DT, Thuiller W, Tolley KA. 2009. Po- tential effects of predicted climate change on the endemic South African Dwarf Cha- meleons, Bradypodion. Afr. J. Herpet. 58:28–35.

Irish J. 2012. Namibia Biodiversity Database Web Site. Page: Bradypodion pumilum (Gmelin 1789) in Namibia. Interpretive collation based on the combined published sources for all included taxa, as listed. [accessed 6 May 2020] http://www.biodiversity.org.na/taxondisplay.php?nr=2708.

Jenkins R, Measey GJ, Anderson CV, Tolley KA. 2013. Chameleon conservation. In: Tolley KA, Herrel A, editors. The Biology of Chameleons. Berkeley: University of California Press.

Largiadèr CR. 2008. Hybridization and introgression between native and alien species. In: Nentwig N, editor. Biological Invasions. Berlin: Springer.

Measey J, Robinson TB, Kruger N, Zengeya TA, Hurley BP. 2020. South Africa as a Donor of Alien Animals. In: van Wilgen B, Measey J, Richardson D, Wilson J, Zengeya T, editors. Biological Invasions in South Africa. Cham: Springer International Publishing.

Riley SP, Bradley Shaffer H, Randal Voss S, Fitzpatrick, BM. 2003. Hybridization between a rare, native tiger salamander (Ambystoma californiense) and its introduced congener. Ecol. Appl. 13:1263–1275.

Rhymer JM, Simberloff D. 1996. Extinction by hybridization and introgression. Ann. Rev. Ecol. Syst. 27:83-109.

Stuart-Fox DM, Whiting MJ. 2005. Male

dwarf chameleons assess risk of courting large, aggressive females. Biol. Lett. 1:231–234.

Todesco M, Pascual MA, Owens GL, Ostevik KL, Moyers BT, Hübner S, Heredia SM, Hahn MA, Caseys C, Bock DG, Rieseberg LH. 2016. Hybridization and extinction. Evol. Appl. 9:892–908.

Tolley KA, Burger M. 2007. Chameleons of Southern Africa. Cape Town: Struik-Penguin Random House.

Tolley KA. 2020. Geographical Distributions: Chamaeleonidae, Bradypodion damaranum (Boulenger, 1887), Kynsna Dwarf Chameleon: Established in Swellendam. Afr. Herp News 74: 83–88.

UNEP-WCMC. 2020. CITES Trade Database. [accessed 4 May 2020] https://trade.cites.org/.

van Wilgen B, Measey J, Richardson D, Wilson J, Zengeya T. 2020. Biological Invasions in South Africa. Cham: Springer International Publishing.

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

AHN
NATURAL HISTORY
notes

ATRACTASPIDIDAE

Atractaspis duerdeni
Gough, 1907
Beaked Stiletto Snake

DIET

C. R. HUNDERMARK

On the night of 8 February 2019, at approximately 20h15, a roadkill specimen of an adult *Atractaspis duerdeni* (Gough, 1907) (Fig. 1) was collected by Joubert Heymans on a tar road near Rust De Winter Dam, Limpopo Province, South Africa (25°15'0.68''S, 28°26'09.94''E, QDS 2528AB, 1079 metres above sea level). This identification was supported by the presence of an entire anal shield, 25 unpaired subcaudal scales, 202 ventral scales, and the characteristic enlarged rostral scale (Marais 2004; Weinstein and Warrell 2019). The specimen was photographed and then stored in a chest freezer for later examination. This record has been uploaded to iNaturalist (https://www.inaturalist.org), with observation number 20251138.

Figure 1. Dorsal (A) and lateral (B) view of the head scalation of the predator, an adult Beaked Stiletto Snake, *Atractaspis duerdeni* (Gough, 1907). Photo: Courtney Robert Hundermark.

The specimen, with a snout-vent length (SVL) of 349 mm and tail length (TL) of 33 mm, was thawed for dissection on 29 October 2019. A mid-ventral incision was made to examine the gut content (Fig. 2). A singular, partially digested prey item, which had been ingested head first, was found in the stomach of the specimen and was identified as a juvenile Holub's Sandveld Lizard, *Nucras holubi* (Steindachner, 1882) (Fig. 3). This identification was confirmed by Werner Conradie of the Port Elizabeth Museum, and was supported by various morphological features including the scalation and dorsal patterning of the lizard's undigested remains, the structure of the hind feet (Branch 1998), and geographic distribution (Bates et al. 2014). Both the predator, *A. duerdeni*, and the prey item, *N. holubi*, have been preserved in 70% ethanol and have been deposited into the herpetology collection at Port Elizabeth Museum, South Africa, under the accession number PEM R24888.

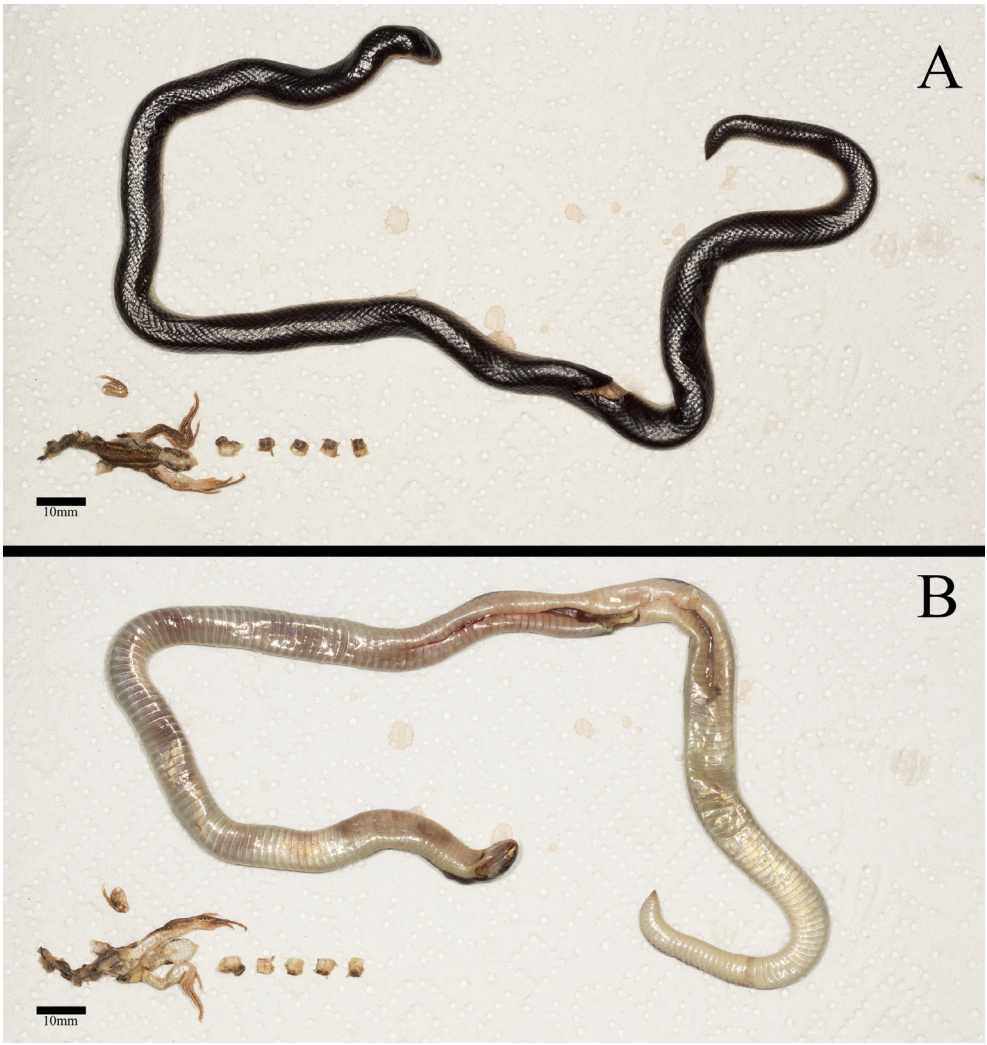


Figure 2. Dorsal (A) and ventral (B) view of *A. duerdeni* and its prey, a juvenile Holub's Sandveld Lizard, *Nucras holubi* (Steindachner, 1882) side by side after dissection. Photo: Courtney Robert Hundermark.

Little is known about the diet of species within the genus *Atractaspis*. It has been widely documented that members of this genus will prey on a variety of burrowing reptiles, including typical lizards, legless lizards and snakes, as well as frogs, amphisbaenians, and small rodents, most of which are predated upon while asleep in their burrows (Broadley 1983; Broadley and Cock 1989; Spawls and Branch 1995; Marais 2004; Weinstein and Warrell 2019). Very few documented records of the diet

Figure 3. Dorsal (A) and ventral (B) view of the undigested remains of the prey item, *N. holubi*. Photo: Courtney Robert Hundermark.

of *A. duerdeni* are known – gut content examinations in previously dissected specimens have recorded the remains of a Spotted Sandveld Lizard, *Nucras intertexta* (Smith, 1838), along with other unidentifiable snakes and lacertids (Broadley 1991; Shine et al. 2006; Weinstein and Warrell 2019). This novel dietary observation represents the first published instance of *N. holubi*, and the second instance of the genus *Nucras*, in the diet of *A. duerdeni*. This record further highlights the importance of roadkill as a valuable source of distribution records and insight into the diet and reproduction of poorly known species of reptiles. Such *ad hoc* documentations need to be encouraged, and voucher material must be deposited in a museum collection where these specimens are accessible to the scientific community.

ACKNOWLEDGEMENTS

I would like to thank Joubert Heymans for collecting and freezing the specimen prior to dissection, Hana Petersen for her assistance with formatting and review of this note, Werner Conradie for his commentary and review of this note, and Tyrone Ping for giving me access to books which I do not yet own.

REFERENCES

Bates MF, Branch WR, Bauer AM, Burger M, Marais J, Alexander GJ, de Villiers MS. 2014. The Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. Pretoria: South African National Biodiversity Institute.

Branch B. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa. Cape Town: Struik Publishers.

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

Broadley DG. 1991. A Review of the Southern African Stiletto Snakes of the genus Atractaspis A. Smith (Serpentes: Atractaspididae). Arnoldia 9: 495-517.

Broadley DG, Cock EV. 1989. Snakes of Zimbabwe. Harare: Longman Zimbabwe.

Marais J. 2004. A Complete Guide to the Snakes of Southern Africa. Cape Town: Struik Nature.

Shine R, Branch WR, Harlow PS, Webb JK, Shine T. Biology of Burrowing Asps (Atractaspididae) from Southern Africa. Copeia 2006:103-115.

Spawls S, Branch B. 1995. The Dangerous Snakes of Africa. Halfway House: Southern

Book Publishers.

Weinstein SA, Warrell DA. 2019. The African and Middle Eastern Burrowing Asps (*Atractaspis spp.*) and Their Allies: Biology, venom and envenoming. Frankfurt am Main: Chimaira.

SUBMITTED BY:

COURTNEY ROBERT HUNDERMARK. College of Agriculture and Environmental Sciences, UNISA, Pretoria, South Africa. Email: 63086786@mylife.unisa.ac.za

LAMPROPHIIDAE LAMPROPHIINAE

Lycodonomorphus rufulus (Lichtenstein, 1823) Common Brown Water Snake

MAXIMUM LENGTH

C. PRINSLOO & L.R.G. RAW

The Common Brown Water Snake (*Lycodonomorphus rufulus*) is a semi-aquatic snake, feeding mostly on frogs, which is widely distributed in South Africa (Broadley 1983; Branch 1998; Marais 2004). As a CBP1 permit (Permit for catch and release of "problem snakes" within Gauteng, issued to a qualifying person by the Gauteng Department of Agriculture and Rural Development) snake remover in Gauteng Province, South Africa, one of us, Conrad Prinsloo (CP), gets calls to remove this species fairly often from gardens where they considered as a potential danger to children or animals. On previous occasions, CP has removed individuals that range from neonates (120mm total length) through to the normal maximum total length of 600 mm total length as recorded in the literature (FitzSimons 1962; Broadley 1983; Marais 2004; Branch 1998).

On the evening of 18 December 2019 at approximately 19:10, an exceptionally large female specimen was removed from a garden in close vicinity to a natural pond in Benoni (26.119213° S, 28.368060° E; 1663 m a.s.l.). With the aid of a normal tape measure the total length of 970 mm (snout-vent length (SVL) 800 mm; tail length (TL) 170 mm) was established (Fig. 1). Around 1974, Lynn Raw (LR) measured an unusually large but poorly preserved specimen sent to him by Ronald Auerbach. This snake, also a female with the same total length of 970 mm, was collected by Edward Bodbijl in Honeydew (26.066668° S, 27.916667° E; 1599 m a.s.l.).

It was not photographed at the time and it is not known if the specimen still exists.

The previous record length was a female (TM 5993) from Pretoria (25.733335° S, 28.183333° E; 1350 m a.s.l.) that measured 870 mm (SVL 702 mm + TL 168 mm) (FitzSimons 1962; Broadley 1983). Branch (1998), refers to the largest female recorded as 702 mm SVL, presumably the same specimen as mentioned above. Marais (2004) reported average lengths of 45–60 cm but seldom exceeding 85 cm. The two new records increase the maximum length of adult females to 970 mm total length.

It is interesting to note that all three of the largest recorded females originated

Figure 1. Photograph of Benoni *Lycodonomorphus rufulus* against a tape measure (Photographs provided by CP).

from a geographically limited area of the grassland and savanna biomes (Fig. 2). The Eastern Highveld connecting with Tshwane through Midrand and Centurion has numerous natural water sources including temporary and permanent ponds, small to larger dams and small streams joining into larger rivers like the Jukskei, Oliefantspruit, Hennopsriver, Sesmylspruit, Blesbokspruit and the Suikerbosrand River feeding dams both toward Centurion and the larger Vaal Dam catchment area. This ideal environment will provide a consistent source of natural prey items (mainly frogs such as *Amietia delalandii, Xenopus laevis, Kassina senegalensis, Cacosternum boettgeri* and various tadpoles, but possibly also nestlings of birds such as *Cisticola juncidis, Anthus cinnamomeus,* small lizards such as juvenile

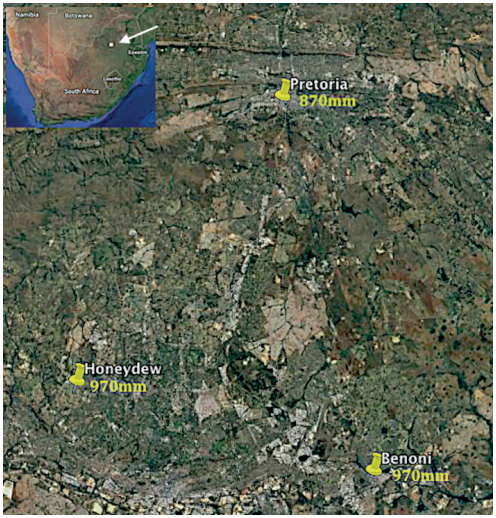


Figure 2. Localities of the three largest *Lycodonomorphus rufulus* recorded with an insert showing location in Southern Africa. (Map images modified from Google Earth by LR.)

Trachylepis capensis, Panaspis wahlbergi and Pachydactylus capensis as well as small fish and nestling rodents) that may explain why these large specimens have been found within this quite limited area.

ACKNOWLEDGEMENTS

The authors thank Luke Kemp and Dr. Ortwin Bourquin for reviewing earlier drafts of this note.

REFERENCES

Branch WR. 1998. Field Guide to Snakes and other Reptiles of Southern Africa. Cape Town: Struik Publishers.

Broadley DG. 1983. FitzSimons' Snakes of Southern Africa. Johannesburg: Delta Books.

FitzSimons VFM. 1962. Snakes of Southern Africa. Cape Town: Purnell & Sons.

Marais J. 2004. A Complete Guide to the Snakes of Southern Africa. Cape Town: Struik Publishers.

SUBMITTED BY:

CONRAD PRINSLOO, Scalesandmore. 14 Topaz Avenue, Dersley, Springs, Gauteng
Email: scalesandmore@gmail.com
LYNN R G RAW, Kirkebakken 37, Aalsoe, 8500 Grenaa, Denmark
Email: lynnrgraw@gmail.com

PROSYMNIDAE

Prosymna stuhlmanni
(Pfeffer, 1893)
East African Shovel Snout

REPRODUCTION

T. J. PING & C. R. HUNDERMARK

On the night of 8th February 2018, at approximately 21h15, the authors found an adult female East African Shovel Snout, *Prosymna stuhlmanni* (Pfeffer, 1893) (Fig. 1), moving during a heavy thunderstorm on a tar road flanked by Coastal Lowland forest between Mtubatuba and St Lucia, KwaZulu-Natal, South Africa (28°23'52.08''S, 32°18'39.90''E, QDS 2832AD, 51 metres above sea level). The identification was supported by the dorsal scales arranged in 17 midbody rows, distinct yellow snout, and a double row of small white dots running along the dorsum (Branch 1998; Branch 2014; Spawls et al. 2018). The snake was collected and kept overnight so that photographs could be taken the following morning. Photographs of the specimen have been uploaded to the ADU Virtual Museum ReptileMap (https://vmus.adu.org.za) under record number 167098.

While being held overnight, the adult female *P. stuhlmanni*, measuring 291 mm in total body length, laid two eggs. The eggs measured 42 mm x 8 mm and 40 mm x 7 mm respectively (Fig. 2). The eggs were placed in a sealed plastic tub, containing a mixture of 95% perlite and 5% water, housed inside the controlled environment of an incubator at a temperature of 28°C with a humidity level ranging between 65 - 75%.

On 16th May 2018, after being incubated for 97 days from 9th February 2018, the eggs began to hatch, with the last hatchling emerging the following day, 17th May 2018.

Figure 1. Adult gravid female *Prosymna stuhlmanni.* From Monzi, KwaZulu-Natal. Photo: T. Ping

Figure 2. Eggs from *Prosymna stuhlmanni*. Photo: T. Ping

Figure 3. Hatchling *Prosymna stuhlmanni.* From Monzi, KwaZulu-Natal. Photo: T. Ping

The hatchling snakes were photographed and measured, both with a total body length of 142 mm (Fig. 3). The hatchlings were released near the original location of capture on 25th May 2018. All measurements were taken using a standard metric measuring tape.

There exists little published information detailing reproduction in members of the genus *Prosymna.* In January 1999, three eggs

measuring 37 - 39 mm x 10 - 12 mm were laid by a *P. frontalis* (Peters, 1867) in Namibia. These eggs were incubated for a period of between 48 - 53 days, at temperatures of between 28 - 32°C, with the total body length of hatchlings measuring between 140 - 145 mm (Griffin and Hauch 1999). A typical clutch size in *P. sundevalli* (Smith, 1849) and *P. bivittata* (Werner, 1903) ranges from three to four elongate eggs, each measuring 28 x 9 mm and 27 x 7 mm respectively (Broadley 1990; Branch 1998). While previous records for *P. stuhlmanni* report a typical clutch size of three to four eggs measuring 19 - 30 mm x 6 - 8 mm (Broadley 1990; Spawls et al. 2018), the present observation shows a comparatively small clutch size comprising two very large eggs, while still conforming to previously recorded averages for this genus. Additionally, details regarding incubation time and the total body length of hatchlings are presented, which have not previously been described for *P. stuhlmanni*. This novel observation provides further insight into the reproductive biology of this genus.

ACKNOWLEDGEMENTS

The authors would like to thank Werner Conradie for his comments and suggestions.

REFERENCES

Branch B. 1998. Field Guide to Snakes and Other Reptiles of Southern Africa. Cape Town: Struik Publishers.

Branch B. 2014. A Photographic Guide to Snakes, Other Reptiles and Amphibians of East Africa. Cape Town: Struik Publishers.

Broadley DG. 1990. Fitzsimons' Snakes of Southern Africa. Johannesburg: Jonathan Ball and Ad. Donker Publishers.

Griffin M, Hauch J. 1999. Life history notes: *Prosymna frontalis*. South-western Shovel-snout. Reproduction. Afr. Herp News 30: 30-31.

Spawls S, Howell K, Hinkel H, Menegon M. 2018. Field Guide to East African Reptiles. London: Bloomsbury Wildlife.

SUBMITTED BY:

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

COURTNEY ROBERT HUNDERMARK. College of Agriculture and Environmental Sciences, UNISA, Pretoria, South Africa.
Email: 63086786@mylife.unisa.ac.za

PSEUDASPIDIDAE

Pseudaspis cana
(Linnaeus, 1758)
Mole Snake

DIET

B. MARITZ, M. VAN HEERDEN & T. SLADE

On 14 November 2018 the partially decomposed remains of a large Mole Snake (*Pseudaspis cana*) were discovered in coastal *veld* in the Cape St Martin area of the Western Cape Province, South Africa (32.719

Figure 1. Deceased molesnake *Pseudaspis cana* with remains of young *Raphicerus* sp. extruding from gut as found. Photo: T. Slade

S; 17.924 E) by Tally Slade. The specific identity of the snake was confirmed by its large size (length and girth), smooth dorsal scales, and colouration typical of Mole Snakes from the region. Examination of the remains revealed the carcass of a small antelope protruding from the body cavity of the snake (Fig 1). The remains likely belong to a member of the genus *Raphicerus*, the most likely candidate species being Steenbok (*Raphicerus campestris*) which is abundant in the vicinity. Measurements of the antelope's cranium (length = 79 mm) and along the ventral surface of the hoof (length = 17 mm) suggest that the animal was very young or possibly new-born (adult hoof length for local *Raphicerus* = ~30 mm; Skinner & Chimimba 2005).

Mole Snakes, especially those from the south-western Cape, are large-bodied and can reach total lengths of over 2 m (Witberg 2007) and weigh in excess of 2 kg (B. Maritz, unpublished data). Although Mole Snakes were not previously known to feed on antelope (Branch 1998), the large size attained by these snakes and the abundance of small-bodied antelope in the region means that a scenario in which a large, foraging Mole Snake encountered a newly born (or even still born) antelope and proceeded to consume it is not implausible. Unfortunately, the cause of death for the Mole Snake is unknown, but speculatively, this might have been associated with the consumption of the relatively large meal.

Figure 2. *Raphicerus* legs protruding from the inside of deceased molesnake, *Pseudaspis cana.* Photo: T. Slade

Consumption of antelope is common among large pythonids (Greene 1997). However, the consumption of antelope is not restricted to this clade of giant snakes, even in Africa with reports of a viperid (*Bitis gabonica*; Warner & Alexander, 2011), and an elapid (*Dendroaspis polylepis*; Jackson 1956; Alexander 1987) consuming young antelope. To our knowledge, this remarkable observation represents the first evidence of consumption of an antelope by a pseudaspidid snake, and one of very few cases of antelope consumption by a non-pythonid species in Africa.

ACKNOWLEDGEMENTS

We thank J. Marais for placing MVH and TS in contact with BM. We also thank D. Smith, M. Keith, and J. Power for comments on the identity of the *Raphicerus*. Finally, we thank S. Spawls and J. Marais for helping to track down the Jackson (1956) reference. Two anonymous reviewers provided useful comments that improved this manuscript.

REFERENCES

Alexander GJ. 1987. The herpetofauna of municipal Durban: a biogeographical review. [MSc thesis]. Durban: University of Natal.

Branch B. 1998. Field guide to the snakes and other reptiles of southern Africa. Struik.

Greene HW. 1997. Snakes: the evolution of mystery in nature. University of California Press.

Jackson WT. 1956. The elusive little Piti. Afr. Wild.: 10: 295–300.

Skinner JD, Chimimba CT. 2005. The mammals of the southern African sub-region. Cambridge University Press.

Warner JK, Alexander GJ. 2011. *Bitis gabonica* (Gaboon Viper). Diet and Prey Size. Herpetol. Rev. 42: 280–281.

Witberg M. 2007. Natural History Note: Maximum Size: *Pseudaspis cana*. Afr. Herp News 42: 18–20.

SUBMITTED BY:

BRYAN MARITZ, Department of Biodiversity and Conservation Biology, University of the Western Cape, Private Bag X17, Bellville, 7535. E-mail: bryanmaritz@gmail.com

MARIE VAN HEERDEN, Cape St Martin Private Nature Reserve, PO Box 91, St Helena Bay, 7390.
E-mail: marie@tpsconsult.co.za

TALLY SLADE, Cape St Martin Private Nature Reserve, PO Box 91, St Helena Bay, 7390. E-mail: tally@tpsconsult.co.za.

ELAPIDAE

Naja anchietae
(Bocage,1879)
Anchieta's Cobra

MAXIMUM SIZE

F. THEART & T. PING

The Anchieta's Cobra *(Naja anchietae)* is a large elapid found in western southern Africa from western Zimbabwe, northern Botswana, south-western Zambia, southern Angola and central north-eastern Namibia (Broadley and Wüster 2004). Although

common and widespread, it is responsible for very few serious envenomations throughout its range (Buys, pers. comm. 2020). *Naja anchietae* typically are shy snakes and are not prominently involved in conflict with humans, but do infrequently enter buildings in urban areas (Hauptfleisch and Theart 2018).

On 06 March 2015, a large *Naja anchietae* was removed from the Ujams water treatment plant (22°28'28.1"S 17°04'56.0"E) (1655 meters above sea level) north of Windhoek in the Khomas region, central Namibia. The identification was supported by the inclusion of large smooth scales numbering 17 rows at midbody although 15 or 19 on occasion (Spawls and Branch 2020). The animal was sexed using a probe set and determined as a male. It was then weighed using a standard digital fishing scale (Fox digital fishing scale 60kg) and measured three times with a measuring tape to ensure accuracy. The total length of the snake was 2410 mm and weighed four kilograms. The snout-vent length (SVL) was not recorded, but presumed around 2008 mm while the tail length was 330 mm based on size ratios from other large individuals measured n = 28 (Hauptfleisch, Theart unpublished). The snake was released at Daan Viljoen Nature Reserve (22°52'50.0"S 16°97'13.0"E) (1650 meters above sea level) west of Windhoek.

Maximum size for males tends to exceed that of females in this species (Shine et al 2007). The largest male *Naja anchietae* previously recorded in literature measured 2310 mm, while the largest female measured 2180 mm (Broadley and Wüster 2004). In a previous study which looked at human interactions with *N. anchietae* reported 28 specimens being removed from homes. Ten individuals exceeding 2000 mm were males, while only three females exceeded that length (Hauptfleisch and Theart 2018). This observation is supported by Wüster and Broadley (2004) and Shine et al. (2007). While there are some anecdotal reports of this snake exceeding 2500 mm, none of these individuals were accurately measured. This record therefore represents the new maximum length of 2410mm this species: an increase of 4.3%.

ACKNOWLEDGEMENTS

We thank Francois Becker for his comments and suggestions on the test and Dr Buys for information on envenomation.

REFERENCES

Spawls S, Branch B. 2020. The Dangerous Snakes of Africa. London: Bloomsbury Wildlife Publishers.

Broadley DG, Wüster W. 2004. A review of the southern African "non-spitting" cobras (Serpentes: Elapidae: Naja). Afr. J. Herpetol. 53: 101–122.

Hauptfleisch ML, Theart F. 2018. A Spatial and Temporal assessment of human-snake conflicts in Windhoek, Namibia. Nam. J. Environ. 2 A: 128-133.

Shine R, Branch WR, Webb JK, Harlow PS, Shine T and Keogh JS. 2007. Ecology of cobras from southern Africa. J. Zool. 272: 183-193

SUBMITTED BY:

FRANCOIS THEART, Namibia University of Science and Technology, 8 Johann Albrecht street, Windhoek, Namibia. Email: francois.theart@gmail.com
TYRONE PING, 7 Oak Tree Avenue, Glen Anil. Kwa-Zulu Natal, South Africa
Email:contact@tyroneping.co.za

Naja nigricincta nigricincta Bogert, 1940 Western Barred Spitting Cobra

MAXIMUM SIZE

F. THEART & T. PING

The Western Barred Spitting Cobra *(Naja nigricincta nigricincta)* is found throughout central and north western Namibia. This species is prominently involved in conflict with humans (Hauptfleisch and Theart 2018) and is responsible for serious envenomation throughout its range (Saaiman and Buys 2019).

On 19 April 2017 a dead on road specimen of a Western Barred Spitting Cobra *(Naja nigricincta nigricincta)* was collected on a gravel road D1952 (22°06'19.0"S 15°46'16.7"E) (1137 meters above sea level) outside of Karibib - a town in the Erongo Region of western Namibia - by Mrs Jeanne Koch. This identification was supported by a strongly black and white banded body upon further inspection, the dorsal scales arranged in 21 (sometimes 23) midbody rows, ventrals 192 - 226 and subcaudals of 57–73. (Spawls and Branch 2020).

Prior to 2007, *Naja nigricincta nigricincta* and *Naja nigricincta woodi* were considered to be sub species of *Naja nigricollis.* However *Naja nigricollis* proved to be polyphyletic and *Naja nigricincta nigricincta* was recognized as a valid species (Wuster and Broadly 2007). *Naja nigricincta nigricincta* consists of one subspecies *Naja nigricincta woodi* which is mainly found in southern Namibia; whereas, *Naja nigricincta nigricincta* is found from south of the Kuiseb river throughout central and northern western Namibia.

The specimen was measured three times using a standard measuring tape to ensure accuracy and was determined as a male using a probe set. A snout vent length (SVL) of 1570 mm and tail length (TL) was 360 mm, providing a total length of 1930 mm. Fitzsimmons (1962) mentions a total length of 1370 mm, while Branch (1998) suggests that *Naja nigricincta nigricincta* rarely exceeds 1500 mm. Personal observations by Theart indicate that males are typically larger than females. This is based on data collected on 135 *Naja nigricincta nigricincta* over a 3 year period (Hauptfleisch and Theart, unpublished data) with the two largest males captured in Windhoek during 2019 (Male 1: 1490 mm (SVL), 310 mm (TL), total length = 1800 mm; Male 2: 1550mm (SVL), 320 mm (TL), total length = 1870mm). The largest female measured 1420 mm (SVL), 280 mm (TL), totalling 1700 mm. There are unconfirmed anecdotal reports of this species exceeding 2000 mm. Shine (2007) cites that females have a larger SVL in comparison than males, however Theart's

findings suggest otherwise and more work needs to be done in this area.

The current record of 1930 mm increases the known size of this species by approximately 22% when comparing it against the previous maximum size of 1500 mm. While *Naja nigricincta nigricincta* may get larger in captivity, these artificial controlled conditions are generally not a true reflection of animals in a natural state.

ACKNOWLEDGEMENTS

The authors would like to thank Francois Becker for his comments and suggestions.

REFERENCES:

Saaiman EL,Buys PJC. 2019. Spitting cobra (*Naja nigricincta nigricincta*) bites complicated by rhabdomyolysis, possible intravascular haemolysis, and coagulopathy. S. Afr. Med. J. 109: 736–740.

Hauptfleisch ML,Theart F. 2018. A spatial and temporal assessment of human-snake conflicts in Windhoek, Namibia. Nam. J. Environ. 2 A: 128-133.

Branch WR. 1998. Field Guide to Snakes and other Reptiles of Southern Africa. Cape Town: Struik Publishers.

Spawls S, Branch WR. 2020. The Dangerous Snakes of Africa. London: Bloomsbury Wildlife Publishers.

Fitzsimons VFM. 1962. Snakes of Southern Africa. Dunstable and London: Waterlow and Sons Limited.

Shine R, Branch WR, Webb JK, Harlow PS, Shine T, Keogh JS. 2007. Ecology of cobras from southern Africa. J. Zool. 272: 183-193.

Wüster W, Crookes S, Ineich I, Mané Y, Pook CE, Trape JF, Broadly DG. 2007. The phylogeny of cobras inferred from mitochondrial DNA sequences: Evolution of venom spitting and the phylogeography of the African spitting cobras (Serpentes: Elapidea: *Naja nigricollis* complex). Mol. Phylogenet. Evol. 45: 437-453.

SUBMITTED BY:

FRANCOIS THEART, Namibia University of Science and Technology, 8 Johann Albrecht street, Windhoek, Namibia. Email: francois.theart@gmail.com

TYRONE PING, 7 Oak Tree Avenue, Glen Anil. Kwa-Zulu Natal, South Africa
Email:contact@tyroneping.co.za

GEKKONIDAE

Lygodactylus capensis
(Smith, 1849)
Common Dwarf Gecko

NEW RECORDS FOR THE MAKHANDA REGION

W. CONRADIE, G.K. NICOLAU, L. KEMP, S. EDWARDS, S. KLIEN SNAKEN- BORG & B. REEVES

The Common Dwarf Gecko, *Lygodactylus capensis*, is native to the northern parts of southern Africa (Branch 2014). In recent years, this little diurnal gecko has slowly spread to most of the larger towns in South Africa via different means of transportation (Rebelo et al. 2019). The first recorded introductions into the Eastern Cape Province took place in Port Elizabeth in 1986, although this species may have been introduced years before and gone unnoticed (Branch 1987; Branch and Haagner 1993). Rebelo et al. (2019) provide a detailed overview of the known invasive populations in the Eastern Cape; however, only nine records have been recorded for the Makhanda (=Grahamstown) region.

During a rapid herpetofaunal survey of the Thomas Baines and Great Fish River nature reserves conducted between 24–28 February 2020, we collected and observed numerous *L. capensis* individuals on man-made structures. Vouchered specimens were cataloged into the Port Elizabeth Museum (PEM; Table 1). These geckos have not previously been reported from these reserves, although they might have been introduced at an earlier date and gone unnoticed. We gathered additional records of *L. capensis* from Makhanda residents and online platforms such as iNaturalist (https://www.inaturalist.org) and ReptileMap (http://vmus.adu.org.za) to explore the origin of these introductions (Table 1, Fig. 1).

The earliest record we could find for Makhanda is a photograph uploaded to Facebook in early 2011 by Justin Nicolau, followed by a record from 2014 (Rebelo et al. 2019). Since these two records, there has been a steady flow of records from across the town. This includes a new record from Stones Hill, about 7 km outside Makhanda on the Port Alfred road (G. Coombs, pers. comm. April 2020; Table 1). Residents from Makhanda recall that these geckos have been around for the last 15–20 years (M. Villet and R. Bills, pers. comm. March 2020). Whether these earlier observations are accurate or not, they indicate a much more recent introduction than elsewhere in the province.

When Burger (1997) compiled a checklist of the herpetofauna of the Thomas Baines Nature Reserve, he did not report the presence of *L. capensis* within the reserve. Thomas Baines Nature Reserve is situated

Table 1. Records of *Lygodactylus capensis* for Makhanda and the two protected areas. NR – Nature Reserve

Field/Catalogue Number	Locality	Latitude	Longitude	Date	Observer	Source
iNaturalist 12821130	Makhanda	-33.31376	26.52264	2018/05/26	Alex Rebelo	Rebelo et al. 2019
	Makhanda	-33.31472	26.52167	2019/07/23	Gary Nicolau	This study
iNaturalist 34161362	Makhanda	-33.31077	26.51831	2019/10/10	Dan Rogers	This study
	Makhanda	-33.31500	26.52000	2019/11/03	Gary Nicalou	This study
SOB0032	Makhanda	-33.31087	26.51762	2020/01/31	Shelley Edwards	This study
	Thomas Baines NR	-33.38447	26.48381	2020/02/14	Gary Nicolau	This study
	Thomas Baines NR	-33.41069	26.50232	2020/02/16	Gary Nicolau	This study
PEM R25326	Thomas Baines NR	-33.38242	26.48032	2020/02/24	Werner Conradie, Gary Nicolau	This study
PEM R25328	Thomas Baines NR	-33.38417	26.48381	2020/02/24	Werner Conradie, Gary Nicolau	This study
PEM R25329	Thomas Baines NR	-33.38417	26.48381	2020/02/24	Werner Conradie, Gary Nicolau	This study
PEM R25333	Thomas Baines NR	-33.41082	26.50260	2020/02/25	Brian Reeves	This study
PEM R25324	Great Fish River NR	-33.11601	26.65786	2020/02/27	Werner Conradie, Brian Reeves, Stacey Snakenborg	This study
	Makhanda	-33.31608	26.53068	2020/03/03	Wouther Hollerman	This study
	Makhanda	-33.31500	26.52306	2020/03/10	Gary Nicalou	This study
	Makhanda	-33.31330	26.52206	2020/03/12	Helen James	This study
	Makhanda	-33.30639	26.52583	2020/03/16	Gary Nicalou, Emily Jackson	This study
	Makhanda	-33.31583	26.53139	2020/03/16	Gary Nicalou, Emily Jackson	This study
	Makhanda	-33.31917	26.53444	2020/03/16	Gary Nicalou, Emily Jackson	This study
	Makhanda	-33.31472	26.54111	2020/03/16	Gary Nicalou, Emily Jackson	This study

Table 1 continued...

Field/Catalogue Number	Field/Catalogue Number	Field/Catalogue Number	Field/Catalogue Number	Field/Catalogue Number	Field/Catalogue Number	Field/Catalogue Number
	Makhanda	-33.31139	26.52222	2020/03/25	Martin Villet	This study
	Makhanda	-33.29790	26.51941	2020/03/25	Roger Bills	This study
	Stone Hill	-33.33402	26.56358	2020/04/02	Gareth Coombs	This study
	Makhanda	-33.30382	26.53636	2020/04/04	Gillian Miles	This study
	Makhanda	-33.29423	26.52744	2020/04/08	Mark De Vos	This study

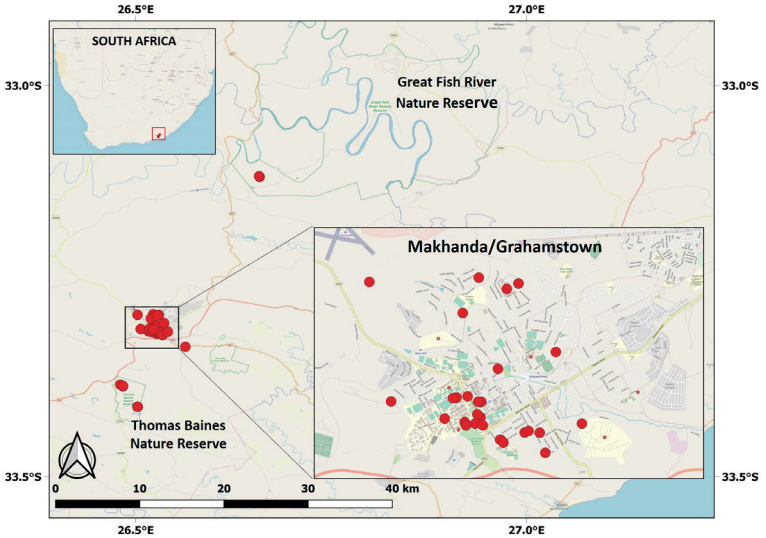


Figure 1. Map indicating the spread of the new records of *Lygodactylus capensis* for Makhanda and the two protected areas: Thomas Baines and Great Fish River Nature Reserve.

less than 10 km from Makhanda and it is a favourite tourist destination and picnic site for the residents of Makhanda. During our recent survey, we frequently observed these geckos on the walls of the education centre, accommodation huts, staff quarters, and day vistor sites. It seems that introductions of these geckos have occurred after 1997 and that they are now well-established within the boundaries of the reserve. The presence of Tropical House Geckos, *Hemidactylus mabouia*, another well-known invader, has also been confirmed from sightings at the education centre within the reserve (G. Nicolau, pers. comm. February 2020).

Rebelo et al. (2019) included a record of *L. capensis* from the Great Fish River Nature Reserve, 35 km north-east of Makhanda, among the list of introduced populations (photographed by Luke Kemp in 2016), but provide no additional information on this record. During our recent survey, an additional voucher specimen (PEM R25324) was collected from the Kentucky Bird Hide in the Great Fish River Nature Reserve and a few other specimens were observed on the bird hide and the latrine, clearly indicating that there is a well-established population living there. Discussions with the field rangers confirmed the presence of these geckos at the staff quarters. Burger (2003), however, did not include this species in the checklist of the herpetofauna of the Great Fish River Nature Reserve suggesting the introduction was post-2003.

As these geckos are not native to the region, the most likely explanation for their presence in the Great Fish River and Thomas Baines nature reserves is due to accidental introduction by humans, for example, tourists and staff from Makhanda or elsewhere. Currently these diurnal geckos have not been observed among the native vegetation in these reserves and they are not expected to pose any threats or compete for the same resources with the native nocturnal gecko species or other reptiles. They do, however, serve as additional prey items to snakes and birds. Further research is needed to understand the potential impact they might have on the ecosystem.

ACKNOWLEDGMENTS

We want to thank Gareth Coombs, Roger Bills, Mark De Vos, Helen James, Wouter Hollerman, Gillian Miles and Martin Villet who provided additional records for Makhanda and for insightful discussions.

REFERENCES

Branch WR. 1987. Introduced reptiles in the Addo Elephant National Park. Koedoe. 30: 165.

Branch WR, Haagner GV. 1993. Life history notes - *Lygodactylus capensis capensis*, Reproduction. J. Herp. Assoc. Afr. 42: 36.

Branch WR. 2014. *Lygodactylus capensis capensis* (A. Smith, 1849). In: Bates MF, Branch WR, Bauer, AM, Burger M, Marais J, Alexander GJ, De Villiers MS, editors. Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. Pretoria: South African National Biodiversity Institute.

Burger M. 1997. Reptiles and amphibians of the Thomas Baines Nature Reserve. Internal Report, Eastern Cape Nature Conservation.

Burger M. 2003. Reptiles and amphibians of the Great Fish River Nature Reserve. Internal Report, Eastern Cape Nature Conservation.

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

SUBMITTED BY:

WERNER CONRADIE, Port Elizabeth Museum (Bayworld), P.O. Box 13147, Humewood, Port Elizabeth, 6013, South Africa. Email: werner@bayword.co.za

GARY NICOLAU, Rhodes University, P.O. Box 94, Makhanda, 6140, South Africa. E-mail: garykylenicolau@gmail.com

LUKE KEMP, African Herpetological and Biodiversity Institute, Naboomspruit, 0560, South Africa. E-mail: luke.kemp94@gmail.com

SHELLEY EDWARDS, Rhodes University, P.O. Box 94, Makhanda, 6140, South Africa. E-mail: S.Edwards@ru.ac.za

STACEY KLEIN SNAKENBORG, Eastern Cape Parks & Tourism Agency, 17-25 Oxford Street, East London, 5200, South Africa. E-mail: Stacey.Snakenborg@ecpta.co.za

BRIAN REEVES, Eastern Cape Parks & Tourism Agency, 17-25 Oxford Street, East London, 5200, South Africa. E-mail: Brian.Reeves@ecpta.co.za

CHAMAELEONIDAE

Bradypodion damaranum
(Boulenger, 1887)
Knysna Dwarf Chameleon

KNYSNA DWARF CHAMELEON: ESTABLISHED IN SWELLENDAM

K.A. TOLLEY

The Knysna Dwarf Chameleon (*Bradypodion damaranum*) is endemic to the Afrotemperate forests of the Tsitsikamma and Outeniqua mountains of South Africa (Tolley and Burger 2007; Fig. 1). Its colourful appearance makes it an attractive target as a pet, although Western Cape Province, Eastern Cape Province and international legislation (CITES Appendix II) require that any removals from the wild and/or for export are under permit. Regardless, uninformed members of the public sometimes translocate chameleons in order to populate their backyard gardens or to keep as pets (Douglas 1992, 1997; Measey et al. 2020). Extra-limital observations of *Bradypodion* have been recorded from Gauteng, Western Cape, Northern Cape, Mpumalanga and Free State provinces, South Africa as well as Namibia (Tolley 2020). In each of these cases, the introduced

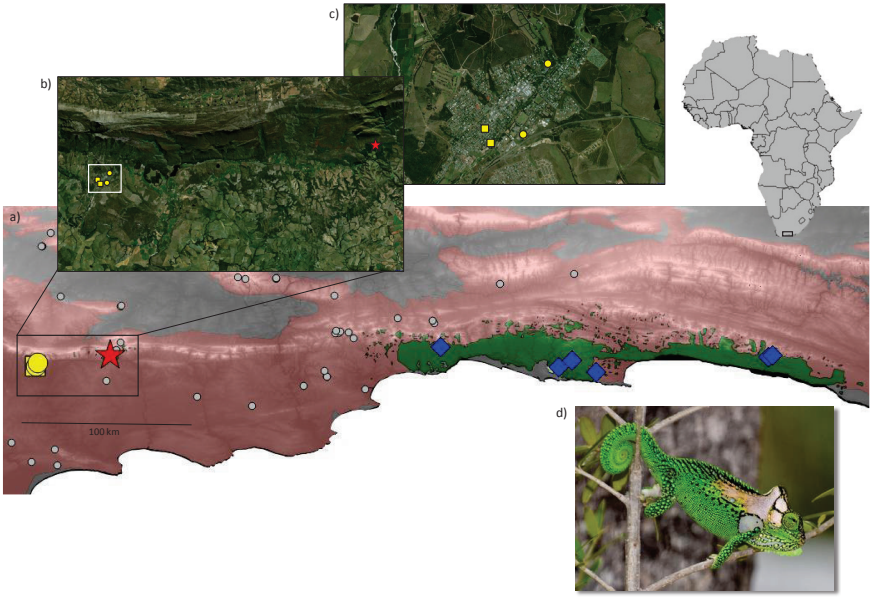


Figure 1. Localities of *Bradypodion* individuals from the Swellendam population that were sequenced. a) all individuals included for genetic analysis, b) the location of Swellendam (white box) and Grootvadersbos Forest (red star), c) Swellendam peri-urban area with records of *B. damaranum* (squares – observations; circles – DNA samples), d) *Bradypodion damaranum* from Swellendam (Photo: Carmen Stuart). Symbols: yellow – Swellendam population of *B. damaranum*, blue – *B. damaranum* from natural range, red – undescribed Grootvadersbos species. Grey dots indicate records of *Bradypodion gutturale*. Afrotemperate forest is shown in green, fynbos in pink, other vegetation types in grey. Elevation gradient from 0 – 1,500 m shown in greyscale shading with highest elevations in lighter shades. Africa inset map: rectangle shows the location of the study area.

Bradypodion populations are not known to have expanded out of the peri-urban areas.

Over the last two decades, there have been a number of *ad hoc* reports and documented observational records from Swellendam, Western Cape Province of a colourful chameleon resembling *Bradypodion damaranum* (Table 1). The earliest known record is from 2003, with additional records since that time from various parts of town (Table 1). Swellendam is separated from the natural range of *B. damaranum* by 200 km of unsuitable fynbos habitat. Given that *B. damaranum* is a forest specialist, and there are no reports of this species from the intervening areas, it is unlikely to have dispersed naturally to Swellendam. The Swellendam population

Table 1. Records of *Bradypodion damaranum* from Swellendam, and additional individuals used for comparing gene sequences. The source of the records are indicated as are the localities including GPS coordinates and the year the record was reported. GenBank accession numbers are given for the samples that were sequenced for ND2 and 16S. NA – not sequenced. Observations (obs) are from iNaturalist. All other records are DNA samples or data deposited at the South African National Biodiversity Institute.

Bradypodion	ID #	Locality	ND2	16S
damaranum	obs 10867286	Swellendam, Western Cape Prov., -34.027, 20.445. recorded in 2013	NA	NA
damaranum	obs 41519427	Swellendam, Western Cape Prov., -34.015, 20.450. recorded in 2020	NA	NA
damaranum	HB091	Swellendam, Western Cape Prov., -34.03, 20.44 (approx). Record date unknown.	NA	NA
damaranum	HLS2	Swellendam, Western Cape Prov., -34.03, 20.44 (approx.). Recorded in 2003.	MT435058	MT427752
damaranum	KTH06-5	Swellendam, Western Cape Prov., -34.03, 20.44. recorded in 2006	MT435059	NA
damaranum	BS01	George, Western Cape Prov.	AY555220	AY555196
damaranum	BS02	George, Western Cape Prov.	AY756667	AY756616
damaranum	CT006	Knysna, Western Cape Prov.	AY289805	AY289861
damaranum	DA18	Knysna, Western Cape Prov.	AY756671	AY756620
damaranum	DA19	Knysna, Western Cape Prov.	AY756672	AY756621
damaranum	DA20	Knysna, Western Cape Prov.	AY756673	AY756622
damaranum	DA21	Knysna, Western Cape Prov.	AY756674	AY756623
damaranum	DA33	Knysna, Western Cape Prov.	AY756677	AY756626
damaranum	KTH118	Witelsbos, Eastern Cape Prov.	AY756697	AY756647
damaranum	KTH119	Witelsbos, Eastern Cape Prov.	AY756698	AY756648
damaranum	KTH128	Witelsbos, Eastern Cape Prov.	AY756701	AY756651
damaranum	KTH145	Witelsbos, Eastern Cape Prov.	AY756703	AY756653
Undescribed	KTH131	Grootvadersbos Forest, Western Cape Prov.	AY756702	AY756652

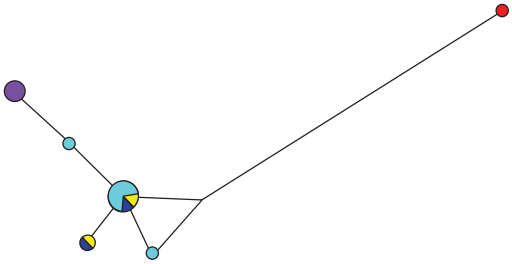


Figure 2. Network of ND2 haplotypes for *B. damaranum* from three localities and the Grootvadersbos chameleon. The size of the circles indicates the frequency of that haplotype, with lines indicating connections between haplotypes. The length of the connecting lines are proportional to the number mutations between haplotypes. Pie charts indicate the frequency of individuals with that haplotype from the different sampling localities: *B. damaranum*: Swellendam – yellow; George – dark blue; Knysna – light blue; Witelsbos – purple; undescribed Grootvadersbos chameleon – red.

could represent an isolated, naturally occurring population of *B. damaranum* but given that the natural habitat in the area is fynbos, not forest, this is unlikely. The chameleon is only known to occur in the town where there are ample trees and bushes that could emulate a forest environment, providing it with suitable habitat. The Swellendam area is also climatically suitable for *B. damaranum* (Houniet et al. 2009), and the favourable climate coupled to the artificial forest-like environment could allow this species to persist in the environs of Swellendam.

While *B. damaranum* could have been introduced to Swellendam and become established, there is also an undescribed forest species of *Bradypodion* from the nearby Grootvadersbos Forest, just 40 km to the east of Swellendam. This Grootvadersbos chameleon is somewhat similar in appearance to *B. damaranum*, although it is genetically divergent and can be distinguished phylogenetically (Tolley et al. 2006). Given the proximity of Grootvadersbos, it is conceivable that the Swellendam population could represent either an introduction from Grootvadersbos, or that corridors of semi-suitable habitat have allowed the Grootvadersbos population to expand into Swellendam. Given their similar appearance, DNA barcoding was used to investigate the identity of the Swellendam population.

Two *Bradypodion* individuals from Swellendam (Table 1) were DNA sequenced for two mitochondrial markers (16S and ND2) following standard laboratory protocols (see Tolley et al. 2004, 2006). The new sequences were examined in the context of existing data from *B. damaranum* and *Bradypodion* individuals from the Grootvadersbos Forest (Tolley et al. 2006). Uncorrected net sequence divergences were estimated for ND2 and 16S between species in MEGA v.5.1 (Tamura et al. 2011) and a median-joining haplotype network was constructed for the ND2 gene to examine the geographic

distribution of haplotypes from the natural range in comparison to the Swellendam individuals using Network v10 (Bandelt et al. 1999).

ND2 and 16S sequence divergence values were 0.06% and 0%, respectively, between the Swellendam individuals and *B. damaranum*, whereas ND2 and 16S values were 3% and 1% compared to the undescribed Grootvadersbos population. The very low sequence divergence between the Swellendam individuals and *B. damaranum* indicates that the Swellendam population matches *B. damaranum*, not the undescribed Grootvadersbos species.

The median-joining network showed five ND2 haplotypes for *B. damaranum* (Fig. 2). The two Swellendam individuals matched two of these haplotypes (Table 1). Swellendam sample HLS2 matched a haplotype present for individuals from George and Knysna, and Swellendam sample KTH06-59 matched a haplotype found for an individual from George. All *B. damaranum*, including those from Swellendam, had divergent haplotypes from the Grootvadersbos species (Fig. 2).

The results confirm that the population in Swellendam is a translocated population of *B. damaranum*. The Swellendam individuals were most likely introduced from the George/Knysna area prior to 2003, and have become established there as a breeding population. However, the sample sizes from both the Swellendam population and *B. damaranum* are small, and better sampling would be required to understand whether there have been multiple introductions from additional areas. The two Swellendam individuals have different haplotypes, strongly suggesting that a minimum of two individuals were originally introduced. It is not possible to ascertain whether the two individuals represent more than one introduction event, or if they could have been part of the same release event into Swellendam.

Given that the introduced, established population of *B. damaranum* in Swellendam is in close geographic proximity to the distribution of the Grootvadersbos chameleon, it is imperative that the two species are not allowed to mix gene pools. These two species have likely been separated by approximately 5 Myr of evolutionary history, and are genetically distinct (Tolley et al. 2008) despite their morphological resemblance. This issue is particularly important because the distribution of the Grootvadersbos species is extremely small (ca. 360 ha), and it is therefore vulnerable to stochastic effects, elevating extinction risk.

Another consideration is that the Swellendam population of *B. damaranum* is sympatric with *B. gutturale* (Fig. 1). *Bradypodion gutturale* occurs in fynbos (Tolley and Burger 2007), so it is unlikely to thrive in the town itself given the peri-urban habitat transformation. It is not known if the established Swellendam population has, or could, spread outside the confines of the peri-urban setting into natural fynbos into *B. gutturale* habitat. However, given that it is a forest specialist, it would most likely not colonise the surrounding fynbos habitats. It could however, spread along habitat

corridors that mirror the peri-urban or forest environment. While it seems unlikely that the two species would co-occur, they could potentially meet at transitional habitat or if there are some suitable localities in town if *B. gutturale* occurs there. It is unknown whether they could hybridise, but if so, this could pose a risk to local *B. gutturale* populations (see Tolley 2020).

While the translocation of *Bradypodion* into peri-urban areas throughout South Africa has apparently not yet impacted native species, the translocation of a species into the native range of an ecologically similar species with a similar climatic envelope could result in catastrophe for native species, particularly those with small ranges such as the Grootvadersbos species. While the latter species is only known from the one forest patch, it could potentially occur in other smaller patches closer to Swellendam. It is therefore essential to ensure that the population of *B. damaranum* does not expand its range further than peri-urban Swellendam. Extra-limital reports of other *Bradypodion* have recently appeared on citizen science platforms (Tolley 2020). Citizen science platforms have gained traction in recent years (e.g. iNaturalist, ReptileMap), and could be a valuable resource for identifying the initial stages of introductions. If monitored by relevant authorities, citizen science records could allow for early identification of introductions, for tracking their spread, and for preparing adequate responses. For the established population at Swellendam, additional citizen science records could assist to assess whether the species is truly confined to the peri-urban area or if there are any signs of expansion.

ACKNOWLEDGEMENTS

Thanks to Carmen Stuart for reporting on the recent *Bradypodion damaranum* records from Swellendam and for providing photos of those individuals, and John Measey for offering helpful comments to the manuscript. This work was funded by the South African National Biodiversity Institute.

REFERENCES

Bandelt H-J, Forster P, Röhl A. 1999. Median-joining networks for inferring intraspecific phylogenies. Mol Biol Evol. 16:37–48.

Douglas R. 1997. The reptile and frog invaders. Culna 51:25–27.

Douglas R. 1992. The genera of *Bradypodion* and *Chamaeleo* in the Orange Free State. J. Herpetol. Assoc. Afr. 37:55–56.

Griffin M. 2000. The species diversity, distribution and conservation of Namibian reptiles: a review. Namibia Wissenschaftliche Gesellschaft 48:116–141.

Houniet DT, Thuiller W, Tolley KA. 2009. Potential effects of predicted climate change on the endemic South African Dwarf Chameleons, *Bradypodion*. Afr. J. Herpetol. 58:28–35.

Measey J, Robinson TB, Kruger N, Zengeya TA, Hurley BP. 2020. South Africa as a Donor of Alien Animals. In: van Wilgen B, Measey J, Richardson D, Wilson J, Zengeya T, editors. Biological Invasions in South Africa. Cham:

Springer International Publishing.

Tamura K, Peterson D, Peterson N, Stecher G, Nei M, Kumar S. 2011. MEGA5: molecular evolutionary genetics analysis using maximum likelihood, evolutionary distance, and maximum parsimony methods. Mol. Biol. Evol. 28:2731–2739.

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

Tolley KA, Burger M. 2007. Chameleons of Southern Africa. Cape Town: Struik-Penguin Random House.

Tolley KA, Chase BM, Forest F. 2008. Speciation and radiations track climate transitions since the Miocene Climatic Optimum: a case study of southern African chameleons. J. Biogeog. 35:1402–1414.

Tolley KA, Burger M, Turner AA, Matthee CA. 2006. Biogeographic patterns and phylogeography of dwarf chameleons (*Bradypodion*) in an African biodiversity hotspot. Mol. Ecol. 15:781–793.

Tolley KA, Tilbury CR, Branch WR, Matthee CA. 2004. Phylogenetics of the southern African dwarf chameleons, *Bradypodion* (Squamata: Chamaeleonidae). Mol. Phylogenet. Evol. 30:354–365.

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

LAMPROPHIIDAE

Lycophidion pygmaeum
Broadley, 1996
Pygmy Wolf Snake

P.R. JORDAAN, J.S.R. CUTLER &
D. SNIJDER

Lycophidion pygmaeum Broadley 1996 is a secretive, small-bodied snake (Branch 1998) with fossorial tendencies (Maritz and Alexander 2008). The species has generally been considered endemic to South Africa (Bates et al. 2014) where it is confined to north-eastern KwaZulu-Natal Province (Branch 1998), although it has been suspected that it also occurs in the extreme southern limits of Mozambique (Maritz 2014), an area characterised by the lack of rigorous herpetological assessments.

As part of the faunal monitoring strategy for the Lubombo Transfrontier Conservation Area, pitfall and funnel trap surveys were conducted in Tembe Elephant Park and Maputo Special Reserve (MSR) during the 2019/2020 austral summer. During these surveys, two *L. pygmaeum* specimens were captured at two different survey sites in MSR. These individuals represent both the northern-most observation localities for the species, as well as the first known Mozambican records.

The MSR portion of the survey comprised 26 trap arrays. The general array structure was adapted from the initial design described by Verburgt et al. (2018). Each array consisted of three driftfence arms

converging at a central point. Driftfences were constructed by linking corru-board sheets to form 10 m long arms. The bottom end of the drift fence is inserted into a shallow trench, 0.1 m deep, creating a barrier 0.35 m to 0.3 m high. A pitfall trap is placed at the central point, with three additional pitfall traps placed at the 5m mark along each driftfence arm. Pitfall traps consisted of 20 litre buckets, 0.41m deep, with an opening diameter of 0.32m, buried up to 0.1m below the level of the surrounding soil surface, allowing for the transection of the pitfall opening by the bottom ends of the corru-board driftfencing. Bucket lids on 0.3m tall wooden stilts were used to create cover over each pitfall trap. At the end of each drift fence arm, a terminal funnel trap was installed. Terminal funnel traps were constructed by inserting an open-ended hazard cone through a tight-fitting hole cut into a corru-board sheet by attaching it with screws and duct tape. The corru-board is then bent into an angular U shape. A mesh cylinder of 0.9m long is attached to either a capped PVC pipe with a diameter of 0.1 m and 0.3m long or, the back end of a plastic coke bottle. This is then fitted to the outside of the cone with duct tape, creating a one-sided funnel trap. Six additional double-sided funnel traps, constructed from 2 mm x 2 mm metal mesh and plastic funnels are placed along the driftfence, two per arm on opposite side of each other. All funnel traps were covered with stacks of plant material to act as cover, protecting animals from exposure.

The first *L. pygmaeum* specimen (Fig. 1) was captured in a terminal funnel trap on the 25th of January 2020. The trap array

Figure 1. The first *Lycophidion pygmaeum* Broadley 1996 specimen captured on Maputo Special Reserve, in sand thicket vegetation (2020.01.25). Photo: PR Jordaan.

Figure 2. *Lycophidion pygmaeum* Broadley 1996 juvenile captured on Maputo Special Reserve in coastal dune forest (2020.01.15). Photo: PR Jordaan.

was deployed in a narrow band of sand thicket vegetation (DNAC 2010, similar to the vegetation described by Mucina and Rutherford (2006) as Tembe sandy bushveld) in the west of MSR along a slope, wedged between sand forest and a small interdune wetland depression (26°27'40.15"S, 32°44'30.36"E). Based on the size of the individual it was an adult (SVL: 208 mm; TL: 230 mm; 5.9 g). During transportation of the specimen, it regurgitated a half-digested *Panaspis wahlbergii* (Smith 1849). The second specimen (Fig. 2) was captured on the 15th of March 2020 in a pitfall trap at a coastal dune forest site north of Ponta Millibangalala (26°25'33.80"S, 32°55'8.44"E). It was slightly larger (SVL: 122 mm; TL: 133 mm; 0.9 g) than the parameters for hatchlings reported in Branch (1998). In total, *L. pygmaeum* accounted for 0.53 % off all reptile captures for the MSR portion of the survey over 5 746 trap nights (traps per array [13] x total number of deployed arrays [26] x standard number of days deployed [17]) indicating either low tradability of this species or low population densities.

Both records were submitted to the FitzPatrick Institute of African Ornithology Animal Demographic Unit (ADU) Virtual Museum (http://vmus.adu.org.za) and catalogued under ReptileMap No. 174169 (first specimen) and Reptile Map No. 174172 (second specimen). These observations extend the range of the species 53 km (second specimen) north of the South African international border and add another species to the reptile inventory of Mozambique. Large portions of suitable habitat are formally protected by MSR. *L. pygmaeum* also likely occurs in the Futi corridor section of MSR, the Lucati Forest Reserve and the Maputo Environmental Protection Area, which was established in 2019, adding to the protection of the species by conserving its habitat. Recreational tourism, as well as industrial and infrastructure development have impacted suitable habitat. Community driven charcoal production has led to localised deforestation, whilst high fire frequencies are maintained by local pastoralist. Increased habitat modification from these activities are likely to impact local *L. pygmaeum* populations but with the continued protection of conservation areas, the Mozambican population is likely to remain stable.

ACKNOWLEDGEMENTS

The Lubombo Transfrontier Conservation Area Scientific Technician post as well as the greater budget for the transfrontier pitfall and funnel trap surveys were funded

by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) through Peace Parks Foundation (PPF) and the Administração Nacional das Áreas de Conservação (ANAC). All corru-board for drift fences and terminal funnel traps were donated by Wild Tomorrow Fund. PMJ Moolman donated all buckets used as pitfall traps. Megan Hudson assisted in the deployment and installation of survey sites. The authors would like to thank Darren Pietersen for commenting on the initial manuscript. Heloise de Villiers (PPF) and Miguel Conçalves (MSR Park Warden, ANAC) reviewed the manuscript before the peer review process. L. Verburgt and one other reviewer are thanked for their comments as part of the review process.

REFERENCES

Bates MF, Branch WR, Bauer AM, Burger M, Marais J, Alexander GJ, De Villiers MS, editors. 2014. Atlas and Red List of the Reptiles of South Africa, Lesotho, and Swaziland. Suricata 1. Pretoria: South African Biodiversity Institute.

Branch WR. 1998. Field guide to snakes and other Reptiles of Southern Africa. Cape Town: Struik Publishers.

DNAC (National Directorate of Conservation Areas, Mozambique). 2010. Maputo Special Reserve Management Plan, First Edition. Maputo: Ministry of Tourism, National Directorate of Conservation Areas (DNAC), Mozambique.

Maritz B. 2014. *Lycophidion pygmaeum* Broadley 1996. In: Bates MF, Branch WR, Bauer AM, Burger M, Marais J, Alexander GJ, De Villiers MS, editors. Atlas and Red List of the Reptiles of South Africa, Lesotho, and Swaziland. Suricata 1. Pretoria: South African Biodiversity Institute.

Maritz B, Alexander G.J. 2008. Breaking ground: Quantitative fossorial herpetofaunal ecology in South Africa. Afr. J. Herpetol. 58: 1-14.

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

Verburgt L, Verburgt UK, Branch WR. 2018. Anew species of Scolecoseps (Reptilia:Scincidae) from coastal north-eastern Mozambique. Afr. J. Herpetol. 67: 86-98.

SUBMITTED BY:

PHILIPPUS RUDOLPH JORDAAN, Lubombo Transfrontier Conservation Area Scientific Technician: Maputo Special Reserve and Tembe Elephant Park. Baltimore St 7, Pierre van Ryneveld, Centurion.
Email: jordaanpr@gmail.com
JOSEPH SIMON RICHARD CUTLER, Manzini Chalets, St. Lucia.
Email: jsrcutler@hotmail.co.uk
DANIEL SNIJDER, BSc Zoology student, University of Pretoria. 33rd Ave 892, Velleria, Pretoria.
Email: daniel@sixkids.co.za

ELAPIDAE

Naja subfulva
Laurent, 1955
Brown Forest Cobra

R. I. STANDER, M. PETFORD & R. VAN HUYSSTEEN

Mphaphuli Nature Reserve is located in the Limpopo province, 20km east of Thohoyandou in the Quarter Degree Grid Cell (QDGC) 2230DC, which currently has 28 reptile species recorded (Virtual Museum 2019a). In comparison to a nearby, well-sampled locus (2231CA; 77 species (Virtual Museum 2019b)) reptile species richness is low and suggests that 2230DC is poorly sampled. During a herpetological survey at Mphaphuli Nature Reserve, observations of *Naja subfulva* were made. The nearest published location where *N. subfulva* has been observed is at Pafuri in the northern Kruger National Park (Marais and Jubber 2010), some 74km NE of Mphaphuli Nature Reserve. Our records confirm the second known locality of *N. subfulva* in the Limpopo province.

Naja subfulva was first documented at Mphaphuli in 2012 by André Coetzer who collected a decapitated specimen (ReptileMAP no. 7687 (Virtual Museum 2012)). Unfortunately, the specimen was lost (André Coetzer pers. comm.) and since then, no further sightings had been reported. Until now, the status of the species at the location remained unresolved since the 2012 record could have represented an inadvertent translocation. Our visit to Mphaphuli confirmed that a local population of *N. subfulva* exists at the location, with three individuals recorded in three days, as well as a freshly sloughed skin. These sightings confirm the presence of *N. subfulva* in the

Figure 1. *Naja subfulva* photographed in situ, Mphaphuli Nature Reserve. Photo: Ruan Stander

2230DC locus, and together with the 2012 record, represent the westernmost records of the species in South Africa (Alexander & Maritz 2014).

The first individual *N. subfulva* was observed on 14 December 2019, when an adult snake was located at an elevation of 540m a.s.l. (22°48'55.6"S, 30°38'57.3"E). The snake was roughly 2m in length and was observed retreating down a cavity at the base of a large tree after being disturbed at around 14:15 on a warm and mostly sunny afternoon. Prior to this, the sloughed skin of a juvenile was found on the morning of the same day, less than 500m from where the adult was seen. The adult snake was identified by its large size, typical light brown to olive green colouration and almost black lower third of the body, as well as the ability to rear up and spread a hood. The sloughed skin was identified as that of *N. subfulva* by the absence of a loreal scale, indicating that it was from an elapid. *Naja mossambica* was ruled out based on the seven upper labials of which the third and fourth were in contact with the ocular (Marais, 2004). The anal shield was entire and subcaudals were paired (see ReptileMAP no. 172836).

The second specimen observed was a juvenile, located on 15 December 2019, approximately 20m from where the sloughed skin was found the day before. The juvenile was observed crossing a patch of leaf litter at high speed, disappearing into thick ferns and debris along a stream. The sighting took place at around 08:15 with temperatures already in the high 20°C. The snake was identified by its diagnostic colouration as described above. The lower third of the body was not conspicuously dark, however the animal had faint mottled black markings and a relatively large eye with a distinctive elapid head.

The third specimen was observed on 16 December 2019, following a cold, rainy night when a sub-adult *N. subfulva* was seen basking on an overcast afternoon at around 14:30. The snake was in a shed cycle as evidenced by the opaque, smokey-coloured ocular. The snake was seen with only about 200mm of its body exposed- the rest concealed in the cavities of the root system on a large, uprooted tree. The surface temperature of the basking area was 22°C. The snake was photographed before it retreated into its refuge and the record was uploaded to the Animal Demography Unit's Virtual Museum (2019c) (ReptileMAP no. 172832). It was identified by the diagnostic head scalation, having seven upper labials with the third and fourth entering the eye, as well as typical colouration of the species (see Fig. 1).

The snakes were all found in a habitat which can be described as Lowveld Riverine Forest, characterised by trees such as *Anthocleista grandiflora, Syzygium cordatum, Garcinia livingstonei, Breonadia salicina and Acridocarpus natalitius* growing in deep, humic sand with a thick layer of leaf litter.

Our records confirm that *N. subfulva* occurs in the Mphaphuli Nature Reserve and indicate that the species is likely distributed more extensively in suitable habitat throughout the eastern Soutpansberg,

particularly in the Sambandou hills. The fact that a large, active snake such as *N. subfulva* has remained unrecorded in this area for so long provides strong motivation to conduct more extensive sampling of the area's herpetofauna.

ACKNOWLEDGMENTS

Willem van der Merwe provided support that made the expedition possible. Both he and Vhutali Dangale are thanked for their assistance and companionship in the field. Mr Mashau of Tshifudi-Phaswana and his family are kindly thanked for their warm hospitality. Mulalo Mashau and Ompfarisaho Mashau shared their knowledge of the area- this is much appreciated. André Coetzer (Protoclea Advanced Image Engineering, South Africa) is thanked for sharing valuable information and we are grateful toward our anonymous reviewers for their time and for providing insightful comments and helpful suggestions.

REFERENCES

Alexander GJ, Maritz B 2014. *Naja melanoleuca* (Hallowell, 1857). In: Bates MF, Branch WR, Bauer AM, Burger M, Marais J, Alexander GJ, de Villiers MS (eds). Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Suricata 1. Pretoria: South African National Biodiversity Institute.

Marais J 2004. A complete guide to the snakes of Southern Africa. Cape Town: Struik Publishers.

Marais J, Jubber W. 2010. Geographical Distribution: *Naja melanoleuca* Hallowell, 1857. Afr. Herp News 52: 24-25.

Virtual museum (ADU). 2012. Reptile Atlas of Africa- ReptileMAP no. 7687. [accessed 18 December 2019]. http://vmus.adu.org.za/?vm=ReptileMAP-7687.

Virtual museum (ADU). 2019a. Reptile Atlas of southern Africa- Summary information for locus 2230DC. [accessed 23 December 2019]. http://vmus.adu.org.za/vm_locus_map.php?database=sarca&prj_acronym=&db=sarca&URL=&Logo=&Headline=&Use_main_filter=0&User_id=02d4b4046bca969c6088f3873e874b6b&Full_name=Ruan%20Stander&serve_sp_list=0&drop_down_list=0&assessment=0&searchType=MAP&searchFor=2230DC&searchField=Locus&database=sarca&nrec=1.

Virtual museum (ADU). 2019b. Reptile Atlas of southern Africa- Summary information for locus 2231CA. [accessed 06 January 2020]. http://vmus.adu.org.za/vm_locus_map.php?database=sarca&prj_acronym=ReptileMAP&db=sarca&URL=http://sarca.adu.org.za&Logo=images/reptilemap_logo.png&Headline=Reptile%20Atlas%20of%20Africa&Use_main_filter=0&User_id=02d4b4046bca969c6088f3873e874b6b&Full_name=Ruan%20Stander&serve_sp_list=1&drop_down_list=0&assessment=0&searchType=MAP&searchFor=2231CA&searchField=Locus&database=sarca&nrec=1

Virtual museum (ADU). 2019c. Reptile Atlas of Africa- ReptileMAP no. 172832. [accessed 23 December 2019]. http://vmus.adu.org.za/?vm=ReptileMAP-172832.

SUBMITTED BY

RUAN I. STANDER, Soutpansberg Centre for Biodiversity and Conservation, Soutpansberg, South Africa.
Email: reptileruan@gmail.com
MELISSA PETFORD, South African National Biodiversity Institute, Kirstenbosch Research Centre. Cape Town, South Africa. School of Animal, Plant and Environmental Sciences, University of the Witwatersrand, Johannesburg, South Africa..
Email: melissa.petford@outlook.com
RYAN VAN HUYSSTEEN, Department of Biodiversity and Conservation Biology, University of the Western Cape, Bellville. Department of Geography Environmental Studies & Tourism, University of the Western Cape, Bellville.
Email: ryanvanhuyssteen@gmail.com

AHN INSTRUCTIONS TO AUTHORS

AFRICAN HERP NEWS

publishes manuscripts in four categories, namely Articles, Herpetological Surveys, Natural History Notes, and Geographical Distributions. The details of these categories are provided below. The newsletter will also consider publishing content that may not necessarily fit into these categories (e.g. envenomation, opinion pieces).

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

The type of submission (e.g., Article, Natural History Note, Geographical Distribution) should be clearly indicated in the file name. As a general note, always use the latest available issue of AHN for instructions. All authors jointly take responsibility for all permits, permission to use data and ethical clearance required to perform the work as and when appropriate.

All submissions should be typewritten in English (UK spelling), set in 10 pt Calibri. Words should not be divided at the right-hand margin. Use the active voice in the first person where possible (except for submissions for *Tomorrow's Herpetologists Today*). Formatting should be achieved with paragraph settings rather than tabs or spaces. Authors should consult the *Council of Biology Editors Style Manual,* 5th edition (1994) for style and abbreviations. Sentences should be separated by a single space (character). Genus and species names must be italicised. Centre major headings in small caps. Subheadings are in bold and left justified (*also in title case*). Footnotes are not accepted. The International System of Units (Systeme Internationale; SI) should be followed. Use decimal points rather than commas. Measures should be in mm, m or km rather than cm or dm. Integers less than 10 should be spelled, while those greater than 10 (including 10) should be given numerically. Group integers of thousands together with a space and do not use a comma (e.g. 10 500 and 1 230). All statistical symbols should be italicised. Follow the Fourth Edition (1999) of the International Code of Zoological Nomenclature.

Scientific names of species must be italicized and up to date. Please consult sources, such as the *Reptile Database* or the *Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland*. The designated authority of a species (the person credited with the first formal

use of the name) should appear the first time the scientific name is provided and should follow the correct format regarding use of brackets and commas. Every word of the English common name should start with a capital letter (e.g. Namaqua Dwarf Adder). Appendices, Material Examined, Tables, legends to Figures, and Figures must follow the References.

ARTICLES

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

TITLE (bold, centred, upper case);

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

HEADINGS (bold, centred, upper case)

Subheading 1 (bold, aligned left, lower case except first letter of first word) as required

Subheading 2 (bold, italics, aligned left, lower case except first letter of first word) as required

ACKNOWLEDGEMENTS (bold, centred)

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

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

HERPETOLOGICAL SURVEYS

African Herp News publishes succinctly annotated species lists resulting from local surveys of amphibians and reptiles on the African continent and adjacent regions, including the Arabian Peninsula, Madagascar, and other islands in the Indian Ocean. The area surveyed may be of any size but should be defined as a geographic unit of special relevance to the herpetological community. For example, surveys should address declared or proposed conservation reserves, poorly explored areas, biogeographically important localities or administrative zones. The relevance of survey results should be judged by the extent that these records fill distributional gaps or synthesise current knowledge. 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:

SYSTEMATIC ACCOUNT (bold, aligned left): comprises Scientific name (including author citation), location and habitat, evidence (including registration numbers and location of vouchers), and comments (where required).

NATURAL HISTORY NOTES

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

FAMILY (bold, centred, uppercase)

Scientific name (bold, italicised, centred)

Author citation (centred)

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

KEYWORD (bold, centred)

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

[Original text] (left aligned)

ACKNOWLEDGEMENTS (bold, centred), if applicable

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

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

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

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

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)

TITLE (bold, centred, upper case)

Original text (aligned left)

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.htm or home.ncifcrf.gov/research/bja/

References should be in the following format:

Article: Branch WR. 2007. A new species of tortoise of the genus *Homopus* (Chelonia:

Testudinidae) from southern Namibia. Afr. J. Herpetol. 56:1–21.

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

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

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

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

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

AUTHOR AFFILIATIONS

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

SUBMITTED BY: [for each author] **AUTHOR'S NAME** (bold, upper case), address or affiliation.

E-mail: example@gmail.com (hard return)

TABLES

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

FIGURES AND PHOTOGRAPHS

Figures must be restricted to the minimum needed to clarify the text. The same data should not be presented in both graph and table form. Photographs and figures should be provided

AHN

HAA MEMBERSHIP

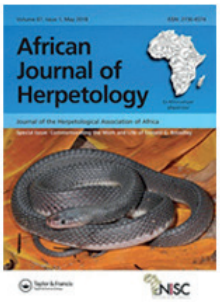
Ex Africa semper aliquid novi

HERPETOLOGICAL ASSOCIATION OF AFRICA

Founded 1965

HAA MEMBERSHIP INCLUDES

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



HAA MEMBERSHIP FEES

2020

African Membership	1 Year	R200	3 Years (10% discount)	R540
Senior Citizens	1 Year	R100	3 Years (10% discount)	R270
Students & Scholars	1 Year	R150	3 Years (11% discount)	R400
International Membership	3 Years		$60 or €50 or R775	

BANKING DETAILS

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

HAA | Herpetological Association of Africa
www.africanherpetology.org

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.