

Final Evaluation Report

Your Details	
Full Name	Arantxa Blecher
Project Title	Monitoring reproductive endocrine patterns of the ground pangolin (<i>Smutsia temminckii</i>), using their scales as hormone matrix.
Application ID	28280-1
Grant Amount	£ 950
Email Address	arantxa.blecher@gmail.com
Date of this Report	12 October 2020

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Examining the efficiency and repeatability of steroid extraction from ground pangolin scales using keratinase as liquidiser.				
Determining the minimum scale mass required for a reliable steroid extraction.				
Examining the distribution of progestagen and androgen concentrations within a pangolin scale.				
Examining the distribution of progestagen and androgen concentrations between scales from different body parts.				
Examining age-related (juvenile vs. adult) and sex-related differences in scale progestagen and androgen concentrations.				Age-related differences in scale hormone concentrations could not be reliably investigated as only a limited number of juvenile individuals were available for sampling.
Measuring scale progestagen and androgen concentrations along the vertical axis of a scale for a retrospective assessment of female lifetime reproductive success and male maturation.				Preliminary experiments showed that the distribution of hormones is similar throughout a scale and thus retrospective assessment of hormone deposition was not possible. However, further investigation is suggested for future projects.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

The Covid-19 pandemic halted research activities in South Africa from March to June 2020, thus the proposed timeline of the project had to be adjusted. From June 2020, restrictions were eased, and lab analysis could resume. Additionally, the two conferences at which the present project was accepted for presentation were both postponed to 2021 due to the pandemic.

3. Briefly describe the three most important outcomes of your project.

- The project's main aim of developing a method for the use of ground pangolin scales as hormone matrix was achieved, and a related scientific article is in preparation for publication.
- The developed method provides the basis for developing a forensic tool that can assist with sex-identification of pangolin scale samples seized from the worldwide trade (scientific article in preparation).
- To my knowledge, this has been the first study conducted to date that examines reproductive hormones (progesteragens and androgens) in a pangolin matrix and thus provides a knowledge base from which more studies can be conducted.

4. Briefly describe the involvement of local communities and how they have benefitted from the project.

Not applicable.

5. Are there any plans to continue this work?

Yes. Various aspects of this work, such as age-related differences in scale progesteragen and androgen levels and the method of hormone deposition into pangolin scales during growth, need further investigation and can be offered as future Master's or Doctorate research projects. Further, an international collaboration is planned to investigate the impact of fences on ground pangolin, were the assessment of hormone levels in pangolin scales will most likely be applied.

6. How do you plan to share the results of your work with others?

Both the methodological aspects as well as its applicability for sex-determination will be published in scientific journals to give other researchers access to the information and allow further optimisation and application of the methods developed in this work.

Additionally, some of the project results were already presented at the National Zoological Gardens and South African National Biodiversity Institute (SANBI) annual research symposium in November 2019. Full project results will be presented at the Department of Zoology and Entomology (University of Pretoria) annual general meeting at the end of 2020.

Depending on availability and funds, results will also be presented at the International Congress of Zoology in Cape Town (South Africa), as well as the 2nd International Pangolin Conference in Skukuza, Kruger Park (South Africa) in 2021.

7. Timescale: Over what period was the grant used? How does this compare to the anticipated or actual length of the project?

The funds from the RSG were used from June 2019 to August 2020. This was longer than the anticipated length as the coronavirus pandemic influenced research activities.

8. Budget: Provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Travel	£ 10	£ 5	£ 5	Fuel for travel less than expected
115 analyses for faecal progesterone metabolites (£ 4.087 per analysis)	£ 470	£ 470	£ 0	
115 analyses for faecal androgen metabolites (£ 4.087 per analysis)	£ 470	£ 470	£ 0	
Total	£ 950	£ 945	£ 5	Exchange rates were calculated at £ 1 = 18.35 Rand

9. Looking ahead, what do you feel are the important next steps?

An increase in the amount of scales analysed with the developed method would be beneficial for further optimisation. As pangolins are rare and endangered, groups and vets that often work with these animals could be asked to get involved and possibly provide scale samples.

Furthermore, the developed method of hormone measurement in pangolin scales should be written in a simple and clear format and provided to laboratories involved in forensic analysis of pangolin samples. This would allow them to add this to their forensic toolkit.

Further research can also look to apply the methods developed in this work to other pangolin species from Africa and Asia and evaluate whether they are similar to ground pangolin.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

The RF logo was displayed in the presentation delivered at the National Zoological Gardens and SANBI annual research symposium presentation (2019).

The RF will also be acknowledged in journal articles published on this work and in the thesis written by Arantxa Blecher as a partial requirement for an MSc in Zoology.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

Arantxa Blecher – Principal investigator, conducting all laboratory work

Prof. Andre Ganswindt – Main project supervisor, assistance with project development and thesis and journal article preparation

Dr Juan Scheun – Project co-supervisor, assistance with accessing sample material, as well as thesis and journal article preparation

12. Any other comments?

I would like to thank The Rufford Foundation for funding this project and thereby contributing greatly to pangolin research and conservation in South Africa.