The Rufford Small Grants Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Kevin Njabo
Project title	Approaches to correlating vectors and disease in the rainforest of Cameroon using molecular data and remote sensing
RSG reference	30.80
Reporting period	April-June 2008
Amount of grant	6000
Your email address	kynjabo@hotmail.com
Date of this report	September 20 2008.

1. Please 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
Training to local students and field assistants		X		Two students/Field assistants have been trained in ID of target species and mounting of specimens. Other staff from the UCLA/Johns Hopkins program in Yaoundé were also trained in field research methods for 10 days. More training and field work required to fully master techniques
Intensive field sampling (trapping of vectors with appropriate trapping techniques and preparation of voucher samples		X		Over 10 000 mosquitoes collected and voucher samples have been pinned and stored at the UCLA/Johns Hopkins laboratory in Yaoundé, Cameroon for future references. More sites needed to be sampled for complete spatial range of species and parasite prevalence in Cameroon
Estimate avian haemosporidian parasites within these vectors		X		On going. *Coquillettidia aurites* had highest infection rate of all the species screened and appears to be the most ornithophilic vector in areas where it occurs
Examine the bio-climatic and remote sensing variables		X		More field research needed to confirm presence of *Plasmodium* in target species. Parasites have been so far linked to 19 different sites. At least 35 presence sites required for effective modelling.
Vector identification and blood meal analyses through PCR			X	Anton provided the necessary morphological keys and helped in identification and training. However, more practical training and practice needed to refine methods
Remote sensing modeling (based of previous results) to identify regions of mature forest and human disturbed areas		X		Vegetation maps and prevalence data produced based on partial results. Further ground-truthing at predicted sites needed to refine model

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

Logistically, sampling proved more difficult and expensive than anticipated. The fall of the dollar with respect to the local CFA francs (Pegged to the Euro) rendered services more expensive. Additionally, local inhabitants (in areas visited) anticipated more than we could afford as they required us to pay for use of land, chairs, and tables and even to build a fence around local farmer's plantation to prevent goats from destroying his crops! We however readjusted our budgets and everyone was happy at the end. It was also more difficult to explain to local authorities that we were not providing a cure for malaria, although our research helped raise awareness on malaria treatment and control. Storms in Nkouak heavier than anticipated and destroyed some of our traps and processing tent on first day of field work. Larval collection and rearing was also hindered due to persistent storms. Some larvae were however reared to eclosion and pelts collection for future laboratory confirmation of species.

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

- We have collected over 10 000 mosquitoes of over 24 species and screened 1167 for avian *Plasmodium*. Preliminary results show that *Coquillettidia aurites* is mostly ornithophilic and a newly recognized vector of at least six phylogenetic species of avian malaria in the lowland forest areas of Cameroon. *Coquillettidia aurites* had never been recorded as a vector of avian *Plasmodium* before and all the parasite lineages recovered from these mosquitoes clustered interestingly with parasites identified from several bird species in sub Saharan Africa suggesting that this vector is capable of infecting birds belonging to different families of birds. With additional sampling, these results would be overlapped with predicted potential distributions of avian *Plasmodium* parasites produced with Maxent using the various environmental predictor sets at which infected birds with similar strains are detected.

- Two young African scientists (students) have been trained in vector identification and trapping techniques including a technician from the Johns Hopkins laboratory in Yaoundé who partially participated in the field work.

- Local awareness improved as local villagers' briefed (through the village Chiefs in areas visited) in simple sanitation techniques, early reporting of disease outbreaks and how to get impregnated mosquito bed-nets from the government services. Partial results presented at the 12th Pan African Ornithological Congress in Cape Town, South Africa.

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

See 3 above

5. Are there any plans to continue this work?

Yes, more sites need to be sampled to in order to improve our ability to predict areas prevalence of avian malaria and spatial distribution of the target vectors. We plan to samples regions north of River Nyong toward the River Sanaga to the Forest-savanna ecotones, eastward. With more data, we will evaluate the compiled locations of confirmed avian malaria-positive samples and their habitat

characteristics using several remote sensing and bioclimatic variables already compiled for Central Africa. At least 35 point localities are needed for the model to produce consistent results. We intend to start a second phase of the project in January-March 2009 to which we will seek additional funding from RSG.

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

Results from sample analyses will be shared with our established network of global researchers through BirdLife International Important Bird Areas program and published in peer-reviewed journals. Presentation of results at the 12th Pan African Ornithological Congress slated for September 7-12, 2008 in Cape Town South Africa. In addition, sequence data will be submitted to Genbank.

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

The RSG was used for 6 weeks (April 24-June 14 2008). We initially anticipated 60 days of field work and we based our calculations at 1GBP to FCFA 500. Due the fall of the US Dollar and GBP with respect to the local CFA Franc (pegged to the Euro), payments for services automatically increased. We however maximized our field efforts given the budgetary constraints

8. Budget: Please 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. (Local exchange rate as of May 2008 is 1GBP = 823.877CFA Francs)

Item	Budgeted Amount	Actual Amount	Difference	Comments
Transportation	£2500	£2,812.71	£312.71	Cost of extra luggage and return date on my airfare corrected.
Vehicle maintenance	£900	£582.61	£317.39	This was mostly subsidized from funds obtained from UCLA since we were over budget
Lodging	£600	£724.24	£175.757	We spent a total of 10 days in Yaoundé @ 15000FCFA/day, i.e. £18.2 which is £3.00 more than predicted
Feeding	£1200	£1213.10	£13.104	Feeding included the 4 of us, 2 field guides, a camp keeper and occasionally their kids and some other regular visitors from the village
Principal Field Assistants	£500	£606.87	£106.866	Our 2 principal assistants stayed with us through out the survey
Local Field guides	£300	£491.63	£191.63	Field guides were paid 3000FCFA/day and that translates to £491.63 due to exchange currency rates
TOTAL	**£6000**	**£6431.16**	**£431.16**	

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

Extend the project to cover other regions of Cameroon and through predicting modelling, other areas in tropical West Africa if possible. Complete knowledge of spatial distribution of these ornithophilic species within the subregion and parasite prevalence with respect to land usage are important next steps for this project

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

Yes. Partial results from this research were presented at the Pan African Ornithological Conference in Cape Town South Africa on the 7th -12th September 2008.

11. Any other comments?

Partial results from this work have shown that *Coquillettidia aurites* has at least 6 highly distinct phylogenetic species of avian malaria. The reasons for the high diversity of these parasite lineages in a single vector species (up to 16.7% sequence divergence) is not known but its understanding may assist in explaining the success of *Cq. aurites* in anthropogenic landscapes or in feeding in a vast array of avian host species. *Coquillettidia aurites* therefore likely represents a threat of colonizing novel hosts if introduced and should warrant more attention when managing the welfare of isolated and naive hosts.