

## 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. The Final Report must be sent in **word format** and not PDF format or any other format. 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. Please note that the information may be edited for clarity. 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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

Grant Recipient Details	
Your name	Varsovia Cevallos
Project title	Identification of mosquito vectors of zoonotic diseases in Guayas, Ecuador
RSG reference	13.07.08
Reporting period	Final Report
Amount of grant	£5,699
Your email address	<a href="mailto:vcevallos-ciz@ac.uce.edu.ec">vcevallos-ciz@ac.uce.edu.ec</a>
Date of this report	May 7 <sup>th</sup> 2010

**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
(1) To determine species composition in surrounding areas of the airport and ship ports in Guayaquil.			√	There were 13 mosquito species recorded, which belong to six genera: <i>Anopheles</i> , <i>Culex</i> , <i>Aedes</i> , <i>Mansonia</i> , <i>Uranotaenia</i> and <i>Wyeomyia</i> . Sampling was conducted for 104 days, instead of 48 days as initially planned, from January 2009 through October 2009 in 5 urban sites in Guayaquil city. We were able to increase the frequency of collection thanks to INH (Instituto Nacional de Higiene-Izquieta Pérez) and CIZ (Centro Internacional de Zoonosis) collaboration. Collections were conducted in each site using one CDC (John W. Hock Co., Gainesville, Fl.) light trap baited with dry ice. At the same time, two researchers collected attracted mosquitoes concurrently during 3 hours at 50 m from the CDC trap.
(2) To establish the geographic distribution of mosquito species in Guayas.		√		We decided to focus our mosquito collections on the airport and main ship ports, while sampling nearby Guayaquil in Durán, Yaguachi, and Daule. Sampling was sporadic during 13 nights from January throughout October 2009. Further sampling is required in the same locations and in-house sampling should be implemented.
(3) To assess the population dynamics of selected mosquito species			√	Out of the 13 species, six were present in most of the study sites. Species abundance was determined for dry and rainy seasons and correlations with temperature, humidity and precipitation analysis were analysed.
(4) Distribution models to predict the probability of the presence of Culicidae species.		√		Construction of predictive models will require further sampling in the same Guayaquil locations linked to Galápagos transportation.

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

The major difficulty was to identify correctly the mosquito species collected, since in Ecuador there was not a reference collection and local entomological literature was limited. This inconvenience was solved by working intensively and extensively on a bibliographic search of morphological keys of mosquito species from tropical South America. Thanks to the RSGF Grant, we have built a partial library on Culicidae and a significant mosquito reference collection at Universidad Central in Ecuador as primary tools for future studies.

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

1. A checklist of the mosquito fauna has been established for Guayaquil contact sites with the Galapagos Islands. The mosquito species list is the result of ten months of collecting in five sites around the airport and main ship ports in Guayaquil. The specimens are now part of an entomological collection maintained at Centro Internacional de Zoonosis of the Universidad Central del Ecuador for reference and future studies. A total of six genera and 13 species were identified using external and genitalia morphology. Eight of the recorded mosquito species are known to be vectors of wildlife diseases agents. A database will be available with all the mosquito collection information and microphotographs for each species, which may be accessed through the web.
2. Two methods of collection, CDC light traps and human bait, were compared. The number of female mosquitoes caught attracted to humans was significantly higher than those attracted to light traps.
3. Important ecological data have been collected and analysed. Temporal abundance was determined for the common species collected and abundance species was compared among sites. The data showed a significant correlation between mosquito abundance and rainfall.

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

The data obtained will be shared with local authorities to help them to control the mosquitoes with a more efficient fumigation and the local communities will benefit from unnecessary pesticide contamination.

**5. Are there any plans to continue this work?**

It is very important to continue this research through a possible second RSG grant. I plan to continue monitoring the mosquito species to gather several years of data to reinforce the data obtained during this project, which will help focus Galapagos conservation strategies planning.

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

The results of this research will be submitted for publication in a scientific journal in the next few months. The final report will be shared with the local authorities, including the Galápagos National Park Service, Charles Darwin Research Station in Galápagos, National Institute of Health - Izquierda Pérez and National Control Service of Arthropods. These last two institutions are in charge of

mosquito control in Guayaquil. In addition, the results will be presented in a National Workshop in November 2010 at the Centro Internacional de Zoonosis.

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

The grant resources were used for a year as originally planned.

**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.**

Item	Budgeted Amount £	Actual Amount £	Difference £	Comments
Survey Trips (Per diem £ 25) (2 people) (48 field days)	2448.98	2411,37	37.61	Money exchange: Expected £1=\$1.96 Received £1=\$1.63 The devaluation of the Sterling pound after the submission of the project resulted in a difference of \$1829.93 between what was requested and what was received.
Bus tickets (£51.00 daily)	244.90	241.02	3.88	Because of that, some adjustments had to be done like shortening the collecting period from 12 to 10 months. But overall, I would say this change did not have a significant impact on the research.
Rent a car (£51.00 daily)	816.33	918.29	-101.96	
Datalogger (4 units)	285.71	272.85	12.86	
GPS (1 unit)	91.84	0.00	91.84	
Reagents (Acetic acid, alcohol, formaldehyde, glycerol, others)	229.59	268.97	-39.38	
Consumable materials (Batteries, nets, zip lock bags, gloves, plastic boxes, etc)	204.08	189.26	14.82	
Preserving materials (Vials different sizes, slides)	153.06	301.42	-148.36	
Insect traps (8 CDC traps plus shipment and handling)	612.24	669.96	-57.72	
Mounting insect materials (Pins different sizes)	153.06	242.54	-89.48	
Field boxes and foam	204.08	189.28	14.80	
Cornell Drawers (10 units)	127.55	0.00	127.55	I have to point out that Universidad Central del Ecuador

				provided extra cabinets, Cornell drawers and other materials to support the work started with the RSGF Grant.
Metal Cabinet (1 unit)	127.55	0.00	127.55	
Total	5699.0	5704.95	-5.98	

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

1. Future fieldwork for successive years is very necessary to document the dynamics of mosquito species that serve as vectors for zoonotic diseases.
2. Compare the mosquito biodiversity living inside buildings versus the outside mosquito fauna, since the behaviour of certain mosquito species causes them to locate near humans.
3. Calculate the probability of individual species to be introduced via the ships that travel to Galápagos.
4. Determine if avian malaria parasites and West Nile Virus are present in the mosquito fauna of Guayaquil.

**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?**

The RSGF logo has been used in all the printed materials used in the project, like data sheets, official letters requiring legal permits to collect, etc. In November 2010, I will present the project results during the Insect Vector of Zoonotic Diseases National Workshop at the Centro Internacional de Zoonosis. The authorities of Universidad Central del Ecuador are very aware and thankful that the funds for the development of my project came from the RSG. The RSGF funding will be acknowledged in all presentations and in the paper/s to be published.

**11. Any other comments?**

I am very grateful to RSGF for financing the project "IDENTIFICATION OF MOSQUITO VECTORS OF ZOONOTIC DISEASES IN GUAYAS, ECUADOR", which will contribute to the Galápagos Islands conservation. I thank the outstanding coordination and immediate answers provided to all my communications. I am also grateful to INH for the assistance in the field and to Dr. Thomas Emmel, Director of the McGuire Center at University of Florida, for his valuable technical advice.