

The Rufford Foundation

Final Report

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

Thank you for your help.

Josh Cole, Grants Director

| Grant Recipient Details | |
|----------------------------|---|
| Your name | Alfonsina ARRIAGA JIMENEZ |
| Project title | Dung beetles in Oaxaca: Biodiversity and the importance of communities for its conservation |
| RSG reference | 23765-2 |
| Reporting period | December 2017- December 2018 |
| Amount of grant | £5000 |
| Your email address | ponchis.arriaga@gmail.com |
| Date of this report | 08 December 2018 |

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 |
|---|--------------|--------------------|----------------|--|
| Dung beetle species list for the Sierra Norte | | | | The species list is finished. A reference collection has already been delivered to each community (San Pablo and Santa María Tlahuitoltepec, see pictures attached). |
| Dung beetle species list for the Sierra Sur and Mixteca | | | | Field work was finished recently, so we have not been able to finish determining all the material. |
| New species description | | | | Three new species are already described and published (<i>Canthidium quercetorum</i> Kohlmann et al. 2018a), <i>Phanaeus dyonisius</i> (Kohlmann et al. 2018b) and <i>Gonaphodioides zempoaltepetlensis</i> (Dellacasa et al. 2018). Another one is in process of description, and two others are under re-description. All those species were already identified with the material processed, on this year insects it might be more new species. |
| Maps of the species distribution, and conservation evaluation | | | | The maps are still in progress, almost all of them are finished, but there is still material to be identified. The maps done will be published soon with the re-description of two <i>Onthophagus</i> species. |
| Article about the social part of the project | | | | One article is already accepted (Arriaga-Jiménez in press) with one colleague and one of my students which is from the Mixe community where we worked. Another one is in process with two of my students. |
| Divulgarion article of dung beetles | | | | One divulgation article is already published (Rös et al. 2018). Another one is in process with the whole team. |

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| <p>Comparison of these mountains with other mountains in Mexico</p> | | | <p>A first paper was published at the beginning of the year, evaluating the fauna of this mountains (Kohlmann et al 2018b). When we finish the identification of all the new material, we will proceed to compare all the mountains.</p> |
| <p>Sharing entomological material with the communities</p> | | | <p>A reference collection has already been delivered to San Pablo and Santa María Tlahuitoltepec (Pictures attached). As soon as we finished to process this year material, we will do the same thing with the other two communities.</p> |
| <p>Sharing entomological material with different Institutions</p> | | | <p>We already gave entomological material (reference collections) to the CIIDIR and the IEXA-INECOL, A.C. We also send some paratypes of the new species to museums in France, Canadá, Brazil and UNAM, México. We will continue to share material with other institutions.</p> |
| <p>Teaching students</p> | | | <p>I have several students under my supervision. One of them is finishing his bachelor thesis, with his defence in January 2019. The other two will continue the field work in the Sierra Mixe next year. Another one already finishes the field work in the Mixteca and is working in the results. In Santa María Tlahuitoltepec we have contact with one student, who already finished her bachelor thesis, and she is our Mixe translator.</p> |
| <p>Share knowledge with the scientific and academic community</p> | | | <p>Our work, along all the advances we are having were presented in different congresses, both with posters and oral presentations: XII Reunión de Scarabaeidología. Universidad del Valle de Guatemala. 17-22 June 2018. Guatemala, Guatemala; VII Simposio de Ecosistemas de Montaña en México, Oaxaca, México. 29- 31 de October 2018.</p> |

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| Share knowledge with communities | | | Each time we came back to the community we make some talks to tell them about how our research is progressing. In November 2018, three of my students present some advances to the community too (picture attached). |
| Evaluation of the conservation status of dung beetle species | | | Some species were already assessed, and all the information was given to the IUCN. Some other species from Oaxaca will be assessed next year, using the new distribution points that we found in the last field season (2018). |
| Evaluation of the conservation of the sites, helping the decision makers to make the right programs (conservation decision of the areas). | | | A paper is in process (with M. Segarra and C. Perez) about the difference in conservation actions in both communities, we might finish the article next year, in order to include the new information we get with the two new communities. |
| Contribute to the knowledge of the mountains' biodiversity. | | | We already started the contribution, with the species description, and the species lists that we made. This will continue until the final analysis of all the data and all the insects. |

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

As for last year project, obtaining the permission from the communities is always a little complicated. However, because we have been able to present evidence of our previous work, and we have spoken with all the members of the “comisariado”, they agreed to give us all the permits to work in the area. As a continuation of the work of the previous year (2017), we were able to carry out divulgation and conservation activities in San Pablo Etla and Santa María Tlahuitoltepec. While, as the main objective of this year (2018), it was possible to carry out the complete sampling of the two new mountains, one in the Mixteca and the other in the Sierra Sur.

We are being recognized in the communities, so in reality we have not had any other problem to carry out our activities. In fact, in each place we have plans to continue carrying out different projects, using the information obtained to manage to conserve certain places in an appropriate way, and share biological and cultural knowledge with the communities.

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

As last year, the most important outcome is the entomological and cultural information we obtained from these communities and mountains. That have allowed to increase the knowledge of the mountain entomofauna, and to share this knowledge both with the communities and with the scientific community.

The re-description of species that had not been collected for more than 30 years (time of their description) have allowed us to know more about these species, let us an adequate re-description of those species, and allow us to realise that these sites are being adequately conserved by the communities. But, most important, it shows the importance of continuing to look for information in the mountains, because there is still much to discover.

The description of new species and the correct assessment of the “endangered” species in those mountains, are also an important outcome of our research.

And last but not least, the student formation and the joint work with the communities, is of the fundamental parts and one of the great successes of this work.

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

In all the communities we involve people since the beginning. We always hire guides and persons to come with us and help us. And if there are persons, students or kids interested, we take them with us into the mountain to show them our work, and to explain them more about the entomology in general, and specifically about dung beetles and their importance. For us is really important that they know we are in the field, and what is our goal, that is why each time we have meetings with the authorities to let them know about our progress.

As for the two communities were we started the project ton 2017 (San Pablo Etla and Santa María Tlahuitoltepec), we are making the conservation evaluation of their forest using the dung beetles as bioindicators. At the same time we made several talks about our results and why dung beetles are important, and we did some workshops about conservation and ecology. In January 2019, we will go to San Pablo Etla again with a group of Bard College, to help them with advertising their ecotouristic project. And two of my students will start a project about biodiversity and cultural heritage in Santa María Tlahuitoltepec.

Similar actions will take place in Sierra Sur and Mixteca as soon as we finished with the material collected this year (2018).

5. Are there any plans to continue this work?

Yes. We realised that there is still a lot of work to be done in this project. In addition, by interacting much more with each community, we have realised different actions that can be done in each, and in the same way, several groups in each site are asking us to perform different activities. We not only want to continue with the project, but the requests from the communities make us ask ourselves more questions and try to help them solve certain conservation problems that they have identified.

I definitely going request again the support of this foundation, to continue with the work in the Sierra Sur, and in the Mixteca next year. As I already mentioned, the mountains of Oaxaca have a lot to offer, both biological and cultural. And I will keep with this project, modifying it and adapting it to the new questions and concerns of each community. With the final objective of proving different ways of management for communities, and forming people from each community in these aspects

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

The information obtained to date (2017 and 2018) has being shared in different ways.

Below I make a list of the scientific and divulgation articles made thanks to the funding received (always acknowledging the Rufford foundation)

- ARRIAGA-JIMENEZ A., C. PEREZ DÍAZ & S. PILLIERI. (In press) Ka'ux: Estudio de caso sobre la pérdida de palabras indígenas por la pérdida de diversidad en Santa María Tlahuitoltepec, Oaxaca, México. *Regions & Cohesion*.
- DELLACASA M, DELLACASA G. & A. ARRIAGA-JIMENEZ (2018) *Gonaphodioides zempoaltepetlensis* (Coleoptera: Scarabaeidae: Aphodiinae), a new species from Oaxaca, Mexico. *Zootaxa* 4508(4):597
- KOHLMANN B., A.ARRYAGA-JIMÉNEZ & M. RÖS. (2018) Dung beetle (Coleoptera: Geotrupidae: Scarabaeidae) vicariant speciation in the mountains of Oaxaca, Mexico, with a description of a new species of *Phanaeus* (Coleoptera: Scarabaeidae). *ZooKeys*, 743, 67.
- KOHLMANN B., A.ARRYAGA-JIMÉNEZ & M. RÖS. (2018) An unusual new species of *Canthidium* (Coleoptera: Scarabaeidae: Scarabaeinae) from Oaxaca, Mexico. *Zootaxa*, 4378 (2): 273–278.
- RÖS, M., ARRIAGA-JIMÉNEZ, A., & VANEGAS, P. A. G. (2018) Los escarabajos del estiércol: los conocidos desconocidos. *Biodiversitas*, 139: 12-16.

Another way of sharing knowledge that we made was by presenting our results in congresses. A list of what we presented in congresses this year is listed below:

- 1º Foro de Identidad Ambiental y Geográfica Ayuujk, Santa María Tlahuitoltepec,

Oxaca, 17- 18 November 2018.

Oral presentation: Relación entre la pérdida de riqueza biológica y la pérdida de riqueza cultural. Alfonsina Arriaga-Jiménez, Brenda J. Cruz- García, Melissa Castillo-Ibarra & Lucelli Pérez- Díaz.

Oral presentation: Escarabajos coprófagos del Zempoaltépetl. Axel Arenas. Parral, Alfonsina Arriaga-Jiménez & Matthias Rös.

- VII Simposio de Ecosistemas de Montaña en México, Oaxaca, México. 29- 31 de Octubre 2018.

Oral presentation: Distribución y diversidad de escarabajos coprófagos (Aphodiinae, Geotrupinae y Scarabaeinae) en las montañas Zempoaltépetl y Peña de San Felipe, Sierra Norte de Oaxaca. Alan Axel Arenas Parral, Alfonsina Arriaga-Jiménez & Matthias Rös.

Oral presentation: Ka'ux: El mixe en cara a la pérdida de biodiversidad en Oaxaca, México. Alfonsina Arriaga-Jiménez, Ciltlali Pérez- Díaz & Sebastián Pillitteri.

Poster: Descripción de las comunidades micófagas de insectos en bosques de Pinus y Quercus en la localidad Independencia, Oaxaca. Asunción Guadalupe Martínez Tomínez, Alfonsina Arriaga-Jiménez, Marko Aurelio Gómez Hernández.

- XII Reunión de Scarabaeidología. Universidad del Valle de Guatemala. 17-22 Junio 2018. Guatemala, Guatemala.

Oral presentation: Dung beetle diversity in high mountains of the Mexican Transition Zone, biogeographical history and ecological influence. ARRIAGA-JIMÉNEZ A. & M. RÖS

A reference collection of dung beetles was given to each community, as well as copies of all the information. As soon as Axel Arenas defend his thesis, a copy of it will be given to the library of each community too.

The workshops and talks of our final results will continue next year for the Sierra Sur and Mixteca.

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

Although the project was supposed to be from December 2017 to December 2018, we actually keep the continuity of the previous project, so it was "used" from September 2017 to December 2018. Our project is still going, so even we do not have more Rufford resources, and we are using other funding to continue it. As soon as this report is accepted I will proceed to ask for another grant to the Rufford foundation, as well as asking for more funding in other places.

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 |
|--|-----------------|---------------|------------|---|
| Accommodation | 900 | 1500 | 600 | The planned budget was exceeded, because we could not camp as much as we expected. And in the end, we had more help in the field (students and translators), which increased the spending on lodging. |
| Food | 1700 | 2000 | 300 | As in the previous point, that we were more people and we made more trips to the field of those planned, increased food consumption. Also in the workshops and presentations we used to bring coffee and some food to share with the community. |
| Petrol | 800 | 1500 | 700 | The petrol price dramatically increased the last months (average of 20 pesos per liter, 0.78 pounds per liter) and as mentioned before, the fact that we increased the visits in each community almost double the petrol consumption. |
| Booths, plus oil, car reparations (flat tires, etc.) | 700 | 1000 | 300 | As for the petrol, the more outings to the field, and the more people, the more we had to spend on minor repairs to the vehicles |
| Printed material | 300 | 500 | 200 | Since we made several presentations in the communities, we had to print material (canvas and posters) as well as guides and copies of the articles so that they were available in the libraries of each site. The printing of the first version of Axel's thesis was also paid. |
| Entomological material, and other materials | 700 | 1000 | 300 | Boxes, viales, cans, jars, whirlpack bags; alcohol, field material, entomological boxes, labels and pins, glasses, etc. |

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| Wages (help in the field work) | 350 | 500 | 150 | We also spent more than budgeted, because by increasing the field trips we had to pay more guides and more help in each of the communities. |
| Financial aid for students and volunteers | 300 | 600 | 300 | The students and translators who helped to the project, and who came in to the field were helped with a small fee to help them pay for their studies or extra expenses they might have. |
| Congresses: Santa María Tlahuitoltepec forum (Oaxaca, Mexico); Mountain Symposium (Oaxaca, Mexico) and RELAS 2018 (Guatemala). | 400 | 800 | 400 | Inscription, transportation, accommodation and meals. For the forum in the Sierra Mixe it was for three of my students; for the symposium it was the expenses for me and three of my students, and for the RELAS it was for me. |
| Total | 6150 | 9400 | 3250 | |

The final expenses of this year's project far exceeded what we had budgeted. This is due to several reasons, the first is the clear rise in prices in the country, but also the fact that we began to involve more students in the project, which allowed us to carry out more activities in the communities (therefore more field trips). Luckily, thanks to the postdoc that I have, I was able to obtain extra funding, in addition to obtaining something extra thanks to the fact that I am part of the National System of Researchers. And finally, the support of Dr. Gonzalo Halffter (with whom I do my post-doctorate), allowed to pay a large part of the surplus we had in the field and especially granted me an assistant scholarship that I could give to my students. That is why, even though the budget was deferred, we managed to finish the project successfully.

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

We will finish to identify all this year material, in order of being able to give some results to the communities of Sierra Sur and Mixteca. Also, we need to finish the articles already in process to be published as soon as possible. And try to have the defense of Axel's thesis in January 2019 is also a priority.

The comparison of the different conservation measures, and of the different mountains is still in process and would like to finish it soon, in order to present the results in the first talks and workshops of 2019. The assessment of other dung beetles should be finished in the first months of 2019 to upload the information in to the IUCN. I will ask again for funding, because me and my team are very interested in continue with this research, working with the communities, and to train and teach students.



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

Yes. The Rufford Foundation logo was on every printed material we presented (see pictures). And we thanked the Rufford foundation in all the papers we published to date, in Axel's thesis, as well as in every presentation of the results.

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

Associated researcher: **Matthias Rös, Bert Kohlmann, Mario Zunino, Marco Dellacasa, Fernando Escobar and Gonzalo Halffter**

Students: **Axel Arenas Parral, Citlali Pérez- Díaz, Lucelli Pérez- Díaz, Brenda J. Cruz-García, Melissa Castillo-Ibarra, Osvaldo Sandoval and Asunción Tomínez.**

12. Any other comments?

My all team, especially my students and I, are deeply grateful to the Rufford Foundation for allowing us to continue this project. We are going further that we thought at the beginning of our research, and we are very happy with the results to date, and we are having an excellent relationship with the communities. We are pretty sure that there are still great things to achieve following this project, with more questions each time, and with more axes that each community is opening for us. The grant really allows us to perform a great research and we are sure even more good quality information will be find. It is true that there is also the combination of different funding's that actually allows to pay for all the research, but the simplicity to have the money without an invoice, allows us to pay for most of the expenses in the communities (food and lodging) where we cannot obtain receipts, as well as the payments of some students, guides and translators. We will definitely come back to you soon to ask for more help in order to continue with this great project.



Left: Delivering the reference collection of dung beetles to the community of Santa María Tlahuitoltepec. Right: Part of the research team in the Zempoaltépetl summit, asking for permission to the Kondoy God.



Left: Axel Arenas presenting some results in the forum of Santa María Tlahuitoltepec. Right: Melissas Castillo and Brenda Cruz presenting one part of the project in Santa María Tlahuitoltepec.



Left: Brenda Cruz, Luz Pérez and Hilaria Díaz in Santa María Tlahuitoltepec. Right: Axel Arenas, Alfonsina Arriaga, Luz Díaz and Citlalli Díaz in the Symposium de Montañas, Oaxaca 2018.



Left: Delivering and explaining about the reference collection to the woman in charge of the butterfly place in "La Mesita", San Pablo Etlá. Right: Geotrupes of la Sierra Sur, Oaxaca.