

DARWIN INITIATIVE: Fellowship Awards 2010

Darwin Reference: EIDPS025: María de la Luz Ruiz Maqueda

Final Report: October 2011

Darwin Project Ref No.	EIDPS025
Darwin Project Title	Fellowship Award 2010, arising from project "Certification to support conservation of endangered Mexican desert cacti" (14-059)
Name of Darwin Fellow	María de la Luz Ruiz Maqueda
UK Organisation	University of Reading
Your Organisation	University of Reading
Your role in your Organisation	Reader in Plant Systematics and Evolution
Start/end date of Fellowship	September 2010 – September 2011
Location	University of Reading
Darwin Fellowship funding (£)	26 700
Type of work (e.g. research, training, other, please specify)	Training – participation in the degree course MSc Plant Diversity
Main contact in UK Organisation	Dr Julie Hawkins
Author(s), date	Ms María de la Luz Ruiz Maqueda (with Dr Julie Hawkins), October 2011

1. Background

- Briefly describe your involvement in the Darwin project before the start of your fellowship.

As a Darwin exchange student on the project "Certification to support conservation of endangered Mexican desert cacti (14-059)" I travelled to Reading in January 2008 and spent 5 months being trained in DNA barcoding for cactus species identification. Prior to the training visit to Reading I was employed by the Cuerpo Académico for Biology, Plants and Micro-organisms, Universidad Autónoma de Querétaro (UAQ). As an employee of the Mexican project partner, I provided technical support for the project, and specifically I was responsible for the micropropagation of certified cactus plants using tissue culture techniques that I developed and adapted from previously published protocols. In Reading I was responsible for the DNA barcoding of plants of the subfamily Opuntioideae. My contribution to this output of the Darwin Initiative project is recognised in the co-authorship of a publication:

Yesson, C, Barcenas, RT, Hernandez, H, **Ruiz-Maqueda, M**, Prado, A, Rodriguez, V.M., Hawkins, JA. (2011) DNA barcodes for Mexican Cactaceae, plants under pressure from wild collecting Early view doi: 10.1111/j.1755-0998.2011.03009.x

- Describe the aim and objectives of the Fellowship, and programme of work.

The principal aims of the Fellowship were to ensure that I enhanced my skills and my on-paper qualifications so that I can become a future project leader in Mexico. The intention was that participation in the MSc training would provide an opportunity to further develop skills in project design, data collection and analysis, and analytical and writing skills.

- Briefly describe the roles of the UK and Fellow's institutions.

In terms of the Fellowship, the major part of the responsibilities fell on the UK partner, since they provided the MSc training, which was the main objective of the project. However, the UK PI (Hawkins) and the Mexican PI (Barcenas) of the project "Certification to support conservation of endangered Mexican desert cacti" (14-059) worked together to co-supervise the research project which comprised a significant part of the MSc training.

- If you have undertaken a formal course of training, please provide a brief explanation of the course and a link to the course website if available.

The MSc in Plant Diversity is designed to address the broad area of Plant Biodiversity and Systematics, which is both socially and scientifically important to the modern world at national and international scales. Reading has a long and successful tradition of training MSc and PhD students, many of whom are now prominent members of the plant science profession. The MSc teaching is led by research active staff who are engaged in a range of scientific projects in the UK and around the world. A link to the degree programme is at

<http://www.reading.ac.uk/biologicalsciences/pg-taught/biosci-pgtmscplantdiversity.aspx>

2. Achievements

- Summarise the work undertaken during your Fellowship. What were the main activities undertaken. Highlight any work undertaken but not originally planned and explain why this happened. Highlight any problems encountered and how they were overcome.

All taught modules have already been examined. The marks so far for the taught modules are as follows:

Plants & Climate 48%

Conservation & Biodiversity, Global and Local Scales 58%

Basic Plant Ecology 59%

Evolution and Classification of Plant Biodiversity 60%

Critical Discussion of Systematic Literature 73%

Creating Revisions, Monographs, Floras and Information Systems 71%

Ecological Biochemistry 53%

Advanced Plant Ecology 61%

Diversity & Identification of Plants 78%

Mediterranean Field Course 51%

Marks for the MSc project are not yet available, but full and final marks will be released following the Faculty examiners' meeting which is scheduled for November 14th 2011. On the basis of marks already awarded, and subject to performance in the project matching performance in the taught modules, my tutors expect that I will graduate with at least a merit mark.

The project carried out was "Cactus candy: Forensic techniques to allocate traded cacti to their original population". This project was developed because it addresses a very pressing need in Mexico, in terms of Mexico's obligations as a signatory of the CBD, i.e. the documentation and control of the illegal cactus trade. Specifically the aims of the project were to develop and test tools to identify species used illegally to manufacture "cactus candy". Development of tools of this kind will be essential if the trade in candy manufactured from threatened cactus species is to be documented as a first step to controlling it. The main aims of the project were to see if microsatellite DNA markers would be able to identify the species and populations that the candy was manufactured from. Presently cactus candy is widely available in Mexico, but its provenance is not clear. This project was technically challenging, and to see the methods developed to the point that they could be fully implemented was beyond what could be achieved in the short time frame of an MSc project. However, in terms of a feasibility study it was useful, and the most important purpose, training in research, was achieved.

- What have been the main achievements of your fellowship? Key documents should be annexed to this report.

The results I have in the MSc demonstrate that I am a good researcher who can work well in English. These skills, as well as the paper qualification itself, will mean I can pursue my career in Mexico, working towards my goals of a career in applied biodiversity science.

3. Outcomes, lessons and Impact

- Do you feel that the work undertaken during your Fellowship has improved skills that are relevant and important for your work in your organisation? How are you planning to apply those skills in future work?

My plan is to study for a PhD, so that I can get a more senior job in a Mexican institution, and so I can have more influence in the future. The MSc qualification I have will help me find a PhD, but I need to secure funding, and that is not easy to find these days. Currently I have raised part-funding for PhD study, and whether I return to my organisation with the enhanced skills I have now, or with further experience, depends on whether I can raise additional funding.

- What arrangements have been made for your future involvement, what more could be done, what discussions have taken place with your original employer to ensure that your new skills are utilised?

My role in my employing institution was not permanent, and my plan is to return to Mexico and take on another role. There is a real need for experienced researchers to work in biodiversity science, and I expect to find a role in, for example, one of the new institutions which are at the interface of conservation biology and molecular sciences. e.g. <http://www.langebio.cinvestav.mx>

- Has the Fellowship helped to improve your capacity to solve practical problems related to the sustainable use and/or conservation of biodiversity in your country?

The Fellowship has given me insights into a wider range of tools and approaches to document biodiversity, and manage its sustainable use and conservation. I have also become more knowledgeable about the international legal frameworks in which conservation biologists operate.

- Have you had the opportunity to make contacts with other UK biodiversity institutions, intergovernmental organisations, NGOs or the private sector during your fellowship? Will these contacts be useful for your future work, and how are you planning to maintain them?

I have made professional contacts at Kew, the Natural History Museum, London, the Institute of Zoology, London, and with professional consultants working in Environmental Impact Assessment in the UK. The former will be useful professional contacts in the future, and the latter have provided insights into UK national legislation and consultancy which are not directly relevant to the Mexican situation, but Mexican legislation might move in this direction. The UK experience could be informative as national legislation is rolled out.

- Any other issue emerging from your experience as Darwin Fellow that you would like to raise, or suggestions for improvements to the Darwin Initiative Fellowship scheme.

I would just like to say thank you.

Annex

MSc project abstract:

Wild plants have been culturally important around the world, and cacti are plants with great significance in Mexico. Cactus candy (traditionally known as “acitrón” or “dulce de biznaga”) is made from several species of the family Cactaceae, principally from *Echinocactus platyacanthus* and *Ferocactus histrix*, and because of the high demand for “acitrón” for the preparation of traditional dishes, these species are now protected by Mexican law (NOM-059-ECOL-2010) and CITES. Even so, the candy is still made in several places around Mexico and easily found. In this study, using an *Echinocactus grusonii* genetic library, microsatellite loci were developed for two widely used (*Echinocactus platyacanthus* and *Ferocactus histrix*) in order to characterise natural populations and determine the provenance of cactus candy. The results showed that both species have excess heterozygosity, low gene flow between related populations and both are experiencing bottleneck processes, especially *Ferocactus histrix*. DNA samples from cactus candy could not be amplified, probably as a consequence of DNA degradation and addition of sugar in the process of making candy. Plans for conservation, restoration and sustainable use of plant resources should be made to protect the genetic diversity of these plants.