

Darwin Fellowship - Final Report

(Please check guidance for submission deadlines, max 6 pages.)

Darwin Project Ref No.	EIDPS031
Darwin Project Title	16-004: Conservation of the Cerrados of Eastern Bolivia
Name of Darwin Fellow	Daniel Soto
UK Organisation	Department of Plant of Sciences, University of Oxford (original project)
Your Organisation	Museo de Historia Natural "Noel Kempff Mercado", Santa Cruz, Bolivia
Your role in your Organisation	Research Associate
Start/end date of Fellowship	28/2/2014 – 7/6/2014
Location	Royal Botanic Gardens, Kew
Darwin Fellowship funding (£)	£8720
Type of work (e.g. research, training, other, please specify)	Research – plant taxonomy
Main contact in UK Organisation	Dr Gwilym Lewis
Author(s), date	Daniel Soto with input from John Wood and Gwil Lewis. 20 August 2014

1. Background

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

I was part of the team of Darwin Project 16-004 "Conservation of the cerrados of Eastern Bolivia" throughout its life until the end of the post-project in 2011 and continue contributing to post-project publications and other activities. I participated in all project activities including field work, identification of plant material, conservation assessments, preparation of reports and field guides and the promotion of educational material through school visits and workshops. I benefitted from project training courses and mentoring from expert visitors. I have a general knowledge of most plant families but as a result of the project I developed specialist interests in *Bauhinia*, Sapindaceae and Rubiaceae, on which I have published two papers in *Brittonia*. I also developed skills in data-basing and photography. As part of the project I had increasing awareness of the importance of educational and promotional activities to support plant conservation and of how local communities need to be involved in conservation.

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

The general aim of the fellowship was to raise my skills and confidence as a plant taxonomist so I could provide effective technical support for biodiversity and conservation work in Bolivia. It would be focussed on developing skills in the use of herbarium material and of library and internet resources in plant identification, focussed on the genus *Bauhinia* in its broad sense. I hoped to become more aware of how modern evolutionary and molecular studies in plant taxonomy are relevant to plant taxonomy.

The main expected outcome was a paper to include a checklist of *Bauhinia* (in its broadest taxonomic sense) in Bolivia with species correctly placed in their segregate genera (thus making use of very recent systematic studies in this group in which Dr Lewis had been involved), a key to the identification of Bolivian species, brief diagnostic descriptions of each species, summary accounts of their ecology and distribution, a preliminary assessment of

their conservation status and descriptions of any new species that might be identified during the course of the fellowship. I hoped to resolve any problems which arose during this study with the advice and support of the project principles, thus gaining skills I could apply to other groups on my return to Bolivia.

I hoped to benefit from being in an institution with world-wide links which would facilitate contacts with other botanists and institutions working in related fields. I believe sound plant taxonomy is important in underpinning the wider aims of conservation and the maintenance of sustainable livelihoods.

There was no very precise work programme but the following developed on an ad hoc basis:

Week 1 included introductions to Kew and its facilities, in particular the library and legume collections. Specimens I had brought from Bolivia were processed for study. Dr Lewis provided a general introduction with advice on plant taxonomy and a provisional work plan was agreed.

Weeks 2 – 4. I planned to work with the specimens from the Bolivian herbaria which I had brought with me and those at Kew identifying key taxonomic characters and sorting specimens into putative species and checking them against published names and accounts from neighbouring countries. Loans were requested from Missouri and New York and visits planned to the Natural History Museum and Oxford. It was planned that publication would be in English to reach a wider audience and the Kew Bulletin format would be used.

Weeks 5 – 10. I fine-tuned my species delimitation work, found names for most entities separated and prepared draft descriptions which were discussed and approved by Wood and Lewis.

Weeks 11 – 14. In the final four weeks I aimed to complete the species descriptions as far as possible, working on a key to species and incorporating information obtained from the loans that had come to Kew from New York and Missouri as well as information from visits to other institutions and the internet. Based on progress it would be necessary to make plans for my return to Bolivia to include limited follow-up field work, visits to Bolivian herbaria to update and revise all collections (the loan from La Paz comprised only a small part of their total holdings) so a manuscript would be ready for submission by the end of 2014.

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

The UK host institution would provide bench space, access to their plant collections, libraries, computer network and other facilities as normally provided to academic visitors to the herbarium. They would process any loans and organise any visits to other institutions agreed with the principal in the project (Dr Lewis). They would help the fellow find suitable accommodation in the neighbourhood.

Dr Lewis and his colleagues in the Herbarium legume team would mentor and advise me on all aspects of his studies of *Bauhinia* to help achieve his objectives.

The other principal, John Wood, would liaise with me in Bolivia before and after the completion of the fellowship, helping with the preparatory groundwork for the fellowship and discussing how its legacy might be secured with the fellow and with stakeholder institutions in Bolivia. During my stay in the UK he would be the principal point of contact for me in matters of welfare and general living in the UK. In collaboration with Kew staff he would ensure accommodation and travel issues were resolved satisfactorily including liaison with the British Embassy in La Paz over visa issues. He would act as my mentor in general matters within the study programme planned with Dr Lewis. He would also be responsible for planning legacy activities of the fellowship with me before my return to Bolivia and assisting me in the preparation of any reports required by the Darwin Initiative or my home institution.

My institution, the Noel Kempff Mercado Natural History Museum is a dependency of the state university in Santa Cruz Bolivia. Based around its collections it conducts scientific research in both zoology and botany and is the pre-eminent institution of its kind in eastern (lowland) Bolivia. It provides support for and collaborates in a wide range of biodiversity and environmental projects including environmental impact studies, studies of sustainable use of biological resources, biological inventories, conservation planning and similar work. I have been a research associate of the Museum since 2006 and I have participated in a range of projects in which the Museum has been involved. These include projects related to plant inventory work, environmental impact studies, research into the forage value of natural vegetation, the identification of wild plant relatives and the impact of pre-Colombian settlements on natural vegetation.

The Museum would provide support to allow me to take the specimens from Bolivia for study at Kew and allow me to continue as honorary second in charge of the herbarium. I would continue working with the Museum in the future, making use of my new skills for publications, field work, biodiversity studies, conservation risk assessments and other activities related to conservation and education, involving projects organised through the Museum.

- 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.

Not applicable

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.

Most of my time at Kew was spent examining specimens of *Bauhinia* from Bolivia and neighbouring countries. I had arranged specimen loans from the National Herbarium in La Paz and from the Museum's herbarium in Santa Cruz and this material together with the collections at Kew formed the core material of my study. In the event this material provided a sound basis and it was only necessary to request loans of relatively few specimens from other institutions to resolve specific problems.

Initially I worked on sorting specimens into putative species by identifying important diagnostic characters while discounting non-diagnostic variation. Kew has excellent bibliographic resources and I was able to assemble all relevant literature enabling me to name most material while understanding and questioning other scientists' interpretation of these species, particularly those who had worked on Brazilian and Argentinian collections. I was able to discuss my decisions with Lewis and Wood. As a result I was able to recognise five new species records for Bolivia and one possible new species for science, although material of that species was inadequate for detailed study. I was also able to put Bolivian material into the wider context of contemporary molecular studies thus recognising that so-called *Bauhinia* in Bolivia consisted of two different genera *Bauhinia* and *Schnella* the first with 30 species and *Schnella* with 9 species. As I worked through the material, I was gradually able to find names for most hitherto unidentified specimens from Bolivia and, perhaps more importantly, to find concrete evidence of which species were rare and potentially under threat, although it is clear that our exact knowledge of the frequency of occurrence of many species is still limited. As some of the rarer species are restricted to threatened habitats, they are of potential value as indicator species within conservation assessment. I also attended English classes for four weeks to improve my oral skills in English.

In the second half of my fellowship I focussed on writing up what I had worked out in the first part of the fellowship. I concentrated on the preparation of species descriptions after agreeing a model with Dr Lewis. I was able to describe 70% of the species fully but some descriptions have proved difficult to complete as available specimens lack either flowers or

fruit. The flowers of *Bauhinia* species are very fragile and fall at midday so they are often missing from dried specimens. Although photographs and specimens with flowers are often available this is not always the case, particularly with the rarer species. I hope to solve some of these problems by finding fresh material in the field in Bolivia but some descriptions are likely to remain incomplete when the paper is finally delivered for publication at the end of this year. I was also able to confirm provisional species identifications as material from New York and Missouri became available. Some issues arose over the typification of species. I hope to resolve these by the lectotypification of some four species in my planned paper. I will also need to formally synonymise several currently accepted species as my studies show clearly that two or more accepted names actually represent one and the same species.

- What have been the main achievements of your fellowship? Key documents should be annexed to this report.
 1. Identification to species of almost all material of *Bauhinia* sensu lato from Bolivia
 2. Recognition of the presence of five additional species in Bolivia
 3. Preparation of an accurate checklist of species of *Bauhinia* sensu lato in Bolivia
 4. Preparation of descriptions of all species (30% remain to be completed with additional detail)
 5. Preliminary assessment of the frequency and potential threats to each species

A draft paper will be available for the Darwin secretariat later in the year when missing details have been added but it must be emphasised that some details may not be found.

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?

Yes, I have been able to reinforce my skills in plant taxonomy. I have also been impressed by some of the team work that takes place at Kew, particularly the group “sorts” of incoming specimens both at family level and within the genera of Leguminosae. This is a good way to teach basic classification skills and I have already approached the head of the herbarium in Santa Cruz to implement similar team “sorts” in the Museum. I hope to encourage more interaction between biodiversity workers in the Museum.

- 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?

I am expected to resume my work in the Museum and participate in the Museum’s activities. No specific arrangements have been made but my employer is eager to encourage publications related to plant taxonomy and biodiversity in general. Publications by the staff are seen as adding to the status of the Museum enabling it to be better placed to enhance its role in conservation and research. Informal discussions have taken place with the director indicating that I will be involved in future projects as these come up. I will continue to act as second in charge of the herbarium and botany section of the Museum.

- 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?

In a general sense, yes. The study has raised my confidence in resolving issues related to species delimitation and plant taxonomy in general. This will enable me to recognise more rapidly the biological value of any site I am asked to investigate as I will be better able to recognise and distinguish unusual species. I hope to build on this experience to develop my capacity in other families, especially Rubiaceae.

- 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?

This has been a very useful aspect of my fellowship. I have been able to renew my links with Francis Mayle of Reading University and with Oliver Philips of the Rainfor project to evaluate climate change in the context of forest dynamics. A visit to Leeds was arranged by, and funded through, that project. I was able to make visits to the Natural History Museum in London and to Oxford University, where after discussion with Dr Hawthorne it was agreed that funds would be provided to carry on with work related to Rapid Assessment begun during the original project. I have made contacts with individuals working in similar fields from Brazil and Venezuela as well as the United Kingdom and expect to maintain contact through e-mail.

- 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.
 1. While at Kew I was able to attend a range of activities including lectures and family sorts. I was also able to look at material of the other family (Rubiaceae) I am particularly interested in. Attendance at an institution like Kew, where there are an ongoing series of activities and events, was one of the most valuable aspects of my fellowship and added much to the enjoyment of the fellowship and my time in England in general.
 2. Processing a visa to come to the UK was a difficult matter, partly because Kew cannot sponsor under Tier 4 of the UK visa system and partly because, as a non-establishment research worker in Bolivia, I could only just fulfil the requirements for admission as an Academic Visitor. In the event Wood's contacts with the British Ambassador may have been crucial in getting Embassy staff to help positively with the application. Perhaps the Darwin Initiative through DEFRA and DFiD could suggest the simplification of the visa process for visitors from countries where visas are required so that people receiving awards through British government direct or semi-direct grants receive visas more expeditiously.