

## Darwin Scholarship - Final Report

(Submit within 2 months of Scholarship completion, max 6 pages.)

Darwin Project Ref No.	EIDPS9
Darwin Project Title	Capacity building in molecular genetics and immunology for biodiversity conservation in Chile.
Name of Darwin Scholar	Cristóbal Briceño Urzúa
UK Organisation	Cambridge University
Your Organisation	Universidad de los Lagos
Your role in your Organisation	Darwin's Fox Project Co-ordinator
Start/end date of Scholarship	1 <sup>st</sup> September 2005 to 31 <sup>st</sup> August 2006
Location	Chile and Cambridge, UK.
Darwin Scholarship funding (£)	£
Type of work (e.g. research, training, other, please specify)	Research in molecular genetics on the endangered Darwin's fox ( <i>Pseudalopex fulvipes</i> ) mainland population.
Main contact in UK Organisation	Dr. Leslie A. Knapp
Author(s), date	3 <sup>rd</sup> of February 2007

### Background

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

I was employed as project co-ordinator via Universidad de los Lagos for DI project 11-013 between 2003 and 2005. My duties included responsibility for animal capture, animal welfare, health screening and serology of Darwin's foxes and domestic dogs. As project co-ordinator, I was involved in maintaining a good working relationship between the project staff, supervising volunteers, collecting field data, handling general logistics and setting up collaborations with local governmental, private and academic institutions as well as communities.

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

The scholarship aims to provide training and capacity building in molecular screening of loci involved in the immune system (MHC) of the critically endangered Darwin's foxes. This methodology will provide important information on the phylogenetic relationship and genetic variability on this cluster of genes responsible of resistance to pathogens, fitness and kin recognition. This research will benefit further conservation planning and this knowledge will be disseminated in Chile.

The current scholarship was structured as follows:

Sept-Oct 2005: Field work in Chile for animal capture and training students.

Nov 2005 to May 2006: Cambridge University. Research and training of scholar.

Jul-Aug 2006: Osorno and Santiago, Chile. Dissemination and training by scholar.

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

University of Cambridge, via its Biological Anthropology Department and Dr. Knapp's lead, has provided infrastructure and guidance for the molecular analysis and research. Besides the administration of resources, the university has provided support and facilities for the scholar's research, such as an office, libraries and online access to journals.

Nature Heritage, has provided field equipment, but most importantly has been an overall guidance and support in particular matters, such as helping to overcome the difficulties found into obtaining capture authorisations inside the National Park.

Universidad de los Lagos provided equipment necessary to conduct the field session such as tomahawk traps, GPS devices, walkie talkies and camping equipment.

## Achievements

- Summarise the work undertaken during your scholarship. 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.

The **work undertaken** can be divided into three major activities throughout the scholarship period.

1. - An intensive **field session** was conducted to capture Darwin's foxes in one of the two extant populations at Nahuelbuta national park during November and December 2005. Trapping effort resulted in 170 traps/night, and although a great trapping effort was conducted, no captures were achieved. One veterinarian (Ignacio Rodriguez), two veterinary students (Nualik Burucker and Leticia Gutierrez) and one park ranger (Cristián Aguilera) were trained in the field into trap setting, wildlife tracking, dog health screening, sampling and processing of biological material. 25 dogs were medically examined, dewormed and owners interviewed whilst awareness for good dog management practices were given along with a wildlife conservation message supported with outreach material such as posters, leaflets and story books on Darwin's foxes for children (produced by DI project 11-013).

2. - A very extensive **diffusion** was achieved reaching an estimated 300 people with 11 national and international talks (60 school students, 70 university students, 11 governmental authorities, 40 local community leaders and authorities and 119 people from the scientific community). Additionally, the most important diffusion was in the field with all the local people we interacted with when visiting houses for dog screening and talking with people in the roads or markets. These are the people that are in closest contact with the fox environment.

Additionally, three press releases were published in local newspapers and their web portals, also I gave a one hour radio interview on my current research for Cambridge University Radio and there were several announcements in a Local Radio in Nahuelbuta advertising our visits for free veterinarian examination on dogs.

In every talk or press release, Darwin Initiative and DEFRA had been fully acknowledged for its financial and institutional support.

A table with detailed information on talks, presentations and press releases is annexed.

3. – All the **genetic research** and analyses were conducted in Cambridge University at PRIME laboratory between January and July of 2006. This period comprised bibliographical research by the scholar, specific genetic primers design, acquisition of reagents, setting up conditions for PCR (Polymerase Chain Reaction) and DNA fragment screening techniques using TTGE (Temporal Temperature Gel Electrophoresis). During this time a very intensive laboratory work was carried out, as we had to set up all conditions required for studying a novel species with novel conditions, which varies from the usual work conducted in primates at PRIME. As an additional challenge, we were forced to extract DNA from archive museum samples, as much as 30 years old, as a consequence of unsuccessful trapping.

Regarding **problems** or **difficulties** encountered during the scholarship.

The first problem encountered came from CONAF (National Forestry Bureau) reluctance to provide authorisation to conduct research inside Nahuelbuta National Park. This was triggered due bad previous experiences with other researchers inside the park. This problem caused a two and a half months delay for the beginning of my field session at Nahuelbuta. This situation was required provision of comprehensive and clear information of the objectives of our research, as well as organising meetings and talks with the authorities and park rangers, in order to give confidence of our complete and serious commitment. Finally, the authorisation was granted allowing me to begin my field session in mid-November.

The second adversity was the impossibility to capture foxes at Nahuelbuta National Park even with a greater trapping effort than our previous experience in Chiloé. Albeit unusual adverse weather conditions, this might be due the fact that the targeted population is too small and/or because these foxes have been intensively trapped in the recent past (2 or 3 years ago). Another difference with the insular population is that these foxes co-exist with the two other Chilean species and the Darwin's fox, being the smallest of all, experiences niche displacement. To overcome this lack of captures and carry on with our aims, 5 fresh faecal samples were collected in the field as well as 4 skin samples from dead animals found in local people's houses. Additionally, I began an intensive search of other possible sources of genetic samples which led me to contact Angol's Museum (the closest city from Nahuelbuta), where I could obtain two additional skin samples. In another collaboration established with Universidad de Concepción, I was able to obtain 6 more fresh faecal samples from Nahuelbuta. Finally, we obtained 6 skin samples from different Darwin's foxes and 11 faecal samples from *Pseudalopex* to carry on our research. In this regard, working with archive samples was especially difficult and represented an additional challenge, as old samples contains mostly degraded DNA and the amplification process was particularly sensitive to the slightest contamination.

The last problem encountered was at the University of Cambridge with financial questioning from their financial department in April 2006. After the arrival of a new Head of Finances, the office began questioning and requesting information on my stipend to the extent of blocking my stipend for 20 days, only to be re-established at the expense of an enormous effort and waste of time (paperwork, phone calls, explanations, etc) from Dr. Knapp and the secretary from the Department of Biological Anthropology. The problem was that my particular position, as a scholar, was novel to the University (i.e., neither student nor professor) on which they requested the payment of taxes as a condition of receiving a cheque from the University. Even DI, through Margaret Okot, Stefanie Halfmann and Sarah Moon intervened explaining to the people involved my situation as a scholar with an awarded stipend for living expenses. The University decided that they would give me my stipend against receipts that I should keep for every living expense. I kept my receipts even though I felt was inappropriate as living expenses are based on personal choices and it it was not always possible to obtain receipts for every little expense (e.g., use of cola machines, etc.) Ironically, the University never requested the receipts.

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

The main achievement has been the important molecular work conducted in Cambridge under the expertise of Dr. Knapp which, being a tremendous challenge, has augmented my capacity in this important and modern technique for conservation research. To execute this molecular research, a successful integral scheme was necessary in order to include the different parts involved: governmental (SAG and CONAF; our Fish and Wildlife Service and National Parks Administration Service respectively, and local municipals) and non-governmental (Local communities, Universities, museums). Integrating all these groups has brought the conservation of the highly endangered population of Darwin's foxes in Nahuelbuta to a wider audience and this project itself has been important catalysing communication and growing interests within its elements. In this regard, a good relationship has been established with national agencies in Nahuelbuta that are willing to collaborate and support further research. We have kept them informed (see Nahuelbuta field report, English version attached) and proactively invited them to participate in upcoming activities and conservation actions. Possibly, one of the immediate benefits of this scholarship has been the valuable and ever-increasing diffusion we achieved. We reached approximately 300 people from different disciplines without considering press releases or radio diffusion (Diffusion Table and press releases attached).

Currently, we are preparing a manuscript with the results and are aiming for submission to the Journal of Molecular Ecology. A plenary talk on the Genetic research carried during the scholarship will be given in the "II Encuentro Universitario Sobre Conservación y Manejo de Flora y Fauna Silvestre" to be held at the Faculty of Veterinary and Agronomic Sciences, Universidad de Concepción between the 28<sup>th</sup> and 30<sup>th</sup> of March 2007. An oral abstract for presentation has been submitted to the "XXI Annual Meeting of the Society for Conservation Biology" at Port Elizabeth, South Africa between the 1<sup>st</sup> and 5<sup>th</sup> of July 2007 and I am currently applying for travel sponsorship (Abstract annexed).

The work conducted during the scholarship has been carried under the legal frame required to work with endangered species in protected areas. Annexed is the SAG (required to work with endemic endangered fauna), CONAF (required to work in national parks), CITES and DEFRA importing authorisations.

### **Outcomes, lessons and Impact**

- Do you feel that the work undertaken during your scholarship 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?

This scholarship represented a tremendous opportunity to conduct research at the highest standards on a species that is poorly understood. I have been trained at Cambridge University and learned a set of molecular tools that have given me a broader background to face challenges for the conservation of species in my own country. This same scholarship has also revealed all of the different groups involved in the Darwin's fox conservation at Nahuelbuta national park, creating a collaboration that can I develop according to the strengths and interests of the different groups. Thus, my newest aim is to continue research on this critically endangered species and seek national and/or international funds to achieve conservation at local level with SAG and CONAF. To achieve this, I am working on keeping communication open and we are currently analysing how this can be done.

Regarding my training by Dr. Knapp and its application, I am planning to apply to a PhD promptly at Cambridge University and continue research on South American canids to establish their phylogenetic relationships and to conduct a comparative study of their health

and disease susceptibility. This next step in my career hardly would have been possible without the Darwin Initiative scholarship, as this important support gave me the possibility to grow professionally.

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

This scholarship certainly has exposed me to situations that have improved my experience to solve pragmatic problems. This has been at institutional levels as well as at the level of field work.

The reluctance from CONAF to provide us the authorisation to conduct our research at the national park, forced me to go further and provide extra information as well as visiting them at their head quarters and present my objectives. In the same way, as mentioned, I was not able to capture foxes at Nahuelbuta so I was obliged to search for alternatives in order to succeed with my research. Besides faecal collection, the necessity to enlarge my sample size led me to contact the people from the museum at Angol. Both situations required that I go further to satisfy any apprehensions. I learned to be more proactive and gained diplomatic experience.

In the field, I had the chance to practice connecting with local people which, besides obtaining valuable information, allowed me to do conservation in the field by subtly informing people of the benefits of wildlife conservation. It also brought me back to the human, domestic animal and wildlife conflict and as a veterinarian, gave me the opportunity to orientate (when possible) toward better animal practices.

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

In my personal experience, the best way to make contacts is by means of meeting the people personally. Being at Cambridge gave me the opportunity to meet very interesting people working in similar areas, share experiences and ideas with colleagues from several organisations dedicated to conservation.

While in England I had the chance to attend to some of the monthly scientific meetings at the Zoological Society of London.

On the 22<sup>nd</sup> of February 2006 I was invited as a Darwin Scholar to the Darwin Initiative Workshop in London. I had the chance to meet other DI Scholars and some of the people I have had contact only by e-mail, such as Margaret Okot.

Between the 28<sup>th</sup> and 30<sup>th</sup> of March 2006 I attended the Student Conference on Conservation Science which represented another very good opportunity to meet colleagues doing conservation in several fields. I met people from Bird Life International, Flora and Fauna International and British Trust for Ornithology among others. Since then, I began to attend to the monthly meetings from the Cambridge Conservation Forum.

I had the opportunity to meet people from different departments at Cambridge University, as giving a talk for the Biological Anthropology group, meet people from Zoology and Botanical Departments.

On the 5<sup>th</sup> of April 2006 I was invited by Denise Taylor to visit the UK Wolf Conservation Trust at Reading. It represented an interesting opportunity to know about their work and share experiences.

The 19<sup>th</sup> of April I was invited to give a talk at Jersey Zoo for the Durrell Conservation Trust in the Channel Islands.

Finally, I was invited to give a talk for the Centre for Ecology, Evolution and Conservation at the University of East Anglia, Norwich.

I am very happy to experience these different activities and to meet many people working in different aspects of conservation. Each one of these experiences was very enlightening and allowed me to learn and share personal experiences whilst working in this field. None of these experiences or contacts would have been possible without my stay in England and I am very grateful for this opportunity. I keep in e-mail contact with many of these people and they keep me updated on current events.

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

This project represented a great experience to me, professionally and personally. It opened a wider range of opportunities in the field of conservation and leaves me in a better position to begin advanced studies in this area. It allowed me to learn molecular techniques whilst being in a great academic environment.

I want to thank the support provided by Margaret Okot, Sarah Moon and Stefanie Halfmann, which made me feel very supported when the financial difficulties arose with Cambridge University. They were extremely supportive and concerned on my behalf, even contacting the people from finances at the University and providing me with guidance.

I am indebt and very grateful for all the support provided by Dr. Leslie Knapp, Dr. Stephan Funk, Jo Osborne, Teresa Parker, David Jordan, Elizabeth Fuller, Dr. Bill Amos, the Biological Anthropology Department, PrIME lab, Emmanuel College, CONAF, SAG, Universidad de Concepción, Museo Dillman Bullock, DEFRA and the Darwin Initiative.

Cristóbal Briceño Urzúa