Darwin Fellowship - Final Report

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

Darwin Project Ref No.	EIDPS033
Darwin Project Title	Revision of *Eriocaulon* for Cambodia, Laos and Vietnam
Name of Darwin Fellow	Phetlasy Souladeth
UK Organisation	Royal Botanic Garden Edinburgh
Your Organisation	National University of Laos
Your role in your Organisation	Lecturer in Botany, Faculty of Forestry (National University of Laos)
Start/end date of Fellowship	1 Oct 2013 to 31 Oct 2014
Location	Edinburgh, UK
Darwin Fellowship funding (£)	20590
Type of work (e.g. research, training, other, please specify)	Research
Main contact in UK Organisation	Royal Botanic Garden Edinburgh
Author(s), date	Mark Newman, 1 Oct 2013 to 31 Oct 2014

1. Background

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

A meeting at the XVI International Botanical Congress in Saint Louis (Missouri, 1999) identified the need for a World Flora Project, a project which would document the world's flora as a high priority. In Cambodia, Laos and Vietnam, which is covered by the Flora of Cambodia, Laos and Vietnam project (Flora of CLV), within-country capacity for such biodiversity work is extremely limited. Moreover, work of this kind is severely hampered by other aspects of the taxonomic impediment, i.e. lack of access to relevant information not held in these countries and few trained personnel.

Conservation of rare and endemic plants, and sustainable usage of others, especially for medicinal purposes and local uses, are high priorities in CLV. Any consideration of these topics first requires knowledge of exactly which species are involved. The taxonomic work of circumscribing and describing species depends upon study of type specimens (the unique vouchers on which species concepts are founded). Types may not be held in the country of origin and, in the case of CLV, local conditions make it difficult for Indochinese taxonomists to gain access to these materials, most of which are held in France and the UK. A second requirement is an accurate inventory of which species occur where and in what numbers. Much baseline data already exists in literature and herbaria but again, this is not readily available in CLV.

As part of Darwin project 13007, "Taxonomic training in a neglected biodiversity hotspot in Lao PDR", which ran from 2004-2007 and aimed to increase the number of proficient Lao botanists, I was trained in the techniques of plant collecting and identification. Since the end of the project in 2007, I have continued my training, gaining an MSc from Khon Kaen University (KKU, Thailand) in 2012. One of the research projects I carried out during my MSc was a study of plants in the genus *Eriocaulon* in Vientiane Capital. I have also been involved in teaching Botany and Biodiversity Conservation to undergraduate students in the Forest

Management programme at the Department of Forest Management, Faculty of Forestry, National University of Laos. Besides teaching, I am responsible for the herbarium of the faculty where I can use my knowledge to develop my career.

Before starting my Darwin fellowship in 2013, my former MSc advisor, Asst Prof Dr Amornrat Prajaksood (KKU) and I received funding from the International Association for Plant Taxonomy (IAPT) for field collections of *Eriocaulon* in southern Laos. We made new collections and updated information relating to this genus in Laos as well as in the CLV region. This provided valuable materials for my study. The final report of this project is available here (http://iapt-taxon.org/downloads/grants/2014_Final_Report_Meesawat.pdf)

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

As stated in the original application the main objectives are:

To build on the promise shown by a trainee in project 13007, making me a more valuable asset to Lao PDR in its efforts to conserve and maintain its biodiversity.

By preparing a taxonomic revision of the Eriocaulaceae of Cambodia, Laos and Vietnam, a critical group of wetland plants, to develop techniques already learned in project 13-007 and to learn valuable new techniques.

To these should be added:

Setting up a website of *Eriocaulon* for the Flora of CLV. This will happen in co-operation with the emonocot project (http://eriocaulaceae.e-monocot.org/) after completion of the project (stated elsewhere in the original application).

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

The Royal Botanic Garden Edinburgh has been closely involved in SE Asian botany for at least 50 years. RBGE has signed a co-publication agreement with the Muséum National d'Histoire Naturelle, Paris in order to accelerate the completion of the Flora of Cambodia, Laos and Vietnam. Dr Mark Newman is a member of the editorial board of this Flora, as well as being an expert in the monocotyledonous family Zingiberaceae, and he has collected widely in CLV.

The main role of the RBGE is to act as host to the Fellow, providing experience of an internationally renowned herbarium which could not be gained in Lao PDR. The Fellow will learn more of taxonomy and all the processes of a herbarium. All of this being done as part of a taxonomic revision which will be published in the Flora of CLV.

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.

I attended an IELTS Preparation Course at the English Speaking Union Edinburgh from the 20th of January until 2nd of September 2014. After that, on 6th of September, I took an IELTS exam for academic English and gained a score of 5.5.

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.

During the year of my fellowship, I have undertaken the following activities some of which were not set out in the original plan:

September 2013, I visited the main herbaria in Vientiane and Ho Chi Minh City (stated in original application).

December 2013, I spent a week studying all the specimens at the Royal Botanic Gardens, Kew and discussing species concepts with Dr Sylvia Phillips, an expert in Eriocaulaceae (stated in original application).

May 2014, having been successful in applying for funds to visit the Muséum National d'Histoire Naturelle in Paris, I spent a month in the herbarium there, where the highest numbers of specimens from Cambodia, Vietnam and Laos are deposited. This was an important addition to my project and resulted in a lot of progress in my research. Without it, I might not have seen all the specimens from CLV at P because they would not loan all their collection from the area at one time. (not stated in original application).

September 2014, I presented progress on this project at the 16th Flora of Thailand Meeting, at RBG Kew (not stated in original application). This gave me experience in presenting my scientific results in English to an audience of my peers. I met many colleagues from Cambodia and Thailand who may be useful contacts for me in future.

Towards the end of my fellowship, Dr Mark Newman and I solved many problems on lectotypification of *Eriocaulon* names and began preparing a manuscript on lectotypification of some names in *Eriocaulon* which have not been designated (not stated in original application).

November 2014, I spent a week studying seed morphology using a scanning electron microscope. This work was done at Khon Kaen University (Thailand) after finishing work in the UK. The results will be published in a paper of new species from CLV (not stated in original application).

In parallel with my scientific work, I attended English language classes for most of the time that I was in Edinburgh, at the English-Speaking Union (stated in original application). During the latter months, I took an IELTS preparation course and sat the IELTS exam on Saturday, 6th September 2014, gaining a mark of 5.5.

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

The main achievement from the Darwin fellowship is that I have studyed all herbarium materials at the Royal Botanic Garden Edinburgh (E), the Royal Botanic Gardens, Kew (K), the Muséum National d'Histoire Naturelle (P), the Institute of Tropical Biology, Vietnam (VNM) and the Natural History Museum, London (BM), in collaboration with experts in the taxonomy of my group. All voucher specimens were recorded in a database for further analysis such as IUCN conservation assessments and preparation of distribution maps. A taxonomic revision of *Eriocaulon* in Cambodia, Laos and Vietnam will be published later, probably next year, including a key to species, distributions, line drawing figures of some species and maps.

Additionally I would separate my achievements during the fellowship into research and training, as below:

Research:

Much of the work in this fellowship is compilatory in nature, scanning literature for references to *Eriocaulon*, especially species occurring in CLV and building up a bibliography of such works. Similarly, producing digital images of specimens is a matter of photographic techniques.

The research elements are more or less confined to dealing with the specimens themselves. For non-type material this is mainly a matter of identification – what species does the specimen belong to? For type material the situation is more complex: is the specimen an original element in the publication of a name? does the specimen match the description and other information in the original protologue? does the specimen match the concept of the species in current use? is the name validly published according to the Botanical Code of

Nomenclature? if only some or none of these, then what must be done to address the situation? Experts in Eriocaulaceae were consulted and typification and nomenclature experts were extensively consulted in general and on specific aspects of the work. This approach is standard procedure for dealing with typification work.

Training:

I've learned several techniques in Plant Taxonomy such as:

- Library skills including electronic catalogue searching
- Herbarium techniques & working with collections, data capture
- Typification & nomenclature; use of the International Code of Nomenclature for algae, fungi and plants
- IT skills; basic database design and use
- Preparation of digital images; scanning and converting text
- Preparation of manuscripts for scientific publications

English training (IELTS preparation).

I don't know what my IELTS score would have been before I reached Edinburgh but now it is 5.5 which is within reach of the score of 6.5 needed for entry into a UK university. I feel much more confident in English now, and can communicate much better than I could.

The outputs of my work are still in preparation so I can't submit them as key documents. I append some photos taken while I was working, and some photomicrographs of seeds which will be used in my publications (see Annex 1, 2, 3).

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?

Working in the herbarium of the Faculty of Forestry (NUoL), I can apply much of what I have learned during my fellowship at the Royal Botanic Garden Edinburgh and other herbaria in UK. This will improve the conditions not only of this herbarium but also others around Vientiane, leading to the adoption of a higher standard of work in the near future. Moreover, the taxonomic skills I have acquired will be useful for my current and further research on plant taxonomy.

I am sure that all the techniques I've learned in Edinburgh and from the UK host will apply to my job in the National University of Laos.

The benefits of the Fellowship include raising the competence of Lao PDR academic staff to contribute to the aims of the National Biodiversity Strategy and Action Plan. The Fellow has the skills needed to continue work towards the targets of the GSPC. I can promote the benefits of the Fellowship in my role as a university lecturer where I teach the coming generation of biologists in Lao PDR.

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?

The Fellow will disseminate the benefits of the Fellowship by producing a website for the distribution of information about CLV *Eriocaulon* species.

I can also update the national plant database (BRAHMS) which is held by the Herbier National du Laos (HNL), Biotechnology and Ecology Institute, Ministry of Science and Technology. My ability to advise HNL will not only apply to *Eriocaulon* but much more widely concerning endangered plants in Lao PDR.

The Fellow is in a better position to proceed to a PhD position which will strengthen my ability to maintain the legacy of project 13007 and this Fellowship. After this Fellowship ends, as a former Fellow I'll continue to collaborate with the RBGE to work in the Flora of CLV.

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?

Yes. I am better able to advise on biodiversity matters than I was before the fellowship.

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?

Yes. I made good contacts with RBG Kew and have met and worked with staff of the Natural History Museum, London who will help me in future, if I need it. As I prepare papers on *Eriocaulon* I'll keep in touch especially with Dr Phillips at RBG Kew who is the main expert in the UK on this genus.

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.

None.

Annex 1: Photos while visiting herbaria.

Figure 1) Royal Botanic Gardens, Kew (K); Figure 2) Muséum National d'Histoire Naturelle (P); and Figure 3) Institute of Tropical Biology, Ho Chi Minh City, Vietnam (VNM).

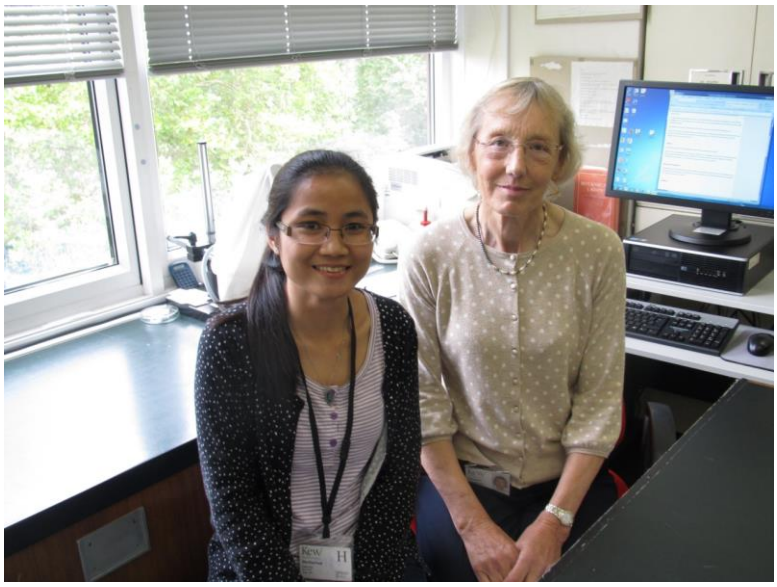


Figure 1. Phetlasy Souladeth with Dr Sylvia Phillip (RBG Kew) after discussing new species of *Eriocaulon* from Cambodia, Laos and Vietnam.

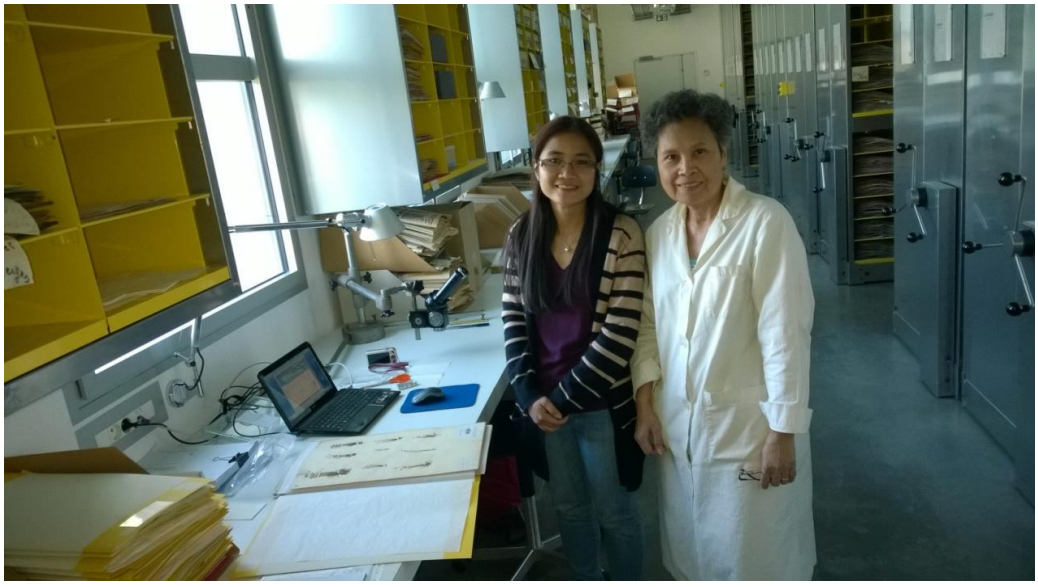


Figure 2. Phetlasy Souladeth with Mme Sovanmoly Hul (P), Editor of the Flore du Cambodge, du Laos et du Viêt Nam, May 2014

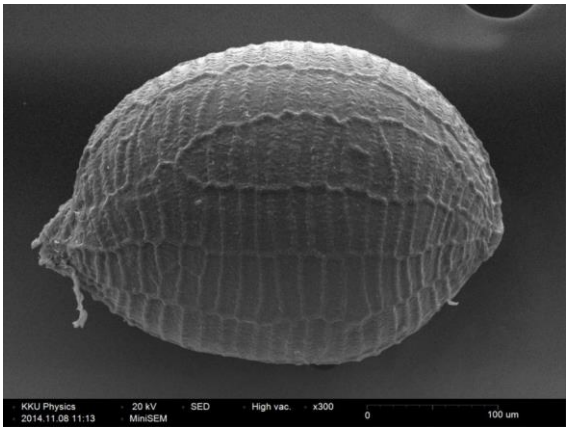
Figure 3. Phetlasy Souladeth with Dr Son Van Dang (curator of VNM), taken while studying *Eriocaulon* specimens from Vietnam.

Annex 2: Two presentations of progress towards a revision of *Eriocaulon* for the Flora of Cambodia, Laos and Vietnam.

Figure 4. The 16th Flora of Thailand Meeting, RBG, Kew, September 2014

Figure 5. Presenting my work to the Science Research Club, RBG Edinburgh, 28th August 2014

Annex 3: Study on seed morphology of some species in *Eriocaulon* from the Flora of Cambodia, Laos and Vietnam.



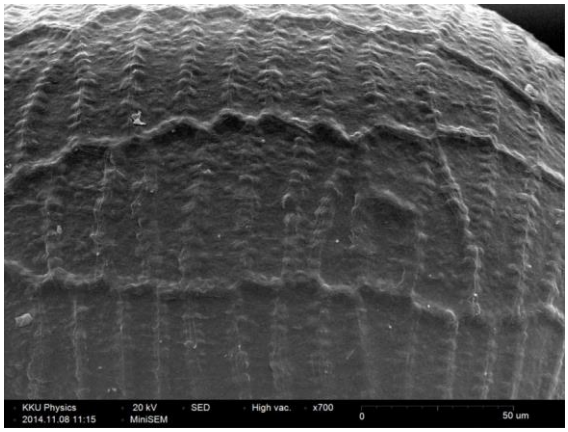
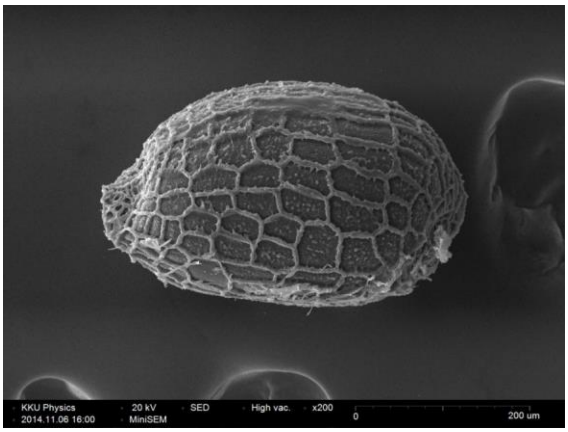


Figure 6. *Eriocaulon phuphanoides* (PS 270)



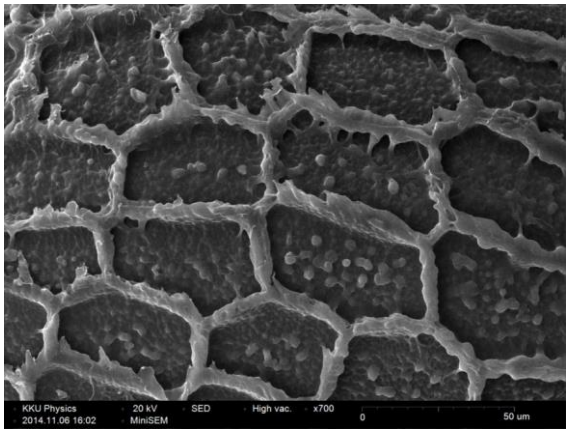
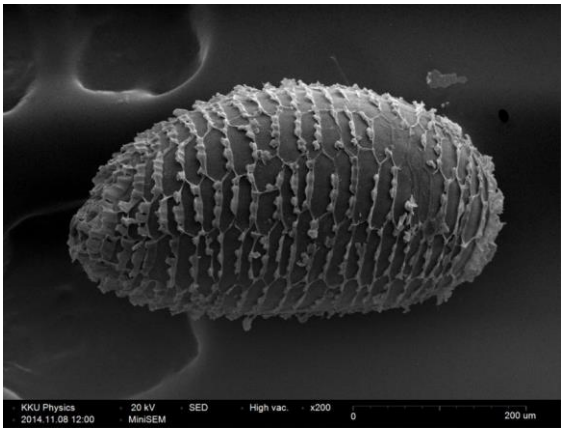


Figure 7. *E. phuchongense* (PS 265)



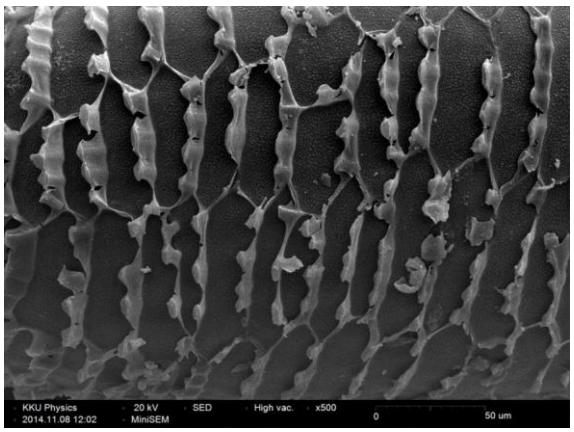


Figure 8. *E. xeranthemum* (PS 324)