Darwin Fellowship - Final Report

Due within one month of the end date of the Fellowship (maximum 6 pages)

Darwin Fellowship reference	DARFW052
Name of Darwin Fellow	Kobil Bobokalanov
Lead organisation	Centre for Middle Eastern Plants, Royal Botanic Garden Edinburgh
Fellow's organisation(s)	National Herbarium, Institute of Botany, Plant Physiology & Genetics, National Academy of Sciences of the Republic of Tajikistan
Fellow's role within their organisation	Senior Scientist
Start/end date of Fellowship	1 July 2020 – 30 September 2021 (extended to 31 March 2024)
Location	Dushanbe, Tajikistan/Edinburgh, Scotland, UK
Darwin Fellowship grant value (£)	£19,700
Type of work (e.g. research, training, if other please specify)	Training, research, planning
Main contact in UK organisation	Alan [redacted]
Author(s) and date	Kobil [redacted] & Alan [redacted] 28 March 2024

1. Background

- Briefly describe your involvement in the Darwin project before the start of your Fellowship. If you were not involved with a specific project, please explain your involvement in the implementation of the key biodiversity conventions, agreements and treaties relevant to Darwin.

- Dr [redacted] was not directly involved as a paid member of staff or with particular responsibilities on Darwin Project 26-010 but has worked closely with Dr Mariyo [redacted] and his staff for a number of years. He also routinely assisted with field expeditions during that project, and as the focus of his PhD studies was the genus *Ziziphora* in the Pamir Altai his research goals were strongly aligned with those of that project – as *Ziziphora* is an aromatic plant that is routinely collected and used by local communities.

- The National Herbarium of Tajikistan is an important resource for the study and assessment of Tajik native and endemic plants. However, it's resources are limited and the way in which the collections could be used for conservation and sustainable use – as is the case in many Global North herbaria – has not developed through strategic planning and implementation. As a result, at the start of this Fellowship, while the herbarium staff were consulted when undertaking National Red Listing for example, the information contained within the herbarium was not used to its full potential.

- The primary aim of this Fellowship was therefore to increase relevant skills for conservation and sustainable use of plant resources in Tajikistan, through mobilization and analyses of

herbarium resources via targeting a young and highly regarded, talented and motivated botanist.

- Describe the aim and objectives of the Fellowship, and programme of work.
- The primary aims and objectives of the Fellowship, as designed and proposed in 2020, were as follows:
- A presentation to be delivered to colleagues in Tajikistan – which was achieved through presentation at a national botanical congress hosted in Kulob in 2020
- Increased knowledge on the use of herbarium resources through case studies – achieved through work on *Ziziphora* with publications planned for completion by 2024.
- Increased knowledge about Tajik biodiversity in a global context – achieved through molecular training and a publication in development for a global phylogeny of *Ziziphora* with a focus on Tajik samples for submission by the end of 2024.
- Increased skills in Red Listing – achieved through formal assessment of four *Ziziphora* taxa.
- Briefly describe the roles of the Lead and Fellow's institutions.
- The National Herbarium of Tajikistan has supported Dr Bobokalanov throughout this Fellowship by allowing him the time to undertake and attend training, undertake field missions to collect and further study Ziziphora species,
- The Centre for Middle Eastern Plants has managed all aspects of the Fellowship. Training programmes and work experience has been discussed and coordinated in Edinburgh, and specific targeted training undertaken both online and in person.
- 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.
- Formal English Language training has been undertaken and is still ongoing.
- A one-week training course in molecular laboratory techniques and analyses was undertaken at the Royal Botanic Garden Edinburgh. In addition, while the Fellow was in Edinburgh, a staff training on Botanical Nomenclature was attended and a certificate of attendance is pending.

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.
- English training: Dr Bobokalanov used the funds for language training to subscribe to the Dushanbe Language Centre. During the course of the Fellowship, his English has progressed from being relatively weak to being competent enough to visit the UK and undertake a range of technical training courses. He has achieved an Elementary level Certificate (attached as evidence) and is subscribed to ongoing and more advanced classes to continue his language development.
- Molecular training: Dr Bobokalanov attended a full week of training in the molecular laboratories at RBGE. At the end of this practical training, he was able to extract DMNA and proceed through to receiving and assessing DNA sequences successfully. This is a critical and rare skill in Tajikistan, and one in which he has learned the value of molecular studies in solving taxonomic issues. Do Bobokalanov brought certified leaf samples of several *Ziziphora* species with him to Edinburgh, and following his training a plan is in place to process these samples to solve a specific taxonomic issue – coupled with re-determination of *Ziziphora* samples in the RBGE herbarium including discovery of a previously unrecognised Type specimen.
- Spatial. Mapping and modelling training: funds sent to Dr Bobokalanov in Tajikistan supported his time and expenses to undertake additional field studies on the *Ziziphora*

species in Tajikistan. Additionally, a range of herbarium specimens from several herbaria (E, TAD, MW, Kulob) were geo-referenced following training on spatial methodologies. This resulted in a total of 265 geo-referenced distribution points across four species in Tajikistan. These were mapped, and environmental data downloaded and used to model the potential distribution of these species in Tajikistan. Distribution models are appended to this report as evidence.

- Red List training: using both direct distribution data and modelled data, Dr Bobokalanov received basic training in IUCN Red Listing and produced draft assessments for four species of *Ziziphora* in Tajikistan, one of which is a global assessment for an endemic species.
- Nomenclature training: Dr Bobokalanov attended a one-day detailed technical training session on botanical nomenclature led by Dr Sandy Knapp, British Museum (Natural History) – certification for this training is still in preparation.
- Dr Bobokalanov used his time at RBGE to visit and speak to various staff about organisation, management and the logistics of maintaining and using the data derived from herbarium collections. His activities used some of these methods using *Ziziphora* as a case study.
- What have been the main achievements of your Fellowship? How do they relate to the overall objectives of this Darwin Initiative funding scheme? Key documents should be annexed to this report.
- Prior to this Fellowship, Dr Bobokalanov was aware that his English was hindering his ability to engage with scientists and conservation practitioners globally, and that this could be a bottleneck to acquiring support and funding to further the use of the herbarium resources in Tajikistan. He therefore signed up for English Language courses in Tajikistan and several people who have known him for a number of years have noted that his English has improved dramatically. While the delays to this project due to the COVID-19 pandemic caused unexpected delays, these have in fact allowed Kobil's English to improve to the extent he was able to attend technical training courses while in Edinburgh and better articulate his future plans for himself and for his institute.
- Red List Assessments for four taxa complete, including a global assessment for the endemic *Z. suffruticosa* to be submitted to the IUCN Red List
- Knowledge gained on the use of global and local distribution data, and how to avoid and correct data inaccuracy through detailed study – for example there are multiple records on global databases that suggest several species of *Ziziphora* in Tajikistan are NOT endemic, whereas study of the specimens in Dushanbe and in other herbaria has allowed assessment of these specimens taxonomically (to address misidentification) and in terms of historical state boundary changes which are often over-looked by OCR in global datasets.

3. Outcome, 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?
- Mention that there is engagement with GBIF and making data more accessible for analyses.
- What arrangements have been made for your future involvement? What discussions have taken place with your original employer to ensure that your new skills are utilised?
- The Fellow recognises that the Flora of Tajikistan – completed in the 1980s and published prior to independence and exclusively in Russian – requires updating to better enable conservation planning and actions and also has the potential to better engage with the global taxonomic community. As such, discussions are under way about supporting Tajikistan to undergo strategic planning for a new Flora of Tajikistan, the potential uses for

such a taxonomic output in terms of biodiversity conservation and Protected Areas planning, and to support capacity development to enable this. This specifically is recognised as requiring discussions about the application of the flora and associated data to give biodiversity and climate benefits alongside those for local communities, and the necessary outputs and presentation of the flora to enable such outputs. Discussion is underway to sign partnership agreements to support the Fellow, his Institute and others in Tajikistan to enable such a programme of work.

- 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 used *Ziziphora* as a case study in the use of a variety of data types to address practical issues in taxonomy, conservation assessment, spatial planning and strategic planning. We now know where the species grow and where they might be expected to grow – the natural extension of which is to model where they might occur under future climate scenarios. It is now possible to identify regions where the conservation of certain taxa may be relevant and important and how to use this data to designate IPAs and KBAs which in Tajikistan are based entirely on birds or on outdated data.
- 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 was not a direct objective of this Fellowship, and the focus was on improving language skills to better allow Dr Bobokalan9ov to integrate more globally in the future.
- Any other issues emerging from your experience as Darwin Fellow that you would like to raise, or suggestions for improvements to the Darwin Initiative Fellowship scheme.
- The Darwin Fellowship Scheme no longer exists. The Capacity & Capability Scheme is favoured as it has more of a focus on longer term institutional development that is suited to Tajik institutes that wish to better use their resources for conservation and sustainable use. Discussion about an application to this fund is planned for the near future, both with Dr Bobokalanov and the National Herbarium and with other herbaria and botanical institutes both in Tajikistan and beyond.

4. Impact of COVID-19 on Fellowship

Please summarise the impact of COVID-19 on your Fellowship as well as providing an overview of how you have responded.

- To what extent has COVID-19 impacted your project?
- How have you responded? For example, by adjusting your workplan or approach to help maintain delivery.
- How did you assure the health and safety of everyone involved in the Fellowship?
- Could any of your Fellowship's expected outcomes or impacts assist with the response to COVID-19 or reduce the risk of future pandemics?
- The COVID-19 pandemic had a major impact on this Fellowship.
- The original schedule featured two visits to Edinburgh – the first to undertake a range of training exercises and the second to complete analytical and publication work. The pandemic made such travel impossible. As a result, English language training was moved to Dushanbe in Tajikistan and a range of theoretical trainings were undertaken online. This was then followed by data gathering in Tajikistan and after considerable delays (due to staff unavailability and illness, laboratory and herbarium works in Edinburgh and further delays in acquiring a UK visa) the Fellow attended RBGE for two weeks of intensive training and research at the end of January 2024. This involved significant changes to the

proposed working arrangements and schedule – but the main objectives for training and subsequent publications and planning have all been achieved or have schedules for completion.

- As such, while training, planning and basic data gathering and research are complete, final analyses and writing of articles will be completed post-Fellowship.
- The reduction in travel and in-country costs has resulted in lower expenditure than that proposed in the original budget.
- During COVID-19 it also became apparent that the Fellow spending two trips of two months duration each away from his family and children would not be beneficial to his or their wellbeing in uncertain times. As a result, the Fellow's ability to better articulate future plans and future partnerships driven in country will result in less requirements for extensive international travel for either Tajik or UK partners.

Future work and collaboration

Following on from training in the molecular laboratory at RBGE, Dr Bobokalanov has left a range of samples that will be further processed and analysed collaboratively and will result in a publication about the native *Ziziphora* species of Tajikistan. This will inform taxonomy, distribution and conservation assessment and is expected to be submitted for publication by the end of 2024.

The extensive use of geo-referenced herbarium specimens in completing conservation assessments, and the methods used to do so including Species Distribution Modelling, have informed how such future assessments will be completed by national staff in Tajikistan. Species Models for *Ziziphora* taxa from Tajikistan are appended to this report as evidence of work completed.

A variety of discussions are under way to facilitate further collaboration. The Tajikistan National Herbarium, Dr Bobokalanov and several partners will convene to discuss plans to write a new flora for Tajikistan as that currently available is out-of-date. Such an undertaking will be driven entirely by Tajik scientists and would involve a high degree of training and support from global partners.