

## Darwin Fellowship - Interim Report

Due within one month of the half way point of your Fellowship (*maximum 3 pages*)

|                                                                 |                                                                                                                                                        |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Darwin Fellowship reference                                     | DPLUS200                                                                                                                                               |
| Name of Darwin Fellow                                           | Jakovos Demetriou                                                                                                                                      |
| Lead organisation                                               | Enalia Physis Environmental Research Centre                                                                                                            |
| Fellow's organisation(s)                                        | Joint Services Health Unit, RAF Akrotiri, BFC<br>Enalia Physis Environmental Research Centre<br>National and Kapodistrian University of Athens, Greece |
| Fellow's role within the organisation (prior to Fellowship)     | Project officer for DPLUS124<br>( <a href="https://darwinplus.org.uk/project/DPLUS124/">https://darwinplus.org.uk/project/DPLUS124/</a> )              |
| Start/end date of Fellowship                                    | 01/07/2023 – 30/06/2025                                                                                                                                |
| Location of Fellowship                                          | Akrotiri UK SBA                                                                                                                                        |
| Darwin Fellowship grant value (£)                               | 49,500.00                                                                                                                                              |
| Type of work (e.g. research, training, if other please specify) | research, training, awareness raising                                                                                                                  |
| Main contact in lead organisation                               | Marios Papageorgiou                                                                                                                                    |
| Author(s) and date                                              | Jakovos Demetriou (25/04/2024)                                                                                                                         |

### 1. Background

Prior to this Fellowship I worked as a project officer for DPLUS124 researching the alien and invasive alien species (IAS) of Cyprus, particularly insects. During the project, I contacted Dr Georgiadis of the National and Kapodistrian University of Athens (NKUA) to discuss data on alien ants. Based on our communication and the lack of local experts on ants, I drafted the proposal for this Fellowship aiming to supplement our knowledge of the island's ant biodiversity. The detection of *Wasmannia auropunctata* (little fire ant), an IAS of EU concern and one of the world's worst IAS, further strengthened the need for more research.

The ongoing Fellowship aims to enhance our knowledge and raise awareness about ants in Cyprus. The objectives of the Fellowship are to: (1) provide a baseline of ants in the Akrotiri Peninsula to enhance scientific research around the region's fauna, through structured monthly surveys to assess the impacts of land-use and biological invasions on ant communities as well as look into the spatiotemporal patterns of native and non-native ants, (2) raise public awareness, pool, supplement, and summarize our knowledge of the ant fauna of Cyprus on an online information portal about the "Ants of Cyprus", (3) establish and promote a citizen-science recording scheme "Antovreis" for the collection of ants by citizen-scientists to raise awareness of their ecological significance, pest status and biological invasions.

Creating the "Ants of Cyprus" website is an office-based job, discussing with the project's principals ideas, data to be included, the site's design as well as contacting teachers of the Akrotiri Environmental Education Centre for the creation of educational material on ants. Research on spatiotemporal patterns of ants involves material sampling and communication with local biodiversity experts to retrieve data and specimens collected from Akrotiri and neighbouring areas. For the "Antovreis" citizen-science recording scheme we visit schools and provide students, teachers and others with ant-collection kits.

I am responsible for undertaking the research under the supervision of Dr Martinou (JSHU) and Professor Roy (UK CEH). The co-supervisors and I meet on regular intervals to assess progress and discuss next steps. I also maintain a constant communication with expert myrmecologists Dr Georgiadis and Dr Salata (University of Wroclaw), discussing ant taxonomy, sending/receiving specimens for identification and learning about ant ecology and taxonomy. I also meet with Professor Sfenthourakis (University of Cyprus), discussing island biogeography theories and receiving specimens stored in the University. Lastly, Enalia Physis is responsible for the economic management of the project and we are constantly in communication in order to ensure a smooth collaboration and workflow as well as dissemination of publications and events on social media, maximizing our work's impact.

### 2. Progress

#### 1) Providing a baseline of ants in the Akrotiri Peninsula:

Samplings were first performed during April 2022 ahead of the Fellowship to get a glimpse of species present in the area. Since then, material surveys have been conducted all around Cyprus and structured field surveys in Akrotiri were first initiated in February 2024. We use pit fall traps filled with propylene glycol, in 10 different habitat types, for a duration of 7 days. We plan to continue samplings every three months to get seasonal data on the distribution, phenology and biodiversity of species.

## 2) Raising public awareness and creating the “Ants of Cyprus” website:

During the first year I focused on the creation of the “Ants of Cyprus” website, investigating possible platforms for its development, searching for and deciphering scientific literature, investigating other similar platforms to plan the website’s layout and communicating findings with other project members. Currently, the website is up and running [REDACTED] and will be further disseminated in scientific conferences and social media. A scientific article is being drafted to secure an official citation for the website, which includes *inter alia* a dynamic checklist, species profiles, and downloadable occurrence records, distributional maps, photographic material, educational material, links to publications and keys, and information on alien species.

## 3) Establish and promote a citizen-science recording scheme and raise public awareness:

I have created aesthetically pleasing ant-collection kits, including instructions, a QR to the website and vials with ethanol for the collection and storage of ants. On the 2<sup>nd</sup>, 3<sup>rd</sup>, 6<sup>th</sup> and 10<sup>th</sup> of November 2023 I visited the Asomatos primary school presenting on ants and providing students with citizen science kits. Similar activities will be performed this year to raise awareness and generate more data on ants in our houses. Similar kits have been also given to other interested participants.

## Difficulties and overcoming obstacles:

During the early start of the project “ScratchPads”, the platform we proposed to host the “Ants of Cyprus” website, was shut down. We swiftly decided to investigate alternative solutions and decided to use Google Sites, a quick, easy to handle virtual environment which can be paired with other Google services e.g. MyMaps, Google Analytics and Google Drive.

We also encountered problems with the delivery of requested equipment. As we got no response from the company we initially contacted, we checked other available solutions. I contacted EntoSphinx, delegated prices and quantities of goods and placed an order for the requested entomological equipment. As we got our equipment in late November 2023, we decided to start material surveys in 2024. Upon communication with our expert myrmecologists we also decided to shift from monthly pit fall trap surveys to once every three months as the quantity of specimens collected would be enormous (millions). As such, not only would its collection, storage and identification would be both cost- and time consuming but could also affect the protected area’s biodiversity.

A trip to Greece had been planned during Q2 of 2023 for me to receive training on ScratchPads from Dr Christos Georgiadis and a trip to Poland would follow during Q1 (Dec 2023 - Mar 2024). During my trip to the University of Wroclaw (10-18 Dec 2023), I received taxonomic training on Cypriot ants from leading experts Dr Sebastian Salata and Prof Lech Borowiec. As we decided to use Google Sites, the trip to Greece was re-scheduled for May 2024 and Dr Christos Georgiadis visited Cyprus (17-21 February 2024). During his visit we placed pitfall traps together and I gained valuable knowledge on environmental study design, while during my visit in May 2024 we will further work on material deposited in the University of Athens and I will gain experience in field work and ant collection techniques. In conclusion, each problem was swiftly overcome, maximizing the Fellowship’s scientific excellence and the development of the Fellow’s skills.

## **3. Achievements and Outcomes**

### Presentations in conferences (3):

- Georgiadis C, **Demetriou J**, Kalagkatsi I, Wojtowicz K, Legakis A (2023) A bibliographic review of the ants of Greece and Cyprus: drawing a historical and biogeographic picture. XII European Congress of Entomology (poster presentation) (16-20 Oct 2023).
- Martinou AF, Angelidou I, Athanasiou K, **Demetriou J**, Josephides A, Koutsoukos E, Mavrovounioti N, Tzirkalli E, Varnava A, Hadjikyriakou T, Kammenou S, Michail K, Papageorgiou M, Hadjistylli M, Steffan-Wyn T, Charilaou P, Roy HE (2023) Citizen science and raising awareness efforts for safeguarding biodiversity and human health in Cyprus. HELECOS 11 - 11th Hellenic Conference of Ecology (poster presentation) (04-07 Oct 2023).
- Demetriou J**, Koutsoukos E, Georgiadis C, Roy HE, Martinou AF (2023) Alien bees, wasps and ants of Cyprus: current knowledge, research gaps and what’s next. ENTO23’ - Royal Entomological Society (poster presentation) (05-07 Sep 2023).

### Participation in workshops/citizen-science events (6):

- Invited speaker at the “Biosecurity Workshop on invasive species affecting environmental, human and plant health” organised by the Department of Environment (Akrotiri UK SBA) in collaboration with the RoC Environment Department, the Game and Fauna Service, the University of Cyprus and Birdlife Cyprus in the framework of Darwin Plus Local project “Preventing Common Myna invasion in Akrotiri SBA and Cyprus” (DPL00023). Presenting “on invasive ant species *Wasmannia auropunctata* and

*Solenopsis* spp.: impacts, distribution in Natura 2000 sites, invasion pathways, and role of citizen science and identification guides awareness raising with notes on other potentially invasive species" (13/03/2024).

- Invited speaker at the "One Health" workshop organised by the Joint Services Health Unit in the framework of Darwin Plus Local projects "Raising awareness about the importance of arthropods" (DPL00014) and "Hedgehog conservation initiative at the Western SBAs Cyprus" (DPL00056). Presentation on the "Potential health impacts of invasive alien insects" (13-14/02/2024) in collaboration with Evangelos Koutsoukos (DPLUS202).
- Participated at the "Akrotiri Marsh through Citizen Science" event celebrating World Wetlands Day. In charge of promoting biodiversity recording through iNaturalist and raising awareness of invertebrates (04/02/2024).
- Invited speaker at the "Science Fridays" online webinar sessions organised by Enalia Physis Environmental Research Centre. Presentation on "Investigating the ants of Cyprus" (19/01/2024).
- "Ants of Cyprus: 150 years in 300 seconds" oral presentation on "Hymathon 2023" online symposium dedicated to Hymenoptera, organised by the International Society of Hymenopterists (ISH) (30/11 - 01/12/2023).
- Invited speaker at the "Ants of the UKOTs" online workshop organised in the framework of DPLUS151. Presentation on the "Alien ants of Cyprus: current knowledge, research gaps and next steps" (29/11/2023).

Articles in peer reviewed journals (5 – with 10 new endemic species to science, 9 new alien species, nomenclatural changes and interpretations to dubious data):

- Salata S, Demetriou J, Georgiadis C, Borowiec L (2024) The genus *Temnothorax* Mayr (Hymenoptera: Formicidae) in Cyprus. *Zootaxa* 5434(1): 1-69. <https://doi.org/10.11646/zootaxa.5434.1.1>
- Demetriou J, Georgiadis C, Martinou AF, Roy HE, Wetterer JK, Borowiec L, Economo EP, Triantis KA, Salata S (2023) Running rampant: the alien ants (Hymenoptera, Formicidae) of Cyprus. *NeoBiota* 88: 17-73. <https://doi.org/10.3897/neobiota.88.106750>
- Salata S, Demetriou J, Georgiadis C, Borowiec L (2023) *Camponotus* Mayr, 1861 (Hymenoptera: Formicidae) of Cyprus: generic synopsis and description of a new species. *Asian Myrmecology* 16: e016007. <https://doi.org/10.20362/am.016007>
- Salata S, Demetriou J, Georgiadis C, Borowiec L (2023) The genus *Messor* Forel, 1890 (Hymenoptera: Formicidae) in Cyprus. *Annales Zoologici* 73(2): 215-234. <https://doi.org/10.3161/00034541ANZ2023.73.2.006>
- Salata S, Demetriou J, Georgiadis C, Borowiec L (2023) The ant genus *Cataglyphis* Förster (Hymenoptera: Formicidae) in Cyprus. *Zootaxa* 5264(3): 301-322. <https://doi.org/10.11646/zootaxa.5264.3.1>

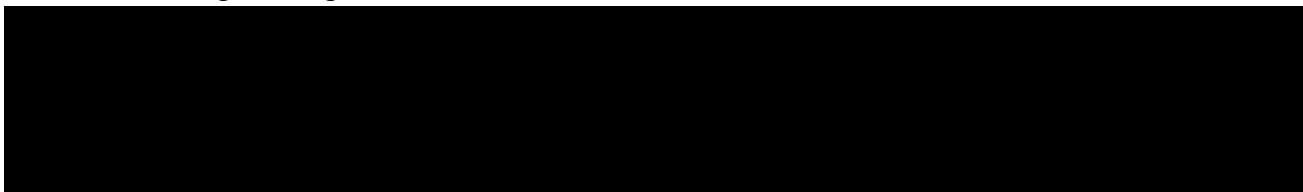
Other outputs (interactive learning tools, videos, leaflets etc.):

- "Ants of Cyprus" website: <https://sites.google.com/view/ants-of-cyprus>
- Leaflets on the "alien invasive insects of Cyprus" and "alien insects and ornamental plants" created in the framework of DPL00014 "Raising awareness about the importance of arthropods" (including data on ants and *Wasmannia auropunctata*).

#### **4. Impact of COVID-19 on Fellowship**

COVID-19 did not impact the Fellowship in any way. Although I got infected with COVID-19 during January of early 2024, I distanced myself working from home to ensure the health and safety of everyone involved in the Fellowship.

#### **5. Safeguarding**



#### **6. Next Steps**

An article on the "Ants of Cyprus" website will be submitted for publication in order to secure a formal citation for the site and its creation will be further communicated through social media and scientific conferences such as ENTO24 of the Royal Entomological Society (10-12 September 2024).

Further samplings in Akrotiri will be carried out. The collected material will be sorted, mounted and identified generating new distributional and ecological data to inform environmental authorities of IAS, endemic or rare species.

Regarding data and specimens collected by citizen-scientists, these will be identified to species-level and communications are under way to visit schools in Limassol and Paphos interested in the project.