Reports from 2012 Travelling Fellowship recipients

Darren Storey
Herpetology course in South-West Arizona

Arizona, with 141 species of herpetofauna comprised of 28 amphibian species and 113 reptile species, has been called "herper's heaven", compared to just 13 (native) herpetofauna species found in the United Kingdom. One can observe more herpetofauna, in terms of abundance and species richness, in a single day in Arizona, than in 21 years in the UK!

I am in my second year studying zoology with herpetology at Bangor University, the only university in the UK offering a course in herpetology, and was ecstatic at the chance to observe the biodiversity in the hot-sport of South-Western Arizona. The trip was not based on a particular species or research, rather to discover the native biodiversity of the region and learn new skills, important for working in herpetology.

We were given the chance to observe a vast variety of life in Arizona and New Mexico, including lizards, tortoises, anurans, spiders, scorpions, solifugae, vinagaroons, scolopendra, odonata, mantises, lepidopterans, owls, hummingbirds, vultures, birds of prey, bats, skunks, black bears, coyotes and many other diverse taxa, along with their individual behaviours and microhabitat preferences.

Over the course of ten days, I observed wild specimen of all ten rattlesnake species in the region, including two specimen of the much sought after Arizona form *Crotalus willardi*; the stunning *Crotalus cerastes*, well known for its side-winding locomotion and 'J' tracks and *Micruroidea euryxanthus*, the only elapid occurring in Arizona.

Snake handling

As well as finding many species, I was able to develop skills important for a future in herpetology, including lizard noosing; in and ex-situ shooting; venomous snake handing; night road cruising using the heat retention qualities of roads to find thermoregulating snakes and anurans. An effective day of 'field herping' offered up a pair of *Crotalus willardi*, a *Crotalus lepidus*, a pair of *Thamnophis cyrtopsis, Hyla wrightorum* and *Hyla arnicolor* and too many lizards to list here.

In summary, the experience was rich with opportunity to observe exotic biodiversity and gain experience with new skills that will no doubt be essential to my continued, and henceforth more inspired, work with herpetofauna long into the future. I am very grateful to the Society for this generous grant.

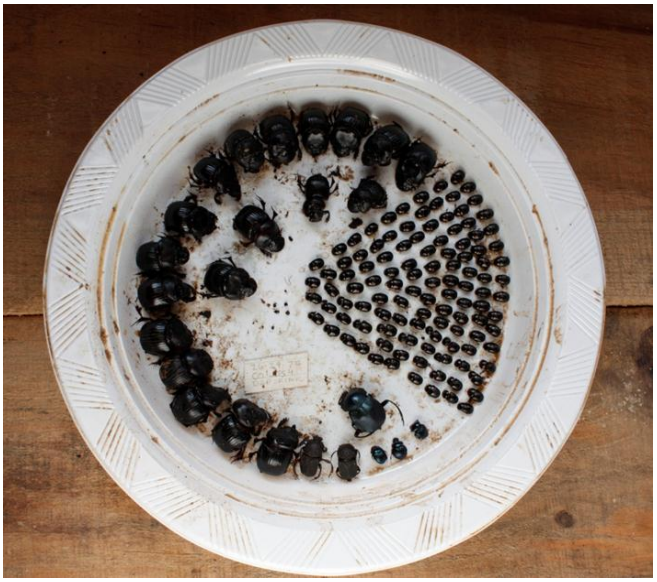
Josie Slade
Dung beetles project in Cusuco National Park, Honduras

Last summer I travelled to the Merendon Mountains in north-western Honduras. I worked alongside a research organisation called Operation Wallacea, and planned to study the effects of forest disturbance on jewel scarab populations by using mark-recapture analysis. Unfortunately, when I arrived I discovered that jewel scarab populations had plummeted since last year, and that there weren't even enough to base my research on. I considered trying to find out why there were so few scarabs, but with so little time to redesign the experiment and the complexity of the challenge, that would have to wait for another year.

A jewel scarab which is endemic to Honduras, Chrysina spectabili and Chrysina pastori, a stunning metallic silver beetle.

I knew I was going to study the deforestation and we've all seen on television swathes of cleared forest, but when I saw for myself the vastness of the destruction, I couldn't quite believe what I saw. I even witnessed trees going down as we trekked between camps, and hearing the cheers and whistles of joy as they fell was more stirring than you can imagine. This wasn't large corporations clearing land for commercial agriculture; this was the locals trying to find a way to earn money to support their families.

With so little time to redesign the experiment, I changed the focus of my study from jewel scarabs to dung beetles – functionally important to the ecosystem and great indicators of habitat health. I then spent the next six weeks running miles of transects up and down stunningly beautiful mountains, collecting and resetting dung-baited pitfall traps. I'm definitely a whole lot fitter now! The local villagers thought I was crazy asking them to bring fresh mule dung every morning so that I could make small muslin won-tons to use as bait. I set four pitfall traps at each site along the numerous transects radiating out from the camps scattered throughout the park which resulted in a huge amount of data.



Species included: (clockwise from the bottom right)
Canthon vazquezae x 3 (three small rounded individuals in bottom right at edge)

Deltochilum mexicanum x 1 (larger rounded individual with the slender bowed legs)

Eurysternus magnus x 2 (the two more elongated browner individuals at bottom centre)

Dichotomius satanas x 19 (the largest species on the plate, bottom left to top right)

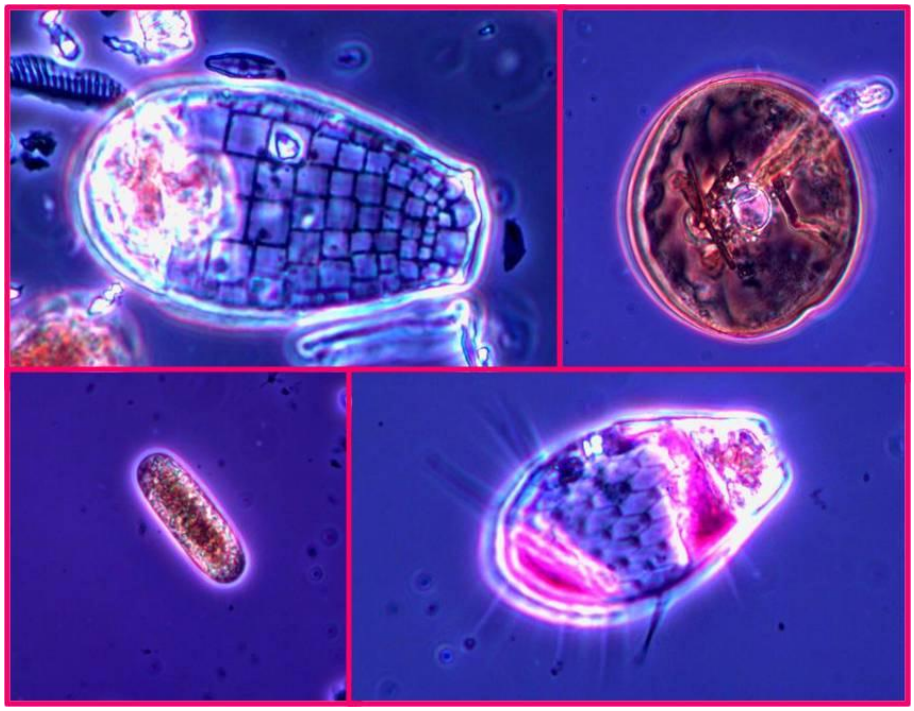
Ateuchus guatemalensis x 121 (the abundant small oval species on right)

This experience was a giant step towards my dreams of studying biology and ecology across the globe. Last year when my university supervisor suggested that I could go anywhere and study anything I have to say I found it hard to believe. Now, having undertaken the most challenging, rewarding and eye-opening expedition of my life, I feel I can achieve anything I put my mind to.

Angela Creevy
6th International Symposium on Testate amoebae, China

Life on earth is microscopic. Microscopy has taken me on an exiting journey, exploring the biological diversity of free-living microorganisms in soils and freshwater. Inspirational lectures during my wildlife conservation undergraduate degree at Liverpool John Moores University (LJMU) taught me that along with the larger, visible, charismatic organisms, we should also have a vested interest in earth's microscopic life, as they are fundamental to the functioning of our planet, and indeed, human life.

Testate amoebae (TA) and diatoms are diverse and abundant groups of 'shelled' protists, preserved in a range of terrestrial and aquatic environments. My current research is using the traditional protist taxonomy based on shell morphology to investigate the microbial diversity of a nature reserve in North West England. The Travelling Fellowship enabled me to travel to China to orally present some of my results at the 6th International Symposium on testate amoebae (ISTA6). This is the main meeting of scientists who study this fine group of protozoa (fig 1), whose ecology is still much of an enigma today.



Earth's microcosmos - hidden biodiversity

The opening talk of the symposium brought to life another group of 'shelled' protists, Foraminifera. Professor Shouyi Zheng, from the Institute of Oceanology in China, revealed why she thinks 'Biology is the most visual of sciences', emphasized by Goethe's 'the spiral of life'. Microscopy reveals the true 'hidden' beauty of nature, yet 'seeing is believing' and at the Foraminiferal Sculpture Park in Guangdong, China there are giant sculptures of the shells of these microscopic protists. These sculptures unearth the remarkable structure of life integrating science, art and culture. I will continue to turn my focus from the visible to the invisible in order to better comprehend the many benefits microorganisms bring to all the wondrous life on our planet.

Dr Dave Wilkinson at LJMU has studied the ecology of TA for many years and I'm thankful to him for introducing me to this meeting. Special thanks to the Society for enabling me to discuss different aspects of TA research with International Scientists working in this field.

William Joyce
Cardio-respiratory physiology course in Brazil

As part of my zoology degree at the University of Manchester, I had the opportunity to undertake an industrial year at the Zoophysiology Department of Aarhus University, Denmark. I studied cardiovascular physiology of reptiles, specifically the importance of oxidative stress as a driver of evolution. This includes considering the impact of high atmospheric oxygen levels on reptile heart evolution.

To expand my knowledge of comparative physiology, I was invited to take part in a cardio-respiratory course in Rio Claro, Brazil. This was a great privilege; the course was aimed at PhD students so I was the only undergraduate attending. The course involved two weeks of lectures and practical sessions at Universidade Estadual Paulista (UNESP).The content ranged from understanding frog lymphatic systems to giraffe blood pressure; it was comparative physiology at its exuberant best!

The related practical sessions provided an opportunity to learn new experimental techniques. Perhaps the most unique of these was the opportunity to try cannulating blood vessels of embryos, from which you can measure blood pressure and derive heart rate. I must admit I was unsuccessful at this, but it clearly requires practise, and I hope to try it again in the future.

Attempting to cannulate an embryo. Here, I am using a domestic chicken egg, but Dr Dane Crossley (supervising) has successfully extrapolated the technique to study animals such as alligators, turtles and emus!

We also had the opportunity to use our newly acquired skills in research projects carried out in small groups. Recent work in snakes identified a humoral factor released into the bloodstream during digestion that contributes to increase heart rate. This factor, termed a NANC (non-adrengergic non-cholinergic) factor, however, remains to be unidentified. I was interested in seeing whether similar principles underlie responses to digestion in another large carnivorous reptile: the caiman. Unfortunately, we encountered a number of hurdles and couldn't gather any meaningful data on digesting caimans. The course was taught by many of the leading names in comparative physiology from around the world. It was great to finally be able to put faces to the names I have seen on many publications!

This was a unique opportunity, and one that has benefitted my education on a number of levels. I would like to conclude with warm thanks to the Society of Biology and their generous travelling fellowship.

Sonal Choudhary
Remote sensing training and conference, USA

I am a plant ecologist in the final year of my PhD at the University of Sheffield. My research focuses on studying the effects of nitrogen deposition on the arctic tundra ecosystem. These pristine and remote ecosystems are threatened by sudden and abrupt atmospheric nitrogen deposition, caused by polluted rain clouds originating from industrialised regions of Europe. It is predicted, with the increase in global temperature and the decrease in sea-ice, such pollution events will occur frequently in the Arctic. Plants of arctic tundra ecosystems are adapted to low nutrient supplies and so are potentially sensitive to increases in even moderate level of external nitrogen inputs.

My work aims to show how damaging these pollution events are to the arctic tundra and whether the tundra plays an important role in stopping the pollution from being released to the streams and rivers. I simulated such nitrogen deposition events in a plot scale experiment in the Arctic in Svalbard (79^0N), Norway. I started my PhD primarily using ecological methods in my research and then moved to remote sensing methods. These offer a non-destructive method of detecting changes in plant responses and therefore, could contribute significantly to a wider understanding of this little-explored research in the Arctic.

I found an excellent training opportunity in remote sensing at the Michigan State University, USA. I also had an invitation to present my work at the prestigious BIOGEOMON international conference at the University of Maine, USA.

Remote sensing training added significant value to my research and the PhD thesis. I could compare different wavelengths of the light reflecting back from the leaf surface to identify the impacts on nitrogen deposition on the photosynthesis of the plants without destroying them. I could also detect how much nitrogen was sufficient to introduce stress in the tundra plants. These remote sensed data were compared and co-related with the ecological data and proved to be very informative.

Due to the travelling fellowship I was able to present my research to the international audience and also received an opportunity to collaborate with researchers based at the University of Virginia, USA. My sincere thanks go to Society of Biology for their grant which provided me a great opportunity for skill-enhancement, international collaborations and networking.

Kimberley Smith
Keystone Symposia on non-coding RNAs in development and cancer, Canada

The development of an embryo is a tightly regulated process, both spatially and temporally. It is hard to imagine that small non coding RNAs, can play a large role in this regulation. I am particularly interested in microRNAs (miRNAs) – small 21-24 nucleotide long regions of non coding RNA that negatively regulate translation, and how they may play a role in the developing embryo. It has always fascinated me how something so small, so tiny, could have such a drastic effect if not present in a cell. However, every talk featured in this conference reported of research that pointed to this function.

My current research involves investigating the cellular response to stress at the molecular level and seeing how miRNAs may play a role in this and how it might be different at various stages of development. The Society of Biology Travel Award allowed me to attend an international keystone conference, and discuss my research with people from across the world. Not only did this give me the opportunity to make advances in my research and try new experiments, but it opened my eyes to what other people are researching and gave me additional ideas to try. It also allowed me to see how experiments are conducted in different parts of the world, and cemented in my love of science.

The keystone symposia really did enforce the concept that although non coding RNAs may be small, they have a huge impact on regulation of development and cancer. I like to think of myself as something similar. Whilst now I am researching for my PhD, one day I hope to make a big impact in the field of molecular and developmental biology.

Katy Jones
Biogeography of endemic plants in Macaronesia

Macaronesia is a biogeographical region comprising the volcanic, oceanic archipelagos of the Azores, Madeira, Canary Islands, Salvage Islands and the Cape Verdes, in the Atlantic Ocean. The region is a biodiversity hotspot, with a rich and threatened endemic flora. Endemic species diversity across the region differs markedly between archipelagos. I am interested in the variation in how plants have evolved across the region and I am seeking possible explanations for these disparities.

My PhD focuses on a genus of flowering plants in the daisy family (*Pericallis, Asteraceae*); it is the only genus which is endemic to the region and occurs on three archipelagos of Macaronesia, it is therefore an ideal focal group. Tenerife (Canary Islands) is the largest (2058 km2), most geographically and ecologically complex of the Canarian archipelago. These characteristics have facilitated the speciation of thousands of endemic plants which display huge diversity in morphology and adaptations to their local environment. Tenerife is the diversity hotspot for *Pericallis* and early on in the PhD we realised that there was a lot of diversity there which had previously been overlooked, potentially due to insufficient sampling in regions that may be difficult to access. The travelling fellowship gave me the opportunity to collect fresh material in some regions that had previously been unexplored, gather environmental data for the new populations and highlight the areas which were in need of conservation.

Since the field trip, I have been busy in the lab extracting DNA and investigating diversity patterns. This has led to the discovery of two potentially new species of *Pericallis*. I have used the ecological and geological data in Tenerife to try and understand what may be driving this diversification. Tenerife was originally three isolated proto islands, ca. 11.5 million years old, which fused to form the present day island in the past 3.5 million years. We have new evidence that the colonization of species from one proto island to another in the past 3.5 million years has led to the isolation and subsequent speciation of plants. We have also discovered regions where two distinct species are hybridizing; hybridization is another potential source of diversity.