In Trinity term of their second year, Oxford biologists are given the opportunity to attend a field course in Tenerife for a week as part of the 3rd year course on Oceanic Biogeography and Botany. Hannah Puleston and I were lucky enough to be able to attend this course with a grant of £365 each from the Santander Travel Fund. The course is run by Timothy Walker, previously the head of Oxford’s botanical garden and a fount of knowledge in Tenerife’s habitats. Also attending the trip were Stephen Harris, John Wood and Pablo Munoz-Rodriguez, all extremely well versed in Tenerife’s flora. Each day we travelled to a new part of the island, exploring the huge variety of different ecosystems from the Barranco scrub and black sand beaches to the striking cloud and pine forests.

Tenerife, often thought of as a beach holiday destination, is a very interesting place in terms of its biology. The island is made up of three oceanic volcanoes – Anaga, Teno and Valle de San Lorenzo and is the largest island in the Canary Archipelago. The highest point of the island is El Teide which reaches 3,700m and is not only the highest peak in Spain’s territories but also in all of the Atlantic islands. The swift rise of the mountainous slopes results in a highly stratified island in terms of its vegetation. The mass of the volcanic island rising from the Atlantic also results in highly differentiated weather patterns. The trade winds from the north bring most of the precipitation; the clouds from these trade winds are obstructed by the mountains in the north and rain falls as the rising clouds condense, making the north humid and wet. This results in a rain shadow in the south which is more arid and hot. This variation across the island in climate and altitude results in a great range of different conditions and thus a great diversity of flora. There are over 1,400 species of plant on Tenerife, 297 of which are endemic to the Canary Islands and 140 that are just endemic to the island of Tenerife. To put this into context, in Oxfordshire (which is ever so slightly larger than Tenerife) there are only 550 species of plant species, none of which are endemic to the region.

On the first day of our course we travelled to the eastern part of the island to a rocky cliff overlooking the ocean. Alongside the cliff-side path we encountered a huge range of plants from wild lavender to the Canary Island endemic Echiums. The 24 biologists were split into three groups among the academics and given a crash course plant identification, looking at what characteristics can be used to identify specimens at family and species level. Just in this one day we learnt many practical skills, from how to use a hand lens...
properly, how to use the floral formula to how to correctly dissect flowers in order to fully appreciate the complex structures within. For several hours we traversed the path, identifying a great range of plants, and slowly getting to grasp with the language botanists use to describe the structures of a plant, such as the difference between sepals, tepals and brachts, and the subtleties of zygomorphic and actinomorphic petal patterns.

One of the most striking habitats we visited was the Badlands, a volcanic, dry, exposed and salty environment in the south of the island, situated by the coast at sea level. We were able to observe that many plants from different families have developed very similar adaptations to the harsh and arid conditions in the Badlands; this is the result of natural selection and what is called ‘convergent evolution’ - whereby evolution converges on similar solutions to the same problem from different starting points. Most of the plants in this environment were succulent plants, with short branches, thick bark and small or no leaves. Here we found the *Euphorbia canaeriensis*, an endemic species to the Canary Islands that could very easily be confused with a cactus as it has developed a lot of similar features to cacti in order to deal with similar conditions to those in which cacti commonly exist. We then drove up the constantly changing landscape towards El Teide, stopping in the pine forests. The pine forests are made up predominantly of one species of pine, *Pinus canaeriensis*, another endemic to the Canaries. We examined the various adaptations of the pine tree, which has thick cork like bark to help insulate from the forest fires which can often be intense as a result of the thick leaf litter of dry pine needles. *Pinus canarensis* is also the only pine tree that can resprout from their bark and thus forests can recover very quickly from the natural wild fires prevalent in hot and dry climates such as that of Tenerife. From the pine forests we ascended even higher reaching the peak of El Teide where the vegetation is vastly different to the pine forests, though more similar to that of the Badlands. At high altitude the UV radiation and winds can be very strong, and the soil highly degraded and arid. Even so vegetation still manages to prevail with families such as that of Fabaceae (also known as the legumes and able to produce their own nitrogen) and Echiums thriving.

Not only did we observe the diversity of the islands habitats but we also learnt about the evolutionary origins of the plant families found on the Canary Islands systems and similarities between all oceanic island systems in the lectures we had each evening. The lectures focused on families such as that of Asteraceae and Euphorbiaceae, both found
widely across the island in a great range of forms, as a result of a radiation on the island after the initial colonisation by the family. We learnt how difficult it was to study the history and phylogeny of the plants colonisation and radiation as one family could have colonised the island multiple times throughout the last few million years. Island systems have a lot of similarities with high levels of endemism, high extinction rates and a shift to insular woodiness, even when the mainland relative is herbaceous. The lectures provided extra detail about what we learnt throughout the day and put into context the evolutionary history of the plants we saw each day in the field.

Another site that we visited was the Laurel or Cloud forests. These environments are almost always cloud covered, resulting in very damp environments that are unique to the canaries. They are very rare due to deforestation during the colonisation of the island by the Spanish. While visiting the laurel forests and the secondary Fayal Brezal forest we used a key of Tenerife’s flowering plants in order to identify a range of plants. We subsequently made our own key, which was interesting as we realised how difficult it is to make an accurate key when such a great range of vegetation is present.

The trip, although hard work, was extremely interesting and enjoyable. Being able to apply the knowledge and information on evolution and plant adaptations we have learnt throughout our degrees into a real-world scenario not only made the biology engaging, but made links between evolution, ecology, adaptation theory and biogeography, which previously seemed like very separate subjects. Being able to experience the amazing diversity of not only plant species but also habitats first hand rather than only seeing it on a lecture slide made the trip so special, and made us realise how lucky we were to have opportunities like this as part of our studies. Thank you to the Santander Travel Fund for helping us to fund such a memorable and extraordinary adventure for us both.