

## Alex Westin-Hardy – Orielton Field Centre, Wales, March 2015

As part of my first year Evolution & Behaviour course I spent a week at Orielton Field Centre on the Pembrokeshire Coast, in order to gain first-hand experience of the vast array of living organisms found in the region and consider evolutionary processes in the field. The area of South Pembrokeshire is exceptionally rich in rocky, sandy and muddy shores, all of which contain a huge diversity of plants and animals, and there is a wealth of woodland, freshwaters, cliffs, sand dunes and saltmarshes. This made it the ideal location for fieldwork, and was the main factor influencing my decision to make the visit. The Field Centre itself comprised an impressive Georgian mansion, field laboratories and over 100 acres of mixed woodland.

The first day of the course was spent in the woodland and estates of the Field centre, where we observed all the major plant phyla discussed in lectures. Through the observation of traits in the laboratory the major evolutionary innovations which allowed the generation of modern-day plants were all placed in context – the development of stomata, roots, a vascular system and the mutualistic relationship with mycorrhizae. The transition from dominant gametophyte generation found in mosses through to the sporophyte dominance of gymnosperms and angiosperms over evolutionary history was well highlighted. We also found examples of innovation within the flowering plants, for example the pin and thrum morphology of primroses where either the carpel or stamens are elongated to prevent self-pollination and ensure outbreeding through spatial separation of reproductive organs. The afternoon pond-dipping session yielded palmate newts, great diving beetles, freshwater shrimp and kaleidoscopic caddisfly larvae; underwater architects which generate their cases from substrate materials of rock, sand, small pieces of twig and aquatic plants held together by silk.

The next morning heralded the solar eclipse, which effected large tidal ranges for the entire week and allowed us unparalleled access to the coastal flora and fauna. We visited the sheltered shore ecosystem of Dale Beach, and equipped with spades, buckets and as many collecting jars as we could carry we set to salting, rummaging and digging to discover the treasures and secret life of the beach. We found many of the organisms we were searching for, including sea potatoes, fan worms, razor shells and a whole host of crab species – long-legged spider crabs, hermit crabs and most interestingly *Corystes cassivelaunus*, the burrowing masked crab. Once we had collected specimens, we returned them to oxygenated tanks in the laboratory for further examination.

The third day saw us visit a number of different sites including Broomhill Burrows, a sand dune complex located within Pembrokeshire National Park, where we observed birds using rocks as tools to crack open snail shells and the succession of plants with increasing complexity as you moved away from the shoreline. We also visited West Angle Bay, an exposed rocky shore, and Angle Point, a sheltered rocky shore, both situated in Milford Haven Estuary. These two sites yielded a collection of organisms largely different to those of the sheltered shore the previous day, including velvet swimming crabs, long-armed *Goneplax rhomboides*, squat lobsters, sea slugs, sea hares and the mermaid's purses of lesser-spotted dogfish. Beached dogfish were also observed on a rocky outcrop exposed by the unusually low tides.

The final day of site visits led us to the edge of the Ministry of Defence's Castlemartin military training range, and the spectacular "Green Bridge of Wales" arch. We indulged in a morning of bird-watching, observing a number of species including guillemots, razorbills, gannets and even a peregrine falcon. A walk through Bosherton lakes and lily ponds directed us to Broad Haven Beach, where we performed vertical transects up the cliff faces to observe zonation of organisms, an effect caused by physical gradients across the environment.

The week was concluded by conducting our own project. My partner and I investigated the distribution of tardigrades, rotifers and nematodes across the mosses of Orielton Field Centre. This involved sample collection, preparation and observation to record the abundances of the organisms, as well as analysis of the data by statistical tests. The study gave some insight into the complex effects of environment quality, competition and predation on organism number, and we presented our findings to the rest of the group.

The field trip was an invaluable experience which allowed me to learn a great deal more about the organisms studied in our Part 1A Natural Sciences lectures. Further lectures on pollination syndromes, morphospace and the evolution of key innovations in plants were an excellent complement to my learning in the Cambridge term. I am extremely grateful for the support from Pembroke College which allowed me to undertake the trip.