

My Laws Prize talk concentrated on my work at BAS over the last 12 years and the major findings of my PhD. The title of the talk was “Where the wild things are” with an emphasis on the “where” because my work involves biogeography. Biogeography is the explanation of the distribution patterns of living organisms. My primary interest lies in explaining the distribution patterns of benthic (sea floor) animals in the Southern Ocean. Benthic animals account for around 90% of the known species from Antarctic waters. We owe a great deal of our knowledge of biodiversity and distributions to the major expeditions and campaigns of the past dating back to Cook’s second expedition in the 18<sup>th</sup> century, through the Challenger, Discovery and Endurance expeditions, the more recent International Geophysical Year and the latest results of the Census of Marine Life. Bringing together this wealth of information enables us to look at patterns across the whole Southern Ocean.

The distribution data for over 1,200 species of seafloor invertebrates have been recorded in a database with links to a digital mapping system (over 64,000 records in total). The combination of this database and mapping system enable me to analyse large amounts of data over vast spatial scales. Because of the huge geographic area covered by the database the patterns observed are very often the results of evolutionary processes that occurred over thousands or millions of years.

Antarctica is famed for having a high number of endemic species (species found nowhere else on earth). With this database it has been possible to quantify how many species are truly endemic to Antarctic Waters (around 50%). Other major biogeographic patterns observed include the effect of the Antarctic Circumpolar Current in dispersing animals around the continent and the groups such as sea spiders (pycnogonids) which have more species in Antarctica than anywhere else on Earth.

The database also highlights the gaps in our knowledge. The vast majority of sampling has taken place in areas close to national research bases or the shipping routes to those bases. More inaccessible regions such as the Amundsen Sea, the western Weddell Sea and vast areas of deep sea remain virtually void of sampling. New technologies may hold the key to sampling areas which are difficult to sample due to depth or ice cover.

One new technology described in the talk was “DNA Barcoding”, a taxonomic method that uses a short genetic marker in an organism's DNA to identify it as belonging to a particular species. This method helps to speed up the identification of animals collected during scientific cruises and also helps to establish if a species is new to science. Work by BAS has created the world’s largest DNA barcode library for brittlestars (marine invertebrates related to starfish that are very common in Antarctic waters) equating to over 4,000 individual animals. Over half of the known species of brittlestar from the Southern Ocean have been barcoded to date and several new species have been identified.

The talk concluded by stressing that the Antarctic may appear to be a desert above the surface but below the waves lays a rich, varied and complex community of animals and that as many as half of these species still await discovery. And my final slide was a photograph of a newly described species of sea cucumber, *Kolostoneura griffithsi* (O’Loughlin & VandenSpiegel, 2011), which was discovered by the BAS “BIOPEARL” expedition and I was lucky enough to have the honour of having it named after me.