Calcarean sponges

Sponges are one of the most ancient life forms on Earth and represent the most basal lineages of all animals. They are one of the more simple multicellular organisms and use pores and channels to circulate water to obtain oxygen and food. In doing this, they perform an important function for the world's oceans by recycling nutrients and providing habitats for other animals and plants.

Sponges make up the phylum Porifera, and are divided into four distinct groups. Many species employ ingenious defensive methods to avoid predation, including spicules to ward off grazers (see also 'Now you see me ...' on page 22). They have a variety of chemical defensive secretions, with more than 5000 chemical compounds isolated from sponges so far, many with anti-inflammatory and anti-cancer properties.

A casual inspection of the intertidal zone on Western Australia's beaches will reveal a plethora of different species, with varying body forms and colour, ranging from dull yellow and brown, through to gaudy red, orange and purple. These are mainly classified in the group Demospongae which are the most common group in shallow seas throughout the world. There has never been a full census of WA sponges, but research conducted by Dr Jane Fromont at the Western Australian Museum suggests that the number of species in WA is in the thousands – many of which have never been described and named. And studying sponges is not for the faint-hearted. Apart from body form and colour, sponge scientists need to closely examine the sponge's bits and pieces with a microscope. One of the more important characteristics, is the shape of the spicules which are inorganic structures made of calcium or silicon. The arrangement of their skeletons and how the spicules mesh together are critical for species identification. The demosponges have spicules made of silicon, while another group, the Calcarea, have spicules made of calcium carbonate.

A recent study by Jane and her colleagues Pedro Leocorny, Aline Alencar and Michelle Klautau from the Universidade Federal do Rio de Janeiro, Brazil has focused on the family *Leucettidae* in the Calcarea. Before this, only seven species in this family were known from Australia, so the description of four new species was a significant advance in our knowledge of these curious creatures. Calcareous sponges tend to be small (they range from two millimetres to about six centimetres in height) and are therefore sometimes overlooked by collectors, but Jane's team found four lovely new species thriving in WA. She made sure that they sampled fresh material to enable the team to obtain molecular sequence data, which has helped establish their closest relatives, and aid in separating them from each other.

One of the new species, *Leucetta purpurea* from Jurien Bay, is the only species of the genus that is purple in colour, and another, *Leucetta foliata,* from Cervantes and the Recherche Archipelago, resembles a simple folded flower. Hence the names they chose for these species. These species belong to the same genus as a sponge called *Leucetta prolifera* that has light-requiring symbionts and is consequently green; surprisingly this sponge turned out to be the dominant species in the Jurien area and was very abundant beneath the kelp.

The other two new species belong to the genus *Pericharax*, and are now named *Pericharax crypta* and *Pericharax vallii*. All four species have been described in a paper published in the journal *Zootaxa*.

Jane's research is shedding new light on the incredible diversity of sponges in our corner of the world, with many more discoveries to be made. WA's location on the edge of the Indian Ocean means that we are in a global biodiversity hotspot. But the discoveries are often hard fought. Before scientists can name a new species, they must ensure it hasn't been previously named. Many of the older taxonomic descriptions are rather poor and not sufficient to recognise the species, and this entails some rather intense taxonomic detective work that sometimes leads to examining the original specimens – the type material – that were used in the original description, to detect differences that characterise a new species. This might sound boring and tedious to some, but taxonomists love nothing more than solving a good mystery by closely examining all potential suspects before honing in on the prime target, then shouting "It's a new species!" I'm not sure if Jane shouted out loud, but her research is helping to shape our understanding of our unique marine ecosystems.