Euacasta acutaflava

What looks like a mollusc but is actually a crustacean? A barnacle. No, it's not a dad joke, these curious creatures look nothing like their cousins—crabs, prawns and slaters. Distinguished European biologists such as Carolus Linnaeus and Georges Cuvier classified them as molluscs and their true relationships weren't known until the 1830s. Charles Darwin, arguably the most noted and famous biologist of all time, took up the challenge of his friend and mentor Joseph Hooker to fully understand a group of organisms before publishing his nascent theory of evolution by natural selection. Beginning in 1846 his studies culminated in four volumes published between 1851 and 1855 with the very alluring title 'A monograph on the sub-class Cirripedia, with figures of all the species'. What started as a detailed examination of a single species ended up as an encyclopedic review of the entire group–both living and fossil. That shows dedication, perseverance, and an eye for detail.

Barnacles occur in marine ecosystems from the seashore to the oceans' depths. Some attach themselves to other animals such as whales, to flotsam or to human structures such as boats where they are a nuisance and cause unwanted drag on the vessel. Most adult barnacles have six hard calcareous plates that form an external wall to protect their organs. Another set of plates form an operculum that opens to allow feeding via filtration of the surrounding seawater, and to mate which is done via the barnacle's famously long penis to deposit sperm inside the shell of nearby mates. After the fertilised eggs hatch, they form a nauplius—a free-living larva comprised of a head and telson—which moults several times before forming a cyprid larva, the final instar before adulthood. The cyprid finds a location to settle, attaches to the substrate and metamorphoses into a juvenile.

Some barnacles have formed exclusive living arrangements with other organisms, and some occur in unusual places. A recent study in the journal *Diversity* by Andrew Hosie, Jane Fromont, Kylie Munyard and Diana Jones of the Western Australian Museum and Curtin University found several species of the subfamily Acastinae living in Western Australian sponges. Indeed, all acastines are obligate symbionts of sponges or corals but early studies on these barnacles often failed to accurately record their hosts. The new study used molecular sequence data to confirm the identity of the barnacles and their hosts. They found that a single species of barnacle may inhabit different sponges, but usually of the same genus.

They also note that species recorded from other parts of the world that have broad host ranges require further research to test these assumptions. It's likely that the ranges of hosts will be refined once detailed molecular and morphological studies confirm barnacle and host identities.

However, Hosie and his collaborators made some other interesting findings. Not all acastine barnacles are specialists. Newly sequenced specimens of *Acasta aspera* from the Montebello Islands matched specimens previously recorded from Taiwan, which they note is a generalist that can colonise several different families of sponges. The free-living nauplius larval stage presumably allows them to colonise hosts over such a wide area via oceanic dispersal.

Darwin didn't recognise the subfamily Acastinae, which wasn't formally named until the 1990s, nor did he recognise *Acasta* at the genus level. He included *Acasta*—the type genus of Acastinae—as a subgenus of *Balanus*. The original species of *Acasta, Acasta spongites*, was first named from Italy in the 1790s when its association with sponges was already known and incorporated into the species name. When discussing *Acasta spongites* Darwin stated that "This species and the three following [i.e. other species of *Acasta*], caused me much doubt and trouble." Hosie might say the same thing, although access to better microscopes and sequence data surely gives modern systematists the edge over Darwin's dedicated research into a curious and fascinating group of crustaceans.

Above *Euacasta acutaflava*, a newly described sponge-inhabiting barnacle from Montgomery Reef, WA.
Photo – A. Hosie/Western Australian Museum