

Bryozoans or “moss animals” – misunderstood marine invertebrates

by Melissa Kay Boonzaaier

Dedicated to Christina Scott (20 November 1961 – 31 October 2011) – for all her efforts and contributions to popularising science, especially in South Africa.

Presenter (P): Welcome to another episode of ScienceMatters here on SAFm! I’m Nicky and tonight I’m chatting to marine biologists Dr Wayne Florence and PhD student Melissa Boonzaaier both from the Iziko South African Museum in Cape Town. Welcome to the show, Melissa and Wayne!

Melissa Boonzaaier (MB): Hi, Nicky!

Wayne Florence (WF): Thanks for having us!

P: So, Melissa, you are currently doing your doctorate degree at the University of the Western Cape on marine animals called “bryozoans”. Now, I’ve seen some pictures of these animals, but to be honest, they look more like marine plants to me! Can you explain to us what bryozoans are and where you can find them?

MB: Well, it’s true, Nicky, bryozoans look a lot like plants, and it’s also why earlier collectors or researchers misinterpreted them as sea plants! Even the word “bryozoan” is derived from Greek where “bryo” means “moss” and “zoa” means “animals”. Bryozoans fall under a group of animals called marine invertebrates. Invertebrates are animals “without a spine” like jellyfish, marine worms, molluscs etc. and form the largest group of animals we know very little about because of how tiny most marine invertebrates are and due to lack of interest in this diverse group. All bryozoans are aquatic and sessile animals, which means, the larvae settles on a substrate like rock or shells and remains there while growing and reproducing.

P: So, bryozoans only occur in water then?

MB: Yes, a few species occur in freshwater and estuarine habitats, but surely the largest and most diverse group of bryozoans occur in the marine habitats, and that’s where my interest lies! Marine bryozoans are extremely diverse - more than 4000 species of Bryozoa are known to date, but this group has been scarcely examined so the number of known species represents just a fraction of the actual number of living species! More so, bryozoans are considered at times as problematic marine-fouling animals as larvae are able to move quite easily with ocean currents and can settle and grow on any favourable substrate, on the surface like floating plastic or wood, thus extending their distribution ranges, and also survive much deeper unexplored areas. They also have interesting and different growth forms, all of which look like plants or even corals to the naked or “untrained” eye, but if you look more closely with a microscope, bryozoans are colonies built-up of hundreds to millions of tiny animals and each individual is called a zooid. Actually, to be more specific, “normal” feeding zooids are called autozooids and the more specialized ones are referred to as heterozooids.

P: In other words, bryozoans or “moss animals” are actually colonies of tiny zooids? Wow! And how does each zooid look like, Wayne?

WF: Well, it depends on the different species, because the size, shape, colour and patterns of zooids are species specific. But, yes, ultimately, each autozooid is a clone of the “parent” zooid which means all of them are genetically identical. Autozooids, as Melissa mentioned, are the feeding zooids so each individual has a

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mouth, gut, reproductive organs, nerves and even a short rectum. These characteristics, of course, sets them apart from plants. Between the autozooids, specialized heterozooids also play certain roles in the colony very much like the hierarchy honeybees display within a colony, where some collect honey and others protect the colony from any threats. These heterozooids include zooids referred to as avicularia, their function is still a bit unknown, but suggested to act as a defence mechanism. Some avicularia have elaborate spines and whip-like structures, and this, with the other characteristics of for example, size and shape of autozooids, allow us to clearly identify different species or recognize potentially new species.

P: You need to go through ALL of those characteristics to identify them correctly?! Wow, sounds time consuming! Melissa, you mentioned earlier that bryozoans have different growth forms. What type of growth forms are there?

MB: Well, there are different colony growth forms - some species are called “seamats” because they form flat orange, pink or white encrusting layers on rocks, seaweed and other shelled animals. Some bryozoans form erect turfs or bushes, while others shelter amongst other bryozoans. Some bryozoans even look like corals and are called “lace corals”. Needless to say, bryozoans are able to inhabit tiny crevices and rocks from shallow waters to the deep abyss.

P: But, why are bryozoans such a particular important or interesting group of animals to work on, though?

MB: Not only are they very unique and diverse – more so, forms habitats for other organisms - but through our research marine invertebrates, like bryozoans, can be used as an indicator group to assess sensitive areas for conservation purposes. Marine invertebrates play an important role in ecosystem functioning for example, breaking down organic material from decomposing bodies and as important food sources for other organisms. More recently, though, bryozoans have been studied for their biochemicals as a potential cure for diseases such as cancers! But Wayne can talk about that more...

WF: The bryozoan-derived biochemical called bryostratin 1 is produced by bacteria that live within bryozoans. Bryostratin 1 is in the second phase of human clinical trials in North America and Europe for the treatment of several cancers including skin cancer, ovarian- and breast cancer. This is very impressive since this is the most advanced level of development reached by a pharmacological agent derived from marine invertebrates, now sponges and sea squirts are also being considered as anti-cancer drugs.

P: Wow, that’s really impressive! Bryozoans are highly diverse marine-fouling organisms and part of an important group of animals called marine invertebrates which play a huge role in ecosystem functioning. Not only are bryozoans potential indicator species for sensitive marine areas, they are also getting way ahead in anti-cancer drug studies! What an interesting research field! I wish both Dr Wayne Florence and Melissa Boonzaaier, from the Iziko South African Museum, well in their research and hope to get them back here for another episode of ScienceMatters! Thanks, you two, and cheers to our science enthusiasts!

WF & MB: Cheers!