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Exploring Our Little Corner of the World with the Galiano Naturalists

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Glass Sponges and Reefs

As you look out across the beautiful water of the Gulf Islands and across to Vancouver, watching boats and ferries move slowly back and forth, do you wonder what lies beneath? Far below the plankton, on the bottom, there could be mud, deep mud filled with worms and heart urchins, or maybe a rock outcrop or wall. If there is rock, you can be sure there will be at least one sponge, and it is probably a glass sponge. But more likely there is not just one, but a multitude of glass sponges. Beneath that shimmering playful surface, the dark, cold, active waters of the Strait of Georgia are home to some of the most exquisite, brittle yet strong, alluring yet elusive animals: glass sponges; and once you know this, the sea beneath is never the same.

Sponges are unusual creatures. They are one of the few animals that we might feel we're familiar with because most of us have one under the kitchen or bathroom sink. Although those are often made of plastic or highly compressed wood chips, they nevertheless give us the general idea – a sponge is an animal with holes in it, and this somehow makes it absorbent. But the difficult thing is that sponges don't look like animals – they lack all the usual indicators of orientation: top and bottom, front and back, limbs, head, eyes. This body design has not changed since the world's first multicellular animals arose, because it is very successful. Sponges are

animals that use tiny cells to pump water through a very porous body – food (bacteria usually) and oxygen is extracted, and wastes (ammonium usually) is excreted. Thus they filter water.

Glass sponges are perhaps the strangest of all. They can be huge – some are a meter tall and over a meter wide, with billowing vase-like openings through which (if you added something to colour the water) you would see water steadily flowing. Glass sponges also have the world's first attempt at a nervous system, and can rapidly shut down their feeding current when disturbed by sending electrical signals throughout the sinuous strands of their creamy white tissues.

Glass sponges are found throughout the world in deep oceans (500-3000m) but there are only 4 places where they reach 'shallow' depths (by shallow I mean 30m). One of the world's largest shallow-water populations is in British Columbia, and unusually here three species of glass sponge have a rigid skeleton that allows them to form reefs; the most common of these are *Aphrocallistes vastus* and *Heterochone calyx* (the cloud



sponges).

Just a couple of kilometers east of Galiano Island is the Galiano Ridge sponge reef: hundreds and hundreds of sponges growing like corals, one generation on the next to form a 4-kilometer long white forest for fish, crabs and squat lobsters. This reef is one of at least 12 in the Strait of Georgia. Some reefs in the Strait of Georgia are heavily buried by sediment, with only the most recent recruits showing their creamy tissue at the top. The Galiano Ridge reef is less heavily sedimented, and the skeletons of past generations form multidimensional condominiums for all sorts of animals.

Glass sponges seem to be fairly slow growing animals. In the 1990s I carried out a study of boot sponges (*Rhabdocalyptus vastus*) in Saanich Inlet, and found they added about 3cm/year in new tissue. They grow faster when they are small, and then growth slows down so that large sponges could be anywhere between 50 and 200 years old. More recently we have photographed the same cloud sponges (*Aphrocallistes vastus*) in the fjords of Barkley Sound at 1-, 2- and 4-year intervals, and found about the same rate of growth.

Reef forming sponges are found throughout the North Pacific waters, the juveniles can start a reef as soon as a good place is found. This seems to have first occurred in our waters after the glaciers left the Pacific Northwest after the last ice age. One of the reefs in Hecate Strait is 5 meters thick, and a core taken by scientists at the

Geological Survey of Canada (NRCan in Sidney) has been aged at 6000 years old.



Thanks to dedicated mapping by NRCan scientists Kim Conway and Vaughn Barrie we now know that sponge reefs lie throughout the Strait of Georgia and upper Johnstone and Hecate Straits. But the presence of great numbers of sponges has long been known by fishermen, who have snagged their nets on the brittle skeletons; some reefs in fact are so damaged only a few stands of sponges remain like sentinels of a time past.

New awareness of these undersea 'old-growth' forests of sponges has allowed us to gain valuable ship time to explore their biology. Since 2005 my group at the University of Alberta has been mapping the full extent of the sponge reefs in the Strait of Georgia, determining what they feed on and how much of an effect their filtration has on the local waters. We are now trying to understand how robust the reefs are, how healthy current populations are and how quickly populations establish themselves.

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Natural Mysteries

Last month's mystery was: How long can a goldfish live out of water? Oh, you hear stories. "...found him under the couch after three days, and when I put him back in the bowl, he swam around happily and lived to be ten." We don't know of any experiments testing this – and it would be cruel to do so – but common opinion is that a goldfish will survive 15 to 20 minutes without water to wet its gills. We knew a little girl, who had a goldfish that she named Goldie. One day she came running, tears streaming, "Goldie got out of the tank, and he's just lying on the carpet." It couldn't have been more than 15 minutes, and when we put the apparently dead fish back in the tank, he perked right up and swam around friskily. But the next week he jumped out again, finding a breach in the lid, and no one was there to notice until much later, hours later. We put him back in the tank, but he floated belly up. The little girl took it hard. That fish loved to jump, and it was the death of him.

This month's Natural Mystery: Why doesn't tape stick to an ice cube?

Have an answer? Send your thoughts to galianonaturalists@gulfislands.com. Have a Natural Mystery of your own? Let us know, and we'll try to answer it.

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