

Interview with a... Marine scientist

A biological oceanographer at Woods Hole Oceanographic Institution, Stace Beaulieu specialises in the mysterious animals of the deep sea



What different habitats can be found in the deep ocean?

The deep ocean is a vast, dark, cold habitat with an average depth of four kilometres (2.5 miles). Most of the seabed is covered in soft sediments but there are also underwater mountains called seamounts and long ridges, associated with volcanic activity along Earth's plate boundaries. Hydrothermal vents are relatively small and distinct habitats can be found along these ridges.

What are hydrothermal vents, and what lives there?

'Hydrothermal' refers to the hot water spewing into the deep cold sea. Hydrothermal vents can reach temperatures over 350 degrees Celsius (660 degrees Fahrenheit)! Importantly, microbes are able to use the venting fluids as a source of energy. This allows for lush, dense communities to thrive in the dark, food-limited deep sea. The species that we find are unique to deep-sea vents and often have unique adaptations, such as the tube worm *Riftia pachyptila*.

How does life survive at such depths?

Interestingly, because most of the body tissue of animals is water, pressure is not the greatest challenge. Access to food and mates is not challenging at deep-sea vents as food is produced here and animals are densely packed together. A bigger challenge is maintenance of populations. Sometimes the vents shut off, and when that happens, for a population to persist, another vent habitat must be colonised.

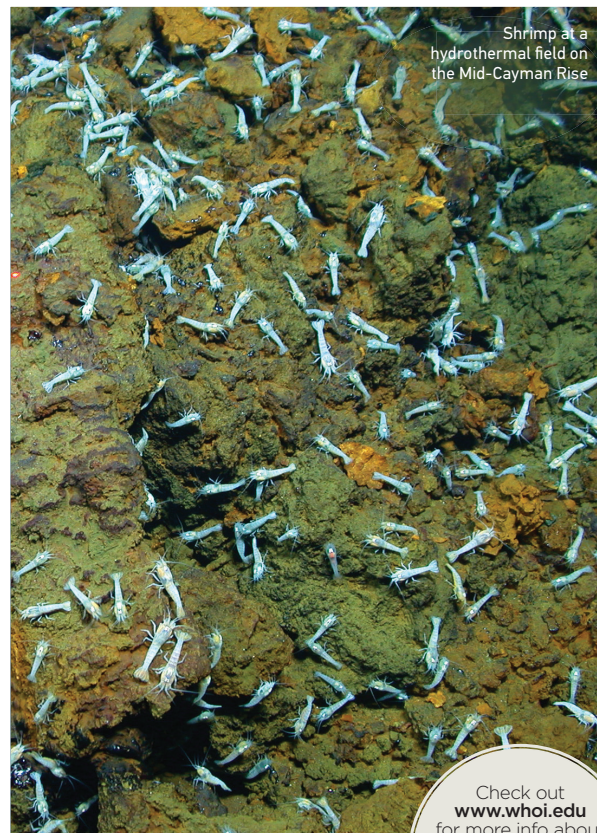
What techniques do you use to study the life this far down?

Working in the deep sea is like working in inner space. Techniques for studying deep-

sea life range from cabled instruments lowered or towed from a research vessel, to tethered or autonomous robots, to human-occupied vehicles (HOVs). There are also autonomous platforms called 'landers' that can be deployed for longer studies, with bait and time-lapse cameras.

What is the most shocking thing that you have found at the bottom of the sea?

In 2005, I had an amazing opportunity to dive in the HOV Alvin to hydrothermal vents at the Galapagos Rift. The mission was to relocate and sample the Garden of Eden vent, the first deep-sea hydrothermal vent discovered in 1977. The HOV Alvin has three passengers and many external lights and cameras, but still, it is difficult to see more than five to ten metres (16.4 to 32.8 inches) away from the vehicle. We followed a fissure, essentially a big crack at the sea floor, and then started seeing some crabs, which indicated that we were nearing a hydrothermal vent field. Then out my viewport, I caught a glimpse of something white against the dark volcanic basalt. It was the most exciting and rewarding moment when the pilot slowly and carefully turned Alvin, and the large white tubes and red plumes of a massive community of tube worms came into view in front of us.



Shrimp at a hydrothermal field on the Mid-Cayman Rise

Check out www.whoi.edu for more info about the amazing research being carried out at Woods Hole Oceanographic Institution

How to begin your marine science career

Stace says the best thing about her job can be summed up in a single word: "Discovery. Sometimes, when I am examining a sample or looking at photographs from the deep sea, I am excited to find an animal that I have never seen before," she tells us. "And a couple of times in my career, I have found an animal that no one has ever seen before." If you're keen to get a slice of the action for yourself, Stace has this advice: "For aspiring marine scientists, I recommend a strong background in maths and sciences, but also writing and communication skills are important. I personally learnt a lot about the research process by participating in science fairs in school. Today, there are also opportunities to get involved in citizen science in your local community."

"A massive community of tube worms came into view in front of us"



Scientists tested the upgraded Alvin's new capabilities on a cruise in the Gulf of Mexico in March 2014