Ocean Gazing: Episode 44
ROVers over and under

<intro music>

Ari: This is Ocean Gazing. It's the podcast where we descend gracefully through the water column and tread lightly upon the seafloor. I'm Ari Daniel Shapiro. This episode is the first of a two-part visit to MBARI. That's the Monterey Bay Aquarium Research Institute. Craig Dawe works there as the Technical Support Manager

Dawe: We're in Moss Landing, California.

Ari: What's it look like?

Dawe: Oh, gray, summertime in California, in central California. It's gray, it's cold, it's nasty! They sell more sweatshirts here than anywhere else in the world, I swear. <laughs>

Ari: MBARI is engaged in studying the ocean by creating a home for collaborations between scientists and engineers, and the results are pretty remarkable. Stay tuned.

<fade up music and sustain>

Ari: So can you tell me where we're headed?

Dawe: We're on our way to the *Point Lobos*, which is our original research vessel. It's a former oil field supply vessel. We've been operating it since 1988.

<sounds of boarding *Point Lobos*>

Ari: Craig Dawe and I stepped onto the deck of the 35-meter *Point Lobos*, and he led me inside the main cabin. Among other jobs, the *Point Lobos* services an ocean observatory sitting in the Monterey Canyon 900 meters underwater.

Dawe: Deep water this close to shore is not that common, particularly with a research institute right next door.

Ari: The observatory, it's called MARS.

Dawe: MARS is an acronym for the Monterey Accelerated Research System, and that is a big extension cord for science that goes out into the Monterey Bay.

Ari: About 52 kilometers out, and you can plug instruments into MARS, instruments that collect all kinds of data.

Dawe: Data or images or whatever the scientist is interested in.

Ari: And all this information – it runs back through this extension cord from deep in the Monterey Canyon, along the seafloor of Monterey Bay, all the way back to shore and onto the Internet – almost instantaneously.

Why is Monterey Bay an interesting place to do this kind of work?

Dawe: That's an interesting…

Ari: Is it? Is it interesting?

Dawe: No! <laughs> Lemme rephrase that. Monterey Bay was selected as a site for this test observatory because it's relatively benign. We weren't concerned about risks from geological formations or there wasn't abundance of fishing going on here, so we could deploy instruments and test them and be relatively sure that they would survive their deployment without some catastrophic event occurring.

Ari: Still, MARS *does* conduct fulltime research. Dawe gave me a tour of the *Point Lobos*. <sounds of us getting up and returning to the deck> We went back out on deck to look at *Ventana*. It's a remotely operated vehicle, or ROV, used to operate and repair MARS, and to explore the waters just off Monterey. <sounds of *Ventana*'s hydraulics> *Ventana* is a 2, 3-meter tall hulking cube that's powered by hydraulics, which you can hear now, and it's got a metal frame, orange foam for flotation, and all kinds of wires and valves. It has these two robotic claws that look like pincers…

Dawe: …Gripping jaws. They're designed to grip tools and be able to collect animals and hold onto traps or collection devices. There's a particular anemone that lives on the sandy seafloor called *Liponema* or the pom-pom anemone. And it's got all these – it's a beautiful animal – really sticky, flowing tentacles. But as soon as you touch them, they just stick to you. So it's very difficult to collect. Somebody said, "Well, why don't you try the colander?" So we took the colander out of the galley, put it in the jaw of the ROV, went down, and we just scooped up all the sand that this animal was sitting on, and dumped it into the drawer, and we started collecting *Liponema*. It was great, it was great.

Ari: It's called – *ventana* means window in Spanish. Is there a reason?

Dawe: It does, yeah, it's a window into the ocean. The name was actually picked by a contest, and somebody submitted *Ventana*, and I thought it was just an excellent name. I love it.

Ari: Before leaving the ship, Dawe took me to the galley.

Dawe: We used to have a toaster oven, which I really loved, but now we've got two microwaves.

Ari: Where's the good stuff stashed?

Dawe: Oh, it's in the fridge, and it's the fresh fruit and vegetables.

Ari: Is there any in there now?

Dawe: Probably not, probably not. <opens fridge>

Ari: Blackberries…

Dawe: Blackberries, bag of salad, the cookies. The cookies are good. <closes fridge>

Ari: What's in these other drawers?

Dawe: Uh, extra cookies.

Ari: You guys like your cookies. Here's some more: biscotti, chocolate hazelnut, pirouette.

Dawe: What else we got up here?

Ari: This isn't exactly a weight loss vessel.

Dawe: Oh, hell, no! <laughs> Can't you tell!?

Ari: I eventually worked my way out of the cookie hole, and back to the labs of MBARI. I went over to this huge garage…

Sherman: This is not a garage. This is our test tank facility. So this is a saltwater pool, essentially.

Ari: It's 10 meters deep, says Alana Sherman, an electrical engineer here. Deep enough to submerge robotics and other equipment, and test them without having to go to sea all the time. Sherman and her colleague Ken Smith – a biologist – are showing off *their* rover. It's the size of a small SUV – 1400 kilograms in air but only 70 in water. The rover moves like a tank with two conveyer treads that shuttle it along the seafloor. And the point of this rover?

Sherman: Well, it's really to study the ecosystem of the benthos.

Ari: Meaning the bottom.

Sherman: Yes. We look at several things. We wanna see how much food is getting down there, and then how many organisms are down there taking advantage of the food. So it's often like at work, if someone puts out, like, a leftover pizza, all of a sudden all these people start swarming in. And if we didn't have a camera to look in that room to see how many people were there, we could put an oxygen sensor and we would be able to tell how many people were in that room, right? Because we all consume oxygen, and the oxygen in that room would be depleted. So I think it's sort of a similar thing for the deep ocean where you have these events where you have a bunch of food that comes down to the seafloor…

Ari: Not pizza.

Sherman: Not pizza. It's a lot of particulate organic matter.

Ari: This is like dead stuff at the surface that falls down.

Sherman: Yeah, the best of it is probably dead stuff at the surface. The other is waste from other marine organisms that is sinking down…they often call it, like, marine snow.

Ari: Which is a polite way of calling it…it's like excrement, sloughed off bits and pieces, but somebody finds that appetizing.

Sherman: Yes, and because the deep ocean is probably the world's largest ecosystem, but it's one of the hardest to study because it's so inaccessible. So that's really where the rover comes in handy is that it can be out there for months at a time, taking measurements. And what we do is we measure how much oxygen is consumed by the organisms that live in the sediment. And that gives us some idea of how many organisms are present, and then we can see how that changes over time.

Ari: And who's part of that benthic neighborhood?

Smith: Oh, everything from…

Ari: Oh, that's biologist Ken Smith.

Smith: …from bacteria to worms of various sorts to crustaceans, sea urchins, sea cucumbers.

Ari: And you're looking to kinda see how all these creatures are forming a food web down there?

Smith: In essence, yes, and how ultimately, we're looking at how it changes with time.

Ari: To see how changes in ocean conditions and climate may be impacting the deep sea?

Smith: Yes.

Ari: Now, when you send a big rover like this one, or like the ROV *Ventana*, to sea, there are risks. Risks that're all too real to Ken Smith. Because there was a rover that came before the one that we're talking about now. It was Smith's first rover, when he was at the Scripps Institution of Oceanography.

Smith: It was deployed off the side of the ship, and then it was left for six months to do a transect of stations. And we went back in six months, and it just wouldn't come back up to the surface. So, so that's all we know.

Sherman: Don't you know a little bit more?

Smith: Yeah, there was, there was a float from it that came ashore. Probably the rover had come up to the surface when we weren't there and really gotten battered up in a high sea, the float broke loose, and the rest of the rover probably just went back down.

Ari: And what was it like going out after 6 months, ready to get your rover back…I mean, that's gotta be horrible, that had to be really hard.

Smith: Yes, but I've been doing this for many years. I've lost a lot of instruments, but this was probably the most painful.

Sherman: Someone told me when I first started that you should never put anything in the ocean that you can't bear not to see again. And so, unfortunately, losing things is part of building instrumentation to study the deep ocean.

Smith: And the original rover, we like to think is still cruising around on the seafloor.

<transition music>

Ari: Check out oceangazing.org to hear Craig Dawe talk about a couple of his more… memorable times aboard *Point Lobos*.

Dawe: I have scars on my shins from the last 20 years.

Ari: And to see photos of my time at MBARI. You can also send a comment or a question to the scientists and engineers featured here. Oceangazing.org. We'll continue our trip to MBARI next time.

In the meanwhile, Ocean Gazing, it's a product of COSEE, and we get financial support from the National Science Foundation.

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