Ocean Gazing: Episode 10
Of bonds and blooms

Barb and Gary Kirkpatrick: Mote Marine Lab, Sarasota, Florida

<begin music>

Ari: Hey! This is Ocean Gazing, and I'm Ari Daniel Shapiro.

<cross-fade digging noises on the beach to plant mangroves>

Ari: This was last episode's sonic stumper. It's the sound of shovels digging holes in a gravely beach at the Indonesian community of Minahasa. Residents were planting mangrove trees to protect their shoreline from the possibility of a future tsunami.

<cross-fade intro music>

Today, we'll discuss another coastal danger. It kills marine animals, contaminates shellfish, and aggravates asthma. And we'll find out what two scientists – Barb and Gary Kirkpatrick – are doing to help matters. So stay tuned!

<fade music up until the end>

Ari: Barb and Gary Kirkpatrick have been married for a long time.

Barb: We both started out in very different careers. And we've sorta morphed now into working down the hall from each other, which if you would've just told me that 15 years ago, I woulda just said, "Get outta here."

Gary: Yeah, she hit it right on the nailhead there. We've ended up very close to the same type of work.

Ari: To understand their story, we first have to understand harmful algal blooms and red tides.

Gary: Ok, the harmful algal bloom or HAB. That's any event, marine or freshwater, anywhere in the world, that's caused by algae – aquatic algae – that grows up and creates a real thick mass of the stuff we call pond scum. The Florida red tide is a specific species of algae that produces a harmful algal bloom in the Gulf of Mexico.

Ari: We'll return to that word "harmful" in a moment. Let's get back to the story of Barb and Gary.

Barb: Gary started out as an electrical engineer and I started out as a respiratory therapist. And then I was teaching respiratory care at the local community college here in town. Part of my responsibility was going around to the local hospitals with

my students doing their clinical rotations. And we were coming across these people in the hospital with asthma who were being told it was probably because of the red tide is why their asthma was triggered. And I remember going home and saying to Gary, "So what's up with this red tide stuff and these aerosols?"

Ari: Aerosols are materials that float around in the air.

Barb: And he said, "You know, I don't think much research has been done about that that I know of." And that's sort of the beginning of where my interest got piqued.

Gary: Yeah, that was about the time that we had a federal grant to study the ecology of the red tide organism. So I was the lead scientist on several research cruises out in the Gulf. One of the things I thought would be useful was let's look at how the scientists respond to, how their health responds to, working in and around the red tide on a daily basis. Barb being a respiratory therapist, I said, "Why don't you come along with us and do some respiratory measurements on us while we're working out there?" Just a real informal thing. You know, there was just enough of a signal in a couple of scientists that really spurred her on. She saw something was happening here and she wanted to know more about it. She got involved. We got space for her on more cruises and away it went.

Ari: And now both Barb and Gary Kirkpatrick are senior scientists at the Mote Marine Lab in Sarasota, Florida. Since those early days, they've learned a lot more. The Florida red tides are caused by a kind of tiny, photosynthetic algae called *Karenia brevis*.

These algae produce a chemical called brevetoxin, and it kills fish, turtles and even marine mammals. Brevetoxin's got some human health impacts too, including something called neurotoxic shellfish poisoning that causes gastro-intestinal upset.

Barb: Commercially purchased shellfish is safe to eat. Where we caution the public is for people who recreationally shellfish and they need to know where there is red tide in the water so they don't harvest from that area.

Ari: Gary and a team have been working on a bunch of technologies that cruise the water on their own, for weeks or months at a time. They scan for red tide by looking for particles that resemble *Karenia brevis*.

Gary: It alerts us. It tells us that it thinks there's a high likelihood that these red tide organisms are in the water. We have gotten to the point where we have 20 of these instruments deployed in a variety of locations, and they are reporting back to us on an hourly basis letting us know what they see in the water.

Ari: This information is sent to the web where anyone can access it and avoid the beaches and waters contaminated with red tide. Brevetoxin can also become part of the marine aerosol, or seaspray.

Barb: We then inhale it and it becomes an irritant to our airways. And it causes kind of a classic irritating <cough> cough, nasal congestion, eye tearing. For the folks who have asthma, the story's a little bit different. With the asthma studies that we do, we measure lung function, and so we ask people to take as big and deep of a breath in as they can and blow it out hard and fast into this thing called a spirometer that measures both volume and the flow, or the speed of the air that you're pushing out.

Ari: Barb and her undergrad Elizabeth Moser showed us how to use the spriometer.

Moser: Is it ready?

Barb: It's ready. Exhale… Big, deep breath in… Blow it out hard and fast. Blow, blow, blow, keep blowin', keep blowin', squeeze, squeeze, keep blowin', keep blowin', keep blowin', squeeze, squeeze, almost there, keep blowin', keep blowin', keep blowin', and take a break. You did it!

Moser: <laughs> I feel like I'm learning, I'm getting better.

Barb: You blew 4.42 liters, so if you think of a 2-liter bottle of Coke.

Moser: Oh, nice!

Ari: Barb's found that after an hour at a beach with aerosols produced by a red tide, people with asthma experience shortness of breath, wheezing and tightness in their chest. And these symptoms last for 5 days.

Barb: And so it becomes really a public health concern to inform asthmatics when we have these blooms on our beaches.

Ari: And Barb has developed a system to do just that.

Barb: The hi-tech part of it is that we have outfitted the lifeguards with Blackberries or PDAs, and right from their lifeguard tower they can put their report in. It immediately goes into a webpage with no human intervention so that before you're leaving your house, you can check the 6 beaches of Sarasota county and the 2 public beaches of Manatee county and choose which beach that you want to go to on any particular day.

Ari: For each beach, the lifeguards report on the level of respiratory irritation, surf conditions, water quality, dead fish on the beach, and so on. Barb's found all sorts of people using this information.

Barb: One woman who looks at it to decide where she's going to do her tai chi every morning because she wants nice, serene, calm conditions. And so we created it for

these harmful algal blooms, but what we're finding is that people are using it for a whole variety of their own personal needs.

Ari: Here's one woman who has asthma, named Allison Pederson, who uses this system to find out about the beach conditions.

Pederson: I have twin daughters that were 8 weeks premature and are prone to get bronchitis and that type of thing, so we try and avoid the ocean when there's a red tide.

Ari: The Kirkpatricks work on projects professionally that help people like Allison Pederson and others make personal decisions. And it was the personal relationship of this wife and husband team that led them into professional collaboration in the first place.

Gary: It's great, I mean, you got a colleague that you can sit and talk and you can throw ideas at anytime, anywhere. I mean it does interfere a little bit with our home life if we're in the middle of dinner and all of a sudden an idea comes up. But we deal with it real well, and I'm glad we're doing it. It's wonderful.

<transition music>

Ari: Alright, here's the next sonic stumper.

<fade up sonic stumper>

Ari: Post your guesses for the sonic stumper and questions for Barb and Gary Kirkpatrick online at www.coseenow.net. Just click the podcast link.

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That's all, thanks!

Barb: You're welcome. Bye.

Gary: Okay, Ari. Thank you.

<fade up sonic stumper; then fade out >