

Ocean Gazing: Episode 13
Autonomous, enormous, ingenious
Gwyn Griffiths: National Oceanography Centre, Southampton, UK

<begin music>

Ari: Hello. Time for a dose of Ocean Gazing, the podcast where we hold our breaths and head underwater. Ready? Inhale. <inhale>

Griffiths: We're inventors. We invent new platforms for science.

Ari: Gwyn Griffiths is at the National Oceanography Centre in Southampton in southern England. He heads up a team of about 50 engineers and students. They build robots and gadgets to keep track of what's going on in the ocean. And he's turning a lotta heads doing it. Stay tuned.

<fade up music; sustain until it concludes>

Ari: Destiny may have had something to do with Gwyn Griffiths' career choice.

Griffiths: I was born and brought up on an island off an island off an island. So the UK is an island. And a county in North Wales, Anglesey, is an island. And on a small island off the island of Anglesey, on Holy Island, is where I was born and brought up. So I guess in some ways there was no escape from saltwater. For the last almost 50 years, I've had the sea in my blood.

Ari: Griffiths has something of a mini-museum honoring his half-century connection to the ocean.

Griffiths: I have some objects from the past within my office here just to remind me of where I've come from.

Ari: You know what I'm wondering is if you could kind of show me what's on those shelves?

Griffiths: We could give it a go. Hold on, it's about 4 feet long.

Ari: That's the first object he spotted. We were doing this over the phone ...

Griffiths: Lifting it down there.

Ari: ... so I didn't realize it was quite so ...

Griffiths: Heavy.

Ari: Heavy.

Griffiths: Okay, we've got it down on the table. What I have here is an instrument that I designed and built in 1986.

<fade Griffiths fiddling with the instrument under next track>

Ari: Griffiths unscrewed various parts to explain how it works. The instruments Griffiths and his team work on nowadays are just as complex ...

Griffiths: That's the retaining bar removed.

Ari: ... and just as important for understanding the ocean. Today, Griffiths' devices're called Autosubs.

Griffiths: They're about 7 meters long, they weigh 3 tons, and they can travel in the ocean for 3 or 400 km gathering their data.

Ari: Autosubs go out for a few days at a time, and they're driven by propellers. They're enormous: they look like torpedoes. They're autonomous. That means nobody's on board. And they're loaded up with all kinds of sensors that measure all kinds of things.

Griffiths: Conductivity. Temperature. Depth. Salinity. Optical instruments. Estimates of the amount of plant material. Clarity of the water. Suite of acoustic instruments. Sonar.

Ari: Autosubs have got a couple of basic missions. First, they can make maps of the seafloor –

Griffiths: – in enormous detail,

Ari: Yeah, which reveal things like underwater landslides. And landslides trigger tsunamis. So Griffiths' science colleagues use the locations of previous landslides to predict where tsunamis might strike in the future. Autosubs can do this seafloor map-making in both open water and under sea ice.

Griffiths: So Autosub can bring good, precise information about the shape of the seabed.

Ari: Autosubs can also keep watch over depths between about 500 and 1000 meters. That's the length of about 5-10 football fields standing endzone to endzone vertically in the water.

Griffiths: The so-called twilight zone.

Ari: It's hard to get instruments into the twilight zone. But Autosub can do it, and just kind of hang there gathering information. Like how much carbon drifts down from the sea surface up above. Which relates to climate change and how much carbon dioxide is leaving the atmosphere and entering the ocean.

Autosubs really are engineering marvels. To get to the bottom of the ocean, they have to hold up under extraordinary pressures.

Griffiths: 60 MegaPascals. Sorry, are you happy with metric units?

Ari: No problem: that's about 600 times the pressure you feel on the surface of the Earth. So the Autosub has to be durable.

Griffiths: And yet, it has to be light. Because unless it's light, we can't carry the instruments and even more importantly the batteries. And so, we have to use light and strong materials such as carbon fiber.

Ari: The Autosubs are quiet too. In fact, here's last episode's sonic stumper. It's the sound of an Autosub heading straight for an underwater microphone.

<fade up underwater Autosub clip>

Griffiths: What you hear first is the nose of Autosub hit the underwater microphone, and then it's scraping along. And only then, do you start to hear some noise from the propeller of the vehicle. And there's a whoosh and some bubbly type noise as the propeller goes by. And then nothing: silence returns. And that really shows that Autosub is an exceedingly quiet underwater vehicle.

Ari: So quiet that it's unlikely to disturb the creatures of the sea. But Griffiths' work's certainly attracting attention on land, of the human variety.

<fade up Handel Wassermusik>

Griffiths: One day the distinguished visitor was the husband of the Queen, the Duke of Edinburgh. And on display was the current meter that I was working on at the time. <fade down Handel> And this was a device that was intended to measure the currents within half a meter of the sea surface. And so to do that, you have to have some buoyancy. For experimental purposes, while we were building this, the flotation device was an inner tube from a motorcycle. So here we were, showing the Duke of Edinburgh this innovative instrument. And he immediately spotted what on earth we were using for a flotation device – the motorcycle inner tube – which amused him greatly. He chuckled and sort of said, “Oh, that's such an interesting use of a motorcycle inner tube.”

Ari: Griffiths doesn't just entertain the British royal family. He speaks to schoolchildren, and he talks with the wider public at museums and other programs

held all over the UK. And Griffiths has noticed that a lotta people have gotten hooked on science and the ocean through TV and the radio.

Griffiths: And it makes it then easy to connect from that into the cutting edge science that we're doing. Because the ocean isn't just about the most attractive, or the garish, or the frightening life forms. Trying to get across the physics of the ocean is actually challenging. But if you start off from talking about the biology, you can take people with you.

Ari: And Griffiths does just that. There's something about the Autosub – a giant marine robot gliding with stealth through the ocean's depths, and looking, sensing, listening all the while – that captures the imagination. So when Griffiths talks about his Autosubs, he does take you with him.

Griffiths: I would like to think that indeed, Ari, yes.

<fade up transition music: "Welcome to British Royalty"; sustain; then fade up next sonic stumper>

Ari: Here's our sonic stumper. <play sonic stumper> We've got a new way for you to share your guesses for the sonic stumpers and your questions for our guests like Gwyn Griffiths. Find us on Facebook by searching for Ocean Gazing!

<outro music>

This podcast's a product of COSEE NOW and the National Science Foundation supports us financially. Thanks to Mike Douglas, Rory Howlett, Sage Lichtenwalner, Janice McDonnell and Jim Yoder.

See ya' in 2 weeks. <beat> You can breathe out now. <exhale>

<fade up outro music; sustain until it ends>