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Promo

The following is an excerpt from the *Science* Podcast. To hear the whole show, visit www.sciencemag.org and click on “*Science* Podcast.”

Music

Interviewer – Kerry Klein

Finally today, Kerry Klein here and with me I’ve got online news editor David Grimm who’s here to give us a rundown of some of the past week’s stories from our online daily news site. So Dave, in our first story, we’ve got an underwater puzzle.

Interviewee – David Grimm

This first story is about some potentially hidden continents or at least very large land masses that may exist on Earth. We’re not exactly talking Atlantis, here, but maybe something not as far-fetched. This has to do with the Indian Ocean, and it turns out that some of the islands in the ocean may actually lie on top of the remains of an ancient continent that was pulled apart by plate tectonics between 50 million and 100 million years ago.

Interviewer – Kerry Klein

So what tipped scientists off that something like this may even be possible?

Interviewee – David Grimm

Well Kerry, it turns out that there is a lot of places in the Indian Ocean where Earth’s gravity is kind of unusual. Places like Madagascar or the Seychelles, they have a slightly stronger gravitational field than is expected. And one thing that might explain it is abnormally thick crust. If that’s the case, it could be that the crust is actually about 25 kilometers thick, which would cause it to resemble a continental crust, which is compared to about the five to ten kilometers of oceanic crust elsewhere. So that would be really unusual. However, thickness alone doesn’t prove that crust is continental, and that you would actually have maybe a hidden continent in this part of the world. So they actually, the researchers in this study looked for some other lines of evidence. They reconstructed the movements of the tectonic plates to determine where and how these potential fragments of undersea crust were once connected to the continents. They were able to show that until about 90 million years ago these places with this really sort of unexpectedly high gravity would have all been attached to India, which is really interesting. And the researchers actually looked for some chemical evidence. And they took sand samples from several beaches in Mauritius, which is an African island located about 1700 kilometers southeast of the Seychelles. The surface rock of Mauritius is made from volcanic oceanic crust or basalt, but its beach sands contain not just fragments of this eroded lava, but also zircons, which is a mineral associated with continental crust.

Interviewer – Kerry Klein

But aren't there multiple ways for these zircons to have gotten to these beaches?

Interviewee – David Grimm

That's right, but it turns out that the zircons they found from Mauritius were hundreds or even thousands of millions of years old, and the island's oceanic crust was less than 10 million years old, which means that these are really coming from a very sort of different place.

Interviewer – Kerry Klein

And so where would they, how could they have ended up on these beaches, then?

Interviewee – David Grimm

Well Kerry, the idea is that the zircons would have existed in the pre-existing continental crust, but when then the magma that formed the Mauritius broke through this crust it may have carried some of these zircons with them, and they would have become incorporated into the basalt lava that the researchers analyzed.

Interviewer – Kerry Klein

How cool! I wonder if there could be any more evidence for this out there.

Interviewee – David Grimm

Well, actually it turns out that the Indian Ocean actually could be littered with continental fragments like the fragments that the researchers are postulating about here. So actually there might be a lot more evidence popping up of this hidden land beneath the waves.

Interviewer – Kerry Klein

Great, and next up we've got some news for those of us who are plagued with acne.

Interviewee – David Grimm

Right, not one of my favorite topics, at least when I was growing up, but it turns out that 80% of Americans and a large percentage of other people around the world have acne, especially when they're going through puberty, when they're growing up. And it's recently been speculated that acne is caused by a bacterium or bacteria in the skin. There's one particular bacterium called *Propionibacterium acnes*, appropriately enough, which seems to be associated with acne, although the researchers aren't exactly sure how it causes acne.

Interviewer – Kerry Klein

So here they've made a little bit more of a connection. Tell me about this new study.

Interviewee – David Grimm

Well what they did was, these researchers took 101 people, 49 of whom had acne and 52 which had very normal, sort of clean skin and they swabbed their faces and they examined all the bacterial DNA that they could find. And not surprisingly, they were finding a lot of this *Propionibacterium acnes*. But what was interesting is it wasn't just

this one type of this particular type of bacteria. There's actually a lot of different subtypes. In fact the researchers identified 66 different strains that they hadn't seen before. And they found that two of these strains, which they call RT4 and RT5, tended to be found predominantly in people with acne. But there was one strain called RT6, which was found almost exclusively in people with clear skin.

Interviewer – Kerry Klein

Interesting. So they found some bacteria tied very clearly to people with acne, and some tied to people without.

Interviewee – David Grimm

Exactly.

Interviewer – Kerry Klein

So of course this brings up the question of cause versus association.

Interviewee – David Grimm

Right, and they think there's a causal effect here because they say this good strain – what they're calling this good strain of bacterium – contains genes known to fight off bacterial viruses and other potentially harmful microbes. So they suspect that it actually may be like, you know, the bacteria in our guts are not doing bad things, are actually doing good things. They help us digest food; they may actually be even protecting us from diseases. It may be very similar with bacteria on our face; some of them may fight off other harmful microbes, which would otherwise cause acne.

Interviewer – Kerry Klein

So if true cause and effect were actually to be found here, could this ever lead to an actual therapeutic use for this knowledge?

Interviewee – David Grimm

Right, exactly, and the researchers are sort of making the analogy with probiotics. I don't know if we want to smear bacteria on our face, but maybe we could find what it is about these bacteria that are having this protective effect, isolate the compound that could be turned into a drug, or potentially a face cream, or something like that. So acne may not be with us for good, who knows.

Interviewer – Kerry Klein

Right, I'll keep my fingers crossed for the next generation of teenagers.

Interviewee – David Grimm

Right.

Interviewer – Kerry Klein

And in our final story today, instead of giving it an intro I'd just kind of like to read the first sentence here: "In the swamp of the blind, the frog with one eye surgically attached to its back is king." What does that mean?

Interviewee – David Grimm

Well, what it means is we're sort of dealing with "frankenfrogs" here. And actually not really "frankenfrogs," but "frankentadpoles." Researchers have taken eye balls from tadpoles and surgically reattached them to different places on the animal's body, most notably places along their backs.

Interviewer – Kerry Klein

And why did they do that?

Interviewee – David Grimm

That is a great question. The reason why they did that is they are really trying to get at the roots of vision. What is it about the eyes that help us see; how do they connect; and actually really beyond that, how do they transmit their visual information to the brain? And what the researchers were hoping to do is figure out, you know, if we attach eyes to random places on these tadpoles bodies, will it give us a sense of how this visual information is transmitted to the brain and how it effects behavior.

Interviewer – Kerry Klein

Right, okay. So how did eyes transplanted around the body help tell us that information?

Interviewee – David Grimm

Well, what the researchers did was that they put these tadpoles sort of in a Petri dish, and if they moved to a red portion of the Petri dish, they received a mild electric shock. And this was to sort of train them to avoid going to that area. And obviously those who could see and can see the red were going to avoid this area. And so once the researchers had these tadpoles trained, they made some of them blind, they let some of them keep their eyes, and others they reattached the eyes to various places around the back. And as expected, those with intact eyes were pretty good at avoiding the red side of the Petri dish. And about 40% of them did so. And none of the blind tadpoles were able to avoid the red side of the Petri dish. Pretty obvious they couldn't see. But 10% of those with the transplanted eyes – with the eyes transplanted on the back – also avoided the red side of the Petri dish, suggesting that some of them were somehow able to see this red side of the Petri dish despite not having eyes where they should be, but having the eyes on their backs.

Interviewer – Kerry Klein

Physiologically, what do scientists think was actually going on in these 10% of blind tadpoles with reattached eyes?

Interviewee – David Grimm

Well when they looked a little bit closer they found that only those tadpoles whose transplanted eyes had formed connections with their spinal cords were able to learn to avoid the red side of the Petri dish, which suggests that you can't just put an eye anywhere and expect it to work and eye. It really has to connect to the rest of the nervous

system. And indeed the eyes that were just sort of attached to formed connections with the guts, or other parts of the body, didn't serve any purpose.

Interviewer – Kerry Klein

Right, so is this knowledge eventually transferrable in any way to humans?

Interviewee – David Grimm

Well that's what the researchers hope. They're learning more about how eyes can be transplanted, how they form connections. And now that we know, you know, sort of some of the connections that are really critical to conferring vision, researchers say that we could have new ways to conduct eye transplants in humans, even ways to create bionic hands and other appendages that could potentially do some of the seeing for us.

Interviewer – Kerry Klein

OK and what else have we had on the site this week?

Interviewee – David Grimm

Well Kerry, we've got a story about how birdsong could shed light on the evolution of language in people, also a story about some of the earliest nude female figurines that humans created. These are figurines that are tens of thousands of years old, and what they may have been used for – what their purpose was. For *ScienceInsider*, our policy blog, we've got a story about a new science scandal happening in Russia; also a story about this sequester happening in the United States. What are the impacts of the proposed massive budget cuts going to have to scientific researchers, to scientists and their careers? And along those lines we've actually set up a page on the site where scientists, grad students can come and just sort of share their thoughts about the sequester; how is even the threat of sequester impacting their research, their ideas about future careers. So be sure to check that out on the site. And finally for *ScienceLive*, our weekly chat on the hottest topics in science, this week's *ScienceLive* is about the science of your dog's brain. What are we learning about canine cognition? And I actually will be moderating that one myself. Next week's *ScienceLive* is about open access; what is the latest in the open access publishing debate? You can log on and ask questions from a couple of world experts. So be sure to check out all these stories on the site.

Interviewer – Kerry Klein

Great. Thanks, Dave.

Interviewee – David Grimm

Thanks, Kerry.

Interviewer – Kerry Klein

David Grimm is the online news editor of *Science*. You can check out all of our news at news.sciencemag.org, including daily stories from *ScienceNOW* and science policy from *ScienceInsider*. And while you're there, be sure to check out *ScienceLive*, a live chat on the hottest science topics every Thursday at 3 p.m. U.S. Eastern time.