ENGLISH TRANSCRIPT
ANCIENT CORAL

INTRO:
This is a podcast about the sea. Because I, Threes Anna, love that sea. But I'm also worried and sometimes even scared. What's actually happening in, with, on and under that water? Just listen.

The wind is blowing and the tide is high, and I'm stepping from the beach into the North Sea. Underwater, walking on that sandy bottom sounds very different. And I can't see that bottom. I only see it when the tide goes out again. Or when I walk out of the water. On the beach, I see shells, seaweed, cigarette butts, dog tracks, footprints, bits of plastic, a reflection of today's world.

VO: And then 3,000 kilometers away. In the Moroccan desert.
Unbelievable. Beautiful, isn't it? Thousands, right? Yes. All shells. So this was the old seabed. They're all there now. Just like they were laid down yesterday. How old? No, I have to guess, because I don't know this rock layer. But it's definitely 300, 400 million years old. Really old. VO: And this desert was sea 400 million years ago!

Episode 7, ancient coral

Oh dear, a little waterfall that's fossilized. I can see the current in it.
VO: I'm in the Moroccan desert with Kees, my husband. It's quiet and endless. And Kees loves fossils, so I help him look. I'm hoping for dinosaur remains. He's a bit more realistic. He wants to find the long-extinct trilobite. But instead, I first find something I don't understand.

Then you're 800 meters up and suddenly you're walking on a layer of coral. The entire bottom is covered with thousands of white bits of coral. Doesn't this feel like it just came out of the sea yesterday? It's amazing.

VO: And when I see all that coral, I suddenly don't understand something. Why is everyone so afraid these days that coral is going extinct? We see it here. So it's been around for 400 million years. It's survived all the mass extinctions. And we've had a whole bunch of them. In which dinosaurs died out, and trilobites, and who knows what other creatures. But apparently not coral.
And so that day begins a completely unexpected quest, in which I find myself in a world from a long time ago and a long way into the future.

We had climbed a mountain where there were supposed to be all sorts of fossils, in a layer of earth from 400 million years ago.
I'm with Fleur van Duyl, a scientist who has been researching corals all her life.
And that coral, it looked—I brought it back for you—as if you'd just found it somewhere on the beach. Yes, definitely coral. These days you often hear that coral is dying. Yes. Has coral survived all those mass extensions? So, in other words, is this still the same coral? Well, it is coral, but whether it's the same kind... as we still have now, I highly doubt. You'd really need experts who knew a lot about that.

VO: And so I'm making an appointment with retired professor Bert Hoeksema. I'm speaking by phone.

We were in Morocco, searching for fossils, in the middle of the desert, high up on a mountain, a stratum from 4 million years ago, and there we found all sorts of coral, and that coral looked like we'd just found it on the beach. My question is, is this old coral the same coral as the corals now? You saying 4 million is a bit off, because your email said 400 million. Sorry, I meant 400 million. Sorry,

sorry, sorry. Oh. 400 million. 400 million? 400 million. And you think that's impossible? No, I was happy when you said 4 million. Because this type of coral only formed 240 million years ago. Maybe there are two layers of the earth mixed together. Uh. Yeah, I don't know. I don't know the geological history of Morocco, so I can't say anything about that.

VO: But I do want to solve the mystery and I've been in touch with a professor in Switzerland who has been doing research on the mountain where we found the coral for years.

My name is Christian Klug and I'm currently in my office in Zurich.
VO: I'll get straight to the point and ask him if that layer of the earth on that mountain is 400 million years old?
Roughly. It's a bit younger. 393 million years. VO: 393 million years old. And is it the same kind of coral? No, they were completely extinct. So they're different corals from the ones we have today. Actually, there's a gap… He tells me there's a 10-million-year gap where there were no corals. Yes, there were no corals at all worldwide. Nothing! But how can something re-emerge? They evolved a new, similar shape, but independently. So it's a new group. So, something that was completely gone is re-emerging.

Back to where it all began for me. In that desert that was once the sea. Where we weren't looking for coral at all, but for trilobites. And I was looking for a dinosaur.
Yes, definitely. Arrived at the Red Cliff. Which says… Oh, here, we were looking for it like crazy. Look at that. Wow. Wow.
And so we're also getting our hammers out of the bag.
Whoa. Ouch!
Oh, look at that. Tiny little shells.

Song SEA

What did you find? Look, this is a trilobite. Yes. This is a whole head. And trilobites live in the sea or on land? In the sea, on the seabed. They look like woodlice.
They look like woodlice, but they're not. And they can grow up to 20 cm long. And just like that ancient coral, the trilobite is also completely extinct.
Look, a beautiful head. Especially note the compound eyes. They must have been some scary creatures. Ouch, ouch, ouch. Those stones are all so damn sharp here. Sigh... I have to protect my trilobite. Let's put that in a separate bag.

VO: A few days later, we go into the desert with Hussain, a Moroccan fossil hunter we know from previous trips.
(Hussain speaks French) We drive along a narrow path along a long mountain range. (Kees + Hussain speak French) It takes us to a place where trilobites can be found. (Kees + Hussain speak French) Hussain, like Kees, only has a small hammer. Together they walk into a gorge. And after less than five minutes...
Hey, hey, hey, look! Voila! Oh man! This is heaven!
Hussain fiddles the fossilized creature out of the rock. (Hussain speaks French) But it turns out to be incomplete. And when he throws it away, Kees quickly grabs it from his hand. Hussain points to the other side. (Hussain speaks French) Kees begins searching blissfully and, like Hussain, scrapes the gravel from the mountainside.
The closer you get, the harder it is to imagine that this was once the sea.

Not for the fossil seller on the side of the road.
This area, or the earth was sea! You know. If you were swimming there, what would you see? Ha! A lot of kind of animals. They have about 400 kinds of trilobites. And starfish! Starfish. Yes, starfish.

Much later, I ask the Swiss professor too.
Oh, there are already lots of coral reefs. Coral reefs. It was a colorful meadow full of these animals, and there were early fishes, with lots of cephalopods… … Cephalopods with their long, squid-like arms, like ammonites and orthoceras, which could grow up to eight meters long. And on the bottom lived shell-like creatures, sea lilies, sea urchins, and various corals. And there were creatures crawling around that looked like lobsters. And of course, there were trilobites.
This is crazy, isn't it? They lie here like potatoes, trilobites. Oh! Complete. Wow. That's good.

VO: But what I find hard to understand is how a sea that was so teeming with life becomes completely extinct.
That's why I visit Bas van der Schootbrugge, a geologist from Utrecht University who specializes in mass extinctions. He first tells me about the five major mass extinctions we've had on this planet. And then we'll focus on the corals.
There were two extinctions in a row.
VO: The first was the biggest ever, 250 million years ago.
Then the old corals die out.
VO: Like the corals we found on the mountain.
And then you get a period in Earth's history where no reef formation takes place. And then the seabed is pretty dull, a bit muddy. A shell here and there.
VO: Imagine a world where everything has died and starts over.
Yes, yes, because with such an extinction, it actually goes back to a very primitive archaic world. Where things you haven't seen for a hundred million years suddenly get a chance again. And yes, it's possible that there were anemone-like organisms that did survive waves of extinction.
VO: A few of those anemones will then start forming a skeleton again at some point.
But then comes the second extinction. And then almost all the corals disappear again. There are a few that survive, and they continue on, leading to our modern corals.
VO: What an incredible tenacity that coral is.
Yes, it's very fascinating. Because those skeletons obviously have a very important function, because without a skeleton, you don't have a reef. You can only build a large reef if you actually have corals that create the hard parts. Corals are the foundation of such a reef. And without corals, you have no fish, no snails, no shrimp, no lobsters, no worms, no seabirds—you have nothing.
VO: So coral is the foundation of marine life?
But corals are struggling. Because coral reefs are also being enormously disrupted by wastewater, tourism, and agriculture, for example. Those creatures can endure a lot, but they're quite sensitive organisms.
VO: And then he compares it to a tropical rainforest?
So if you remove trees and tropical rainforest, everything collapses. Imagine the same thing with a coral reef: if you don't have coral, then you don't have biodiversity. Something we might be heading towards now.
VO: Something we might be heading towards now. A sea where the foundation is dying out, because coral is the foundation.
And for a long time. For hundreds of millions of years, the reefs have been the places where a lot of life has existed. And that's why you find all those fossils there.

(Hussain speaks French) No. What's that? … Ah, a snail. Escargot. Qui.
Snails, you wouldn't say that, are enormously successful gastropods. Snails are mollusks in shells. Within the mollusks, snails are the most successful group of organisms.
VO: Yes, because they've lived on this planet for over 500 million years.
A few hundred thousand species of snails. That live both in the sea and on land.
VO: So we keep encountering them in the endless sand.
And what could that be? A sand snail. Isn't it really cool what we have here?
Yeah, you don't hear people talking about snails becoming extinct. Although people with gardens might wish they were. Because those snails turn out to be incredible survivors. For millions of years.
VO: But that doesn't apply to all the others.
I think it's almost impossible to get rid of life once it's there, once a planet is infected with life. And then you're mainly talking about microbes, of course, so all the larger organisms can certainly be wiped out.
VO: And we belong to that large group.
There's a huge step in the evolution of life on Earth from bacteria to us, so to eukaryotes. We could become extinct; it wouldn't be that difficult. But the basic principle of a eukaryote, an organism with a really good nucleus...
VO: All animals, plants, algae, and fungi belong to those eukaryotes.
I don't think you can just get rid of that. Things will surely emerge from that.
VO: Because after an extinction, new life emerges. Or, as the Swiss professor said.
Mass extinctions are a boost for evolution. You free eco-space.
VO: So mass extinctions make room for evolution. And then you have to consider that the period we're living in now is called by many the sixth mass extinction. Not caused by a catastrophic series of volcanic eruptions or a meteorite, but simply by ourselves. So, in fact, we're making room for the next one.

Will, if a being comes 400 million years from now, in the future, who can also think and who actually... Also makes a podcast. Well, no, who also does the same work as you. So he'll sit and dig in the ground and see what it was like. What would he say about what he sees? 400 million years from now? Yes. I think if you look back 400 million years from now, you'd have a lot of trouble finding this at all. We're just a blip in the whole story.
VO: Yes, we're just a second. Because we, modern humans, have only been around for 300,000 years. Trilobites, on the other hand, lived here for 271 million years, and snails and coral almost twice as long. And then, of course, the dinosaurs; they also lived here for at least 165 million years. Well, the dinosaurs.
Preserving things, including those fossils you saw in Morocco, is always a matter of how much there is and how you preserve it. So, how is it stored?
VO: In the seabed, which is now a desert.
Yes, because everything that ends up in the sea has a better chance of being preserved than on land.
VO: And we live primarily on land.
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So we're just not going to find much of us.
VO: Really, nothing?
Sure, because you can find dinosaurs too. Well. They're skeletons, of course. So there are bound to be

places where human skeletons are found. But if a new creature appears in a million or ten million years, or if it can just see—yes, they've all become extinct due to climate change—I think a lot more research will be needed to really establish that.
VO: To be honest, I actually don't know if we're actually smarter than a snail or that coral. (Kees speaks French) Although, our fossil friend Hussain takes the backside of a trilobite. (ne pas complete). And the head of another. And pushes them together. And that's how you have another whole one for the tourist. Because he lives off what he catches in this former sea.

Yes, the sea. We had a lot of shallow seas at one point, of course. And they were teeming with reefs and corals and sponges and all the creatures that go with them.
VO: And those seas were even shallower than the North Sea?
Maybe 10, 20 meters deep.
VO: And all sorts of rivers flowed into those shallow seas.
Yes. You can simply fill them up. If you bring in a lot of material, and a lot of sediment is deposited.
VO: So layer upon layer upon layer.
And then it gets shallower and shallower. So if that sea level simply remains stable, then you simply fill it up. And that sea is ultimately a kind of dumping ground. Everything ends up there. And then the sea is gone. So then you no longer have a sea, and then you have land.
VO: With a kind of treasure chest inside it.
Yes, then you've stored it. It's an interplay of the land rising, the sea entering, disappearing, but also being buried. And that interplay. Yes, that sea is a waste pit, a dumping ground. Everything eventually ends up in the sea. Yes. That sea is also ultimately recycled again when it ends up in mountains. Or perhaps even goes into the depths. So that's the beauty of the Earth. Everything is in motion. Yes, *pantha rey*.
VO: Everything flows. Yes, everything flows. Even the desert. You just have to look at it from a slightly larger perspective.

Song sea

VO: We leave the desert with all its fossils and we travel on. Back to the ocean, just above Agadir, where the coast consists of rocks of fossilized mud.
And now we're walking on the actual seabed. In, uh, the water is low, behind me the ocean.
VO: And then suddenly I see it, right in front of me.
Yes. Here! Dinosaur prints just like that in the rocks. You can see how they walked. I can follow about 8 or 9 meters of footprints from over 100 million years ago.

VO: We, humans, just like the dinosaurs, won't be here forever, that's for sure. One day we too will be extinct. When?
We always think in terms of our time speed. But evolution is slow. So on our scale, that extinction will take a while. But evolutionarily speaking, it seems to be happening quickly now. Faster than previous extinctions, except for the meteorite, of course. Because we're extremely proactive and seem to think we're invincible, that we can technically solve all our own problems. But according to the laws of nature, that's impossible.
Just as we can't eliminate gravity on this planet, we can't stop evolution either.
We've become a sophisticated mechanism, like a switch in a car these days. You can't repair it anymore. It's simply replaced. Look, that snail lives on. And if the coral dies out, it might just crawl back up. Because the more basic the design, the more likely it is to last.
And intelligence? Well, that can also evolve further in others. In the octopus, for example.

Ancient Coral is the 7th episode in the sea series. I produce a new one every quarter. If you'd like to hear it, subscribe, and it will automatically appear in your podcast app. You can also follow me on Instagram. All credits and more information can be found in the show notes. And if you liked this story, please share it.
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