Nature Podcast

Introduction

This is a transcript of the 14th June 2018 edition of the weekly *Nature Podcast*. Audio files for the current show and archive episodes can be accessed from the *Nature Podcast* index page (http://www.nature.com/nature/podcast), which also contains details on how to subscribe to the *Nature Podcast* for FREE, and has troubleshooting top-tips. Send us your feedback to podcast@nature.com.

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Host: Benjamin Thompson
Welcome back to the *Nature Podcast*. This week, we're finding out about the sudden death of baobab trees in Africa and getting an update on the latest research in Antarctica.

Host: Ellie Mackay
Plus, we'll be hearing how zebrafish stem cells are protected from radiation. This is the *Nature Podcast* for the 14th June 2018. I'm Ellie Mackay.

Host: Benjamin Thompson
And I'm Benjamin Thompson.

[Jingle]

Host: Benjamin Thompson
First up this week, Noah Baker has been delving into a scientific mystery. A mystery surrounding the deaths of a type of tree which goes by many names: the tree of Africa, the upside-down tree, the tree of life, the baobab.

[Witness and family singing a traditional song about the baobab]

Interviewee: Witness Konzanayi
Growing up we would name the baobab trees after, you know, maybe after their shape. If it is too ugly, say 'this ugly one', if it produces a fruit or sweet foods, we'll say this one is 'sweet mama'.

Interviewee: Chris Surridge
The baobab is a completely unique tree in lots of respects, those sort of massive trees that are just about as wide as they are tall. It's probably the oldest lived, it's certainly the largest of the angiosperms, these flowering plants.

Interviewee: Witness Konzanayi
It is a tree that every child will identify with.

Interviewer: Noah Baker

If you picture an African savannah, more likely than not you'll picture a baobab tree. A solemn giant, somehow bulbous and spindly at the same time, often described as growing upside-down. Now, new research investigating the age of baobabs has shown that many of the largest and oldest trees in the world are dead or dying, and scientists don't know why.

Interviewee: Witness Konzanayi
Once upon a time, a long time ago, the Creator invited all animals to his office so that he could give them trees, you know seedlings for planting.

Interviewer: Noah Baker
That's Witness Konzanayi from the University of Cape Town in South Africa. He's just finished his PhD on the governance of the baobab.

Interviewee: Witness Konzanayi
And the hyena of all animals was very lazy and he went to the Creator very late, and when he got there the only seedling that was left was that of a baobab tree. And he didn't impress the hyena, so in anger the hyena took the seedling, threw it far away. That's what happened, that's how the baobab ended up with such an ugly shape.

Interviewer: Noah Baker
There are countless folktales like this one, each surrounding the baobab, many explaining its bizarre shape. Here's Chris Surridge, the editor of *Nature Plants* with the scientific version.

Interviewee: Chris Surridge
Normally, trees grow, they have a trunk, and they pretty much have one trunk and they split off further up into branches. Now baobabs are a bit weird in that they through their life can produce additional trunks that come up out of the ground. You sometimes see suckers come out of things like blackberries, but trees do not do this. But the baobab does, it throws up these extra trunks, a ring of stems which then fuse together to form this empty centre. They become sort of circular but with a gap in the middle.

Interviewer: Noah Baker
This is the leading theory for how baobabs have ended up so fat, and also explains why, more often than not, they have huge cavities inside. This bizarre architecture leads to problems if scientists want to find out how old a tree is.

Interviewee: Chris Surridge
Normally, when you try and date a tree you have to chop it down and count the rings into the centre, or you put a bore in and you can do that and check these. But there's no centre to a baobab tree.

Interviewer: Noah Baker
So, when researchers decided to measure the age of the largest baobabs known across the African continent, they had to turn to another method. Here's Adrian Patrut from the University of Babeş-Bolyai in Romania.

Interviewee: Adrian Patrut

The only possibility to date a baobab is actually to radiocarbon date samples collected from each stem.

Interviewer: Noah Baker
Radio carbon dating is not uncommon when dealing with very old trees. In fact, trees are often used to calibrate carbon dating methods – because counting tree rings is such a reliable way of measuring age, it can be used as a solid point of comparison. Adrian Patrut's team started surveying trees in 2005, and some of those they surveyed were truly ancient.

Interviewee: Adrian Patrut
The oldest trees were around 2,000 years old, and we found a specimen in Zimbabwe, the so-called Panke baobab, and we collected samples which were up to 2,450 years old.

Interviewer: Noah Baker
These are trees which sprouted before Aristotle even proposed the division of the sciences. Trees which were already centuries old when Julius Caesar took the throne in Rome.

Interviewee: Chris Surridge
This is just an incredible age. Trees are happy to grow for hundreds of years, but getting up to these sorts of millennial ages is something that the flowering plants and flowering trees just don't do.

Interviewer: Noah Baker
It's worth noting here that there are non-flowering trees which are even older. Now, when a baobab gets really large or old, it can take on a particular significance. Here's Witness again.

Interviewee: Witness Konzanayi
To an African person who identifies with these trees, once a tree becomes this big, it becomes sacred. They become more venues for spirits of the land.

Interviewer: Noah Baker
This significance adds even more weight to another discovery that Patrut and his team made.

Interviewee: Adrian Patrut
It was very unexpected to find that many old and large trees die in a very short timespan.

Interviewer: Noah Baker
Specifically, they found that 9 of the 13 oldest trees measured, and 5 of the 6 largest trees, have all died in the last 12 years. Now, these trees are all spread across Africa, sometimes thousands of miles apart. There was no sign of disease and the revered trees are usually very well cared for – they all even had names. It therefore seems too much of a coincidence that all of these deaths could happen by chance so suddenly. In fact, Patrut claims that it's impossible.

Interviewee: Adrian Patrut

Scientifically it is impossible for trees which have an age limit of over 2,000 years to die in such a large number over a such short timespan.

Interviewer: Noah Baker
It begs the question then – what's causing the deaths of these Baobabs?

Interviewee: Chris Surridge
The obvious conclusion is that it's something environmental, something to do with changes in climate. But again, that's very difficult to nail down because over 2,000 years these trees have seen a great deal of climate. I mean, they've lived through the Little Ice Ages that happened in about the 1400s, 1500s, so they've seen much colder temperatures than now. They've seen droughts, they've seen practically floods, and yet they have carried through that. It is true that as far as we can tell, the temperature in these areas is warmer now than it has often been in the past, and it is also quite dry at the moment so maybe this is going on. But we really don't know what it is that is killing these trees, if indeed this is an unusual amount of deaths.

Interviewer: Noah Baker
It's an interesting scientific mystery. As an academic who works with the baobab, Witness too was intrigued, but for him speaking as a Zimbabwean, the findings also represented something else.

Interviewee: Witness Konzanayi
To ecologists it is just the dying of trees, but to an African person the death of such big trees means the death of culture, it means the death of identity, it means the death of spirituality.

[Witness and family singing a traditional song about the baobab]

Interviewee: Witness Konzanayi
Increasingly I think people are getting to know about climate change, even in the modest areas, in fact you don't need to be told – you live it because you see your leaves are drying, we experience floods every year. But what I'm not sure of is if people are able to relate the deaths of these trees to climate change. If the big trees are dying I think what we need to do is to quickly establish what the cause is, because for some communities, the baobab tree defines who they are.

[Witness and family singing a traditional song about the baobab]

Host: Benjamin Thompson
That was Witness Konzanayi from the University of Cape Town, Adrian Patrut from University of Babeş-Bolyai, and Chris Surridge, the editor-in-chief of *Nature Plants*, where Adrian's study was published. Thanks in particular to Witness and his wife and children for performing the song about the baobab, or 'Muuyu' in their mother tongue.

Host: Ellie Mackay
This week, *Nature* is publishing a special Insight on Antarctica which features a number of Reviews and Analyses, looking back over the regions history and forward to its possible fate.

Reporter Adam Levy has been speaking to some of the researchers behind these articles, taking a look at how the different timelines of research can inform our understanding of the climate of our planet.

Interviewer: Adam Levy
Locked in Antarctica is the past, present and future of our planet. Ice cores reveal the changes Earth has been through in the distant past, satellite measurements uncover how global warming is changing the ice today, and all these data suggest that the fate of Antarctica, whatever that may be, will define our future. This week's *Nature* features an Antarctica special, with a wealth of research and comment. I spoke with three authors from three of the studies to paint a picture of the past, the present and the future of the icy continent. First, to the past, and researcher Christo Buizert.

Interviewee: Christo Buizert
Antarctica is really unique in recording the climate of the past, and one of the reasons is you can think of it as a tree. A tree grows a ring every year, and in the same way Antarctica records a layer of snow every year, and particularly interesting is the fact that Antarctic ice has little bubbles inside of it, and so these bubbles have a memory or a record of how the atmosphere has changed.

Interviewer: Adam Levy
And how do we actually access this record of the ancient atmosphere via this ice?

Interviewee: Christo Buizert
Yeah, so we do it by drilling, and so we start at the top and just drill a core all the way down, and it's three miles long, so it's just an enormous stick of ice.

Interviewer: Adam Levy
And how far back does this enormous stick of ice give us access to?

Interviewee: Christo Buizert
The oldest ice we have found in one stick is 800,000 years old.

Interviewer: Adam Levy
And what's it teaching us about Earth's past?

Interviewee: Christo Buizert
It's telling us a lot of things, both about the long-term changes and about changes on small timescales, so great detail. And so, on these long timescales of hundreds of thousands of years we can see the Ice Ages. On the short time scale, time scales of maybe hundreds and thousands of years, we saw also very abrupt changes in climate.

Interviewer: Adam Levy
Of course, right now we are changing the climate a great do through pumping greenhouse gases and all sorts of other chemicals into the atmosphere. Looking at these records that we have from Antarctica, how unusual what's happening today in this kind of geological timeframe.

Interviewee: Christo Buizert
What's happening today is highly unusual if you look at it on the long geologic time. So, for example right now if you look at carbon dioxide or CO2, typically during those Ice Ages, we're about 180 parts per million, during these warm climates in between it's typically 280, right now we're over 400. So, we're way above anything that the world has ever seen. Also, the rate at which CO2 is increasing is much higher, maybe 10-100 times faster than anything we see in the ice core record. So, it is very clear that our impact on the atmosphere is really profound.

Interviewer: Adam Levy
That was Christo Buizert. And now, on to the present. A huge amount of work is unpicking how Antarctica is changing today. I phoned Pippa Whitehouse, an author of another study in the special. Her paper combines several different metrics in search of the most comprehensive picture yet of the changes in Antarctica.

Interviewee: Pippa Whitehouse
Traditionally, when we research kicked off in Antarctica, sort of in the 50s, it was very much on the ground measurements. But these days, since the early 90s, we've had satellite measurements and that completely revolutionised our ability to actually quantify what's going on across the whole of the ice sheet. So, we actually used three independent techniques to try and quantify how quickly Antarctica's melting, and then we look at the answer we get from each technique and see if they agree, which is an interesting exercise in itself. But the three measurements that are made, one, satellites measure the volume of the ice sheet, a second one is a different set of satellites measure the mass, and then the third measurement that we make is the speed of the ice that's flowing off the continent.

Interviewer: Adam Levy
And so, what answers do you end up getting? How much mass is being lost from Antarctica?

Interviewee: Pippa Whitehouse
That's really the shocking thing in this study. Comparing our results in 2012 and today, we can see that actually it's melting three times as fast as it was back then. And it won't sound like a lot, but we think it's melting at about 0.6 millimetres of a year's sea level contribution each year.

Interviewer: Adam Levy
But as you said, that doesn't sound like a huge amount of sea level rise. Is this concerning for the future then?

Interviewee: Pippa Whitehouse
Very much so. A three-fold increase over just a decade is staggering, it's that scale of change. And what that means is we don't really understand the processes.

Interviewer: Adam Levy

I mean you have been looking at what has happened in Antarctica over the last couple of decades, but when you think about what might happen over coming decades, how do you feel about Antarctica's potential future?

Interviewee: Pippa Whitehouse
I find the potential future worrying, but actually very interesting to scientists. It's quite rare that we get something to change so quickly in our lifetimes that we can study, and it's unfortunate it's such a catastrophic change.

Interviewer: Adam Levy
Pippa Whitehouse there. Of course, what happens in Antarctica over the coming decades and centuries is not yet settled. To a great extent, it depends on whether inaction on climate change continues, and we fail to limit emissions. And that brings us to Antarctica's future. Our final paper from the special presents two very different narratives for Antarctica half a century from now. Here's author Valerie Masson-Delmotte.

Interviewee: Valerie Masson-Delmotte
In one case, Antarctica and its ecosystems as well would stay quite similar to those of today – slight warming and most of the ice staying frozen in Antarctica. And the second narrative it's extremely different – there's a strong warming, and the onset of an irreversible loss of ice through the thinning of ice shelves, the floating parts of the ice sheet that are in touch with the ocean, and due to ocean acidification, major changes in the biodiversity in the oceans and the ecosystems around Antarctica as well.

Interviewer: Adam Levy
Hugely different pictures that you're painting, and of course, one of the biggest things that people are worried about from Antarctica is its contribution to sea level rise. What is the difference between the kind of best-case picture and worst-case picture?

Interviewee: Valerie Masson-Delmotte
In the best-case picture, the contribution of Antarctica to sea level rise in 50 years from now would be small, a couple of centimetres. In the business as usual, high emission, growing demand scenario, we expect the contribution of Antarctica to gradually increase in the coming decades, and to continue for hundreds of years in the future.

Interviewer: Adam Levy
So, we'd be committed to more and more ice being lost from Antarctica in that scenario?

Interviewee: Valerie Masson-Delmotte
Exactly, so there are not only two very different scenarios for Antarctica and its ecosystems, but there are also very different scenarios with respect to those exposed to sea level rise risks, and so what we wanted to do is share the state of knowledge in a way that has a narrative, not to trigger feelings, but maybe rather than that to trigger action.

Host: Ellie Mackay
That was Valerie Masson-Delmotte of the Laboratory of Climate and Environment Science in France, speaking with reporter Adam Levy. Before her, you heard from Pippa Whitehouse of

Durham University in the UK, and Christo Buizert of Oregon State University in the US. Find all their papers and more at nature.com/nature.

Host: Benjamin Thompson
Later in the show, we'll be finding out how the European Commission plans to spend its biggest ever research and innovation budget. That's coming up in the News Chat. Up next though, it's Shamini Bundell with a quick one-two of science in this week's Research Highlights.

[Jingle]

Interviewer: Shamini Bundell
Predicting exactly when a baby is going to be born isn't the most accurate of sciences. But now, a new non-invasive blood test could help determine both the age of a foetus, and when it might be born. The test measures the levels of particular placental RNA molecules circulating in the blood of a pregnant person to predict the foetus' age and delivery date with about the same accuracy as an ultrasound scan, and a second RNA test can assess the risk of the baby being born prematurely. These tests could be useful in low-resource settings, but the researchers stress that since this was a pilot study involving 38 women, larger clinical trials will be required to validate the tests. The full story has been successfully delivered in *Science*.

[Jingle]

Interviewer: Shamini Bundell
Like humans, bonobos turn their noses up at obviously contaminated food, according to new research. In a series of experiments, bonobos living in a sanctuary in the Democratic Republic of Congo were offered a choice between clean apple slices, apple slices contaminated with faeces or soil, and bananas at increasing distances from fresh faeces. Understandably, the apes avoided the contaminated food, and the food closest to the poo pile. Further work showed that the bonobos were less likely to take food when in the presence of unpleasant odours, although younger animals were less cautious than their seniors. This disgust response may be an evolutionary system designed to protect against diseases. As yet, the team behind this new work are unsure whether bonobos express their disgust in a recognisable way, but they plan to continue their research to further investigate the evolutionary roots of the response. Dig into this paper at the *Philosophical Transactions of the Royal Society B*.

[Jingle]

Host: Ellie Mackay
One paper that caught our eye this week combines a whole load of popular topics in biology: evolution, stem cells and zebrafish.

Host: Benjamin Thompson
You've got to love those zebrafish.

Interviewer: Ellie Mackay
Well, one person whose curiosity was definitely piqued was Shamini, so here she is again to tell us more.

Interviewer: Shamini Bundell
In your body, with every second that goes by, around 2 million of your red blood cells die. Fortunately, your body also makes new blood cells at a rate of around 2 million per second. These red cells are made in the bone marrow, inside bones such as the ribs, pelvis and vertebrae. White blood cells are made here too, vital for our immune systems, and both types of blood cells are made by stem cells. Understanding these blood stem cells, where they're situated and how they work can have important implications for medicine, as Leonard Zon explained to me.

Interviewee: Leonard Zon
So, blood stem cells are cells that produce all of the blood in your body and from a clinical perspective, if you have a patient who has a Leukaemia, if you treat them with chemotherapy that erases the Leukaemia but it also erases their immune system. And so, it's very helpful to give back blood stem cells from a matched donor like a brother or sister, and they end up amplifying tremendously to reconstitute the blood system.

Interviewer: Shamini Bundell
So, I can see, you know, why you're interested in studying these blood stem cells, but this paper rather than looking at Leukaemia treatments or anything like that, is actually looking at an evolutionary perspective which is quite interesting.

Interviewee: Leonard Zon
When we first started studying blood development in my lab, I knew about being a haematologist, I knew that the blood cells are formed in the bones. But when we started doing work in the other model organism that I study, the zebrafish, we found that the kidney was where the blood cells were made and the blood stem cells were actually in the kidney. And, it was kind of strange for me to think that why isn't in the same place, and so that's been the central question of this paper, and you know the evolutionary implications of that.

Interviewer: Shamini Bundell
And people have known for a while that blood stem cells live in different places in different creatures, so for fish it's in the kidneys, and amphibians it's often in the liver, in birds and mammals it's in the bones, but it wasn't really clear why that would be the case. But you weren't even trying to answer that question when you started out. You were initially studying the environments around the blood stem cells in your body, so what other cells and things were surrounding them, their sort of niche, is that right?

Interviewee: Leonard Zon
That's right. So, in these organs that have stem cells, there are specific regions that are very important to support those stem cells or to nurse those stem cells, and these regions are known as the stem cell niche. Friedrich Kapp, the postdoc who did this work, was able to find that melanocytes actually came into the niche and seemed to be very abundant, and to

form a sheet of tissue that was over the marrow, over the place where the blood stem cells were.

Interviewer: Shamini Bundell
And what is a melanocyte, and why was this layer of them unusual?

Interviewee: Leonard Zon
Well, so, melanocytes cover your whole body and are the pigment cells of the skin. And so, I asked Friedrich what would these melanocytes be doing right next to the stem cells. And he actually came up with the model that this large sheet of tissue formed an umbrella, and what protecting the stem cells from UV radiation. That was truly an amazing moment because I realised at that point from my reading, that the major theory in the early 1980s was that the stem cells in mammals had retreated to the bones because they were being shielded from irradiation.

Interviewer: Shamini Bundell
So, then the idea is that because birds and mammals live mostly on land, they then don't have extra protection from that UV getting absorbed by the water, so then inside the bone might be a more shielded little home for the stem cells.

Interviewee: Leonard Zon
Exactly, and we went on in this paper to show that the bone is really good at shielding from a variety of types of irradiation.

Interviewer: Shamini Bundell
And then you also tested the effects of UV radiation on the fish stem cells which are by the kidneys.

Interviewee: Leonard Zon
What we did was to use a sunlamp and be able to irradiate the fish from above, and we were able to show that in an embryo that has melanocytes, the stem cells are protected. But in an embryo that lacks the melanocytes, or even that has melanocytes that don't have the black pigment, that these animals, their stem cells were hurt by the UV irradiation from the sunlamp.

Interviewer: Shamini Bundell
So, are you now confident that that is the purpose of that melanocyte umbrella?

Interviewee: Leonard Zon
Well one of the experiments we did, which I have to say is one of the best experiments my lab has really ever done, was to realise that this umbrella of melanocytes was on top of the kidney marrow. This would protect from UV irradiation above. And so, what Friedrich did, was to anesthetise the fish and to turn them upside down, so now the umbrella of melanocytes was under the stem cells rather than on top, and when we put the umbrella down and then irradiated from the top of the fish, the stem cells were hurt.

Interviewer: Shamini Bundell

And so, given that birds and mammals have their stem cells inside their bones, then presumably they wouldn't need protection from melanocytes anymore.

Interviewee: Leonard Zon
We examined all the fish that we could get our hands on, and every single fish species had the melanocytes over the kidney marrow. But then when we went to birds, we no longer saw the melanocytes over the kidney.

Interviewer: Shamini Bundell
And there are lots of stem cells in our body for making different types of tissue, so what's so special about blood stem cells in terms of this UV protection?

Interviewee: Leonard Zon
It turns out that blood stem cells are particularly sensitive. So, if you think about irradiation exposure like Chernobyl, the first organ of your body that is hurt by that is your blood stem cells, and that puts you at risk for Leukaemia.

Host: Ellie Mackay
That was Leonard Zon of Harvard University, Harvard Medical School and Boston Children's Hospital. He was talking to Shamini Bundell about his team's paper which is out this week at nature.com/nature, where you'll also find a News and Views article about the work.

Host: Benjamin Thompson
Right then listeners, now it's time for the News Chat, and it's another week and another debut, and this time it's Holly Else, one of the reporters here at *Nature*. Hi Holly.

Interviewee: Holly Else
Hi!

Interviewer: Benjamin Thompson
Well last week on the podcast, Adam and Flora mentioned that there was a big upcoming announcement from the European Commission about their next pot of funding money, and well listeners that announcement has now happened, and Holly, what's going on?

Interviewee: Holly Else
So, last week the European Commission announced how they were going to spend the biggest pot of money they've ever had for research and development. It's €100-billion that they will have to distribute, and scientists have been eagerly anticipating the details on how that will work.

Interviewer: Benjamin Thompson
That is a lot of money then, so, I mean, goodness, firstly where is this money coming from?

Interviewee: Holly Else
So, this money comes from the member states of the European Union when they pay their fees into become part of the Commission. And this year in the budget negotiations, the

research and innovation directorate managed to campaign to get an increase in the money from the big EU pot that goes into research and innovation.

Interviewer: Benjamin Thompson
Oh goodness, so as you say the biggest one yet then. Do we have any ideas of how it's going to be broken down?

Interviewee: Holly Else
Yeah, so they've got three, what they call funding streams, within the programme. The first one will go towards funding basic research, then there's a second pot which will address the challenges that society faces and how to boost competitiveness, and the third stream is really about innovation, so it's about helping people and companies create these wonderful, innovative products that can disrupt the market and create new jobs.

Interviewer: Benjamin Thompson
Yeah, and in the news story the phrase 'radical changes' is used to describe how innovation will be funded. What's so radically different about it?

Interviewee: Holly Else
So, what they've done is, they've decided to create this body called the European Innovation Council, and why they've decided to change it is that before they thought they were only getting incremental advances in innovation. So for example, you would tell somebody we want a better battery, so they would continue along the work that they're already doing to improve batteries, and actually the change that you would get would only be very small, and they really want people to be bold and suggest things that may not otherwise get funding.

Interviewer: Benjamin Thompson
So, Horizon Europe then, this is called, is taking over from Horizon 2020, the previous funding tranche. When's it due to start?

Interviewee: Holly Else
So, it's coming in, it will come in in 2021, that's when Horizon 2020 finishes in 2020.

Interviewer: Benjamin Thompson
Which I guess makes a lot of sense! How do the two things differ?

Interviewee: Holly Else
So, the big difference this time is that the European Commission has changed the rules on who can actually take part, so which scientists can apply for funding. So previously, a country could make a payment to the European Commission, even if they were not a European country, and that meant that their researchers could bid for funding. The rules have been pretty strict, so you had to be either a very close neighbour, a specific type of trading partner or be a country trying to join the EU. And the difference this time is that they've made a new category for countries that are able to join in that way, and this is the way that the UK will now be able to bid for money in the programme.

Interviewer: Benjamin Thompson
So, the UK was certainly part of Horizon 2020 then, but I guess with Brexit maybe it's on the outside looking in?

Interviewee: Holly Else
Exactly, and so the UK is really concerned about how it can actually get its scientists able to bid for this money, because the UK gets a lot of funding from the European Commission for research, and so this new change in the rules actually sort of gives a bit of hope that this is one area where the UK can still work incredibly closely with the European Union.

Interviewer: Benjamin Thompson
So, Holly finally then for this one, I mean I guess €100-billion is a very round number, what are the chances it's going to be exactly that then in 2021 when everything kicks off?

Interviewee: Holly Else
Well, pretty slim to be honest because what has to happen now is that the European Parliament and the European Council of Ministers all have to have a bit of a tussle over how much actually they want to spend on research and innovation. And also, any countries who might want to join the scheme through this new association mechanism that we discussed will also be adding a contribution to the pot. So, we've got €100-billion at the moment, that's just a proposal, we don't really know exactly how much it will end up with, but it won't be too dissimilar.

Interviewer: Benjamin Thompson
Okay then, well let's move on to our next story today then, and well, it couldn't be any more different to be honest with you. We're going to be talking about koalas.

Interviewee: Holly Else
So yes, this is some research presented at the meeting of the American Society for Microbiology last week in Georgia, and it's looking at koalas and how what they eat affects the bacteria in their guts.

Interviewer: Benjamin Thompson
As we know, I mean koalas are remarkably fussy eaters and I think eucalyptus is their only source of sustenance.

Interviewee: Holly Else
Yeah, apparently. So, there's two different types of eucalyptus which koalas generally eat, and apparently, they can really prefer one over another. And this is a problem when ecologists are trying find new habitats for koalas to live in, because their habitats are being destroyed by humans. So, they want to resettle them into new places but if they don't have this specific type of eucalyptus that a koala is really interested in eating, then that process doesn't actually work successfully because the koala then has nothing to actually eat because it's too fussy.

Interviewer: Benjamin Thompson

So, you say then that this research was presented at a microbiology conference, how does microbiology play a role?

Interviewee: Holly Else
So, the researchers took some samples of faeces from a group of koalas from across Australia, and they found that depending on which type of eucalyptus they like to eat, they actually had different bacteria in their guts. And so, to see if they could entice a koala who only liked one specific type to eat the other, they decided to do a faecal transplant, so that's taking the microbiome from the guts of one koala who eats one specific type, and putting it into the other. And so within 18 days, the microbiomes of the koalas that had the procedure were nearly identical to the ones that they received the donor from. And surprisingly, some of those that got a transplant actually then went on to start to eat the type of food that previously they didn't want to.

Interviewer: Benjamin Thompson
Well Holly, the human microbiome is sort of an area of great interest at the moment, and I mean it seems that in this case that animal microbiome might be as well. Has anything similar been tried in any other sorts of animals?

Interviewee: Holly Else
Yeah, so there were several other researchers presenting at this exact conference who described similar things. So, there was one who presented results of transplanting bacteria from frog skin onto another frog to try and protect them from a fungal infection. And then also some researchers at San Diego Zoo who looked at the guts microbiome of a near threatened southern white rhinoceros, and found that actually if they changed the diet of these rhinos, it actually changed the microbiome significantly enough to affect how fertile they were. In fact, two female rhinos who had their diets changed actually went on to give birth to healthy calves within two years.

Interviewer: Benjamin Thompson
Well Holly, though I suppose with microbiome stuff there's a lot of correlation and we're yet to have that sort of perfect causation. What are the researchers saying?

Interviewee: Holly Else
Well, they're saying that this is sort of really early days for this kind of research, and actually only really now they've had the tools to be able to look at these things in so much detail, so it could be something that we see more of in the years ahead.

Interviewer: Benjamin Thompson
Well thanks for that, Holly. Listeners, if you'd like to know more about the latest science news, don't forget to head over to nature.com/news.

Host: Ellie Mackay
That's it for this week's show.

Host: Benjamin Thompson

Woah, hang on a minute. Isn't there something else we need to tell people about, maybe a small video that you've made?

Host: Ellie Mackay
So, yeah, there's just time to tell you about our latest video. It's all about 3D printing magnetically-morphing materials, and you can find it on our YouTube channel at youtube.com/NatureVideoChannel. I'm Ellie Mackay.

Host: Benjamin Thompson
And I'm Benjamin Thompson. Thanks for listening everyone, see you next time.

[Jingle]