



Science Magazine Podcast Transcript, 17 May 2013

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Promo

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Music

Interviewer – Sarah Crespi

Finally today, I’m here with David Grimm, online news editor for *Science*. He’s here to give us a rundown of some of the recent stories from our daily news site. I’m Sarah Crespi. So Dave, first up we have “dam” deforestation.

Interviewee – David Grimm

Sarah, this story is about hydropower. This is a major source of power in the world; turbines hooked up to dams, the water flows down, spins the turbine, and can power a lot. In fact, there is a dam that’s being constructed in Brazil called the Belo Monte Dam, which is a 14 billion dollar project. And when it’s complete, it will have the third greatest capacity for generating hydropower in the world.

Interviewer – Sarah Crespi

Okay, so what about the trees?

Interviewee – David Grimm

Well, there’s a problem: to build these dams you’ve got to cut down a lot of trees, and that has its own ecological problems. But engineers didn’t worry about the cutting down the trees themselves as a problem for the dam power; in fact, they thought that cutting down the trees would actually improve hydroelectric power, the reason being that trees suck up a lot of water from the soil. It’s a process known as evapotranspiration, where the water gets sucked up into the trees, the trees transpire the water through their leaves, and that water enters the atmosphere. The idea was, because trees are sucking so much water from the ground, they’re sucking the water that would otherwise be flowing into streams and rivers, and therefore the fewer trees, the more water you’ve got in the ground, the better it is for hydropower.

Interviewer – Sarah Crespi

So the new finding here is that that’s not really true.

Interviewee – David Grimm

That’s not really true. Researchers modeled this dam being built in Brazil, and what they found was that actually, trees—it was actually already known, that trees actually play a really important role in local weather systems because of their transpiring that water up into the sky. That actually has effects on local climate. It can cause added rainfall, and you can imagine the more rain you get, that’s also good for hydropower. And what the

researchers found is that when you clear-cut forests you can actually reduce the amount of hydropower by up to 40% from these dams because so much water is not falling anymore due to local rainfall.

Interviewer – Sarah Crespi

What effect is this research, this finding, going to have on the building of dams in Brazil and other Amazon countries?

Interviewee – David Grimm

Well, it could change the way engineers build these dams. One thing the researchers didn't take into account is actually clear-cutting has actually fallen in recent years, suggesting that it's going to be less of an issue for some of these dams, but it still indicates that trees play a very important role in hydroelectric power; a role that really wasn't very well understood before.

Interviewer – Sarah Crespi

So next up we have some new information about, possibly about, the human lineage.

Interviewee – David Grimm

That's right, Sarah. You know something very important happened 25 to 30 million years ago. Two primate groups split off from each other. One gave rise to what are today old world monkeys, and that's animals like baboons and macaques. The other lineage gave rise to gorillas, chimpanzees, and humans. So this is a very important point in our history where we wouldn't be here if this hadn't happened. It's sort of shrouded in mystery because the genetic evidence suggests the split happened 25 to 30 million years ago, but researchers haven't found any fossils directly related to either of these two groups dating back more than 20 million years ago. So it sort of raises the question: if we did have this split happen all this time ago, why aren't we finding fossils for early ancestors of either of these lineages around that time?

Interviewer – Sarah Crespi

So genetic evidence is pointing to this time period.

Interviewee – David Grimm

Yeah.

Interviewer – Sarah Crespi

And we haven't had any fossils yet, but it sounds like maybe we have found something?

Interviewee – David Grimm

Well, that's what this new study is all about. Researchers that have been digging in Tanzania, specifically a site called the Rukwa Rift Basin, found some fossils that seemed to be what they were looking for in terms of finding the ancestors of both of these lineages. The fossils were dated to about 25 million years ago, which is almost exactly the time point that you would want. And one seems to be an apparent ape ancestor. The other one seems to be an apparent old world monkey ancestor. And the way the

researchers tell this is to actually look at the teeth. The fossils – actually they don't have a whole lot to go on here – but the teeth of each fossil seem to share features that are consistent with that particular lineage.

Interviewer – Sarah Crespi

These are ancestors, one from each lineage, but it's not the golden fossil, the one that, you know, unites these two different lines.

Interviewee – David Grimm

That's a great point, that they don't have that Holy Grail yet. But what's important about the find is it really starts to back up this genetic evidence. Now there's evidence of this 25 to 30 million year-old split in the fossil record, which we didn't have before.

Interviewer – Sarah Crespi

So these are pretty small pieces of the animal; it's some teeth and jaws. Does this seal the deal? Are these for sure related to the current old world monkeys and to the current great apes?

Interviewee – David Grimm

A couple of experts that we consulted for this story think that this is very strong evidence, but one notes that there have been mistakes made in the past because, as you stated, we're dealing with very small fragments of these animals. It's possible that neither one of these is actually a primate. It could be what this one expert says is a pig-like hoofed animal. So, you know, the researchers are confident, but when you're dealing with such small fragments, you have to keep in mind that you may not always have what you think you have.

Interviewer – Sarah Crespi

Great! Last up we have a story about endangered species that have big populations but not necessarily the diversity needed to maintain them.

Interviewee – David Grimm

Well, that's right, Sarah, I mean when we think about species that are on the brink of extinction, and then their numbers coming back, we think that's usually a good sign. But there's a couple of new studies that have come out this week that have suggested that numbers aren't everything, that there could still be problems with populations even though their numbers have recovered. Their so-called genetic diversity, which is variety of their gene pool, may not be where it should be, and that could open up these animals to a whole host of diseases and other problems.

Interviewer – Sarah Crespi

Well, let's start with one example that came up in the story: the tiny spotted kiwi.

Interviewee – David Grimm

This is a species known as the little spotted kiwi. It's a worm-eater. It's so small it could be cradled in a child's arms. It's also very cute. There's a picture of it on the site. And

this particular species was faring very poorly at the turn of the 20th century. And in 1912 officials transplanted five of these little “spots” – as they’re known – to an island refuge where they would be safe from hunters and from predators. And lo and behold over the decades the species recovered, and today there are about 1700 individuals, which from a conservation standpoint, seems like good news. You’ve got a very large population of animals; seems like they’re in good shape.

Interviewer – Sarah Crespi

One thing I noticed about both of the species we’re going to talk about is the strange way they went about collecting their DNA for these studies.

Interviewee – David Grimm

Right, for the kiwi what they did was they actually sent dogs after the birds that would actually locate the birds and not kill them, ideally. And then they drew blood from these birds. They compared the DNA of more than 180 of the animals, and what they found was kind of disturbing. They found that there was very little genetic variation in these birds. Genetic variation is something you really need to deal with big changes in your environment. If we’re all the same and a disease hits or the weather gets suddenly warmer, we’re all going to suffer the same. But if some of us are better adapted to deal with warmer weather or certain diseases or maybe even certain predators, then some of us are going to survive and go on to continue the population and the species. But that’s not what the researchers were seeing here. They were seeing a very low genetic diversity, which isn’t a good sign for the future of these kiwis.

Interviewer – Sarah Crespi

And so what about the tiger?

Interviewee – David Grimm

Well, that’s the other species. The other species is the Bengal tiger, a very different species, much larger. We’re talking about a 220 kilogram cat that could rip you apart if he wanted to. And Bengal tigers have a similar history. They were nearly hunted to extinction. Their numbers have been coming back, recently. By 2011 there were an estimated 1700 Bengal tigers in India compared to just 1400 in 2006, so their population’s rebounding. But again we have this problem with genetic diversity.

Interviewer – Sarah Crespi

And in this case they didn’t actually hunt down the tigers with dogs.

Interviewee – David Grimm

They didn’t. They did two things. First of all they wanted to compare the genetic diversity today to what it had been in the past. You can’t go back in time, but you can in a way if you go to a museum. So the researchers went to museums. They looked at some Bengal tiger specimens, they were able to extract DNA from them – these were maybe about 100 years old or so. And then for the modern tiger they actually recovered it from tiger scat, which is tiger poop. And when they compared the genetic diversity they found that, especially in the mitochondrial DNA – this is the DNA that’s passed down from

mother to child – this DNA showed very little genetic diversity, which is also, again, a bad sign for the future of this population.

Interviewer – Sarah Crespi

So what does this mean for the management of these species in the preserves or in the zoo?

Interviewee – David Grimm

Well, what it means is that the conservation of these species is going to be a lot more difficult than we thought. It's not just a question of boosting numbers; you've also got to boost this genetic diversity, which is a problem so hard that one of the experts we consulted for the article actually says that biologists can't do it alone. It's going to take a much more concerted effort, a much more dramatic effort, and again, the focus really has to be on genes in addition to numbers.

Interviewer – Sarah Crespi

Okay. So what else is on the site this week, Dave?

Interviewee – David Grimm

Well, Sarah for *ScienceNOW* we've got a story about a fast and painless way to better mental arithmetic, for those of us who are not great at math. Also a story about peering inside caterpillars as they develop into butterflies; some very cool 3D images. For *ScienceInsider*, our policy blog, we've got a story about corporations and the National Science Foundation teaming up to lower dropout rates of minorities and women in science and education fields. Also a story about whether France should be using English in its universities especially to teach science; it's a very controversial topic in France. This week's *ScienceLive* is about honeybees in trouble, why honeybees are disappearing and what the impact of their disappearance will have on the entire world. And next week's *ScienceLive* is about the release of the diagnostic and statistical manual of mental disorders known as DSM5. This is a manual that has all of the mental disorders, as it were. It's also very controversial in terms of what it includes, what it excludes, and what it exactly defines as a mental disorder. So we should have a really fascinating chat on that. Both of these are going to be video chats. We're hosting with Google Hangouts, so be sure to check out all these stories on the site.

Interviewer – Sarah Crespi

Thanks, Dave.

Interviewee – David Grimm

Thanks, Sarah.

Interviewer – Sarah Crespi

David Grimm is the editor for *Science*'s online daily news site, *ScienceNOW*. You can check out the latest news and the policy blog, *ScienceInsider* at news.sciencemag.org, where you can also join a live chat, *ScienceLive*, on the hottest science topics every Thursday at 3 p.m. U.S. Eastern time.