

WEEK 4 INTERVIEW WITH A BIOLOGICAL ANTHROPOLOGIST

ACT – Anusuya Chinsamy-Turan

BA – Becky Ackermann

ACT So, today we have Becky Ackermann with us, and Becky is a biological anthropologist. It's going to be so wonderful to talk about human evolution with you. You know, we've been talking about extinctions for the past couple of weeks and we are currently at the point where we are talking about the sixth extinction. And we know that a lot of what's happening today has been mediated by humankind. But I think it'd be fascinating for everyone on the course to understand when and how did humans actually come to be such dominant species.

BA Ok, so in a nutshell, hominins have been evolving for, so human ancestors, have been evolving for about 6 million years, that's kind of our best estimate right now, given the fossil and the molecular record. And, for the first four million years of that, they evolved in an African context, largely ape-like in the beginning. And then once we started to look more like us, so once Homo evolved at around, you know, two-and-a-half million years ago and then left Africa at around 1.8 million years ago or so, and and spread around the planet. Then things obviously started to change a bit.

Right, so it's all pre- it's all in Africa before then, and then started to move around in different places in the planet. But, having said that, these hominins still remained essentially hunter-gatherers in terms of their lifestyle. So small groups of people living on a landscape in a close connection with their environment, not over - exploiting resources, all that kind of thing. Which means that population numbers were very low. It would have only been around the time of the emergence of agriculture, so 10,000 years ago.

Where people started to become sedentary could grow population numbers because they're growing their own food and they're able to sustain higher population numbers, that we can even start to talk about an increase in the people that were on planet. But even then it was still a relatively difficult life. The numbers probably only increased slightly relative to before, so it was really once the industrial revolution happened, just a couple hundred years ago. And along with that, and modern medicine essentially, or the beginning of modern medicine, that our population really started to take off in numbers, exponentially. As we are seeing today with the exponential increase.

So it's been a gradual process but the reality is that the bulk of human evolution we remain in a fairly low numbers as a hunter-gatherer lifestyle. And it's been a fairly recent thing across the Holocene.

ACT Technological development really.

BA Yeah the agricultural and then the technological development that really caused our numbers to take off, and obviously has led to, you know, the over-exploitation of the planet.

ACT And, you know, I read before that humans have been involved, or said to have been involved, in the megafaunal extinctions in the late Pleistocene, I mean do you think that is actually a valid argument?

BA As you know, there's quite a lot of disagreement about this, but certainly in some context it has been shown that there's a very tight correlation between humans landing somewhere and the megafauna going extinct. A good example, of course, being Madagascar which is which is quite a recent megafaunal extinction. Essentially people ended up on the island you know 1,500 years ago and all of those giant primates ended up disappearing very quickly. So there are certain cases where that has been proven to be the case. Deeper in time it's harder to prove, but there's a lot of coincidence there.

ACT Yeah I think so, I think it's a combination of factors but humans may have been a big contributing factor.

BA A big player.

ACT Yes, and the other thing that I have been wondering about is the fact that, when we look at the modern humans, they seem to be genetically quite less diverse than any other primate. I mean do you have any ideas about why that may be the case?

BA So again, this probably comes down to the fact that humans were hunter-gatherers for such a long period of time and at extremely low numbers, very susceptible to genetic drift, to loss of diversity, to population bottlenecks.

We used to think that this would appear to be a bottleneck, so in other words going through a period of very, very small population sizes in humans, was associated with an out-of-Africa replacement model of human evolution. We no longer know that, because we now know that an out-of-Africa replacement model actually isn't the right model. So it's probably reflecting just very small population sizes and, frankly, a difficult lifestyle and reduction in numbers more than anything else.

ACT Ok, that's interesting. And then, of course, the recent decade, I think, we've had this whole rise in genomic research and I think there's been fascinating work that has come out in terms of human being relationship with that of the Neanderthals and the Denisovans. Have you anything, I don't know if you personally worked in that area, but do you have any views on those findings?

BA Yes. That's only been since 2010, it's been a very, very short period of time when we've started to get whole genome information. So before that there was quite a lot of information on the mitochondrial genome of Neanderthals in particular, and the previous information had kind of been telling us that Neanderthals weren't contributors to modern people.

It was supporting this replacement idea that people came out of Africa and replaced anything else. Once 2010 came along, and the work started to come out on whole genome, everything got quite mixed up and essentially what it's saying now is that

we've had a whole series of hybridization events. So hybridization around a hundred thousand years ago, that caused genes to flow from the people emerging from Africa into Neanderthals. Hybridization that caused genes to flow from Neanderthals into the people emerging from Africa around 50,000 years ago. Hybridization between Denisovans and archaic populations, like archaic, what became modern populations of people coming out of Africa. So there were a number of archaic groups that were essentially meeting and exchanging genes.

And what that means for modern people is that we have acquired different aspects of our genotype and our phenotype from these ancient gene flow events. So, things like genes for skin pigmentation and skin properties. Genes for immunity, genes for being able to live at high altitudes so the Tibetans have acquired genes from Denisovans to allow them to live at high altitudes. And so, our genome if you think of it as a, like a whole human species kind of genome, is this amalgamation of stuff and it's almost like evolution has picked and chosen from these different archaic groups to make the combinations in different parts of the world that suited to the environment there.

I think there's a bit of a take-home lesson in this and, and that take-home lesson is essentially two part. One, we are all African and we've always been that because our ancestors initially evolved in Africa and everything resulted from an emergence from Africa. But the second take-home from that is that modern people today are also, simultaneously, all hybrids. That we've had a history of, not just for a thousand years or 2,000 years or a hundred thousand years, but from millions of years of migrating, meeting interacting and exchanging, including exchanging genes, as well as culture. And that property of ours, that coming together and exchanging is a very human trait that makes it very difficult to parcel people into discrete units. That's a big lesson in today's world, right? We do that all the time.

ACT Exactly, I think it's such an important message actually that, in a sense, that's why we're all one. We are one species and the differences between us are so minute that it's not even worth talking about.

BA One complex, diverging amalgamating group of people.

ACT Wonderful. So, Becky, it looks like these, the phenomenal success that humans have had on the planet has actually been the downfall for the planet. I mean, what do you think of that?

BA It's true, you know, we are, what makes us successful evolutionarily as a species, right, is reproducing.

And we've been extraordinarily successful of that, and particularly in the last few decades our numbers have increased tremendously. But of course that means we're putting pressure on the environment, on our food resources, on the other organisms on the planet. We're causing these extinctions, we're causing extinction of our closest relatives, you know, the other primates. So the reality is we need to, we need to confront all of those things and try to reduce our impact on the planet. And, you know, I hate to say this, but at the end of the day, humans really need to get our population numbers down.

You know, we need to also control our own reproduction so that we are less of an impact on the planet that way and it's more sustainable going forward.

ACT And I guess, for now people can do simple things, they can take care of the environment in ways that not many people know how to do but I hope that, by the end of this course, people would have a better idea about what they personally can do to make this a better planet for the future.

BA I mean, we're not going to go back to being hunter-gatherers, right?

ACT Yes.

BA Or, at least, most of us aren't going to go back to being hunter-gatherers but what you want to do is to adopt a hunter-gatherer way of living in concert with the environment so that you're never over-exploiting.

ACT Exactly, exactly. Becky, it's been absolutely wonderful chatting with you today and it's been fascinating to see our journey on the planet, I mean, you know, from beginning from the primate stock, our diversification as humans and then, of

course, to see how we've become this dominant species that have led to exploitation of so much of the planet.

But, I hope that, in the end, we have a message of hope and the hope is that we can make a difference because we are the main culprits, we also can make the difference for the planet. Thank you.



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