



Episode 43: We Eat Bugs

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Meredith Johnson

This is Origin Stories - The Leakey Foundation podcast. I'm Meredith Johnson

Food has been on my mind a lot lately. When it comes down to it, I think 'what's for dinner?' is actually one of the most profound and important questions there is.

What we eat doesn't just impact our health - our world is shaped by food - the food we eat now - and the food our ancestors ate in the past.

So what did they eat? How did they get it? What impact did their food choices - or the foods available to them - have on the way our species evolved?

Did eating lots of meat and smashing the marrow out of bones give us our big brains? How did the tough seeds or soft fruits gathered by our ancestors make us who we are right now - today.

These are the some of the fundamental questions in the study of human evolution

So today's episode is all about food. Well, one kind of food anyway.

Interviewer

So, have you eaten termites? And what are they like?

Julie Lesnik

Termites are delicious. I've eaten them in South Africa. I've eaten them straight out of the mound. And then when you eat 'em straight out of the mountain, to me, they just tasted like dirt cause you eat more dirt. but in the community I was working with in South Africa, up in the Northern province of Limpopo, they would harvest these *Macrotermes* soldiers, clean off the dirt, boil them just very shortly for just what felt like a minute with some salt. They tasted just like popcorn. I could have sat there and ate a whole bucket of these termites.

Meredith Johnson

That's Julie Lesnik She's a Leakey Foundation grantee who initially went to grad school to study ancient tool use. In her studies she saw how chimpanzees use sticks to catch and eat termites - she thought about the fact that these chimps had taught themselves to do this -they made and used tools just to get to termites. That made her realize what an important food source they were and she wanted to learn more.

Now Lesnik is a professor at Wayne State University in Detroit and she studies the evolution of the human diet with a focus on insects as food.

She said that for a long time, paleoanthropologists weren't paying much attention to the role termites and other insects might have played in the diet of early humans. Until in 2001 a study by Leakey Foundation grantee Lucinda Backwell and Francesco D'Errico showed that chimpanzees weren't the only ones with special tools for gathering termites. Their experimental study on some South African tools made of bone showed that humans were also poking around in termite mounds - more than a million years ago

Julie Lesnik

All of a sudden we sort of had the direct evidence and we could really start seriously talking about it as paleoanthropologists because it's hard to talk about things just theoretically when we don't have the evidence.

I realized that paleoanthropologists - we don't understand the species richness of something like insects. It's a whole different scale than we're used to thinking about ourselves. And so that's where I've put all my energy was like... let's understand termites, and then we can start talking about what sort of nutritional contributions they make.

Meredith Johnson

How do you go about understanding termites - seems like a big job

Julie Lesnik

The one thing is termites are actually super cool and very well studied. They're social insects, like bees. They build these nests that are regulated in both moisture and temperature, so they're architects. The termites that chimpanzees eat are fungus farmers. They actually forage for foods to bring back to the fungus, and then the fungus breaks it down, and then the termites eat the byproduct of that.

They're farmers, they're architects, and so they've been fascinating entomologists forever. And so really where I started making my contributions was representing

termites for their beauty and their variability in paleoanthropology literature.

Meredith Johnson

The social structure of these beautiful termites is actually what makes them the perfect target for chimps - or humans to collect in large numbers.

Julie Lesnik

The termites these chimps go after have a mechanism for defense - so they're used to attacking ants that might want to take over their mound. The soldiers have these really large pinchers. Because of the social nature of these insects, the soldiers are dispensable. Their entire existence is to protect the queen, to protect the nest, and so they just have this kind of unidirectional pinch with these mandibles and so they can easily be extracted.

They bite that tool and then they hang on the whole time as the chimps drag them out of the mound, and so then chimps can just eat them right off of their tool. Fresh termites.

Meredith Johnson

Nice fresh termites

Julie Lesnik

with lots of grit.

Meredith Johnson

It's been known for a long time that our ape relatives eat termites, and the experiments with the ancient bone tools from South Africa showed that our ancestors were also using tools to get termites -

- but being a scientist, Julie Lesnik wanted to know some specifics - and you might think this focus on termites is excessive - but here's a fun fact I learned - termites are so plentiful even now that they make up 10% of all the animal biomass in the tropics -

Julie Lesnik

One of the biggest problems we've had is because termites are so variable, which termites were they eating? and that's where I really started my research. I really wanted to try to confirm that. They were eating macro termites, termites. And I tried doing experiments on different termite mounds, but they weren't different enough to show up in the wear pattern on my experimental tools. So I've really just been theoretically saying that macro termites, termites is probably what the hominids were eating. cause we know from entomology literature that the same genus existed at the same time as the early hominids. So they were probably around.

Meredith Johnson

And then a few years ago - at Olduvai Gorge in Tanzania- Julie's collaborators found what she was looking for. A fossilized termite mound -1.8 million years old - found in the same place where Mary Leakey found fossils of an ancient human relative called *Paranthropus*.

Julie Lesnik

We have a beautifully preserved termite mound and using biomarkers because this mound is preserved from an ashfall. It was just kind of catastrophic. Lee preserved in a moment in time, the organic matter is rich in these sediments and we can actually match them up to the genus level of termites and show that macro Termez termites were there with the hominids.

Meredith Johnson

So now we know what kind of termites were there 1.8 million years ago when our *Paranthropus* relatives were looking for dinner - but how do we know how much of that dinner was termites?

Julie Lesnik

What I do when I'm reconstructing the role of insects for hominid diets. I use the models that we have available to us today. I look at modern foragers and I look at, you know, at apes like chimpanzees or orangutans, and yeah what I see is that the apes really focus on the social insects they eat, termites And they might go after honey and get the larva that's in the, in the bees nest. But when you look at modern foragers, we start seeing a lot greater variety in, in the insects they choose. We start seeing the collection of things that can really only be picked up one at a time and require predicting the environment and getting them at the right time.

And so when I reconstruct diets for the earliest hominids, I'm very confident they would have been going after the social insects, but then as I, and so that's how I reconstructed. We really focus on termites, especially. But for later hominids kind of with the genus homo, I think termites and ants would have been just as important to them.

Now we can start thinking about what they can collect if they had a bag with them. Like once you start having more tools, once you have an Acheulian hand ax and can break into a log and get the beetle larva that are in there... and so I start thinking that the insect portion of the hominid diet starts becoming more variable with . Homo erectus or with the genus homo. Just as we know, the evidence shows - all of our isotopic evidence, the dental microwear evidence - suggests that diet starts getting more variable as humans evolve.

And I think that is true of that insect portion of the diet as well.

Julie's certain that the more access our ancestors had to different kinds of insects the more they ate.

Julie Lesnik

My research is always focusing on Paranthropus cause it's just....the evidence is kinda lined up that way, but I'm trying to just kind of change the perspective to insects as food for all hominids because millions of people eat insects today.

We know that chimpanzees and the other great apes all eat insects in some regard. It's an important food source across all of the primate order, but because we don't eat insects in. The U S and because insects aren't a popular food source in Europe, all of the literature is really been done by people from these regions.

And so we overlook it as a potential food source.

Julie Lesnik

And so the, a lot of my work is just trying to change our perceptions of insects, that they're not a fallback food. They're a food. People today choose to eat insects because they like them because they're good for them, not because they're nutritionally stressed.

And I think insects have always been looked at that way for humans. No homo erectus or earlier hominids is like, Oh, well, maybe they eat them when there's nothing else better. What we see from chimpanzees doesn't support that either. And what we see from people today doesn't support that.

Meredith Johnson

Millions of people eat insects as a regular part of their diet. Crickets, grasshoppers, beetles, caterpillars, ants, moths and many other insects are important year-round foods and delicious seasonal treats. They're not just foods of the past.

And so Julie's research also includes studies of the insect foods in our diets now.

Julie Lesnik

So, one thing I've really tried to do is just look through the literature and see what people have studied from, you know, modern Hunter gatherers from foragers that, you know, most of the data comes from the 1970s or before, because these groups are, continually vanishing as the world becomes more globalized. So I'm working in the old literature, but I am running into the same problems I run into with paleoanthropology is

that the anthropologists who went to study what these foragers used in their diets, they would overlook or underemphasize the importance of insects.

And so I'm really trying to tease apart where I can see that insects are important, kind of through these weird dialogues where it's always portrayed as this fallback.

And so I've done research on global patterns of insect eating today. And if it was a fallback food, you would expect them to only eat insects where food insecurity is a major issue. But if you look at global patterns, that does not match up, the best thing that actually predicts global patterns of insect eating is latitude. It is a tropical resource because in the tropics there's just more insects than there are in Northern latitudes. So, you know, in Northern latitudes you have harsh winters. And so during that time insects are, are. Are dormant. They're sleeping there, they're migrating there. They're just not around. But in the tropics, you have that all year around those insects are available. And so the number one predictor of whether or not a country the presence or absence of insects is latitude.

Meredith Johnson

So in the warmer climates where our species evolved, insects were probably plentiful year-round. And that stable and nutritious food source might be part of what made us who we are today.

Julie Lesnik

Insects are an animal food, just like hunted meat or dairy or eggs. And one of the most important things about that is we always talk about it as protein rich.

but it's not just protein. It's the fact that these animal foods tend to have the complete, tend to have all of the essential amino acids in one stop. So if you're a . A vegan and you're trying to get all your protein needs. What you're actually trying to do is make sure you have all of those essential amino acids bause if you don't have one, then they're kind of all useless. You need them all. And these are things our body can't produce. We need to get it dietarily.

Insects offer that same amazing food source that hunted meat does. But unlike hunted meat, they can be a lot easier to obtain, especially if you're looking at social insects. So you have a termite mound or an ant hill. There are millions of individuals in there. And so one stop, you can spend a half hour there and get all your protein needs for the day.

Meredith Johnson

Do you think it had any impact on brain evolution?

Julie Lesnik

When we talk about insects as food, we tend to focus on protein and protein is really

important, but actually what insects contribute that may be more important is fat and fat is actually a very rare resource.

In the environment and when it comes to brain evolution, it is fatty acids that our brains function on. It is fatty acids that are critical to brain development. And so although we, we look at protein because we know that protein needs go up for reproductive women, or we know that, you know, as body mass increases, you have more muscle mass and you need more protein, it might actually be the fat component that is really critical to the human evolution component.

We look at hunting, but the meat that the hunters would be bringing in is very lean, right? These animals are living in that same environment, but there are insects, especially if you get the larval form. So the baby form of all animals tend to store fat because they store their own energy so that they can continue to develop. And that is true in insects as well. So if you eat beetle larva or the reproductive flying termites, or if you dig in and find the eggs, or the larva they had is an incredibly rich source of fat. And so that might actually be the more critical component of the diet for these hominids.

Meredith Johnson

Have you eaten beetle larva?

Julie Lesnik

I have not eaten beetle larva. And I will tell you that beetle larva is the one thing, like we have Fear Factor and things like that. And it's always very large beetle larva that they make these people eat in these scare tactics shows. And so that's affected me too. I haven't been anywhere where beetle larva has been, you know, kind of, commonly consumed. But I know it's gonna happen one day and I look forward to challenging myself. And so I think people tend to think of insects as only being, like picked up off the ground and thrown in your mouth, but it's an ingredient like anything else, and you can make it delicious. So I'm looking forward to trying something like beetle larva, cause I know they're going to be fried and kind of everything fried is amazing. It'll be fatty and delicious, and it'll hit all those senses that we look for in food because those are important resources that we need.

Meredith Johnson

And another thing Julie's research examines is who was out there gathering and preparing all this fatty- delicious - amino-acid rich brain-building protein?

Julie Lesnik

It tends to be the women that forage for these insects. I really celebrate how it's an important source of food for women especially. And if we don't talk about what the

women are eating, then we're not talking about women. So if we only talk about meat, we tend to only talk about men. So by looking at food sources that are more variable, we start seeing more people that existed in the past.

We put so much value on meat and we put so much value on the men that go and hunt meat and bring it back. But the thing I'm trying to say is that like, yes, if men bring meat back, that helps maybe the women that they're provisioning.

But also women have the ability to go and meet their own nutritional needs with a kid on their side, like with a kid with them.

There's such low risk of harming that child. They go to these termite mounds and again, sit there and they can get their needs for the day. They can bring it back to camp. The kids sit there learning so that they can do it in their lives going forward.

And the amazing thing is, is you see this pattern across foraging populations. You see it in chimpanzees too. It's the females at forage for insects more than the males. You see it in orangutans. It's the females at forage for termites more than the males. And so to me, it's this important resource that has allowed, you know, females to successfully reproduce and provide nourishment for both themselves and their young. And so to me that is more important than meat, because meat might not be brought back every day, and if it's not brought back, you can still make it to that termite mound and know that those resources are there.

In places where insect eating is just a part of life, people probably think it's very strange that so many Europeans and non-indigenous North Americans are afraid to even try eating bugs. This cultural attitude that insects are gross or icky to eat might go all the way back to the Neanderthals.

Julie Lesnik

So one thing I try to do is try to answer the question why we don't eat insects here. The first place I start is population history of northern latitudes. And so I try to think about what the first inhabitants of Europe would have been consuming. So a population like Neanderthals. In order to survive in the Northern latitudes, Neanderthals had to hunt a lot. They had to eat a resource that could make do with the woody foods that we can't eat. And so the way you can survive in those environments is to hunt the animals that can eat that woody food that we can't digest. And so really, the only way a species like Neanderthals could thrive in a Northern environment is to be hunters.

And so if they were eating insects, insects would actually be redundant to their diet. So I think in the summer when insects were available, it might have given them a reprieve

from hunting, but I don't think it would have been as important to Neanderthals as it would have been to hominids in more tropical areas.

And so that explains people from Northern latitudes not needing insects, but that doesn't answer the question of why Europeans and non-indigenous North Americans tend to have such strong negative opinions about eating insects. For that, Julie says, you have to look at more recent history - and European colonization.

Julie Lesnik

So just because we don't eat the food doesn't necessarily mean we should. Be disgusted by the food. And so when Columbus first traveled to the Caribbean, they traveled across latitudes in a way that had never been done before.

And all of a sudden they're in these regions that are much more tropical and they're seeing people with tropical diets. And insects are an important part of tropical diets, but these European explorers only associate insects with maybe rotting foods or what they see animals around them consuming. It was never a food source for them.

Letters from the voyages portray this insect portion of the diet as beast-like for these native inhabitants of the Caribbean that they first encountered. And we know that what happened then is that these people became enslaved and used as part of sugarcane crop production. And so part of the justification in enslaving these people is because they considered them more like beasts, like beasts of burden. And a lot of that narrative came from the fact that they ate insects. And so we are still working against that today when we're talking about the potential of insects.

People have this idea that it's primitive. And why would we eat insects? Why would we “de evolve” to use this food source when we are so advanced now, but modern humans are modern. We're all capable. No matter where you're from in the world. We all have these amazing brains and this incredible intelligence, and in a tropical environment, that intelligence means you can find all you need right where you are and you don't need to farm. But these farming Europeans come in and they think what they do is superior and it just creates this narrative that we're still using today.

Meredith Johnson

So how do you advise Americans today to open themselves to change their ideas about eating insects?

Julie Lesnik

There's a wonderful push right now by anthropologists to decolonize what we do and to

recognize the history of not just world history, but the history of our field, and that and that we've played a part in this. And so I think by just bringing these concepts, by talking about them and recognizing the scars of our past and how that's changed what we look at, I think that's a very important first step.

But then the other part of it is that we just develop mentally. We grow up with these. Concepts around us in ways that form our perceptions into adulthood. If you grow up and you're a kid and there's a bug and everybody around you says ewww, then your developing brain grows and thinks eww - and it's really hard to overcome that.

I've been studying this for over a decade now, and I still have to push back against some of my own disgust triggers. So I'm very understanding that the psychological concepts are hard to overcome. But the thing we can do is stop speaking badly about the food resource. Just because you don't want to eat it doesn't mean you have to shame people who do want to eat it. How we talk about food matters, and it matters for letting cultures around the world be themselves and being able to celebrate themselves and eat the foods they want to do that they want to eat.

It might be our grandkids who really need insects as a food source, so we'd be doing them a disservice having them grow up with that same negative perception.

I like to tell people like, it's fine if you don't want to eat insects, but let your kids make their own decision. Don't put your disgust on them. Let them explore. Let them decide if it's delicious. And, and like I said, the way you can start with that is that you season it. Like I have these mealworms from farms that are flavored with barbecue flavoring. They taste just like barbecue potato chips and at events, kids love eating these cause they taste like a delicious. Snack. And so if the parents don't want to eat it, it's fine. But like celebrate your kids discovery of this new food source.

Meredith Johnson

Insects are a part of our global food heritage that stretches back through millions of years of evolution. Recent research by Christopher Emerling and colleagues at the University of Berkeley shows that our very distant ancestors – the first mammals - the tiny furry creatures that lived in the time of the dinosaurs 66 million years ago – were mostly insect eaters. The scientists know this because the genes for the enzymes that allowed these early ancestors of all mammals to digest insects - are still hanging around in nearly every mammals alive today. Even animals that don't eat any bugs have non-functional pieces of these genes sitting there in their chromosomes, telling us that we come from a long line of insect eaters.

And as we look for sustainable food sources and imagine the future of food, Julie hopes

that people will look to insects. I've eaten them and liked them - And if you want to try them here's how Julie recommends you get started

Julie Lesnik

So crickets and mealworms, I'm grinding them into powder, putting them in protein bars, making cakes or cookies or, different foods that we're already familiar with, but just has a small amount of insect component to them that can ups through nutritional value starts getting people more comfortable with the idea of like insect nutrition, but still eating what they enjoy, and then from there you can take whole insects, put them in a sushi roll or a taco, something that you know with flavors that you already like, and now you're just getting the protein from a different source, and then you know, then you work up to being able to eat handfuls of termites.

Meredith Johnson

Did you have to work up to it or were you like, let's go?

Julie Lesnik

I was a horribly picky eater. Like I think my family thinks it's so weird that this is what I studied cause nobody in the world would have expected me to be a bug eater, seeing what I ate as a child. But there is this really cool study, it came out of Belgium. And they did a survey of who would potentially include insects in their diet. And their conclusion is, if you have two of these three things, you are likely to be willing to incorporate insects in your diet. One was being an adventurous eater, but the next one was making food choices with environmental consciousness on your mind. And third, already having a reduced meat intake. So if you're not eating meat every meal of the day or not eating meat every day of the week, then you already have started shifting to ideas of alternative proteins and so insects really fit well there. And so I'm not an adventurous eater, but I do make decisions based on the environment, and I do already have a reduced meat intake. And so that study perfectly reflects why I choose to add insects to my diet.

And I think people want to know what they're eating. They want, they want knowledge, they want to make informed food choices. And I think that this idea that it's a food source that we've been utilizing for millions of years is just another piece of that puzzle to getting people to accept insects as food.

Meredith Johnson

Thanks to Julie Lesnik for sharing her work and her passion for edible insects. You can learn more about her work in her recent book - Edible Insects and Human Evolution.

Thanks as well to Monica Martinez from Don Bugito - Prehispanic Snackeria for the

tasty insect snacks - I recommend the Chile Lime crickets and the bugito brittle.

Origin Stories is a project of The Leakey Foundation - a nonprofit organization dedicated to funding human origins research and sharing discoveries. Learn more at leakeyfoundation.org that's l-e-a-k-e-y foundation.org. Check out our Origin Stories webpage for a transcript of this episode and others.

I want to give a sincere thank you to all of you who donated to our lesson plan fundraiser. It was a huge success and we are very grateful.

Thanks as well to all of you who shared the last episode with your friends or tweet about the show. That means a lot to me and I appreciate it.

As always, we hope you'll share the show or leave a review of the podcast. It really helps.

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Thanks for listening.