



"Fossils and Families: What Paleoanthropology Can Tell Us
About Relationships" with Jeremy DeSilva

Dr. Dipesh Navsaria: [00:00:00] Reach Out and Read, where books build better brains. This is the Reach Out and Read Podcast. I'm your host, Dr. Dipesh Navsaria, a practicing pediatrician with degrees in public health and children's librarianship. I'm a clinical professor of human development and family studies at the School of Human Ecology and a professor of pediatrics at the School of Medicine and Public Health, both at the University of Wisconsin in Madison. At Reach Out and Read. We dream of a world in which every child is read to every day. Our show explores how children and families flourish and thrive through a combination of individual well-being, confident parents, supportive communities, strong public health, and good policy. Join us here for thought-provoking conversations on these issues with expert guests, authors, and leaders in the field of early childhood health and literacy. Research shows that reading physical books together brings the strongest benefits to children. That's why we're happy to have Boise Paper, a responsible paper manufacturer, as the founding sponsor of this podcast. Through their paper with Purpose Promise Boise paper looks for ways to make a difference in local communities. Thank you to Boise Paper for investing in our Reach Out and Read community on this podcast.

We've not shied away from going back in time to talk about child development and parenting. I mean, we've talked to people about parenting advice going back over 100 years ago to learn how that can help us understand how to best support families here and now. But of course, humans have been around longer, a lot longer. And yes, I have it on good authority that young children have existed in all that time. And parenting has, indeed, been a thing throughout human existence. So, it was with interest that I spotted a piece that discussed parenting and infant care by looking at the fossil record. What can fossils tell us about the antiquity of shared parental care and infant helplessness through human evolution? Today, we're going to take a deep dive — like a few million years deep — into human evolution and what the fossils of our ancestors can tell us about the evolution of family relationships and behavior. Our guest today is Jeremy DeSilva, an endowed professor of archaeology, paleontology, and ethnology at Dartmouth and a paleoanthropologist specializing in the evolution of the first apes — hominoids — and early human ancestors — hominins. Jeremy, welcome to the show.

Jeremy DeSilva: [00:02:27] It's a pleasure to be here. Thank you for having me.

Dr. Dipesh Navsaria: [00:02:30] So, before we get into the meat of the topic here, we've produced nearly 175 episodes of this podcast and you are our first paleoanthropologist. For those who might not know, can you tell us what paleoanthropology is? And why would there be a connection to Early Relational Health, which is what we spend a lot of time talking about?

Jeremy DeSilva: [00:02:52] Sure. So, the word “paleoanthropology” can be broken up into “paleo-,” which is short for “paleontology” — and that's the study of fossils — and then “anthropology,” which is the study of humans. So, I study human fossils. Every year I travel to Africa and I dig in caves — mostly in South Africa, but also in Eastern Africa — for the remains of our ancient ancestors, and also for the remains of other animals that help us understand the ecology and the circumstances under which our ancestors evolved. And so, I'm really interested in how we got to be the way we are — how we move, what we eat, how we think, and how we birth and raise our kids — and what the fossil record tells us about that evolutionary trajectory.

Dr. Dipesh Navsaria: [00:03:40] Yeah. Because for folks who may not have spent much time thinking about this, right, we often rely on the written record to tell us anything about life. And often, things like parenting or families may not have even been commented on in the written record — at least what's available to us. But when you go pre-writing, we only have these other ways of looking at things. Right?

Jeremy DeSilva: [00:04:04] That's right. And we use two different approaches to this. The first is to look at our close relatives. And so, there are a lot of researchers, like me, who are interested in living chimpanzees, gorillas, orangutans, gibbons and monkeys are close living relatives. So, what do they do in terms of the questions we're interested in — locomotion, diet, or in this case, again, parenting. What do they do that's similar to what we do? And what is it that's different? What's unique about us? And when it comes to birth and infancy and child development, there are actually quite a few differences that we see between humans and those other apes. So, then the fossils are the piece of information that allow us to reconstruct the changes that happened over the course of the last — it turns out — six to seven million years of evolutionary change since we last shared a common ancestor with chimpanzees. And paleoanthropologists are clever. My colleagues do amazing work, squeezing every bit of information that they can out of these incredibly rare and fragile fossils that we find of our ancestors — including as, to some degree, how they raised their kids.

Dr. Dipesh Navsaria: [00:05:24] I must admit that I'm expecting now that there'll be a parenting fad sometime in the next few years: "raising your child the orangutan way" or something like that.

Jeremy DeSilva: [00:05:33] Orangutans are very good at raising their kids. They are outstanding, but I wouldn't recommend it for humans. We can talk about that, but it's a very different strategy.

Dr. Dipesh Navsaria: [00:05:44] There we go. So, what caught my attention was an article in Science Magazine, and it was entitled "Fossil Skull Flattening Suggests Ancient Origins of Infant Helplessness." And I have to say, right — as a pediatrician, any of my pediatric colleagues will know how much time we spend talking to parents about putting your baby on their tummy — to, you know, have tummy time while they're awake, worrying about the flattening of the backs of skulls, etc. So, this felt both simultaneously ancient and very modern as a concern about skull flattening. But can you tell us about what you found?

Jeremy DeSilva: [00:06:23] Sure. So, this was a research team that I wasn't involved with the actual research itself — but I was asked to comment on it. So, if we take a step back and look at our close living relatives — chimpanzees, for instance — when they give birth, they give birth to a baby that has grown about 40% of its brain by the time it's born. And then, over the course of the next couple of years, it's about three, four years. It grows to that full 100% adult brain volume. And so, chimpanzees take about four years to grow their full brain. When chimpanzees are first born, they can grasp on to their mother's fur. The mother can carry them around through the treetops, as the chimp is able to grasp on to the mother. And so, they're not as helpless when it comes to their motor skills as human babies are — which, you know, can grasp on to a finger perhaps, but they're pretty helpless. They're kind of just luggage that you're carrying around. So, it turns out that that brain size at birth is an indicator of how developed you are or not as a mammal. And so, in humans, when we're first born, our babies have only about 25 to 30% of their brain grown. And then, it takes them up to six to seven years to get that full 100% volume. And so, that's surprising to some people that your brain is fully sized.

Jeremy DeSilva: [00:07:56] It's not fully developed, but it has its full size by the time you're seven. But the next time you pass by an elementary school, just look how gigantic kids' heads are. Right? Heads grow faster than bodies do. Okay. So, this idea that brains in these underdeveloped kids are going to be a little bit smaller at birth compared to the adult volume is something that we've tried to interrogate through the fossil record by looking at fossil pelvises and saying, "well, okay — how big can the baby's head be and still be

birthed by this ancient population?” We don't have a time machine, so we can't go back in time and witness birth, but we can estimate the size of the baby and the baby's head by the geometry of the bony pelvis. And what we have concluded essentially is that back in time — a million, two million, even three million years ago — our ancestors were giving birth to these underdeveloped babies. These babies that were what we call “altricial” — they were relatively helpless — and that it would have taken not only mom, but other members of the group would have assisted with the raising and the bringing up of these babies. So, what this research team did was they examined not child helplessness from the point of view of the pelvis, but from the point of view of the very plastic skull of the baby at birth.

Dr. Dipesh Navsaria: [00:09:30] That can be molded so easily.

Jeremy DeSilva: [00:09:32] Yeah. You know, fontanelles — the soft spot of the skull — right? Yeah. Those bones of the skull are not fully connected yet in those infants. And so, the head is much more moldable. And the prediction would be if that was happening back in time, then we should also see some flattening of the skull — some asymmetry of the skull — that would persist into adulthood. And so, this research team looked at hundreds of skulls of chimpanzees and gorillas, and they found very little asymmetry because they don't have that flattening that happens. They're born a little more developed, whereas humans do have that flattening that varies quite a bit, as you were mentioning. And then, they looked at *Homo erectus*, which was a relative of ours — and some populations, probably direct ancestor of ours that lived as far back in this population that they looked at about half a million years. And they found that same kind of human like asymmetry to the development of the skull, which they interpreted. And I think they're right that these babies were born pretty underdeveloped with a soft skull that would have molded and changed depending on how they were carrying their babies, whether they were putting them down or not. But it would have been subject to that kind of environmental pressure and would change the shape of the skull. It's a really clever study to get at something that happened millions of years ago.

Dr. Dipesh Navsaria: [00:11:01] Yeah, it makes me think of — because I sometimes in talks talk about this relative helplessness of humans, right — and I contrast it usually to barnyard animals. You know? Because most people are like, “oh yes, you know, you think about a baby calf or a goat, you know, being born” and, you know, within an hour or two, they're standing up. They're jumping around. They've got these cute little wobbly legs, you know, all that stuff. Right? And of course, right. That means that they're never lying on their back or on their side for months on end, whereas — these are not the words you used, but I'll summarize that — basically human babies are kind of useless when they're born, right? They can't do anything much. You know? They can

feed. They can poop. Yeah, but they can't even hold on, right — like you mentioned with some of our relatives, and that helplessness means that — yeah, that head is going to be lying down on the ground for a fair chunk of time.

Jeremy DeSilva: [00:12:00] That's right. And the authors of this paper made note that that the lack of musculoskeletal development means that the neck muscles are not going to be able to hold up this head. And so, that head is going to be leaning, like you said, against whatever substrate — whether it's the ground, or I can imagine a sling or somebody's arm, as they're carrying that baby. And that pressure could mold that skull.

Dr. Dipesh Navsaria: [00:12:23] Yeah, sure. And if I remember correctly, they looked at 508 skulls in this study across multiple species. And for modern humans, it was both modern skulls as well as the burial sites in Japan up to 1,000 years old.

Jeremy DeSilva: [00:12:42] That's right.

Dr. Dipesh Navsaria: [00:12:43] Yeah.

Jeremy DeSilva: [00:12:44] So, yeah. Yeah, they are thorough. It's a thorough study. You know, sometimes you read studies — especially when it has to do with the fossil record where we don't have thousands of individuals represented — these fossils are very rare. And sometimes, you read these studies and say, “okay, well — wait a minute.” If we measure more, might the narrative or might the interpretation of the study change? And in this case, I don't think that's the case at all. Instead, what I might suggest is, as we look even further back in time at predecessors of these populations that they looked at, they may even see the same thing. So, it would be curious now what the next steps are going to be with this kind of study going back in time to see how far back do we do? We see this helpless infant and, based on some other data we have from other lines of evidence, I think it's going to end up being really ancient — back to the time of the very famous skeleton Lucy, who lived over three million years ago. Her species, for a variety of different reasons, gives us some suggestions that there were these helpless infants — including, as I mentioned a second ago, the dimensions of the pelvis. We have Lucy's pelvis, and it would indicate that she was giving birth to a pretty helpless, at least helpless, infants when it comes from a musculoskeletal perspective. Sure.

Dr. Dipesh Navsaria: [00:14:06] Yeah. Now, in this article, you had commented: “the whole ‘it takes a village’ expression is pretty deeply rooted in our evolutionary past.” Tell us more.

Jeremy DeSilva: [00:14:18] Yeah. So, in chimpanzees and in gorillas and orangutans, when a mother gives birth, she usually gives birth by herself at night in a tree. There's no one else present. She'll keep that baby to herself. She won't share it with others for months. She'll nurse that baby sometimes for years and years. So, in chimpanzees, their weaning time is about four to five years — same with gorillas. Orangutans will nurse their babies for up to seven years before they wean that baby and have another. Those babies, once they are weaned, I call them — they're not “babies” anymore. Right? These are juveniles. By the time they're weaned at seven years old, they can go off and start foraging from there for themselves in the forest. Humans have a very different strategy where we wean much earlier than the apes do, and that's true for all human populations around the world. Even hunter-gatherer populations will wean their babies at about two or two-and-a-half years. But you're not going to send that kid off to forage on its own, right? This is still a relatively helpless individual. Mhm. And so, from two-and-a-half until those adolescent years, we have this whole new section of being a human called childhood.

Jeremy DeSilva: [00:15:44] And during that time period — which is entirely unique to us, chimps don't have this. Gorillas don't have this. Childhood is unique to us. And during that time period, there are so many other helpers that are involved in bringing food, in teaching, in providing safety and comfort, advice, all these things that are happening. And I jumped ahead to childhood, but even during those early months and years of infancy, that child is not on its own. There are helpers that are helping out mom bringing food. There's food sharing that's happening. So, baby helplessness — right — ends up being a catalyst for sociality. And it ends up being a driver, in terms of bringing people together around this cherished thing that is now part of your community. And it encourages food sharing. Right? Why would an animal ever share food? Why would it ever give something that it is collected and done so, you know, difficult? Why would I ever give it away, right — unless it's going to benefit that other individual? Right? So, this is — now, we're getting the beginnings of altricial behavior. Right? Helping others, the beginnings of compassion, thinking about the needs of others.

Jeremy DeSilva: [00:17:11] And what is it centered around? It's centered around a helpless baby. Right? And so, we can use all of these proxies with the fossil record — the size of the birth canal, the development of the brain. We've even looked at isotopes in teeth to figure out, “well, when did our ancestors wean their babies?” Was it four years — five years like a chimpanzee? Or was it closer to one year or two years — like a human? And it looks like early weaning is very ancient — that millions of years ago, our ancestors were already weaning our kids early — which means there was a community of helpers. Sure. And so, between this study of cranial asymmetry,

and the isotopes we can squeeze out of these teeth, and the brain development, and the size of the pelvis — it is all pointing to the same narrative, which is that the collective raising of young — of this “it takes a village,” right — is a deeply rooted human characteristic that goes back millions of years. It's an ancient trait of ours. It's a unique one, but it's an ancient feature of what it means to be human.

Dr. Dipesh Navsaria: [00:18:26] Wow. That is something else. I will say that the next time I'm arguing for policy support for parenting support programs, and home visitation, and so on, I'm just going to say like, “come on, guys — the fossil record says we should do this.”

Jeremy DeSilva: [00:18:43] We've been doing it for three million years. Yeah. Lots of problems can emerge if you stop something you've been doing for three million years.

Dr. Dipesh Navsaria: [00:18:49] Right? Yeah. So, skulls aren't the only thing that can provide this sort of insight. You mentioned a few others. One that we noticed was also how you just talked about empathy and compassion — that this physical disadvantages in being bipedal, right — of walking upright. Can you talk a bit more about bipedalism and what you meant by that?

Jeremy DeSilva: [00:19:18] Sure. So, we often think about moving on two legs and all the advantages that come of it. And there are plenty of them. Most other animals use their hands for locomotion to grab onto the ground or to a tree branch. By moving on two legs, we have released our hands from the responsibilities of locomotion, and with those hands we can carry things — carry food, more food than maybe we need to deliver to others. We can carry babies, as we were just talking about. We can use those hands to make things. And so, the stone tool fossil record, for instance, is very ancient — goes back now over three million years of us constructing tools out of stone, making tools out of wood, and more perishable items that may not preserve — is probably even more ancient than that. So, moving on two legs is fantastic. I'm glad I do it, but it has its disadvantages as well. We are incredibly slow, as a mammal. We can't outrun a leopard or a lion. We can't outrun an antelope or a zebra — the things we might want to eat or the things that might want to eat us. I can't even run down a chicken. We are very, very slow animals. And so, we're vulnerable. Right? It would be vulnerable in a landscape full of predators, which our ancestors were. And then, if you're a four-legged animal — if you're a zebra or an antelope and you injure one of those legs — you can still get around on three legs.

Jeremy DeSilva: [00:20:53] You can still move. You'll be slower. You'll move with a limp, but you can still get from point A to point B in your group. If you

are a bipedal animal like me and you injure one of those legs — you break your leg. You badly injure your foot bone. You're going to be hopping around on a single limb, which makes you extremely vulnerable to predation. And so, these vulnerabilities, I think, were overcome because of our prosociality, and our empathy, and our compassion. And one of the reasons that I say that with some degree of confidence is because we have very ancient fossils — fossils that go back over 3.5 million years of individuals who have healed leg fractures. So, there's one skeleton from Ethiopia. It's from the same species as the famous Lucy skeleton. And this is from a bigger individual. We think it's a male. And he's been given the nickname “Kadanuumuu.” So, we have Lucy, the female. We have Kadanuumuu, the big male. And Kadanuumuu even means “big guy” in the local language. And when he was a child, he broke his ankle. And we can tell that from the way the bone healed. Sure. And you can look on the inside of the bone. You can look on the outside and you can see the callus formation. The bone is really messed up. This individual broke their ankle as a kid. And then, it healed. That healing process — how did he not just get taken down by a leopard? How did he not just be left for dead? Right? We should have found that skeleton, you know, in the state it was after he broke his ankle. Essentially, that should have been the moment that he died. No, he lived for years, and years, and years following that injury. And I don't think that's possible unless you have the assistance of others. Others are bringing you food. Maybe they helped him into a tree and brought him the things he needed to survive. Sure. You know — ward off predators. Throw rocks at predators. Whatever it took to keep him alive that group did it. And that's 3.5 million years ago and something that's not even human. It's an *Australopithecus* is the name we give to that particular kind of ancestor of ours. And he's not the only one. We've got lots, and lots, and lots of examples of — you know — some minor injuries, but other really major injuries. There's a fractured femur from an early human that lived two million years ago in Kenya. And again, a fractured femur should have been the end of that individual. And it wasn't. It healed. Right? And they survived long enough for us, for callus formation and eventually rejoining the group. So, the fossils, you know, they're just these old bones. Right? But they tell these incredible stories of survival and resilience. And in those old bones, you see echoes of humanity.

Dr. Dipesh Navsaria: [00:23:59] You see sort of the beginnings.

Jeremy DeSilva: [00:24:01] Yeah — the beginnings of how we got to be this way. And so, I just love the stories that these fossils tell us about ourselves.

Dr. Dipesh Navsaria: [00:24:09] Yeah. That — to a sense, right — like those prosocial behaviors and establishment of community and community norms was perhaps the killer app — right — of humanity. Right? That allowed for this domination, eventually.

Jeremy DeSilva: [00:24:27] That's right. I mean, initially it was to overcome our vulnerabilities.

Dr. Dipesh Navsaria: [00:24:31] Yeah.

Jeremy DeSilva: [00:24:31] But then, right, it eventually becomes so powerful and so successful that now we're the dominant species.

Dr. Dipesh Navsaria: [00:24:39] Sure. It also makes me think, just going back to what you were saying earlier about how much gorillas, and chimpanzees, or orangutans would basically like be weaning their children — would be remaining up in the trees with their youngest, you know, with the infants and so on. That bipedalism also freed up your hands not only to do the long list of things you pointed out, which I will also point out includes in this modern time doomscrolling and all, but it also allowed you to hold on to your child and carry them — but it also allowed you, when they were able to walk, to hold their hand, right, and keep them from wandering off in different ways. And I think if we just think about right parents in our modern times being out and about with their kids right here. “Make sure you hold my hand,” you know. “Don't let go of my hand,” you know, before they go get lost in a crowd or something. That's not so easily feasible. Yeah.

Jeremy DeSilva: [00:25:39] Oh, that's right. And you know, related to that are two things that I think of where — if we're thinking about Lucy — if you try to imagine a day in the life of an early human ancestor three million years ago, and she has this relatively helpless baby, and it can't quite cling to her, and she can't just throw it on her back like a chimpanzee would do because she's bipedal. She's upright. So, she put the baby on her back. It would just slide right off. And so, she's physically carrying this thing, and she's on a landscape full of predators. And one of the safe places to go would be up in the trees. But how are you going to climb with one hand? Right? Or maybe that's where the food is. There's fruiting trees and she wants to go up and get that fruit. She can't if she's just climbing with one hand. So, what does she do? Well, she gives the baby to someone else, right — and then, goes up and forages for herself. We think of that scenario as well. Of course, that's what she would do because that's what a human today would do — is just, you know, hand the baby to an auntie, or to a grandparent, or to a partner, or to an older sibling. That's unheard of in chimpanzees. Chimpanzees would not do that with a newborn. That would be quite risky for that particular newborn — to hand it off to another individual in the group who might do it some harm.

Jeremy DeSilva: [00:27:02] Sure, that is possible. And so, that scenario right there — the origins of bipedalism. Just by being vertical, you now have this relationship with how we handle our babies and we can see those kinds of

scenarios that you're talking about even in fossil footprints. So, there's this amazing set of fossil footprints, and this one happens to be from Homo sapiens — but Homo sapiens thousands of years ago. And it's just a single set of footprints walking through a mudflat. And one of the legs is kind of sticking out to the side a little bit. It looks like maybe the individual might be injured or they're doing something. They're supporting something with that leg almost acting like a crutch. And then, in that trackway of footprints, right next to that individual, suddenly are two tiny little feet. So, she or he put the baby down just for a second, left little footprints, and then scooped them back up and off they went again. And so, fossil footprints — kind of like the bones — bones capture the whole life of an individual. But footprints, these magical snapshots into a moment in time, in an individual's life — and so, we can see there, thousands of years ago, this individual going on a journey with this kid — and then that kid leaving its mark on the world thousands of years later without even knowing it.

Dr. Dipesh Navsaria: [00:28:34] Ah, amazing style parenting. Well, I want to thank you so much. This was such a fascinating exploration of — I never realized that we would. We would be able to find all this, these glimpses into the world of human parenting and how it evolved over the millennia available to us in so many ways. So, thank you so much for spending this time with us and explaining this.

Jeremy DeSilva: [00:29:06] It was a pleasure. Thank you so much for having me.

Dr. Dipesh Navsaria: [00:29:12] Welcome to today's 33rd page or something extra for you, our listeners. So, talking as we did today to a paleoanthropologist made me think about children and those prehistoric times. And while, yes, I'm completely aware that the time periods he was talking about was well after the age of dinosaurs — so please don't send in angry letters correcting me — I thought I'd share this poem called “The Age of Dinosaurs” by James Scruton. “There are, of course, theories about the wide eyed, drop jawed fascination children have for them — about how, before he's learned his own phone number or address, a five-year-old can carry, like a few small stones, the Latin tonnage of those names: the prefixes and preferences for leaf or meat. My son recites the syllables I stumble over now, sets up figures as I did years ago in his prehistory. Here is the green ski slope of the Brontosaurus. Back there, a triceratops in full gladiator gear. From the arm of a chair, a pterodactyl surveys the dark, primeval carpet. Each has disappeared from time to time — excavated finally from beneath a cabinet, or the sofa cushions, only to be buried again amongst its kind in the deep toy chest — the closed lid snug as earth. The next time they're brought out to roam the living room, another bone has been found somewhere, a tooth or fragment of an

eggshell dusted off, brushing away some long-held notion about their lifespan or intelligence. Warm blood or cold on the floor, they face off as if debating the latest find. What part of which one of them has been discovered this time, or else? They stand abreast in one long row, side by scaly side, waiting to fall like dominoes. My sons toss tennis ball — a neon yellow asteroid, his shadow a dark cloud. When he stands, his fervor for them, cooling so slowly he can't feel it. The speed of glaciers may be how one age slides into the next.” And that's today's 33rd page. You've been listening to the Reach Out and Read Podcast. Reach Out and Read is a nonprofit organization that is the authoritative national voice for the positive effects of reading daily, and supports, coaches, and celebrates engaging in those language-rich activities with young children. We're continually inspired by stories that encourage language literacy and Early Relational Health. Visit us at reachoutandread.org/podcast to find out more. And don't forget to subscribe to our show wherever you listen to your podcasts. If you like what you hear, please leave us a review. Your feedback helps grow our podcast community and tells others that this podcast is worth listening to. Our show is a production of Reach Out and Read. Our producer is Jill Ruby. Lori Brooks is our chief external affairs director. Thank you to our founding sponsor, Boise Paper, for making a difference in local communities like ours. I'm your host, Dr. Dipesh Navsaria. I look forward to spending time with you soon. And remember, books build better brains.