*Love Nature: The Biophilia Podcast*
North Carolina Museum of Natural Sciences
Episode 1

Narrator: Welcome to Love Nature, the biophilia podcast from the North Carolina Museum of Natural Sciences. Now here are your hosts. Dr. Eric Dorfman and Dr. Dan Dombrowski.

Eric: Welcome to the first inaugural episode of Love Nature, The Biophilia Podcast. I am Dr. Eric Dorfman, the Director and CEO of North Carolina Museum of Natural Sciences.

Dan: And I am Dr. Dan Dombrowski, the Chief Veterinarian at the North Carolina Museum of Natural Sciences, and I am excited to be here. I think this is going to be a great opportunity and a fun conversation about love for nature and biophilia.

Eric: And for the many conversations, we've had already this a topic that really resonates a lot with both of us. And for me, I think being a Museum that sort of connects hearts and minds, especially with a science and conservation focus, really this kind of our space isn't?

Dan: Absolutely, I agree totally. I've had a wonderful opportunity working at the museum being a veterinarian working with species that are a lot of times wildlife species or wildlife cases or exotic species. And so, I get to work with some really interesting cases, a lot of interesting animals, but I also get to educate and work with our Museum public.

Eric: Right, yes you do. And for those of you who haven't been to the museum, Dan's veterinary clinic is actually covered in glass, well it's got a big window and the public can come in and see Dan and his team working and doing procedures on the animals. But let's step back a second and think about what biophilia is to begin with. In 1984 Dr. E.O. Wilson wrote the book, *Biophilia*, and in it he defined that term as our innate connection to Nature, human's innate connection to Nature. What do you think Dan?

Dan: It does, and I think he really hit on a few points. That we're part of nature, right? We're a part of the wildlife and a part of the wilderness. We have a long history with nature, and I think it's good for us to recognize that connection and celebrate that connection. I find that a lot of times it's easy to get a little disconnected and think of nature as a an aquarium or a glass bowl, that's somehow separate from us, but I try to work hard to introduce people to concepts and ideas and all the cool stuff that's happening out there around us. And I think we're really a part of that and part of that process. It's good for us. It's good for our health, good for our societies and communities and really are our existence here on the planet. Right?

Eric: Absolutely. And of course, that really brings up the idea of what is nature? Are we nature? Is nature out your window? Or is nature something you have to drive to? For instance, if we are biological organisms, then our houses should in some ways be part of nature, you know? So, there's so much to think about and to explore. And of course, Biophilia, since 1984 has been the subject of things like art and architecture and there's biophilic design. So, over the course of

this podcast will be inviting all kinds of people in who have different perspectives on biophilia and having some really exciting conversations.

Dan: Yeah. I think we'll introduce a lot of folks that have their own angles or perspectives on nature, and they may be scientists or authors or folks that are just sort of out there in the world doing things that connect to nature. Maybe architects that bring nature into buildings and I think it'll be a great opportunity for us to meet them and get to know them and introduce them to our listeners.

Eric: And of course, later on in the show. We'll be having Dr. E.O. Wilson as our inaugural guest. The author of *Biophilia*. And of course, so many other books. So that's going to be a fantastic interview really.

Dan: Absolutely in that brings together our science and nature kind of in one in the study of biodiversity. I think that's a really important aspect of hopefully what will go into in the podcast in the future.

Eric: And we of course have been discussing different things that would fit into biophilia even things like house plants and pets and backyard conservation and nature art, which I can see actually here. Of course, we're doing this remotely being good social distancers and I can see in the back of Dan's wall. There's some nature art there behind him and what are those? I've actually been meaning to ask. Are those Boy Scout badges or something?

Dan: Oh, that's so funny. I don't know how much view you get here but those are actually Wildlife patches actually from Pennsylvania.

Eric: I was going to say that they've got a keystone shape to them, so I thought.

Dan: They do they do. These are mostly non-game species the series of patches that they came out with in the state of Pennsylvania and have lots of cool reptiles and amphibians and fish.

Eric: Oh, how cool that's wonderful and well this is the thing too isn't it, that our connection to nature not only take so many forms. But has so much nuance you know, there's the being out in nature and digging things up and counting things and whether it's through the dirt of the sand or diving and watching stuff. There's all that kind of thing, but there's also the way we choose to bring it into our homes through our pets through the art that we choose to put on our walls.

Dan: I always think about when we talk about biophilic design, I think about here in North Carolina at the coast, you know our coastal development and a lot of that especially from maybe 40-50 years ago a lot of those homes and buildings were really built so that they interacted with the coastal environment with the wind and the air and views onto the water. Their usually materials that are you know, very sort of natural materials that kind of blend in well, and so that's what I was think about when kind of the beginnings of that. You're in those homes and you just really feel like you're a part of the outdoors. You can feel the air and smell

the all the smells sights and sounds. Kind of like they're really right there with you even while you're indoors so.

Eric: Yeah, I know I love that my first home. I was born in a home right on the beach in southern California and my first memory of being there with was seeing Grunion, which are these little fish that breed in the surf right on the sand and they dig little hole in the sand and really need an inch or two of water as the waves come up. And back when I was a kid and they were perhaps more abundant; people would go down and collect them for fry ups. But for me being a little kid and watching all this phenomenon happening right in front of you is pretty special and in some ways, I think the magic of what that was, you know the night with the silvery fish in the flashlights and moon, because they do this on a full moon, was really sort of an image that I have been captivated by my whole life. It's really something that stayed with me and something that's so exciting to think of those powerful and emotive images that everybody probably has, well everybody whose lucky enough to be somehow connected to the outdoors really, I think takes home. And maybe one of the things that we try to achieve through the Museum. What about you Dan, what was an early memory for you?

Dan: Yeah, I would have to say some of my fondest memories are with sea turtles I would say.

Eric: Oh, wow!

Dan: That's something that I'm really lucky to continue to be able to work with sea turtles, but I can remember I grew up in Virginia. There's a Virginia Institute of Marine Sciences is a place where they did a lot of early sea turtle work, research and science and they worked with hatchlings. And when I was in high school actually in a governor's school, we have the science program. We could go out and do internships. I got to work at VIMS or the Virginia Institute of Marine Science with a group of loggerhead sea turtles. And so that was like my introduction seeing those animals and then translating that to the adults out in the ocean and sort of that back then even now there's so much we don't know about sea turtles and about so much in nature that it's just so it's like a discovery, you know, every time you're out making an observation, it could be at the beach. It could be in your backyard and there's just so much to learn that, you know, we need armies of people armies of individuals to be interested to really start to make those discoveries and I think for things like our biodiversity and things that are important to maintain this level of nature that we have the more people we have that we can sort of turn onto that and introduce the better.

Eric: and you still got some work with sea turtles happening, don't you?

Dan: Absolutely, I've been super fortunate super lucky I guess in my position as a veterinarian at the Museum. I work with are other state agencies in the state of North Carolina. Our aquariums in our North Carolina Zoo. Our aquariums are very active in sea turtle rehabilitation. And so, we at the museum that we work out of are able to participate and take in some cases that were cold stranded or cold-stunned sea turtles and even work with those animals to nurse them back

to health and release them back into the wild. So, they were green sea turtles a size that was pretty easy to work with kind of dinner-plate sized and to put it in perspective.

Eric: *laughs*

Dan: *laughs* Well… but yeah, it was a great experience. And again, that really those are one of those memories I have from being, you know being a kid and really understanding and my first introduction to nature and when I knew that I wanted to at that time be a biologist, be involved in science and eventually become a veterinarian. And so, as a veterinarian in a museum, I say I have the best job in the world. I can combine all those things and do things like this podcast and introduce other people and get them excited about the things that I'm interested in.

Eric: What actually made you want to be like, like decide on being a vet.

Dan: I wasn't that great of a student. I didn't have good grades and sort of primary and high school and I did go to college. I was one of the first folks in my family to go to college. I went and studied biology and really became interested in bugs and herps so entomology and herpetology and from there actually became a museum curator right out of college. I worked actually at the Museum before I was a veterinarian and we have a partnership, relationship with the NC State College of Vet Medicine. I met some faculty there and was encouraged to apply and I didn't know if I'd be able to be accepted or get into the program. But I was and turned out to be just the best adventure of my life so. *laughs*

Eric:  Oh, wow. That's great. There's certainly lots of adventures. I've seen this wonderful photograph of you doing a procedure on a tarantula. There are all kinds of stuff like it. It really seems never-ending parade of interesting things come in front of you.

Dan: We at the Museum get to work in our Veterinary Services Group on a lot of exotic species and the unusual animals. And so that might be a spider might be a tarantula that we're doing an exam on or procedure on; it could be some other invertebrate we work with horseshoe crabs and lobsters. We've worked with American lobsters as well or it could be more traditional reptile amphibian those are traditional for us snake surgery any of those are sort of regular part of our day so.

Eric: That's fantastic, you know for me being a field biologist, which I was for a number of years to earn my PhD in out back Australian to in postdoc in South Africa as well as in Northern Australia, the exposure to the landscape and the creatures in that landscape but also in your case, Dan, being able to bring them in and see them up close in many cases, that at least on a personal level, it's really instilled a love of nature that you know the familiarity of the exposure to it and also the desire to protect it and I think that's the other thing that our Museum can do and your Windows on Animal Health as your area is called and really create that sense of familiarity and love I hope.

Dan: Absolutely, I wanted to ask you, so you've really traveled the world. I have spent most of my life on the east coast of the U.S. and in a few states on the east coast. But, what do you think, like what of your travels, you know, you've been all over the world in facilities like our museum and some others not like the museum. Tell us a little bit about that!

Eric: *laughs* So, I did a Master's degree on the West Coast in central California on harbor porpoises, the sort of behavioral ecology is my field of study, so I'm interested in how the environment impacts the behavior of animals in their quest to find food, find mates, stay away from predators and how they're innate drivers make them group together or not group together as the case may be. And so, because my career in science developed, it was really about relating variability in the environment to the predictability and how animals cope with a lack of predictability in their food resources for instance. So, I did this behavioral project in Northern California, Monterey and then moved to Australia for my PhD. And worked form the University of Sydney and split my time up between the East Coast of Australia studying birds, cormorants mostly, and on the East Coast where variability is very low, to the inland interior of Australia where you go through these boom-and-bust droughts and flood cycles.
The cormorants actually fly back and forth between the coast in this very long trip inland to the desert when there's rain. And from there I moved to South Africa where I was looking at the wetlands of the east coast of South Africa. On what predictors of wetland systems made the different assemblages of water birds that you would see and so, you know that thinking about regime's and, and topography and how farmland was impacting. And so even then was starting to think a lot about how farming impacted the environment that the water birds had to navigate. But also, how the presence of wetlands could be important for things like ecotourism and water rehabilitation. So, I mean, they're even then was recognizing here could be an interplay between humanity and environment and actually in Australia. So, I went back to Australia for my second postdoc and that was up in the top end in Kakadu National Park. But during that I spent time on the Great Barrier Reef, which was pretty special and in fact you said that green sea turtles were fairly rare here on the East Coast and there of course there they're the common turtle. So, I've never actually seen a loggerhead.

Dan: Oh yeah!

Eric: Yeah really huge full-grown green turtles.

Dan: Yeah here in North Carolina. We really have a population of loggerheads that are a primary sort of nesting turtles. And so that's the one that folks here in North Carolina are familiar with. Green turtles are common in our waters, but we're really at the Northern edge of their nesting, because they're really a tropical nester. And so, worldwide they're turtles that can be found around the globe but mostly around the band of the tropics for nesting. Those animals we get or either choose juveniles that are growing up or animals that are migrating further North in this case to feed and find sites to feed. So yeah, we'll have to take you out and introduce you to some.

Eric: Oh, I can't wait, that'll be fantastic!

Dan: *laughs*

Eric: So, the thing about the Great Barrier Reef though is that that I was studying these egrets that were obligatory on feeding on, they call them bommies coral bommies that stick up out of the water at low tide. So, they're like little islands of coral. That species over the five years or so that I studied them the population just plummeted where I was in fact, I studied them right around the Pacific and was realizing that they were going to and I thought well, I don't really know why right? But you have to imagine that it could be related to climate change. It could be related to some other conservation issue. And I realized that instead of being an academic biologist as I had been planning to, I really wanted to get more into conservation and that became a primary driver for me. And this gets back to the idea of biophilia to here you are, out there in this incredibly beautiful habitat getting intimately involved with the biology with the lifecycle of one species or a set of species and when you see something like that all the sudden plummet in terms of their numbers

Dan: Yeah

Eric: It's a real wake-up call and that was a career changer for me to move from this sort of academic light that I thought I would be leading to something that was not only more conservation focus, but perhaps more a public basin too. It has been incredibly satisfying to, you know, even something like this podcast where we are wrapping up this big set of experiences that we have and that our guests have, into something where people can connect to well how they feel about nature, why they love it or why perhaps in invokes other kinds of emotion even fear. That's where I think is our go-to place for this podcast.

Dan: I agree. I think that our love of nature if you would and our experiences with nature and wildlife and I think if we can bring that to people and we can find other guests. I want guests to know that we're going to have them and that I'm going to learn from them. There's nothing I enjoy more dogged in a subject that I'm familiar with and hearing something new for the first time. Or seeing something in a new way for the first time. So, I want to share that type of experience with listeners so that we can bring those topics doing these ideas. And I know if we can just give them a little taste of that it improves lives once you recognize those details you can go outside and you can see things around you and you start to make observations and I think it's something no matter where we come from where our backgrounds are. We can all kind of come together on this idea of really enjoying and loving nature and letting it be a part of the human experience and recognizing that we are a part of nature as well.

Eric: I think to me that exactly resonate why we want to do this podcast that well part of it is like you said, it's selfish

Dan: *laughs*

Eric: Because we get to connect with all these amazing people and learn things ourselves.

Dan: I think also the bringing people to science and science to people that's an important effort a lot of what we know tells us a lot and we don't know right so the vast majority of life on Earth the species on earth have yet to be identified or named order catalog. So part of this is just really to help bridge that gap try to coordinate that conversation between you know, the scientists that are out on the edges of discoveries and bring that back to folks so they can be plugged into it is one of our goals in science. And in research the goal is to publish what you find and what that means. Some folks might not even know what that means, they publish those results you write up your report, you do your research, you get the data, you analyze it and you write a report, you submit that to a group of peers that do similar work or are in similar fields of science they review it, they make sure that it is sound and your process is sound and then that's published and that's a long process that leads to a publication that often is read by a lot of other scientists. So, I am hoping that what we can do in our podcast is bridge that gap and make it a lot faster connection between folks that are reading those journals and the actual cutting-edge science that's happening and being published.

Eric: Well this is something that I think is so amazing about our museum too. For those of you who haven't been there yet, one major section of the museum is a series of open laboratories. So, what I mean by that is that they are glass windows and you can come and see people working on their science, doing what they do every day right in front of you. So, they're making discoveries in real time. They're doing the amazing things that in fact is the subject matter for a lot of what we're talking about here. So that's an incredibly exciting thing and what Dan's just been talking about is actually available physically in the walls of our museum, and maybe touch on with this podcast for it to be the virtual museum

Dan: Right

Eric: Like to bring all those amazing ideas out to people across the world and that is incredibly exciting to me. We have Dr. Edward, E.O. Wilson with us coming up, Dan and I are both very excited about this. He's an icon in biology.

Dan: I am very excited. To get to interview or have a conversation with Dr. Edward E.O. Wilson, as I've always called him from his publications and books. I am really excited to get to talk to him about some of his ideas, not only about *Biophilia*. He really sort of sets the stage or really branded this term related to our podcast or integral to this podcast.

Eric: Yes

Dan: But also, this idea of *Half Earth* and what that means with conserving nature

Eric: Right and in fact we will be talking to him mostly about his *Biophilia* from 1984 and his 2016 book *Half Earth: Our Planets Fight for Life*, which is about setting half of the planet aside for conservation for not only the plants and animals that live there, but for the functioning of the biological systems, and of course, both of these books are very thoughtful

and they're very well introspected as well as broadly presenting a worldview in some ways. They're a nice pair of books to be talking about because one written decades ago introducing this new concept and then the more recent book, taking in some ways taking this concept of loving nature and saying how do we use that to connect people to help us survive the next centuries.

Dan: Right

Eric: So incredible and so wonderful that he gets to be our first interviewee!

Dan: I think that you know, he's got some really good ideas that not only are good for nature, but good for people, right? I mean this idea of half Earth and setting aside wild places. Not just for nature to exist separately, but for us to exist with nature I think is really key. So, I am excited to hear what he has to say.

Eric: And the other thing is, he's very committed to young people getting into science. And this is something that to me is also really important and he talks about it especially in *Half Earth*, really trying to encourage people who are thinking about a career to consider science, especially natural history, it's incredibly rewarding often times very adventurous, if I do say so.

Dan: *laughs*

Eric: If you think about conservation as providing us a continuance of the planet to live on that to me is a really compelling statement that he makes

Dan: Absolutely

Eric: So, after the break we'll be talking to E.O. Wilson about his perspectives on biophilia and his books.

Dan: Sounds good!

INTERMISSION

Eric: Dr. E.O. Wilson is a research professor emeritus at Harvard University in the guiding force shaping the mission the E.O. Wilson Biodiversity Foundation in his long career. He's transformed his field of study which has been the behavior of ants and applied his scientific perspective to the human condition, our origins, nature and interactions. He's also a pioneer in efforts to protect the planets biodiversity. It is the author of more than 20 books including The *Social Conquest of Earth*, *The Meaning of Human Existence* and *Letters to a Young Scientist*. He's also the author of two Pulitzer prize-winning books on human nature and the ants with Bert Hölldobler. Importantly for our conversation today in 1984, he wrote *Biophilia* the human bond with other species and in 2016 he wrote *Half Earth: Our Planets Fight for Life*. Ed welcome,

thanks for being our inaugural guest. Is there anything else you'd like to say about yourself before we get into *Biophilia*?

EO Wilson: No that was well done thank you, very complementary. Well done.

Eric: Thank you. No, it's wonderful. So why don't we why don't we kick off a little bit and, start thinking about biophilia from your perspective. How do you or what caused you to bring this all together as an idea?

E.O. Wilson: I had two motivations that joined together and made me want to search for something like this in the 1980s. In 1975, I published a book called sociobiology and it was a treatise on the origins of social behavior throughout the animal kingdom. All which got kudos from biologists mostly but also, I included human beings because I wanted to transmit from what we learn about the rest of life, concerning behavior particularly social behavior, owner transmitted to some useful form to explain human instinct. And that raised quite a controversy to a lot. I was always in mind, as the controversy cooled off. I was always in mind, ways of studying of the genetic purpose of human behavior. Then I've also plan of also was at that time on board of directors of conservation organizations who are just getting a new power and initiative in the 1980s-1990s of organizations promoting conservation and making the public more conscious, but I was concerned… those after having served on a couple of boards of that the arguments made for conserving the rest of life of setting up nature reserves was vulnerable because the arguments that were being made primarily and fundraising and underlying leadership with that business on was were heavily economic. I mean it was, conservation was being promoted as good for business, good for human beings, their welfare, and particularly the systems that we have developed by learning and uh I was vulnerable, so I began to think a lot about the 1980s about a deeper reason. For making a real effort to save biodiversity the rest of life of the variety of the rest of life. And as a result of that I developed a concept of biophilia which is we are innately prolonged not just immediately to have a concern for the welfare and preservation of the risks of life forms. But that we have an innate propensity to learn and feel satisfaction, deep emotional satisfaction from looking out after the rest of life. I found enough evidence of that and logic to make a serious subject and that's when I set out to publish the idea in the book in 1984 or 83 called *Biophilia.*

Eric: And since then it's really taken off as a concept hasn't it? I mean, there's so many Institutes of biophilic design and architects who are using this and artists. How do you feel about this being sort of a lynchpin for so many different kinds of endeavor?

E.O. Wilson: Well my anxiety relaxed somewhat

Dan: *laughs* that's good,

Eric: *laughing* that's good, yes

E.O. Wilson: I saw that the agreement through the notion that we have more than just a learned and cultural propensity to want to protect the rest of life. There's more of that to conservation and the motivation for conservation is something of that I think we've established that and I'm very satisfied.

Dan: So, we're really a part of nature right, so I think that's hard for some folks. It's not just like a terrarium or a fish bowl that we take care of but I think people were a big part of that and it's part of our world and we need to protect it. Just like we protect ourselves.

E.O. Wilson: That's what it comes to now. I believe that pretty well settled down and in the course of human evolution, we had such an intimate relationship to the rest of nature and depended on it as our ancestors did, our pre-human ancestors going back for hundreds of thousands, even millions of years that we have, that they had such intimate relationship to the environment that they developed propensities to learn certain things and value certain things automatically. The result I believe is our emotions evolved in our pre-human state over this long millennia in which human beings came into their present form. And that's how we are guided substantially by pre-human emotional born instincts but among the among those instincts was the one or which I believe included in the concept of biophilia.

Eric: Mm-hmm, yeah. You said something in *Half Earth* that I thought was fascinating, which was the idea that our modern garden aesthetic is trying to recreate the savannah that we evolved on and that it was thinking about it in the kinds of landscapes that we love that we find stimulating, is the same structure that you find in Africa as it was fascinating

E.O. Wilson: That phenomenon of habitat selection, what people everywhere at least people that have been tested everywhere consider their ideal environment that they like to be in these studies conducted primarily by a team at the University of Washington. I showed that what people almost everywhere they're tested for an environment. That matches pretty closely with that of Africa and Africa going all the way back to the period of in the time in which human beings were evolving and that has the features of one grassland or something like it or savannah grasslands with copes of woodland scattered here and there. That covers a good deal of Africa. Next this your habitation is ideally all a little bit of an elevation. I look out over that and finally next to water. That's what people innately prefer if they can choose where they live.

Dan: That sounds perfect to me if that's exactly how I want to live *laughs*

Eric: *laughs* that sounds ideal doesn't it

Dan: That's right. And you just said a minute ago if that's the time that our emotions were evolving as something we can recognize as being human today. It makes sense that it all is connecting, is it, I hate to use the word archetype because I'm never quite sure I get it right, you know *laughs* but if there is one maybe that, that's it?

E.O. Wilson: Part of this is from the obvious evidence of people living in cities and grew up in cities having their ancestors having lived generations in and around cities have a strong tendency to go out into nature. Natures hard to identify but basically, what it is, the environment existed before humanity became what it is today.

Dan: So, if we have this connection because I think some people don't recognize it right. I think some people have been kind of shut out from nature in a way that if we can just open the door and kind of reintroduce them. I think that will be better for people, for their health and for the environment and for nature itself, what do you think? Like, how can we get people to really recognize that connection?

E.O. Wilson: We're already doing it you are involved in it and by having kind of a truthful and moving exhibitions we have in the best museums and also our gardens and zoos. These are highly developed in Western cultures particularly and that's the starter but also by studying human behavior in evolutionarily historical terms which brings us pretty quickly to our relationship to nature and having that as just a general education. I believe that this is a lot easier to do, that latter part and many people would think. When they first began to worry a bit about the problems, there are things in it that make us very interesting such as our automatic fight created by snakes and spiders.

Dan: That's a good one. Actually, I'm a veterinarian. I work mostly with reptiles and amphibians and even bugs and invertebrates. So, I love where you've written about your adventures with snakes and kind of that idea that people have this kind of excitement or this like this innate reaction and I think even people who like those animals probably feel a little bit of that excitement as well. I've really connected with that in your writing.

E.O. Wilson: Oh, yes. Snakes make excitement. Some parts of my preparation in life, I didn't realize I was doing it in my teens. Growing up in Southern Alabama where there are 32 species of snake

Dan: That’s a great snake place *laughs*

E.O. Wilson: I will say I developed a fascination with and collected as many as I could keep some, in captivity and I’d let them all go, and it was very exciting to me to work on them. But we know now that people are afraid of snakes generally and have an innate powerful fear of snakes. Ophidiophobia it’s called. If as children, they are exposed to snakes in an unpleasant way such as having something like a snake or rubber snake dropped on them or spurious stories about snakes and they acquire that way, if they're ever going to have it, a deep fear of snakes and even an abnormal fear of— or a true phobia. Where they have a strong physical reaction to just fight all the reality of a snake that originated probably from the fact that snakes are in primitive areas with a lot of forest particularly in the tropics the calling the mortality.

Dan: Yeah. I’ve been wanting to ask Eric what his thoughts on snakes are

Eric: Oh, I love snakes!

E.O. Wilson: *laughs*

Eric: I kept a couple; I had a python and a boa constrictor, both small over the years. I'm a huge fan of snakes. But you know, it's interesting because, thinking about how we can love or hate something in a species or a group of species on a visceral level, something that you wrote in *Half Earth* that really resonated with me a lot was about how a natural historian can almost develop a romance with a species or group of species and I did my PhD on cormorants and anhinga, especially cormorants are a sort of species that are persecuted people hate especially fishermen, and I have this absolute love of them. You know, I love to see every species of cormorant in the world eventually and when you know their behavior and the nuance of what they do and how intelligent they are. They can solve problems to get fish and this is exactly, you know, how do we create a love instead of the phobia that people have of spiders. Which is another thing that I love. I really find them, especially the salticidae, the jumping spiders. I just have this real admiration for them. How do we get people to have that exposure and that love of what they see around. As opposed to coming in contact with it and having instead of that primal love, the primal loathing that you were just talking about.

E.O. Wilson: I think a way to do it is to introduce biodiversity and field trips to study and see biodiversity in the early stages of education even going back to the grammar school. We worry and talk a lot about bringing more young people into science. We don't know exactly how to do that. I have suspicion on my part of the importance and magnitude of what is called STEM. That's for science, technology, engineering and mathematics. Young people sort of forgiven the notion from the rule of STEM as a teaching principle that if they want to be, say biologist or things like to me ecologist, especially those they have to make it through schools by means of STEM. I will say if you want to be a naturalist if you want to become an ecologist and really learn a lot and do a lot then sorry, unless you're willing to work really hard. You've got to learn biology

Eric: Mmhmm

E.O. Wilson:  And in order to learn biology, you've got to learn chemistry and don't forget that chemistry is undergirded by physics so, we're gonna have to learn some physics. And certainly, we recognize what this time that none of these are probably going to be properly mastered, even at an amateur level without an understanding of mathematics.

Eric: Mmhmm yeah

Dan: *laughs*

E.O. Wilson: Training periods, you're playing out for most kids. I think a completely different view I say that, I think, I hope. This would be my answer anyway to it, doesn't matter the way you're raised. The best way to introduced young people to science and get them doing science

and getting them the want to be scientists and in addition taking an interest in other species and nature and developing a real love of it so that they are preparing with pleasure to develop more STEM as they go along in high school and college education. The way to do it is to take them out on field trips for teachers to engage young people in field. In which they see nature and they discover things and they hunt for certain things. There's an activity called Bio Bliss.

Eric: Yeah, that's great.

E.O. Wilson: Yeah, I was in on the first one conducted here in the 1990s, people including whatever experts could be recruited, on different kinds of animals spiders, snakes, butterflies, whatever go out for one day into a designated area and see how many different species they can find in order to, well just for the pleasure of it then to meet and talk about them if they've set some kind of record and the like and young people are invited to participate with that. That's the way, along with other methods of having research projects, field trips that can be done even as early as grammar schools to find things to see things that you'll bring young people more easily and naturally into the study and the love of nature.

Eric: You talked a second ago about STEM, in *Biophilia* you were writing about the sort of interplay between art and science. So, I'm wondering if you have any thoughts on STEAM. I mean the science, technology, engineering, the arts and mathematics that, that sort of subgroup of STEM.

E.O. Wilson: Yeah. I admit I'm pretty biased because my mind is on conservation and biodiversity. In fact, I had another motivation in the 1980s when I started writing on this aspect of human behavior. *Biophilia*. The practice as it was going on in the 1980s and the conservation organization. I was on the board of directors of several of them from the 80s and 90s and almost to the present time and I was worried they were not doing the job that they could be doing. That it was too early or too easy to overturn the results of conservation and as I mentioned earlier there was that inspired me to take up the subject of conservation scientific subject.

Eric: One of the things that I think about a lot being in a museum is that you know, we have these essentially artistic spaces that we interpret, that we use to interpret the world. And is there a way to loop in say fine artists or other aesthetic mechanisms to either send people out to nature or interpret nature kind of as a portal? That's something I thought about a lot what our place or our role is as a museum.

E.O. Wilson: I'm talking to an expert.

Dan: *laughs*

Eric: *laughs* I don’t know, I think…

E.O. Wilson: I am not very good at advising experts but I'm sure you're doing the right thing. I believe probably that you draw people in with extraordinary exhibits which you can advertise being exceptional and that can be some kind of extraordinary material you can put on display. But also, you can bring people in and when they're there you can teach them a lot and as well as perhaps help guide the young people with the principles of ecology illustrated by the material that you have there.

Eric: We were very lucky to have filmed a couple of years ago. You did a wonderful program in our daily planet theater where you were talking to young people about science and it was really such a charming interaction, especially with their questions from around the world. For me that was a huge treat. I'm so glad that it's still available.

E.O. Wilson: Yeah, I am glad to hear that. Part of the attraction of the outdoors and nature for the inspiration to learn about science comes from the ability to make discoveries almost immediately.

Eric: Yeah

E.O. Wilson: Those discoveries are exceptionally striking when you have something to promote for a very large general audience. But the fact is that there's so much new to discover all around us. It's estimated that there are, on the planet, about in order of magnitude 10 million species of different kinds of organisms, land and sea and the number that have been discovered a diagnostic and that is given study all these main characteristics of and given a scientific name is just a little more than 2 million. So about four-fifths, 80 percent of the species on Earth.
Of plants and animal and to some degree of microorganisms about which we know extremely little. About 80 percent remain to be discovered. I can, if we were together and you have a little bit of grass has been growing for a period of time or a patch of woodland near the museum.
Eric: Yeah

E.O. Wilson: We could go out together. Take up leaf litter, some soil, and get out the very small organisms we find in there, mites, a little wasp, maybe even ants and with the help of specialists who know how to identify them, discover at least one or two new species. Anywhere you go. This is a notion I think that somehow should be implanted by exhibitions in museums and even zoos.

Dan: I agree. I think that's a really good concept and what a great way to get kids involved in science and making discoveries. I think just as you said, I've seen in medicine, so in veterinary medicine when I work with bugs or invertebrates, so we do medical exams and medical procedures, but this stuff is never been done before. So, at our Museum our clinic is on display and folks can interact with us. And so, they literally can make discoveries you know. This is like the first time this has ever been done and there could be a family with a couple kids and a couple of adults right there with us making discoveries and I think that's a great way to pull people into science.

E.O. Wilson:  Also, to get the New York Times to stop making this a big story. Like the new species is discovered.

Eric: Why do you think?

E.O. Wilson: Well what they tend to do is headline a discovery of some kind of organism that people know about usually a bird or mammal and present a big story that a new species of animal or new species of plant has been made by the expedition perhaps in Ecuador or in Thailand and make a story out of it. I think that's probably over doing it. I think it should be a different way

Eric: Interesting

E.O. Wilson: Such as 13 new species discovered in Central Park

Eric: *laughs* yeah, right

E.O. Wilson: of wasps

Dan: Unfortunately, my wife is quite a naturalist and we've been married for a long time. We went to high school together. Anyway, she loves to work in the yard and sort of document nature in the yard, and she has posted these pictures of a little spider. This is a crab spider that she's posted and apparently maybe a new species. That's what that's what the folks that follower the experts say. So, you know, even in your backyard, just anybody can have an opportunity!

E.O. Wilson: That's very true and jumping spiders incidentally need experts. These delightful little spiders who only build partial nest and do most of their hunting not by waiting for something to fall into their nests, but going out and hunting

Dan: Right

E.O. Wilson: Are extraordinarily interesting creatures. They're everywhere and there are large numbers of undescribed species, new species where in many parts of the world particularly in tropical parts. I've been told there's a possibility of jumping spiders ranging a good way up Mount Everest, probably with new species

Dan & Eric: Amazing

Eric: Good career

Dan: *laughs*

E.O. Wilson: If anyone, if there are young people listening and they want to get started on a group of organisms, that they could become experts on and the be important experts doing really original research and making new discoveries by the time they're in college. That's one of the group's I would suggest, jumping spiders. Another group of, the ones that are the most abundant, among the most abundant, those are the springtails. They are little slender creatures that you find under rocks and soil and on the top of snow sometimes and they are largely unknown around the world. We need experts on Springtails.

Dan: That's something with springtails, folks that have aquariums in their homes and have like aquarium filters and a little bit of flow surprisingly there will be whole colonies of springtails that live just under the light or the you know, the enclosure top of their aquarium.

E.O. Wilson: That's interesting. Recently the Russians attempted to bore through the Antarctic ice shield to lake Vostok, which is freshwater lake a million years old trapped under that ice shield, and succeeded and they brought up the first water and organisms in it and incredibly the first organisms that came up that have been down under that Antarctic seal in the water there were springtails. We know that some springtails are aquatic they can live in water many are in other extreme environments and we need, if any young person is listening who's thinking about jumping spiders salticidae spiders at this point and are not quite convinced, start thinking about springtails as something to become an expert on when you're still in high school

Dan: *laughs* Good advice

Eric: We are going to have an interview coming up with Adrian Smith whose an insect behavior biologists at our museum. He's been filming springtails in slow motion and looking at their jumping mechanism

Dan: *laughs*

Eric: He collects them off his rubbish bin, it's something, it's all right there just waiting.

E.O. Wilson: Oh, I'm sure there's just a few he's getting are undescribed species. Actually, springtails played a role in my own career. I did what I've just been suggesting in our discussion, with ants. I began studying ants when I was down in Alabama where it has a lot of different kinds of ants and some new to science and very few having been studied anyway, and when I got to the University of Alabama. I was encouraged to continue my interest by the faculty there. I was given a spot for the microscope to work with and I worked out in my freshman year what some of the ants feed on and that included a kind of ant that is very common, new species all over the place on that has long mandibles and I discovered those mandibles are used to capture springtails.

Dan: *laughs*

E.O. Wilson: So, I've had a springtail important career myself

Dan: *laughs*

Eric: Wow *laughs*

E.O. Wilson: I stayed with the ants, but I switched over to springtails, but they're still there waiting and so are many other kinds of organisms, plant and animal including insects.

Narrator: Be sure to catch our next episode where we have the conclusion of the interview with Dr. E.O. Wilson.