

# S3 E1 William Kimler

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## SPEAKERS

William Kimler, Matthew Zipple, Caleb Hazelwood

### Matthew Zipple 00:07

Hello, and welcome to Season 3 of the Animal Behavior Podcast. I'm Matthew Zipple. To kick off the new season, today we're doing things a bit differently. This week, we're launching a new style of episode focused on interpreting foundational texts in animal behavior. Classic texts are often both long and challenging to read and, absent some knowledge of the broader context surrounding a work, it can be hard to know exactly what we should take from it. So to help us all overcome that barrier, the basic format of this kind of episode will be that we all - you and me - read a foundational text from the field of animal behavior. And then I'll host a conversation with an expert on that text who can help us get the most out of our reading experience. These episodes are designed to accompany reading the text, not replace reading, but they also are designed so that you can listen either before you read, so you have additional context, or after you read so you can gain deeper understanding of what you've already consumed. We're going to have at least two episodes in this series this season, and probably in each season going forward. But if you really liked them, let us know and we might increase their frequency. Today, we're going back to 1859 to what is really the founding text of all evolutionary fields, Charles Darwin's book *On the Origin of Species by Means of Natural Selection*, and most relevant to animal behavior, we're going to be reading the chapter entitled "Instinct". If you're reading the first edition of the origin, which is the version we link to in the show notes, this will be chapter seven for you. If you're using a later edition, it will be chapter eight. And with that, I'm very pleased to welcome our guest today, Dr. William Kimler, the Alumni Distinguished Professor of History at North Carolina State University. William is an intellectual historian whose work focuses on the history of evolutionary ideas, generally, and the work of Charles Darwin in particular. He writes beautifully tracing the development of evolutionary thought over time, and carefully, but excessively dissecting those ideas and the philosophers and scientists that advocate for them. And hopefully, that's going to shine through today. So William Kimler, thanks so much for being here.

### William Kimler 02:02

Thank you, it's a real joy to be able to talk about this.

**Matthew Zipple** 02:06

Our topic for today is instinct. But before we get there, I want to start with Darwin by positioning him in a scientific historical context. So in 1831, Darwin sets off on the HMS Beagle to perform what will be the five most influential years of fieldwork of all time. And before preparing for this interview, I hadn't quite realized how young he was at the time, but he's only 22 years old. So it helped set the scene of his kind of personal intellectual state at that time, he certainly would have called himself a naturalist. But would he have called himself a scientist, a philosopher, or both?

**William Kimler** 02:41

Yeah, it's a great question. They called themselves natural philosophers, the word scientist wasn't even in use yet. That will come about 15 years later, with the formation of one of those associations to promote science. It was actually coined by Darwin's Professor William Whewell, who gave him much of a philosophical approach to how natural history should work, Whewell was busily writing one of the first foundational texts in the history and philosophy of science. And he had this idea which we now use frequently to describe Darwin's work, this idea of consilience, that all the explanations ought to come together, he used it to justify how Newton was correct. We now know 200 years after Newton's work, that all of his stuff has come to fruition. Therefore, we can see how it all ties together. And Darwin really took to heart this idea, the unification and the connection of things. As a naturalist, he was fascinated by birds. He never missed an opening day of a hunting season for birds. He was good with dogs, he collected insects, you know, he had, you know, collections of press specimens and things, rather typical gentleman's sort of knowledge of the day. He didn't really think of himself even as a naturalist of any professional way, because there wasn't much about the profession. But he was rich. And he had leisure time, he was planning to be a clergyman, what could be better than to study God's creation? And maybe he thought add one little brick to the sort of edifice of knowledge, you know, a new species, a new description of something. But he did get fascinated by geology, primarily on the voyage and became I think his first self-definition would have been as a budding geologist, encouraged by Captain Fitzroy, who was pretty good himself.

**Matthew Zipple** 04:28

And I'm glad you brought up his training to be a clergyman because we really can't talk about the society which Darwin would shape and was being shaped by without talking about institutional Christianity. So talk a little bit about kind of Christian apologetics as an intellectual pursuit, and its impacts on Darwin's thinking, maybe starting with the description of natural theology.

**William Kimler** 04:48

Yeah, natural theology means using the evidences of nature to justify a belief in a creator. So a strong argument for some form of deity, a bulwark against atheism. But in the British Protestant tradition, it became even more central, if you even tried to derive the characteristics of this benevolent deity. And that meant some real emphases following Linnaeus actually, who wrote a treatise in 1750s, on the natural economy, where he had this idea of a balance of nature, in God creating the perfect behavior

and form and location and traits, you know, all the details of each species. So it became a fundamentally fixed species idea, non-evolutionary, with everything in its place. In its role. Is nice for conservative theologians because it puts everything in its place. But also for naturalists meant a deeply pious act of exploring nature of finding God's wonders. And they could get their sense of curiosity, their sense of wonder, their sense of piety, and still be out poking at things. What's really important, I think, is that it makes you focus on detail. And this is a characteristic of Darwin's natural history, he's observant. He sees tiny little detail, he's not a lister, you know, he's not just trying to walk through the habitat and note every bird species, he's stopping and asking questions. What's it doing? Why is it doing that? How's it fitting in? And that natural theologian approach is also an apology for all the suffering in the world? This is one of the prime problems for a theologian, if you have God's creation, and he's benevolent, then why all the disease, death, parasitism suffering? And you know, the standard answer was it serves the higher good, it's for the benefit of all the community, the species, the system. And this is something Darwin's going to break with. So he's training is in the classic. And he maintains that view of a created order by God, well, through his work in developing the Origin of Species, you know, from 1836 to 1859, somewhere in the 1840s, he realizes he doesn't need the designer and drops it, but he stays pretty well convinced of that, overall, coherence of nature.

**Matthew Zipple 07:10**

Right. Okay, thank you for that. So let's turn to the chapter, to instinct. And I asked you to select some excerpts to talk about in greater detail and context. And you selected one that really fits well into this conflict that he's going to have or that he's going to try to avoid with the kind of institutional Christianity that exists around him. So let's start there.

**William Kimler 07:31**

Yeah, so you know, what he had to do in the origin was demolish natural theology in a way, the argument from design in particular, that it's so perfectly put together that it had to have been designed. And the whole point of the natural selection theory is, here's the way it happens by natural law, what he'd been told by his clergyman, professors. Henslow, the botanist, Whewell the philosopher, physicist, mathematician. He had been told by them to search for natural laws to replace miracle as better science. And so we now he's done it. But he wants to avoid the metaphysical questions, he wants to avoid the religious conflict. And so he's very clever in his writing, and the... the rhetoric of the origin is to never really argue against creationism. Simply replace it with his powerful theory. So you should read every chapter of the origin as here's my pitch for why natural selection is powerful enough to do what I'm doing. It's not only logically possible, it's sufficient to do everything. So why does he write about behavior really rather difficult? He's not going to write about humans in the origin at all. Behavior, we immediately start thinking about human behavior and the comparisons to animal behavior. So why would he even want to take it on? And my reading is, it's one more of these attempts to show you, here's something you're going to find impossible to believe. About. Natural selection is power, that he could make behaviors evolve. And I'm going to show you how it's possible. So to start that, he has to confront the idea that everybody knows behavior is from the soul. It's from the Spirit, and he wants to have a materialist explanation. We even see that materialist notion that approach way back in his notebooks in the 1830s. And he writes notes to himself about oh, you materialist, he basically says:

"everybody thinks we are this special thing above all else, but really, you know, the end of our form is coming just like everything else. We are just a mammal that came about like other mammals". So your question is really fine, because he has to approach this behavior, but not engaged with all the discussion about the source of mentality. So what he does is the same thing he does with the origin of humans. I have no evidence. I won't talk about it. There are no fossils that say anything. The origin of life. We have no evidence from the chemists or you know, ideas. I'll say nothing about it. The origin of mentality what he says is, I must premise that I have nothing to do with the origin of the primary mental powers any more than I have with that of life itself. We are concerned with the diversities of instinct. And on the other mental qualities of animals within the same class. Notice what he's doing, they're turning it immediately to like, we don't know the metaphysical deep, scientific answer. So we won't talk about it. I'm rigorous. And what do we turn you to diversity across the comparative classes of animals. Same way we build a comparative argument for seeing the pieces of natural selection building up an adaptation.

**Matthew Zipple 10:38**

Yeah. And so that the mural that he gives that he has nothing to do with the origin of the primary mental powers, when we read something like that from him, should we believe that he actually thinks that or does Darwin expect that his theory will eventually tell us something about the origin of primary mental powers? He's just gonna punt on that topic for now.

**William Kimler 10:57**

I think he's punting. I think he knows that this is the first stage the previous evolution books had been savaged by his colleagues, people, he respected his own critiques of the earlier theories. And in his notebooks, he says. You know, I've read Lamarck, there's basically there's nothing here, it doesn't have an explanation at all. That's the closest he comes to kind of critiquing other theories. He, just as he does with natural theology, he ignores the previous evolutionary theories, because they hadn't provided anything. So thinking of himself as the first salvo, he's not going to raise the difficult problems that are not necessary to answer. So for heredity, for instance, he admits straight up in the chapter on heredity, which comes immediately after the chapter on natural selection. So it's like he's saying. Okay, I've just given you a theory, it's going to require variability, what do we actually know about the cellular biology that you know, what we would call today, the molecular biology, the causal structure of heredity? And he says, really, we don't, but look, all the patterns fit. Everything we do know, doesn't contradict my theory, fuels consilience. Right, it all fits together, no contradictions. And the same way he doesn't know where the mentality comes from physiologically. So he will avoid it. But I think we see in his approach, since he thinks of it as being piecemeal. It's like anatomical evolution. It's like any other adaptation, it's parts of the body that change under selection pressure, if they provide advantage. So he's willing to see a kind of, what would you call the individuated pieces of behavior, which would make you think he's got a theory of the mind is like stages or something heading on, he never writes that out. But his proteges do, they will tie it much more to phylogeny and development. I think he thinks that but he's just not going to do it.

**Matthew Zipple 12:53**

I want to move on to talk about awe. So let's read that next passage. And then tell us what role the experience of wonder really plays in Darwin's thinking.

**William Kimler 13:01**

I may put a little more context in it besides the awe which is, he's always going to attack the difficult problems, he'll draw you in with either common knowledge, like everybody knows about dog behavior or something like that. And one of those prime examples had been the perfection of the hexagonal cell, in honeybees. And so Darwin is going to take this one on, because going all the way back to the early 1700s in a marvelous book by Friedrich Lesser called Insecto-theology. You know, the idea that even the pests of the world your insects, even they show God's beautiful designs and here everybody knows this honey bee story, and so he starts off reminding you about it. He must be dull man who can examine the exquisite structure of a comb so beautifully adapted to its end without enthusiastic admiration. We hear from mathematicians that bees have practically solved a recondite problem and have made their cells of the proper shape to hold the greatest possible amount of honey with the least possible consumption of previous wax in their construction. Grant whatever instincts you please. And it seems, at first, quite inconceivable how they can make all the necessary angles and planes or even proceed when they are correctly made. But the difficulty is not nearly so great as it first appears. All this beautiful work can be shown, I think, to follow from a few very simple instincts. And there we see him, you know, telling you how the problem should be approached. After laying out the theory in the first four chapters, he starts to lay out the difficulties, and each one becomes ah, I can show you how it could work. Michael Ghiselin pointed out in a book called The Triumph of the Darwinian Method how this is constantly a bit of a almost satire you know, the Darwin's undercutting natural theology, he frequently uses their very own examples of perfection and design and takes them on and shows you here's a possible scenario of evolutionary steps. Here's how a selective regime would build such a thing. And so now the honeybee becomes that. It's a classic example. Everybody knows it. It's inconceivable. Let me show you how it's done.

**Matthew Zipple 15:11**

Okay, but of course, alongside the awe inspiring, Darwin also saw behaviors in nature that he found repulsive, and that he described in wicked moral terms. So let's move on to the next passage. And then please tell us a bit about Darwin's beliefs regarding the relationship between nature and human morality

**William Kimler 15:28**

Well, so one of the other examples he's going to take is not so familiar in the literature. And so this one he actually introduces by pointing out that it might seem almost unbelievable, but he's got another sly reason for doing this. It's about slave making instinct in ants and species capturing another species and using them as workers in their nests. Darwin wants to always attend to the things that the natural theologians wanted to avoid, they answered the problem of suffering by this greater grand purpose. But

natural selection undercuts the greater grand purpose, things just all got built for their own advantage. So many of the examples in the difficulties chapter are trying to show you how this is not for the good of the species, this is good of the individual who possesses the variant trait. And in fact, he frequently will drop in this little bomb that says, if this could be shown that any species ever has an instinct or behavior or an adaptation, you know, that's for others and not for itself. My whole theory is wrong. And then he of course, tries to get you to not think that it takes you away from that. So slave making is one of these ones that he's going to bring out because, as he did in discussions with his friends, we see in his correspondence, he would like to believe in the design and benevolence of the whole world. But as he says, there is too much suffering. And when he discusses that he'll raise things like insects that eat their way out of their host animal while it's still alive, you know, the suffering of predation, what the Victorians had already called nature, red in tooth and claw, not Darwin's phrase, they already knew there was lots of death and mayhem and struggle and suffering. And now Darwin saying, "no, that's natural", that comes about, but as a human moralist, he's appalled by some behaviors. He's a pretty gentle kind man, and abolition is one of his and his family's long held traditions, going back to his grandparents, as you know, abolitionists, stop England having the slave trade. So Darwin is appalled by this parallel of slave making and ants. And it's the one place in the chapter where we start to see the language he uses sounds more human. My attention was struck by about a score of the slave makers haunting the same spot. He's out looking at, at an ant nest and following trails and things. They were evidently not in search of food. They approached them were vigorously repulsed by an independent community of the slave species, *formica fusca*. Sometimes as many as three of these ants clinging to the legs of the slave making *formica sanguinea*, the latter ruthlessly killed their small opponents and carried their dead bodies as food to their nest, 29 yards distant, but they were prevented from getting any pupi to rear as slaves. So you know, here we get this, you know, it's violent, it's ruthless. Well, he doesn't really think the ants have any motion of ruthlessness, but he's going to use that language. And I think what he's doing is he's appealing to the abolitionist sentiment, and saying, It's not natural for us to be slave makers, maybe these ants do it. But we're appalled morally, in a subtle way, he's refusing a direct line from nature, to our behavior as morality, a problem that will be running through evolutionary biology ever since.

**Matthew Zipple 18:46**

Right? And that understanding the Darwin had that nature and evolution can't inform our morality makes it all the more twisted that Nazis and scientific racists would then claim Darwin's work as supporting their ideologies.

**William Kimler 18:58**

Right? And he calls it you know, so extraordinary and odious an instinct is that of making slaves. So Darwin's notion is that we have the capacity to be above nature. Other evolutionist joined him in this, you know, Thomas Henry Huxley famously rejected eugenics and other sorts of things, because he said, basically, you know, when I grow a garden, I water all my plants. But of course, we know, the selection was used as that justification for many hierarchical and struggle, perceptions, eugenics, social Darwinism, and there's a long literature now of Darwin's responsible for it sort of the rise of this thinking, but that's not Darwin himself. And it's not in this book much at all. Where we really get to see Darwin

talking about the evolution of morality is when he finally turns to humans in the *Descent of Man* and the *Expression of Emotions in Man and Animals*, two books of the 1870s, where the primary focus is how did we get the social behavior and communicative behavior of humans?

**Matthew Zipple** 19:59

All right. I want to move on to one more. And this next one is my favorite because it's a part of Darwin's approach that I really hadn't adequately internalized before. So let's read the next section and talk about Darwin as an experimentalist.

**William Kimler** 20:11

Yeah, one of the things about the *Origin of Species* is that many people ignore how much experimentation is in it. And we think of Darwin, the observer. And part of this is his later reputation that he was an observing Baconian naturalist, he partly set that up himself, by wanting to fit the standards of science at the time that you'd be this unbiased observer just seeing the patterns of nature. But he's also just an inveterate experimenter, when he does make an observation, he likes to poke at them. So lots of his studies are, oh, I think I see what's going on. Let me separate a population. Let me trace some individuals, you know, let me see if I can figure out how this little mechanism works. Like the release of the polliniferous orchids famously. He, he does lots of little experiments. So on the honey bee, he, you know, acknowledges how inconceivable it is that they could make all the necessary planes and angles. So he watches them do it, you know, they chew and build and move the wax around and build the cell up multiple bees working at the same time, next to each other. And so Darwin starts to think about what is the spacing of the bees is the rotation, what do they do, and then he does an interesting little experiment, he gets wax, and he delivers it to them in the hive. As he says about his experiments, I believe the hive bees have acquired through natural selection, their inimitable architectural powers. But this theory can be tested by experiment, he says, I then put into the hive instead of a thick square piece of wax in a narrow knife edge ridge, colored with vermilion. And then he traces the dye spreading out in the wax, you know, going from this concentrated place. So we can basically see where the wax went, as they built it up and show how they took wax, formed it, put it in another place, built up a wall, and eventually gets a whole account of what they're doing. They're clever, you know, those sorts of experiments you do in basic field course in behavior today, you know, take one observation, control some conditions, trace the animals and see if you can connect it to some fundamental movements or motivations or something else.

**Matthew Zipple** 22:19

And importantly, these were experiments that Darwin was performing in nature, really under conditions that animals have evolved to deal with.

**William Kimler** 22:27

Right. Yeah, so the little experiments of you know, putting an ant in the nest, and if they get recognized, or pulling them out, or disrupting them, they're all going and finding a place out in the garden or out in

the woods, and then doing manipulations and tracking carefully what's going on, some of them in his greenhouse. But yes, lots of these experiments are not isolated, like we think of later, you know, animal psychology experiments, you know, learning mazes, and things like that. No, he's giving them like, what are they doing already, let me manipulate conditions and see what changes, see if I can tease out the pieces. Remember, we're always after behavior is built a little constructs, little units, little bits to see if I can tease those apart.

**Matthew Zipple** 23:11

Right. And related to that kind of modularity of behavior and the kind of gradual changes in intermediate forms. Let's turn now to a section where Darwin is really connecting this chapter on instinct, to the overall argument and kind of structure of the origin.

**William Kimler** 23:28

As this was a chapter meant to be, you know, part of the difficulties chapter and then it got expanded, because in some ways, when Darwin gets on something, he can't help himself and it just develops more and more and more. His way of developing this whole argument should be seen as I'm taking care of one of the big difficulties you're going to think of as a reader, which is that behavior seems one of the most insane things, inconceivable things that could come about. So what he says is in the final paragraph here, no doubt many instincts a very difficult explanation could be opposed to the theory of natural selection, cases in which we cannot see how an instinct could possibly have originated cases in which no intermediate gradations are shown to exist. Cases of instinct with apparently such trifling importance that they could hardly have been acted upon by natural selection. Cases of instincts almost identically the same in animals, so remote in the scale of nature, that we cannot account for their similarity by inheritance from a common parent, and therefore must believe that they have been acquired by independent acts of natural selection. He's raised all the classic objections. In fact, he's so clever, he raises just about every objection anybody comes up with until modern molecular genetics and phylogenetics, I mean, he realizes that his comparative argument looks for these intermediate gradations. He looked across the ant species to show how they were some you know, more or less developed forms of slave making or raiding or using. He looks across the the bees to show that there are gradations in the kinds of hives, they make the kinds of cells the kinds of stories they make. And when you can find a species that's got one part of the behavior, then you can imagine a scenario where you link them together, not that one went to the other. But those are the possible steps because they exist in nature in one place or another. That's his famous account of the eye developing as invaginations of a light detecting spot. It's, it's really marvelous thinking to be the first on a theory, and be already being so rigorous and skeptical of your own theory, that you're putting out all the objections and coming up with really good ones. But of course, he does believe that when we don't see the intermediate gradations, well, because nature is not a full perfect record, geology, in particular, the lack of fossil gradations will drive anti evolutionists for the next century and a half, right? But Darwin knows that fossilization of the evidence is going to be rare, you know, too perfect an instinct well he'll come up with a kind of a correlation. Anyway, it started out as an adaptation for something else. This will see in his later work where, you know, like, for the emotions, that they came from more fundamental things like the smile comes from a sort of antithesis to rage, and you're baring the teeth, but then it becomes



an appeasement signal, right. But it has to be evolutionary steps. So he know he has arguments about these. But they're the important arguments against selection still.

**Matthew Zipple 26:33**

And so is this a common rhetorical approach at the time was to take like all the objections a person could think of, and put them right in the middle of the book, and then address them one at a time, it just seems like the kind of approach that benefits from spending, you know, 28 years writing the book, maybe that he did science that is much less common today that he's able to really think about, like you say, really every possible objection that people the time could come up with.

**William Kimler 27:01**

I think it's a really unusual book. I mean, I think most of his colleagues were polemicists, they had their idea they were going to promote it. And Darwin admits he's pretty proud of his idea, pretty defensive about it wants it to succeed. He laid out the chapter pretty much in his earlier sketches of the book in the late 1830s, early 1840s. And he follows that his idea was, he was going to produce some big, you know, eight volume, my species book, and he, and then he just worked forever on it. So he is able to think of the objections, he writes a note that says, you know, early on, I realized I should make a note of everything opposed to my theory, for I was much apt to forget those. And that, you know, he's recognized as that confirmation bias in his own work. And primarily, I think he's recognizing that he's throwing a big wrench in the works, that he better be very cautious. So there's been a lot of writing about, you know, Darwin's delay, Darwin not knowing these what Darwin was afraid of religion, Darwin was afraid of his wife's religious views. None of these seem to be have much to support them. When you read his notes, his letters, look at his family life, his wife was quite supportive of his work. You know, he wasn't made ill from stress from looking at his work, he worked on it every day. So he's got this sense that he needs to be cautious, because he knows it's new. And it's just so unusual. I mean, few of us are coming up with ideas that go against hundreds and hundreds of years of intellectual tradition,

**Matthew Zipple 28:28**

Right? It would take, I would think, you know, just trying to imagine what that would be like, it would take a great deal of confidence. I mean, you would be constantly doubting yourself, everyone around you think something different. And yet somehow, you're going to have this paradigmatic shift that you're going to lob in there, I can see why one would take a long time to make sure when really believe that.

**William Kimler 28:48**

And I think the structure of the book is unusual. When you pick up this book, you think, oh, it's an evolution book. This is one of the most unusual presentations of evolution every odd because it's the first one that's convincing, there'd been books before. And it's a completely different structure. Everybody else. So let's go back to a great example, which is the anonymous book of 1844, called the Vestiges of the Natural History of Creation, it was a sensation. In fact, that's the title of, of Secord's

book about the Victorian Sensation, it was a runaway bestseller. It was politically charged, and it was a progressive, sort of unfolding history, but chapter arrangement of that book is just perfect. You know, there is the solar system comes together materially like from a dust cloud, and then there's the oceans and life arises and then you have the sequence of the phylogeny you know, coming on land and, and the last chapters are about humans. So you've got that whole parade, you know, from beginning to end. Not very scientific, misusing some of the sort of sequences and things but scientific enough to be you know, attractive. Darwin and his colleagues thought it was not very good science, except for Wallace. Alfred Russel Wallace liked it because it was an evolutionary theory. And he thought that was probably true. But, you know, it didn't really have a way it could work is Darwin's problem. But that whole approached me people write those books, after Darwin as well. And his starts with domesticated animals showing that they vary. And that we can think of evolution by looking at dogs and pigeons. And then he tells us about standard natural economy from the theologians, the balance of nature, the tight niches, everything in competition and struggle reminds us that overproduction happens, you logically get selection. And then we deal with the difficulties. And then the last half of the book is the case studies. What the fossil record should show. What island biogeography shows us, you know, what embryology and more comparative anatomy should show us, you know, homology and analogy. So it's a completely different book, because its argument is, I'm going to show you that selection makes evolution happen.

**Matthew Zipple** 31:00

And he's really appealing to people's intuition, right. He's using very approachable examples.

**William Kimler** 31:06

Yeah, the examples in the first chapter, you know, there's nothing from South America there. It's all English stuff for his naturalist reader who had no dogs and pine trees and roses and pigeons, and all these things. In fact, the Galapagos, you know, famously, supposedly discovered evolution in the Galapagos. Well he got some great case studies there. But they appear, like 300 pages into the book, as one more example of the pattern of islands next to continents showing derivation.

**Matthew Zipple** 31:34

Great. And then the last thing, this is kind of fun. Are you familiar with ChatGPT?

**William Kimler** 31:39

No

**Matthew Zipple** 31:39

Okay, so this is the new AI textual language processor, it generates text. So I asked ChatGPT to write some questions for you. Question one, we'll see if this makes sense. How did the Victorian era as emphasis on progress, and civilization shape the way that Darwin's work was perceived?

**William Kimler** 31:59

I hate to say that AI is brilliant. Oh, dear.

**Matthew Zipple** 32:03

I could not believe when I saw that question, right? That's, that's...

**William Kimler** 32:06

That's I mean, that's really insightful. Because in fact, you know, the problem for Darwin was, his natural selection theory was so logical and so compelling. And his examples, as we've been talking about today are so good. Everybody still wanted to see it in progress, like the books before him had been. And so you know, we have this classic story that Darwin's natural selection theory convinces biologists to become evolutionists. And then within 10 years, they're looking for alternative explanations for evolution, like inner directed developmental, or, you know, the sensecence of the species or genetic mutation, with its own drives in its own directions. And my view is that was all meant to keep the special place of humans as the endpoint and purpose of evolution, and to put progress into it. You know, all that talk higher and lower animals. You know, Darwin doesn't mean for there to be this hierarchy, his evolutionary tree is a branching tree. But you know, the language of reception of that theory, for the next 100 years really, until we really get that hardcore emphasis on natural selection. Yeah, progress has been a, probably the most influential idea hanging on. It's also where you can maintain design, you can keep the creator in nature. And so it had deep appeal to try to turn Darwin into a progressive sort of story.

**Matthew Zipple** 33:24

Cool. Okay. Question two, how does the concept of instinct fit into Darwin's broader ideas about the continuity of life and the interconnectedness of all living things?

**William Kimler** 33:38

Well, for continuity, interconnectedness, yeah, he has an evolutionary tree, you know, instinct doesn't change that, oddly enough, like a lot of the work on expression he'd done before he had the origin fully worked out. So the continuity part instinct is just "yes, of course, it is". Because all of life is a tree, derived. The other part of that question, you know, he really wanted to see a kind of inter gradation, that animals have more of our thinking behavior that we sometimes would acknowledge or think, and that we are more animal like. I mean, he's a materialist. And he's an evolutionist. He wants to see that there's no break. Right? This is our problem, of course, is it a break in kind when you have such a break of degree, I mean, our linguistic skills, our social skills, I mean, we're really different from other species. And this has been, of course, a problem for animal behaviors, how to deal with the human difference forever, you know, we're still working through it. But you know, Darwin wanted to emphasize

that all the pieces are there, and you can find them and they're not. I mean, they're the same pieces. Morphology shows it behavior is just another part of morphology. So AI is half smart!

**Matthew Zipple** 34:52

Okay, so question one, good, question two.. half and half. Question three here. This last one. In chapter seven, Darwin discusses both the innate tendency of animals to perform certain actions and the way that animals learn from experience. How does he reconcile these two seemingly contradictory forms of behavior?

**William Kimler** 35:14

That's a good question again, because in Darwin's day, the idea of acquired character is being passed on and some bit of change, I mean, not completely, because they recognized all the mutational variation and all the oddities. But it was a real mixed bag of heredity theories. In fact, there's like a dozen theories of heredity, you know, until mendelism comes out of sweeps through after 1900. So for Darwin, he's going to acknowledge that habits, as he would call them, could perhaps influence the development of a structure that you know, something done enough, might then be either through selection, or the variants do that better, or maybe even directly, physiologically, would make that become an inherited trait. So he doesn't really want to emphasize the habits because he's trying to emphasize selection could do this, this goes back and forth. His treatment of that problem is different in the Origin, and Descent of Man, and in the Expression of Emotions. I mean, he takes a different sort of emphasis in each of the books, that was a hard problem for them, you know, because they thought they can see behaviors being inherited, when they knew they could like, like, pointing dogs or something. But did it start with a habit? Or did it start with a random variation? You know, they don't know.

**Matthew Zipple** 36:29

Well, that was fun. I think that we'll take a quick break. And we'll come back, we'll switch gears a bit and talk a little bit about your scientific trajectory from field ecologist to historian, and why we should all be reading more Darwin. But first, here's a two minute takeaway.

**Caleb Hazelwood** 36:43

What are the causes of evolution? An obvious answer is natural selection, of course. But what else? How about genetic drift, mutation and migration? These are the familiar culprits that we all learn about in introductory biology courses, but what about organisms themselves? What about their own choices and actions? What about organismal agency? My name is Caleb Hazelwood, and I'm a PhD Candidate in Philosophy at Duke University. My research lives at the incredibly interesting interface between philosophy and evolutionary biology. I'm especially concerned with how biologists investigate, model and explain the causal relationships between organisms and their environment, as well as how these relationships impact evolutionary trajectories. People often ask me what it means to do research in philosophy of biology. They imagine me sitting around and doing lots of deep thinking about what biologists have published and that's one way of doing it. But another way of doing philosophy of biology

is simply to go and talk to the biologists themselves. This methodology is referred to as experimental philosophy. It combines the tools of psychology and social sciences. Tools, such as surveys and interviews, to gain a more systematic understanding of how biologists think about the concepts that feature in their research. For example, in a recent paper published in the journal *biology and philosophy*, I explore whether American evolutionary biologists and ecologists are compelled by emerging criticisms of standard evolutionary models, criticisms that depict these models as having privileged genes and environments and evolution while neglecting the role of organismal agency. Do biologists think such a criticism is warranted? And even if it is, does it have implications for their everyday research practices? These are some of the questions experimental philosophy enables us to investigate. This kind of empirical engagement with biologists is a promising tool and we want to understand the practical utility of a conceptual framework. And that is a tool that can be usefully applied to research in animal behavior. I'm currently collaborating with researchers from Cornell and Emory on a study that uses these methods to survey beliefs about animal emotions among researchers. If you'd like to learn more about that study, or any of the other work I've done in this area, feel free to get in touch with me by visiting my website, [calebhazelwood.com](http://calebhazelwood.com).

**Matthew Zipple** 39:20

And we're back. I'm here speaking with William Kimler, intellectual historian and Darwin scholar. So at NC State, you direct the Thomas Jefferson Scholars Program, which is a very selective program through which students can earn two degrees, one from the College of Agriculture and Life Science, and one from the College of Humanities and Social Sciences. So I want to give you the chance to talk about that program. But I'll ask you to start by describing your philosophy regarding the purpose of education that makes you think that that kind of cross disciplinary approach is valuable.

**William Kimler** 39:48

I came to NC State because I was attracted to land grants that this mission of connecting things and outreach is really good, but also land grants have the best libraries of old biology. And so I came here, you know, to be a historian of biology with as my specialist in the field sciences, natural history, you know, all these people. And after being here a few years, the founder of this program, the Jefferson Scholars said, "well, you're a perfect fit, because you know, you're a scientist, and now you're a humanist. And you know, your work crosses these things, you use philosophy in your history, and you understand the science, we have this program, and we'd like you to direct it", and I fell in love with it, because the students are the ones who have already recognized that every scientific problem is already embedded in a set of social expectations in a social construct, you know, that the the questions you're asking are directed by the interests of society or ought to be, and that it fits for them to go even deeper. And it's not necessarily pragmatic. It's not like, oh, a biochemistry student, then we'll study ethics, because we have to worry about what's the ethics of applying, you know, this new chemical or, you know, genetics students should be doing the ethics of genetics to avoid eugenics? Yes, yes, yes, we do that, of course. But my favorite students are the ones who are like biochemistry and English literature with a creative writing, concentration, writing poetry. And it's that way of having multiple minds, that attracts me that most of us don't think in just one way. And creativity often comes from that odd clash, or that it just comes out of the blue somewhere of a different way of thinking. And then you

start thinking about all the great scientists who have been poets and musicians or, you know, biochemists who are ardent birders. And, you know, it's nothing to do with their professional work, but they're out there doing natural history. And, you know, questions are going to come up from these other ways of thinking, we have narrowed scientific education, in our society into like, you should know what you're doing, I mean, really declare a major to enter college, why not go and explore lots of the great thinkers and workers have had the space to have that multiple mentality. And I think more and more we're seeing in lots of the problems we have that how deeply interdisciplinary they are, and doesn't really matter which disciplines, it's just that coming together in teams that solve so many good problems. And so a little bit of his learning how to deal with your, you know, divergent kind of work.

**Matthew Zipple 42:25**

And I want to talk now a little bit about your personal journey, if that's okay, because I think it's going to be really interesting for listeners. And when we get to this part of the show, I often don't know much about guests lives. But one of the coolest things about the ecology and evolutionary biology department at Cornell, is that every student's dissertation gets printed and bound and placed in one of the reading rooms in the building. So last week, I walked down the hall picked up your 1983 dissertation, complete with biographical sketch. And there I learned, for example, that you were born in Canada, but spent much of your childhood moving around between numerous international locations. I imagine that kind of diverse travel inspired a curiosity about natural history.

**William Kimler 43:05**

Oh, that's true. One of my the earliest photos of me is as a three year old, sitting there in American blue jeans and red t shirt holding a kangaroos paw flower, in the Botanical Garden in Perth, Western Australia, my dad was searching for oil, and we moved all around the world. And it's true an early experience with the diversity of these kinds of habitats, you know, northern Alberta, where I was born, you know, in Texas, in part at times, Singapore, in the tropics, in Australia, and in the Outback and dry country of the West. It led to a pretty much a fascination with being a naturalist, you know, being a bit of a small bit of a collector, we often like to say, you know, each of us sees in Darwin, the Darwin, we want him to be Darwin, who's like me, this is a little dangerous. But, you know, when I, when I read the passages on him poking around with ants, I think of like, yeah, that's what I used to do, you know, just the kid who poked in nature. But, you know, I thought to be a scientist, this being the 1960s and 70s, that you had to be a physicist, or a rocket engineer something. So I actually started off in physics as an undergraduate, and then sort of hit my limits of how much math I wanted to do and to learn, and that the problems weren't big enough, you know, they were. If I'd only known there was a field like biomechanics, you know, and I mean, I would have loved that there would have been that kind of physics engineering background. But that wasn't what at my university, the physicists did, they played with cyclotrons and accelerators and things. Well, so what was I going to do? Well, I was lucky and had an undergraduate mentor, who you know, and I became a biology major because I like that subject. And it's always good to tell your students that you know, you made the C in Bio 101 because that's not your future. You know, I did an honours thesis, you know, doing field ecology. And so then I got a job as an ecologist doing the surveys and things for environmental impact statements. And along the way, I realized I should go to graduate school. And it was just basically I was going to advance as a

professional field ecologist. And Cornell was perfect because they had brilliant people working in insect ecology. So I took a trip to Cornell, and I talked to Dick. And he basically said, What would you do if you join my lab? So I started talking about what I would do to try to look at insect plant interactions, you know, host with these narrow sort of coordinated font of all the things that are on milkweeds. And he just looked into what we're doing next year why don't you join my lab, and about two weeks later, I love Cornell, because well maybe they'll take my degree away now. Two weeks later, he called me and said, you do have like a diploma and transcripts and everything right? You need that stuff. But you know, it wasn't old boy network of like the just, but it was more that someone recognized my interest, my fascination, and then I fit. And then of course, they checked out my background.

**Matthew Zipple** 46:01

Yeah, so that's the part of your career trajectory that's most fascinating to me is that you didn't enter graduate school intending to be a historian, right. So you were this hardcore experimental field ecologist and I would have even claimed as a behavioral ecologist, right. And then it seems those planes took a dramatic turn. So kind of step us through that process.

**William Kimler** 46:19

So I came to Cornell to be this insect ecologist. So I was finding, going along had my field studies from the summers. And then I realized that all the problems that ecologists were arguing over in the 1970s were problems that had persisted for decades and decades and decades, population regulation, balance of nature, and all these problems were philosophical problems that had deep histories. And I realized that there was a historian of population genetics on campus, who was a great evolutionist as well and trained by Dick Lewington in part on his committee at Chicago and that was Will Provine. So I took a seminar on the modern synthesis, and Provine had me said, well, you're my biologist in the room amongst all these historians, you can understand what RA Fisher is saying. what Sewall Wright is doing in this mathematical model, you should be reading them. So I read all these people from the 1930s. And I got hooked. I just got hooked on the intellectual journey of seeing where our ideas come from transform, persist, don't get resolved, you know, all those pieces. And Cornell being Cornell, they said, Oh, you want to do something interdisciplinary, just expand your committee. So Provine became my chair. I kept my ecologists and mathematicians and others on the committee. And then they turned me loose. So I wrote about mimicry, because it's one of the classic foundational support arguments for natural selection. Darwin didn't treat it in his own work. But his colleagues started. My first inclination as a historian was going to be, I'll never work on Darwin, everybody does Darwin, I'm doing Darwin's friends. It sucks you in, meeting him.

**Matthew Zipple** 48:05

Well, and I love that story about taking the seminar with with Will Provine because it really highlights the importance of being in the right place at the right time meeting the right person that then reveals that path that you might not have otherwise had, do you think in an alternative universe where you never met Will Provine, you would have later fallen in love with the history of evolutionary thought by some other route.

**William Kimler 48:28**

I think I had a tendency to want to know the background work. And partly, this was way as well. You know, in our weekly lab meetings, we read classic papers, but I had a bit of a tendency to want to see foundational things and not believing that maybe the arguments have actually been resolved by whatever clever thing we are now doing. So it's possible.

**Matthew Zipple 48:53**

So obviously, you think Darwin is important. I think everyone listening is going to agree that Darwin is important. But actually reading Darwin can be hard and time consuming. And science has advanced just oh, so much, right? In the last 160 years. So why should we still read Darwin?

**William Kimler 49:11**

Well, what fascinates me the most, when I step back from and think, "Okay, put my scientist hat on", it's that we are seeing an action, this broadly synthetic method. This is how to build comparative arguments, by looking, you know, across classes of perhaps animals, you know, looking for these components of behavior. It's a good guidance in how to think from simple steps in ordinary language. You know, it diffuses the difficulty, think about Darwin himself, like you said, you know, he's 22 years old, it's like, get on the ship, go to South America and do some science. I mean, what's he going to do? He's not been trained to other than he knows how to collect, he knows how to preserve specimens. And he knows how to look things up in a book to figure out what species it is right? So when you see see him expressing in the, in his writing the structure of start with a simple observation have a theory that motivates how you're going to look at it. And he teaches you how to think with natural selection. And I think we still have a notion that humans are special. Humans are at the point of the universe, everything's in perfect balance, you know, the sort of Lion King ecology, you know, where everything's happy and in its place, and we don't think about the individual variation and need to look for the, the advantage or the variant or something. And Darwin shows us how to do it. And I love seeing a strong explanatory power, just like seeing reasoning, you know, watching him work out, and how it can work is fascinating.

**Matthew Zipple 50:45**

Okay, so let's say I'm a listener, and you've convinced me I'm gonna go read some Darwin. Now, let's say, What should I read?

**William Kimler 50:52**

Well, Origin is fun. And the you know, the way to read it is sort of skim through the first couple of chapters realizing what he's doing, that he's setting out examples and have a little humility that his readers know all of these, even though they might be new to you, because they're from gardening and, you know, pigeons and things like that. And then the, the language of the struggle for existence and



natural selection chapters is just wonderful how he builds this case, and you can watch him explaining how selections can be a theory that explains both stability and the divergence of things. The difficulties chapter that we talked about is wonderful as a rhetoric, an unusual rhetoric of acknowledging the problems in your own theory and confronting them and trying to sort of out front demolish your own work, the Descent of Man, you know, his later book on behavior, because it's awesome sexual selection, and his expression of emotions are kind of a harder slog, because they become his technical books, of the things that he really wanted to get across. So they're kind of difficult to read, unless you have a guide. So for reading, like introductions, you know, the Princeton edition of The Descent of Man, he's got this lovely introduction from Robert May and John Bonner. And you know, they were they they set it up for you like how to read this, what's going on. And I find these recent reprints really useful. You get some scholars telling you, here's a kind of a guide to what's going on, because you're confronting Victorian prose, and someone's whole different motivation and argument, you know, you have to know why is he writing the book in this way. And what I would suggest is start with some good introductions to what he's doing there. Some of these are rather classic works like on the Darwin death centennial, in 1982, a number of works came out about Darwin. And there's a book edited by David Kohn called the Darwinian Heritage. And Janet Browne, the brilliant biographer of Darwin, has a nice chapter in there about his book on the expression of the emotions, and what he's trying to do there. And more recently, Mike Ruse put together a Cambridge Encyclopedia of Darwin and Evolutionary Thought, there's a number of nice essays in there. And one of them from Greg Radick at the University of Leeds is on Darwin and Humans. But you know, the title is really not very insightful, because what it's really about is how Darwin is using the Descent of Man and the expression of emotions to make a full argument for human evolution. And so if you're interested in the behavior part, Greg's essay is really good, because he's pointing out that, you know, the expression of the emotions is actually Darwin's fullest account of a narrative of how he thinks humans evolved. Because the central problem is not the primate body, that's easy. In fact, the beginning of the Descent of Man is basically everybody else's work showing that we come from primates. The expression of the emotions is the narrative of how we got moral behavior, social behavior and language. So you know, out of these physical features, you know, that didn't get turned into adaptations. The classic great work if you want to read that thick book is Robert Richards. Richards has this magnificent book called Darwin and the Emergence of Evolutionary Theories of Mind and Behavior. And what's good is he starts with the natural theological tradition, he starts with Darwin's early postings on this. Discusses, you know, Darwin's works, but then he traces it forward and what the followers and protégées did, how they're arguing about phylogeny of behaviors and comparisons, the animal mind versus the human mind all these problems that Darwin doesn't do a lot with.

**Matthew Zipple** 54:27

Sure. Well, those are all great suggestions. Thank you. We will list all of those with places people can find them in the show notes for interested listeners. And I think we'll leave things there William Kimler this has been so much fun. I feel like I could happily continue this conversation for hours. Thanks so much for being here.

**William Kimler** 54:43

Thank you.

**Matthew Zipple 54:50**

The Animal Behavior Podcast is created by talented team of animal behavior researchers. We have three excellent content editors, Niko Hensley an NSF, postdoctoral fellow studying the evolution of neuro sensory systems and their impact on animal communication and speciation at Cornell University. Camilla Cenni, who studies tool use, object play, and animal innovation in non human primates. And Logan James, a postdoctoral fellow at the Smithsonian Tropical Research Institute, studying acoustic communication in frogs and birds. Our communications director is Casey Patmore, a PhD student at the University of Edinburgh studying the behavior of burying beetles. You can follow us on Twitter @AnimalBehavPod, or check out our website at animalbehaviorpod.com. Our education team makes lesson plans and classroom materials that you can incorporate into your undergraduate classes. You can find those materials on our website. The Education Team is Emily McLean, an assistant professor of biology at Oxford college at Emory University, Georgia Lambert, a PhD candidate studying parental cooperation in burying beetles at the University of Edinburgh, and Smile Choudhary, a recent Master of Research graduate in Biological Sciences from the University of Exeter, who works on camouflage and escape responses and green shore crabs. Our sound director is Brian Leavell, a PhD candidate studying the evolution of acoustic signals in Ximena Burnal's lab at Purdue University. This season, I'll be recording my side of most conversations in the Cornell Broadcast Studios with engineering support from Bert Odom-Reed. Our art is all produced by animal behavior researchers. Our logo was designed by Adeline Durand-Monteil. Our theme music is by Sally Street, and transitions are by André Gonçalves. I direct and host the show along with my co host, Amy Strauss, we received financial support from the Animal Behavior Society. Finally, if you liked the show, then please help us by telling someone else about the show. And leave us a rating or review on Spotify or Apple podcasts. Thanks for listening. See you next time.