

Ask a Biologist Vol 004 (Guest Pierre Deviche)

The Sounds of Nature -

An interview with biologist Pierre Deviche and his passion for recording some of nature's most interesting animals. Humans are not the only animals that have dialects as you will learn in this show. Dr Biology tests your skills again with a mystery animal quiz at the beginning of this show.

Transcript

Dr. Biology: This is 'Ask-A-Biologist', a program about the living world, and I am Dr. Biology.

We began our last program with a mystery animal quiz that turned out to be both fun and popular. For this show we have a similar quiz, but in this case we're going to play the sound of one of the animals that our guest scientist spends his time researching, and as you will learn in this program, he also records and collects the sounds they make. So let's listen to the mystery animal.

[audio of animal sound]

Now what animal could this be? To help out, let me give you four choices. The first, a pig. The second, a bird. The third, a frog. And for the fourth, none of the above, you came up with some completely different animal.

Are you ready? The answer is: a bird. Yes, this is a recording of a bird called Neotropic Cormorant, and my guest today is Professor Pierre Deviche, who is a faculty member in the School of Life Sciences at Arizona State University.

Welcome to our show, Professor Deviche.

Professor Pierre Deviche: Hello.

Dr. Biology: For our listeners, let me just tell them a little bit about you. Your area of research is avian endocrinology, and you are what we call an avian endocrinologist, or in simpler terms, a scientist interested in hormones. Now, for those of you that don't know what a hormone is, these are little chemical messengers that travel through our bodies, and they are able to turn some things on and some things off.

In the case of birds, Pierre Deviche, he is looking into how they control bird behavior during the time of year when they mate and reproduce. Is that pretty close?

Pierre: Yeah, that is a pretty good description of the kind of research that I do.

Dr. Biology: But for this show, we're going to talk about another passion that involves recording and collecting bird songs and calls. We will also talk about a great place on the Web where visitors can listen to your recordings.

To start us off, I've heard that birds have dialects in much the same way people speak with a Southern drawl or a Brooklyn accent. Is this true?

Pierre: Yeah, this is quite correct. That is to say, you can actually know something about where a bird is coming from, sometimes, be just by listening to its song. So different populations of the same species have different, what we call dialects, depending on where they are coming from.

Dr. Biology: So if birds have dialects, then for bird watching enthusiasts, wouldn't it be better to get recordings from the area they're doing their bird watching?

Pierre: Yeah, generally speaking, this is what you should be doing. If you live in a specific area and you really want to know about the birds that live in that area, you should probably focus on the birds around you, because a bird of the same species that lives two or three thousand miles away might have a song which is distinctly different.

Dr. Biology: Some of the CDs, I went through the bookstore and I have also been looking on the web site since we have actually started working with bird songs, with you, I noticed that they only have one recording. They don't often have more than one recording of the same species. So how important is it to be able to listen to several recordings of a bird's song and/or their calls?

Pierre: Well, I think that really depends on the kind of work that you are doing. That is to say, if you, for example, listen to a robin, well a robin from the East Coast or the West Coast, it's still a robin, and if you know that song you would be able to say that very easily.

However, if you are interested in more subtle aspects of the song, then this is kind of making the difference between the dialects, it's something that can actually tell us a lot and is a lot of fun as well.

Dr. Biology: What do you know, we were talking about dialects here, I also found it very interesting because of our interactions with the bird aviary, that it turns out that birds don't all sing the same song. Is this true?

I mean, if I'm in my backyard today and I listen to a particular bird, will I hear exactly the same song from that species of bird all the time?

Pierre: There is sort of a variation here. Sometimes you have some species in which, for example, a male sings one song, and that's essentially all it does.

You see that, for example, if you go to a pet store and you buy, let's say, a zebra finch, which is a very common pet bird. Well an adult zebra finch essentially has one song, so each male has its own song, and this is the only song that that bird ever produces. But many birds don't do that, and each individual has multiple songs, so there is a lot of variation there.

You can see that, for example, if you live in an area which has, say, mockingbirds, which

is a very widespread bird, and you can listen to a mockingbird for hours and you still pick up new, what you call 'syllables'. So these birds, as I say, are not going to sing infinite, but a very large number of different syllables within their songs, with a song that is extremely complex and very difficult.

Dr. Biology: I have actually heard that, myself. Strangely enough, mockingbirds, I hear them often at night, singing out in my backyard.

Pierre: Yes.

Dr. Biology: And it's kind of curious because, yes, they seem to have an awful lot of songs or calls.

Pierre: Yeah. No, what happens in a bird like in a mockingbird is they are very good at learning new songs. So they will start picking up sounds like cell phones or cars honking, and all sort of sounds like that, that you don't normally associates with a bird, especially; but these birds are really good at learning that kind of thing, and then essentially making that part of their own song. But of course, not all birds are like that at all.

Dr. Biology: It's a good thing, because this one I have at my back door seems to keep me up at night, especially in the summertime.

We have, in the studio with us, two song sparrows, actually, two of your recordings of Song Sparrows. And I thought it would be nice to do a comparison, because this gives an example of a more typical bird. But you can see from the two recordings that they sound quite a bit different, not totally different, but quite a bit, and why it would be important to have more than one recording if you're going to learn the sounds and the calls of a typical bird. So let's go ahead and play the first recording.

[recording of a Song Sparrow birdcall]

So that's the first one. So that's the recording of a song sparrow. Now here's a second one.

[recording of a second Song Sparrow birdcall]

So you can tell, I think, even from that quick lesson, if you were a listener that even though they are both song sparrows, there was quite a bit of difference in there.

Pierre: Yes, I think this is very easy to pick up.

Dr. Biology: And it's also one of the things that you actually, we started talking about doing a bird aviary as a novice, not being a bird enthusiast, I thought you could put one song up and you're done. And I still remember, to this day, your comment was, 'Oh no, no, no. We must have more than one.'

You know, along with these songs, we, as children, as humans, we think about the fact that we learn to speak; it's not something you're born with. Is this something similar to birds? Do birds learn how to sing?

Pierre: Yes. This is something that, you know, this is a topic that there is a tremendous amount of research that has been done on this topic, and it turns out that it really depends on the species that you're talking of.

Some bird species, essentially the song is what we call 'innate', that is to say, the bird is essentially born with that ability to produce song. And as an adult it doesn't really have to learn anything, this is just the way it does it, just like we maybe learn to walk or something like that, we pretty much do that all the same way.

But then it turns out that many other birds actually do have to learn their song. The way that scientists have shown that is by raising some of these birds in complete isolation, without the presence of parents, or without these birds, when they were young, ever hearing other birds of the same species.

And if you do that, what you find is that what these birds do is, they still can produce some kind of vocalizations, but they can never produce the song which is, well, sort of articulated, and what you really associate with that species. So there is definitely a learned component.

Dr. Biology: Now, if they're taken out of isolation, just to clarify this, are they able to then learn the song, or if they don't learn it at a young age they never actually...?

Pierre: Yeah, right. What you see is the second possibility, that is to say, what you observe when you do that kind of study is that birds have what we call, technically we call that an 'open window'. That is to say, they are able to learn the song of their own species when they are at a certain age, and past that age it becomes much more difficult and oftentimes impossible for them to learn it. So this is a very, sort of interesting topic, and in a way this is very much a sight that we see in humans.

That is to say, humans, when we study a second language, and I can take my own example, because English is a second language for me, I know that I will ever speak English like a native English speaker. That is because when I learned English I was at school, and I was old enough that my brain is just working in a way that I can try as hard as I can, but I know that for the rest of my life, each time I go to the store, the first question someone is going to ask me is, "Where are you coming from?" If I say, "Texas" they don't believe me somehow. So yeah, this is very much the same phenomenon.

Dr. Biology: So your brain gets wired at that early stage, and after it's more difficult to work through that.

Well that actually is a curious thing. So learning bird calls at a young age, some of them need it, some of them don't. Do all birds sing and have calls?

Pierre: No, no, no! Absolutely not! You again have a tremendous amount of variation. The birds that have all the complex songs that we typically associate with singing, in birds, are part of a specific family. We call these passerine. So this is like the mockingbird, and the thrushes, and robins and all these things.

But then you have many birds that produce relatively simple songs. And then you have many birds that never sing at all. If I take, like, a duck or a turkey vulture or a chicken, they can sometimes produce sounds, but these are not songs.

Dr. Biology: So some of the birds can sing, some of them can't. Some of them just don't have the type of physiological mechanisms to be able to sing. Do both males and females sing, or is it mainly the male that does all the singing?

Pierre: Yeah, again you have a tremendous amount of variation there, depending on the species. In many species, in most of the species that we think of around us, usually only the male sings, if it sings at all.

Sometimes the female can produce a little bit of what we probably would not even call a song, because it's very simple and not as loud, so basically the females do not sing.

But I'm saying that there is a lot of variation here because if you go, for example, to the tropics, there you find many species in which the male and the female actually have songs that are just about as complex and very elaborate, and when you hear one of these birds sing, you would be totally unable to decide, is this a male or a female, based on the song.

Up here in the United States, we don't really have many species like that, but we've got a few. For example, cardinals. This is a species where the female, oftentimes, can sing as well as the male, from her point of view. So the song is as complex.

Dr. Biology: So this is the Arizona cardinal?

Pierre: The Arizona cardinal is especially red, as we all know.

Dr. Biology: I'm teasing, since our football team is the Arizona Cardinals.

Since your research does not involve recording and collecting bird songs as an avian endocrinologist you're not really focused on that what got you started with recording birds?

Pierre: Well, first of all, this is a fun thing to do. This is something that, even if you are not paid to do it, this is one of these things that I find really enjoyable.

And I think a different reason is that you can actually learn a lot from doing that, because you get back home, you listen to the recordings, and that oftentimes actually really helps you memorize them. So next time you go out in the field it becomes much easier to identify that bird based on the sound, because you heard it 200 times at home before you went out in the field. So there is actually a really practical aspect to that.

The other thing is that I think recording songs and then analyzing them with the computer, I think it really gives you a view like in a different world. I mean, you really

discover how complex these vocalizations are, and how fine-tuned, and how everything is so amazingly complex. It is a really amazing thing.

Dr. Biology: I would agree, from listening to the songs that are on the web site. We're going to talk a little bit more about that.

In the meantime, since you got hooked on this, I bet you we have some young scientists out there that might like to go do a similar thing, is there special equipment needed? Or can you suggest a simple set of equipment that anyone can start with?

Pierre: Well, there are two basic pieces of equipment you need, OK? You need a microphone, and you need a recorder. Basically, the quality of your recordings is going to be much more dependent on your microphone than on your recorder.

Price wise, these things vary enormously. If you go high-end, to like the really professional kind of equipment, you are talking of easily several thousand dollars. But you can really do, at least initially, it with much less money than that, and probably for a few hundred dollars you can get an MP3 recorder and a decent little mic, and that will really get you going.

Dr. Biology: Is there a particular kind of mic that you could suggest?

Pierre: Most people who go out and do bird recordings use what we call a 'shotgun' microphone, and what we mean by that is a very directional microphone, so they really target what is just in front of the microphone at a relatively small angle.

And this is something that in many cases you probably want, because what that does is eliminate a lot of the noise which is sort of outside what you are really interested in recording. So the more directional your microphone, the cleaner, if you like, your recording should be.

Dr. Biology: Very good. If they end up having more questions at the end of the show, we actually have a place for them to send their questions, if someone really wants to try this.

I also want to put a plug in for the bird aviary at the 'Ask-a-biologist' website; I spoke about it a little bit at the beginning of the show. This is a place on the web that people can visit and hear recordings from over 220 species of birds, many of them that are multiples of each bird, that live in the south-west United States, these are your recordings.

And I have to say, after working with him for several years I have become more of a connoisseur, and I definitely think they are worth the visit.

It also includes a lot of basic information about birds, including sonograms of the bird recordings, and in many cases more than one recording of each species as I said.

Is this a project you would have ever imagined that you would have been working on?

Pierre: Oh, absolutely not. When I started with this, as I mentioned a few minutes ago, it was really to have fun out there in nature, and to learn about the birds that surround us. It's something which I always find very enjoyable.

But I think when you can develop that into some kind of program that becomes publicly useful and enjoyable; I think that really adds a huge dimension to the whole thing. I did not think the project was going to go this way five years ago, absolutely not.

Dr. Biology: I noticed also on the website. I say noticed, it's kind of a third person type of thing. I realized that besides the recordings we put on the pictures of the birds and the descriptions. We also do something a little but more unique, and we out what are called 'sonograms' of the recordings, these are visual representations of what the songs or the sounds look like.

And even though you may be used to looking at a sound file on your computer where you see as they time goes it either gets fatter or thinner on the line, and it means either louder or quieter. Sonograms are different from that, because they have this color associated with them. And what I'd like you to do, if you could just give us a quick run-down of the difference between just looking at that time and volume, versus what is going on in the sonogram.

Pierre: Yes, sonogram as you mentioned is really a visual representation of the song, so this is a representation of the song as a function of time. And sonogram is going to give you information about the volume, how loud the sound is, but also about the pitch, which is the frequencies, either high pitch or low pitch sound.

Dr. Biology: Something real basey versus something that's really high.

Pierre: That's right. And where this becomes critical, when you study about song, is that there are many subtleties in a song that you cannot pick up just by listening to it, you have to visualize it. And sometimes that really informs you about fine features of the song, that when you just go out there and listen to it you could not even guess that exist.

And I think it is also very visually appealing in many cases. And I think that people who are listening to us right now, if they actually go into the website and check some of these songs, will, I think, have a clear idea of what I'm talking about, it's very visually appealing.

Dr. Biology: Well, actually when we were talking... Not only are they appealing, I think you mentioned that some can actually look at the sonograms and reproduce the song or whistle it, so to speak.

Pierre: Yeah, this is a very crude approximation of course, because we don't have the complexity that birds have, in terms of being able to produce the kind of vocalization that they produce.

But you are right, if you know how to read sonogram, you can whistle it or try to sing

like a bird, you never get even close, because it's much more complex and different than the way we produce sounds.

Dr. Biology: You did a beautiful job of leading me into a question that I've been wanting to ask, how are they different than humans that they can make these songs that are so much more elaborate?

Pierre: Yeah, so the way that birds produce songs is completely different than the way we produce sounds. And that is to say, they way that we humans produce sounds is by using what we call our 'larynx', which is our sound-box.

Well, birds don't have that sound box. Instead they have what we call 'syrinx'. And it is located anatomically not at the same place as the human sound-box, and it also works quite differently.

And so the way that the sounds are generated by a bird are completely different than the way they are generated in a human. The sound-box, or the equivalent of the sound-box, is just build on a different principle.

And so we can try to imitate the sound that a bird sings, but we can never do the same, we just don't have the mechanical ability to do that.

Dr. Biology: Right, we just don't have the right parts.

Pierre: We don't have the right parts.

Dr. Biology: And before computers came about, which was another that I learned as we were working on the aviary, the movies used samples from birds for a lot of their science fiction movies, because they are so, quite literally, out of this world sounding.

I want the listeners to actually go to our website and pull up the brown-headed cowbird. It sounds like a perfect electronic instrument from the far, far future to me.

So here we are. We've got our avian endocrinologist who has a passion for recording birds. What's it like to go out and search for new birds to record? Is this something where you can just step out your back door, or is it a little more involved?

Pierre: Well it really depends on what you are trying to do. Yeah, you could just step into your backyard and record birds, and you will learn a lot from just doing that.

But of course, after awhile, you will probably want to venture a little bit further away and try to record different kinds of birds, a more variety of things you might not have heard or encountered in the past. So then it becomes a little bit more involved, in terms of time and distance. You'll probably have to drive to new places and begin to look for specific birds that are not seen where you live, and things like that.

So in a way, this is a lot of fun as well because it really takes you to new places and you

discover all kinds of new areas that you did not even know existed until then. It is a lot of fun and it is time-consuming; there's no question about that.

Dr. Biology: Early mornings?

Pierre: Many times, early mornings, yes. Most birds are most active and sing during the early morning around dawn, and sometimes dusk as well. But many birds are definitely active in the early morning. And of course, they also sing mostly in the spring and summer, which is when the sun rises very early. Many species sing well before sunrise, when it's just barely getting light. To get recordings of these birds, of course, you will have to be there at the right time as well.

Dr. Biology: Well I think some of our younger listeners may not be willing to get up too early. But let's go back to your backyard here. We have another set of recordings. What we're going to do is start off with one bird, and we're going to keep adding until we finish up with five birds. Quite frankly, you don't get to hear birds all by themselves, so nicely isolated, and you work very hard at that. So let's just let this one go and let's listen to how complex the backyard can become.

[recording of birdcalls]

Dr. Biology: So as you can tell, it becomes quite complex and quite busy in the backyard.

I'd like to switch to some of the questions I like to ask every one of my scientists and biologists. When did you first know you wanted to be a scientist?

Pierre: Well this is a really difficult question. Because I don't think you get up one day out of your bed and decide that you're going to be a scientist. In my case, I was definitely raised in the countryside, in a very small place. So my whole life, I was in contact with animals, not only birds but also all kinds of wildlife around where I was living.

Eventually you start asking questions about what these animals are doing out there and how they do it. So in my case, it was like a gradual sort of development and getting more and more interested in that kind of question.

Dr. Biology: That's really curious. Even though this is a young program, this is our fourth episode that we've created; it's interesting because the three other people before you all had similar things to say. The most common thing was an interest and love of animals in general. We're going to see if this continues over the year, if that's a theme.

So if you weren't a biologist, what would you be?

Pierre: Well that is a difficult question as well. I've thought of that sometimes, and I think that I'd like to be a geologist or a paleontologist, maybe.

Dr. Biology: Paleontologist.

Pierre: Yes.

Dr. Biology: And so if you have some young scientists listening out there, what advice do you have for them?

Pierre: My advice is to simply look around you. The thing you have to keep in mind is that you don't have to go very far to discover how wonderful and how complex nature is.

If you have a small backyard and you just go out there on a summer day, and you find insects, butterflies and little things like that; then you start observing them; and of course birds as well. You start to discover that these animals are doing amazingly complex and interesting things.

The more you know about them, the more you want to know about them. And I think the key is to always keep an eye and an ear open on everything that is going on around you. I think this is critical.

Dr. Biology: Very good.

I have one more question. What is your favorite birdsong?

Pierre: I would say that some of my favorite birdsongs are among the thrushes that we have here in North America. Some of these birds are producing the most amazing songs, not necessarily the most complex songs. But in terms of the way we perceive them, these are absolutely fascinating sounds to listen to. These birds always amaze me when I hear them.

Dr. Biology: Well that's what we want our listeners to do. Go to the website, not only to listen to the brown-head cowbird to see what that sounds like, but also to listen to the thrushes.

Pierre Deviche, thank you for visiting with us.

Pierre: Thank you very much.

Dr. Biology: You've been listening to 'Ask-a-Biologist'. My guest has been Pierre Deviche from the ASU School of Life Sciences.

The 'Ask-a-Biologist' podcast is produced on the campus of Arizona State University. And even though our program is not broadcasted live, you can still send us your questions about biology using our companion website. The address is askabiologist.asu.edu. Or you can just Google the words 'Ask a Biologist'.

I'm Dr. Biology.