

Ask a Biologist vol 029 Topic: Birds Guests: WEI Fuwen & Andrew Smith

Panda-monium -

Have you ever wondered what it would be like to hold a baby Giant Panda in your lap? Listen in while Dr. Biology talks with two scientists who have gotten up close and personal with Pandas. Andrew Smith is a returning guest and WEI Fuwen is a visiting scientist from China that has been studying pandas in the wild. He has even caught the sounds of these elusive animals in the wild.

Transcript

Dr. Biology: This is "Ask a Biologist", a program about the living world, and I'm Dr. Biology.

What's black and white and furry all over? Need a hint? How about if I told you they're living, they eat bamboo, and you find them in China. I bet you know the answer now. In today's program we get to talk about the giant panda. These animals are one of the most well-known and loved animals in the world. Whenever these furry creatures come to visit a local zoo, lines of people gather and, well, there's a bit of panda-monium.

Our guests today have come to know giant pandas up close and personal. In fact, they both had the chance to hold young panda cubs in their laps, something very few people get to do. Andrew Smith is professor in the School of Sciences at ASU. We had a chance to talk to him about his main study animal, another furry creature called the pika, found on the Tibetan plateau.

Wei Fuwen is a faculty member in the Institute of Zoology, Chinese Academy of Sciences. He's been studying the giant panda for more than twenty years and is considered a world expert on the evolutionary ecology of the giant panda in the wild. He's one of the scientists who published a paper in the journal Current Biology that asked the question, "Are giant pandas heading for extinction?" I think, you'll be pleasantly surprised and pleased at the answer that Dr. Wei and his colleagues have found.

Welcome to the show Dr. Smith, and a special thank you to Dr. Wei for sitting down and talking with us while visiting Arizona State University. This is a long way from China.

Andrew Smith: It's a pleasure to be here.

Dr. Biology: And Dr. Wei.

Wei Fuwen: It's my honor to be here to talk with your guest.

Dr. Biology: Before we get into all the research that Dr. Wei has been doing, I thought we'd talk a little bit about the giant panda. A lot of people know what they look like, but let's go through a few details. How giant is a giant panda? In other words, how big are they?

Fuwen: Well, giant pandas are very big, especially compared with other species, such as the red panda. It's quite big. It's about 1.5 meters long, and 1.8 meters high. It weighs about 100 kilograms.

Dr. Biology: One hundred kilograms? So, they're about what, 30 inches tall at about the shoulder, and they are over two hundred pounds.

Fuwen: Yeah. I have no idea about pounds, but it might be that.

Andrew: I think, it is 2.2, so, that would make it about 220 pounds with the conversion.

Dr. Biology: Very good.

Fuwen: The male is a little bit bigger than the female.

Dr. Biology: Well, they are big. Are they strong?

Fuwen: I think so. It's very strong in the wild. In captivity we see pandas as very tender, but don't go quite close to them. It might be very dangerous.

Dr. Biology: You actually have a story about being in the wild and observing.

Fuwen: Yes, in the wild it's very hard to get close.

Dr. Biology: You actually have some recordings of pandas, don't you?

Fuwen: Sure, yes.

Dr. Biology: Well, maybe later in the show we can play some of those recordings and talk just a little bit about them.

Andrew: One thing I can say. Although pandas are very big and weigh a lot, they actually look even bigger. I remember when I first saw pandas at the Wulong Giant Panda Breeding Center. There was a one-year-old panda up in the tree, and it was looking like it didn't belong in the tree, like it would fall.

It kept looking like it would fall, and it was very awkward. I whispered under my breath, "What happens if they fall?" The director of the breeding center said, "They bounce".

[laughter]

And then, he let me hold the panda in my lap. The fur was so thick that I could see that maybe the panda would bounce.

Fuwen: As a baby, it's very, very small. A newborn baby weighs just a hundred grams. That's quite small.

Dr. Biology: I have a picture of you with you holding one of the baby cubs. They are called cubs, I assume.

Fuwen: Sure, the babies are cubs. That's correct.

Dr. Biology: And pandas are bears, right?

Andrew: Yes. They're the most primitive of the eight bear species in the world. Actually, biochemically they are very different, because they split off from the most primitive bear. All of the other bears are more similar to each other, and the pandas, they are the most unlike all of the other true bears in the world.

Dr. Biology: I actually went up to one of my favorite sources, which is Wikipedia and looked into it. I said, "Oh, they are actually bears."

Fuwen: It takes a long time to get this down, that the panda is a bear. In the past, the panda can be another family, not a bear family, its own family. Might be a family of the red panda, they come together. But finally, from the genetic study, people think it's a real bear.

Dr. Biology: Right, it took the genetics to actually get the real truth.

Fuwen: Yeah, yeah.

Dr. Biology: All right, when we look at the pandas in the wild... You had a wonderful lecture; I enjoyed it yesterday. I got to see a lot of pandas in the forest, bamboo forests.

The forests are very green. Pandas are black and white. What's up with that? It doesn't seem normal. Most animals seem to blend in with their surroundings. Why is a panda black and white?

Fuwen: Well, they're joking about that - panda never have the color picture, because it's white and black. It's hard to say about why the panda has this kind of a color. There's some prediction about that. It might be related to the visual communication, because some people are thinking that the giant panda is short-sighted.

With this kind of a color, the giant panda can see each other at a very far distance; so, not to get two pandas quite close. If they get very close, they will fight for the home range or for the.... I'm think...

Dr. Biology: I see. So, in this case, it's so that they can see very easily from a distance that there's another panda out there. They don't really have predators, do they?

Fuwen: There are predators, such as the common leopard and the yellow-throated marten. The predators just have harm for their cubs, not for the adults.

Dr. Biology: Right, so once you get to become an adult you have less to worry about. So, if you are black and white, who cares? Right? But, the cubs do. I do recall from your lecture, you mentioned that as well.

The other thing, you talked about their vision, you said they're short-sighted. They're also curious, because in most bears the pupils of the eyes are round. Pandas actually have eyes

like a cat. Again, learning a little bit with my research, the name for panda in China is "bearcat," correct?

Fuwen: Yes, we call that a "daishunma" [Chinese] - "Dai" means big, "shun" means bear, "ma" means cat. So, to put them together - "the Big Bear Cat."

Dr. Biology: Ah. I think, it's really nice and descriptive because it talks about what the eyes look like and of course, then they are a bear.

Pandas live in the forest, bamboo forest, which is very convenient because that's what they eat. That's their main diet, right? Bamboo?

Fuwen: Yes.

Andrew: But, bamboo are extremely interesting plants. They grow for very, very long time, and then they flower and for any species of bamboo when they flower, they die after they flower. And what's interesting is if you have a species of bamboo that's in a pot, in Buenos Aires, in Sidney, Australia, in Phoenix, Arizona, they will all flower and die at the same time. That they are synchronous world wide regardless of whether they are being grown in captivity or not, and it's one of the really unique things about bamboo. So, any species of bamboo is synchronous worldwide.

Dr. Biology: That's fascinating.

Fuwen: Yeah, yeah, yeah.

Dr. Biology: See, we're learning. We learn all the time.

So they eat bamboo, so then, I would say, they would be an herbivore, but they actually do eat other things besides plants, right, sometimes?

Fuwen: Yeah, yeah. Sometimes, they are sampling some of the plants. It's quite rare. Also, sometimes you can find some meat bones in his droppings.

Dr. Biology: Oh, in the droppings. Now, you are talking about panda droppings. And this takes us actually into your research. Turns out that you published a paper, was it in 2006?

Fuwen: Yeah, yeah.

Dr. Biology: In 2006. It was a very interesting paper, because it reset the total number of pandas in the world to a higher number, because the census that had been done before wasn't really accurate. You went out and tried to get an idea of how many pandas you'd see and then estimate from there how many more there might be.

Your research is a little different. Can you talk about how you figured out how many pandas are living in the wild?

Fuwen: OK. You know Chinese government has paid much more attention to about Giant Panda Conservation. In history, we have done three national surveys to try to estimate how many giant panda in the wild. The first estimation was in 1970s. There were over 2500, something like that.

The second survey has been conducted in 1980s. The estimation number is over 1000. The third national survey is come to the number of the 1500 to 1600, something like that. But, some people it's hard to estimate the giant panda, even for the people. Human populations are hard to get accurate numbers of the human population.

So some people doubt about the number, because they just use the dropping to estimate the population size of giant pandas in the wild. So, how to accurately estimate the panda population, we developed a new methodology using panda droppings.

We tried to extract the DNA from panda droppings because it contains cells of the giant panda. We can do that. So, we extract the DNA and amplify the microscopic level kinds of the genetic marker to genotype, if the dropping yield the same genotype, we think they came from the same individual; if it's different, then different individuals. So, using this kind of methodology, you can accurately estimate the population.

Dr. Biology: All right. So with the panda droppings you are able to extract the DNA and you are able to isolate it to individual pandas so that, say, you have a dozen panda droppings, you could go through all those and it could turn out that it was all from one panda.

Fuwen: Yes, might be.

Dr. Biology: Right. While as you could have a dozen panda droppings and it's twelve individual pandas. So it's much more accurate figuring out how many pandas are out there.

Fuwen: Yes.

Andrew: Right. One of the other things naturally about panda droppings is, because they eat bamboo, bamboo is largely filled with silicon, which can't be digested, is that the bamboo must go through the panda very fast. Because they get very little nutrition from eating the bamboo, so they eat the bamboo and the forest is covered with droppings, because they have to have frequently defecate their droppings to make room to eat more bamboo. If they don't have this going through them really fast, eating lots and lots of bamboo, they won't get enough energy to grow and to survive.

Dr. Biology: How big is a dropping?

Fuwen: This size.

Dr. Biology: So, about six inches long by about, what, about three or four inches in diameter?

Andrew: Like a child's football size.

Dr. Biology: Yeah. And it looks like, it's really woven fibers, of course. It's pretty dense. When you go out looking for these, how many droppings did you have to collect?

Fuwen: Ah, we collect a lot of samples. There are abundant droppings in the wild. You couldn't get all of them. You try to find is this from the guess, is this from the same pandas or not? After that you can connect to some of them. We have done pilot studies in Wulong Nature Reserve and finally we get over 300 droppings. Back in the laboratory, we genotype this kind of droppings, we found over 300 droppings come from 66 pandas.

Dr. Biology: OK. So, 300 droppings and you ended up with 66 individuals.

Fuwen: Yea.

Dr. Biology: Well, they're pretty active, aren't they?

[laughter]

The habitat for the giant panda, this is another thing that we would be very interested in, because without the bamboo and without the forests that they live in, that's obviously going to be a problem. How is the habitat doing in China right now for the giant panda?

Fuwen: It's doing very well. The government has put a lot of money and effort to try to protect the wild habitat of the giant pandas. Compared with the national survey, its habitat has been improved a lot. The potential habitat has been increased about 50 percent. So, they have huge habitat for them.

Dr. Biology: This is one of the things we've been worrying about, is the extinction of the giant panda.

Fuwen: Everybody is worried about that.

Dr. Biology: You have a little more optimistic view - that maybe it's not the end of the line for the panda. Is that correct?

Fuwen: I think so. Yeah.

Dr. Biology: What do we need to do to make sure it's not the end of the line for the panda? What do we need to keep doing?

Fuwen: Yeah, what we have to keep doing is to protect their habitat. That's very important. No habitat, no pandas, no animals, just human beings. The first thing we need to do is to still keep protecting the habitat. The second thing is, we need to pay more attention to the most isolated population because in that population the giant panda's numbers are very low. They might go to extinction in the future. So, you need to do some translocation or reintroduction in the future.

Dr. Biology: Right, you showed a map, and was it - where there's seven habitats or seven ranges - different individual ranges for the panda...

Fuwen: Six. Six.

Dr. Biology: Six?

Fuwen: Yeah.

Dr. Biology: There's six of them. OK. And so, they're separated, which is part of the problem, right?

Fuwen: Yeah.

Dr. Biology: Is there anything underway to bridge the gaps between those ranges to help expand the diversity of the pandas?

Andrew: To put in corridors between the different protected areas, so the pandas can move from one place to the other to increase their diversity, and that's a major conservation goal for pandas as well as for many other large mammals.

Fuwen: That's one of the strategies the government was thinking about. To put a corridor there, they will spend a lot of money and...

Andrew: It's very difficult, and what you end up dealing a lot with in the field of conservation biology is called "community-based conservation." You can have a scientific principle, and you can realize that you have fragmentation, which is the word in conservation for having these little patches of habitat with the animal populations that are divided. They're fragmented.

To bring the fragments together, you want to build corridors, but the corridors are where people live. So, much work in conservation biology is dealing with community-based conservation.

Even within a protected area, the protected areas in China are different than, say, the national parks in the United States, because people live in the protected areas. Often the agriculture will follow a river valley, and if the people get to be too many and their fields become broader across the river valley, then even the north and south half of a protected area may be divided in half.

So, there's the need to have corridors and to work with the local people. A lot of the conservation work in China that's being done by the Chinese government and various non-government organizations is to work through these aspects of working with local people. Because if local people aren't engaged in saving this species, then all the scientists and all the government can do anything. You have to have everybody engaged.

Fuwen: Andrew has very good comments for that. It's another kind of strategy to build these corridors between the isolated populations.

Dr. Biology: The other thing that the Chinese government has been doing for quite a while, and they've become much more successful is actually raising pandas in captivity.

Fuwen: Yeah.

Dr. Biology: This is an interesting and sometimes used method in wildlife conservation, and it has its own critics, I would have to say. What I was curious about is if you raise a panda, especially when I see these cute pandas on laps of people, do you have a problem or can you even reintroduce them into the wild? Is that something you can do?

Fuwen: Yes, that's a future strategy, too. If you have much more giant pandas over there, you have to do the reintroduction, release them to the wild. That's kind of the code [indecipherable] conservation program.

Dr. Biology: And have they actually been introducing pandas into the wild?

Fuwen: Yes, there are two reintroduction programs that have been done during the past two years. One panda, called "Serial Number One," was released into the wild. A lot of pandas are from the wild - that's translocation, which just puts them to another place.

Dr. Biology: Right.

Fuwen: That panda has successfully lived in the wild. Another program is done by Wulong Natural Reserve. They put the captive-born pandas in the wild with an enclosure. Then, they'll stay there for two years. After that, release them to the wild. However, the panda was killed by other pandas. So, it's not so successful. But, it provided us a lot of experience for future reintroduction programs.

Dr. Biology: Right. Andrew, do you have a view on that?

Andrew: A lot of money has gone into doing the captive breeding. Like I say, I think the international world is actually expecting more and more of these reintroductions to take place, but as we just learned, it's very difficult to do this.

Animals have their natural territories, and not only are the animals somewhat inexperienced, but they're smaller. The big dominant male pandas may have a larger territory or home range, and may be protecting that. I think, ultimately, a lot of the captive-bred pandas may have to go into areas where there aren't other pandas, so that we can populate areas where there are fewer pandas, and that might be a more successful strategy.

Dr. Biology: Oh, I see. That makes a lot of sense. Don't put them in with the ones that are so successful - the wild pandas that are the tough guys - but put them in with larger room to grow.

Fuwen: Lower density area, or some area where there's no pandas. But in the past, there was pandas.

Dr. Biology: Oh, that's neat. I like that. We'll be listening and reading and hoping we hear more about that in the future. There's the picture of Dr. Wei and he has this really cute, I have to say, cute panda in his lap. What's it like holding a panda? Is it like holding a normal household pet? Or can you describe it?

Fuwen: [laughs] When you hold a panda, it's very soft. There's something very exciting about that. Yeah, that's a picture taken in Wulong, its age is two months...

Dr. Biology: Two-month-old?

Fuwen: Yes, two-month-old.

Dr. Biology: And do they spend a lot of time focusing on you? Do they actually look into your eyes?

Andrew: When I was holding the panda, Wulong, I think it was a four-month-old, maybe, my impression was - again, the fur was just so thick. It was just amazing. I mean, I've never imagined fur could be that thick, and then the scientist who knew that particular panda said that it was teething, and to put my hand in its mouth.

Dr. Biology: Oh, sure!

Andrew: So I put my hand in the mouth and it sort of just gently chewed on me, because its teeth were just coming in, just teething, and it sort of tickled a little bit, and it was just a thrill to be able to hold an animal that you never thought that you would have in your lap. But, it was very different than other animals that I've held, because it was very gentle and very calm. Certainly, when they grow up, they can become...

Fuwen: Very dangerous.

Andrew: ...much more dangerous.

[laughter]

Andrew: But the young ones that we were able to hold...

Dr. Biology: Very cute.

Andrew: It's really... they're adorable.

Dr. Biology: OK, well, all right, well, we're not going to be running out into the wilds of China trying to hold an adult male panda in our lap, that wouldn't go over...

Andrew: Well, you'd probably spend years and years looking to even find one for the first time.

Fuwen: Yeah.

Andrew: We can ask Fuwen how long he worked on pandas in the wild before he ever saw his very first panda.

Fuwen: That's about fifteen years.

Dr. Biology: Fifteen years you were...

Fuwen: That's in the wild... it's very very hard... In [indecipherable], the mountains are very high and very deep. Also the panda density is not too high. So, it's very hard for you to find the real pandas over there. What we can find is a feeding site, droppings, that's very easy.

Dr. Biology: That's amazing to me, because again we just talked about the fact that they're black and white and you'd think you'd be able to see a lot of them everywhere, but there's so few of them. What's the range for them? How many pandas would I find on a couple of square kilometers?

Fuwen: It's...five square kilometers... to eight.

Dr. Biology: OK, five square kilometers...

Andrew: And they'll be slightly overlapping. Males and females will overlap.

Dr. Biology: Dr. Wei, you also have some recordings of pandas in the wild, don't you?

Fuwen: Yeah, I have some of them.

Dr. Biology: I want to listen to a couple of them right now.

[panda sounds]

Fuwen: OK, pandas have a lot of the different kinds of the sounds they can make. Different sounds have different meanings. They can be over 15 different kinds of sounds.

Dr. Biology: So the pandas have about 15 different calls.

Fuwen: Yeah, over fifteen...

Dr. Biology: What did we just listen to? What were those two calls?

Fuwen: The barking, like the dog barking, and the chirp. Different kind. I can't remember all of the names, yes.

Dr. Biology: What is the chirp used for?

Fuwen: For the mating.

Dr. Biology: For mating?

Fuwen: Yeah.

Dr. Biology: And the barking?

Fuwen: The barking is to the mate before mating.

Dr. Biology: Before mating.

Fuwen: Yeah. Fighting or something like that.

Dr. Biology: Well, Andrew, you've been really good, because you've been on the show before, and you've answered these three questions that I'm going to ask to Dr. Wei.

I always ask three questions of my guests, and the first question is, "When did you first know you wanted to be a scientist or a biologist?"

Fuwen: Ah. That's hard to answer... When I was sixteen years [old], I took entrance examination to the college. At the first, I don't want to study the biology. I would like to study medicine or something like that. Be a doctor. Because my father was very, very ill before I went to the college. But, I finally failed to go to medical school and I was enrolled in the teacher's college. I would be a teacher for future. Four years study and thinking, 'should I be a scientist or something like that.' So, I took my master degree in the teacher's college, then I went to my PhD to be a scientist.

Dr. Biology: So, you had an evolution of your own, didn't you?

Fuwen: Sure, sure. Have to make a good choice.

Dr. Biology: The other question I like to ask is, "If I took that away from you, you weren't going to be a biologist, you're not going to be a scientist, and you had the ability to do some other kind of career, what would you do?"

Fuwen: I have no idea. I might be a teacher in a high school, to train more students or something like that.

Dr. Biology: OK. And the last question I ask is, "What advice do you have for people that want to become biologists or scientists?"

Fuwen: To be a good scientist, you have to work very hard. That's the first thing you need to do, especially for the biologist, in the field of biology. Every day, you stay in the mountain area. That's very tough. You get a lot of rain every day you go to the field, climb the mountain... it costs a lot of energy up there for things.

You have to work very hard to get the data that you want. And other thing, you have to be very clever to think about the scientific question, and what kind of scientific question you ask. You try to answer this kind of question. That's very important.

Dr. Biology: You actually need to do some exercise and be strong for one thing, if you're going to be out there walking around the mountains, and the other one is to make sure that you can be prepared to do the actual research itself. Know how to ask the questions, and if you ask the questions, how to find the answers.

Fuwen: Yup.

Dr. Biology: Well, this is very good advice. Andrew Smith, Wei Fuwen, I really appreciate you sitting down with us today. I know that I've learned a lot about the giant panda today, and have a new respect and hope for their survival.

Andrew: Great to be back.

Dr. Biology: Dr Wei.

Fuwen: Thanks. My honor.

Dr. Biology: You've been listening to Ask-A-Biologist. My guests have been Professor Andrew Smith from the ASU School of Life Sciences, and Dr. Wei Fuwen, a faculty member in the Institute of Zoology, Chinese Academy of Sciences. The ask-A-Biologist podcast is produced on the campus of Arizona State University, and even though our program is not broadcast 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 am Dr. Biology.