

## Ask A Biologist Vol 059 (Guest: Mary Liz Jameson)

### **Been There Dung That**

Are there really flesh-eating scarab beetles, or is it a movie myth? Just what are dung beetles doing with all the poop they gather in big balls? These are a few of the questions that biologist Mary Liz Jameson answers on this fun-filled podcast.

### **Transcript**

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**Dr. Biology:** This is "Ask A Biologist," a program about the living world, and I'm Dr. Biology. My guest today is Mary Liz Jameson, a research associate professor in the Department of Biological Sciences at Wichita State University. Her work is with an insect that has family members that love to take a bite out of plants. OK, that's not that unusual. But there are also other members of the family that prefer a nice ball of dung. That's right. Some folks might call it poop or feces. Well, this is the food of choice for dung beetles, which are part of the family Scarabaeidae.

While talking about food, we'll also be learning about some tasty treats made from insects that you might want to try. So stick around, and maybe you can pick up a great recipe for your next dinner or potluck.

Welcome to the show, Mary Liz, and thank you for visiting with me today.

**Professor Mary Liz Jameson:** Hi, Dr. Biology. Great to be here.

**Dr. Biology:** You've got this passion for these really cool scarab beetles, and you have a pretty good list of recipes that we're going to be able to talk about later. But to start off with, I really want to talk about the scarab beetles. I mentioned that they like to eat plants and, of course, all of us can't forget the fact that there are these dung beetles, we can talk about those, which are rather interesting creatures in themselves. But if someone was paying really close attention, they might have thought I missed mentioning animals, and in particular, humans, since almost everyone has seen the movie "The Mummy." In the movie, there are several places where it looks like scarab beetles in their thousands come out and eat some people. So, let's get this out of the way, are there flesh-eating scarab beetles, or is this just another Hollywood invention?

**Mary Liz:** Hollywood sensationalism. Absolutely snarky. Doesn't exist. Yes, within Egyptology and Egypt, and within the culture that surrounded the Egyptians, scarabs were sacred. They were revered, so how the movie "The Mummy" fell on the idea of turning scarabs into flesh-eating organisms is well beyond my comprehension. So let me dismiss this myth. There's no such thing as flesh-eating scarabs. The ones that were in the movie, in fact, really didn't look like scarabs at all. They looked like little electronic, I don't know, Volkswagens or something -- shiny Volkswagens. They didn't look like scarabs a bit.

**Dr. Biology:** Right. Well actually, let's talk a little bit about scarab beetles. You mentioned that they go way, way back and they were in the Egyptian culture. They were very much high on the really cool list, or the thing to have.

**Mary Liz:** Yeah, yeah.

**Dr. Biology:** I even brought in some pictures of them because there have been some amulets and they used them with all sorts of jewelry. Typically, how large and how small? There must be a range of scarab beetles, so what's a tiny scarab beetle's size?

**Mary Liz:** In real life, scarab beetles can range anywhere from one millimeter all the way up to about a foot. The Hercules beetle, with its horn, is about a foot long, so it's a good long beetle.

**Dr. Biology:** Wow.

**Mary Liz:** They also have a lot of mass that goes along with it. One of the heaviest insects is the Goliath beetle, and it is massive. It's a very strong flier so the body is packed with muscles. It's a very heavy insect, heavier than a lot of mammals -- mice, et cetera.

**Dr. Biology:** Right. Now, not all beetles are scarab beetles?

**Mary Liz:** Correct. There's about 350,000 different species of beetles. Do you know what? There's more beetles than there are flowering plants.

**Dr. Biology:** You've got to be kidding.

**Mary Liz:** One out of every four living things is a beetle.

**Dr. Biology:** Wow.

**Mary Liz:** Yeah.

**Dr. Biology:** Talking about flowering plants, You gave a great lecture yesterday. One of the interesting things about it, you know, you think you've done science, you're Dr. Biology, you should know all these things. I didn't really think about beetles as pollinators.

**Mary Liz:** Yeah. A lot of people don't think about beetles as pollinators. They are all over flowering plants. Within certain ecosystems, they are the pollinator. In South Africa, scarab beetles and beetles pollinate about 48 percent of all the plants. Pretty cool. Within communities across the globe, beetles pollinate about 88 percent of all flowering plants. So beetles are really important economically, and within our communities. You were talking about dung beetles. If we didn't have dung beetles, we might be knee-deep in poo, because who's taking care of that stuff? Who are the custodians?

**Dr. Biology:** Ah.

**Mary Liz:** Those little dung beetles are doing a lot of work, a lot of dirty work and we're not giving them any credit.

**Dr. Biology:** Right. They work so hard. You wouldn't say they get pooped out?

**Mary Liz:** [laughs]

**Dr. Biology:** OK. They're really important. Do you find them everywhere, or are there some places that we can't find a scarab beetle?

**Mary Liz:** You can find scarab beetles in almost every place on the planet, except Antarctica.

**Dr. Biology:** The same thing for scorpions, for example.

**Mary Liz:** Yeah, exactly. They're almost on every feeding habitat. They feed on mushrooms, they feed on plants, they feed on plant sap, on the roots. They feed on dung, of course, or feces or poo, whatever you want to call it. They feed on lots of different things, as well as pollen and wheat grains. Some of them are pests, some of them are very beneficial.

**Dr. Biology:** Ah.

**Mary Liz:** There is a great diversity. There are about 35,000 species known to science, and we think that when we get done describing them all, there might be about 50,000 species. There's a lot left to do.

**Dr. Biology:** 50,000.

**Mary Liz:** Yeah.

**Dr. Biology:** Well, I know that if anybody is curious about scarab beetles, they probably gravitate towards the dung beetles. I thought maybe we should talk a little bit about really what's going on there, especially if you go out and you see either the videos or you see some pictures, they're rolling up these really pretty big balls of dung.

**Mary Liz:** Balls of dung.

**Dr. Biology:** What's going on? Tell us the story.

**Mary Liz:** OK. Back to Egyptian culture, the dung beetles that a lot of people see, for example in the desert, are rolling a dung ball across the surface of the land. In Egyptian culture, when the Egyptians saw this, they saw the dung beetles rolling the ball across the surface of the land, depositing it in the soil, and a little while later, out would come another beetle. They likened that to being reborn, to transformation, and that's where we get the sun-god Ra, and the god Khepri for transformation and rebirth. That's why the scarab was revered in Egyptian cultures, and there were several gods that were named for the scarab beetles.

The *Scarabaeus sacer* is the sacred scarab, and the scarab amulet, then, that the Egyptians had was put on the people who died, and if you looked on the back side of those scarab amulets, it had like a little resume on the back side that said this guy was really good while he was on the earth, and he should be able to enter the holy kingdom when he appears.

**Dr. Biology:** Ah.

**Mary Liz:** Those little scarab amulets, then, became something that people would wear as good luck, additionally. You had the hard scarabs that would be found, associated with the dead folks, and you had the scarab amulets that would be just tokens of good luck, to make sure that the

gods you're a good person. The Egyptians were cute about their environment, looking at these dung beetles rolling a ball across the surface of the soil, and depositing their ball in the soil, and out comes another beetle. They didn't understand a whole lot about the complex life-cycle. So we have a dung beetle that's visiting a pat of dung, and dung is ephemeral, it's a resource that's only around for a short time. It's an ephemeral resource.

**Dr. Biology:** Ephemeral, very short time. OK. Fleeting.

**Mary Liz:** Fleeting, yes.

**Dr. Biology:** Yes, OK.

**Mary Liz:** Because it represents an excellent food source. A lot of undigested matter, a lot of bacteria. Good hearty stuff, should be on your menu.

**Dr. Biology:** [laughs] OK, I'm going to bypass that.

**Mary Liz:** [laughs] The dung beetles, when a nice new pile of poo is laid, they have their receptors out, their antennae, trying to pick up the odors that are wafting across the prairies, or the plains, or wherever it is, the tropical forests. They arrive at that pat as soon as possible, to reduce the competition that's there. The dung beetles that are picking a ball, forming a ball, pushing along the surface, and then depositing it further away from the pat, are reducing competition from the other things that are going to the pat, like flies and other kinds of beetles.

Then they lay an egg in it. They put it in the soil, they lay an egg in it. Mommy has prepared a nice platter for the one larva, the one egg, that's going to be consuming that ball of dung, in the soil. Then eventually, that larva will grow, it will pupate, and then it will come out as a brand new individual, of course, and then carry on the life-cycle.

Now, that's one kind of dung beetle and that's the kind that people typically see.

**Dr. Biology:** These balls of dung, when I've seen them, are a lot bigger than the little beetles that are actually trying to push them across whatever area they're doing.

**Mary Liz:** Right.

**Dr. Biology:** So mom takes them, puts them in there, and I guess, what is this, an early form of telling the kids, "I made you a dinner, it's in the oven here"?

**Mary Liz:** Yeah.

**Dr. Biology:** So they've got their food. How long does it last, actually?

**Mary Liz:** Oh. Well, not very long. Some scarab beetles will coat the outside of the ball with clay, to prevent it from desiccating, from getting too dry. That helps to make sure that the larva also is not going to dry out. But not too long. The life-cycle, depending on the species, could be a couple of weeks, up to perhaps a month, entirely depending on the beetle.

**Dr. Biology:** You've been studying scarab beetles for how long now?

**Mary Liz:** Oh, gosh. Too long. [laughs] No, not long enough. I don't know enough. [laughs]

**Dr. Biology:** There's more to be discovered, so obviously, not long enough. [laughs] How long have you been studying?

**Mary Liz:** About 25 years.

**Dr. Biology:** 25 years, wow. OK. Have you discovered any new ones?

**Mary Liz:** Oh yeah.

**Dr. Biology:** OK.

**Mary Liz:** Oh yeah.

**Dr. Biology:** How many have you discovered?

**Mary Liz:** Oh gosh. You know, I haven't counted. But give or take, maybe about 30.

**Dr. Biology:** About 30.

**Mary Liz:** About 30.

**Dr. Biology:** Do you have a favorite?

**Mary Liz:** Let's see, my favorite. Well, I've recently named some scarabs that are associated with cool flowers that you find in south east Asia. Some of these are giant flowers that are really stinky. I should name one that would be named on a really stinky flower. But the relationship between the beetle and the flower is something that I think is fascinating.

**Dr. Biology:** Oh, I'm getting a hint here. If those beetles are attracted to an odor...

**Mary Liz:** Yes.

**Dr. Biology:** ...And you said some beetles are pollinators...

**Mary Liz:** Yes.

**Dr. Biology:** Ah. Have the flowers become very clever?

**Mary Liz:** Some of them have, yeah. Some of the flowers are very, very stinky and they bring in all kinds of different scarabs, from dung beetles to the leaf-eating scarabs, too, the clean-feeding scarabs. Those are the ones I really, particularly work on. But they are also attracted to the stinky scents that some plants have.

**Dr. Biology:** Now, in doing my research, I see all these scarab jewelry pieces, and this is where people have actually made jewelry looking like a scarab, but are there actually scarab beetles that are just jewel-like themselves?

**Mary Liz:** Absolutely. In fact, there's scarab beetles called jewel scarabs. They are large, they are about an inch and a half long. Over 150 different species of jewel scarabs in the genus *Chrysina*, and they are made into jewelry across Mexico and to South America. There is also another species called *Chrysophora chrysochlora* that the Indians in this area use as headdresses with flowers, and as necklaces. They're absolutely beautiful. Across the globe, insects, and especially scarabs, are particularly beautiful, metallic greens, metallic gold, metallic silver, and these are used by lots of different people to make jewelry.

**Dr. Biology:** When you do that, how do they prepare them? You don't just dry them out and stick them on there, wouldn't they break?

**Mary Liz:** No. In fact, the chitin, the cuticle of an insect, is so hard that they can just sew it into a headdress, they can loop it around a string and make necklace out of it. They use the Hercules beetle with a very long horn, it's very hard. All you have to do is just drape a necklace and put it on your neck. They sell them at the markets. Great jewelry.

**Dr. Biology:** Hmm. Who'd have thought?

**Mary Liz:** Who'd have thought?

**Dr. Biology:** Now, we've talked about dung, the food of choice for these scarab beetles...

**Mary Liz:** [laughs]

**Dr. Biology:** You also have an interesting, I don't even know if it's a hobby, but you have this passion for exotic foods.

**Mary Liz:** [laughs]

**Dr. Biology:** When I say "exotic foods," we're talking about foods made with insects.

**Mary Liz:** Yum. That's on my menu.

**Dr. Biology:** OK. So this is the perfect time for us to talk a little bit about this. Now in the United States, you don't often see insects on the menu. At least, I have not seen any menus with insects as a delicacy. But that's not necessarily true about other parts of the world.

**Mary Liz:** Definitely not.

**Dr. Biology:** Are there parts in the world where stir-fried bees and chocolate-coated ants are a regular item a person can order?

**Mary Liz:** [laughs] I'd say those still fall within the delicacy items of most other restaurants around the world. But, insects as far as food, across the globe, are much more in demand in other places than they are in the United States. They're an excellent source of protein, an excellent source of fat. In Africa for example, the children will be out beating the bushes and gathering grasshoppers to take them home and eat grasshoppers. Also in Southern Africa there's a Mopane worm and they gather those. They feed on nice green leaves and nice green juicy caterpillars and they take those home and fry them up.

Across all of Mexico grasshoppers are very, very popular. Beetles, if they come out in abundance in Ecuador, you stir those up with a little bit of garlic and butter and sell them at the market. Oh, Ada, Ada ants! When the rains start, the Ada ants come out and in very high numbers and people will go out and collect them in the streets in the morning, put them in bags and sell them at the market. They taste like pork rinds to me.

Very greasy, very fat but very much part of the regular diet in many other parts of the world. A good source of protein, a good source of fat and if you think about it, in the United States we love shrimp, that's an invertebrate! We love lobster, that's an invertebrate. We love mussels, another invertebrate.

And you know what? A lot of those critters are eating filth! But scarabs, not scarabs but insects in general, they might be feeding on good stuff like leaves and nice clean things. Why don't we eat insects?

**Dr. Biology:** Oh, OK. Well, it's a good way, as you said, you got your protein and you got your fats.

**Mary Liz:** Yeah.

**Dr. Biology:** All right, I was excited when I was doing some research on you because I knew that you worked with scarab beetles but I came across this section where it looked like a pot luck based on insect food dishes. And so, I was really wanting to know, do you have a recipe book of insect dishes?

**Mary Liz:** I have recipes that I have tried on the public and the public love!

**Dr. Biology:** Really?

**Mary Liz:** Yeah!

**Dr. Biology:** OK, can you share on with me?

**Mary Liz:** Sure!

**Dr. Biology:** OK! [laughs]

**Mary Liz:** I'll bring it up on my laptop.

**Dr. Biology:** OK, all right.

**Mary Liz:** There it is!

**Dr. Biology:** OK!

**Mary Liz:** Or there they are anyway!

**Dr. Biology:** OK!

**Mary Liz:** One, you know, that the public really loves is something that I call "Yummy Hummers".

**Dr. Biology:** Yummy Hummers?

**Mary Liz:** Mm-hmm, and they're yummy! So, hummers, what do you think that means? What kind of an insect is a hummer?

**Dr. Biology:** Humming, could it be a bee?

**Mary Liz:** Yes!

**Dr. Biology:** OK! [laughs]

**Mary Liz:** It's a bee! And bees are really pretty easy to obtain if you know a beekeeper. And it's interesting, you go out to the hive, learn a little bit about the hive and then the beekeeper's usually fairly generous about giving you a scoopful of bees. So, it makes for a great trip. So, with Yummy Hummers all you need is a cup of frozen bees. You don't really need to do a whole lot, maybe just clean them, sort of run them through some water. One large onion all diced up. Two cloves of garlic, all diced up. Half a cup of butter and little bits of ginger. Little bits of ginger just to add a little extra zip to it, you know?

**Dr. Biology:** OK.

**Mary Liz:** So, you put those in a big frying pan with the butter in the bottom and you just sauté them! Sauté them long enough so that the smells of the garlic and the ginger are all melding together, they evanesce around the room. And then you take just a scoopful of the Yummy Hummer and put it on a cracker and it melts in your mouth!

**Dr. Biology:** Really?

**Mary Liz:** It's really good because you get a little hint of floweriness from the bees.

**Dr. Biology:** Wow!

**Mary Liz:** So, yeah, they're excellent! It's a very good dish, most people love it, even children. Some children don't so much like the onions.

**Dr. Biology:** Right.

**Mary Liz:** But with a little zap of bee in there it adds a lot of character.

**Dr. Biology:** Well, as I scroll through your list I see you have quite a list of recipes. How about one more, since the kids don't necessarily like the ones with the onions and the garlic, how about another one?

**Mary Liz:** OK. Well, this one's sure to please absolutely everyone, OK? I call this one Chocolate Covered Crispies.

**Dr. Biology:** Chocolate Covered Crispies.

**Mary Liz:** Yeah! [laughs]

**Dr. Biology:** OK!

**Mary Liz:** And of course it's got chocolate and everybody loves chocolate, so that's going to please a large crowd.

**Dr. Biology:** As long as it's dark chocolate.

**Mary Liz:** [laughs] I agree with you there! So, in this recipe you'll need one and a half cups of semi-sweet chocolate chips.

**Dr. Biology:** OK.

**Mary Liz:** You'll need four tablespoons of oil.

**Dr. Biology:** All right.

**Mary Liz:** And then another one cup of cleaned bees. So, you've gone out to the hive, try to get two cups of bees when you're out at that hive with the beekeeper. So, you'll place the bees on a cookie sheet and you roast it in the oven for about one to two hours but at very low heat, at about 200. And you just want the bees to be crispy. So, you can test with the tip of a spoon to make sure that it's crispy, that will tell you that the bee is done roasting, OK? And then you'll take the bees, you'll shake them off into a cookie sheet that has a piece of wax paper laid on the bottom.

And then in a pot or in a big, what do you call it? I guess a glass pot, put the chocolate and the oil and put it in the microwave, just enough so that it's melty, OK? And then you'll add the chocolate, cover it over the top of the bees that's on the wax paper, kind of making a nice, crispy piece of candy, if you will, OK? Just large enough for a bite-full.

So, you ladle the chocolate on top of the bees. And then you just let it cool and you pick each of those off as a little bit of candy and you're ready to go! They also have, you see, you get the taste of the chocolate and you get a bit of floweriness from the pollen that's on the bees. Sometimes you get a little bit of honey also accompanying that flavor.

**Dr. Biology:** You know, Mrs. Dr. Biology has a birthday coming up.

**Mary Liz:** Ooh!

**Dr. Biology:** And I was trying to think of something that would be unique for her birthday. And so maybe this will be it. I don't know if I'll be in trouble or not ...

**Mary Liz:** [laughs]

**Dr. Biology:** ... But at least I know it will be a unique thing for her birthday. And since you have quite a nice list here, I was wondering, would you be willing to share them? And if you would we'll just create a nice story and a little recipe book on our companion website.

**Mary Liz:** That will be great!

**Dr. Biology:** All right!

**Mary Liz:** All right! Oh, something for your wife though. Up in Montreal there's an insectarium in Montreal and once a year they have a soiree that's all about eating insect food.

**Dr. Biology:** A soiree?

**Mary Liz:** A soiree! Oh, a party at night!

**Dr. Biology:** Yeah, OK!

**Mary Liz:** And they have samplings of all kinds of things -- scorpions with Tapenade and wax grubs that I could never cook up because they're just too juicy looking, all kinds of things. But they did have a birthday cake and on top of the birthday cake they had Carpenter ants. [laughs] So, if you could get some Carpenter ants and roast them and put them on top it's a great decoration!

**Dr. Biology:** Ah! Well, those Carpenter ants can be kind of wicked in their sting, so maybe that would be, I guess, our revenge!

**Mary Liz:** [laughs]

**Dr. Biology:** All right, on our show guests can't get out of here without answering three questions.

**Mary Liz:** OK!

**Dr. Biology:** So, are you ready?

**Mary Liz:** I am ready!

**Dr. Biology:** All right. When did you first know you wanted to be a scientist?

**Mary Liz:** Ooh!

**Dr. Biology:** Was it that spark or was it something that evolved?

**Mary Liz:** No, I think I was pretty much born that way. In fact, my profession is, I'm a biodiversity scientist and another way of saying that among sort of my peers is, I'm a systematist. I study the science of biodiversity, OK? So, I think that when I was a kid I remember driving down the street, it was along a boulevard with my parents and the three of us kids in the backseat. We were singing *Twinkle Twinkle Little Star*. So, I was pretty young and I remember looking out that car window and saying, "Mommy, Mommy, what kind of tree is that?" And she said, "It's a pine tree."

And it was shaped like your typical Christmas tree, OK? Go a little bit further down that boulevard, I say, "Mommy, mommy, what kind of tree is that?" "That's a pine tree!" "But mommy, that doesn't look like the other tree that I was just talking about!" And it was shaped like a piece of broccoli but she called them both pine trees and to me there was something going on there.

So, among my parent's generation those two things that were vastly different were pine trees and I think at that time early, early on I think I had sort of the biodiversity scientist in my blood. My grandfather in fact was a biologist and he studied mites.

**Dr. Biology:** Mites?

**Mary Liz:** Things like ticks and little water mites that you find in the water. So because I kind of grew up as a sort of a scientisty kind of girl, because I had a grandfather who was a scientist, it was OK for me to be a little geeky.

**Dr. Biology:** Well, you know, geeks rule!

**Mary Liz:** [laughs]

**Dr. Biology:** Geeks rock! Geeks are the future of the world, right? [laughs] All right. Well, so you did mention biodiversity ...

**Mary Liz:** Yes.

**Dr. Biology:** ... and if we break that down, you know, bio -- life and diversity means a whole bunch of different kinds of living things!

**Mary Liz:** Yeah!

**Dr. Biology:** So, and when you talked about those pine trees it was interesting because what you were noticing, even at a young age, that even though they had a common name that was being used, they were different kinds of pine trees.

**Mary Liz:** Exactly!

**Dr. Biology:** And I also grew up in an area that someone could say, "That's a pine tree, that's a pine tree and that's a pine tree!" And all three of them would have been different trees. All right! Well, I'm going to take it all away from you, OK?

**Mary Liz:** No!

**Dr. Biology:** You've had it all your life. Yeah, it's going to go!

**Mary Liz:** No!

**Dr. Biology:** Yeah! And now you're no longer going to be a scientist. So, what would you be or what would you do? And the sky's the limit. You can just do whatever you want, something that's always been a passion.

**Mary Liz:** Oh, there's so many things that I enjoy doing! Maybe I'd be a chicken rancher! No, OK! [laughs] I love chickens!

**Dr. Biology:** A chicken rancher?

**Mary Liz:** A chicken rancher. Anyway, OK. I love birds!

**Dr. Biology:** Free range chickens, right?

**Mary Liz:** Oh, of course, yeah! I love birds. When I was growing up I thought I might be a veterinarian and work on birds specifically. OK, so if I could be anything and I wasn't a biodiversity scientist ... I love being outside, I love getting dirty, I love planning things. So, I might be a gardener of some sort. I like to have dirt under my nails. I like to have my knees a little dirty and my clothes a little dirty. I like to see how things grow, I like to nurture them and see how they transform from one thing into the next and how they all meld together and make communities. And then, you know, what kinds of animals then come the various stages of a garden.

So, it's still sort of ... Has a lot of biodiversity in it and a lot of science in it but it's more free range, I suppose, being a gardener.

**Dr. Biology:** So, would you do a flower garden or would you do a vegetable garden or would you do a little bit of both?

**Mary Liz:** A little bit of both and probably always with something that's native.

**Dr. Biology:** OK. So, for the last question I always like to ask about advice. And in particular, we talk about the need to have more women in science. It's not that they're not interested and they don't get started in it but we kind of lose them along the way. So, I'm going to give you a slightly different task on this and I guess I'm going to guide you. What's your advice for a young scientist, a she, who wants to get into the science and how can she stay in the world of science? Because it seems to be, the issue for us is keeping women in science. So, it's a tough task. See if you can do it.

**Mary Liz:** Well, I do tell young girls, when they have an interest in biology or even if they don't, because you don't always know what your interests are. A lot of people have a lot of broad interests -- music, sports, science, the arts, et cetera. If they can become involved with a program, say Wildlife Rescue or some sort of a zoo program, and become involved with the women who's in those programs.

**Dr. Biology:** A mentor.

**Mary Liz:** A mentor!

**Dr. Biology:** Right, OK.

**Mary Liz:** A female mentor in those programs, that's what I had. I was very lucky when I was a kid. I found a bird when I was quite young, in elementary school, Robbie the Robin. And as a result of finding Robbie the Robin I was lucky to find two female mentors who helped me learn about science, about how to become involved in the community and the community of not just other scientists but people who worked with biodiversity. Maybe they were at the gaming parks or something like that. And I learned a lot from those women. I learned how to interact with other people and how to learn about plants and animals. So, become involved with programs and if you can especially can become involved with women in those programs.

Then continue on with your schooling, you should interact with both men and women as mentors, I believe, because it helps you understand how the world works. And follow your passions, you have to follow your passions. And if you stick with your passions you will inevitably end up doing what you enjoy and hopefully you'll stay with science in some regard.

**Dr. Biology:** Well, on that note, Professor Jameson, I want to thank you for visiting with me today.

**Mary Liz:** Thank you very much, Dr. Biology.

**Dr. Biology:** You've been listening to Ask a Biologist and my guest has been Professor Mary Liz Jameson - visiting ASU from the Department of Biological Sciences at Wichita State University. For more information on recipes from this show, check out our companion website. We'll be putting something up there so you can make your own Yummy Hummers or your crispy ...

**Mary Liz:** Chocolate Covered Crispies!

**Dr. Biology:** Oh, yeah, Chocolate Covered Crispies! The Ask A Biologist podcast is produced on the campus of Arizona State University and is recorded in the Grassroots Studio housed in the School of Life Sciences, which is a division of the College of Liberal Arts and Sciences. And remember, 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](http://askabiologist.asu.edu) or you can just Google the words Ask A Biologist. I'm Dr. Biology.