

Ask A Biologist Vol 057 (Guest: Page Baluch)

Micronauts and Beyond

Three inquisitive young co-hosts, Stephanie Galindo, Anthony Delgado and Raenesha Willis visit with biologist and microscopist Page Baluch. Together with Dr. Biology they explore the tiny world of inner space and learn that there is more to a flower than can be seen with only the eye.

Transcript

Dr. Biology: Are you ready to rock? OK. This is Ask A Biologist, a program about the living world and I'm Dr. Biology.

Anthony Delgado: And this is Anthony Delgado.

Stephanie Galindo: Stephanie Galindo.

Raenesha Willis: And Raenesha Willis.

Dr. Biology: And they're my co-host today on 'Ask A Biologist'. Great to have you here. Now to start off, can you tell me what school do you go to?

Raenesha: Kenilworth.

Dr. Biology: And Kenilworth is located in?

Anthony: Downtown Phoenix.

Dr. Biology: That's right. And let's see here. Are you all from the same classroom?

Raenesha: Yes.

Dr. Biology: And who's the teacher?

Raenesha: Mrs. Dodge.

Dr. Biology: Well thank you Mrs. Dodge. I've really enjoyed exploring some cool science today with your students. Earlier, we were visiting one of my favorite laboratories at ASU. As a matter of fact, it's just down the hall from Grass Root Studio and where our guest biologist spends most of her time each day. Dr. Page Baluch is the manager of the W.M. Keck Bioimaging Laboratory. She also spends a lot of time doing research with cells using some pretty amazing microscopes. Welcome to the show, Dr. Baluch.

Page Baluch: Well, I'm glad to be here and I'm looking forward to answering your questions.

Dr. Biology: All right. To start off with, let me ask my co-hosts, have you ever wanted to be an astronaut?

Students: Yes. No.

Dr. Biology: Your answers really don't surprise me, although there was a no in there that, I guess, was a little unexpected. But we do know, even if you want to be an astronaut, not too many people become astronauts and get to travel into space. Today, however, we all got to travel into inner space, the tiny world that we cannot see without some type of instrument. So today, we had a bunch of microscopes, right?

Stephanie: Right.

Dr. Biology: Right, as Stephanie says. And even though you haven't been an astronaut and may never be an astronaut, you've already become a micronaut. How cool is that?

Student: Very cool.

Dr. Biology: OK. [laughs] Now, as part of exploring today, we saw a lot of microscopes, didn't we?

Raenasha: Yes. I want to know how many microscopes there are.

Page: There are many types of microscopes, but we only have a few kinds in our lab. We saw a standard bright field microscope and that was the one that you looked at leaves. And you saw a dissection microscope and we looked at the bugs. We put the flower underneath and we saw that there are bugs climbing on it. And then there was also a confocal microscope. That's that special big microscope and I showed you how we could do the 3D images on that. There are also other microscopes that are down the hall from us. They're called electron microscopes.

Dr. Biology: Electron microscopes? So why are they called electron microscopes?

Page: So when you looked at the microscopes today, we had regular light that illuminated that put light onto the sample so that you could see it. But in an electron microscope, it would use a beam of electrons in order to be able to see something within that microscope.

Dr. Biology: Oh, OK. So I remember that we have the Ugly Bug Contest. You guys all have posters, right?

Students: Right.

Dr. Biology: That poster was done with a scanning electron microscope. Let's hear a little bit about the scanning electron microscope.

Page: An electron microscope can see things really, really close. A lot closer than what we saw with the microscopes that we used today, even the big fancy one. So it can see inside of those cells. So remember you saw cells that were walking on the computer screen? Remember that? We could just look at one of them and look inside of it and see what makes it.

So when you go to the doctor and you have an x-ray and you can see inside your body, we can see inside of a cell like that. And so that's why people like electron microscopes.

They can also see the surface of them so there's two different ways in which you can use electron microscopes to see stuff. So you can see inside real detail like an x-ray or you can see the surface really well.

And that's what we do when we scan bugs. We image the surface of the bug so you get a good three-dimensional view of it. So you remember those pictures that we saw on the hallway? We saw their face and the reason why we could do that is because we took a surface view of the bug.

Stephanie: How many bugs do you normally find in the flower?

Page: I guess it all depends on the flower. So the flowers that we looked at today was mostly aphids that we saw. They're very common, but you can also see ladybugs. Sometimes you can see bees. You could see maybe ants climbing up the stems of the flowers. But it also, like I said, depends on the plant. Sometimes plants are certain colors and there's different colors of aphids in there. It's like camouflage. And so the different kinds of bugs match up with the particular flower type.

Dr. Biology: So how many bugs did you see in the flower today, Stephanie?

Stephanie: Like five.

Dr. Biology: Like five. OK. I think there are at least five. You're right.

Raenesha: How did you become interested in this?

Page: I've always liked science and I used to like working with skeletons a lot. And I really liked studying biology, but then when I started working with cells, then I realized I could look at them under the microscope. And I found it very fascinating because you can do different experiments with stuff, but you don't see the results until you look at it up close. And so every time I do an experiment, I look forward to using the microscopes. So you mix things together and you move cells around and you do different things to them. But eventually, you put them under the microscope so that you can see them up close to see how they behave because of what you did and that was exciting to me.

Raenesha: Do your kids want to work here like you?

Page: Well, that's a funny question. I would have thought that my kids would have been interested in the same things, but actually, everybody has their own interests. I have one of my kids that wants to be a police officer, another one wants to be a nurse, another one wants to teach school, and another one that wants to do engineering. So it's all different, but they do sometimes have interest that overlap. So if you're a police officer, sometimes they use microscopy to study things like crime scenes or something like that. So I have a feeling even though they're not doing just what I'm doing, they'll do something that we would cross paths.

Dr. Biology: Right, everybody's a scientist one way or another. Stephanie, do you have another question?

Stephanie: What is the ugliest bug you've ever seen?

Page: That one's hard. There are all kinds of bugs. One that just pops into my mind the most, for some reason, is we caught a tick, the little bugs that gets drop off of the trees and it sucks your blood. Well, we caught one of those for that Ugly Bug Contest and when we imaged it and zoomed in, the way its face looked was pretty much one of the ugliest bugs that I had seen.

Dr. Biology: Right, it almost looks like one of the ugly ghost from Ghostbusters. Remember that movie? It would be a rerun for you guys?

Raenesha: Do bugs have skeletons?

Page: Well, bugs are unique. They're different than us. In our bodies, our skeletons are inside of us, but for a bug, their skeleton's on the outside and it's call an exoskeleton. It's that hard shell that's on the outside. That's their skeleton and so when you look at a bug, you are looking at its skeleton.

Dr. Biology: Pretty cool, huh?

Stephanie: That's pretty interesting.

Page: [laughs]

Dr. Biology: Yeah. Well, let me ask you. What was your favorite bug today?

Stephanie: My favorite bug was the light one, light brown one.

Dr. Biology: The light brown one?

Stephanie: The one you couldn't see that much that was like clear.

Dr. Biology: The translucent one.

Stephanie: That one.

Dr. Biology: OK. Some of the aphids were translucent. Yeah. Yeah. How about you, Anthony? Did you have a favorite bug?

Anthony: My favorite bug was that black one that we saw through the microscope that looked like a centipede.

Dr. Biology: Yeah. Yeah, and it kept walking in and around. It was actually probably moving around more than the other bugs. Raenesha, you had a really good description of one of them.

Raenesha: Mine was the one that looks like a newborn ladybug.

Dr. Biology: Yeah, it did. It had that dome shape to it and it was also clear like Stephanie said, right?

Raenesha: Right.

Dr. Biology: We call that translucent.

Raenesha: What does the mean, translucent?

Dr. Biology: That's a good question. It means that you're able to look through it. May not be as quite as clear as glass, right, that's transparent. Translucent means you can see through it and often all you can see it light that comes through it, not necessarily as if it's a piece of glass.

Anthony: What's the most interesting thing you saw in a microscope?

Page: That's a hard question. I've seen a lot of cool things in microscopes, but what would be the most interesting? I really like studying the skeleton. We talked about that in your bodies you have skeletons. Well, cells have skeletons too. So I like to see the skeletons in different cells.

Dr. Biology: The other thing that's very interesting about them is how they're not the same as ours. Our skeleton stays in the same place. The bones don't shift around and in cells, they actually can change the way they're put together, right?

Page: That's right. We, earlier today, saw that cells can walk around and we saw that they form little legs and extensions, but then they pull them back. And that's because they can form their skeleton and then take it back apart again so they can move around.

Dr. Biology: Very cool.

Stephanie: What 's your favorite microscope?

Page: My favorite microscope is the confocal microscope. That was that big one that we used. And that's because we said that we used bright light to look at stuff. Well, it uses lasers to image things. So you've seen laser pointers. That would be the light that you would shine onto stuff in order to see it. I like it because not only can I see different colors like that, but I can stuff very clear. Remember when we used that little toy microscope where we couldn't get it to look very clear? The bugs looked pretty good, but you can get it looking very crisp on the confocal microscope.

Stephanie: Is that the one that you can also see 3D images?

Page: That's right. That particular microscope has computer with it with a program and so it can enable me to do a lot of different things with it. So one of the things that it can do is it can make your image into a 3D image. So we can use the special glasses and see it coming out of the screen when we look at it.

Anthony: Can you see blood cells in a microscope?

Page: Yes, you can. You can take blood and you put it on that glass slide that we saw. And you can use different kinds of dyes because at first, you can't see details in them very well, but if you look really close you'll find out that blood contains many parts. So you have red blood cells, but then you also have what's called white blood cells and there's different types of white blood cells and they all look different. And so there are people that do study the different types of blood.

Anthony: That's very cool.

Stephanie: What is your favorite flower?

Page: Well, usually the flowers I look at are ones that are on the trees that are blooming or are off of a bush. And what I find funny is when we go to a store and we buy roses or we buy carnations or something like that and you think that they're so beautiful. When you look at them under the microscope, they're not as interesting as the flowers that you pick off the scrub bushes that are outside. And it's because the pictures that you see of the ones coming off scrub bushes, they're more colorful and they're more colorful because they attract the bugs. And so, it's funny that the bugs know which are the better plants than people. We're picking the ones just because they have colorful petals where the bugs can see inside. They can get inside and they see all the colors of the pollen. We saw pictures of pollen. The bug's eye view is better.

Anthony: What do germs look like they come out of the faucet?

Page: Usually, water that's coming out of a faucet has been treated or else we'd all get sick when we went and drank out of the water fountain. So there's treatment plants that add, sometimes, chemicals to it like chlorine, like pool water. And it helps so that it kills bugs so that the water you get is clean. The germs are actually on the handles like the knob that you turn to get your drink of water and that's where stuff like bacteria would grow. And if I took a Q-tip and I swab that area and then I put it onto that glass slide and stuck it under the microscope, I would see the shapes of bacteria.

So, there's three common shapes that bacteria look like. There are rods and then there's spirilla, which are springs and then there's cocci, which are little circles that all hook together. So those are common shapes of bacteria and that's what it would look like under a microscope.

Stephanie: Do the germs freak you out sometimes?

Page: Not too bad, but I don't work with bad germs. Some people do work with bad germs and they have to wear special outfits, so it depends on how bad. Some germs are very, very dangerous and they cause really bad diseases. And those people wear space suits and you have oxygen tank attached to their outfit because they can't even breathe the air that these germs are living in. So those would be really scary ones, but I don't work with those kind. I work with very common type bacteria. It's called E. Coli. You maybe have heard about this in the news. E. Coli is known to cause food poisoning, but that's a specific type of E. Coli.

In the lab I work with, we actually use a type that's similar to what's found in your intestines and it helps you digest your food. So that one's not so scary because it's something we already have inside of our bodies.

So there are people who do research and they work with them and those aren't so scary. If you did work with scary ones, then you would have special protective clothes that would keep you safe.

Dr. Biology: And while we're talking about germs, which is a really common word for you to use at your age, we're talking about bacteria and viruses, for the most part. And if you've ever gone to the doctor and they ended up giving you something called an antibiotic, that means it's a medicine to help kill the bad bacteria that's making you sick. But if you have a cold, right? If you

get a cold, colds aren't caused by bacteria. They're caused by a virus. There's no reason to take antibiotics for a cold.

OK, so on this show, none of my guests get to leave without first answering three more questions. I'm going to have my co-hosts ask the questions today so I think I'll start off with Anthony.

Anthony: When did you first know that you wanted to be a biologist?

Page: Well, one Christmas, I got a microscope when I was in fifth grade and I started looking at stuff. Everything I could find, just like what we did in the lab. So I would put pieces of plants in there, our water, our pond water, and I started looking at that stuff and it made me interested in biology. And then when I was in high school, then I took all the biology classes that they had. I took all the extra ones and I had some really good teachers and it made it very interesting. So I just kept studying it from then on.

Raenesha: If you're not a scientist, what would you be?

Page: Well, I guess it's still kind of a scientist, so it would be archeologist. I think that would be interesting to study historical facts so those are scientists that look at the remains of old civilizations or something like that. Like the Roman Empire disappeared, but they're people that go and dig up and find information as to what happened to that society and I think that would be really interesting.

Stephanie: What advice would you have for a young scientist like me?

Page: Well, I think what's important is you have to find things that make you happy and excited and interested. So when you're at school and you study science, there might be parts that really interest you and I think you should really focus on that and you tell your teachers about that. And your teachers can help you meet other people. So eventually, you'll be able to do science fair and if you have an area that you like, then really study it and see if your teachers can help you find people at the university. Sometimes we have volunteers that will come and help you and teach you about it more. And that's basically what you need to do.

I even tell college students when there are something they want to do, they need to go to a lab and volunteer and help and work with people. And the people that are working there, they love what they do so they would love to share and teach that to other people.

Stephanie: That's interesting.

Dr. Biology: That's interesting. [laughter]

Dr. Biology: So Dr. Baluch, I have to say we had a great time today and I want to thank you for letting us visit and for you showing us all the cool things in the W.M. Keck Laboratory. I had a great time exploring all the tiny things.

Page: I really enjoyed being here and it was really exciting to have the students come in and check out the microscopes. I really enjoy seeing their excitement when they look at things in the

microscope for the time that they had never even imagined would be there, like seeing bugs crawling out of the flowers.

Dr. Biology: So for my fellow micronauts, would you say that microscopes and microscopy rocks?

Students: Microscopy rocks!

Dr. Biology: [laughs] All right. And it was great having you here asking questions with Dr. Baluch. We got to explore innerspace. I have a question for you. What did you like best and I'll start with Anthony.

Anthony: My favorite part was when we all got to get pictures of our fingerprints.

Dr. Biology: Oh, all right, the fingerprints. Yeah, it's cool. All those grooves. Stephanie, what about you?

Stephanie: My favorite part was when we looked at the flowers where the insects were.

Dr. Biology: Oh yeah. Did you have a favorite insect?

Stephanie: The clear insect.

Dr. Biology: Oh, the translucent one.

Stephanie: Yeah.

Dr. Biology: That's right. We talked about that. That's right. And Raenesha, how about you?

Raenesha: My favorite part is when we looked at the flower and we got to take a picture of it.

Dr. Biology: Taking the pictures. And all those pictures will be going back to school with you so you can show them to all your friends at school and they can also be excited about maybe coming on Ask a Biologist. Is it fun to be on Ask a Biologist?

Students: Yes.

Dr. Biology: [laughs] OK, well you've been listening to Ask A Biologist and our guest has been Page Baluch from the ASU School of Life Sciences. Dr. Baluch manages the W.M. Keck Bioimaging Laboratory. Now, if you don't have your own microscope to explore some of the innerspace and the world around you, you might like to try out our zoom galleries on the Ask a Biologist website. They're like having your own microscope. You can find them under the image section of our companion website.

The Ask A Biology podcast is produced on the campus of Arizona State University and is recorded in the Grass Roots Studio, housed in the School and Life Sciences, which is 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 askbiologist.asu.edu or you can just Google the words "Ask A Biologist." I'm Dr. Biology.

Anthony: And this is Anthony Delgado.

Stephanie: Stephanie Galindo.

Raenesha: And Raenesha Willis.

Dr. Biology: Hey guys. You want to go back and look at the microscopes some more? Is that going to be OK with you, Dr. Baluch?

Page: Sure. I bet there's a bug we haven't seen yet.

Dr. Biology: [laughs] OK.

Transcription by CastingWords