

Video Transcript - Q?Crew Captain Talk – 'Working in a Microscopy Lab'

Justin: So before I start, I'll say bluntly what I learned from my internship experience in the Smithsonian. And that is, not everything seems what it looks. Sometimes, you have to look at different angles, different views, to truly appreciate what it is. And in my case, me working in a museum had me realize what capabilities I have in contributing to science, just like how the scanning electron microscope provided me with a newfound appreciation for the microscopic world. [00:00:30] To introduce myself my name is Justin Baeck [00:00:34]. I'm a senior, and I'm also a Smithsonian intern at the Natural History Museum working with the scanning electron microscope. So my connection with the Smithsonian began even before I went to school. I was this dinosaur, and I still am, this dinosaur-obsessed kid who would go to museum many times just on my whim. And I was just fascinated by these magnificent creatures. And that fascination drove me to [00:01:00] being passionate about science, and that passion for science drove me to be passionate about education and school in general.

Justin: Now, however, me contributing to science, me being in a science field seemed something so far away. See I thought it was something that only professors or experts did in their laboratories and after years and years of training. And a high schooler like me could possibly not do it right now. So I was just content with just learning about science and keeping up within the latest science discoveries. [00:01:30] And I've never imagined that I would be able to contribute to science so early. And I would never have imagined that it will be in the world famous Smithsonian. So I was surprised when I saw a volunteering opportunity for high schoolers. I was just surfing the Smithsonian website just being like a Smithsonian fanboy, I guess. And I was just keeping up with the latest Smithsonian news. And then it popped up.

Justin: And what's so special is that, even before that, I tried volunteering. I sent an email to them inquiring about if there were any volunteer [00:02:00] activities for me? And it was just like, "Yeah you have to be 18 and you have to have a degree." Like, no. Don't have that. I'm a high schooler. Of course, I don't have that. So it was a big letdown. So it was more special, so I applied (and) I got in. So I was like, "Yes. I got in!" It's like, "Whoa!" It was like that kind of moment. So now that's how I became a volunteer for Q?rius, which is the Education and Interactive Center for the museum. And what I did there was I basically learned [00:02:30] and touched the thousands of specimens there and conveyed my passion about them through visitors. Or "unlocked" their world, as the Q?rius motto says.

Justin: So working around with those tons of fossils, birds, mammals, plants all around me was a breathtaking experience and gave me a new perspective of what I can do and what environment I can work in. And a whole new world opened when I started applying for an internship [00:03:00] and I was assigned a project. It was (that) I had to work with the scanning electron microscope or also known as the SEM. Now, this is different from the regular light microscope you'll see in school, which actually is like the glasses. Light goes through the lens, boom it magnifies it. How the SEM works is it shoots out a steady stream of electrons onto the object. And when the electrons reflect back, the

microscope reads the signals and creates an image. Through that, the topography of the object will be in great detail [00:03:30] and much more magnified than in a regular light microscope.

Justin: So if a regular light microscope has about a few hundred magnification, the SEM can actually go up to 1.2 million times. So what I had to do was I had to create a bunch of samples to put under, take pictures, and do a bit of research on why it looks that way. So for example, I made a sample of a sea urchin. To the regular eye the sea urchin spine looks smooth, [00:04:00] just small, smooth, and regular. But, however, if you put it under an SEM, you can see multitudes of little, tiny bumps and spines on the seemingly smooth surface. Now, another one is the Blue Morpho butterfly. This beautiful butterfly looks blue, but, in fact, the fun fact is, it's actually green-ish. So why it looks blue?

Justin: So if you look closely at the butterfly, the wings, the wings are made up of tiny little scales. [00:04:30] And if you take the cross-section of the scale and put it under the microscope, you'll see tiny little microstructures. So how that works is, when the light hit the microstructures, unlike regular pigments, which reflects certain light back, this actually distorts the wavelengths of the light, and actually diffracts it. And when it diffracts, the wavelengths are canceled and some are amplified and reflected back, making the green look actually blue. So what the exciting part of me doing this is I was actually able to be [00:05:00] in a professional microscopy lab, which was great.

Justin: They told me to put gloves on, make sure to sanitize everything so I don't contaminate everything, which added to like the excitement of "I'm going professional." And so I was able to prepare stubs. I was able to put these samples in the oven to dry it, so to make sure that the moisture doesn't mess with the microscope. And then I had to paint them with gold and with the [00:05:30] spiro-coating machine, which was because, since the electrons have to bounce back, it has to be covered in something conductible, such as metal, and gold was a great option for that. Then I get the final product. And when I put the final product under the microscope, it's like an alien world that's been revealed to me. Because it's just different from what I look with my bare eyes.

Justin: Operating with the SEM was a new experience for me. And I would have never appreciated the microscopic world without me actually operating it. [00:06:00] Of course I can just go online and search SEM picked photos and all that, but it's just completely different from making your own and putting it under, and taking your own pictures. So just the five year old me would never have imagined that I would be in this position of doing science and working with this complicated equipment and contributing to the museum. And I would have never known if I never applied to volunteer at the Smithsonian. And I'm very glad that I have done. [00:06:30] Thank you.