Antibiotic Hunters | Students Ask Scientists

Transcript

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- What is your lab and what do you all research there?

- Jo Handelsman: My lab works on a whole array of topics related to microorganisms, particularly bacteria. And so, bacteria are tiny little cells that most people think are bad, but actually, they keep the world running the way it does. And one of the things they do is congregate with each other. And that's the kind of thing that we want to study is that communication and interaction process among bacteria.

- Julia Nepper: We study the microbes that live in the soil. We're interested in discovering antibiotics and understanding how antibiotics work in nature and understanding better how we can use them in the medical fields. Science is a very collaborative endeavor. So I do a lot of it with other people, especially in the lab when I'm learning new techniques.

- Deepa Acharya: Tiny Earth is this amazing network of many different kinds of people, instructors, and even students like you, where we bring together a mix of chemists and biologists and even computational scientists to try and figure out how to come up with new antibiotics to fight all of these new infections that are coming up across the world.

- So, what's an antibiotic and how does it work?

- Marc Chevrette: Antibiotics are chemicals that kill bacteria. What's really interesting about antibiotics is most antibiotics get made by bacteria themselves. So, they're used by bacteria to fight with other bacteria and kill them. So, almost all of the antibiotics that a medical doctor would give you were discovered from bacteria that are making them either in the soil or in their natural environments. Some of the antibiotic-resistant bacteria are called 'superbugs.' They're called that in the news because they have resistance to a bunch of different types of antibiotics.

- Austin Hall: Whenever you add more and more antibiotic to a person or the environment, a bacteria can adapt and become resistant to it. So we need to discover new antibiotics to overcome this adaptation so they have something new to interact with.

- What signs do you look for when you're trying to discover a new antibiotic?

- Deepa Acharya: So, one of the most important signs is that it is able to consistently kill a specific infection of a specific pathogen. So, pathogens are the types of microorganisms that cause diseases. And so, oftentimes, we want to find antibiotics that can kill a specific kind of pathogen, so that we can target our, our drugs in a better way.

- Austin Hall: Whenever we look for antibiotics, our lab looks at something called a 'zone of inhibition.' So, whenever a bacteria that produces an antibiotic is producing it, it creates this little clear circle, essentially, where the antibiotic is in the agar, the Petri dish, and this creates kind of like a safe haven that prevents other bacteria from spreading into that area.

- Why look for antibiotics in dirt instead of something else?

- Marc Chevrette: Because it's one of the most diverse communities in the entire world. There are more bacteria in a gram of soil than there are humans on the planet. So, it's an incredibly diverse community of bacteria and fungi and worms and all different sorts of organisms interacting with one another.

- Julia Nepper: There are a lot of bacteria that naturally produce antibiotics in soil. There are bacteria called 'Streptomyces' that are very common in soil. And, in fact, they produce many of the antibiotics that we use in clinics and in research.

- So, how do you get your dirt?

- Amanda Hurley: It comes from around the country. So, Tiny Earth is, again, a network of instructors and student scientists who go out into their own communities and talk about antibiotics and talk about antibiotic resistance and then collect soil samples from wherever they are. And they can test those soil samples themselves in their own laboratories. And then, they send us the bacteria so that we can find the chemicals, these new antibiotics.

- Deepa Acharya: We need to cast our net wide enough for us to get all the diversity that is there in the soil. So, if we only collected soil from Madison, we wouldn't be able to find these new species of bacteria or the new antibiotics that they could be making. And so, it's important for everyone to pitch in so that we can really see the immense diversity that's there in soil across the country. Students and instructors are extremely important to our research because they're the ones who go out and find the soil. They are the ones who do the first tests. And so, without them, we wouldn't have a place to start.

- I want to be a scientist when I'm older. What advice do you have for me?

- Amanda Hurley: That makes me so happy. First of all, congratulations! I'm so happy you want to be a scientist. It's a great job. To be a scientist, you just have to be curious. You have to be interested in the world around you.

- Julia Nepper: Honestly, we're all already scientists because we're all constantly doing experiments in our own lives to see what will happen. So you have the talent to be a scientist. It doesn't matter when you figure that out. That door is always open for you.