Transcript for *Green Machine: The Slightly Gross Truth about Turning Your Food Scraps into Green Energy* (Henry Holt and Company) Preview Video

Preview (0:00 – 5:37)

Hi everyone! It's Colleen from the KU Natural History Museum, and I am so excited to remind you about tomorrow's Story Book Science here on Facebook Live at 10 o'clock AM. I will be reading the book *Green Machine: The Slightly Gross Truth about Turning Your Food Scraps into Green Energy*. It's written by Rebecca Donnelly, and it's illustrated by Christophe Jacques. And we will be reading it with permission from Henry Holt and Company. So thank you to them for the permission to read this book!

Now I think this book is really cool because it makes me think about how food waste, things like a banana peel, can then turn into energy that can be used to power lights and do other things for us.

Now it's a little weird to think about how something like a banana peel can turn into energy, but it goes through a special process. So what happens is food waste, and in some cases animal waste, it's broken down by microbes, small, tiny organisms. And when it's broken down by microbes, what happens is a gas is produced, especially a really smelly gas called methane! That methane, and any other gases, can be turned into energy.

So this all happens in an anaerobic digester, and that's this enclosed area where there's not a lot of oxygen because that's what anaerobic means: no oxygen. And the microbes in the anaerobic digester, they're totally fine to live there to break down the food, because anaerobic means no oxygen. And the microbes are anaerobic. They don't need oxygen, or they don't need a lot of oxygen in order to do their job.

Now earlier I said microbes are these really small, tiny organisms. And there are so many different microbes! There's bacteria, viruses, even fungi! And what they have in common is that they're all very small. So we can't see them with just our naked eye.

So scientists have to use special tools in order to study microbes. One of the tools a scientist can use is a microscope! A microscope makes those really small, tiny organisms really big. So a microscope can be used by a scientist to study microbes. Another tool scientists can use is a Winogradsky column. Now a Winogradsky column is a combination of mud, dirt, water, and some nutrients, and it forms a mini-microbial garden! So let's look at one together!

This Winogradsky column, I made about 12 weeks ago. And I'm going to bring it close to the camera. You do have a bit of a reflection of the light, but what you should notice are these different colored layers. So you have this really dark layer here with some purple layers mixed in. There's an orange layer, and then you even have some green at the very top!

Now this Winogradsky column, it didn't look like that at first. At first, it looked like this, just looked like a mixture of mud with some water on top of it. But I waited and waited for weeks. And what happened as I waited is that these layers formed. These different colored layers. And those different colored layers indicate different microbes growing. And we'll talk a little bit more about the different types of microbes. But one of

the things I want to tell you is that when we look at a Winogradsky column, at the top, there's a lot of oxygen. Now that makes sense because there is some plastic covering the top, but oxygen can get in the plastic. You see plants are growing, so they're producing oxygen. So there's a lot of oxygen at the top. As you go down the column, and you get deeper and deeper into the mud, there's less and less oxygen. Now there's less oxygen, but there's a lot of methane and carbon dioxide and even sulfide sometimes.

So what I want you to think about is the type of microbes you would find in the very bottom. We know that there's very little oxygen at the bottom of this column, deep in the mud layers. So what type of microbes live there? Are they aerobic, which means they need oxygen? Or are they anaerobic, which means that they don't need oxygen, or if they do, they need very little? What do you think?

Now I want you to take some time with that question and then come back tomorrow where I'll read *Green Machine*, and we'll talk more about microbes. And we'll determine what type of microbes live at the very bottom in the deep, deep mud of a Winogradsky column. I'll see you then! Bye!