Grassroots Environmental Education
Kids Discovery Series
Module One: Coronavirus or COVID 19
Written by Abby Bezrutczyk

Everyone is talking about the coronavirus, COVID 19. The virus has drastically changed the way we are living, to keep us from getting sick from it or making other people sick. So what is a virus? How is it different from other illnesses you've heard of?[1] Here are some interesting facts:

If you've ever had a cold or the flu, then you've come face-to-face with a virus. But viruses are not responsible for all illnesses. Sometimes you get sick from a bacteria, like the one that causes strep throat.

What makes a virus different?

Viruses and bacteria are both "germs," but they're actually very different, and those differences are important! First, let's look at their sizes. For one thing, viruses are a lot smaller than bacteria.[2] If one of your body's cells was the size of a trampoline, a bacteria would be the size of a frisbee and a virus would be the size of a nickel![3]

Another difference is that a virus isn't really alive – at least, not in the way that you and I are, or like bacteria are.[4] Viruses are more like tiny pre-programmed bots that take advantage of the work our cells do. You and I have DNA in all of our cells, which gives our cells instructions about how to make energy, protein, sugar, etc…and that is actually what makes us, us! Viruses just have a tiny bit of DNA, or its cousin, RNA, which they use to mess up the way our cells work.

Some viruses trick our cells into making copies of the virus, and then the copies escape to find other cells to get into. When enough cells have been invaded by the virus, you end up feeling sick!

So how do we keep from getting sick?

Viruses are clever and, honestly, they are really good at what they do. But humans are clever too, and we can find ways to stay healthy and strong. One of the best ways to fight viruses is to eat nutritious, healthy food and get plenty of exercise. This strengthens our immune system.

You also need to get enough sleep every night and spend some time every day outside in the sunshine to absorb the very best form of vitamin D. For serious viruses, you may get a vaccine to help your body fight the infection.

Coronavirus or COVID-19

Now with all that background, what's the deal with this virus – the COVID-19 coronavirus? Here's the thing: COVID-19, which stands for COronaVIrus Disease- 2019, is a new virus for humans.

Back in December of 2019 in the Wuhan province of China, this virus did something new: scientists say it "jumped species." This means the virus originally infected one animal - maybe a bat that was being sold in a market - and then the virus carried by the bat mutated, or changed in such a way that it could infect humans too.[5]

A disease that normally exists in animals, but can be transmitted to humans is called a **zoonotic** disease. Buying and selling wildlife isn't the only activity that can cause this dangerous problem: human destruction of remote and wild animal habitats for mining and other industries also increases disease risk by bringing humans into closer contact with animals.[6]

Maybe you remember, or have heard people talk about the "swine flu"- that's when a flu virus jumped species from pigs to humans. COVID-19 is in a group of viruses that we already know, called coronaviruses.

If you look at the coronavirus under a special microscope, you'll see it looks like a spikey ball. And scientists think that it's these spikes that make COVID-19 different from the bat coronaviruses, because the COVID-19 spikes help it attach itself to human cells. Because it's new and we have no immunity to it, anyone can catch it. That means the tools we have to prevent other viruses from infecting us don't work in this case.

It might be a year or more before a vaccine for COVID-19 is ready to be used on people – there's a lot of testing that needs to happen before we know that a vaccine is safe and actually works.

What started out as a few cases in China has now spread to every continent in the word except Antarctica! When a disease spreads all over the world like this, it's called a pandemic.

- How do people get exposed to COVID-19?

Coronavirus spreads in the same way a lot of colds spread.[7] When a sick person coughs or sneezes, their saliva or mucus has the virus bundled up inside it. So if these "viral droplets" from another person are in the air space near you, you can breathe them in. If a sick person sneezes or coughs into their hands and then they touch a surface that you eventually touch, you can be exposed this way as well. Touching your mouth and nose or rubbing your eyes with contaminated hands opens the door for the virus to walk right in.

Once it enters through your nose, mouth or eyes, it attaches to cells and replicates inside the body, like other viruses. Two early symptoms of COVID-19 are a fever and dry cough, and most of the time these symptoms will go away on their own. Some people temporarily lose their sense of taste and smell, even if they have no other symptoms of being sick.[8] Other people have trouble breathing if the virus gets into their lungs.

It can become a bigger problem for people who already have health problems, and that's why a lot of people around the world have ended up in the hospital, or even died. Young people mostly have mild, flu-like symptoms.

It's important to keep your community in mind When COIVID-19 enters a new city or town, it can spread quickly if people aren't being very careful and taking precautions. Hard-working doctors and nurses will have too many patients to take care of, and that is bad for everyone.

We're all trying to avoid that, and that's what people mean by "flatten the curve"; you're trying to keep the number of sick people down at a level that hospitals can handle.[9] This means we all need to work together to limit the spread of the disease in simple ways.

What you can do

Wash your hands! You use soap everyday- but have you ever wondered how it works?[10] Soap is made of molecules that look like tiny pins, but like a magnet, the pins have two different poles. The head of the pin loves water, but the tail of the pin hates it. So when these soap molecules are on your hands, that tail is searching for something else to stick into, to get away from the water. When it finds viruses or bacteria, it sticks into them, bursting them and killing them. Eventually a bunch of these pins come together in a ball, tails in and heads out, carrying away the remains of their poking. Those little balls, called micelles, wash down the drain! So when you wash your hands, you're doing a lot to keep the coronavirus from spreading.

Another way to stop the spread of COVID-19 is to "quarantine" or keep "social distance." To "quarantine" means to keep yourself away from other people, sometimes even your family, so that you don't spread the disease to anyone else.

"Social distancing" on the other hand, is a little more relaxed. Because the disease can spread from someone's "viral droplet" from their cough or sneeze, it makes sense to avoid being in groups of people. Staying six feet away – about the length of a cafeteria table – is a safe distance. "Social distancing" is why schools and favorite restaurants are closed during an outbreak; keeping people away from each other, while sad, is keeping people safe.

Wearing a cloth mask is important to protect us and other people. First, if people who have the virus are wearing a mask, they are not spreading droplets, and second, it keeps healthy people from touching their face with their hands.

Technology helps us to continue school in new ways, and keeps us connected with our friends and family, even if we can't be together. However, with increased use of technology, remember to put your devices on airplane mode whenever possible to avoid continuous exposure to microwave radiation, or better yet, ask about hard wiring using Ethernet connections.

You are living through a time that will be recorded in the history books, and it's not easy for us humans. The last pandemic was about 100 years ago, and even though it was a difficult time, the years passed and the disease disappeared. So remember, it won't be like this forever and soon we will go back to living our lives more normally.

Review questions:

1.
2.
3.

Suggested projects:

- Draw a picture of a corona virus germ. Compare it to a bacteria.
- Write a story about how your family is protecting itself from the virus
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Citations:

1. "Viruses or Bacteria: What's got you sick?" Factsheet published by the CDC.
2. "Cell Size and Scale" Published by Genetic Science Learning Center, University of Utah.

3. "The big and the small" by Bernie Hobbs. Published on ABC Science, March 30, 2010.
4. "Are Viruses Alive?" By Luis P. Villarreal. Published by Scientific American, August 8, 2008.
5. "Mystery deepens over animal source of coronavirus," by David Cyranoski. Published by Nature, News Section February 26, 2020.
6. "Impacts of biodiversity on the emergence and transmission of infectious diseases," by Keesing et al. Published in Nature, December 1, 2010.
7. "Coronavirus Disease 2019: How it Spreads," Published by the CDC, May 22, 2020.
8. "Lost Sense of Smell May Be Peculiar Clue to Coronavirus Infection," By Roni Caryn Rabin. Published by the New York Times, March 26, 2020.
9. "Why outbreaks like coronavirus spread exponentially, and how to 'flatten the curve'," by Harry Stevens. Published by the Washington Post, March 14, 2020.
10. "Why Soap Works," by Ferris Jabr. Published by the New York Times March 13, 2020.

Other resources

"Coronavirus disease (COVID-19) advice for the public: Myth busters," Published by the CDC, 2020.