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Printed by: Jessica Christian
Printed on: March 12, 2020

Germs at Home

Article

PART 1

MANAUS, Brazil. You may live in a jungle hut or a city apartment. Either way, your home has bacteria. Now, new research from the Amazon rainforest suggests that people who live in the city might want to open a window.

Photo credit and all related images: Humberto Cavallin/University of Puerto Rico/Science Advance via AP

Maria Gloria Dominguez-Bello, left, collects temperature information from the floor of a hut in Peru. She studied bacteria in homes.

Scientists traveled from villages in Peru to a large Brazilian city. They tracked the effects of urbanization on the kinds of bacteria in people's homes. They wondered, "Do city homes have different types of bacteria than country homes?" It's a small step in the effort to understand how different environmental bacteria help shape what's called the microbiome. That's the trillions of bacteria that share our bodies. They play an important role in our health.

Everyone carries microbes. They exist on the skin, in the nose, and in the gut. They begin forming when a person is born. They help the body work. They protect us from illness. Some of these bacteria are good. Some are harmful. What changes the balance between good and bad bacteria? That differs. It depends on things like a person's diet or any medicine he or she may take. It also depends on where people live. Some studies show that children who grow up on farms or around animals have allergies or asthma less often.

Scientists studying the microbiome are looking at people's homes. One of those scientists is microbiologist Maria Gloria Dominguez-Bello. She led the study in Peru and Brazil.

"Very little is known about the microbes of the built environment," said Dominguez-Bello.

To track the effects of urbanization, Dominguez-Bello's team studied the microbiomes of 10 houses and their inhabitants. They did this in three Peruvian locations. One was a small village in the jungle. Another was a slightly larger village. The last was a medium-sized city. The scientists also looked at homes in Manaus, Brazil. It is a city.

The housing was different in each setting. In the jungle, some homes were huts with no outside walls. Some huts had outside walls but were more open on the inside. Sometimes, large families lived in these. City homes had closed rooms. They also had fewer people living in them.

The team found that as people living in the Amazon rainforest become more urbanized, the kinds of bacteria in their homes change. The more crowded country homes in the study had bacteria found in soil and water. But the city homes had bacteria that live on people.

The researchers learned that the more urbanized a home, the more human bacteria lived on its walls and floors. This is true even though homes in the city have fewer people living in them. In fact, in city homes, the researchers could tell which room the bacteria came from. There are different bacteria in kitchens, bathrooms, and living rooms.

"That's amazing," Dominguez-Bello said. "The walls talk."

Country homes are open to air circulation. But the walls in city homes were acting as traps as people shed bacteria, the team reported. Dominguez-Bello was shocked by the findings. She had the windows in her New York office unsealed. She decided it was important to open them.

Information for this story came from AP.

PART 2

Dig Deeper

There are some single-celled organisms without a nucleus. Most of these are bacteria. Bacteria are found in almost every environment. They do many different jobs. Some bacteria have chlorophyll. These bacteria use sunlight for energy. In oceans, these bacteria are an important food for many organisms. These bacteria also give off oxygen gas. Animals need oxygen to breathe.

Bacteria without chlorophyll do different jobs. Some bacteria break down parts of dead plants and animals. This helps recycle matter. Some bacteria give off chemicals. These chemicals go into the environment. They become food for other organisms. Scientists often group bacteria by what they do in the environment.

- **Producers**

  Some bacteria can change energy from sunlight into energy that cells can use. These bacteria are called producers. Organisms that cannot make their own food use these bacteria as food.

- **Decomposers**

  How do decomposers get energy? They break down materials in dead or decaying organisms. Decomposers help other organisms reuse materials from decaying matter.

- **Parasites**

  Some bacteria live in or on another organism. The organism is the host organism or the host cell. Some bacteria do not affect their hosts. Some help their hosts. Other bacteria harm their hosts. They are called parasites.

Bacteria may help or harm other organisms. These are just a few examples:

Helpful Bacteria

- One shovel filled with soil has trillions of bacteria. Think about what is outside. Do you see fallen leaves? Are there dead animals? Each is covered with bacteria. These bacteria break down the matter in dead bodies. They also break down wastes. Other organisms can then use these broken-down materials. These materials help them build their bodies.
- Bacteria live in your intestines. They help you break down food. They also help you get vitamins. Vitamin K is one such vitamin.
- Cities use bacteria to break down sewage. Bacteria are found in sewage-treatment plants. They live on the material broken down in liquid sewage. These bacteria help clean the water. What will happen when the water is clean enough? The water is sent out into rivers or oceans. Other bacteria can break down oil.
- Bacteria can change materials that do not come from living things. Then, other organisms can use them. Some bacteria can change nitrogen gas into nitrogen compounds. The nitrogen can then be useful to plants. This process is

called *nitrogen fixation*. Plants use these nitrogen compounds in making proteins. Proteins are an important part of every cell.

Harmful Bacteria

In the late 1800s, scientists learned that bacteria cause some diseases. Scientists wanted to learn more about these bacteria that cause disease in humans. Tuberculosis, cholera, and strep throat are diseases caused by bacteria. Bacteria also may cause disease in other animals and plants.

Bacteria can cause disease in three ways:

- They can take over parts of the body. They will multiply in body tissues. Then, they will break down cells.
- They can poison the body. How do they do this? They make harmful chemicals. The chemicals are then given off into the body.
- They can poison the body in another way. There are chemicals that are part of the bacteria themselves. These poison the body.

How can we fight bacterial disease? Vaccinations are one way. Vaccines help get an organism ready to fight diseases it might get in the future. Humans get vaccinations for bacterial diseases. Cats and dogs do as well.

Dictionary

circulation *(noun)* the flow of something through a space

decomposer *(noun)* an organism that feeds on and breaks down dead plant or animal matter

inhabitant *(noun)* a person or animal that lives in a particular place

microbe *(noun)* a very small organism that can be seen only with a microscope

parasite *(noun)* an organism that absorbs nutrients from the body of another organism; a parasite often harms the organism

producer *(noun)* an organism that captures energy from sunlight; it changes sunlight into chemical energy; this energy is stored in energy-rich carbon compounds

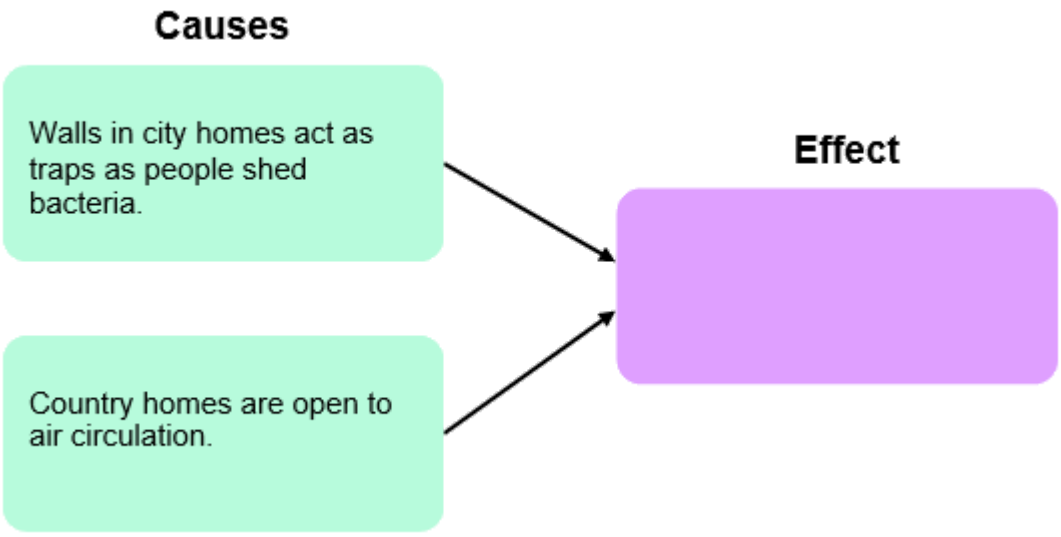
research *(noun)* close, careful study

urbanization *(noun)* the process by which towns and cities are formed and become larger

Activity

PART 1

Question 1



Based on the Article, which fits best in the empty box above?

- (A) The more urbanized a home, the more human bacteria lived on its walls and floors.
- (B) In the jungle, some huts had outside walls but were more open on the inside.
- (C) A team of scientists found many people living in the Amazon rainforest.
- (D) Some bacteria protect people from illness, but other bacteria are harmful.

Question 2

The Article talks mainly about _____.

- (A) The types of bacteria found in city homes and country homes
- (B) The results of a study that looked at children who grew up around animals
- (C) How a person's diet can change the balance between good and bad bacteria
- (D) How scientists were able to examine the bacteria in some homes in a rainforest

Question 3

Which two words are the closest **synonyms**, as they're used in the Article?

(A) Gut and diet

(B) Kitchen and village

(C) Inhabitants and children

(D) Researchers and scientists

Question 4

Which of these is an opinion?

(A) The best way to get a good balance of bacteria is by eating a healthy diet.

(B) Maria Gloria Dominguez-Bello led a study of microbiomes in Peru and Brazil.

(C) A person's microbiome is made up of the trillions of bacteria that share his or her body.

(D) Microbes begin forming when a person is born and can protect people from illness.

Question 5

Based on the Article, the reader can tell that _____.

(A) Most kitchens probably have far more bacteria than most bathrooms.

(B) Most scientists probably aren't familiar with the term microbiome.

(C) Maria Gloria Dominguez-Bello probably tells friends in New York to open their windows.

(D) Maria Gloria Dominguez-Bello probably grew up on a farm with many animals.

Question 6

The Article states:

> **But the walls in city homes were acting as traps as people shed bacteria, the team reported. Dominguez-Bello was *shocked* by the findings. She had the windows in her New York office unsealed.**

Which would be the closest **synonym** for the word *shocked*, as it is used above?

(A) Disturbed

(B) Disappointed

(C) Confused

(D) Comforted

Question 7

Khaled wants to read more about microbes. He would find **most** of the information _____.

(A) In a science book

(B) In a travel guide

(C) In a math book

(D) In a history book

Question 8

Which statement from the Article best supports the idea that microbes can be helpful?

(A) Scientists studying the microbiome are looking at people's homes.

(B) They protect us from illness.

(C) Everyone carries microbes.

(D) But the walls in city homes were acting as traps as people shed bacteria, the team reported.