

# Travels of **Bob,** the Soil Bacterium

by Stephanie Cunti  
and Cindy Nakatsu

Illustrated by Mary Lou Jones

***Bob the Soil Bacterium*** was written by Stephanie Cunti when she was a 5th grade student at St. Boniface Catholic School in Toronto, Canada. Bob was conceptualized by Stephanie when she learned about the diversity and distribution of bacteria from Cindy Nakatsu, assistant professor in the Department of Agronomy at Purdue University, West Lafayette, Indiana.



## BOB THE SOIL BACTERIUM



**B**esides all of the big living things in the world—humans, animals, insects—there are many tiny creatures called bacteria that you need a powerful microscope to see. They come in all kinds of shapes and colors. The more common shapes are rod (bacillus), round (coccus) and spiral.

Bacteria are unicellular organisms that do not require other cells to exist. All functions required for survival and reproduction can be carried out by this single cell. All large organisms are multicellular; this means they are made up of many cells.



**B**acteria live everywhere—in the water, in the soil, in your shoes and even inside you. People often call bacteria germs because some of them can cause disease, but many others do useful jobs. They eat human and animal wastes; they eat garbage; make soil from leaves, rocks and roots; destroy harmful chemicals; and help humans and animals digest food.

Let us join Bob and visit some of these bacteria.

Think about any place on the earth. There are likely bacteria living there.



**B**ob is a rod shaped bacterium. He lives in the soil beside plant roots in Farmer Brown's field. His job is to eat roots and leaves. One day Farmer Brown was pulling weeds. Suddenly, Bob found himself on the farmer's hands. He was frightened, he had never been away from his home in the soil.

The soil that is in direct contact with plant roots is called the rhizosphere. The plant roots provide a higher concentration of nutrients in this region. This results in a large population of bacteria that can also be beneficial to the plant.



**T**hen, he heard a voice say, "Don't be afraid, I am a bacterium that lives on Farmer Brown's hands; you will not be harmed." Bob said, "I did not know bacteria grew in places other than soil." The bacterium told him, "There are not many bacteria on skin, but bacteria can grow just about everywhere you look. You will be surprised to see all the places where you can find bacteria."

Most bacteria living on skin are Gram positive. Dyes are used to stain bacterial cells to determine if they are Gram positive or Gram negative. Cells stain differently because their cell wall composition differs.



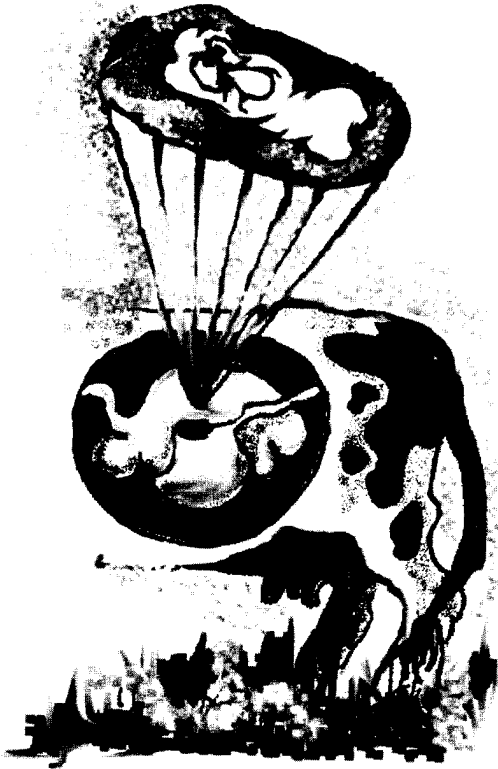
**F**armer Brown picked up an apple. Bob found himself on a soft brown spot on the fruit. It was full of bacteria. Bob asked them, "Who are you, and what are you doing here?" They replied, "We are the bacteria that make food rot." Bob replied, "You are a lot like me, if bacteria did not eat other organisms eventually the world would be covered with garbage."

Bacteria have diverse metabolic functions. This means they are able to breakdown an array of materials and transform them into different compounds. Bacteria that derive their energy from breaking down organic carbon sources are called heterotrophs.



**F**armer Brown went to the pump and washed his apple. Bob was quickly swept off the apple, into the water and landed in the basin near the base of the pump. The basin was lined with bacteria that had a blue-green color. Bob asked these bacteria, "Why do you have a blue-green color?" They replied, "We are photosynthetic bacteria, we make oxygen from water." Bob thought, "These are very good bacteria," he knew he needed oxygen to live.

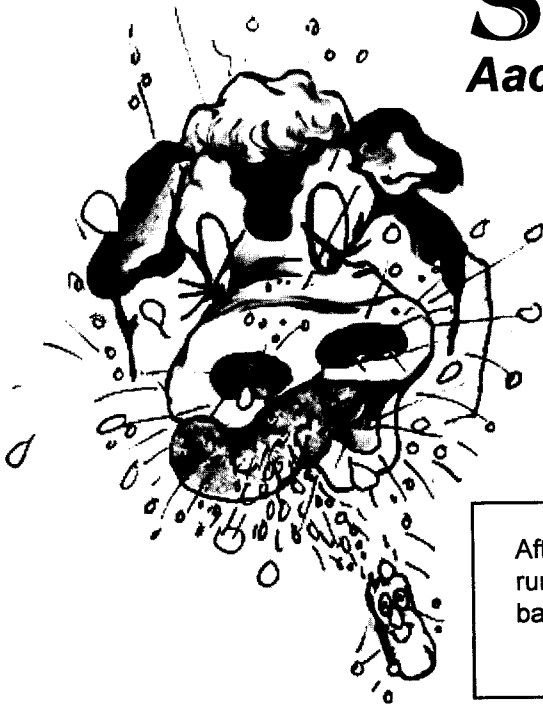
Photosynthetic bacteria are autotrophic. This means they can use an inorganic carbon source for growth. They are similar to plants because they use light for energy and carbon dioxide as their source of carbon.



**J**ust then a cow came and drank water from the basin. Bob went down the cow's throat and landed in the first compartment of the stomach, the rumen. "Who are you?" Bob asked these new bacteria. "We are the bacteria who live in the cow's stomach and help her to digest food" they said. Bob was having trouble breathing, there was no oxygen in the stomach. These bacteria do not need oxygen to live but Bob does need oxygen. Bob knew he had to escape quickly.

Bacteria that live in the absence of oxygen are anaerobes. Some of these bacteria can be killed when exposed to oxygen.

**S**uddenly Bob felt himself moving back up into the cow's mouth with the cud. **Aachoo!** He was back in his field.



After primary digestion of food by bacteria in the rumen the processed food, called cud, is regurgitated back into the mouth to be chewed more thoroughly.



**N**ow Bob knows a lot more about other bacteria. He was very happy to be home!

© **Purdue Research Foundation**

**Department of Agronomy  
Lilly Hall of Life Sciences  
Purdue University  
West Lafayette, IN 47907-1150**

**New 10/97 (50M)**

---

Cooperative Extension work in Agriculture and Home Economics, state of Indiana,  
Purdue University, and U.S. Department of Agriculture cooperating;  
H.A. Wadsworth, Director, West Lafayette, IN.  
Issued in furtherance of the acts of May 8 and June 30, 1914.  
The Purdue University Cooperative Extension Service is an equal opportunity/equal access institution.