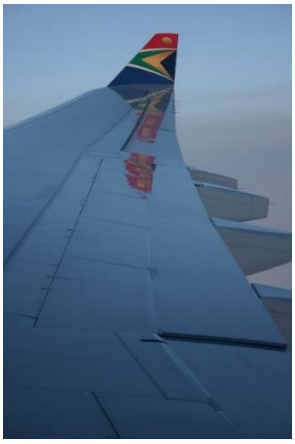
READING PASSAGE

Lesson 2 – Ecology of Disease: Comparing Viruses, Bacteria, and Eukaryotes

Exploring Ecological Interactions

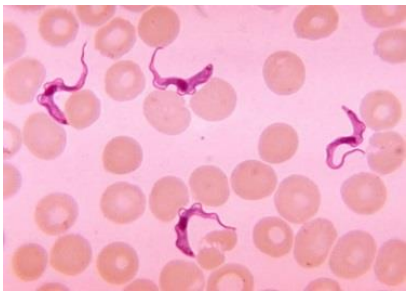


Mikaela gazed out of the airplane window. She was so excited! As long as she could remember, it had been her dream to come to Africa. Now she was here, with a job as a wildlife biologist!

She stepped out of the plane feeling the warm sun on her skin. The air smelled of woodsmoke. She could hear the sounds of the vibrant city in the distance. She drove along bumpy, dusty roads to the nature reserve where she was to work. It was very different from the city. Here, the chirps of birds or rustling of small creatures broke the silence. Sometimes, she heard the roar of a lion. She looked out on the pastel browns and greens of the African savanna. She thought about her background research on ecological interactions. All organisms interact with others. Her specific project was to study how dung beetles depend on large herbivores, especially buffalo. Scientists call this relationship "commensalism." In commensalism, one organism benefits. The other organism is not affected. In the case of the dung beetle, it gets a steady food supply (dung). It lays its eggs in the balls of dung as well. However, the beetle does not affect the buffalo.

Mikaela also studied bacteria in the gut of herbivores.
This relationship is different because both organisms benefit. The bacteria produce chemicals that help the buffalo to digest grass. The bacteria benefit by getting a steady supply of food. Scientists call this type of win-win relationship "mutualism."

In the field, Mikaela spotted an oxpecker bird. These birds perch on the back of the buffalo. Their relationship is another example of mutualism. The buffalo disturb insects as they move through the grass. The bugs make an easy meal for the birds riding on the back of the buffalo. In turn, the oxpecker eats blood-sucking pests of the buffalo, such as the tsetse fly.

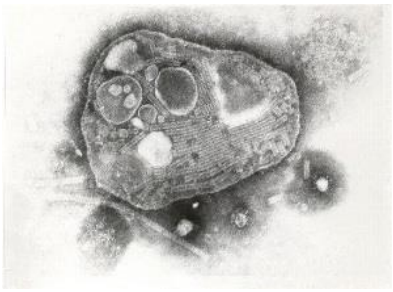


Trypanosoma parasites in blood
CDC Public Health Image Library

These flies are an example of another ecological relationship—parasitism. Parasites benefit from their host, and harm it. The tsetse fly gets food from buffalo's blood. The buffalo does not benefit. In fact, it loses some blood. The tsetse may even pass diseases to the buffalo.

Mikaela saw buffalo in other ecological interactions. For example, lions prey on buffalo calves. This is an example of predation. One organism wins and one loses, and often dies. Mikaela watched the herd of buffalo defending their turf, literally! The buffalo chase away some zebras that come too close. Zebras and other large grazers compete with buffalo for food. Competition negatively affects both organisms involved.

Watching these animals interact, Mikaela thought about her preparatory research before she got to Africa. She had read that buffalo used to get a disease called rinderpest.



Rinderpest virus

A virus caused this disease. It would infect many kinds of herbivores. However, scientists wiped out the disease with vaccines and other methods. The last case in the world was in 2001. As Mikaela made her way to her camp, she wondered about disease as a type of ecological interaction. Is it predation if a disease kills the host? Is it parasitism if the host lives? Or neither?