

## BSCS Biology An Ecological Approach

### Chapter 11 Prokaryotes and Viruses

*Is there waste, well I don't know  
'Cause one thing dies to let another grow  
This circle we see most every day  
The name that we call it is decay*

S. Van Zandt from the *Decomposition Rap*

#### Introduction

The members of the **prokaryote kingdom** are known to us primarily as **bacteria**. They are the most numerous and most ancient forms of life on earth. They live virtually everywhere including such extreme habitats as volcanoes, sulfur hot springs, and extremely cold habitats. Most bacteria are helpful as they perform important functions such as **decomposing** dead material and releasing the nutrients back into the ecosystem. Without prokaryotes, life on earth as we know it would not be possible.

#### Prokaryote Structure and Function

Prokaryotes are microscopic one-celled primitive forms of life. They come in a variety of shapes including rods, spheres, spirals, and chains. They lack a nucleus but do contain genetic material including DNA and genes. Prokaryotes were probably the first forms of life on earth. They can survive in hostile environments by forming **endospores** or protective capsules which allow them to survive in extreme conditions.

#### Types of Bacteria

There are two groups of bacteria. They include the **archaeobacteria** and the **eubacteria**. **Archaeobacteria** are the more primitive and include such groups as the **thermacidophiles** (living in hot environments), **halophiles** (salt loving), and **methanogens** (living in **anaerobic** or oxygen-poor environments). Bacteria are part of many complex ecosystems living in a wide variety of habitats. For example, bacteria live in special enlargements in the digestive tracts of animals called **rumens**. This is an adaptation for digestion of vegetable matter. The **eubacteria** group contains many different forms of life. They are classified by the way in which they accept various stains due to the differences in their cell coverings (**mycoplasmas**). One large group of eubacteria is the **cyanobacteria** group which includes many forms which live in various environments. They were thought to be the source of large amounts of **oxygen** in the developing earth's environment.

#### The Nitrogen Cycle

Nitrogen is very important and essential to living things. Nitrogen cycles through the environment in a complex cycle (**nitrogen cycle**) in which types of bacteria assist in the changing of the various forms of nitrogen. These include nitrogen **fixing bacteria** and **nitrifying bacteria**. **Nitrogen fixing bacteria** often live in the **nodules** of certain plants. **Denitrifying bacteria** help return nitrogen to its gaseous form.

## **Diseases**

A **disease** is a condition which interferes with the normal functioning of an organism. **Pathogens** are disease-causing agents to their **host**, or primary organism. When an organism has the ability to cope with the disease, it is said to be **resistant**. When an organism becomes resistant, it is said to be **immune** to the disease as it has the ability to produce **antibodies** to fight off the disease. **Vaccines** have been developed for the purpose of artificially producing antibodies to fight diseases. There are many types of pathogens including bacteria and **viruses**.

## **STDs**

A number of diseases are transmitted by sexual contact with infected persons. These diseases include **gonorrhea**, **syphilis**, **chlamydia**, **herpes**, and **AIDS** (*acquired immuno deficiency syndrome*). Gonorrhea, syphilis, and chlamydia are caused by eubacteria; herpes and AIDS are caused by viruses. In the case of AIDS, the virus is known as **HIV**.