



An Introduction to Prokaryotes

Prokaryotes appeared on earth 3.5 billion years ago. Today **prokaryotes** are found wherever there is life and they out-number all **eukaryotes** combined! **Prokaryotes** also survive in **habitats** too cold, too hot, too salty, too **acidic** or too **alkaline** for any **eukaryote**.

We hear most about new **species** of **prokaryotic bacteria** that cause serious illnesses, such as: the black **plague**, **tuberculosis**, **cholera**, many sexually transmitted diseases and certain types of food poisoning.

Far more common than harmful **bacteria** are **beneficial bacteria**. Some **beneficial bacteria** include those in our intestines that provide us with important vitamins, or those living in our mouth that help prevent harmful fungi from growing there. Some **prokaryotes** break down dead organisms.

Prokaryotes are **varied** and found in many different environmental conditions. They are found in soil, at the bottom of lakes, rivers and oceans returning **vital** chemical elements to the environment.

Prokaryotes show much more **diversity** in how they make energy and **obtain nutrients** than **eukaryotes**. Many **prokaryotes** are **autotrophs**, making their own energy like plants. Most bacteria are “other feeders,” feeding on just about any **organic molecule** they come across.

When nutrients are available, **prokaryotes reproduce**, one making two, two making four and so on, similar to **eukaryotes**. Time between **division events** can be as short as a few hours! Their growth is limited by environmental factors, buildup of waste and availability of nutrients.

Prokaryotic bacteria are **abundant** in many **habitats**, including places where few other **organisms** can survive. One such example are bodies of water with extreme salt content, up to 15-20%. To give you a frame of reference, the ocean has a salt content of about 3%. These salt loving **bacteria** are called extreme **halophiles**.

Extreme **thermophiles** are those **bacteria** that love heat. Some live in deep-sea ocean **vents** that can get as hot as 212 degrees!

A third group of bacteria are called **methanogens** which live in environments without oxygen and produce **methane** (gas) as a waste product. In humans, a large amount of our gas is a result of these **methanogen prokaryotic bacteria**. Despite being thought of as mostly **extremeophiles**, living in extreme environments, some **prokaryotic bacteria** do live in **moderate** environments.

Some **structural** features of **prokaryotes** help them live in such extreme conditions. One such feature is the **flagella**. The **flagella** allow the bacteria to move about, moving toward more **favorable** conditions or away from less **favorable** ones. **Pili** help **bacteria** stick together or to other surfaces.

Some **bacteria** are harmful to us. The reason we aren't sick all of the time is because our body's defenses check the growth of **bacteria's** disease causing **agents**. Even some of the **bacteria** that are normal **residents** of our body can make us sick when our defenses have been weakened by poor nutrition or **viral infection**. **Bacteria** cause about half of all human diseases.

