

Name _____

10.1

What Are Fecal Coliform Bacteria?

A few years ago, meat shipped to a chain of restaurants in the northwest United States was contaminated with bacteria from the intestines of animals. The meat was not cooked at a high enough temperature to kill the bacteria, and many people who ate the meat became gravely ill; some even died. As a result, the public has become more concerned about bacterial contamination of food and water.

Certain bacteria that propagate in the digestive tracts of humans and animals are known as **fecal coliforms** (FEE kuhl KOH luh forms). Inside the intestines, these bacteria normally do not cause disease. Outside, however, some fecal coliforms may cause disease if they are ingested by humans or if they reach tissues outside the digestive tract.

Why Test Water for Fecal Coliforms?

Although fecal coliforms normally do not cause disease, they often coexist with **pathogenic bacteria** (path uh JEHN ihk bak TIHR ee uh) that are capable of causing human disease such as typhoid fever, cholera, and dysentery.

Usually, waterborne bacteria that cause these types of diseases occur in small numbers and cannot exist outside of living organisms for very long. They are, therefore, difficult to detect and monitor in waterways. Fecal coliforms, however, can exist in greater numbers and for longer periods of time outside the body. This makes them easier to detect and monitor.

Because fecal coliform bacteria coexist with their pathogenic relatives in the same host environment, fecal coliforms are often used as indicators of possible pathogenic bacterial contamination. Thus, if water is tested and found to have a high fecal coliform population, there is a very good possibility that pathogenic bacteria are also present. On the other hand, if water is tested and found to have very few fecal coliforms, then the water probably has very few pathogenic bacteria.

In addition to being a health threat, untreated fecal matter adds excess organic material to a waterway. As the excess organic matter decays, the amount of dissolved oxygen in the water decreases. As you learned in Lesson 6, if large amounts of dissolved oxygen are taken from a waterway, fish kills and loss of other aquatic life could result.

How Do Fecal Coliforms Enter a Waterway?

Whenever untreated (raw) animal and human fecal matter enters a waterway, so do fecal coliforms. Fecal waste can come from a number of sources such as untreated sewage, broken sewer lines, overflowing septic tanks, and stockyards.

How Is Fecal Coliform Monitored?

Because bacteria are small and numerous, counting how many individuals are in a water sample is very difficult. To assess the level of fecal coliforms in water samples, scientists **culture** the bacteria, or propagate them in a specially prepared environment that enhances growth. The bacteria are grown on or in a medium. A **medium** is an environment in which microorganisms can live. Each bacterium will divide and grown into a **colony**, or group of bacteria. Bacterial colonies are visible to the naked eye and can be counted relatively easily.

Some colonies have their own distinctive color, which aids the researcher to count the colonies. Fecal coliform colonies have a blue color.

How Much Fecal Coliform Is Too Much?

Drinking water should be free of all fecal coliforms. Before drinking water is released to customers, the water-treatment plant analyzes the water for fecal coliform. If bacteria are found, the water should not be released for human consumption until the bacteria are destroyed. To insure that drinking water is free of bacteria, water-treatment plants add a small quantity of chlorine or other chemical disinfectant to destroy any microorganisms that may be present. The amount of chlorine is carefully measured to be the lowest amount needed to keep the water germ-free.

Water Quality Standards

Category	Maximum Fecal Coliforms per 100 mL of Water
Drinking water	0 colonies
Swimming	200 colonies
Treated sewage	200 colonies
Boating	1000 colonies

Fecal coliform analyses are also performed on treated sewage before it is released into a waterway. If more than 200 colonies per 100 mL are found, the sewage should not be released until the count is reduced by further treatment.

Water that is used for swimming and boating is also periodically tested for fecal coliform levels. If the levels are too high, the area is closed for recreational use.

Some people think that if water is clear, it is safe for drinking, swimming, and boating. Clarity is no guarantee that water is bacteria free. Insuring public safety requires regular monitoring of fecal coliform. Usually fecal coliform tests to insure public safety are performed weekly or monthly. In some cities, the drinking water is tested two times a week. At some public boating facilities, analyses are run once a month.

Questions

1. Why is water tested for fecal coliforms rather than for pathogenic bacteria?
2. What are two diseases associated with waterborne pathogenic bacteria?
3. How do fecal coliforms get into waterways?
4. When analyzing water samples for fecal coliforms, why do scientists count bacterial colonies rather than each bacterium?
5. What are the water quality standards for fecal coliforms in drinking water, swimming water, properly treated sewage, and boating water?