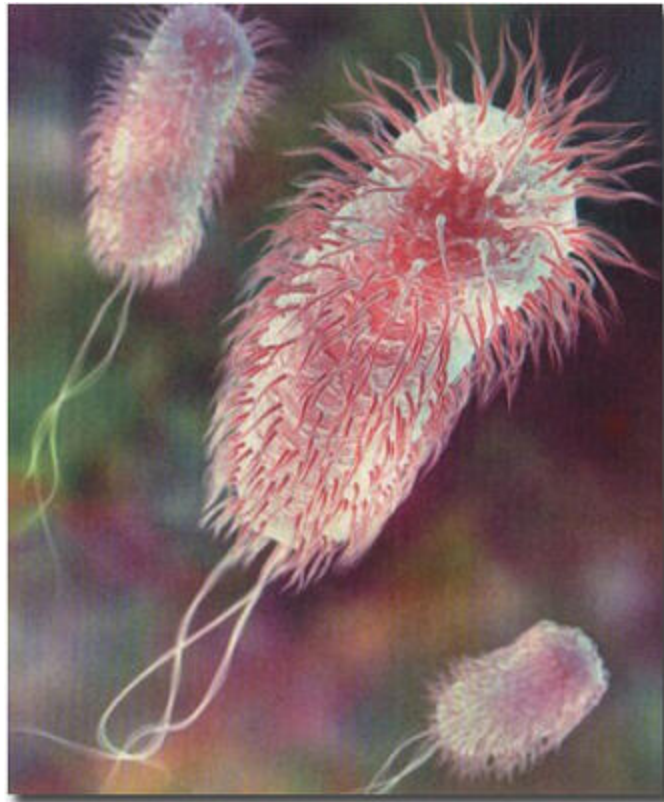


Bacteria and E. Coli in Water

 usgs.gov/special-topics/water-science-school/science/bacteria-and-e-coli-water

Water, like everything else on Earth, including you, is full of bacteria. Some bacteria are beneficial and some are not. *Escherichia coli* (*E. coli*) bacteria, found in the digestive tract of animals, can get into the environment, and if contacted by people, can cause health problems and sickness. Find out the details here.



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Escherichia coli or E. coli is a type fecal coliform bacteria that is commonly found in the intestines of animals and humans. E. coli in water is a strong indicator of sewage or animal waste contamination. Sewage and animal waste can contain many types of disease causing organisms. Consumption may result in severe illness; children under five years of age, those with compromised immune systems, and the elderly are particularly susceptible.

Credit: U.S. Environmental Protection Agency

Bacteria are common single-celled organisms and are a natural component of **lakes, rivers, and streams**. Most of these bacteria are harmless to humans; however, certain bacteria, some of which normally inhabit the intestinal tract of warm-blooded animals, have the

potential to cause sickness and disease in humans. High numbers of these harmless bacteria often indicate high numbers of harmful bacteria as well as other disease-causing organisms such as viruses and protozoans.

One method of determining bacteria counts is to count the number of bacteria colonies that grow on a prepared medium.

Escherichia coli (abbreviated as *E. coli*) are bacteria found in the environment, foods, and intestines of people and animals. *E. coli* are a large and diverse group of bacteria. Although most strains of *E. coli* are harmless, others can make you sick. Some kinds of *E. coli* can cause diarrhea, while others cause urinary tract infections, respiratory illness and pneumonia, and other illnesses.

Total coliform

Total coliforms are gram-negative, aerobic or facultative anaerobic, nonspore forming rods. These bacteria were originally believed to indicate the presence of fecal contamination, however total coliforms have been found to be widely distributed in nature and not always associated with the gastrointestinal tract of warm blooded animals. The number of total coliform bacteria in the environment is still widely used as an indicator for potable water in the U.S.

Fecal coliform

Fecal coliform bacteria are a subgroup of coliform bacteria that were used to establish the first microbial water quality criteria. The ability to grow at an elevated temperature (44.5 degrees Celsius) separate this bacteria from the total coliforms and make it a more accurate indicator of fecal contamination by warm-blooded animals. Fecal- coliform bacteria are detected by counting the dark-blue to blue-grey colonies that grow on a 0.65 micron filters placed on mFC agar incubated in a 44.5° C oven for 22-24 hours. The presence of fecal coliforms in water indicates that fecal contamination of the water by a warm-blooded animal has occurred, however, recent studies have found no statistical relationship between fecal coliform concentrations and swimmer-associated sickness.

E. coli

Escherichia coli (*E. coli*) is a rod-shaped bacteria commonly found in the gastrointestinal tract and feces of warm-blooded animals. It is a member of the fecal coliform group of bacteria and is distinguished by its inability to break down urease. *E. coli* numbers in freshwater are determined by counting the number of yellow and yellow brown colonies growing on a 0.45 micron filter placed on m-TEC media and incubated at 35.0° C for 22-24 hours. The addition of urea substrate confirms that colonies are *E. coli*. This bacteria is a preferred indicator for freshwater recreation and its presence provides direct evidence of fecal contamination from warm-blooded animals. Although usually harmless, *E. coli* can

cause illnesses such as meningitis, septicemia, urinary tract, and intestinal infections. A recently discovered strain of *E. coli* (*E. coli* 0157:H7) can cause severe disease and may be fatal in small children and the elderly.

The relation between bacteria counts and sickness

Consumption of or contact with water contaminated with feces of warm-blooded animals can cause a variety of illnesses. Minor gastrointestinal discomfort is probably the most common symptom; however, pathogens that may cause only minor sickness in some people may cause serious conditions or death in others, especially in the very young, old, or those with weakened immunological systems.