# Spirochetes Encyclopedia Article

## Spirochetes

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# Contents

Spirochetes Encyclopedia Article.....1

Contents.....2

Spirochetes.....3

# Spirochetes

Spirochetes are a group comprised of six genera of **bacteria** in a family known as *Spirochaete*. They are named because of their spiral shape. Typically, spirochetes are very slender. Their length can vary from about five microns (millionths of an inch) to several hundred microns, depending on the species. Under the light or electron **microscope**, the tight coiling that is characteristic of spirochetes is readily visible. Spirochetes are a significant health threat to humans. Both **syphilis** and **Lyme disease** are caused by spirochetes. Beneficially, spirochetes contribute to digestion in ruminants such as cows.

Besides their shape, another distinctive aspect of spirochetes in the presence of what is essentially internal flagella. These structures, called axial filaments, are embedded in the cell wall of the bacterium. They are constructed very similarly as flagella, having the characteristic arrangement of structures that anchors the filament to the cell membrane. There can be only a few to as many as 200 axial filaments present in a given bacterium. The rigidity of an axial filament allows a bacterium to move in a corkscrew type of motion. Axial filaments are present in all spirochetes except *Treponema*.

Spirochetes have varied habitats and growth requirements. Some of the bacteria require oxygen for their survival, while others do not tolerate the presence of oxygen.

In terms of human health, spirochetes are noteworthy because of the disease causing members of the group. *Treponema pallidum* is the cause of syphilis and *Borrelia burgdorferi* is the cause of Lyme disease, which can produce a chronic infection that can result in arthritis, damage to the central nervous system, and even heart failure. *Borrelia burgdorferi* can convert to a metabolically dormant cyst in natural environments and even in humans. The cyst form allows the bacterium to survive inhospitable conditions and to elude host immune defense mechanisms.

In ruminants, spirochetes are beneficial. Their chemical activities help the cow or other ruminant digest food. Spirochetes also live in harmony with mussels and oysters, where the bacteria help in feeding by acting as cilia to sweep food into the mollusk.

A spirochete known as *Aquaspririllum magnetotacticum* is of interest to microbiologists because it is one of a number of bacteria that possess magnetic particles. These particles allow a bacterium to orient itself in the water in relation to Earth's magnetic field.