

Caulobacter Encyclopedia Article

Caulobacter

The following sections of this BookRags Literature Study Guide is offprint from Gale's For Students Series: Presenting Analysis, Context, and Criticism on Commonly Studied Works: Introduction, Author Biography, Plot Summary, Characters, Themes, Style, Historical Context, Critical Overview, Criticism and Critical Essays, Media Adaptations, Topics for Further Study, Compare & Contrast, What Do I Read Next?, For Further Study, and Sources.

(c)1998-2002; (c)2002 by Gale. Gale is an imprint of The Gale Group, Inc., a division of Thomson Learning, Inc. Gale and Design and Thomson Learning are trademarks used herein under license.

The following sections, if they exist, are offprint from Beacham's Encyclopedia of Popular Fiction: "Social Concerns", "Thematic Overview", "Techniques", "Literary Precedents", "Key Questions", "Related Titles", "Adaptations", "Related Web Sites". (c)1994-2005, by Walton Beacham.

The following sections, if they exist, are offprint from Beacham's Guide to Literature for Young Adults: "About the Author", "Overview", "Setting", "Literary Qualities", "Social Sensitivity", "Topics for Discussion", "Ideas for Reports and Papers". (c)1994-2005, by Walton Beacham.

All other sections in this Literature Study Guide are owned and copyrighted by BookRags, Inc.

Contents

Caulobacter Encyclopedia Article.....	1
Contents.....	2
Caulobacter.....	3

Caulobacter

Caulobacter crescentus is a Gram-negative rod-like bacterium that inhabits fresh water. It is noteworthy principally because of the unusual nature of its division. Instead of dividing two form two identical daughter cells as other **bacteria** do (a process termed binary division), *Caulobacter crescentus* undergoes what is termed symmetric division. The parent bacterium divides to yield two daughter cells that differ from one another structurally and functionally.

When a bacterium divides, one cell is motile by virtue of a single flagellum at one end. This daughter cell is called a swarmer cell. The other cell does not have a flagellum. Instead, at one end of the cell there is a stalk that terminates in an attachment structure called a holdfast. This daughter cell is called the stalk cell. The stalk is an outgrowth of the cell wall, and serves to attach the bacterium to plants or to other microbes in its natural environment (lakes, streams, and sea water).

Caulobacter crescentus exhibits a distinctive behavior. The swarmer cell remains motile for 30 to 45 minutes. The cell swims around and settles onto a new surface where the food supply is suitable. After settling, the flagellum is shed and the bacterium differentiates into a stalk cell. With each division cycle the stalk becomes longer and can grow to be several times as long as the body of the bacterium.

The regulation of **gene** expression is different in the swarmer and stalk cells. Replication of the genetic material occurs immediately in the stalk cell but for reasons yet to be determined is repressed in the swarmer cell. However, when a swarmer cell differentiates into a stalk cell, replication of the genetic material immediately commences. Thus, the transition to a stalk cell is necessary before division into the daughter swarmer and stalk cells can occur.

The genetics of the swarmer to stalk **cell cycle** are complex, with at least 500 genes known to play a role in the structural transition. The regulation of these activities with respect to time are of great interest to geneticists.

Caulobacter crescentus can be grown in the laboratory so that all the bacteria in the population undergoes division at the same time. This type of growth is termed **synchronous growth**. This has made the bacterium an ideal system to study the various events in gene regulation necessary for growth and division.