Frame Shifts Encyclopedia Article

Frame Shifts

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

Frame Shifts Encyclopedia Article.....1

Contents.....2

Frame Shifts.....3

Frame Shifts

A frame shift is a shift in the sequence that **DNA** (**deoxyribonucleic acid**) is read.

DNA is transcribed into messenger **ribonucleic acid**, the blueprint for the manufacture of protein, by being read in frames of three **bases** at a time by the **transcription** apparatus. The two strands of DNA, being complimentary to one another, can produce the same **mRNA** when read in opposite directions. But slippage of a DNA strand can cause displacement and looping out of a portion of one strand. Slipped mispairing is often transient, and the normal alignment can be re-established. However, if the error-correcting system of a **cell** encounters a slipped mispairing before it reverts, the system will attempt to correct the slippage. Often the correction is by the excision of the looped out portion. The deletion of up to several hundred bases alters the frame sequence. When the DNA is subsequently replicated it will produce one daughter with the frame shift **mutation** and one daughter with the **wild type** (normal) sequence. Frame shift can also occur if a base is inserted.

Frame shift mutations cause the **gene** to be read in the wrong three-base groupings, distorting the genetic message. This can have various effects. If the correct reading frame is re-established shortly following the frame shift, then the protein produced may retain most or all of the structure and function of the normal protein. However, a frame shift can often disrupt the coding sequence of the bases downstream of the shifted region. This can make the DNA sequence meaningless, which will result in a shortened protein. The function of the protein will likely be destroyed.

Certain chemicals can specifically promote frame shift mutations by stabilizing the looped out portions produced during slipped mispairing, thus increasing the time the loops are vulnerable to excision.

The clinical consequences of frame shift mutations can be significant. Resistant forms of some viruses are attributable to frame shifts. Some of the forms of **cystic fibrosis** result from frame shifts in the CFTR gene. Frame shift mutations are also relevant in the genetic instability known clinically as microsatellite instability, which can be a hallmark of **cancer** cells.