Transduction Encyclopedia Article

Transduction

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.



BOOKRAGS

Contents

Transduction Encyclopedia Article.....1

Contents.....2

Transduction.....3

Transduction

Transduction is defined as the transfer of genetic information between cells using a type of **virus** particle called a **bacteriophage**. The virus contains genetic material from one **cell**, which is introduced into the other cell upon virus infection of the second cell. Transduction does not, therefore, require cell to cell contact and is resistant to **enzymes** that can degrade **DNA**.

Bacteriophage can infect the recipient cell and commandeer the host's **replication** machinery to produce more copies of itself. This is referred to as the lytic cycle. Alternatively, the phage genetic material can integrate into the host DNA where it can replicate undetected along with the host until such time as an activation signal stimulates the production of new virus particles. This is referred to as the lysogenic cycle. Transduction relies on the establishment of the lysogenic cycle, with the bacterial DNA becoming incorporated into the recipient cell **chromosome** along with the phage DNA. This means of transferring **bacteria** DNA has been exploited for genetic research with bacteria like *Escherichia coli, Salmonella typhimurium,* and *Bacillus subtilis,* which are specifically targeted by certain types of bacteriophage.

There are two types of transduction: generalized transduction and specialized transduction. In generalized transduction, the packaging of bacterial DNA inside the phage particle that subsequently infects another bacterial cell occurs due to error. The error rate is about one phage particle in 1,000. Experimental mutants of phage have been engineered where the error rate is higher. Once the bacterial DNA has been injected inside the second bacterium, there is approximately a 10 percent change that the DNA will be stably incorporated into the chromosome of the recipient. A successful integration changes the **genotype and phenotype** of the recipient, which is called a transductant. A transductant will arise for about every 10^6 phage particles that contain bacterial DNA.

Specialized transduction utilizes specialized phage, in which some of the phage genetic material has been replaced by other genetic material, typically the bacterial chromosome. All of the phage particles carry the same portion of the bacterial chromosome. The phage can introduce their DNA into the recipient bacterium as above or via **recombination** between the chromosomal DNA carried by the phage and the chromosome itself.

Transduction has proved to be a useful means of transferring genetic traits from one bacterial cell to another.