

Recombinant DNA LAB - Making Paper Plasmids

Standard: 5c

Objective:

To understand how genes can be inserted into another DNA - "recombine"

To conceptualize "restriction enzymes" and recognition of specific sites

Students will model the process of using restriction enzymes and plasmids to form recombinant DNA.

The "Recombinant DNA Lab" activity can help you see how genes may be manipulated for genetic research, namely, gene cloning/genetic engineering. This activity will help you conceptualize the mechanics involved in cutting and ligating DNAs into a plasmid vector with "sticky ends" of complementary DNA base pairs.

Background Information

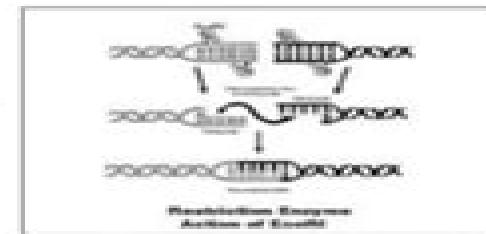
Recombinant DNA technology is one of the new techniques of biotechnology. Biotechnology uses living organisms to carry out chemical processes or to produce substances, combining biology with chemistry and science with industry. Biotechnology includes the field of **genetic engineering**, which is the science of directly manipulating genes to produce recombinant DNA. Genetic engineering techniques are used in a variety of industries, in agriculture, in basic research, and in medicine.

Through genetic engineering, there is great potential for the development of useful products. Researchers have already developed sources of interferon, human growth hormone, insulin, and resistant fruits and vegetables. A gene coding for a particular protein is transferred into a host organism. The host organism reproduces and the population produces the desired protein in volume. For example, the gene that codes for the production of human insulin has been inserted into the common bacterium *E. coli*. Then the bacteria can be grown in huge containers and large amounts of insulin can be collected.

As an introduction to recombinant DNA technology, the exercise that follows illustrates on paper some of the steps of recombinant DNA experiments done in laboratories.

Steps to Recombination

1. Scientists must first **identify the gene** that codes for the production of the protein they want to manufacture.
2. Next scientists must **isolate the desired gene**. Restriction enzymes from bacterial cells are important in this step. Each **restriction enzyme** recognizes and cleaves (cuts) a very specific sequence of DNA called a **restriction site**. Some restriction enzymes make a staggered cut of the DNA producing **sticky ends** or single strands of unpaired nucleotide bases capable of binding with complementary sticky ends. By using restriction enzymes that will cut the DNA on either side of the gene, the desired gene can be clipped out of the DNA strand.
3. Once the desired gene has been isolated scientists must then **insert the gene into a plasmid**. Plasmids are small circular pieces of DNA found naturally in most bacteria. The plasmid must be removed from a bacterium and cleaved with the same restriction enzyme used to isolate the gene. This way the sticky ends of the plasmid will match those of the gene.



Recombinant Dna Paper Lab Answers

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Chapter Resource 11 Gene Technology Biology Holt Rinehart & Winston, Holt, Rinehart and Winston Staff, 2004 **The American Biology Teacher**, 1998 *Chapter-wise NCERT + Exemplar + PAST 13 Years Solutions for CBSE Class 12 Biology* 7th Edition Disha Experts, 2020-06-20 The book provides Step by step Chapter wise Solutions to the 3 Most Important requirements of the students NCERT Solutions Exemplar Solutions Solved Papers Past 13 years for CBSE Class 12 The 7th Edition of the book is divided into 3 sections Section 1 NCERT Exercise consists of solutions to all Intext and chapter exercises Section 2 Past Year Questions of Past 13 years with Solutions Section 3 Exemplar Problems Solutions to select NCERT Exemplar problems *Super 10 CBSE Class 12 Biology 2021 Exam Sample Papers 3rd Edition* Disha Experts, 2020-09-04

Annot Inst Edit Lab Man Biol 3e /Campbell Benjamin-Cummings Publishing Company, Judith

Giles Morgan, 1994-02 **Prentice Hall Science** Anthea Maton, Jill D. Wright, Jean Hopkins, Susan Johnson, David

Lahart, Maryanna Quon Warner, 1994 **Biology Class 12 CBSE Board 8 YEAR-WISE (2013 - 2020) Solved Papers**

powered with Concept Notes Disha Experts, 2020-07-04 **EPA Publications Bibliography** United States.

Environmental Protection Agency, 1995 **Biology Class 12 CBSE Board 10 YEAR-WISE (2013 - 2022) Solved Papers**

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Bulletin United States. Environmental Protection Agency, 1995-04 **Modules** McDougal Littell Incorporated, 2005

Teacher's Wraparound Edition: Twe Biology Everyday Experience Albert Kaskel, 1994-04-19 **God and Gaia** Michael S Northcott, 2022-12-22 God and Gaia explores the overlap between traditional religious cosmologies and the scientific Gaia theory of James Lovelock It argues that a Gaian approach to the ecological crisis involves rebalancing human and more than human influences on Earth by reviving the ecological agency of local and indigenous human communities and of nonhuman beings Present day human ecological influences on Earth have been growing at pace since the Scientific and Industrial Revolutions when modern humans adopted a machine cosmology in which humans are the sole intelligent agency The resultant imbalance between human and Earthly agencies is degrading the species diversity of ecosystems causing local

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