

MODULE 2: LECTURE 1

ENZYMES IN GENETIC ENGINEERING: RESTRICTION NUCLEASES: EXO & ENDO NUCLEASES

2-1.1 Introduction:

A **restriction enzyme** is a nuclease enzyme that cleaves DNA sequence at a random or specific recognition sites known as restriction sites. In bacteria, restriction enzymes form a combined system (restriction + modification system) with modification enzymes that methylate the bacterial DNA. Methylation of bacterial DNA at the recognition sequence typically protects the own DNA of the bacteria from being cleaved by restriction enzyme.

There are two different kinds of restriction enzymes:

- (1) **Exonucleases** catalyses hydrolysis of terminal nucleotides from the end of DNA or RNA molecule either 5' to 3' direction or 3' to 5' direction. Example: exonuclease I, exonuclease II etc.
- (2) **Endonucleases** can recognize specific base sequence (restriction site) within DNA or RNA molecule and cleave internal phosphodiester bonds within a DNA molecule. Example: EcoRI, Hind III, BamHI etc.

2-1.2 History:

In 1970 the first restriction endonuclease enzyme *HindII* was isolated. For the subsequent discovery and characterization of numerous restriction endonucleases, in 1978 Daniel Nathans, Werner Arber, and Hamilton O. Smith awarded for Nobel Prize for Physiology or Medicine. Since then, restriction enzymes have been used as an essential tool in recombinant DNA technology.

Module 2 Lecture 1 Enzymes In Genetic Engineering

Jianjun Gao



Module 2 Lecture 1 Enzymes In Genetic Engineering:

Directory of Postgraduate Studies 2002 Hobsons Publishing, PLC,2001 **Systems and Computational Biology**
Ning-Sun Yang,2011-09-12 Whereas some microarray or bioinformatics scientists among us may have been criticized as doing cataloging research the majority of us believe that we are sincerely exploring new scientific and technological systems to benefit human health human food and animal feed production and environmental protections Indeed we are humbled by the complexity extent and beauty of cross talks in various biological systems on the other hand we are becoming more educated and are able to start addressing honestly and skillfully the various important issues concerning translational medicine global agriculture and the environment The two volumes of this book present a series of high quality research or review articles in a timely fashion to this emerging research field of our scientific community Tools, Techniques, and Strategies for Teaching in a Real-World Context With Microbiology Davida Smyth,Nichole A. Broderick,Laura Bowater,Carlos C. Goller,2021-12-02 Encyclopedia of Bioinformatics and Computational Biology ,2018-08-21 Encyclopedia of Bioinformatics and Computational Biology ABC of Bioinformatics Three Volume Set combines elements of computer science information technology mathematics statistics and biotechnology providing the methodology and in silico solutions to mine biological data and processes The book covers Theory Topics and Applications with a special focus on Integrative omics and Systems Biology The theoretical methodological underpinnings of BCB including phylogeny are covered as are more current areas of focus such as translational bioinformatics cheminformatics and environmental informatics Finally Applications provide guidance for commonly asked questions This major reference work spans basic and cutting edge methodologies authored by leaders in the field providing an invaluable resource for students scientists professionals in research institutes and a broad swath of researchers in biotechnology and the biomedical and pharmaceutical industries Brings together information from computer science information technology mathematics statistics and biotechnology Written and reviewed by leading experts in the field providing a unique and authoritative resource Focuses on the main theoretical and methodological concepts before expanding on specific topics and applications Includes interactive images multimedia tools and crosslinking to further resources and databases *Biomedical Engineering and Computational Intelligence* João Manuel R. S. Tavares,Nilanjan Dey,Amit Joshi,2019-07-29 This book reports on timely research at the interface between biomedical engineering and intelligence technologies applied to biology and healthcare It covers cutting edge methods applied to biomechanics and robotics EEG time series analysis blood glucose prediction models among others It includes ten chapters which were selected upon a rigorous peer review process and presented at the 1st World Thematic Conference Biomedical Engineering and Computational Intelligence BIOCUM 2018 held in London United Kingdom during October 30 31 2018
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Arny,2003 **Genetic Engineering of Redox-active Enzymes** Claus Jacob,1996 **Enzymes and DNA Recombinant Technology** Shafat Ahmad Latoo,2024

Enzymes represent one of the most fascinating and meaningful entities in the biological world. In the fields of genetic engineering and recombinant DNA technology, enzymes serve as vital tools. Enzymes acting as biological catalysts have been known to all of us since our primary education. Nonetheless, learning about enzymes at the graduate level can be difficult by a lack of comprehension of the principles and a misunderstanding of the terminology employed in enzymology. This book has been written to augment the understanding of enzymology among graduate and postgraduate students. The author of this book has extensive experience teaching enzymology and has proven and admired competence in the field. Balanced text, well-illustrated concepts, and an organized stepwise ascent of the topics are key features of this book. Besides fundamentals, this book also covers some of the emerging areas of enzymology such as enzyme immobilization, reversible covalent modification, and proteolytic activation. This book not only provides information for enzymologists but also does so in a manner that will also aid non-enzymologists in making proper use of these biocatalysts in their research. This book consists of a detailed discussion of key concepts of enzymology: enzyme kinetics, modes of enzyme regulation, isozymes, enzyme immobilization, DNA cloning, and genome editing. Difficult concepts have been simplified with analogies and examples. Furthermore, this book's material aligns with the majority of university curriculum and exams, both domestically and internationally.

Key Features: Written in a simple and understandable language. Covers fundamental concepts. Presents information in an easily accessible format to serve as a quick reference source. A concise write-up for addressing dullness while going through it. Provides essential basics as well as up-to-date information on enzymes and their use in recombinant DNA technology and genome editing.

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