Elementary Biotechnology

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AKHAND PUBLISHING HOUSE
DELHI (INDIA)

Published by



AKHAND PUBLISHING HOUSE

Publisher, Distributor, Exporter having an Online Bookstore

L-9A, First Floor, Street No. 42,
Sadatpur Extension, Delhi-110094 (INDIA)
Phone No.: 9968628081, 9555149955 & 9013387535
E-mail : akhandpublishinghouse@gmail.com,
akhandpublishing@yahoo.com
Website : www.akhandbooks.com

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© Authors
IInd Edition 2019
ISBN 978-93-88998-48-2

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Printed in India

Published by Jhapsu Yadav for Akhand Publishing House, Delhi.

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Preface

'Elementary Biotechnology' is a book which has been written to demystify the science of biotechnology. A branch of science that utilizes and manipulates microorganisms for the welfare of mankind is biotechnology. It uses technique that can modify the products, improve qualities of plants and animals and also products generated from microorganisms. Biotechnology is the applicative part of biology that is multidisciplinary in activity. Commercial potential of biotechnology is immense.

Biotechnology emerged as a new research field that arose as a result of the fusion in the late 1970s of recombinant deoxyribonucleic acid technology and traditional industrial microbiology. At its simplest it is the commercial exploitation of living organisms or their components e.g., enzymes. Thus the science formerly known as industrial microbiology clearly falls within the definition of biotechnology and to many they are synonymous. Modern science encompasses new developments in the biological, physical, and social sciences. In biology, discoveries over the past 20 years allow the better understanding of the structure and function of human, animal, and plant genes.

At the same time, new discoveries in the physical sciences underpin the revolution in information and communications technologies. Geographic information systems enable characterization of agro- ecosystems and offer means by which new technologies can be customized to the needs of particular agro- ecosystems.

The biological and physical sciences also interact in new ways. For example, the ability to analyze large volumes of data is a critical component of various genome projects that are mapping all the genes in an organism, as in the Human Genome Project. New developments in the social sciences underpin community participation in technology development and evaluation (sometimes termed agro-ecological methods).

In biology, cloning is the process of producing similar populations of genetically identical individuals that occurs in nature when organisms such as bacteria, insects, plants or animals reproduce asexually. Cloning in biotechnology refers to processes used to create copies of DNAfragments (molecular cloning), cells (cell cloning), or organisms (organism cloning).

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The term also refers to the production of multiple copies of a product such as digital media or software.

Transgenic Plants are plants that have been genetically engineered, a breeding approach that uses recombinant DNA techniques to create plants with new characteristics. The genetic manipulation of plants has been going on since the dawn of agriculture, but until recently this has required the slow and tedious process of cross-breeding varieties. Genetic engineering promises to speed the process and broaden the scope of what can be done.

Plant genomes contain various repetitive sequences and retrovirus-like retrotransposons containing long terminal repeats and other retroelements, such as long interspersed nuclear elements and short-interspersed nuclear elements (Kumar and Bennetzen 1999). Retroelement insertions contribute to the large difference in size between collinear genome segments in different plant species and to the 50% or more difference in total genome size among species with relatively large genomes, such as corn. They contribute a smaller percentage of genome size in plants with smaller genomes such as *Arabidopsis* (The Arabidopsis Genome Initiative, 2000). If other repetitive sequences are accounted for, the corn genome is comprised of over 70% repetitive sequences and of 5% protein encoding regions.

Genetic engineering is the genetic make-up of an organism's genome using biotechnology tools and the one of the most powerful and promising application of the genetic engineering involves the treatment of genetic disorders like sickle cell anemia, Duchenne muscular dystrophy, cystis fibrosis, Tay-Sachs disease, Huntington's chorea and Lesch-Nyhan syndrome. Now, medical Scientists can identify more than 3000 disorders happens because of the error in individuals DNA. By this technique scientists modify the genome of an organism. Creation of genetically modified organisms requires recombinant DNA. Recombinant DNA is a combination of DNA from different organisms or different locations in a given genome that would not normally be found in nature.

Today man cannot imagine surviving without biotechnology or the products associated with it. Biotechnology has potential in treating many diseases that has on other hand increased the life of man.

This book explores, in a highly comprehensive manner, all aspects of biotechnology, explaining the history, techniques and applications of modern biotechnology. This book will be invaluable to biotechnologists, microbiologists as well as students dealing with biotechnology, microbiology and cell and tissue engineering.

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