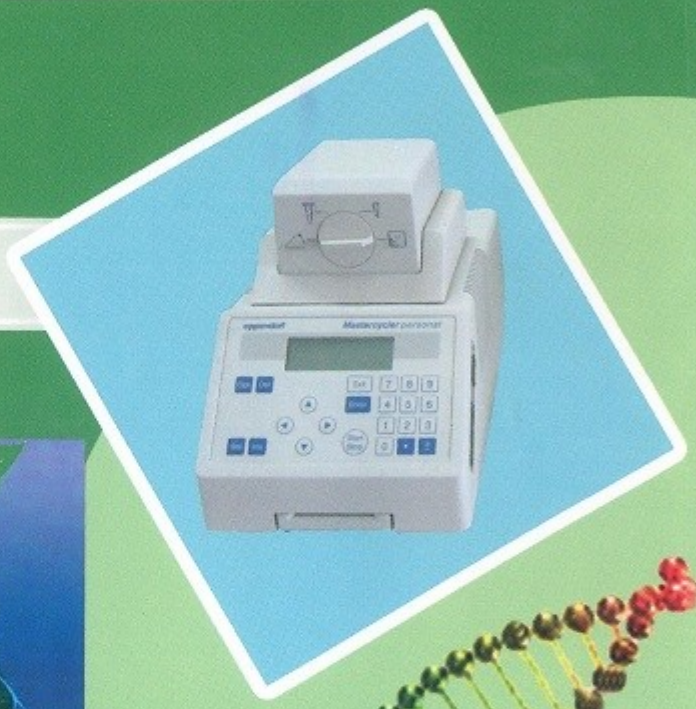
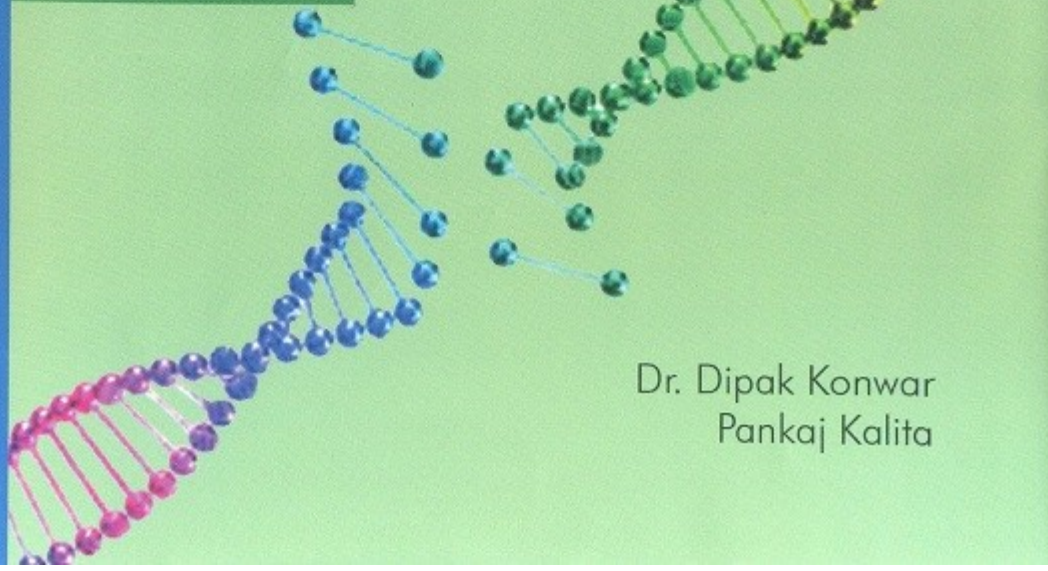
BIOTECHNOLOGY AND BIOINFORMATICS

Tools, Techniques and Applications





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III

Basic Principles and Applications of Centrifugation

P. Vijaya Bhaskar Reddy
NL Raju
Uday Sankar Allam
Chadipiralla Kiranmai

A centrifuge is an important device that is used to separate or concentrate materials suspended in a liquid medium and this process of separation is termed as centrifugation. A centrifuge uses centrifugal force (gravitational force) to isolate suspended particles from their surrounding medium on either a batch or a continuous flow basis. Applications for centrifugation are many and may include sedimentation of cells and viruses, separation of subcellular organelles and isolation of macromolecules such as DNA, RNA, proteins or lipids. Centrifugation is one of the most important and widely applied research techniques in biochemistry, cellular and molecular biology and in medicine. It separates particles from suspensions or even macromolecules from solutions according to their size, shape and density by subjecting the dispersed systems to artificially induced

IV

Spectrophotometry and Colorimetry: Principles and Applications

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The term spectroscopy is derived from Latin where *"Spectrum"* means light and *"Scopy"* means "to look at or to study". Light is of two kinds. i. Polychromatic light (light of various colors or wavelengths), and ii. Monochromatic light (light of single color or wavelength). Spectrophotometry is an analytical technique used for identification and quantification of a compound. In spectrophotometry, monochromatic light is used. Spectrophotometry is based on a simple principle that every object or particle of matter absorbs light of a particular wavelength and is a specific characteristic of that particle. When we plot the amount of light absorbed by the compound at different wavelengths we get the spectrum of the compound. Every compound has a property of absorbing maximal light at a particular wavelength. Such absorption is significantly reduced or becomes zero above or below

V

Polymerase Chain Reaction (PCR) : Its Variants and Applications

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In 1983, a new technique was conceived by Kary Mullis of Cetus Corporation that has become widely used to amplify specific DNA fragments without the need for bacterial cells. This technique is known as polymerase chain reaction (PCR). Earlier, cloning of DNA fragment was made by growing up bacterial cultures and extracting and purifying the DNA. As the name PCR indicates, DNA polymerase is used to amplify DNA using a pre-existing DNA molecule as template and each new DNA molecule synthesized becomes a template for generating more, thus creating a chain reaction. Of all the technical advances in modern molecular biology, the polymerase chain reaction (PCR) is one of the most useful technique. In particular, PCR has revolutionized and speeded up the whole area of recombinant DNA technology. PCR allows the rapid generation of large amounts of specific DNA sequences that are easier to purify