

# Molecular Biology

A.V.S.S. Sambamurthy



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# Molecular Biology

DEDICATED  
TO  
LORD SRI VENKATESWARA

# Preface

Molecular Biology deals with the entire “cell” in a three-dimensional way, viz., the structural details, the functional details and their regulatory mechanisms. It is an exhaustive treatment of the subject covering 41 chapters, several appendices and glossaries. Molecular Biology is taught in schools, colleges and universities. As such it is a fundamental science at all levels of study.

The book starts with the chapter on Chemistry of Life, which deals with the chemical nature of the bond, the structure and function of nucleic acids, carbohydrates, proteins, enzymes and lipids. These constitute the crux of the entire Molecular Biology. In the next four chapters introduction and tools, techniques in Molecular Biology, Bioenergetics, Metabolism, Glycolysis and Tricarboxylic Acid Cycle and their regulatory mechanisms are discussed.

Next few chapters are focussed on certain organelles like Mitochondria, Chloroplasts, Golgi Apparatus, Lysosomes, Peroxisomes and Microbodies in a detailed way. Cell structures like Plasmamembrane, Nucleus, DNA, RNA and Genetic Code are discussed in detail.

From chapters 21-41 the entire Molecular Genetics, Cytogenetics, Classical Genetics and Genomics are discussed. Special topics like Genomics, Immunology and Immunity, Human Genetics, Human Molecular Genetics and Cancer Genetics have been treated with up to date literature giving a glimpse of molecular aspects of human beings. It is hoped that this book will cater to the needs of M.Sc. and B.Sc. students of Molecular Biology, Genetics, Pharmacy, Biotechnology, Medicine, Biochemistry, Botany and Zoology.

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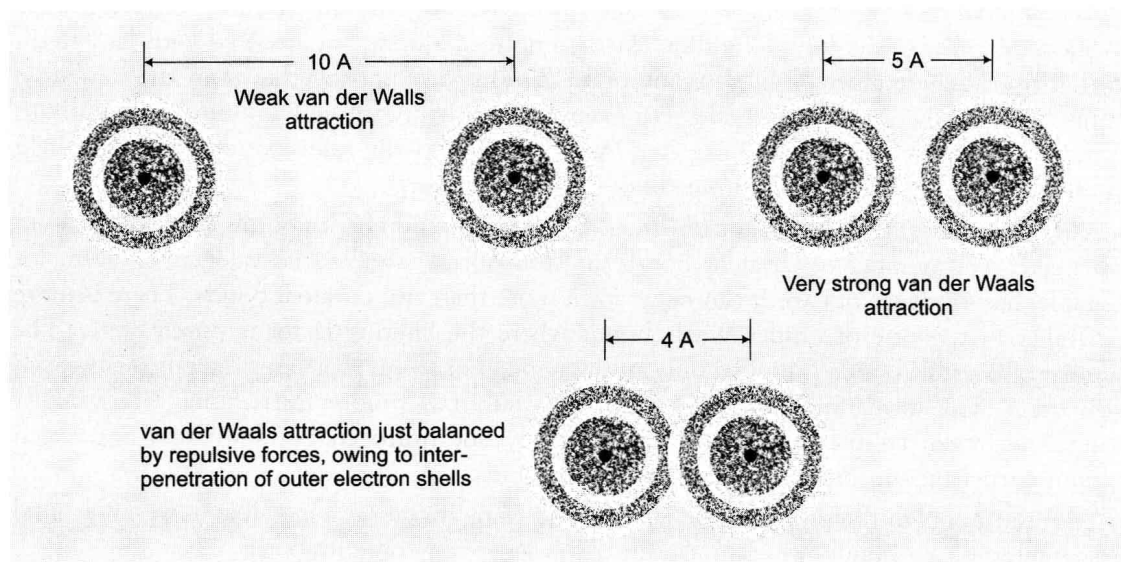
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# Chemistry of Life



In this chapter on the 'Chemistry of life', an introduction to the chemical phenomena essential to life processes like nature of the chemical bond, bond energy, thermodynamics, structure and function of proteins, enzymes, carbohydrates, glycolysis, citric acid cycle, have been discussed. These will help the students to understand the biochemistry of reactions involved in molecular genetics. All reactions are atom specific in gene activity involving DNA, RNA, etc.

## SECTION A

### THE NATURE OF THE CHEMICAL BOND

#### Characteristics of Chemical Bond

A chemical bond is an attractive force that holds atoms together. Aggregates of definite size are called molecules. Originally, it was thought that only covalent bonds hold atoms together in