

# DETAILED CONTENTS

## Life Processes are Driven by Macromolecular Assemblies and Machines

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### Chapter 1 The Machines and Assemblies of Life

#### 1.1 EXPRESSION OF THE GENETIC BLUEPRINT

The flow of information is not perfect and not always in one direction

#### 1.2 WEAK FORCES AND MOLECULAR INTERACTIONS

All weak forces other than hydrophobic interactions are electrostatic in origin

Hydrophobic interactions drive the folding and assembly of macromolecules

The energy balance in folding and assembly has both enthalpic and entropic contributions

Size and topography matter for interaction patches

A certain minimum strength of interaction is required for specificity

Cooperativity enhances stability in multi-subunit complexes

#### 1.3 PROTEIN FOLDING AND STABILITY

Protein folding follows pathways populated with intermediates

Protein structures are only marginally stable

Protein stability correlates with size and other factors such as covalent cross-links

Many cellular proteins denature collectively under thermal stress

Proteins from thermophilic organisms are not very different from mesophilic homologs

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Most proteins form symmetrical oligomers with two or more subunits

Symmetry defines a set of larger structures composed of multiple copies of identical subunits

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