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Nota di contenuto	Part One: Light Energy Capture and Energy Transfer -- 1. Structure-based Calculation of Pigment-protein and Excitonic Pigment-pigment Coupling in Photosynthetic Light-harvesting Complexes -- 2. Electron-Phonon and Exciton-Phonon Coupling in Light Harvesting, Insights from Line-Narrowing Spectroscopies -- 3. Photosynthetic Energy Transfer and Charge Separation in Higher Plants -- Part Two: Underlying Principles of Electron Transport -- 4. Tunneling in Electron Transport -- 5. Spin in Photosynthetic Electron Transport -- 6. Energy Changes in Photosynthetic Electron Transport: Probing Photosynthesis

by Pulsed Photoacoustics -- Part Three: Separation and Stabilization of Charge -- 7. Mechanism of Primary Charge Separation in Photosynthetic Reaction Centers -- 8. Effects of Quasi-Equilibrium States on the Kinetics of Electron Transfer and Radical Pair Stabilization in Photosystem I -- 9. Energetics of Cofactors in Photosynthetic Complexes: Relationship Between Protein-Cofactor Interactions and Midpoint Potentials -- Part Four: Donor Side Intermediates and Water Splitting -- 10. The Radical Intermediates of Photosystem II -- 11. Structure-Function Relationships in the Mn4CaO5 Water Splitting Cluster -- 12. Water and Oxygen Diffusion Pathways within Photosystem II. Computational Studies of Controlled Substrate Access and Product Release -- Part Five: Evolution of the Photosynthetic Apparatus -- 13. From Ionizing Radiation to Photosynthesis -- 14. Origin of Oxygenic Photosynthesis from Anoxygenic Type I and Type II Reaction Centers.

Sommario/riassunto

The volume is intended as an introduction to the physical principles governing the main processes that occur in photosynthesis, with emphasis on the light reactions and electron transport chain. A unique feature of the photosynthetic apparatus is the fact that the molecular structures are known in detail for essentially all of its major components. The availability of this data has allowed their functions to be probed at a very fundamental level to discover the design principles that have guided evolution. Other volumes on photosynthesis have tended to focus on single components or on a specific set of biophysical techniques, and the authors' goal is to provide new researchers with an introduction to the overall field of photosynthesis. The book is divided into sections, each dealing with one of the main physical processes in photosynthetic energy conversion. Each section has several chapters each describing the role that a basic physical property, such as charge or spin, plays in governing the process being discussed. The chapters proceed in an orderly fashion from a quantum mechanical description of early processes on an ultrafast timescale to a classical treatment of electron transfer and catalysis on a biochemical timescale culminating in evolutionary principles on a geological timescale.