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| Nota di contenuto | The Photosynthetic Membrane: Molecular Mechanisms and Biophysics of Light Harvesting; Copyright; Contents; Preface; Acknowledgements; 1 Life, Energy and Light; 1.1 The Definition of Life; 1.2 The Energy of Matter; 1.2.1 The Source of Life's Energy; 1.3 Energy for the Future; 1.4 Photosynthesis by Life; 1.4.1 Photon Energy Transformations; Reference; Bibliography; 2 The Space of the Cell; 2.1 The Cell Concept: Fundamental Nature of Life; 2.2 Compartmentalization: The Cult of the Membrane; 2.3 Membrane Components: Fundamentals of Proteins; 2.4 Functional Classification of Membrane Proteins ReferenceBibliography; 3 The Photosynthetic Membrane: Outlook; 3.1 Knowledge of the Pre-Atomic Structure Era: Organization of the |

Photosynthetic Membrane System; 3.2 Composition of the Photosynthetic Membrane; 3.2.1 Lipids; 3.2.2 Lipid-Related Compounds of the Photosynthetic Membrane; 3.2.3 Proteins and Protein Complexes; 3.3 Oligomerization, Interactions and Mobility of the Photosynthetic Proteins: Enabling Functions and Adaptations; 3.3.1 Oligomerization and Clustering of Photosynthetic Membrane Proteins; 3.3.2 Protein Mobility; Reference; Bibliography

4 Popular Methods and Approaches to Study Composition, Structure and Functions of the Photosynthetic Membrane

4.1 Biochemistry and Molecular Biology Approaches; 4.1.1 Isolation of Chloroplasts and Subchloroplast Particles; 4.1.2 Isolation of Membrane Protein Complexes; 4.1.3 Analysis of Lipids and Pigments; 4.1.4 Protein Expression and Reconstitution In Vitro; 4.1.5 Reconstitution of Membrane Proteins in Liposomes; 4.1.6 Mutagenesis and Transgenic Manipulations; 4.2 Visualization Techniques; 4.2.1 Optical Microscopy; 4.2.2 Electron Microscopy (EM); 4.2.3 Atomic Force Microscopy (AFM); 4.2.4 Crystallography Methods

4.3 Function Probing Methods; 4.3.1 Absorption-Based Approaches; 4.3.2 Raman Spectroscopy; 4.3.3 Fluorescence-Based Approaches; References; Bibliography;

5 Primary Processes of the Light Phase of Photosynthesis: Principles of Light Harvesting in Antennae; 5.1 The Nature of Light; 5.2 Absorption of Light by Molecules; 5.3 Fate of Absorbed Light Energy; 5.4 The Need for the Photosynthetic Antenna and the Fifth Fate of Excitation Energy; 5.5 Photosynthetic Antenna Pigments; 5.5.1 Chlorophylls; 5.5.2 Xanthophylls

5.6 Variety and Classification of Photosynthetic Antennae

5.7 Principles of Light Harvesting: Summary; 5.8 Connecting Light Harvesting Antenna to the Photosystems: Red Energy Traps; References; Bibliography;

6 Towards the Atomic Resolution Structure of Light Harvesting Antennae: On the Path of Discoveries; 6.1 Discovery and Primary Characterization of the Higher Plant Antenna Complex; 6.2 Development of Isolation Methods: Intactness, Purity and Quantity; 6.3 LHCII Crystallography: The Beginnings; 6.4 Revealing the Atomic Resolution Structure of LHCII Antenna Complexes

6.4.1 Key Biochemical and Spectroscopic Advances that Aided the Emergence of the Current Atomic LHCIIb Structure

Sommario/riassunto

The proteins that gather light for plant photosynthesis are embedded within cell membranes in a site called the thylakoid membrane (or the "photosynthetic membrane"). These proteins form the light harvesting antenna that feeds with energy a number of vital photosynthetic processes such as water oxidation and oxygen evolution, the pumping of protons across the thylakoid membranes coupled with the electron transport chain of the photosystems and cytochrome b6f complex, and ATP synthesis by ATP synthase utilizing the generated proton gradient. The Photosynthetic Membrane: Molecular M