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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Biological Water -- Dynamics of Water at Low Temperatures and Implications for Biomolecules -- Anomalous Behaviour of Supercooled Water and Its Implication for Protein Dynamics -- Interactions of Polarizable Media in Water and the Hydrophobic Interaction -- Protein and Biological Solutions -- Metastable Mesoscopic Phases in Concentrated Protein Solutions -- Application of Discrete Molecular Dynamics to Protein Folding and Aggregation -- Cooperative Effects in Biological Suspensions: From Filaments to Propellers -- Transport and Replication -- A Thermodynamic Description of Active Transport -- Energy Interconversion in Transport ATPases Role of Water in Ions Transport and in the Energy of Hydrolysis of Phosphate Compounds -- A Novel Mechanism for Activator-Controlled Initiation of DNA Replication that Resolves the Auto-regulation Sequestration Paradox -- Activity-Dependent Model for Neuronal Avalanches.
Sommario/riassunto	The application to Biology of the methodologies developed in Physics is attracting an increasing interest from the scientific community. It has led to the emergence of a new interdisciplinary field, called Physical Biology, with the aim of reaching a better understanding of the biological mechanisms at molecular and cellular levels. Statistical Mechanics in particular plays an important role in the development of this new field. For this reason, the XXth session of the famous Sitges

Conference on Statistical Physics was dedicated to "Physical Biology: from Molecular Interactions to Cellular Behavior". As is by now tradition, a number of lectures were subsequently selected, expanded and updated for publication as lecture notes, so as to provide both a state-of-the-art introduction and overview to a number of subjects of broader interest and to favor the interchange and cross-fertilization of ideas between biologists and physicists. The present volume focuses on three main subtopics (biological water, protein solutions as well as transport and replication), presenting for each of the them the on-going debates on recent results. The role of water in biological processes, the mechanisms of protein folding, the phases and cooperative effects in biological solutions, the thermodynamic description of replication, transport and neural activity, all are subjects that are revised in this volume, based on new experiments and new theoretical interpretations.

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