Preface

Biophysics as a scientific discipline traverses a wide multidisciplinary field of knowledge, employing the principles of physics and chemistry and the methods of mathematical analysis and computer modeling to understand how biological systems work. Starting basically as a molecular science, biophysics is also able to leap widely across the vertical organization of biosystems. Thus, building on molecular assemblies with precise quantitative physical descriptions of how individual molecular mechanisms produce specific biological functions, the highest levels of organization, such as brain networking, can be studied. Because it is a diverse and eclectic scientific field, biophysics is also difficult to categorize, a problem that we had to tackle while preparing this volume of *Annals*, which is a collection of papers presented at the 22nd International Biophysics Symposium, held on October 9–14, 2004 in Sveti Stefan/Belgrade, Serbia and Montenegro. The papers covered a wide range of topics including molecular biophysics, membrane biophysics, and cell signaling, while the highlights of the meeting were the contributions in neurobiophysics. Thus, as emphasized by the title of this book, the molecular aspects of biophysics lead here to the studies of brain function.

This biophysical roadmap starts with the examples of diverse landmark studies done by the late Professor R.K. Andjus, to whom the meeting was dedicated: time-resolution enhanced NMR of brain energetics in deep hypothermia, multicompartmental analysis of the brain nucleotides' energy status, enzyme-substrate kinetic models in temperature compensation, circannual rhythms in hibernators, color-coding in retinal neurons, and modeling of migration waves of fish. The biophysical path is then "paved" with review papers on the exciting technique of voltage-imaging of the many different electrophysiological roads of a dendritic arbor, on subtle biophysics of ion channels that underlie circadian rhythms or ATP-induced activity, and on what we can learn from the direction-coding in the fish retina. A special group of review papers deals with the topic of CNS trauma and repair starting from the role activity and myelin-associated molecules can have in remodeling of neural circuits, and continuing on to the topics of molecular biophysics of neurodegenerative diseases and approaches to neuroprotection.

In addition to the highlights in neurobiophysics, the eclectic nature of biophysics is also served through a number of review and research articles, and short communications varying from the vibrant story of activity vs. gene expression in neural plasticity, molecular mechanisms of exocytosis, thermodynamic models of ligand binding to polynucleotides, and structural organization of plant cell polymers to oscillatory phenomena in the hypothalamo-pituitary-adrenocortical axis, fractal analysis of brain activity, and ecobiophysics of giant gel formation in the North Adriatic sea.

A special highlight of this meeting was the revival of the activity of two societies—the Yugoslav Biophysical Society and the Yugoslav Society for Neurosciences. In the history of biophysical meetings, such symposia were a yearly tradition of the Yugoslav Biophysical Society (the first meeting was held in 1971 in Krapinske

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Toplice, Croatia), but owing to political and economic reasons only one such meeting was held (in 1998 in Kotor, SR Yugoslavia) after the dissolution of SFR Yugoslavia. The Yugoslav Biophysical Society is a continuing member of IUPAB (International Union for Pure and Applied Biophysics) and is now consolidated again in Serbia and Montenegro, and this meeting was organized in cooperation with a revitalized Yugoslav Society for Neurosciences. The international contribution to the meeting is quite apparent (in participants as well as in fellowships), with a significant number of contributions from centers of excellence in the United States and other countries, which provides a guide to follow for the organization of future meetings on a regional basis.

The organizers of the 22nd International Biophysics Symposium (see <http://www.cms.bg.ac.yu/ippa_web/index.htm>) and the editors of this volume would like to express their gratitude to the International Brain Research Organization (IBRO, see <http://clm.bio.bg.ac.yu/>) for the support of the participation of young researchers at the meeting, to the National Institute of Child Health and Human Development, NIH, Bethesda, for helping to cover the organizational costs, and to the New York Academy of Sciences (<http://www.nyas.org/>)for their expert help in bringing the fruits of this meeting to publication in print and online.

—PROF. PAVLE R. ANDJUS