

Biological modelling / Biomodélisation

Population dynamics
Foreword

Population dynamics is the study of changes in the number and composition of individuals in a population, and the factors that influence those changes. Although the first population models appeared in ecology and demography, they have become increasingly important in almost all branches of biology. The rapidly developing techniques of molecular biology and genetics produce large quantities of data, which demand mathematical analysis and modelling. Nowadays mathematical modelling of population dynamics is a central topic in mathematical biology and some biologists find that mathematical models are absolutely essential for research in modern biology. Mathematics provides a broad spectrum of methods to study population dynamics. The models use all types of differential equations, probability theory, dynamical systems, discrete mathematics and also very complicated systems that include age, stage or size structures.

The *Conference on Mathematical Modelling of Population Dynamics* was held at the Mathematical Conference Centre in Bedlewo (Poland) on 24–28 June 2002 with 98 participants from 20 countries. The conference was organized by the Institute of Mathematics of the Polish Academy of Sciences, within the EU Programme Centre of Excellence coordinated by the Stefan Banach International Mathematical Centre through the Package *Mathematical Modelling and Analysis of Cellular Populations*.

The conference focused on mathematical modelling and model analysis of populations at various levels, including cells, genes, biomolecules and of population dynamics in ecology, epidemiology and in-

fectious diseases, genetics, physiology, immunology and cancer growth. A variety of important and current topics of population dynamics were presented in more than 60 lectures.

In the framework of the Biological Modelling section of the journal *Comptes Rendus Biologies* of the French Academy of Sciences, the present special issue presents a collection of articles that cover a number of important topics of biology together with some of the mathematical methods that are currently used in mathematical modelling in biology and medicine.

It reflects some of the recent advances in the field of population dynamics, connected with the most topical subjects in modern biological research, whereas papers presenting mathematical aspects of this theory are published in the Banach Center Publications series. The papers in this volume indicate several current trends in population dynamics. They also illustrate the balance between adequate description of biological phenomena and mathematical methods and techniques. We hope that this volume will interest both biologists and mathematicians.

Each manuscript has been reviewed according to the standards of this journal. Thus, this special issue consists of a set of high-quality articles on biological aspects of population dynamics.

We want to express our gratitude to all authors who took part in this special issue.

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