Preface

The book is designed as an introduction for students of biology, biochemistry and biophysics, and for the researchers interested in analysis of biological processes. And this is done in an explanatory rather than mathematical manner the mathematical equations being based on reasonable assumptions. These assumptions facilitate the understanding of the subject by developing an abstract mathematical foundation from the beginning. And this rewards the students with an easy understanding of the subject.

It seems that experimental data in biology quite often are analyzed inadequately. Useful and interesting inferences that can be drawn from the data are left unnoticed and the evidence forgotten. An aversion to math, little appreciation for the importance of models in scientific progress is known among biology students. Unfortunately, mathematics does not seem to be properly appreciated by biology teachers (or scientists in general), either. The attitude towards physics does not seem much better. That is hardly justified. No evidence has ever been produced that physical laws are no longer valid when it comes to biological systems. In my own research (from the very earliest investigations) concerning the analysis attempts were made to re-examine the data not treated quantitatively. It has appeared that sometimes not only generally known metods of analysis were disregarded but the very experiments were carried out not the best way.

There being no reason to consider the biological phenomena too sophisticated for physical approach, the biological processes should be supposed to obey physical laws. The processes can be adequately modeled, i.e., mathematical equations or corresponding systems can be composed and solved afterwords with the widely used software. That is rather simple, easy and clear. The results of analysis, however, are not trivial. Some of them merit publication in scientific journals and, presumably, are of interest for the scientific community.

The book has arisen as a result of teaching Models in Biology to students of Bioengineering at the Gediminas Technical University of Vilnius. The aim was to teach the students to use a physical approach to the problems they are familiar with, to come up with articulate verbal models upon a mental effort, to express the model in rigorous mathematical terms, to solve (with the aid of computers) corresponding equations, and finally, to analyze and interpret experimental data in terms of their (mathematical) models. That raises neither any special demands on the skills nor requirements for extra knowledge of mathematics. The appreciation of role and importance of models in science evolves as a result of modeling.

The analysis along with the experimental investigation is an essential part of any scientific research.

It is hoped that this book will be useful both for the students and the researchers.



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