

# Foreword

The issues addressed in this work complement the basic biochemistry curriculum.

The authors assume that the reader is already familiar with the material covered in a classic biochemistry course. An integrative approach—which is attempted here—enables the reader to grasp the entirety of the problem domain.

We believe that the proposed systemic approach to biology will prove useful not only for students but also for teaching staff and for all those interested in the general domain of biology.

Our handbook frequently refers to real-world macroscopic models. The purpose of this exercise is to underline the unity of the laws of physics, chemistry and biology and, at the same time, the clear and obvious nature of certain solutions derived from biochemistry and the macroscopic world.

We believe that high school students, already in possession of a large body of detailed information, should focus on generalizations rather than on encyclopedic knowledge, which necessarily becomes fragmented and selective as the amount of available data increases. In our view the foremost goal of education is to ensure that knowledge can be put to practical use by associating facts and predicting their consequences. This can only be achieved by acquainting students with the rules and mechanisms governing various processes and phenomena. Our work should therefore be viewed in light of the presented goal.

Approaching the subject of biology from the viewpoint of basic scientific knowledge (physics and chemistry) yields a convenient platform to formulate generalizations. This is why we have divided the subject matter of the handbook into five sections: the structure and function of living organisms, the role of energy in biology, the role of information in living organisms, regulatory processes in biological systems and the modes of cooperation in such systems.

We believe that these generalizations will provide readers—particularly those interested in expanding their knowledge beyond simple academic minima—with exploitable insight in the field of biochemistry. Generations introduced is aimed also to become the platform for using simulation techniques.

It goes without saying that any attempt at generalizing diverse biological phenomena involves the risk of oversimplifications or overstepping the bounds of science. Such threats also apply to our work and the reader should be fully aware of this fact.

As stated above, this study is primarily aimed at students and therefore it assumes the form of a handbook. In order to encourage readers to try their own hand at interpreting observable events the last section of the book contains some unresolved hypotheses dealing with fundamental biological processes and the phenomenon of life itself. These include key problems in medicine and drug research, e.g. protein folding and proteome construction, as well as the challenge of formulating a proper definition of life. We hope that the presented study will encourage readers to try and develop their own approaches to such problems.

The work is supplemented by references, including other handbooks, selected monographs and periodicals dealing with the basic problems of biochemistry.

Systems Biology

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