

This text was written to provide a brief, systematic introduction to living phenomena for college nonscience students. Because of the diversity of living phenomena to be discussed and the variety among nonscience students, this task is a challenging one. Within the limitations not only of space but of time, as dictated by the one-semester course for which it is intended, this text introduces students to the full range of phenomena in the living world and our knowledge of it.

I have tried to achieve a balance between descriptive phenomena of organisms and mechanistic explanations of those phenomena. I have sought to balance the discussions of procaryotic and eucaryotic cells, of plants, animals, and humans. Perhaps most important is balance in seeing the big picture above the small details. I have made a constant effort to ensure that the concepts are not obscured by details. However, enough details are presented to support each general concept.

PREFACE

In my view, too many textbooks for the non-science student have been simply watered-down versions of larger texts. Often difficult to read, they have tended to offer what is familiar to the instructor rather than what is interesting and useful to the student. Some books are superficial in their coverage and consequently condescending and patronizing in their tone. Others have been very selective in the phenomena they discuss. In this book I have tried to provide a balanced presentation, directed specifically at the nonscience student who comes to biology with uncertain interests and weak background preparation, especially in chemistry.

An early elementary discussion of chemistry is an attempt to overcome the most important problems that introductory students have with this material. I try to make it clear that without this understanding, it is really impossible to explore and appreciate the complexities of life processes as science presently understands them. One simply cannot participate in the excitement of recent discoveries in biology without understanding some chemistry.

There are several keys to creating a text that is accurate, comprehensive, balanced, readable, and appealing to the imagination. The first of these keys is organization. The book has been organized around functions common to all living systems. Within each chapter, unity of process or function and diversity of forms are given equal emphasis. Again I hope I have achieved a balance that is realistic for student and instructor.

A second key is the language used to inform and involve students. The introductory course of any discipline inevitably opens up an entirely new vocabulary, and biology is no exception. I have been careful to avoid unnecessary technical terms, bearing in mind that the familiar word that does the job is not to be scorned. An equally important aspect of language is its ability to excite. I have tried to instill through the language used in the text some of the flavor of probing the unknown.

Third, having taught biology on varying levels to students of varying interests has given me an appreciation for areas that need patient explanation and clear, simplified illustrative material. Consequently, the coverage of some sub-

jects has been expanded, some illustrations have been added, and others have been altered.

CHANGES AND NEW FEATURES

The third edition of *Elements of Biology*, in addition to being thoroughly updated in its contents, has a number of new features.

The chemistry chapters were completely rewritten to present the necessary concepts in the simplest language possible for the understanding of the biological principles to follow.

A second ecology chapter on the impact of humans on the ecosphere was added to demonstrate the delicate balances in our environments and how we humans have disrupted so much of that balance.

Chapter previews and internal summaries were added to introduce and emphasize major concepts; at the end of each chapter is also a summary of the chapter's contents. These are valuable study aids that may be used before as well as after reading the chapter. Review and discussion questions are designed to help the student understand the principal focal points in the chapter and apply them to everyday and imaginary situations.

The chapters concerning reproduction, development, meiosis and genetics were rearranged to provide first a broad conceptual understanding of the processes, followed by a detailed explanation of the principles accounting for the differences between organisms.

New terms are printed in boldface and defined when first encountered in the text. Full definitions appear in the extensive glossary, which was still further expanded in this edition, at the end of the book. For most entries, the pronunciation in simplified form is also given.

To the extent possible, legends accompanying illustrations are complete and self-contained. That is, the student examining the illustration has direct access to its full explanation in the legend.

In addition to referenced art the book contains supplementary illustration and tabular material. In some instances this material will summarize concepts in the text, in other cases it will provide more detailed material elaboration on concepts developed in the text.

SUPPLEMENTS

Accompanying the text are a study guide and instructor's manual. The study guide is designed to help students interrelate concepts from various sections and chapters and to review the important points of the text. For each chapter of the text, it includes questions for study, discussion, and application.

THE LANGUAGE OF BIOLOGY

On a matter that today calls for increasing sensitivity, I have made a considerable effort to avoid sexist language, though sometimes with only limited success because of the special problem biologists face. Nobel prizewinner S. E. Luria has so lucidly expressed the problem that I can do no better than incorporate his statement here.

In deference to the well-justified concern for equality between sexes even in the relatively trivial matter of the use of words, I tried to avoid the use of "man" and "his" as referents to the human species as a whole but found no way to do so without being bogged down in the clumsiness of alternative expressions. So "man" it is, in the deplorable sexist tradition of the English language, a tradition that proves hard to overcome. "Man" stands for the species—that is, about equal numbers of women and men. An understanding of biological facts and an awareness of the depth of biological interdependence among all members of a species may help foster the recognition of the justness of social equality between members of the two sexes and among all groups of mankind.*

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C.K.L.
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*S. E. Luria, *Life, The Unfinished Experiment* (New York: Scribner's 1973), pp. 4-5.