Preface

Every college student and instructor must at one time or another have indulged in a wistful pipe dream. It is the dream of finding the perfect textbook—one that is appealing to the eye and covers the material soundly and with intellectual integrity, but yet manages to be clear and comprehensible. While it would probably be inviting thunderbolts from on high to claim that we have achieved that perfect textbook, this has at least been our aim.

Biology: The Science of Life covers all of the topics normally included in an introductory biology course, plus a few more that instructors can use as they see fit. The style is lively and readable, and difficult subjects such as biochemistry and genetics are explained in clear, step-by-step, logical fashion. Important terms are set in boldface to catch the reader's attention, and new terms are explained as soon as they are introduced.

Summaries and review questions are provided at the end of each chapter, to help students test their understanding of the material—not merely the recall of facts, but the comprehension of what the facts mean. A glossary of important terms appears at the end of the book, along with an annotated list of scholarly and popular readings. In addition, the text is supplemented by more than four hundred illustrations, most in full color, which help to clarify difficult points and also to keep students aware of the fact that biology is not merely a collection of cold abstractions but is tangible, breathing life.

Two features should be especially attractive to the introductory student. Each chapter contains a two-page essay on some animal or plant—ostrich, octopus, bristlecone pine, sperm whale, the world's only known albino gorilla—describing its appearance, habits, special adaptations to its environment, and the things that render it, perhaps, amazing or amusing to a human viewer. There is also, in each chapter, a shorter feature dealing with some current topic related to health, medicine, or agriculture—for example: Is organic farming practical? Can antibiotics be killers? Will an antipregnancy vaccine soon be on the market?

Throughout the preparation of this text, it has been our assumption that biology does not have to be "made interesting" to the student. It *is* interesting by its very nature and by its relevance to pressing questions of individual and social human life. What is needed—and what we have

tried to do—is to clear away the barriers and let that fascination come through.

Organization

The book is divided into five major sections, organized around major life functions and the structures that serve them.

Part I: Patterns of Structure and Function. The three chapters in this section deal with the structure and function of cells and with elementary biochemistry—atomic structure, molecular bonding, the principal types of organic compound, and the energy reactions of photosynthesis and cellular respiration. Numerous diagrams help to clarify the various structures and processes, and a foundation is laid for understanding the cellular activities that underlie the larger activities of organisms.

Part II: Patterns of Maintenance and Regulation. In the seven chapters of this section, the principal physiological systems are discussed—digestion, transport, gas exchange, support and locomotion, the various aspects of homeostasis, and hormonal and nervous system regulation. Animals and plants are treated together, to bring out the unity of life across taxonomic divisions. Since the students' particular interest, however, is likely to be in their own species, special attention is given to each system as it appears in humans.

Part III: Patterns of Reproduction and Development. In these four chapters, the outlook widens from the maintenance of individual organisms to the processes by which they reproduce and assure the continuance of their kind. Chapter 11 surveys various past and present theories of the first origin of life—assessing probabilities rather than making final assertions—and then goes on to discuss the basic processes of cellular reproduction through mitosis and meiosis. The following three chapters build on this with an examination of reproduction and the stages of development in plants and animals. Again, human patterns are given particular attention.

Part IV: Patterns of Change. Here the outlook broadens again, from the reproduction of individuals to the means by which characteristics are inherited and species are changed. Classical genetics is discussed first, with numerous diagrams; then the molecular structure of the gene is considered, and how the cell operates to translate coded genetic instructions into working substances and structures needed by the organism. With this cellular and molecular basis established, the next three chapters consider the principles and probable history of population variation and species evolution. Pre-Darwinian theories of evolution are presented objectively, in the contexts that made them seem reasonable and probable to their proponents; Darwinian natural selection is then presented as the theory that at present seems to offer the most satisfactory explanation of the observed facts. The last chapter in the section deals with taxonomy—the reasons for taxonomic classifications and the major phyla according to the Whittaker five-kingdom system.

Part V: Interacting with the Environment. Today we are aware, as perhaps never before since the modern age began, of the dependence of all living creatures on their environment—an environment that includes the fellow members of their own species, the members of other species, and the nonliving world of earth, water, air, and the airless space beyond. These last four chapters, therefore, deal with relationships on this level. Subjects include the means by which animals receive and communicate information, their patterns of individual and social behavior, the ecological interactions by which they fit into their living and nonliving surroundings, and finally the pressing questions of finite resources and human destruction thereof by wastage and pollution.

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