

Preface

General Immunology fills an important need as a fully integrated immunology text. While standard texts cover immunology and supposedly describe the biological aspects of immunity, in my opinion, the majority of these texts are still written for a restricted audience. Most immunology texts are written by and for cellular immunologists and immunochemists and for medical and paramedical readers. These texts usually exclude certain basic subjects such as embryology and evolution, leaving students with a less than broad view of immunology. Because immunology has an increasingly broader scope as a biological science, there should be a text which does present, in fact, the subject from the viewpoint of the biologist and in a comprehensive manner rather than as a narrow discipline as is usually the immunologist's style.

The inspiration for this book grew out of my contact with students (at all levels) and lay persons (often artists, persons in business, archeologists) who know nothing of the rudiments of biology in general and immunology in particular. After even long pauses, my presentation of the word *immunology* conjured nothing, not even a response so simple as "do you study immunity or how the body fights infection"? Even the response from my own medical students, future physicians, is essentially the same. Obviously students are not grasping some of the sense of immunology at the earliest stages, high school, undergraduate, etc.

It was my aim in this text to present undergraduate students with a *general overview* of the immune system. Thus ample evidence is presented concerning the *basics* of immunology and, in my mind, those tenets of the discipline which are less controversial. Thus, students will learn that plasma cells are derived from B lymphocytes. On the other hand, they will not be exposed to the details of complex regulatory events (e.g. suppressor T-cells) that characterize T-lymphocyte sub-types. Since it was the purpose of this text to present a broad approach

to immunology, many of such details are more appropriate for the specialized text. As it were, this text has been painted with broad strokes — it is an impressionist approach providing a quick, overall view. Whether I have accomplished my goal of providing something for the future specialist or the generalist who wants to know some basic immunology just as one through curiosity takes a general course in world history, remains to be seen.

In this text, topics in immunology are presented from all living groups, treating cells, tissues, organs and organismal levels of biological organization. There are 23 chapters arranged in 8 sections: I. Introduction, II. Foreignness, III. How the Immune System Developed, IV. Cells of the Immune System, V. Defense and Immunity, VI. Antigens, Antibodies and Immunoglobulins, VII. Organs of the Immune System, VIII. How the Immune Systems Evolved. Information within each chapter and between other chapters in other sections of *General Immunology* are woven together into the fabric of general immunology. Certain chapters in Section I (1 and 3), III (5 and 6), IV, VII, and VIII represent material never presented in most immunology textbooks. These subjects are usually dealt with in other texts and from different points of view. For example, all chapters in Section VII, are usually presented in histology textbooks and from the viewpoint of the microscopic anatomist.

The first three chapters serve as an introduction to immunology — a science, a sketch of its history, some of its more recent contributors, something about gathering facts, immunology journals, and the entire biomedical enterprise of which immunology is just a part. These three chapters essentially set the tone of the book. For the first time, only pictures of twentieth century immunologists are included (Chapter 1) and not those of pioneer eighteenth century immunologists. The essence of the field is briefly presented in Chapter 2 which alludes to the

immune system as an exquisite sensing system. The immunologists' tools and methods used to obtain facts are discussed in Chapter 3. Chapters 1 and 3 may be unique for any immunology text.

Since the immune system's function is the recognition and destruction of foreign material, the book plunges immediately into antigens (Chapter 4). Chapter 5 sketches the immune system in chordates including vertebrates other than humans; a unique chapter, never before presented. Chapter 6 covers the ontogeny of the immune system, a subject usually described in embryology texts. Cells of the immune system beginning appropriately with monocytes, macrophages, the three granulocytic types, and mast cells are treated in Chapters 7, 8. Chapter 9 deals with lymphocytes. The functions of these two major groups are dealt with in Chapter 10 on phagocytosis and interaction of lymphocytes in Chapter 11. Antigens in relation to antibody synthesis, antigen-antibody interactions, immunoglobulin structure and immunoglobulin assembly occupy Chapters 12-15. These subjects are always described in immunology texts but here, as in all the other chapters, the information is integrated with credible work derived from diverse animal models.

The organ level of the immune system is presented

in Chapters 16-20 with detailed considerations of bone marrow, thymus, spleen, lymph nodes, and lymphoid aggregations. These subjects are usually described in histology texts and, like Chapters 7, 8 and 9 are here written in detail for general immunologists by drawing on information from many sources. In dealing with Section VIII and how the immune system evolved, three chapters treat the topic in some depth, and in a special order. Cell-mediated immunity, often considered to be prototypic as well as universal, is presented in Chapter 21. However, there is no exclusive chapter devoted to transplantation immunology. Since humoral immunity appears to be of a unique sort in invertebrates, this is treated in Chapter 22. Finally, Chapter 23 concerns evolution with a discussion of antibody diversity and the importance of the major histocompatibility system.

General Immunology is intended as a general immunology text treating those subjects usually scattered in the past in texts related to other disciplines (e.g. embryology, histology). Although written for advanced undergraduates, and because it is comprehensive, immunologists and biologists at all levels will find it useful. The last three chapters will even appeal to medical students and clinicians.