Preface

This new edition maintains the approach of the first edition. The prominent nature of enzymes is to enhance the rate of reaction. The characterization of enzyme was initially performed by measuring the rate of product formation or of the substrate decrease (overall reaction kinetics). These topics are discussed in Chapters 2 to 4. The advances in the purification of enzymes helped in obtaining large quantities, and the research on enzyme focused on the changes in enzyme itself during catalysis. The technique used in these studies was the rapid-mixing method (Chapter 5). The general properties of protein and the method to determine and describe the protein structure are presented in Chapter 6. The enzyme is composed of protein, but the non-proteinaceous factors known as cofactors (coenzymes and prosthetic groups) are an essential factor for many enzymes. These are described in the new Chapter 7 (Cofactors). Half of the chapter describes the proteinaceous cofactors produced via the post-translational modification of the enzyme active site (Section 7.3, "Protein-Derived Cofactor"). In the discovery and characterization of some of these cofactors, the carbonyl reagent phenylhydrazine (PH) and related compounds have been used. Therefore, the carbonyl reagents are included as the chemical modification reagents in the new Chapter 8 (Search of Active Site), where *Aspergillus* amine oxidase was added as an example. The detailed knowledge of kinetic behavior of enzymes and their structure has revealed the secret of enzyme. The first may be the explanation of cooperative binding of oxygen to hemoglobin, though hemoglobin is not enzyme. Several examples are presented in Chapter 9. Advancement of computational tools has helped to understand the structure–function relationship of enzymes, and in future, much more complex enzyme systems, such as ribosomal protein synthesis, can be explained on the basis of the structure of enzyme. As a starting point in a more complex enzyme system, polyfunctional enzymes are described in the new Chapter 10 (Channeling of Substrates and Products). Tryptophan synthase is

described first. The enzyme is thought to be a template of the research in the field. The rest of the chapter describes heterotetrameric sarcosine oxidase as another example. Chapter 1 has also been updated, and Chapters 2–5, 9, 11, and 12 are mostly the same as in the first edition.

The knowledge of the structure and function of enzymes helps to understand the ingenious mechanism of organisms and to develop therapeutics for diseases. I hope this book will be useful not only for beginners in enzymology but also for researchers in the field of biological basics and applications.

Three-dimensional figures (indicated by "stereo view" in the figure captions) have been presented for the readers to better understand the function of enzyme from its structure. Most readers will be able to see the stereo view by looking at the left figure with the right eye and the right one with the left eye (crossing the eyes), and then moving the face closer to or away from figures will enable them to see the 3D structure. A few problems concerning 3D structure are presented in the end of chapter, but I have not provided answers. I expect readers to become familiar with software for 3D structure.

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