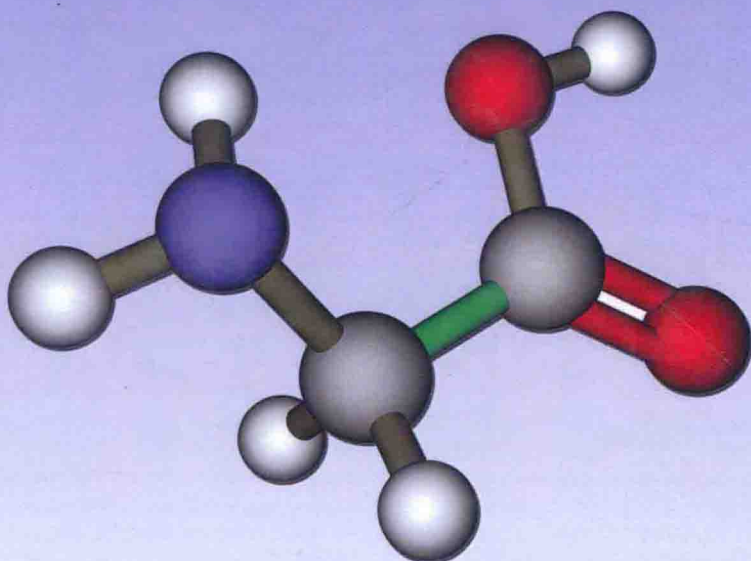

AMINO ACIDS

Biochemistry and Nutrition



GUOYAO WU



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Guoyao Wu



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Preface

Amino acid biochemistry and nutrition are interesting, dynamic, and challenging subjects in biological sciences. They span a wide range from chemistry, metabolism, and physiology to reproduction, immunology, pathology, and cell biology. In the nearly half-century since the last two volumes of the monograph *Biochemistry of the Amino Acids* were published by Alton Meister in 1965, this field has developed rapidly. Important technical and conceptual advances include (1) the analysis of amino acids by high-performance liquid chromatography and mass spectrometry; (2) isotopic measurements of synthesis and degradation of proteins and amino acids in cells, tissues, and the whole body; (3) interorgan metabolism of amino acids involving key tissues and organs such as liver, skeletal muscles, small intestine, and kidneys; (4) amino acids in cell signaling and regulation of gene expression; (5) nonlysosomal protein degradation by ATP- and ubiquitin-dependent multicatalytic proteasomes; (6) molecular and cellular regulation of intracellular protein turnover and amino acid metabolism; (7) determination of true ileal digestibilities of amino acids; (8) molecular cloning of transporters for amino acids and small peptides; (9) development of the ideal protein concept; and (10) elucidation of dietary requirements of functional amino acids by humans and other animals. Comprehensive and systematic coverage of these new scientific developments in a well-organized book will benefit researchers and students in both biomedical and agricultural disciplines to improve health and the nutritional value of foods.

Amino Acids: Biochemistry and Nutrition consists of 13 chapters. The text starts with the discoveries and basic concepts of amino acids, peptides, and proteins. It then advances to protein digestion in the gastrointestinal tract and the absorption of small peptides and free amino acids in the small intestine. This chapter is followed by detailed coverage of cell- and tissue-specific synthesis and catabolism of amino acids and related nitrogenous substances (including nitric oxide, polyamines, glutathione, creatine, urea and uric acid) in animals. After the use of isotopes in studying nitrogen metabolism is introduced in Chapter 7, the book continues with intracellular protein turnover, short- and long-term regulation of amino acid metabolism, physiological functions of amino acids, and inborn errors of amino acid metabolism. Finally, the text ends with dietary requirements of amino acids by humans and other animals. While the classical concepts and principles of amino acid biochemistry and nutrition are emphasized throughout the book, every effort has been made to include the most recent progress in this ever-expanding field so that readers in various biological disciplines can integrate amino acid biochemistry with nutrition, health, and disease in mammals, birds, and other animal species. At the end of each chapter, selected references are listed to provide readers with both comprehensive reviews of the chosen topics and original experimental data on which modern concepts in amino acid biochemistry and nutrition are based. Reading the scientific literature is essential for a thorough understanding of the history of the field and also provides “food” for creative thinking and for rigorous development as a productive scientist.

In the Index, a list of key words, phrases, and abbreviations is provided to help readers quickly find information presented in all the chapters.

This book owes its origin to the lecture notes of a graduate course ANSC/NUTR 613 “Protein Metabolism” the author has taught at Texas A&M University for the past 21 years. Its conception was motivated largely by the lack of a suitable textbook for teaching such an advanced course for students majoring in animal science, biochemistry, biomedical engineering, biology, human medicine, kinesiology, veterinary medicine, nutrition, physiology, toxicology, and other related disciplines. Besides its use as a textbook, all of the chapters also provide useful references to general and specific knowledge on amino acid biochemistry and nutrition for researchers in biomedicine and agriculture (including animal science and plant breeding).

The sciences of amino acid biochemistry and nutrition have been built on the shoulders of many giants and pioneers worldwide. Their seminal contributions to the field have made this book possible. The author must apologize to those whose published works are not cited in the text due to limited space. Sincere thanks are also extended to the author’s past and current students for their constructive comments on the “Protein Metabolism” course and for their stimulating discussions to further improve its content.

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Author

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