
PREFACE

D-Amino acids are stereoisomers or optical isomers of naturally occurring L-amino acids. D-Amino acids and L-amino acids have almost the same physical and chemical properties. D-Amino acids have been considered to be unnatural substances that are produced only when we synthesize amino acids in laboratories or factories. Indeed, equal amounts of D-amino acids and L-amino acids (racemic mixture) are produced by chemical synthesis.

Until recently, living organisms were thought to contain exclusively L-amino acids. Before the emergence of life, D- and L-amino acids should have existed on the primitive earth, because amino acids are considered to be produced under the conditions of high temperature, high pressure and lightning. It is an interesting and important question why D-amino acids were eliminated and organisms have evolved using only L-amino acids. This mystery has not been solved.

D-Amino acids have been considered exceptional amino acids that exist only in prokaryotes and a part of lower organisms. However, the development and improvement of analytical instruments and methods have revealed that D-amino acids are present in organisms far more in the amount and extent than previously considered. It has become clear that D-amino acids are present in invertebrates and vertebrates including humans and that some of D-amino acids have important physiological functions. Biological systems for synthesis and degradation of D-amino acids have also been found.

In the past few decades new evidence for D-amino acids has been uncovered and a vast new knowledge has been accumulated in the field of D-amino acid research. New experimental results have been published in a wide range of journals and have been reported in several conferences and symposia. This scattered information makes it difficult for the newcomers to the field to obtain a general oversight of current activity and new advances. Therefore, we launch out into a new publication of this book that includes comprehensive D-amino acid research. We have asked researchers worldwide who are actively studying D-amino acids to send us their contributions regarding their original methods and findings. Those contributions are compiled in this book. The readers will find what kind of research is conducted in the field of D-amino acids and what problems there are. This is a basic methodology book. We think this book is useful especially for young researchers and students to start their own researches in the field of D-amino acids.

Finally, we would like to thank all of the contributors who have agreed to participate in this project and are willing to spare their time to write the chapters and share their expertise.

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