
PREFACE

Biochemical pathways comprise specific, fundamental bond-breaking and bond-making processes which are combined, arranged, and interdigitated in such a way as to allow a living organism to be produced and maintained. Perhaps for many of the same types of reasons that cause an inquisitive child to attempt to understand the way in which a toy works, the biochemist attempts to understand the way in which the living organism works. In the latter instance, the investigation frequently entails resolving intricate biochemical processes into familiar components which are more readily understood. One such component is the reaction mechanism and another is the kinetic mechanism. Thus, I have chosen to discuss the principal biochemical pathways in terms of their reaction mechanisms and kinetic mechanisms. For those who are less familiar with the structural, chemical, and physical characteristics of biochemical compounds, these are described within the first six chapters. Also included in this introductory material is a chapter on optical activity, which I believe is appropriate since in virtually all cases biochemical compounds are optically active. Following the first six chapters, and serving as a bridge between the description of the behavior of biochemical compounds in the flask and that in the living organism, are chapters that focus upon the thermodynamic and kinetic aspects of biochemical reactions. With this as background, carbohydrate, lipid, nucleic acid, and protein metabolism are discussed in some detail.

In my judgement, the reasons for discussing biochemical reactions from the perspective of their reaction mechanisms and their kinetic mechanisms are as follows. Reaction mechanisms readily illustrate that there are a relative few types of chemical conversions that occur and recur in all known biochemical pathways. Thus, these pathways can be dissected and recognized to comprise a sequence of familiar, simple bond-breaking and bond-making processes. It is, of course, reassuring to observe that the fundamental tenets of organic and inorganic reaction mechanisms pertain whether the reaction occurs in a living system or in the laboratory. Kinetic mechanisms, similarly, illustrate that the biochemical reactions which occur in living systems proceed according to prescribed patterns of behavior. Thus, in this instance, biochemical pathways can be dissected and recognized to comprise a sequence of reactions which each proceed according to one of a few familiar courses.

In summary, it is my wish to provide some insight into the processes that occur in living organisms by means of dissecting them and identifying the products of that dissection with familiar concepts. I believe that this is one way in which learning can be most efficient, most effective, and most enjoyable.

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Earlene Brown Cunningham