## Preface to the Second English Edition

Die Zeit, innerhalb welcher eine bestimmte Menge Substrat verändert wird, also das Maß der Reaktionsbeschleunigung durch den Katalysator, hängt in erster Linie von seiner Menge ab. In sehr vielen Fällen ist sie sogar direkt proportional der wirksamen Menge des Fermentes, in anderen Fällen bestehen kompliziertere Beziehungen, die man in den sogenannten „Fermentgesetzen" hat ausdrücken wollen, die aber zum großen Teil sehr mangelhaft fundiert sind.

The time needed for a distinct amount of substrate to be changed, hence the degree of acceleration of the reaction by the catalyst, depends primarily on its amount. In a great number of cases it is even directly proportional to the efficient amount of the ferment. In other cases more complicated relationships exist. It was attempted to formulate these in the so-called "ferment laws". However, to a large extent, they are very insufficiently substantiated.

Carl Oppenheimer (1919) *Biochemie*
Georg-Thieme-Verlag Leipzig

Upon preparing a new edition of a book inevitably the question arises: what should be changed? A textbook is bound to present the fundamental topics, which cannot easily be modified without disturbing the whole concept and, since enzyme kinetics is not a very expanding area of biochemistry, most topics can be regarded as fundamental. One challenging area not satisfactorily covered by classical enzyme kinetics concerns enzymes located at boundary layers, especially at membranes. Actually, about half of the enzymes in a cell are in more or less intense contact with membranes. Such enzymes and their reactions are different to reactions in aqueous solutions and cannot be treated in the same way because of profound differences in the immediate environment, the access of substrates and the release of products. The situation is complicated by the fact that there exists no general mode of membrane association of enzymes. While various enzymes are completely integrated into the membrane, others are more or less loosely associated. Further, it must be considered that (non-enzymatic) transport processes through membranes also exhibit similarities with enzyme reactions, translocation from one site to another in the membrane can be compared with the conversion of substrate to product. This opens a broad field for the extension of the rules of enzyme kinetics. However, since such sys-

*Enzyme Kinetics. Principles and Methods. 2nd Ed.* Hans Bisswanger

ISBN: 978-3-527-31957-2

tems cannot satisfactorily be described by one or a few general rules, special mechanisms have to be developed for each individual system; the discussion of this topic is restricted to prominent systems, immobilized enzymes, membrane integrated enzymes and transport systems, and enzymes on boundary layers between the aqueous solution of the cytosol and the membrane. A striking conformity of all these systems is the broad applicability of the basic equation of enzyme kinetics, the Michaelis-Menten law which, as a rule, can be used in a first approach, while the special features of the respective system may necessitate distinct modifications. The concept of allosteric enzymes is extended to membrane systems. Nevertheless, only suggestions can be given, while for distinct solutions for a certain system the special literature must be consulted.

In a separate section a comparison is drawn between enzyme kinetics and pharmacokinetics, two closely related areas, both depending on enzyme reactions and thus sharing various similarities. However, there are also essential differences, enzyme kinetics treating defined enzyme reactions, while pharmacokinetics deals with more complex processes observing the fate of a drug during its journey through the organism. The different terminology employed in these fields is compared to facilitate mutual understanding.

The text was generally revised especially in order to simplify the understanding of the theoretical, often dry, matter. Sections not directly required for the continuous treatise are set in separate boxes.

I thank Mr. Zhougang Yang for updating and designing many of the figures.

Tübingen, January 2008 *Hans Bisswanger*