

BOOK REVIEWS

E. F. ANNISON and DYFED LEWIS: **Metabolism in the Rumen**. Methuen and Co. Ltd., London, 1959. pp. 177, 15s.

A GREAT deal of work on ruminant digestion has been done during the last 20 years and this monograph summarises the biochemical aspects of the subject. The title emphasises the fact that a study of the digestive functions of this organ is really a study of the metabolism of the bacteria and protozoa that live in it. To a large extent the metabolism of these organisms does fulfil the definition of digestion, namely that ingested food is prepared for assimilation by the animal. Since, however, the organisms themselves live on the food eaten by the animal, transformations of food constituents into microbial constituents also occur. The monograph consists of 6 chapters: the first is an introduction which sets out the important anatomical features of the stomach, being marred only by a misleading arrow in the diagram that shows the direction taken by the food through the stomach. This arrow suggests that when food is reswallowed during rumination it passes directly to the 3rd and 4th parts of the stomach, which is not supported by the text. The second chapter deals with the microbiology of the rumen; the third with fermentation of carbohydrates; the fourth with the metabolism of nitrogenous compounds; the fifth with absorption from the rumen; and the sixth with rumen function and dysfunction. Each chapter is annotated and the reference lists, although not exhaustive, give a good introduction to the literature. The text is supported by tables of published experimental results and diagrams.

This monograph is well written, easy to read, and gives a most comprehensive account of the work done in the various aspects of the subject. A clear indication of the ways in which this new knowledge has influenced research on the nutrition of domestic ruminants, on the evaluation of foodstuffs, and on the various disorders that occur in the rumen, or are associated with it, is given. Inevitably there are a few controversial conclusions, but this is only a sign that the subject is rapidly growing, and they are quite overwhelmed by the main body of the book on which substantial agreement has been reached. Consequently it can be recommended confidently as a book which all veterinary and agricultural students should read. It will be useful for those who teach animal nutrition and to those who wish to be well informed on this aspect of biology. The word biology is used because, although the subject matter is largely biochemical, it is treated in a biological manner.

One further matter should be mentioned. This book was written while both authors were on the staff of the Institute of Animal Physiology at Babraham, although the address given to the Preface suggests that this was not so.

A. T. PHILLIPSON

Steric Course of Microbiological Reactions. Edited by G. E. W. WOLSTENHOLME and C. M. O'CONNOR. J. and A. Churchill, Ltd., 1959. Ciba Foundation Study Group No. 2. pp. 115, 12s. 6d.

ONCE the cover of this exciting book is opened there are few faults to be found. The poor printing on the cover is matched by the inaccuracy of its title. Why should a book on microbiological reactions contain a table which compares enzymes from the flounder, sole, lamb, dogfish, grass frog and herring? Although some articles are largely microbiological, the substitution of the word "Biochemical" for "Microbiological" in the title would give a truer picture of the scope of this excellent book.

After NEUBERGER's orientating opening remarks, WESTHEIMER gives an excellent summary of stereospecific reactions. These two articles summarize main themes of the following papers and discussion by treating the biochemical reactions specific for one of the two "a" groups attached to a carbon atom in compounds of the general type Ca_2bc . Citric acid ($\text{a} = -\text{CH}_2\text{COOH}$), the nicotinamide residue ($\text{a} = -\text{H}$) and ethanol ($\text{a} = -\text{H}$) are the compounds most thoroughly considered.

WALLENFELS discusses hydrogen transfer by the nicotinamide residue in detail. He uses chemical reactions as models, and some biochemists may wish that the material had been more clearly arranged. Evidence is presented that in those reactions most like enzymic ones, the transfer is of a hydrogen nucleus with an electron pair (i.e. a hydride ion) rather than of a radical or of free electrons. Wallenfels also mentions possible binding mechanisms of the coenzymes with certain dehydrogenases.

KAPLAN follows with a masterly article. After skimming past α -DPN and the neat evidence that it contains the α -ribosidic bond, he reviews L- and D-lactic dehydrogenases from bacteria and animals, and their reactions with coenzyme analogues. Interestingly the two enzymes from *Lactobacillus arabinosus* transfer hydrogen to the same side of the pyridine ring of the coenzymes although to different sides of the pyruvic acid. Finally KAPLAN checks the relationships between fishes, on the basis of the relative behaviour of their heart lactic dehydrogenases with coenzyme analogues.

TALALAY and LEVY lead their readers adroitly through the maze of properties of the steroid dehydrogenases to their determinations of the equilibrium constants of several of the reactions. The surprise is that, whereas in the 5α (rings AB flat) and 5β (rings AB bent) androstane series oxidation of 3α - and 3β -hydroxyls requires, as expected, less energy (by about 1 kcal/mole) when the hydroxyl is axial rather than equatorial, no such difference is found when the molecules bear a $-\text{CO}\cdot\text{CH}_2\text{OH}$ side chain at position 17 at the far end of the molecule. Can this group affect the conformation of ring A three rings away?

PRELOG, in whose honour the meeting was arranged, chooses the reduction of decalones as simpler substrates than steroids. Again we are guided through a variety of microbiological reactions to a simple hypothesis at the end. This states that steric course of the reduction is determined by the larger side of the ketone being compelled to approach from the side away from the $-\text{CO}\cdot\text{NH}_2$ group of the coenzyme when the oxygen of the ketone points towards the ring nitrogen of the coenzyme. Discussion follows whether this might be a purely steric effect or an orientation of both substrate and coenzyme between polar and nonpolar regions of the enzyme.

The whole booklet gives a fascinating glimpse into an exciting part of biochemistry. The Editors are to be congratulated on the most helpful cross references between the different articles. Could they be asked to read Fowler on hyphens before allowing "nucleic acid-containing particles"? The book is to be praised for the speed of its appearance (the meeting was in March 1959) and for its reasonable price.

H. B. F. DIXON

Medizinische Grundlagenforschung: Edited by K. F. BAUER. Vol. II, pp. 827, 168 DM.

DAS Buch ist der 2. Band einer Schriftenreihe, die den Mediziner in Forschung, Klinik und Praxis über den wissenschaftlichen Fortschritt auf den verschiedensten aktuellen Gebieten in kurzer und verständlicher Form unterrichten soll. Die einzelnen Beiträge sind in sich geschlossen und von hervorragenden Sachkennern geschrieben. Sie nehmen eine Mittelstellung ein zwischen Übersicht und Originalarbeit.

Der vorliegende 2. Band enthält 17 voneinander unabhängige Beiträge. Im ersten Kapitel behandelt O. SCHAUMANN den Schmerz als physiologisches und pathologisches Phaenomen. Der folgende Beitrag von R. GRANIT ist der Steuerung der Körperhaltung durch tonische Hemmungen von der *Formatio reticularis* gewidmet mit besonderer Berücksichtigung der Gamma-Neuronen. Die "Physiologie der markhaltigen Nervenfasern" ist von H. C. LÜTTGAU, Bern, mit 30 hervorragenden Abbildungen meisterhaft dargestellt. Dieser Beitrag, der die erfreulich eng gewordenen Beziehungen zwischen Physiologie und Pharmakologie zur Grundlage hat, verdient Bewunderung. Schon recht speziell ist das Kapitel von E. C. CROSBY, T. HUMPHREY und M. J. SHOWERS über die supplementären motorischen Rindenregionen. Anschliessend gibt E. HAGEN, Bonn, eine mit vielen guten Abbildungen versehene Übersicht "über morphologische Veränderungen vegetativer Nervenzentren bei pathologischen Vorgängen". Nach einer kurzen allgemeinen Darstellung der Zellenlehre und der Zellulär-Pathologie unter neuen Aspekten von K. F. Bauer und E. MÜLLER berichtet T. ASTRUP über die Fibrinolyse und Thrombolyse. E. RUTISHAUSER, R. LAGIER und E. GRASSET liefern neue Beiträge aus der Arthrose- und Arthritis-Forschung. Die Pathologie der Endocarditiden ist von G. BOMPIANI und A. ASCENZI behandelt. Grosses Interesse wird der Beitrag von V. BECKER über Wirkungen des äusseren und inneren Sauerstoffmangels finden. Dasselbe gilt für die Biochemie der Entzündung,