

Enterobacter aerogenes); R. E. Strange and J. R. Hunter consider diverse effects of magnesium on the survival of similar organisms in aqueous suspensions; J. Sykes deals with the ribosomes and RNA of *Ps. putida* grown in magnesium and carbon-limiting conditions and different ratios of sodium to magnesium, and D. W. Tempest and J. W. Dicks discuss the inter-relationships of potassium, magnesium, phosphorus and RNA (each being a function of growth rate but stoichiometrically related) in *Enterobacter aerogenes*.

The fifth section of this book looks at products, and W. D. Maxon and J. W. Chen examine the kinetics of formation (neomycin); S. J. Pirt considers the conditions for producing some of six types of "exocellular products" and J. F. Wilkinson and A. L. S. Munro discuss growth limiting conditions in the synthesis of glycogen and poly- β -hydroxybutyrate in *B. megaterium*.

The sixth section takes up the ideas of multi-state processes with the changes in filamentous organisms (*A. niger*) in relation to dilution rate (Z. Fencl *et al.*) and the properties of cells grown with excess substrate of different dilutions in "multi-stream culture" (J. Řiřica *et al.*). This section concludes with an editorial analogy between batch and continuous culture.

The seventh section is concerned with mixed substrates, and B. T. Hamlin *et al.* examine the effect of citrate on 8-9 glucose enzymes of *Ps. aeruginosa* and R. I. Matcheles *et al.* study mixed substrate (glucose, fructose, lactose) continuous cultures (of *E. coli*, *Ps. fluorescens* or *S. cerevisiae*).

The last section reports studies by D. W. Tempest *et al.* on the growth of *E. aerogenes* in a chemostat at low dilution rates (minimum rate concept). There is also in this section a closing "summary" by S. R. Elsdon (emphasizing, for example, apparatus, "balanced growth" and long generation times) and editorial comment on balanced and restricted growth.

If further microbial studies are to lead to solutions to some of man's problems, then this volume has something of interest for many applied investigators. The volume is well printed, bound and presented under an HMSO imprimatur. At 60s. for 260 pages it represents very reasonable value at less than 3d. per page of very specialist matter in comparison with, for example, a companion volume, edited by Malek and Fencl⁶.

M. WOODBINE

¹ Monod, J., *La Croissance des Cultures Bacteriennes* (Herman et Cie, Paris, 1942).

² Monod, J., *Rev. Microbiol.*, 3, 371 (1949).

³ Monod, J., *Ann. Inst. Pasteur*, 79, 390 (1950).

⁴ *Continuous Cultivation of Micro-organisms* (Czechoslovak Academy of Sciences Publishing House, Prague, 1958).

⁵ *Continuous Culture of Micro-organisms* (Monograph 12, Society of Chemical Industry, London, 1961).

⁶ Malek, I., and Fencl, Z., *Theoretical and Methodological Basis of Continuous Culture of Micro-organisms* (Czechoslovak Academy of Sciences Publishing House, Prague, 1966).

MAMMALS OF THE PAST

Pleistocene Mammals of Europe

By Björn Kurtén. (The World Naturalist.) Pp. viii + 317. (London: Weidenfeld and Nicolson, 1968.) 84s. net.

THIS is a much needed book. It surveys some three hundred species of land mammals from the Pleistocene of Europe, discussing the status of each species, its evolutionary history, its distribution and probable habits. Pleistocene mammals provide a considerable body of data for the evolutionist, not only because many of them are the immediate ancestors of the living species, but also because the stratigraphy, palaeoclimatology and dating of the Pleistocene are known in more detail than those of

earlier geological periods. Ecological information about living species must, however, be applied with caution to the interpretation of fossil forms; for instance, the leopard was common in Europe even in the coldest phases of the Würm glaciation. For each of the species treated, the known extra-European fossil distribution is given, with possible phyletic relations to other species. Faunal interchanges with North America, presumably through Bering's Strait, are of much interest. The European bison is believed to be a late immigrant, having divided from the American bison only within the past 10,000 years, and not derived from the Middle Pleistocene species of Europe. The American sabre-tooth *Smilodon*, which reached South America, is derived from the Lower Pleistocene Old World genus *Megantereon*. The larger mammals are, of course, much the best known palaeontologically, and Dr. Kurtén's treatment of the bears, hyenas and cats is particularly to be recommended, reflecting his extensive work on the Pleistocene Carnivora. The rodents are treated more briefly, despite their preponderance in species; this reflects the relative backwardness of micro-mammalian palaeontology, a field which promises to become of increasing importance to stratigraphy and palaeoecology in future years.

There is a useful introductory section on the chronology of the European Pleistocene, and in the final chapters some of the general problems of Pleistocene palaeontology are briefly but pertinently discussed. Attention is drawn to problems of taxonomy at the specific level, and to rates of evolution as measured by faunal turnover. It is interesting to note that seven out of fifteen species adapted to arctic or boreal conditions had already made their appearance by the late phase of the Günz glaciation, and that the half-life of species is shorter in the later part of the Pleistocene than in the earlier part. In a final chapter it is suggested that man has been a dominant factor in the extermination of European mammals since the late Pleistocene: thirty-eight species are listed as having disappeared from Europe, though fourteen of these are still living outside the European continent.

The book is written in a readable, non-technical style, much to be applauded in a field where technical erudition only too often acts as a deterrent. A well chosen bibliography (319 titles) is provided for the student who wishes to follow the subject more deeply. The text is liberally illustrated with drawings of specimens and reconstructions, and also with representations by palaeolithic man. It is hoped that this book will stimulate further interest in mammalian palaeontology, somewhat neglected in this country at present.

P. M. BUTLER

PLATINUM AND CATALYSTS

Catalytic Hydrogenation over Platinum Metals

By Paul N. Rylander. Pp. xii + 550. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1967.) \$22.50; 180s.

THIS is an experimental chemist's book. It is not concerned with the physical chemistry underlying the hydrogenations which are described, but aims to provide the empirical information necessary to carry out the hydrogenation of a particular compound most efficiently. Dr Rylander takes the view that the easiest way to solve a problem in catalysis is through experiment, coupled with an extensive acquaintance with the development of the subject.

Within these limits, the book is extremely well written and organized. It is immensely detailed and full information on the suitability of each of the metals is given for a particular reaction, together with the scope of present knowledge of the effect of conditions (pressure, tempera-