

the oesophagus downwards. There is a section on mucosal architecture and cell renewal in the small intestine illustrated by optical and scanning electron microscopy, the latter providing a dramatic three dimensional surface view of the pattern of crypts and villi. Other regions of the tract are unfortunately not shown in this way. Salivary gland cells are considered, together with those of the liver, gall bladder (but not the bile duct), pancreas and Brunner's glands, and there is a final short chapter on non-epithelial components.

There are some 200 illustrations depicting both human and laboratory animal material. The prints are of a kind that most photographers would regard as "contrasty", but this is not meant as an adverse criticism, for they are of a generally high quality (the worst is the very first!). The legends are fully explanatory and their layout on the text page is pleasing. The text itself makes easy reading and the description of each cell type leads up to the all-important point—the correlation between structure and function, with suitable comment on those areas where current knowledge is sparse. There is a good summary of the endocrine cell problem as it existed at the time of going to press, but almost every month now brings new information on the cells that produce gastrin, secretin and other intestinal hormones, and no book can capture the latest word on this subject at present. There are useful reference lists, including an up-to-date addendum. An occasional typographical error has escaped the proof readers.

This volume is a significant contribution to the literature of gastroenterology and it is hoped that one of its effects will be to stimulate collaboration between clinician and basic scientist. Such rapport can bring nothing but good—provided that each recognizes the problems and limitations of the other in their respective fields of investigation. A book of this kind makes electron microscopy look all so easy, and many clinicians especially do not appreciate the amount of time and effort that has to be expended to obtain one good photomicrograph, let alone two hundred.

R. M. H. McMINN

Primary Battery

The Primary Battery. Vol. 1. By George W. Heise and N. Corey Cahoon. (The Electrochemical Society Series.) Pp. xvi+500. (Wiley: New York and London, April 1971.) £12.

It is more than twenty years since G. W. Vinal's well known book on primary batteries was published. In this time a commercial demand has been established for $MnO_2/KOH/Zn$ and $HgO/KOH/Zn$ batteries, and $AgO, Ag_2O/KOH/Zn$ batteries have

proved important for special high power density applications. Fuel cells have caught the public imagination for their role in space exploration and their potentiality in electric cars. These batteries, the Leclanché battery and other novel systems have benefited from considerable funds supplied by governments and private industry over two decades of intense activity and electrochemical awareness. A new book is clearly overdue. Indeed, almost a generation of battery technologists has matured and deplored the absence of a modern reference work to ease the task of assimilating existing knowledge.

Although the book under review is only the first of two volumes, the authority and care taken in compilation make clear that the work will be one of importance. The criticisms that follow are not intended to detract from this overall conclusion.

The historical introduction is by George W. Heise and the periods up to 1880 in particular are well done with events shown as a logical train rather than as a series of random happenings. It is regrettable that the period 1880–1920 which contains the origins of the important Leclanché dry cell is only dealt with sparsely. Heise himself must be uniquely placed to review this important era.

The chapter on fundamental aspects by Ernest B. Yeager and Eugene P. Schwartz with appendices comprises 22 per cent of the book. It is carefully worded, helpfully slanted in directions of battery interest and written to be understood. Apart from useful experimental advice on techniques, circuits and equipment, much of the content is available elsewhere in standard electrochemical texts. The electrode-solution interface is treated in depth and, while this is the heart of the battery process, fundamental instruction is also required on electrolytes, the solid state, separators, mixing, mixtures, particle technology and porosity, which are not considered. There seems little reason to include twelve pages of standard potentials derived from well known reference works, particularly since many are not relevant to primary batteries and those which are are given in another form in a further appendix. In the further appendix the data for the Leclanché cell are of doubtful value since Mn_2O_3 is represented rather than $MnOOH$.

The next six chapters, "Primary Cells with Caustic Alkali Electrolyte", "The Alkaline Copper Oxide:Zinc Cell", "Zinc:Oxygen Cells with Alkaline Electrolyte" all by Erwin A. Schumacher, "The Mercuric Oxide:Zinc Cell" by Samuel Ruben, "The Silver Oxide:Zinc System" by Thedford P. Dirkse and "The Alkaline Manganese Dioxide:Zinc System" by N. Corey

Cahoon and Harry W. Holland, are the *raison d'être* for this volume. These batteries are all made industrially for profit and fulfil a useful function in society. The treatments are adequate but except for the chapter on zinc: oxygen cells one is a little disappointed in their brevity. Ruben, for example, modestly dismisses his important invention in around 3,000 words. Something has gone seriously awry with tables 3.1 (page 171) and 3.2 (page 176). Clarification is needed to avoid any impression that Mn_3O_4 is involved in the initial open circuit voltage of $MnO_2/KOH/Zn$ cells (page 239) or that the cited degrees of on-load voltage stability for $HgO/KOH/Zn$ cells are achieved if MnO_2 is incorporated into the cathodes (pages 213, 214).

The final four chapters attain a very high standard. In "Fuel and Continuous Feed Cells" Ralph Roberts has summarized an immense amount of development effort in a concise and balanced account. Advances are shown without losing sight of the real objectives and the very considerable problems that still remain. "Low Temperature Non-aqueous Cells" by John M. Freund and William C. Spindler is instructive and readable. "Semidry and Solid-Electrolyte Batteries" by John N. Mrgudich and Demetrios V. Louzos is a stimulating chapter which gathers together for the first time much information in a logical and digestible form. Finally, Walter J. Hamer has built on the solid foundations laid in Vinal's book to produce a discussion of "Standard Cells" and related aspects that is excellent in all respects.

F. L. TYE

Biochemistry of Babies

The Biochemistry of Development. Edited by Phillip Benson. Pp. v+273. (William Heinemann Medical Books: London; J. B. Lippincott: Philadelphia, 1971.) £3.25.

THERE is a type of publication, with which all biologists are familiar, in which a handful of indifferent papers are mixed with a little elementary biochemistry, inadequately edited, given a grandiloquent title and a fancy cover, graced with a blurb or preface which explains that they are essential reading for all practising frothblowers, published at an exorbitant price and sold at a handsome profit to institutional libraries. In spite of some striking superficial resemblances Dr Benson's book does not belong to this depressing category. Behind its general and rather misleading title it is a collection of essays on the narrow but important and exciting theme of the biochemistry of the foetus and the newborn mammal. Although the chapters are numbered as though they formed part of a continuous exposition they are quite independent of