

tion and analysis. We can learn from here something of the secret of 'what makes a factory tick'. We can learn from a body of men who have all taken an active part in developing industries of this kind. This is an excellent volume for which we should be grateful to Mr. Cremer and Mr. Watkins.

J. M. COULSON

SCIENCE AND MEAT

The Science of Meat and Meat Products

By Members of the Research Staff of the American Meat Institute Foundation. (Series of Books in Agricultural Science.) Pp. x+438. (San Francisco and London: W. H. Freeman and Company, 1960.) 68s.

THE growth of education in the subject which has come to be known as food science has been handicapped by a lack of suitable texts. For this reason the publication of "The Science of Meat and Meat Products" is an event of some importance. Yet the book is more than a text. As its preface claims, it is no less than an attempt "to present the current scientific knowledge on meat and meat products, and to show how various scientific disciplines are applied in meat research."

In common with other foodstuffs, meat has attracted the attention of chemists, biochemists, nutritionists, microbiologists and others for more than half a century. The quickening tempo of research in recent years has both stimulated and been stimulated by the increasing industrial demand for fundamental information. The problem starts with the geneticist in breeding from the gene pools at his disposal the types of animal best suited for the varied purposes of use. It ends perhaps at the level of human nutrition; but between the beginning and the end diverse scientific disciplines have many parts to play.

With this field to survey within the compass of a modest 438 pages, the American Meat Institute Foundation has undertaken a substantial task. It is inevitable that an individual reader will find some topics treated less fully than he would have liked. Moreover, the various chapters were written by a panel of twenty-six authors, and some unevenness of treatment would seem inescapable. That the reader is not unduly conscious of multiple authorship in the circumstances is a tribute to the editorial board. Formal references have been wisely avoided, but at the end of each chapter a carefully selected list of source material is given to ease the path of those who would study further. The compression of factual information does not always make for easy reading, but the style throughout is lucid, and comprehension is aided by excellent illustrations.

The necessity for keeping the book in proportion has cramped the writers of certain sections, and it is to be regretted that space has been devoted to topics such as Michaelis-Menten kinetics and the methods of protein chemistry which will be familiar to most of its readers. The space saved by omitting such material might have been devoted to the anatomy of meat animals and to a fuller treatment of the relations between carcass conformation and meat quality. The average butcher is a better anatomist than some scientists engaged in the study of meat.

The indexing of such a book presents peculiar problems, and the index, although good, is not comprehensive and fails to list some of the important

items considered in the text. Few misprints were noticed, apart from a very obvious one in the table of contents, but a curious mistake in connexion with federal regulations governing the use of ascorbic acid was noted on p. 359.

Notwithstanding these criticisms, this book is an important work which may become a standard text. It is an essential purchase for food science libraries, and a laboratory copy in British meat-packing plants might well contribute to improvements in practice in our own industry.

J. HAWTHORN

BIOGRAPHY OF AUSTRALOPITHECUS

Adventures with the Missing Link

By Prof. Raymond A. Dart, with Dennis Craig. Pp. xv+251+20 plates. (London: Hamish Hamilton, Ltd., 1959.) 25s. net.

PROF. Dart has brought together many of his controversial theories in this book, which is partly autobiographical, but mainly a biography of *Australopithecus*. The story begins with the discovery of the Taungs infant in 1924 and ends with a footnote on *Zinjanthropus* added while the book was in the press.

Nearly half the pages concern the 'osteodontokeratic culture', which has been Dart's main interest for 14 years. Only by proving that the Australopithecines were tool-makers could he resolve the interminable arguments as to their hominid or pongid status. Sceptics discredited the 'culture' as the work of bone-collecting hyenas, a myth which Dart took great trouble to disprove. His detailed analysis of bone fragments from Makapansgat revealed that the great majority were antelope mandibles and the distal ends of humeri. By comparing these finds with a similar bone 'industry' from a Middle Stone Age site at Kalkbank, he became convinced that the Makapansgat specimens were artefacts.

Whether one agrees with Dart's conclusions or not, he cannot be accused of drawing on too little evidence. The task of sorting thousands of tons of breccia, chiselling out the bone fragments and identifying them must have been formidable. Nor did he neglect practical experiments, such as reproducing the famous cannon bone 'apple-corers' which necessitated striking over a hundred blows with a bone fabricator. But to suggest that the Australopithecines went to such lengths to make scoops to convey pulped food to the mouths of toothless infants is surely to overestimate their technological skill—and our own credulity.

Dart's genius and persistence might be interpreted by some as impetuosity and obduracy. He makes no attempt to conceal his faults, of which the most serious is touchiness. He refused to study the Mapungubwe skeletons because "any report I might make on the remains would be regarded as prejudiced" (p. 68); and would not interpret the endocranial casts from Sterkfontein because of Hooton's remark that "a dispassionate interpretation of new fossil evidence is usually obtainable only . . . by persons not emotionally identified with the specimen" (p. 86).

Some of the causes which Dart took up with such enthusiasm found few supporters: the Eastern origin of Rhodesian mining and stone building; Mongoloid contacts with the Bushmen; the fire-making abilities