should grip the attention of anyone interested in biological phenomena. *A Model of the Brain* will itself serve as a model of how work on brain functioning should be undertaken and presented for some time to come.

N. S. SUTHERLAND

AGRICULTURAL RESEARCH

The Principles and Practice of Agricultural Research

By Dr. S. C. Salmon and Dr. A. A. Hanson. Pp. ix + 384. (London: Leonard Hill (Books), Ltd., 1964.) 75s. net.

ANY book concerned with the principles and practice of agricultural research is particularly welcome at this time when there is such a need for increased food production in many of the developing countries, and that by Salmon and Hanson is a very good introduction to the subject. Although it does not discuss any particular aspects in sufficient depth to make it a manual for the research worker, it is well-worth reading, not only by agriculturists but also by everyone who is concerned about the world's food supply and methods of increasing it.

The first part gives a brief sketch of the history of agricultural improvements, tracing the development of some of the more important aspects such as plant breeding improvements, and directing attention to the methods used by some of the scientists whose work later became important in agriculture, men such as Liebig, Darwin and Pasteur. This discourse leads to the conclusion that many of the improvements in agriculture have been made without the aid of formal research but that such advances have been painfully slow, indicating that a better understanding of research methods might enable us to proceed more quickly in the future. To this end, the second part is devoted to the "Philosophy of Research", a very useful section which is pertinent to all research workers, not just those applying their talents to agriculture. The various basic methods of research are discussed briefly and a chapter is devoted to the possible reasons why erroneous conclusions are sometimes drawn. Agriculture, which is so affected by uncontrollable variation, is particularly suitable for directing attention to such difficulties in research and for considering the meaning of 'proof' which the authors discuss in the last chapter of this section.

Part 3 is devoted to statistical methods, a subject which is already very well covered by standard text-books. This section does not attempt any new explanation but simply shows, mainly by example, how various statistical computations are made, without attempting to show much basic theory. The reader is simply asked to accept that each method is correct; for example, the reason for using standard deviations instead of average deviation "is that many statistical deductions and practically all statistical tables... are based on standard deviations". This approach is no doubt admirable for those who wish to use statistics as a research tool without involving themselves in mathematical formalities, provided they wish to use only those methods detailed in the book; but, if they try to extrapolate the ideas to slightly different designs or situations, lack of fundamental understanding is liable to lead to inefficient experimentation or even erroneous results. However, the impression given of the absolute simplicity of the methods may well encourage those who have been avoiding statistical techniques to examine statistical text-books and so adopt better designs and analyses. The aspects covered include standard deviation and variance, significance tests using t , χ^2 , F and Duncan's multiple-range test, analysis of variance for randomized block designs and other factorial arrangements, Bartlett's test of homogeneity of variance, the use of simple transformations, correlation, regression and co-variance. There is a chapter on sampling which sets out in quite simple terms

the effects of randomization and is a good reminder of the sound views of Fisher which are so often forgotten in these days of more sophisticated statistical techniques. The section ends with a discussion of the uses and limitations of statistical methods which very wisely produces the conclusion that they are no substitute for critical observation and thought, but should be used, where appropriate, for the purposes for which they are designed.

This appreciation of statistics is followed by an examination of the techniques of agricultural research, which first deals with problems found in all kinds of field research, such as differential responses from place to place and year to year, and then goes on to deal with choice of experimental material, size, shape, replication and management of plots in field trials. Another chapter in this section is devoted to experiments with farm animals in which most experimental aspects are mentioned, though none receives very exhaustive consideration, which is to be expected in a book which attempts to cover such a wide subject in so small a space. There is also a chapter on experimental design which demonstrates the possibilities of Latin squares, cross-over trials, split-plot and incomplete plot designs, without attempting to show how these are analysed, and the book ends with some thoughts on the methods of research in agricultural economics including a reference to linear programming.

W. J. RIDGMAN

MONOSACCHARIDES

The Monosaccharides

By Jaroslav Staněk, Miloslav Černý, Jan Kocourek and Josef Pačák. Pp. 1006. (New York and London: Academic Press; Prague: Publishing House of the Czechoslovak Academy of Science, 1963.) 228s. 6d.

THE *Monosaccharides*, by Jaroslav Staněk, Miloslav Černý, Jan Kocourek and Josef Pačák, is an advanced text and reference work. It was originally published in Czech, but the present volume is an entirely new edition, considerably supplemented and partly rearranged in comparison with the first Czech edition: the literature survey and addenda inserted in the form of notes directly into the text cover the period to mid-1962.

The scope of the volume is so vast that it will best be apparent from its chapters, that deal with: (1) introduction; (2) structure of the monosaccharides; (3) isolation of the monosaccharides from natural material, their properties and industrial utilization; (4) preparation of the monosaccharides by synthetic methods; (5) esters of cyclic monosaccharide forms and organic acids; (6) the glycosyl halides and their derivatives; (7) glycosyl derivatives of aromatic hydrocarbons; (8) esters of monosaccharides and inorganic acids; (9) glycosides and thio-glycosides; (10) monosaccharide orthoesters; (11) monosaccharide ethers; (12) condensation products of monosaccharides and carbonyl compounds; (13) sugar anhydrides (glycosans) and anhydro sugars; (14) unsaturated derivatives of monosaccharides; (15) deoxy sugars; (16) glycosylamines; (17) nucleosides; (18) amino sugars; (19) monosaccharide oximes; (20) reaction products of monosaccharides and aromatic hydrazine derivatives; (21) glycosyl azides; (22) oxo derivatives of monosaccharides; (23) the reaction products of monosaccharides and hydrazine, urea, thiourea, guanidine, semicarbazide, thiosemicarbazide and similar compounds; (24) acyclic derivatives of monosaccharides; (25) other derivatives of monosaccharides containing sulphur; (26) alditols; (27) aldonic acids; (28) branched-chain aldonic acids; (29) the saccharinic acids; (30) oxo derivatives of aldonic acids; (31) ascorbic acids; (32) monosaccharide dicarboxylic acids; (33) amino-acids from the monosaccharide series; (34) polyhydroxyalkylbenzimidazoles; (35) inositols and related compounds; (36) synthesis and transformations of sugars in living systems; (37) sugar analysis.