The agreement is important because there are such good reasons for it : genetic reasons, evolutionary reasons. To understand the reasons it is necessary to consider the three aspects of " sex " in conjunction with the mechanism of vegetative or mitotic heredity and to see them together as processes in the evolution of genetic systems.

The present book lacks any such guiding principles and in doing so it loses clarity and sometimes loses meaning. " A number of complicating phenomena tend to mitigate the simplicity of the picture " writes one editor. We may mitigate our complaint by admitting that the editors have attempted what no-one else has dared to do. But we must assert that they should have tried to find a common denominator of agreement before they set to work. In doing so (who knows ?) they might have discovered the meaning of their title.   C. D. Darlington.

BIOMATHEMATICS. THE PRINCIPLES OF MATHEMATICS FOR STUDENTS OF BIO-
   LOGICAL SCIENCE. By C. A. B. Smith. London : Griffin. 1954. Pp. xv+712.
   80s.

Feldman's *Biomathematics* first appeared in 1923 as a book for students of biology who wanted to acquire in a short time enough mathematical knowledge to follow mathematical researches in their subject. In twenty chapters averaging sixteen pages each, the author dipped into arithmetic, algebra, geometry, and the calculus. In the twenty-first and final chapter headed " Biometrics " and comprising fifty-five pages, Feldman attempted to dispose of the statistical treatment of experimental results. If this was a subject for which he had no great liking, it was one that he could not ignore. When a second edition appeared in 1935 the chapter on biometry had perforce grown to eighty pages, a sixth of the whole book. It was still the weakest part of the text.

Now Dr Smith has courageously attempted to rebuild on this old framework. The text has been completely revised and rewritten so that it is almost a new book, but it still bears the stamp of Feldman's mind.

The book begins with elementary arithmetic, algebra and geometry and then deals in some detail with logarithms and graphs. There follows a large section devoted to the differential and integral calculus and then chapters on series, vectors, matrices and the solution of equations. This is the best part of the book. Many examples, some of them worked, are provided from a number of biological fields. These should be particularly useful to teachers who, unfortunately, have tended to neglect mathematical applications in biology.

The last four chapters of the book deal with probability, statistical theory and arithmetical notation. These are rather patchy. The first of these chapters, " Chance and Probability " begins with a good introduction to probability theory and contains many useful genetical illustrations. Later in this same chapter there are sections on the binomial distribution and the normal approximation, the derivation of Stirling's approximation for factorials and the gamma and beta functions. But it is not only that whole sections seem to have been misplaced ; some have surely been lost. In chapter 20, headed " Distributions ", the Poisson series is dismissed in two lines. This seems to be the only mention of the Poisson distribution in the 712 pages of *Biomathematics*. In chapter 21, " Simple

Statistical Procedures ", the reader is introduced very briefly to some tests of significance and estimation theory. The exact test for proportionality of 2×2 tables is not presented but the reader will find a heterogeneity test which the author has recently proposed and of which he can write (p. 628) " it has not yet been carefully studied ". No mention is made of maximum likelihood scoring in estimation and heterogeneity testing, a method that has been found extremely useful in genetics. Instead Dr Smith asserts that maximum likelihood is sometimes awkward to apply and proceeds to give a general discussion of theories of estimation. This will be of limited interest and probably of no use to biologists. In this same chapter the author manages to discuss regression and the fitting of curves by the method of least squares without any mention of least squares.

The book ends with chapter 22, " Colson Notation. Arithmetic Made Easy ", an account of an arithmetical notation that is 228 years old and which, Dr Smith thinks, has been " strangely neglected ". Those who are historically minded will enjoy this presentation of a fascinating notation long overlooked by mathematicians and now embellished with inverted numbers.

Those who are not historians should perhaps be told that the calculus was not discovered by the Chinese as is stated on page 198.

It is clear from his style of writing that the author possesses great enthusiasm for his subject. It is therefore all the more to be regretted that he has not given us a completely new book.

Because of the content of the first eighteen chapters, the present book should be specially useful to teachers and also to biologists wanting to build up their mathematical knowledge. But its price will place it beyond the reach of many for whom it is intended. J. H. BENNETT.

RECENT DEVELOPMENTS IN CELL PHYSIOLOGY. Proceedings of the Seventh Symposium of the Colston Research Society. Edited by J. A. Kitching. London : Butterworths Scientific Publications. 1954. Pp. 206. £2.

There are fifteen not very well connected papers in this symposium (or polyposium) by Danish and British workers. Four are of genetical interest. Brachet discusses the lack of relation of the cell nucleus to oxidation and the mitochondria, and its effectiveness for enzyme activity, especially of the microsomes, and for nucleotide and protein production. Waddington explores the function of different types of plasmagenes in development. Westergaard and Hirsch describe an experiment in the genetics of melanin metabolism in Neurospora which has very wide bearings. Swann shows how the delay in one mitosis fails to delay the next mitosis in a sea-urchin egg : he discusses the nature of the reservoir of mitosis-producing materials which this implies.

ARTIFICIAL BREEDING AND LIVESTOCK IMPROVEMENT. By G. W. Stamm. Chicago : Popular Mechanics Press. 1954. Pp. 282. $3.50.

An " easy-to-understand book " on stockbreeding with emphasis on artificial insemination and an account of American cattle, pig and sheep breeds. Over 100 illustrations, including one of a zebra-donkey and one of a unicorn (p. 117).