

the greatest possible amount. Table 1 (84 pages) gives $W(a, x)$ and $W(a, -x)$ on facing pages for $a = -10(1)10, x = 0(0.1)10$, to about 8 figures. Reduced derivatives for x -wise interpolation by Taylor series are fully tabulated. Various auxiliary functions occupy Tables 2-6 (56 pages), including $\ln W(a, \pm x)$ in exponential regions, and the modulus and phase of $W(a, \pm x)$ in oscillatory regions.

This review is slightly improper, in that I was intimately concerned with some of the basic calculations; but (such is the gestation period of a volume of good mathematical tables) eleven years have passed without my having further contact with the work. I therefore feel impartial in welcoming this production of Scientific Computing Service, Ltd., sponsored by the National Physical Laboratory through its Mathematics Division, the constructive influence of which on this and other table-making projects has been considerable. The volume has been very well printed by H.M. Stationery Office.

C. W. JONES

FOSSIL BRACHIOPODS

Chazyan and Related Brachiopods

By G. A. Cooper. Part 1, Text: Pp. xvi+1-1024. Part 2, Plates: Pp. 1025-1245+269 plates. (Washington, D.C.: Smithsonian Institution, 1956.)

THE publication of a monograph describing a supposedly well-known brachiopod fossil fauna in which sixty-nine new genera and more than six hundred new species are proposed is an occasion for some reflexion on the function of the systematist in the realm of palaeontology and the wider world of geology. Theoretically, of course, a palaeontologist, like his counterpart in the biological sciences, may indulge in identification and classification without further motive. But in practice he is usually fully aware of the possible consequences of his activities, for it is inevitable that they will, sooner or later, influence decisions on stratigraphical correlation on one hand and inquiries into the processes of evolution on the other. These are purposes which demand the exercise of somewhat different methods in faunal investigations so that only rarely is an attempt deliberately made to provide detailed and pertinent information for both fields of knowledge, and, in his study of "Chazyan and Related Brachiopods", Dr. Cooper is no exception, for he has written what is primarily a stratigraphical guide to the Lower and Middle Ordovician rocks of North America based on comparisons of brachiopod faunas.

In this context, Dr. Cooper has succeeded to such a degree that his study is one of the ablest stratigraphical syntheses deriving from the taxonomic analysis of fossil assemblages yet conceived, a truly remarkable demonstration of the advantages as well as the limitations of correlation by faunal association. Doubtless many stratigraphers will feel alarmed at the prospect of so many new names flooding into Ordovician literature but, relative to the scope of this work, the size of collections and the spectacular success of a sustained etching programme for the recovery of chitinous and silicified shells, his new genera and species are not unreasonably prolific. It is true that exception will certainly be taken by other students of the phylum to some aspects of systematic procedure adopted by him. A few of the

genera like *Chaulistomella*, *Apatomorpha* and *Glyptambonites* are, in my opinion, too finely drawn, as are some of the new species, especially those founded on size differences, for no attempt has been made to analyse the supposed differences quantitatively. Nevertheless, these discrepancies are really minor, for the majority of his taxonomic units are surely destined to withstand the test of time, and reference to them is facilitated by well-organized systematic descriptions supplemented by brilliantly executed illustrations.

The most inadequate section is undoubtedly that on evolution. Admittedly, the author had no intention of giving more than a few brief interpretative notes on the morphological development and change exhibited by the faunas he has described, and what comments there are are very instructive. Yet it is not unreasonable to judge them insufficient in view of the abundance and magnificence of material so patiently collected and prepared by the author. Surely the discovery of so many bizarre forms and the possession of what must be reasonably complete samples throughout the ranges of a number of related stocks deserves a more detailed appraisal of evolutionary changes affecting the phylum during those times. It is hoped that some such study is forthcoming; in the meantime, Dr. Cooper is to be congratulated on the completion of the most significant contribution to Appalachian geology since 1859.

ALWYN WILLIAMS

PULSE CIRCUITS AND MULTIVIBRATORS

Elements of Pulse Circuits

By Dr. F. J. M. Farley. (Methuen's Monographs on Physical Subjects.) Pp. viii+143. (London: Methuen and Co., Ltd.; New York: John Wiley and Sons, Inc., 1956.) 8s. 6d. net.

Analysis of Bistable Multivibrator Operation

The Eccles-Jordan Flip-Flop Circuit. By P. A. Neeteson. (Series on Electronic Valves, Vol. 10.) Pp. vi+82. (Eindhoven: N.V. Philips' Gloeilampenfabrieken; London: Cleaver-Hume Press, Ltd., 1956.) 15s.

THIS addition to the Methuen series of monographs on physical subjects provides a concise introduction to the principles and use of pulse techniques, and is addressed primarily to physicists and research workers. The fundamental principles of pulse wave-forms and of the use of differentiation and integration techniques are described, together with their application to various valve circuit arrangements. Chapter 3 deals with square-wave generators of the multivibrator and other types; and the next chapter illustrates the various arrangements of trigger circuits, including the classical scale-of-two circuit first described by Eccles and Jordan. Later chapters deal with time bases and pulse amplifiers, concluding with one on applications of these circuits to such fields as radar, television, counters and particle detection. Many of the circuit diagrams in the last chapter contain sufficient description of the valves and components to enable the experimenter to set up the practical arrangements as may be desired.