more will undoubtedly follow. But how much? A comparison of this book with the new volume by Dieudonné, *Foundations of Modern Analysis*, shows that the former is itself still a compromise between the classical and the contemporary in analysis. Dieudonné, we may suppose, represents the pure gospel according to Bourbaki, when he insists on the modern emphasis on conceptual notions, as opposed to the computational aspect expounded, for example, in Whittaker and Watson. His is the remark above about the Riemann integral. If the older analyst should doubt whether the concept-conscious undergraduate would succeed with, say, some of the stiffer examples in Whittaker and Watson, it would certainly not be quibbling to suggest that there is no reason why he should: indeed, the epsilon-conscious undergraduate of the 1920's might have been no more successful with some of Wolstenholme's teasers on conics. Mathematics changes in mode as it grows in content, and the undergraduate must be taught in the style and idiom of living mathematics. Yet this may not be a complete answer, save as regards the training of pure mathematicians. It is true that certain concepts of modern abstract mathematics have found a place in branches of mathematical physics, but too much abstraction might hamper the student whose chief interest in mathematics lies in its physical applications. Are we then to impose an early separation between the pure and the applied mathematician? Before accepting this harsh doctrine, we may remember that Maxwell, Rayleigh, J. J. Thomson were all products of the old Tripos, and hope that some British mathematician will set himself the task of writing a text for our universities which will weave together the modern abstract concepts with the older computational technique, which will absorb Bourbaki without exorcising Whittaker and Watson, which will save us from the sterility of ideas without technique and from the superficiality of technique without ideas. T. A. A. BROADBENT

PICTORIAL GUIDE TO THE LANGUAGE OF SCIENCE

Mathematics in the Making

By Lancelot Hogben. Pp. 320. (London: Macdonald and Co. (Publishers), Ltd., 1960.) 50*s*. net.

"SCIENTISTS need to be taught mathematics", Sir Cyril Hinshelwood has said, "as a language they can actually speak"; one implication of this is that those non-scientists who wish or need to know what modern science is doing should have some knowledge of the mathematical language, though a phrase-book may serve them instead of a complete grammar and dictionary. Hogben has given us a vivid and stimulating phrase-book, built up in roughly chronological order, with a wealth of coloured plates, diagrams and pictures. The representations of three-dimensional surfaces, for example, are so admirable that some irrelevancies—Samurai, the mosque at Cordova—can be forgiven. The team-work which has gone into the making of the book deserves all the praise which Hogben bestows on it.

Neugebauer and Needham have thrown a completely new light on early mathematics in Egypt, Mesopotamia, China, India, and Hogben's account is clear and illuminating. He is rather less at home with the Greeks, since he under-estimates the importance of the Greek contribution to the concept of mathematical proof, and over-estimates the role of measurement in mathematics. Hogben says that we must learn to communicate in language which the electronic brain understands; the mathematician would say that the electronic brain has been constructed to obey the commands given to it in our language.

The influence of the Moslem civilization bridges the gap in the Western World from the Hellenic legacy to the seventeenth century. Here Descartes showed us how to describe geometrical properties in algebraic language, Fermat groped towards the Newton–Leibniz calculus, Pascal and Bernoulli initiated the doctrine of probability. On probability, the author is at his best; his enthusiasm is infectious, his excellent diagrams and pictures are genuinely constructive, and his somewhat old-fashioned obsession with visual aids is pardonable. By way of contrast, there is much clumsy symbolism and heavy-handed manipulation in dealing with algebraic geometry and calculus. More modern mathematics is dismissed briefly: hasty references to topology, non-Euclidean geometry, an ugly version of vector algebra lacking any motivation for the non-commutative product, Boolean algebra and recent views on logic and the nature of mathematics. The author is willing to deal sketchily with these topics because, to use a favourite phrase of his, they have as yet had little or no 'pay-off'. But it may be fair to suggest that there is a further reason; Hogben has no interest in or liking for mathematics as a creative art. This may well diminish the value of his book to the many amateur students of mathematics who, outside their surgeries, court-rooms, offices, enjoy the delights of mathematical investigation without worrying very much about the material 'pay-off'.

Success for the book is certain, and, on the whole, well deserved. There is a warmth and vitality which over-ride some minor irritations. Ideological epigrams about Roman gangsters, remittance men in Kenya and the third person of the Trinity can be ignored. T. A. A. BROADBENT

ELECTRON MICROSCOPY

Vierter Internationaler Kongress für Elektronenmikroskopie

Berlin, 10–17 September, 1958. Verhandlungen Band I: Physikalisch-Technischer Teil. Herausgegeben von G. Möllenstedt, H. Niehrs und E. Ruska. Pp. xix+851. 228 D.M. Verhandlungen Band II: Biologisch-Medizinischer Teil. Herausgegeben von W. Bargmann, D. Peters und C. Wolpers. Pp. xv+649. 196 D.M. (Berlin: Springer-Verlag, 1960.)

BETWEEN them, these two volumes contain more than 1,500 pages and nearly 1,700 illustrations, mostly electron micrographs very well reproduced. Of the 400 separate contributions, just one-half are in English, one-tenth in French and the remainder in German; the authors come from 26 different countries (as the foreword tells us), and the subjects dealt with run into almost every conceivable branch of science and technology. Volume 1, devoted