

*The Queen of the Sciences.* By Prof. E. T. Bell. (A Century of Progress Series.) Pp. iv+138. (Baltimore, Md.: The Williams and Wilkins Co.; London: Baillière, Tindall and Cox, 1931.) 5s. 6d. net.

THIS fascinating little volume opens with the famous words of Gauss, "Mathematics is queen of the sciences and arithmetic the queen of mathematics. . . ." Prof. Bell takes us from the objects and descriptions of mathematics through the development of systems of algebra, groups and matrices, the Einstein geometry, etc., to Hilbert's logic. Whilst, however, the manifold applications of mathematics are briefly touched upon, especially in the chapter on groups, the treatment rather follows the aim set forth by Jacobi, who, when reproached by the applied mathematician, Fourier, retorted, "The true end of mathematics is the greater glory of the human mind". Indeed, the progress of the century is aptly summarised by the author in the words, "Ever greater generality and ever sharper criticism".

One feels that many of the excellent illustrations are a little too brief to be really effective: just a slightly fuller explanation here and there would not only have safeguarded essential principles being misinterpreted, but would also have made a greater appeal to the lay reader. It is surprising to find no mention of Boole in the chapter on the development of algebra.

The whole book, nevertheless, is extremely interesting, for it tends to broaden the mathematical horizon of the reader, and especially so in the case of a student whose vision has been partially dimmed by the artificial boundaries of examination syllabuses. Here, too, the mature mathematician may derive renewed inspiration. A few references to original sources of some of the topics discussed would have enhanced considerably the value of these.

*The Exponential and Hyperbolic Functions and their Applications: a Practical Book for the General Student and Engineer.* By A. H. Bell. (Technical School Series.) Pp. x+82. (London: Sir Isaac Pitman and Sons, Ltd., 1932.) 3s. 6d. net.

THIS little book deals with the practical applications of exponential and hyperbolic functions as required in engineering, physics, etc. Only an elementary knowledge of trigonometry and calculus is assumed. The treatment, whilst not rigorous, is carefully thought out and written. There is, however, a grave danger in not warning the student sufficiently of the necessity of justifying certain operations. Even in subordinating rigour to practical utility, it is nevertheless essential to point out clearly what assumptions have been made and to state that the validity of such assumptions requires further investigation. Especially is this necessary in dealing with series. Yet, on pp. 46-50 it is assumed, without comment, that a circular function is expressible in a valid

series, and that the process of differentiation may afterwards be applied to the supposed identity.

The text is well illustrated by fully worked out practical examples, and a fair number of exercises are provided for the student. It is curious to see logh written for log<sub>e</sub>. There is an unfortunate misprint on p. 3 where *ex* appears in thick type for  $e^x$ .

*Advanced Algebra.* By Clement V. Durell. Vol. 1. Pp. viii+193+xxii. (London: G. Bell and Sons, Ltd., 1932.) 4s.

THIS book, originally intended to be Part 4 of the author's "New Algebra for Schools", deals comprehensively with the Higher Certificate requirements. The topics discussed include permutations, combinations, finite series, limits, convergence, logarithmic, exponential and quadratic functions, theory of equations and determinants. The treatment is not only thoroughly sound but also fascinating, the student's interest being stimulated from the beginning. In accord with modern experience, Mr. Durell has not hesitated to introduce calculus methods where necessary. The long, cumbersome and often fallacious methods of the older books have therefore been replaced by valid and elegant proofs. Especially is this manifest in the excellent chapter devoted to the logarithmic and exponential functions, which most teachers will appreciate.

The treatment of limits and convergence, which is often dull, is well adapted to the ordinary pupil, and reveals the author as a practical teacher who knows how to present to young students a difficult part of the subject.

A new book on advanced algebra is long overdue, and teachers will be grateful to Mr. Durell for so ably providing the needed volume.

*Recent Advances in Atomic Physics.* By Prof. Gaetano Castelfranchi. Approved translation by Dr. W. S. Stiles and Dr. J. W. T. Walsh. Vol. 1: *Atoms, Molecules and Electrons.* Pp. xii+360+12. Vol. 2: *Quantum Theory.* Pp. xii+400+12. (London: J. and A. Churchill, 1932.) 15s. each vol.

THE two volumes before us constitute the latest addition to a well-known series dealing with "Recent Advances in Science". Up to the present, we have been able to 'Buy British'; now, if we wish to study "Recent Advances in Atomistics", we have to turn to an English translation of an Italian work, of which three editions have appeared in two years. Well, this is very good free trade and sound internationalism; the book is good of its kind, and may be unequivocally welcomed. It is something of a feat to present in compact form a general introduction to the fundamentals of physical atomic theory, with a discussion on wave motion and kinetic theory, and then to proceed, chapter by chapter, to give succinct accounts of fluctuations, electrons and positive rays, isotopes, X-rays, crystals, radioactivity, nuclear properties,