knocked the stuffing out of intuition by the strange alchemy by which it welded space and time into the architecture of the universe – and its consequences like time dilatation and the twin paradox. But it was left to quantum mechanics to do the demolition job on naïve realism – which it proceeded to do methodically in a series of bizarre footnotes like the uncertainty principle, the superposition of states and the EPR paradox. ("Whoever is not shocked by Quantum Mechanics has not understood it", said Bohr).

"It has long been an axiom of mine", observed the immortal detective of Baker Street, "that little things are infinitely the most important". Roger Newton would surely agree. In a chapter devoted to the 'little things', he has created a portrait gallery of the particle zoo. The fermions, bosons, tachyons and baryons are all there, along with some more exotic species. As for the parlour games the little things can get up when they decide to party, Newton presents a discussion on magnetism, superfluidity and superconductivity from the molecular standpoint. The last short chapter looks at the profound role played by symmetry in unifying physical phenomena at their deepest level and the consequences of symmetry breaking. An excellent bibliography rounds off the account.

The book's Americanisms (an approximation is a 'ballpark estimate') and its preoccupation with political correctness (witness its curious solution to the issue of gender specific pronouns), should add a piquant cultural flavour for readers outside the States. Beyond these and the occasional and almost inevitable obscurities bred by the nature of the undertaking itself, lie the invincible merits of the book. And there should surely be enough of these to ensure its enthusiastic reception.

A K Vijaykumar, 3104, Sector 35-D, Chandigarh 160 022, India

Algebra in Ancient and Modern Times

K B Sinha

Algebra in Ancient and Modern Times
V S Varadarajan
Hindustan Book Agency
Trim series #14,
New Delhi, 1997, pp. 159

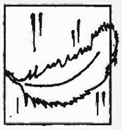
This is a wonderfully well-written book by an outstanding Indian mathematician and is delightful to read. The author has achieved a most difficult task – making the material accessible to the expected readership (final year in school/first year in University) and yet at the same time keep alive a sense of history.

The presentation is chronological, beginning with Pythagoras, Archimedes and Euclid and their geometry, interweaving his account with various facts about numbers and their properties, with a brief excursion into Diophantine problems (in particular the famous Fermat's last theorem). The study of the Diophantine equation $X^2 - NY^2 = \pm 1$ (where N is a given positive integer which is not a square and where solutions are sought for X and Y positive integers) by the ancient Hindu mathematicians like Aryabhata and Bhaskara has been covered with a fair amount of detail. One chapter deals with (geometrically) constructible numbers leading to various approximations for the transcendental number π. However, the beautiful example of the Gauss construction of a regular 17-gon leading to a somewhat involved constructible number, makes its appearance only much later.

Then the reader is guided through the efforts of the Arabic mathematicians in solving quadratic equations to the golden period in Italian mathematics (Fibonacci: A.D. 1180–1240, del Ferro, Tartaglia, Cardano and Ferrari: A.D. 1450–1580). It is during this period in Italy that the seeds of modern algebra were sown. There was the solution of the cubic by del Ferro, the controversy between Tartaglia and Cardano. It was indeed exciting to learn from this book that long before Gauss, Cardano did face the question of a square root of a negative number and called such a situation 'truly sophisticated'. The discussion in the spirit of historical development ends with the description of Ferrari's solution of the biquadratic and with the fact that the treatise *Ars Magna* by Cardano brought about a fundamental change in the methodology of discourse in algebra. The last part of the book briefly touches upon relatively more modern ideas like polynomials, their factorisation, the fundamental theorem of algebra etc. There is even a footnote on Clifford algebras and the Dirac equation, indicating the human thirst for creating newer and newer 'numbers' and more amazingly, finding natural phenomena where these new numbers find application.

The only criticism this reviewer has is that there are quite a few typos and a few editorial mistakes. But these small things do not take away the sheer delight this reviewer had in going through the book and there is no doubt that the book will be read and enjoyed as much by many.

K B Sinha, Indian Statistical Institute, New Delhi 110 016, India



The safest definition, then, of beauty, as well as the oldest, is that of Pythagoras:

THE REDUCTION OF MANY TO ONE

— *S T Coleridge*