

BOOK REVIEWS

Modern Algebra and the Rise of Mathematical Structures. Leo Corry. Birkhauser Verlag, PO Box 133, CH-4010 Basel, Switzerland. 2004. 2nd revised edition. 431 pp. Price: EUR 65.

‘How many things by season seasoned are to their right praise and true perfection!’

exclaims the Bard and quite aptly too. Subjects require their time to take shape and evolve. For instance, algebra, which began as a mere servant to the number system, with the operations $+$, \times and their inversions, has come a long way to become an impressive doctrine over the years. Its growth has indeed been phenomenal, thanks to the various brilliant mathematicians who moulded it.

In the book under review, the author deals with a particular aspect of the growth of algebra and gives an account of some of its developments, beginning with Dedekind’s theory of ideals and ending with category theory (a brainchild of Eilenberg–MacLane during the mid twentieth century). The author mentions in his preface that his original intention was to give only an account of the history of category theory. However, he decided later to lead up to it by discussing some of the contributions of mathematicians like Dedekind, Hilbert, Emmy Noether, Steinitz, Fraenkel and others to algebra. What started in the nineteenth century as a tool in dealing with polynomial equations (the great names of Lagrange, Abel, Ruffini, Galois, . . . naturally come to one’s mind in this connection), finally emerged as an autonomous structural subject in 1930 in the pioneering work, *Moderne Algebra*, of Van der Waerden (this book itself was heavily influenced by the ideas of Emmy Noether and Emil Artin). This account occupies the first part of the book under review. The second part deals with the influence of the earlier period on the work of Oysten Ore, Bourbaki and finally on the work of Eilenberg–MacLane on category theory. This, in brief, is a summary of the contents of this book.

Apart from providing a historical account described above, the author enunciates and tries to uphold a philosophical tenet relating to the general growth of algebra (more generally of mathematics) as a structure. While doing so, he postulates two separate domains of discourse of the

subject, namely ‘the body of knowledge’ and ‘the image of knowledge’. He claims that this image is possible in mathematics in view of the ‘reflexive’ nature of the subject. (By the reflexive character of mathematics, the author means ‘the possibility of formulating and proving meta-statements about the discipline of mathematics, from within the body of mathematical knowledge’.) This reflexive nature is nothing special to mathematics and is equally valid for other scientific disciplines too. The heavy weather that the author makes, throughout the book, harping on the twofold distinction between the body and image of knowledge, appears artificial, and somewhat forced.

The author’s predilection with his philosophical tenet apart, one could go through the book as a piece of history. The reviewer discovered a number of mathematical inaccuracies, some grammatically and semantically queer constructions and a fair amount of typographical errors. Listed below are a few instances of the mathematical inaccuracies, which are especially mentioned, since they might present a wrong notion to the uninitiated.

Unique factorization is said to hold for all ideals ‘with given multiplicities’ (p. 97).

‘Polynomial’ should be replaced by ‘irreducible polynomial’ (p. 99, line 3 from top).

One should be careful to distinguish between the zero and the non-zero prime ideals.

There is a mention of non-existence of distributivity and zero element for a group (p. 188).

There is a mention of a construction of a field of quotients out of two rings (p. 191).

The definition of algebraic closure of a field is garbled and wrong as stated (p. 195).

‘Irrationally equivalent’ should be replaced by ‘birationally equivalent’ (p. 256).

The author seems to believe that objects in a category must have elements (p. 342).

The author seems to imply that a morphism in a category that is both monic and epic is an isomorphism, which is generally false (p. 343).

In footnote 6 on p. 347, the author talks about the group of characters of a topological space. He also seems to believe that *any* group is isomorphic to its character group.

In the text, the forgetful functor from **Groups** to **Sets** goes in the wrong direction (p. 396).

R. SRIDHARAN

*Chennai Mathematical Institute,
92, G. N. Chetty Road,
T. Nagar,
Chennai 600 017, India
e-mail: rsridhar@cmi.ac.in*

The Tests of Time – Readings in the Development of Physical Theory. L. M. Dolling, A. F. Gianelli and G. N. Statile (eds). Princeton University Press, 41, William Street, Princeton, NJ 08540, USA. 2003. 716 pp. Price: US\$ 36.95.

There are theories and theories, all of them constructed with the purpose of explaining the physical world around us. There have been *ad hoc* theories that describe a limited set of data, models to fit observations or, on the other hand, superstructures that support entire areas of phenomena possessing prodigious powers of explanation and prediction. While some theories, like sand castles built on the seashore, have been swept away by the turning tide, others have proved to be monumental edifices that have stood the test of time. It is the latter that form the focal point of the present volume. It traces the evolution of five such theories by presenting excerpts from the writings of the pioneers who created them. These are the heliocentric theory, the electromagnetic theory, theory of relativity, quantum theory, and the big bang theory of the Universe. All these represent revelations and revolutions in our understanding of nature. In the course of time, some of them may have to be modified or may even be superseded by radically different theories. Nonetheless, the basic tenets of these theories are bound to be retained despite new developments that may occur in the future. In this sense, they will never become extinct.

Obviously, one cannot and should not try to read a tome of some seven hundred pages from cover to cover at a stretch. Furthermore, familiarity with the basic elements of the subjects dealt with is essential for the true appreciation of the