BOOK REVIEWS

CHAKRAVORTY, K. R., *Science Based on Symmetry* : Firma K. L. Mukhopadhyay (P) Ltd. Calcutta 12, 1977 ; 50+502 pages. Price Rs. 150·00

The aim of the author in this book is to present the theme of "Universal Symmetry, so fundamental in nature, with unlimited scope and applicability, pervading all aspects of knowledge and thinking, governing all domains of nature" which "for its full appreciation, must be presented in most comprehensive manner". He states that "The science based on symmetry......in reality happens to be the science of the ancients" and goes on to lament that "That science has now become not relevant in modern scientific approaches... because modern science originates from and depends on mathematics based on relationships in right-angled triangle of pythagoras on the one hand and probability and statistics on the other". It is then not surprising that "an attempt has been made (in the book) to reconcile and establish a link between the two sciences".

Through the ages, mankind has dreamed of and hankered after things of sublime beauty or transcendental power, whether it be the philosopher's stone, the *kāmadhenu*, the elixir of life or the holy grail. A belief in a unifying simplicity underlying the manifest diversity and complexity of the universe has likewise been part of the human condition. It is this belief in fact that has been the driving force behind the development of science to the present day level, and every major advance in this development has had as its essential feature the unification of a wide variety of phenomena under the umbrella of one or a few simple laws.

This fundamental truth has apparently been obscure, in the mind of the author of the work under review, by the very richness of the sciences which is but a reflection of the immense variety of the phenomena of Nature. The author is apparently unable to reconcile himself to this surfeit of riches, and he seeks the kind of unity, in this diversity, which can be expressed through some kind of a magic formula. The magic formula he advocates is a universal symmetry of unlimited scope ; this "symmetry", as revealed in the book, is a concept expressed in term of sums (or differences) of squares of the natural numbers, and has its origin in the contemplation of the numbers of squares in projections of the "balanced tetrahedral configuration" consisting of a regular tetrahedron with four other identical tetrahedrons mounted on its faces. The fundamental principle enunciated is that this "ideal" configuration can "represent symmetry of nature".

The elaboration of the principle of "symmetry" in the context of particular areas of physics consists in "fitting" everything to square configurations of squares, or to sums or differences of squares (which after a while, cease to be of natural numbers alone and include continuous variables too) Thus, the periodic table of atoms, temperature variation of specific volumes of liquids and gases and of specific heats, relativity, and even simple harmonic motion are subjected to the above operation. Finally the author identifies the "configuration of symmetry of nature" with "original Sāṅkhya postulates in '*Tattasamāsa*' of Kapila" in the penultimate chapter, before closing the book with geometrical and metaphysical extrapolations.

This book is not science nor a "link between the two sciences" (ancient and modern). It is rather an expression of an individual's yearning for a profound simplicity in the understanding of a complex world. Inasmuch as he rejects the accumulated wisdom which has evolved through the strivings of men, over the ages, to see a little further than their forbears into the mysteries of universe, and prefers instead to start *de novo,* the only way open to him to cast the awsome task into a manageable mould is to reduce it to one of "fitting" all phenomena of the Universe to a Procrustean bed of a rigid "universal" principle. And that in essence, is what this book is all about.

Department of Theoretical Physics   P. M. MATHEWS
University of Madras, Madras

KAMAT, N. D. 1978. *Botanists and Botanical Researches in Maharashtra* 1951-1975. Vimal Prakashan, Aurangabad. Pp. VI+310. Price Rs. 50/-

The scientific world has witnessed an precedented explosion of knowledge in recent times. The number of scientific journals has shot up as never before. Faced with the prospect of 'publish or perish' the botanists of India, like other species of scientists elsewhere have been busy manufacturing papers. Serious doubts have been raised about the wisdom of supporting research which may or may not have any relevance to society.

The present book has been compiled with the objective of providing information about the botanists of Maharashtra and their research contributions during the period 1951-1975. It is a catalogue of names of 83 botanists, their addresses, and main areas of specialization, length of their teaching and/ or research experience. An index to botanists working in different fields has also been compiled.

The major part of the book (over 185 pages) is devoted to a list of publications arranged in alphabetical order. Titles of over 217 Ph. D. and

D. Sc. theses submitted to the Universities of Bombay, Marathwada, Nagpur, Pune and Shivaji have been listed. Subject, author and place indexes have been included to facilitate ready reference.

It is doubtfnl whether the effort and industry have resulted in a work which would be of benefit to the B. Sc. and M. Sc. students, as intented by the author. Nevertheless the titles of paper and theses may help the young botanists in their literature survey as well as in avoiding duplication of research endeavours.

The essential part of this work is the brief preface (of about 4 pages) in which the author has made a few generalizations. The author's parameters of judging the scientific merit of the botanists of Maharashtra, however, are not objective. It would have been rewarding if an attempt had been made to assess the botanical contributions to either basic knowledge or to the problems of the state or the country. For example, have the botanists of Maharashtra added significantly to the understanding of the floristic wealth, pathology, ecology, physiology or plant breeding, with special reference to their own state ? Instead of letting the reader find these answers from the raw material supplied, the author could have presented this information. He has also missed tracing the historical background of the various schools of botanical learning in Maharashtra.

The author has pointed out that by and large, the publications are repetitive and have generated few new ideas, theories or techniques. He is also critical of the chemical and biochemical work done in the botany departments which has been criticized abroad.

The cost of the book is too high and the text has numerons printing mistakes. A researcher may still find some information which may interest him.

Department of Botany   H. Y. MOHAN RAM
Delhi University, Delhi 11000J.

TRUESDELL, C. and BHARATHA, S., *The Concepts and Logic of Classical Thermodynamics as a Theory of Heat Engines,* Springer-Verlag, New York, 1977 pages xxii+154.

The authors of the present book, basing themselves on the work of the great French Thermodynamicists Carnot and Reech, have attempted to present a simple and logical structure for classical Thermodynamics of homogeneous fluids. The concepts dealt with here were all developed by these two physicists and some others like Clausius and Kelvin prior to 1854.

As stated by the authors, the aims of the book are three :

(i) 'Conceptual : for those already expert in Thermodynamics, to show how all the concepts of the traditional elementary theory can be derived from simple and natural assumptions about heat engines, developed by simple and rigorous mathematics, with no "physical" arguments and no appeal to metaphysics'

(ii) pro-historical and

(iii) paedagogical.

The book is divided into four parts :

I   Calorimetry (6 Chapters).

II   Carnot's general axiom (8 Chapters).

III Universal efficiency of ordinary Carnot cycles (2 Chapters).

IV   Epilogue (1 Chapter).

The first part deals with topics like ; Thermal equation of state, latent and specific heats and adiabatic processes. The second part, which is the major part, deals in depth with various aspects of Carnot cycle. The authors also discuss some properties of ideal and Vander Waals fluids, relation between motors and regrigerators and Reech theorem regarding the existence of four Thermodynamic potentials.

The third part deals with the 'proof' of the First and Second Laws of Thermodynamics from the theory of heat engines. The book ends with an Epilogue on energy and entropy.

The style of presentation of material differs from the usual style. The authors have divided each chapter into small sections with headings like Definition, Remark, Axiom, Theorem, Historical Comment, Scholion, etc. This has made the presentation precise and easy to follow.

The book presents a simple and consistent account of the role played by the theory of heat engines in the development of classical thermodynamics. The often neglected work of Reech in this area is highlighted. The book will be read interest by those already familiar with the subject.

The senior author, Prof. C. Truesdell, has done considerable work to elucidate the historical development of Thermodynamics and has published a lot in this area. His wide experience is reflected in the choice of material and in the historical remarks made in the book. This will be a good addition to any physics library.

Department of Physics and Astrophysics
Delhi University, Delhi 110007   L. S. KOTHARI

GUPTA, S. P., *Modern India and Progress of Science and Technology*, Vikas Publishing House Private Ltd., New Delhi, 1979, 164 pages, Rs. 45.00.

The work presents an idea of the growth and development of Science in India roughly during the last 200 years starting from 1710 A. D. It has been carefully planned in 9 chapters. The first chapter discusses about the standard, facilities, and status of education in 18th century in India in a nutshell and gives effectively an outline of the role played by Ram Mohan Roy and British Policy to introduce English as well as Science Education in India. How the effort helped the growth of universities like Calcutta, Bombay, Madras, Allahabad etc. has been discussed in chapter 2. The role of universities, scientific surveys, learned societies, British Policy on scientific education and its impact on engineering and industry, technical and agricultural education and research have been described in different chapters in the process.

The facts are mostly supported with extracts from different committee reports and lectures of different personalities and editorials of paper like *The Statesman* of contemporary time. The select passages have been used as a running commentary by the author which make the work interesting, lucid in style and readable. Many of Dr. Gupta's remarks are perceptive. He deserves our thanks and commendation for his ability to reduce an obviously enormous literature in the period to a manageable and significant proportion. Though much of the facts have been drawn from the secondary sources, strangely enough, the originality of the book is attested by the lack of bibliography of secondary literature.

The get-up is satisfactory and the work is a welcome addition to the literature of History of Sciences in India.

Indian National Science Academy
New Delhi 110002   A. K. BAG