

would have to search through a lot of information spread among different chapters to find the relevant details. In my opinion, what is needed is a book that explains, compares and summarizes the different techniques of using LCs in a way that is accessible to those outside the field, and yet contains enough information to be more than just a general article.

This review is written from the perspective of an applied optical scientist working with LCs. For a review from an alternative viewpoint see M. Schadt, *Condensed Matter News*, 1992, 1(3), 25.

GORDON D. LOVE

Raman Research Institute
Bangalore 560 080
India

Phase transitions

The Many Phases of Matter. G. Venkataraman. Orient Longman Ltd., 3-6-272, Himayat Nagar, Hyderabad 500 029 1991. 94 pp. Rs 30.

The book under review is written in the same spirit as George Gamow's famous volumes which inspired the author. The book is aimed at young students who wish to take up later a serious study of physics. It is intended as a bridge to the more serious textbooks such as the *Feynman Lectures* and the Landau-Lifshitz classics. The author has adopted a simple, chatty style to convey the excitement of science. In his words 'if the reader is able to experience at least in some small measure the excitement of science, then my purpose would have been served'.

The book is about phase transitions. It starts out by defining what a phase is and goes on to discuss the variety of phases of matter that are observed in nature, order and disorder, quasicrystals, fluctuations and symmetry breaking, critical phenomena and exponents, mean field theory, superfluidity, superconductivity, phase transitions and life, as well as phase transitions in the early universe. And all this in 94 pages.

Although the reviewers are by no

means any longer young, they found the book very instructive and a convenient digest of the entire gamut of phase transitions. Each chapter is compact, well illustrated by helpful diagrams, and contains boxes with interesting information about the leading physicists whose work figures in it, as well as auxiliary information relevant to the chapter. Each chapter also contains a useful summary at the end.

Quite consciously the author has pitched things a bit high on occasions, as, for example, in the case of the Landau theory, where he introduces the concept of the order parameter and elements of bifurcation and catastrophe theory. To what extent this sort of high pitch will 'excite' the young readers rather than discourage them is perhaps a debatable point, particularly in our country where school education in science is woefully inadequate.

We found the treatment of superconductivity too brief compared to the treatment of superfluidity. For example, a few more words to explain how Cooper pairs are formed would have made this section less mysterious. We are also surprised that no mention is made anywhere of the role of Bose statistics and Bose condensation in these phenomena. This would have been particularly relevant in the Indian context.

The chapter on phase transitions and life is obviously intended to give a mere flavour of this extremely difficult and challenging area. It discusses nonequilibrium phase transitions, bifurcations, convection patterns, symmetry breaking aspects and the origin of life. We did not find any mention of the pioneering work of Prigogine and his group on nonequilibrium thermodynamics and the fundamental role of dissipation in the formation of new structures ('dissipative structures'). This is essential in understanding how order can emerge out of chaos in nonequilibrium situations despite the reign of the second law of thermodynamics.

The last chapter on phase transitions in the early universe is also written in a similar vein and serves as a good introduction. However, there is one statement regarding the weak force that we find misleading. It says that this force was 'explained to us by E. C. G. Sudarshan, and also by Gell-Mann and Feynman'. The Sudarshan-Marshak-

Gell-Mann-Feynman V-A theory is not really an 'explanation' of the weak force but only a characterization. The 'explanation' in terms of more fundamental fields came later with the Salam-Weinberg-Glashow theory.

The above minor criticisms in no way detract from the importance and value of the book. To the best of our knowledge, this is the first book of its kind written by an Indian author for Indian students. The publishers deserve to be congratulated for bringing out this first book in a series entitled 'Vignettes in physics' by Venkataraman, a well-known physicist whose recent book *Journey into Light: Life and Sciences of C. V. Raman* has been widely acclaimed. There is every reason to look forward to reading the forthcoming volumes, which include *Why Are Things the Way They Are?*, *Chandrasekhar and His Limit*, *Bose and His Statistics*, *At the Speed of Light* and *Raman and His Effect*.

PARTHA GHOSE
DIPANKAR HOME*

Satyendra Nath Bose National Centre
for Basic Sciences
DB 17, Sector-1, Salt Lake
Calcutta 700 064, India
*Bose Institute
Calcutta 700 009, India

Brief reviews

A Course of Experiments with He-Ne Laser. R. S. Sirohi. Wiley Eastern Ltd., 4835/24, Ansari Road, Daryaganj, New Delhi 110 012. 1991. 106 pp. Rs 45.

As the name suggests, the book contains a large number of experiments that can be performed using a low-power He-Ne laser. These experiments deal with concepts of interference, diffraction, polarization, holography, speckle phenomena, spatial filtering and laser Doppler anemometry. The experiments cover both undergraduate and graduate level laboratory course. Although some of the experiments described can be done by quasi-monochromatic light (e.g. sodium lamp), the use of He-Ne laser makes them much more appreciated by the students. To quote the author: 'What seems to be difficult to observe with

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quasi-monochromatic light, can be projected with a laser beam and the visual experience can be shared by a large audience'.

The experiments on holography, speckle phenomena and spatial filtering are well introduced in the book. Some of these experiments teach an important concept of Fourier optics to the students. The measurement of flow velocities by a simple experiment using interference fringe mode is very instructive to convey essential features of a laser Doppler anemometer. One of the good features of the book is the problems given at the end of each chapter. The problems are useful and educating.

With the relatively easy availability of He-Ne lasers in India, it is hoped that our colleges and universities will adopt to the use of lasers in teaching of optics and, in this sense, the book under review will prove to be very useful as a starting point. A reasonable price (Rs 45/-) of the book makes it within easy reach of students and teachers. In conclusion, the book is well written and will prove to be useful to the scientific community.

A. K. SOOD

*Department of Physics
Indian Institute of Science
Bangalore 560 012*

Indian Gondwana (Sahni volume). B. S. Venkatachala and H. K. Maheshwari eds. Memoir 21, Geological Society of India. 1991. 529 pp. Rs 600.

Gondwana sediments play an important role in Indian stratigraphy because of the occurrence of coal in these sediments. In fact geological studies in this country were initiated for the exploration of coal associated with the Gondwana sediments.

The book covers progress of knowledge

on different aspects of Gondwana over the last one and a quarter centuries. The book has been divided into the following aspects; Part I, Concepts; Part II, Classification, Stratigraphy, Sedimentology; Part III, Palaeobotany; Part IV, Palaeozoology; Part V, Marine incursion; Part VI, Palaeogeography, Climate, Glaciation; Part VII, Tectonics; Part VIII, Economic geology. In each part the editors have made an overall assessment of the work with critical comments.

Another useful feature of the book is that some original articles on various aspects have been reproduced. This will help readers considerably in getting a comprehensive idea of the progress that has been made in different aspects of Gondwana sediments. It will spare the readers the trouble of digging into the earlier literature.

It is befitting that the book has been dedicated to Birbal Sahni to commemorate his birth centenary. By publishing this book the Geological Society of India has made a lasting contribution. There is no doubt that the book will be extremely useful to geologists, teachers, researchers and students.

D. CHANDRA

*Indian School of Mines
Dhanbad 826 004
India*

A Textbook on Biotechnology. H. D. Kumar. Affiliated East-West Press Pvt Ltd., 104 Nirmal Tower, 26 Barakhamba Road, New Delhi 110 001. 1991. 280pp. Rs. 150.

It is not clear for whom this book is intended. Biotechnology is a very general term that encompasses a wide variety of

subjects and topics. The first chapter entitled 'General introduction' seems to indicate that the book provides the basis for technological developments in the utilization of knowledge derived from advances in modern biology. Training and education in biotechnology must essentially depend on the strengths in modern biology, including molecular biology (biochemistry), biophysics, molecular genetics, microbiology, cell biology, engineering technologies such as fermentation, biomolecular separation, and a whole lot of other processes. Hence it is not practical to cover the whole gamut in one small textbook. The book is an overview of the potential of the discoveries in current biology and it serves the purpose of introducing the technological potential of modern biology to students. The book seems to have a bias towards plant sciences, and this is indeed a very welcome change from similar books.

This book is not a textbook but a synthesis of several aspects of modern biology and current topics of applied research in industrial microbiology, immunotherapy, disease resistance in plants, improvement of grain quality, environment and energy. Thus it has a somewhat uneven but diverse coverage.

The book has limited value for a serious student preparing for a career in biotechnology but may stimulate interest in the uninitiated. In addition the information contained in the book could be very useful for those preparing for competitive examinations that may require general knowledge in biotechnology.

S. ANAND KUMAR

*Astra Research Centre, India
P. O. Box 359
Malleswaram P.O
Bangalore 560 003
India*