

The editors of this book deserve to be congratulated for organizing the articles in this book appropriately along with a nicely written 'Preface', inspiring anyone to read the contents of the book in detail. The first three articles cover in an excellent and readable manner the fundamental aspects of solitons, including their universality and ubiquitous nature, fibre optics communication and nonlinear optical materials. The remaining fourteen articles are devoted in general to several theoretical aspects of the changing collisions of optical solitons and their connection to logical gate operations is also discussed in an article. Another article discusses the methodology of obtaining the approximate solutions of different nonlinear evolution equations in optics. Completely integrable models of nonlinear optics based on different optical effects are presented in an interesting article along with their detailed analysis. An article discusses exact periodic wave tracing for systems of coupled, nonlinear Schrödinger equation. Another one analyses the concept of up-switching and down-switching between bistable solitons in doubly inhomogeneously doped fibre systems involving lossless as well as lossy couplers. The nonlinear compression of bright and dark solitons in inhomogeneous, nonlinear Schrödinger equation is nicely discussed in another article. Even the concept of spinning solitons in both conservative and dissipative cubic–quintic nonlinear media is adequately discussed in an article. The existence of fully stable spinning solitons in fibres with Kerr nonlinearity and in bulk media featuring a combination of the cubic self-defocusing and quadratic nonlinearities form the subject of another article. This article also considers a system of compiled, nonlinear Schrödinger equations for the fundamental and helical mode solitons to discuss the results of collisions between solitons associated with the two modes from the analytical as well as experimental point of view. The book also contains an article presenting an interesting overview of the soliton-based ultra-high speed communications and discussion of the recent theoretical and experimental results in this area. Basic concepts of the theory of spatial solitons, including the soliton stability in non-Kerr media and the collisions of solitary waves in nonintegrable media are discussed in another article. The last two articles

cover recent experimental developments in the study of optical spatiotemporal solitons and an account of the experimental study of the spatial solitons in nonlinear liquid wave-guides.

In summary, this book brings out clearly the relevance and utility of optical solitons and the related optical devices in optical communications systems in future. Most of the articles are written in a lucid and readable manner. It clearly fulfils its aim of being useful for beginners as well as for specialists and research workers in the area of nonlinear optics and optical communications. It may also be useful to teachers teaching courses on optical solitons and their applications to future optical communication systems.

S. V. LAWANDE

*Department of Physics,
University of Pune,
Pune 411 007, India*

Calcium Carbonate – From the Cretaceous Period into the 21st Century. F. Wolfgang Tegethoff *et al.* (eds). Birkhäuser Verlag, AG, P.O. Box 133, CH-4010, Basel, Switzerland. 2001. 350 pp. Price: SFr 168/DM 224/Euro 112.

The deceptive simplicity of the formula for calcium carbonate – CaCO_3 hides its rich crystal and geochemistry, its importance as a biomaterial and its many uses as a structural material and in industry. From blackboard chalk to pearls, the Taj Mahal and the David, to many toothpaste formulations, calcium carbonate is ubiquitous. It can be unobtrusive and it can be kitsch. Tegethoff's collaborators have examined these many aspects of calcium carbonate in this erudite and fascinating oeuvre.

The first part of the book is on the geochemistry of calcium carbonate by Jacques Geyssant, starting with the formation of the constituent elements in the universe. One learns that in Shergotty, near Gaya, a meteorite fell which contained calcium carbonate and sulphate and is believed to have been chipped-off from the Mars crust. The standard geochemist test for calcite – effervescence

with acid – was apparently put to use by Hannibal when he crossed the Alps. He had vinegar poured to soften the limestone so that his elephants would tread more surely. One learns here of formation of limestone and its conversion to marble, the distribution of limestone and marble worldwide, the sources of colour in marble, and the important role of marine organisms such as certain marine algae.

The second part of the book is by Johannes Rohleder and titled 'The Cultural History of Limestone'. This beautifully illustrated part describes the many uses of limestone and marble in art and in buildings over the ages. The illustrations include Egyptian and Mayan pyramids, chalk Champagne cellars in Reims, Palladio's Villa Rotonda and a certain white building on the banks of the Yamuna. We are told of the fluctuating fortunes of marble, and of how there is today, renewed faith in the natural stone as a building material.

The third part of the book, by Johannes Rohleder and Eberhard Huwald, is a regression to the mundane. We are told here of the many uses of chalk and PCC (precipitated calcium carbonate) as a glazing compound, in the rubber industry, as a pigment and as a filler material. In keeping with the comprehensive nature of this book, the authors not only tell us what kind of calcium carbonate is used in which product, but also describe the entire supply chain.

Christian Naydowski, Peter Heß, Dieter Strauch and Ralph Kuhlmann have shared the writing of the fourth and last part of the book which is on modern industrial, agricultural and environmental uses of calcium carbonate. This versatile material finds its way into a number of plastics formulations, including as a filler and reinforcing agent in thermoplastic, thermosetting, elastomeric, adhesive and sealant formulations. It also finds use as a pigment extender and as a surface-coating material. Most interesting is its use in the treatment of flue gases (for desulphurization) and drinking water, and for the treatment of water bodies whose pH has fallen to unacceptably low levels. One also learns that large quantities of calcium carbonate go into livestock feed.

The book is beautifully illustrated and produced. One complaint that can be made is that many small but nagging errors have crept in during the transla-

tion, including some German spellings in the figures. Another small complaint that I have (perhaps characteristic of this publisher) is that nowhere in the book does one find mention of the author's academic (or other) affiliations.

RAM SESHADRI

*Solid State and Structural Chemistry Unit,
Indian Institute of Science,
Bangalore 560 012, India
e-mail: seshadri@sscu.iisc.ernet.in*

Vertebrate Functional Morphology: Horizon of Research in the 21st Century. H. M. Dutta and J. S. Dutta Munshi (eds). Oxford and IBH Publishing Co Pvt Ltd, 66 Janpath, New Delhi 110 001. 2001. 487 pp. Price not mentioned.

This book, a sequel to *Fish Morphology: Horizon of New Research* by the same editors, is claimed to be a novel contribution to functional morphology of selected systems from representative vertebrate classes. It includes an introduction and 16 chapters. The first five are concerned with the cartilaginous skeleton, head morphology, gustatory and feeding organs, respiratory system of gill- and air-breathing fishes. A single chapter narrates the functional morphology of feeding apparatus of squamates. Then a series of three chapters describes the taste organs, ultrastructure of lung, and reproductive system of selected amphibians. The next two chapters deal with feeding apparatus of woodpecker and the like. Subsequently, two chapters are assigned to comparative morphology of kidney and vessels of different vertebrate groups. The last but two chapters go on with the digestive and reproductive systems of selected mammals. The last chapter, the most interesting one, explains the 3D-reconstruction as an advanced method in morphological research.

Morphology describes the form, including features such as topography, size, shape, structure and quality, and other secondary features. Functional morphology is concerned with mechanical and

spatial arrangements of parts and structural features, and other functions within the architecture of an organism. As a hybridized subject between anatomy and physiology, functional morphology was taught in zoology classes at the undergraduate and postgraduate levels in universities and colleges about 10–20 years ago. However, with a view to assess the new contribution of the book to this 'old but established subject', the reviewer found that of 1193 references cited in the book, 306 were published after 1990s. Hence, one may look for new information. But the chapters by H. M. Dutta, M. Jakubowski and K. Zuwala, O. Gurina and N. F. Zhukova have less than 10% references, which were published after 1990. Remarkably, of 89 citations referred by J. Streicher, 57 publications are dated after 1990. Hence, 3D-reconstruction as a method is perhaps the most active area of morphological research.

Functional morphologists have employed a wide variety of instruments to derive more precise information on the form and function of the chosen organ, system and organism. This book mentions about the use of instruments, ranging from light microscopy to electron microscopy and confocal laser scanning microscopy, cinematography to cine-radiography to electromyography and a wide variety of computer-aided virtual sectioning technology, stereolithography and so on. Usage of these modern equipment has emboldened Streicher to claim that within the next decade, technical progress will allow the production of 3D-reconstruction of almost any type of specimen from macroscopic to molecular level.

Remarkably, the review by G. M. Wright and F. W. Keeley summarizes the morphological, biochemical and molecular biological analyses of the family of unusual non collagen-based cartilages in the skeleton of lamprey. Similarities between the agnathan, cartilage matrix proteins and elastin-based cartilage in higher vertebrates led them to speculate that the evolutionary lineage of elastin may be traced through cartilage rather than visicular tissues. Zoologically, it is interesting to note that the accessory respiratory organs of air-breathing fishes and amphibians can easily cope with oxygen demand, but are unable to function efficiently in CO₂ elimination. In the adult amphibians too, lungs are the main place of oxygen uptake, while the skin is

the site of CO₂ excretion. The length of pulmonary capillaries increases from 3.5 m/g body weight of *Triturus cristatus carnifex* with smooth lungs and low level metabolism to 34.0 m/g of *Hyla arborea* with high level cellular metabolism. Smaller cells of *Anura* display higher level of metabolism than the larger ones of *Urodela*.

Notably, the choice of authors for this book has been global; among the 19, five are from USA, three from Poland, two each from Austria and Canada, and one each from Belgium, England, India, Mexico, The Netherlands, Russia and Ukraine. Apparently, reasonably good research work on functional morphology is undertaken all over the world. Admirably, the Polish and Russian authors have used flawless language and have had the required access to relevant English literature.

It is not clear why the editors have not chosen to accomplish a comprehensive account on the functional morphology of an organ system of all the vertebrate classes, or all organ systems of a higher vertebrate class. It is also not clear why chapters on 'Mammalian Reproduction' and 'Animal Vessels' were included and authored by A. Hossain and H. M. Dutta (one of the editors), and O. Gurina respectively; they have not published original contribution(s) related to the title chosen or given to them. As such, they cannot claim themselves as internationally known experts. Consequently, these articles, especially the one on 'Mammalian Reproduction' read like an essay written by a college student. The editors have also failed to bring the expected standard in 'References'. For instance, there are more than a dozen mistakes (e.g. america) in the 'References' listed by H. Ditrich; spelling mistakes are also not uncommon (e.g. Chiroptera instead of Chiroptera, p. 391). The authors and editors have also failed to make necessary corrections in the proof. For instance, Figures 2 and 5 in the chapter by Ditrich are a verbatim repetition. Annoyingly, the legends for these figures are different and not compatible.

Yet, this book may be regarded as an oasis in the desert.

T. J. PANDIAN

*School of Biological Sciences,
Madurai Kamaraj University,
Madurai 625 021, India
e-mail: tjpandi@pronet.net.in*