food for the larvae and juveniles of innumerable species in aquaculture. The author gives a detailed account of the biology and use of *Artemia*, in particular the Indian strains.

The Indian Ocean Biological Centre (IOBC) in Kochi, now a regional centre of the NIO, was started in 1961 as part of the International Indian Ocean Expedition, a multinational programme in which 19 ships from 9 countries participated. The author describes the history of the IOBC, the role of India in the international programme and its current functioning. The last chapter on sunken treasures describes marine archaeology in India, with interesting accounts of the discovery of the submerged port at Dwarka and the prehistoric remains of Somnath.

In India, apart from the scattered efforts of a few institutes such as the NIO in Goa, little work has gone into marine systems. Part of this is due to the lack of infrastructure and money to carry out marine studies. On the other hand, biology itself has been a neglected discipline, and with the advent of biology as a moneyed science, laboratory disciplines such as molecular biology and genetics have gained primacy and multidisciplinary fields such as marine biology have had little money to operate. In this backdrop, the author's efforts in this field come as a great boost to various aspects of marine biology and should inspire at least curiosity and hopefully lead to more work in the area.

Unfortunately, the book does not provide a general perspective of oceanic or coastal biology. While it may be true that such information is also available elsewhere (perhaps even in the author's earlier book which I have not had the opportunity to read), it would still have been useful to provide a general picture of oceanic science. This would have illustrated the relevance of some of the information with which the book is filled. In its current form, the title of the book does convey the impression that it is review of information on the Indian Ocean which it is not. Perhaps the title of the author's earlier book, *Glimpses of the Indian Ocean*, would have been more suitable, or maybe even *Glimpses of Indian Coasts*. The author does deny any claim to the book or its chapters being reviews, and suggests the book aims to fill certain gaps left by the previous one. However, while a vast array of information is displayed for the reader, much of it seems disjointed and is not assembled in any fashion designed to instruct. Many things have been missed; as a wildlife biologist, I miss the mention of any marine mammals; dolphins, whales and dugongs, though poorly studied thus far deserve at least a passing mention. Many marine birds and marine turtles have been extensively studied and should have a place in any account of the Indian or any other ocean. Even as far as the other marine sciences go, too little has been said about the climatic and other general aspects of the Indian Ocean. Marine ecosystems are in peril due to a variety of reasons, and a section on conservation and the management of marine ecosystems would have been most welcome.

However, this book is undoubtedly an excellent compilation of information by a highly erudite scientist who has spent his entire career in pursuit of the secrets of the ocean. In sum, the book offers a large amount of information on a wide variety of subjects which go into the study of marine science, and on the Indian Ocean. The reading lists at the end of each chapter are also useful to students of this field of research. While it is a book that is difficult to read and assimilate from cover to cover, anyone who is involved with studies on the Indian Ocean would benefit from the information compiled here.

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Deccan Volcanic Province. West Volume. K. V. Subbarao (ed.). Mem. Geological Society of India, P.B. 1922, Gavipuram PO, Bangalore 560 019, India. 1999. 947 pp. Price: Rs 750/US $ 50.

The Deccan Volcanic Province represents one of the largest continental flood basalt provinces of the world that erupted during India's rapid northerly drift from the Gondwanaland to raise the Himalayas. The volcanism has been related to the Reunion Plume and may also possibly be a cause for the extinction of dinosaurs during the K–T transition. Hence, publications on the Deccan Volcanic Province should be of interest to a wide spectrum of scientists. Part 2 of the West Volume on the Deccan Volcanic Province under review commemorates the contributions made to Indian Geology, notably the Deccan Traps by the late William Dixon West (1901–1994), former Director of the Geological Survey of India and professor and founder of the Department of Applied Geology, University of Saugar, Madhya Pradesh (MP), which is celebrating the centenary of West. The volume represents in part the papers presented at a Seminar held at the Indian Institute of Technology, Mumbai during December 1996, together with selected papers by the editor that have been published previously and have greater relevance to studies on Deccan basalts. The volume aptly begins with a tribute to late K. G. Cox, who inaugurated the meet but could not live to see the volume in print due to his tragic demise in a boat accident in Scotland in August 1998. Cox recognized the importance of picrite basalts in flood basalt genesis in general and a re-study of West's bore hole sequence (paper reproduced in the Mineralogy and Petrology section) with picrite basalts in Saurashtra was taken up in the early 1970s by P. Krishnamurthy under Keith Cox for a better understanding of the parental magma and the evolution of Deccan basalts (*Contrib. Mineral. Petrol.*, 1977, **62**, 53–75). Geochemical and Sr–Nd–Pb isotopic studies on these samples by Peng and Mahoney (*Earth Plant. Sci. Lett.*, 1995, **131**, 169–185) have clearly pointed out the chemical similarity of the present-day basalts of the Reunion Plume and these early stage basalts, including picrite basalts of the Deccan.

The present volume includes a total of 28 papers, six in geomorphology, ten in Mineralogy and Petrology, eight in Geochemistry and four on the Lonar Lake. Among these, the new contributions included are only six, namely four in Petrology and Mineralogy and two in Geochemistry. The editor provides comments on all these papers at the beginning of each section and highlights the contributions in the overall perspective of understanding the genesis and evolution of the Deccan Traps in general or from a particular area. The ratio of almost 5 between the old and new contributions in the volume clearly highlights the need for

new work in appropriate areas notably in the geomorphology of the Trap region.

The Geomorphology section includes a total of six papers previously published, out of which five have been reprinted fully. These pertain to the Western Ghats of the Indian Peninsula (pp. 561–573) by B. P. Radhakrishna. According to him, the Ghats represent an 'upraised and disrupted continental block'. Keith Cox attempts to show that the characteristic drainage pattern (pp. 607–617) in the Peninsular India indicates topographic doming associated with the Reunion Plume activity that is still preserved after up to 200 million years. Magmatic under plating due to the plume is considered to be the most likely cause for the persistence of such features. McGetchin and others (pp. 591–600) deal with the mode and mechanism of plateau uplift and conclude that uplifts are 'commonly associated either with subduction or its direct effects or with deep-seated thermal disturbances which result in expansion and uplift'. The latter view seems to support Cox's model outlined previously.

Dan McKenzie discusses the possible mechanism of Epeirogenic uplift (pp. 601–606) and both large igneous intrusions and hot upwelling mantle (plume) are attributed to such plateau uplifts, again strengthening the case of the mantle plumes for elevated plateau in continental flood basalt provinces. Frank Dixey (pp. 575–590) deals with the geomorphology of MP with recognition of six erosion cycles. The sub-trap cycle of late Cretaceous age and the early post-trap cycle are important to understand the Trap–Plume links. The collection of six papers, thus represents a major contribution towards a better understanding of the Deccan Volcanic Province, notably the Western Ghats Plateau.

The second section on 'Mineralogy and Petrology' contains ten contributions out of which four are new. The paper dealing with the mafic dyke swarms of the Tapti river in the Nandurbar area (Melluso and others, pp. 735–756), clearly brings out the presence of two chemical groups in the ENE-WSE trending dykes, namely low-TiO_2 (< 1.5 wt%) and high-TiO_2 (> 1.8%–4.5 wt%) which share chemical similarity to the flows of lower formations in Western Ghats, Kathiawar, Rajpipla and NW Deccan, indicating heterogeneity of the mantle source. The spinel peridotite nodule – hosting alkaline basaltic rocks of Kutch (Krishnamurthy and others, pp. 757–784) comprise melanephelinites and basanites and detailed mineralogical and chemical studies indicate polybaric fractionation involving eclogite ± olivine and other phases, besides contamination in some basanites by Jurassic sandstones. The contribution on ferrocarbonatites (LeBas, pp. 785–802) recognizes several additional late-stage evolved carbonatites that may show enrichment of Ba, Th, REE, Mn, Fe, Zn and Pb and have direct bearing on the economic potential of a carbonatite complex. The paper on the chemistry and formation of zeolites from parts of Western India indicates that Deccan zeolites have a dominant calcic over sodic component (James and Walsh, pp. 803–818).

Among the six previously published contributions, the ones that have been wholly reproduced include the paper by Bowen on the 'Analcite-rich rocks from the Deccan Trap from Kutch' (pp. 623 626), Mathur and others 'Girnar complex' (pp. 627–636), 'Volcanic activity of the coastal tracts of Bombay, Salsette and Bassein by Mathur and Naidu (pp. 637–640), the 'Petrography and Petrogenesis of forty-eight flows of Deccan Trap Penetrated by Borings in Western India' by West (pp. 641–704), 'Deccan basalts of Bombay area' by Sukheswala and Poldervaart (pp. 705–726), and 'Silicate liquid immiscibility in the Deccan Traps' by De (pp. 727–734). Some of these important publications are not easily accessible and hence would be a welcome relief to those researchers who would like to refer to the original in full. The section on 'Geochemistry' contains eight papers and includes only two new contributions. The new paper on the Narmada dykes to the south of the river (Subbarao and others, pp. 891–902), indicates that the chemical, Sr-isotopic and magnetic properties of many of the dykes are similar to those overlying flows and could be feeders. Nb/Y and Rb/Y ratios of dykes are similar to those found in the flow sequences of the Western Ghats, but otherwise difficult to correlate. The other interesting new paper on nitrogen and light noble gases in mantle xenolith from Kutch and a dunite from Reunion (Mohapatra and others, pp. 903–910) clearly indicated heterogeneity in the source regions of the basalts.

Among the six previously published contributions, those of Washington (Plateau basalts, pp. 823–836), Fermor (Chemistry of Linga Traps, pp. 824–837), Sukheswala (Gradation of tholeiitic basalt to spilite, pp. 847–854), Vallance (Spilitic degradation of tholeiitic basalt, pp. 855–866) and Mahoney and others (Origin of Mahabaleshwar basalts based on Nd, Sr isotopic and chemical evidence) have been extracted in parts. The paper on rare-earth elements mobility during spilitization by Hellman and Henderson (pp. 867–872) has been fully reproduced, considering perhaps that it is a special type of study and only one of its kind from the Deccan.

The section on Lonar Crater Lake contains four papers that have been published previously. It begins with a commentary by R. F. Fudali on the status of research on Lonar Crater – the only known terrestrial impact crator excavated in basalt. The four papers by La Fond and Dietz (pp. 915–919), Fredriksson and others (pp. 921–927), Nayak (pp. 929–932), and Fudali and others (pp. 933–947), provide a comprehensive account of the researches that were carried out on Lonar Crator since 1964 and recognized presently a classic example of a super velocity meteoric impact crator. As pointed out by Fudali, studies on Lonar would help in comparisons and understanding of the so called 'fluidized craters' of Mars.

The present volume thus includes the most significant contributions that have already been published (but may not be easily available to many University researches in India and abroad) and which have a direct bearing on future research and also includes new contributions and data from hitherto less-studied areas, which is certainly a welcome addition to the Deccan database. Like most of the memoirs produced by the Geological Society of India, the present volume is elegantly laid out with a pleasing dark green coloured paperback cover. It will be useful for teachers, researchers and students who are interested in flood basalts in general and the Deccan in particular.

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