ASPECTS OF TECTONICS – FOCUS ON SOUTH-CENTRAL ASIA. By K. S. Valdiya. Tata McGraw-Hill Publishing Company Limited, New Delhi, 1984, pp. 319, figures 240, Price: Rs. 180/-

In recent years several books have appeared dealing with geodynamics having wider aspects and in these, the Indian subcontinent, despite its tectonic diversity has only cursorily been referred. The present book by K. S. Valdiya is an attempt to make good this deficiency for the benefit of students of earth science from South-Central Asia. The book is divided into 15 chapters with a select bibliography. 9 chapters contain a short summary at the end. The reason for not giving a summary for the rest of the chapters is not known. The scope of the book is all-embracing and the author has laboured hard to provide an insight into the wider aspects of the tectonics of the globe.

The ingenious ancient Hindu mythology of ocean churning provides an apt curtain raiser to the book as most of the thought-provoking global concepts of today have their source in the data obtained from the ocean floor. Since most of the chapters have definite titles, the readers normally expect more details which, I admit, is not always possible to provide in a compilation of this type and, in this connection, it would have been helpful if the author had given a list of important books on the topic at the end of each chapter for further reading.

While reading the chapter on crust and interior of the earth, we, in India, are reminded that this sub-continent was the laboratory where important theories of isostasy and travel of earthquakes had their origin. Regarding information about India, updating of information was necessary. The oldest age so far recorded for the Singhbhum craton is 3800 m.y. and that for Karnataka 3400 m.y. In the discussion on gravity, the figure for gravity at equator is interchanged with that for the poles.

The chapter on thrust movements could have been more broad-based to include divergent views and also many of the indigenous and little-known aspects of the Himalaya and also the modern concept of thrust and nappe tectonics. The dynamics of strike-slip faults has received succinct treatment. The development of spectacular Himalayan festoons and their relationship with Pre-Cambrian structural framework (Swaminath *et al* 1964) needed a mention. Compression and tension have complemented each other in crustal evolution and vertical movements have brought varied structural patterns. In these chapters, the author has made a good synthesis of geological and geophysical data. The chapter on sea-floor spreading and plate-tectonics is comprehensive enough to acquaint the student with the main aspects of these modern theories. It would have been more logical if continental drift had been dealt with separately. Sea-floor spreading is concerned more with the definitive evidence emanating from the study of the sea floor. Early continental drift theories were dependent on land-based evidences. For an objective analysis, inclusion of objections to plate-tectonic theory would have provided a better balance to the chapter. Mountain belts and orogeny logically follow the chapter on plate-tectonics. A brief discussion on classical concepts would have helped a better appreciation of modern theories of mountain building. The chapter on tectonic design and evolution of the Himalaya, in spite of receiving maximum attention, has not adequately covered the subject. The tectonic description of the

Indus-Tsangpo tectonic zone is sketchy and incomplete, and many publications of 1980 and 1981 based on systematic and detailed field investigations have been left out. The evolution of the Indus-Tsangpo tectonic zone and the Himalaya could have been combined as these two are closely related. The spectacular Jura type folds of the Tethyan Mesozoic Formations, the Shilakong ophiolite nappe, the huge crystalline basement nappe and smaller klippen, the continuity of structural belts, the essentially parautochthonous nature of the Lesser Himalayan belts, the cover rocks detachment and evolution of superficial nappes, needed better emphasis. The tectonic framework of the ophiolite belts of the sub-continent could have been separately presented for a better impact. Salient points are covered in the evolution of the Himalaya within the constraint of space. The discussion of seismicity of southern Tibet and the Himalayan belts needed a little more reference on MCT and also a comparative seismicity picture with the other major dislocations. The southward migration of basins is true with regard to the frontal Paleogene and Neogene basins but it does not hold good with all the Lesser Himalayan basins. It is also doubtful whether Zagros represents the westward extension of the Himalaya. The contemporaneity of belts cannot be taken for continuity as trends in these belts do not coincide.

The evolution of cratons draw examples from South India. The South Indian Peninsular region includes three distinct lithotectonic units (1) high grade granulites, (2) older supracrustals and (3) younger supracrustals in craton-basin association. This needed emphasis. In the evolutionary history, the early 3400 m.y. event finds no mention. There is an useful discussion on chemical evolution and the gravity conditions over the Indian craton. The figure 9.20 in this chapter is mistakenly referred as Bouguer gravity map instead of Airy-Heiskanen anomaly map.

There is an intimate relationship between tectonic cycle and principal sedimentary facies, and tectonism has always played an important role in sedimentation and also in the development of sedimentary basins. A separate chapter on this aspect is well thought of. The famous flysch and molasse facies are excellent examples of tectonically controlled sediments in orogenic belts.

Metamorphism and igneous activity are rather related, as these events are temperature and pressure controlled and these chapters have some overlap with the previous ones and could have been suitably rearranged.

In view of economic importance, it is necessary to know the relationship between tectonics and localisation of ore. However, the long list of minerals as in the case of the Indus Tectonic Zone of Ladakh may be misleading as anyone not conversant with the actual geology of the area would get a distorted picture.

The morphogenic phase of mountain building, formation of plateau, change in river courses and raised beaches are events related to neotectonic movements which form the last chapter of the book. The correct understanding of the implication of neotectonics helps us in our efforts to protect our environment and in the Himalaya with some of the major dislocations still remaining active, this chapter marks a fitting finale to the book.

The author has included a selected bibliography which by no means can be considered as complete. The inclusion of separate subject, geographic and author indices is very thoughtful and the author deserves to be complemented for the same. There are a few embarrassing spelling mistakes in author index. The illustrations

are clear and the printing is good. After reading through the book, the question arises whether it serves the purpose for which it is written i.e. for the benefit of post-graduate students of earth science. The answer is yes and I have no hesitation in recommending this book to all the libraries of geology departments.

A.M.S.E. Wing
Geological Survey of India
Bangalore 560 001

S. V. SRIKANTIA

STRATIGRAPHY OF THE JAMMU LIMESTONE (GREAT LIMESTONE), UDHAMPUR DISTRICT, JAMMU AND KASHMIR STATE, WITH SPECIAL REFERENCE TO ITS STROMATOLITE CONTENT AND AGE: PALAEONTOLOGIA INDICA, NEW SERIES, VOL. XLVII. By P. K. Raha, Geological Survey of India, 29, Jawaharlal Nehru Road, Calcutta 700 016, pp. 103. Price: Inland Rs. 39.25; Foreign £ 4.70 or $ 14.50.

Palaeontologia Indica Series of Geological Survey of India has the reputation of bringing out outstanding work on Palaeontology and Stratigraphy of the Indian sub-continent. The New Series incorporating for the first time work on fossil-algae is a commendable effort.

The Riasi inlier of the Jammu Limestone (Great Limestone) extends for about 40 km in a northwest-southeast direction in the Himalayan foot-hills of Jammu and Kashmir State of India. The structural inliers consisting of grey and white carbonate rocks form prominent hill ranges amongst the surrounding Murree and Siwalik rocks of Tertiary age. Permo-carboniferous age of these limestones was accepted by Wadia and other workers. It, however, remained controversial and lacked authentic fossil support. Now, on the basis of stromatolite and supporting data of Pb-isotopic dating of galena, their Precambrian age is confirmed. In the second chapter a summary of regional geologic set-up, tectonic implication and stratigraphy have been given. In the third chapter the author has attempted to classify Jammu Limestone into fifteen sub-facies. Palaeoenvironmental analysis reveals their cyclic deposition in supratidal, intertidal and shallow subtidal conditions on a broad sea-marginal shelf.

The chapter on stromatolite is perhaps the most important contribution of the author in which he compares the stromatolite-assemblage found in Jammu-Limestone with those identified earlier in other parts of the Himalaya and in Peninsular part of India. The identification of biostromes and their utility in broader correlation is very significant and can have a wider application in many such stromatolite-bearing Precambrian carbonate belts of India.

Although most of the material incorporated in this volume has already been published by the author, the present compilation forms a good reference book for future studies in stromatolite bearing horizons of the entire Himalayan region extending from J & K to Arunachal. Some of the plates viz. Geological Map etc. have been reduced to such an extent that minor details have become quite obscure. The reproduction of halftone photographs from field and micrographs and blocks are poor in quality. Despite some typographical errors and other shortcomings, the volume is an attempt to use stromatolites for dating of carbonate rocks and reconstruction of palaeoenvironment. The price is reasonable like other GSI publications and it should not be out of reach for individual researcher to secure a copy. This reference book is recommended for all Earth-Science and allied subject libraries.

Wadia Institute of Himalayan Geology,
Dehra Dun

A. K. SINHA