BOOK REVIEWS

THE EVOLVING CONTINENTS (1995), By Brian F. Windley; *John Wiley & Sons*, Third Edition, 526 pp., Price: £19.99.

This popular text book, which first appeared in 1977, is one of the best efforts at presenting a synthesis of the enormous amount of new information generated in recent years on Continental Evolution. The popularity of the book is demonstrated by its running to the third edition. The present edition has undergone major revision, a greater part having been completely rewritten. A large number of new figures have taken the place of old ones. Reference list has been thoroughly revised.

The aim of the book as stated by the author is " to provide an up to date synthesis of earth history as indicated by the geological record and constrained by isotopic, geophysical, sedimentological and geochemical data". The first seven Chapters present a wealth of new information on different aspects of the plate tectonics theory, palaeomagnetism, rifts, island arcs and continental margins. A notable change made in the present edition is the reversal of the order in which earth history is presented. Instead of starting from the oldest Precambrian and tracing different stages of continental evolution through time, the narration starts with a description of the Alps and the Cenozoic Deformation of Europe (Chapter 8) followed by an account of the Himalaya and the Cenozoic Deformation of Asia (Chapter 9). Only the briefest mention is made on the tectonic evolution of the Himalaya. Indian readers and even those outside the country, would have been benefitted if a more detailed account of the different stages of the evolution of this highest and most magnificent mountain range had been attempted. The Himalaya is, in fact, the single solid evidence of crustal shortening and thickening, a spectacular illustration of the Plate Tectonics Theory. Figures illustrating many of the features are not specially drawn for the book, but reproduced from other publications and lack clarity. Chapter 10 starts with a description of Pangea – the Supercontinent in Permian-Triassic times. The Variscan Orogen of Europe is the next region to be covered (Chapter 11) followed by the Caledonian-Appalachian Orogens (Chapter 12).

The events of the Late Proterozoic (1000-540 Ma.) are detailed in Chapter 13. This period in Earth History is important as it immediately precedes the Phanerozoic and is marked by the existence of supercontinents, extensive sedimentary basins, glaciation, and intense magmatic activity in the form of mafic dyke swarms as a prelude to continental breakup. Chapter 14 is of interest as it summarises latest information on the major orogens which developed during the Proterozoic. Chapter 15 covers the Mid-Proterozoic (1600-1000 Ma.), but the discussion is mostly centred around the North American Supercontinent and the Grenville Orogen. Anorogenic magmatism along a 5000 km long and 1000 km wide belt extending from Southern California to Labrador is described. The important point that the Grenville Orogen has no exposed suture, no ophiolite or blue schists has been emphasized. Yet the lack of these has not prevented the application of plate tectonics and continent-continent collision to explain the development of this belt. The Eastern Ghat Mobile Belt of Eastern India is an equally spectacular mobile belt of the same period but it does not find a place in the discussion. Early Proterozoic (2500-1600 Ma.) is another period marked by major orogenic belts, dyke magmatism, continental fragmentation and

vast sedimentary basins developed along passive continental margins. Emphasis in this chapter (Chapter 16) again is on America and Canada. The Orogenic belts of Central and Western India, the great sedimentary basins of Cuddapah and Vindhyan are not even mentioned. While the Banded Iron Formations of many parts of the world are listed (p.304), the Indian occurrences are conspicuous by their absence.

Chapter 17 attempts a review of Crustal Evolution in the Proterozoic marked by supercontinents, accretionary orogens, sutures, ophiolites, blue schists, and high pressure granulites. Models for Archaean and Proterozoic crustal evolution are evaluated. Chapter 18 is almost wholly devoted to the Late Archaean Basins of S. Africa and W. Australia and the Great Dyke of Zimbabwe. A useful summary of the latest views on gold and uranium mineralisation in the Witwatersrand is presented.

Archaean Greenstone Granite Belts form the subject matter of Chapter 19. A wide range of shapes and modes of formation are envisaged for the greenstone belts. The assembly of greenstone-gneiss belts and granites into terranes and groups of such terranes forming cratons is a new concept gaining ground. Indian readers will be disappointed to find Indian greenstone sequence occupying less than half a column. A balanced account of global events should give equal importance to all regions of the world. The statement that greenstone successions are not in their original stratigraphic order, that there are thrust sheets of gneiss within and between some belts and that the result of this intense sub-horizontal deformation was the possible development of a tectonic melange into a thickened crust made up of continental, oceanic, trench and arc material, sums up the present picture admirably.

Chapter 20 deals with the much debated granulite-gneiss belts of the Archaean. Even here, much of the recent work on granulites of South India has been ignored. There is not a single figure illustrating the distribution of the granulitic belts of India. The excellent examples of arrested granulite formation first recorded from South India have not merited specific mention.

Focus of attention in recent years has been on deciphering different aspects of the early history of the earth. It would have been more appropriate to start with this early period on which so much work has been carried out in recent years and much new light has been focused, instead of relegating such a discussion to the last. Understanding evolution in the reverse order makes for a topsy-turvey view of geological history. There is no added advantage in the treatment. A wealth of new data, however, has been gathered as can be seen from the list of reference running to 50 pages and including nearly 2500 references. Most of them are new and quite useful. Indian work, however, has been largely ignored and where referred to relates mainly to work of western scholars and research published in western journals. Co-ordination of facts and arriving at a simple and elegant model of general applicability, inspite of all this effort at synthesis, has remained elusive.

'The Evolving Continents' is a book which all students of earth science should read to get a glimpse of the problems involved in understanding the earth and in tracing the evolutionary history of the continental crust.

Bangalore B.P. RADHAKRISHNA