
Book Review

Dynamic Himalaya by K.S. Valdiya. Universities Press (India) Limited, Hyderabad, 1998, 178 pp., Price Rs. 160.00, ISBN 81-7371-094-5.

This book is a result of author's sustained work spread over more than three decades in the geodynamically crucial and geologically very representative central sector of the Himalayan arc.

Written by Professor Valdiya it is in one of the series being brought out as part of the publication activities of the Jawaharlal Nehru Centre for Advanced Scientific Research (at Bangalore). It is good that there are still niches that allow for publication of ones extensive systematic research as Educational Monographs.

Even though quite young in age, the Himalaya is disconcertingly complex in its structural design. As the Indian land mass continues to move and press Asia, stresses and strains are building up and accumulating progressively in the fractured frame of the Himalaya. Natural hazards are therefore very common in the mountain domain as well as in the adjacent Indo-Gangetic Plains formed out of the detritus derived from the quivering and growing Himalaya.

The book under review is self contained and has been written primarily for laymen and students who have an understanding of the basics of geology. It aims to apprise readers of the natural events and processes that were in operation before the emergence of the giant edifice of the Himalaya. Based on the author's own studies and the analysis of the works of the world's leading Himalayan geologists, the book is an up-to-date account of the history of the evolution of the Himalaya. Professor Valdiya has done an excellent job (in portraying a picture of the setting and origin of the Himalaya) of presenting often complex data, his style is clear and fluent and he presents his data in as uncomplicated a manner as the often

complex material will permit. He must be congratulated on a task well done.

In a concise introductory Chapter "*Many-Splendoured Mountain*" author gives a short and fair account about the great Himalaya describing it as a restless giant and its role as a controller of climate in India's northern border and liberality in giving water to the Indo-Gangetic Plains. The Himalayan snow cover has long been known to affect the monsoon in the country. This chapter also provides brief information about hot springs in certain zones of deep, long faults, mineral wealth stored in Himalayan rocks, province forests and their biodiversity and finally the settlers who live in the bountiful Himalaya.

Chapter 2 "*Perspective: Physiographic and Environmental*" presents a summary on bulges and bends found in the main Himalaya, four recognizable physiographically distinctive and geologically contrasted subprovinces or terranes of the Himalaya, and how birth and growth of the Himalayas begins. Overall the Himalayan mountains constitute a geological province characterized by nearly similar structural architecture, lithological setting and evolutionary history. Major events take place in the evolutionary history of the Himalaya are presented by author in the tabular form corresponding with geological era and time span. The later phase of the chapter deals with state of the natural environment in this geodynamically very active, fragile ecosystem, degeneration and loss of vegetal cover, erosion and landslides, and reduced discharges of springs and streams.

Chapter 3 "*Protracted Cycle of Purana Sedimentation*" addresses how the embryonic development of the Himalaya, which began nearly 2000 m.y. ago, took place. Then the northern margin of the Indian shield was flooded by sea water. The thick pile of rocks in Himalayan basin

is a result of an interrupted (caused by crustal disturbances) long cycle of sedimentation over the northward- and northwestward-sloping continental margin of the shield. The author relates and elaborates the whole developmental episodes of the long cycle of Purana sedimentation convincingly by giving evidences for volcanism contemporaneous with sedimentation, quite period of carbonate formation (prolific growth of cyanobacteria-built stromatolites), time of transition, advent of invertebrates, salt/phosphorites formations and for the cessation of more than a 1000 m.y. long cycle of sedimentation. Evidently, the whole of the continent was gradually lifted up above the sea water and became a landmass.

In Chapter 4 "*From Diastrophism to Diastrophism*" author discusses the tectonic upheaval of continental dimensions which was accompanied by extensive invasion of granitic magma. One, the regional crustal movement which heaved up the Indian subcontinent was contemporaneous with the Pan-African mountain-building movements of Gondwanaland (Pan-African diastrophism). This was evidenced by the termination of deposition of sediments practically all over the continent. The fissuring of the Himalayan province with accompanying volcanism and incursion of the sea along the depression, thus formed implies that the Gondwanic Indian shield was once again overtaken by a powerful crustal movement (Hercynian diastrophism).

The era (Mesozoic) that followed the Hercynian crustal movements is discussed in Chapter 5 "*Era of Growing Tectonic Instability*", which witnessed the splitting away of the Tibetan landmass from India, formation of oceanic trench and development of volcanic island arc in front of Asian landmass.

Chapter 6 "*Collision and Welding of India with Asia*" deals with the collision of the subcontinent with mainland Asia, which resulted into a composite synclinal structure of regional extent.

This witnessed the whole mixed assemblage of diverse rock types- or melanges of rocks in the zone of welding of the continents. The chapter also includes activities like emplacement and squeezing out of sea floor rocks, initial drainage development, sagging of suture zone, formation of elongate basins north and south of emerging Himalaya, and accumulation of fossil fuel deposits. Understandably, the whole of the Himalayan province was elevated and subjected to strong deformation (happened towards the Late Eocene).

In Chapter 7 "*Turbulent times: Birth of the 'King of Mountains'*" author discusses the totality of phenomena (known as Himalayan Orogeny) entailing folding, faulting and thrusting accompanied by metamorphism and intrusion of granites that gave rise to the building of the mighty Himalaya. Development of the Lesser Himalayan domain, formation of the Main Boundary Thrust, evolution of an elongate foreland basin (Siwalik Basin), structural evolution of Siwalik terrane, evolution of the syntaxial bends on the continental margin, etc. are the major points discussed in detail.

In Chapter 8 "*Evolution of the 'Abode of Snows' and Development of Indo-Gangetic Basin*" author introduces about the Quaternary landscape, which witnessed tremendous uplift of Himalaya due to tectonic resurrection and geomorphic rejuvenation. The continued and particularly high rise of the mountain in this period caused profound perturbations in the circulation of winds (including moisture-laden air). Diversion of the even flow of winds and creation of large cool areas caused snowfall on the elevated mountains. The result of the combined process of floor subsidence and rapid voluminous sediment accumulation is evidenced for the development of one of the largest fluvial deposits, forming the great Indo-Gangetic Plains.

In the concluding Chapter "*Continuing Tectonic Unrest*" author states the build-up of strains as Himalaya is being continually pressed. Up-and-down movements in the direction of dips

and sideways sliding of crustal blocks in the direction of strike on the boundary thrusts are taking place within the Himalayan province. Movements along main thrusts and several other thrusts and faults (in the last 1.6 m.y. of Quaternary Period) have not only made the Himalaya the World's highest mountain, but also rendered its land extremely rugged and difficult. The Himalaya that we see today, thus, appears to have been the result of very recent tectonic development. In the end, author cautioned that the region will certainly shake violently someday in the future.

The book contains 20 photoplates (14 in colour), 6 tables, and 85 well-illustrated text-figures of mostly geological models, maps and section. Apart from these, various geographical-geological sectors of Himalaya and geological time-scale are also supplemented in the beginning. One of the interesting aspects of the book is the inclusion of Glossary of nearly 300 geological terms which are extracted largely from W. Kenneth Hamblin's book "Earth's Dynamic System" (6th edition, MacMillan, NY, 647 p., 1992) along with additions from other sources.

Having summarized the essence of the chapters, what can I say about this book in general? This is a valuable effort which forms a timely synthesis of ideas, field results and important citations (348). A perfect starting point for a researcher and graduate student looking for a research problem or for an up-date on the Himalaya. Professor Valdiya has done commendable service to the geoscience communities bringing together a remarkable wealth of information. This book is surely one that anyone interested should read. The reviewer recommends this Educational Monographs to all interested in the evolutionary history of the *Nagadhiraj*- a colossus among the great mountains of the world. The price-tag of the book is within the reach of common man. The book is highly recommended for libraries, students, researchers and even for layman interested in Himalayan trekking.

Anshu Kumar Sinha
Birbal Sahni Institute of Palaeobotany
Lucknow, India