

**Himalayan Tectonics.** Edited by P. J. Treloar and M. P. Searle. Geological Society Special Publication No. 74, The Geological Society, London. 1993. 630 pp. 285 illustrations.

'Geology', said American writer Josiah G. Holland (1819–1881), 'gives us a key to the patience of God.' Himalayan geology seems to do the reverse. Active tectonics of these highest and youngest mountains on earth are manifested in enormous erosion, orographic rainfall, floods, landslides, avalanches, and earthquakes. The Himalayas also provide a natural laboratory for studying tectonic processes at continent-to-continent collisional settings. For these and other reasons, there is an international interest in Himalayan tectonics.

Since 1985 a series of annual Himalaya-Karakoram-Tibet Workshops have been held in Europe (except the 1994 conference which took place in Kathmandu). These workshops give valuable opportunities for Himalayan geologists to gather, present their studies and exchange ideas for further research. Papers presented in these workshops have been published in abstract volumes and in some cases as special issues of journals. *Himalayan Tectonics* boldly and rightly breaks this tradition as it is 'the first time that a full conference volume has arisen out of a Himalayan workshop.' Peter Treloar and Mike Searle, organisers of the Oxford workshop in April 1992 and editors of this volume, have set the standard for future conveners of the workshops, but their pioneering step may not be followed because of time-consuming involvement in editing papers and finding interested publishers. Perhaps if Himalayan workshops are held every three or four years with better preparation so that each conference produces a refereed, published volume, these efforts will be more fruitful. 'Gondwana' symposia held every three years provide a successful example.

Since the Indian plate crashed into Asia at 50–55 Ma, it has continued its northward movement for more than 2000 km, resulting in crustal shortening and active tectonics not only within the Himalayan mountains to the south of the Indus-Tsangpo Suture, where the initial collision took place, but also in the Karakoram,

Hindu Kush, Pamir, Kun Lun and Tibetan plateau. Unraveling this complex tectonic history is a challenge for geologists in order to understand the behaviour of the lithosphere. *Himalayan Tectonics* points to frontier fields of research in the geology of orogenic belts: the nature of the Indus suture zone in Kohistan and Ladakh where Tethyan oceanic crust was consumed, post-collisional formation of granitic rocks which constitute some of the highest and most spectacular peaks in the Himalaya such as Manaslu in Nepal and Bhagirathi in the Indian Garhwal Himalaya, exhumation of deep-seated metamorphic rocks (which form the backbone of the Himalayan mountains), the puzzle of crustal extension in a compressional tectonic regime as in the Zaskar region, etc.

The book covers various geologic aspects of the Himalayan region and has been divided into six parts: the Karakoram and Afghanistan (5 papers), Kohistan and Pakistan Himalaya (10), the Tethyan Himalayan (5), the High Himalayan crystallines (10), the Main Central Thrust zone (4), and the sedimentary foreland basins (5). Out of these 39 papers, 27 papers (70 per cent) deal with NW India and Pakistan Himalaya and the Karakoram, where the editors have mainly worked. But comparison with the abstract volume of the Oxford meeting indicates that this imbalance was probably due to the original submission of papers – thus revealing scarcity of geologic research in the eastern parts of the Himalayas and the need to resolve this shortcoming in the future.

Almost all of the papers, from 'Recent gravity measurements in the Karakoram' (the first) to 'Evolution of the Himalaya since Miocene time: isotopic and sedimentological evidence from the Bengal fan' (the last), present new data rather than being reviews and overviews of past studies. The editors should be commended for their selection of data-based papers because 'at present there are more models than facts' (quoted from American geologist Clarke Burchfiel's talk on the Himalaya-Tibetan tectonics at the 1993 Annual Meeting of the Geological Society of America, Boston).

The editors have dedicated this volume 'to the memory of three young Himalayan geologists who died in the mountains': Paul Mectalfe, Ingrid Reuber, and Ugo Pognante. Geologists with an interest in

Himalayan tectonics will find this book informative.

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**Geology of the Lower Himalaya.** P. S. Saklani. International Books and Periodicals Supply Service, 38 Nishant Kunj, Pahari, Dhiraj Enclave, Pitampura, Delhi 110 034. 1993. 255 pp. Rs 800.

The Garhwal sector of the Central Himalaya has been a subject of geological investigations for well over a century. The pioneering works of C. S. Middlemiss, J. B. Auden, A. Heim, A. Gansser and K. S. Valdiya put our understanding of the complex geological and structural set up on a relatively firm footing. Significant contributions have been made during the last two decades by workers from Geological Survey of India, Wadia Institute of Himalayan Geology and universities both Indian and foreign.

P. S. Saklani has been one of the active workers along with his students. *Geology of the Lower Himalaya* is a monograph containing the results of data collected and published by them over the last two decades or so.

The monograph is divided into six chapters dealing with Introduction, Stratigraphy, Geology, Structure and Tectonics, Metamorphic Petrology and Concluding remarks. Chapter I essentially gives a resume of previous work on geology, structure, etc. Saklani prefers the term Lower Himalaya in contrast to the more accepted Lesser Himalaya, though in Figure 1 only Lesser Himalaya is shown.

Chapter II deals with stratigraphy. It is again largely a synthesis of work mostly of others with hardly any input from the author or his coworkers. Some important contributions which have brought major changes in our understanding of stratigraphy, age, evolution, etc. of Krol Belt have been given only a passing reference. Recently published geochronological data have not been fully exploited to build up the stratigraphy and chronology of tectono-metamorphic events. A good ref-

erence material apart from those referred in the book is available in Geol. Surv. India, Special Pub. No. 26 for 1989, dealing with geology and tectonics of the Himalaya.

In the description of lithology of various units, some awkward terms like basaltic and tuffaceous intrusives (p. 24), low-grade granitic gneisses (p. 19), varves of sericite quartz schists (p. 24), Himalayan striking bedding (p. 64), Himalayan thrust-strike (p. 65), etc. could have been avoided. I do not find anything in the book or maps regarding the Permian transgression represented by the Boulder Slate Formation, so unique to the Garhwal Himalaya.

At other places more clear descriptions are called for, e.g. Kotga-Banali Group is proposed as the youngest part of Jaunsar Group (p. 23), but the correlation of Paturi (Nagthat) with Rautgara-Berinag etc. and of Bhelunta limestone with Deoban leave one utterly confused. This is true of many of other sections.

Chapter III deals with geology. It is essentially a synthesis of work of Satyendra, Bahuguna, Nainwal, etc. (unpublished Ph D theses) and other coworkers. Most of the material given is again repetition from the chapter on stratigraphy. One is confused with the proliferation of new names and their correlation with those of the already well-established units. Quite a bit of structural data has also been given but this together with the data in Chapter IV on structure and tectonics could have presented a more solid picture.

The chapter on structure and tectonics is the strongest part of the book and will be useful for future workers. However, the cross-sections, their balancing and application of thrust tectonics must wait for support from geophysical data. Until and unless there is some consensus regarding correlation of variation thrust sheets, their age, areal extensions and nature of bounding thrusts, the models of thrust tectonics can only be regarded as tectono-fancifull (term used by Asger Bertelsen).

### Figures and tables

The monograph has much data but the synthesis and interpretations have been hurriedly laid down. Even the cross-section in the coloured map shows Chandpur

Formation in the core of Narendranagar syncline overlying the Infra-Krol. No outcrop of Permian is shown. In the map, the colour scheme could have been better, e.g. 13 & 14 have the same colour and no explanation is given for 16, 17, 18 a, b. Even names of places are not properly located, e.g. Mussoorie is written 5 km south of the spot marked. No upright fold is seen in Plate 5 a—the fold has horizontal axial plane. The nicols are shown as crossed in Figure 15 b but the photomicrograph clearly shows it to be under plain polarized light. No units of thickness cm/m are given in Table 1 a. Explanation to Figures 5–10 is upside down. These are some of the points which could have been avoided, by proper editing. The quality of some of the maps is also very poor and they are also very old (1972–73 Vintage). These could have been properly redrafted and updated.

The geological studies in the Himalaya are being actively pursued by many organizations and a lot of material is being published everyday. Every new information on this fascinating mountain belt is welcome. However, only few publications will leave their impact behind. The Monograph I have my doubts will cause any major waves in the vast sea of geological information on two accounts, firstly, most of the material is already available in research papers and workers on geology of Garhwal are conversant with it, secondly too much proliferation of names without any sound basis. Even the price tag of Rs 800 seems to be high and not many of us can afford to possess a copy.

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**Measurements Principles and Practices.**  
Harsh Vardhan. MacMillan India Ltd.,  
1993. 395 pp.

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This book has been written by a recognized authority in the field in the country, who has been concerned with Measurements and Instrumentation throughout his career. As stated in the preface, it is a result of revision of the lectures the author delivered at BITS, Pilani in the Instrument

Technology programme. Such efforts usually end up in a somewhat sketchy and disjointed compilation. This book is obviously much more than revised course notes—it is the experience of a lifetime chronicled in a balanced manner to serve as a comprehensive reference and text for students as well as the practising engineer. Historical background, careful treatment of various methods with necessary analysis and illustrations, critical comparison and objective conclusions, and clear and scholarly presentation in simple English are some of the high points of the book.

The book deals with the measurement of weight, temperature, flow, pressure and level. Starting with general considerations in Chapter 1, where the author defines and explains common terms encountered in measurement practice, including error characterization, the author goes to weights and weighing in Chapter 2. It is a treat to read the various weighing systems used in the past in various countries. The author has discussed all known methods of weight measurement although some have, of necessity, had to be brief. Measurement of temperature forms the subject matter of Chapter 3. Again, historical development precedes the various methods of sensing temperature and processing the resulting signal. I found this to be the most well written Chapter. The next chapter deals with measurement of fluid flow and includes lucid presentation of head, variable area, magnetic, ultrasonic, NMR, laser Doppler, thermal, swirl, mechanical and other flow meters. Measurement of pressure is presented in Chapter 5 with equal lucidity and comprehensiveness. The last chapter deals with the why's and how's of measurement of liquid level.

No human exercise is perfect and the book is no exception. Let me start with the cover design. Yellow letters in dark blue background with an empty enclosed area did not appeal to my eyes. While this may be a matter of personal bias, the quality of paper and printing does not at all match the quality of the material printed. Readability is further reduced by the dense printing on each page, leaving very little margin. The figures, although carefully drawn by a professional, have been reduced by various degrees at different places, resulting in widely differing sizes of lettering, and congestion at many places. Actual photographs of practical