should be of considerable help in future investigations in this area, particularly in the field of sedimentation. The paleogeographic maps are rather sketchy, though relevant, and the photographs could be of better quality. The text is very well written. On page 1, line 5 from the bottom in the first column, the toposheet number should be 64 K/7 and not K/8.

The Geological Survey of India should encourage and promote facilities to its officers, not only to conduct field surveys, but also the much needed assistance to supplement their observations in the field with laboratory studies so that a much better picture of the geological history of the area emerges. It is hoped that more publications of this kind will be forthcoming from the Survey.

Cuddalore - 607 001 R. VAIDYANADHAN

HYDROGEOLOGY (1994), By K.R. Karanth, Tata McGraw-Hill Publishing Company Limited, New Delhi; 458 pp. Price Rs.399.

The study of water resources, more especially the part which lie hidden from our view and stored underground, is a much neglected subject. There are myriad problems related to the wise utilization of this precious resource which can only be understood through a scientific study of all aspects of its occurrence and availability. We, therefore, welcome this present contribution brought out by Tata McGraw-Hill Publishing Company Limited. It is gratifying to note that this book originally issued in 1989 has been twice reprinted testifying to its popularity.

The first two chapters provide essential background information on rainfall, runoff, infiltration, water balance, recharge and discharge areas. Mathematical basis for groundwater flow is explained in Chapters three and four. Hazards due to land subsidence as a result of abstraction of groundwater are detailed in chapter five. Dissolved constituents which are a reflection of groundwater-quality, and quality criteria for different uses are discussed in chapter six. Chapter seven deals with groundwater temperature.

Chapter eight on groundwater exploration is of special interest as it discusses, in addition to geological methods, utility of aerial photographs and geographical methods for identifying favourable structures. The Chapter also furnishes details relating to exploratory drilling, testing and well-logging. Crystalline rocks by which term is meant non-volcanic, igneous and metamorphic rocks, are rightly singled out for special treatment in Chapter nine. We wish there was a more elaborative discussion on groundwater conditions in hard rock areas with specific examples, as a good part of Peninsular India is covered by hard rocks, and these areas also happen to be drought-prone. Chapter 10 is devoted to description of groundwater conditions in volcanic rocks. The following seven Chapters (10 to 17) deal with lithified clastic sediments (Chapter 11), carbonate rocks (Chapter 12), fluvial deposits (Chapter 13), coastal deposits (Chapter 14), glacial deposits (Chapter 15), lacustrine deposits (Chapter 16) and aeolian deposits (Chapter 17). The last Chapter (Chapter 18) lists legands to be used in Hydrogeological maps. The inclusion of a few illustrative hydrogeological maps would have greatly added to the usefulness of the book.

General books on hydrogeology, lavishly produced with numerous illustrations in colour are available for reference, although their cost is prohibitive. But books dealing specifically with hydrogeological conditions existing in India are badly needed. The coverage in the book under review from this point of view, is considered inadequate. A more comprehensive account of hydrogeological conditions in the Indian context, summ-

arising the information gathered so for and illustrated with specific examples and hydrogeological maps is felt necessary. The author with his first hand knowledge of groundwater conditions in different parts of India is specially qualified to undertake such a study. The publishers, we trust, will take steps to bring out such a book specifically devoted to groundwater in India so that the subject of hydrogeology can be taught in our schools and colleges in a more understanding way.

B.P. RADHAKRISHNA

SYSTEMATIC STUDY OF PLANT FOSSILS FROM DAGSHAI, KASAULI AND DHARAMSALA FORMATIONS OF HIMACHAL PRADESH (1996), by A.K. Mathur, V.P. Mishra and S. Mehra. Geological Survey of India, Calcutta. 121 p., Rs.151 or $54.36 or £17.61.

The Geological Survey of India have been publishing monographic reports on major plant/animal fossil discoveries by officers of the survey in *Palaeontologica indica* (Memoirs of the Geological Survey of India) for over 125 years. The volume under review (volume 50 of the new series) contains descriptions of angiosperm megafossils, mostly leaves, and a few algae collected during 1988-1991 (794) from 21 sections, covering 810.15 m, of Early Tertiary strata in Himachal Pradesh.

In the area, two major belts expose Lower Tertiary sediments, *i.e.*Shimla Hills and Kangra Valley. In both the areas, the Lower Tertiary sedimentation commenced with a marine phase that laid the Subathu Formation. In the Shimla Hills, the Subathu Formation is unconformably overlain by the Dagshai and the Kasauli Formations. The Kasauli Formation is in thrust/faulted contact with the Late Tertiary Siwalik Group. In the Kangra Valley, the Subathu Formation is unconformably overlain by the Dharamsala Formation which in turn is in faulted/thrusted contact with the Siwalik Group of sedimentaries. Detailed field studies conducted by the Group have brought out the fact that a major abiotic event, *viz.* volcanicity, separated the Kasauli from the Dagshai and the Lower Dharamsala from the Upper Dharamsala Formations, which otherwise show a gradational contact.

The authors report, for the first time, megaplant remains from the Dagshai Formation. The presence of four taxa, supposedly of moist tropical habitat, indicate that the climate during deposition of Dagshai sediments was akin to that of present day Ganga plains. The Kasauli megaflora is comparatively more diversified, and is dominated by elements of leguminoid affinities. A few charophyte casts have also been found. The overall composition of the flora indicates altitudes higher than the Ganga plains. From the Dharmasala Formation, only charophyte fossils have been reported.

The present study has thus generated important data on the Early Tertiary vegetation of Himachal Pradesh. It is gratifying that lithologs and sample locations (both temporal and spatial) have been provided.

A major controversial point in this monographic study is the identification of 15 "species" of extant genera of plants based only on leaves. The authors have of course followed the trend set by certain Tertiary palaeobotanists who, overlooking the established norms for establishing taxa of modern plants, both at the genus and species level (that is, totality of morphological characters in general and reproductive biology in particular), institute new species in modern genera only on the basis of fragmentary fossil materials. The features of the leaves or the wood are hardly ever considered in isolation for taxonomic differentiation. There are no valid grounds either to establish new species epithets when