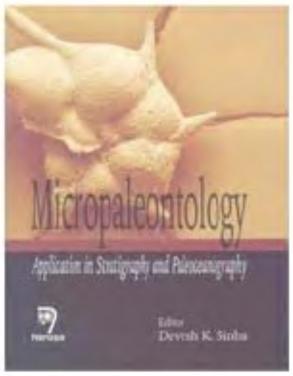

Micropalaentology: Application in Stratigraphy and Palaeoceanography. Devesh K. Sinha. Narosa Publishing House, Darya Ganj, Delhi Medical Association Road, New Delhi 110 002, India. 381 pp. Price not mentioned.

The volume 'Micropaleontology: Application in Stratigraphy and Palaeoceanography' incorporates twenty six invited papers on microfossils ranging from Mesoproterozoic to Recent, by some of the leading scientists from academia and industry, besides eminent micropaleontologists from abroad. Of these, seven papers are devoted to palynofossils and four papers to planktic foraminifera, three to isotopic studies and two each to radiolaria and benthic foraminifera and one paper each on nanofossils, diatom, corals, micro vertebrates, mega fossils, neotectonism, microtektites and miscellaneous group. However, there is no paper on ostracodes. The book under review, dedicated to Prof. M. S. Srinivasan, is a welcome addition to the knowledge base on the current understanding of application of various groups in high resolution biostratigraphy, paleoceanography and paleoclimatology.

The paper by Prasad *et al.* on the Meso-Neoproterozoic organic walled microfossils from Vindhyans of Son valley gives a comprehensive account of acritarchs, coccoid and filamentous forms, characteristic of Meso–Neoproterozoic. The work is supported by excellent illustrations of various photomicrographs and concludes that the Vindhyan super group ranges in age from Early Mesoproterozoic (Ca 1550 Ma) to Terminal Proterozoic (Ca 544 Ma). Another paper on the Vindhyan super group of central India by Azmi and co-workers, discusses the enigma of the age of these sediments. The article, supported by high quality photographs of small shelly fossils, calcareous skeletal algae, megascopic carbonaceous metaphyte compressions and megascopic burrow trace fossils, strongly recommend a thorough review of the Vindhyan geochronological dates in view of their fossil data and dating of the VSG.

In the Paleozoic section, Sinha and his co-workers provide an account of acritarchs from Silurian sediments of Tethyan Garhwal Himalaya and argue a rethinking on the Ordovician/Silurian boundary based on their work. Ram Awatar provides an account of the palynostratigraphy of the lower Gondwanas in the Raigarh coalfield of Chhattisgarh and gives an illustrative account of palynoflora recorded.

The Cretaceous rocks of south India are well known for their wealth of ammonites. Ayyasami and his team have summarized the Santonian mega fossil assemblage of the Ariyalur area and have provided a comparison of similar fossils from other parts of the world. Through their work on Cretaceous–Tertiary (K/T) transition and micro floral association, Kar and Singh highlight the necessity of further study of Maastrichtian and Danian markers for better understanding of this boundary and paleoecological changes across it.

A large number of articles are devoted to the Cenozoic microfossils on their application in stratigraphy and paleoecology. The Paleocene vertebrate fauna from Barmer, Rajasthan has been discussed by Rana *et al.* The paper emphasizes further scope of finding more complete remains of vertebrates that will help in precise dating and paleobiological interpretations.

The Subathu of Kalka-Shimla area has been studied by Singh *et al.* and five palynozones have been identified based on dinoflagellates and spore-pollen assemblages. The paper by Whiso *et al.* signifies the age significance of *Planorotalites palmerae* from Dillai Parbat area of Assam. Kundal and Humane recorded coralline alga from the Eocene–Oligocene of Kutch. A new approach on Neotectonism through sea level changes by study of micro fauna from beach rocks of south Andaman has been provided by Rajshekhar and his co-workers.

A review of current status of radiolarian research in India has been provided by Sharma. He has also discussed the future direction in the research in this interesting group of microfossils. In another paper Sharma and Daneshian have discussed species diversity of radiolaria from the early Middle Miocene of Andaman and possible causes responsible for variation in their diversity.

An important contribution in this volume is the paper on diatom events of Oligocene–Miocene in equatorial pacific by Baron. He provides the latest diatom zonation for the Eocene–Miocene, correlated with paleomagnetic stratigraphy as a reference for future work on this group.

Keller and Pardo have discussed in detail the foraminifer *Guembelitria* for its environmental proxy during Late Maastrichtian and post–KTB (early Danian). The blooms of these taxa have their environmental implications especially locating times of environmental stress and biotic catastrophes.

Srinivasan and Sinha report discovery of microtektites (microscopic glassy objects that provide evidence for an extraterrestrial bolide impact) from a DSDP site in northern Indian Ocean and discuss its geological implication especially for understanding its link with geomagnetic reversals and faunal extinctions besides improved correlations.

The astronomic and oceanographic influences on global carbon cycle across Oligo–Miocene boundary and its relationship with deep sea temperatures, nutrient delivery, dissolution and deep water variability have been discussed in detail by Flower and his team. They speculate that global carbon cycling led to deep circulation changes and dissolution cycles in deep Atlantic Ocean, at least in the obliquity band.

Based on relative faunal abundance, factor analysis, faunal diversity of benthic foraminifera, Rai *et al.* discuss the paleoceanographic changes in northwest Indian ocean DSDP site 237 at Miocene level. Biochronologic analysis of planktic foraminifer of Neogene section in the Pacific coast of South America has been attempted by Ibaraki. Based on changes in surface temperatures at Zone N19 at 3.95 Ma, he concludes a coastal upwelling in Peru coast at this time. A checklist of planktic foraminifera recorded in the study is also provided. Another work on paleoceanographic implication of planktic foraminifera and isotopic composition is provided by Sinha and Singh, who record episodes of weakening of Leenwin current during Quaternary in the southeast Indian Ocean.

Four major deep sea hiatuses and two strong dissolution intervals in the Neogene of northern Indian Ocean have been brought out by Singh and Mohan. The study reveals that the erosion events cor-

respond to intervals of positive excursion of $\delta^{18}O$ indicating climatic cooling and sealevel drop. The study of *Orbulina universa* for oxygen and carbon isotopic composition from sediments cores in eastern Arabian Sea for potential monsoon proxy has been discussed in detail by Ramesh and Tiwari. The paper by Saraswati discussed foraminifera–algal symbiosis and their significant implication in paleobiology and paleoceanography.

The solitary paper on calcareous nannofossils records a rich assemblage from the Neogene of Andaman Sea.

Based on distribution pattern of benthic foraminifera from Krishna–Godavari delta, Bhattacharjee and others have described several biofacies and their environmental significance with special emphasis on relict sediments.

The editing of the volume by Devesh K. Sinha is praiseworthy, particularly the layout, quality of illustrations, printing and overall getup. There are some spelling mistakes especially in the titles and text of some papers which could have been avoided.

To summarize, this book is a welcome addition to the literature on micropaleontology and is recommended for stratigraphers and micropaleontologists both in industry and academia alike.

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The Nano-Micro Interface: Bridging the Micro and Nano Worlds. Han-Jorg Fecht and Matthias Werner (eds). Wiley-VCH Verlag GmbH & Co. KGaA. 2005. 327 pp. Price not mentioned.

Nanotechnology has acquired a new dimension in almost all spheres of materials technology and is influencing virtually all systems; yet microtechnology stands out on its own right. In this backdrop, the title of the book under review attracts immediate attention. The contents mainly deal with nanotechnology for electronics, but also have a few articles of other disciplines as well. The book consists of three parts. Part I which constitutes about 23% of the book is not of much use to serious researchers. In fact, it is purported to limit discussions around micro-level only but, on many occasions, it interpolated many macro/mega management terms like venture capital, investment, partnership, marketing, etc. Part II placed under the heading 'Fundamentals and technology' constitutes about 45% of the book and Part III is placed under the heading 'Applications'. Articles under Parts II and III are generally overlapping in nature; and some of them are interesting. For example, a short write-up on 'Nanomaterials and smart medical devices' and an article entitled 'Bioinspired anti-reflective surfaces by imprinting processes' will in fact motivate many readers to learn more from nature to simulate systems through nanotechnology. Illustratively, information on the surface properties of lotus leaf in the nanoscale level enables one to understand the scope of super hydrophobic surfaces by imprinting process. The idea for creation of moth-eye surface structure to improve light transmission in large and complex surfaces evokes special interest. Besides, discussion on anti-reflective coating deserves mention, where the concept of nanotechnology has been presented with an interdisciplinary approach through chemistry, physics and engineering. In fact, these two articles should be read at the outset to appreciate the scope of nanotechnology in a broader perspective.

A short article entitled 'Biomimetic nanoscale structures on titanium', focuses on biocompatibility, highlighting the necessity of histocompatibility for strong tissues–implant interactions vis-à-vis hemocompatibility, where no such interaction between body fluids and foreign surfaces is required. Discussion on nano-crystalline oxide-reinforced polymer electrolytic membrane for fuel cell for energy generation with clean technology approach is important in the contemporary context. It also shows the application of electroencephalogram (EEG), where scalp electrodes are connected indirectly with the skin via electrolyte bridge using a special type of gel. The article on applications of diamond nabbed nano- and microtechnology shows the scope of diamond-based devices like diodes, transistors, microsensors and even diamond-MEMS, besides micromechanical applications through ultra-sharp diamond-cutting edges with radii of curvature less than 5 nm, for use as scalpels for eye and neurosurgery.

The paper on microwave-driven hydrothermal synthesis of oxide nanopowders for optoelectronics is useful because of its information content, but it has a few inconsistencies. In Part II, a well-written article on the growth of nano-wires is important from the viewpoint of interconnecting conventional electronics, microsystems and nano-electronics. Nanoparticle-based chemical gas sensor for monitoring air quality is an important inclusion in this book, where the role of size of tin oxide nanoparticles on sensitivity has been discussed. Instruments like AFM and AFAM (atomic force acoustical microscopy – a new variation of the scanning probe microscopy) are covered in two separate articles, for analysis of elastic properties of a surface with resolution down to nanometre.

As nanotechnology is an interdisciplinary field, it would have been more beneficial had there been an appendix with a list of acronyms at the end, because for example, terms like FBAR have been used (p. 181) without giving the full name while discussing new approaches towards improving piezoelectric quality of ZnO resonator devices using chemo-mechanical polishing process, to enable a mobile to work around the world on different frequencies.

Mictamict is a special class of materials and a rather uncommon topic, yet it finds place in the discussion on amorphous, electrically conducting materials for transducer applications. Another article entitled 'New technology for application-specific lab-on-a-chip' showing the potentiality to integrate microtechnology to enable fusion of chemical and electronic systems in a lab chip based on micro- and nanochemistry and surface interaction is informative. However, it may not create immediate interest among general readers because of its technical complexity.

Generally, it is known that only special polymers like PVDF can provide electromechanical effect, but the last article presents uncommon information that even a general purpose polymer like polypropylene can be considered for electromechanical response, provided it is processed to an appropriately oriented micro-cellular texture to function as a dynamic sensor.

One of the articles in Part I bears a few shallow sentences and some typing mistakes, which seem to have diluted the standard.

The article on nanates and nanites (p. 32) defines nanates as systems that are associated with passive applications of nanotechnology as exemplified by a photographic film which exploits chemical reactions to generate nanoscale particles for a nanocomposite system. On the other