extracting DNA from long dead individuals such as fossils, mummies and museum specimens can be very helpful in conservation. The ability to amplify DNA from hairs, droppings, etc. can be useful in the genetic study of endangered populations where collecting blood samples may not be feasible. Similarly, genetic variation in extinct populations can be studied by accessing DNA from museum specimens. Such information may help understand some of the causes of extinction. Moreover, extensive museum collections from different historical periods can allow one to do time course studies on genetic variation, at least for some species.

Overall, the book is interesting and informative. The coverage of material is also rather balanced: both the benefits and pitfalls of genetic techniques in conservation are emphasized and discussed, and theory, techniques and case studies are all covered. The book will perhaps be most beneficial to conservation biologists who come from more of a natural history/ecology background, because it highlights many genetic processes and techniques that they need to be aware of, but often are not, and also provides a good bibliography. Conservationists without a reasonable background in biology may find the book pitched a little too high for them. Even so, some of the simple take-home messages are emphasized in clear, non-technical language and these will be of use to resource managers, policy-makers and the like. The book would also be useful as supplementary reading material for courses in conservation biology and its availability in paperback form makes it relatively affordable.

AMITABH JOSHI

Evolutionary and Organismal Biology Unit,
Jawaharlal Nehru Centre for Advanced Scientific Research,
P.O. Box 6436, Jakkur,
Bangalore 560 064, India

Plant Systematics – Theory and Practice. Gurcharan Singh. Oxford & IBH Publishing Co Pvt Ltd, 66 Janpath, New Delhi 110 001. 1999. 359 pp. Price: Rs 160.

The book is an update on the subject of plant systematics (chapters 1–10) over some five standard books that have appeared since 1950s, followed by a descriptive, illustrated account of 27 common families of flowering plants (chapter 11). The coverage is comprehensive.

The late P. H. Davis had once mentioned to me that he was against a new edition of the excellent book then in wide circulation of which he was the first author[1] because, with so much new information from very diverse fields to be handled, two authors could no longer do justice to the subject. The book under review, attempting such a handling, offers too much for the student, and too little for researchers.

On the one hand, botany and systematic botany in particular, is hardly the first choice of the general stream of students. Undergraduate/post-graduate teaching should aim at inculcating an appreciation of the variations in nature, more as an outdoor exercise than an indoor one. This should expose the students to the riches of plant life and instil in them an abiding interest in plants even if they do not specialize further in botany.

A good illustration of such a teaching aid is the eminently readable and stimulating book by Jeffrey[2], a title not listed in the references section. The problem-solving approach is truly original and gripping, in the course of which the conventionally inscrutable taxonomic technicalities fit in as answers to a felt need (I had an intention to produce a tropical version of this book about which the author was agreeable, but not the publishers!).

On the other hand, India – the home of a considerable share of the planet's green cover – really needs a fair number of competent systematists. Consequently, the dated colonial *Floras* are still largely the basic reference for plant inventories, in spite of swarms of new publications. Data on endemic threatened/endangered/extinct plants fed into the international database are a serious disservice[3].

This situation underscores the urgent need of monography, the core of taxonomic research. And the massive herbarium collections now largely idling across the country will then be used to study the plant wealth of the country. Summarizing my views on the teaching of, and research in, plant taxonomy since the 1970s, I have pointed out that Indian plant taxonomy, having drifted out of the international taxonomic endeavour, has been undergoing inbreeding, resulting in loss of vitality[4].

An Indian (tropical) textbook should aim at correcting this anomaly by stressing on indigenous priorities, namely the specific regional contributions to world botany among which is the first-hand knowledge of plants and their conservation, which no one else can provide. It is this thrust that is generally lacking in the book. It may be necessary to skip subjects in which world centres are better equipped: nomenclatural intricacies, electronic devices and phylogeny[5] among others, belong here. The steady influx of new techniques (computers, internet, etc.) should not be confused with better taxonomy. They are merely tools that can be used for organizing data but not a substitute. We get out of these techniques what we put into them, not more. They do not provide any new information; they help us organize our data more efficiently.

A specialty of the book is in fact, chapter 11, with descriptions of families and some included species, and illustrations and floral diagrams. However, these do not meet the requirements indicated earlier and are not inspiring. The structure of the book is conventional, and the close similarity, even verbal, to any title it hopes to supersede, is obvious.

Some minor slips and antiquities may be mentioned. (i) Herbarium methodology: use of glue for mounting specimens (p. 73) or use of vasculum (p. 60) are not the best; (ii) theoretical: Hutchinson's system (pp. 142–148) being listed among phylogenetic systems is untenable (the late B.G.L. Swamy would insist on the qualificative *putative* to precede several of the systems); (iii) nomenclatural: *Adhatoda vasica* (p. 300), *Peristrophe bicalyculata* (p. 301), *Phyllanthus niruri* (p. 311) are no longer considered as the correct names; (iv) taxonomy: *Nymphaea pubescens* Willd. (not *pubescence*!) (p. 45) and *N. nouchali* Burm.f are different plants; (v) periodicals: *Journal of the Arnold Arboretum* ceased publication several years ago, and *Systematic Botany* is not published from New York (p. 78).

These are minor failings, understandable when a single author handles such a vast subject in a mere 359 pages. On the positive side, the methodical organization of so much information from such diverse fields, with emphasis on modern techniques, is commended. Updating of lit-

erature references also is adequate. The production is good, the text generally free of errors and the price reasonable. The book is recommended for judicious use.

1. Davis, P. H. and Heywood, V. H., *Principles of Angiosperm Taxonomy*, Oliver and Boyd, London, 1963.
2. Jeffrey, C., *An Introduction to Plant Taxonomy*, Cambridge University Press, Cambridge, 1982, 2nd edn.
3. Kerry, S. W. and Gillet, H. J. (eds), *1997 IUCN Red List of Threatened Plants*, IUCN, Gland, Switzerland, 1998.
4. Matthew, K. M., in *Biodiversity, Taxonomy and Ecology* (eds Tandon, R. K. and Pritipalsingh), Scientific Publishers (India), Jodhpur, 1999, pp. 193–206.
5. Judd, W. S. *et al.*, *Plant Systematics: A Phylogenetic Approach*, Sinauer Associates, Sunderland, Mass, 1999.

K. M. MATTHEW

The Rapinat Herbarium,
St. Joseph's College,
Tiruchirapalli 620 002, India

Biogeochemistry of Rivers in Tropical South and Southeast Asia. V. Ittekkot, V. Subramanian and S. Annadurai (eds). Institute of Biogeochemistry and Marine Chemistry, University of Hamburg. 1999. 297 pp. Price not stated.

The most striking feature of the earth, also known as the water planet, is its extensive hydrosphere which undoubtedly originated from the degassing lithosphere. The biosphere, lithosphere and atmosphere commonly interact with one another via the action of water. Water in its various states is the medium, catalyst and/or participant in nearly all the chemical reactions occurring in the environment including those of life processes. It is the carrier in many of the natural cycles and transfers energy and chemical materials, dissolved or particulate, from place to place.

The biosphere acts like a transducer taking carbon and water from the atmosphere and the hydrosphere and fixing them in organic materials by photosynthesis and finally giving them back to the lithosphere. It also accumulates ions as nutrients and sends them back to the lithosphere.

It is with this scenario of global circulation of materials and energy in mind that the book under review carries tremendous scientific significance. With all our major rivers and other water bodies being polluted, the appearance of such a book in the Indian environmental scenario will be a shot in the arm.

This book is a collection of 27 papers presented at an International Workshop on Environmental Biogeochemistry held in New Delhi during December 1998. It addresses critical issues like development and control of monsoonal character and precipitation, terrestrial discharge of dissolved and particulate fluxes through rivers lakes and estuaries, anthropogenic inputs of pollutants like heavy metals, excess nutrients and pesticides, etc., all related to an intensely rain-fed region of south and south-east Asia. Eleven of the papers are directly related to problems in India, nine are of general nature, two related to Vietnam and one each to Sri Lanka, Bangladesh, Nepal, Thailand, Indonesia and China.

The book opens with a paper by Ittekkot and Subramanian giving a comprehensive account of impact of various aquatic fluxes from land to ocean including those arising out of human activities such as agricultural practice, land use, deforestation, urbanization, etc. The heralding of the monsoon in south and south-east Asia, which primes aquatic mass transfer from land to sea, is well discussed by Lydia Dumenil in a paper on monsoon modelling with a 150-year long numerical simulation and in relation to Sea Surface Temperature (SST) anomalies and ENSO-nonENSO oscillation.

In a series of papers dealing with elemental mass transfer, Milliman emphasizes the importance of the SS : DS ratio and the fate of sediments downstream rivers in south-east Asia; Soman gives an account of the rivers of the Western Ghat draining terrains rich in flora and fauna; Decov and Subramanian discuss about mass elemental transfer in major Indian rivers flowing over a variety of lithological basins; Silva discusses the water quality and chemical fluxes in rivers of Sri Lanka; and Nihn *et al.* present data on the Red river in Vietnam. That the sediment flux to China Sea has apparently decreased in spite of increased flood discharge is pointed out in a paper by Cheng Hequin who accounts for this phenomenon due to man-made trapping of sediments by way of dams, reservoirs, settlements and urbanization. It has also affected nutrient discharge into the estuary with consequent impact on biota. In an identical paper Nguyn *et al.* discuss the mechanism of mixing of the advancing terruginous plume with sea water in Mekon delta of Vietnam and the consequent decrease in photosynthesis and scavengers in the interactive zone, which apparently has adverse effects on aquatic life.

In order to characterize the stream and river fluxes from a pristine, uninterfered basin, Rawat *et al.* have made a pilot study over a macro-basin in the Lower Himalayas, but the authors themselves have recognized minor anomalies in man-made interferences. B. K. Das *et al.* report on the sediment quality of lakes in the lower Himalayas, correlate sediment chemistry to source rocks and propose zero pollution.

In a paper presented by Dupre *et al.* variation in the content of organic acids and the consequent intensity of weathering and decomposition have been noted on plateau, along slopes and in swamps. Decomposition of organic materials and generation of methane in various aquatic bodies, also arising out of agricultural practices, are extensively dealt with by Ramesh *et al.* who opine that the emissions significantly contribute to global greenhouse gases.

While most of the papers mentioned earlier emphasize more on natural flux transfers, as many as eleven papers deal specially with anthropogenic fluxes, such as heavy metals, nutrients (P, N and C), pesticides, etc. Hungspreugs *et al.* present data to establish pollution of Thai rivers with toxic heavy metals. Seno Adi, in a paper on the Brantas river of E. Java, discusses pollution arising out of agricultural practices and urbanization. Dutta mentions the fluctuation in the level of dissolved phosphates during monsoon and winter flows in the Ganga–Bramhaputra–Megna riverine system in Bangladesh. Mahanta discusses the impact of agricultural practices on the C : N ratio and organic/inorganic P in Bramhaputra sediments. Saffiullha talks about arsenic leachates in sediments of Bangladesh and