because hyperlinks would allow cross linking of terms to glossary entries, and searching and updating would be easy.

David G. Mann

References

Adl, S. M., Simpson, A. G. B., Farmer, M. A., Andersen, R. A., Anderson, O. R., Barta, J. R., Bowser, S. S., Brugerolle, G., Fensome, R. A., Fredericq, S., James, T. Y., Karpov, S., Kugrens, P., Krug, J., Lane, C. E., Lewis, L. A., Lodge, J., Lynn, D. H., Mann, D. G., McCourt, R. M., Mendoza, L., Moestrup, Ø., Mozley-Standridge, S. E., Nerad, T. A., Shearer, C., Smirnov, A. V., Spiegel, F. W. & Taylor, M. F. J. R. (2005). The new higher level classification of eukaryotes with emphasis on the taxonomy of protists. *J. Eukar. Microbiol.* 52(5): 399–451.

Adl, S. M., Simpson, A. G. B., Lane, C. E., Lukeš, J., Bass, D., Bowser, S. S., Brown, M. W., Burki, F., Dunthorn, M., Hampl, V., Heiss, A., Hoppenrath, M., Lara, E., le Gall, L., Lynn, D. H., McManus, H., Mitchell, E. A. D., Mozley-Standridge, S. E., Parfrey, L. W., Pawlowski, J., Rueckert, S., Shadwick, L., Schoch, C. L., Smirnov, A. & Spiegel, F. W. (2012). The revised classification of eukaryotes. *J. Eukar. Microbiol.* 59(5): 429–514.

Archibald, J. M., Simpson, A. G. B. & Slamovits, C. H. (eds) (2017). *Handbook of the Protists*, 2nd edition. Heidelberg: Springer (in press).

Burki, F. (2014). The eukaryotic tree of life from a global phylogenomic perspective. *Cold Spring Harbor Perspect. Biol.* 6: a016147.

Graham, J. E., Wilcox, L. W. & Graham, L. E. (2009). *Algae*, 2nd edition. San Francisco, California: Pearson.

Hoek, C. van den, Mann, D. G. & Jahns, H. M. (1995). *Algae. An Introduction to Phycology*. Cambridge: Cambridge University Press.

Hoppenrath, M. & Saldarriaga J., F. (2008) Tabulation in Dinoflagellates. In: Maddison, D. R. & Schulz, K.-S. (eds) *Tree of Life Web Project*. Online. Available: http://tolweb.org/notes/?note_id=4796#AboutThisPage

Karsten, G. (1928). Bacillariophyta (Diatomaceae). In: *Die Natürlichen Pflanzenfamilien*, vol. 2, 2nd edition, pp. 105–303. Leipzig: W. Engelmann.

Lee, R. E. (2008). *Phycology*, 4th edition. Cambridge: Cambridge University Press.

Yang, E. C., Boo, G. H., Kim, H. J., Cho, S. M., Boo, S. M., Andersen, R. A. & Yoon, H. S. (2012). Supermatrix data highlight the phylogenetic relationships of photosynthetic stramenopiles. *Protist* 163(2): 217–231.

Nepal: an Introduction to the Natural History, Ecology and Human Environment of the Himalayas. A Companion to the *Flora of Nepal*. G. Miehe, C. Pendry & R. Chaudhary (eds). Edinburgh: Royal Botanic Garden Edinburgh. 2015. 576 pp. ISBN 978 1 910877 02 9. £70 (hardback).
doi: 10.1017/S096042861700021X

The Himalayas are the greatest mountain range on Earth. This mountain system, which includes the world's highest peaks, including Mount Everest, is the largest

extent of high-altitude areas and has the most complex topography; it is also an area of exceptional biological diversity along condensed vertical ecological gradients. Furthermore, it is renowned for its diverse ethnic groups, outstanding cultural diversity and high variability of human–environmental subsystems. In recent decades, a considerable wealth of knowledge about the ecology and environment of Nepal and the Himalayas has been accumulated. Nepal, located in the centre of the Himalayan Arc, has been a particular target region for research efforts in vast fields of environmental sciences. However, numerous recent research endeavours should not obscure the fact that the knowledge is still deficient in many respects, and that there was a need for a comprehensive treatment of the natural history, ecology, biogeography and human impact on the environment of Nepal and the Himalayas. This companion volume to the *Flora of Nepal*, an ongoing publication project of 10 volumes, aims to fulfil that need. With a touch of understatement, the editors seek to present an "introductory account" of the geographical and ecological context of the c.7000 species to be described in the *Flora of Nepal*, to give a "concise overview" of Nepal's physical environment, vegetation types, ecology and conservation.

The result is more than impressive and anything but concise. It is an overwhelmingly extensive account and can be considered the standard reference work on Himalayan ecology and environment. The book provides a tremendous wealth of detailed information on Nepal's abiotic and biotic environment, palaeoecology, and related biogeographical and ecological processes in space and time, and includes also the human dimension. All chapters are superbly illustrated with maps, figures and photographs. The readership will perceive the encompassing expertise of the editors and more than 40 authors involved, who collectively have centuries of research experience in the Himalayan region. Georg Miehe, biogeographer and mountain ecologist, looks back on 40 years of geographical and ecological research in Nepal and the wider Himalayan region. The book is coedited by a taxonomist with an ecological background, Colin Pendry, who is an editor of the *Flora of Nepal*, and whose focus has been on Nepal since 2004. Ram Chaudhary, associate editor, is a taxonomist, conservation biologist and policy advisor, and has studied the Himalayas since 1978.

The first chapters of the book are dedicated to the physical environment. Chapter 1 discusses Nepal's regional setting within the Himalayan Arc, and is followed by a differentiation of Nepal's physiographic regions and the respective altitudinal zonation of the potential natural vegetation in Chapter 2. Here, the older term 'midlands' is given precedence over the well-established term 'mid hills' for the landscape unit between the Siwaliks and the southern slopes of the High Himalayas. Chapter 3 covers in brief Nepal's geology and tectonic history; the discussion of controversial issues, however, is given more space in later chapters (e.g. the timing of uplift phases). The next chapter provides exceedingly detailed information on climate and weather (almost 70 pp.), including modelled thermal and precipitation regimes as well as detailed relationships between climate variation and vegetation patterns, as exemplified by the distribution of epiphytes or the succession in glacier forefields. Whereas some information is presented

down to the smallest detail, for example daily weather measurements in Langtang and Helambu over a 9-month period, the climate change subchapter could have been expanded to include a regionalisation of temperature and precipitation changes along the entire Himalayan Arc. Chapter 5 deals with Himalayan hydrology (rivers, lakes, run-off patterns and glaciers), emphasising the significance of the 'water tower of Asia' for the densely populated lowland regions. It includes impressive repeat photography documenting considerable glacier retreat over recent decades. Chapter 6 discusses Himalayan landforms, slope stability, and underlying processes such as earthquakes, giant rockslides and river captures, including an account of the disastrous earthquake of April 2015. Chapter 7 describes Nepal's soils, soil properties and distribution patterns, and discusses rather briefly processes of soil erosion and soil degradation.

One of the main chapters of the book deals with flora and biogeography (Chapter 8), providing an excellent overview of phytogeographical connections and contemporary distribution patterns, and presenting a state-of-the-art review and new perspectives on plant migration, dispersal, isolation and *in situ* speciation in relation to Himalayan uplift processes and Quaternary climatic changes. This chapter is one of the highlights of the book, as it updates our understanding of the evolution of biodiversity in the region. The subsequent chapters and subchapters on mycota (Chapter 9) and animal groups such as millipedes, dragonflies and freshwater invertebrates (Chapter 10) appear partly to be out of the context of a companion book to a flora but nevertheless contribute to a synopsis of the evolution of Himalayan biodiversity and its contemporary spatial patterns.

One of the noteworthy aspects of this book is the devotion of whole chapters to the human dimension (people, ethnobotany and land use). Chapter 11 examines Nepal's ethnic and cultural diversity, and is followed by an account of people–plant interactions and the significance of plant life for economic and cultural activities (Chapter 12). The impact of agriculture, pastoralism and forestry on Nepal's environment is the subject of Chapter 13, which provides a comprehensive overview of spatially differentiated land use patterns, highlighting the close linkage between land use and vegetation. This overview is up to date; however, earlier figures on land categories given in Table 13.1 may no longer be accurate.

Chapter 14 discusses the environmental history of Nepal over time, focusing on climate-driven Pleistocene and Holocene environmental changes and the effects of the increasing human population. The considerations of the timing of the onset of major human impacts are particularly interesting, even though the subchapter on language groups in East and Southeast Asia seems to go beyond the focus of the book. Ecological transects of three regions of Nepal (Thakkhola, Helambu-Langtang and Khumbu Himal) are described in Chapter 15. Drawing heavily on the extensive field experience of Georg and Sabine Miehe, this chapter integrates climate-determined vegetation patterns and human impacts to provide a detailed account of regional vegetation mosaics, partially accompanied by detailed plant community tables.

Chapter 16, entitled *Vegetation Ecology*, is in my view the core chapter of the book. Considered by the editors to be one of the most important parts of the

book, this chapter provides a thorough description of a representative selection of vegetation types found in Nepal and in the Himalayan Arc, i.e. the perspective goes far beyond the central Himalayas and includes all major vegetation types occurring between Afghanistan and Southwest China. Expanding on earlier classifications of Himalayan vegetation units by Champion (1936), Schweinfurth (1957), Stainton (1972), Dobremez (1976) and others, each vegetation type is characterised by means of condensed information on classification, climate and weather, distribution range, habitat preference, vegetation structure, flora, successional status, human impact and conservation status. The ecological information presented here is extremely rich in detail, supplemented by special subchapters on the upper treeline and the drought line of forests. The final chapter, on biodiversity conservation and protected area management, is a perfect complement to the preceding sections of the book. It not only retraces the history of conservation activities in Nepal, and highlights the positive impacts of the 'Community Forestry' programme that largely contributed to the reversal of deforestation in Nepal, but draws attention to the increasing threats to the natural environment arising from land use pressure, climate change, illegal trade and invasive plant species.

In summary, this Nepal book will be a landmark publication for many years to come. It stands in its own right, regardless of the publication of other volumes of the *Flora of Nepal*. I highly recommend this work to the many readers interested in the environment of Nepal and the Himalayas, as it contains an unprecedented wealth of geographical and biological information. Because the writing is accessible and the text is complemented by stunning photographs, outstanding illustrations and an extensive bibliography, both specialists and non-specialists will enjoy this volume. It is hoped that it will reinforce and stimulate research activities in the Earth's greatest mountain range.

UDO SCHICKHOFF

REFERENCES

CHAMPION, H. G. (1936). A preliminary survey of the forest types of India and Burma. *Indian Forest Rec., Sylvic.* 1(1).

DOBREMEZ, J. F. (1976). *Le Népal, Ècologie et Biogéographie*. Paris: CNRS.

SCHWEINFURTH, U. (1957). Die horizontale und vertikale Verbreitung der Vegetation im Himalaya. *Bonner Geogr. Abh.* 20.

STAINTON, J. D. A. (1972). *Forests of Nepal*. New York, New York: Hafner.