

was realized, and a convincing and mathematically more rigorous foundation was provided by the East German team of Steenbeck *et al.* in 1966. In the final analysis the solar dynamo has to do with the emergence of coherent structures in a magnetohydrodynamic turbulent flow, due to what may legitimately be called a 'Reynolds e.m.f.' – the kind of situation that is still the stuff of a great deal of research even in such simple fluids as nonmagnetohydrodynamic air and water. The author's subject therefore *is* complex, and he deserves our compliments for hacking a route through that complexity in a convincing, simple and pleasant narrative.

Chapter 8 discusses the solar wind phenomenon in similar terms – predicted by Parker in 1958, and confirmed by newly emerging satellite sensors a few years later – and with its own stories of supersonic flow in the solar system.

The book is strongly recommended to anybody who is interested in solar physics, but in particular also to fluid dynamicists who may like to see how some of the ideas they are playing with can work out in the extreme situations prevailing in the Sun (and elsewhere in the universe). The book should also interest every physical scientist as an excellent account – historical, scientific and autobiographical all at the same time – an account that is not only illuminating about the Third Cycle but also makes an extremely well-told story. And it gives young students, at the threshold of their scientific careers, a feel for the nature of the human enterprise called science – from its often-strange beginnings, its tragic heroes, its skeptical insiders ... till finally an overall consensus emerges magically among the community of its practitioners – and all of this told from a perspective that is at once both global and Indian.

RODDAM NARASIMHA

*Engineering Mechanics Unit,
Jawaharlal Nehru Centre for Advanced
Scientific Research,
Jakkur PO,
Bengaluru 560 064, India
e-mail: roddam@caos.iisc.ernet.in*



Flowering Plants of the Western Ghats, India. T. S. Nayar, A. Rasiya Beegam and M. Sibi. Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Palode, Thiruvananthapuram 695 562, India. Hardcover. 2014. Volume 1: x + 1–934 and Volume 2: vi + 935–1684 = 1700 pp. Price: Rs 3,500/US\$ 200.00. ISBN: 978-81-920098-9-6 (set), 978-81-920098-2-7 (Volume 1), 978-81-920098-3-4 (Volume 2).

The first ever work on plants of the Western Ghats (precisely) from Goa was published by Garcia de Orta (*Conversations*, 1563). It was after more than a century, Heinrich van Rheede brought out his famous work *Hortus Malabaricus* in 12 volumes (1678–1703) which dealt with the plants of the Malabar (present day Kerala) area in the Western Ghats. The Western Ghats had been a hub of botanical research, especially in the field of collection, identification and classification of plants, for more than a century before independence, starting from Graham and Nimmo to Gamble and Fischer (1839–1936). Independent India witnessed an upsurge in floristic exploration and taxonomic research in the Western Ghats with the reorganization of Botanical Survey of India in 1954, and establishment of different R&D centres and universities in the six states with the Western Ghats (Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu). As a result, thousands of small and big publications have come out on the floristics and taxonomy of the plants of Western Ghats, especially angiosperms, imparting a good deal of knowledge on their distribution and conservation status. However, the fact remained that we never had an 'authentic' and comprehensive work on the flowering plants of the Western Ghats, an important phyto-geographical area; besides, now a global hotspot and a heritage site. The two-volume work under the present review

befittingly fills the gap that has existed for so long.

The Western Ghats occupy an area of 1,64,280 sq. km and cover fully or partially 53 districts in six states. The work records 7,402 species, 117 subspecies and 476 varieties from these areas and brings 66 species, 5 subspecies and 14 varieties under the category of Doubtful Occurrences. Altogether, the work deals with 8,080 taxa. This account shows the surprisingly rich flowering plant diversity in the Western Ghats not estimated before. So far, we were tuned to hearing differently projected figures that ranged from 4,000 to 5,000 species in different publications.

Details provided in the work for each species follow a unique system not very familiar to Indian taxonomy. This pattern has been elaborated in the diagram given under Users' Key. Each species is provided with the accepted name, relevant synonyms, habit of the species, references to three good descriptions and illustrations, distribution in the world and the Western Ghat states, phenology, IUCN threat categories and other threat categories given in related publications, economic importance, uses and local names in Gujarati, Hindi, Marathi, Kannada, Malayalam and Tamil. A maximum of three references have been cited for each of these characters. This precisely means up to 55 characters for a species. These references are represented by numbers in brackets in the text and the full references are given at the end along with the corresponding numbers. This shows how elaborately the details of a species or taxon have been worked out. As stated in the Preface by the authors, the work accommodates about 23,000 scientific names, 13,000 local names, up to 55 character references per species, about 3,000 references and almost 1.5 lakh times their citations in the text in different combinations. Cultivated and planted species are treated under separate sub-heads. General arrangement follows the alphabetical order: species under genera, genera under families and families under Dicotyledons (Volume 1) and Monocotyledons (Volume 2 + indices to scientific and local names) with names of families and genera appearing as page headers. All these features help one to easily reach the desired species.

The work highlights the fact that though the Western Ghats represent only 5% of the total area of India, the region

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harbours about 44% of the flowering plants occurring in the country. This emphasizes the conservation value of the Western Ghats landscape and underscores the importance of studies in landscape ecology. The vast amount of data contained in the work, as stated earlier, can undoubtedly serve as the basic building blocks for such studies. They can also remain as important source of information to assess the phytogeographical affinities of flowering plants of the Western Ghats afresh on account of the world distribution given for each species and on account of the fact that the work deals with a phytogeographical region itself and not a political boundary. The data provided also help to reassess or revisit the so far known centres of endemism. Areas of species depletion due to various threat factors can also be judged when these data are correlated with threat factors and localities of RET species in the Western Ghats. The work, therefore, stands out as high relevant in the backdrop of gross depletion of plant genetic resources in the Western Ghats. Though the Western Ghats have 19,244 sq. km forests under Protected Area, 40% of the original vegetation, it is stated, has already been converted for cultivation, plantation and hydroelectric reservoirs.

Floras serve as the main sources of taxonomic information of species. Though there could be indications about phenology, local distribution, local names or general comments like 'frequent', 'rare', etc. on the local distribution of species, Floras essentially contain only abbreviated citations of published works that trace the nomenclatural history of the species included, followed by brief, moderate or elaborate description, as the authors like, of the species in terse taxonomic terminologies and keys for species identification based on such terminologies. It is definitely a precision art, but literarily 'Latin and Greek' to non taxonomists! This is the main reason for the limited use of Floras, though it should not be so, and why Floras are often described as works written by taxonomists for taxonomists, a fact our taxonomists have not, it appears, considered very seriously. Ironically, at the same time, non taxonomists, both botanists and non botanists, are always in need of information on taxonomy, ecology, geography, conservation status and economic uses of plant species in their research pursuits. It is heartening that the authors of this

work have understood this barrier and have adequately addressed this problem when they framed the pattern for data presentation in this work. The task accomplished in bringing such huge data related to 8,080 flowering plant taxa systematically within a beautiful framework, in which letters and figures in bold, normal and italics also convey different additional meanings and information, their way of representation is the most original part of this work. This is definitely a laudable achievement. It is easy for non taxonomists to make use of the vast data given for each species mentioned, unlike the details of species contained in Floras. For example, if a non taxonomist wants to work on dye-yielding plants of the Western Ghats, or say, to know the fibre-yielding plants, it is easy for him/her to access detailed information of those species using this work. Further, as three references are given for each category of characters, the person who needs more details can directly go to those elaborate works in the respective fields. At the same time, these volumes also serve as an essential reference work for taxonomists working with tropical plants.

Can a Flora substitute this type of work? Or, is this work a substitute for a Flora? I have an emphatic 'No' as answer for both the questions. But there is no doubt that this work provides much more information than a Flora can provide on a single given species and is much more useful for non taxonomists and taxonomists alike. I would like to treat both these forms under two separate genres and feel they function totally complementarily.

Absence of nomenclature (protologue) citations for Latin names, lack of taxonomic descriptions and absence of keys for species identification, perhaps, may disappoint a traditional taxonomist. Amateur plant lovers and conservationists may not be happy if they expect photographs of plants in this work. A minor point I noticed is when the two volumes of the excellent work refer to the medicinal uses of species. It provides three references to medicinal uses of species (like other uses, dye, fibre, etc.), but does not elaborate specific uses and ailments (like, for blood pressure, fever, etc.). To know these qualities, one has to go to the original references. In spite of such minor drawbacks, it is undoubtedly an authentic guide for all who deal with the flowering plants of the Western Ghats of

India and the tropics, as these volumes are structured in a precise manner to access any single or collective information of a taxon occurring in the Western Ghats with least effort. This makes the work unique and anybody's first point of reference on the flowering plants of Western Ghats. The volumes are excellent in production with beautiful jackets and the price tag attached to them is reasonable. It comes with a Foreword by M. S. Swaminathan.

Almost seven decades have passed after Independence and still we do not have a 'Flora of India' to substitute J. D. Hooker's *Flora of British India* (1872–1897), though we have excellent angiosperm taxonomists doing outstanding works in this field. Hence, 'Flora of India' is, perhaps, a distant dream to be realized, but in absence of such a work, one cannot help thinking about a work of this nature for India as essential requirement to be accomplished by our angiosperm taxonomists.

Plant taxonomy is a dying science which needs a thorough nurturing and resurrection. Younger plant taxonomists often perceive, albeit wrongly, taxonomy as 'tax-on-me'. They wish to emulate arm-chair, lab-oriented molecular biologists rather than soiling their clothes, boots and carrying out arduous field work. Hope this exhaustive and comprehensive work of Nayar and his team will serve to motivate them and kindle their interest in plant taxonomy where there is still a huge scope for discovering species new to science, and for undertaking other formidable challenges offered by the vast forests of India. The present monumental work is in line with Global Strategy for Plant Conservation of the Convention on Biological Diversity (CBD) and contributes to the achievement of global AICHI biodiversity targets as well as the National biodiversity targets. Post CBD period demands, conservation being the main target, work of this nature having comprehensive data on species rather than conventional Floras having technical details.

J. R. BHATT

*Ministry of Environment, Forest and
Climate Change,
J 326, 3rd Floor, Jal Block,
Indira Paryavaran Bhawan,
Jorbagh Road,
New Delhi 110 003, India
e-mail: jrbhatt@nic.in*
