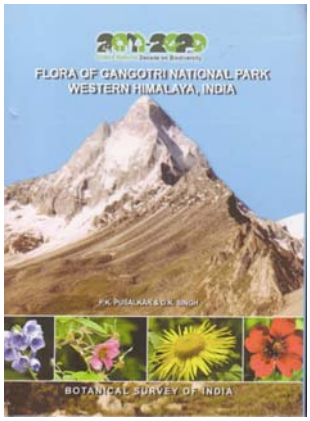

Flora of Gangotri National Park, Western Himalaya, India. P. K. Pusalkar and D. K. Singh. Botanical Survey of India, Kolkata, 2012. 708 pp. Price: Rs 4480/US$ 200.

For a rational forest development and utilization of forest resources on scientific lines of any given region, it is important to know as precisely as possible, the floristic resources of that region. Such information is all the more necessary for National Park administrators/ managers for biomonitoring and protection of flora. This book by two established and experienced systematic botanists of the Botanical Survey of India (BSI), does just that and fulfils such an objective. The book serves as a handy reference manual for identification and study of all high-altitude plants of Western Himalaya in general and Gangotri National Park in particular.

The aim of the book is to provide mainly a floristic account and serve as an identification manual for all the plant resources of Gangotri National Park which covers parts of the difficult Trans Himalayan Cold Desert terrain and Greater Himalayan ranges. The region has been a happy hunting ground for botanists, amateurs and naturalists over more than two centuries and is home to numerous colourful alpine plants, many of which are highly priced medicinal plants. A comprehensive account of all plant resources of the region was not available. The present publication serves to fill such a knowledge gap as well.

The authors have done a commendable job of providing a complete and comprehensive floristic account of all the plants of Gangotri National Park. The book provides an excellent taxonomic account of 982 vascular plant species that include 844 species, 22 subspecies and 35 varieties spread among 357 genera and 87 families of flowering plants; 68 species of Pteridophytes belonging to 25 genera and 18 families and 11 Gymnosperm taxa belonging to 7 genera and 4 families. Flora writers normally exclude the two latter groups and to that extent, I consider the present compendium a comprehensive one. The book describes the geology, soil, climate, general vegetation, rare and endemic plants of the region, and plants with economic potential, systematic enumeration which forms the major portion of the book, bibliography and an index to botanical and vernacular names.

The general vegetation account is based on the first-hand field study and collection of all plant species in different eco zones of the region. The floristic composition of various vegetation types is supplemented by several excellent quality colour photographs of vegetation and unique plant species. The systematic enumeration provides a dichotomous botanical key to all families and to different genera and species under each family. As far as I can see, the keys are workable and are usable not only by trained botanists but also by amateurs interested in identification of plants of high Himalayas. The key characters used are analytical and are based on actual specimens studied by the authors. As aptly mentioned in the Foreword by Paramjit Singh (Director, BSI) the book has user-friendly format with identification keys based on easily observable characters. Again, the authors have provided detailed and authentic botanical descriptions of all plant species included in the flora, based on the specimens collected by them as well as other collections deposited in various herbaria in the Himalayan region and in the Central National Herbarium, Kolkata (CAL). The scientific names provided are all up-to-date and in conformity with the latest International Code of Botanical nomenclature. Relevant synonyms to connect the nomenclatural history are also provided under nomenclature citation. In the whole work, I did not come across any discrepancy in nomenclature. Vernacular names (Garhwali, Jadh-Bhotia names) provided for most of the species certainly help the local botanists, naturalists, mountaineers and even village folk while identifying the local plants. For each species, detailed taxonomic citation, description, phenology and critical notes on its identity, nomenclature, distribution in India and the world, and etymology of the scientific names are provided. No written account can capture the full range of a species without photographs. In this book another worthy trait pertains to the numerous (about 1000) high-quality colour photographs of plant species, which greatly help in correct identification of the species even by a common man. In addition, about 31 plates of line drawings of various plant species are also provided. Discussing the economic potential of the flora of the region, the authors have provided a list of all such species used as medicinal plants, dye-yielding plants, wild relatives of crop plants, wild aromatic plants, wild edible plants and wild plants of horticulture potential. Such information helps in proper utilization of the natural plant resources for economic development of the region. The discussion on the major threats to flora and important endemic, rare and threatened species helps the Park managers in taking steps for effective conservation and protection of these floristic elements. Information on the endemic plant species of the region throws light on the phytogeographic significance as well as phytogeographical limits of these elements in the floristic province.

The get-up and production of the book is excellent. The cover page with the Gangotri peak and ornamental plant photographs is really eye-catching. High-quality paper is used for the entire book. In view of this, the slightly higher price of the book can be ignored. But this limits its distribution only to research institutes and universities and other public organizations. Overall, the book is a praiseworthy, long awaited contribution to the knowledge of the high-altitude plants of the Western Himalayan region. It is successful in providing an inventory of alpine and sub-alpine species of plants from various ecological niches and their ready identification through analytical botanical keys. In my opinion, it is one of the best works in recent years. The reviewer earnestly compliments the efforts of the authors and hopes that the present work serves the growing needs of National Park Managers, foresters, botanists, researchers, conservationists, teachers and students and other field botanists interested in floristic studies of not only of Gangotri region, but of the entire Himalaya. The book should also prove useful to our neighbouring countries like Pakistan, Nepal, Bhutan, China

and Myanmar. The numerous curious and nature-loving pilgrims who visit the 'Devabhoomi' region every year will also find this book useful in knowing the plants on their pilgrimage path. The book is a must for all institutions, colleges, universities and for those interested in high-altitude flora of the Himalayan region. The authors richly deserve generous compliments by the entire botanical fraternity of the country.

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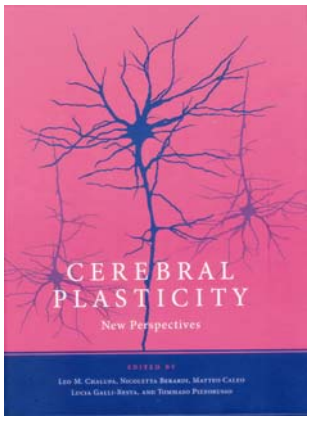

Cerebral Plasticity: New Perspectives. Leo M. Chalupa *et al.* (eds). The MIT Press, 55 Hayward Street, Cambridge, MA02142, USA. 2011. x + 415 pp. Price US$ 60.00/£ 44.95.

Are we the result of our genes or our environment? This question has fascinated mankind through the ages and it should come as no surprise that this question becomes all the more fascinating when one considers the brain, which is changing constantly through experience. Which aspects of brain then are hard-wired (nature) and which are shaped by the environment (nurture)? The book under review brings together reviews on this controversial yet fundamental question by a number of neuroscientists, in honour of a major figure in brain plasticity, Lamberto Maffei.

These reviews address basic questions about plasticity in the developing brain (where it was first studied), in the adult brain (the extent and dynamics of which is hotly debated even today), the injured brain (where extensive cortical reorganization is observed), and the mechanisms underlying plasticity under all these conditions (which could potentially be very different) – all of these questions remain an active area of research. The implications are profound: an understanding of plasticity can potentially be used to devise novel strategies for repairing injuries to the nervous system and to treat neurodegenerative disorders. Since it is rather impossible to review a book which itself contains reviews, we instead discuss below a few selected chapters from the book to convey a sense of its contents.

In chapter 4, Kim and Sanes address the issue of how we can identify the different types of neurons found in the brain. In invertebrates and some lower vertebrates it is possible to identify individual neurons in a network and study their properties. For example, the adult *Caenorhabditis elegans* nervous system consists of 302 neurons that can be identified reliably from animal to animal. In higher vertebrates, there is no way to reliably identify individual neurons, their inputs and outputs and study their properties as they function in a neural network and relate them to a simple definable behaviour. However, neurons can still be classified into subtypes and the general structure (and consequently, plasticity) of a network can be understood in part using the distribution of subtypes. This excellent and concise review summarizes the methods to mark individual neurons of a given subtype. It begins with the ability to mark single neurons that was first accomplished using the method of Emilio Golgi, the late 19th century Italian physician. From this historical point it traces the various methods that have evolved with the advent of techniques of molecular biology for marking a subset of neurons with a common characteristic. It highlights the interesting ways in which transgenesis and different fluorescent proteins are used in mice where different subtypes of neurons are labelled in different colours. The review uses the retinal system to illustrate how the different subtypes of neurons present in the retina can be identified. It also talks about the identification of a new subtype of neuron in the retina and the characterization of its electrophysiological properties. Further, it highlights the power of modern-day techniques to interfere with the function of specific types of neurons and thereby study how different neurons may be integrated to make a functional circuit. The review concludes with the observation that being able to identify and manipulate specific populations of neurons also gives one a powerful means of assessing how the environment can influence development and plasticity of neuronal connections.

In chapter 13, Li *et al*. describe how orientation selectivity in ferrets develops several weeks after birth only after they open their eyes. As a result, ferrets form a good model system in which the developmental trajectory can be dissociated from visual experience. The authors find that visual experience increases the magnitude of direction selectivity and this by itself can explain the rapid emergence of orientation columns. But how the directional preferences get specified and form the map is not clear. But what is remarkable is that just a few hours of seeing visual motion signals can create direction selectivity!

In chapter 20, Singer builds upon the well-established role of temporal contiguity of pre- and post-synaptic neuronal firing in synaptic plasticity to explore the role of precise timing of spiking activity on cortical processing. Three lines of research are elaborated. First is the discovery of spike-timing-dependent-plasticity (STDP), where the timing difference between the excitatory-post-synaptic-potential (EPSP) and back-propagating dendritic spike in the post-synaptic neuron determines the efficacy and polarity of the change in synaptic strength (essentially adding causality in the original framework of long-term potentiation/depression that is based only on co-variations between pre- and post-synaptic firing). The second line of evidence is based on recent studies suggesting an important role of precise timing of individual spikes in signal processing, in which oscillations in the network at various frequency ranges such as theta (4–10 Hz), beta (16–30 Hz) or gamma (30–80 Hz) provide a mechanism to adjust the precise timing of neuronal activity. This adjustment can synchronize the activity of the neuronal population, or provide an alternate coding scheme based on the position of the spike relative to the underlying oscillation (phase-coding). Finally, Singer reviews the literature suggesting that neurons are optimized for the