

## BOOK REVIEWS

core of highly and mutually interconnected brain regions within a modular small world. Some studies have shown that functional networks can exhibit critical behaviour, characterized by a mixture of randomness and order, which can potentially enhance information processing. Dynamic criticality is associated with hierarchical modularity, which is another hallmark of brain organization.

The final chapter describes the role of informatics and computation to model, visualize, analyse and interpret connectome data. Several model-driven as well as data-driven approaches are described that are being developed to build models of the brain such as the Blue Brain Project and the Virtual Brain that is built on a multi-scale theoretical framework. Sporns predicts that in the coming years connectomics as a field will expand rapidly, especially in generating shared large databases and developing network analysis tools and modelling. These will lead to a better understanding of brain dysfunction and disease, and could potentially be a phenotypic marker of an individual's behaviour and cognitive abilities.

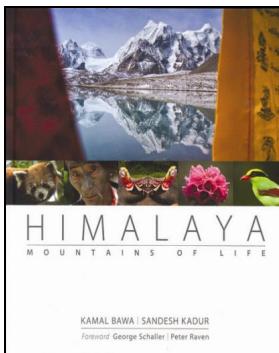
The idea of generating a comprehensive structural map to understand functional properties of a biological system is not new – for example, the Human Genome Project is also based on the same ideology. The key question is how much can we know about the brain by a detailed study of the underlying structure, and what level of detail should we consider? Indeed, as the author elegantly points out, to describe the architecture of the great pyramid at Giza, a list of the dimensions and positions of the two million blocks of limestone would hardly be of any use. Connectomics goes beyond providing a detailed description of the structure, and emphasizes the development of hierarchical network models and mathematical tools to describe the complexity rather than using a brute-force approach. Recent advances in technology such as fMRI, super-resolution imaging, tract tracing, electrophysiology, EEG, MEG, etc. have led to the generation of large datasets, and specialized mathematical tools to interpret and extract useful information have become a necessity. The development of such tools is an important step towards understanding complex brain function as a whole.

Overall, this book will be of great interest to neurophysiologists and theoretical neuroscientists interested in under-

standing complex cognitive functions, properties of the brain architecture and various techniques and models used to study it, and to clinicians interested in the pathogenesis of brain disorders.

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**Himalaya: Mountains of Life.** Kamal Bawa and Sandesh Kadur. Ashoka Trust for Research in Ecology and the Environment, Royal Enclave, Srirampura, Jakkur Post, Bangalore 560 064. 2013. 305 pp. Price not mentioned.

The Himalaya is the youngest, tallest and amongst the most fascinating mountain ranges on Earth. It is a unique abode of biodiversity elements, large and small, from astoundingly enormous conifers and relatively medium-sized rhododendrons, elephants, brown bears and bearded vultures, to tiny invertebrates, many of which are endemic. The biodiversity of the Himalaya is remarkable at any scale, which has earned it the recognition of a global biodiversity hotspot. It is also an outstanding human cultural mix of varied ethnic and religious groups and people of different evolutionary and ecological histories. The immensity and complexity of life in the Himalaya are possible because of the size and peculiar geography of these mountain ranges. Through its sheer might, the Himalaya restricts the frigid Arctic winds to the north, thereby keeping South Asia warm, and drains the thunderous monsoon clouds to the south, thereby keeping the terais wet and the Tibetan plateau dry. With more than 15,000 glaciers, many of which are the starting points of important rivers, including the Indus, Ganga, Brah-

maputra, Irrawaddy and their tributaries, it is a vast storehouse of freshwater that supports life over a million square kilometres downstream. The broad elevation gradient of the Himalaya goes from the low-lying outer flood plains and the Shivaliks to the inner Trans- and Greater Himalayan ranges, which are the tallest in the world. As a result, one can see the greater one-horned rhinoceros and giant hornbills in the alluvial flood plains and subtropical forests of the foothills, and the elusive snow leopard and delightful Apollo butterflies at mountaintops and in the Trans-Himalaya. The precipitation gradient also creates an interesting biodiversity gradient from east to west. Due to greater precipitation and proximity to Indo-China, the Eastern Himalaya is far more biodiverse compared to the Western Himalaya. The Western Himalaya also has more Palaeoarctic biodiversity elements (groups of plants and animals), whereas the Eastern Himalaya is dominated by the Oriental elements. On the whole, the Himalayan mountains are an outstanding phenomenon that has captivated geographers, hydrologists, biologists, spiritualists, pilgrims and tourists for hundreds of years. The magnificence, beauty and diversity of the Himalaya have now been captured in a large-format, superbly produced coffee-table book. It is a collection of expertly interwoven and wonderfully blended photographic stories of people, wildlife and landscapes. It is a product of the combined efforts of Kamal Bawa, an eminent plant evolutionary biologist and a pioneering conservationist, and Sandesh Kadur, a talented and accomplished photographer and wildlife film-maker.

The main strength, and the major attraction of the book, is its collection of stunning images of rare, endemic and



The Jerdon's Pit Viper is one of over 150 species of highly-evolved venomous snakes belonging to the subfamily Crotalinae which are distinguished by a deep pit, or fossa, in the loreal area between the eye and the nostril on either side of the head.

endangered wildlife, captivating landscapes and portraits of tribal people across the region. The book covers the more charismatic and widely known wildlife, but the main emphasis is on lesser known yet ecologically important and species-rich groups of organisms that are so special in the Himalaya, such as rhododendrons, ferns, fungi, invertebrates, small mammals, amphibians and reptiles. The maps are informative and provide the reader a good understanding of the overall geography of the region.

The book is divided into major sections: The Land, The People, The Plants, The Fungi and The Animals, each of which is divided into numerous subsections. Some of the middle subsections about plants and animals are perhaps the most arresting. The plant section offers a superb collection of rhododendrons, balsams, primroses and pedicularis (plant parasites). Among butterflies and moths, frogs and lizards, some of which are not yet described, the images of the Edward's atlas moth (*Archaeoattacus edwardsii*) and the Asian glass lizard (*Ophiosaurus gracilis*) are special, and a composite image of the courtship display of the Bengal Florican (*Houbaropsis bengalensis*) is truly spectacular. The alluvial flood plains of the Brahmaputra have been depicted along with highly endangered wildlife, including the pygmy hog, greater one-horned rhinoceros, and barasingha, amongst many others. They represent the diversity harboured by seasonally flooded terai grasslands, the once widespread habitats that have now lost much of their ground to agricultural fields and bustling townships.

The subtropical forests are represented by a diverse array of plants, including orchids and zingibers, and narrowly endemic mammals such as the golden langur and the hoolock gibbon. Hornbills and their associations via seed dispersal of several large tree species, and also with humans such as the Wanchos of the eastern Arunachal and the Nyishis of the western Arunachal, are lucidly shown. The freshwater and riverine forest ecosystems have been elegantly depicted by multitudes of butterflies, fish and rare birds such as the white-bellied heron and the ibisbill. The temperate wildlife is portrayed, among others, with images of the recently discovered Bugun liocichla, a narrowly endemic bird species whose geographic distribution, like that of the local Bugun community after which it is

named, is restricted to a small area in western Arunachal Pradesh. These forests are also home to some of the most charming and enigmatic of animals, such as the red panda and the Ward's trogon. This section also includes some recent rediscoveries, such as the lizard, *Japalura sagittifera*, rediscovered in eastern Arunachal nearly 60 years after its original description in 1940 from northern Myanmar. There is much to explore here.

The authors have dedicated a special subsection to rhododendrons, which attain greatest diversity in the eastern Himalaya. They have also described association of rhododendrons with their pollinators, especially sunbirds. The painting of the fire-tailed sunbird hawking, an insect in mid-air is surreal due to its detail and a sense of action. Amongst the most exciting sections of the book is the one on life and scenery above the tree line. It has images of many rarely photographed animals including the strange-looking Tibetan sand fox and Pallas's cat. The black-necked crane is globally vulnerable but continues to successfully breed in the Trans-Himalayan region partly because most of the local humans in Bhutan and adjoining Arunachal Pradesh are Buddhists and let the cranes breed peacefully without much hunting pressure. The book pays special tribute to the remarkable flowers from alpine meadows and other higher elevation species, including *Meconopsis* that had enthralled Frank Kingdon-Ward during his plant-collecting expeditions to the Myanmarese Himalaya. It also includes a beautiful image of the noble rhubarb (*Rheum nobile*), whose conspicuous, papery bracts adorn the alpine meadows as translucent towers of plants above the tree line.

The book understandably ends with a section on biodiversity conservation and sustainable development in the Himalayan region. The threats to biodiversity include large-scale development activities such as massive hydroelectric power projects in critical biodiverse landscapes, and other anthropogenic threats such as climate change, logging, hunting and man-made forest fires. The growing national demand for electricity has resulted in more than 150 proposed dams in Arunachal Pradesh alone. Some of the most important biodiversity hotspots and fragile ecosystems in Sikkim have already been irreparably damaged by recently completed projects and more are being destroyed as part of new projects

as we read this review. Human populations in the Eastern Himalaya are growing at a rate much greater than the national average, which is putting tremendous pressure on the remaining forests and shrinking rivers. Heart-breaking images show fire ravaging natural landscapes, massive dam building, and a clouded leopard pelt hanging in a Naga kitchen. With eroding traditional taboos about hunting, access to more deadly arms and ammunition, and growing human populations hungry for resources, two of the most worrisome threats to biodiversity in the Himalaya are going to be hunting and habitat destruction.

Overall, this is a high-quality book that presents the landscape, biodiversity and people of the Himalaya in an attractive package, which should easily engage nature lovers and naturalists alike. It also brings conservation issues of this fascinating and complex mountain in sharp focus. It is hoped that this book will increase appreciation for the lofty Himalaya among the general public as well as the policy-makers, and serve as a reminder of our responsibility to judiciously manage this important global biodiversity hotspot. This book should find place in the personal libraries of nature enthusiasts and any respectable wildlife- and conservation-related organizations.

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**Kumudavathy River Rejuvenation Project.** Y. Lingaraju, Sri Janardhan and Sri Abhilash. An Art of Living initiative, International Association of Human Values, No. 196, Arekere-Bannerghatta Main Road, Bangalore 560 078. 2013. 52 pp. Price not mentioned.

A river is a hydrological, geomorphic and ecological system that plays a key role in the freshwater cycle, balancing dynamic equilibrium between soil moisture, snowfall, rainfall, surface water and groundwater. It provides large number of social, environmental and economic services. A set of hydrological and geological