but a result of what she calls a 'game of telephone' among scientists. Remarkably, unlike neurons, glial cells follow a tight relationship with brain mass (almost linear), which is consistent across species and brain structures. More surprisingly, she found that neurons in the cerebral cortex, across species and irrespective of size, needed about the same amount of energy (~6 kcal/billion neurons/day), and therefore metabolic cost of the brain depended only on the number of neurons present. Running a human brain is costly just because it has so many neurons in the cerebral cortex.

So, why are the brains of great apes too small for their size? The author suggests that a large body and large brain both need more energy, but caloric intake is limited by availability and quantity of food, as well as the capacity to take food through the mouth and produce saliva for swallowing. Caloric intake increases with body mass, but not as fast as the energy cost of larger body mass. Consequently, longer foraging hours are needed to meet daily energy requirements. Eventually, there is a trade-off between body weight, the number of neurons and foraging hours. It appears that great apes chose brawn over brains, while human ancestors went the other way. Even then, to have 86 billion neurons and a body weight of 70 kg, more than 9 h of foraging would have been required. The key difference is that human ancestors learned cooking about 1.5 million years ago, which increased caloric intake tremendously (an idea first put forth by Richard Wrangham; bipedality and endurance running are also discussed as other factors). Indeed, the brain size increased tremendously precisely after we learned to cook with fire, which made food easier to chew, swallow and subsequently digest.

Finally, the author discusses the difference between capacity versus ability. Modern humans have about the same number of neurons that their ancestors had 200,000 years ago (and hence presumably the same cognitive capacity), but have more cognitive ability, because abilities (for example, reading) change the way our brain works and bring improved technologies that expand the materials available, leading to an ascending, self-reinforcing spiral. Herculano-Houzel discusses technological revolutions such as making tools, controlling fire, agriculture and other path-breaking steps such as development of writing that allowed cultural transmission across generations. More recent advancements – the Industrial Revolution, and making automated machines to do physical and even mental work, have leapfrogged us to the forefront of cognitive and intellectual abilities, without having more neurons than our ancestors even a few 100,000 years ago.

Starting with a modest but important goal of counting the number of neurons in the brain, this book takes on fundamentally profound questions about our place in evolution and whether we (more specifically, our brains) are truly 'special'. Written with great style and excellent sense of humour that keeps the reader engaged throughout, Herculano-Houzel explains important scientific concepts and results in an accessible way without compromising scientific rigour. This book will be of great interest to anyone fascinated by the human brain and its wonderful cognitive abilities.

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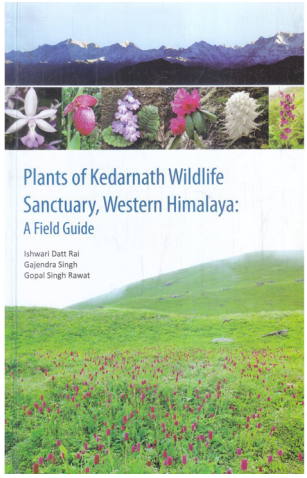

Plants of Kedarnath Wildlife Sanctuary, Western Himalaya: A Field Guide. Ishwari Datt Rai, Gajendra Singh and Gopal Singh Rawat. Bishen Singh Mahendra Pal Singh, Dehra Dun. 2017. 393 pages. Price: Rs 695. ISBN: 978-81-211-0959-8

Bio-resources in tropical countries are usually concentrated in designated protected areas. The managers of these protected areas habitually focus on conservation of some charismatic and appealing animals and their prey or fodder base but ignore all inclusive diversity and significance of plant wealth therein. Besides what does not occur to them is that plant wealth does amount to wildlife too. The scarcity of scientists and the situational disadvantages are often experienced by Botanical Survey of India in floral documentation of protected areas which are far away from its head quarters/regional centres. It was also believed that such studies by scientists from other institutes and university colleges can in fact speed up such documentation in all the designated protected areas. In this context, a field guide for the *Plants of Kedarnath Wildlife Sanctuary* is truly a crucial contribution from scientists of Wildlife Institute of India and Space Application Centre, Dehra Dun. Kedarnath, the holy shrine of Western Himalaya, receives a large number of devotees annually and many of them get attracted to the enchanting colourful flowering plants in its varied landscapes. The present publication serves as an excellent field guide and helps in identification of the plants of this sanctuary. This field guide contains an introduction, the details of holy place, landscapes and land use classes, vegetation types, people and resources utilization and management. Floristic analysis and recognized families are arranged following Bentham & Hooker's system of classification. A key to use this guide is provided. Serial numbered thumbnails of flowers grouped under different colours and families are provided. The alphabetical enumeration of species with currently accepted names (a few with synonyms), vernacular name/s, brief description, flowering and fruiting periods, habitat, distribution localities within the sanctuary and outside India/ global distribution and, uses if any are given. The photographs depicting landscapes and vegetation types are truly good. A flowering twig/or a whole plant and sometimes a close up of flower/s and fruits is given for species catalogued. The photographs of some are much reduced to correctly distinguish species that are closely allied. The photo inset showing vivipary on page 261 is interesting.

It is contextual to state that the floristic works published in recent years are generously photographed to make them user friendly. Thanks to the advanced

digital technology in cameras with which most non professionals have taken fancy to shoot plants and attempting to know them by their botanical names. The awareness is such that social media these days are flooded with plant photographs from different parts of India. Though it is often difficult/incorrect to identify plants based on photographs but clues provided would help in arriving at correct identities. There are Facebook groups interested in identifying plants in general or certain plant groups or plants from certain geographical area.

The flora in the sanctuary accounts for 1130 species belonging to 555 genera distributed in 132 seed plant families. There are many omissions in the text and what we are pointed out here is not exhaustive. Species in text do not follow any consistency in sequence, in some places it is alphabetical and in others it is not. The basionyms are given for some and not given for many, where they exist! Some 17 families, such as Juglandaceae, Aristolochiaceae, etc., are incorporated in the text but not in the checklist. Conversely, Eriocaulaceae and Commelinaceae appear in checklist but not included in text or index. These anomalies extend even for many species and in multiple ways. *Notholirion macrophyllum* and its synonym *Frittilaria macrophylla* are given in text (page 326) but nowhere to be found in checklist (page 375). *Coleus barbatus* (Andrews) Benth. on page 248 is found missing in checklist but its synonym *Plectranthus barbatus* Andrews is given on page 368. *Indigofera heterantha* Wall. ex Brandis appears on pages 112 and 354 but its synonym *Indigofera gerardiana* Wall. ex Baker (page 112) is listed as distinct species in checklist (plant 354). At times, the validating author's name (of species) is omitted in one place and correctly cited elsewhere. Many such discrepancies/contradictions between the text and checklist under each family imply flippant attitude of authors in its compilation. There are also inconsistencies while following Brummitt & Powell in citing authors abbreviations (e.g., Kuntze for *Malaxis muscifera* (page 306) is cited as Ktze (page 374)).

Some species which are not collected in the present instance are included in checklist based on earlier records. There are no details concerning to examined collections of earlier workers and acronyms of the herbaria where they are housed. Citing of both earlier specimens and those collected during the present project would have added authenticity to the work and desirably would have given a scope to taxonomists to verify further on any day. However, we assume all the authors' collections must be in Wildlife Institute of India, Dehra Dun. Forty species considered endemic to Western Himalaya occur in Kedarnath WLS. There is no purpose seen in the inclusion of nine species assessed as 'Least Concerned' since they appear in IUCN website. It is also not clear why authors choose to specify widely distributed species (Afghanistan, China, Pakistan and Tajikistan) as endemics? They are truly Pan Himalayan species and may even extend to other adjoining countries. An identification key based on prominent easily observable field features could have added value to this work. A thorough review with a good taxonomist is a must to reduce the stated omissions. Further, inclusion of photographs of all species given in checklist is desired which may be taken care of in the next/revised edition.

Except for these omissions the design and printing quality of the book is exceptional. The authors richly deserve to be congratulated for publishing such an informative and user-friendly field guide for the flora of this well-known bur remotely situated protected and pilgrimage area. It would be greatly used by tourists, foresters, students, researchers, field botanists, ecologists, conservationists and defence personnel interested in the flora of this protected area and similar landscapes in adjoining areas.

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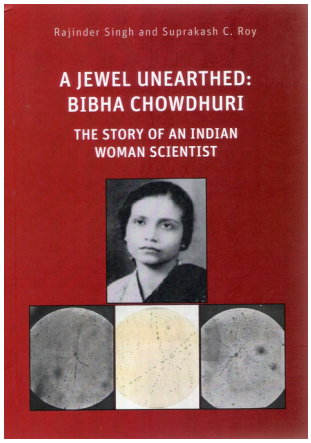

A Jewel Unearthed: Bibha Chowdhuri. The Story of an Indian Woman Scientist. Rajinder Singh and S. C. Roy. Shaker Verlag GmbH, Aachen, Germany. 2018. 158 pages. Price: 21.90 Euro.

Rajinder Singh and S. C. Roy are both well established historians of science dealing with contributions of Indian Scientists of Calcutta School. The monograph under review is the 23rd volume in the series produced by Rajinder Singh. I was attracted by the title of this book as Bibha Chowdhuri participated in Third National SSNTD (Solid State Nuclear Track Detectors) Conference organized by me in Guru Nanak Dev University, Amritsar in March 1983. She never retired from research and was the oldest delegate at 70 to present her paper in Amritsar. I was pleased to share a group photo of this conference and her paper with the authors for inclusion in this monograph.

In the introduction, authors narrate how women were not encouraged to join research in England as well as in India. D. M. Bose was related to Bibha and he took her under her supervision with some reluctance. Bibha's family belonged to Brahmo Samaj, which advocated social, political and religious reforms in Hindu society. Her family encouraged the girls education and all her sisters were highly qualified. She got her B Sc from Scottish Church College and M Sc from Calcutta University in 1936. She joined D. M. Bose, who was Palit Professor of Physics in the university, for research in Cosmic Rays. When Bose shifted to Bose Institute in 1938, Bibha also moved with him. It was in Bose Institute that Bibha published three papers in *Nature* towards the discovery of mesons using photographic (nuclear emulsion) plates. It is not