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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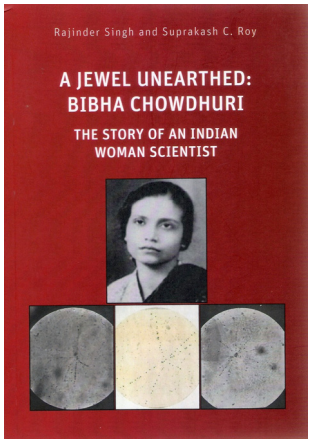

A Jewel Unearthed: Bibha Chowdhuri. The Story of an Indian Woman Scientist. Rajinder Singh and S. C. Roy. Shaker Verlag GmbH, Aachen, Germany. 2018. 158 pages. Price: 21.90 Euro.

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

known why she did not prefer to go for her doctorate in Calcutta University despite her publications in *Nature*?

In chapter 2, the authors have described the history of cosmic rays and beginning of research in this area using photographic technique in India. Bibha's first research paper was on 'Studies in nuclear disintegration by the photographic plate method – I. Disintegration of samarium nucleus by cosmic rays'. This experiment was carried out at an altitude of 3600 m in May 1938 at Sandakphu in the Himalayas using half-tone Ilford plates. The disintegration energy of Samarium nucleus was calculated to be 13 MeV from measurement of length of tracks. To measure the mass of mesotrons (mesons), experiments were carried out at Darjeeling (7000 ft), Sandakphu (12,000 ft) and Pharijong (14,000 ft) using emulsion plates. Using standard measuring techniques for the study of cosmic ray star tracks, the mass values of mesotrons were determined to vary between 149 and 265 m_e, where m_e is mass of electron. In 1944, Bose, Bibha and Sinha observed the frequency distribution curve for the occurrence of multiples of mesons and 'cascade production of mesons'. Bibha's research was recognized and appreciated by the international scientific community.

In chapter 3, the authors dig up the archives of Manchester University to obtain a copy of Bibha Chowdhuri's Ph D thesis. Bibha was fortunate enough to work in the group of P. M. S. Blackett in Manchester School in 1944 and guided by two renowned cosmic ray scientists, L. Janossy and J. G. Wilson. Her Ph D thesis was submitted under the title 'Extensive air showers associated with penetrating particles' in 1949. She used the coincidence technique for the study of 'density spectrum of extensive air showers' with iron and lead as absorbers. She rejected the notion that nucleons are responsible for the production of penetrating particles in extensive showers. The results of her thesis were published in *Nature* and she got global recognition.

Chapter 4 is based on Bibha Chowdhuri's work at Tata Institute of Fundamental Research (TIFR), Bombay and Physical Research Laboratory (PRL), Ahmedabad. She was invited to join TIFR's Cosmic Ray Group by Homi Bhabha in 1949 on the recommendation of her Ph D supervisor, J. G. Wilson. She participated in neutrino experiment being conducted by TIFR in Kolar Gold Field. In 1950, Bibha, by a counter hodoscope arrangement gave evidence of the presence of particles which can produce showers with two or more secondaries under 15 cm of lead. Her results were confirmed by other groups by cloud chamber method. She left TIFR in 1957 and visited USA and France for her research work. On return, she joined PRL and remained dormant for almost 14 years due to lack of research facilities in her area of specialisation. She guided a Ph D student, Y. C. Saxena, in PRL who has provided information to authors about their work in Kolar Gold Field. In 1970, Bibha Chowdhuri along with Y. C. Saxena studied the characteristics (such as multiplicity, absolute number and angular distribution) of muons of energy ≥ 150 GeV with neon flash tube technique. The measurements were made at a depth of 580 m in Kolar Gold mines. This work was published in 1977 in *Parmana – Journal of Physics*. She took voluntary retirement from PRL to join Saha Institute of Nuclear Physics (SINP), Kolkata.

Chapter 5 discusses the research work carried out by Bibha Chowdhuri at SINP from 1977 to 1990 as a guest scientist. Her main collaborators were A. K. Ganguly of Calcutta University, B. B. Baliga of SINP and D. P. Bhattacharya of IACS, Kolkata. They studied relativistic ions obtained from Variable Energy Cyclotron Centre (VECC), Kolkata with solid state track detectors like CR-39 (DOP). It was expected that precise knowledge of the projectile fragmentation could help to understand the nature, acceleration mechanism, origin and source of cosmic rays.

In a paper published in *Nuovo Cimento*, 'Fragmentation of ^{56}Fe in Al at 1.88A GeV' in 1988, D. P. Bhattacharya *et al*. stated the aims and objectives of their experiments: 'The knowledge of fragmentation probabilities of different ions in various targets is necessary to understand the elemental and isotopic composition of cosmic rays at their source. The proper understanding of nucleus–nucleus interaction processes may be used for calibration of heavy-ion detectors – both passive and active – carried by balloons and spacecrafts.'

Chapter 6 lists 27 publications of Bibha Chowdhuri. Her last paper titled 'Existence of charge phenomena in ^{56}Fe + ^{27}Al collisions at 1.88A GeV' was published in the *Indian Journal of Physics* in 1990. Bibha Chowdhuri died in 1991. This publication clearly shows that she was an active scientist till her death. She was a woman – born to be a scientist. In my lecture delivered in Sri Guru Gobind Singh College, Chandigarh on 28 September 2018 to inspire fresh graduates of Physics, I called Bibha Chowdhuri, a Marie Curie of India. She deserved the Nobel Prize for her work on discovery of mesons along with C. F. Powell of Bristol University in 1947. The authors deserve all praise for unearthing a 'Jewel' of Indian science.

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