

Clay, Craft, Music and Science: Purnima Sinha's Life. Rajinder Singh and Suprakash C. Roy. Shaker Verlag GmbH, Am Langon 15a, 52353 Düren. 2020. xviii + 139 pages. Price: 21,90 Euro.

The authors of this monograph are well established historians of science. I had the privilege of reviewing more than half a dozen books of Rajinder Singh. In the preface, authors write: 'The idea of writing a book on Purnima Sinha came to our mind soon after writing the book *A Jewel Unearthed: Bibha Chowdhuri – The Story of an Indian Woman Scientist*. Purnima Sinha was the first woman who did her Ph D in Physics from Calcutta University under the supervision of Satyendra Nath Bose'. The prime movers for motivating the authors of this book are Sukanya Sinha and Supurna Sinha, daughters of Purnima Sinha.

In the opinion of authors, Purnima was a multi-talented lady and her excellence in arts, music, painting etc. far supersedes her achievements in science. She had an analytical mind to assess various societal issues hindering the development of Indian society. Her article titled 'Social obstacles to science in India' published in *Science and Culture* expresses her ability to analyse and present her candid opinion boldly.

Chandrima Shaha, President INSA, writes in her Foreword: 'An inborn innovator, Dr Sinha, fabricated instruments for her own doctoral research. She built her own X-ray laboratory apparatus from scraps of World War II surplus. This ability to make one's own instrument is difficult to achieve even today and marks the extraordinary ability of a scientist in the early 50's who happened to be a woman, to design and make her own instruments to carry on research. Dr Sinha received her D Phil in 1956 from Calcutta

University, being the first woman in doing so.'

In the Introduction, the authors reveal the mindset of Indian administrators of scientific institutions where husband and wife are not allowed to work in the same division: 'Unfortunately, the unwritten rule, which states that spouses should not be appointed in the same division, is faithfully followed in research institutes in our country.' They also reveal her personal traits of character: 'We intend to show that P. Sinha was an independent lady and a free thinker. She did not live under the shadows of her mentor S. N. Bose, or her husband Surajit Chandra Sinha, a great anthropologist, who was Vice-Chancellor of the renowned Visva-Bharati University.

Purnima Sen-Gupta was born on 12 October 1927 in a well-to-do family. Her father, N. C. Sen-Gupta was a jurist and Professor at the University of Dacca. She had the opportunity to study in the best educational institutions of her time. In 1951, Purnima started her doctoral work under the supervision of celebrated physicist, S. N. Bose. She received her D Phil degree in 1956 from Calcutta University. Her thesis was on 'X-ray and differential thermal analysis of Indian clays'. Purnima got married to Surajit Chandra Sinha, a reputed anthropologist. The couple moved to USA in 1961 for higher studies. Purnima worked on the 'Origin of Life' in the Biophysics Research Group at the Stanford University, California, and studied structures involving clay and bases that appear in the DNA double helix.

On return from USA, Purnima joined the Bose Institute in 1964 and then moved to join Central Glass and Ceramic Research Institute (CGCRI) in Jadavpur in 1968. She was asked to teach Music at Visva-Bharati, Shantiniketan, when she started living with her husband who was Professor there and appointed as Vice Chancellor in 1978. Her talents as a painter and sculptor found expression at Visva-Bharati and an exhibition of her works was organized. Some of her paintings adorned the walls of Visva-Bharati University.

The authors discuss Purnima's scientific research in chapter 2 under the heading 'Study of clays and clay minerals'. Scientifically, the term clay is used for shales, soil clays and glacial clays. The major constituent of clay mineral is illite. Very little work had been done in

India using X-ray and differential thermal analysis with the clays available in India when Purnima started working on her Ph D thesis. She studied 50 samples of clays, soils and shales from different parts of India by X-ray diffraction (XRD) method and differential thermal analysis (DTA) method and classified them into montmorillonite, vermiculite, chlorite, mica, illite, and kaolinite. The results of her investigations were published in *Nature*, and in the *Bulletin of CGCRI*.

Chapter 3 gives an account of her research work carried out at CGCRI, Jadavpur where she spent almost eighteen years of her active life. She worked on ceramic, spinels and clays there and published 'A review of the classification of ceramic pigments' in both English and Bengali. Her work on Spinel and Panchmura clay was of high quality. Purnima published a series of articles in Bengali in the magazine *Jnan O Bijan* (Knowledge and Science), while she was in CGCRI, in a lucid Bengali language.

Chapter 4 is devoted to Purnima's research work in Music. She seems to be the only Indian physicist who wrote a book on Indian music. Her turning to music as a professional scientist was more of a compulsion than choice. She wanted to remove wrong perceptions about Indian music in the western minds. She learnt playing the *tabla* (an Indian percussion instrument), a male-dominated area of art, under the renowned *tabla* player Pandit Jnan Prakash Ghosh. She delivered seven lectures on Indian Music at the University of Chicago in 1962, which were published as a series of articles in magazine *Folklore*. These articles were compiled as a book *An Approach to the Study of Indian Music*. This book gives information about her contact with eminent scientists and musicologists. Music experts refer to her work done in the 1960s during the 21st century, which indicates the superlative quality of her work.

Chapter 5 gives an inkling to Purnima's personal relations and interactions with her mentor, S. N. Bose and Paul Dirac and his family. When Diracs visited Kolkata in 1955, Purnima was asked to play host to the Dirac couple. The details of her interactions are given in a six-page long letter written in Bengali and translated by Sujata Roy (wife of the author, S. C. Roy). The correspondence between

Purnima and Mrs Dirac continued till the death of Paul Dirac in 1984.

Chapter 6 'A critical observer and translator' shows some interesting features of Purnima's character as an independent thinker. She had the opportunity of seeing from close quarters the inner structures of University of Calcutta, Bose Institute, Central Glass and Ceramic Research Institute, Visva-Bharati and Geological Survey of India. She was emphatic in her views about Indian science, children's education and social hindrances as follows:

1. 'Science is not developing in India due to lack of research facilities. Even if instruments are there, scientists are reluctant to share them with their colleagues. There is a lack of cooperation within the community.'
2. She opined that scientists do not protest against the poor working conditions and people in power are not interested in the scientists' work.
3. The tradition of recruitment of talented scientists from an all India base has completely broken down in favour of recruiting only Bengalis.
4. Instead of the young and enthusiastic, old scientists who have stopped research work are promoted based on their seniority instead of their scientific achievements.
5. Purnima observed that bureaucrats dominate the scientific laboratories.
6. After independence funds were not an issue but there were no good scientists in the well-equipped laboratories.
7. Our education system is not progressive. Even in the innovative field of science, our emphasis is on cramming. We do not encourage our children to ask questions.
8. She suggested that students from middle and upper middle classes should compulsorily work with farmers and workers. In order to make scientific planning realistic, persons from the working class should be appointed.
9. In order to impart science education to all strata, S. N. Bose and others thought of teaching science in Bengali.'

In chapter 7 'Conclusions', the authors dilate further on Purnima's qualities of head and heart and pay her glowing tributes in the following words:

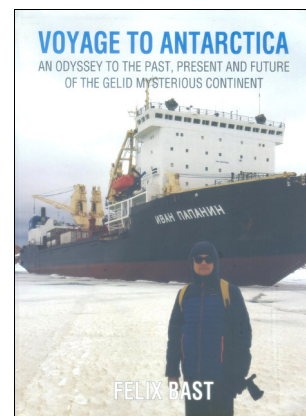
1. 'Purnima's writings show that she had a bleeding heart for the down trodden. Though she came from a well-to-do family, she was always in favour of workers and farmers. This part of her life seems to have been influenced by her father, who was President of Labour Party of India (1934).
2. Purnima's scientific work as well as her ventures into different fields, particularly music, and her criticism of the existing scientific policies leave no doubt that she was an independent and analytical woman'.

Purnima Sinha was a versatile writer in Bengali. She translated Maxim D. F. Kamenetskii's book *Unravelling DNA* and Erwin Schrödinger's – *Mind and Matter* into Bengali under the title *Mon O Jodobostu*. She was a loyal student and like a daughter to S. N. Bose. She wrote two biographies of her mentor: *Amar Katha* and *Bijnan Sadhanar Dharay Satyendranath Bose*.

In my view, the authors deserve all praise for their labour of love in digging up archival material running up to ten pages of bibliography about this unique multi-talented lady, who created history by fabricating her own equipment to carry out research investigations into an hitherto unexplored field in India. Purnima was the first woman Ph D student of Calcutta university supervised by S. N. Bose. Despite many handicaps, her achievements both in Arts and Science are remarkable.

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Voyage to Antarctica: An Odyssey to the Past, Present and Future of the Gelid Mysterious Continent. Felix Bast. Vignyan Prasar, Department of Science & Technology, A-50, Industrial Area, Sector-62, Noida 201 309. 2019. xii + 172 pages. Price: Rs 300.

This book by Felix Bast is originally a diary and a travelogue. The author was on a short Antarctic summer trip and has tried to share his polar experiences. It is really admirable that a first-time-visitor to Antarctica was fired with the enthusiasm to chronicle his impressions! Even in his first exposure to Antarctica, the author appreciates the Indian Antarctic programme establishing great facilities in the remotest place on the earth, '...indubitably a remarkable achievement'. He recognizes that the pre-expedition training and interactions at Auli-India were useful preparations, '...the Antarctic veterans... the interactions I had with them were simply the best part of the whole acclimatization program'. He also rightly points out that 'Climate change denialism is indeed a form of pseudoscience...'

However, the book is full of major factual errors; reflecting on author's limited polar experience and inadequate Antarctic knowledge. The book should contain facts and not vague assumptions.

Since its first expedition in 1981, Indian Scientific Expedition to Antarctica (ISEA) was initially managed by the Department of Ocean Development (DOD) and now by NCPOR under the aegis of the Ministry of Earth Sciences (MoES). ISEA was never 'managed by the Indian Navy', as mentioned by the author (p. 91).

Geology, glaciology, paleoclimatology have always been integral aspects of ISEA. The author wrongly mentions that