



**DARWIN OF STELLAR ASTROPHYSICS
MEGHNAD SAHA** by Shyamal Bhadra, Rik
Chattopadhyay and Ajoy Ghatak; published
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In a life of sixty-three years, Meghnad Saha (1893-1956) combined in himself so many roles and achieved so much of distinction in each of them that he continues to be inspirational. As a scientist and builder of scientific institutions, as a teacher, as a Parliamentarian and a public figure, Saha stands tall amongst the builders of modern India. Many books have been written on his life and works, but none captures the unique facets of this persona as comprehensively as the book under review does, published on the occasion of the 125th birth anniversary celebration of Saha by the National Academy of Sciences, India at Allahabad, the oldest science academy with the largest fellowship, founded by him in 1930.

This commemorative volume, edited by the three eminent scientists, covers in fourteen chapters the evolution of a poor grocer's son from an obscure Bengal village to

a figure of international renown. While his pioneering work on *Thermal Ionisation* and its global impact have been dealt with in ample details - there are at least two distinctive features of this tome. First, an attempt has been made, with hindsight, to understand how his work had triggered the development of a new branch of physics to mark him as the 'Darwin of Stellar Astrophysics'. Second, this work includes personal reminiscences of Saha's living daughters and family members that illuminate his personality - as a loving guide to endless stream of students and an affectionate father to his seven children.

To give an idea of the contents, here is a chapter-wise breakup. Prof. Ajoy Ghatak, one of the editors and a distinguished physicist himself, provides a biographical sketch and explains, in simple terms, Saha's ionization formula. Thereafter, the renowned astrophysicist Jayant V. Narlikar discusses *The Saha Equation and Beyond*. Saha's youngest son, Prasenjit, explores his father's work through letters and correspondence (1917-1936). The fourth chapter reproduces the comments by two leading astrophysicists, Henry Norris Russell and Arthur Eddington, about the decisive impact of Saha's path-breaking work.

The fifth chapter projects *Meghnad Saha as Father*, as recollected by his three living daughters and the eldest daughter-in-law - Krishna Das, Chitra Roy, Sanghamitra Roy and Biswabani Saha. Chapter six comprises five tributes by noted scientists like (Sir) Jnan Chandra Ghosh, Debendramohan Bose, Santimay Chatterjee, Sam Kean and A.A. Kamal. In the next one, Saha's role and vision -in creating institutions like the National Academy of Sciences, India at Allahabad, the Institute of Nuclear Physics at Calcutta (later named after him), the present campus of the Indian Association for the Cultivation of Science at Jadavpur, Positional Astronomy Centre etc.—as also in establishing the Indian Science News Association and the journal *Science and Culture* (1935), setting up the National Planning Committee under Nehru (1938) etc.— have been faithfully recorded by Amalendu Bandyopadhyay, Suprakash C. Roy (current editor of *Science and Culture*), Prasenjit Saha and Shyamal Bhadra.

Some of the key public lectures delivered by Saha have been compiled in Chapter eight. Chapters nine, ten

and eleven comprise select letters and correspondence of Saha, articles written by him on famous personalities like Albert Einstein and Jagadis Bose after their deaths, and assessments of Saha's scientific works by authorities like Binayak Dutta Roy, J.C. Bhattacharyya and David H. DeVorkin. Chapters twelve to fourteen delve into the latest insights to Saha's equation by three Russian and German experts (2011), an account of the last years of his life, as also his obituary notice published in *Nature* (1956).

While much of Saha's public life is well-known, how he was as a private person is quite revealing. How conscious he was about the education and upbringing of his children has been recounted by his daughter-in-law (wife of the late Professor Ajit Saha, also a distinguished physicist and, like his father, an elected President of the Indian Science Congress, 1980). '... during lunch and dinner time each one had to keep book on dining table in order to continue with their study and occasionally he intervened and discussed various issues related to their studies.' Saha's affection for his students many of whom lived at his house, when he headed the physics department at Allahabad University (1923-1938), comes out vividly from his daughter's account. 'Father's 3 or 4 students, their own 7 children and the many relatives from East Bengal... Mother never got to eat lunch before 3 or 4 o'clock in the afternoon... Ma supervised our cook to feed 20-25 people every day and also made arrangements for those who were strict vegetarians...' Other than the scientists of his time, Saha's house used to be visited by Acharya P.C. Ray, Subhas Bose, Jawaharlal Nehru, Humayun Kabir and the like. 'Ma cooked all the meals and us girls served them to our guests...' The family accounts are replete with such touching details.

Saha was close to both Nehru and Subhas Bose. Unfortunately, from the late forties, Saha's differences with Nehru started manifesting. He won returned to the first Lok Sabha (1952) with a big margin as an independent candidate but his constant opposition to Nehru haunted him. In a letter to Dr. S. Radhakrishnan that year, Saha wrote 'Fate has ordained that I shall be in Opposition, but I hope my friendship with Panditji will stand the strain...' Many of Saha's stern criticism of the government infuriated Nehru who once remarked 'He used to be a great scientist but has drifted from the field of science and has found no foothold elsewhere yet...' The Nehru-Saha difference perhaps prevented Saha from becoming the most influential scientific figure in post-independence India. Nehru's preference for Bhabha may have to be seen in this context.

Though Raman wrote the Foreword to the internationally acclaimed and authoritative text book *A*

Treatise on Heat by Saha (and his junior colleague Srivastava) in 1931, there were evidently many disagreements between them, dividing, according to Kameshwar Wali, many Indian 'scientists into two camps'. Saha also expressed how Raman had been antagonistic towards him.

In what great esteem Saha was held in the global scientific community would be apparent from his interaction with Einstein and other leading lights of the day. In 1927, Einstein told Saha 'I cannot believe the dear God has made the α -particle a wave.' In a letter from Cambridge in April 1935, S. Chandrasekhar sought Saha's help to 'send a carefully worded letter' to the Russian Ambassador in London so that Peter Kapitza is allowed to return to Cambridge.

Enrico Fermi recalled the inspiration he received from Saha's theory of gas ionisation. Scientists like Arthur Compton and others nominated Saha for the Nobel Prize. As Herold Shapley wrote 'The Harvard Observatory owes much to...Saha. His pioneering work...thirty years ago... inspired the activity of British scientists who in turn inspired the work here at Harvard... and their work established modern astrophysics at Harvard.'

Saha's pioneering work on calendar reforms, river planning (including for the Damodar Valley) and others, not so publicly known, has also been alluded to.

While Saha's election as a Fellow of the Royal Society (London) was under consideration, an intelligence report identified Saha 'as a conduit for Indian revolutionaries in Germany and Switzerland!' Saha in his early days had taken part in anti-British agitation when Curzon partitioned Bengal, and later he was denied permission to sit for the Financial Civil Service examination. Fortunately, it was a great gain for science.

Why Saha did not win a Nobel Prize remains debatable. But I discovered to my dismay that Saha was not even awarded any national honour whereas, by 1956, C.V.Raman had been awarded the Bharat Ratna, Satyendra Nath Bose received the Padma Vibhushan and other scientists like K.S. Krishnan, Homi Bhabha, S. S. Bhatnagar and J.C. Ghosh the Padma Bhushan. Evidently, his differences with Nehru, criticism of the bureaucracy, antipathy to khaddar, bullock-cart and other symbols, and his rebellious spirit didn't endear him to the powers that be.

Saha died on 16th February, 1956 in Delhi, on the day of Saraswati puja. Many years ago, on this auspicious day, while awaiting *prasad*, he was told to wait till the

Brahmins were served. Upper caste students used to taunt 'Look, a Saha is going to school'. Even when a kind doctor agreed to provide him free board and lodging in his house, as his daughter reminisces, 'he was required to wash his own plate and take care of the cow.' Saha's spectacular rise to fame has to be contextualised against the sufferings and disappointments he faced all his life.

This book, an invaluable compendium on Saha and his times, contains many interesting photographs but does not have an index. It should adorn all public libraries and be of immense interest to students, teachers and the

enlightened public. I would also suggest that its shorter version be prepared and translated into regional languages in order for the life of this extraordinary man to be accessible to a much wider body of readers. □

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