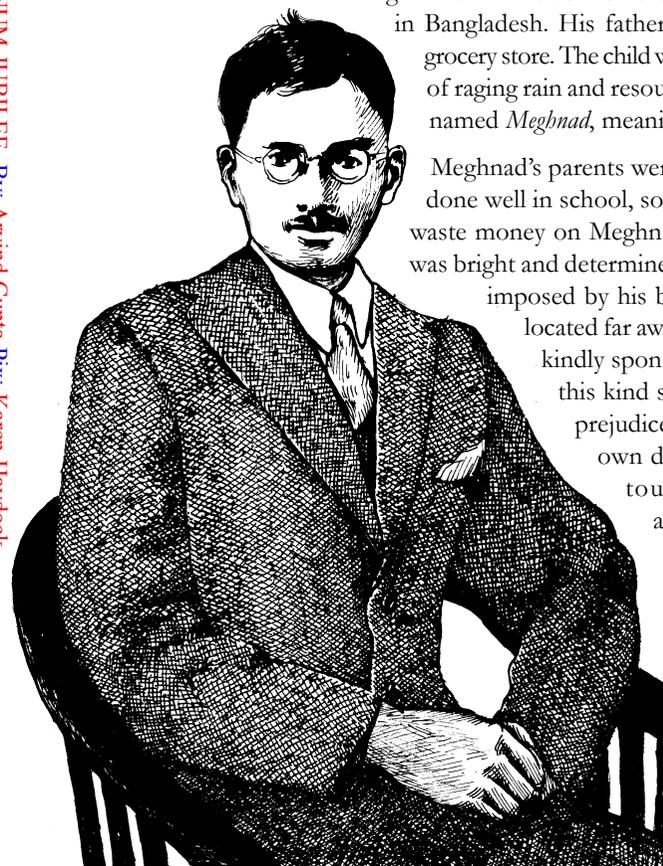




In a segregated society people of the lower castes are often persecuted and discriminated against. This prevents them from achieving their full potential. But it also inspires some gifted people to break the shackles. Dr. Meghnad Saha, a distinguished Indian scientist overcame crippling social constraints by sheer perseverance.

Meghnad Saha was born on 6 October 1893 in Seoratali, now in Bangladesh. His father Jagannath Saha ran a small grocery store. The child was born to the accompaniment of raging rain and resounding thunder and hence was named *Meghnad*, meaning the roll of thunder.

Meghnad's parents were poor. His brothers had not done well in school, so there was no good reason to waste money on Meghnad's schooling. But Meghnad was bright and determined to overcome the handicaps imposed by his birth. The middle school was located far away. Hence he had to live with a kindly sponsor near the school. But even this kind sponsor was not above social prejudices. Meghnad had to wash his own dishes – as no one else would touch them! But Meghnad accepted it stoically. He completed the Middle School in 1905, being placed first in Dacca division. He next joined the Collegiate School in Dacca City.

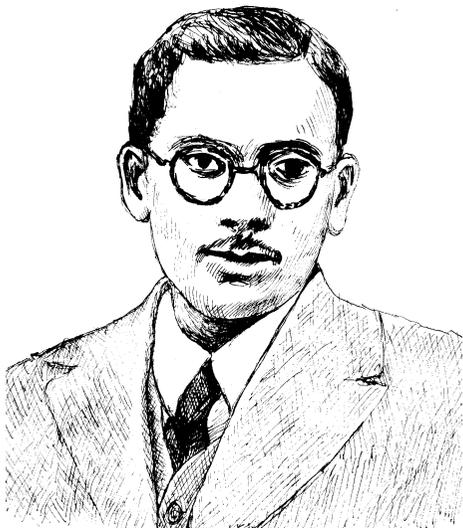


The game of *divide and rule* had helped the British in ruling India. Lord Curzon partitioned Bengal into an eastern and western part. Administrative convenience was the reason given. But since the two parts were Hindu and Muslim majority areas the British mischief was obvious. Nationalist Bengalis rose in revolt. The young Meghnad joined anti-British agitations for which he was expelled from school. Fortunately, another school accepted him. He completed Intermediate Science in 1911 and joined the Presidency College in Calcutta.

At Presidency College Saha was in the company of brilliant minds. Satyendra Nath Bose was his classmate; Subhash Chandra Bose his junior and P.C Mahalanobis his senior. He had illustrious teachers in Sir J.C. Bose and P.C. Ray whose dictum: “*Science can wait, Swaraj cannot*” left a deep imprint on Saha. He completed BSc in 1913 and MSc in 1915, being placed second in the Calcutta University. His friend Satyendra Nath Bose stood first.

Saha faced social harassment and poverty in Calcutta. To supplement his meagre income he cycled all over town giving tuitions. After graduation Saha wanted to appear for the much sought after Finance Service Examination but he was debarred because of his political activities. In 1918, he was married to Radharani Roy.

Saha then joined the Physics Department at Calcutta University along with Satyendra Nath Bose. Saha was trained as a mathematician and it took him some time to master experimental physics.



The then rapidly developing Theory of Relativity and Quantum Mechanics attracted Saha. In 1917, he published his first scientific paper titled *On Maxwell's stresses, concerning the electro-magnetic theory of radiation* in the *Philosophical Magazine*. The Calcutta University awarded him the DSc degree in 1919.

After the First World War scientists discovered the deflexion of starlight by the gravitational field of the sun, confirming Einstein's theory

of relativity. Soon Saha became intensely interested in the field which now indelibly carries the mark of his contribution - the spectra of stars. In 1814 Fraunhofer had discovered a large number of dark lines in the *solar spectra*. In 1859

Kirchoff proved that these lines represented definite chemical elements. Helium was discovered in the sun before it was discovered on earth! Better spectrometers revealed bright as well as dark spectral lines. But the number of bright and dark lines far exceeded the number of elements known. This set the field in turmoil, until Saha came up with the solution. When a gas is heated some of its electrons are stripped away leaving positively charged nuclei and negatively charged free electrons. This process is called *ionisation*. Saha developed the theory of high thermal ionisation and its application to the interpretation of stellar spectra. Saha's *ionization equation* solved this riddle of Astrophysics and has been rated as an important milestone. With the help of this equation one can determine the ionization state of various elements making up a star.

A grant enabled Saha to visit Europe. In Germany he met eminent scientists like Einstein and Planck. Soon Saha was invited by Asutosh Mookherjee to take the post of Khaira Professor of Physics in Calcutta University. Saha returned to India in 1923. He later accepted an offer from Allahabad University and worked there for 15 years.

In 1927 at a young age of 34 Saha was elected a Fellow of the Royal Society. He delved deeply in nuclear physics. The (Paul) Dirac-Saha formula for calculating the pole strength of magnetic monopoles is a permanent reminder of his success in this field.

Saha was not an *Ivory Tower* scientist. He involved himself in solving the problems of ordinary people. Spreading of scientific temper among people was a high priority with him.

In 1936 Saha left on an extensive study tour of Europe and USA. The research of Fermi, Heisenberg and Bohr gave the world the atom bomb. Saha earnestly believed in the peaceful uses of nuclear energy. In 1940, with a grant of Rs. 60,000 from the Tatas, Saha constructed a cyclotron and laid the foundation of nuclear research in India. With Nehru's help he set up the Institute of Nuclear Physics (fittingly renamed as Saha Institute of Nuclear Physics). Saha was also made the Director of the Indian Association for the Cultivation of Science for which he worked untiringly.

Saha was elected a Member of Parliament from the Calcutta North-West Constituency in 1952. His politics had a definite leftist orientation. His experience of obscurantism had turned him into a fervent rationalist, scornful of Indian superstitions. He founded the journal *Science and Culture* and edited it for a number of years.

Like many intellectuals, Saha believed that a planned economy was the salvation to India's economic problems. He had personally witnessed ravages caused by floods in his native Bengal. He strongly advocated River Valley schemes to control floods. This resulted in the Damodar Valley Corporation which built several dams to control floods.

Saha was perturbed by the irrational proliferation of numerous calendars in different regions of India. A Calendar Reform Committee was formed to rectify the defects, but because of deep biases it was only partly successful. Saha was also a strong believer in the linguistic reorganisation of India.

Saha was the founder of the National Academy of Sciences. He headed many committees of the Council of Scientific and Industrial Research. Saha was President of the Royal Asiatic Society of Bengal (now Asiatic Society) from 1944-46.

While on an official visit to Delhi, Saha suddenly collapsed and died due to a massive heart attack on 16 February 1956. His struggles and achievements proved that caste and poverty are not insurmountable barriers for the determined and courageous.

