Soma Banerjee has provided a thoughtful and sensitive account of Meghnad Saha as a physicist and nationalist in India and his rise to international fame as an astrophysicist. I have a large collection of letters, given to me by Saha's family, between him and other scientists and between other scientists about him. I wanted to share some of the insights and knowledge I gathered from those letters and from other publications.

The notion persisted that Saha owed the idea of his groundbreaking work in astrophysics, the Saha equation, to Alfred Fowler, with whom he worked in England in 1920. Saha was particularly offended by a talk in 1946 in which Harry Plaskett discussed Saha's work on the thermal ionization theory. Saha found the discussion "entirely gratuitous and misleading" and wrote Plaskett a long letter discussing how and where the ionization theory was developed and describing his career in India. Plaskett's response was remarkable:

> What was quite new to me was the fact that the early part of your work had been done in India, not Germany, before you came to Fowler's laboratory. The knowledge that you had done so much without help and backing in India only serves to increase the admiration I have always felt for your great contribution to astrophysics. I only regret that I did not know about this at the time of my presidential address, and can only ascribe my ignorance to a probably incorrectly remembered statement of [Henry Norris] Russell on his return from England in the early 1920's. . . . Your place in the history of astrophysics is secured for all time. So much so indeed, that it seemed to me worthwhile to correct a tendency (prevalent in some quarters of the United States) to regard astrophysics stemming from the work of [William] Pickering and yourself, forgetting the indispensable contributions from [Ralph] Fowler and [Norman] Lockyer.

At the Calcutta School of Physics, Saha belonged to a generation of stellar physicists[1] that included Jagadish Bose, a pioneer of radio-wave communication, semiconductor junctions, and plant biophysics; Chandrasekhara Venkata Raman and Kariamanickam Srinivasa Krishnan, who also made major contributions to the discovery of the Raman effect;[2] and Satyendra Nath Bose of Bose–Einstein statistics, Bose–Einstein condensation, and bosons. That group emerged quickly in an almost barren field that had not yet produced internationally acclaimed scientists. Subrahmanyan Chandrasekhar, according to a biography by Kameshwar Wali, speculated that this remarkable assembly was probably associated "with the need for self-expression, which became a dominant motive among the young during the national movement. . . . We could show the West in their own realm that we were equal to them."[3]

The nationalistic spirit surely had played a major role in the emergence of that extraordinary group, but somehow the city of Calcutta was also fortunate to have visionaries and mentors like distinguished mathematician Asutosh Mukherjee, who was also a judge of the Calcutta High Court and later a vice chancellor of the University of Calcutta, and Prafulla Chandra Ray, a distinguished chemist and industrialist. Both were able to identify talents among the younger generation and tried to provide them with a nurturing environment and as much support as possible.

The Saha and S. N. Bose translation of the relativity papers of Albert Einstein and Hermann Minkowski in 1919, which represents the first translation of those papers, grew out of a program of self-study of relativity and quantum mechanics. Mukherjee, then vice chancellor, mandated that work for the newly hired young lecturers in the university so they could teach the new subjects to their students (see PHYSICS TODAY, September 2006, page 10). Saha and Bose were relieved of any teaching responsibility in their first year. Both the Saha equation and Bose–Einstein statistics followed soon after the self-study and marked the birth of theoretical physics research in India. Scientific research in India received very little financial or infrastructural support at the time of Saha and the others. Saha struggled to generate modest funding from different courses, including the US, but without much success.

In addition to his prolific scientific contributions, Saha also led various organizational aspects and coordination of scientific work in India. Chandrasekhar, then a student at Cambridge University, characterized those efforts as "beyond all praise"; he sought Saha's help for the release of Pyotr Kapitsa from his native country, the Soviet Union.

Later in his career, Saha got involved in national politics, as he thought he must put his knowledge of science to use in contributing to society. Although born into a Hindu family, his activism put him on a collision course with some Hindu religious leaders.

Meghnad Saha was twice nominated for the Nobel Prize by Arthur Compton, in 1937 and in 1940, but without success.

References

1. G. Venkataraman, *Journey into Light: Life and Science of C. V. Raman*, Penguin Books (1994).
2. K. C. Wali, *Chandra: A Biography of S. Chandrasekhar*, U. Chicago Press (1992), p. 250.
3. Ref. 2, p. 246.

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Science is indeed special

This letter is in response to Charles Day's editorial "Science is special" (PHYSICS TODAY, July 2016, page 8). Obviously, there is an objective truth regarding the universe that exists external to the human mind. However, all of our scientific theories are products of the human mind and therefore not the same as the real universe. To what extent is the progress of science discovering the truth about the universe, and to what extent are humans simply inventing new theories to match current observation? It is human nature to want to believe that our theories are true, so in the debate over discovering versus inventing, our impulse is to skew in the direction of claiming that we are discovering something that was true before we discovered it.

In his book *Constructing Quarks: A Sociological History of Particle Physics* (University of Chicago Press, 1984), Andrew Pickering discusses the flaw in this way of looking at the history of science. Obviously, we discover individual facts that