This does pose practical difficulties of repeat visits and compliance in the expanded programmes of immunization. These difficulties are further compounded by the uncertainties of availability and maintenance of cold chain for this vaccine in far-flung rural areas. Thus, after due scrutiny of the data, the Indian Council of Medical Research recommended the use of the Salk vaccine as such or as adjunct to the Sabin vaccine. An opportunity to make the Salk vaccine in the country, along with two other cell-culture-derived vaccines against measles and rabies, came forth in 1989 with the French company Merieux agreeing to be a partner in a venture along with the Department of Biotechnology, Indian Petrochemicals, and 25% shares accessible to public for investment. Jonas Salk (and others including me) played an active role in motivating Merieux to come to India with a technology that will be useful for more than one vaccine of proven efficacy. An agreement was signed in New Delhi by the President of Merieux with counterpart officials in the august presence of President François Mitterand and Prime Minister Rajiv Gandhi. Had this agreement materialized, India would have been the largest producer of these vaccines in the world, meeting its own needs and exporting to other countries. Merieux had a further proposal of making a quadruple vaccine comprised of DPT (diphtheria, pertussis and tetanus) along with the Salk polio vaccine. Thus, complete immunization of the child against these four killer diseases could be accomplished with a common vaccine. A cherished goal of researchers and public health organizations is to have a vaccine with multiple components to prevent all childhood infections by a single intervention. Technologies are evolving to deliver multiple doses of the vaccine in biodegradable microspheres at a single contact point.

Jonas Salk was a pioneer vaccinologist. He was also a thinker and theorized on the implications of scientific findings on man and his place in society. He authored four books in this context: *Man Unfolding* (1972); *The Survival of the Wisest* (1973); *World Population and Human Values* (1981) and *Anatomy of Reality* (1983). He rallied readily for public causes. In spite of specialized focusing that any notable scientific work demands, his outlook was broad. He had a sensitive personality, and was at home amongst writers, artists and thinkers. He married in 1970 an equally lovable person, Françoise Gilot, an artist and a writer (*My Years with Picasso*) who was for many years a companion of and lived with Pablo Picasso. He is survived by three sons from his first wife.

Although Jonas Salk did not get the Nobel prize, he received several recognitions. In 1975, he delivered in New Delhi the Jawaharlal Nehru Award Oration for International Understanding.

In response to the havoc that AIDS was causing worldwide, he got energized in the last years of his life to make a vaccine against this 'clever' virus, which attacks and incapacitates the host immune status. With his demise, his ambition remains unfulfilled.

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A doyen of Indian physicists

An obituary of S. D. Chatterjee

Professor Shyamadas Chatterjee, a doyen of Indian physicists, passed away in Calcutta on 27 May 1995 at the age of 86.

Born on 29 June 1909, he studied at Cuttack, Patna and then at Presidency College, Calcutta, obtaining his B Sc degree in 1930 and M Sc degree in Physics from Calcutta University in 1932. Among his teachers was none other than C. V. Raman, who on winning the Nobel Prize in 1930 graciously acknowledged the letter of congratulation from his young student. Chatterjee joined the Bose Institute, founded by the pioneer Jagadish Chandra Bose in 1938, and showed his experimental skills by constructing one of the first Wilson cloud chambers in India. For his research on cosmic rays he was awarded the D Sc degree of Calcutta University in 1945, his examiners being Blackett and Cockroft.

When the news of the discovery of nuclear fission reached India, he set up his own experiment with indigenous components to detect the emitted neutrons. He was thus the first one to detect the spontaneous fission of uranium in 1940. For the interpretation of his experimental results he was indebted to S. N. Bose. His brief communication to *Science and Culture* was, however, withdrawn as it had been sent without the permission of the then Director of the Bose Institute! His estimate of the half-life of uranium was a few orders of magnitude less than the value of Teller but was verified by Georgy Flerov from the Soviet Union within a few months. The actual calculation of the half-life from the detector counts was done by N. R. Sen of the Department of Applied Mathematics. In return Chatterjee repaired Sen's radio set, an indication of how scientific collaboration worked in those days! Chatterjee was awarded the Woodburn Medal of Calcutta University for best research in 1948 and the Elliott Medal of the Royal Asiatic Society in 1951.

In 1949 Chatterjee went to Chalk River, Canada, and also visited several laboratories in the USA, including the National Bureau of Standards, where he interacted with Tuve. He maintained contact with

leading scientists like Herzberg, Marton and Mott throughout his life.

Satyendra Nath Bose had moved back to Calcutta from Dacca in 1945 and recruited Chatterjee as Lecturer in the Department of Pure Physics in 1951. He was later promoted to Reader. He set up the first radiocarbon dating laboratory in India and detected fall-out across the country from atmospheric nuclear tests conducted in the early fifties.

Chatterjee was known for his brilliance in electronic instrumentation and built his own GM and proportional counters, picking up the coincidence counting technique from Walter Bothe in Germany. He worked as Fellow in The Davy–Faraday Laboratory of The Royal Institution, London, in 1958 when Lawrence Bragg was the Director. During one of his visits to Europe he is credited with the suggestion of the possibility of recoil-less emission of gamma rays from the nucleus, which led to the discovery of the Mossbauer effect. In recognition of this, he was invited to Munich as a Visiting Professor in 1964.

Chatterjee was invited to head the Physics Department of the newly constituted Jadavpur University in 1956 and built up the department with energy and devotion. His group discovered very high helium content from the emanations at the hot springs at Bakreshwar near Calcutta. For enriching the gas he set up his own laboratory which was later taken over by the Department of Atomic Energy. His research interests expanded into experimental solid-state physics, his students studying exo-electron emission from GM electrodes, surface states in semiconductors and metal–semiconductor contacts. He guided over 60 doctoral theses and was a kindly father-figure, ever ready to advise and support financially researchers in need.

On retirement from Jadavpur University in 1969, he joined his mentor S. N. Bose at the Indian Association for the Cultivation of Science as Senior Fellow and again set up a helium laboratory. He continued to guide research students, his encyclopedic knowledge of physics being always available to colleagues and students. A small laboratory was even set up in his own house and run by the S D Chatterjee Foundation.

He was elected Fellow of the American Physical Society and Fellow, IEEE and was one of the seniormost Fellows of the Indian National Science Academy. A bachelor with spiritual leanings, Chatterjee donated his house to the Asiatic Society Calcutta, one of the oldest institutions pursuing knowledge in all its aspects.

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