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EDITORIAL

RABINDRANATH AND SCIENCE

The issue May and June 2021 (Vol. 87 Nos. 5-6, 2021) of Science and Culture is being released for our readers. May and June months are most significant not only for the advancement of science and technology but also culturally at the international level. May-June reflects the birth of so many intellectuals of Indian Renaissance. Rabindranath Tagore (7 May 1861) is the first Nobel Laureate in Asia and Africa in 1913 (in Literature for his book _ Gitanjali – Song Offerings). He is a cultural icon and his writings particularly poetry and songs are the emblem of Bengali culture. For the first time he reshaped Bengali literature and music (Rabindra sangeet) and also Indian art with modernism during the second half of the nineteenth century flowing into the twentieth century. During the initial stage of Indian Renaissance, Rabindranath had a good proximity with the rising scientists of India like Acharya Jagadish Chandra Bose (1858-1937), Acharya Prafulla Chandra Ray (1861-1944), Meghnad Saha (1893-1956), Satyendranath Bose (1894-1974), Prasanta Chandra Mahalanobis (1893-1972).

Indian Renaissance was a constructive interaction and a creative synthesis of the best of both worlds i.e. East and West within the canopy of Indian tradition and culture. Ram Mohan Roy (1774-1833) was the torch bearer followed by Iswar Chandra Vidyasagar (1820-1891), Michael Madhusudan Datta (1824-1873), Bankim Chandra Chattopadhyay (1838-1894), Rabindranath Tagore (1861-1941), Prafulla Chandra Ray (1861-1944), Swami Vivekananda (1863-1902), Asutosh Mukherjee (1864-1924), Sarat Chandra Chattopadhya (1876-1938), Nazrul Islam (1899-1976) and many others from all stages of Indian life, culture, religion, literature and finally science. They are the jewel of late 19th and 20th centuries. The following other celebrated personalities were born in May-June playing significant role for the greater development of the academic scenario of India: Pramatha Nath Bose–pioneering Indian Geologist (12 May 1855-27 April 1934), Satyajit Ray-Author, Calligrapher and Film Director, Documentary Filmmaker, Magazine Editor (2 May 1921-23 April 1992), Raja Ram Mohan Roy-Father of Bengal Renaissance (22 May 1772-27 September 1833), Debendranath Tagore-Hindu philosopher and religious reformer (15 May 1817-19 January 1905), Ram Kinkar Bej-Indian sculptor and painter (25 May 1906-2 August 1980), Ronald Ross–First British Nobel Laureate born in Almora, India (13 May1857-16 September 1932), Satyendranath Tagore- the first Indian civil servant and social reformer (1 June 1842-9 January 1923).

It is noteworthy to mention that May and June reflects the birth of 154 scientists/ celebrated personalities won the Nobel prize for their significant contributions. The special mention to Pierre Curie (15 May 1859-19 April 1906) won the Nobel Prize in physics in 1903 for his work "on crystallography, magnetism and radioactivity" John Bardeen (23 May 1908- 30 January 1991) the only person to be awarded the Nobel Prize in physics twice: first in 1956 for the invention of the transistor and again in 1972 for a fundamental theory of superconductivity, Arthur Leonard Schawlow (5 May 1921-28 April 1999) won the Nobel Prize in Physics in 1981 for his work on laser spectroscopy.

The United Nations proclaimed June 1 to be the **Global Day of Parents** as a mark of appreciation to all parents in all parts of the world for their selfless commitment to children and their lifelong sacrifice towards nurturing this relationship. Love your parents. ***The depth of the love of parents for their children cannot be measured. It is like no other relationship.*** On Global Day

of Parents, here are seven extraordinary parent-child pairs who are Nobel Laureates:

1. Marie Skodowska Curie won the Nobel Prize for Chemistry in 1911. She shared the Prize for Physics in 1903 with husband Pierre Curie. Their daughter, Irene Joliot-Curie was awarded the Chemistry Prize in 1935.
2. William Bragg won the Nobel for Physics in 1915 and Lawrence Bragg in 1915.
3. Niels Bohr was awarded Nobel for Physics in 1922 and son Aage N. Bohr in 1975.
4. Hans von Euler-Chelpin won the Nobel Prize for Chemistry in 1929 and Ulf von Euler for Medicine in 1970.
5. Arthur Kornberg won the Nobel Prize for Medicine in 1959 and his son Roger Kornberg for Chemistry in 2006.
6. Manne Siegbahn was awarded the Nobel for Physics in 1924 and his son Ki M. Siegbahn won the Physics prize in 1981.
7. J.J. Thomson won the Nobel for Physics in 1906 and his son George Paget Thomson in 1937.

Rabindranath welcomed the West because it had brought the gift of Science: "Let us admit that modern science is Europe's great gift to humanity for all time to come. We, in India, must claim it from her hands, and gratefully accept it in order to be saved from the curse of futility by lagging behind. We shall fail to reap the harvest of the present age if we delay".

India's first Nobel Laureate, Rabindranath Tagore was a multifaceted genius. Tagore's ***Gitanjali*** is his beautiful English translation of his own poems with an introduction by W.B. Yeats, ***Gitanjali*** has held a special pride of place in the hearts of all Indians. The literary world has seen this book in innumerable editions – it has been translated into almost all Indian languages, into nearly all major languages of the world; there is also an edition in Braille. Rabindranath Tagore is India's greatest modern poet and the most brilliant creative person of the Indian Renaissance and finally the founder of Visva-Bharati (1921). He is a talented poet who made outstanding contributions to world literature.

Rabindranath in his Nobel Acceptance Speech categorically mentioned "And thus I am proud to say that your awarding me the prize has made some contribution to this great object which I had in mind. This has made me come out once again to the West, and I have come to ask you, to invite you to the feast which is waiting for you in the far East. I hope that my invitation will not be rejected. I have visited different countries of Europe, and I have accepted from them an enthusiastic welcome. That welcome has its own meaning, that the West has need of the East, as the East has need of the West, and so the time has come when they should meet".

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One thing is certain that the all-embracing poverty which has overwhelmed our country cannot be removed by working with our hands to the neglect of science. Physics, Chemistry, Botany, Agriculture and Meteorology should be properly studied here. Along with these Physiology and Hygiene should be studied under the guidance of a physician and acquaintance made with machinery with the help of a trained mechanic (Tagore, 1935)

Speaking in China in 1924 Rabindranath mentioned categorically "I say again that we must accept truth when it comes from the West and not hesitate to render it our tribute of admiration. Unless we accept it our civilization will be one-sided, it will remain stagnant. Science gives us the power of reason, enabling us to be actively conscious of the worth of our own ideals".

Rabindranath established Santiniketan School in 1901 (Brahma-Charya Ashram Vidyalaya), where he encouraged the teaching of science by direct practical experimentation from the very beginning i.e. introducing science at the primary level. In 1906 Rabindranath in his essay "Shiksha"

wrote "In order to teach science to youngsters, their eyes need to be opened up first and power of observation enriched". In the early days there used to be a science laboratory in a room in the library building and there were regular science classes for all the students of the school. Rabindranath was a keen observer of birds and wild flowers and plants and always encouraged the students to make careful observations of nature. For that reason a subject called Nature study is still continuing in the school section (Patha-Bhavana – school at Santiniketan and Siksha-Satra –school at Sriniketan). He used to read with great interest books on general science and wrote many popular articles on science in Bengali; one volume of such articles named "***Vishvaparichaya"(Introducing the Universe, 1937***) which was dedicated to Scientist Prof. Satyendranath Bose. Eminent Bengali writer and linguist, Syed Mustaba Ali, one of the closest students of Rabindranath at his Santiniketan School (1921-1926) mentioned in one of his articles that Rabindranath used to read books on science, physics, anthropology, chemistry, astronomy, plant sciences regularly and sent them to the school library. Rabindranath's writings of articles on science are all in Bengali (mother tongue) having limitation to non-Bengali readers.

For an all-round education, there must be a blending of Science with Humanities and if ever there was a place where this blending could easily be done the Visva-Bharati was certainly that place. Here students will learn Science in their classes and carry on experiments in the laboratories during class hours and after the day's work they will refresh their minds by attending literary meetings or musical soirees or by taking part in dramatic performances. They will join daily congregational prayers and weekly divine service in the prayer hall. All these facilities provided here will give the Science students adequate opportunity to have a fuller development of their minds.

Rabindranath used to look forward to the future when India would be again great in the pursuit of science and in the application of science and technology for the improvement of the material conditions of our life. He had fully accepted science as a most significant feature of civilization but continually protested against the use of physical power for narrow nationalistic purposes.

Rabindranath had his first writing on science when he was 13 years old but his first verse came out in his eighth year. He published his first science article " *Grahagan Jiber Abashbhumi*" (Planets are the home of living things) in their family periodical "***Tattabodhini Patrika*** in 1874, which was established and edited by his father Debendranath Tagore. To encourage literary activities among the children, a journal named "***Balak***"was established in 1885 by Jnanadanandini Devi, wife of Rabindranath's elder brother, Satyendranath Tagore. Rabindranath took active part in editing and publication. Rabindranath wrote articles on *"Barafpara*" (Snowfall) and "*Bigynan Sambad*" (Science News). He used to write Science News from the first issue. Rabindranath himself edited five periodicals like "***Sadhana, Bharati, Bangadarshan, Bhandar, Tattabodhini*"** at different times of his life. It is to be mentioned here that different news and small articles on science were the regular feature in those periodicals. ***Bangadarshan*** established by Bankim Chandra Chattopadhyay (1838-1894) was also edited by Rabindranath for five years (1901-1905) after Bankim's death. Bankim Chandra has also written a book in Bengali language purely on science named *"Vigynan Rahasaya*" (Science Mystery) in his journal ***Bangadarshan***. As Editor of Bangadarshan Rabindranath used to invite articles on science from different peoples. Rabindranath himself published an article on Jagadish Bose's research entitled "*Acharya Jagadisher Joybarta – Victory Message of Acharya Jagadish in 1901.* Rabindranath also wrote and published many articles in journal ***"Sadhana"*** on science like *Vayupravaha (Wind force), Ichchamrityu (Suicide), Bhugarvasthajal (Underground Water), Gatinirnayaner Indriya (Indicators of Motion) and Utpakhir Lathi (Camelbird's Kick)*. He was the Editor of the science section of the Journal "***Sadhana"*** (1901).

Rabindranath's interest in science can be traced to his early childhood. He was very much inspired by his father Maharshi Debendranath Tagore and his science teacher Sitanath Ghosh. As a young boy he used to listen from his father about the details of astronomical phenomena that's why he used to love the subject astronomy. He visited the Greenwich observatory when he was in England at the age of 18. But his science teacher Sitanath Ghosh carried out some simple experiments (conduction of heat, emission of steam and boiling of milk) at the Jorasakko house to inspire Rabindranath and to ignite sparks of science within Rabindranath. Rabindranath got some teachers as house Tutors at his early life to start education at the primary level. His teachers were Madhab Chandra Mukhopadhyay, Neelkamal Ghoshal, Aghorbabu, Bishnuchandra Chakraborty. Sitanath Ghosh being a physical science scholar used to write **popular science articles in very simple language in the *Hindoo Patrika and Tattabodhini.***

Rabindranath had no formal education. He resisted formal schooling but he received education at home from tutors and under the supervision of his elder brothers

which can be compared with a British Public school. It covered everything from languages, mathematics, drawing, music, natural sciences, anatomy and gymnastics. Rabindranath read many books on astronomy, life sciences, agriculture and used to make notes from them. He read "Hand Book of Stars" by Proctor and "Origin of Species" by Charles Darwin and many others.

Asutosh Mukherjee, the then Vice-Chancellor of the University of Calcutta find out a galaxy of Indian scientists, who showed their talents and made immense contributions towards the development of a global profile of Indian science. The nation is always grateful to Asutosh for initiating modern science education in India. Rabindranath had a very good bonding with Asutosh regarding the academic development of our country. He had a wide and diverse interest in science. The development of post-graduate teaching and research in science and technology at the University of Calcutta opened a door for the Indians to learn science. Dr. Mahendra Lal Sarkar was the first person to initiate the science movement in India. This was simply possible due to the contribution of educationists, scientists and scientific workers in India. The Indian research institutes like Indian Association for the Cultivation of Science in Calcutta (in 1876), Tata Institute (1908) now known as Indian Institute of Science in Bangalore and the Bose Institute (1917) in Calcutta are landmarks in science development butnone can reach that level before independence as compared to the developments initiated by Asutosh at the University of Calcutta.

For an all-round education, there must be a blending of Science with Humanities and if ever there was a place where this blending could easily be done the Visva-Bharati was certainly that place. Here students will learn Science in their classes and carry on experiments in the laboratories during class hours and after the day's work they will refresh their minds by attending literary meetings or musical soirees or by taking part in dramatic performances. They will join daily congregational prayers and weekly divine service in the prayer hall. All these facilities provided here will give the Science students adequate opportunity to have a fuller development of their minds.

Rabindranath also had a very good discussion on science and philosophy with the European scientists and scientifically minded philosophers like Bertrand Russell, Nobel Laureate in Literature in 1950, Arnold Johannes Wilhelm Sommerfeld meeting in Calcutta in 1928, Werner Karl Heisenberg-the famous German physicist and philosopher, Nobel Laureate in Physics in 1932, met in 1928 at his Jorasanko-house, Calcutta. Heisenberg (the young scientist at 27) had several conversations with the mature poet (then 67) about relativity, interconnectedness, incommensurability and impermanence as fundamentsl aspects of physical reality. Later on he said in 1972 that Rabindranath's philosophical ideas had been of great help to me as a physicist. He became close to Albert Einstein, Nobel Laureate in Physics in 1921, after delivering the Hibbert Lectures "The Religion of Man" at Manchester College, Oxford University on May 19, 21 & 26, 1930. His Lectures mainly focus on the relationship between Man and Nature. The Russian-Belgian scientist – Ilya Prigogine, Nobel Laureate in Chemistry in 1977 remarked in 1984 that *"Curiously enough, the present evolution of science is running in the direction stated by the great Indian poet"*.

Rabindranath and Albert Einstein are legendary figures. They met four times- the first time in Germany in 1926. Their first conversation about the nature of reality took place on July 14, 1930 during his second visit at Einstein' home at Kaputh, Postdam, Berlin. On Science, the Poet told the Scientist during the conversation: "Science is concerned with that which is not confined to individuals; it is the impersonal human world of truth". They met again at Kaputh on August 19, 1930 for the third time and had a lengthy conversation on science and music. Finally for the fourth and last time Tagore met Einstein in December, 1930 in New York sharing a mutual respect. Einstein alluded to Tagore affectionately as "Rabbi" (Teacher) and Tagore turned down the offer of an Honorary Doctorate from Berlin University as a protest against the Nazi treatment of

Einstein. The conversation on science made a great impact on several Indian scientists of the day (Sisir K. Majumdar, 2011).

Rabindranath and Jagadish Chandra were very close friends; both were in constant touch with each other at home and abroad - a union of two minds – poetic and scientific. Jagadish always looked to Rabindranath for inspiration and guidance in moments of despair in his odyssey of scientific research at home and abroad. Being the Editor of Bangadarshan (1901-05), Rabindranath congratulated Jagadish Chandra writing an article on a congratulatory poem-thematic of his research work titled "Jagadish" (1928) in his Book "Vanabani". Rabindranath was an active patron of scientific research. He arranged funds for Jagadish Chandra to establish the Bose Institute in 1917. A seed sown by Jagadish in 1917 is now a big tree. The Bose Institute (Basu Vignan Mandir) in Kolkata is now a leading center of moden scientific research in India.

Rabindranath said about himself: " I am not a worshiper of science nor a writer on science". Einstein once said: "Experimentation with instruments only does not make one a scientist, to me scientific mind makes one a real scientist". Rabindranath fits this definition of a scientist. It is surprising to note that both Shakespeare and Rabindranath had a close similarity : That the two giants of world literature had abiding interest in matters related to medical and scientific respectively, which was reflected to their literary works. ❐

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