

**ACHARYA PRAFULLA CHANDRA RAY: A SCIENTIST, TEACHER,
AUTHOR AND A PATRIOTIC ENTREPRENEUR***

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(Received 19 January 2011)

Introduction

An appreciation of the intellectual renaissance, which occurred in India during the second half of the nineteenth century, flowing into the twentieth, is vital in order to understand the genesis of modern science in our country. It was within this renaissance that modern science took root and flourished to a remarkable extent in a brilliant group of scientists. Acharya Prafulla Chandra Ray (Aug. 2, 1861-June 16, 1944) was one of them. Hailing from Jessore (now in Bangladesh), he attended the Hare and Albert Schools and while studying in Pandit Iswar-Chandra Vidyasagar's (1820-1891) Metropolitan Institute, he developed a keen interest in chemistry. He won the prestigious Gilchrist Scholarship and went to study in Edingburgh University in 1882. The Gilchrist Scholarship was established in memory of Dr. Berthwick Gilchrist (1759-1841) by the Gilchrist Education Trust in 1865 ... "for the benefit of advancement and propagation of education and learning in every part fo the world as far as circumstances will permit" ... (quoted from his will). Aghornath Chattopadhyay (1850-1915), the first D.Sc. (Edinburgh) of India was the first recipient of the Gilchrist Scholarship in India. Just to mention, Sarojoni Chattopadhyay (Naidu) (1879-1949), an eminent poet in English and first female President of the Indian National Congress in 1925 was the eldest child of Aghornath. However, for dubious reasons, the Gilchrist Scholarship was discontinued in India in 1896.

Prafulla was awarded the Doctor of Science (D.Sc.) of Edinburgh University in 1887. He presented a paper based on his D.Sc. Thesis "On the Conjugated Sulphate of the Coper Magnesium Group" at the Royal Society of Edinburgh. The

*A tribute to Acharya P C Ray in his 150th birth aniversary.

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presented paper was published in the *Proceedings of the Royal Society of Edinburgh* (Vol. 15, pp. 267-288, 1888). Returning to India, he first joined Presidency College as a Lecturer – then became the Professor and Head of Chemistry. In 1916, P.C. Ray joined as the first Palit Professor of Chemistry, University College of Science and Technology in 1916 at the request of Sir Ashutosh Mukherjee (1864-1924), the then Vice-Chancellor of the University of Calcutta. He taught and conducted research at the Science College for about twenty years (1916-1936). After retirement, he became Professor Emeritus. He was a life-long bachelor. He used to live in the Chemistry Department of Science College till his death. The room he stayed in is now a small commemorative museum.

He was a dedicated researcher in chemistry and a pioneer of research in Physical Chemistry in India. He trained a band of eminent chemical scientists. While in Presidency College, he published 101 papers. While in Science College he continued his research publications.

Nature (London), August 15, 1912, commented on one bit of his research:

“... Prof. P.C. Ray had added to his success in preparing ammonium nitrite in a tangible form, a further accomplishment in determining the vapour density of this very fugitive compound.”

He was elected President of Indian Science Congress in 1920. In 1924, he founded the Indian Chemical Society and for the first four years he was the President of the Society.

P.C. Ray, along with his colleague – the eminent scientist, Acharya Jagadish Chandra Bose (1858-1937) – taught at the Indian Association for the Cultivation of Science (I.A.S.C.) – the first nationalist institution of scientific research in India. The I.A.C.S. was established in 1876 by Dr. Mahendra Lal Sircar (1833-1904) – an eminent physician of Calcutta. “Its objective...”, Sircar pointed out, ...” is to carry on the work with our own efforts, unaided by Government I want freedom for the institution. I want it to be entirely under our own management and control. I want to be solely native and purely national.” (A Century: Indian Association for the Cultivation of Science, Calcutta, 1976, p. 5-8.).

I.A.C.S. started very modestly at 210, Bowbazar Street, Central Calcutta, but soon it became a vibrant hub of scientific research. Chandra Sekhara Venkata Raman (1888-1970), first Afro-Asian Nobel Laureate in Physics (1930) for his “Raman Effect” first started his research work at the I.A.C.S. in 1907, while still

working in Indian Revenue Services in Burma. Initially, he used to do research at the I.A.C.S. while on annual leave. Later, he joined the University of Calcutta as the first Palit Professor of Physics.

Today, I.A.C.S. at a big campus at Jadavpur is a leading institution of research in India. P.C. Ray was a nationalist par excellence and later in commercial enterprise Mahendra Lal was his model. He succeeded as an entrepreneur, as Mahendra Lal did as an organizer of scientific research.

P.C. Ray: The Patriotic Entrepreneur

P.C. Ray was not at all confined within the four walls of research institutions. He was committed to social welfare. His kind generosity to poor people is well known. His main worry was how to alleviate the terrible scourge of unemployment among the younger generation of his time.

He realized that we are exporting our valuable and even rare raw materials to the industrialist west at a low, sometimes very low, price. The tragedy was that we were importing finished goods made out of our cheap raw materials from the West at a very exorbitant price. We were being exploited in Colonial India.

With the aim of eradicating this chronic tragedy, he founded the Bengal Chemical and Pharmaceutical works in Calcutta with his own savings in 1893; it became a limited company in 1902. It is the first in India to manufacture indigenous drugs. He realized that the advancement of our Society is impossible without industry and self-sufficiency of our consuming products- drugs, food, chemicals, fertilizers, etc. The indigenous drugs made at Bengal Chemical were displayed at the exhibition of Indian Medical Congress held in Calcutta in 1898. Doctors from different parts of India attending the Congress were attracted to these indigenous drugs.

He was actively involved in running Bengal Chemical and, after his academic work at the Science College, he used to work in the factory daily up to 7-8 p.m. Still today, it stands as a glaring symbol of his commercial entrepreneurship. Eminent social reformer, Gopal Krishna Gokhale (1866-1915), probably rightly said in those days:

“What Bengal thinks today, India thinks tomorrow.”

The great contribution of Prafulla Chandra to the service of his society and country, to scientific research and teaching did not escape the attention of our

poet-philosopher—Rabindranath Tagore (1861-1941), Nobel Laureate in Literature (First in Asia) in 1913 and also of our “Father of the Nation” — Mahatma Gandhi (1869-1948).

At the reception on Prafulla Chandra’s 70th birth anniversary organized in 1932 by the Corporation of Calcutta and the leading elites of the day, Rabindranath said in his presidential address:

“It says in the Upaniṣads that the Supreme one wanted to be many. The urge of self-disposal is at the root of creation. It was through this kind of creative urge that Prafulla Chandra became many in the minds of pupils by diffusing and thereby reactivating himself in many younger minds. But this would hardly be possible unless he had the capacity to give himself fully to others.”

Prafulla Chandra was a great nationalist and a dedicated patriot par excellence, he is reported to have said to his students that science may wait but *Swarāj* cannot. He first met the Mahatma in 1901. Gandhi said later:

“Great he undoubted is: But goodness from Indian stand point is greater than greatness and Acharya Ray is even more good than he is great.

And it is his goodness—his childlike simplicity, his suavity of manners, his ready accessibility, his unblemished purity, unostentious charity, his voluntary poverty with plain living and high thinking, his enthusiasm and optimism, his innate spirit of self-denial, his incurable habit of always taking a back seat, his sturdy independence, his inflexible incorruptibility...in a word, his nobility of nature made him idol of the people. Service and sacrifice were his watch-word...” (70th Birthday Volume)

P.C. Ray: The Organizer

P.C. Ray, Prof. Meghnad Saha (1893-1956) and other scientists founded the Indian Science News Association (ISNA) in 1935 at the Science College. The purpose was to promote diffusion of knowledge laying special stress on the progress of scientific studies in India and abroad and advocating methodical application of science to problems of national regeneration (This author is a Council member of ISNA). The journal – *Science and Culture* the mouthpiece of ISNA was first published in 1935 and is being continued uninterrupted for more than seven decades. P.C. Ray was the founder President of ISNA and was President till his death in 1944.

P.C. Ray: The Author

He was a prolific writer. His epic creation on ancient Indian Science – *History of Hindu Chemistry* (1902) was written more than a century ago. In this classic he factually elaborated the contribution of ancient Indian chemistry and other sciences to the global world of Science. He also analysed the reasons of its subsequent decline, and pointed out the social causes for the decline of science in India. Major causes were the indifference and neglect of the privileged, educated upper classes towards cultivation of science. The whole spectrum of sciences was left to the care of the uneducated, underprivileged, powerless lower class of people, though they were good artisans and mechanics, but they were not intellectually equipped to handle this complicated and complex chapter of knowledge. Foreign occupation and colonization of the country added salt to the injury.

He was a bilingual writer – in English and in his mother tongue, Bengali. His important books in Bengali are as follows:

1. “*Saral Bijñān* (1902) – (Simple Science)
2. “*Rasāyanik Paribhāṣā*” (1919) – (Vernacular Terminology in Chemistry)
3. “*Deśi Rang*” (1922) – (Indigenous Colours)
4. “*Khādyabijñān*” (1936) – (Food Chemistry)
5. “*Viśvavidyalayer Takmā O Śilpa – Vyavasāye Kritityalāv*” (1937) – (University Degrees and Success in Commerce and Industry)

He also wrote many articles on science and nature in famous Bengali journals of the day – “*Pravasī*”, “*Prakriti*”, “*Baṅgavāṇi*” and so on. He even addressed the Faridpur District Committee of Businessmen on Trade, Commerce and Food Scarcity of Bengal on April 7, 1935.

He also wrote (anonymously) a political book on India, while studying in Edinburgh University – *India: Before and After the Mutiny by an Indian Student*. (Published by Livingstone Publishers). It sent ripples among the colonial rulers of the day.

Epilogue

Acharya Prafulla Chandra Ray was not only a scientific genius and an academician par excellence; he was dedicated to ameliorate the misery of his people at the grassroot level. Like most *Bengali Bhadrak* (privileged educated

middle class) of the day, he was not detached from the common people. His help – financial and otherwise – was generously extended to the core of our society. He was not only with them – he was always one of them – understood them sincerely and genuinely.

In one important respect, P.C. Ray was unlike other contemporaries of the day, namely, his willingness to work within the framework of a single scientific discipline, that is chemistry. Many of his scientific colleagues deliberately concentrated their effort upon the boundary regions between established fields of scientific research, and this was most conspicuously true of his fellow nationalist “hero” and his colleague in Presidency College, Calcutta, Acharya Jagadish Chandra Bose (1858-1937).

The year “1861” is “*Annus Mirabilis*” in the history of science in India. The first Nobel Laureate in Literature (1913) in the Afro-Asian continent – Rabindranath Thakur (1861-1941); the first female graduate (1882) of the Medical College, Bengal, the first Indian lady doctor and also the first Great Britain – returned lady doctor – Kadambini Ganguly (1861-1923); and Acharya Prafulla Chandra Ray (1861-1944) were born in the same year.

Gopal Krishna Gokhale (1866-1915), the prominent nationalist, educationalist and social reformer, has already paid glaring tribute to this multi-talented man in his simple but superlative words for all of us:

“where will you find another scientist in all India
to place by the side of Dr. J.C. Bose or Dr. P.C. Ray?”

(G.K. Gokhale – *Speeches*, Calcutta, Natesan and Co. 1920, p. 309).

Annex-I

Life-Sketch : A Chronology

- 1861 : Born on Raruli-Katipara village, Jessore district (Now in Bangladesh), August 2, Father-Harischandra Roychowdhury, Mother-Bhuvanmohini Devi. Four brothers; Jnanendra Chandra, Purnachandra, Bhuddadev. Two sisters-Indumati and Belamati. Prafullachandra third child of his parents. Nick name-Fulu.
- 1863 : Death of his grand-father—Anandalall Roychowdhury.
- 1866-1870 : Studied at the village school.

- 1870 : Came to Calcutta with his parents and eldest brother — Jnanendra Chandra. Address: 132, Amherst Street, Calcutta.
- 1871 : Admitted to Hare School- studied upto Class-IV
- 1872-1873 : Attacked with dysentery and sleeplessness. Returned to village.
- 1874 : Admitted to Albert School Established by Kashab Chandra Sen.
- 1875 : Again returned to his village.
- 1876 : Again admitted to Albert School.
- 1878-79 : Passed Matriculation Examination in First Division — Admitted to Metropolitan College — Established by Iswarchandra Vidyasagar.
- 1881 : Passed First Arts (FA) examination in Second Division. Admitted to B.A. Class (B-Course) with chemistry as the main subject.
- 1882 : Obtained Gilchrist Scholarship. Left for Great Britain in August for higher studies.
- 1883-84 : Admitted to Edinburgh University to study chemistry.
- 1885 : Participated in an Essay Competition— “India before and after Mutiny” (His essay topic). Passed B.Sc. Examination.
- 1886 : Wrote— “Essays on India”
- 1887 : Obtained D.Sc. of Edinburgh University. Awarded “Hope Prize” (\$ 100/- annually) and Faraday Gold Medal. Elected Vice-President of Edinburgh Chemical Society.
- 1888 : His research paper — “On the Conjugated Sulphates of the Copper-Magnesium Group.” Published in the *Proceedings of Royal Society of Edinburgh*. Returned to India. Took hospitality of Dr. Amulyacharan Basu first and then of Acharya Jagadish Bose.
- 1889 : Joined Presidency College in July as Assistant Professor. Started research.
- 1890-91 : Founded “Nature Club”. Became member of *Bhramahsamaj* Working Committee. Started living at 91, Upper Circular Road.
- 1892 : Initiated the process of founding ‘Bengal Chemical and Pharmaceutical Works’ to conduct research on indigenous herbal products and to popularize them.
- 1893 : First research paper published in India — “On the Chemical Examination of Certain Indian Food Stuffs; Part-I— Fats and Oils” (*Journal of the Asiatic Society of Bengal*, 1894, Vol-I, pp. 59-80 (Communicated by Alex Pedlar FRS). Death of his father—Harischandra Roychowdhury. First trip to Europe after joining service. Met Roskow, Barthello, Victor Meyer and other scientists.

- 1895 : Discovered Mercurous Nitrites’.
- 1896 : His first research student—Jatindranath Sen started working under his supervision
- 1897 : Declined the offer of Principalship of Rajsahi College, Started research on ancient Indian chemistry.
- 1899 : Publication of his extra-scientific paper: “Problem of Scientific Education in India.”
- 1901 : First met Gopal Krishna Gokhale and Mahatma Ghandi.
- 1902 : “History of Hindu Chemistry”—Vol I published.
- 1904 : Went to England (Second time). Visited some research institutions in Europe. Death his mother³Bhubanmohini Devi, “History of Hindu Chemistry” reprinted.
- 1906 : Bangiya Sahitya Parishad published his first Book on Chemistry in Bengali: “*Nabya Rasāyanividyā O Tāhār Utsa.*”
- 1907 : Elected President of ‘National Education Society.’
- 1908 : University of Calcutta awarded an honouary degree. President of Bengali Literary Society’s Conference held at Rajsahi.
- 1909 : “History of Hindu Chemistry” Vol-II published. Became Full Professor in Presidency College. Wrote a textbook for college students: “Elementary Inorganic Chemistry”.
- 1910 : Elected President of Bengal Literary Conference held at Rajsahi. His book in both English and Bengali — “Bengalee’s Brain and its Misuse.” Published also published by the Asiatic Society: “*Rasārṇava*” Edited jointly by Prafullachandra and Harischandra Kavyaratna.
- 1911 : Founded “Maidan Club”—Girish Chandra Basu, Satyananda Basu, Devaprasad Ghosh and Prankishna Acharya became members of the Club.
- 1912 : Left for “England for the third time accompanied with his classmate—Devaprasad Sarbadhikary. Appealed to the British Government to setup more institutions in India for higher education. Awarded C.I.E. (Companion of Indian Empire) by the British Government.
- 1913 : Presided over the Science Section of Bengal Literary Conference. Protested to the Royal Commission about divisiveness in education in India.
- 1914-1915 : Delivered an oration in Punjab University. Prof. Armstrong declared him as “Master of Nitrites”.
- 1916 : Retired from Presidency College. Joined as Palit Professor of Chemistry in the University of Calcutta at the request of Sir Ashutosh Mookherjee, the then Vice-Chancellor. Lectured at the Bengal Provincial Literary Conference in support for the “Science Education in Bengali” (Held at Jessore).

- 1917 : Spoke against untouchability at the 31st Conference of the Indian Social Reform Committee. Established Co-operative for the employees of Bengal Chemical.
- 1918 : His book: “*Essays and Discourses*” published. Gave oration at the University of Madras.
- 1919 : Lectured against the Rowlat Act at the Town Hall. Accepted Directorship of Bengal Potteries Ltd. “Knighted” for his contribution in chemistry. Elected honorary member of the Deutsch Akademik of Munich, Germany: Lectured at the students’ convention of Assam.
- 1920 : Presidential address at the 7th Congress of Indian Science Congress Association held at Nagpur: “Dawn of Science in Modern India.” Awarded Honorary D.Sc. by Dacca University and Benaras Hindu University. Left for England for the fourth time.
- 1921 : Declared his commitment to denote his savings for development of the Chemistry Department, University of Calcutta. Donated a monthly research scholarship of Rs. 200/-. President of the first conference of All Bengal Teachers’ Association (ABTA). Elected President of Bengal Co-operative Organisation. Formed Relief Committee for famine in Khulna.
- 1922 : Dedicated to flood relief work in North Bengal. Offered encouragement and financial help to “Charka Movement for its popularization. Donated Rs. 10,000 for establishing the Nagarjun Prize in the University of Calcutta. Took active part in the proceedings to protect the independence of the University of Calcutta from interference of the British administration of the day (Senate Hall, Dec., 8, 1922).
- 1923 : Lectured at the National University of Ahmedabad, Gujarat. Delivered the Convocation Address at Aligarh Muslem University. Gave the Presidential Address at the inauguration of Handloom (Khadi) Exhibition at Kokonad. Took active part in Malaria Prevention Co-operative Committee. Lectured at the third annual conference of Khulna district co-operative Committee. Attended the Conference of Indian National Congress held at Faridpur in presence of Mahatma Gandhi and Deshabandhu Chittaranjan Das.
- 1924 : Founded Indian Chemical Society. Founder—President. Donated Rs. 10,000/- for building the office of the Society. Elected President of ‘Primary Education Special Committee of Calcutta Corporation. Made a general appeal in “The Forward” to buy ‘*khādi*’. Addressed the 8th Conference of Faridpur district Hindu Mahashava as President of the Reception Committee.
- 1925 : Visited Shantiniketan. Inaugurated the Seuri Fair. Lectured at Nagpur University. Delivered the “Adhar Chandra Mukhopadhyay Oration” of the Calcutta University. Attended the Kokonad session of Indian National Congress as the representative of Bengal. His Book: “*Makers of Modern Chemistry*” published.

- 1926 : Presidential address at the first conference of Rural Welfare Association. Presidential address also at the Conference of All Bengal College and University Teachers' Association. Delivered the Convocation Address at Mysore University at the invitation of Acharya Brajendranath Sil. His book: "*The Discovery of Oxygen*" published by Calcutta University.
- 1927 : Attended the All India Education Conference held at Benaras. Presidential Address at Co-operative Conference of Dacca Division. Donated money to the Jenana, Society of Jessore to advance womens' education.
- 1928 : Discussed about the faults of Secondary Education. Appealed for propagation of education in mother-tongue.
- 1929 : Visited England (Fifth time): Represented the University of Calcutta at the Congress of the Universities of the Empire held at the University of Cambridge-Severaly criticized the attitude of the British Government in India towards higher education in the section: "State and University". Presidential address at the Provincial Co-operative Conference held in Bombay. Inaugurated the exhibition in Lahore organized by Indian National Congress.
- 1930 : Lectured at the National Fair held at Madras and also at the Classified Trade Organisation held at Bombay. Delivered the Convocation Address at Benaras Hindu University.
- 1931 : Lectured at the National Fair held at Puna. Inaugurated the All India Khadi Exhibition held at Tiruchirapalli. Organized "Bengal Flood Relief Committee" for North and East Bengal. Elected President of Bangiya Sahitya Parishad. Inaugurated the All India Industrial Fair held at Karachi, Operated the new factory of Bengal Chemical at Panihati.
- 1932 : Participated at the seminar on the "Flourishing of Industry in India " Published a serial on "The Shakespearean Puzzle" in *Calcutta Review*". Felicitated by the Corporation of Calcutta and other eminent citizens on his 70th birthday under the Chairmanship of Rabindranath tagore (1932). His book : *Life and Experiences of A Bengali Chemist (VOL-I)*" Published.
- 1933 : Presidential Address at the State Youth Conference held at Travancore. Inaugurated the State Fair held at Indore. Inaugurated the All India Industrial Fair held in Delhi. Took active part in the movement for allowing entry of Harijans to Hindu temples at Midnapore. Delivered the Convocation Address in Annamalai University. Inaugurated industrial fair and co-operative Bank in Karachi. Felicitated by the Corporation of Karachi. Sent telegram to the British Prime Minster demanding release of all political prisoners.
- 1934 : Presidential Address at the Indian Life Insurance Conference held in Lahore. Nominated Fellow of London Chemical Society. Founded Bengal Salt Corporation. Agreed to become the first President of Indian Science News

- Association, Calcutta. Awarded Hon. D.Sc. by Dacca University. Founded Cotton Mill at Khulna. Took active part in the movement against the policy of distribution of any state favour based on communal ground.
- 1935 : Attended the Education Conference held at Wardah. Initiated seminars under “Bengal Initiative” to advance Trade and Industry. “*Life Experiences of Bengali Chemist*” (Vol. II) Published.
- 1936 : President of “15th Pravāśī Baṅga Sāhitya Sammelan” held at Patna. Donated Rs. 10,000 to Calcutta University to Award “Sir Ashutosh Mukhopadya Memorial Prize.” Retired from Palit-Professor of Chemistry, Calcutta University at the age of 75. Became Emeritus Professor. Delivered the Presidential Address at the Conference of Bengal-Assam Bhrmhasamaj held at Tongail. Inaugurated Chittaranjan Cotton Mills at Narayanganj. Korotia College, Mymensingh awarded the title of “Jnanabaridi.” Made a general appeal to help the Bengal Personal Liberty Society. Signed the manifesto of World Peace Conference held at Brussels at the request Romain Rolland.
- 1937 : Addressed the Silver Jubilee Session of Marowari Education Society held at Wardah. His Book: “*Ātmacarit*” (Autobiography) published.
- 1938 : Founded “Indian Chemical Manufacturers Association” and elected its President.
- 1940 : Address at the foundation day ceremony (Jan. 28) of the Medical College, Bengal. Address through All India Radio. Opposed the ill-famous Secondary Education Bill. Resigned from the Chairmanship of Bengal Chemical.
- 1941 : Felicitated by the University of Calcutta and a few other organizations on his 80th birthday at the historic Senate Hall. First signatory to the condemnation proposal against invasion of Soviet Union by Nazi Germany.
- 1942 : Spent some time with Arabinda Sardar at his house at Sripur Town.
- 1943 : Felicitated by the people of Khulna Town and Raruli village. Last lecture of his life on April, 24.
- 1944 : End of this “Great Life” at 6-27 p.m. on June 16.