Acharya Prafullachandra Ray: Life of a Legend

Syamal Chakrabarti

The nineteenth century Bengal witnessed the birth of many illustrious characters. To name a few are Pandit Madhusudan Gupta, Radhanath Sikdar, Mahendralal Sircar, Iswarchandra Vidyasagar, Akshoy Kumar Dutta, Rambrahma Sanyal, Pramathanath Bose, Girishchandra Bose, Rajendranath Mukhopadhyay, Jagadishchandra Bose, Rabindranath Tagore, Nilratan Sirkar and Prafullachandra Ray. New ideas and innovations in that period lead the society into enlightenment.

The birth of modern science in India is mostly because of two great personalities – Acharya Jagadishchandra Bose and Acharya Prafullachandra Ray. Both of them are called 'Father of Modern Science in India'. Jagadishchandra laid the foundation of physics, biophysics and plant physiology research in our country whereas Prafullachandra became the initiator of chemical research and industries in India. One who has seen his portrait can easily realise the simplicity in his life-style. Gandhiji once commented, 'It is difficult to believe that the man in simple Indian dress wearing simple manners could possibly be a great scientist and professor'. But all of us know that he was not simply a scientist and a professor. He was a multi-faceted personality, a patriot, a social worker, a science-historian of international standing, and a tireless writer on science and society.

Prafullachandra's great grandfather earned a fabulous amount of wealth working as a Dewan under the collector of Krishnanagar and Jessore. Anandalal, grandfather of Prafullachandra sent his son Harishchandra, father of Prafullachandra, to Krishnanagar College for studying English, Sanskrit and Persian. But after the sudden demise of Anandalal, he was compelled to go home before the completion of his college education. Harischandra was a liberal man. He founded a middle school for boys and another school for girls in his village.

Prafullachandra was born on August 2, 1861 in Raruli-Katipara – a village of Jessore (now Khulna), Bangladesh. His mother was Bhubanmohini Devi. They were five brothers and two sisters – Jnanendrachandra, Nalinikanta, Prafullachandra, Purnachandra, Buddhadev, Indumati and Belamati. The family lost Buddhadev and Belamati when they were very young.

Prafullachandra started his education in his village. He studied there up to the age of nine and then came to Kolkata in 1870 for further education. They got a rented house (132, Amherst Street) where Harishchandra's family lived for a decade. Eldest

Fig. 1. Acharya Prafulla Chandra Ray (1861 - 1944)

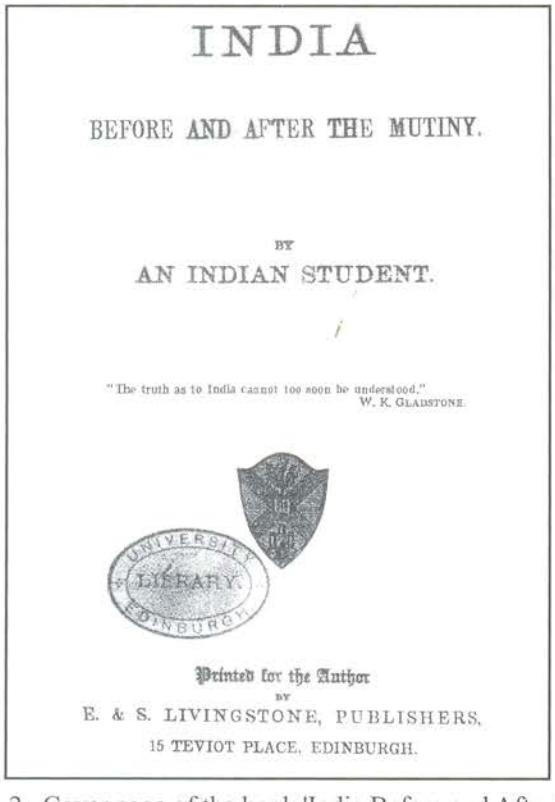
Jnanendrachandra took admission in Hindu School whereas Nalinikanta and Prafullachandra got admission in Hare School. Prafullachandra suddenly fell ill and had to return to his own village for recovery. He could not attend school for one and a half years. During that period, Prafullachandra studied lot of books from his family's library. His basic interest was in history and language. Once he stated that he became a chemist by mistake, though it is difficult to know whether Prafullachandra made the statement in a serious mood.

After one and a half years, Prafullachandra returned to Kolkata and took admission in Albert School, a new school founded by Keshabchandra Sen. Prafullachandra had a desire to go back to Hare school but the teachers of Albert school did not like to miss a boy like Prafullachandra and kept him in the same school.

Prafullachandra passed the entrance examination in 1879 in first division. He then joined the Metropolitan Institution (now Vidyasagar College) and passed first arts (F.A.) examination in 1881 in second division. Metropolitan Institution did not have chemistry classes, so Prafullachandra during his B.A. classes used to attend the chemistry classes in Presidency Collage. He was much influenced by the teaching of Alexander Pedler (who later became Vice-Chancellor of the University of Calcutta). During his B.A. studentship, Prafullachandra appeared for Gilchrist Scholarship and got it. In 1882, he went to Edinburgh University. Alexander Crum Brown – an internationally known chemist and also a man of multiple culture - was

Prafullachandra's most favourite teacher. Prafullachandra passed B.Sc. in 1885 and became a D.Sc in inorganic chemistry in 1887. He did his work on conjugated sulphates of the Cu-Mg group which was published in 1888. Prafullachandra won the prestigious 'Hope Prize' and continued his research for one more year. During that time he was the Vice-President of Edinburgh Chemical Society. He returned to Kolkata in August 1889.

Here one important episode during his student life in Edinburgh should be mentiond. Prafullachandra participated in a competition to write an essay on 'India before and after the Mutiny'. He was exceedingly upright, courageous in his conclusions and criticized the British rule in India. That a 'native' student, 24-25 years old, Prafullachandra, could write such an essay, showed the potential of a historian in him. Let us cite few lines from the essay. 'It is forgotten that at the time when a queen of England was flinging into flames and hurling into dungeons those of her own subjects who had the misfortune to differ from her on dogmatic niceties, the great Mogul Akbar had proclaimed the principles of universal tolerance, had invited the molvi, the pandit, the rabbi, and the missionary to his court, and had held philosophical disquisitions with them on the merits of their various religions'.


INDIA

BEFORE AND AFTER THE MUTINY.

BY

AN INDIAN STUDENT.

"The truth as to India cannot too soon be understood."
W. K. GLADSTONE.

Printed for the Author
BY
E. & S. LIVINGSTONE, PUBLISHERS,
15 TEVIOT PLACE, EDINBURGH.

Fig. 2 Cover page of the book 'India Before and After the Mutiny (1885).

Coming back from England after one year, Prafullachandra got appointment in Presidency College, Kolkata as a temporary Assistant Professor of Chemistry which he joined in July 1889. It was the same year when Alexandar Pedler was elected a fellow of the Royal Society, London. Chemistry teaching in India in the last decade of nineteenth century was only beginning. Historically the teaching of chemistry as a subject started at the Medical College after it was established in 1835. There was also a post of 'Chief Chemical Examiner' there. Chunilal Bose, who was also born in 1861, was a close friend of Prafullachandra and became the first Indian Chief Chemical Examiner. But proper teaching in chemistry started later, only after Alexander Pedler joined Presidency College in 1873. Prof. Pedler first published papers in chemistry in the *Journal of Chemical Society*, London and also in the *Journal of the Asiatic Society of Bengal*.

Jagadishchandra in physics and Prafullachandra in chemistry – two doyens of science were then working in Presidency College. Both of them had to overcome a number of hurdles to pursue their research. Jagadishchandra joined Presidency College in 1885, but he got his first publication during 1895, after a gap of one decade. Many readers may not believe that Jagadishchandra started his research in a room of 24 sq. ft. (about 2.2 sq.m) only. Similarly Prafullachandra joined the college in 1889 but got his first publication in the *Journal of Asiatic Society of Bengal* in 1894.

In 1890, Prafullachandra rented a house at 91, Upper Circular Road (now Acharya Prafullachandra Road) which is closest to University College of Science (92, Upper Circular Road) and the residence of Jagadishchandra Bose was at 93, Upper Circular Road. Prafullachandra started his research on the analysis of oil foods such as ghee, mustard oil and published his first paper (in India) in 1894. From 1894 to 1903, he published a total of 19 papers. All the papers were solely authored by him. Beside teaching and research, Prafullachandra also initiated a venture for preparing a number of chemical products so that India one day might be industrially self-reliant. The Bengal Chemical and Pharmaceutical Works (BCPW) took the shape from that venture. In fact BCPW was born in 1892 but it was declared a public limited company in 1902. Prafullachandra spent 27 years (1889-1916) in Presidency College. His influence as a teacher was boundless. A number of great Indian scientists of next generation such as Meghnad Saha, Satyendranath Bose, Jnanchandra Ghosh. Jnanendranath Mukhopadhyaya, Nilratan Dhar, Nikhilranjan Sen, Bireshchandra Guha were his beloved disciples. In the span of 27 years in Presidency College, Prafullachandra published a total of 87 papers, some as a single author and some with his research students.

Among the co-workers, Prafullachandra had the highest number of publications with Jitendranath Rakshit. Jitendranath failed in B.Sc. Examination and decided to go without the degree, but Prafullachandra appreciated his skill very much. At the beginning of his career, Prafullachandra had an intention to find out one or two new elements from Indian minerals. However, the attempt was not successful. But there came a turning point when he was performing gas analysis. In the process of purifying an impure sample of mercury, he discovered the formation of mercurous nitrite. In his paper in the *Journal of the Asiatic Society of Bengal*, Prafullachandra wrote: 'Having recently had the occasion to prepare mercurous nitrite in quantity by the action of dilute nitric acid in the cold on mercury, I was rather struck by the appearance of a yellow crystalline deposit. At first sight, it was taken to be a basic salt, but the formation of such a salt in a strongly acid solution was contrary to ordinary experience. A preliminary test proved it, however, to be at once a mercurous salt as well as a nitrite. The interesting compound promised thus amply to repay an investigation'. (1896)

Commenting on the paper, the journal 'Nature', wrote '*The Journal of the Asiatic Society* can scarcely be said to have a place in our chemical libraries; the current number, however, contains a paper by Dr. P. C. Ray of the Presidency College, Calcutta on mercurous nitrite that is worthy to note. During a preparation of mercurous nitrate by the action of nitric acid (dilute) in the cold on mercury, yellow crystals are deposited, which upon examination, proved to be mercurous nitrite (Nature, 1896). Prafullachandra was introduced in the world of chemists as 'Master of nitrites'.

After working from 1889 to 1900 alone, he finally got permission to have a research student. Prafullachandra mostly worked on problems of inorganic chemistry. But he also did some work on different topics of organic as well as physical chemistry.

Govt. Science Record of Dr. P. C. Ray
Taken from the Histor of Services of Gazetted and other officers serving under the Government of Bengal.
(Corrected up to 1st July 1916, Pt. II, 1916.)

Ray, Dr. Prafullay Chandra, D.Sc. (Edinburgh) C.I.E..., Born August 1961—Joined the service, 24th June 1889 (Dy. G. B. 4185, dated 1st December 1904).

Station	Substantive Appointment	Officiating Date Appointment Date
Calcutta	Asstt. Prof. of Chemistry, Presy. College 24.6.1889	
"	Class IV of Provl. Ednl. Service,	1. 8. 1896
"	Class III "	8.12.1900
"	Class II "	20.4.1902
	Subsidiary leave for 2nd August, 1904	
	Furlough for 7 months and 28 days from 3rd August, 1904, during which he was on deputation in England from 7th September, 1904 to 6th March, 1905	
(on leave)	Class I, "	1. 2. 1905
	Subsidiary leave from 31st March, 1905	
Calcutta	Ditto and Prof. Presidency College	3. 4. 1905
"	"	I.E.S. 10.4.1906
"	"	17.1.1910
"	"	I.E.S. 23.2.1911

Leave on private affairs for 1 month and 10 days, from 30th June 1912, combined with the college vacation.

The provisions of Articles 233 (IV) and 337, Civil Service Regulations, were relaxed and the leave on private affairs should not be held to interrupt Dr. Roy's service for future furlough. (Vide S. of S.'s telegram, dated 27th June 1912–Dy. G.I., 222 dated 1.7.12).

Subsidiary leave from 9th August 1912

Ditto	Ditto	12 Aug. 1912

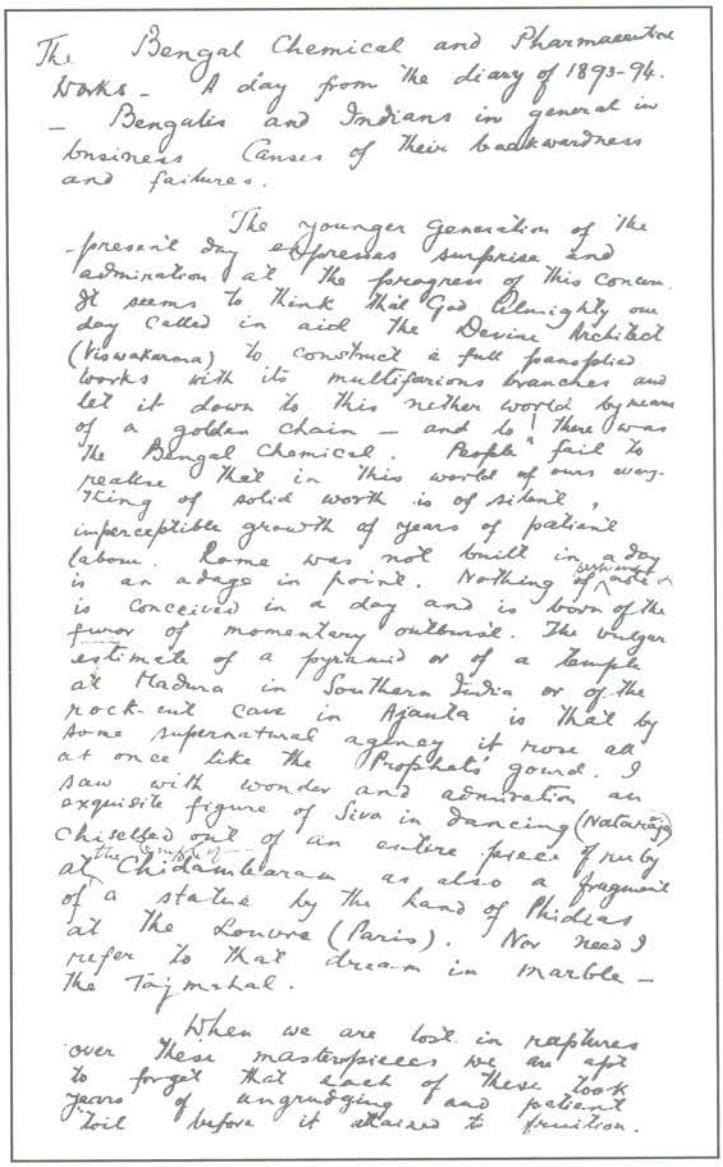
Literary Work :—The Sulphates of the Copper and Magnesium Group, Hindu Chemistry.

Fig. 3. Government Service Record of Acharya Prafullachandra Ray.

Prafullachandra took his retirement from Presidency College after the age of 55 years and joined the University of Calcutta on the request of the Vice-Chancellor Sir Asutosh Mukhopadhyay. Prafullachandra served the University as Sir Taraknath Palit Professor from 1917 to 1936.

During that period, a large number of students worked with him. A total of 72 papers were published. Most of his publications were in the *Journal of the Chemical Society*, London. Prafullachandra and some of his senior associates were feeling the need of an Indian chemical journal. As a result, Indian Chemical Society was established in 1924. Prafullachandra became the founder-president of the Society and most of his papers, there after, were published in 'Journal of Indian Chemical Society'.

After one decade of the establishment of Indian Chemical Society, another organisation was instituted by Acharya Prafullachandra and his most-beloved disciple Meghnad Saha. The name of the organiation was Indian Science News Association (ISNA) which was established in 1935. Its objective was to disseminate science news as well as the reflection of the community of Indian scientists and thinkers for public understanding of science and culture together. The founder-president of ISNA was Acharya Prafullachandra. Prof. Meghnad Saha and Prof. Bidhu Bhusan Ray became the founder-secretaries of the Association.



The Bengal Chemical and Pharmaceutical Works - A day from the diary of 1893-94.
- Bengalis and Indians in general in business. Causes of their backwardness and failures.

The younger generation of the present day expresses surprise and admiration at the foregrown of this concern. It seems to think that God Almighty one day called in aid the Devine Architect (Viswakarma) to construct a full fledged works with its multifarious branches and let it down to this nether world by means of a golden chain - and lo! there was the Bengal Chemical. People fail to realise that in this world of ours everything of solid worth is of silent, imperceptible growth of years of patient labour. Rome was not built in a day is an adage in point. Nothing of note is conceived in a day and is born of the fumor of momentary outbreak. The vulgar estimate of a pyramid or of a temple at Madura in Southern India or of the rock-cut cave in Ajanta is that by some supernatural agency it rose all at once like the Prophet's gourd. I saw with wonder and admiration an exquisite figure of Siva in dancing (Nataraja) Chiselled out of an entire piece of ruby at Chidambaram as also a fragment of a statue by the hand of Phidias at the Louvre (Paris). Nor need I refer to that dream in marble - the Taj mahal.

When we are lost in raptures over these masterpieces we are apt to forget that each of these took years of ungrudging and patient toil before it attained to perfection.

Fig. 4. A page of the manuscript of 'Life and Experiences of a Bengali Chemist'.

Prafullachandra was against ivory-tower scientists. His involvement in all types of social issues was very transparent and encouraging.

Prafullachandra never forgot to come forward when there were floods or famines in Bengal. He had a very strong sympathy for the revolutionaries. He even contributed for secret purchase of arms for the freedom fighters. During the movement against Rowlatt Act, Prafullachandra made a memorable statement: 'There are occasions when a scientist should leave his test tube to attend to the call of the country'. The scientist donated almost all his earnings for the welfare of distressed and downtrodden people. One of his biographers wrote :

'He never took any honorarium, remuneration or Director's allowance from B.C.P.W. – all were given away directly or through trusts. The salary of Palit Professor from 1922-1936 was not drawn but donated for the improvement of chemistry department of Calcutta University'. However, he had a very strong opinion that university had been converted to a factory for mass production of graduates.

Prafullachandra was awarded D.Sc. from Durham University in 1912. Long later, he was conferred D.Sc. by the university of Dacca and the University of Banaras. In 1922, Prafullachandra was elected the general president of the Indian Science Congress.

The life-sketch of Prafullachandra could never be complete without mentioning about his book *A History of Hindu Chemistry*. Prafullachandra wrote the first volume of his book in 1902 and 2nd volume in 1909.

'Knowledge in the fields of philosophy and mathematics including astronomy, arithmatic, algebra, trigonometry and geometry and medicine has received some share of attention. One branch has, however, up till this time, remained entirely neglected viz. Chemistry ….complex and technical nature repelled the investigators'.

We quote here a words of appreciation in a letter from Marcellin Berthelot (1827-1907) to Acharya Prafullachandra after receiving a copy of A History of Hindu Chemistry, vol.1.

'I have received your chemical researches which are highly interesting and I have seen specially with pleasure how science with its universal and impersonal character is equally cultivated by all civilised peoples of Asia as well as Europe and America'.

It should be noted that Prafullachandra dedicated the second volume to the memory of Professor Marcellin Berthelot.

Prafullachandra straightway mentioned that the emergence and decline of science depend on the laws of society but not on the laws of science. He wrote history which had more analytical than information bias. He firmly rejected the 'internalist hypothesis' (i.e. science constructs science, no impact of society) of science. According to him, the Vedanta philosophy modified and expanded by Samkara is responsible for bringing physical science into disrepute. The book was highly appreciated by *Nature*. It has been a labour of love……the great value of the results of his patient and laborious researches will be fully appreciated by all students of history of chemistry'.

(*Nature*, July 21, 1910)

According to Prafullachandra, cohesion of Intellectual labour and physical labour results the advancement of our society but when there is a conflict, the civilisation collapses. A number of old civilisations were ruined for this reason. What was advocated by Prafullachandra that had also been supported by Joseph Needham for Chinese civilisation and Benjamin Farrington for Greek civilisation. The book was out of print for a long time and got published in 2002 as a 'centenary edition' with a humble note of regards by the present author. The most important chapter of the book was 'Knowledge of technical arts and the decline of scientific spirit' where Prafullachandra clearly said, 'The intellectual portion of the community being thus withdrawn from active participation in the arts, the how and why of phenomena - the co-ordination of cause and effect - were lost sight of and the spirit of enquiry gradually died out among a nation naturally prone to speculation and metaphysical subtleties and India for once bade adieu to experimental and inductive sciences. Her soil was rendered morally unfit for the birth of a Boyle, a Des Cartes or a Newton and her very name was all but expunged from the map of scientific world'.

In the year 1997, the University of Calcutta established 'Acharya P. C. Ray Museum' in the room of the department of chemistry where he used to work. The museum contains his personal belongings, his collection of books (with personal comments), manuscripts and reprints of his articles and also a good number of correspondences. Prafullachandra was an expert on Shakespeare. His *The Shakespearean Puzzle*, is a brilliant collection of articles. There were a number of books on Shakespeare in his personal library.

The end of this great life came on June 16, 1944. Prafullachandra died in his room in the college of science, Calcutta University, surrounded by his students and admirers.

To
Prof. Meghnad Saha
FNI, FRS etc.
University College of Science
92 Upper Circular Road. Calcutta 20. 6. 44

Dear Sir,

With the whole nation we deeply mourn the irreplaceable loss at the calamitous disappearance in the Great Bengal of yet another most lustrous luminancy in the person of the great immortal Acharya Roy out of an almost vanishing galaxy of creative geniuses in our resurgent nation's life, shaping the present age with serene, variegated colours by shedding their ennobling and invigorating lights over all the essential flows of our cultural and material growth and efflorescence. A saintly teacher in every sense of the term, a brilliant embodiment of what is best in India's great heritage, a giant among the world scientists living his whole active life in a stere simplicity in the Temple of Learning and dedicating his lifelong and uncommonly constructive service and all earthly possessions to the cause of education and furtherance of nation's prosperity, this prince among philanthropists, a beaconlight to every servant of our afflicated society, knew no yielding to injustice and was still greater as a man than a scientist. He will ever live - enshrined in the memory of his countrymen through the magnificent gifts he made to the nation and to the domain of science throughout his eventful life. In deep anguish while lamenting this loss and praying our humble tribute to the memory of the great departed, we hope this illustrious life will for ever inspire our countrymen towards greater and greater striving for beautifying our nation in every respect.*

Yours faithfully
Jogesh Chandra Chakraborty**
On behalf of the security prisoners
Dacca Central Jail, 19.6.44.

Fig. 5. Condolence resolution of the security prisinors of Dacca Central Jail (19.6.44) after the death of Acharya Prafullachandra Ray (16.6.44).

Prof. Syamal Chakrabarti of Department of Chemistry, University of Calcutta is a noted popular science writer and the recipient of 'Satyendranath Bose Award' and 'Rabindra Puraskar' for his contribution to science literature.