

Sir Prafulla Chandra Rây

New Chemical Laboratory, Mercurous Nitrite and History of Hindu Chemistry

The article represents portions of Chapter VIII, bearing the same title as above, of the remarkable book 'Life and Experiences of a Bengali Chemist', an autobiography of Prafulla Chandra Rây. It was published in 1932 by Chuckerverty, Chatterjee & Co, Ltd, Calcutta. The book was dedicated to 'The Youth of India' and in its Preface Prafulla Chandra said : *'While a student at Edinburgh I found to my regret that every civilized country including Japan was adding to the world's stock of knowledge but unhappy that India was lagging behind. I dreamt a dream that, God willing, a time would come when she too would contribute her quota. Half-a-century has since then rolled by. My dream I have now the gratification of finding fairly materialized. A new era has evidently dawned upon India. Her sons have taken kindly to the zealous pursuit of different branches of Science. May the torch thus kindled burn with greater brilliance from generation to generation!'*

The chemical department of the Presidency College, located in the old one-storey building, was now proving quite inadequate to meet the increased demands made upon it. Although practical work for the F.A. in chemistry was not yet compulsory, the number of students choosing this subject for the B.A. and M.A. courses was increasing year after year. There were no flues for drawing off the noxious gases and the ventilating arrangements were most rudimentary; in fact while the practical classes were in full swing, the atmosphere, especially in the rainy season, thickly laden with fumes, became suffocating and highly injurious to health.

On one such occasion I invited Principal Tawney to go around the laboratory and breathe the air for a few minutes. Tawney, who, I believe, suffered constitutionally from weak lungs, after being in for a couple of minutes became terribly agitated and rushed out of the room and fulminated in a letter to the Director of Public Instruction against the state of things. He pointed out that if the Health Officer would come to know of it, he would be justified in prosecuting the authorities of the college for endangering the health of the students.



CLASSICS

We soon learned to our delight that the Government had sanctioned and approved the plan [of a new building] submitted to it. I had a copy of the reprint of the description of the Edinburgh University's new chemical laboratory, containing drawings and diagrams illustrating the students' working benches, the reagent shelves, the ventilating flues, etc., and some of these were incorporated into our new plan.

We moved to the new buildings at the beginning of the session, July 1894. It soon began to attract visitors from different parts of India and by a curious coincidence my renewed and redoubled activity in the field of chemical researches dates from this eventful year. I had taken up the analysis of certain rare Indian minerals, in the expectation that one or two new elements might turn up and thus fill up the gap in Mendeleeff's Periodic System. Mr. (now Sir Thomas) Holland, then a junior officer in the Geological Survey of India and also a lecturer in Geology, Presidency College, kindly undertook to supply me with specimens of such minerals. I made some progress [in mineral analysis] when my chemical career underwent an unexpected turn.

The discovery of mercurous nitrite opened a new chapter in my life. The circumstances which led to it are thus described in the opening paragraph of the first communication on the subject. "Having recently had occasion to prepare mercurous nitrate in quantity by the action of dilute acid [nitric acid] in the cold 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 thus promised to amply repay an investigation." *Journal of Asiatic Society* (Bengal), 1896.

It is not necessary to give here anything like a detailed enumeration of the investigations on mercurous nitrite and its numerous derivatives as also on the nitrites in general, as they form the subject-matter of some one hundred and more communications to chemical journals. As one new compound followed in the wake of another, I took up their examination with unabated zeal. In short, I could fully enter into the feelings of one of the illustrious makers of modern chemistry, the immortal Scheele. "*There is no delight like that which springs from a discovery; it is a joy that gladdens the heart.*" To plough the new field thus opened up and to explore the untrodden regions was a constant source of thrilling excitement the appreciative and congratulatory letters from eminent chemists like Roscoe, Divers, Berthelot, Victor Meyer, Volhard, and others not only filled me with inspiration but stimulated me to further activity.



CLASSICS

At this time I was also indulging my favourite hobby, – researches into the history of chemistry, including lives of the makers of our science. Kopp's *Geschichte* was a hard nut to crack; its long-winded and involved sentences were by no means easy reading, but so great was the interest created day by day that I waded through it. I ungrudgingly devoted my precious morning hours to mastering its contents. I also knew full well that our *Kavirajas* (Ayurvedic physicians) used many metallic preparations of which an account is given in Udoychand Dutt's *Materia Medica of the Hindus*. My curiosity prompted me to read some of the original Sanskrit works quoted in this pioneering work.

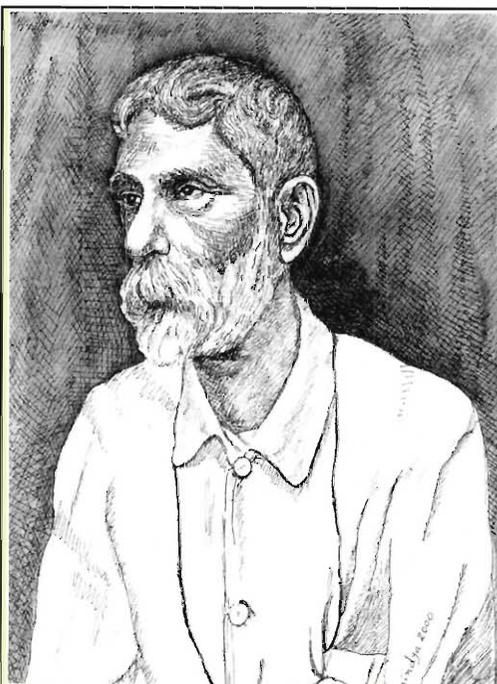
In the Presidency College library, I came across Berthelot's *L' Alchimistes Grecs*, which further stimulated my inquisitiveness. About this time, I was brought into correspondence with the great French chemist himself. Berthelot sent me three monumental volumes of his encyclopaedic work on Syriac, Arabic, and middle-age alchemy. I greedily devoured the contents of these, and the idea now firmly took hold of me that I must write a history of Hindu chemistry modelled upon the exemplars before me.

I was not at all appalled by the gigantic nature of the task. I instituted a vigorous search for manuscripts bearing upon the subject and ransacked the pages of 'Aufrecht's *Catalogus Catalogorum*, Bhandarkar's, Rajendra Lal Mitra's, H P Sastri's and Burnell's Notices of Sanskrit Manuscripts and put myself in communication with the librarians in India and the India Office, London, where some of the manuscripts have been preserved. Pandit Navakanta Kavibhusan, who acted for four or five years as my amanuensis, was also deputed to Benares in search of old works on alchemy.

Any one who has experience in collecting manuscripts in India knows what ravages the white ant, the silver fish and other insects commit on them. The damp climate of Bengal is specially unfortunate in this respect. It was often necessary to collect as many as 3 or 4 manuscripts of the same *Tantra* since sometimes the introductory pages were found eaten up by worms, sometimes again the concluding portion; there were also discrepancies in the readings of different manuscripts.

The following extract from the preface to the first volume of the history [History of Hindu Chemistry] represents in a nutshell my object in undertaking the task. "Since the days of Sir W. Jones, Sanskrit literature, in almost every department, has been zealously ransacked by scholars, both European and Indian. As the results of their labours we are now in possession of ample facts and data, which enable us to form some idea of the knowledge of the Hindus of old in the fields of Philosophy and Mathematics including Astronomy, Arithmetic, Algebra, Trigonometry, and Geometry. Even Medicine has received some share of attention ... One branch has,





Acharya Prafulla Chandra Rây

however, up till this time, remained entirely neglected namely, Chemistry. Indeed, it may be assumed that on account of its complex and technical nature it has hitherto repelled investigators”.

It was a source of gratification to me that almost immediately on the appearance of the first volume it was welcomed with high encomiums both at home and abroad. Svante Arrhenius in his *Chemistry in Modern Life* (English translation by Leonard) quotes from the *Hindu Chemistry* at length and assigns to India the priority in the use of metallic, especially mercurial drugs.

The preparation of the first volume of the *History of Hindu Chemistry* entailed such hard and continuous labour that it did not leave me much time to pursue my studies in modern chemistry, which had been advancing by leaps

and bounds and making gigantic strides. During these years argon had been isolated by Rayleigh and Ramsay and its discovery was soon followed by that of neon, xenon and krypton. Radioactive properties of certain compounds and minerals were being studied and examined by Becquerel, Rutherford and Soddy, and the Curies had brought to a culmination the researches in this line by the discovery of radium itself. Ramsay soon showed that certain emanations of radium itself were converted into the gas helium and this was again an irrefragable proof of the transmutation of elements. In the meantime atmospheric air had been liquefied in quantity by Dewar. No less astounding was the liquefaction of hydrogen.

While these epoch-making discoveries were following one another in rapid succession, I was buried in my researches into the chemical knowledge of the Hindus of old and therefore losing touch with the modern world. On the completion of the first volume I therefore paused in my antiquarian studies and put aside altogether for a few years my completion of the promised second volume of *Hindu Chemistry* as I had now to catch up and be *en courant* with modern chemical literature. It should be noted here that my laboratory work was never allowed to suffer. In fact, an unbroken series of papers on the nitrites appeared during this time in the scientific journals, chiefly in that of the London Chemical Society.

