



Science in colonial India

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Abstract

The present paper seeks to explore the paradigms of scientific development in colonial India. The history of colonial India during the eighteenth-nineteenth century spectacularly illustrate a close link between science and imperialism and my endeavor will be to underline the nature, course and significance of this link with the help of a little theoretical discussion to be substantiated by a few illustrative examples from certain scientific works. A history of science in India must also be a history of India, not merely a history of the projection of western science in India. Pre-colonial stage means Ancient and Medieval times was India's own science, technology and medicine, themselves subjected to wide internal variation and different historical influence and cultural practice and the legacies these provided for the subsequent era of British rule.

Keywords: ancient, national, western, science, technology, medicine, Bengal, Calcutta

Introduction

Social character and cultural plurality of science has a particular bearing on the History of science, technology and medicine in India, which had a well-established scientific and technological tradition of its own long before being subjected to an extended period of colonial rule. Although the history of science, technology, and medicine continued to be presented in general histories as a record of western discovery and dissemination, it has become more widely acknowledged than a generation or two ago that not all such histories can be conflicted into a single story of European achievement or sage of European enterprise overseas. Particular attention has been directed to understand the place of science in the colonial India of the eighteenth, nineteenth and early twentieth century, situations in which the story of science often appears inseparable from the history of imperialism itself.

Idea of Western Science in India

The institutionalization of modern or western science in India began with the establishment of Great Surveys – the Geological, Botanical, and Trigonometric – under the inspired impetus of the Asiatic Society of Bengal inaugurated in 1784. At first the missionaries took the responsibility to spread the western education and science. Then the Company established the Hindu College and also started the culture of English Language and European Education. They also set up modern Universities. Then the educated natives joined Company's job and also took interest in western science.

The history of science, technology, and medicine in British India has often been represented as essentially the story of introduction and dissemination of western ideas, practices, and techniques. The most influential statement of the diffusion model of Western Science was made by George Basalla in 1967. He wanted to say India had no own science and technology ^[1]. George Basalla opined that the modern

advancement of science and technology is mere an emulation of Ancient British way of looking at the same topic. David Arnold deconstructed Basalla's model by saying that India always has had its own practice of science and technology and it has an immense share in today's height in the same ^[2].

Science in Ancient India

The Ancient India had its own practice of Science and Technology. Subjects like mathematics – arithmetic, algebra, geometry, trigonometry, calculus, astronomy, architecture, medicine – ayurveda, were in practice in full in Ancient India. Aryabhata, Varahamihira, Brahmagupta, Bhaskar-I, Bhaskar-II, Nagarjuna, Charaka, Susruta were the noble persons in Ancient time who had diligently attached their names with the world history of science.

Science in Medieval India

From the late fifteenth century onwards, scientific and medical and technological, exchanges continued through the agency and impetus of trade and warfare and through the migration of scholars, merchants, physician and craftsman. Astronomy, medicine, textiles and arms-making benefited from the fashioning of an Indo-Muslim policy and culture under the Mughals, but India also profited in such areas as shipbuilding and horticulture from contacts after 1498 with the Portuguese and later with the Dutch, French and English ^[3].

Science in Colonial India

Once the British East India Company became a ruling power, at first they were of no any interest education purpose of Indians. After many years they rejected this policy. William Jones was the first to recognize this and founded the Royal Asiatic Society in Bengal (RASB) in 1784 at Calcutta. The British economic interests of exploring and appropriating the vast Indian resources, desire for control and domination led

the British Colonial powers to formulate appropriate policies. Colonizers were fully aware of the importance of science as a very effective instrument of colonization and control. This concept of science was closely related to the needs of empire [4].

On 20th January 1817, Hindu college was opened in Calcutta (Presidency College in 1856). Now upper-class Hindu boys (Baboo or Bhadraklok) paid their own pocket money to receive English Education. The college started receiving Government Grant from 1924 and science classes were started to be held.

At first the company was start of modern science by Geological, Zoological, Botanical, Trigonometrically survey in colonial area. Astronomy was the first modern science to be brought in India by the Company. There first need was geographical knowledge of India. Geological survey of Peninsular India started in 1800. These efforts were solely for the imperialistic purpose of the British colonizer.

Survey System

The Great Trigonometrically Survey of India (GTS) was established in 1818 and extended to cover the whole country. "The Great Trigonometrically Survey of India had age-wins in the history of science under the company [5]. Survey work expended, so they needed to involve the Indians. British surveyors argued for the use of the natives. In 1830 Sir George Everest was appointed as the Surveyor-General. George Everest wanted help required immediate from Native agency. Although field data were being collected by the British surveyors themselves but they had no time to sit down and reduce the data. So they decided to set up a computing office as distinct from the field staff, Hindu College was ready to fulfill it.

Radhanath Sickdhar and six other students of Hindu College joined at the end of 1831. Sickdhar was made a Sub-assistant at GTS. A legend had grown that the height of Mount Everest was computed by Sickdhar. The GTS recruited another Indian, Ram Dayal De as a Sub-assistant in 1840.

However, as the needs of the Empire grew so did its perceptions in the abilities of the natives. The scientific content of the British administration in India increased steadily; and with it increased the role assigned to the Indians. As first, the natives moved from being coolies to calculators. In the second, they graduated to become doctors and engineers to work on the network railways, telegraph, roads and canals. It is noteworthy that the first Indian fellowship of the Royal society in London belonged to this stage [6].

Engineering

Ardayaseer Cursetjee, marine engineer at Bombay, was elected FRS on 27th may 1841. Cursetjee belonged to the famous Parsi family of Wadia shipbuilders [7]. He was interested in the newly introduced steam machinery than in shipbuilding and fortunately for him interest converged with the company's need. The company funded his one year visit to Britain from December 1839 to November 1840 during which he visited various royal dockyards and private foundations. While in England, he was selected for the post of chief Engineer and Inspector of Machinery in the Company's steam factory at Bombay.

The British timed their operations well. When upper Ganga

canal was being dug, an engineering college was set up at Roorkee. When wood was needed for the railways, a forest school was opened at Dehra Dun. It is no wonder that the British emphasized higher education among selected Indians rather than removal mass illiteracy, which would harm their interests. The Sahib's faith in the Baboos was fully justified. During the 1857 upheaval, it was an Indian, Seebchundar Nandy, who kept alive the vital telegraph link between Calcutta and Bombay [8].

Medical

The Bengal Medical Service, was created in 1763, similarly followed soon Madras and Bombay. In 1785 Court of Directors was established for the three presidencies at 234 surgeons and assistant surgeons. Then they increased 650 and 820 in colonial period [9]. Also British Govt. appointed a sanitary commission, J.M. Cunningham, was a sanitary commissioner from 1866 to 1884 [10].

British Govt. created Calcutta's Native Medical Institution but few years later Govt. closed this. In Bengal in 1833 the Governor-General Lord Bentinck, appointed a committee for the purpose of improving the Native Medical Institution and creating a system of good management and better education. The committee advice the abolition of the native institution, along with medical classes at the Madras's and Sanskrit College and created new college to teach Western Medicine exclusively and with English as the sole medium of instruction. Bentinck approved these recommendations, and in 1835 the Native Medical Institution was replaced by the new Medical College in Calcutta. Also Madras Medical College founded in 1835 and Grant Medical College opened in Bombay in 1945.

Between 1835to1858 Calcutta Medical College produced 456 Native Doctors. One of the was S. G. Chuckerbutty, who had been sent to London for medical training in 1845, passed second in the examination of 1855, joined the Indian Medical Service and subsequently held the chair of materia medica and clinical medicine at Calcutta Medical College [11]. Mid 1890's century Robert Koch was identified Cholera bacillus and Ronald Ross discovered the mode of Malaria transmission and outbreak of bubonic plague in India.

Industrial Art

After mid-nineteen century, it became clear that Indian opinion makers quite early in the game that the English education being imparted to them was inadequate. Thus the Hindu Patriot wrote 6th April 1854...The end aim of their (native's) education is to make them either accountants or letter writer The resources of the country will never be developed unless the children of the soil learn to develop them [12].

Rajendra Lal Mitra, who later became the first Indian president of the Asiatic society, wrote in 1854 that practical training will be an effectual means for the removal of those barriers to progress which have been created by the ancient system of confining the cultivation of industrial art to particular classes, and those the least educated in the community. R. L. Mitra had just established an Industrial Art society where the Indians could learn practical skills [13].

IACS in Bengal

The first scientific research organization set up by an Indian, Dr. Mahendra Lal Sircar, was the Indian Association for the Cultivation of Science, (IACS) at Calcutta in 1876. At the end of the nineteenth century, India had a total of six science-related societies. The modern colonial science gave birth to a massive interest in subjects like the General Science, astrology, geology, botany, physics, chemistry, biology, medical science also, homeopathy, ayurveda, technology, engineering. Dr. Mahendra Lal Sircar, much interested in science, he was student of the presidency college. Then he got the M.D degree from Calcutta Medical College. He had the courage to face professional ostracism for his advocacy and practice of homeopathy. In 1869 M. L. Sircar came up with the idea of a national institution for the cultivation of science by the native Indians. After six years his restless propaganda Indian Association for the Cultivation of Science (IACS) was inaugurated in January 1876. In 1893 IACS was recognized by Calcutta University as a teaching Centre. From 1909, IACS had launched its own journal as Bulletin of the Association. M.L. Sircar suggested seven such branches: general physics, chemistry, astronomy, systematic botany, systematic zoology, physiology and geology.

Two eminent scientists of the day - Sir Jagadis Chandra Bose (1858-1937) and Sir Prafulla Chandra Ray (1861-1944) lectured at IACS though they carried out their research work at their own college, the Presidency College. Another visiting lecturer was Pramatha Nath Bose, a senior government geologist. Asutosh Mukherjee joined in 1887 to deliver lectures in physics and mathematics.

During the 1890's as part of the National Education Movement, P.K.Roy and M.L.Sircar were demanding separate science courses in Physics, Chemistry, Botany and Mathematics the Calcutta University. So, the Science Degree Commission was set up in 1898. 1914 in Calcutta established a new science college – University College of Science and Technology.

School of Chemistry

Indian School of Chemistry came into existence by 1920. The Father of Indian Chemistry P. C. Ray discovered Mercurous nitrite in 1896. He was founder of Bengal Chemical and Pharmaceutical Works Ltd in 1892. Also, J. C. Ghosh, P. C. Bose, Pulin Bihari Sarkar, P. Neogi, Nilratan Dhar were member of this school. Prof. N. R. Dhar researches in Physical Chemistry, he also made original contributions to electro chemistry. J. N. Mukherjee was related to advanced research on colonial chemistry in India.

School of Physics

Chandrasekhar Venkata Raman began his researches in 1907 in the fields of acoustics of musical instruments at IACS follows by his investigation in scattering of light, X-ray diffraction. His work on scattering of light earned him the Noble Prize in 1930.

In 1909 the Indian industrialist J.N. Tata founded the Indian Institute of Science at Bangalore, mainly imparted instructions in pure and applied science and towards postgraduate training and research. C. V. Raman, J. C. Bose, S. N. Bose, M. N. Saha constituted the Indian School of Physics at Calcutta.

School of Botany

Another research community, which was active during that period, was the group of Plant Physiology under Jagadis Chandra Bose. In his paper in 1900 on "Generality of Molecular Phenomena Produced Electrically in Living and Non-living Matter", "Living and Non-living" (1902), "Plant Response as a Means of Physiological Investigation" in 1906, J.C. Bose organized a research group at his Bose Research Institute from 1917^[14]. From 1917, Bose Research Institute was started its own journal called the "Transactions of the Bose Research Institute"^[15].

School of Mathematics

Revising the Indian tradition of Mathematics, the Calcutta Mathematics Society was established in 1908, Asutosh Mukherjee as a president. He contributed 16 original papers on differential equation known as "Mukherjee Theorems". Another genius was Srinivasa Ramanujan (1887-1920) a port-trust clerk at Madras who never entered the University, also made substantial contributions to the Analytical theory of numbers and worked an elliptic functions, continued fractions, and infinite series.

Conclusion

Early use of modern science in India was sporadic and desultory and motivated by localized curiosity. Most of it had no contemporaneous significance and was incorporated into the main body of science much later. Additionally, it left the Indians themselves untouched. The British-sponsored science by the very reason of its experience was field science. Geography, geology, botany, Zoology, medicine, and even astronomy- all these stemmed from the physical and cultural novelty in India. British rulers were not interested in science in India for its own sake, but in using it to further their interests. Whenever their practical needs pointed a finger towards a particular branch of science, attention was paid to that science. Harnessing science advanced it also. Thus in the process of empire building, India was added as a field station to the edifice of world science. Astronomy was the first modern science to be brought to India, as a geological and navigational aid. Physical science was never a part of colonial science. The Missionaries interacted with the Indians and documented their tacit knowledge with a view to incorporating it into the European mainstream.

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