

## **Science Diplomacy and Indian Freedom Movement: A Retrospective View of Events during the 1870s-1940s**

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### **ABSTRACT**

Science diplomacy has been a recent phenomenon that has captured the attention of policymakers. However, science and science diplomacy had been at the forefront of international relations as early as the 1850s. In this paper, a retrospective view of the role of science diplomacy during Colonial rule and its role in strengthening the Indian Swadeshi struggle is elucidated. The case study method is adopted to study three cases within the following framework: diplomacy in science; science for diplomacy; and science & diplomacy. The first case, 'diplomacy in science', illustrates from Indian scientists' perspective the role of science in Indian diplomacy. Despite the challenges and extraneous prejudices, they were able to perform academically, create a connection with the international scientists, during their stay in a foreign land, and on their return home were successfully able to establish institutions of eminence.

These institutions became the founding pillars of Indian science. The second case highlights 'science for diplomacy'. It is related to the international politics on health diplomacy that forced the British to consider scientific interventions in India, particularly during the spread of Cholera. The third case, science with diplomacy illustrates the collaboration between Indian and British scientists. The study is an attempt to unravel the role of science, science diplomacy and Indian scientists during the Independence movement.

**Keywords:** Science Diplomacy, independence, international relations, scientists, health diplomacy.

### **Introduction**

The period 1870s to 1940s was a significant period for both India as well as developed nations for scientific explorations. In the developed nations, the focus on scientific research for global supremacy and its role in the World War I and II were amply apparent. For India, science and scientists were also part of the freedom movement. Scientists like P.C. Ray, C.V. Raman, S.N. Bose, M.N. Saha, S.S. Bhatnagar, etc. were all nationalists and were the founding fathers of Indian modern science. These scientists had invested a significant amount of their time, energy, and knowledge not only for the universalism of science but also in the promotion of modern science in India. The challenges faced by the scientists were plenty.

During the 1870s to 1940s Indian scientists were ensured that they do not climb the scientific hierarchy (Kumar, 1980). With meagre research supports many Indian researchers had to struggle in foreign lands to conduct research. Their intellectual superiority had helped them gain a standing in the comity of western scientists and had helped them collaborate with leading scientists. When these scientists returned home, they were engaged in institutional building that formed the basis of future science in India.

The period of study is important since it was during this period British started exploring the possibility of science as a tool for control and also for economic growth. The imperial British government was interested in “science for profit and capital gains” (Kumar, 1980). However, there was also pressure on the colonisers internationally to spread epidemics like cholera and also ensure that the British were doing something “constructive” for the colonies. The universalism of science and cooperation within the empire was the theme of many Imperial conferences from 1907 to 1926 (Worboys, 1991). Further, the Imperial British had also conceptualised Colonial Science Policies that were also formulated as per the colonial needs (Worboys & Petitjean, 1996).

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After World War I, the British were exploring new avenues to expand their hegemony through the exploration of natural resources, plant varieties, raw materials, and land resources both for their economic gain as well as enforce their domination on the colony. Many explorers, researchers, and medical practitioners were dispatched along with the military personnel to survey the colony and identify economic value.

However, according to a few western researchers, the spread of modern science from the western world to the non-western world was considered as one-way traffic and was part of the colonial development process. This was postulated by George Basalla and other social scientists. Basalla had proposed three stages of science transmission from the western world to the non-western world. According to Basalla, in the first phase, European explorers, missionaries, scientists, etc. travelled to new regions in search of flora and fauna and also to survey new areas. The data collected by these explorers were taken back to Europe for further study. The second phase can be termed as colonial science. In this phase, the scientific work carried out by the scientists and explorers who resettled in new colonies along with the local scientists was considered to be dependent on their masters in Europe and the third phase is considered as the establishment of independent scientific traditions, nevertheless, grounded on western standards (Bhaumik, 2017).

With the one-way traffic of civility, science and culture from the imperialist to the colonised (Palladino & Worboys, 1993), the challenges posed for the Indian scientists as well as the imperial British empires were many. Indian scientists had the burden to establish a strong scientific ecosystem that echoed the sentiments of a free and stable India. On the other hand, the British colonisers had to maintain their image as an enabler and responsible administrators that had to balance their economic growth as well as address growing social concerns. Further, the need for the British empire to collaborate stemmed from the need for the empire to counter the growing control of the United States on scientific research. The diplomatic manoeuvre to address the global challenges was addressed by collaboration and cooperation by the British with the Indian continent. The Indian scientists and the nation benefited from this posturing of the British empire.

### **Framework for the Study**

With this background, the paper explores the role of science diplomacy during the 1870 to 1940 period. According to Davis & Patman (2015) Science diplomacy is the use of scientific knowledge for diplomatic representation by the state in a global arena (Davis & Patman, 2015). In this regard, the contours of science diplomacy, as proposed by AAAS — The Royal Society in their seminal report “New frontiers in science diplomacy” Navigating the changing balance of power published in January 2010, is adopted. The three-dimension proposed (The Royal Society, 2010) are:

- 1 science in diplomacy – scientific advice for foreign policy
- 2 science for diplomacy – using scientific cooperation to improve international relations
- 3 diplomacy for science – to facilitate international cooperation in science

In this paper, the first two dimensions are adopted and the diplomacy for science dimension is modified as “science with diplomacy”. Diplomacy and sciences are two different dimensions. However, in this paper, the collaboration of science with diplomacy to address a common goal is explained. The case study method is adopted to illustrate the role of science and diplomacy during the period. The cases highlight the background, challenges and politics played in harmonising the relations between India and Britain. The study is an effort to explore the role of science, scientists, and science diplomacy during the period that complimented the Indian Independence movement.

### **Science & Diplomacy during the Imperial rule**

#### *Case 1: ‘Science in diplomacy’*

The first case, ‘science in diplomacy’, illustrates from Indian scientists’ perspective the role of science in Indian diplomacy. The traditional definition of science in diplomacy by the AAAS – Royal Society is that scientific knowledge and evidence are tools for foreign policy. In the period under reference, the challenges were with respect to the role played by the Indian scientific community in pushing the British Government to

recognise, engage and reward Indian scientists. Further, global challenges like the dominance of the United States in the Applied Sciences (Worboys & Petitjean, 1996), the relative backwardness of Britain in comparison to Germany and the United States on the importance of science in economic and industrial growth (Worboys, 1991), diplomacy with the grant of the Royal Society membership were few situations that were helpful to the Indian scientists.

The British Government, during the period, were in the balancing act inclined to provide incentives to their colonies to salvage their global image. The challenges from the dominance of the United States and Germany forced them to look at colonial science as an extension of their research work. However, the attitude of the British administrators was to exploit the colony for its raw material and maximise the Imperial profits with minimal loss. The period 1870 to 1940 saw many new initiatives by the British Government. Colonial Science Policy, 1918, was initiated along with Colonial Development Fund and a Colonial Research Committee to advise on the spending was also envisaged (Worboys & Petitjean, 1996). In India, the British Empire was finding a sense of balance through the creation of two agencies – the Indian Advisory Committee of the Royal Society and the Board of Scientific Advice of the Government of India was established for ensuring a smooth transition between the British scientific enterprises with the Indian counterpart (MacLeod, 1975). All these initiatives were forced by the science and scientific community on the British rulers to think of a collaborative approach to address their global political agenda.

From an Indian scientists' perspective, their international connection and engagement were instrumental in the growth of Indian science. Indian scientists, such as Meghnad Saha, Homi Baba, Chandrashekar, Prafulla Chandra Ray, C.V. Raman and many more leading scientists had visited Britain, Europe and the western world to enhance their scientific research as well as establish connections with leading scientists. Many of these scientists were subjected to extraneous prejudices, like not being provided with equal grants that were provided to their white peers. However, their academic distinction enabled them to work closely with Nobel laureates. For example, Prafulla Chandra Ray writes to Saha

*“...In fact, with the exception of one or two, all others in England are mediocre. They cannot appreciate our work with an open mind, perhaps because we are a subject race. Only a genius can appreciate a genius. It is impossible for British scientists to appreciate (our work) without a condescending attitude.” (Ganguly et al., 2019).*

Simultaneously, the universalism of science prevailed in Europe and many Nobel laureates were forthcoming in supporting the research endeavour of Indian scientists. For example, Einstein initially translated Bose’s paper and published it in Germany (R.S. Anderson, 2010). The research work was later called as Bose-Einstein condensation of light. On other hand, the ‘apartheid’ in science had led to the establishment of Indian Associations and Institutions. For example, Meghnad Saha founded the National Institute of Science which was later renamed as Indian National Science Academy (INSA) (Ganguly et al., 2019). The Indian Association for the Cultivation of Science was established in 1876 in Calcutta (erstwhile name of Kolkata) to fight politically the repressive policies of the British Government (Kumar, 1980). Similarly, the growing Indian scientific fraternity enabled change in the membership in the British Royal Society. Apart from recognising British scientists and geologists with Indian connections, the Royal Society started accepting the nomination of native Indians as well (Home, 2003). For example, the research work of Meghnad Saha’s ionization formula (1920), with the recommendation by Alfred Fowler (Ganguly et al., 2019), enabled him to be elected as a member in 1927 even though the Government had objected due to anti-British stance of Saha (Kochhar, 2019).

The diplomacy during the period can be attributed to the interaction between the Indian scientists with their British counterparts and the role of the British Government to reclaim their image by initiating a few steps. Few British scientists were also neutral in recognising merit in Indian scientists. However, the literature is replete with models of engagement, for example, George Basalla’s triangular model including centre-periphery interaction (Kumar, 1980; Raina & Habib, 1996). The benefits of a partnership based on science persuaded the British regime to

cooperate with the Indian intellectuals, which was welcomed by the Indian scientists. Further, the exposure gained by leading Indian scientists such as Meghnad Saha, Homi Baba, Shanti Swarup Bhatnagar, etc. in a foreign land from the 1870s to 1930s helped India in establishing scientific institutes during the 1930s-1940s. The win-win situation thus enabled science to grow further and was instrumental in establishing centres of eminence in India.

#### *Case 2: Science for Diplomacy*

Science for diplomacy, according to the Royal Society (2010), is using scientific cooperation to improve international relations. In this paper, the science of diplomacy is explored by looking at the health crisis that originated due to the spread of Cholera during the 1880s and global pressure on the British Empire to address the spread.

According to Fidler (2001), the International Health Diplomacy can be traced back to 1851 when the first International Sanitary Conference was organised by the European countries to discuss cooperation on plague, yellow fever and cholera. Health diplomacy took a major focus in the fifth Cholera epidemic during the 1880s. The Suez Canal that was opened in 1869 created an economic trade route for England with reduced time for ships travelling between India and England. Simultaneously, the cholera epidemic was spreading rapidly in the Mediterranean region causing huge casualties both in the Mediterranean and Europe. Pressure on the built on the English ships because, it was believed that, the disease originated from India and was spreading to other regions (Ersoy *et al.*, 2011; OGAWA, 2000). The point of contention was with respect to quarantine policy. The European states controlled the spread through quarantine policy (Fidler, 2001). The English ships were not quarantined in Egypt which was considered for the spread. On the contrary, the English were not forthcoming considering the economic cost of delayed trade.

The Imperialists were on a diplomatic challenge with science as the only ray of hope. Scientists were dispatched to India by the colonisers to respond to the growing fervour on the origin of the disease. The diplomatic entanglement had led to scientific

arguments and counter-arguments with the support of contagion theory, and germ theory that was promulgated and argued. The British Commission under Hunter that visited India, and the French and German Commission that included Koch had presented conflicting reports (OGAWA, 2000). The challenge was more science-driven with each trying to prove the origin of cholera using scientific facts and research.

For, India, the Cholera epidemic had enabled a slew of measures ranging from the establishment of Indian Medical Services (IMS), Public Health Commissioners, Sanitary Commissioners (Mushtaq, 2009), etc. Similarly, the Plague Commission Report 1904 based on which Indian Research Fund Association for promoting research in medical problems was suggested (Kumar, 1980). A chain of central facilities and laboratories for the investigation of the problem of tropical and other diseases was initiated.

Central Research Institute of India, was opened in 1906 in Kasauli; Indian Research Fund Association (now ICMR) was established in 1911; Pasteur Institute at Kasauli, Shilong, Coonoor; Bombay bacteriological Laboratory; The Plague Research Laboratory at Parel; the King Institute in Guindy, Madras were all established (ICMR, 2011). Further, Indian entomologists like M.O.P Iyengar, who was in-charge of the Bengal Malaria Research Laboratory in Calcutta in 1918, and Dr K.S. Mhaskar in 1913 carried out research on malarial vectors (Mushtaq, 2009).

History is replete with instances of health diplomacy and its challenges. Particularly, the role in harmonizing the United States and Germany during pork war 1880-1891 and also the case of vaccine diplomacy between the U.S. and Russia during the cold war era are testimonials of the role of science in harmonizing the dispute or a way out of tensed international relation (Kanagarajan & Sony, 2020). In the case of India and its imperial Government, the spillover effect of the role of science in diplomacy can be duly acknowledged.

### *Case 3: 'Science with diplomacy'*

Science with diplomacy is a departure from the traditional taxonomy of diplomacy for science by the Royal Society and



AAAS. Diplomacy for Science, according to AAAS (AAAS, n.d.), is focused on diplomacy that enables international cooperation especially focused on scientific research. These cooperation are generally for major flagship international projects like CERN, construction of international space station (PAYETTE, 2012), SESAME centre in Jordan, etc. are major projects that require international collaboration to manage high-cost that are also rated high on risk. In this paper, however, diplomacy for science during the period 1870-1940s could not be substantiated during the Indian freedom movement. Therefore, the frame of science with diplomacy is used to understand the interaction and role of Indians working with the European scientists in the domains like geological survey, health, etc. are reviewed from a collaboration and cooperation perspective. Also, other interaction between the British natives in India and Indian citizens that contributed to the science is evaluated.

During the 1870s to 1920s, the British imperial government initiated many expeditions and explorations. According to Palladino and Worboys (1993), science practiced by the British and the European colonies were planned to support political objectives and economic gains. As suggested earlier in Science in diplomacy, the ulterior motive of the Imperial government was to exploit the natural resources, agricultural products, herbal plants, etc. that were of importance to the British.

Considering George Basalla's (1967) euphemistic theory, Phase I provides a source for European science from the nonscientific (absence of modern western science, i.e. countries like India). In this initial phase, exploration of natural resources such as flora and fauna, geology, botany, etc. are collected and taken back to their research base for further study. The data may be collected by scientists or amateur travellers, however, the data collected were shifted to empire. Phase II was the colonial science period. Phase III is considered as the transplantation with a tussle to accomplish an independent scientific tradition (ibid.).

George Basalla and similar western historians, during the 1960s to 1980s, had committed to showcasing epic achievements of European scientists and their development (W. Anderson, 2018), however, the benefits that the colonies achieved due to the struggle to be an independent nation are noteworthy. In India,

the British empire had set up many Universities, research institutes, and scientific and technical services to impart scientific and technical education so as to prepare and train technicians to assist the British natives (Palladino & Worboys, 1993).

Dhruv Raina and S. Irfan Habib (Raina & Habib, 1996) in their work 'The structure of scientific exchanges in the age of colonialism' have explored the interaction between scientists from a centre-periphery framework. Their work is of relevance to us since the cooperation and competition between Western scientists and Indian scientists have been identified. According to Dhruv Raina and Irfan Habib, there was cooperation, collaboration and competition between scientists, particularly between European scientists and Indian scientists, that takes a different form depending upon the scenario. Generally, the literatures highlight that western scientists were in the centre and Indian scientists were in the periphery and any challenge by the Indian scientist to take centre stage would lead to competition. However, from a diplomacy point of view, the collaboration and cooperation between these scientists were evident from many leading joint journal publications (eg. Bose-Einstein's condensation of light).

Similarly, the interaction between the British natives located in India, be it professors, surveyors, physicians, explorers, botanists, etc. with the Indian counterpart forms the basis of science and diplomacy. In many interactions, the outcome had been fruitful. For example, Sir Alexander Pedler had a great influence on Prafulla Chandra Ray. The establishment of Presidency College by Raja Ram Mohan Roy, David Hare, Babu Buddinath Mukherjee, Sir Edward Hyde East, Raja Radhakanta Deb is another example of science and diplomacy hand in hand. George Everest, the Surveyor General of India was impressed by Mohsin Hossain of Arcot through his remarkable mechanic of inventive talent (Kumar, 1980). The British researchers also gained from their expedition in India by observing the local traditions and techniques, the case in point is the dietary research of Robert McCarrison and the adoption of agricultural practices by Albert Howard (Harrison, 2005). The mutual collaboration, cooperation, and learning had benefited both the Imperial government and India.

### **Conclusion**

The intersection of science and international relations, historically, has been quite evident right from the 1870s. The cases discussed above highlight the role of science in supporting the policy decisions relating to international relations of the British Empire as well as that of India. The cases highlight the compulsion, collaboration, cooperation and mutual benefit espoused from the interaction between science and diplomacy. In the first case, science in diplomacy, it is evident that the diplomacy during the period can be attributed to the interaction between the Indian scientists with their British counterparts and the role of the British Government to reclaim their image by initiating a few steps. Few British scientists were also neutral in recognising merit in Indian scientists. However, the literature is replete with models of engagement, for example, George Basalla's triangular model including centre-periphery interaction (Kumar, 1980; Raina & Habib, 1996). The benefits out of partnership based on science persuaded the British regime to cooperate with the Indian intellectuals, which was welcomed by the Indian scientists. The win-win situation thus enabled science to grow further and was instrumental in establishing centres of eminence in the Indian continent.

The role of science in health diplomacy due to cholera had a spillover effect on India. Many institutes of eminence in the health and medicine domains were established that helped create scientific knowledge in India.

In all the cases, the international pressure on the Imperialists as well as the organic growth of science enabled the Indian scientists to gain knowledge that subsequently helped in the Indian freedom movement. The scientists were not only engaged in knowledge creation but were also preparing the blueprint for India's scientific future by developing the necessary institutions, facilities and support systems. The scientists even collaborated with international peers and had also sought support from various grants available internationally. The case studies have highlighted the tacit interaction between the epistemic community in India and Europe that had an impact on the policies adopted by the colonisers. The interaction was also instrumental in the establishment of independent scientific

research, as suggested by Basalla that was also a policy shift considering geopolitical turmoil such as World War 1 & 2. Overall, the role of science in the Independence movement will be incomplete without looking at the diplomacy played by Indian scientists during the British empire between 1870-1940.

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