SCIENCE AND SOCIETY: LESSONS FROM COLONIAL PAST

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Every society, however crude or primitive it might appear from the benefit of hindsight, has certain amount of scientific rationality and endeavour within it. The South Asian society, from time immemorial, has nurtured a thinking civilization. It never lived an isolated existence and never displayed xenophobic tendencies. Techno-scientific tradition in South Asia has largely been a synthetic tradition, continuously evolving as a result of each politico-cultural interaction with the outside world and social change within the region. In pre-modern times, South Asia was known for its contribution to astronomy, medicine and mathematics. But it was during the post-Renaissance epoch (that of Descartes and Newton) that Europe began to outdistance all other culture-areas. In eighteenth century this distance became virtually unbridgeable. For India, this century proved unique in the sense that it saw the decline of pre-colonial systems as well as the inauguration of systematic colonization. During this period the rise of modern science itself coincided with the rise of capitalism and colonial expansion. Probably they grew in tandem, feeding each other.

Exploring the Links Colonization was an extremely important historical process with wide-ranging results. We do talk about colonial polity, colonial society, colonial economy, colonial legacy, etc. Can the ethos and function of colonialism be extended to the realm of science and technology? Can the latter be spotted at the center of the Colonial whirlpool? Is it possible to talk of colonial science? Of course, few would deny the universality, rationality, and utility of science. But colonialism also has affected our universe no less profoundly than, say, the scientific or industrial revolution. Many claimed it to be rational as well and some still harp on its utilitarian ideology!

The Inheritance

Eighteenth-century India inherited a long-lived tradition in both philosophical and material terms. Centuries before, Said al Andalusi (1029-1070), in his Tabaqat al Uman (probably the first work on the history of science in any language), referred to India as the first nation that cultivated the sciences. Later, India adopted post-Ghazali Islam, which was marked by a bitter theological opposition to falsafa (philosophical rationalism). Knowledge in the Islamic framework was divided between ilm-al-Adyan and ilm-al Dunya. Accordingly, Muslim scholars were divided into those who relied on manqul (traditional

knowledge) and those who favoured the touchstone of reason (maqul). The former, greater in number and more powerful, opposed Sultan Muhammad Tuglaq (1325-1351) when he tried to patronize ilm-I-maqulat. However, Mughal India was somewhat eclectic, and because there was no consolidated, systematic, and detailed curriculum, the channels of learning were not at all closed to maqul ideas.
It seems that during the late medieval period no comprehensive attempt was made to explore India's scientific heritage, much less to keep it abreast of the developments then taking place in the Western hemisphere. Unlike Alberuni's Kitbu-l-Hind, Abul Fazl's A'in-i-Akbari (a classic on Mughal times) barely touches science. Alberuni could cite numerous Greek texts; Abul Fazl refers only to Aristotle and Ptolemy. . He cites the tables of specific gravity from Alberuni but makes no attempt to verify Alberuni's calculations, which were made almost 550 years earlier (1030 A.D.). It appears that scientific curiosity was in decline, and Abul Fazl admits it. But he shows great interest in technology, especially the smelting process and liquor distillation. Abul Fazl appreciated the importance of technological improvements for the state economy; socially he enunciated Sulh-I-Kul which emphasized tolerance and coexistence; and intellectually he was not at all dogmatic. Yet he was unable to move beyond the classical theoreticians.
Another important aspect that needs to be taken into account is the caste system, which has always been a unique feature of Indian society. P.C. Ray was the first historian of science who saw in the caste structure "something that made science a prey to creeping paralysis." Caste led to the ruinous separation of theory from practice – of mental work from manual work. Ray wrote as follows:
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 – the spirit of enquiry gradually died out. Her (India's) soil was rendered morally unfit for the birth of a Boyle, a Descartes, or a Newton.
In eighteenth-century India this paralysis was compounded by an enormous intellectual (cultural) failure on the part of the ruling class. Jai Singh had attracted several scholars to his court, but he never thought of establishing an institution that would continue and improve on his work. It was a curious situation. On the one hand, one finds Mushibullah al-Bihari writing Risalah Juz 'la Yatajazza, an Arabic treatise on the indivisible atom, and two other texts on motion and time (1700) on the other hand is Walih Musawi (1700-1770) wiring Murgh-namah (on cock fighting) and Kabutar-namah (on pigeons). As the British strengthened their grip at the end of the eighteenth century, the Indians did not continue this withdrawal. As interaction

with the West grew, Indians did try to look out and look within. For example, in 1790 Mir Hussain Isfahani wrote Risalah-I-Hai'at-iAngrezi, a Persian text on European astronomy. Many commentaries were written during this period; although they did not entail a paradigmatic change, neither were they slavish. In fact, composing commentaries were written during this period; although they did not entail a paradigmatic change, neither were they slavish. In fact, composing commentaries was considered a civilized form of making progress. In several instances (especially in medicine) these commentaries explain scientific knowledge in terms of its own rationality and logic, but in the final anlaysis when the validity of certain knowledge was put to test, the sacred texts were always the standard measure. More than three hundred years before P.C. Ray, Abul Fazl had mourned "the blowing of the heavy wind of taqlid (tradition) and the dimming of the lamp of wisdom.... The door of "how" and "why" has been closed; and questioning and enquiry have been deemed fruitless and tantamount of paganism."

This was true not only of late Mughal India but the Safavids in Iran, the Manchus and the mighty Ottomans had also begun to show signs of crack. Some resurgent nations, now ruling the waves, came in and through their trading companies chalked out large areas. Their sails, their guns, their training were substantially different. They had 'new' knowledge behind them. In the midst of political intrigues, plunder and numerous local wars, some official of the East India Company could think of establishing a forum for knowledge (The Asiatic Society, 1784) and a college at their fort (Fort William College, 1801). Trained surveyors marched along with their armies. The British could succeed against their numerically superior adversaries largely because they possessed a thorough and scientific knowledge of the country through which they marched. Survey and expansion moved side by side. Every boat that touched the Indian shores had a medical man on board. Trained in the scientific seminaries of Scotland and Northern Europe, he would be known as surgeon-naturalist: and true to his training, in his spare time, he would look for and report on the topography, minerals, flora, fauna and people of his area. They were scientific soldiers who willingly and promptly extended the help of 'new' knowledge to the process of colonial expansion and consolidation. Thus was born the phenomenon of 'colonial science'. In some ways, it did represent an advance over pre-colonial science. It was far more systematic, methodical, penetrative and pervasive. It involved everything: science, politics, commerce, military operations, administration etc. In any case it is now widely acknowledged that techno-scientific developments and colonial expansion had closer links. These links beg certain questions. Can there be an imperialist side to

the core of natural knowledge? What was the shape that 'modern' and 'universal' science took in a colony? What was the colonial posture in science and to what extent were scientific discourses used to achieve political and cultural goals? No less important is to glean how the recipient culture sought to appropriate or redefine the metropolitan ideology of science. How was the indigenous scientific tradition perceived? How did the indigens react to the introduction of 'new' 'knowledge and new tools? Was a synthesis possible? Finally, could the integration of technological and scientific tradition have taken place as part of the natural evolution of the Indian society had colonization not intervened?

Clear cut answers are difficult to attempt, for colonialism was no monolith and it left several facts and questions open which can be interpreted either way. Yet one thing is certain, colonial science lacked sovereignty. Its contours were of course drawn on the colonial terrain, but it enjoyed a rather limited autonomy which was further reduced as the colonial grip tightened. Several colonial scientists felt uncomfortable, yet they had to perform a dual role -to serve the colonial state and to serve science. This state claimed superiority in terms of structure, power, race, etc. Science claimed superiority in terms of knowledge and inter alia helped the colonial state dismiss 'other' epistemologies. Both needed each other and became mutually dependent.

DUAL MANDATE

As the Company rule in India owed its origin primarily to mercantilist activities, the notion of 'science for profit' makes an early appearance. Yet, in the early stage, the colonial scientists (those days mostly surgeon-naturalists) had more freedom and flexibility. There were tremendous difficulties but also enormous opportunities to discover and sight new things. Support from metropolitan scientists added to their confidence and their agenda was not entirely derivative. They did enjoy a certain amount of autonomy and they too influenced metropolitan discourses (for example, on the deposition of coal-seams, nature of cholera, etc.). A recent work has shown that the idea of environmental conservation came from the colonies, and colonial planters, botanists and foresters contributed a great deal to the initiation and maturation of conservation debates in the metropolitan circles. Moreover, the very concept of a state scientist emerged in the colonies and this shows how aware the trading companies who ran the colonial business were of the importance of scientific explorations. A knowledge of the local terrain, local resources, customs and traditions

was vital for the founding of a colonial state. The process of acquiring this knowledge was not an easy one; almost insurmountable physical and conceptual problems came in the way.

ORGANIZATIONAL IMPERATIVES

An impressive institutionalization alone could have consolidated the gains that accrued from the exploration. It may be interesting to observe how and in what form a particular scientific organization at a particular historical juncture worked for the then - existing politico-economic structure. Geological and survey department, for instance, received the maximum patronage from the government. Next ranked botany. Agriculture remained a Cinderella till the 1890s, though a few private agricultural and horticultural societies did try to give it a commercial drift. Private scientific bodies were often more vigorous than the government machinery itself. Among them can be counted the Asiatic Society of Bengal, the Bombay Branch of the Royal Asiatic Society and the medical and physical societies in presidency towns. Changing economic needs, the proliferation of scientific establishments, and the growing concern shown for them by the educated Indians made the government to think in terms of an apex body to regulate scientific affairs in India. In 1898, at the instance of the Home Government, the Royal Society formed an Indian Advisory Committee, and in 1902 the Government of India established a Board of Scientific Advice. These experiments unfortunately generated more heat than light and ended in a whimper. Still these institutions had brought the government, science, and economic consideration into a close relationship. The economic interest-group desired research to gain immediate and practical ends. The economic ramification can well be spotted in the growth of industries fed on applied science, viz. coal, cotton, jute, tea, etc. One may argue that scientific development in British India should be treated as individual romances with natural history without linking them with the political economy of the time. But where natural sciences would be without industry and commerce? The light of science had certainly been dimmed by the smoke of commercialism.

Excessive government control of scientific undertakings often hampered the logical development of modern science in India. The government would always goad the various organizations to work only along economically beneficial lines. Most of them buckled under this pressure. Watt, for example, was asked in 1903 to prepare an abridged volume of his famous Dictionary of Economic Products. But he was not given a free hand in selecting the products. He was asked to include only those which were of commercial value. The result was that instead of a Dictionary of Economic Products, he produced a Manual of Commercial Products.

Colonial researchers often found themselves unable to distinguish between 'basic' research and 'applied' research. This was particularly true of the geologist and botanists. Their dilemma was fairly acute. On top of it, though the colonial government would always recognize the importance of science, it would never approve of' any large outlay upon them which must, however useful in its remote results, be immediately unremunerative'. Some of the specialists (especially the botanists) felt slighted. A few received a great deal of attention while others none; for example, large sums were spent on geological explorations and nothing on the examination of agricultural soils. George Watt thought it 'absurd to suppose that the Geology of India requires fourteen European experts, while the Agriculture and the Industries of India must be content with two or three expert investigators.'

A significant feature of this phase is the relative neglect of medical and zoological sciences and this is in sharp contrast to larger investments in botanical, geological and geographical surveys from which the British hoped to get direct and substantial economic and military advantages, while medical or zoological sciences did not hold such promises. Western medical classes, for instance, were started in 1822, but it took another thirty years to produce the first exhaustive compilation of information on tropical disease in India. The treatment and study of tropical diseases was undertaken by individuals who were separated both geographically and professionally and so, naturally, a consistent body of knowledge failed to develop. This was true for every branch of knowledge.

Another important feature is the almost total absence of pure or theoretical research. Research activities in science like physics and chemistry which had by then reached' a professional stage' in Europe, were hardly noticeable in India. In the Centenary Review of the Asiatic Society, P.N .Bose apologetically wrote: ' Our chapter of chemistry at the Asiatic Society is near being as brief as the proverbial chapter on Snakes in Ireland.' Till the advent of P.C. Ray, only one chemical paper had appeared - by A. Pedler on the volatility of some of the compounds of mercury. There were chemical analyzers in every province but their job was confined only to medico-legal cases and the inspection of government stores. India was found suitable only for field research. She was in fact used as a 'vast storehouse' with exotic varietiesSCIENCE AND SOCIETY: LESSONS FROM COLONIAL PAST

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