

The ‘culture’ of science and colonial culture, India 1820–1920

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The culture of science is deeply influenced and conditioned by the socio-political realities of both time and locale. Pre-colonial India, for example, was no *tabula rasa*. It had a vigorous tradition in at least the realms of mathematics, astronomy and medicine. But gradual colonization made a big dent. It brought forth a massive cultural collision which influenced profoundly the cognitive and material existence of both the colonizer and the colonized.¹

This encounter was initially disturbing, even agonizing. Gradually relations stabilized and the recipients started examining what was living and what was dead in their system, and, under the new circumstances, what to accept and what not. The encounter also had within it the question of attitude (towards each other), an uneasy acceptance, a quest for identity and, finally, the seeds of decolonization. How did different nations view each other’s techno-scientific traditions and capabilities? The confidence of one and the diffidence of the other; the disjunctions, the gaps, and the efforts to bridge them; the inner inconsistencies and contradictions which characterize this relationship: these are some of the facets this paper focuses on, drawing upon the professional and personal experiences of notable cultural interlocutors and Indian scientists. The question of identity was important for a colonized society and its subdued psyche in the same way as the feeling of superiority and invincibility was for the colonizers. The retrieval of this seemingly lost identity was a precondition for regaining the lost sovereignty.

THE FIRST SIGHT

In the early eighteenth century an *amatya* (minister) of Kolhapur, Ramchandrapant, wrote about the activities of the European traders and ‘factors’. He called them *topikars* (hat-wearers) and recognized that their strength lay in ‘navy, guns and ammunition’. His

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1 Ashis Nandy, *The Intimate Enemy: Loss and Recovery of Self under Colonialism*, Delhi, 1983; Michael Adas, *Machines as the Measure of Men: Science, Technology and Ideologies of Western Dominance*. Ithaca, 1989; Suhash Chakravarty, *The Raj Syndrome: A Study in Imperial Perceptions*, New Delhi, 1991; T. R. Metcalf, *Ideologies of the Raj*, Cambridge, 1994; Deepak Kumar, *Science and the Raj 1857–1905*, Delhi, 1995.

prompt advice was to avoid the *topikars*, ‘neither troubling them nor being troubled by them’.² This was an early sign of withdrawal, of playing safe. But this attitude tempted the *topikars* to attempt conquest along with commerce, and their success was virtually assured. Once faced with a *fait accompli*, the indigenous élite did not persist in withdrawal. As the interaction progressed, they did try to look outwards and also to look within. The first Indian to visit England was perhaps Itisamuddin, who went there in 1767 as envoy of the powerless Mughal emperor. In London the royal letter and the precious gifts that he was carrying were taken over by Lord Clive, who presented them on his own behalf to George III. No wonder, in his travel diary Itisamuddin is critical of their administrative and moral conduct.³ He is silent about the industrial developments then taking place in England. This was rectified by Mirza Abu Talib, who spent four years in England at the turn of the century. He wrote glowingly about the literary societies, theatres, mills, iron foundries and hydraulic machines.⁴

In the first half of the nineteenth century several Indians visited England and wrote about the technological marvels they came across. Two Parsees, Jahangir Nowrojee and Hirjeebhoy Merwanjee gave a full chapter to ‘scientific institutions’ in their travelogue.⁵ The Gallery of Practical Science near Charing Cross and the Polytechnic on Regent Street struck them most. Commenting on the ‘steam culture’, they exclaimed, ‘Oh! happy England, possessing within yourself this source of employment [that is, coal and iron], of manufacture and of wealth, old happy England you are, and long will be, the wonder and envy of the world.’ This sense of wonder and awe is expressed again by Lutfullah in 1844 when he visited the College of Surgeons and the Polytechnic in London.⁶ The Indians had definitely come a long way from the days of Ramchandrapant. Dominant culture does induce submission but it is not always based on fear. The signs of wonder that Abu Talib or the Parsee brothers showed were not only spontaneous but also logical and natural. It was no slavish admiration because they did criticize certain social conduct and cultural values of the new masters.

The Europeans who came to India in such large numbers were no less wonder-struck. They saw here enormous opportunities (in terms of explorations, exploitation and so forth) and equally enormous paradoxes (social, cultural etc.). Naturally their reactions were mixed. Some felt overwhelmed. Working on *Bijaganita* (algebra), Edward Strachey found ‘every scrap of Hindu science interesting’.⁷ Some were sceptical and many more derisive. To cultural pluralists like William Jones, Henry Thomas Colebrooke and Robert Lambert Playfair the Indian scientific tradition appeared impressive and inaccurate at the same time. On one occasion Jones conceded that Hindu writings might yield some ‘helpful hints’ to European scientists, but on another he declared that the Asiatics were ‘mere

2 B. K. Sarkar, *India in Exact Science: Old and New*, Calcutta, 1937, 8–9.

3 *Shigrafi Nama-i-Wilayat*, MSS preserved at the National Archive of India, New Delhi.

4 Mirza Abu Talib’s *Safarnama* was translated and published by C. Stewart as *Travels in Asia, Africa and Europe*, London, 1810.

5 Jahangir Nowrojee and Hirjeebhoy Merwanjee, *Journal of a Residence of Two Years and a Half in Great Britain*, London, 1841, 111–43.

6 S. A. I. Tirmizi (ed.), *Autobiography of Lutfullah: An Indian’s Perceptions of the West*, New Delhi, 1989, pp. i–xv.

7 Edward Strachey, *Bijaganita*, London, 1813, 1–10.

children' when compared with Europeans.⁸ The politics of patronage invokes a simultaneous recourse to both caress and whip. Colonial hegemony has its own dialectic. Even in the midst of mid-Victorian jingoism some felt:

We are not cleverer than the Hindu; our minds are not richer or larger than his. We can not astonish him, as we astonish the barbarian, by putting before him ideas that he never dreamed of. He can match from his poetry our sublimest thoughts; even our science perhaps has few conceptions that are altogether novel to him.⁹

A 'COLONIAL' RENAISSANCE

In order to establish their complete supremacy, British colonizers had first to dethrone and delegitimize several pre-colonial symbols and totems, both political and cultural (see the numerous travelogues and early colonial writings), and then present their ideological and material wares in a form that would appear attractive, if not always superior, to at least a section of the indigenous population. This was how the so-called Bengal Renaissance emerged.¹⁰ The name of Rammohun Roy comes to mind first. One may add the name and works of Bal Shastri Jambhekar in Bombay and Master Ramchandra in Delhi. Although it is easy (though not strictly proper) to spot in their works 'an anti-colonial consciousness' or 'struggle' in some form, this would appear plausible only when their complicity in the colonial project is diluted or withdrawn. The 'Renaissance' was a colonial Renaissance, and cannot be understood without reference to colonial parameters and structures. The two were simultaneous, and not unconnected, experiences.¹¹

Yet the urge to comprehend the modern knowledge and tools that the colonizers had brought, and to assimilate them, was definitely there. This urge came from within, and the acculturative influence of European thought and Christian liberalism strengthened it. Even the commercial class realized the importance of new knowledge. Leading Bombay merchants like Maneckji Cursetjee and Jagannath Sunkersett viewed Western arts and sciences as a commodity, easily transported and, when acquired, easily adopted for use like any other material goods.¹² The new interlocutors did put a premium on alien rule, and in a sense idolized it and supported downward filtration. They had to do this the more so because initially they could think of no other effective way to deal with the serious ills their society was suffering from. The traditional mores and practices carried little weight in their armoury.

New exposure made their weaknesses and faults even more glaring. The colonial state naturally took every possible advantage. In the face of an unprecedented cultural onslaught, the new pioneers were dazed, if not bewildered. They experienced a dual

8 Quoted in Adas, *op. cit.* (1), 106–7.

9 John Seeley, *The Expansion of England*, London, 1883, 244.

10 Michelet's concept of 'Renaissance' should not be applied to nineteenth-century Bengal. The colonial context precludes such comparison. The *Banians* and *Babus* of Calcutta were hardly a match to the Renaissance men of Italy. See Amalesh Tripathi, 'Bengali culture: the nineteenth century Renaissance', *Sunday Statesman Miscellany*, 7 January 1990, 1–3.

11 Dipesh Chakrabarty, 'The colonial context of the Bengal Renaissance', *Indian Economic and Social History Review* (1974), 1, 92–111.

12 Jim Masselos, 'Perceptions of science and technology in Western India in the nineteenth century' (mimeograph).

alienation (*à la* Cabral) from the traditional and later from the colonial life and system.¹³ They could to some extent anticipate the distortions the colonial medium was likely to produce. But the realization was slow and diffident. Perhaps this explains why Rammohun Roy (1772–1833, Calcutta) looked to both *Vedanta* and the West;¹⁴ Ishwarchand Vidyasagar (1820–91, Calcutta), an admirer of Western knowledge, wanted Indian students to study their own ‘false system’ also;¹⁵ Bal Shastri Jambhekar (1802–46, Bombay) commenced his science popularization activities in both Marathi and English;¹⁶ and Master Ramchandra (1821–80, Delhi) began his mathematical *Treatise* from a twelfth-century Indian text, Bhaskara’s *Bij-Ganita*.¹⁷ The soil was being prepared for cross-fertilization, and the seed was a cross-breed.

Rammohun Roy and Vidyasagar were great social reformers. Unlike them, Bal Shastri Jambhekar and Master Ramchandra concentrated on mathematics teaching and science-popularization. Jambhekar was the first Indian to become a professor of mathematics and astronomy. He taught at Elphinstone College, Bombay, and among his early pupils was Dadabhai Naoroji, the doyen of Indian nationalism. Jambhekar worked for science learning through the local Marathi language. In 1836 he published the Marathi translation of a well-known English work on *Mathematical Geography*, to which he added an ‘Essay on the system of Bhaskaracharya’. In 1842 he published in Marathi two books on the *Theory of Equations* and the *Differential and Integral Calculus*. A little later in Delhi, Master Ramchandra tried to revive the Indian spirit of algebra so as to resuscitate ‘the native disposition’.¹⁸ Bhaskara was common to both. To begin with one’s own heritage was quite natural. Indeed, this was the strategy advocated by the ‘orientalists’ as well. L. Wilkinson, a British Resident and an astronomer at the court of Rewa, found Bhaskara’s works ‘beyond all comparison, the best means of promoting the cause of education, civilization, and truth amongst our Hindu subjects’.¹⁹ Ramchandra, however, moved ahead and incorporated the post-Bhaskara ‘advances’ in his *Treatise on the Problems of Maxima and Minima*, published in 1850. His idea was to bridge the gap. But the effort aborted. An alien government, confident of its epistemic superiority (especially after Macaulay), would not allow the transplantation of modern science on an indigenous base.²⁰

Another interesting dimension of these ‘early stirrings’ was that both Jambhekar and Ramchandra took to science popularization through the Indian languages. Both worked

13 K. N. Panikkar, ‘The intellectual history of colonial India: some historiographical and conceptual questions’, in *Situating Indian History* (ed. S. Bhattacharya and R. Thapar), Delhi, 1986, 402–32.

14 V. C. Joshi (ed.), *Rammohun Roy and the Process of Modernisation in India*, Delhi, 1975.

15 Ashok Sen, *Ishwarchandra Vidyasagar and His Elusive Milestones*, Occasional Paper No. 1, CSSS, Calcutta, 1975.

16 G. G. Jambhekar (ed.), *Memoirs and Writings of Bal Gangadhar Shastri Jambhekar*, 3 vols., Poona, 1950.

17 Dhruv Raina, ‘Mathematical foundations of a cultural project or Ramchandra’s treatise “Through the unsentimentalised light of mathematics”’, *Historia Mathematica* (1992), 19, 371–84.

18 Dhruv Raina and S. Irfan Habib, ‘Ramchandra’s treatise through “The Haze of the Golden Sunset”: an aborted pedagogy’, *Social Studies of Science* (1990), 20, 455–72.

19 ‘What can be more flattering to the vanity of the Hindu nation, than to see their own great and revered masters quoted by us with respect, to prove and illustrate the truths we propound’. L. Wilkinson, ‘On the use of the Siddhantas in the work of native education’, *Journal of the Asiatic Society of Bengal* (1834), 3, 504–19.

20 Raina, op. cit. (17).

for their respective Native Education Society and published journals (the Bombay Durpan in English and Marathi, and *Mohabb-e-Hind* in Urdu). Both were avid translation enthusiasts. In a meeting organized by the Delhi Education Society on ‘Learning European Knowledge through Translations’ on 12 November 1867, an English priest argued that no society has gained knowledge through translations, to which Ramchandra replied that Europe was enriched through translations as the centres of science had shifted from Greeks to Muslims.²¹ What Ramchandra probably did not realize then was that the translations in the Arab and the Mediterranean culture area were accompanied and often preceded by original research. The subsequent years were to prove the priest more correct, as the translation activities of Master Ramchandra and his more illustrious contemporary Sir Syed Ahmed (and his Aligarh Scientific Society) were to end on a feeble note.

Jambhekar was a forceful writer. Though the city in which he worked was a city of business and brokers, he looked to science for the sake of knowledge. He viewed modern science not as a commodity but as a new paradigm, to be pursued without a profit motive and for its own sake. The world-wide domination of the Europeans he attributed to their ‘pre-eminent superiority...in almost every department of science’.²² In contrast, ‘the Asiatic philosophers’ had not bestowed ‘the same attention on useful sciences and arts as they have done on more abstruse and subtle branches of knowledge, such as Metaphysics and Logic’. The latter were ‘in no way connected with the common purposes of life’.²³ This reference to the ‘useful sciences and arts...connected with the common purposes of life’ is significant. In a remarkable inversion of the colonial ethos, he added:

Is it not owing to the power which knowledge has given to the people of so small and so distant a country as England that they have [been] enabled to conquer and keep possession of these vast territories far more congenial to the prosperity of human race than the *sterile* soil of England? Why is it thought the most extravagant dream to suppose that *India should ever conquer England*?²⁴

Ramchandra, on the other hand, offered a fourfold religio-political explanation for the Westerner’s superiority: (1) They fought for the liberation of Jerusalem from the Muslims and in the process learnt many things from Islam. (2) The Turkish invasion of Rome, which resulted in the exodus of intellectuals and their settlement in Western Europe. (3) The discovery of America by Columbus, which led to the process of colonization. (4) The liberation of Europe from papal authority.²⁵

Jambhekar died early in 1846; Ramchandra had a longer and more eventful life in which he embraced Christianity, joined the British forces and narrowly escaped the ‘Mutiny’ in 1857. Once the rebellion was crushed, the ‘loyalists’ were rewarded. Ramchandra clearly felt that these rewards were unfairly apportioned. He submitted to his government: ‘The reward of two thousand and three hundred Rupees bestowed on me is very much less than that bestowed on Moulvee Rajjub Ali of Jugraon and Lalla Nuthmull of Delhi for their good services during the outbreak.’ It seemed his pro-English stance was a liability.

21 S. R. Kidwai, *Master Ramchandra*, Delhi, 1963, 57.

22 *Bombay Durpan*, 13 July 1832.

23 *Bombay Durpan*, 24 August 1832.

24 *Bombay Durpan*, 24 August 1832 (emphasis added).

25 S. Irfan Habib and Dhruv Raina, ‘The introduction of scientific rationality into India: a study of Master Ramchandra’, *Annals of Science* (1989), 46, 597–610.

It is said by some that Christians could not but be loyal to the English Government, and that therefore they hardly deserved any reward. To this I beg to reply that the rebels considered all loyal natives, whether Hindoo or Mohamedans, just as Christians themselves, and were ready to destroy them. No doubt loyal Hindoo and Mahomedans had the advantage of *outwardly* speaking against the English and *inwardly* wishing them well, and *this no conscientious and true Christian could ever do*. All the loyal Hindoos and Mahomedans were those who were happy under the English Government, and who were ruined or in danger of being ruined under the anarchy of rebellion. Besides Newspapers tell us that Europeans have been rewarded with lands in Oude for their good services during the outbreak.²⁶

The government did not budge and Ramchandra apparently felt let down. This pioneer of the so-called 'Delhi Renaissance' obviously had a poor understanding of colonialism. This, however, should not deflect us from the value of his mathematical enterprise and popular articles on scientific subjects. The colonial lures and constraints were formidable. Anti-colonial consciousness could 'flower' only in the last quarter of the nineteenth century.²⁷

Similar ambivalence can be seen in the speeches of S. C. G. Chuckerbutty (1824–74), who was one of the first Indians to be sent to England for a higher medical degree in 1845, and later the first Indian successfully to compete in the coveted Indian Medical Service. Like Master Ramchandra, he embraced Christianity and was very perturbed over the events of 1857. He called it a war of 'ignorance and fanaticism against knowledge and religious toleration, a war in which the educated native has as great a stake as any European in this country'. He invoked the progressive qualities of science:

Already the light of science is beginning to produce its purifying and elevating effects. Already the little community of educated natives is heaving with swelling thoughts and noble aspiration... Already the champions of darkness have taken the alarm, and are waging a mortal struggle against civilization but the votaries of knowledge have caught them by their throats... The battle is as good as won.²⁸

Chuckerbutty noted with satisfaction that only two or three native doctors had joined the rebellion. But his loyalty did not mean a complete surrender. He resented the fact that the Medical Faculty of Calcutta University represented 'only European opinions and interests', and ignored 'the *national* element'. 'And so long as this state of things continues it [medical education] will remain an exotic instead of being naturalized and respected among the people. It should not have one principle for the European and another principle for the native.'²⁹ He sensed and suffered discrimination but could not do much about it. It was left to J. C. Bose to fight the discriminatory service rules about three decades later.

The most important characteristic of mid-nineteenth-century Indian thinking was an unprecedented emphasis on cultural synthesis. Akshay Kumar Dutt, a contemporary

26 *Home, Education*, 2, 5 November 1862, National Archives of India (emphasis added).

27 Writing in an Egyptian journal, *al Hilal*, on the Indian uprising of 1857, Jurji Zaydan wrote that the Indian revolt against colonialism had failed because India had not yet reached the historical state in its development that made possible an independent political life. The Indian people had not acquired a knowledge of science and administration. Quoted from Timothy Mitchell, *Colonising Egypt*, Cambridge, 1988, 169.

28 S. C. G. Chuckerbutty, 'Lecture on defence of native education (8th July 1858)', *Popular Lectures on Subjects of Indian Interest*, Calcutta, 1870, 81–2.

29 S. C. G. Chuckerbutty, 'Lecture on the necessity of forming a Medical Association in Bengal (May 27, 1863)', in Chuckerbutty, *op. cit.* (28), 135 (emphasis added).

crusader, worked for 'Indianising Western science'. Numerous journals of the period (like *Samvad Prabhakara*, *Tatva Bodhini* and *Vividharta Samgraha*) claimed the same objective. The idea of a cultural synthesis gave them the best of both worlds. First it enabled them to absorb culture-shock and also promised a possible opportunity to transcend the barriers imposed by colonialism. Moreover, it also fitted well with the dominant Hindu doctrine of epistemological pluralism.³⁰ So the clamour for cultural synthesis grew. Bacon and Comte impressed the Indian mind. But how to integrate their experimental method and rationality into the Hindu 'science of spirit'? This, local thinkers were not clear about. They pursued a great variety of strategies – imitation, translation, assimilation, 'distanced' appreciation, and even retreat to isolation – but without much success. The search for synthesis remained elusive, yet it did accelerate the quest for identity.

COMING TO GRIPS

During 1860–80 a number of cultural essayists tried to articulate modern scientific rationality in terms of indigenous traditions and requirements. Bankimchandra, a Bengali novelist of high intellect and repute, for instance, wrote on *Vijnan Rahasya* (Secrets of Science), which appeared in *Banga Darshan* during 1865–70. With the help of John Tyndall's *Dust and Disease* he wrote *Dhula*, and T. H. Huxley's *Lay Sermons* was utilized in *Jaivonik*.³¹ There are a number of direct references to Comte in his literary as well as discursive writings (for example *Debi Chaudhurani* and *Dharmatattva*).³² These forays sometimes led Bankimchandra to return to certain ancient theological concepts. In 1873 he rejected the Hindu concept of Trinity as an aberration, but in 1875 he found it close to Darwin's theory of natural selection. Hindu spiritualism finally sucked up many who ventured to travel outside its orbit.

Islamic progressives faced a similar situation and fared worse. In 1877 one Maulvi Ubaidullah wrote:

The Mahomedans with their philosophy are exactly in the position of the schoolmen of Europe, that is they have travelled half way towards *actual* civilization: consequently when the modern reformed philosophy of Europe once gains an entrance to their minds, they will be able to make more rapid progress than their neighbour Hindoos. Among us a *Newtonized* Avicenna or a *Copernicized* Averroes may spring up, who may be able to criticise even sons of Sina and Rushd.³³

This lure of inching towards 'actual civilization' and the hope of producing 'a Newtonized Avicenna or a Copernicized Averroes' present a curious mix of both self-criticism and a yearning for change (and also a hope perhaps yet to be realized). Equally

30 Bhikhu Parekh, *Colonialism, Tradition and Reform*, New Delhi, 1989, 61.

31 B. Bhattacharya, *Banga Sahitya Vijnan*, Calcutta, 1960 (in Bengali), 351. Bhartendu Harishchandra, a very influential Hindi laureate, was also impressed by the developments in machinery and he associated them with a certain kind of attitude and behaviour. Krishna Kumar, *Political Agenda of Education: A Study of Colonialist and Nationalist Ideas*, New Delhi, 1991, 151.

32 Ranajit Guha, *A Construction of Humanism in Colonial India*, The Wertheim Lecture, Centre for Asian Studies, Amsterdam, CASA Monographs, Amsterdam, 1993.

33 Maulvi Ubaidullah, *Essay on the Possible Influence of European Learning on the Mahomedan Mind in India*, Calcutta, 1877, 47 (emphasis added).

explicit was the desire 'to make more rapid progress than their neighbour Hindoos'. At a deeper psycho-social level, one may notice in these efforts an element of 'social neurosis', so powerful was the force of tradition and the momentum of the encounter.³⁴

Two things are striking in any account of this period. First, it was an age of translations. The numerous school-book societies and the scientific societies (Aligarh and Bihar, for example) were basically translation societies. Translations, no doubt, were very important and must have helped popularize certain scientific notions. But a major lacuna was that they were not accompanied, except in one or two cases, by any research. They remained mere translations, secondary, superficial and of limited value. In earlier transfers of knowledge, for example from Greek to Arabic, research 'preceded' or at least accompanied translations. This was not so with 'colonial transfers', at least in the case of India. It was at best a 'trial' transfer and in this sense one could speak of the disintegration, not of the integration, of knowledge.³⁵ Yet the penchant for translations must have done some good. Following Ballantyne's efforts,³⁶ Rajendralal Mitra (the most active Indian member of the Asiatic Society) prepared 'a scheme for rendering European scientific terms in the vernacular'. In the vernaculars of India 'untrammelled by any existing scientific literature' he could see the possibility 'to secure something thoroughly national and perfect'.³⁷ With limited and defective means, his intentions, however sound, were to remain utopian.

The second important aspect, of course, is the magnetic pull of tradition. In a subtle way the colonizers themselves promoted this by heaping occasional praises on 'the spirit of the East', and 'the Hindu Technology of Contemplation', etc. The Indians were shown as a superior civilization in spiritual matters. This was some, though poor, compensation for the loss of sovereignty. Indians themselves seemed to enjoy this distinction and it seems that Max Muller was discussed more than Charles Darwin. The positivists and the Brahmos emphasized the importance of reason and observation, though their reason was not without God and was mixed with a heavy dose of moral and spiritual teaching. In any case, modern science was not seen as an alien import. Darwinism, for instance, was imported readily and the theological issues at its heart did not cause a ripple in India. The new paradigms in science were quickly accepted and numerous popular articles traced the seeds of modern advancements in ancient texts. How to characterize such arguments? Were they exercises in revivalism or revitalization; cultural self-defence or self-assertion? It was perhaps a combination of both – a delicate balancing act which promised a semblance of identity in an age of intellectual torpor and crisis.

The theme of the identity of the colonized on its own terms (that is, away from what the colonizers thought about or dictated) also contained the seeds of decolonization. An imperial rationalist discourse showed Indians how rationalism could be turned against the Europeans themselves. Rationalism was seen as something inherent in human nature rather than a European 'speciality', and as a mark of progress independent from Europeanization.

34 Tapan Raychaudury, *Europe Reconsidered*, Delhi, 1988, 10.

35 Roshdi Rashed, 'Problems of integration', in *Science and Empires* (ed. P. Petitjean *et al.*), Dordrecht, 1992, 76–7.

36 J. R. Ballantyne, *A Discourse on Translation*, Mirzapur, 1855.

37 Rajendralal Mitra, *A Scheme for Rendering of European Scientific Terms in the Vernaculars of India*, Calcutta, 1877, 1–2.

Gradually colonialism came to be viewed as a cultural invasion of space, to be ended, neutralized and rolled back.³⁸

One of the first to realize the necessity of re-articulating science in national terms was Mahendra Lal Sircar (1833–1904). In 1869 he wrote an article 'On the desirability of a national institution for the cultivation of sciences by the natives of India'. This title is extremely significant. He argued against the prevailing contention that the Hindu mind was metaphysical, and called for the cultivation of the sciences by 'original' research. He wrote, 'We want an Institution which will combine the character, the scope and objects of the Royal Institution of London and of the British Association for the Advancement of Science', and then added, 'I want freedom for this Institution. I want it to be entirely under our own management and control. I want it to be *solely native* and *purely national*.'³⁹ In April 1875, Bharatvarshiya Vigyan Sabha (an all-India Science Society) was formed. Its objects were: (1) to discuss science as a subject by instituting a Society at Calcutta, which would have branches in other parts of India; and (2) to educate the people of India in various scientific subjects and to publish all the ancient Indian tracts relating to science.⁴⁰ In 1876, after a great deal of effort and controversy, the Indian Association for Cultivation of Science was inaugurated in Calcutta. This event was no less important than the establishment, nine years later, of the Indian National Congress, a political forum that was to spearhead the national movement. The Association was a cultural challenge and symbolized the determination of a hurt psyche to assert and stand on its own in an area that formed the kernel of Western superiority.

THE STRUGGLE CRYSTALLIZES

In the last decades of the nineteenth century, some of the individual 'native' scientists gathered sufficient strength to differ with their metropolitan peers and fight colonial bureaucracy. At Poona Science College, the physics teacher K. D. Naigamvala established an observatory through voluntary efforts, and, impressed with his zeal, and at the request of the Bombay government, the India Office in London sent him a spectroscope in 1888. However, Norman Lockyer, the Astronomer Royal (and founder-editor of *Nature*), intervened. He wanted the spectroscope to be installed at Dehra Dun under official control so that the solar observations could be sent to him directly. Naigamvala, on the other hand, proposed to publish the observations periodically and 'thus make them immediately available to all solar observers'. He informed the government that 'Mr. Lockyer is not a safe guide to follow and that the observations... ought to be carried out independently of South Kensington and should be published independently of Mr. Lockyer or any other observer.'⁴¹ This courage speaks of the changing times.

For J. C. Bose (1858–1937), a creative physicist, it was a lifelong struggle and a multi-pronged fight against his scientific peers abroad for recognition, the colonial bureaucracy

38 Sudipta Kaviraj, 'On the construction of colonial power', in *Contesting Colonial Hegemony* (ed. D. Engels and S. Marks), London, 1994, 19–53.

39 Quoted in *A Century: Indian Association for the Cultivation in Science*, Calcutta, 1976, 5, plate 6 (emphasis added).

40 Bhattacharya, op. cit. (31), 144–5 n31.

41 Maharashtra State Archive, Education, vol. 26, 1891, file 270.

for fair treatment and facilities, and, to a lesser extent, his own scientific compatriots. During 1895–1900 Bose gradually shifted from physics to plant physiology – an area then dominated by vitalists, who believed in the assumption of a ‘vital force’ permeating physical life. Bose tried to prove that plant responses are determined ‘not by the play of an unknowable and arbitrary vital force’, but by the working of certain physico-chemical laws ‘that know no change, acting equally and uniformly throughout the organic and the inorganic worlds’.⁴² This was not liked by the ‘vitalists’, especially John Burdon-Sanderson of Oxford. For this reason the paper that Bose had presented at the Royal Society on 6 June 1901 was shelved in the Society’s archives. Bose sought an extension of his overseas deputation to vindicate his stand. The expert whom the India Office consulted refused, and it was at the personal intervention of the Secretary of State that his stay in England could be extended. Then he worked at the Royal Institution laboratory for a year, and in February 1902 the Linnean Society accepted his findings with unanimous applause. Meanwhile, a physicist who had seen Bose’s experiments before the Royal Society, claimed precedence over them. A shocked Bose asked for an inquiry, which finally upheld his right to absolute priority over the theory of molecular stretch and strain.⁴³

Doubts, nevertheless, continued even after two decades. As Bose confided to his friend and biographer, Patrick Geddes:

You thought I had no more enemies left! But they have raised their head once more, and taking unfair means to misrepresent. They have joined forces to show that there is no nervous impulse in plants. In answer, I have carried out some startling experiments which show that not only is there a nervous impulse, but that in certain plants at least, a very high degree of complexity of nervous system is attained... The paper is sent to the Royal Society where the old gang is trying to suppress it! But they won’t succeed... It is curious that the Continental scientific workers are more up to date than English.⁴⁴

As regards the possibility of getting a Nobel Prize, Bose candidly admitted: ‘I am after all a stranger and things of this description [are] taken up by people who have personal friendship for you. I have a good number in the Royal Society who have kind regard for me, that is all. On the other hand there are a few who like Walles have [a] personal grudge, and these few can be more effective than the others.’⁴⁵

The colonial bureaucracy, moreover, had its own discriminatory rules that affected Bose. Indian professors were given only two-thirds of the salary of their European counterparts, even though they had the same designation and similar qualifications. Bose resented this and refused to accept a salary for three years in protest. His action had a nation-wide impact. A Kannada weekly (*The Karnataka Prakasika*, 18 January 1897) wrote, ‘What an irony! Fair science frowns not on his Indian birth, but the Anglo-Indian Government does’.⁴⁶ But the bureaucracy would not relent. On Bose’s petition, the Finance Member of the Viceroy’s Council noted, ‘I think Mr. Bose has got his head a bit turned, and he can

42 J. C. Bose, *Response in the Living and Non-living*, London, 1902, 189–90.

43 *Modern Review*, December 1915, 694.

44 J. C. Bose to P. Geddes, 15 January 1924, Geddes papers, MSS 10576, fols. 132–3, National Library of Scotland, Edinburgh (hereafter Geddes Papers). Punctuation and spelling are as in the original.

45 J. C. Bose to Geddes, 6 March 1918, Geddes Papers, fol. 40.

46 *Native Newspaper Report*, Madras, 1897, 14.

wait a bit for his distinctions and rewards.⁴⁷ Later, in 1903, after a knighthood and other honours, Bose was admitted to the European scale of pay.⁴⁸ He raised the issue of limitations in the employment of non-Europeans before the Royal Public Services Commission in 1913. In 1917 Bose set up an autonomous research institute in Calcutta through voluntary donations to which the Secretary of State added a permanent grant from the imperial revenue in 1921. Soon Bose found that 'Messers Sharp Co. [of Education Department] and all the reactionary members of Government of India, combined to defy the secretary of state.' His pay and the grant were withheld, and he faced 'the prospect of closing the institute'. Yet he assured Geddes, 'the lion though in a net is not dead yet! Don't worry.'⁴⁹

The third set of difficulties, though presumably of a limited nature, came from his own Indian colleagues. The sources are not very clear on this issue. But it appears that his relations with Asutosh Mukherjee, the prominent vice-chancellor of Calcutta University and mathematician, were strained, especially when Bose was trying to build a separate research institute. Again he wrote to Geddes 'you know that Brahmanism and priestcraft are not unknown in English science. The evil is far more accentuated here [in India] where the number of scientific men are few, and where wire-pullers have succeeded in securing positions of authority.'⁵⁰ A few months later he wrote, 'as regards government, they told us that if people stood by me, they would give land and building. Our friend Asutosh has been manipulating, and now government wrote that since people are coming forward with their lacs (!) why should I not buy the land myself!'⁵¹ After the Bose Institute was established he informed Geddes, 'Sir A [Ashutosh Mukherjee?] never forgets, he is bidding his time. He has suffered defeat, but he will wait and set his evil spirits. All these things make me hesitate one way or another.'⁵²

This confession of hesitancy is important, and speaks of the enormous difficulties an Indian pioneer faced on several counts. The cultural and administrative problems that Bose had to deal with were real and pressing.⁵³ In the process he was appreciated and vilified simultaneously. And as the tide of mass nationalism grew, his early role in finding a scientific identity for his country diminished in value. This is evident in the anguish with which his wife, Abala Bose, wrote in 1920:

There is a feeling in India among the extremists that my husband is too fond of government patronage. You know that it is not true. My husband is the one who has made the government to recognise and respect an Indian. He is too full of self-respect... I do not care what the extremists

47 Note by J. Westland, 7 September 1897, on *Home, Education*, Nos. 25–28, November 1897, A. National Archives of India.

48 *Home, Education*, Nos. 49–50, October 1903, A. National Archives of India.

49 J. C. Bose to Geddes, 14 March 1921, Geddes Papers, fols. 68–9.

50 J. C. Bose to Geddes, 24 January 1917, Geddes Papers, fol. 2.

51 J. C. Bose to Geddes, 20 October 1917, Geddes Papers, fol. 14.

52 J. C. Bose to Geddes, 11 February 1918, Geddes Papers, fol. 31.

53 Some time ago, Ashis Nandy made a comparative study of J. C. Bose and Ramanujan (a 'native-intuitive' mathematician). See Ashis Nandy, *Alternative Science*, New Delhi, 1980. He felt that Bose (unlike Ramanujan) with 'his subtle intellectual antennae could at least manipulate his way through'. But in a later publication Nandy revised his opinion and stated that Bose was equally vulnerable. 'As he negotiated his way through the ruthless world of modern science, he had to cope with the hostility which the liminal man always arouses as opposed to the proper alien'. Nandy, *op. cit.* (1), 103.

think but I should like the nation to know [that] he has struggled hard to keep his independence and how India has been made known and respected to the world both by Tagore and my husband.⁵⁴

A far more courageous and socially conscious scientist was Prafulla Chandra Ray (1861–1944), a chemist and teacher of great repute and standing. As early as 1885, while on a Gilchrist scholarship at Edinburgh, Ray published a pamphlet, *India: Before and After the Mutiny*, in which he asked, ‘Is there no golden mean between stubborn denial... and humiliating surrender?’ Earlier, Pramatha Nath Bose, who had received another Gilchrist scholarship to study geology in London, used to participate in political meetings and often criticized the government. On their return, both showed concern for the poor state of affairs in their country; both demanded a comprehensive techno-scientific education and later worked for industrial upliftment. Their deep national commitments made them look into the causes for degeneration and both turned to an internal inquiry that was historical in character but contemporary in concern. In 1896 P. N. Bose published *A History of Hindu Civilization*, in which he traced the decay of the Hindu civilization from the establishment of ‘the Mahomedan Empire’. Later he added, ‘But the Muslim conquest was by no means the sole cause of the decline of the Hindu civilization. It carried the germs of its decay within it.’⁵⁶

Meanwhile Ray became interested in exploring the character of chemical practices in India since antiquity, and in 1902 published *A History of Hindu Chemistry*. He was the first to pin-point and examine factors external to science. The cognitive development of chemical science *per se* was straightforward in his opinion. But he saw in the caste structure a ruinous separation of theory from practice – of mental work from manual work. He severely criticized the Brahmanical tradition.⁵⁷ Then, in 1909 he wrote in Bengali an essay titled *Banglar Mastishaka O Tahar Apavyavahar* (Bengali Brain and its Misuse). Perhaps Bacon was not half so contemptuous of the scholastics as Ray was of the medieval logicians of Bengal.⁵⁸ Though both Bose and Ray made frequent use of the term ‘Hindu’, its connotations were then different from those it came to acquire during the 1940s and afterwards.

DIALECTICS OF THE DEBATE

An increasingly frequent recourse to the notions of rationality and science characterizes the entire spectrum of ‘native’ discourse. This yearning for change and progress without snapping genetic ties with the past is reflected in almost all discursive writings, whether journalistic, literary,⁵⁹ or political. In fact, during the period 1860–1920 the lines between

54 Abala Bose to Geddes, 8 January 1920, Geddes Papers, fols. 60–1.

55 While at Edinburgh, P. C. Ray published two tracts: *India Before and After the Mutiny*, 1885, and *Essay on India*, 1886.

56 P. N. Bose, *Essays and Lectures on the Industrial Development of India*, Calcutta, 1906, 141.

57 P. C. Ray, *History of Hindu Chemistry*, 2 vols., Calcutta, 1909, ii, 195.

58 R. K. Dasgupta, ‘Acharya Ray as a man of letters’, *Acharya Prafulla Chandra Ray Birth Centenary Volume*, Calcutta, 1962, 140–7.

59 For a superbly crafted study of the *littérateur’s* perception of tradition, modernity and colonialism issues, see Sudhir Chandra, *The Oppressive Present: Literature and Social Consciousness in Colonial India*, Delhi, 1992.

philosophical or literary and journalistic or political writings were thin. Similarly the lines between science and technology were fuzzy. These terms were used interchangeably and the forum for voicing 'scientific' demands was mostly of a public (non-scientific?) nature. So the science that developed outside the narrow official circles of a colony bore the constraints of the prevailing socio-economic conditions more explicitly than, say, the science of the metropolis. The 'native' scientists were thus quick to perceive and later exhibit the spirit of counter-hegemony. In this they had the full support of the native press and the people. In 1885, when science education had barely begun, a letter-writer in the *Statesman* wanted to see in India such scientists who 'shall rival European thinkers and investigators'. If the universities and their degree-holders failed to ensure this, 'the robe and the hood in such a case resemble only the cerements of a dead body, and the fancied immortalities of university honours become the drunk asphodels of scientific death'.⁶⁰ Later, when Curzon tried to scuttle J. N. Tata's plan for an Indian University of Research, the native press was unanimous in its condemnation. As a Kannada weekly wrote, 'In India Lord Curzon has thought fit to discourage higher education lest the people should get a scientific education and thereby come in the way of the English exploiters of the country.'⁶¹ The native press was equally harsh on the native princes who 'exhaust their resources for the sake of empty titles by subscribing lots of money to purposes by which Englishmen alone are benefited'.⁶²

The pressure intensified during the Swadeshi movement. The Swadeshi ideas of 1905 symbolized the determination of the people in two fields: first, the promotion of 'education along national lines and under national control', with special emphasis on the exact sciences and technology, and secondly, the industrialization of the country and material advancement.⁶³ Early colonizers had made full use of their self-proclaimed epistemological superiority and growing technological prowess for colonial expansion. Similar strategies now became part of the nationalist agenda. Hindu contributions to 'exact, positive and material culture' were shown to be the same 'as those of the Greeks, in quality, quantity and variety'.⁶⁴ Similar views were aired and demands raised in several political and other public forums. Scientists and medical men took part in the deliberations of the Indian National Congress; and from 1888 resolutions on medical, scientific and industrial issues were repeatedly adopted.⁶⁵ Social and cultural reformers showed rather greater concern. Swami Dayanand (the founder of the Arya Samaj movement) believed that science

60 Letter to the Editor, *Statesman*, 26 August 1885.

61 'The Vrittanta Chintamani', 20 July 1904, in *Native Newspaper Report*, Madras, 1904, 260.

62 'The Vijayadhwa', 3 August 1887, in *Native Newspaper Report*, Madras, 1887, 141. Another Kannada weekly, the *Mysore Vrittanta Bodhini* (28 May 1887) cited the example of the Maharaja of Darbhanga who 'subscribed Rs. 50,000 to the Imperial Institute Fund and Rs. 5000 to the Prince of Wales Testimonial Fund', and asked, 'how could our native princes obtain such titles as C.I.E., K.C.S.I., etc. if not by wasting large sums on such objects?' *ibid.*, 97. The Imperial Institute, established in London in 1885 to carry out scientific investigations for India and other colonies, was not popular with British scientists either. William Thiselton-Dyer (Director, Royal Botanic Gardens, Kew) called this Institute 'a second rate local club with rather Bohemian proclivities'. Dyer to G. C. M. Birdwood, 25 December 1893, Birdwood Papers, India Office Records MSS. Eur. F216/49.

63 B. K. Sarkar, *Creative India*, Lahore, 1937, 625.

64 B. K. Sarkar, *Hindu Achievements in Exact Sciences*, New York, 1918.

65 A. M. Zaidi (ed.), *The Encyclopaedia of the India National Congress*, 6 vols., New Delhi, 1978, ii, 163, 406; iv, 100, 144-6, 251.

vindicated Vedic Knowledge and not semitic beliefs. Vivekanand borrowed scientific terms to expound his views and dispute Christian claims to superior rationality. For Bankim Chandra science was central to his reconstruction of Hinduism.⁶⁶ The notions of science and its terminologies entered so deep in the political and cultural lexicon of the country that no politician or social reformer could afford to ignore them. Writing on nationalism, Rabindra Nath Tagore (a Nobel laureate and perhaps the most influential literary figure in the country) called government ‘an applied science... it is like a hydraulic press, whose pressure is impersonal, and on that account completely effective’. And ‘power’ appeared to him as ‘a scientific product made in the political laboratory of the Nation’.⁶⁷

Another interesting characteristic of the period is the cautious yet firm approach towards industrialization. In industrialization lay salvation, they believed: but it was also thought necessary to avoid the pitfalls of blind imitation and crude industrialization. Efforts were to be made not to lose human, nay Indian, face. The colonizers had talked about moral regeneration for a long time. This, the nationalists viewed as propagandist in nature. Instead, they dwelt upon a ‘synthetical’ economic and industrial regeneration. This regeneration was not to be achieved at the cost of peasants and artisans. Whether it was the *Dawn Society Magazine* of Calcutta or the *Kayastha Samachar* (later the *Hindustan Review*) of Allahabad, or the *Swadeshmitran* of Madras, the tenor was the same – industrialization was in the national interest and should be conducted on national terms. Indian values were a constant refrain, from the writings of Mahendra Lal Sircar to those of Rabindra Nath Tagore. Benoy Kumar Sarkar, an important interlocutor of the period, used interesting terms like ‘mistrification’ and ‘factorification’ (*mistri* refers to technicians).⁶⁸ The importance of artisans and technicians was thus brought into focus. The demand for chemical industries was ably advocated and pushed by scientists like P. C. Ray. All this had been preceded by a vociferous demand for techno-scientific education. There was to be no diminution in that. Rather the new argument was that science should be taught in a scientific way and not by the literary method.⁶⁹ The overall picture that emerges is of an all-embracing ‘socio-cultural transformation’. *Suraj* (good rule, which many genuinely believed the British provided) was to be replaced by *Swaraj* (self-rule) which, coupled with *Swadeshi* (self-reliance), constituted a *Weltanschauung* powerful enough to transcend the barrier imposed by colonial rule. The process of decolonization was thus more than a political process. As Habib puts it, it contained within it the development of an alternative developmental philosophy.⁷⁰

One serious limitation in this process of self-discovery was the constant harping on the distant past. Revivalist streaks were definitely there, and they played an important role in constituting and arousing social consciousness in colonial India.⁷¹ They may not have been very dominant at times but they remained latent throughout. Science popularizers and

66 L. E. L. Thistlethwayte, ‘The role of science in the Hindu-Christian encounter’, *Indo-British Review*, 19, 73–82.

67 Rabindra Nath Tagore, *Nationalism*, London, 1921, 11–17.

68 B. K. Sarkar, *Education for Industrialisation*, Calcutta, 1946, 3.

69 R. D. Patel, *The Claims of Science in National Life*, Surat, 1921, p. ix.

70 S. Irfan Habib, ‘Science, technical education and industrialisation: contours of a Bhadrakol debate, 1890–1915’, in *Technology and the Raj* (ed. Roy MacLeod and Deepak Kumar), Delhi, 1995, 235–49.

71 Chandra, op. cit. (59), 64.

cultural essayists, even established scientists, could not remain immune to them. In this regard J. C. Bose coined a Sanskrit name *Tejometer* for his famous ‘coherer’ (*tej* means radiation). Such names did not stick but it was an attempt to show a certain Indian distinctiveness.

As the national aspirations passed into the phase of Swadeshi, a ‘truly’ national identity was sought. Ray talked of the ‘tangled skein of India’s culture’ to which different social and religious groups had contributed in their own way. He did not consider the term ‘national’ as synonymous with ‘the boycott of western civilization’ and a return to tradition ‘with unthinking veneration’. ‘Not in isolation, rigid and exclusive, but in native intercourse with the modern progressive world does our own progress lie’, he prophesied.⁷² The real difficulty lay in determining what constituted progress and how to progress. With Gandhi fast emerging on the political scene, the debate was to become far more intense, sharp and divided in the years that followed. Gandhi was to dismiss the modernizing role attributed to colonialism.

One thing is obvious. The dialogue was conditioned by external considerations; it had no primordial affinity with Western learning. Mostly these external considerations were interventions from above to mobilize people or to elicit consent, not really in a Gramscian sense, but definitely related to the power-equation of the time. ‘Native’ interlocutors had to tread warily through a double text – one internal, the other alien. This resulted sometimes in cultural reassertions, sometimes in restricted appropriation. The Indian quest for identity was born and reared in this ambivalence.

72 P. C. Ray, *Convocation Address at Jamia Millia Islamia*, Aligarh, 1923, 34–48. It is significant that this address ended with *Bande Mataram* (an invocation to the motherland with a supposedly Hindu bias).