THE QUEST FOR IDENTITY IN SCIENCE AND THE SEEDS OF DECOLONISATION: INDIA 1860-1920

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Colonisation entailed a massive cultural encounter which influenced profoundly the cognitive and material existence of both the coloniser and the colonised. In this encounter the role and place of rationality, science and technology has several fascinating aspects. The Indian society claimed a living tradition and a vibrant culture and yet it found itself caught in a web. The encounter was initially disturbing, even agonising; gradually the relations stabilised and the recipients started to examine what was living and what was dead in their system, and under the new circumstances what to accept and what not. In the midst of complete subjugation, a quest for identity had begun. In this quest were hidden the seeds of decolonisation. In the very process of empowerment one can also see the possibilities of disempowerment. The colonial process was self-destructive in this sense at least.

The question of identity was important for a colonised society and it subdued psyche in the same way as the feeling of superiority and invincibility was for the colonisers. The retrieval of this seemingly lost identity was a precondition for regaining the lost sovereignty. The paper begins by outlining the early phase of this endeavour and then concentrates on the events and instances occurring during 1890-1920. They are drawn from the professional and personal experiences of certain Indian scientists and from the views of certain cultural interlocutors.

A "Colonial" Renaissance

In order to establish their complete supremacy, the colonisers had first to dethrone and delegitimise 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 is how was born the so-called Bengal Renaissance (1). 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. It may not be very difficult (though not strictly proper) to spot in

their works "an anti-colonial consciousness" or "struggle" in some form, but this would appear plausible only when their complicity in the colonial project is diluted or withdrawn. Their "renaissance" was a "colonial renaissance" and cannot be understood without reference to the colonial parameters and structures. The two were simultaneous, and not unconnected, experiences (2).

Yet the urge to comprehend modern knowledge and tools which the colonisers had brought and to assimilate them was definitely there. This urge came from within, and the acculturative influence of European thought and Christian liberalism had strengthened it. The new interlocutors did put a premium on the alien rule, in a sense idolised it and supported "downward filtration". They had to do this 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 had little in their armoury. The new exposure had made their weaknesses and faults even more glaring. The colonial state naturally took every possible advantage. In face of an unprecedented cultural onslaught, the new pioneers were dazed, if not bewildered. They experienced a dual alienation (a la Cabral) from the traditional and later from the colonial life and system (3). They could to some extent anticipate the distortions the colonial medium was likely to produce. But the realisation was slow and diffident. Perhaps this explains why Rammohun Roy (1772-1833, Calcutta) looked to both *Vedanta* and the West (4); Vidyasagar (1820-1891, Calcutta), an admirer of western knowledge, wanted the Indian students to study their "false system" also (5); Bal Shastri Jambhekar (1802-46 Bombay) commenced his science popularisation activities in Marathi and English both (6); and Master Ramchandra (1821-1880, Delhi) began his mathematical "Treatise" from a twelfth century Indian text, Bhaskara's *Bij-Ganita* (7) The soil was being prepared for cross-fertilisation, and the seed was a cross-breed.

The most important characteristic of the mid-nineteenth century Indian thinking was an unprecedented emphasis on cultural synthesis. Akshay Kumar Dutt, a contemporary 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 the 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 (8). 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 they were not clear about. They pursued a great variety of strategies – imitation, translation, assimilation, "distanced" appreciation, and even retreat to isolation – but not with much success. The search for synthesis remained elusive but it did accelerate the quest for identity.

Coming to Grips

During 1860-80 a number of cultural essayists appeared who tried to articulate modern scientific rationality in terms of indigenous traditions and requirements. Bankimchandra, a Bengali novelist of high intellect and repute, wrote on *Vijnan Rahasya*

(*Secrets of science*) which appeared in *Banga Darshan* during 1865-70. With the help of Tyndall's "Dust and Disease" he wrote *Dhula* and Huxley's "Lay Sermons" was utilised in *Jaivonik* (9). There are a number of direct references to Comte in his literary as well as discursive writings (e.g. *Debi Chandhurani* and *Dharmatattva*) (10). These forays sometimes led him to return to certain ancient theological concepts. In 1873 he had rejected the Hindu concept of Trinity as an aberration but in 1875 he found it closer to Darwin's theory of natural selection! Hindu spritualism 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 school-men 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". (11)*

This lure of inching towards "actual civilisation" 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 realised). Equally explicit was the desire "to make more rapid progress than their neighbour Hindoos". At a deeper psycho-social level, one may note in these efforts an element of "social neurosis" (12). So powerful was the force of tradition and the momentum of the encounter.

Two things strike most in any account of this period. First, it was an age of translations. The numerous school-book societies and the scientific societies (of Aligarh and Bihar, for example) were basically translation societies. Translations no doubt were very important and must have helped popularise certain scientific notions. But its major lacunae was that it was not accompanied, except in one or two cases, by any research. They remained mere translations, secondary, superificial and of limited value. In earlier transfers of knowledge, for example from Greek to Arabic and so forth, research "preceded" or at least accompanied translations. This was not so with "colonial transfers". It was at best a "trial" transfer and in this sense one could speak of disintegration, not of integration of knowledge (13).

The second important aspect, of course, is the magnetic pull of tradition. In a subtle way the colonisers themselves promoted it by heaping occasional praises on "the Spirit of the East", and "the Hindu Technology of Contemplation", etc. The Indians were shown as a superior civilisation in spiritual matters. This was some, though poor, compensation for the loss of sovereignty. Indians themselves seemed to enjoy this distinction and Max Muller was discussed more than Charles Darwin. The positivists and the Brahmos emphasised the importance of reason and observation, though their reason was not without God and was mixed with a heavy dose of moral and spritual teaching. In any case, modern science was not seen as an alien import. Darwinism 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 characterise such arguments? Were they exercises in revivalism or revitalisation; cultural self-defence or self-assertion? It was perhaps a combination of both – a delicate balancing act which promised them a semblance of identity in an age of intellectual torpor and crisis.

The idea of the identity of the colonised on its own terms (i.e. away from what the colonisers thought about or dictated) had an interesting consequence. It contained the seeds of decolonisation. The imperial rationalist discourse gave Indians the idea of how the point of rationalism could be turned against the Europeans themselves. Rationalism was seen as something inherent in human nature rather than a European "speciality", and a mark of progress rather than Europeanisation. Gradually colonialism came to be viewed as a cultural invasion of space, to be ended, neutralised and rolled back (14).

One of the first to realise the necessity of a `scientific' response and to articulate 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 cultivation of 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 the Institution. I want it to be entirely under our own management and control. I want it to be *solely native* and *purely national*" (15). 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 which was to spearhead the national movement. The Association was a cultural challenge and symbolised the determination of a hurt psyche to assert and stand on its own in an area which formed the kernel of western superiority.

The Struggle Crystallises

By the last decade of the nineteenth century, some of the individual "native" scientists had gathered sufficient strength to differ with their metropolitan peers and fight the colonial bureaucracy. At Poona Science College, its physics teacher K.D. Naigamvala had established an observatory through voluntary efforts. Impressed with his zeal and at the request of Bombay Government, the India Office in London sent him a spectroscope in 1888. 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 and none else. 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" (16). This courage speaks of the changing times.

For J.C. Bose, a creative physicist (1858-1937), it was a life-long struggle and a multi-pronged fight against (1) his scientific peers abroad for recognition, (2) the colonial

bureaucracy for fair treatment and facilities, and (3), to a lesser extent, his own scientific compatriots. During 1895-1900 Bose gradually shifted from physics to plant-physiology – an area then dominated by the "vitalists" who believed in the assumption of a "vital force" permeating physical life. Bose tried to prove that responses are determind "not by the play of an unknowable and arbitrary vital force", but by the working of certain physiochemical laws "that know no change, acting equally and uniformly throughout the organic and the inorganic worlds" (17). This was not liked by the "vitalists", especially Professor Sanderson of Oxford. For this reason the paper which Bose had presented at the Royal Society on June 6, 1901 was shelved in the Society's archives. Bose sought extension of his deputation to vindicate his stand. The expert, whom the Indian 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 Feb. 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 (18). 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 curious that the Continental scientific workers are more uptodate than English... (19)*

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 personal grudge, and these few can be more effective than the others". (20)

The colonial bureaucracy had its own discriminatory rules which pinched Bose. Indian professors were given only two-thirds 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. This had a nation-wide impact. A Kannada weekly (*The Karnataka Prakasika*, Jan. 18, 1897) wrote, "What an irony! Fair Science frowns not on his Indian birth, but the Anglo - Indian Government does" (21). 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 wait a bit for his distinctions and rewards" (22). Later in 1903, after knighthood and other honours, Bose was admitted to the European scale of pay (23). He raised the issue of `limitations in the employment of non-Europeans' before the Royal Public Serives 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 his friend, "the lion though in a net is not dead yet! Don't worry" (24).

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 Mukerjee, the esteemed vice-chancellor of Calcutta University and mathematician, were strained, especially when Bose was trying to build a separate reseach institute. Again to Geddes he wrote, "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 wirepullers have succeeded in securing positions of authority (25)". 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!" (26) After the Bose Institute is established he informs, "Sir A (Asuthosh Mukherjee?) never forgets, he is biding 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" (27).

This confession of "hesitancy" is important, and speaks of the enormous difficulties an Indian pioneer had to face on several counts. The cultural and administrative problems that Bose had to deal with were real and pressing (28). In the process he was appreciated and vilified simultaneously. 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 to their family friend:

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 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 (29).

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, he published a pamphlet, *India: Before and After the Mutiny*, in which he asked, "Is there no golden mean between stubborn denial... and humiliating surrender...? (30)" This was something unusual, but not without a precedent. Earlier Pramatha Nath Bose, who was on the same scholarship to study geology in London, used to participate in political meetings and often criticised the government. On 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 which 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 establish-

ment 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" (31). Meanwhile P. C. Ray got 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 fine. But he saw in the caste structure a ruinous separation of theory from practice – of mental work from manual work. He severely criticised the Brahmanical tradition (32). In 1909 he wrote in Bengali an essay titled *Banglar Mastishaka O Tahar Apawavahar* (Bengali Brain and its Misuse). Perhaps Bacon was not half so contemptuous of the scholastics as Prafulla Chandra of the medieval logicians of Bengal (33). Though both Bose and Ray made frequent use of the term "Hindu", its connotations were then different from what it came to acquire during the murky years of 1940s and afterwards.

Dialectics of the Debate

An increasingly frequent recourse to the notions of rationality and science characterises the entire spectrum of "native" discourse. This yearning for change and progress, without snapping the 'genetic' ties with the past, is reflected in almost all discursive writings, whether journalistic, literary (34), or political. In fact during the period 1860-1920, the lines between 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 were mostly of public (non-scientific?) nature. So the science that developed outside the narrow official circles in a colony bore the constraints of the prevailing socio-economic conditions more explicitly than, say, the science in the metropolis. The "native" scientists thus were quick to perceive and later exhibit the spirit of counter-hegemony. In this they had the full support of the native press and the public-minded people. In 1885, when science education had barely begun, a correspondent 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 immortalles of University honours become the dank asphodels of scientific death" (35). Later, when Curzon tried to scuttle J. N. Tata's plan for an Indian University of Research, the native press was unanimous in condemnation (36).

The pressure intensified during the *Swadeshi* movement. The *Swadeshi* ideas of 1905 symbolised the determination of the people in two fields; (1) the promotion of education along "national lines and under national control" with special emphasis on the exact sciences and technology, and (2) the industrialisation of the country and material advancement (37). Early colonisers had made full use of their self-proclaimed epistemological superiority and growing technological process for colonial expansion. Similar strategy now formed part of the nationalist agenda. The Hindu contributions to "exact, positive and material culture" were shown to be the same "as those of the Greeks, in quality, quantity, and variety" (38). Similar views were aired and demands raised in several political and other public forums. Scientists and medicalmen took part

in the deliberations of the Indian National Congress and right from 1888 resolutions were repeatedy adopted on medical, scientific and industrial issues (39). 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 completey effective". And "power" appeared to him as "a scientific product made in the political laboratory of the Nation" (40).

The second interesting characteristic of the period is the cautious yet firm approach towards industrialisation. In industrialistion lay salvation, they realised; but the caution lay in avoiding the pitfalls of blind imitation and crude industrialisation. The efforts were not to lose human, native, Indian face. Moral regeneration the colonisers had talked about for long. This the nationalists viewed as propagandist in nature. Instead they dwelt upon a "synthetical" economic and industrial regeneration. This regeneration was not to be at the cost of the peasants and artisans. Whether it be *The Dawn Society Magazine* of Calcutta or the *Kavastha Samachar* (later *Hindustan Review*) of Allahabad, or the *Swadeshmitran* of Madras, the tenor was the same industrialisation in national interest and on national terms. Indian values are a constant refrain right from the writings of Mahendra Lal Sircar to Rabindra Nath Tagore. Benoy Kumar Sarkar, an important interlocutor of the period, used interesting terms like "mistrification" and "factorification" (*mistri* refers to technicians) (41). 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 let-off in that. Rather the new argument was that science should be taught in a scientific way and not by the literary method (42). The overall picture that emerges is that 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 a colonial rule. The process of decolonization was thus more than a political process, it contained within it the development of "an alternate developmental philosophy" (43).

A serious limitation in this entire process of self-discovery was the constant harping on the past. Revivalist streaks were definitely there and they played an important role in constituting and arousing social-consciousness in colonial India (44). They may not be very dominant at times but latent they remained all through. What to say of science popularisers and cultural essayists, even established scientists could not remain immune to it. To his famous "coherer" J. C. Bose gave a Sanskrit name *Tejometer* (*Tej* means radiation). These names did not stick but this was an attempt to show certain distinctiveness.

As the national aspirations passed into the phase of *Swadeshi*, a "truly" national identity was sought to be achieved. P. C. 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 (45). The real difficulty lay in determining what constituted 'progress' and 'how' to progress. With Gandhi fast emerging on the scene, the debate was to be more intense. sharp and divided in the years to come.

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

NOTES

1) 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. Amalesh Tripathi, "Bengali Culture: the Nineteenth Century Renaissance", *The Sunday Statesman Miscellany*, Jan. 7, 1990, pp. 1-3.

2) Dipesh Chakrabarty, "The Colonial Context of the Bengal Renaissance", *Indian Economic and Social History Review*, I, March 1974, pp. 92-111.

3) K.N. Panikkar, "The Intellectual History of Colonial India: Some Historiographical and Conceptual Questions", in S. Bhattacharya and R. Thapar (eds.), *Situating Indian History*, Delhi, 1986, pp. 402-432.

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

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

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

7) Dhruv Raina, "Mathematical Foundations of a Cultural Project or Ramchandra's Treatise 'Through the Unsentimentalised Light of Mathematics", *Historia Mathematica*, 19, 1992, pp. 371-384.

8) Bhikhu Parekh, *Colonialism Tradition and Reform*, New Delhi, 1989, p. 61.

9) B. Bhattacharya, *Banga Sahitve Vijnan*, Calcutta, 1960 (in Bengali).

10) Ranjit Guha, *A Construction of Humanism in Colonial India*, The Wertheim Lecture, CASA, Amsterdam, 1993.

11) Maulvi Ubaidullah, *Essay on the Possible influence of European Learning on the Mahomedan mind in India*, Calcutta, 1877, p.47 (emphasis added).

12) Tapan Raychandhury, *Europe Reconsidered*, Delhi, 1988, p. 10.

13) Roshdi Rashed, "Problems of Integration", in Patrick Petitjean et al (eds.), *Science and Empires*, Dordrecht, 1992, pp. 76-77.

14) Sudipta Kaviraj, "On the Construction of Colonial Power Structure", presented at a *Conference on Hegemony*, Berlin, June 1989, (memeo).

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

16) Maharastra State Archive, Education, vol. 26, 1891, file 270, (emphasis as in original).

17) J.C. Bose, *Response in the Living and Non-living*, London, 1902, pp. 189-190.

18) *The Modern Review*, Dec. 1915, p. 694.

19) J.C. Bose to P. Geddes, Jan. 15, 1924, Geddes Papers, MSS 10576, ff. 132-33, National Library of Scotland, Edinburgh.

20) J.C. Bose to P. Geddes, March 6, 1918, *Ibid*, f. 40.

21) *Native Newspaper Report*, Madras, 1897, p. 14.

22) Note by J. Westland, Sept. 7, 1897, Home, Education, 25-28, Nov. 1897, A.

23) Home, Education, Nos. 49-50, Oct. 1903, A.

24) J.C. Bose to P. Geddes, March 14, 1921, Geddes Papers, MSS 10576, ff. 68-69.

25) J.C. Bose to P. Geddes, Jan. 24, 1917, *ibid*, f. 2.

26) J.C. Bose to P. Geddes, Oct. 20, 1917, *ibid*, f. 14.

27) J.C. Bose to P.Geddes, Feb. 11, 1918, *ibid*, f. 31.

28) Sometime 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 then 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 agreed 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". Ashis Nandy, *The Intimate Enemy: Loss and Recovery of Self Under Colonialism*, Delhi, 1983, p. 103.

29) Abala Bose to P. Geddes, Jan. 8, 1920, Geddes papers, *op. cit.*, ff. 60-61.

30) While at Edinburgh, P.C. Ray published two tracts: *India before and after the Mutiny* in 1885 and *Essay on India* in1886.

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

32) P.C. Ray, *History of Hindu Chemistry*, II, Calcutta, 1909, p. 195.

33) R.K. Dasgupta, "Acharya Ray as a Man of Letters", in *Acharya Prafulla Chandra Ray Birth Centenary volume*, Calcutta, 1962, p. 140-47.

34) For a superbly-crafted study of the literature's perception of the tradition, modernity and colonialism issues, see, Sudhir Chandra, *The Oppressive present: Literature and Social Consciousness in Colonial India*, Delhi, 1992.

35) Letter to the Editor, *The Statesman*, August 26, 1885.

36) Curzon discouraged higher education because, a Kannada weekly (*The Vrittanta Chintamani* of July 20, 1904) argued, "lest the people should get a scientific education and thereby come in the way of the English exploiters of the country". *Native Newspaper Report*, Madras, 1904, p. 260.

37) B.K. Sarkar, *Creative India*, Lahore, 1937, p. 625.

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

39) A.M. Zaidi (ed.) *The Encyclopaedia of the Indian National Congress*, vol. II, New Delhi, 1978, pp. 163, 406; vol. IV, pp. 100, 144-46, 251.

40) The idealist that he was, to Tagore power was to be achieved through "the dissolution of personal humanity". Rabindra Nath Tagore, *Nationalism*, London, 1921, pp. 11-17.

41) B.K. Sarkar, *Education for Industrialisation*, Calcutta, 1946, p. 3.

42) R.D. Patel, *The Claims of Science in National Life*, Pt. I, Surat, 1921, p. IX.

43) S. Irfan Habib, "Science, Technical Education and Industrialisation: Contours of a Bhadralok Debate, 1890-1915", in Roy MacLeod and Deepak Kumar (eds.), *Technology and The Raj 1800-1947*, Delhi (forthcoming).

44) Sudhir Chandra, *op. cit*, p. 64.

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

LES SCIENCES HORS D'OCCIDENT
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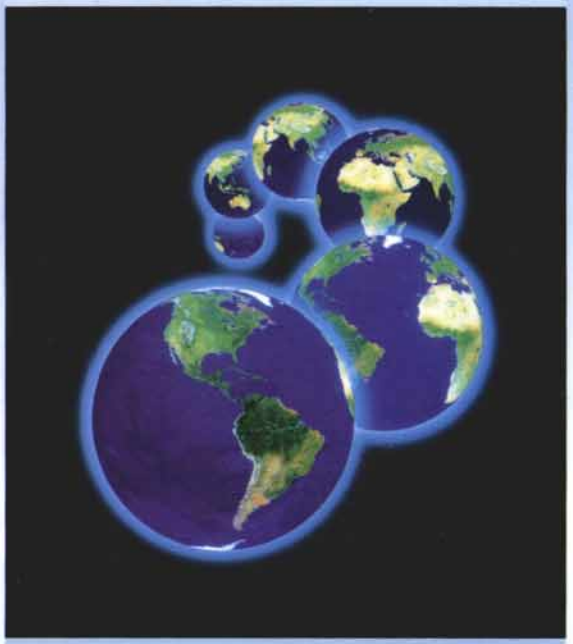

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