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Social History of Science in Colonial India

edited by

S. IRFAN HABIB & DHRUV RAINA

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Series Note

The series focuses on important themes in Indian history, on those which have long been the subject of interest and debate, or which have acquired importance more recently.

Each volume in the series consists of, first, a detailed Introduction; second, a careful choice of the essays and book-extracts vital to a proper understanding of the theme; and, finally, an Annotated Bibliography.

Using this consistent format, each volume seeks as a whole to critically assess the state of the art on its theme, chart the historiographical shifts that have occurred since the theme emerged, rethink old problems, open up questions which were considered closed, locate the theme within wider historiographical debates, and pose new issues of inquiry by which further work may be made possible.

Preface

This reader was planned keeping in mind the growing interest in the history of science in the South Asian region, and more specifically the issue of science and colonialism. It is meant to serve as a general introduction to the world of science and technology in colonial India, offering graduate students of history, history of science and the sciences with a reader that will open them to the world and concerns of science and technology in the nineteenth century. The central problem confronting the editors of this volume was arriving at an appropriate criterion for selecting papers. As others will testify, the criteria have little to do with the relative importance of the papers excluded or included in the collection. At the very outset we would like to clarify the guidelines that facilitated our close to impossible task. We decided to steer far from the history of medicine and ecology and environmental history since these were areas far from our own area of competence. One paper on the history of medicine was included to provide our intended readership with an idea of the issues involved in that rapidly growing area of inquiry. A comprehensive but select bibliography that covers the publications in more or less all the sub-disciplines is included at the end of the volume. Secondly, some of the relevant readings, for example from the writings of Ashis Nandy, Christ Bayly and several others available in other books and collected volumes have been omitted in order to make space for publications that are less easily available in libraries in India, despite a much improved environment of e-accessibility. The papers and readings that have been omitted on account of their accessibility have nevertheless been discussed in some detail in the introductory chapter. Thirdly, the papers cover a period of two hundred years of recent Indian history in particular. The

discussion more or less commences with the founding of the Asiatic Society in the last quarter of the eighteenth century and ends with the end of colonial rule on the sub-continent. The essays included in the collection reveal the variety of historiographic positions on colonial science, and the changing landscape for the study of science in South Asia. Finally, we had to exclude a number of primary sources that we wished to include, as well as some lesser-known essays, since that would have resulted in a volume of about six hundred pages. At the risk of repeating ourselves, we had started out with a plan for a much larger volume but several considerations altered our plans and we hope that in small measure the introductory essay underscores the importance of the papers that have been excluded from the collection.

We also wish to point out that all the publications included here are with their original references, and readers may find some of them incomplete. We consciously decided to keep most of them in their original form. Several years ago Romila Thapar suggested that we edit such a volume and we hope that this comes up to her expectations.

Acknowledgements

We gratefully acknowledge the authors of the chapters included here, as well as journals and publishing houses for readily permitting us to include the essays that make up this volume. These include:

Zaheer Baber, 1996, 'Science, Technology and Colonial Power', from *Science of Empire*, State University of New York Press, pp. 184–245. © State University of New York Press 1996.

Subrata Dasgupta, 1999, 'Response to Western Science: Failures and Successes', from *Jagdis Chandra Bose and the Indian Response to Western Science*, Oxford University Press, New Delhi, pp. 247–70.

Russell Dionne and Roy MacLeod, 1979, 'Science and Policy in British India, 1858-1914: Perspectives on a Persisting Belief', *Colloques Internationaux du CNRS, N. 582-Asie Du Sud: Traditions et Changements*, pp. 55–68.

Matthew H. Edney, 1999, 'The Ideologies and Practices of Mapping and Imperialism', from *Mapping an Empire*, University of Chicago Press, Chicago, pp. 1–36. © University of Chicago Press 1997.

S. Irfan Habib and Dhruv Raina, 2004, 'Copernicus, Columbus, Colonialism and the Role of Science in Nineteenth Century India', from *Domesticating Modern Science*, Tulika Books, New Delhi, 2004, pp. 60–82.

Ian Inkster, 1991, 'Science, Technology and Imperialism in India', from *Science and Technology in History*, Macmillan, London, pp. 205–25

Deepak Kumar, 2000, 'Reconstructing India: Disunity in the Science and Technology for Development Discourse, 1900–1947', *OSIRIS*, vol.15, pp. 241–57. © University of Chicago Press 2000.

K.N. Panikkar, 1980, 'Cultural Trends in Pre-Colonial India: An Overview', *Studies in History*, vol. 2, no. 2, pp. 63–80. © Jawaharlal Nehru University 2000.

Gyan Prakash, 1999, 'The Image of the Archaic', from *Another Reason: Science and the Imagination of Modern India*, Princeton University Press, Princeton, pp. 86–120. © Princeton University Press 1999.

Kapil Raj, 2000, 'Colonial Encounters and the Forging of New Knowledge and National Identities: Great Britain and India, 1760–1850', *OSIRIS*, vol. 15, pp. 119–34. © University of Chicago Press 2000.

S. N. Sen, 1988, 'The Character of the Introduction of Western Science in India during the Eighteenth and the Nineteenth Centuries', *Indian Journal of History of Science*, vol. 1, no. 2, pp. 112–21.

Shiv Visvanathan, 1985, 'The Rise of Industrial Research I', from *Organising for Science: The making of an Industrial Research Laboratory*, Oxford University Press, New Delhi, pp. 8–38.

While it has taken us sometime to get these essays together, as occasionally happens when preparing readers, we thank the editorial staff of Oxford University Press for their patience and support.

Introduction*

The study of science and politics has never ceased to fascinate principally because science, for many, has donned numerous faces, from being conceived as a disembodied object of investigation to one that is infused with the ideological concerns of the time.[1] The manner in which the relation between science and politics has been conceived has itself undergone a dramatic transformation over the last century. There is a continuity of vision and inspiration from the Enlightenment conception of the emancipatory possibilities of science, to the Vienna circle's hope of cleansing science of metaphysical and political prejudice.[2] Other more sceptical perspectives about science in society always shadowed this picture.[3] While some of these theoretical frameworks were overtly critical of science,[4] others sought to give concrete form to the radical possibilities of science when it was embedded within egalitarian political practices.[5] However, over the last three decades this picture has changed quite radically, a change that has been prompted by developments in the social sciences as much as by changes in the realm of international politics.

In marking out this distinction we do not wish to suggest that developments in the social sciences are unrelated to the changing configurations of international politics or that they are marked by an absence of reciprocity.[6] On the contrary, regimes of international politics have played an influential role in modifying the optic or theoretical frames of academic discourse. This recognition leads

*This introduction draws upon a paper entitled 'Postcolonial Narratives of Modern Science in the Making: The Exchanges of Scientific Knowledge between India and Europe' presented at the 32nd Congress of the German Sociological Association, held at Munich from 4-8 October 2004, as well as material from a number of book reviews that one of us (DR) has published in *Biblio, Seminar, Science as Culture*, Isis, and *Current Science.*

us to the identification and context of the academic discourse about science in the non-West. A feature common to the several perspectives that are woven into a discourse about the non-West is that its advent is more or less concurrent with the successes of anti-colonial struggle and the process of decolonization initiated within former colonial societies. The two most salient of these perspectives, of quite diverse origins, could be alluded to as the postcolonial perspectives of science and the new sociology of scientific knowledge. Metatheoretically, a feature common to these genres of theory of science is that they both look upon science within a social context.[7]

Evidently then, the politics of scientific knowledge has been a growing area of investigation and has drawn extensively from several disciplinary frames. The essays in this volume address issues of science and colonialism in South Asia and cover a variety of scientific disciplines. It must be clarified nevertheless that these essays mark a departure from the standard tale of science and colonialism that had currency till the end of the 1960s and was founded on the idea of science as a cultural universal. Several of the articles appear to be committed to that very idea and yet engage with the drift produced by the entanglement of science and values, the complicity of the scientific project in that of imperialism. But more importantly, while departing from the standard tale, they emphasize the need for redrawing boundaries for long taken for granted. Elements of the standard tale projected science as the flag bearer of the civilizing mission, dispelling the darkness of centuries of superstition, while the installation of new technological systems displaced ancient primitive techniques. The essays collected here do not replace this simplistic picture of the transmission of modern science and technology with another more complex one but with several perspectives that share a more contextual account of the transmission of science. It is not our purpose here to provide another perspective, but to expose the variety of perspectives currently available.

These studies indicate how modern science—considered as a pristine Western cultural import—is reconstituted in the encounter

with other ways of knowing and acting on the world. The elucidation of the latter point requires engaging with the nature of encounter between different systems of classification. This could be seen as a process of the cultural appropriation of scientific or technological ideas from one cultural context to another. Furthermore, idea hybridization at the peripheries of modern science stimulated new traditions of research in the metropolises of Western Europe. From the perspective of the metropolis, this entails identifying how novel cultural practices are assimilated within the practice of so-called modern science. These processes have been elaborated in some of the essays identified and listed by the editors in the bibliography.

The contextualization of science is difficult, particularly when we maintain the idea that there exist cognitive homologies that bridge knowledge forms across cultures and civilizations. This might also involve bringing in some reflexivity into the reading of nineteenth-century history of science. For one, the Wood's Dispatch of 1854 as much as the Macaulayan Minute both reveal the emergent totalizing discourse of science of the nineteenth century wherein it was becoming difficult to countenance the fact that science could be done in another way. The British mathematician Augustus De Morgan would certainly have encountered difficulties in insinuating the idea that an Indian mathematician had discovered an alternate pedagogic device to introduce modern calculus to Indians without reference to any topology.[8] In the late nineteenth century and certainly in the early half of the twentieth century methodological pluralism in the sciences was difficult if not impossible to entertain.

The encounter between metropolitan sciences of the West prompted numerous projects of cultural redefinition and engagement with European modernity and Indian culture. Thus Western science had to be reinvented in the idiom of a modernizing India. The process involved recuperating elements of reason and rationality from within the resources of Indian culture — broadly defined.[9] These processes could be viewed either in terms of the assertion of the new or in terms of a process of

cultural appropriation. The colonial agenda was nevertheless elaborated and constructed through the educational system and an interesting opening for studying the assimilation of modern science is at the level of pedagogy. The standard tale informs us of the replacement of the traditional pedagogy and curricula by new ones, under pressure of the imperial dispensation. In reality, science teachers had to contend with local cultural conceptions and knowledge forms, produce translations of modern science textbooks, and invent new lexicons; in other words render the unfamiliar in the language of familiarity. These contingent pressures opened up the gateways for a dialogue between modern science and the existing knowledge systems, a dialogue that generated interesting experiments in pedagogy and in science that enriched both. At the level of higher technical education there was an immanent connection between scientific and technological instruction in India and the designs of the colonial capitalist state. The changing place of Britain in the international economy required that the colonial state be innovative in the founding of formal technical institutions. The colleges and technical institutes that came to be established served as models for replication in England in the late nineteenth century and the colonial encounter contributed to the development of technical education in England.

In short, the essays collected here highlight the inadequacy of percolation models in comprehending the relationship between modern science and culture in colonial India. The several perspectives emerging argue, despite differences, that the standard tale of the assimilation of modern science as a Western cultural import was inadequate and missed out the multifarious nature of exchange between modern science and so-called traditional knowledge forms. The idea of modern science as an instrument of the civilizing mission has differentiated into a number of perspectives that suggest that the expansion of European sciences was catalyzed by the joint efforts of imperial bureaucrats, their scientific entourage and indigenous traditions. Indigenous elites visualized this encounter with science as a path to revitalization. This dynamic relationship itself constantly reshaped modern science. Consequently,

the growth of modern science and European colonial expansion were inextricably linked. While there is an epistemological dimension to the process of reshaping modern science, the fact remains that the standard tale is oblivious of how the politics of knowledge could provide crucial insights in to science in the former colonies.

The standard historical narrative of the scientific exchange between Europe and India since the late eighteenth century has been structured by a version of the modernization theory, wherein modern science is seen to be one of the constituents of modernity itself which encroaches upon and invades the domain of the traditional sciences of non-Western societies. Modern science then is seen in contrast to the traditional sciences of India; a science whose growth was arrested for a number of social and cultural reasons.[10] Versions of the standard tale suggest that the rate of expansion of the dominion of modern science was curtailed by resistance posed by persisting pre-modern forces within these societies in transition. This narrative did not appear in its final form overnight but evolved over a century and a half, and it would be possible to suggest that there are several cognate versions of this standard tale that share a number of tropes in common. As a history of transmissions it is pivoted on an osmotic metaphor[11] that conveys the idea that truth flows from regions of high truth concentration to regions of low truth concentration, from regions of light (read modern Europe) to regions of darkness (read the contemporaneous non-West).

For the sake of convenience, two principal stages in the evolution of the standard tale could be marked out. The first commences in the second half of the eighteenth century and comes to an end with the end of colonial rule in India. The second stage follows in the wake of decolonization, though this picture began to develop towards the last decades of the nineteenth century. The Orientalist phase is one of the preliminary stages in the emergence of this discourse on the antiquity of the sciences in India. The Orientalist phase itself is quite nuanced. The landscape of the Orientalist historiography of the sciences of India from the

end of the eighteenth to the middle of the nineteenth centuries is different from the scholarship of the succeeding decades in focus and emphasis.[12] But the broad historiographic orientation of the first seventy years of Oriental scholarship was to portray India as the possible cradle of the sciences. And as Eurocentric theory begins to consolidate its hold in the history of science towards the middle decades of the nineteenth century, the effort is to paint India as a civilization that has entered a state of decline from its initial phase of scientific creativity.[13] The decline was so serious that much of the ancient wisdom was lost and the core of that understanding was disfigured.[14]

As is evident, the historiography of modern science is in turn premised on Weber's theory of the rise of capitalism[15]. Irfan Habib's classic paper on the potentiality of the rise of capitalism in Mughal India opened up discussion on the roots of modernity in the South Asian region. The essays here do not engage with these issues but explore the frames through which scholars have approached the debate on science and colonialism. Imperial historiography provided a staple explanation for the failure of industrialization in precolonial India. Irfan Habib, as suggested above, was to turn this question around into an interrogation of the potentialities of capitalistic development in precolonial India. While agricultural and non-agricultural production and the handicrafts markets exhibited expansionist tendencies, the established manufactory 'was outside the sphere of commodity production'.[16] The economy at the time was monetized and merchant capital was available, yet domestic industry predominated. Hence, while the political environment did not drastically pose impediments to commercial expansion, Habib had suggested that certain features essential to generating Western capitalism were absent.

Did colonialism disrupt the natural pace of development of the region or was the civilizing mission the pre-eminent project that filled the vacuum created by the political instability that followed in the wake of the decline of the Mughal Empire? Recent historiography disengages itself from its predecessors in rejecting

the central idea that the precolonial period was one of decline and intellectual decadence. In fact, positions range from depicting it as one of cultural renaissance to others that see elements of a different kind of modernity coruscating along different axes of learning. This was not necessarily accompanied by a scientific renaissance, as conventional theory of science would have it. Nevertheless, current scholarship on the Indian ecumene on the eve of colonialism has another perspective to offer.[17]

Furthermore, the historiography of the eighteenth century—portraying the South Asian region in a state of decline, political instability, chaos, and cultural decadence—legitimates the idea that colonial rule rushed in to fill the vacuum created by this cultural chaos. This historiography was partially given form by a Delhi-centred view of the South Asian region. Panikkar pointed out how the fragmentation of the Mughal Empire did not necessarily imply the political disintegration of the South Asian region. Independent states emerged at the periphery of the empire and displayed creditable vigour and vitality, with an array of momentous cultural achievements to boast off, not necessarily scientific ones.[18] Going back further into the precolonial period Ahsan Jan Qaiser engaged with the standard depictions of sixteenth and seventeenth century India as static, and impervious to innovation and change. On the contrary, he demonstrated that technical innovations were often inhibited. During this period India's response to European technology and culture was scrupulously selective in nature, depending on convenience, utility, exigencies, and other pragmatic considerations. Similarly resistance could never be explained in simple xenophobic or essentialist terms such as the natural oriental resistance to innovation.[19]

The project of imperialism required scientific exploration of the subcontinent. This entailed the imperial task of map-making being closely tied up with the strategic projects of the East India Company, and subsequently provided the empire with technologies for governing the colonies. The steamboat has often been seen as the most important invention of the nineteenth century for the history of imperialism.[20] By the early eighteenth century they were

the vectors of European power in Africa and Asia; the gunboat easily became the most significant technological icon of the march of European imperialism. Different constituencies saw a multitude of possibilities in the steamship, for those most distant from the mother country, the steamship contained the possibility of enhancing rapid communications.[21] Closely connected with the imperial project was the technology of map-making; the attempts of geographers to construct a spatial image of the company's dominion, that later defined the empire itself giving it 'territorial integrity'.[22] A study of the first surveys and maps reveals during the first hundred years of British ascendancy the imperial conceptualization of 'how India should be'. This construction of India acquired a reality for British imperialists as it did for Indian nationalists by the end of the nineteenth century.[23] Thus map-making, geography, and geology were closely interwoven with the making of empire. The stimulus provided to cartography by strategic interests of the empire, intelligence, and governance have surfaced repeatedly in recent books from Edney and Raj to Barrow.[24] The expansion of colonial power and the production of scientific knowledge were symbiotically related, and as several of the essays suggest, in the process India served as the arena for construction of a large-scale scientific research system.[25] But the more important point that emerges is that the institutionalization of modern science in India was a much more complex process and cannot be seen merely in terms of a hegemonic imposition from above for on more than one count this would be very mechanistic.

The colonial science model of Basalla, which has been disputed on several counts and from a number of perspectives,[26] in a manner of speaking suggested that what the West took from the East was raw information that was cooked, processed, theorized upon, and subsequently transferred to the East. The most evocative and debated of these theories were proposed in Basalla's paper and work on the expansion of the European sciences.[27] The theory itself was enveloped within a larger theory of modernization and a Rostowian understanding of the transfer of technology. In a way it mixed both descriptive and prescriptive components of

theorizing. Basalla-like analyses hoped to suggest to developing countries possible strategies for the development of a full-fledged scientific-research system and in addition provided a set of diagnostic tools to correct the deceleration or enable the realization of this all important task. A category called 'colonial science' was invented to describe a particular stage in the institutionalization of science in the colonies. The science produced in this stage had reflected the dependency of the developing world on the metropolises of science in the West, in terms of problems considered suitable for research as well as in terms of theoretical influences. Critics of the model argued that the institutionalization of Western science in India involved a complex dialectic of structure and agency.[28]

An intriguing question for diffusionists has been the slow introduction of Western science in nineteenth-century India. The early nineteenth century was a period of extended, expansive, and creative contact between European scientists and Indian savants; and yet the introduction of modern sciences was tardy during this phase and according to Sen was hardly noticeable towards the closing decades of the nineteenth century and the beginning of the twentieth century. Sen contrasted this with the situation in Japan after the Meiji Restoration in 1867.[29] He attempted to explain this inordinate delay in terms of the priority accorded to field sciences over pure sciences as well as the differences between the contributions of Europeans in India and by the Europeans themselves.[30]

Similarly, it was relevant to ask of the rate of the diffusion of technology in areas under colonial domination. The standard trope projects forces of traditionalism within Indian society as offering resistance to the advent of modern science and technology. The articles in this volume look at science and technology quite differently, highlighting the linkages between them in the appropriate contexts. However, it becomes clear that the fetters to technological change and innovation were not posed by traditional technical practices and cultures. The differences in the rate of diffusion according to cultural anthropologists are explainable in terms of the nature and structure of the recipient culture.[31] Taking up the case of

Western technologies introduced into India, Bhattacharya shows that resistance to efficient and costly machines arose from the unwillingness to 'accept the separation of the use and possession of the implements of production'. The ownership of the machines resided with those who could invest rather than those who used them. Bhattacharya concluded that resistance to innovation consequently is to be understood in terms of the separation of production from the means of production. Consequently, as and when there was resistance it was prompted by entirely economic and social considerations, having to do with the uncertainties in the transformation of the 'life worlds' of the concerned communities. It also reveals the lack of trust, understandably, that operated between the colonizer and colonized.[32]

Similarly the sciences that were undergoing theoretical consolidation from the seventeenth century onwards, a process that accelerated towards the early decades of the nineteenth century,[33] were not merely enriched in terms of data pouring in from Latin America, Africa, South and Southeast Asia, China, and the Far East[34]. On the contrary, there was a constant interaction between the prevalent systems of classification of 'natural objects' within these cultures as well as those that were evolving into the modern scientific system. Thus van Rhede's *Hortus Malabaricus* elaborates upon the botany of the Ezhavas of the Malabar Coast and Grove suggests the influence of this classificatory system on that developed by Linnaeus. In like manner, surveying techniques as well as contemporary map-making practices were deeply informed by the cultural practices of the regions explored by European adventurers in India and other regions of the world. These practices were subsequently integrated within modern science and the cultural signature of the regions from where they originated was retrospectively rendered invisible.

Speaking of a historiographic revolution in the last decades of the twentieth century, Harding recently pointed out that postcolonial science studies led to three important changes. For one, it had helped chart out fresh perspectives on the integrity of European sciences. Secondly, it had clarified the nature of the relationship

between European and non-European cultures. As a corollary it could be said that these studies detailed the nature of interaction between European and non-European sciences. In so doing they provided a different perspective on how modern science itself was reconstituted as a result of the encounter with the knowledge forms of the non-West[35]. The researches undertaken by David DeVorkin, Richard Grove, S. Irfan Habib, Kapil Raj, Dhruv Raina, and more recently Gyan Prakash have argued, despite differences between their respective points of view, that the standard tale of the assimilation of modern science as a Western cultural import was inadequate and missed out the multifarious nature of exchange between modern science and so-called traditional knowledge forms.[36]

The idea of modern science as an instrument of the civilizing mission has made way for numerous perspectives that suggest that the expansion of European sciences was catalyzed by the joint efforts of imperial bureaucrats, their scientific entourage, and indigenous traditions. Indigenous elites visualized this encounter with science as a path to revitalization.[37] Thus for example, Barbara Metcalf's study of the revitalization of Unani Tibb in late nineteenth century Delhi, suggests that traditional knowledge was often reworked and configured in the light of modern scientific developments. This openness was on the one hand pinioned in the cosmopolitan culture of early twentieth century Delhi of which somebody like Hakim Ajmal Khan was the most visible member. Further in his association with the nationalist movement, he was a leading proponent of Hindu–Muslim unity.[38] Such processes of reworking so-called traditional knowledge could from a certain distance be visualized as a functioning trading zone where so-called indigenous knowledge forms transacted with the practices of modern science, though frequently in the idiom of modern science. This dynamic relationship itself constantly reshaped modern science. Consequently, the growth of modern science and European colonial expansion were inextricably linked. While there is an epistemological dimension to the process of reshaping modern science, the fact remains that the standard tale is oblivious

of how the politics of knowledge could provide crucial insights for any discussion for science in the former colonies.

Historians of East Asian science have, unlike their Indian counterparts, broken with traditional historiography quite some time ago. Having anticipated these changes they pursued their investigations on the sciences of the East Asian region in terms of positive characterizations and proffered an understanding of modernity in East Asia with or without science.[39] Unfortunately, this has not been the case for the South Asian region for a multitude of reasons. In part, this has arisen from the continued fidelity of historians of science to the epistemic image of positivist science in reconstructing the sciences of India. Further, this condition has been exacerbated with the preoccupation with modernization itself. Nevertheless, historians in the 1950s and 1960s had begun to question the standard precepts of Indian history produced by Western scholars.

A number of scholars working independently in India and abroad have played an important role in revising our perspective of the theory of transmission. This necessitated the articulation of the historical and institutional dimensions of science in order to decode the complex social processes involved in the institutionalization and introduction of Western or modern science in India. These accounts depart from the older diffusionist models and reckon with the agency of the colonized. The decline of diffusionist models commenced with the rejection of global world systems approaches and theories of modernization that were the staple fare of the Chicago school.[40] Founded on a more qualified interpretation of imperialism, these studies departed from Eurocentric models that trivialized the contributions of local knowledge.[41] This new discourse focuses upon the intimate relationship of scientific and technological projects to nineteenth-century British imperialism; the impact of colonial rule on indigenous scientific knowledge and institutions; and finally the role of British and Indian scientists in the creation of scientific knowledge and the institutions of science. The new genre marks a phase in the social studies of science in India that examines the latter two aspects of the processes

involved outside the terms set by older diffusionist models. Furthermore they do not consider romantic indigenous science as the epistemic mirror image of Western science, endowed with a sacred ethic that restrained it from going berserk.

In *The Science of Empire* Baber seeks to establish how the expansion of colonial power and the production of scientific knowledge were symbiotically related; that in the process India served as the arena for the construction of a large-scale scientific research system. An important point that Baber teases out is the immanent connection between instruction on science and technology in India and the emergence of the colonial capitalist state. This required that the colonial state be innovative in the founding of formal technical institutions. Drawing upon the work of Dionne and MacLeod it is suggested that these colleges served as models 'for replication in England in the late nineteenth century and the colonial encounter contributed to the development of technical education in England'.[42]

The rise and nature of British colonialism is a much debated and nuanced concern of economic history, well beyond the scope of the present volume that would be unable to find a way out of the contentious vocabulary of new imperialism, colonialism, social imperialism etc. Ian Inkster's article in this volume provides a fine review of the issues, debates and explanatory frames on science, technology and imperialism. The review emphasizes the difficulty of estimating the financial impact of British rule. What could be inferred with some certainty is that, as in the case of the sciences, British economic policies in India retarded structural change of the Indian economy. Further, in tune with Bhattacharya's findings discussed above, there appear to have been no 'overwhelming' cultural barriers to development. The positive impact, if any, of the larger projects undertaken by the 'British rulers' retrospectively appears to have been neutralized by the enclavist colonial economy.[43]

In the foregoing discussion on science and colonialism, the relationship between modern colonialism and the modern scientific disciplines are themselves salient for any social history of science. Contextualized histories of the so-called 'universal

sciences' were deeply interfoliated with the 'histories of colonialism'.[44] But as suggested by Visvanathan, Baber, Prakash, and more recently Kalpagam, the state played a role 'in the development of the scientific analyses of society'.[45] The imperatives of governmentality accordingly produced statistical knowledge of the country which included classificatory schemes for the census. While newspapers were instrumental in creating public spheres, new conceptions of the economy and society crystallized in new discourses of history and progress.[46]

Challenging the historiography of the hegemonic diffusion of European science, a number of scholars sought to examine the reordering of indigenous knowledge (the methodological imperative) within the European canon. Chris Bayly examined the debates in the Indian public sphere in the 1840s and rejected the portrait constructed by European and Indian reformers that the growth and communication of knowledge was stunted by hierarchy, and indicates that Indians had begun adapting their practices to the modernist idiom and literary technologies and further were reflecting upon the status of Indian, and Western learning.[47] The relationship, as argued by Bayly, during these early decades between science and colonial rule was fairly complex and driven from the metropolis by a variety of concerns. On the one hand within the sphere of the modern nation-state, as much as in the colonial state, the colonial rulers sought political legitimacy through the patronage of Indian learning. On the other hand, Western science was expected to promote Christian values.[48] Finally, as far as European officials in India were concerned, competition among amateurs stimulated scientific research. This complex of arrangements stimulated by the sheer asymmetry inherent in the colonial experience, prompted a positive evaluation of Indian scientific traditions by Indians themselves.[49] Studies focussed upon the first century of British colonial rule revealed that the construction of modern science involved greater complexity and reciprocity 'even in the asymmetrical colonial situation'. This resulted in the development of heterogeneous networks in forging research and teaching traditions even in the

early nineteenth century. Thus local knowledge was enrolled into a global science. However, the calibration of scientific instruments and the standardization of scientific practices played a crucial role in universalizing material and cultural practices.[50]

Similarly, recent studies on tropical medicine, which otherwise this volume desists from discussing, depart from the classical understanding of the emergence of tropical medicine in the colonies. Taking off from where Worboys had earlier left off Harrison questioned the view that developments in tropical medicine in India before 1880 were insignificant, meaning that before the core epistemological (germ theory) and instrumental innovations of modern medicine were integrated into the discipline, tropical medicine as such was underdeveloped. On the contrary, Harrison proposes a model for the development of tropical medicine in the colonies. A variety of forces steered developments in the area during the course of each of the stages. During the first stage the literature reveals that there was a willingness on the part of officials dealing with questions of hygiene and survival in the tropics to adapt indigenous medical practices.[51] However, towards the third decade of the nineteenth century, the prevalent climate of utilitarianism widened the gulf between European and Indian cultures and produced a disdain towards Indian knowledge systems and canonical texts. Developments within medicine at the metropole in the areas of pathological anatomy, and the chemistry of Liebig, pushed the barriers further.

Historians of science had thus to examine the tendency to underplay the quality of science pursued in the colonies when contrasted with European or American science. Sociologists of science in the West, possibly informed by the work of dependencia theories were trying to frame this asymmetry in the production of knowledge in terms of a centre-periphery framework.[52] Clearly this geography of knowledge addressed the unequal exchange that marked the globalization of science, a process well underway by the 1960s. Scholars in India and abroad were predisposed at the time to looking upon the contemporary production of scientific knowledge, as well as the uptake of science during the period of

colonial rule, as one of generating a derivative science. This derivative science was a lower kind of science, an appendage to the grand theories produced in the West.

However, in the 1980s and 1990s historians working on the transmission of scientific knowledge indicated that the centres of science were constantly shifting.[53] Further, a precondition for the evolution of scientific knowledge was innovation and transformation produced through the perpetual migration of knowledge from one region to the other.[54] Consequently, it made little sense to speak of the derivative character of science pursued in the colonies or the former colonies. In the 1980s sociologists of scientific knowledge had independently suggested that the standard tale of the history of science was founded on a Western ideological assumption that knowledge germinated in the minds of exceptionally gifted individuals.[55] Instead, these sociologists disclosed the social character of scientific knowledge. This disclosure threw up a whole host of new actors that had been hitherto ignored by the historians of science.

Seeking cognitive justice and breaking out of Eurocentrism, historians of science were trying to chart out a departure from appendage history, wherein the history of science in the colonies was seen as subordinate to the mainstream account of metropolitan science of the last two centuries. And here we would do well to distinguish between those who attempted to obtain cognitive justice within an ecumenical picture of science and those who were constructing an inverted image of the essentialist Eurocentric history of science. The latter trend is not so interesting in what it tells us of the transmission, circulation, and transmission of scientific knowledge between India and Europe. But these trends were a product of changes in perspective in several areas of investigation.

During the initial stages of decolonization, scientists in India also wrote history of science and they sought to break out of the frame of Europe centred history of science, seeking cognitive justice[56] and a due place in the sun.[57] Some of them were inspired by the Needhamian historical project. In that capacity they were

responding to two sets of questions. When harking back to India's remote past they were asking for causes of the non-emergence of a scientific revolution in India. But when investigating the more recent past, namely the colonial period, the primary concern was to understand the tardy expansion of the sciences in India over the last two centuries.[58] A critique of colonial policy and the fetters posed by colonialism in the path of authentic modernization were the subject of historical investigation. Latent and explicit racism, colonial reservations concerning the abilities of Indians to pursue science, or competition from new sources were the causes imputed to the slow expansion of modern science during the period of colonial rule.[59]

A perspective that broke away from a neo-positivist philosophy of science and looked at the past of science from a different theory of history and theory of science—came from the first generation of Indian cultural theorists.[60] The field was self-limiting three decades ago, though a glasnost had commenced as the disenchantment with a particular frame of modernization and development had set in since the mid-1960s.[61] This disenchantment produced in India a diversity of intellectual responses. At one level, it seeded an interrogation of European modernity and its conjugate modern science as solely paradigmatic of modernity and science. This was accomplished from two vantage points among others. The common understanding shared by both was that the dualism of fact and value logically culminated in a vivisectionist science that confronted its limits and its possible culmination in the concentration camps of Auschwitz and the nuclear destruction of Hiroshima. This modernity took its toll in genocidal development that the Third World had been witness to.[62]

The first of the responses drew inspiration from Gandhi and generated a different vision of politics and of providing the template of an alternate modernity. In the realm of the sciences, this inspired the search for alternate sciences and the possible episteme that underpins them within the scientific culture of modern India. This search recognized that the search for an Indian alternative would be 'impossibly unmanageable'.[63] The other

response that certainly viewed the Gandhian corpus in the same light turned its gaze upon Europe, and explored other European imaginations and non-dualist modernities. This did not exhaust the responses to the crisis in modernity but is descriptive of the shared ground of the neo-Gandhian project.

The interrogation of modernity and the civilizational critique of modernity and science resulted in a re-examination of the encounter between modern Western science and the so-called traditional sciences. This re-examination commenced with the abandonment of the epistemic privilege hitherto accorded to modern science. The purport was thus to reopen the question of science and modernity that would disclose the form of other sciences and modernities that were not as malevolent in their impact on the non-West as Western modernity. Ashis Nandy thus put two of India's first generation modern scientists, J.C. Bose and Ramanujan on the psychoanalytical couch to uncover the cultural specificity of their scientific projects.[64] He commenced his investigation by rejecting the dichotomy that separated the content and context of science since it exonerated the scientist of all criticism of the dystopian potentiality manifest within science. The study of Bose and Ramanujan sought to impress upon the reader how traditional cognitive orders creatively enriched the practice of contemporary science. This exploration into the 'cultural context of scientific creativity in science in the non-Western world', was embraced by a readership disenchanted by modern science. They saw this endeavour as opening a window into the world of alternate sciences. While Nandy was acute in his observations of the connection between the metaphysical and the psychological he left out the influence of the latter on the cognitive content of the science. This was certainly a milestone in India in the political psychology of scientific knowledge. This work while controversial inspired subsequent studies focussed upon research programmes and projects from the precolonial Indian tradition whose paths did not intersect with the science that was currently fashionable in the West. In addition, scholars had now begun in the alternativist mode to look for research traditions, programmes, and projects that had been marginalized by modern science.

The assimilation of modern science naturally commences at the level of pedagogy. The standard tale informs us of the replacement of traditional pedagogy and curricula by new ones under the pressure of imperial dispensation. In reality, science teachers had to contend with local cultural conceptions and knowledge forms as well as the need to mobilize existing teachers within modern schools. These contingent pressures opened up the gateways for a dialogue between modern science and the existing knowledge systems, a dialogue that generated interesting experiments both in pedagogy and in science and was to enrich both.

The other issue relates to how the process of data gathering in science is visualized within the division of labour of science. The activity of data gathering and calculation came to be considered a lower-order activity in the Western European scientific imagination since the end of the eighteenth century.[65] Much of the science pursued in the colonies was of an empirical nature, the task of theoretical synthesis was to be performed at the metropoles of London, Paris, Berlin, etc.[66] The science pursued in Calcutta, Auckland, Beijing, or Tokyo in the early twentieth century was never quite the real thing. But the advantage of pursuing a scientific research career far from the metropole was the absence of peer pressure. Sociologists of science have argued, this created the possibility of idea hybridization at the periphery.[67] Idea hybridization resulted in the creation of disciplines such as theoretical astrophysics in Calcutta and one of the renormalization theories of physics in Tokyo.[68]

The history of modern science in India during the last decades of the nineteenth century and the early decades of the twentieth century is of interest as Indians schooled in modern science struggled to inaugurate a scientific and technological research system. The purported objective was to draw India closer to the international community of science. The first generation of Indian scientists have acquired an iconic place within this narrative of the institutionalization of modern science. These scientists were embarking on an unenviable project of building bridges between the science they were pursuing and the knowledge forms that were

part of the cultural life of the region before colonialism.[69] This task often produced a variety of responses that appeared curious to the Western eye. Thus J.C. Bose, the first of modern India's physicists, is one of the deific figures in the aforementioned pantheon. Amongst Indians Bose's research has been seen as India's response to Western science, while in the West he continues to be an enigma. But scientists in the West and in India have often marvelled at his acumen as an inventor of instruments.

In an interesting intellectual biography Dasgupta establishes that the priority dispute over the discovery of radio waves between Marconi and Bose is a misplaced one.[70] Bose, he goes on to ascertain, must in fact be credited with the production of short wavelength radio waves, in addition to which he researched the cohering properties of different substances and was the inventor of truly ingenuous coherers. Furthermore, Bose's science was certainly not of a revolutionary nature and was no more than a Kuhnian mopping-up operation within the paradigm of electromagnetic theory. Secondly, scholars have responded differently to the process of cultural assimilation of modern science. Ashis Nandy in his *Alternative Sciences* had suggested that Bose's later work on plant physiology, alongside Ramanujan's equally enigmatic mathematical style, could be seen in epistemic terms as an attempt to construct an alternate Indian science.[71] The thrust of Dasgupta's investigation is that the work of the early Bose in experimental physics, on account of which he acquired his standing as a scientist of repute, was grounded within the prevalent paradigm of late nineteenth century physics. On the other hand, the 'Middle Bose' was a 'flawed genius' who carried out marvellous experiments but whose theoretical interpretations were laden with far too many metaphysical assumptions and exhibited analogical reasoning resulting in assertions whose validity could not be established. The issue is to understand why Bose's modern science was a success while his 'Indian response' was a failure.

British colonial power reached its zenith towards the end of the nineteenth century. Subsequent reconfigurations in the global

political economy and international power relations combined with increasing demands and pressures of an insurrectionary citizenry forced the colonial government to accede to nationalist demands and reoriented the priorities of imperial government. Kumar's article focuses upon the world of science in the last few decades of imperial rule. In the world of science debates raged over how the postcolonial word of science was to be organized.[72]

This brings us to reconsider the question of the expansion of 'Western science', and the globalization of science itself. Perhaps the expansion of 'Western science' cannot be looked upon as the replication and reproduction of a paradigmatic version of science that emerged in Northern Europe in the seventeenth and eighteenth centuries. Sociologists of science working within the framework of laboratory studies or sociologists working within the frame of multiple modernities do not look upon a canonical science or Western modernity migrating across impermeable boundaries, whereby a paradigmatic version of Western modernity or canonical science is installed in the non-West. On the contrary we have a much more complex process wherein modern science encounters other knowledge forms and we have local versions of modern science taking root there. In the process, the encounter metamorphoses modern science. There is a tendency among theorists of modernity to see the local forms of scientific knowledge as the product of premodern knowledge forms and practices persisting within modern science and preventing the realization of the agenda of truly modern science. But these local versions or regional variations in the forms of knowledge and practices are embedded in diverse cultural and political environments. These regional variations could manifest themselves in the diverse organization of pedagogical and evidential cultures. In like manner we could have different versions of the unwritten charter or contract between state and science. Thus under the microscope the purely normative account of science, or its globalization, begins to exhibit distinct regional adaptations, rather than homogenization on the Western model.

Furthermore, recipient cultures and nations could proffer varying constraints and possibilities for the development of

scientific institutions, thoughts and practices. In this manner local forms of science grounded in locally acquired knowledge of science develop. The problematic posed by earlier stories of the expansion of the dominion modern science were that its sources were ascribed to Europe and networks of European scientists. This knowledge was imputed a status of being purer and more universal than the empirical traditions encountered elsewhere. The natural evolution of social scientific research, accompanied by the changing pattern of political authority opened up a space for multiplicity of voices that rendered visible the engagement of non-European scientific communities with what were considered culturally distinct knowledge systems. This engagement has resulted in the creation and accumulation of scientific theories and information. While these developments are embraced within the expanding envelope of 'universal science', stories about this creative process are founded on selection principles that filter out the diverse social and cultural contexts that shape the production of this knowledge.

The traditional tale has thus to be readapted depending upon whether we commence with the trope of the 'original home of modern science', or we commence with an evolutionary perspective of several sciences in a constant relation of exchanges that result in global science. If we were to commence with the former, then modern science emerged in a specific historical context of Western Europe. On expanding into other cultures it undergoes a dual process of universalization and localization. One version of the standard tale would have us believe that the process of universalization is nothing other than a replication of the self-same. On the other hand as a multiplicity of local knowledge forms interface with universal science they are constantly changing the face of universal science. By confining the idea of the universality of science within parenthesis a number of rich veins of historical investigation open up. Does abandoning the idea of the universality of science in an 'absolute, or even functional, sense' lead us into the trap of localism? Montgomery argues that the recognition of the context of knowledge is not identical with reducing the one to the other. In Montgomery's

words: '...the objective component of scientific knowledge and its technological products must be recognised as very large; indeed, its power to create concepts and machines that can be shared by any large linguistic community lies near the base of its influence on social structures and practices in the modern world'.[73] The history of scientific transmissions has often been preoccupied with the percolation and diffusion of a pre-existing version of universal science. The multicultural history of science appears to suggest that universality is not given a priori but is constantly refurbished and thus evolving in time. This evolution occurs within the context of encounter of local scientific knowledge. The current preoccupation with scientific and cultural practices, the renunciation of the tropes of 'original texts' and 'original homes' of science, and a critical awareness of the categories and theoretical constructs we employ may yet lead us onto a more cognitively adequate and interesting version of the transmission of scientific and technological knowledge.

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1

Cultural Trends in Precolonial India*

An Overview

K.N. Panikkar

I

Reflecting on the nature of society and polity in precolonial India Rev. W. Tennant observed as follows:

> It may justly be questioned whether in any instance, the annals of nations can present to our contemplation a great community plunged into an abyss of anarchy, equally deep and gloomy, as that by which India was overwhelmed after the decline and fall of the Mughal Empire.[1]

That the eighteenth century was a dark age has been a view held by several others; Henry Beveridge, James Mill, John Marshman, and a host of other European administrator-historians and contemporary observers have so characterized this period. The precolonial political anarchy, intellectual stagnation and cultural backwardness when contrasted to the progress under British benevolence were to some an explanation and to others a justification for the conquest of India. This perspective was not limited to early colonial ideologues; it became an integral part of

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the later historical writings on eighteenth-century India. Thus, L.S.S. O'Malley, B.T. McCulley, Percival Spear, Jadunath Sarkar, Tarachand, and several others either explicitly or implicitly, have indicated the decline and decadence of precolonial Indian society.[2]

This gloomy picture was initially derived from a Delhi-centred view of the political conditions in India. The political anomie that followed the decline of Mughal authority, particularly in the heartland of the empire, not only led to almost continuous struggle between various forces contending for political power but also brought to the fore several military adventurers, both Indian and foreign, in quest of easy fortunes. The Pindarees and Pathans under the leadership of Amirkhan, Karimkhan, and Chittu ravaged and plundered central India[3] and European free-booters like Skinner, Sombre, and George Thomas looked for kingdoms in India.[4] The Marathas, as a part of their northward push laid waste the states of Rajputana, made repeated incursions into Bengal and meddled in the politics of north India. The Mughal emperors who succeeded Aurangzeb lacked the efficiency and determination to deal with the decay that had set in the Mughal administrative institutions, to contain the popular upsurge corroding the imperial foundations and to restructure its economy to meet the new challenges. The power and authority of the empire was irretrievably lost and the emperors' right to the throne depended upon the support of the Marathas, the Rohillas, or the British. Viewed in this background, Gulam Hussains' characterization of the eighteenth century as 'an age of senseless, slothful princes, and of grandees, ignorant and meddling' seemed to be well justified. He wrote:

> It is in consequence of such wretched administration that every part of Hind has gone to ruin, and every one of its discouraged inhabitants have broken their hearts. Life itself is become disgustful to most. So that, on comparing the present times with the past, one is apt to think that the world is overspread with blindness, and that the earth is totally overwhelmed with an everlasting darkness.[5]

There is no denying the fact that the decline of Mughal power was accompanied by political instability, administrative inefficiency, and social insecurity. But while the disintegration of the Mughal

Empire represented a political trend, the chaos, confusion and anarchy attendant upon it did not. The alternate political trend that manifested in the eighteenth century was the emergence of autonomous states and the consolidation of independent states. In other words, the political process which emerged out of the break-up of the Mughal Empire was one of fragmentation of political power and not of political disintegration. The disintegration of a centralized empire is not necessarily a misfortune nor is it politically retrogressive. At any rate, the new political structure emerging in the eighteenth century was not devoid of vigour and vitality; nor did the autonomous and independent states present a picture of anarchy and decadence. For instance, in Bengal under Murshid Kuli Khan and Alivardi Khan, though a realignment of forces was under way the administration was as efficient, if not better than, during the heyday of the empire.[6] So was perhaps Hyderabad and the Carnatic before the French intervention. Travancore, under the dynamic leadership of Marthanda Varma (1729–58), not only reorganized its administration and quelled internal dissensions but also became a powerful force in the region.[7] What would have been the nature of Indian polity if these tendencies were allowed to mature without colonial intervention is futile to speculate. At least one Indian ruler in the eighteenth century had initiated steps, though unsuccessfully, to restructure the economy of his state, indicating his nebulous awareness of the needs of modernization.[8] While saying so, certain inherent weaknesses of the Indian political structure which could adversely affect the emergence of new socio-economic formations are not overlooked. With reference to Tipu Sultan's Mysore, Ashok Sen has described them as follows:

> The most prominent obstacle, speaking generically, was the absence of forces and perspective to work for the emergence of Civil Society and the whole complex of individualization of property and socio-economic change associated with the European experience of transition from feudalism to capitalism. Whether in respect of agriculture, or that of trade and industry, Tipu's means of striking an advance could not go beyond the elaborate manipulations of statecraft which continued and even accentuated the

stranglehold of politics and bureaucracy on the process of appropriation and use of economic surplus.[9]

However, what Tipu Sultan represented was the willingness and ability of Indian leadership to strike out a new path and what the course of history denied to Indians was the chance to overcome these obstacles experienced by Tipu's efforts.

II

A direct connection between political anarchy and socio-cultural development informed almost every work on eighteenth-century India. 'Civilised life', wrote Raghuvanshi, 'cannot flourish amid conditions of insecurity and oppression. In the eighteenth century the breakup of the Mughal monarchy released forces of political disintegration and anarchical conditions which destroyed the creative and cooperative spirit of man. They caused deterioration in every phase of national life.'[10]

The contemporary observers like Abu Dubois, Alexander Dow, and Forbes have testified to the lowest level to which Indian creativity had sunk.[11] That political instability and economic crisis are necessarily accompanied by a void in artistic and literary creativity does not seem to have historical validity.[12] With respect to eighteenth-century India, this point first demonstrated by Hermann Goetz who argued that political instability did not lead to an overall decline in culture.[13] He wrote:

For those symptoms of decadence which have been made a reproach to 18th century India, are clearly discernable in all those times which we consider as glorious periods in the history of other peoples. They have been, so to say, the inevitable shadow of the splendour, they have, no doubt, brought about the final collapse, but we generally overlook them because those dark sides have passed away whereas their splendour is still the living heritage of our culture. But a similar splendid side was inherent also to Indian civilisation of the 18th and early 19th centuries. Can we overlook the fairy like palaces and gardens of Jaipur, Jodhpur, Dig, Udaipur, Lahore, Lucknow, Murshidabad, Poona, etc.? Can we deny the sweetness and the refined taste of the innumerable paintings of those times? Can we forget the Golden Age of

Urdu, Bengali and Marathi literature? Can we doubt the high accomplishment of the music and dancing of those times? Or the refinement of social life and the important position of women in that society? Must we not come to the conclusion that the 18th and early 19th centuries have been a period not only of political and economic decline, but also of the highest refinement of Indian culture?[14]

Detailed historical investigations into the nature of creativity in art and literature and the changing pattern of patronage in the eighteenth century are yet to be undertaken. Yet our existing knowledge about painting, music, and literature does not indicate sterility and stagnation in these spheres. On the contrary, in certain fields, creativity reached new heights and in some others it strove to attain new forms of expression. Has it anything to do with the geographical shift in the centres of patronage and the new life experience confronted by the artists? The puritanism of Aurangzeb and the financial crisis of the later Mughals led to the development of important regional centres of cultural activity. Lucknow, Hyderabad, the states of Rajputana, and the Rajput states in the Punjab hill region became major sources of patronage during this period. Not that they did not exist as cultural centres before but with the decline of the patronage of the imperial court and of the nobles attendant on it, the full effect from the regional centres to the imperial capital had ceased to exist. For instance, in the court of Akbar over a hundred painters mostly from Gujarat, Gwalior, and Kashmir were employed.[15] During the Aurangzeb and post-Aurangzeb periods this tendency was reversed. The painters and artists migrated to regional centres, one of the prominent example being that of the family of Manak and Nain Sukh in Kangra.[16] This had an important bearing on the development of regional cultural centres as well as its spread effect on the regions as a whole, drawing a larger number of territorial aristocrats into the network of patronage.

The case of miniature painting is a good example of creative vitality and changes in patronage in the eighteenth century. The miniature painting had its origin in India in the eleventh century Jain miniatures done on palm leaves which were used for

illustrating religious texts. It flourished during the Mughal rule with marked Persian influence. Akbar had at his court two Persian artists, Abdus Samad and Mir Syed Ali, who imparted training to painters assembled from all over India, and under the munificent patronage of Jahangir, Mughal miniature found its best expression.[17] During this period, miniature painting became popular in the Rajput states as well, in all probability due to Mughal influence.[18] But miniature painting thrived in Rajputana with distinct character, style, and content long after the Mughal school had passed its prime.[19] Some of the best creative efforts in this field, notably of the Kishangarh and Bundi school, were the product of the eighteenth century. The paintings of Kishangarh and Bundi were spontaneous and innovative and possessed a style of romantic loveliness which was unique and unrivalled in Rajasthan paintings.[20]

'The Bundi paintings,' wrote Moti Chandra, 'are distinguished by a careful finish, brilliant colours, costumes, architectural settings and romantic landscapes. The artists of Bundi were not slavish followers of any particular style; they seem to have fully imbibed the distinguished traits of other Rajput schools'.[21]

Similarly the eighteenth century witnessed a flowering of miniature painting in the hill states of the Punjab.[22] Manak and Nainsukh in Kangra, Mola Ram in Garhwal, and a host of other unidentified painters experimented with new styles, synthesising the abstract with the natural. 'Painting begins to lean on the side of naturalism, a lyrical romantic quality comes into it and that search for delicacy of feeling begins.'[22a]

The Rajput and Hill paintings also mark a change in the objects of the painter's interest and the manner in which they are portrayed. The scenes from everyday life, religious festivals and ceremonies, mythological subjects and in particular, episodes from the legend of Krishna, dominated their interest. The emphasis on religious themes was perhaps due to the continuing influence of the Bhakti tradition, especially in Rajasthan.[23] But the tendency to identify living personalities with mythical characters could be interpreted as the initial expression of the transitional process towards

secular art. In Kishangarh, Sudhraj Nihalchand introduced the Savant Singh–Bani Thani love affair[24] into the Radha-Krishna theme and gave the semblance of Savant Singh and Bani Thani to Krishna and Radha. In Kangra paintings Krishna is often depicted as a *pahari* cowherd surrounded by pahari maidens in a hill setting.[25] It is an indication that from an art confined to the experiences of the court life under the Mughals, the miniature painting during the eighteenth century was becoming sensitive to the social milieu. It was, in fact, an important shift in the creative realm as a whole in India at that time.

In the execution of paintings, the eighteenth century miniature of Rajasthan and Kangra maintained high aesthetic standards. A painstaking attention to detail, the use of soft and luminous colours, and the employment of tiny and delicate strokes which imparted a life-like quality to the skin and hair and transparency to cloth characterized these paintings. This was true of the paintings in other areas like Deccan and Oudh.[26] The signs of decadence appeared only in the nineteenth century: over-ornamentation, lack of proper proportions, clumsy drawings, strong colours laid with a heavy hand, and filled-in surfaces which gave a solid and static appearance.[26a] Neither in style, content or output was miniature painting in a state of decadence in the eighteenth century.

III

Historians and literary critics have tended to view eighteenth century Indian literature as pedantic, degenerate, and decadent.

> The literature which was produced in these degenerate times suffered from all the ills society was heir to. Its poetry was dilettantish, weighed with euphemism and conceit. Its spirit was shackled by artificial limitations of rhyme, and its mood alternated between the sensuous and the spiritual, neither deeply experienced. Clouds of pessimism and despair hung over it. It sought rest in flight from reality.[27]

This is a view, echoed by several others,[28] which overlooks the developing trends in Indian literature during the precolonial era. In fact, eighteenth century literature inherited and further developed

a shift, both in form and content, towards popular literature from the painted, powdered, and the obsequious Sanskritist tradition of the earlier period. Mir and Sauda in Urdu, Brajanatha Bodajena in Oriya, Bharatchandra Ray in Bengali, and Vemana in Telugu set new dimensions of literary experience for the people.[29] Brajanatha Bodajena (1730–95), the author of *Chatur Vinoda, Ambika Vilasa,* and *Samaratarangana* experimented with several styles of literary composition. *Chatur Vinoda* was partly in prose and partly in blank verse, which was a novel attempt at a time when neither prose nor blank verse had developed in Indian literature. This is the one prose work in the whole of old Oriya literature that is original, planned and complete. The style is strikingly fresh, untrammelled, coversational, and very near the modern.[30] More importantly, the prose style of Bodajena was very close to the dialect of the common man. In Bengal the first half of the eighteenth century was a period of great literary activity[31] and Ramesvar Bhattacharya and Bharatchandra Ray represented the new tendency.[32] Bharatchandra Ray, the author of the trilogy *Annapurnamangal,* is considered the most outstanding poet of Bengal before Tagore. Almost till the end of the nineteenth century, *Vidyasunder,* one of the trilogy continued to be influential in the literary circles in Calcutta.[33] An important feature of Bengali poetry during this period was the popular style of composition and an effort to portray gods in the image of common men which, as noticed earlier, also characterized the miniature paintings of the eighteenth century. In Rameswar Bhattacharya's *Siva-Sankirtan* (1710), Siva is a petty and poor farmer and his heroine (Gauri) the poor farmer's wife who is content with two square meals and a few yards of cloth.[34] The change in content was becoming marked during the second half of the eighteenth century. The sad plight of forced labour and the protest of the ryots against the appointment of the dewan were some of the themes in ballads written in a folk style during this time.[35]

The eighteenth century was the heyday of Urdu literature which though romantic in content, showed a highly refined poetic imagination. It was the period of the three outstanding poets in

Urdu literature; Sauda (1713–80), Mir (1724–1810), and Dard (1719–85). They were sensitive to the declining fortunes the imperial city and their poetry did focus on the tragedy engulfing the society. Symbolizing the tragedy of common man toiling under feudal fatalism, their poetry reflected the cultural ethos of their age in an idiom at once intelligible to the massess.

In Oriya, Bengali, Telugu, and Malayalam and perhaps in all other literatures, a shift towards popular literature was a clearly discernible tendency in the eighteenth century. It marked a definite break and, in case the break had occurred earlier, a further advance from the existing literary tradition which incorporated mainly upper-class themes in highly sanskritized diction. The process of vernacularization which had already started was steadily gaining ground during this period. Thematically too, as noticed earlier, literature was transcending the limits of princely courts and was increasingly becoming sensitive to the stresses and strains of the life outside it. The pursists have viewed this shift as decadence, whereas in reality it should be considered a healthy tendency. This tendency, however, came to an end during the course of the nineteenth century when Indian literature lost its inherent vitality and became heavily imitative of the West.

What is said about painting and literature was also true of other realms of creativity. In Carnatic music the eighteenth century was the period of the famous trinity—Tyagaraja (1759–1847), Muthuswami Dikshitar (1775–1835), and Syama Shastri (1763–1827). Prolific in compositions,[35a] distinct in style and original in handling the ragas, they brought about a marked change in the existing musical tradition and created a new era in the history of Carnatic music.[36] While the compositions of Syama Shastri and Muthuswami Dikshitar were learned and difficult to understand, Tyagaraja was a composer with great popular and emotional appeal. Muthuswami Dikshitar mainly composed in Sanskrit, but Syama Shastri and Tyagaraja used Telugu. All the three were endowed with creative ability of a very high order; they composed new ragas and *talas* and their ability to introduce innovations within the same raga was remarkable.[37] Syama Shastri's compositions

in *apurva* ragas like *Manji Kalagada* and *Chitamani* are evidence of his genius and originality in discovering new forms in fields which to others were apparently barren. His contest with Kesavaya of Bobbili was perhaps the best example of his creative ability. During the contest at the court of the maharaja of Tanjore, Kesavayya rendered a raga and followed it with a *tana* in different *jatis* and *gatis*. To the sheer delight of the audience and to the great discomfiture of Kesavayya, Syama Shastri not only reproduced similar *tanas* with greater skill, but also rendered several subvarieties which were not even known to Kesavayya.[38] The genuis of Tyagaraja, the greatest composer in the annals of Carnatic music, lay not only in his originality and his innovative ability which gave to each composition even of the same raga a variant form (*rupa*) and nuance, but also in his capacity to take the music to the uninitiated masses. He was the originator of a new form and a new style of composition as represented by *geya natakam* (opera) and *ghana raga pancharatnam*.[39] He also created several new ragas, important among them are *Devamrita Varshini, Saramati, Phalaranjani,* and *Umabharanam*.[40] Tyagaraja's compositions, particularly his devotional songs, drew a larger section of the population into a new cultural experience which is akin to the general tendency discernible in other fields of creativity.

The era of the musical trinity was one of the most creative epochs in the cultural life of India. Assessing their contribution S. Seetha has noted:

> The *kritis* of the Trinity happen to be the foremost definition of the *ragas* and the vivid portrayal of the melodic individuality of the 'abstract picture in the sound' helped in the standardisation of their *laksana*. This led to the development of *manodharma sangita* in all its varied aspects. The elaborate exposition of the *raga* through the different stages, the systematic *tana* and *ghanam* singing and the complicated *pallavi* expositions emerged.[41]

The contribution of Shah Walliullah to theological studies,[42] of Maharaja Jai Singh's efforts in the field of astronomy and town planning[43] and of the development of architecture during the eighteenth century would also be significant areas to investigate.[44]

IV

In all comparisons between the "darkness" of the eighteenth century and the "glory" of the nineteenth, religion and education have been crucial considerations. While religion in the eighteenth century was characterized by obscurantist and superstitious practices, the nineteenth century reform movements inspired by the European intellectual influences restored the pristine purity of religion. Similarly, to the intellectual stagnation and ignorance of the eighteenth century, Western education brought Enlightenment leading to political and social progress. This is a familiar theme in Indian historiography, worked out in great detail by historians ranging from J.N. Farquhar to R.C. Majumdar. 'A new ideology', wrote Majumdar, 'suddenly burst forth upon the static life, moulded for centuries by a fixed set of religious ideas and social convention. It gave birth to a critical attitude towards religion and a spirit of enquiry into the origins of state and society with a view to determining the proper scope and function.'[45] The assumptions behind this contrast are the static nature of Indian social institutions, the moral and ethical degeneration, educational and scientific backwardness, and above all the inability of the Indian mind to come to grips with the problems of a decadent society. Indeed, to the colonial ideologues and their modern-historian incarnations, it is a convenient framework to justify colonial rule, since they argued that without the vistas opened up by European knowledge, Indians would not even have become conscious of the ills of their society.

The popular Hindu religion in the sect-caste ridden eighteenth century society had degenerated into a compound of magic, animism, and superstition. While polytheism and idolatory had made religion into ceremonious ritualism, religious practices and rituals included physical tortures and animal sacrifices. Exploiting the credulity and superstition of the ignorant laity, the priests had made religion into what Rammohan called 'a system of deception'[45a] and religious worship had become 'not worship of the god but coercion of the god, and invocation is not prayer but rather the

exercise of magical formula.'[46] Once these maladies which vitiated the religious life of the people are noticed, what is important to enquire is the manner in which the society responded to this situation. Was there a general sense of resignation and acceptance or was there any attempt to change and purify the religious life. The emergence of a large number of heterodox sects in almost all parts of India during the course of the eighteenth century indicate the latter. The Satnami, Appapanthi, and Shivanarayan sects in Uttar Pradesh; the Karthabhajas, Balramis, Spashtadavyaka, Kushi Biswasis Ramvallabhis, and Sahebadhanis in Bengal, the Charandasis and Ramsanehi sects in Rajasthan and the Veerabhramas in Andhra Pradesh were, in fact, an expression of social response to the religious conditions prevailing at that time. These sects which opposed polytheism, idolatory, and caste were particularly significant because, being movements of lower castes, they were unlike the nineteenth century reform movements concerned with the problems of mass culture.[47] The Karthabhajas met in congregations twice a year, where all caste distinctions were renounced, ate together as equals, and addressed one another as brother and sister.[48] Charan Das (1703–80) tried to break the priestly monopoly of scriptural knowledge by propagating Vedic truth in simple Hindi and Veerabrahmam advocated the right of every one to acquire Vedic knowledge.[49] The struggle against the monopoly of knowledge has been crucial to the evolution of individualism and the emancipation of the human mind from superstitions fostered by oppressive religious systems. In the nineteenth century Rammohan's translation of the Upanishads into Bengali and Dayanand's advocacy of the right of all to read the Vedas were an expression of this idea. Charan Das, in fact, had anticipated his more illustrious successors. In championing anti-idolatory and anticasteism, like the nineteenth century reformers, he also referred to Vedic authority.[50] Apart from the efforts to reform the methods of worship, to organize periodic congregations and to introduce egalitarian ideas, these eighteenth century sects tried to introduce purity in personal and social life as well as a moral code of behaviour.[51] These sects were not only present in

almost all parts of the country, their following was also not insignificant—each of them had about twenty to thirty thousand adherents. Given that the movements of the nineteenth century with better organization and more enlightened leadership could not initially command a larger social support, the eighteenth century sects could not be dismissed as personal revolts without any social significance. They have to be assessed and understood primarily as an expression of a developing trend of protest and dissent in the religious life of the people, characterized at that time by superstitions and the tyranny of priests. Their failure or success apart—and this depended upon various factors including the subsequent socio-economic developments—they 'testify to the reform movements manifesting in society even independently of foreign influence'.[52]

V

Another assumption commonly held is the prevalence of an abject state of ignorance in eighteenth century India. But for the emancipating role of Western education, it is argued, the Indian mind would have continued to remain in a state of inertia. Surprisingly, in spite of the orientalist-anglicist controversy of the early nineteenth century, almost all discussions on educational progress in India totally ignore the indigenous system of education as well as the educational ideas developed by Indian intellectuals in the nineteenth century, as distinct from the colonial system of education.[53] They are dismissed either as non-existent or as inconsequential. Unfortunately our knowledge of the state of education in the precolonial period is very unsatisfactory and even the sources are very limited and inadequate. Apart from incidental observations by European travellers and British official representatives, contemporary sources are almost non-existent. The only solution is to draw inferences from the reports on the educational conditions during the early part of the nineteenth century which provide considerable insight into the organization, extent, and content of the indigenous system. Thomas Munro's report in 1822 for Madras Presidency, Mounstuart Elphinstone's

report in 1823 for Bombay Presidency, and William Adam's report in 1835–8 for Bengal Presidency are the most important of them. Of these, Adam's reports containing district-wise statistics are the most exhaustive and informative. Adam's passionate involvement with indigenous education led him to undertake very detailed investigations into the state of indigenous education in Bengal. But such interest and enthusiasm were lacking in Bombay and Madras, in spite of Elphinstone's and Munro's respect for traditional institutions, and therefore the reports for these two presidencies remained sketchy and elementary.

The general consciousness about the importance of education, particularly among the members of the upper strata of society, was quite evident. The scholars and teachers were held in high esteem both by the aristocracy and common men and the educated were able to command a distinguished position in society. 'The teachers and students of sanskrit schools,' observed Adam, constitute the cultivated intellect of the Hindu people and they 'command that respect and exert that influence which cultivated intellect always enjoys. . . . There is no class of persons that exercise a greater degree of influence in giving native society the tone, the form and the character which it actually possesses than the body of the learned'.[54]

In the absence of direct control and direction by the state, educational institutions were maintained by voluntary efforts from within the society. The extensive contributions made by rulers and nobles formed an important source of patronage for arts and letters. On taking over the Maratha territory, Elphinstone found that the Peshwa's charities amounted to Rs 15,00,000 and the custom of *dakshina* had contributed to the encouragement of classical learning.[55] In Bengal, Raja Krishan Chandra of Nadia and Rani Bhabani of Rajshahi took keen interest in education. Krishna Chandra gave a stipend of Rs 200 to every student who reported at the *tols* in Nadia and the Rani encouraged Sanskrit education by instituting endowments.[56] In the Carnatic, Tanjore, Travancore, Cochin, and in almost all other states the rulers and their subordinate chiefs contributed to the pursuit of knowledge.

The educational institutions can be broadly categorized as indigenous elementary schools and institutions of higher learning. Adam has identified two types of schools in the former category. The first derived their principal support from the patronage of a single wealthy family and the second depended upon the general support of the community in the town or village in which they were established. The primary object of the former was

> the education of the children of the opulent Hindoos by whom they are chiefly supported, but as the teacher seldom receives more than three rupees a month from that source, he is allowed to collect from the neighbourhood as many additional pupils as he can obtain or conveniently manage. They pay him at the rate of two eight annas per month, in addition to which each pupil gives him such a quantity of rice, pulse, oil, salt and vegetables at the end of each month as will suffice for one day's maintenance.[57]

This was the domestic system centring around the families of the affluent and mainly meant for providing education to their children, but to which the students of the neighbourhood were also drawn.[58] This was an important source for imparting education and the educational facilities available in precolonial India cannot really be assessed without taking this into consideration.

The second category of elementary schools were exclusively maintained by the contribution made by the pupils. In addition to the monthly contribution by each pupil ranging from four annas to one rupee, the teacher was also entitled to receive one day's maintenance per month from each pupil.[59] The *pathshala*s and madrasas run by individual teachers or attached to temples and mosques or maintained by charitable institutions belonged to this category.

Several centres of higher learning in Sanskrit, Arabic, and Persian flourished during the eighteenth century. 'We contemplate', wrote Forbes, 'the Hindu colleges and Brahmanical seminaries, at Banaras and different parts of Hindustan, with pleasure; they are useful institutions; and however limited in their benefits to particular castes and descriptions of people they are the nurses of literature, medicine, and science as far as is deemed necessary among the Hindus.'[60]

The major centres of Sanskrit learning were Benaras, Ujjain, Tirhut, Nadia, Rajshahi, Tanjore, and Trivandrum. Calcutta had 28 seminaries of Sanskrit learning with 173 scholars in 1818, Twenty-Four Parganas had 190 seminaries in 1801 and Nadia had 31 with 747 scholars. In Rajshahi in 1834–5 Adam found 38 colleges of Sanskrit education, 19 of Hindu law, 13 of general literature, two of logic and four of Vedanta, tantric, puranic, and medical learning.[61] According to him, the number of scholars engaged in the study and teaching of Sanskrit was 126,000 in Bengal.[62] The chief centres of Islamic learning were Jaunpur, Lucknow, and Patna.

The extent of educational facilities available in precolonial India has been a point of controversy among scholars. Adam had estimated the existence of 100,000 indigenous elementary schools[63] in Bengal Presidency in the beginning of the nineteenth century. On the basis of the estimate that the population of the province was 40,000,000 Adam came to the conclusion that there was a village school for every 400 persons. He also calculated that there was on an average a village school for every 73 children of school-going age and one for every 30 or 32 boys.[64] 'It will appear', wrote Adam,

> that the system of village schools is extensively prevalent, that desire to give education to their male children must be deeply seated in the minds of parents even of the humblest classes; and those are the institutions closely interwoven as they are with the habit of the people and the custom of the country.[65]

The ratio of one elementary school to every 400 persons or for every 63 school-going children, even in spite of the limited facilities and of the nature of their organization, favourably compares with any country in the world. Philip Hartog has dismissed it as a myth and a fantastic exaggeration.[66] Was it really a myth and an exaggeration? According to the data collected by Adam the districts of Murshidabad, Birbhum, Burdwan, south Bihar and Tirhut with a total population of 5,679,778 had 2,567 elementary schools, whereas on the basis of the hypothetical ratio of 1:400 there should have been 14,200 schools.[67] If so, Adam's calculation

appears to be erroneous. But then the figures for these five districts did not include the centres of domestic instruction which formed an important constituent of the institutional structure. The inclusion of domestic schools would considerably alter the picture. For instance, the six *thanas* of Murshidabad, Daulatbazar, Nanghia, Culna, Jehanabad, and Bhasra with a population of 496,974 had 288 elementary schools, 80 schools of learning, five other schools, and 1,747 schools of domestic instruction thus making a total of 2,120 schools, whereas the ratio of 1:400 would need only 1,241 schools.[68] That 2,414 out of 6,786 students were receiving education in domestic centres underlines the importance of domestic education in precolonial India. Once domestic education is taken into consideration, Adam's assessment ceases to be a myth and an exaggeration.

Though for Bombay and Madras Presidencies the available data are not as detailed as for Bengal, Adam's conclusions are equally true of these areas also. In Madras, Munro found one primary school in every village, approximately for about 1,000 people. According to the reports received from the district collectors there were 12,498 schools in the presidency with a population of 12,850,941. The facilities for domestic instruction were not included in this; the number of students receiving domestic instruction was five times as many as those in other schools. Munro's assessment was that one child out of every three of school-going age received education.[69] In Central India, Malcolm observed that every village with one hundred houses had an elementary school.[70]

The level of literacy in eighteenth-century India cannot be accurately ascertained in the absence of reliable data. However, the investigations of Buchanan in Purnia district of Bengal during the first decade of the nineteenth century provide some useful insights.[71]

Table 13.1

Statistics of Education in Purnia district of Bengal	
Total Population	29,04,380
Number of teachers and Arabic Schools	119
Teachers of Persian and Arabic Schools	66
Sanskrit Teachers	643
Men capable of keeping common account	18,650
Men who could sign their name	16,505
Men who could understand common poetry	1,830
Women who could understand common poetry	488
Total	38,301

The above statistics would mean that about 13 per cent of the total population could read and write which does not compare unfavourably with the 'enlightenment' provided by the British rule.

The content of education, however, did not reflect the advance made in knowledge particularly in science, technology, and social thought in other parts of the world; nor was there an effort to further the traditional knowledge in mathematics and science. It was largely tradition bound with overemphasis on literary texts, grammar, and metaphysics. The study of grammar consumed anything between two to twelve years and that of law and philosophy six to ten years. The education was more of an exercise in memory than excitement to the mind and the teacher-taught relationship induced a sense of conformity and hardly encouraged original thinking.[72] Discussing the defects of this system Adam felt that 'what was wanted was something to awaken and expand the mind, to unshackle it from the trammels of mere usage.'[73]

Nevertheless, the system was sensitive to the changing needs of society and had imbibed a certain utilitarian content. Apart from the knowledge of science and mathematics inbuilt into Arabic and Sanskrit education, the training in correspondence, account keeping, commercial accounts, and agricultural accounts, formed a part of the curriculum in certain schools.[74] Adam remarked that 'my recollections of the village schools of Scotland do not enable me to pronounce that the instructions given in them has a more direct bearing upon the daily interests of life than that which I find

given or proposed to be given, in the humble village schools of Bengal.'[75]

That the Indian society in the eighteenth century was not indifferent to its educational requirements needs no further elaboration. Whether the literary and classical education would have continued to engage the Indian mind and that it would have remained impervious to the advance in knowledge in other parts of the world is inextricably linked with the nature of social change and progress. Yet, Tipu Sultan's emissaries to France and Jaisingh's exchanges with European astronomers[76] bear enough proof that no mental barriers existed for incorporating the knowledge developed elsewhere. When the Christian missionaries introduced books on 'Western Science' into China, the Chinese scholars objected to the word Western and insisted on it being replaced by the word 'New'.[77] Neither precolonial nor colonial India was sensitive to this question. Yet, the dialogue of East and West would have been more meaningful without the mediation of colonialism since it would have kept open the possibility of evolving perspectives rooted in indigenous intellectual and cultural heritage.

While questioning some of the generally accepted assumptions on eighteenth century society, the intention is not to create an ideal picture of precolonial India nor to suggest that India was at the threshold of a transition when colonialism intervened. What is suggested is that in spite of the difficulties experienced in the political and economic life, the intellectual and cultural creativity had not lost its dynamism and vitality. The real disruption of its creative ability was in fact a part of England's work in India.

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11. Ibid., p. 28.
12. Robert S. Lopez, 'Hard Times and Investment in Culture', in Antony Molho, *Social and Economic Foundation of Italian Renaissance*, New York, 1969.
13. Hermaan Goetz, *The Crisis of Indian Civilization in the 18th and Early 19th centuries*, London, 1938.
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16. Mukund Lal, *Garhwal Painting*, New Delhi, 1968; Karl Khandalawala, *The Development of Style in Indian Painting*, Delhi, 1974, pp. 88–92; Jamila Brijbhushan, *The World of Indian Miniatures*, Tokyo, 1979, p. 113; and M.S. Randhawa, *Kangra Rangamala Paintings*, New Delhi, 1971, pp. 11–12.
17. Percy Brown, *Indian Painting Under the Mughals*, New York, 1975, pp. 69–71.
18. Anand Coomaraswamy, *Rajput Painting*, New York, 1975, pp. 11–16.
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20. Randhawa, *Indian Miniature Painting*, 1981, p. 80 and Brijbhushan, *The World of Indian Miniature*, p. 166.
21. Moti Chandra, 'General Survey of Rajasthan Painting-Bundi', *Marg*, vol. 11, March 1958.
22. W.G. Archer, *Indian Paintings from the Panjab Hills*, Delhi, 1973.

22a. B.N. Goswami, *Pahari Paintings of the Nala-Damayanti Theme*, New Delhi, 1975, p. 2.

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24. Savant Singh, the ruler of Kishangarh, fell in love with Bani Thani who was a highly accomplished slave girl. Savant Singh married Bani Thani, abdicated the throne and retired to Mathura.

25. Brijbhushan, *The World of Indian Miniature*, p. 167.
26. Several illustrations could be given for this. See for instance, 'Marriage Procession of Dara Shikoh', Awadh *c.* 1760, No. 58.58/36, National Museum, New Delhi, 'Ragini-Bhairavi', Deccan *c.* 1725, No. 22.3292, Prince of Wales Museum, Bombay and 'Mahlavi with his disciples', Deccan, Early 18th *c.* No. 22.3437, Prince of Wales Museum, Bombay.

26a. See for instance, plate nos 67, 75 and 79 in Brijbushan, *The World of Indian Miniature.*

27. Tarachand, *History of Freedom Movement in India*, vol. 1, p. 192.
28. About Tamil literature Varadarajan has written as follows: 'The literature of this period is full of frigid conceits and pedantic exercises of the grammarians and the simplicity, the directness and the restraint characteristic of the early literature are now lost. Most of the poets of this age seem imitative and repetitive not only in their narrative but also in their descriptions. Taste in poetry had become sophisticated and poets are judged by the jingle of their alliteration and the acrobatics of their metre .... There is, in many works of this period, not so much of art as artificially, and therefore many of these works have fallen into oblivion. Nagendra (ed.), *Indian Literature*, Agra, 1959, p. 48; see also B.K. Barua, *History of Assamese Literature*, New Delhi, 1964, p. 102.
29. Muhammad Sadiq, *A History of Urdu Literature*, New Delhi, 1964, pp. 66–116; Ram Babu Saxena, *A History of Urdu Literature*, Allahabad, 1940, pp. 54–66; George Bearse, 'Intellectual and Cultural Characteristics of India in a Changing Era, 1740–1800', *Journal of Asian Studies*, November, 1965; W.H. Compel, 'The One Great Poet of the People', in V.R. Narla (ed.), *Vemana Through Western Eyes*, New Delhi, 1969, pp. 50–67; G.V. Sitapati, *History of Telugu Literature*, New Delhi, 1968, p. 36; Mayadhar Mansinha, *History of Oriya Literature*, New Delhi, 1962, pp. 155–62; and Sukumar Sen, *History of Bengali Literature*, New Delhi, 1960, pp. 151–62.
30. Mansinha, *History of Oriya Literature*, pp. 156–7.
31. J.C. Ghosh, *Bengali Literature*, London, 1948, p. 85.
32. Both of them lived during the first half of the eighteenth century.
33. Sukumar Sen, *History of Bengali Literature*, p. 153.
34. Ibid., p. 151.
35. Ibid., pp. 158–9.

35a. Tyagaraja had composed about 2000 pieces and the other two had 200 each. P. Sambamoorthy, *Syama Sastri and Other Famous Figures of South India Music*, Madras, 1934, p. 3.

36. R. Rangaramanuja Ayyangar, *History of South Indian (Carnatic) Music*, Madras, 1972, pp. 219–39 and S. Seetha, *Tanjore As a Seat of Music*, Madras, 1981, pp. 200–14.
37. P. Sambamoorthy, *Great Composers*, Book I, Madras, 1978, pp. 5–6.
38. P. Sambamoorthy, 1934, *Syama Sastri*, pp. 30–1.
39. P. Sambamoorthy, 1978, *Great Composers*, pp. 5–6.

40. Ibid., Book II, p. 13.
41. S. Seetha, *Tanjore As a Seat of Music*, Madras, 1981, pp. 200–14.
42. S.A.A. Rizvi, *Shah Walliullah and His Times*, New Delhi, 1980.
43. Jai Singh founded five astronomical observatories at Delhi, Jaipur, Ujjain, Mathura, and Benaras. Astronomers from Bavaria, France, and Portugal frequented his court to hold discussions and as a result Jai Singh was well posted with advances made in astronomy in Europe. It is an indication how endogenous knowledge would have come to grips with the advances made in the West. It is also important that scholars from all parts of the country assembled in Jaipur. V.S. Bhatnagar, *Life and Times of Sawai Jai Singh*, Delhi, 1974, pp. 314 and 343–6. Jai Singh was responsible for planning the Jaipur city which was in all probability the first planned city of India. It was not planned on the design known in the *Shilpas Shastra*, but on Jai Singh's own design. Ashim Kumar Ray, *History of the Jaipur City*, New Delhi, 1978, p. 1, and Satya Prakash, 'Jaipur and its Environs: A study in Architecture', in J.N. Asopa (ed.), *Cultural Heritage of Jaipur*, Rajasthan History Congress, Jaipur, 1979.
44. Hermaan Goetz, 'Later Mughal Architecture', *Marg*, September 1958, vol. 11, no. 4, and Percy Brown, *Indian Architecture: Islamic Period*, Bombay, 1968, p. 113.
45. R.C. Majumdar (ed.), *British Paramountcy and Indian Renaissance*, vol. 10, pt. 2, Bombay, 1965, p. 84.

45a. J.C. Ghosh (ed.), *The English Works of Ram Mohan Roy*, Allahabad, 1906, p. 496.

46. Max Weber, *The Sociology of Religion*, London, 1971, p. 25.
47. Raghuvanshi, *Indian Society.*, pp. 143–6; P.N. Bose, *Hindu Civilization*, vol. 1, Calcutta, 1896, pp. 115–16; G.N. Sharma, *Social Life in Medieval Rajasthan, 1500–1800*; Agra, 1968, pp. 237–9; Tarachand, *Influence of Islam on Indian Culture*, Allahabad, 1954, pp. 203–5; Pramatha Nath Bose, *A History of Hindu Civilization*, vol. 1, New Delhi, 1975, pp. 105–20; K. Veeraraghavacharyula, *Mona Gurudevudu* (Telugu), Kandimallayapalle, 1963, pp. 120–36 and Jakjula Swaminathaiah, *Sri Pothuluri Veerabhrahmagari: Jeevitha Charitha*, (Telugu), 1933, pp. 162–70. I am thankful to V. Ramakrishna, principal, Jawahar Bharati, Kavali, for translating the Telugu sources.
48. K.K. Datta, *Survey of India's Social Life and Economic Conditions in the Eighteenth Century, 1707–1813*, 1961, p. 4. The other sects in Bengal showed similar tendencies and some of them admitted even Muslims as members. See Amitabha Mukherjee, *Reform and Regeneration in Bengal*, Calcutta, 1968, pp. 128–9.
49. V. Ramakrishna, 'Social Reform Movement in Andhra, 1848–1919.' unpublished PhD thesis, Jawaharlal Nehru University, New Delhi, 1977, p. 81. Veerabrahmam had also advocated certain reforms, the marriage of girls only after puberty, for instance, which became points of controversy among the reformers in the nineteenth century.

50. Beni Gupta, 'Charan Dasi Sect,' *Journal of the Rajasthan Institute of Historical Research*, April–June 1974, pp. 16–30.
51. Charan Das laid down that a man should not tell a lie, revile, speak harshly, discourse idly, steal, commit adultery, act violently to any creature, imagine evil, entertain hatred, and possess conceit or pride, Gupta, 'Charan Dasi Sect'. The Karthabhajas also laid down ten rules of conduct. Ram Sanehis believed in austere habits and insisted on moral and religious discipline. They also abstained from intoxicants, tobacco, and nonvegetarian food. G.N. Sharma, *Social Life in Medieval Rajasthan*; Tarachand, *Influence of Islam*, pp. 205, 239, and John Campell Oman, *The Mystics, Ascetics and Saints of India*, London, 1905, p. 133.
52. Raghuvanshi, *Indian Society*, p. 146. Also see H.H. Wilson, *Essays and Lectures Chiefly on the Religion of the Hindus*, vol. 2, London, 1862, pp. 76–7.
53. For these ideas see K.N. Panikkar, Presidential Address, *Proceedings of Indian History Congress*, 36th Session, Aligarh, 1975, Section III, pp. 370–6.
54. William Adam, *Reports on the State of Education in Bengal*, (ed.), A.N. Basu, Calcutta, 1941, pp. 274 and 429.
55. Raghuvanshi, *Indian Seciety*, p. 172.
56. Adam, *Reports*, p. 166.
57. Ibid., p. 56.
58. At Pandua in Hughly district, it is said to have been the practice of the Muslim land proprietors to entertain teachers at their own private cost for the benefit of the children of their neighbourhood, *and it was a rare thing to find an opulent farmer or head of a village who had not a teacher in his employment for that purpose.* (Emphasis in the original), Adam, *Reports*, p. 57.
59. Ibid.
60. J. Forbes, *Oriental Memoirs*, vol. 1, London, 1834, p. 471.
61. Adam, *Reports*, pp. 175–83.
62. Ibid., p. 17.
63. By indigenous elementary schools Adam meant 'those schools in which instruction in the elements of knowledge is communicated, and which have been *originated and are supported by Natives themselves*, in contra-distinction from those that are supported by religious or philanthropic societies.' Adam, *Reports*, p. 6 (emphasis added).
64. Ibid., pp. 6–7.
65. Ibid., p. 7.
66. Syed Nurullah and J.P. Naik, *History of Education in India*, London, 1962, p. 11.
67. Ibid., pp. 14–16.
68. Ibid.
69. *Manual of the Administration of the Madras Presidency*, Madras, 1885, p. 568.
70. John Malcolm, *Memoirs of Central India*, vol. 2, London, 1832, p. 190.

71. Raghuvanshi, *Indian Society*, p. 196.
72. Adam, *Reports*, p. 18.
73. Ibid., p. 147.
74. Ibid., p. 252.
75. Ibid., p. 146.
76. Bhatnagar, *Life and Times*, p. 314.
77. Joseph Needham, *Within the Four Seas: The Dialogue of East and West*, London, 1969, pp. 12–13.

2

The Ideologies and Practices of Mapping and Imperialism*

Matthew H. Edney

The activities of the East India Company in sponsoring science are an obvious point of approach to the whole ideology of British rule. The Great Trigonometrical Survey of India shows the workings of British policy better than still another study of Macaulay's education minute.

Susan Faye Cannon, 1978

Imperialism and map-making intersect in the most basic manner. Both are fundamentally concerned with territory and knowledge. Their relationship was the subject of Jorge Luis Borges' famous fantasy of an empire so addicted to cartography that its geographers constructed an unconscionable map at the same size as the empire itself, coinciding with it point by point.[1] This satire is rooted in an important realization: knowledge of the territory is determined by geographic representations and most especially by the map. Geography and empire are thus intimately and thoroughly interwoven. 'In order to set boundaries to their empire and to claim to have reached those that were marked out:' Claude Nicolet writes of the Romans, they

* First published in *Mapping an Empire*, University of Chicago Press, Chicago, pp. 1–36.

needed a certain perception of geographical space, of its dimensions and of the area they occupied . . . . the ineluctable necessities of conquest and government are to understand (or to believe that one understands) the physical space that one occupies or that one hopes to dominate, to overcome the obstacle of distance and to establish regular contact with the peoples and their territories (by enumerating the former and by measuring the dimensions, the surfaces and the capacities of the latter).[2]

To govern territories, one must know them.

In the case of the British conquest of South Asia in the hundred years after 1750, military and civilian officials of the East India Company undertook a massive intellectual campaign to transform a land of incomprehensible spectacle into an empire of knowledge. At the forefront of this campaign were the geographers who mapped the landscapes and studied the inhabitants, who collected geological and botanical specimens, and who recorded details of economy, society, and culture. More fundamentally than even Susan Cannon recognized, the geographers created and defined the spatial image of the Company's empire. The maps came to define the empire itself, to give it territorial integrity and its basic existence. The empire exists because it can be mapped; the meaning of empire is inscribed into each map.[3]

Imperial British India was far more dependent on maps than early imperial Rome had ever been. The steady expansion of map literacy in Europe since 1450—driven by new print technologies, protocapitalist consumption, and humanist culture—meant that by the eighteenth century the map had become, and has since remained, the dominant vehicle for conveying geographical conceptions. The intellectual process of creating, communicating, and accepting geographical conceptions, whether at an individual or socio-cultural level, is thus often referred to as mapping. It is a process which in the modern world depends heavily on the actual production of maps, which is to say map-making per se. Just as, in Samuel Johnson's phrase of 1750, 'when a book is once in the hands of the public, it is considered as permanent and unalterable; and the reader . . . accommodates his mind to the author's design, so maps shape and manipulate mental geographical images'.[4] The

map-making process and the resulting maps are in turn dependent on aculturated conceptions of space. As with any other form of representation—graphic or textual, artifactual or ephemeral—meaning is invested in all aspects of cartography: in the instrumentation and technologies wielded by the geographer; in the social relations within which maps are made and used; and in the cultural expectations which define, and which are defined by the map image.[5]

This study of the surveys and maps which the British made in and of South Asia during the first hundred years of their ascendancy is accordingly a study of the British conceptions of what India should be. It is a study of how the British represented their India. I say 'their India' because they did not map the real India. They mapped the India that they perceived and that they governed. To the extent that many aspects of India's societies and cultures remained beyond British experience and to the extent that Indians resisted and negotiated with the British, India could never be entirely and perfectly known. The British deluded themselves that their science enabled them to know the real India. But what they did map, what they did create, was a *British* India. Wrapped in a scientistic ideology, each survey and geographical investigation was thoroughly implicated in the ideology of the British empire in South Asia.

A Spatial History of 'India' to 1780

The creation of British India required the prior acceptance by the British of 'India' as signifying a specific region of the earth's surface. Changes in the European involvement with Asia during the seventeenth and eighteenth centuries produced important changes in geographical conceptions, which were in turn more broadly accommodated and disseminated through cartographic representations. The issue here is that unless a region is first conceived of and named, it cannot become the specific subject of a map. Conversely, a mapped region gains prominence in the public eye. For example, there could be no maps of Southeast Asia until the Second World War, when the several colonial spheres

of interest were replaced by a single theater of war; the distribution of maps of that theater subsequently led to the general acceptance of Southeast Asia as a region sufficiently coherent and meaningful to warrant its own academic discipline.[6] For South Asia, changing economic and political activities led to new geographical conceptions which, by the later eighteenth century, had developed into an image of India that coincided with the territory of the subcontinent and which was given meaning by the commercial and imperial ambitions of the British.

In the fifteenth and sixteenth centuries, Europeans conceived of Asia as an ill-defined series of exotic and fabulously wealthy countries. There was Cathay (China), Cipangu (Japan), and the Indies. The conception of the Indies derived from Hellenistic Antiquity. It originally signified all the lands east of the Indus, the traditional eastward limit of the Hellenistic world. The Hellenistic image of the Indies was adopted by Renaissance Europe from the geographies of Ptolemy and Strabo and, although the Ptolemaic map was quickly supplanted by new maps constructed by Portuguese navigators, the Hellenistic nomenclature survived. *India intra gangem*—the Indies this side of (within) the Ganges—comprised all the lands lying between the Indus and the mouth of the Ganges and included the peninsula, which Ptolemy seems to have transformed into Taprobana, the oversized Sri Lanka. *India extra gangem*—the Indies beyond (outside of) the Ganges—comprised all the lands further west, specifically Indo-China and modern Indonesia. Some Renaissance geographers carried the name to its logical extension and called China 'India superior.' Christopher Columbus's conviction that he had indeed reached the Indies in 1492 resulted in the name being transplanted to the New World. The Indies henceforth became the East Indies, or East India. Thus, the London merchants who sought to compete with the Portuguese in the spice trade, and for which they received a monopoly charter from Elizabeth I in 1600, soon acquired the popular name of the East India Company.

The initial plan of the English merchants was to establish trading centres in what is now Indonesia in order to control the

supply of spices. They did so, but were evicted by their Dutch coreligionists in 1623. The English resorted to trading across the whole width of the Indian Ocean, from Arabia and East Africa to the Malay Peninsula and further east to southern China. They established several trading centres, known as factories, of which three on the coast of the subcontinent were dominant by 1700: Madras (Fort St George), Bombay, and Calcutta (Fort William). The East India Company appointed a council of traders at each of these factories to manage the Company's affairs in each portion of the subcontinent. Each small bureaucracy was known as a presidency because its governing council was headed by a president; this name continued to be used even when the three small administrations were transformed into major territorial governments.

The three presidencies were functionally distinct during the initial period of English involvement in South Asia, that is, before the mid-eighteenth century. Administratively, none were responsible for the others. More often than not, they competed rather than cooperated with each other. The principal presidency was Madras. Bombay and Calcutta gave access to the markets and produce of the great Mughal Empire, which dominated the north of the subcontinent, but the empire also regulated the English traders. Madras, on the other hand, lay on the southern fringes of Mughal power so that the English there enjoyed much greater economic flexibility. Located at the centre of the Indian Ocean trade routes, and set up as an early version of a free-trade zone, Madras flourished. The French Compagnie des Indes sought to emulate the English success when it established its own factory at Pondicherry, just to the south of Madras.

European maps accordingly framed the subcontinent in three distinct ways in this early period. Beginning in the early 1500s, general maps showed the traditional region of the Indies, from the Indus to Indo-China. The subcontinent was, of course, a prominent feature of these maps but it was not their focus. Later in the sixteenth century, Europeans began to produce maps that framed only the peninsula south of the river Krishna, the area of

their principal involvement. The third framing developed in the early seventeenth century and focussed on the polity of the Mughal Empire. These maps emphasized the seat of Mughal power in the northern plains. They also included the Mughal territories west of the Indus: the Punjab, the Hindu Kush, and on occasion Afghanistan. They omitted the peninsula.[7]

The three framings began to merge in the eighteenth century. In part, this was a manifestation of the Enlightenment's encyclopedic mentality, which produced massive tomes intended to present all available knowledge to their bourgeois readership in a systematic manner. Geographical encyclopedias took the form of huge multivolume texts, which contained many small maps, as well as huge multisheet cartographic extravaganzas. These maps were constructed at such large scales, and were physically so big, that the cartographer could simply copy data directly from survey maps into the expansive graticule of latitude and longitude; he would not have to omit any data to ensure the new map's legibility.[8]

The prominent French cartographer J.B.B. d'Anville published the first such map of the Indies in 1752. He constructed his *Carte de l'Inde* in four sheets at a scale of about 1: 3,000,000. It comprised almost one square meter of paper, too large to be reproduced here in its entirety. It was framed like all other maps of the Indies, extending from the Indus to the China Sea, with the subcontinent on the left and Indo-China on the right. It was not much smaller in scale than maps of the two regional framings, and d'Anville copied data from them directly into the larger frame. The quality of d' Anville's sources was variable. As the region of most European activity, the peninsula was shown in greatest detail; d'Anville used the same sources to construct a somewhat larger-scale map just of the Carnatic, which was published in 1753. For the rest of the Indies, d'Anville's data was so sparse that the map was dominated by substantial areas of white space. D'Anville himself acknowledged that he would never have made this map with such sparse data had not the Compagnie des Indes specifically commissioned him to do so; nor was he reluctant to express his dissatisfaction with the map once it had been published.[9]

More significantly for the idea of India, the southward expansion of Mughal power under Aurungzeb (reigned 1658–1707) in the later seventeenth century led to the merging of the two regional framings in the early eighteenth century. As the empire now encompassed all but the southernmost tip of the subcontinent, in name at least, European cartographers extended their maps of the empire to incorporate the peninsula. Hermann Moll's 'The West Part of India, or the Empire of the Great Mogul' (1717) is just one of several maps which equated the subcontinent (the west part of the Indies) with the empire. The map's frame now encompassed the entire region usually considered to be India per se, specifically the lands south of the entire circuit of northern mountains and including the lands west of the Indus. Nonetheless, there is still an ambiguity in such maps between the old regional concept of the Indies and the Mughal Empire.

It is no coincidence that the early eighteenth century was also the period when the English and the French began to meddle seriously in South Asian politics. The prize was the immense revenue derived from land taxation, revenue which promised to far surpass the profits which could be realized even by monopoly trade. Initially, both European trading companies rented out their regiments to Indian princes; soon they sought to control the princes' finances directly. During the Seven Years' War (1756–63), the global rivalry between the English and the French spilled over into a struggle for control of the Carnatic. A paradoxical consequence of this conflict was a major shift in English interests away from the south to the north, to Bengal, and to the heart of the Mughal Empire. In what might have remained a comparatively minor aspect of the war, a small British army under Robert Clive defeated the nawab of Bengal at Plassey in 1757, by intrigue as much as by force of arms. The English merchants found themselves in control of one of the richest provinces of the Mughal Empire. Clive subsequently negotiated, in 1765, a formal position for the Company as the province's *diwan*, or chief financial and administrative officer. Thereafter the Company steadily eroded the position of the nawab until they pensioned him off altogether in 1772.

The Company's dramatic territorial growth subsequent to Plassey did not take place in a vacuum. At home, the Company's territorial gains did not please many in parliament. A series of political arguments over the very existence of the Company culminated in William Pitt's India Act of 1784. The Company's mercantile and territorial functions were separated in order to curb the excesses of the 1760s. As Calcutta was now the most important presidency, its governor was promoted to be governor general of Bengal and given authority in political and military affairs over both the Bombay and Madras presidencies. The governors and the commanders-in-chief of all three presidencies were henceforth to be appointed by the British Crown. And, perhaps most importantly, a parliamentary 'Board of Control' was established to oversee, and if necessary to veto, the decisions made by the Company's directors; the board's president became a member of the cabinet. The 1784 act accordingly serves as a useful date for marking the conversion of the Company from a mercantile corporation to a major territorial power. I should also note that the conscious efforts at this time by the English to incorporate the Scots into the home and colonial governments meant that the English East India Company is henceforth more properly referred to as being British in character.

In South Asia, the British territorial acquisitions were part of the larger process of the Mughal Empire's slow disintegration. The forms and rituals of the empire remained, and the Mughals remained the wellspring of authority. Even so, actual control of Mughal territories increasingly devolved onto the provincial governors and to new territorial powers. The Marathas had long been in conflict with the Mughals in western India and they now established new dynastic states. They also entered into a three-way contest for control of the empire, competing with the Afghans and the Mughals themselves; by the 1780s, the East India Company had replaced the Afghans in the struggle.

It was therefore during the 1760s and 1770s that the two regional framings completely merged to create a conception of India as a region characterized by multiple ambitions to take

control of the Mughal Empire. That empire had already expanded to cover the entire subcontinent; now British interests followed suit, expanding to encompass the north as well as the south. The new region was mapped as the domain of conflict between the Mughal Empire, its successor states, and British interests. It looked as much to Afghanistan and the West as it did to Malaya and the East. Its autonomy was graphically manifested by the repositioning of the centre line of the map frame to be coincident with the subcontinent's north-south axis. Modern India was born.

Rennell and the Framing of India, 1782–8

The new conception of the subcontinent as an actual region in and of itself was most apparent in, and most effectively disseminated by, James Rennell's maps of India and their accompanying geographical memoirs.[10] As surveyor general of Bengal, Rennell had collected together the geographical data acquired by British army columns on campaign. There was now sufficient information that he could compile general maps of the entire subcontinent with much less white space than had plagued d'Anville's maps thirty years before. Admittedly, the detail of some areas remained rather sparse, especially to the northwest. Nonetheless, Rennell's maps provided the definitive image of India for the British and European public. It is in his highly influential maps that we find the establishment of India as a meaningful, if still ambiguous, geographical entity.[11]

The ambiguity of the region is most obvious in the various names that Rennell used to refer to the region that his maps framed. The titles of the maps and the memoirs all used 'Hindustan.' But this was not a self-evident region, so Rennell began both of his memoirs with an explanation of its extent. 'Hindustan'—land of the Hindus—was originally coined by the early Islamic marauders to refer to the northern plains they conquered. Many Europeans adopted this usage. But the plains were also the historic core of Mughal power, so that Hindustan was used by some Europeans as a synonym for the empire. Because Hindus dominate South Asia

and, furthermore, because the Mughal Empire had by 1700 been extended almost to Cape Comorin, many Europeans took the entire subcontinent to constitute Hindustan. Rennell did not select one of these three conceptions as being the proper one; instead, he conflated them. The titles of his memoirs explicitly equated Hindustan with the Mughal Empire—*Memoir of a Map of Hindoostan; or the Mogul['s] Empire*—whereas the maps themselves were of the entire subcontinent. But within the memoirs themselves, Rennell usually referred to the whole subcontinent as India. He thus established a conceptual equivalency between the subcontinent, India, and the Mughal Empire: they all referred to the same fundamental region which he mapped.

The equivalency was borne out in Rennell's cartographic portrayal of political entities. He decided to subdivide India according to the Mughal *subas* (provinces) as defined under Emperor Akbar (reigned 1555–1605). Although these divisions did not extend very far south of the Krishna River, Rennell nonetheless thought that the system was 'the most permanent one.' His knowledge of the old divisions came from the recent translation of an Islamic geography of the empire, the *A'in-i Akbari* (1598).[12] Rennell showed the names of the subas in regular type on his maps, to distinguish them from contemporary political divisions in a cursive script. The new polities were named after their rulers, such as Nizam Shah or Moodajee Bhonsle. Rennell explained his decision:

> It must be observed, that since the empire has been dismembered, a new division of its provinces has also taken place . . . These modern divisions are not only distinguished in the map by the names of the present possessors; but the colouring also is entirely employed in facilitating the distinctions between them. So that the modern divisions appear, as it were, in the *fore ground*; and the ancient ones in the *back ground*; one illustrating and explaining the other.[13]

Rennell's failure to identify the East India Company as the contemporary ruler of Bengal implied that Bengal was still a Mughal suba and that there had been a legitimate delegation of Mughal authority to the British. Conversely, the emperor himself, Shah Alam (reigned 1759–1807) is identified as actually ruling

only the district around Delhi. Rennell thus justified British authority over Bengal as stemming from the sovereign authority of the Mughal Empire, even as that empire had itself collapsed into apolitical anarchy signified through the names of rulers rather than regions. Rennell left the British as the sole representatives of the empire's legitimate and suprapersonal authority.

Rennell was himself an avid supporter of the East India Company's 'splendid territorial aggrandizement.' He devoted several paragraphs of his geographical memoirs to the defense of his old patron, Robert Clive, and of others who supported the Company's territorial conquests against critics in London. He was particularly motivated in his 1792 map of southern India to help explain the present state of the political geography of the Peninsula, together with the advantages that may be derived from our territorial acquisitions.[14] But this is not to say that Rennell possessed any greater idea of a future British Empire which would one day cover the whole subcontinent. Instead, the maps of India-as-subcontinent produced by Rennell and copied by other European geographers reflected the continuing potency of the Mughal Empire as the sole source of authority in the subcontinent. Contemporary politicians thought that the legitimacy of British power ultimately rested on the Company's adherence to forms of Mughal power and on its claim to rule Bengal as the imperial diwan. That is, the new regional maps embodied the recognition by all political factions that the Company's fortunes had become embroiled with the Mughal Empire and its heirs, both de facto and de jure, almost to the exclusion of its other interests in Asia.

This message also constituted the essence of the remarkable title cartouche for Rennell's first map. Most eighteenth-century maps were given intricate title cartouches, but very few were as elaborate as this. Rennell gave the following explanation in the memoir:

Explanation of the Emblematical Frontispiece to the Map

Brittannia [sic] receiving into her Protection, the sacred Books of the Hindoos, presented by the Pundits, or Learned Bramins: in Allusion to the humane Interposition of the British Legislature in Favor of the Natives of

Bengal, in the Year 1781. Brittannia is supported by a Pedestal, on which are engraven the Victories, by means of which the British Nation obtained, and has hitherto upheld, its Influence in India: amongst which, the two recent ones of *Porto Novo* and *Sholingur*, gained by *General [Eyre] Coote*, are particularly pointed out by a Sepoy to his Comrade.[15]

In the background of the image, an East India man is being loaded (the Indian on the beach, beyond the pandit proffering Britannia the sacred texts, can only be dragging his load toward the ship). Britannia's spear rests possessively on a bolt of cotton cloth (then the main Indian export to Europe), next to an artist's palette, mathematical dividers, and the stonemason's mallet and chisels (perhaps alluding to the freemasonry then resurgent in Europe). The iconography develops on that established in the 1730s, as with funerary statuary, in which India was personified according to 'notions of place as a function of commerce or as a reference to the Orientalists' enthusiasms.'[16] The textual components of British orientalism are emphasized, with the Brahmins handing over their legal texts (*sastras*), but its artistic (the palette), cartographic (the dividers), and architectural (the ziggurat at rear) elements are all included.

To these conceptions Rennell added the celebration of empire and of British arms, very much in the Roman mould, complete with mercenary soldiers (the sepoys) and an imperial wreath. The wreath is not made from hallucinogenic laurel, used by oracles for divinely inspired visions, but rather from the opium poppy, the primary cash crop for the China trade. The Roman influence extended to the map itself, as Rennell used Roman sources for fixing places in the northern plains and gave a scale bar for Roman miles in addition to those for geographical [nautical] miles, statute miles, and the *coss*, a common Indian unit of distance. Rennell thus established India as the site of glorious conquest and territorial aggrandizement.

The continued expansion after 1790 of the Company's territories and of its political power produced an increasing congruence between the old Mughal and the new British empires. The Company's interests, which had grown in 1757 to encompass the eastern seaboard of the subcontinent, expanded still further.

By 1818, British military strategy took the entire subcontinent into account even if the British had yet to conquer it all.[17] And with that expansion came new geographical information to be fitted into new editions of old maps or to serve as the basis of entirely new maps of India. The new information was collected and organized according to the new polities shaped and created by British hegemony. The maps of India produced both by the Company's officers in India and by its client cartographers in London increasingly reflected that organization, replacing the Mughal provinces with British districts and creating a geographical entity defined by the extent of British-dominated states and provinces.

Over the course of the nineteenth century, the British mapping of India further consolidated 'India' in its modern image. Rennell had to take great care in defining what he understood to be the regions which constituted India. A century or more later, such care was no longer necessary. The geographical rhetoric of British India was so effective that India had become a real entity for both British imperialists and Indian nationalists alike. Both groups held India to be a single, coherent, self-referential geographical entity coincident with the bounds of the South Asian subcontinent and the extent of British power but which nonetheless predated British hegemony. Thus, one historian could state in 1902 that the purpose of his account of the empire was 'to set before the ordinary reader the story of the steps by which India came gradually to be painted red on the map.'[18] The triumph of the British Empire, from the imperialist perspective, was its replacement of the multitude of political and cultural components of India with a single all-India state coincident with a cartographically defined geographical whole.

This geographical conception of India was adopted without question in the second half of the nineteenth century by Indian nationalists. They argued that there had historically been a region of cultural unity which coincided with the entire subcontinent. This position is enshrined in the present-day state of India, which has asserted that its northern frontier has run 'approximately where it runs now [1959] for nearly three thousand years.'[19] India is not unique in this respect. Benedict Anderson has noted that

both Thailand and Indonesia have inherited the 'colonial imaginings' of coherent geographical entities which supposedly predate the colonial era.[20]

The nineteenth-century consolidation of the idea of India was not a direct outgrowth of the initial framing of the region in the late 1700s. The consolidation depended on the comprehensive mapping of British India. In constructing a uniform and comprehensive archive of India, the British fixed the scope and character of the region's territories. They located and mapped the human landscape of villages, forts, roads, irrigation schemes, and boundaries within the physical landscape of hills, rivers, and forests. They also undertook cadastral surveys, delimiting field boundaries, buildings, and even individual trees, when agriculturally important, at scales sometimes as large as forty feet to an inch (1:480). The British made themselves the intellectual masters of the Indian landscape. And they did so with all the certainty and correctness granted by the Enlightenment's epistemology.

That epistemology, however, was flawed. The archive was certain and truthful only within the rhetoric of the Enlightenment philosophes. 'India' does not comprise a preexistent stage, framed by mountains and oceans, on which the events of history play out. It is not a 'theater of its own design,' to use Paul Carter's phrase. It is instead a creation of historical events and processes. It is, like all other regions to which we ascribe some meaning, the product of spatial history.[21] To believe otherwise requires intellectual convolutions. B.B. Misra has stated, for example, that although it is 'a unified geographical category equipped with national frontiers, the Indian subcontinent has hardly ever been a single, integrated political entity.'[22] The geographical unity of India is, in short, a creation of the British mapping of their empire.

The Cartographic Ideal and the Great Trigonometrical Survey of India

The conceptual potency of James Rennell's framing of India and the subsequent consolidation of that image depended on European culture's unquestioning acceptance of maps as

unproblematic and truthful statements of geographical reality. The formation of this cartographic ideal had two stages. First, the Enlightenment philosophes developed an epistemological ideal: correct and certain archives of knowledge could be constructed, they believed, by following rational processes epitomized by map-making. In the case of map-making, however, the epistemological ideal was undermined by recognized flaws in cartographic technologies. The second stage in the formulation of the cartographic ideal accordingly came with the widespread promulgation of a technological solution—triangulation—which promised to perfect geographical knowledge.

In British India, triangulation was represented by the Great Trigonometrical Survey of India (GTS). Because of the GTS, the British could believe that they were indeed constructing a single, complete, truthful, and ordered archive of geographical knowledge for their empire, even though a single, systematic, and coherent survey organization for all of their empire—the Survey of India—was not established until 1878. The literature of the early British surveys in India reflects this belief: the simple presence of the GTS was sufficient to bring all the British map-making activities into a single, coherent whole. At the core of this study, however, lies the argument that, in practice, the British could never implement the technological ideal offered by triangulation and were forced to rely on the older epistemological ideal of the eighteenth century. That is, the British could only make their general maps of South Asia by combining multiple surveys within a framework of latitude and longitude. The epistemological ideal is itself open to an extensive critique. More generally, some recent writers on the culture of imperialism have accepted the claims for constructing complete archives of knowledge at face value. As I will further argue, such perfection and total comprehensiveness is impossible *in practice*. The European knowledge of each empire is accordingly far more incomplete and nuanced than has often been recognized.

Rennell provides the starting point for the eighteenth-century style of topographic map-making in India. He made the first

borders with their sovereignty, so that a breach in the one is a breach of the other. Consideration of the state-territory relationship has thus focused on the role of the border as the line of physical contact and conflict between states and as the delimiter of territory to be filled by the culture and economy of the state's dominant centre. Drawing attention back to the rhetorical domination of territory as an active component of the internal negotiations of modern state formation provides an approach to the continuing problem of nationalism and its rhetoric of territorial rootedness.[59]

The present study is therefore more than the history of a particular cartographic institution or a particular manifestation of British imperialism. My concern is with the elite British construction of knowledge, with their assumptions and ideologies, as part of the broader goal of understanding the empire they created in India. (I must stress again that I am interested in the construction of knowledge by an elite: the scope of knowledge is determined not by some fiction of ethnicity but by society and economics.) I am interested in the cartographic culture transplanted from Europe to India by the British elites. Cartographic culture encompasses not material map-artefacts but the understanding of the practices of cartography which a society possesses, the forms of representation employed to experience and explore the world, and the means whereby the social order permeates those representations in order to recast and recreate itself.[60] That is, this is a study of the creation of a legitimating conception of empire, of political and territorial hegemony, mapped out in a scientistic and rational construction of space.

Notes and References

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5. Matthew H. Edney, 'Cartography without "Progress": Reinterpreting the Nature and Historical Development of Mapmaking', *Cartographica*, vol. 30, nos 2 and 3, 1993, pp. 54–68.
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9. J.B.B. d'Anville, *Carte de l'Inde dressée pour la Compagnie des Indes*, Paris, 1752; d'Anville, *Eclaircissemens géographiques sur la Carte de l'Inde*, Paris: 1753, vi, re his dissatisfaction; L. Ch. J. Manne and Jean Denis Barbié du Bocage, Notice *des ouvrages de M d'anville, Premier Géographe du Roi . .*, Paris, 1802, no. 162. D'Anville, *Coromandel*, Paris, 1753; Manne and Barbié du Bocage, no. 165; cf. d'Anville, *Carte des cotes de Malabar et de Coromandel*, Paris, 1737.
10. James Rennell, *Hindoostan*, London, 1782, Rennell, *Memoir of a Map of Hindoostan; or the Mogul's Empire: With an Examination of some Positions in the Former System of Indian Geography*, London, 1783; 2d edn, 1785, cited hereafter as *Memoir I*. Rennell, *A New Map of Hindoostan*, London, 1788; Rennell, *Memoir of a Map of Hindoostan; or the Mogul Empire, with an Introduction, Illustrative of the Geography and Present Division of that Country . . .*, London, 1788; 2d edn, 1792; 3d edn, 1793, cited hereafter as *Memoir II*. See chapter 3 for details of the publication history of both maps and memoirs.
11. Clements R. Markham, *Major James Rennell and the Rise of Modern English Geography*, London: Cassell & Co., 1895, is still the best biography. Several highly derivative essays are listed in the bibliography. Rennell's work was translated into French and German; see reviews in *Monatliche Correspondenz zur Beförederung der Erd-und Himmels-Kunde* vol. 4, 1801, pp. 341–4, and vol. 12, 1805, pp. 250–6.
12. Rennell, *Memoir I* 1st edn, iv, repeated in *Memoir II*, 1st edn, vi.
13. Ibid., pp. 1–2, repeated in *Memoir II*, 1st edn, xix–xx. Original emphasis.

Ray's supreme achievement and fame as a nationalist scientist, however, rested on his two-volume *A History of Hindu Chemistry* (1902–9), a meticulous, scholarly reconstruction of the history of the ancient chemical theories and practices, accomplished with a careful reading of Sanskrit texts.[44] Ray divided the development of Hindu alchemy into four periods: the Vedic and Ayurvedic age from 1500 BCE to 800 CE, the transitional period from 800 to 1100, the period of Tantric chemistry lasting from 1100 to 1300, and the iatro-chemical period from 1300 to 1550. Beginning with the knowledge of metallurgy evidenced on the pottery of the Indus Valley Civilization, Ray set forth a history of chemistry in India—documenting alchemic notions developed around medicine in the Vedas and in Ayurveda, tracing the transformation in Hindu medicine as it increasingly used metallic substances in the composition of drugs during the transitional period, depicting the evolution of Hindu alchemy along with the development of Tantric rituals, and describing the final stage of the growth of metallurgy before a decline set in towards the close of the sixteenth century.

This was not a work of nationalist cheerleading but a work of immense sophistication and erudition that assessed the achievements of Hindu alchemy from the point of view of modern experiments and observations. Ray never claimed that Hindu alchemy was an experimental science, but only that its development in India was owed to indigenous sources, not to Greek influence, as European orientalists were wont to believe.[45] He patiently reconstructed the history of Hindu alchemy, including its knowledge of the science of mercury, through its different stages. India, more so than Europe, developed alchemy as a branch of medicine, which meant an inevitable connection of alchemy with faith in deities, because the full efficacy of drugs was believed to require the interposition of the gods. But the higher gods of the *Rgveda* were

> 'almost always personifications of the elements and other natural phenomena, such as the fire and the wind, the sun and the dawn.'[46]

Herbs and plants were recognized for their active properties and were addressed as deities. Even the *Carakasamhita*, the foundational

While Ray made an eloquent plea on behalf of Hindu chemistry, others rose to the defense of Ayurveda, a system of medical ideas and practices first set out in the Vedas and elaborated subsequently in other treatises, most notably in the *Carakasamhita* and the *Susrutasamhita.* Ayurveda had come under increasing attack as quackery by the practitioners of Western medicine, and it was defended spiritedly as science not only by Ayurvedic practitioners but also by those who regarded it as Hindu science.[52] One such able and influential defender was G. Srinivasa Murti, a Tamil Brahmin, Sanskrit scholar, and a doctor trained in Western medicine. Srinivasa Murti's combination of classical Sanskritic erudition and modern Western education drew him to Theosophy.[53] The Theosophical Society, after the establishment of its headquarters in Madras in 1882, was quick to win influence among the Tamil upper-caste elite, who read Theosophy's heady mixture of occultism, mesmerism, positivism, and Eastern philosophy as a strong defence of the ancient Brahminical order. Functioning in this milieu, Srinivasa Murti was well positioned to provide a scientific justification for Ayurveda when he was appointed in 1921 by the Madras government as the secretary of a committee charged to study indigenous medicine. In the report he submitted in 1923, Srinivasa Murti defended Ayurveda and the Hindu scientific method.[54] His purpose, however, was not to render Ayurveda identical to Western science. He showed resemblance and convergence between the two but also asserted the irreducible difference of Hindu science. He did so not only by claiming that Hindu methods were superior to Western methods, but, more interestingly, by refuting the charge that Ayurveda's intimacy with religion and philosophy crippled its scientific status. He wrote:

> To understand this position, we must first realize that, to a Hindu, Philosophy was not a matter of mere speculation or intellectual edification; from his standpoint, no subject of inquiry was worth the study, unless it helped the student to so regulate his life as to lead him to that state of perfection called Moksha. The modern Western conception of Philosophy as a pure speculative, theoretical study dissociated, as it were, from the actual problems of life had no place in his scheme of life; his justification of Philosophy was