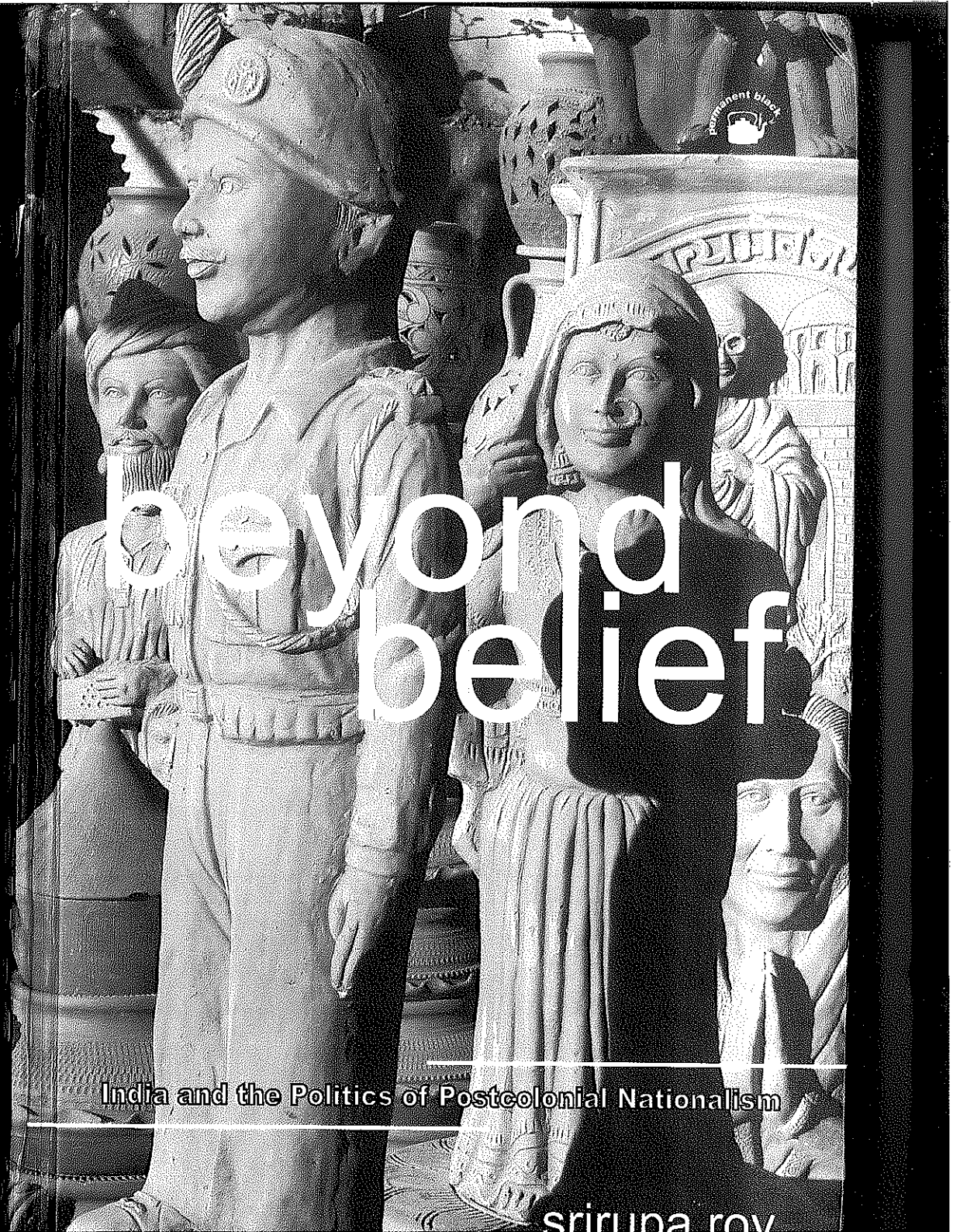
beyond
belief
India and the Politics of Postcolonial Nationalism
sriruna roy

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CONTENTS

tive presumptions that have structured the arena of politics and public culture in postcolonial India.

Chapters 1 and 2 have examined the encounter with the Nehruvian nation-state through visual and ritual practices, respectively. Together they document how the nation-state was seen and performed in the most literal sense; how the attempt to transform "subjects into citizens" following the end of colonial rule was about producing citizens as spectators of their nation, their state, and their ideal selves. But images and passive spectatorship do not exhaust the postcolonial project. In the next chapter I investigate another kind of encounter with the nation-state: the policy discourses and practices of "nation-building" that called for the active participation of citizens as "builders" of the new India.

CHAPTER 3

Indian Darkness

Science, Development, and the Needs Discourse of the Nation-State

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> Mr. Nehru, usually shy of statistics, could tell precisely how many problems India was facing today. He was asked this when he visited Europe recently and he had unhesitatingly replied: "350 million." "Every single individual in India," he said, "is a problem."
> —*Times of India*, July 8, 1953

> Adversity is part of this independence package. The government needs courageous citizens. We have to lift burdens like strong real men. Colonization meant that we weren't burdened, this was part of being enslaved. We can no longer sit back on a bed of flowers. We need to run on thorns.
> —Minister of Education Maulana Azad, August 15, 1948

In the first few decades after independence, the vocabulary of "nation building" dominated both policy debates and political discourse in India. Receiving special emphasis was the ongoing and necessarily incomplete character of Indian nationhood, along with the connotations of nation building as arduous and perilous work. In marked contrast to the celebratory, even triumphal, registers of nationalist discourse that dominate twenty-first-century India—the ascendant imagination of "India Shining" or the proclamation of India as a significant economic and geopolitical global power[1]—the vocabulary of nation building from the initial years after independence conjured up an "Indian darkness" and defined the nation-state as a collection of per-

sistent and unfulfilled problems, failures, and needs. Moreover, and as the epigraphs above indicate, these charges about the continuing problems, unmet needs, ongoing difficulties, and present failures of the nation-state were leveled not by critics but by the agents of the postcolonial state. Equally, the disdain for politics, construed as the machinations of power-hungry politicians, was endorsed and furthered by the state elites themselves in the foundational years of the postcolonial polity. If political practices are, according to Rogers Brubaker, "crucially famed, mediated, indeed constituted by institutionalized definitions of nationhood and nationality," then the "practical category" of nation building framed postindependence Indian politics in a way that alternative conceptions of nationhood as triumph, ease, or plenitude would not have done, with the vocabularies of consent as well as those of critique confirming the role of the state as the chief protagonist of the nation.[2]

To examine how, when, why, and with what effects this particular understanding of postcolonial nationhood emerged is my aim in this chapter. What kinds of institutional practices and political rationalities were associated with such an imagination of the lacking and needy nation? Why was nation building presented as an arduous, uncertain, and incomplete process? Finally, what are the convergences and divergences between the current emphasis of a shining and modern India and the earlier constitution of a modernizing India, between, respectively, the discourses and practices of fulfilled promises and unmet needs?

In the first section I discuss the origins of the postcolonial imagination of India as a "needy nation." I trace its emergence to processes that were unique to the Indian experience of colonialism, nationalism, and decolonization, and to the ideologies and institutional structures of development that dominated the postwar conjuncture. In the next section I turn to the "need for science"—the most common expression of postcolonial needs discourse in Nehruvian India—and the ways in which it enabled the project of nation-state formation.[3] The discourse of scientific needs was not a seamless formation. The two variants of the "need for scientific expertise" and the "need for scientific temper" often contradicted each other and gave rise to competing understandings of the relation between state, nation, and science. In highlighting these contradictions, I draw attention here to the fissured constitution of the Nehruvian nation-state and its dual commitment to state sovereignty and national sovereignty—the investment of sovereign authority in the state as well as in the people/nation. As I will demonstrate, it is through the interplay of these contending projects that the link between nation and state was elaborated and consolidated, and India was defined in terms of its constitutive problems, unmet needs, and inherent deficiencies.

Locating Needs Discourse: Colonialism, Nationalism, and Development

Like other aspects of the postcolonial nation-state project, the needs discourse of the Nehruvian state had extranational and colonial origins. The conception of India in terms of its essential lack, and the broader ideology of development that shaped this conception, were not new inventions of the postcolonial state. At one level, this transposed within the domestic arena the discourses, practices, and ideas about national development that were globally hegemonic at the particular historical conjuncture of the mid-twentieth century, the moment of Indian independence. India was but one of the many newly sovereign nation-states that had committed themselves actively to a developmental model of rapid economic growth through state intervention, receiving both material and normative support from the new ensemble of international institutions that had emerged in the aftermath of World War II.[4] This endorsement of state-led development also entailed the acceptance of a global teleology, or the idea that all nation-states can be lined up along a continuum of more or less evolved in terms of economy, society, politics, and culture, and that it is possible to move from one rung in the ladder of development to the next through the judicious application of an appropriate mix of policies.

The postwar emergence of new international institutions and norms[5]—linked to transformations in the interstate system, the growing prominence of Keynesian economic ideas, and the global reorganization of capital[6]—is undoubtedly important in explaining this phenomenon of "development hegemony" on a global scale.[7] However, to view development as an idea that emerged "fully formed from the forehead of Truman"[8]—the commonly held view that the idea of development originated with the Marshall Plan for the postwar reconstruction of Europe—is to overlook the considerable historical valence of this concept and its intimate relationship to colonial power. As Dipesh Chakrabarty, David Ludden, and Partha Chatterjee among others have pointed out, the discourse of development in postcolonial India drew upon colonial registers of historicist thought and their attendant dichotomies of civilization and backwardness.[9] Through the operations of the "rule of colonial difference,"[10] and its elaboration of a hierarchical distance between the civilized colonial self and the primitive, to-be-civilized colonial other, colonial historicist reasoning had, from the nineteenth century on-

ward (and possibly earlier as well),[11] placed India and Indians in a "waiting room" outside the progressive march of history.

At times, the historicist injunction took the form of a definitive "not ever" or "never," thereby denying the very existence of India as a substantive national community.[12] As the colonial administrator John Strachey famously observed at the turn of the twentieth century: "This is the first and most essential thing to learn about India, that there is not, and never was an India, or even any country of India, possessing, according to European ideas, any sort of unity, physical, political, social, and religious, no people of India, of which we hear so much."[13] On other occasions, however, the absolute denial of the "never" was tempered by the civilizing imperatives of colonial rule and by the quest to improve and reform the lot of Indians through a flurry of legal, economic, political, and administrative interventions. Thus it was not ever, but some day; which also meant not now, "not yet," and not without the guidance and protection of the colonial state.[14]

The colonial commitment to change was not absolute. Failure was a preordained outcome of all civilizing projects. In upholding the principle of state certitude, or the impossibility of wrong outcomes stemming from the actions of the state, these self-fulfilling failures were linked to deficiencies in Indian character rather than to the constitutive flaws of the colonial reform project itself. Other features of the colonial development regime were the separation that it effected between society and economy so that the economy was produced as an objectlike realm for progressive state intervention,[15] along with the use of statistics and the "logic of number" to classify, enumerate, quantify, and otherwise configure India as a mappable "empirical terrain."[16] The deployment of techniques and policy instruments associated with the "new apparatus of [empiricist] cognition"[17] shored up the authority of centralized state power and constituted the state as the ultimate and sole agent of progress.

Nationalist efforts played their own part in advancing the "transition narrative" and the statist logic of the colonial development regime even as they mounted a critique of colonial policy.[18] For the most part, anticolonial nationalism was premised on a demand for a different kind of state that would be able to fulfill the promise of progress rather than on a rejection of state-led developmentalism or of the notion of development itself.[19] For Indian nationalists, Dipesh Chakrabarty notes, "British rule [was seen as] a necessary period of tutelage that Indians had to undergo in order to prepare precisely for what the British denied but extolled as the end of all history: citizenship and the nation state."[20]

The necessity of a state was upheld in both political and economic arenas. In the political domain the Indian National Congress, the Muslim League, and other organizations strove to establish the capacity of Indians for self-government. The economic program developed by the Indian National Congress from the 1920s onward "promised that its state would do everything that the British were doing, but do it better and do it more."[21] By the end of the 1930s the Indian National Congress' proposal for a system of economic planning after Indian independence gave formal structure and coherence to the idea of state-led economic development. For the National Planning Committee convened by the Congress, a representative and indigenous national state would replace a nonrepresentative and foreign colonial state as the harbinger of development and change. The idea of planning that the National Planning Committee settled upon in the course of its deliberations between 1938 and 1940 was that of planning as an "exercise in state policy" to be undertaken by a state-constituted body of "neutral" or disinterested experts. Even before independence the project of planning, according to Partha Chatterjee, "had emerged as a crucial institutional modality by which the state would determine the material allocation of productive resources within the nation: a modality of power constituted outside the immediate political process itself."[22]

As the possibility of independence drew nearer, and in marked contrast to the earlier nationalist discourses about the sanctity of the "inner domain" of national culture and the need for its insulation from state intervention,[23] the progressive agency of a national state was authorized not just in the context of economic development but in the arena of cultural reform as well. A year before the official transfer of power, the National Cultural Trust would chart a cultural policy for the "new India" in which the state's role in reforming, preserving, and promoting an appropriate national culture would be as salient as its role as the "engine" of capitalist growth and economic development.

The discourses of development and progress in postcolonial India thus echoed earlier colonial and nationalist themes, both in regard to the authorization of the state as the agent of transformation and the accompanying characterization of the Indian people/nation in terms of lack or inadequacies, backwardness, and needs. But there was at least one significant difference in postcolonial discourses of development that reflected the unique conjuncture of decolonization, or the fact that developmentalism and historicist reasoning after 1947 were conjoined with discourses and practices of national sovereignty and democracy. What resulted after independence may best be described as a practice of self-placement in history's waiting room;

the saying of "not yet" to ourselves. In postcolonial India, it was neither the colonial construction of the Indian people as the source of backwardness nor the opposing nationalist contention that backwardness instead stemmed from the colonial state that prevailed. Instead, the needs discourse of this period offered a joint indictment of both state as well as people for the present failures of India, and following from this, a joint authorization of both as the agents of progress and development.

Toward this end, visions of the arduous, incomplete, and perilous project of nation-building were elaborated in the five-year plans produced by the Planning Commission after independence, the apex authority entrusted with the responsibility of formulating and overseeing the project of planned development; in the policy discourses of state agencies engaged in furthering different aspects of the developmental project, from science and youth policies to policies on culture and social welfare; and in the innumerable public addresses delivered by a wide variety of state representatives on exemplary occasions such as days of national commemoration or inaugural ceremonies for laboratories, dams, townships, and factories. The main emphasis of the developmental projects was on the unmet needs and present inadequacies of India and Indians. Poverty, illiteracy, technological stagnation, undisciplined youth, chaotic cities, superstitious villagers, self-interested politicians—all of these were upheld as various signs of Indian deficiencies that required the tutelary interventions of the developmental state.

In this manner, postcolonial development discourse remapped the civilization-backwardness dichotomy of colonial historicism within national space. The "cross of 'inadequacy' " was now born by different fragments of the nation.[24] Thus while "every single Indian is a problem," as Nehru observed to his European audience, certain kinds of Indians were especially problematic: "superstitious" peasants; "indisciplined" youth, and even "unscientific" scientists who were unable to apply their professional training in the conduct of their daily lives.[25]

But the themes of national backwardness and lack and the corresponding authorization of state intervention did not exhaust the developmentalist imagination. The theme of popular participation was of equal importance, or the fact that the legitimization of state-led development in the context of political democracy entailed an emphasis on the consensual, voluntary, and enthusiastic participation of "the people." This in turn led to a very different representation of the state, not simply as a problem solver, but as a subject of needs itself.

Although this has been overlooked in much of the available literature on

the developmentalist discourses and practices of the Nehruvian state, the state's "need of assistance" and the call for people to "help the state" were among its most persistent themes, as integral to the representational repertoires of nation-building as was the figure of the backward and needy people/nation. In marked contrast to the premises of state certitude that characterized the colonial development regime, postcolonial developmentalism elaborated visions of state failure and state inadequacy, and presented the task of nation building as perilous, uncertain, and above all incomplete without the willing partnership and active participation of the people.

In sum, what was distinctive about the representational practices and needs discourses of postcolonial development and nation building was not so much their negative constitution of the nation in terms of its deficiencies or the paradox of securing the nation through an insistence on its nonexistence. Such a "performative" expression of nationalism, wherein national becoming rather than national being receives emphasis, is a constitutive feature of nationalist thought and practice across the world.[26] Instead, the mark of distinction was the attribution of lack to the state as well: the fact that the charge of state failure was a state-produced discourse.

Locating Needs Discourse: The Dilemmas of Decolonization

The production of both the state and the people/nation as figures of need, and the related paradox of state-generated discourses of state failure, reflect the specific historical and political conjuncture of postcolonial nation-state formation and its often-contradictory dilemmas and imperatives. Some of these were not unique to India but reflected instead the broader dynamics of decolonization that a wide range of polities across Asia and Africa grappled with in different ways during the period of imperial retreat that followed in the wake of World War II.[27]

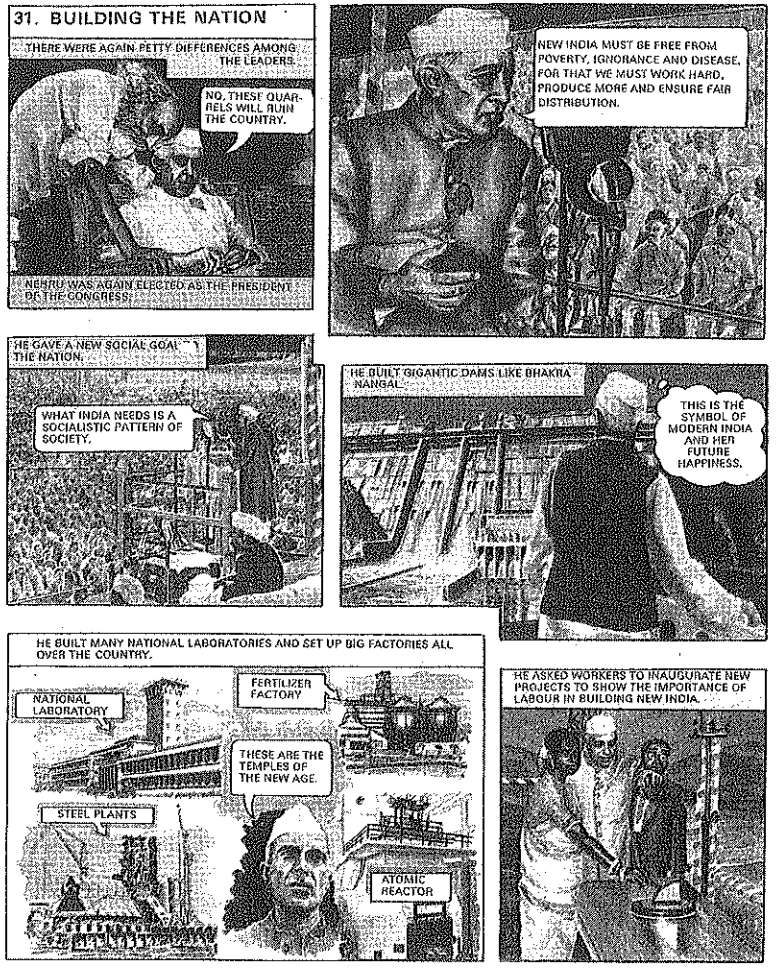
In addition to these general dilemmas of decolonization, the project of nation-state formation in India was structured by a unique set of exigencies that reflected the particular historical experiences of colonialism and nationalism in the South Asian subcontinent, as well as the specific mode of transition from colonial rule that India had experienced. First was the particular conjuncture of the "revolution-restoration" or the "passive revolutionary" nature of India's postcolonial transition. According to the political theorist Sudipta Kaviraj, the mobilizations of anticolonial nationalism and the establishment of a sovereign nation-state in India followed the trajectory of a Gramscian "passive revolution," with competing class claims welded

together in an unwieldy and often unstable alliance between agrarian, industrial, and bureaucratic sections of the bourgeoisie.[28] In this context, the transformative impulses of development and modernization were inevitably tempered. In some instances, proposals for change were abandoned altogether, as in the case of the ultimate failure to undertake substantive land reform legislations.[29] In other instances they were rolled back, as in the case of the effort to reform Hindu personal law. In the face of concerted opposition by Hindu conservatives both within and outside the legislature, the omnibus legislation was eventually passed in a piecemeal fashion minus several of its original clauses that had called for radical changes.[30]

The representational practices of development and modernization in India—the ways in which the state elites explained, described, and justified these processes to national audiences—were also modulated by a similar tempering effect. As described later in this chapter, the imaginary of development would be simultaneously confident and diffident. Reflecting the unique conjuncture of India's passive revolution, state representations of developmentalist projects would emphasize their sweeping ambition and unstoppable logic and also their partial, gradual, and tentative nature.

Further, the "cartographic anxiety"[31] and "territorial ambiguity"[32] that stemmed from the peculiarities of the partition of British India made the consolidation of sovereign state authority an especially protracted process. The unsettled status of the external borders of the Indian nation-state militated against an unambiguous pronouncement of the state's territorial reach. Within the geopolitical confines of India as well, sovereignty was constituted through a series of negotiations, as the central state had to settle the question of accession with each of the many princely states that had enjoyed (nominal) sovereignty during the colonial period.[33] State sovereignty in this context required not just establishing institutional control over a given territory but also establishing the givenness and the meaning of territory itself. This led to a heightened preoccupation with territoriality, as manifested in the anxiety about the vulnerability of India's borders that has repeatedly surfaced in political discourse over the past fifty years. At the same time, however, there also emerged a parallel strategy of disregarding the territorial predicament altogether. India was reimagined as a space constituted not by land and borders but by the abstract grid of national development.

Finally, the question of national identity posed a substantial dilemma. What was the basis on which Indian unity could be proclaimed, given the profusion of mobilized cultural, linguistic, religious, and ethnic groups in India and the absence of a common colonial enemy against which a



Building the Nation, 1971. From *Chacha Nehru*, a comic book produced by the Publications Division, Government of India.

common front of opposition could be forged? What could serve as the common glue of Indian identity, when every choice of a national language or national religion could be construed in partisan terms as an attempt to secure the dominance of a particular subnational group? Such questions drew attention to the difficulties of imagining the national community along familiar axes of ethnicity, religion, language, race, or even territory, and to the fact that the unity of India and the substance of national identity would have to be proclaimed in and through other registers of belonging. The distinctive forms of a "stated nation," where nationhood is defined in terms of how the state fulfills—and fails to fulfill—different sets of national needs, would play a central role in this endeavor. The homogeneous configuration of the nation-state as a space peopled by identical, substitutable individuals would be enabled in the Indian context by the discourse of needs rather than the discourse of rights or of cultural commonalities.

What exactly did this imagination of the "needy nation" entail? To answer this question, I turn to a specific expression of needs discourse in postcolonial India—namely, the "need for science" and the complex of policies, institutions, and projects that were developed to address what was repeatedly described to be the most acute need of the newly independent nation-state.

Needing Science

The Nehruvian state's enthusiastic embrace of science dominated the postcolonial political and cultural field.[34] The identity of the new India was defined in terms of the privileged place that it accorded to science and technology in all arenas of life. For instance, techno-scientific artifacts such as dams, steel plants, and atomic reactors were hailed as the icons of the new nation-state. Policy debates on the many problems and needs that India faced in economic, educational, social, and cultural arenas emphasized their solution through the application of the objective methodologies and neutral rationalities of science. The years after independence also saw a flurry of initiatives for the development of scientific and technological education. The encouragement of science education in schools and universities, the establishment of research institutes dedicated to specific areas of scientific and technological research, and the creation of state-funded elite institutions of scientific and technological education such as the Indian Institutes of Technology were important and much-publicized priorities for the central state. In all of these cases, the lack of science was defined as the primary national problem, and the "need for science" the most urgent and most palpable national need.

Like the colonial provenances of the "development regime"[35] discussed in the preceding section, the postcolonial state's conception of the national need for science can also be traced to the ideologies, practices, and institutional innovations undertaken by colonial state elites. In addition, nationalist and nonstate actors also had a significant role to play in ensuring the domination of science.[36] The distinctive aspect of the colonial state-scientific field related to the kind of state power that it constituted and authorized. As Gyan Prakash has observed in his discussion of colonial science in India, the "democratic deficit" obtaining under colonialism required the state-scientific episteme to expose rather than conceal the coercive abilities of state power.[37] In other words, the colonial state's scientific vision was linked to coercive rather than hegemonic techniques and rationalities of rule.

The postcolonial state's vision of science took a somewhat different form, although there were significant continuities in scientific institutions, personnel, and policy formations before and after 1947. The institutions, practices, and knowledge formations of official science after independence reflected the different imperatives of national rather than colonial forms and strategies of rule. Now the grammars of state science were inflected by new idioms of democratic legitimization and national representation. Instead of solely enabling the exhibition of the state's ability to know and command its subject population, science was now also the site and means for staging unified national consent to, and willing acceptance of, the state's decisions and actions. Thus, while the link between the development and application of science and the welfare of the "native population" had been established in the scientific discourses of the colonial state,[38] the postcolonial description of this link emphasized its dialogic and consensual nature. The official science policy declarations presented the scientific enterprises of the postcolonial state not as unsolicited initiatives derived from the state's superior knowledge of its population, but instead as "responses" to national needs and as evidence of the new state's commitment to "its own" population.[39]

But what did it mean to need science? Who was the subject of this need, and how was it expressed? By whom, and how, could this need be fulfilled? At one level to define India and Indians in terms of a need for science was to insert India within world historical time and to claim world historical agency for the state as the fulfiller of scientific needs. In this rendition, the specificity of Indian needs received less attention than did the universal nature of the "problems" that India faced. In the rhetoric of Nehruvian India, science was

described as a need that manifested itself with equal urgency in new and old, Western and non-Western, and developed and underdeveloped nations. The discourse of scientific needs was harnessed to a wider project of claiming international recognition and commensurability for the nation-state that can be termed, pace Dipesh Chakrabarty, the project of "universalizing India."[40]

For instance, in the context of the legislative discussions on the Atomic Energy Bill in 1948, Nehru's argument for why the state should invest considerable resources in atomic energy research and development activities drew upon civilizational rather than national registers. For Nehru, the development of atomic energy in India was an unavoidable necessity. He argued that it was impossible for India to ignore the call of science, conceptualized here as a universal *geist* that affected all of humankind in the same way and at the same time. Thus while some delegates elaborated visions of an "Indian science" by turning to Hindu religious texts for a prefiguration of the atom, Itty Abraham points out that "the discursive register . . . shifted, in Nehru, to a displacement of the subject 'India' to an abstract humanist understanding of world history . . . India [was] mapped on a world scale."[41] In sum, in this version of the official scientific imagination, the state's commitment to science was presented in world historical terms. The subject of the needs that the Indian state was fulfilling through its development of atomic energy was not circumscribed by bloodlines, history, or territory, but instead was grandly described to be all of humankind itself.

At another level however, the need for science was mapped onto specifically national subjects. Although science was seen to be a universal need, the need for science was described to be especially acute in India. As Nehru noted, "Ours is an urgent way, how we can deal with urgent problems in so far as they affect hundreds of millions of our people. It is they who count and nobody else counts in the ultimate analysis."[42] The imagination of India as a nation defined by its needs and deficiencies was extensive and all-inclusive. In Nehru's words, there were "three hundred and fifty million problems"—a proclamation that explicitly erased any distinctions on grounds of religion, ethnicity, language, or class. Within this undifferentiated vision of the uniformly needy nation, some problems and needs stood out as exemplary, namely, those experienced by "rural India": "The real problems of India are not in cities but in villages. Every politician, every industrialist, who does not have in his eyes the picture of the village has not understood India. Every person in India, who seeks real education, must have this picture of the Indian village before him."[43]

In the Nehruvian national imagination the Indian village had two kinds of

problems, both described in abstract and placeless terms: the lack of "basic essentials of life" and the persistence of "narrow mindedness" or "resistance to change."[44] Like the very notion of village India itself, these problems were conceptualized in abstract and general terms, emptied of human agency and disconnected from specific places and times. Needs discourse translated all expressions of popular discontent and incidents of social and individual unrest into one or the other of these two overarching problems, which were constituted as first-order needs, or those from which all others derived. Invoked repeatedly on a wide variety of occasions, ranging from the inauguration of industrial research laboratories and parliamentary discussions on the Scientific Policy Resolution to commencement addresses at institutes for technical education and meetings of science societies, the primary and urgent nature of these needs formed the ground on which official science and technology policy sought legitimization.

While science was prescribed as the solution to India's problems and needs, there were varied understandings of what the scientific solution entailed. Under the sign of science, the new nation-state committed itself to two distinct projects: the development of "scientific expertise" and the development of "scientific temper." As I demonstrate below, each of these drew upon and reproduced a different normative ideal of science and authorized a different set of relations between science, the state, and the nation. Thus the call for scientific experts was premised on a vision of the state as the authoritative problem solver of the needy nation. The call for scientific temper advanced a different understanding—that of how the people/nation could help the limited and inadequate state. The coexistence of these contending perspectives draws attention to the fissured constitution of the official national imagination and the ways in which narratives of failure as well as those of success—celebrations as well as denunciations of state agency and scientific rationality—enable the formation and consolidation of the nation-state.[45]

A Few Good Men: The Need for Scientific Expertise

In order for science to be instrumentalized in the service of national needs and problems, the development of the instrument itself was seen to be a priority. To this end, a series of specialized institutes for scientific research and training were established shortly after independence with the express purpose of developing India's "scientific expertise" and "scientific manpower." The scientific expertise projects addressed the need for "world

class" scientists who would undertake pioneering research and advise the state on its developmental projects. The scientific manpower projects addressed the equally pressing requirement of producing a large number of technically trained and qualified individuals who would actually implement development plans by providing their crucial labor power as doctors, nurses, laboratory technicians, or engineers.

The institutional solutions devised to meet these needs included organizations devoted to the pursuit of postgraduate scientific and technological research such as the Indian Institute of Science (IIS) in Bangalore; centers for applied research such as the chain of industrial research laboratories established by the Centre for Scientific and Industrial Research; and degree and diploma-granting educational institutes that imparted techno-scientific training such as the Indian Institutes of Technology or the Indian Institutes of Management. Although expressed in different forms, a common goal of securing the uniqueness of science and technology and asserting the singularity of the scientific expert informed all of these initiatives.

For instance, the theme that dominated the deliberations of the committee convened by the Ministry of Education in 1948 to review the work of the Indian Institute of Science and chart its future course was that of the epistemological or disciplinary-methodological distinctiveness of science—that is, science as a particular object and method of study with rules, conventions, and expectations that differed substantially from those governing other fields of academic inquiry, such as the humanities. In this rendition, science was constituted as a singular episteme, and the successful production of scientific expertise was contingent on maintaining this epistemological and methodological distinctiveness and ensuring that the specificity of science was not "diluted" by adding departments of humanities to the IIS. For the IIS committee, the ideal scientist was exclusively defined by his commitment to the specialized pursuit of techno-scientific knowledge alone: while "an interest in literary, historical and art subjects . . . [could] develop the breadth of view and the general culture of students," it was felt that "a full study of the subject [was] not however, in conformity with the character of the Institute."[46]

In the review committee report, the singularity of science was translated into the singularity of scientists, whose difference from the rest of the population had to be secured. For the IIS review committee, the urgency of India's need for scientific manpower was of note. But it was essential that efforts to increase the quantity of scientists and technologists in India did not lose sight of considerations of their quality. By repeatedly defining scientific

expertise in terms of the work carried out by a "few men of high calibre,"[47] the IIS review committee emphasized the constitutive link between the excellence or the "calibre" of work and the selectivity of the scientific community. In their view, the success of the IIS rested on its ability to create and maintain scientific experts as a breed apart. This required the judicious investment of resources in "the development of fewer establishments for advanced training and research," since a more expansive approach would mean that "the general level of technical education and research would be lowered."[48]

Given that the IIS review committee was composed entirely of professional scientists, its emphasis on maintaining the exclusivity of the scientific community was not surprising. But this viewpoint was not restricted to the community of scientists alone. For instance, the quandary of how to juggle the contradictory requirements of increasing scientific manpower and also scientific expertise were expressed by Nehru more than a decade after the IIS review was concluded: "There can be no doubt that science and the scientist will grow in India, grow in numbers, I hope grow in quality. Numbers certainly; already, I have no idea how many people there are in India who can be termed as scientists. The figure must be fairly large . . . They will go on growing. Now, how are you to maintain real quality? . . . I am all for democracy, but democracy normally means mediocrity too. It is a well-known thing you put up with it in a democracy because, well, it is better to have democracy than having something worse. But the fact is that numbers lead to mediocrity specially in the matter of science etc."[49]

The institution-building efforts that were undertaken solely with the manpower mandate in mind—the objective of expanding rather than restricting access to techno-scientific research and education—also emphasized the exclusivity of the scientist and of science. Despite the dissenting opinions of scientists such as Saha who argued for a closer alignment between scientific and technological research and education and the existing network of national universities,[50] these institutes were established outside the university system as separate entities, and as such the pursuit of science and technology was in this way quite literally set apart from other educational endeavors. The institutional infrastructure of higher education in techno-scientific fields such as engineering was developed as a parallel formation with separate budgetary allocations, entrance examinations, fee structures, and curricular frameworks.[51]

Apart from the provision of a separate institutional space, and the careful delimitation of the techno-scientific community through the establishment

of stringent entrance requirements that culled excellence from mediocrity, the production of scientific expertise was seen to require the insulation of science from the encroachments of politics, commerce, and bureaucracy. The separation of science from politics was not simply a discursive move but one that took concrete institutional form. The formulation of scientific and technological policy was monopolized by a small group of handpicked scientific advisors who worked closely with Nehru. The aura of scientific expertise meant that extensive parliamentary debates on scientific and technological policy were relatively rare occurrences. As Nirmal Haritash and B. M. Gupta have shown in their survey of parliamentary debates over the past five decades, the number of times that parliamentary representatives have asked questions and have sought additional information and clarification on science and technology policies is extremely low, although there have been vigorous discussions and debates on other issues during the same period.[52]

If the hesitation of lay representatives to enter the abstruse domain of scientific discussions was one way in which science and technology were insulated from the political arena, the conjunction of science and security in arenas such as atomic energy and space research was another. In the name of national security, nuclear science was enshrouded in a cloak of "official secrecy" and kept at far remove from the scrutiny of elected representatives.[53]

The institutional separation of science and politics was transposed to the individual level as well. The ideal scientist, like the ideal planner and others associated with the development regime, was envisioned as someone disconnected from the rough and tumble of the political process.[54] Real scientists did not engage in politics, a category that encompassed a wide range of practices. Criticisms of state policy by scientists, the formation of trade unions within industrial research laboratories, and student agitations in scientific and technological institutes of higher education were variously cited as examples of inappropriately political behavior on the part of scientists. When members of the Association of Scientific Workers—a consortium formed by the employees of state scientific organizations—issued a memorandum criticizing the Planning Commission for its failure to consult with scientists in the course of developing the third five-year plan, their identity as scientists was called into question: "Mr. Nehru chided the Association for its 'contradictory approaches' in some of its draft resolutions and said, 'I am not tremendously impressed by them. In fact, I am distressed by some of them. It seems to me that you are forgetting your science.' . . . Mr. Nehru commented that the resolutions did not show any scientific approach. On the contrary, 'It is an expression of your various contradictory approaches, an angry approach. At any rate, it is not a scientific approach, that is what I am trying to point out.' "[55]

At a certain level, the very existence of an association of scientific workers was a source of concern. Two years prior to expressing his overt disapproval of its "contradictory approaches," Nehru had cautioned the association of the need to ensure that their organizing activities did not take place "at the cost of others."[56] The association was asked to bear in mind the essential difference between science and industry, and to consequently resist from organizing scientific workers along trade union lines. The argument was that they would be better placed if they devoted their energies to the pursuit of science, since "thus only they can advance themselves. When scientific expansion takes place in India, there will be more opportunities for work and more jobs."[57] Similar concerns were voiced when the employees of the industrial research laboratories of the Council of Scientific and Industrial Research began to act more like workers and less like scientists by forming a trade union, thereby undermining the vision of the industrial research laboratory as a distinctive third space that enabled connections to be forged between science and industry even as the separation between these two domains was preserved.[58]

If the purpose of science was to fulfill the unmet needs of the nation, then the ideal scientist as the embodied agent of science had to rise above all considerations of individual gain and focus on the bigger task of serving national needs instead of on petty concerns about career prospects and conditions of employment. In a turn of phrase that illuminated the considerable hierarchies of power inscribed by the call to move beyond selfish individualism, the ideal scientist was described as one who devoted himself to what, in Nehru's words, "we in India consider the Brahminic spirit of service."[59] In the terms of official nationalist discourse, what India needed was not "young men who want[ed] jobs," but those who would "serve India."[60]

The metaphor of the scientist as Brahmin was multivalent. It conveyed both the ability of an elite caste to disengage from the quotidian and material concerns that preoccupied those less privileged, and the unique qualities of creative thought that emanated from the "head" of the social body.[61] The insulation of the scientist from politics and commerce had enabled the first form of transcendence from the everyday. The second move of creative transcendence required another kind of insulation—one that would place the scientist at considerable remove from the deadening effects of bureaucracy.

Despite the close relationship between the political elite and the promi-

nent scientists that actually obtained in the Nehruvian period, the autonomy and separation of scientists from the government was central to the normative vision of scientific expertise. The creative faculties of scientific experts were repeatedly contrasted with the "unimaginative" labors of bureaucracy, and scientists were urged to maintain a distance from institutions of governance. Moreover, in what amounts to a paradox these criticisms of government and bureaucracy were generated by the state itself; the irrelevance of paperwork documented in copious paper trails.

For instance, in presiding over the foundation stone laying ceremony for the Electrical Communication and Engineering Department at the Indian Institute of Science in 1948 in his capacity as the head of government, Nehru noted that "[I am] not sorry that scientists did not reach ministerial office because ministerial office has a mentally corrupting influence. It slightly coarsened the mind. It prevented a person from doing any kind of creative work. In the democratic structure of society, one had to spread oneself out so much and please so many kinds of people that one could not do any solid thinking or any kind of work. This was a problem democracy had to resolve. I am entirely opposed to any serious minded person coming and working in Delhi."[62]

The description of the capital city as a stultifying, "coarsening" environment that impeded the "creative work" of science and the related indictment of administrative labors as meaningless and superfluous were echoed by Nehru in other contexts as well: "I find that here in this city of New Delhi, one could do with a good deal of more imaginative approach but it is a man who sits in an office who becomes static and a dead-weight. And that is why, if I may make a personal confession, I want to run away from New Delhi from time to time, rushing about from place to place. I want to get out of this deadly static atmosphere of this place which cannot think, which forgets that there are people, that there are human beings in India, which thinks in terms of paper and files and ink and all that, which thinks even in terms of figures, but figures are not human beings; figures are only hints or some suggestions as to what human beings are."[63] Reflecting this call to separate science from the static world of "paper and files and ink" that dominated life in the capital city, scientific institutions and artifacts were spread out across national territory. Located in unknown and unfamiliar "elsewheres" they enabled the reimagination of national space along new lines and provided scientific expertise with yet another mark of distinction: a cartography of its own. Each new institute and techno-scientific "fetish"[64] that was built by the Nehruvian state introduced a new name into the existing litany of national

geography. Jeolagoda, Sindri, Bhakra Nangal, and Bhilai were sites whose symbolic significance derived not from historical, religious, or cultural registers, but from the abstract grid of the developmentalist imagination.

Like the scientific expert who would inhabit these spaces, the new nation-statist "heterotopias" were presented as spaces unmarked by particularist identities and interests.[65] With this, the establishment of a fuel research institute in Dhanbad could be announced as the fulfillment of the needs of people located several hundred miles away, or the laying of the foundation stone of the new food research institute in Mysore could be a "response" to the drought experienced by residents of Bihar. In this way, the discourses and practices of scientific expertise lent themselves to the central tasks of the nation-state formation project, namely, the constitution of a new subject whose "true" needs and interests were formed and expressed at a national level, and the production of an undifferentiated, state-centered, imagination of India.

Limits of Expertise: The Need for Scientific Temper

In the previous section I explored how the national need for science was addressed through the development of scientific expertise. The expectation was that the scientific expert—the exemplary new Indian man—would solve the pressing national problem of the "lack of basic essentials" by devoting his energies to the development of new technologies. The understanding of science that informed these projects was a fetishized one of science as a visible and distinctive artifact—whether a research institute, a dam, an atomic reactor, a variety of high-yielding grain, or a "made-in-India" tractor. The success of the scientific experts was seen to rest on the insulation of science from politics, commerce, bureaucracy, and local-parochial concerns.

But this still left another problem unaccounted for—namely, the "narrow mindedness" or the "resistance to change" on the part of the Indian masses. The development of a "scientific temper" was proposed as a solution. Nehru's emphasis on the need for scientific temper predated independence. Writing in *Discovery of India* (1946) on the relationship between religion, philosophy, and science, he defined scientific temper as "the search for truth and new knowledge, the refusal to accept anything without testing and trial, the capacity to change previous conclusions in the face of new evidence, the reliance on observed fact and not on pre-conceived theory, the hard discipline of the mind . . . necessary not merely for the application of science but for life itself and the solution of its many problems . . . The

scientific approach and temper are, or should be, a way of life, a process of thinking, a method of acting and associating with our fellow-men."[66] If the application of science was the chief concern of scientific experts, with the field of expertise constituted around the notion of science as an instrument, then the project of scientific temper called for the recognition of the limits of such an understanding of science. Science qua temper was characterized by several distinct attributes, all of which were seen to be conspicuously absent from the circumscribed institutional world of experts and their preoccupations with scientific research and application. Discussions of scientific temper were invariably framed in oppositional terms, as an extension, supplement, or otherwise a corrective to the deficiencies of expertise.

First, as the term itself indicates, the temper of science referred to a mentality or an outlook rather than an artifact or a specialized body of knowledge. It was "not the devoted study of a particular subject, but the devoted search for truth."[67] This was described as a broad-based, ecumenical search—the temper of science addressed itself to universalist concerns about "values of life," rather than to narrow and specialized questions of scientific research and application. The pursuit of scientific temper could reconcile the mutually exclusive domains of "spirituality" and science: the advancement of science qua temper would enable the advancement of "the higher things of life."[68] As Nehru stated in 1959 on the occasion of the golden jubilee celebrations of the Indian Institute of Science:

> There is something in life, let us say, like goodness, like truth, something like beauty . . . which presumably are very important in life. And when we put it in this way, how far can science be allied, without destroying its basis, to certain fundamental values in life? If it is not concerned with life as such—if it is independent of these values—then it may make the greatest advance there divorced from those values, but presumably the ultimate result will not be good.
>
> On the other hand, we cannot merely talk of these values in life without science coming into the picture. These are difficult problems and certainly a little beyond my depth. *But I do not myself see any essential incompatibility between the temper of science, the spirit of science, the approach of science, and these higher values—provided that even in the search for these higher values the temper of science is maintained.*[69]

The second distinctive feature related to the intended scope or reach of scientific temper. Unlike the rarefied and insulated domain of scientific expertise, the project of scientific temper was a call for the diffusion of

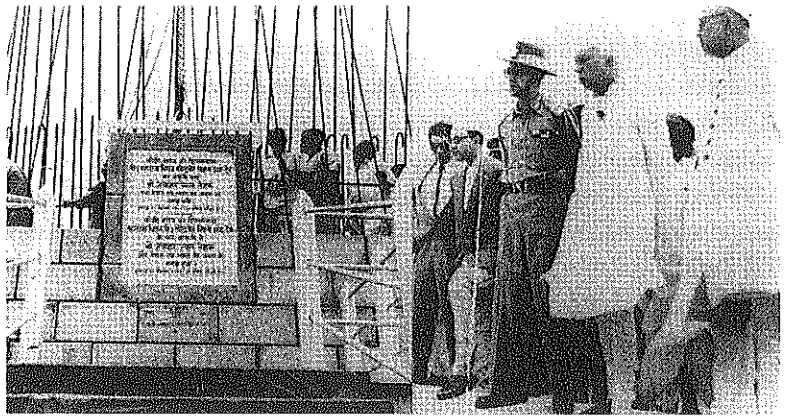
"science mindedness" throughout the population. The growth of scientific temper was thus measured not by an increase in the number of research institutes and in the levels of scientific manpower within the nation (the number of trained scientists and technical workers), but by the extent to which ordinary people were "apply[ing] the methods of science to all of life's problems"—by their demonstrated ability to take a "dispassionate" and "objective" stand on individual and social problems;[70] by their patience and their refusal to indulge in unconstructive acts of criticism or what Nehru dismissively described as the propensity to "froth and foam";[71] and above all else, by their active commitment to agendas of change and to a vision of a future unburdened by the dead weight of custom and superstition.

Defined by these ideal attributes, scientific temper was seen to elude scientists and nonscientists alike. In Nehru's opinion, the fact that scientists excelled in research skills and developed utilitarian techno-scientific applications had no bearing on their ability to apply the scientific method in their daily lives. The theme of the "unscientific scientist" repeatedly surfaced in his addresses to scientific audiences, illustrated through examples of how scientific experts continued to lead private lives marked by superstition, prejudice, and atavistic customs.

The contradictions between the ideals of scientific expertise and scientific temper were also expressed during ceremonial occasions such as the inauguration of industrial research laboratories. If foundation-stone laying and ribbon-cutting ceremonies for techno-scientific projects were the definitive rituals of Nehruvian India, both in terms of their frequency of occurrence and the widespread media coverage that they received as events of national importance, then the contending ideals of science that were reproduced at each of these ceremonial moments was integral to the ritual repertoire. In the following section I examine in closer detail the contradictory constitution of postcolonial scientific rites and the ways in which the state-centered understanding of nationhood was reproduced through performances of the "clash of sciences," or the contest between the normative goals of scientific expertise and scientific temper.

Ceremonial Contradictions: Expertise, Temper, and the Rituals of Scientific Inaugurations

Under the terms of a scheme developed by the Council of Scientific and Industrial Research (CSIR) and its director S. S. Bhatnagar,[72] in the first two decades after independence several research laboratories were set up in

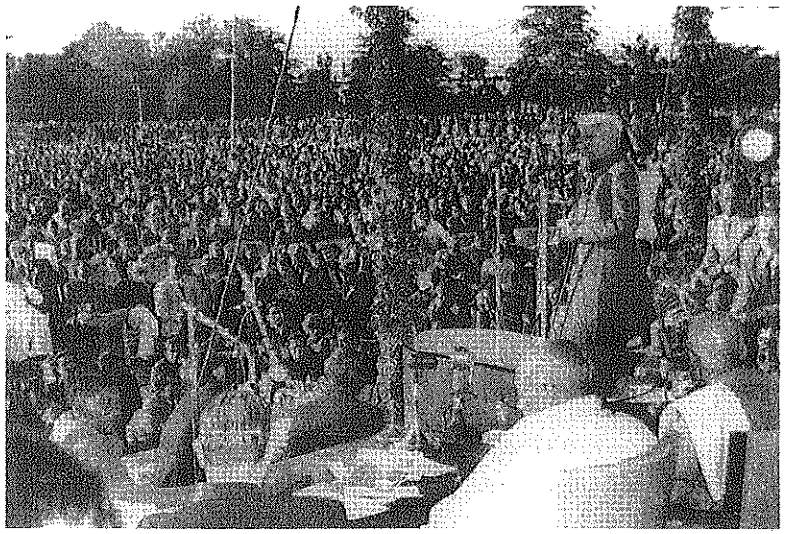


Jawaharlal Nehru at the foundation-stone laying ceremony of the Kosi barrage in Hanumanagar, April 30, 1959 (Courtesy of the Nehru Memorial Museum and Library, New Delhi)

locations across the nation, each specializing in a different field of industrial research. Together, the laboratories constituted a "chain" that remapped national space along techno-scientific and developmental lines. Among those heralded as the new centers of national devotion, or the sacred pilgrimage sites of the postcolony, were the National Chemical Laboratory in Pune, the National Physical Laboratory in Delhi, the Central Fuel Research Institute in Dhanbad, the Central Glass and Ceramics Research Institute in Calcutta, the Central Food Technological Research Institute in Mysore, the Central Electrochemical Research Institute in Karaikudi, and the Central Building Research Institute in Roorkee.[73]

Given their national-symbolic significance, is not surprising that the inauguration of each new laboratory was a carefully choreographed event, graced by political dignitaries and scientists of national and international renown. The laying of the foundation stone of the National Physical Laboratory in New Delhi in June 1947 was witnessed by Patrick Blackett and other eminent scientists who were in the city to attend the meeting of the Indian Science Congress.[74] In January 1950, Desmond Bernal, Irene Curie-Joliot, and Robert Robinson, the president of the Royal Society (the premier international scientific association) were among those present at the formal opening of the National Chemical Laboratory in the western Indian city of Poona.[75]

Other laboratories were visited by a different array of "chief guests" at each of their two founding moments: the initial stage of laying a foundation



The opening ceremony of the National Physical Laboratory, New Delhi, 1950. (Courtesy of the Nehru Memorial Museum and Library, New Delhi)

stone for the new building and the final stage of the formal inauguration after all the construction work had been completed and the premises were ready for occupancy. The status and rank of these guests varied according to the national-symbolic importance of the particular scientific venture. Thus, the opening of the two pioneer industrial research laboratories, the National Physical Laboratory and the National Chemical Laboratory, attracted more prominent visitors than did the inauguration of the Central Institute of Medicinal and Aromatic Plants in the city of Lucknow in northern India a decade later. Despite these differences, the audiences at each of these inaugural events were comprised of a common mix of national and regional politicians, scientists, students, bureaucrats, reporters, and, finally, representatives of "ordinary Indians": the masons, electricians, and daily wage laborers who had actually constructed the new buildings.[76]

There were significant similarities as well in the practices and procedures that were followed during the inaugural ceremonies. Speakers discussed the national and scientific significance of the particular project being inaugurated and offered more wide-ranging observations about the meaning and future of science and development in India.[77] In some instances, the intimate bond between science and nationhood was represented through visual means, such as the unfurling of the national flag on the roof of the new

laboratory;[78] in others, the spoken word constituted this link, as in the case of the address delivered by S. S. Bhatnagar during the inauguration of the National Physical Laboratory. Citing a letter that had been written to him by Gandhi, Bhatnagar likened the work of science and scientists to the "rod and staff" that holds a national flag aloft. While Gandhi had "succeeded in creating a National Flag . . . he had left it to the scientists to create a rod which will hold the flag firmly."[79]

Particular individuals and institutions were then applauded for their role in advancing the nation-building cause. Taking the form of an egalitarian eulogy, these declarations of gratitude and praise traversed a long chain of command all the way from the prime minister to the "bulldozer operators" who had quite literally laid the groundwork for the future of science and technology in India.[80] Finally, the event concluded with the climactic moment of the actual inauguration, when the presiding dignitary would declare the laboratory open.

The inaugurations often took the form of dramatic demonstrations of the magnificent promises of science and technology. For instance, the National Chemical Laboratory was inaugurated "as it should be the case in a chemical laboratory, with a bang."[81] The National Physical Laboratory announced its opening through a similarly impressive technological display. The presiding dignitary, Sardar Vallabhai Patel, a leading figure of the nationalist movement and the home minister of India at the time, was presented with a miniature model of the laboratory. When he cut the ribbon attached to the model, a wireless transmitter was activated and the doors of the laboratory slowly swung open. According to a witness present on the occasion, the spectacular display incarnated the dazzle and wonder of science before the marveling audience; indeed, "Jawaharlal Nehru was so excited that he jumped on to the table to get a better view of the opening doors."[82] Like the prestidigitations of colonial science, postcolonial science drew upon magical registers in the effort to harness popular support and acceptance. Remote-controlled doors and impressive explosions were thus as much a part of the persuasive techniques of official science as were the rational cost-benefit analyses churned out in the dry bureaucratic prose of the five-year plans.

In sum, the inauguration of each laboratory was the site as well as the means for the material representation of the science-state-nation triad that structured social relations in Nehruvian India. The joint presence of state officials and scientists at these events attested to the partnership between science and the state.[83] The acknowledgment of the efforts of elected officials, bureaucrats, and state scientists constituted the state as a multifaceted

entity. The figure of the construction worker elaborated a central theme of official nationalism—namely, the active involvement of ordinary people in nation-building projects. If science was staged as a display *for* the nation, it was equally a display *of* popular participation. Both the expert scientist and the nameless worker were authorized as builders of the new scientific nation at these events, although their respective labors were valued in very different ways.

Finally, the inaugural ceremonies were occasions on which the imagination of India as a needy nation was reproduced through texts and performances that showcased both the abilities and the failures of state and science to address the unmet needs of the nation. Thus, on the one hand, inaugurations celebrated the magic of science and the superior abilities of the scientific researchers who would occupy the new laboratory buildings. In speeches, publicity brochures, and newspaper reports, the opening of each new scientific venture was invariably heralded as a sign of national progress toward a modern and prosperous future. The opening of a leather research institute, a ceramics research institute, or an institute for developing more efficient mining technologies were all hailed as significant milestones in the developmental journey of the new nation; that is, as success stories that proved that the state's pursuit of science and technology could indeed reap substantive benefits.

On the other hand, the enormity of India's unmet needs, the uncertainties and hardships of the present, and the exclusion of the masses from the world of scientific expertise were central themes of all inaugurations. Along with the triumphant accounts of scientific successes that were routinely produced on these occasions were the discussions of the limits of institutional science. What was the point of "so many bricks and mortar" in the face of continued ignorance, poverty, and inequality?[84] Didn't the elaborate ambitions of "Big Science" and the penchant for undertaking monumental techno-scientific projects slow down the process of fulfilling national needs?[85] Didn't the call to celebrate the establishment of scientific institutions encourage passive "worship at the altar of science" and transform science into an empty "set of ceremonials and forms . . . a ritual, a religion"?[86] Although hailed as sites where "humanity works for the good of humanity," weren't big dams also places where "thousands and lakhs [a unit of one hundred thousand] of people have worked, have sweated, have shed their blood, have even given their lives?"[87]

What is significant about these interrogations is not so much their content but the fact that the doubts and indictments were offered freely by state

elites themselves. In a reflection of the contending political compulsions that structured the postcolonial field—the dual mandate of investing the state as well as the people/nation with sovereign authority that the specific formation of a democratic nation-state required—the discourse of official science deployed vocabularies of praise as well as doubt, questioning the worth of scientific institution building at its very moment of triumph. Moreover, this was not just a stray occurrence but a systematic, even structural feature of the inaugural ceremony. The interrogation of official science was as much a part of the ceremonial status quo as the applause that greeted the cutting of ribbons; the shining visions of national futures was as intrinsic to the inaugural imaginary as the dark images of the troubled present.

Conclusion

Is nationalism a "derivative discourse"? Does the formation of a nation always and necessarily entail a modular transfer of eighteenth- and nineteenth-century Euro-American experiences to other places and times? Raising this question in response to Benedict Anderson's thesis on nations as "imagined communities" that are formed through processes of imitative diffusion, Partha Chatterjee developed an equally influential account of the specificity of nationalist ideologies and practices in the non-Western world.[88] Locating his discussion of Indian nationalism in the specific historical conjuncture of colonial relations, he drew attention to the unique set of political compulsions that structured the anticolonial nationalist movement. In his account, the nation-form in India emerged as a distinctive configuration that was driven not by replication and imitation but instead by the endeavor to differentiate the cultural core of nationhood from preexisting modular templates.

Chatterjee's argument situates nationalism within a historicized field of political and social relations. With this analytical move, the emergence of the nation is no longer seen as a derivative by-product of macro-structural transformations, whether the invention of "print capitalism" identified by Anderson or the more broad-ranging transformation from agrarian to industrial society discussed by Ernest Gellner.[89] Instead, the nation is a politically contingent formation that is shaped by the interplay of particular structures, agents, and practices, and that accordingly assumes different forms in different spatial and temporal contexts. While the transformative logics of modernity, capitalism, and industrialization play an enabling role, it is the mediations of these general processes by localized constellations of social and political relations that determines the actual form and content of nationhood.

Extending this argument to the context of postcolonial Indian nationalism, in this chapter I have located the distinctive imagination of India as a "needy nation," and the attendant discourse and practice of "nation building," within the specific historical conjuncture of the 1950s and the political dilemmas and compulsions of the decolonization project, or the attempt to produce a sovereign nation-state. While efforts to produce and consolidate state and national sovereignty in a host of new nations in the aftermath of World War II drew upon similar sets of developmental ideologies and practices, there were substantive differences as well in the "style and idiom"[90] of the national imagination, and the normative categories of state, nation, and citizen that were produced in each polity. Among the factors that played a role in the production of the particular state-centered national imagination are India's particular historical legacy of British colonialism; the dilemmas of territorial ambiguity that stemmed from the coincidence of independence and partition; the availability of diverse nation-state templates that spanned the political and economic spectrum, from the liberal capitalist democracy of the United States to the democratic socialism of the USSR; and the ideational checks and balances exerted by the moral legacy of Gandhianism on the Nehruvian vision of industrial modernity and planned development.

As noted above, the state-centered national imagination had three distinctive features. First, it fostered a vision of "Indian darkness." The ideologies and institutional practices of nation building insistently drew attention to the perils, problems, and uncertainties that were encountered by the nation-state. Second, it entailed the "defamation of the present."[91] The teleological visions of state-led modernization and development that dominated the political and cultural arenas in postcolonial India, from the moment of independence in 1947 until the late 1980s, deferred the fulfillment of national needs to an ever-receding future horizon, and constituted the present in terms of negativity, difficulty, and lack: a "bed of thorns," to use Azad's words cited at the opening of this chapter, or a unity of "350 million problems," as Nehru would have it.

Finally, it was a contradictory formation that both celebrated and called into question the scientific-developmental endeavors of the state. However, as the example of the contest between scientific temper and scientific expertise has illustrated, the interrogation of the state in the name of national-popular sovereignty did not dismantle the statist coordinates of the national imagination but instead authorized new and different forms of state inter-

vention.[92] In the end, both sets of projects constituted the ideal citizen in suprapolitical terms: the neutral expert scientist insulated from the messiness of the political process; the peasant as a passive beneficiary of scientific and developmental policies, and whose mode of political participation was restricted to "cooperating" and "rendering assistance" to state agencies.

The disavowal of politics is also the central theme of the next chapter, in which I examine the building of the postcolonial nation-state in the most literal sense: the construction of planned townships as the exemplary spaces of the new and modern India. Like the representations of cultural diversity, science, and development explored thus far, the effort to build new urban space would also further, and reflect, normative visions of a national identity beyond politics.

CHAPTER 4

Cities of Hope

Steel Townships and the Spatial Practices of the Nation-State

: : :

> A tremendous amount of building is taking place in India and an attempt should be made to give it a right direction . . . so that new types may come out, new designs, . . . new ideas, and out of that amalgam something new and good will emerge.
> —Jawaharlal Nehru, 1949
>
> Durgapur Steel Township today presents a notable example of lapse.
> —Town and Country Planning Organization, 1971

In 1957 the Indian state announced its second five-year plan. Explicitly borrowing from both the form and the content of Soviet-style economic planning, a program of economic development was proclaimed that committed significant financial, political, and human resources to rapid state-sponsored industrial growth and the creation of large-scale projects such as hydroelectric stations, steel plants, shipyards, and locomotive, cement, and fertilizer factories.[1] The mandate of the second plan (and the third plan, with its continued emphasis on heavy industrialization) also included the building of several industrial townships in areas adjacent to the plan projects. The rationale for township development was expressed in terms that went far beyond practical or utilitarian considerations of providing housing for workers. Instead, the townships were described as entirely new kinds of places inhabited by new kinds of people who would directly participate in the

grand project of building the nation—that is, nation builders in both the narrowest sense of physically enabling the manufacture of new industrial products and infrastructure and in the broadest sense of becoming the ideal "producer-patriots" of the new nation. In the words of a brochure issued by the Steel Authority of India (SAIL) to commemorate three decades of the Indian steel industry: "Nehru wanted the steel plants [and the associated steel townships] to be special places, inhabited by special people."[2]

If the postcolonial nation took the abstract form of, in Salman Rushdie's words, a "dream we all agreed to dream,"[3] then industrial townships like Durgapur, Bokaro, Bhilai, and Rourkela were its grounded and inhabited "dreamworlds"[4]—namely, locations in which a dramatic and substantial reworking of existing spaces, times, and subjectivities could take place. As the state's Town and Country Planning Organization noted in a report on Durgapur steel township in West Bengal, an industrial township built to house the workers of the steel plant in the area, the expectation was that Durgapur would be a "grown-up city," with its adulthood or coming-of-age marked by its "well planned nature" and by the fact that the state would, through the provision of superior civic amenities, enable the existence of a "better civic life."[5] Moreover, unlike the vexed task of planning and developing already existing and inhabited cities, the activity of planning and developing these industrial townships or "steel towns" offered the nation-state an opportunity to realize its vision from scratch. Located in underdeveloped areas of the country, far from the large metropolitan centers of colonial India, the steel towns would enable the postcolonial state to break new ground.

The idealization of an "elsewhere" that informed the project of building steel towns was echoed in other contexts as well. In the years after independence, the urban spaces most celebrated by the discourses and practices of official nationalism had neither a significant geographic-material presence nor a historical one. They were instead unknown sites with unfamiliar and in many cases invented names, populated by relatively small numbers of people. Like the steel towns, these were all new urban spaces built by the postcolonial state, ranging from regional capital cities such as Chandigarh (Punjab) and Bhubaneswar (Orissa) to refugee "model towns" such as Faridabad, Nilokheri, Kalyani, and Ulhasnagar that were built to house the displaced refugees who had recently arrived from Pakistan.[6] While the spatial practices of colonialism were informed by strategies of centering—the building of capital cities with newly demarcated "city centers" containing imperial buildings, central promenades or avenues, parks, fountains, and monuments—postcolonial spatial practices were shaped by the imperative of

decentering. Neither the capital city nor the national borders were the primary objects of the official nationalist gaze. Instead, it was to the "elsewheres" that lay between the center and the limits of the nation, to the new urban places filling in the abstract space of the national map, that official nationalism drew attention. They were upheld as the exemplary national spaces of the new India—spaces that would enable the birth of new citizens and bring forth the future of national time; spaces in which the state could foreground activities undertaken on behalf of the nation and thereby render visible its representative nature; spaces in which the dream of "national integration" or the harmonious coexistence of diverse ethnic and religious groups would be realized.

Within a span of fifteen years, the symbolic significance of the steel town was substantially revised. By the early 1970s, specific examples of crime, corruption, communal riots, residential segregation, labor unrest, and the inadequate supply and distribution of essential municipal services in steel towns were cited as material evidence for the multiple failures of the nation-building project and as proof of what happens when the pace of development is too rapid or when plans are carelessly implemented. According to the government's report on Durgapur, the brave new citizen had become a "victim of haphazard and unplanned growth and uncongenial environment" and the new city a place of "low and uneconomical densities, wastage of space and inability to optimally utilize existing infrastructure, ill-distributed facilities, loose planning, [and] monotonous housing."[7] The dreamworld of the steel town was thus renamed as catastrophe, now cited as a "notable example of lapse" rather than a manifestation of the Nehruvian promise to realize "something new and something good."

The journey of the steel town from exemplary promise to exemplary problem is the subject of this chapter. I am interested here not so much in the reasons for this downfall but instead in the political stakes of the narrative of the steel town as failed promise. How was the steel town produced as a dreamworld—that is, what kinds of desires and expectations were invested in it and what were the practices undertaken to realize the dream? What were the grounds on which its failure was proclaimed, and what were the solutions offered? In addressing these questions, this chapter examines the spatial practices—both the locations and the dislocations—and the temporal visions—the utopian as well as dystopian imaginations—that consolidated the distinctive formation of the Nehruvian nation-state.

By tracing this journey, I draw attention to three specific aspects of the nation-state formation project and the encounter with the nation-state that

former prime minister's residence by the Indira Gandhi Memorial Trust, foregrounds the assassination (and implicit martyrdom) of Indira Gandhi in its museum display. An accompanying exhibit on Rajiv Gandhi also reproduces a similar theme of sacrifice and martyrdom, drawing parallels between the assassinations of Mahatma Gandhi in 1948, Indira Gandhi in 1984, and Rajiv Gandhi in 1991. "Leaders who laid down their lives in the service of their country" are to be emulated by ordinary citizens in their daily lives, urges the museum display—perhaps not literally by facing bullets but symbolically by bearing with quiet fortitude economic hardship, food rationing, and other failures of the state to deliver the goods.

62 It can be argued that the organization of the Indian Army in a regionally territorialized fashion is a purely symbolic gesture—officers can serve in any contingent, regardless of their regional origin. However, the symbolic effect is precisely what is of interest—despite its lack of direct material impact, the regionalized nomenclature of the army's classificatory system draws attention to, and even legitimizes the existence of, a regionally compartmentalized way of being.

63 While this is geographically appropriate in the case of Kashmir (Kargil is a district in the state), the Delhi float's depiction of Kargil martyrs speaks less of the distinct regional identity of the state than of its self-representation as *primus inter pares*—the premier state of the nation that houses its capital city and that can therefore lay claim to national events such as the Kargil war.

CHAPTER 3 *Indian Darkness*

1 "India Shining" was the formal name of the massive publicity campaign that was launched by the BJP coalition government in late 2003 and early 2004 to showcase the significant social, economic, and technological advances made by the Indian nation-state. Unlike the modernizing discourses of nation building, "India Shining" proclaimed modernity as an already-achieved goal in India. I take up the political significance of the "India Shining" campaign in further detail in chapter 5.

2 Brubaker, *Nationalism Reframed*, 25.

3 I borrow the term "need for science" from Fraser, "Talking about Needs."

4 For a discussion of the international institutional and ideational complex of development that emerged in the postwar era, see Escobar, *Encountering Development*; and Cooper and Packard, *International Development and the Social Sciences*.

5 For a discussion of the normative reconfiguration of the postwar international order, and the ways in which these normative shifts facilitated the process of imperial withdrawal in Asia and Africa, see Crawford, "Decolonization as an International Norm."

6 See Hamza Alavi, "State and Class in Peripheral Capitalism," for a classic analysis of the processes and implications of the "internationalization of capital" and its impact on social relations and state structures in decolonizing polities.

7 I borrow this phrase from Sangeeta Kamat's discussion in *Development Hegemony* of the structuring impact of development ideologies on the field of postcolonial politics in India, both during the era of state planning and in the present conjuncture of economic liberalization and the "NGO-ization of civil society."

8 Sivaramakrishnan and Agrawal, "Regional Modernities," 28.

9 See, among others, Ludden, "India's Development Regime"; Mehta, *Liberalism and Empire*; and Chakrabarty, *Provincializing Europe*.

10 According to Partha Chatterjee, colonial power was consolidated through the "preservation of the alienness of the ruling group," or the assertion of an absolute and ineradicable or unbridgeable distance between the colonizer and the colonized. See Chatterjee, *The Nation and Its Fragments*, 10.

11 David Ludden has argued for a longer historical genealogy of development, with the eighteenth century as the period in which the "preconditions" for India's "development regime" emerged as a result of transformed relations and structures of indigenous class formation through "pervasive commercialism." See Ludden, "India's Development Regime," 253–61. For a related discussion, see Cowen and Shenton, "The Invention of Development."

12 See Chakrabarty, *Provincializing Europe*.

13 Strachey, *India: Its Administration and Progress*, cited in Larson, *India's Agony over Religion*, 5.

14 See Mehta, *Liberalism and Empire*; and Chakrabarty, *Provincializing Europe*.

15 In the case of social reform, other colonial presumptions about the "enduring" social hierarchies of caste and the need to respect "natural" religious differences came into play to limit the scope and extent of reform projects. Thus, for instance, the legal reform initiatives that were undertaken by the colonial state included the creation of a uniform Penal Code (1860) and a codification of criminal procedure (1861), but not the codification of "personal law" systems that governed marriages and their dissolution, dowry, adoption, succession, or inheritance. As stated in the Privy Council's explanation in 1871 for the existence of multiple personal law regimes: "The difference of religion pervades and governs all domestic usages and social relations" in India, and legal reform initiatives would accordingly have to be modified in recognition of this social-cultural difference. Cited in Larson, "Introduction," 4.

16 Ludden, "India's Development Regime," 260.

17 The introduction of newer and more coordinated institutions and technologies of "the state information apparatus" in the 1840s and beyond consolidated this process. See Ludden, "India's Development Regime," 259–61.

18 The term "transition narrative" is from Chakrabarty, *Provincializing Europe*, 30.

19 As noted in earlier chapters, Gandhian nationalism upheld a very different vision of state-society relations, envisioning the future of India along the lines of decentralized and self-sufficient village communities.

20 Chakrabarty, *Provincializing Europe*, 30.

21 Ludden, "India's Development Regime," 264.

22 Chatterjee, *The Nation and Its Fragments*.

23 In the effort to delineate a distinctive national essence for India, the "splitting strategies" of anticolonial nationalism had separated the "inner domain" of culture from the "outer domain" of "economy and of statecraft, of science and technology, a domain where the West had proved its superiority and the East had succumbed" (Chatterjee, *The Nation and Its Fragments*, 6).

24 Chakrabarty, *Provincializing Europe*.

25 This fragmentary constitution of the nation as a collection of (differently) inadequate human subjects was only one aspect of postcolonial needs discourse. The subject of needs was also conceptualized in totalized, abstract, and disembodied terms. To use Foucault's description of modern governmental power as the project of ensuring "the right disposition of men and things," not just "men" but "things" as well were the targets of developmentalist technologies in postcolonial India. Thus, alongside the problem-stricken workers, peasants, and youth, "industry," "agriculture," "economy," and "education" also took their place as governmental categories that were invested with problems, backwardness, and needs of their own. Like their human counterparts, they also called for the ameliorative actions of "better and more" state intervention. See Foucault, "The Subject and Power." See also Cruikshank, *The Will to Empower*.

26 See Bhabha, *Nation and Narration*, 139–70.

27 The process of transforming a movement politics of nationalism into an institutional politics of state formation and legitimization was one such dynamic. Another was the effort to constitute nationhood in both universalist and particularist terms—a general problematic of "national modularity" that was given an added edge at a time when the "universal grammar" of nation-statehood and the coordinates of the international system were in flux, and a variety of viable "modular templates" from liberalism to socialism were on offer. For a discussion of the political-ethical pitfalls that attend the transformation of a movement of "national liberation" into a nation-statist project, see Fanon, *The Wretched of the Earth*, and, more recently, the work of Neil Lazarus, who in *Nationalism and Cultural Practice in the Postcolonial World* has drawn upon Fanon to discuss the postcolonial transmutation of internationally solidarist "nationalitarian" consciousness into an insular and exclusivist expression of national identity. For a discussion of the "modularity" of the nation-form, see Anderson, *Imagined Communities*; and Goswami, "Rethinking the Modular Nation Form."

28 Kaviraj, "A Critique of the Passive Revolution." For related but different discussions of class and state formation in postcolonial India, see Vanaik, *The Painful Transition*; and Bardhan, *The Political Economy of Development in India*.

29 For a discussion of the political and social compromises that affected the trajectories of social and economic reform in Nehruvian India, see Corbridge and Harriss, *Reinventing India*; Frankel, *India's Political Economy*; and Rudolph and Rudolph, *In Pursuit of Lakshmi*.

30 See Som, "Jawaharlal Nehru and the Hindu Code Bill"; Galanter, *Law and Society in Modern India*; and Smith, *India as a Secular State*.

31 Krishna, "Cartographic Anxiety."

32 For a discussion of the political effects of India's boundary-making projects, and the unsettled status of borderlands (and those who inhabit these areas), see Van Schendel, "Stateless in South Asia"; Ludden, "Maps in the Mind and the Mobility of Asia"; and Aggarwal, *Beyond Lines of Control*.

33 The central government had to settle "accession issues" with the several hundred independent "princely states" that had remained juridically exterior to the colonial territories of British India immediately following the transfer of power in 1947. For further discussion, see the introduction to this volume.

34 For a witty and incisive account of postcolonial India's fascination with science and technology, and the evolution of the "engineering elite," see Bhaya Nair, *Technobrat*.

35 Ludden, "India's Development Regime."

36 The colonial period was witness to a wide variety of engagements by political leaders such as Nehru, Ambedkar, and Gandhi with the question of how, whether, and what kind of science was relevant to the nationalist cause. Scientific practitioners such as Homi Bhabha, S. S. Bhatnagar, Meghnad Saha, and J. C. Bose, and industrial entrepreneurs such as J. R. D. Tata, also had a significant role to play. Among the numerous biographical accounts of these individuals, the following focus on the social-historical context of colonial science in India: Sur, "Scientism and Social Justice"; Dasgupta, *Jagdish Chandra Bose*; Lala, *For the Love of India*; and Mian, "Homi Bhabha Killed a Crow."

37 Prakash, *Another Reason*.

38 Ibid.

39 For a discussion of how postcolonial science and technology policies reflected the ideologies of nationalism and normative ideals of citizenship and modernity, see Anderson, "Cultivating Science as Cultural Policy"; and Chakravartty, "Telecom, National Development, and the Indian State."

40 Chakrabarty, *Provincializing Europe*.

41 Abraham, *The Making of the Indian Atomic Bomb*, 28.

42 Nehru, "Address at the opening of the National Mettalurgical Laboratory, Jamshedpur, November 26, 1950"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 86.

43 Nehru, "Inaugural Address at the Silver Jubilee Session of the State Medical Conference at Meerut on October 24, 1959"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 204.

44 The difference between the "conservatism," or the "principle of continuity," that characterized Indian society was contrasted with "discovery" as the primary animating principle of science. See Nehru, "Speech delivered at the Central Fuel Research Institute, Jealgoda, April 22, 1950"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 78.

45 Existing accounts of the hegemonic status of official science in postcolonial India paint a one-dimensional picture that ignores these fissures and contradictions. In their linear narratives, science and technology were uncritically "worshipped" by political and cultural elites. Although Meera Nanda's recent discussion of postcolonial science in India criticizes the "anti-modernist" arguments of these writers by arguing that they fail to recognize the emancipatory possibilities of Western science in India and lend support to the ideological-political project of Hindu nationalism, she also subscribes to a similarly one-dimensional understanding of the state-science relationship. Where for Ashis Nandy the alliance between state and science is inherently oppressive, for Meera Nanda it is inherently emancipatory—equally a position that overlooks the contradictions and the multiple institutional locations and actors that shaped the state-science relationship in the postcolonial period. See Nanda, *Prophets Facing Backward*. For the opposing "anti-modernist" viewpoint, see Nandy, *Science, Hegemony and Violence*; Visvanathan, *A Carnival for Science*; Alvares, *Science, Development and Violence*; and Shiva, *The Violence of the Green Revolution*.

46 Government of India, "Report of the Review Committee for the Indian Institute of Sciences," 15.

47 Ibid., 13.

48 Ibid., 9.

49 Nehru, "Address at the Anniversary Meeting Associated with the Silver Jubilee Celebrations of the National Institute of Sciences, New Delhi on December 31, 1960"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 229.

50 Meghnad Saha was among those who argued for a different relationship between laboratories and universities by proposing a fuller integration of the techno-scientific enterprise into the broader mission of higher education in India. However, as in the case of Saha's marginalization during the debates over official secrecy and the Atomic Energy Bill, his views were ignored. See Visvanathan, *Organizing for Science*. For an interesting discussion of the distinctive political-ethical vision of science, social justice, and democracy that Saha endorsed from the early stages of his career as a young physicist in colonial India, see Sur, "Scientism and Social Justice."

51 For instance, in order to gain admission to an engineering college, students were required to take a "Joint Entrance" examination (thus named because the examination qualified students for admission to a range of different engineering institutions, depending on their rank) after completing high school.

52 Haritash and Gupta, "Mapping of S & T issues in the Indian Parliament."

53 For a discussion of how the principle of official secrecy and the reign of democratically unaccountable statist reason—the "state knows best"—was authorized for the development of nuclear science and other techno-scientific enterprises deemed essential for "national security," see Abraham, *The Making of the Indian Atomic Bomb*.

54 See Chatterjee, *The Nation and Its Fragments*, on how the "experts" of the Planning Commission were insulated from the political process.

55 Nehru, "Remarks at the Annual General Meeting of the Association of Scientific Workers of India, New Delhi, January 24, 1959"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 186.

56 Speaking at the tenth council meeting of the Association of Scientific Workers in India, Nehru observed: "I suppose you have done useful work. There are two aspects of your work: firstly, as a trade union, you should protect your rights, and secondly—*and this I consider more important—you should get together and discuss the problems of advancing science in India. Trade union means advancing your own interests, and that is very good provided it is not at the cost of others*" (Nehru, *Bulletin of the Association of Scientific Workers of India*, September 1958; cited in Singh, *Jawaharlal Nehru on Science and Society*, 153. Emphasis added).

57 Ibid.

58 For a discussion of the trade union activities at the National Physical Laboratory, see Visvanathan, *Organizing for Science*.

59 Nehru, "Speech at the Inaugural Meeting of the All-India Scientific Workers' Association, New Delhi, January 7, 1947"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 44. My choice of the pronoun "himself" is deliberate, since the ideal scientist was invariably described as a male.

60 Nehru, "Address on the Occasion of the Opening of the National Chemical Laboratory, Pune on January 3, 1950"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 72.

61 In the anthropormorphized description of the *varna* system of caste from the Rig Veda, the four orders emanated from four parts of the body of Purusha: the Brahmin from the head or the mouth, the Kshatriya from the arm, the Vaishya from the thigh, and the Shudra from the feet.

62 Nehru, untitled writing from December 28, 1948; cited in Singh, *Jawaharlal Nehru on Science and Society*, 69.

63 Nehru, "Irrigation and Power"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 95–96.

64 For a discussion of how science was the site and means for the "fetishization" of the postcolonial state, see Abraham, *The Making of the Indian Atomic Bomb*, chapter 1.

65 According to Foucault, heterotopias, unlike the "non-places" of utopias, are simultaneously real and mythic spaces. Thus, a CSIR industrial laboratory was at once a concrete building with a specified location and an ideological-normative expression of a particular nation-statist ideal. See Foucault, "Of Other Spaces." For a Foucauldian reading of Nehruvian India's heterotopias, see Deshpande, "Hegemonic Spatial Strategies."

66 Nehru, "Religion, Philosophy and Science"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 35. Emphasis added.

67 Jawaharlal Nehru, "Address at the Opening of the National Metallurgical Laboratory, Jamshedpur on November 26, 1950"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 86.

68 Nehru, "Speech at the Foundation-Stone Laying Ceremony for the National Institute of Sciences, Delhi, April 19, 1948"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 64.

69 Nehru, "Speech at the Golden Jubilee Celebrations of the Indian Institute of Science, Bangalore on February 4, 1959"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 189.

70 Addressing the audience at the inaugural ceremony for the National Metallurgical Laboratory in Jamshedpur in November 1950, Nehru described scientific temper as "not only the devoted study of a particular subject, but the devoted search for truth [that] produces a dispassionate mind. It makes a person study objectively. It prevents an individual from being swept away by momentary passions" (cited in Singh, *Jawaharlal Nehru on Science and Society*, 86).

71 "To my mind, complacency is a dangerous thing—the person who is complacent naturally falls out of the race. I want that we should be impatient and dissatisfied with the pace of our progress, so that we always have the desire to increase the tempo of our work. But we must also remember that we have to change this impatience into activity and not froth and foam as many people are tending to do these days. Such people are really stumbling blocks in the nation's path to peace and prosperity." Nehru, "Speech Delivered at the Opening Ceremony of the Central Building Research Institute, Roorkee, April 12, 1953"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 107.

72 The eminent chemist Shanti Swaroop Bhatnagar was one of the key figures of the "state scientific complex" or the elite group of scientists who played a crucial role in the formulation of science and technology policy in the postcolonial period. Bhatnagar's close rapport with Nehru led many contemporary observers to describe the establishment of industrial research laboratories as a product of the "Nehru-Bhatnagar Effect." See Richards, *The Life and Work of Sir S. S. Bhatnagar*.

73 Between 1950 and 1964, a total of twenty-nine national laboratories were established by the CSIR. In addition to those listed above were the following: National Metalurgical Laboratory (Jamshedpur); Central Drug Research Institute (Lucknow); Publications and Information Directorate (New Delhi); Central Road Research Institute (New Delhi); Indian National Scientific Documentation Centre (New Delhi); Central Leather Research Institute (Madras); National Botanical Research Institute (Lucknow); Central Electronics Engineering Research Institute (Pilani); Central Salt and Marine Chemicals Research Institute (Bhavnagar); Central Mining Research Station (Dhanbad); Indian Institute of Chemical Biology (Calcutta); Indian Institute of Chemical Technology (Hyderabad); Regional Research Laboratory (Jammu); Central Mechanical Engineering Research Institute (Durgapur); National Environmental Engineering Research Institute (Nagpur); Central Institute of Medicinal and Aromatic Plants (Lucknow); National Aeronautical Laboratory (Bangalore); Regional Research Laboratory (Jorhat); Indian Institute of Petroleum (Dehradun); Central Scientific Instruments Organization (Chandigarh); National Geophysical Research Institute (Hyderabad); and National Research Laboratory (Bhubaneswar). For further details, see Rajagopal, *The CSIR Saga*, 103.

74 Visvanathan, *Organizing for Science*, 143.

75 Like the laying of the foundation stone at the National Physical Laboratory, the opening of the National Chemical Laboratory also coincided with the meeting of the Indian Science Congress. As S. S. Bhatnagar (the director of the CSIR) observed at the opening ceremony for the National Chemical Laboratory, the date for the event was moved forward to take advantage of the fact that the "cream of Indian and Foreign scientists as well as all our young university men are available without any extra expenditure." See Bhatnagar, "Opening of NCL," in *S. S. Bhatnagar on Science, Technology, and Development*, 222.

76 Visvanathan, *Organizing for Science*, 143.

77 Given the diversity of speakers at these events, there were varied accounts of the relevance and meaning of the scientific venture at hand, as scientists and politicians deployed internalist and externalist criteria respectively in their account of the importance of science. Thus Bhatnagar delivered a rousing speech on the intrinsic value of "Big Science" at the opening of the National Physical Laboratory, in which he drew attention to the ways that the laboratory complex would advance the formation of scientific knowledge in India and also contribute to the universal episteme of science. The same event occasioned a very different narrative from the parliamentarian John Mathai. For Mathai, the value of the laboratory was related to its industrial utility and the role it would play in advancing the cause of planned development. See Visvanathan, *Organizing for Science*.

78 Ibid., 146.

79 Bhatnagar, "Opening of NPL," in *S. S. Bhatnagar on Science, Technology, and Development*, 231.

80 For instance, at the inauguration of the National Chemical Laboratory on January 3, 1950, Bhatnagar thanked, in the following order, "our beloved prime minister"; the (former) Viceroy Lord Linlithgow; the eminent scientist Ramaswamy Mudaliar, the first president of the Board of Scientific and Industrial Research (the colonial precursor of the CSIR); other members of the Board (Ardershir Dalal and Akbar Hydari); Governor-General Chakravarty Rajagopalachari; the governor of Bombay, B. G. Kher; the member of parliament and chair of the Planning Committee of the NCL, John Mathai; and the army officers in Pune, "without [whose] bulldozer we could not have held this ceremony today." See Bhatnagar, "Opening of NCL," in *S. S. Bhatnagar on Science, Technology, and Development*, 217–18.

81 Bhatnagar, "On the Opening of NPL," in *S. S. Bhatnagar on Science, Technology, and Development*, 232.

82 Mathur, "How It All Began—NPL in Retrospect," *NPL Silver Jubilee Supplement*; cited in Visvanathan, *Organizing for Science*, 146.

83 The efforts to ensure the presence of international scientists at these events highlights the global orientation of the national science project and the quest to garner international recognition of India's scientific prowess.

84 "It is human beings who make science, not bricks and mortar." Nehru, "Speech delivered at the Central Fuel Research Institute, Jealgoda, April 22, 1950"; cited in Singh, *Jawaharlal Nehru on Science and Society*, 77.

85 This was the thrust of John Mathai's comments at the inauguration of the National Physical Laboratory. See Visvanathan, *Organizing for Science*.

86 Cited in Singh, *Jawaharlal Nehru on Science and Society*, 75.

87 Nehru, "Speech at the Inauguration of the Bhakra Nangal Canal"; cited in Central Board of Irrigation and Power, *Modern Temples of India*.

88 See Chatterjee, *Nationalist Thought and the Colonial World*.

89 See the discussion of Anderson and Gellner in the introduction to this volume.

90 Anderson, *Imagined Communities*.

91 According to Alev Cinar's discussion of the modernization project of Kemalist Turkey, the production of modernity as the ultimate telos of the national-building project was secured through the continual denigration or defamation of the present as a nonmodern and backward time and place. See Cinar, *Modernity, Islam, and Secularism in Turkey*.

92 See Ferguson, *The Anti-Politics Machine*.

CHAPTER 4 *Cities of Hope*

1 For a discussion of the import-substitution industrialization policies of the Nehruvian state that were ushered in by the "Nehru-Mahalanobis" second five-year plan (so named in reference to the shared vision of economic development endorsed by the Indian prime minister and the economist P. K. Mahalanobis, the chair of the Planning Commission), and the considerable state investment in heavy industrialization and the rapid growth of a public sector that followed, see Bhagwati and Desai, *India: Planning for Industrialization*; Chibber, *Locked in Place*; and Bardhan, *The Political Economy of Development in India*.

2 Steel Authority of India, *Tryst with Steel*, 6.

3 Rushdie, *Midnight's Children*, 112.

4 Buck-Morss, *Dreamworld and Catastrophe*.

5 Town and Country Planning Organization, *Durgapur Steel Township*, 2.

6 See Sivaramakrishnan, "Durgapur," for a general overview of postcolonial India's new urban projects. For discussions of Bhubaneswar, see Kalia, *Bhubaneswar*; and for Chandigarh, see Evenson, *Chandigarh*; Prakash, *Chandigarh's Le Corbusier*; and Kalia, *Chandigarh*. For a discussion of the urban planning projects that were undertaken with the specific mandate of housing Partition refugees, see Jain, *City of Hope*. This autobiographical account of the Faridabad "model town" draws attention to the competing imperatives that informed the project, namely the simultaneous commitment to the rehabilitation of refugees or the normalization of their liminal status and to the continued preservation of their distinction as people in need of special forms of assistance.

7 Government of India, *Durgapur Steel Township*, 2–3.

8 Despite methodological and epistemological differences (for instance, the difference between the "primordialist," "instrumentalist," and "constructivist" scholars of nationalism discussed in the introduction), there is a remarkable convergence around the view of nationalism as a homogenizing ideology and practice, and of nation-formation as a process of "scaling up" from local-level particularities to produce a seamless national "whole."

9 My focus on the centrality of the "new urban" in Nehruvian India goes against the grain of most discussions on the place of the urban in the postcolonial national imagination. For instance, in the Indian context studies of Nehruvian nationalism have argued that the postcolonial moment is marked by a "frugal investment in the urban" and that the legacy of the anticolonial movement and the shadow of the "Great Peasant" Gandhi led to the view of the village rather than the city as the authentic heartland of India. See Sundaram, "The Bazaar and the City"; and Seth, "Nationalism, National Identity and 'History.'" For a notable exception, see the recent essay by Gyan Prakash, "The Urban Turn." Moreover, even when nationalism is seen to entail the valorization of "metropolitan modernity" this has been described in terms of a logic of abstract placelessness—the metropolis figuring as an idea or a symbol rather than a specific place targeted by specific sets of spatial practices. These arguments about the urban lack in the Nehruvian national imagination miss an important part of the picture—namely, the importance accorded to the spatial production of the *new urban*. See Srivastava, *Constructing Post-Colonial India*, 165–89. My argument also addresses general theoretical debates about the relationship between the urban and the national. By locating my discussion of the interrelationship between the urban and the national in the specific space of the steel town, I call into question the historical-metropolitan bias of urban studies—the conflation of the urban with the "big city" and the "old city." As this essay suggests, the category of the urban is not exhausted by Bombay, Delhi, Calcutta, and Madras in the Indian context, or, if we use a broader geopolitical canvas, by Istanbul, Paris, Karachi, New York, London, Mexico City, or Nairobi.

10 In fact in some ways the initial celebration of the steel town as a national dreamworld already prefigured its future condemnation as a national catastrophe, since the actual achievement of promises and targets would have made the call for "nation-building" redundant and removed the "need for the state" that was integral to the Nehruvian understanding of nationhood.

11 Although the terms "communal" and "communalism" are defined in the dictionary as "pertaining to a community," in the Indian context they are used in exclusive reference to hostile relations between religious communities.

12 For a discussion of these colonial steel towns, see Benegal, "Township and Housing Design for Bokaro Steel Project, India," 7.

13 A significant qualifier is necessary here: all of the public-sector steel plants and

Jonathan Parry

10
The Brahmanical tradition and the technology of the intellect[1]

The technology of the intellect

In *The Domestication of the Savage Mind* (1977), Goody takes up and develops a thesis which he had originally outlined in a joint article with Watt (1963), and which was further elaborated in his edited collection *Literacy in Traditional Societies* (1968a). *The Domestication* was published in the year after Goody's *Production and Reproduction,* and although the two volumes deal with quite different topics, their general inspiration is extremely close. In its barest outline the argument of the latter is that there is a causal relationship between the kind of agricultural technology (plough versus hoe) and the kind of inheritance rules present in a particular society, and between these inheritance rules and the forms of kinship and marriage. *The Domestication of the Savage Mind* assigns an equally prominent place to technology—'the technology of the intellect'. It offers a view of human development in which literacy is the crucial variable with the potential for transforming social and mental life. The present paper provides a commentary on this view in the light of material on traditional Hindu India.

Many writers have discerned a radical contrast between the modes of thought characteristic of traditional and modern society. Though Goody speaks of a continuum rather than a dichotomy, he does not deny that this fundamental difference exists but seeks to explain it in terms of literacy. For Horton (1970) a critical distinction between traditional and scientific thought is the essential scepticism of the latter. But Africans, says Goody, are no more credulous than people in the industrial West. The real contrast is rather that in the absence of literacy they can neither accumulate nor reproduce scepticism. With writing a closer scrutiny becomes possible, and hence the perception of contradictions not immediately apparent in oral discourse. Writing is also a pre-condition of syllogistic reasoning, and of logic as a formalized set of analytic procedures (1977:11). By contrast, pre-literate societies 'are marked not so much by the absence of reflective thinking as by the proper tools for constructive rumination' (1977:44). With the heightening of critical activity made possible by literacy goes a movement from magic to science and from myth to history (which obviously depends on written records). Historical thinking in turn favours a

stress on linear as opposed to cyclical conceptions of time; while scepticism promotes science, which encourages a process of secularization (1977:150). Literacy further permits an enlargement of political scale and more depersonalized systems of government, lends itself to more anonymous modes of transmission of knowledge, and—by recording individual innovation—promotes the growth of individualism and stimulates creativity.

Book learning, however, has its costs. It leads to a 'restriction of spontaneity' (1977:144). For Goody, knowledge in pre-literate societies seems to be an almost infinitely plastic resource. As in the Malinowskian view of myth, it is continually manipulated to serve as a charter for current social alignments. But 'ideas communicated by literary means can never be totally absorbed like those passed on orally, because the book always remains there as a check upon the transformations that have taken place' (1968b: 216).

To my mind the striking thing about this catalogue of corollaries that Goody derives from literacy is that—as I endeavour to document below—almost none of his predictions holds unambiguously good for traditional India. In part, perhaps, the problem derives from the fact that while he clearly recognizes the wide differences between literate traditions, he nevertheless seems at times to slip into an unconscious equation between literate societies and 'cognitive modernism', and between pre-literate societies and 'cognitive traditionalism'. Horton (1982)—from whom I borrow these terms—falls into the same trap when taking stock of, and refining, his earlier argument in the light of Goody and others. By revealing differences between past and present, he argues, literacy weakens the belief that existing knowledge is legitimated by an unbroken tradition stretching back to the time of the first ancestors, and encourages a theoretical pluralism which is likely to give rise to an 'inter-theoretic competition' which is one of the critical characteristics of cognitive modernism. At its most obvious level, however, the kind of data discussed below clearly suggest that literacy is quite as compatible with a thoroughgoing cognitive conservatism as with its converse, and that this cognitive orientation displays a remarkable tenacity in a context from which inter-theoretic competition has for many centuries been by no means absent.

But Goody is not, of course, unaware of the kind of situation I describe; he himself draws explicit attention to cases of 'restricted literacy' where writing is largely confined to religious uses and where 'the Book becomes less a means to further enquiry, a step in the accumulation of knowledge, than an end in itself, the timeless depository of all knowledge' (1968b: 237). So literacy may encourage 'criticism and commentary on the one hand and the orthodoxy of the book on the other' (1977:37).

Given this second possibility, in what sense can literacy be seen as a critical causal factor in the emergence of the syndrome of mental attributes supposedly characteristic of modern society? It is, we are told, an enabling rather than a sufficient condition. In the sense of a general precondition for—as the Neolithic Revolution was a pre-condition for the Age of Steam—his argument would

surely be as unexceptionable as it would be vacuous. But it is clear that Goody intends something far stronger. What I take him to mean is that the 'liberating effects' of literacy will almost inexorably lead in the direction I have outlined *unless* a powerful set of socio-cultural conditions inhibits this development. Exactly what these conditions would be is, however, left largely unspecified although attention is drawn to the restrictive practices of a religious literati anxious to preserve their monopoly over the sources of mystical power.

Adopting such a focus we might ask why literacy failed to promote 'cognitive modernism' in the kind of context I describe. By formulating the issue in these terms, however, we immediately concede to literacy a causal role in the transformation of mental life. In the concluding paragraphs of this paper I by contrast suggest that its significance as a dynamic force is questionable. Rather than providing a positive thrust towards the kind of rationality characteristic of modern science, all we can confidently endorse is the truism that it is a necessary prerequisite for such a development.

It is perhaps only natural that academics should have a propensity to exaggerate the unique significance of book learning, and Goody is by no means the only one who is prone to do so. In their manifesto 'For a Sociology of India', Dumont and Pocock (1957) insist on the postulate that sociologically India is one. 'The very existence, and influence', they claim, 'of the traditional higher, Sanskritic, civilization demonstrates without question the unity of India. One might think that it does not only demonstrate, but actually constitutes it' (p. 9). What is implied here, then, is that the unity of India is—in part at least—a consequence of the fact that all Hindus acknowledge the authority of the same set of texts and thus subscribe to the same set of fundamental ideas and values. We are therefore dealing 'not merely with a cultural unity' as among neighbouring African tribes (1957:10). This last proposition—that in the pre-literate world continuities between neighbouring societies do not concern fundamental values but are 'merely cultural'—is, I would argue, a kind of optical illusion and would not be borne out by systematic regional comparisons of the sort being undertaken by Andrew Strathern for Highland New Guinea (e.g. Strathern 1982), or Adam Kuper for parts of Bantu Africa (e.g. Kuper 1982). More pertinent here, however, is that a textual tradition can surely only 'constitute' an ideological unity *if* one assumes that the texts themselves display a unity of ideas and values, and that all Hindus derive the same message from the same text. But when the scriptures themselves differ on such fundamental matters as monism, theism, vegetarianism, and caste (Singer 1972:43), and when Tilak and Aurobindo Ghose invoke the *Bhagavad-Gita* as justification for violence in the cause of nationalism while Gandhi makes it the cornerstone of his doctrine of non-violence (Cohn 1971:55), there is surely good reason to doubt whether either of these assumptions is valid.

In line with their stress on the unity between text and the religion as it is actually practised, Dumont and Pocock reject the Great tradition/Little tradition dichotomy, and represent the relationship between textual and popular 'levels' as

one of homologous structures and the local working out of a general idea. For the villagers themselves, they say in criticism of Marriott (1955) who implies otherwise, there are not two traditions but simply one. Hinduism on the ground is not conceptually separable into different elements (see Tambiah 1970:369). For reasons I take up in the section after next, however, my own ethnographic experience leads me to believe that the facts are on Marriott's side.

The ethnographic context

The ethnographic experience referred to, and most of the observations reported here, derive from fieldwork in the city of Benares.[2] Benares is one of the most important centres of pilgrimage in India, and is inextricably associated in the Hindu mind with death and the transcendence of death. Each year scores of old and terminally sick people come to the city in order that they may die there; thousands of corpses are brought for cremation on one of the two principal burning *ghats,* and hundreds of thousands of pilgrims bring the ashes of a deceased relative to immerse in the Ganges or make offerings to their ancestors there. But what is also central to the identity of Benares is its ancient tradition of Sanskritic learning. A number of distinct theological traditions have at one time or another been influential in the city's religious history; though it is orthodox Brahmanism which remains the dominant influence.

With a population of little over half a million, and with an adult literacy rate of around 50 per cent (*India Year Book* 1974), the city now supports three independent universities, all of which pride themselves on a strength in Sanskrit studies and/or Hindu philosophy. More directly relevant to the present discusssion are the now dwindling number of traditional *pathasalas* (or schools), devoted to transmitting under the tutelage of a Brahman *guru* a knowledge of the sacred scriptures and an ability to recite the Vedic *mantras*. For Benares and its immediate environs I have a list of 142 of these, though the total number of students receiving this type of education is probably less than the 2,000 estimated by Saraswati (1975:19).[3]

Numerically far more significant than the small, though highly prestigious, class of Sanskrit pedagogues attached to such institutions, are the vast array of different kinds of Brahman sacred specialist who cater to the religious needs of the pilgrims, mourners, and inhabitants of the city: Vedic chanters, Funeral Priests, Temple-priests, Pilgrimage-priests, and so on. This sacerdotal class provides the ritual technicians of Sanskritic Hinduism rather than its theoreticians. It is they who actually conduct the rituals prescribed by the texts, who expound their meaning, and who in this sense mediate between the textual tradition and the theologically untutored. Not that they could (by their own criteria) be appropriately described as prodigies of learning. Indeed their reputation for avarice is at least as great as their reputation for scholarship. Though all of them are literate in the vernacular, only a small minority have any real command of Sanskrit. Though they learn to read, they do not on the whole

learn by reading. The majority rely principally for their religious knowledge on the oral tradition of their communities, and secondarily on the religious pamphlets and digests in Hindi which are sold throughout the city. The Sanskrit *mantras* they recite have been learned by rote; they have little idea of their 'real' meaning, and are often reduced to inaudible mumbling or brazening it out with gobbledygook in the confident expectation that their patrons will never know the difference. Though my most intimate contacts in Benares are with priests rather than with scholars or laymen, I would claim that the attitudes towards scriptural learning which I describe in what follows are common to an extremely wide segment of the population.

The literate tradition of the Benarasi Brahman

For all my informants—whether priests, ascetics, or ordinary householders—there is a sharp distinction, which brings me back to the Dumont-Pocock criticism of Marriott, between the *shastrik* (or scriptural) and the *laukik* (or popular). Belief and practice are visualized as a composite of both. The *shastrik* elements are *pramanik* ('proven'), eternally valid and binding on all Hindus, and in their interpretation the Brahman is pre-eminent. By contrast, the *laukik* is ephemeral, a mere matter of local usage to be discarded if it offends against contemporary canons of good sense, and here it is often the women who are regarded as the repositories of tradition. Admittedly this *shastrik/laukik* division is itself derived from the *shastrik* domain; but the fact remains that it is internalized by many illiterate Hindus who clearly represent their religious universe as composed of elements taken from two conceptually separable traditions.

Debate on theological issues, or on correct ritual practice, always starts from this distinction. If it can be established that a particular item is *shastrik,* then there's an end of the matter, it is unquestionably authoritative. In 1981, for example, a bitter controversy developed over whether to continue the custom of cremating the corpses of the affluent next to the footprints left by Lord Vishnu as he sat performing the austerities by which he created the world at the beginning of time (see Parry 1981). Considerable financial interests were generally held to be at the root of the matter. The debate—to which many column inches of the local press were devoted—was however couched entirely in terms of whether the practice was textually sanctioned.

While everybody agrees that the *laukik/shastrik* distinction is of fundamental significance, there is—as this last example shows—no general consensus on what belongs to which category. Moreover, some practices which in fact have no backing at all in the ancient texts (for example, the 50-mile circumambulatory pilgrimage of the city) are almost universally believed to be scriptural and are rated as *shastrik,* while others (like animal sacrifice) which do indeed have a respectable textual pedigree are generally regarded as merely *laukik*. The central point that I want to stress, however, is that that which is *believed* to be textual is

—at least in principle—beyond debate, while that which belongs to the oral tradition is not. At the risk of labouring the point, the *textual* tradition is here accorded an ideological immunity to sceptical scrutiny, while the oral tradition is the focus of continual critical evaluation.

The equation I imply between the *shastrik* and the literate, and between the *laukik* and the oral is, however, only a first approximation. More precisely, the *shastrik* is that which is sanctioned—or held to be sanctioned—by the ancient Sanskrit texts[4] (a category which will itself require qualification in due course). Both their age and their language are crucial aspects of their authority.

Sanskrit is *deva-vani,* 'the speech of the gods'. Since many of the sacred texts purport to be a transcription of divine conversation or instruction, their original and most authoritative form is clearly Sanskrit. Sanskrit is far more than a language. It is a badge of civilization. Indeed the word itself means 'cultured' or 'refined'. When my Benares friends say—as they often do—that Europeans have no *sanskriti,* they are not merely referring to a linguistic deficiency but to the well-known fact that Europeans fornicate like dogs, never know who their fathers are, and have no religion and philosophy to speak of. In short, they are without culture-Sanskrit merely being the vehicle for *sanskriti*. It is only in this light that one can begin to appreciate the cultural appositeness of M.N.Srinivas's choice of the label 'sanskritization' for the process by which the lower castes come to take over the customs and style of life of their superiors. Sanskritization is something far more than is suggested by the dry sociological jargon 'reference group behaviour'. It took a Brahman anthropologist to coin a term which so perfectly captures the idea that it is above all a process of refinement and civilization (see van Buitenen 1966:34).

The *shastras,* then, are written in the language of the gods and even at their dictation. Consistent with this, they are the repositories of all authentic knowledge. Knowledge, then, is not something to be *discovered,* as in the western scientific tradition, but something to be *recovered* from the texts (van Buitenen 1966:35). The absolute truth has already been revealed and is there for man to appropriate if only he can penetrate their meaning. Sanskrit thus provides an essential handle on eternally valid knowledge.

But what kind of knowledge is that? The first thing to be said is that not all knowledge is equally worth while. One *aspect* of my informants' attitudes—which is strongly marked in the tradition at large—is a comparative devaluation of knowledge of the empirical world, which is after all the product of illusion *(maya)* and created by the divine play of the gods *(lila)*. During my Benares fieldwork I was continually being upbraided for wasting my time with meaningless enquiries of a sociological character. I have no doubt that such admonishment was generally prompted by a certain uneasiness about what I might discover; but the reproach reflected and appealed to a deeply rooted cultural value that nothing of lasting worth is to be learnt from such matters. Real knowledge is knowledge of a metaphysical truth which liberates the soul from the endless cycle of existence—a knowledge which is revealed in the texts

but which is generally thought to be obtained only by years of submission to a rigorous ascetic discipline. The theological premise that underlies such attitudes is that suffering and evil are not—as in mainstream Christianity—the consequence of original sin, but rather of ignorance of this truth. The obvious parallel is with the Christianity of the Gnostic Gospels (Pagels 1979). In both cases not only is man's problem located in ignorance, but the answer is to be found *within* the individual, who having found it becomes one with God—himself a Christ or a Siva.

But this is only one side of the picture. While what is of permanent value is knowledge which leads out of the world, the scriptures also provide the keys to an understanding by which it may be mastered while in it. They contain, that is, instructions of a pre-eminently practical kind which, properly understood, are the source of a fabulous power—a power which is conferred on those who travel the path which leads to liberation, but which must be renounced if liberation is to be obtained (though it is hard to suppress the suspicion that for a majority the real attraction is the journey rather than the destination). Continual play is made between the term *shastra* (i.e. the texts) and *shastr* (a weapon)—the *shastras* being the most powerful weapons at man's command. In Benares I have often been told—and I have heard variants of the same story elsewhere—that Max Muller stole chunks of the *Sama-veda* from India, and it was by studying these that German scientists were able to develop the atom bomb. The *rishis,* or ancient sages, not only knew all about nuclear fission, but as (what we would call) mythology testifies, they also had supersonic aeroplanes and guided missiles. Of a piece with such claims is the commonly made assertion that every ritual detail prescribed by the texts has some justification or other in terms of modern science, and if this scientific rationality remains obscure that is only because of the rudimentary state of our present knowledge. In reality, then, the *shastras* are a highly developed science which the *rishis* presented as religion *(dharma)* since they knew full well that in the degenerate times to come the wisdom they embodied would not be properly understood and could only survive as blind faith.

It is of course tempting to see in all this a kind of defensive reaction to the encounter with cosmopolitan science and British imperialism. Indeed my example of the stolen fragments of the *Sama-veda* immediately recalls the widespread Melanesian belief that the Europeans had excised various pages from the Bible in order to prevent them from obtaining cargo. I do not doubt that there is an element of this kind in what I have described, though it seems to me that there is more to it than that, and that the interpretation of religious texts as technical know-how is not the departure it might at first sight appear. The essential point is that in traditional Indian thought there is no conceptual divide between 'religious' and 'scientific' knowledge. Without any sense of incongruity the texts known as Puranas contain terrifying accounts of the fate of the souls of sinners, sandwiched between sections on—say—mineralogy and medicine. Again, in modern Hindi the term *shastra* elides what we would separate. The

shastras are the sacred texts, but sociology is *samaj-shastra*—where the word has become a suffix which is used very much like the suffix '-ology' in our language, and conveys the idea of a theoretical discipline. A standard Hindi-English dictionary lists the following equivalents: 'scripture(s), a religious or scientific treatise, a composition of divine or secular authority, science…'.[5] The term thus broadly corresponds to the original meaning of the English word 'science' as knowledge in general.

While everything that I have said so far might seem to imply that the written is always privileged over the oral, it is important to stress that this written tradition is itself held to be based (at least in the case of certain texts) on an originally *spoken* revelation made by the gods, and to be preserved largely by oral transmission; and further that the most ancient and authoritative texts—the Vedas—are conventionally classified as *sruti,* that which is 'heard' (as opposed to *smriti* which is 'remembered'). Indeed, Brahman culture is very much a culture of the spoken word, and a desire to dominate verbally, to render others speechless by the force of one's own speech and erudition, is a striking aspect of the ethos of the Benarasi Brahman. It is institutionalized in the *shastrarth*—a kind of formalized verbal battle over the interpretation of the texts.

Given this premium on the spoken word, my earlier emphasis on the prestige of the written text may seem paradoxical. This apparent contradiction, I would argue, is more properly seen as a disjunction between principle and practice. While in theory oral transmission has ideological pre-eminence, in fact such knowledge may be suspect for its authority rests on that of its repositories. In these debased times human memory has supposedly become so fallible, and the pedagogical tradition of the Brahmans so enfeebled and corrupted, that the authenticity of knowledge transmitted by purely oral means can no longer be automatically accepted as axiomatic. Instead of a mere prop to memory, a supplement to the instruction of a teacher, the written text may now be regarded as a more reliable guide to an ancient wisdom once more fully apprehended through personalized transmission.

While Goody is clearly correct to note that literacy provides the potential for more anonymous modes of communicating knowledge, the Brahmanical tradition has gone as far as it possibly can to evade this possibility. It is uncertain when the Vedas were actually composed, or even when they were first written down. But what is generally agreed by Indologists (e.g. Winternitz 1927:63; Staal 1961:15) is that many centuries separated the two things, and that it was not for want of literacy that they were not written down earlier. Though Goody (in press) has recently challenged this claim in proposing that 'the role of writing in the composition or transcription of the Vedas must remain a serious possibility from the historical point of view', there can be no question about the consistent hostility of Brahmanical thought to the graphic reproduction of the Veda. Indeed some of the later texts condemn to hell those who reduce the Veda to writing (Kane 1976:2: 349). It should be (and still is) preserved by direct transmission from teacher to pupil, a process involving the endless repetition of each verse

until it has been completely mastered and an elaborate system of mnemonic checks and phonetic rules *(vyasa siksa)* designed to ensure the exact replication of the proper sound.

Rather than the essential character of oral discourse being modified by intellectual procedures inseparable from literacy, as Goody predicts for literate cultures, it would be nearer the mark to say that in traditional India it was literary expression which was subordinated to the demands of oral transmission, for much of the sacred literature was composed in a form and with a redundancy which was clearly intended to facilitate memorization and faithful replication.

A very high proportion of the Sanskrit corpus is written in verse rather than prose, and this applies to the texts on medicine, astronomy, and architecture, and to historical and biographical works, as much as to those which deal with such purely 'ritualistic' topics as sacrifice (Winternitz 1927:3). Goody passes over the possible relevance of the distinction between prose and verse for his argument about the association between literacy and cognitive modernism. Its significance is, however, suggested by Merton's (1978:19) observation that in seventeenth-century England the revolution in science went along with a marked shift of interest from poetry to prose—both developments revealing an increasing preoccupation with the exposition and description of empirical phenomena.

If verse is better suited than prose to the faithful memorization of the text and its exact verbal replication, then one might perhaps see these pre-occupations as being in turn the typical product of a scribal (as opposed to a print) technology. In a scribal culture, the argument would go, much knowledge continually sinks into the sand as manuscripts disappear and as texts progressively 'drift' away from their original, and the overriding pre-occupation tends therefore to be with the retention of what is already known. Books are scarce, their contents imparted to most only because they are read aloud, and memorization retains a significance it does not possess in a print culture where books are readily available (see Ong 1982:119; Hirst and Woolley 1982:36–8)

In India however—as in many other traditional cultures—this emphasis on the precise reproduction of the text has been motivated more by a concern with the precise reproduction of sound than by a concern with the retention of the meaning it conveys. The words in themselves have power once they are vocalized. For this power to become manifest they must be pronounced with precision and exactly the right inflection. Wrongly accentuated they may have an effect opposite to the one intended (see Kane 1976:2: 347). I can best illustrate the importance of pronunciation by the case of a south Indian Brahman I know who earns his living performing mortuary rituals on Benares's principal cremation ground. He claims to have memorized three of the Vedas and to have learned to recite them with complete accuracy. Since Presidents Nixon and Ford short-sightedly overlooked his letters offering to put this remarkable skill at their disposal, he wishes me to make it known that he would be prepared to consider a post in the University of London, and that his appointment should be treated as a matter of urgency since it is only a question of time before he loses the full set of

teeth essential for a flawless recitation. Seen in the light of all this, it is clearly irrelevant whether the written word exists in printed or manuscript form. In either case the memorization of its proper verbal manifestation remains an equally insistent need; and one which cannot therefore be wholly accounted for by the technical deficiencies of a scribal mode of communication.

The most powerful words of all are those of the Vedic *mantras* which are recited as an indispensable part of every major ritual and are what makes it efficacious. The *mantra* is not a prayer but a kind of sound form of the deity it embodies. More than a supplication it is a means of coercion.[6] By *japa*—the repeated muttering of Vedic passages—the Brahman chanter may achieve for his client success in litigation, the restoration of good health or the indefinite postponement of death—the more ambitious the project the larger the number of repetitions required.[7] The content of these passages is not, however, understood. Those ritual specialists who are competent in classical Sanskrit are quite unable to comprehend the archaic language of the Veda. Even amongst the traditional *scholarly* community of the city, and despite persistent enquiry, I experienced enormous difficulty in finding a Pandit who could confidently render any of the Vedic *mantras* used in the mortuary rituals into Hindi.

While all twice-born castes have in theory the right to study the Veda, it is only the Brahmans who are authorized to teach it. The stress on oral transmission and correct pronunciation clearly ensures that their indispensability in this role remains unthreatened by the potential literacy provides for circumventing pedagogical control by private study. Without the guidance of a *guru,* book learning is said to be without value and even an obstacle to the acquisition of knowledge (see Kane 1976:2: 322, 349).

Power is with the word, and the word is with the Brahman; or—as my informants endlessly quoted—'the gods control the world; *mantras* control the gods and the Brahmans control the *mantras*'. It was, after all, the Brahman who at the beginning of time emerged from of time emerged from the *mouth* of the sacrificial body of primeval man, while the progenitors of successively lower *varnas* emerged from successively lower parts of his body. It is they who are descended from the ancient *rishis* who originally received the divine revelation and expounded it for posterity. But above all it is the Brahman's purity that qualifies him for Vedic study—which must be suspended if either teacher or pupil is afflicted by the pollution of birth or death,[8] or if the place of study is in any way rendered impure.

Ideologically, Brahmanical pre-eminence is inseparable from their learning. The respectable Brahman is a scholar and a teacher rather than a priest. The priesthood is, as I have discussed at length elsewhere, regarded with equivocation since priests must necessarily accept the gifts *(dana)* of their patrons if the ritual is to work, but these gifts embody the sins of the donor (Parry 1980). Though in practice seen as an impossible ideal, the theory is that they can 'digest' these sins by the meticulous performance of certain rites and by passing on the gifts they have received, with increment, to a number of other Brahmans.

The relevance of this here is that the transactional code it implies also obtains for learning. Indeed Stevenson (1920:228) reports that the Brahman's teaching is assimilated to the category of gift *(dana),* and it is therefore not surprising that it should be governed by the same rules. These state that what the Brahman takes in, he must at all costs disgorge again, for if he fails to keep in circulation what he has received he will be required to pay the direst penalties in this and future lives. Here we are clearly in a quite different universe from those ideologies—like that of the Hindu Tantric or the New Guinea Baktaman (Barth 1975)—where the most powerful knowledge is the most highly secret and where access to it is as narrowly restricted as possible. Barring the Shudra—whose ears are to be filled with mercury if he hears the Veda—the Brahman's knowledge is theoretically something to be disseminated.

The specialists generally assert that over the centuries which separated their original composition from their commitment to writing, the Vedas were transmitted without significant alteration; and clearly this claim does not altogether square with Goody's characterization of oral knowledge as a highly volatile and malleable resource. The supposition of faithful oral transmission has recently—though in my view unconvincingly—been contested by Goody (in press) and Ong (1982:65–6).[9] In any event the Veda must in certain respects be regarded as a special case. But attention has also often been drawn (e.g. Shulman 1980:11) to the remarkable continuity between many classical myths and those of the contemporary village, where the presumption is that their transmission has been almost exclusively oral. Again, Wadley (1975) remarks on the lack of variation in the (unwritten) non-Sanskritic dialect *'mantras'* employed by the exorcists of Karimpur over the forty-year period since the Wisers' fieldwork; and Smith (1977) persuasively argues that the Pabuji epic of Rajasthan does not conform to Lord's findings for Yugoslavia, but is an example of an oral 'text' performed without improvisation or significant deviation from an original composition. The difference between the two traditions, he suggests, is related to the liturgical role of the Rajasthani epic; a suggestion which would receive support from Wadley's evidence (1978) that while in the case of those religious stories classed as *kissa* there is legitimate scope for a personal rendering, in the case of those which are classed as *katha* and which are distinguished by being recited within a *ritual* frame, the emphasis is on the careful reproduction of a set text. What seems clear at any rate is that oral knowledge of this kind may display a surprising resilience to change over long periods of time (see Ong 1982:62–3).

Of more immediate interest here, however, is the other side of Goody's contrast—the relative immutability of knowledge which he associates with a literate tradition by contrast with an oral one, and which he sees as imposing a 'restriction on spontaneity'. On the contrary, I would like to emphasize its mutability, and its malleability to the requirements of practical life.

The Vedas, for example, are commonly cited as being the ultimate authority on matters of moral and religious duty *(dharma)*. Yet the paradox is that these ritualistic texts do not contain any 'positive injunctions that could be used

directly as rules of conduct' (Heesterman 1978:81). In fact, to follow Heesterman's argument, their lack of any real bearing on the practical world is essential to their inviolability. Since they are not bound to the social world they are immune to the corrosive effects of the changes it undergoes. Given that the Vedas are the ultimate authority on matters they do not pronounce upon, the common recourse is to the 'transcendent vision', as Heesterman puts it, 'of a human authority'—a sage or a *guru*. But how is one to judge *his* credentials? The conventional answer is in terms of his knowledge of the scriptural revelation. It is his knowledge of texts that have nothing to say about *dharma* that authorizes him to rule on it. The way would seem to be open for him to say what he likes.

The content of the Veda is fixed; but its direct application to practical life is minimal. I now turn to a much later text where this situation is reversed. The *Garuda Purana* is one of the 18 so-called *Mahapuranas,* or Great *Puranas,* which were all supposedly composed by the legendary sage Vyasa at the beginning of the *Kali Yuga,*[10] the Black Age of historical time in which we actually live and which is the last and most degenerate of the four epochs of the world cycle. The text is one to which my informants continually refer; is regarded as the final word on matters relating to death, mourning, and the conduct of mortuary rituals; and it is with these matters that their version is exclusively concerned. During mourning it is read daily in the house of the deceased by a Brahman priest who is called in specially for this purpose.

An English translation of the *Garuda Purana* by an eminent Brahman Pandit has also been published from Benares. What is striking, however, is that virtually the only thing that the two versions have in common is the claim that unsurpassable benefits accrue to those who hear them, and the exhortation to give liberally to the Brahman who recites them. While the one deals only with matters related to death, the other has little to say on this topic, but ranges over a diffuse set of other subjects from aphrodisiacs to the medical treatment of horses. The translator of this version (1968: iii-iv) acknowledges the existence of the first as one of the parts, or *khandas,* of which the work has often been held to consist. But he goes on to say that 'it requires nothing more than average intellect to detect that (it)…is manifestly an interpolation…bad in reason and rhetoric'. This 'spurious portion' has been expunged in an attempt to restore the text to its original form. We therefore have at least two entirely different versions of the same work. According to a recent scholarly study, however, it is very doubtful whether either of them bears much relationship to the ancient texts of the same name, since the contents of none of the existing versions conform to what is said about the *Garuda Purana* in other better authenticated *Puranas* (Gangadharan 1971:120, 124). It is, then, almost as if the *Garuda Purana* is an empty box into which an enormous range of possible contents might be poured by selecting from a vast array of manuscript sources of greater or lesser antiquity and authenticity.

A critical edition of the *Garuda Purana* is about to be prepared by the Kashi Raj Trust, a scholarly foundation set up and funded by the Maharaja of Benares to promote and disseminate knowledge of the Hindu texts. Amongst its most

important projects is the publication of 'authorized' versions of each of the *Puranas,* restored as nearly as possible to their original form by 'scientific' principles of textual scholarship imported from the West. Manuscripts of the *Purana* in hand are collected from all over India, and are collated verse by verse. In the case of the *Garuda Purana,* for example, manuscripts have been obtained from as far afield as Kathmandu and Tamilnadu, Jammu and Calcutta. The oldest of these is probably no earlier than the beginning of the seventeenth century, and not one of them contains all of the three *khandas* (parts) of which the work is traditionally supposed to comprise. Variation within each *khanda* is itself enormous; and there are three quite different versions of the *preta-kalpa*—the part which relates to death and which my priestly informants unsuspectingly believe to be the complete and invariant work. In order to arrive at an authoritative text, the Trust's Pandits select the 'best' version of each passage, so that the new edition is a composite put together from quite different sources. In choosing between variants one of the rules applied is that the more impenetrable the verse the more authentic it is likely to be—clarity suggesting the intrusive hand and crude mind of later copyists. I need hardly say that the result of this procedure is likely to be an obscurity that lends itself to rival interpretations and requires a Brahman scholar for its elucidation.

Following Biardeau (1968), the more interesting point however is that what has been borrowed is a method which was developed in order to reconstruct, out of relatively minor variations between texts, the original written text of the author. But in the case of the *Puranas* it is very doubtful that there ever was a single original written text—the probability being that we are dealing with a number of quite different recensions which evolved out of the oral traditions of the regions from which each comes. What we have, then, is an attempt to restore something which probably never existed. Yet for the Brahman Pandits it is a matter of faith that it did exist, and that it was actually composed by Vyasa whom they regard as a historical individual rather than as a generalized symbol of tradition. In other words, the whole apparatus of the critical edition is directed—as Biardeau notes—to the essentially religious purpose of recovering as nearly as possible the divine inspiration of a purely mythical character. The objective result, however, is a completely new recension of the work.

As the Pandits are apt to see it, authentic fragments of Vyasa's revelation may have been preserved in the oral tradition as well as in the manuscript sources, and they therefore regard it as perfectly legitimate to supplement the latter from their own knowledge of the tradition as it was handed down to them. Here we can recall the experience of the great Sanskritist, Georg Buhler, who was presented with a copy of the *Nilamatapurana* by the Maharaja of Kashmir. When Buhler later visited Kashmir and checked the originals he discovered that the beginning of his text was the copyist's own insertion. Yet all the Pandits with whom he spoke rated his version as the best (Rocher 1983). Today, one of the most renowned Puranic scholars in Benares is quite forthright in the view that a new edition or translation of a text should be an original work incorporating details known to

the Pandit but somehow missing from his sources. The implication here is clearly that the 'text' is not conceptualized as a purely literary document. Its 'authentic version' is rather an original and sacred revelation, the recovery of which may require recourse to *both* written and oral sources (the authenticity of the latter—if not also of the former—being validated only by the prestige and authority of its Brahman repositories).

Although everybody is aware that there are eighteen 'Great' *Puranas,* even amongst scholars there is no complete unanimity on which they are. Dozens of other works are also rated as *Puranas,* though not in the major league. More generally, the canon of sacred literature is by no means closed. Shulman (1980: 37–9) refers to a fascinating account written by a disciple of the nineteenth-century Tamil scholar Minatcicuntaram Pillai, who ran what Shulman appositely describes as a 'Purana-industry'. Commissioned by a wealthy patron, he would search out old manuscripts on the deity or shrine for whose glorification he was asked to work, make prose versions of any relevant mythology, and visit the temple itself. He then composed orally and at great speed while one of his pupils recorded his words. On one occasion he is reported as having reeled off 50 verses without preparation or hesitation. Clearly the style of composition was highly formulaic—and in this respect at least invites comparison with the bardic tradition which produced the *Odyssey* and *Iliad*. The obvious but significant difference, however, is that while Homer belonged to a pre-literate culture, not only did Minatcicuntaram Pillai belong to a literate one, he was also himself a man of letters. Once more, then, a pattern purportedly characteristic of oral cultures is seen to persist in a highly literate one. More germane to my present point, however, is that while the precise provenance of these particular texts is known, it is not hard to imagine that similar compositions of fairly recent date have in a relatively short space of time acquired an antiquity which links them with the direct inspiration of Vyasa at the beginning of the present world epoch.

Although in principle superior authority always resides with the most ancient texts, and although this might seem to promote an extreme religious conservatism, the notion of time as progressive degeneration in fact allows considerable scope for manoeuvre. Practices—like animal sacrifice and asceticism—which were appropriate in the Age of Truth at the beginning of time are no longer suitable to man's degraded nature in the Black Age. It is in precisely these terms that the Puranic texts often claim their equality with, or sometimes even their superiority to, the Veda (Kane 1977:5: II: 914; Bonazzoli 1983). On the one hand they go out of their way to borrow its authority by presenting themselves as a kind of primer on the original revelation which the gods have provided out of compassion for the impoverished intellect of modern man. But they may on the other hand claim a pre-eminence in the degraded conditions of the present, and can justify quite radical innovation by reference to the exigencies of the Age (see Srinivasen 1980). The authority of the Veda is acknowledged as supreme, though Vedic precepts must perforce be modified in an epoch so debased.

One device by which the Puranic texts may be assimilated to Vedic revelation is by collapsing their mythological composers into one. The *Kashi Khanda,* which is a eulogy of Benares (and which probably dates from around the fourteenth century AD), opens with an account of how it came down to us from the gods. It is told here by Vyasa to the reciter (Sut) as it was told by the god Kartik to the sage Agastya, as Kartik himself heard it recounted to the goddess Parvati by his father Siva. What is obvious is that this elaborate pedigree is intended to establish a direct line of oral transmission from Siva to the reciter. But what is also happening here is that the *Kashi Khanda* is being equated with the *Rg-Veda,* the oldest of the Vedic texts. Agastya and his wife (Lopamudra) were the first human beings to hear it, just as in an earlier incarnation they are sometimes said to have been the first to receive the revelation of the *Rg-Veda*. In relation to Goody the more general point, however, is that the individuality of those who actually did compose these works must at all costs be suppressed since the authority of the text relies on establishing its direct transmission from the gods to a mythical sage who is credited with its preservation for posterity. So far from perpetuating individual achievement, the object here is to efface it. It is clearly not only oral communication which has a propensity to 'swallow up' the creative product of the individual 'in a body of transmitted custom' (Goody 1977: 27).

What this example might also alert us to is that the texts not only purvey a vision of time as progressive degeneration, but also as endlessly repeating itself. If it moves downwards it does so in spirals regularly returning to the same point, only lower down. In Puranic mythology, for example, the same characters keep reappearing in different incarnations, and re-enacting more or less the same events. Indeed, as my informants would appear to see it, these events continue to recur in the present. For example, the English—as I am ceaselessly reminded—are the descendants of Ravana, one of the main protagonists in the epic *Ramayana*. Ravana was the demon king of Lanka, the lustful abductor of the goddess Sita and a fallen Brahman whose knowledge gave him fantastic power. His wife, Mandodari, bore him a son at an astrologically disastrous moment. The boy was set to drift on the sea and was carried by the current to England, which is now populated by his descendants. In her next incarnation Mandodari, the mother, crops up again as Queen Victoria. In a similar vein I have several times been told that Mrs Gandhi was a reincarnation of the regenerate demoness Trijata, who befriended Sita in Lanka; and that the Americans are the descendants of Raja Bali—the explanation for which is perhaps provided by the fact his mythological comeuppance was the consequence of his interested and vainglorious donations. I cite all this not so much for its perspicacity about international relations, but to establish the point that the sacred texts purvey a model of time which is directly carried over into perceptions of present-day reality. There is, it seems to me, at least as good a case to be made for the argument that in traditional India literacy has promoted a cyclical conception of time, as for Goody's claim that it encourages a durational notion.

More generally, modern communications are—in the medium term at least-just as likely to reinforce 'traditional' religious values, to lend a helping hand to the 'civilizing' process of Sanskritization, as to contribute to a process of secularization. With the coming of the railways one of the most likely long-distance journeys for many a rural peasant is a pilgrimage; and with literacy and printing in the vernacular he is as likely to pick up a book or a pamphlet on a religious theme as one which promotes a secular 'disenchantment' of the world. Wadley (1978) reports, for example, that apart from schoolbooks, the only books which find their way to Karimpur are religious works published in the vernacular.

Another angle on the extent to which the literate tradition moulds, or constrains, knowledge would be to look at the way in which some of its key concepts are actually interpreted by the actors. The terms *moksha* and *mukti* mean 'liberation', which is conventionally described as the highest goal of human existence. The religious pre-eminence of Benares is associated with the fact that all who die there are held to achieve this goal. But the paradox is that nobody seems to be agreed on what exactly it is. The commonest view is that it is a 'cessation of coming and going'—that is, of rebirth. You no longer 'have to bear the pain of the womb', or have 'to wander between the 840,000 kinds of life form'. But some informants interpreted this as an extinction of the individual soul, which 'is absorbed into the universal Spirit as water mixes with water', while others took it to imply a perpetual and sybaritic residence in heaven. While either of these possibilities might find textual sanction, many people take the definitely unscriptural line that 'liberation' is here to be understood as the promise of a happy and prosperous rebirth (see Parry 1981).

It may at first sight appear tempting to see this as part of the process of 'parochialization' whereby 'the essentially unlearned and non-literate nature of the little tradition obstructs the direct transmission or spread of elements downward from great (tradition) to little' (Marriott 1961:204). As the thoughts of the literati filter through to the masses their original meaning is diluted and transformed. The problem, however, is that the informants who interpreted the doctrine that 'death in Benares is liberation' in terms of a privileged rebirth included a number of sacred specialists, and I was as likely to get the doctrinally orthodox view from an illiterate pilgrim as from a professional priest. While I do not wish to discount the very real possibility of sheer ignorance of the *Shastric* tradition amongst the priesthood, I am inclined to look for the explanation of such variation as much in the contradictions inherent within textual Hinduism as in the adulterating influence of the so-called 'little tradition'. That is, the reason why some informants flatly rejected the claim that all who die in Benares are released from the cycle of rebirths may stem in part from the perceived inconsistency between this doctrine and other scripturally sanctioned beliefs—from a belief, for example, that the only way to escape the world is to renounce it.

With regard to matters of belief the kind of variation I have described is characteristic. But with regard to ritual practice—even allowing for the self-acknowledged incompetence of many of the priests and the surreptitious editing in which they indulge if the rewards look unpromising—there is much greater standardization. Unless he knows it by heart the priest more or less follows a printed manual *(paddhati)*. But the manuals tell him only what to do and say, not what it means; and exegesis of the ritual is often highly discrepant. We are back, then, to my metaphor of the empty box into which quite different sets of contents can be put.

This contrast between the variability of belief and the constancy of ritual form is, however, far from absolute. For a start there are quite significant differences of form between, for example, the mortuary rituals laid down in the different manuals followed by the Maithila community of Benares, the South Indians and the indigeneous population of the city. The latter generally follow a *paddhati* known as the *Preta Manjari*. Even here the printed editions vary considerably not only in the number of errors which have crept into the Sanskrit text but also in length—the most extensive containing many details omitted from the shortest.

Moreover at least some of the priests creatively elaborate on what is laid down in the standard manual. A South Indian funerary priest once told me that when a woman of one of his client families dies in childbirth her corpse must be purified by bathing it 108 times before it is fit to be cremated. Intrigued by this information, I asked a large number of north Indian priests what they would do in such circumstances, and was consistently assured that no special rituals were required. One of these was my friend Sita Maharaj, with whom I discussed the matter at length, and to whom I told what I had heard from my south Indian informant. On visiting the cremation ground some weeks later I was intrigued to find Sita Maharaj presiding over the 108 purificatory baths of a female corpse. He had eventually tracked it down in an old book, he claimed, and had decided to adopt it into his repertoire. Incidentally his brother, Ram Maharaj, has often groused to me about Sita's insistence on doing things according to his own interpretation of the Shastras, even if it annoys their clients.

> 'But Ram Maharaj is not Sita. I do what they want. In my whole life I have only performed two or three *sraddhas* (mortuary rites) according to the *Shastras*. I emphasise *lokachar* (the popular tradition). What the women of the family say, that's the truth. Blowing our conch shells, we Brahmans throw dust in people's eyes.'

I conclude, then, that the 'restriction on spontaneity' imposed by reducing knowledge to a written form is in fact rather minimal. I have also suggested that in the context I have been discussing the written form—so far from promoting scepticism—provides a certain immunity against it; that the potential that literacy provides for the anonymous transmission of knowledge and the recording of individual innovation is evaded, and that textual knowledge is intimately bound

up with the magical power of words and the pursuit of a metaphysical truth which is likely to inhibit any trend towards a more 'rational' scientific outlook. There is at least as much evidence to suggest that literacy promotes Sanskritization as secularization, and cyclical as against durational notions of time.

Literacy and 'cognitive modernism'

If we start from the (questionable) premise that literacy plays a crucial causative role in the transformation from 'cognitive traditionalism' to 'modernism', then the next obvious step is to ask why in some cases this 'take-off apparently aborts. Why, in other words, do some literate societies (or part-societies) fail to realize its full potential?

One possible answer here would be in terms of the insufficient development of the technology of the intellect in the pre-print world, for in much of the recent literature it is the development of printing, rather than the development of literacy, which is seen as providing the crucial impetus for a revolution in human thought processes. Indeed it is striking that Eisenstein (1969, 1981, 1983) attributes to print almost exactly the same range of cognitive 'advances' as Goody attributes to literacy. Viewed from this perspective the crucial break is not that between pre-literate and literate, but that between scribal and print cultures.

In the former, texts not only have a tendency to 'drift' cumulatively away from their original source as they pass through the hands of generations of copyists, but many of them are lost or destroyed completely. Knowledge rests on a precarious foundation, and most of it is accessible only to the wandering scholar. In such a context the preoccupation is with retrieving what is already known; with recovering the wisdom of the ancients rather than with discovering something new. Before print it was in fact almost impossible to know whether a discovery was new. By vastly increasing the sheer quantity of knowledge available, print promoted a change in its qualitative character. Systematic cross-referencing became possible, thereby enhancing the likelihood of sceptical scrutiny and allowing for new intellectual combinations. What was known to the ancient world could now be established, could be found wanting and could provide the basis for a cumulative advance. In a scribal culture, by contrast, 'there could be no systematic forward movement, no accumulation of stepping stones enabling a new generation to begin where the prior one had left off (Eisenstein 1969:65). Associated with the development of print goes the shift from magic to science, and the growth of individualism. It was print technology that gave birth to the notion of intellectual property rights ('an absurdity…where every book copied is a minor victory over ignorance and wastage' (Hirst and Woolley 1982:41)); 'which encouraged publishers to advertise authors and authors to advertise themselves' (Eisenstein 1969:58), and which recorded individual achievement in a form and on a scale hitherto unknown. The transmission of knowledge became a more anonymous process, which allowed for the auto-

didact. But in a scribal culture books remain relatively rare items, and most people are acquainted with their contents only by hearing them read aloud. As a result they tend to take the form of compendia covering a wide range of diffuse topics, and 'oral performance sets its demands on composition' (Hirst and Woolley 1982:36). It was, in short, 'the shift from script to print (which) revolutionised Western culture', and which effected 'a shift in human consciousness' (Eisenstein 1969:19, 56). Before print. literary products had a restricted circulation, and it is this simple fact that gave rise to the cognitive syndrome associated with 'restricted literacy'.

It might, in other words, be plausibly argued that many of the features I have described for traditional India are common to the pre-print world in general, and are a direct consequence of the technological deficiencies in a scribal mode of communication. Even such highly particularized cultural notions as the idea that knowledge is (or is like) a 'gift' which must be circulated if it is not to destroy its possessor, might be seen in terms of the necessary preoccupation of such a culture with the problem of preserving existing knowledge.

While the argument of the previous paragraph has a certain force, the causal proposition that printing promotes a spirit of sceptical scientific enquiry, a weakening of confidence in old theories and the development of new intellectual paradigms obviously presuppose a specific institutional context. If in early modern Europe access to the new means of communication had been monopolized by priests and rulers, and denied to 'free-wheeling urban entrepreneurs', then—as Eisenstein (1983:273) herself explicitly acknowledges—the picture would have been significantly different. Far from being an instrument of intellectual liberation, under such conditions the printing press is far more likely to be an instrument of domination used to entrench the ruling paradigms. Moreover, the process of feedback from readers to publishers and authors which —on Eisenstein's showing—provided an important source of new information and facilitated a cumulative advance of knowledge in the early era of print, is clearly likely to occur only in a context where the submissions of the lay public are considered worthy of serious attention, and where the empirical knowledge they supply is highly valued. In short, the 'printing revolution' was revolutionary only because it was associated with a much wider 'democratization of society and learning' that was already under way. In a different institutional context (as for example in China and Korea) the implications of print technology were quite different (see Eisenstein 1983:273); and the development of this technology is therefore manifestly insufficient to account for the 'great transformation' of mental life.

It has often been argued that the scientific revolution which took place in Western Europe in the sixteenth and seventeenth centuries was positively promoted by the religious climate created by the Reformation. All believers with the capacity to do so now had

> 'the right, and even the duty…to study Scripture without depending on the authority of tradition and hierarchy, together with the right and duty to study the other book written by God, the book of nature, without regard to the authority of the fathers of natural philosophy.' (Hooykaas 1977:109)

Literacy itself became a moral obligation required of the believer so that he could directly receive the word of God (see Strauss 1981; Lockridge 1981). Though Newton and others saw themselves as retrieving knowledge which had been lost rather than discovering anything really new (Hall 1983:14), the general expectation was that the wisdom of the ancients *would* be surpassed, for in science 'truth is the daughter of time' (Hooykaas 1977:113). No pope was recognized in either religion or philosophy; the domain of science was freed from both ecclesiastical authority and that of the ancients, and was increasingly allowed to proceed by reference to its own autonomous rules and procedures. Since the Protestant God was remote and mysterious, he could only be known through his works and the investigation of his creation (Merton 1978; Parsons 1968:523). 'The study of natural phenomena (was seen as) an effective means for promoting the glory of God' (Merton 1978: 71); empirical knowledge was highly valued and a premium placed on its practical utility—for what sweetens the lives of mortals is good in the sight of God (Merton 1978:72). Painstaking observation and experiment became the scientific expression of the Puritan emphasis on labouring tirelessly in God's calling: and the relatively positive evaluation of both manual labour and artisan-type occupations favoured technological advance and the rise of experimental science. Made in the image of God, man moreover exercised dominion over nature and therefore had the right to master it by technological means.

The contrast between all this and the Brahmanical tradition I have described is radical. Far from a priesthood of all believers, the *shastras* are to be transmitted and interpreted only by those with the authority to do so, and literacy is not a requirement laid on the devout. Knowledge progressively degenerates with time, and is therefore something to be recovered from the sages of the past, whose wisdom cannot be surpassed in the present. Consistent with this is an emphasis on its faithful reproduction rather than on innovation and experiment; and on memorization over complete understanding. Since the *guru* provides a life-line to past tradition, his authority is paramount and a sceptical scrutiny of his teaching discountenanced. The *shastras* contain the last word on both science and salvation, and science does not constitute an autonomous domain apart from religion. Nor does the book of nature hold the keys to a transcendent truth. Knowledge of the empirical world is rather devalued—as is consistent with the notion that it is a world of illusion and an obstacle to salvation. 'The gods love the mystic'; they 'are fond of the obscure (and) detest direct knowledge', say the Satapatha Brahmana and the sage Yajnavalkya (quoted in Chattopadhyaya 1977: 272, 277). Real, eternally valid knowledge is of a soteriological nature; and in so far as one incidentally acquires a practical means of controlling the world by the

acquisition of knowledge that leads out of it, this control is of an essentially magical nature associated above all with the power of the spoken word. The tradition moreover accords a relatively low status to manual labour and craft occupations, and offers little stimulus to experimentation and technological innovation.

I do not, of course, intend to claim that all this represents the *only* strand in traditional Hindu thought; nor to suggest that all the divergent traditions of Hinduism were equally antipathetic to that 'rational empiricism' which characterized the emergence of modern science in Western Europe. Nor is my objective to account for the failure of Indian science to sustain its early promise (though I do suggest that the authority of the particular tradition I describe would be *one* of the factors relevant for such an account). A proper exploration of these issues is both beyond the scope of this paper and the competence of its author; and would obviously demand a consideration of politico-economic constraints which have not been touched on here.

The point of juxtaposing the two situations is rather that it directs attention to the enormous disparity between the two cognitive worlds, and emphasizes the necessity of understanding the transformation of mental life to which Goody alludes in relation to the wider context in which it actually occurs. But once this wider context is brought into the picture, the assumption that literacy is an active agent in the process—an assumption that underlies the questions with which I opened this section—begins to look rather dubious. Literacy is certainly a general precondition for the transformation, but surely reveals as much about the specific conditions under which it is likely to occur as the Neolithic Revolution reveals about the conditions likely to produce Stephenson's 'Rocket'. Once we have recognized that it provides no more than a passive prerequisite for 'cognitive modernism', it comes as no surprise that the 'cognitive traditionalism' supposedly characteristic of preliterate societies is no less marked in most literate ones. In terms of types of rationality, any antithesis between oral and literate cultures is false.

Notes

1 An earlier draft of this paper was presented to 'The Patterns of History' seminar at the London School of Economics, the South Asian Anthropologists Group, and at the University of Sussex. I gratefully acknowledge the helpful comments received on these occasions. Thanks are especially due to André Béteille, Maurice Bloch, Mary Searle-Chatterjee, Chris Fuller, and Mick Mann for their critical scrutiny of a previous version of the text.

2 Fieldwork in Benares was carried out between September 1976 and November 1977 (supported by the Social Science Research Council) and in August 1978, August-September 1981 and March-April 1983 (supported by the London School of Economics and Political Science). I am deeply obligated to Virendra Singh for his

language instruction, and to him and Om Prakash Sharma for their research assistance.

3 While the prestige and influence of these institutions is now much diminished, it is not clear that they catered for much larger student numbers in the pre-British period. Bernier observed that in the mid-seventeenth century 'the town contains no colleges or regular classes, as in our universities, but resembles rather the schools of the ancients, the masters being dispersed over different parts of the town in private houses…. Some of these masters have four disciples, others six or seven, and the most eminent have 12 or 15; but this is the largest number' (Bernier 1968:334; originally 1670). From a much earlier date, however, we learn of an establishment with 500 students (Basham 1971; 165).

4 Technically the *shastras* are the 'law books' and compilations of the post-Vedic period. In everyday speech, however, the term *shastrik* is used indiscriminately to cover beliefs and practices validated by the whole range of sacred texts from the Vedas to the Puranas and Dharmasastras.

5 For a body of scientific theory to rate as a *shastra* presupposes its unquestioned authority. Since it remains contentious, Darwin's theory of evolution would not be described as a *shastra,* but rather as a *siddhant* or 'doctrine'.

6 In the tradition at large the matter is not wholly unambiguous however; and even amongst my own informants there would be some who would stress an aspect of entreaty.

7 Not only the Veda but also the recitation of sacred texts of lesser prestige confers untold benefits. For the birth of a son the household priest will be asked to read the *Harivamsa Purana;* for the liberation of a soul who got stuck as a marginal ghost *(preta)* the *Shrimat Bhagavata Purana*. Though it is often said that it is necessary to listen to the text carefully if the desired result is to be obtained, and though the Sanskrit verses are accompanied by a Hindi commentary, attention tends to be rather fitful.

8 According to the ritual experts, Vedic *mantras* cannot in theory be chanted as part of the mortuary rituals of the first ten days after death which is the period of most intense pollution (though in practice this is not invariably true).

9 There is no way, they point out, that such stability could possibly be demonstrated in the absence of writing; and while it is certainly the case that Brahmanical dogma insists on the meticulous accuracy of oral transmission, this is no reason for accepting their testimony uncritically—a point which is brought home by Lord's (1960) work on Yugoslav bards, whose claims for the perfect repetition of their performance from one occasion to the next are both sincere and demonstrably false. The case of the Veda invites reassessment in the light of such findings. Ong (1982:62–3) nevertheless cites some impressive evidence of stability in cases of purely oral transmission, and plausibly suggests that ritual recitations and those constrained by music and/or rigid metrical forms are least susceptible to distortion and drift. Why these considerations should be ignored in the case of the Vedas is left unclear.

What is incontrovertibly established is that the highly formalized, disciplined, and rigorous methods developed for teaching the Veda do result in a remarkably accurate reproduction of what has been taught by purely oral transmission. Goody suggests that what makes this possible is the application of mnemonic techniques that depend on the reduction of language to a visual form and therefore presuppose

a literate culture—the implication being that verbatim reproduction of such accuracy could not be matched in a pre-literate one. This seems questionable. Is it really obvious that verbatim memorization *is* dependent on the visual representation of language, or that visual representation necessarily implies writing? Would not the commonplace observation that writing is destructive of memory suggest that oral knowledge is more likely to be faithfully reproduced in a pre-literate culture? While it is certainly the case that the elaborate theory of phonetics laid down in the Sanskrit texts which deal with the pronunciation and transmission of the Veda (e.g. Pattubhiram Sastri 1976) is inconceivable without literacy, is it equally clear that the actual teaching methods employed were wholly dependent on this theoretical apparatus and are unimaginable without it?

10 There are actually two slightly different traditions: the first that there is one *Purana* in heaven which Vyasa divided into eighteen on earth; the second that Vyasa transmitted only one *samhita* ('compilation') to his disciples, and it was subsequently subdivided.

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DHARAMPAL • *COLLECTED WRITINGS*

Volume I

INDIAN SCIENCE AND TECHNOLOGY IN THE EIGHTEENTH CENTURY

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Volume I
Indian Science and Technology in the Eighteenth Century

Volume II
Civil Disobedience in Indian Tradition

Volume III
The Beautiful Tree: Indigenous Indian Education in the Eighteenth Century

Volume IV
Panchayat Raj and India's Polity

Volume V
Essays on Tradition, Recovery and Freedom

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Some contemporary European accounts

by

Dharampal

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CONTENTS

Introduction

The present volume is part of an attempt to understand the functioning of the Indian state and society some eight to ten generations back, i.e., around the period 1750, when India began to fall under European domination—firstly in the Tamil and Telugu areas, and afterwards in Bengal and elsewhere. This attempt consisted in a perusal, during 1966-70, of some of the vast Indian archival material in the English language lodged in the archives of Britain. This volume presents some of the major eighteenth and early nineteenth century documents found during this search on the subject of science and technology.

The authors of these documents came to India in various capacities: as military, medical and civilian servants of the European governments; as travellers, sometimes coming on their own, but more often sent by wealthy patrons or the newly established learned societies (like the Royal Societies of Paris and London; the Society of Arts in London, etc.); and some, like the Jesuits, came on behalf of the various Christian religious orders. According to the European scholarly canons of the time, all these were experts in their respective fields and were considered to be competent to report on what they observed or studied. Most of those, included here, spent a substantial part of their active lives in different parts of India.

Practically all European scientific and technological accounts relating to the sciences and technologies of non-European countries (including the ones reproduced here) are an outcome of the seventeenth and eighteenth century European quest for useful knowledge in these fields. The nature of the quest itself got wider and more complex with the passing of practically each decade. Few things, except finished consumer goods or gold and diamonds, etc., were noticed in the non-European world by the earlier European travellers, servants of European states, and the scientists and technologists, etc. This was partly due to the short durations which most of them spent in any particular area. But

the preponderant cause was the lack of requisite comprehension amongst the learned of Europe of the prevailing non-European practices and technologies. Such lack of understanding was even more evident amongst the learned of Britain who, till about 1800, seem to have lagged behind some of the other parts of Europe in many scientific and technological fields by about fifty years.

Two examples of such lack of comprehension pertain to the practice of inoculation against smallpox, and the use of the drill plough. Till 1720, when the wife of the then British Ambassador in Turkey, having got her children successfully inoculated,[1] began to advocate its introduction into Britain, the practice of inoculation was unknown to the British medical and scientific world. Proving relatively successful, though for a considerable period vehemently opposed[2] by large sections of the medical profession and the theologians of Oxford, etc., an awareness grew about its value and various medical men engaged themselves in enquiries concerning it in different lands. The two accounts of inoculation reproduced here are a result of this post-1720 quest.

Similarly about the drill plough. The drill plough is said to have been first used in Europe by one Joseph Locatelli of Carinthia (Austria) in 1662.[3] Its first introduction in England dates to 1730. But it took perhaps another 50 years before it was used on any scale. It was used in India (according to the authors of Chapters XII and XIII) from time immemorial. Observations of its use, by the British, however could only begin in the last decades of the eighteenth century, after its awareness had dawned on the more observant amongst them.

Initially, the quest is limited and the queries which are put by the various European learned societies and individual patrons to those of their kind who have stayed or wandered in the non-European world, are fairly simple. In course of time, as knowledge gets added to knowledge and newer formulations develop in Europe, the quest becomes wider and more sophisticated and the queries begin to be concerned with the more complex. The interest in the Indian manufacture of ice; in the making of the 'Madras mortar'; in the processes of Indian iron and steel manufacture; or the observatory at Varanasi (Benares) (treated as one of the five 'celebrated observatories' of the world by the

1. Lady Mary Wortley Montagu: *Memoirs.*

2. See mid-eighteenth century *Tracts on Inoculation* in the British Museum

3. *Encyclopaedia Britannica*: 1910-11 edition: Article on *Sowing.*

Encyclopaedia Britannica in its editions till 1823); the search for newer chemicals and dyes, or for materials for the water-proofing of the bottom of ships (considerable quantities of which were sent with information as late as the 1790s by a Bombay correspondent to the President of the British Royal Society: Chapter XVII), arose out of rapidly multiplying but specific European needs.

It is in this context of widening horizons as well as the urgent need for materials and processes (partly resulting from constant warfare in which the Europeans were engaged during the greater part of the eighteenth century) that accounts of the kind presented here were written and submitted by individual Europeans to their respective patrons. It is in these European writings of the period (i.e., from about 1720 to 1820), that one discovers the observed details about science and technology as well as about the societies, institutions, customs and laws of various parts of the non-European world. Before this period, the European ability to comprehend this new world was limited; after about 1820, the knowledge and institutions of the non-European world also began to have much less usefulness to the problems of Europe. Further, by the 1820s, most parts of the non-European world are no longer themselves. Their institutions, sciences and technologies are not what they were 50 or a 100 years earlier, and have met the same fate as their political systems and sovereignty. By the 1820s or so, most of the non-European world had become, at least in European theory and most conventional history texts, if not actually in practice, 'backward and barbarian'.

But the imagery of backwardness and barbarism which still serves as a descriptive label for most of the non-European world was no sudden product of the 1820s or any other decade. It grew over a fairly long period, but at a much accelerated pace after about 1780. Many of the post-1780 accounts reflect the growth of this attitude amply.

The widespread prevalence (no less amongst the learned and scholarly) of European ethnocentric bias is dramatically demonstrated by the post-1780 writings on Indian astronomy and the observatory at Benares. It comes through even in the very learned review (p.48-93) which Prof John Playfair, professor of mathematics in the University of Edinburgh, an academician of distinction, did of the then accumulated European knowledge on Indian astronomy. After a detailed examination, he arrives at the conclusion that the Indian astronomical observations pertain-

ing to the period 3,102 years before Christ appeared to be correct by every conceivable test. Such correctness of observation was possible either through complex astronomical calculations by the Indians or by direct observation in the year 3102 B.C. He chooses the latter explanation. The reason for the rejection of the explanation that these could have been arrived at by the Indians through astronomical calculation would have implied that 'there had arisen a Newton among the Brahmins, to discover that universal principle which connects, not only the most distant regions of space, but the most remote periods of duration, and a De La Grange, to trace, through the immensity of both its most subtle and complicated operations.'[4] It became intellectually easier for him to concede this astronomy's antiquity rather than its sophistication and the scientific capacities of its underlying theories.

But even the conceding of its mere antiquity was of very short duration. With the strengthening of the fundamentalist and evangelical Christian tendencies, this concession began to look like blasphemy. Keeping in view the European historical premises, originating in the Old Testament, it was just not conceivable for anything except the stated items to have survived 'the Deluge' which was computed to have taken place in the year 2348 B.C. By 1814, though things Indian were still being half-heartedly defended by a journal like the *Edinburgh Review*, even the mere antiquity of Indian astronomy had received a final European dismissal.

While reviewing Cuvier's 'The Theory of the Earth'[5], (in which Cuvier had ridiculed and dismissed the ancient date of the Indian tables), the *Edinburgh Review* took cognisance of the changed attitudes and relationships between Europe and the non-European world, and observed: 'But though the tide of opinion seems, for some time past, to have set strongly against the high antiquity of the sciences of the East, it does not appear that the main arguments of the Historian of astronomy [i.e., Bailly] have ever been refuted.' It tried to resolve the contradiction between the Mosaic and Christian belief, and the earlier date of the Indian tables, by advancing the proposition, that 'the early date of that Astronomy, and the usual date of the Deluge, may be perfectly reconciled, on the supposition that the former is a fragment of antediluvian science, which had escaped the general destruction.' Such a solution of the controversy was, however, no

4. See Chapter II, p.89.

5. *Edinburgh Review*, Vol.22, Jan. 1814, pp.474-75

longer practicable, nor necessary from the viewpoint of European scholarship, in what had by then become an exclusively European century.

Even when the ancientness of Indian astronomy was being conceded, as was done by Prof Playfair, it was difficult to admit that the eighteenth century Indian astronomers and scholars on the subject had any real competence. According to Playfair, the eighteenth century Indian astronomer had 'little knowledge of the principles on which his rules are founded, and no anxiety to be better informed.'[6] Yet it was only through intercourse with Indian astronomers and by means of instruction and data received from them that the European knowledge of Indian astronomy could be acquired. It was thus acquired by M. Le Gentil during his visit to India about 1769. According to the *Encyclopaedia Britannica*: 'During the time of his stay in Hindustan, the Brahmins had been much more familiar with him on account of his astronomical knowledge, than they usually were with Europeans, and he thus had an opportunity of obtaining considerable insight into their methods of calculation. In consequence of this instruction he published tables and rules, according to the Indian method, in the Academy of Science for 1772.'[7]

The general incommunicativeness of eighteenth century Indian scholars and specialists in the various fields had two probable roots: one, the usual secretiveness of such persons, and, two, the very sophistication and complexity of their theories which in their view (whether rightly or wrongly) would not have been understood by most Europeans. It is possible that the various sciences and technologies were on a decline in India around 1750 and, perhaps, had been on a similar course for several centuries previously. But there seems little doubt that the processes, methods, theories and formulations described in the contemporary accounts included in this volume were very much a living reality in the areas of India to which they pertain. Whether these were also used or taught or discussed in most other parts is a matter for detailed investigation, not only into the English language records, but more so in the surviving indigenous Indian records of the period, and also the Indian archival material in other foreign languages. How do mid-eighteenth century Indian sciences and technologies compare with the sciences and technologies in earlier periods requires similar investigation.

6. See Chapter II, p.51.

7. *Encyclopaedia Britannica*: 1823 edition: Article on *Hindoos*, Vol.X, p.477.

The later eighteenth century European ethnocentric preoccupations had other dimensions also. Some of these are expressed in Chapters III and V, whereby everything existing elsewhere is visualised to have had its origin in India. A different dimension was expressed in propositions like: 'The Hindu religion had its origin in the British Isles,'[8] (which was held to be the *Sweta Dwipa* of the Hindu classics). Though perhaps not so intended, all of these conflicting speculations and formulations ultimately led to the subversion of the non-European world. Many directly confirmed the growing European view of the barbarism and ignorance of the non-Europeans; the others served the same purpose by becoming easy targets for European ridicule and contempt.

II

Four of the accounts included in this volume deal with astronomy and two with mathematics. The observatory at Benares described by Sir Robert Barker, after a visit to it in 1772, still exists more or less intact and is at present known as the Man Mandir. It stands only a few hundred yards away from the Dasasvamedha Ghat. Its appearance today seems even more neglected* than that described two centuries ago, except that a few plates have been fixed indicating the names of the various *yantras* (instruments) in Hindi and English. Two other plaques indicate the period of the building and the date of the erection of the observatory. While the building is stated to have been built in the late sixteenth century, the relevant plaque states the erection of the observatory in the early eighteenth.

Such playing about with the dates of the founding of the observatory has a curious tale to tell. Barker's account was published in the *Transactions* of the British Royal Society in 1777 and it put the erection of the observatory some two centuries

8. *Edinburgh Review*, Vol.X (1810), p.387; also see 'An Essay on the Sacred Isles in the West' by Francis Wilford in the *Asiatic Researches*, Vol.8 (1808), pp.246-7.

*It is tragic that one of the five celebrated observatories of the world (and in India the most celebrated), though still intact, remains in complete neglect. Its counterparts in Britain, France, etc. are greatly cherished and serve as the repositories and centres of their respective astronomical knowledge. India owes that much to itself and its people that places like the Man Mandir are duly cherished and looked after.

previously. In 1792, in conformity with the request of a Fellow of the Royal Society, another report on the observatory was received from one J.L. Williams of Benares. This was published in the *Transactions* in 1793.[9]

One of the two main points which this later account, as if in passing, tried to make was that the observatory only came into being some 50-60 years earlier and was not built in the sixteenth century—as stated by the Bengal commander-in-chief in his article published in 1777. To support this contention, it produced what it claimed to be the opinion of the Indian magistrate of Benares (who, incidentally, with his colleagues was in the process of being displaced by British judges and magistrates through the newly enacted 'Cornwallis' Judicial Regulations). The magistrate is alleged to have said that though the building was built by 'Rajah Maunsing, for the repose of holy men and pilgrims', the 'observatory was built, by the Rajah Jeysing.' Further, it was begun in 1794 *sumbut* (A.D. 1737) and finished in two years and that the Rajah died in 1800 *sumbut* (A.D. 1743). To this was added the even 'weightier' opinion of the Brahmins of Benares 'one of whom is professor of astronomy in the new founded college.' According to him, 'they all agreed that this observatory never was used, nor did they think it capable of being used, for any nice observations; and believe it was built more for ostentation, than the promotion of useful knowledge.' Besides these two points, the article gave the measurements of the various instruments but stated that 'from the want of sufficient knowledge of the science of astronomy, I have not been able to describe the different instruments, and their uses, satisfactorily; however, you may rely on the measurements being taken with the greatest exactness.'

The subject of the Benares observatory was again taken up in 1798 by William Hunter, an assistant to the British Resident at the Marhatta capital at Poona, in an article, 'Some account of the astronomical labours of Jayasinha, Raja of Ambhere, or Jayanagar'. The interest in Raja Jayasinha is explained: 'Arising superior to the prejudices of education, of national pride and religion', Jayasinha strove to enrich his country 'with scientific truth derived from a foreign source', in this particular instance, Europe. The writer was quite candid and outspoken about his purpose. He said: 'I have always thought, that after having convinced the eastern nations of our superiority in policy and in

9. *Philosophical Transactions*, Vol.83 (1793), Article by John Lloyd Williams, pp.45-9.

arms, nothing can contribute more to the extension of our national glory, than the diffusion among them of a taste for European science. And as the means of promoting so desirable an end, those among the natives who have penetration to see, and ingenuousness to own its superior accuracy and evidence, ought to be cherished.'[10]

This article made an attempt to provide documentary evidence of the Benares observatory as having been the creation of this early eighteenth century Raja Jayasinha by quoting from what is called the *Zeej Mohammedshahy*.* According to this document, having 'assembled the astronomers and geometricians of the faith of Islam and the Brahmins and Pundits, and the astronomers of Europe' etc., Jayasinha 'bound the girdle of resolution about the loins of his soul, and constructed (at Dehly) several of the instruments of an observatory.' And 'in order to confirm the truth of these observations' i.e., at Dehly, 'he constructed instruments of the same kind in Sewai Jeypoor and Matra, and Benares and Oujein.' With the foregoing statement from the *Zeej Mohammedshahy,* the documentary proof ended. For the rest, he added: 'The observatory at Benares having been described by Sir Robert Barker and Mr Williams, I have only a few remarks to offer, in addition to the account delivered by those gentlemen' [11] and the writer made some more observations on its measurements, etc.

Various other Britishers seem to have gone and made reports on the Benares observatory in the early decades of the nineteenth century. But the subject soon disappeared from public discussion. It was re-opened in 1920 by the author of 'A Guide to the Old Observatories',[12] originally published by the Archaeological Survey of India. It stated that the Man Mandir i.e., the actual building of the Benares observatory, 'was built about the beginning of the seventeenth century. The astronomical instruments were added by Jai Singh about A.D. 1737.' It said further: 'The date is not certain, and nearly every writer gives a different one.'

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*If it still exists, much more needs to be known about this mid-eighteenth century document: how it came to be written, by whom, under whose patronage and in what year.

10. *Asiatic Researches*, Vol.5 (1798), Article by W. Hunter, pp.177-211.

11. *Ibid.*

12. G.R. Kaye (honorary correspondent of Archaeological Department of India), Calcutta, Government Printing Press, 1920.

It further observed, 'Prinsep wrote: "The building was converted into an observatory by Jaysingh in A.D. 1680" and refers to a supposed description of it by Tavernier.' Dismissing all these other dates* this author concluded that 'Williams' date for the observatory at Benares, 1737, may be accepted' as he 'on all points that can be verified, is extremely reliable', and quoted Hunter as speaking 'of the accuracy of Mr Williams' measurements.'[13]

The eighteenth century dating of the Benares observatory thus rests on the two articles published in 1793 and 1798 respectively; the first, at the instance of a Fellow of the Royal Society, and the second, in a longer piece wishing to convince the Eastern nations of the superiority of European eighteenth century science with a view to 'contribute more to the extension of our national glory.' What Tavernier said in his published, 'Travels' was: 'Near to this great Pagod, upon the summer-west, stands a kind of a college which the Raja Jesseing the most potent of all the idolaters in the Mogul's empire, built for the education of the youth of the better sort.'[14] Tavernier visited Benares in 1655-6. It may be added that quite a few 'Jayasinha' (spelt variously) have been Rajas of 'Ambhere' through the centuries. It is possible that this fact has also contributed to different writers claiming widely separate dates for the construction of the Benares observatory.

A rather curious point arises here out of this chronology about the dating of the Benares observatory: Barker along with Pearse, and A. Campbell visited the observatory in 1772. If the observatory was actually built in 1737, it was only 35 years old at this date. Both Barker and Pearse specifically state that it had been there for some two centuries. They must have arrived at this statement after meeting and conversing with persons who, if the observatory had been constructed only 35 years previously, must have been eye witnesses to its construction. As there was no controversy in 1772 about the date of the construction of the observatory, it is inconceivable that Barker's informants misled him on this point. The conversion of two centuries into 35 years is the most fabulous aspect of this later controversy.

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*Prinsep, with a footnote: 'Tavernier died in 1689, three years after Jai Singh's birth.'

13. *Ibid.*

14. J.P. Tavernier: *Travels in India*, Calcutta, 1905, p.425.

Next is the long and learned review (Chapter II), 'Remarks on the Astronomy of the Brahmins', by John Playfair, read by him in 1789. In this article, the author begins by referring to certain astronomical tables received from the East Indies by European scholars at an early stage in their contact with the East. Some of these tables were received from Siam and their 'epoch' corresponded to 21 March 638 A.D. But the point to note was that the 'meridian' of these tables was not Siam but Benares!

Other tables received from South India had one thing in common. Their 'epoch' coincides with the era of *Kaliyuga*, that is, with the beginning of the year 3102 B.C. Prof Playfair begins by enquiring whether the 'epoch' was real or fictitious; that is, whether the planetary positions at that time were actually observed or were merely calculated back from the 'epochs' of more modern tables to coincide with a mythical *Kaliyuga*.

Prof Playfair observes that it is not for astronomy, even in its most perfect state, to go back 46 centuries and to ascertain the situation of the heavenly bodies at so remote a period, except with the help of lately developed Integral Calculus and the Theory of Gravitation. He finds that the positions of the planets as given in these tables is very close to the position as calculated back with the help of modern Integral Calculus and the Theory of Gravitation. All other systems of calculation, whether Chaldean or Egyptian or Greek which the Hindus might have used for their purpose gave very different results.

So for him, the inescapable conclusion is that these positions were observed by the Brahmins, and it is rather a wonder that the Brahmins could do so rather precisely at so distant a past. Prof Playfair also observed that the construction of these tables implied a good knowledge of geometry and arithmetic, as well as the possession of a Calculus equal to Trigonometry.

The paper (Chapter IV) by Colonel T.D. Pearse, sent by him to the Royal Society, London, and surviving in their archives, refers to the Indian knowledge of the four Satellites of Jupiter and the seven Satellites of Saturn. Pearse further felt that the Indians must have possessed some kind of telescopic instruments to have acquired such detailed knowledge. The author of Pearse's memoirs, while including a slightly modified version of this piece in the memoirs, states:

> We cannot pass this interesting communication without offering some reflection upon the subjects it embraces. The circumstances of the four girls dancing round the figure of

> Jupiter, as they ought to be according to the Brahmin's statement to Colonel Pearse, is a strong argument in favour of the superior knowledge of the heavenly bodies which the ancient Arabians and Hindus possessed. The four dancing girls evidently represent the four satellites of Jupiter. These circumjovial satellites (as they are styled by modern astronomers from the quirk of their motions in their orbits) were not known in Europe before the year 1609, and the third and fourth only are visible, and this but rarely and in the clearest atmosphere to the naked eye. But it is truly interesting and curious that the figure of Saturn should be represented with seven arms. At the time Colonel Pearse wrote his letter to the Royal Society, the sixth satellite of Saturn had not been discovered: it was first discovered by Herschel on the 28 August 1789; and the seventh satellite, which the seventh arm of the figure, without dispute, must be intended to represent, was not discovered by Herschel until he had completed his grand telescope of 40 feet focal length, when it was first observed by him on the 17 September 1789. All the satellites of Saturn are so small, and the planet is so remote from the earth, that the best telescopes are necessary for observing them. May not the seventh arm *having hold of the ring* denote a circumstance connected with the orbits of these planets, which is that the planes of their orbits so nearly accord with that of the ring, that the difference is not perceptible? Undoubtedly, the ancient astronomers must have possessed the best instruments: probably differing from modern ones, but fully as powerful.

The writer added further: 'We are not aware that the Royal Society in any of its printed papers have noticed Colonel Pearse's communication, but our imagination, warmly interested as it has been in all that relates to the subject of the present memoir, has pictured the probability that Colonel Pearse's paper may have met the eye of Herschel, and may have been an additional spur to the indefatigable and wonderful labours of that great man.'[15]

Reuben Burrow's unpublished paper (Chapter III) was addressed to the British Governor General Warren Hastings soon after Burrow had come to India to take up his new job at Calcutta. It is highly speculative and in a way is more in line with the contemporary intellectual tradition of the European en-

15. *Bengal: Past and Present*, Vol.6, pp.279-80

lightenment of the eighteenth century.* Though in itself it does not provide much factual data, and perhaps comes to even several erroneous conclusions as we would see them today, its very speculativeness seems to have provided inspiration and stimulus to a number of subsequent enquiries about Indian sciences, particularly mathematics. The article 'A Proof that the Hindus had the Binomial Theorem' by Burrow himself, and the later dissertation by H.T. Colebrooke on 'Hindu Algebra' (given as introduction to his translation of 'Algebra with Arithmetic and Mensuration' of Brahmagupta and Bhascara) decidedly follow such speculativeness. Acknowledging Burrow's contribution, particularly in bringing Indian Algebra to the notice of Europeans, the article on 'Algebra' in the *Encyclopaedia Britannica* (8th edition) stated:

> We are indebted, we believe, to Mr Reuben Burrow for some of the earliest notices which reached Europe on this very curious subject. His eagerness to illustrate the history of the mathematical sciences led him to collect oriental manuscripts, some of which in the Persian language, with partial translations, were bequeathed to his friend Mr Dalby of the Royal Military College, who communicated them to such as took an interest in the subject, about the year 1800.[16]

The article (Chapter V) on 'the Binomial Theorem' was published in 1790 in Calcutta. Till then, and in British reference books like the *Encyclopaedia Britannica* well into the twentieth century, the discovery of this theorem has been credited to Newton.[17] Some thirty years later, Burrow's article was followed by another titled 'Essay on the Binomial Theorem; as known to the Arabs'.[18] This later article was a sequel to the first by R. Burrow, and it concluded: 'It plainly appears, that whatever may have been the case in Europe, yet long before the time of Briggs the Arabians were acquainted with' the Binomial Theorem.

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*The tradition has, in fact, continued well into the present time; only as time passed, however, it has become more and more Eurocentric. The late 19th century dictum, 'Except the blind forces of nature, nothing moves in this world which is not Greek in its origin,' enunciated by Maine (one-time Law Member of the Governor General's Council in India) was merely an intellectual and scholarly expression of the mounting Eurocentric character of this speculativeness.

16. *Encyclopaedia Britannica*: 8th Edition (1850), Article on *Algebra*.

17. *Encyclopaedia Britannica*: 11th Edition (1910-11), Article on *Binomial Theorem*.

18. *Asiatic Researches*, Vol.13 (1820), Article by R. Tytler, M.D., pp.456-67.

(Briggs was teaching around 1600, about a century before Newton).

This later author quoted Dr Hutton concerning the origin of the Binomial Theorem in Europe. The following, from the longer extract of Hutton's account, is worth quoting:

> Lucas De Burgo extracted the cube root by the same coefficients, about the year 1470...Briggs was the first who taught the rule for generating the coefficients of the terms, successively one from another, of any powers of a binomial, independent of those of any other power...This theorem then being thus plainly taught by Briggs about the year 1600, it is surprising how a man of such general reading as Dr Wallis was, could be ignorant of it...and fully ascribe the invention to Newton...But I do not wonder that Briggs remark was unknown to Newton, who owed almost everything to genius and deep meditation, but very little to reading: and I have no doubt that he made the discovery himself, without any light from Briggs.[19]

H.T. Colebrooke's dissertation on 'Hindu Algebra', resulting from all the preceding investigations by men like R. Burrow, F. Wilford, S. Davis, Edward Strachey, John Taylor, etc., and from his own considerable knowledge, is a learned survey and comparison of the developments in Europe and India. But the conclusion that Indian Algebra, etc., may have had an independent development proves difficult for him to digest. Reversing the speculations of Burrow, he comes to the conclusion that the 'Algebra of the Greeks', imperfect though he admits it to be, 'was made known to the Hindus by their Grecian instructors in improved astronomy.'* But wishing to be gracious and charitable, he infers that 'by the ingenuity of the Hindu scholars, the hint was rendered fruitful and the algebraic method was soon ripened from that slender beginning to the advanced state of a well arranged science.'[20]

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19. *Ibid.*

20. See Chapter VI, p.146.

*The reviewer of 'Algebra, with Arithmetic and Mensuration', in *The Edinburgh Review* (November 1817) however thought differently and stated that it 'could not have been derived from Greece.' Commenting on Colebrooke's opinion he added: 'Mr Colebrooke, after demonstrating the excellence of this algebra, and comparing its more perfect algorithm and its superior advancement with the Greek algebra, as explained in the work of Diophantus, seems nevertheless willing to admit, that some communication about the time of the last mentioned author, may have come

III

As contrasted with the eighteenth century European consideration and discussion on Indian sciences, the accounts of Indian technology did not give rise to passionate controversy. Perhaps such passion was neither possible nor necessary, as it ordinarily did not challenge any fundamental European dogma or belief. The results of the technology were there for all to observe and utilise. And it may incidentally be the lack of such controversy itself that explains the complete current ignorance of most aspects of this technology.

It appears that Indian medical men (with whatever names they may be termed at the end of the eighteenth century) made considerable use of surgical techniques in different parts of India. According to Colonel Kyd in 'Chirurgery (in which they are considered by us the least advanced) they often succeed, in removing ulcers and cutaneous irruptions of the worst kind, which have baffled the skill of our surgeons, by the process of inducing inflammation and by means directly opposite to ours, and which they have probably long been in possession of.'[21] Dr H. Scott (Chapter XVII) seems to corroborate the above and further reports the prevalence of plastic surgery in Western India, in his letters to the President of the Royal Society, London. In 1972, he states:

> In medicine I shall not be able to praise their science very much. It is one of those arts which is too delicate in its nature to bear war and oppression and the revolutions of governments. The effects of surgical operation are more obvious, more easily acquired and lost by no means so readily. Here I should have much to praise. They practice with great success the operation of depressing the crystalline lens when become opaque and from time immemorial they have

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from Greece to India, on the subject of the Algebraic Analysis. Of this we are inclined to doubt; for this simple reason, that the Greeks had nothing to give on that subject which it was worth the while of the Indians to receive. Mr Colebrooke seems inclined to this concession, by the strength of a philological argument, of the force of which we are perhaps not sufficiently sensible. It seems however certain, that the facts in the history of Algebraic Analysis, taken by themselves, give no countenance to the supposition.'

21. India Office Records (IOR): *MSS Eur F/95/I*, 'Some Remarks on the Soil and Cultivation on the Western Side of the River Hooghly', ff.81r.

cut for the stone at the same place which they now do in Europe. These are curious facts and I believe unknown before to us.[22]

Two years later he refers to the 'putting on noses on those who lost them' and sends to London a quantity of 'Caute', the cement used for 'uniting animal parts'.[23]

Inoculation against the smallpox seems to have been universal, if not throughout, in large parts of Northern and Southern India, till it was banned in Calcutta and other places under the Bengal Presidency (and perhaps elsewhere) from around 1802-3. Its banning, undoubtedly, was done in the name of 'humanity', and justified by the Superintendent General of Vaccine* Inoculation in his first report in March 1804.[24]

The most detailed account of the practice of inoculation against the smallpox in India is by J.Z. Holwell, written by him for the College of Physicians in London.

After giving the details of the indigenous practice, Holwell stated (Chapter VIII, pg 158): 'When the before recited treatment of the inoculated is strictly followed, it is next to a miracle to hear, that one in a million fails of receiving the infection, or of one that miscarries under it.' It is possible that Holwell's information was not as accurate as of the newly appointed Superintendent General of Vaccine Inoculation in 1804. According to the latter, fatalities amongst the inoculated were around one in two hundred amongst the Indian population and amongst the Europeans in Calcutta, etc., 'one in sixty or seventy'.[25] The wider risk, however, seems to have been in the spreading of disease by contagion from the inoculated themselves to those who for one reason or another had not been thus inoculated.

It is possible that there were some areas in India where inoculation did not prevail. This, of course, is a matter for enquiry. But wherever it did, it appears to have been universal over

*A vaccine (the Latin *vacca*, meaning cow) from the cow, for use in the inoculation against smallpox was manufactured by Dr E. Jenner in 1798. From then on, this vaccine replaced the previous 'variolous' matter, taken from human agents. Hence the method using the 'vaccine' came to be called 'Vaccine Inoculation'.

22. See Chapter XVII, pp.255.

23. *Ibid*, pp.256.

24. Report on the Progress of Vaccine Inoculation in Bengal, Calcutta, 1804.

25. *Ibid*, p.27-8.

a whole tract. After the imposition of British rule in Bengal, Bihar, Orissa, areas of Madras Presidency, etc., this situation seems to alter. According to the Superintendent General of Vaccine Inoculation, a section of the people, either 'from indigence' or 'from principle', did not any longer (*circa* 1800) receive the inoculation.[26] Those who did not receive it 'from principle' seem to have been the Europeans in Calcutta, etc. Partly this may have been due to the greater mortality (i.e. one in sixty or seventy, as indicated above) amongst them. Further it may have also resulted from the persistence of Christian theological objections to any inoculation amongst them.[27]

Not receiving it 'from indigence', on the other hand, pertained to sections of the Indian population. Like many other categories of specialists, (including school teachers, doctors, establishments of religious institutions and places, village establishments, etc.), it is probable that the inoculators in India had also been maintained on subventions from public revenues. With the imposition of British rule, the Indian fiscal system began to collapse and various categories of specialists and functionaries were thrown out on the streets and left to wholly fend for themselves. It is this development, and the simultaneous deepening of poverty amongst the people, that most probably resulted in many not being inoculated 'from indigence'. Such a situation must have naturally made the practice of inoculation seem even more undesirable to the Europeans who, while they themselves did not like to be inoculated, yet could not function without whole contingents of Indian domestic servants.

So what, till the latter part of the eighteenth century, when practised universally in any tract, was a relatively effective method involving no contagious effects (since all were similarly inoculated), had begun to seem by 1800 a great hazard to the Europeans in Calcutta. But in spite of the bannings, prohibitions, etc. resorted to in Calcutta and other cities and towns, the introduction of vaccine inoculation was very halting. Such halting development must have been caused by insufficient provision of resources or by sheer indifference. Or, as hinted by the officiating Superintendent General of Vaccination for N.W.P. (the present U.P.) in 1870, it may also have been caused by the peoples' reluctance to get vaccinated as, according to this author-

26. *Ibid*, p.94.

27. See *Tracts on Inoculation*, referred to above (reference 2) for the theological reasons advanced against inoculation in Britain in the eighteenth century.

ity, the indigenous inoculation possessed 'more protective power than is possessed by vaccination performed in a damp climate.'[28] Whatever the causes, the indigenous inoculation seems to have been still practised around 1870. For areas near Calcutta, those who were not so inoculated are estimated at 10 per cent of the population around 1870, and for the Benares area at 36 per cent.[29] The frequent smallpox epidemics which were rampant in various parts of India in the nineteenth and early twentieth century may largely be traced back, on the one hand, to the state's backwardness and indifference in making the requisite arrangement for universal vaccination; and on the other hand, to having made the existence of the indigenous practice of inoculation most difficult not only by withdrawing all support for it, but also forcing it to be practised secretly and stealthily.

Another important point which emerges from Mr Holwell's account of the Indian method of inoculation relates to the prevalence of some theory of bacterial infection amongst the mid-eighteenth century Indian inoculators. According to them: 'The smallpox is more or less epidemical, more mild or malignant, in proportion as the air is charged with these animalculae', i.e. bacteria, and that these 'adhere more closely, and in greater numbers, to glutinous, fat, and oily substances.' That these '*imperceptible animalculae* floating in the atmosphere...are the cause of all epidemical diseases, but more particularly of the small-pox;' that 'they pass and repass in and out of the bodies of all animals in the act of respiration, without injury to themselves, or the bodies they pass through;' but 'such is not the case with those that are taken in with food,' as these 'are conveyed into the blood, where, in a certain time, their malignant juices excite a fermentation' and end 'in an eruption on the skin.'[30]

Similarly interesting accounts are available on Indian agriculture. The observation by Alexander Walker (Chapter XII), that 'the practice of watering and irrigation is not peculiar to the husbandry of India, but it has probably been carried there to a greater extent, and more laborious ingenuity displayed in it than in any other country,'[31] is in dramatic contrast to present day

28. IOR: Practice of Inoculation in the Benares Division: From Officiating Superintendent General of Vaccination to Government N.W.P., dated 6th June 1870, p.77.

29. Ibid, Report by R.M. Milne, Officiating Superintendent of Vaccination, dated 1st April 1870, p.72.

30. See Chapter VIII, p.161.

31. See Chapter XII, p.191.

text-book accounts of 'the comparative absence of artificial irrigation' in eighteenth century India.[32] How Indian agricultural principles, implements and practices (and these may have somewhat varied in different parts of India itself) compared with those elsewhere (China, Egypt, various countries of Europe, etc.), can only be known after a detailed comparative study of the subject. The causes of relative scarcity of resources constantly facing the Indian husbandman also need to be enquired into. It is probable that in most parts of India such scarcity was of late eighteenth century origin, and directly resulted from political causes. But it seems clear that besides widespread artificial irrigation, the practices of (i) crop rotation, (ii) manuring, (iii) sowing by means of the drill plough, and (iv) use of a variety of other implements were fairly widespread. The nature and quality of soils seemed to be well understood and in areas like Malabar, certain species of paddy are propagated by cuttings. The use of the drill plough, however, (and perhaps also of some other implements and practices), as noted in Chapter XIII, varied from husbandman to husbandman, the poor not being in a position to use it as it required larger resources not only in implements but also in draught cattle. The latter-day decline in the variety and efficiency of agricultural implements seems to be a result of the general economic impoverishment brought about by the state appropriating all it possibly could in the late eighteenth and the nineteenth centuries.*

The composition of the 'Madrass Mortar' (Chapter IX) is very curious, while the process of making paper (Chapter XI) is perhaps not very different from that currently in use in the manufacture of hand-made paper. Chapter X, on the process of making ice, however, is still more fascinating. It was first published in 1775 in London. But it appears that this subject and the

32. Rameshchandra Majumdar, H.C. Raychaudhuri, Kalikinkar Datta: *An Advanced History of India*, 3rd edition (1967), p.564.

*The material concerning the proportion of the gross produce of agriculture taken away by the state constitutes a major portion of British Indian archival documents. Theoretically, the land revenue due to government was fixed at 50%. In large parts of India under British rule till 1855 or so, the proportion that during most years actually went towards governmental land revenue was appreciably higher. For instance, according to certain enquiries in the Madras Presidency Ryotwary areas during the 1850s, about one-third of the irrigated land had over the years altogether gone out of cultivation as the amount of land revenue on such land had begun to approximate the gross produce itself, and at times even exceeded it.

manner in which ice was made had been observed even earlier by a number of Britishers in India and had given rise to considerable scientific curiosity in England. The artificial making of ice seems to have been till then unknown in Britain (and perhaps also in other European countries). The observation that 'boiling the water is esteemed a necessary preparative to this method of congelation' aroused particular interest. Sir Robert Barker, the author of this article, while referring to this point wondered 'how far this may be consonant with philosophical reasoning' (i.e., with scientific proof). As a consequence, after carrying out various experiments, the professor of Chemistry at Edinburgh University provided the following explanation:

> The boiled and common water differ from one another in this respect; that whereas the common water, when exposed in a state of tranquility to air that is a few degrees colder than the freezing point, may easily be cooled to the degree of such air, and still continue perfectly fluid, provided it still remains undisturbed: the boiled water, on the contrary, cannot be preserved fluid in these circumstances; but when cooled down to the freezing point, if we attempt to make it the least colder, a part of it is immediately changed into ice; after which, by the continued action of the cold air upon it, more ice is formed in it every moment, until the whole of it gradually congealed before it can become as cold as the air that surrounds it. From this discovery it is easy to understand, why they find it necessary to boil the water in India, in order to obtain ice.[33]

Dr H. Scott (Chapter XVII) makes mention of many other processes and dyeing and other agents and substances. 'Dammer: a substance in universal use through the whole Eastern world,'[34] for covering the bottom of ships and for other uses where water proofing was required, was one such.

But the substance which seems to have evoked most scientific and technical interest in the Britain of the 1790s was the sample of *wootz* steel sent by Dr Scott to Sir J. Banks, the President of the British Royal Society. The sample went through examination and analysis by several experts.[35] It was found in gen-

33. *Philosophical Transactions*, Vol.65 (1775), Article by Joseph Black, M.D., pp.124-8.

34. See Chapter XVII, p.258.

35. *Philosophical Transactions*, Vol.85 (1795), 'Experiments and Observations to investigate the Nature of a Kind of Steel, manufactured at

eral to match the best steel then available in Britain, and according to one user, 'promises to be of importance to the manufactures' of Britain.[36] He found it 'excellently adapted for the purpose of fine cutlery, and particularly for all edge instruments used for surgical purposes.' After its being sent as a sample in 1794 and its examination and analysis in late 1794 and early 1795, it began to be much in demand; and some 18 years later the afore-quoted user of steel stated, 'I have at this time a liberal supply of *wootz*, and I intend to use it for many purposes. If a better steel is offered to me, I will gladly attend to it; but the steel of India is decidedly the best I have yet met with.'[37]

Till well into the nineteenth century, Britain produced very little of the steel it required and imported it mostly from Sweden, Russia, etc. Partly, Britain's lag in steel production was due to the inferior quality of its iron ore, and the fuel, i.e., coal, it used.* Possibly such lag also resulted from Britain's backwardness in the comprehension of processes and theories on which the production of good steel depended.

Whatever may have been the understanding in the other European countries regarding the details of the processes employed in the manufacture of Indian steel, the British, at the time *wootz* was examined and analysed by them, concluded 'that it

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Bombay, and there called Wootz: with Remarks on the Properties and Composition of the different States of Iron', by. George Pearson, M.D., F.R.S., pp.322-346. See also D. Mushet: *Experiments on Wootz or Indian Steel* (British Museum 727. k.3), pp.650-62.

36. Stodart to B. Heyne: Quoted in Heyne's *Tracts on India*, 1814, p.363. According to Robert Hadfield, Stodart was probably 'the same Mr Stodart who many years later assisted Faraday in preparing and investigating a large number of steel alloys' (*Journal of Iron and Steel Institute*, Vol.85). According to Heyne, Stodart was 'an eminent instrument-maker', and according to Pearson, whom he assisted in conducting the experiments on Wootz in 1794-5, Stodart was an 'ingenious artist'.

37. *Ibid*, p.364.

*Writing in 1824, J.M. Heath, later a leading manufacturer of iron and steel at Sheffield, stated: 'It is well known that England is entirely dependent upon foreign countries for all the iron required for this purpose, and last year the importation of foreign iron into England, for the purpose of making steel alone, exceeded 12,000 tons...Year after year does the Society for the Encouragement of Arts offer a premium for the manufacture of English Iron fit for steel making, and to this time the premium has never been claimed; nor is it likely that it ever will, from the nature of the English ores, and the inferior quality of the English fuel.' (*Madras Public Proceedings*, January 1825)

is made directly from the ore; and consequently that it has never been in the state of wrought iron.'[38] Its qualities were thus ascribed to the quality of the ore from which it came and these qualities were considered to have little to do with the techniques and processes employed by the Indian manufacturers. In fact it was felt that the various cakes of *wootz* were of uneven texture and the cause of such imperfection and defects was thought to lie in the crudeness of the techniques employed.

It was only some three decades later that this view was revised. An earlier revision in fact, even when confronted with contrary evidence as was made available by other observers of the Indian techniques and processes, was an intellectual impossibility. 'That iron could be converted into cast steel by fusing it in a close vessel in contact with carbon' was yet to be discovered, and it was only in 1825 that a British manufacturer 'took out a patent for converting iron into steel by exposing it to the action of carburetted hydrogen gas in a close vessel, at a very high temperature, by which means the process of conversion is completed in a few hours, while by the old method, it was the work of from 14 to 20 days.'[39]

According to J.M. Heath, founder of the Indian Iron and Steel Company, and later prominently connected with the development of steel making in Sheffield, the Indian process appeared to combine both of the above early nineteenth century British discoveries. He observed:

> Now it appears to me that the Indian process combines the principles of both the above described methods. On elevating the temperature of the crucible containing pure iron, and dry wood, and green leaves, an abundant evolution of carburetted hydrogen gas would take place from the vegetable matter, and as its escape would be prevented by the luting at the mouth of the crucible, it would be retained in contact with the iron, which, at a high temperature, appears [from the above-mentioned patent process] to have a much greater affinity for gaseous than for concrete carbon; this would greatly shorten the operation, and probably at a much lower temperature than were the iron in contact with charcoal powder.[40]

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38. *Philosophical Transactions*, Vol.85, Pearson's Experiments, p.345.

39. J.M. Heath: 'On Indian Iron and Steel' quoted in D. Mushet, *Ibid*, p.671.

40. *Ibid.*

And he added:

> In no other way can I account for the fact that iron is converted into cast steel by the natives of India, in two hours and a half, with an application of heat, that, in this country, would be considered quite inadequate to produce such an effect; while at Sheffield it requires at least four hours to melt blistered steel in wind-furnaces of the best construction, although the crucibles in which the steel is melted, are at a white heat when the metal is put into them, and in the Indian process, the crucibles are put into the furnace quite cold.[41]

The above quoted British authority however did not imply that the Indian practice was based on a knowledge 'of the theory of his operations' by the Indian manufacturer. He felt it to be impossible 'that the process was discovered by any scientific induction, for the theory of it can only be explained by the lights of modern chemistry.'[42] And feeling that 'all speculation upon the origin of the discovery seems useless', he proceeded to deal with the more practical matters.

Several scores of British accounts (some more, some less detailed) pertaining to widely separated areas of India, and perhaps pertaining to about a hundred districts, are available on the Indian manufacture of iron and steel. Though some date to the 1790s, most were written during the period 1820-1855. That included in Chapter XV is probably the most graphic and detailed amongst them, while the one in Chapter XVI tries to provide some perspective and comparison of the different processes and corresponding details prevailing in different countries. Though there seems to be some fairly detailed accounts of the process of Indian iron and steel manufacture in other European languages dating back to the late seventeenth century,[43] that in Chapter XIV is probably one of the earliest British accounts of it.

The design, measurements, and construction of the furnaces and accessory implements, described in Chapter XV, require much detailed examination by experts. Similar examination is essential of the large amounts of data provided in Chapters

41. *Ibid.*

42. *Ibid*, p.669, 671.

43. See, for instance, an English version of D. Havart's *Rise and Decline of Coromandel* (from the original Dutch published in 1692 or 1693, from Utrecht), pp.291-94, 401-3, in *Mackenzie MSS (Private)*, Vol.88, in IOR.

XV and XVI. But a cursory study of the data seems to indicate that the proportion of iron recovered from the ore and the amount of charcoal required to produce a given quantity of crude iron in Central India is comparable with the respective ratios pertaining to the manufacture of iron and steel in Sweden, etc. It is possible that these quantities varied considerably in different parts of India. Maybe, with the continuous deterioration which had set in, the consumption of fuel in the production of iron increased considerably. It is perhaps due to this later development, or basing himself on the data from some selected areas, that Mahadeva Govind Ranade remarked (in the 1890s) that indigenous Indian 'processes involve a great waste of power and resources, as much as fourteen tons of fuel being required to produce one ton of iron.' And thus he concluded: 'Besides the effects of foreign competitors, the collapse of the iron industry has been brought about by the increasing scarcity of fuel.'[44]

According to Chapter XV,[45] 140 seers of charcoal produced 70 seers of crude iron at Aggeriya, etc., in the district of Jabalpur. At Jowli, in the same district, 165 seers of charcoal were required to produce 77 seers of crude iron. How much charcoal was required to convert the crude into malleable and wrought iron is not indicated in Chapter XV. However, considering that the amount of charcoal required to convert the ore into crude iron is of the same order as the quantities required in European countries, it may be inferred that the requirement of fuel in subsequent processes would not have been very different.

It is not easy to estimate the total number of such furnaces which may have been in operation in various parts of India in the eighteenth century. Certain mid-nineteenth century enumerations, however, place the number of furnaces operating in certain districts, talooks, etc., in hundreds. It is, therefore, probable that the number of iron and steel furnaces functioning throughout India in the latter part of the eighteenth century was in the region of 10,000. According to the data given in Chapter XV, the production of iron per furnace amounted to somewhat above half a ton per week. Assuming that a furnace on an average worked about 35-40 weeks a year, the potential production of iron per furnace may be assumed at 20 tons annually.

Besides the furnaces and accessories so graphically described in Chapter XV, certain other devices varying from area

44. M.G. Ranade: *Essays on Indian Economics*, 3rd edition, 1916, p.155.
45. See Chapter XV, p.215.

to area also appear to have been used in Indian metallurgy. One such was the use of the *Panchakki* (water-mill) in the crushing of ore by the manufacturers of Kumaon and Garhwal. According to J.D. Herbert and J. Manson 'in reducing the ore to fragments, the Dhunpoor miners employ the *Panchakki* or water-mill. When water is present no better plan can be devised.'[46]

Several questions arise out of the material on technology described and discussed here. One of them arises from the generally shared European opinion—at times asserted—that the Indian manufacturer of iron and steel (and, in other instances, of other commodities, or practitioners in other professions) could not have had any knowledge 'of the theory of his operations'. Though such opinions essentially originated from the ethnocentric views and inclinations* of the societies to which such observers belonged, and were not in their essence derived from the subject observed and described, these, as mere statements which generally hold true at all times, need not be disputed. But most practitioners of a profession which they have learnt after a long apprenticeship and in which their essential job is to repeat ever more perfectly what they had done before, never require, and seldom possess, such knowledge. The possession of such knowledge and its development and refinement is, at all times, the function of a separate, though interlinked, group. Such division between the practitioners and the theoreticians is currently more evident than ever before.

It is possible that the link between the practitioners of the various techniques or professions and the professors of the theoretical knowledge relating to them had largely snapped in India by the end of the eighteenth century. It is even probable that though not altogether snapped, such a break had begun to take place centuries earlier. This, however, is a view which cannot be

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46. National Archives of India (NAI): HOME, Misc. Records, Vol.437, *Report of the Mineralogical Survey of the Himalaya Mountains, 1826*, p.627.

*Even the British Royal Society does not seem to have remained untouched from such inclinations. Referring to the letter of Dr Scott on *wootz*, it quoted him as having written that it 'admits of a harder temper than anything known in that part of India.' What Dr Scott had actually stated was that 'it appears to admit of a harder temper than anything we are acquainted with.' As is obvious, Dr Scott's 'we' implied 'we in Europe'. But as this must have seemed inadmissible in the pages of the *Philosophical Transactions*, the observation got altered to 'than anything known in that part of India.' (See *Philosophical Transactions*, vol.85, p.322; and chapter XVII, pp.256 in this volume).

determined by mere conjecture. Its substantiation requires detailed studies of Indian techniques and processes as they operated over several centuries up until the early nineteenth.

Even if these links had already snapped but the practices had continued, it is very probable that in a changed political climate—resulting, for instance, from the success of the early eighteenth century resurgence—they could have been restored by fresh interaction between the practitioners and the surviving professors with their knowledge of the theoretical aspects. Or even forged anew.

Another question that arises from the above discussion on the manufacture of Indian iron and steel is that if the manufacturing processes were so very superior and widespread throughout the country, why did they disappear? So far, our knowledge of such widespread manufacture has itself been very scanty. Therefore, answers to such a question at present can merely be tentative. The disappearance seems to have resulted mainly from large-scale economic breakdown resulting from hostile state policy. From about 1800 onwards, India was to be treated as a consumer of British manufactures. Yet some of the British in India did visualise the undertaking of large scale production of iron and steel in India. But even they, when they came forth with such plans, were at great pains in stating that such production would in no way injure the production in Britain or the consumption of British iron in India. Even this type of proposition was, however, difficult for the British Government to contemplate. For example, replying to an early application for setting up such works in the Bengal area, the London authorities in 1814 stated: 'But as we entertain strong doubts as to the policy of encouraging the prosecution of such works to any extent, we direct that no further expense may be incurred.'[47]

47. IOR: Public Despatch to Bengal, July 29, 1814, para 9.

IV

Many other aspects of science and technology are not at all referred to in the accounts which are reproduced in the following pages. Textiles, armaments, horticultural techniques, or the breeding of animals are among those omitted aspects. The design or construction of boats and other sea-faring vessels are also not referred to. A mention in this respect may, however, be made of an observation made by Solvyns in the *Les Hindous*. Introducing the 40 or so sketches of boats and river vessels in use in Northern India in the 1790s, he observed: 'The English, attentive to everything which relates to naval architecture, have borrowed from the Hindoos many improvements which they have adapted with success to their own shipping.'[48] Commenting on Indian rowing, an early eighteenth century observer remarked: 'Their water-men row after a different manner from ours. They move the oar with their feet, and their hands serve instead of the *hypomochlion*, or roller on which it turns.'[49]

It is not as if nothing at all is known of the various accounts reproduced in this volume. Chapters I, II, V and VI dealing with astronomy and mathematics are perhaps known to many concerned scholars. The accounts dealing with the manufacture of paper, the composition of the 'Madrass Mortar' and Iron Works at Ramanakapettah are possibly known to a still wider circle. Even the practice of inoculation against the smallpox is known to have existed in ancient times in India, for, according to one modern writer: 'Preventive inoculation against the smallpox, which was practised in China from the eleventh century, apparently came from India.'[50] Something also seems to be known about the manufacture of iron and steel in Salem through the writings about it by Campbell, the Assistant Surveyor General, Madras. Ranade himself seems to have been fairly well informed about the export of *wootz* to England and other countries, though he leaves the time vague

But all this knowledge among the scholars and prominent writers on Indian economics has not so far created any general

48. Francois Baltazar Solvyns: *Les Hindous*, 4 Vols, 1802-12.

49. *Philosophical Transactions*, Vol.28, from Fr Papin, Bengale, December 18, 1709, p.226.

50. Kurt Pollak: *The Healers: The Doctor, Then and Now*, English Edition 1968, pp.37-8.

awareness of the teaching and practice of these sciences and technologies, or the questioning of the prevailing hypothesis of 'the eighteenth century' being 'the darkest period' in Indian history,[51] etc. The reasons for the lack of appropriate awareness or the prevailing indifference are manifold. Primarily the responsibility for such a situation lies with the system of education which has prevailed in independent India, which by nurturing indifference, even contempt, for everything indigenous effectively blocks such enquiries.

The intellectual basis of the contempt and indifference which began to grow around the close of the eighteenth century, is perhaps best illustrated by the article on 'Algebra' in the *Encyclopaedia Britannica*, in its 8th edition (1850). Discussing Indian Algebra, it referred to a review by Prof John Playfair, of Colebrooke's work on Indian Algebra, and observed:

> This last article, published in 1817, may be supposed to contain the matured opinions of one of the most ardent, able, and we must say most candid, enquirers into the history of Hindoo mathematical science. There is here certainly an abatement of his first confidence in the opinion of Bailly on the Indian astronomy, and a corresponding caution in his own opinion as to the antiquity of the mathematical sciences. The very remote origin of the Indian Astronomy had been strongly questioned by many in this country, and also on the Continent; particularly by Laplace, also by Delambre in his *Histoire de l'Astronomie Ancienne*, tome i.p.400, & c., and again *Histoire de l'Astronomie du Moyen Age*, *Discourse Preliminaire*, p.8, & c., where he speaks slightingly of their algebra.

The article added: 'And in this country, Prof. Leslie, in his very learned work on *The Philosophy of Arithmetic*, pp.225 and 226, calls the *Lilavati* "a very poor performance, containing merely a few scanty precepts couched in obscure memorial verses".'

Playfair's observations, alluded to on this occasion, while differing from the views of Leslie etc., expressed some scholarly scepticism of the Indians' capacity in mathematical sciences. He had said:

> Among many subjects of wonder which the study of these ancient fragments cannot fail to suggest, it is not one of the

51. Majumdar and others: *An Advanced History of India*, p.561.

> least that algebra has existed in India, and has been cultivated for more than 1200 years, without any signal improvement, or the addition of any material discovery. The works of the ancient teachers of science have been commented on, elucidated, and explained with skill and learning; but no new methods have been invented, nor any new principle introduced. The method of resolving indeterminate problems, that constitute the highest merit of their analytical science, were known to Brahmagupta hardly less accurately than to Bhascara; and they appear to have been understood even by Aryabhata, more ancient by several centuries than either. A long series of scholiasts display in their annotations great acuteness, intelligence, and judgement; but they never pass far beyond the line drawn by their predecessors, which probably seemed even to those learned and intelligent men as the barrier within which it was to be confined. In India, indeed, everything seems equally insurmountable, and truth and error are equally assured of permanence in the stations they have once occupied. The politics, the laws, the religion, the science, and the manners, seem all nearly the same as at the remotest period to which history extends. Is it because the power which brought about a certain degree of civilisation, and advanced science to a certain height, has either ceased to act, or has met with such a resistance as it is barely able to overcome? Or is it because the discoveries which the Hindoos are in possession of are an inheritance from some more inventive and more ancient people, of whom no memorial remains but some of their attainments in science?[52]

The choice of this passage during the 1850s by the *Encyclopaedia Britannica* was in keeping with the sentiments of the period. But the 24 page unsigned article in the *Edinburgh Review* (Nov. 1817), from which this sceptical passage is taken, had also said many other things. Earlier in the article, Playfair observed:

> A commentary on the *Vija Ganita*, bearing the date of 1602, contains a full exposition of the sense, with complete demonstrations of the rules, much in the manner of Ganesa; and there is a scholiast of a still later date, who appears to have flourished about the year 1621. If, therefore, it be true, that the Hindus of the present time understand noth-

52. *Encyclopaedia Britannica*: 8th edition, Article on Algebra.

> ing of their scientific books the decline of knowledge among them must have been very rapid, as it is plain that, at the distance, of less than two centuries from the present time, the light of science was shining in India with considerable lustre.

Proceeding further while deploring the lack of 'analysis' even in the *Vija Ganita*, he noted that Brahmagupta had given 'a solution that appears quite general' concerning 'Indeterminate Problems'. And he observed: 'The solution then of a very difficult problem given by an Indian Algebraist, more than 1200 years ago, is such as can vie with those of two of the mathematicians the most distinguished for genius and invention which Europe could boast of ever having seen, at the end of the eighteenth century.' Dismissing that the finding of such a solution by Brahmagupta may have been due to chance, he added, 'there are inquiries where chance and accident have great influence and where a man of very inferior genius and knowledge may make great discoveries. But the subject we are treating of here, is not of that number; it is one where no one *finds*, who does not know how to *search*; and where there is no reward but for intense thought, and patient inquiry.'

Given the doubts of academicians like Playfair, Laplace, Delambre, etc., as well as the supporting role of the fast multiplying tribe of 'oriental scholars' amongst the servants of the British authorities in India (including those amongst the missionaries), Macaulay's verdict on Indian sciences and learning was inevitable. Only Macaulay expresses such doubts and contempt with greater drama and bombast. But what he said, in his minute of 2 February 1835, was shared fully not only by the then British Governor General of India, Bentinck ('I give my entire concurrence to the sentiments expressed in this minute'), but practically by every other learned or powerful European. Referring to the orientalists Macaulay observed:

> I have never found one amongst them who could deny that a single shelf of a good European library was worth the whole native literature of India and Arabia. The intrinsic superiority of the western literature is indeed fully admitted by those members of the committee [of Public Instruction] who support the oriental plan of education.

And then he added:

> It will hardly be disputed, I suppose, that the department of literature in which the Eastern writers stand highest is

> poetry. And I certainly never met with any orientalist who ventured to maintain that the Arabic and Sanskrit poetry could be compared to that of the great European nations. But when we pass from works of imagination to works in which facts are recorded and general principles investigated, the superiority of the Europeans becomes absolutely immeasurable. It is, I believe, no exaggeration to say that all the historical information which has been collected from all the books written in the Sanskrit language is less valuable than what may be found in the most paltry abridgement used at preparatory schools in England. In every branch of physical or moral philosophy the relative position of the two nations is nearly the same.

Concluding, Macaulay refused to associate himself with any support or assistance to Indian learning and declaimed:

> If on the other hand, it be the opinion of the Government that the present system ought to remain unchanged, I beg that I may be permitted to retire from the chair of the committee. I feel that I could not be of the smallest use to them. I feel also that I should be lending my countenance to what I firmly believe to be a mere delusion. I believe that the present system tends not to accelerate the progress of truth but to delay the natural death of expiring errors. I conceive that we have at present no right to the respectable name of a Board of Public Instruction. We are a Board for wasting the public money, for printing books which are of less value than the paper on which they are printed was while it was blank,—for giving artificial encouragement to absurd history, absurd metaphysics, absurd physics, absurd theology,—for raising up a breed of scholars who find their scholarship an encumbrance and a blemish, who live on the public while they are receiving their education, and whose education is so utterly useless to them that, when they have received it, they must either starve or live on the public all the rest of their lives. Entertaining these opinions I am naturally desirous to decline all share in the responsibility of a body which, unless it alters its whole mode of proceedings, I must consider not merely as useless, but as positively noxious.[53]

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53. NAI: India Public Proceedings, March 7, 1835, Minutes on Public Instruction.

Remarks, observations, threats and declamations, like those quoted above, have shaped all the writing and teaching about India, and more or less continue to do so, in the manner and direction indicated by Macaulay and by his more (though less known in India) powerful precursors like William Wilberforce and James Mill.[54] Ignorance, apathy and utter mental confusion, particularly about life and society in the eighteenth century not only in India but in West Europe itself, are the natural products of such writing and teaching.

The doubts and declamations (of Playfair, Laplace, Macaulay, etc.), however, are not the sole causes of this ignorance and apathy. These seem to arise, partly, from much deeper issues which pertain to the conflicting hypotheses about state and society. The seventeenth, eighteenth and nineteenth centuries' European view of society, and thus of science, technology, politics, etc., was diametrically at variance with the views about them held by non-European societies during the same period.

Consequently, the sciences and technologies of the non-European world also had different seekings and developments to those of Europe. Further, in countries like India, their organisation was in tune with their more decentralist politics and there was no seeking to make their tools and work places unnecessarily gigantic and grandiose. Smallness and simplicity of construction, as of the iron and steel furnaces or of the drill ploughs, was in fact due to social and political maturity as well as arising from understanding of the principles and processes involved. Instead of being crude, the processes and tools of eighteenth century India appear to have developed from a great deal of sophistication in theory and a heightened sense of the aesthetic.

It is in such a context that a man like Voltaire considered India 'famous for its laws and sciences', and deplored the mounting European preoccupation (both individual and national) of those in India with the amassing of 'immense fortunes'. This quest for riches intensified the struggles, plunder, etc., during his own time, and made him remark: 'If the Indians had remained unknown to the Tartars and to us, they would have been the happiest people in the world.'[55] Looking back at what has happened since he wrote these lines, Voltaire seems to have been

54. See, amongst others, *Speeches of William Wilberforce on India in the British House of Commons in 1813*, also James Mill's *History of British India*, 1817, particularly Vol.I.

55. Voltaire: *Collected Works*, Vol.38 (BM 1341 d 8), pp.83-4, 87.

very perceptive in his judgment. But the whole world, if such contacts had not occurred, would have been very different not only in politics and society but also in science and technology. Speculations about what it may have been, though fascinating, are far beyond the scope of this volume.

A question yet remains: Why have sciences and technologies—which seem to have been very much alive about 8-10 generations ago—been wholly eclipsed? Answers about the causes of such an eclipse are very complex. Some of them are also—till there is systematic and detailed research available about Indian science and society—largely speculative. A few of them may, however, be suggested here.

The first is related to the economic breakdown of India during 1750-1900.

We may argue about the nature and intensity of exploitation of the agricultural and manufacturing population, or about the question of what happened to the money and goods extorted (the 50 per cent of the gross agricultural product compulsorily taken as governmental land revenue is a good example). But there can be no dispute that the breakdown of the economy was overwhelming and total. No sciences or technologies can survive intact such catastrophe.

The second point relates to the contrary nature of the new state fiscal system when compared with the indigenous system (or systems) prevailing at the commencement of the European impact. It seems that the indigenous budgeting of state revenues (whether for larger or smaller political entities and through various in-built devices) left the overwhelming proportion of revenue at the local levels.

The British-created fiscal system, on the other hand, doubled or trebled the rates of various assessments and effectively brought all people under its sway; taking away the overwhelming proportions to the central exchequers as well as to the metropolises and places above them. Studied neglect and contempt added to the economic breakdown and the transformation of the fiscal system. This to my mind completed the uprooting and elimination of indigenous sciences and technologies not only from society but from Indian memory itself.

Finally, the notion that all these sciences and technologies have wholly disappeared is not altogether true. Remnants of many still exist and continue to be of use; but, at a most neglected and impoverished level. For instance, it is said that some

aspects of indigenous plastic surgery were being practised till fairly recently in places as far apart as Kangra and Junagadh.[56]

There are many philosophical formulations regarding the growth and decline of human societies (or the various stages which they are supposed to pass through). The theory of atrophy (as usually applied to India) is one of them. It is possible that it also has some relevance in explaining the growth, flowering and decline of Indian society. Though the contemporary data, as separate from opinions and formulations, does not seem to indicate that the eighteenth century sciences and technologies in India had atrophied, some of them may well have been in such a state. It is possible that various other current or past formulations on the subject of growth and decline of human societies also have some contribution to make in explaining what happened to Indian science and society over the millennia.

Whatever may be the actual relevance of the theory of atrophy or other theories of European origin in explaining the development of Indian society, it appears much more probable that in most respects the sciences and technologies of India had reached a desirable balance and equilibrium much before the eighteenth century. In the context of the values and aptitudes of Indian culture and social norms (and the consequent political structure and institutions), the sciences and technologies of India, instead of being in a state of atrophy, were in actuality usefully performing the tasks desired by Indian society. It is the application of unrelated standards and judgments (particularly those emanating from eighteenth-nineteenth century Europe) which hide and distort the actual situation and relationship.

V

Although organisationally weak in a military-political sense, in most respects the political and social ideas of India (like its legal and administrative arrangements as well as sciences and technologies) had achieved maturity and balance at some time previous to its present day contacts with the European world. Its social and political structure at this period, though seemingly different from those that obtain in the European world of today,

56. See S.C. Almast 'History and Evolution of Indian Method of Rhinoplasty', in Proceedings of Fourth International Congress on Plastic Surgery, Rome, 1967, Excerpta Medica Foundation, Amsterdam, 1969.

was able to provide of freedom, well-being and social security basically similar to those at present available in much of the European world. It also seems to have had somewhat similar ideas about ruler-ruled relationship, the resolution of disputes, legal punishments, sexual mores, protests against those in authority, etc. But while the whole led to more freedom and equality, these characteristics added to a basically decentralised political and military structure and contributed to this society becoming more prone to external attack.

During the centuries, particularly between the twelfth and seventeenth, there is no dearth of such external onslaughts. The onslaughts to an extent are absorbed and accommodated by Indian society. Over a time, however, they contribute not only to further political and military weakness, but also to damaging the various integrating factors which had provided the necessary intellectual and spiritual links between different regions and specialist as well as ethnic groups. Over all, however, though considerably weaker and perhaps also psychologically at a low ebb, the major arrangements and expressions continued to serve the physical, social and spiritual needs of the Indian people satisfactorily.

At the time of the European onslaught, the indigenous tendencies in India seem to have been in a state of slow resurgence. The resurgence, while it restored a measure of confidence, weakened at the same time the political and military structure. With the beginning of European dominance in India, the resurgence got transformed into depression and unimaginable disorganisation. Foreign aggression and dominance was not wholly unknown in India before the resort to it by Europe in the mid-eighteenth century. But the Europeans of this period belonged to a wholly alien world in relation to India. They were not only armed with the concepts and hierarchical institutions of a long feudal European past, but had also been preparing for the occasion for two to three centuries. The subsequent application of their concepts and values completed the destruction of Indian science and society which had been started by the political and military defeat of India at their hands.

What has developed in India in the field of science and technology during the past century, and at a greater pace since 1947, is mainly a transplanting of some of that which has developed during this period in the European world. Such transplanting has happened not only at the level of theories, but even more so as regards the organisation of technology and the direc-

tion of research. It is largely due to such transplanting and its unthinking acceptance that, though many individual Indian scientists and technologists are as creative and inventive as their colleagues in the European world, the impact of this science and technology on the larger society of India is in fact minimal. It is no exaggeration, perhaps, to add that the field of science and technology in India, as far as it concerns its ordinary life, is only a little less barren than India's state system and its politics.

Borrowing of ideas and practices in themselves need not be obstructive to India's development or creativity. During the centuries, India must have borrowed many ideas and practices from other lands—in the same manner in which Europe received much in the field of science and technology from the Arabs etc., or the Arabs and others did from India. To the extent that such borrowings lead to further innovation and creativity, they are to be greatly welcomed. Unfortunately, so far, the past century's unthinking transplanting of European sciences and technologies in India has resulted mainly in retarding and blunting of indigenous innovation and creativity.

The problem for India today, as perhaps for many other lands which are still recovering from the effects of eighteenth and nineteenth century European dominance, is how to achieve and increase such innovation and creativity. Such innovation and creativity can arise, however, only from a widespread indigenous base. Such a base has yet to be identified (and the superstructure accordingly modified and linked with it) in countries like India. For that, knowledge and comprehension of how they functioned before the beginning of this dominance seem to be essential. Even for the purposeful adaptations from European (or for that matter Japanese, Chinese or any other) science and technology and their integration with indigenous concepts, knowledge and forms, it is necessary that these countries achieve such self-knowledge and understanding at the earliest possible.

I

Bramin's Observatory at Benares*

Benares in the East Indies, one of the principal seminaries of the Bramins or priests of the original Gentoos of Hindostan, continues still to be the place of resort of that sect of people; and there are many public charities, hospitals, and pagodas, where some thousands of them now reside. Having frequently heard that the ancient Bramins had a knowledge of astronomy, and being confirmed in this by their information of an approaching eclipse both of the Sun and Moon, I made inquiry, when at that place in the year 1772, among the principal Bramins, to endeavour to get some information relative to the manner in which they were acquainted of an approaching eclipse. The most intelligent that I could meet with, however, gave me but little satisfaction. I was told, that these matters were confined to a few, who were in possession of certain books and records; some containing the mysteries of their religion, and others the tables of astronomical observations, written in the Sanskrit language, which few understood but themselves: that they would take me to a place which had been constructed for the purpose of making such observations as I was inquiring after, and from whence they supposed the learned Bramins made theirs. I was then conducted to an ancient building of stone, the lower part of which, in its present situation, was converted into a stable for horses, and a receptacle for lumber; but, by the number of courtyards and apartments, it appeared that it must once have been an edifice for the use of some public body of people. We entered this building, and went up a staircase to the top of a part of it, near to the river Ganges, that led to a large terrace, where, to my surprise and satisfaction, I saw a number of instruments yet remaining, in the greatest preservation, stupendously large, immoveable from the spot, and built of stone, some of them being upwards of twenty feet in height; and, although they are said to have been erected two hundred years ago, the graduations and divisions on the several arcs appeared as well cut, and as accu-

*By Sir Robert Barker, F.R.S. (Published 1777).

rately divided, as if they had been the performance of a modern artist. The execution in the construction of these instruments exhibited a mathematical exactness in the fixing, bearing, and fitting of the several parts, in the necessary and sufficient supports to the very large stones that composed them, and in the joining and fastening each into the other by means of lead and iron.

The situation of the two large quadrants of the instrument marked *A* in *Figure I,* whose radius is nine feet two inches, by their being at right angles with a gnomon at twenty-five degrees elevation, are thrown into such an oblique situation as to render them the most difficult, not only to construct of such a magnitude, but to secure in their position for so long a period, and affords a striking instance of the ability of the architect in their construction; for, by the shadow of the gnomon thrown on the quadrants, they do not appear to have altered in the least from their original position; and so true is the line of the gnomon, that, by applying the eye to a small iron ring of an inch diameter at one end, the sight is carried through three others of the same dimension to the extremity at the other end, distant thirty-eight feet eight inches, without obstruction; such is the firmness and art with which this instrument has been executed. This performance is the more wonderful and extraordinary when compared with the works of the artificers of Hindostan at this day, who are not under the immediate direction of an European mechanic; but arts appear to have declined equally with science in the East.

Lieutenant-colonel Archibald Campbell, at that time chief engineer in the East India Company's service at Bengal, a gentleman whose abilities do honour to his profession, made a perspective drawing of the whole of the apparatus that could be brought within his eye at one view; but I lament he could not represent some very large quadrants, whose radii were about twenty feet, they being on the side from whence he took his drawing. Their description however is, that they are exact quarters of circles of different radii, the largest of which I judged to be twenty feet, constructed very exactly on the sides of stone walls built perpendicular, and situated, I suppose, in the meridian of the place: a brass pin is fixed at the center or angle of the quadrant, from whence, the Bramin informed me, they stretched a wire to the circumference when an observation was to be made; from which it occurred to me, the observer must have moved his eye up or down the circumference, by means of a ladder or some

such contrivance, to raise and lower himself, until he had discovered the altitude of any of the heavenly bodies in their passage over the meridian, so expressed on the arcs of these quadrants: these arcs were very exactly divided into nine large sections; each of which again into ten, making ninety lesser divisions or degrees: and those also into twenty, expressing three minutes each, of about two-tenths of an inch as under; so that it is probable, they had some method of dividing even these into more minute divisions at the time of observation.

My time would only permit me to take down the particular dimensions of the most capital instrument, or the greater equinoctial Sun-dial, represented by *Figure I, A,* which appears to be an instrument to express solar time by the shadow of a gnomon upon two quadrants, one situated to the east, and the other to the west of it; and indeed the chief part of their instruments at this place appear to be constructed for the same purpose, except the quadrants, and a brass instrument that will be described hereafter.

Figure I, B, is another instrument for the purpose of determining the exact hour of the day by the shadow of a gnomon, which stands perpendicular to and in the center of a flat circular stone, supported in an oblique situation by means of four upright stones and a cross-piece; so that the shadow of the gnomon, which is a perpendicular iron rod, is thrown upon the divisions of the circle described on the face of the flat, circular stone.

Figure I, C, is a brass circle, about two feet in diameter, moving vertically upon two pivots between two stone pillars, having an index or hand turning round horizontally on the center of this circle, which is divided into 360 parts; but there are no counter-divisions on the index to sub-divide those on the circle. This instrument appears to be made for taking the angle of a star at setting or rising, or for taking the azimuth or amplitude of the Sun at rising or setting.

The use of the instrument, *Figure I, D*, I was at a loss to account for. It consists of two circular walls; the outer of which is about forty feet diameter, and eight feet high; the wall within about half that height, and appears intended for a place to stand on to observe the divisions on the upper circle of the outer wall, rather than for any other purpose; and yet both circles are divided into 360 degrees, each degree being sub-divided into twenty lesser divisions, the same as the quadrants. There is a

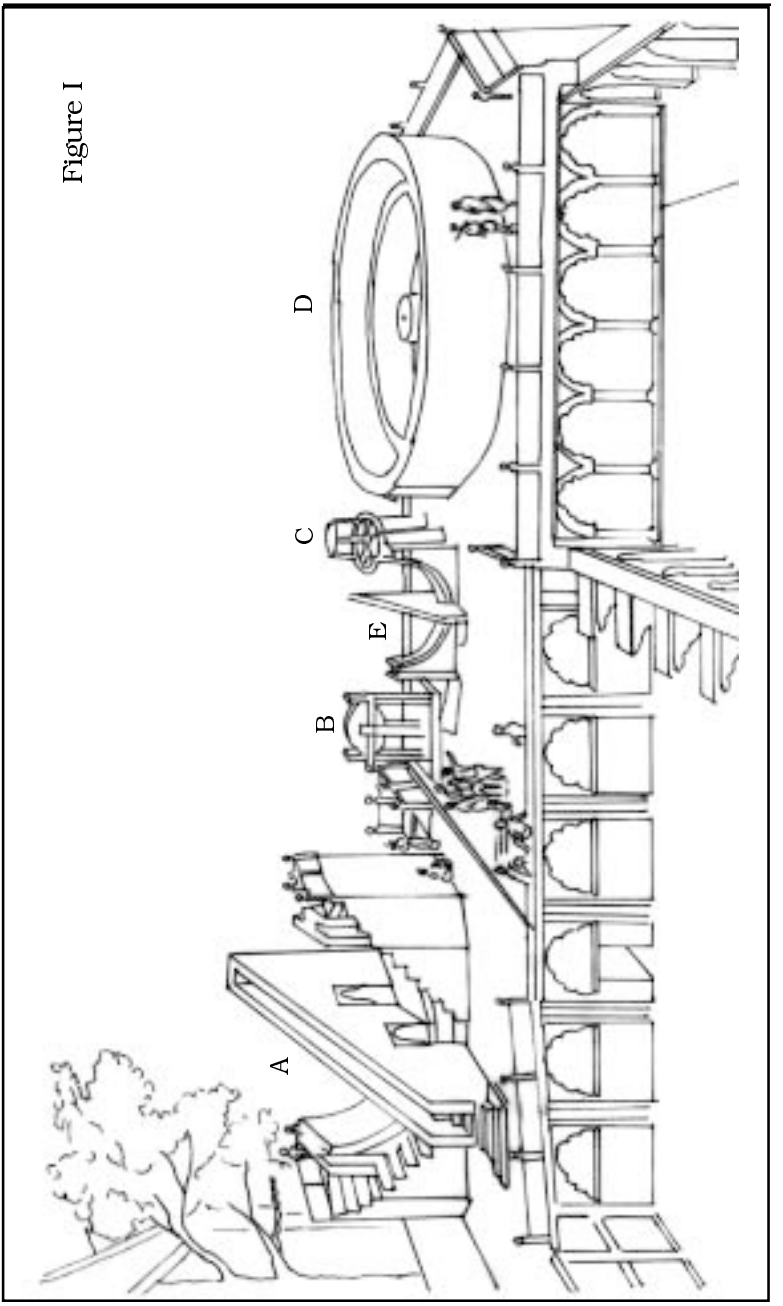

Figure 1

doorway to pass into the inner circle, and a pillar in the center, of the same height with the lower circle, having a hole in it, being the center of both circles, and seems to be a socket for an iron rod to be placed perpendicular into it. The divisions on these, as well as all the other instruments, will bear a nice examination with a pair of compass.

Figure I, E, is a smaller equinoctial Sun-dial, constructed upon the same principle as the large one *A*.

I cannot quit this subject without observing, that the Bramins, without the assistance of optical glasses, had nevertheless an advantage unexperienced by the observers of the more Northern climates. The serenity and clearness of the atmosphere in the night-time in the East Indies, except at the seasons of changing the monsoons or periodical winds, is difficult to express to those who have not seen it, because we have nothing in comparison to form our ideas upon: it is clear to perfection, a total quietude subsists, scarcely a cloud to be seen; and the light of the heavens, by the numerous appearance of the stars, affords a prospect both of wonder and contemplation.

This observatory at Benares is said to have been built by the order of the emperor Ackbar; for as this wise prince endeavoured to improve the arts, so he wished also to recover the sciences of Hindostan, and therefore directed that three such places should be erected; one at Delhi, another at Agra, and the third at Benares.

Some doubts have arisen with regard to the certainty of the ancient Bramins having a knowledge in astronomy, and whether the Persians might not have introduced it into Hindostan, when conquered by that people; but these doubts I think must vanish, when we know that the present Bramins pronounce, from the records and tables which have been handed down to them by their forefathers, the approach of the eclipses of the Sun and Moon, and regularly as they advance give timely information to the emperor and the princes in whose dominion they reside. There are yet some remains in evidence of their being at one time in possession of this science. The signs of the Zodiac, in some of their Choultrys on the coast of Coromandel, as remarked by John Call, Esq. F.R.S. in his letter to the Astronomer Royal, requires little other confirmation. Mr Call says, that as he was laying on his back, resting himself in the heat of the day, in a Choultry at Verdapetah in the Madura country, near Cape Commorin, he discovered the signs of the Zodiac on the ceiling

of the Choultry: that he found one, equally complete, which was on the ceiling of a temple, in the middle of a tank before the pagoda Teppecolum near Mindurah; and that he had often met with several parts in detached pieces. (See *Philos. Trans.* 1772, p.353) These buildings and temples were the places of residence and worship of the original Bramins, and bear the marks of great antiquity, having perhaps been built before the Persian conquest. Besides, when we know that the manners and customs of the Gentoo religion are such as to preclude them from admitting the smallest innovation in their institutions; when we also know that their fashion in dress, and the mode of their living, have not received the least variation from the earliest account we have of them; it cannot be supposed they would engrave the symbolical figures of the Persian astronomy in their sacred temples; the signs of the Zodiac must therefore have originated with them, if we credit their tradition of the purity of their religion and customs.

Mr Fraser in his History of the Mogul Emperors, speaking of time says, 'the Lunar year they reckon 354 days, 22 gurris, 1 pull; the Solar year they reckon 365 days, 15 gurris, 30 pulls, 22½ peels; 60 peels making 1 pull, 60 pulls 1 gurri, and 60 gurris 1 day. This is according to the Bramins or Indian priests, and what the Moguls and other Mahommedans in India chiefly go by.'

Thus far Mr Fraser; and it serves to strengthen the argument for supposing that the Bramins had a knowledge of astronomy before the introduction of Mahommedanism into Hindostan.

Dimensions of the Larger Equinoctial Sun-dial
(Figures II and III)

	Feet	In.
Length of the gnomon at the base *b b*,	34	8
Oblique length of the gnomon *c c*,	38	8
Radius of the quadrants *a a*,	9	2
Height of the gnomon at *d*,	22	3
Breadth of the quadrants *f f*,	5	10
Thickness *g g*,	1	0
Breadth of the gnomon *b b*,	4	6
Whole extent of the instrument *i i*,	37	4

Latitude of the place taken by double altitude 25°10'.

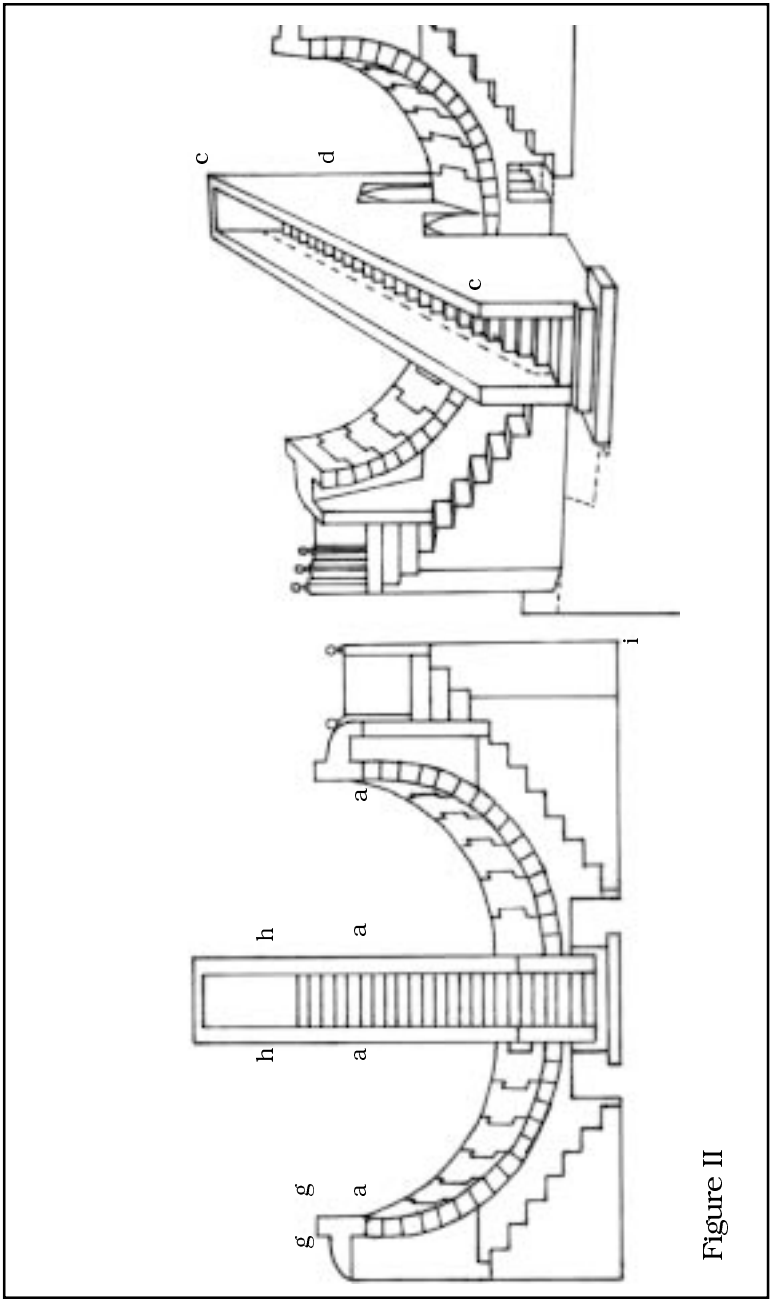

Figure II

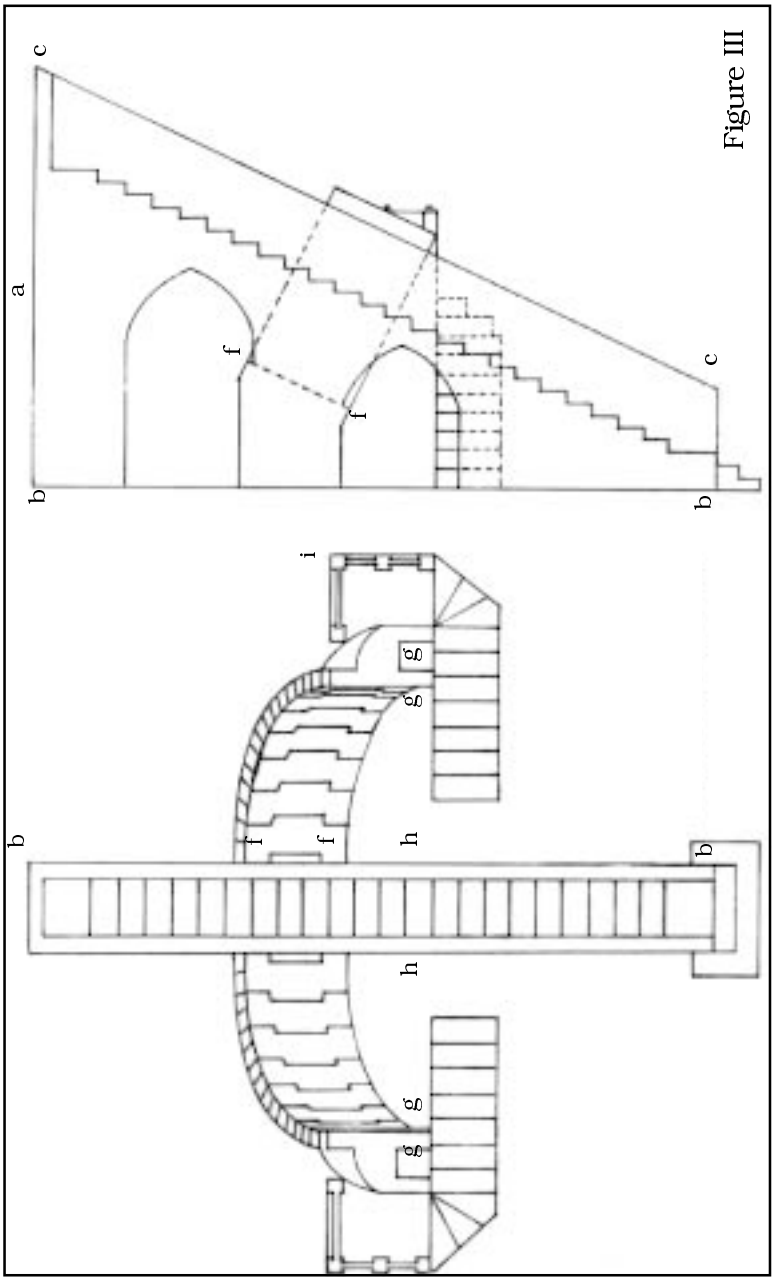

Figure III

*Supplementary Note**

The principal curiosity here is the observatory, built by Mawnsing, the son of Jysing, about 200 years ago; there is an exceedingly good mural arch cut upon a fine plaister of chunam, so fine and smooth, that it has the appearance of marble; and though it is certainly very old, it still is perfect, but the index is wanting; that is a loss which could very easily be supplied by a person who has a taste for these studies; for the centres are left in the wall.

There are two ring dials; the large one is curious: the radius of the stone arch is 9 feet 8 inches; the gnomon is 4 feet 6 inches thick, and its slant side about 40 feet long: there are steps in the gnomon by which you ascend to the top of it. By the measure of the two gnomons, I find they stand in latitude 25° 20′ N. There are likewise two small inclined dials, in which the gnomon is perpendicular to the plane of the stone on which the degrees are marked. Lastly, there is an instrument which I do not understand, the following is a description of it:

A, b are circular walls; *a* is 24 inches thick, and near 16 feet radius; *b* is concentric with *a*, 18 inches thick, and between 12 and 13 feet radius. *C* is a cylinder of stone, its center is the center of the walls. *B* and *C* are of equal height, viz, 4 feet 2 inches; the outward wall is 8 feet and 4 inches. The tops of these walls are horizontal, and are very nicely divided into degrees, and subdivided into arches of 6′. At the cardinal points on the top of the wall *a*; there are two iron pins, from which I conjecture there has been an instrument to fix upon the wall, though I do not know for what purpose or of what kind.

Lastly the second, for I had forgotten an instrument for taking the declension of the sun, etc., which consists of a circle of iron, covered with brass, an axis of the same materials, and an index with sights. This axis, which is a diameter of a circle, and consequently in the plane of it, moves on pivots fixed in the walls, which support it and is parallel to the axis of the earth. The divisions are very much inferior to those on the stone.

*By Colonel T.D. Pearse (who accompanied Sir Robert Barker) to General Desaguliers.

XV

The Mode Of Manufacturing Iron In Central India*

An opportunity afforded by the Government of Bengal in 1828-9, having enabled me to examine several iron mines in the central part of India, and to make experiments on the Indian mode of manufacturing iron, I beg to offer the result of my observations to the hon'ble court of directors of the East India Company and I desire more particularly to draw attention to the simple forge and refinery, by means of which the process of smelting and decarbonisation is performed.

These mines are situated in the districts of *Jabalpur, Baragaon, Panna, Katola,* and *Sagur*, in the bed of a great central channel, which intersects the heart of India; and their localities are as follows.

IRON MINES OF JABALPUR

In the district of Jabalpur the best mines are at *Aggeriya, Gatna, Baila, Magaila, Jowli, Imliya,* and *Baragaon*, and the ore (No.12) of the first four, is micaceous, resembling in its less oxidated condition Iron Glance; at *Aggeriya, Gatna* and *Baila* it is interstratified with *sandstone*, and exploited from a small hill capped with *laterite;*[1] but at the other places, it is in fragments, buried in ferruginous gravelly clay, about five or six feet below the surface; it melts easily; and on actual experiment, 170 sers of ore, smelted by 140 of charcoal, produced 70 sers of crude iron *en masset*, in ten hours, which is equal to 40 per cent; the ore of Magaila is less oxidated than the others; it slightly affects the needle when heated, and sometimes crystallises; its streak is cherry red, and from its hardness, it is principally smelted for steel.

*By Major James Franklin, Bengal Army, F.R.S., M.R.A.S., (circa 1829).

1. Laterite is a term given by Dr Buchanan to a species of iron clay very prevalent in India.

The same kind of ore (No.13) still less oxidated, is in great abundance, interstratified with *quartz sandstone*, and forms mountain masses, exhibiting a variety or contortions, as in the Lori hills; in this state, it is shining, splendent, and even glittering, but it is never smelted, because there is better ore on the same spot.

The ore of *Jowli* (No.15) is the *ochrey* variety of red oxide, it is almost a pure oxide, and affords a good pigment; it soils the fingers deeply, and its stain on cloth is difficult to wash out; it melts more easily than the former, and on actual experiment 185 sers, smelted by 165 of charcoal, produced 77 sers of crude iron *en masset*, in something less than ten hours, which is nearly 42 per cent; it is associated with a compact variety, (No.16 and 17) which appears to contain *specular* ore, from the blood red colour reflected from its small crystals when fresh from the mine; it lies near the border of a range of trap hills, and is clearly a deposit, or a vein, in the fissure of a rock resembling *hornstone* (No.18) which has probably been thus changed by contact with the trap.

South of the river Nermada near the village of *Dangrai*, the micaceous variety (No.19) is found in thicker laminae, interstratified with *quartz sandstone*, which separates into rhomboids; it is extracted by breaking the rock, but its iron is bad, and as it scarcely repays the expense and labour, it is rarely smelted.

The general character of the ore of these mines appears to range in the class, which the Comte de Bournon denominates *fer oxyde au maximum*; the *micaceous* kind is at times so highly oxidated, that it is nearly pulverulent, and the *ochrey* variety is almost a pure oxide; the compact species is rare, and fibrous *hematite* (No.19) is still more scarce; in every instance it is found near the surface, and all the varieties, except that of Magaila, yield excellent malleable iron.

IRON MINES OF BARAGAON, LAMTERA & EMLIYA

The mines of *Baragaon, Lamtera* and *Emliya* in the pergunnah of Belhari, are situated on the north side of the valley, and it is remarkable that near this ridge, there is a change in the nature of the ore; it lies near the surface embedded in ferruginous sandy clay, and is unconnected with any rock, though the subjacent stratum is *sandstone*; in the two first of these mines, the ore is granular, argillaceous (No.20) in globular grains, about the size of a pea, which are cemented together into a solid mass, by fer-

ruginous clay; the other is the lenticular variety of the same kind of ore (No.21) differing from the former in the size and flatness of its pieces; but its cement is of the same nature, only less hard, and the nodules of ore being more easily separated, appears to give it a superiority over that of *Baragaon*, the grains of which not being divisible, its ore is perhaps affected by some vitiating property contained in the cement, the metal being very brittle.

IRON MINES OF THE DISTRICT OF PANNA

The best mines of the Panna district are near Brijpur, the ore is common argillaceous lying in a thin stratum, between beds of *reddle* and yellow earth (No.22) the former below, and the other above it; both these earths adhere slightly to the tongue, and fall to pieces in water, but do not form a paste, the former dissolves rapidly, the latter after a slight ebullition falls first in flakes, and finally into powder; on calcination the yellow earth assumes a lively colour—like English red, and they both would form useful pigments; the ore yields bad and brittle iron; but there is another kind of red ore exploited and smelted at the village of *Simmeriya* which produces better metal.

IRON MINES OF THE DISTRICT OF KATOLA

The district of *Panna* produces diamonds, and the tract in which they are found, borders on the iron mines of Katola; the Ken river being the boundary between them; and though this circumstance is foreign to my present object, it is at least curious, as it may perhaps serve to show, the connection, between the gem and ferruginous matter: the iron mines of Katola are in a cluster[2] of hills which extend between the Ken and Dessan rivers, and the ore, with one exception only, consists of varieties of the red oxide, its changes being from the most compact form, having a metallic lustre, into common argillaceous, according to the quantum of clay, associated with it; the nature of which will be best understood from the specimens which are sent herewith.

Commencing from the *Ken* river and proceeding westward, the first mine is in the *Pandua hill* (No.23) but as it is nearly exhausted, I pass on to those of *Amrownia, Majgaon*, and *Motehi*; the ore of the first and second of these places (No.24) resembles

2. *Note*: See the map which accompanies this paper.
[Omitted here. —*Editor*].

that of *Deora* to be described hereafter, and that of the third (No.25) is in the form of water worn pebbles of various sizes, which are embedded in ferruginous sandy clay; the mines are situated near the foot of the Bindachel hills which are here composed of *sandstone conglomerate*, and capped with the newer horizontal *sandstone*, which everywhere is uppermost in this range; the iron stone pebbles are about fifteen feet below the surface, and are intermixed with blocks, and fragments of *sandstone*, the whole bearing evident marks of attrition; the metal made from them is not esteemed.

Next in succession still proceeding westward, are the mines of *Deora*, the ore of which (No.26) is of two kinds, one compact with a metallic lustre, and the other containing a large portion of clay; the second of these is found high up in the hills, and in a vein, or deposit, immediately below the upper *sandstone*; it yields very good malleable iron, not brittle like that of *Motehi*, but such as may be drawn into thin plates without bursting.

About five miles farther west are the mines of Kotah, but the iron is bad, and I therefore pass on to the more celebrated mines of this district, viz. those of *Saigerh* and *Chandrapura*, which are situated on the crest of the *Bindachel* range, and near the point where the waters separate; in this respect they correspond with the mines of *Baragaon* and *Emliya* before mentioned, and like them also, the ore (No.27 and 28) differs both in nature and character, from all the other ores of this district; it lies in a thin vein, in ferruginous sandy, or gravelly clay—very near the surface; and its streak, in some specimens is yellow, in others yellowish brown, whilst that of all the other ores is red; in general appearance, it somewhat resembles the ore of *Baragaon*, but the grains are not so perfectly formed; its iron is excellent, possessing tenacity and malleability in a high degree far excelling every other description of iron produced in this district; *coal shale* crops out in its neighbourhood, and in all probability *coal* exists near the mines, but with all these advantages, the want of water carriage will ever prevent them from becoming more valuable than they now are.

West of the above, are the mines of *Piperiya, Rejkoi* and *Kanjra*, the ore of the former (No.29) is something like that of *Saigerh*, and is usually mixed with the other two, to correct them; that of *Rejkoi* (No.30) being nearly compact, and that of *Kanjra* (No.31) containing more argile.

Next in succession, still proceeding westward, is the *Chapar* hills near the town of *Bajna* which abounds in iron, and viewed

at a distance it appears as if blackened by fire; its base is surrounded by protrusions of greenstone, and its stratification appeared to me to exhibit marks of derangement; at the foot of it is a cavern, and a chasm, filled with water to the depth of 220 feet, and an isolated fragment in its neighbourhood seems to have been separated from its parent mountain by violence; these appearances are very striking, and furnish grounds for speculation, but my present business is with its mines, which are situated at *Bajna, Keritanga,* and *Suka*, near to *Surajpura*; the ore of all which is nearly compact; the former (No.32) is on the summit of the hill, in large amorphous masses, the ore appearing to have penetrated the *sandstone* rock from a fissure of which it is excavated; the second (No.33) is a vein, in Syenite about half way up the hill, and the third (No.34) is in a small adjoining colline; there are some rounded pebbles of iron stone—dug out of ferruginous clay near the village of *Bhojpura*—but they closely resemble those of Motehi and deserve no further notice.

The last of the mines of this district are at *Serwa, Hirapur, Tighora,* and *Mandewra*, the former of which is in a small colline near the village, and the ore (No.35) does not appear to deserve notice; that of the latter (No.36) is of the same kind; but the ore of Hirapur is rich, and its iron in great request; it is also cheaper, and being situated on a good road it is often purchased in its crude state, and carried elsewhere to refine.

There are other iron mines still further west which are situated in a similar cluster of hills between the Dessan and Jamni rivers, as at Weldana, Sarai, Dhori Sagar & c.—and towards the north-west iron abounds in every part of the hills from the mines of Katola to those of Gualior.

The Katola mines extend from the Ken to the Dessan rivers, and it is remarkable that the ore is confined to the cluster of hills, which lie between those points—never being found northwards of them—and only in a few instances, in the *sandstone* range south of them; this cluster, like the detached hills of *Callinger* and *Adjyegerh*, have all the appearance of having once formed part of the great range; their bases are all composed of Syenite or Syenitic Granite, and their caps of *sandstone*, and there is strong reason to conclude that the iron ore, here found, is an associate of the latter rock;—with one exception only—it consists, as I have stated above, of varieties of the red oxide, and in no instance have I found it affect the needle, unless it is heated, and even in that case, it is the compact variety alone, which does affect it slightly; its principal vitiating constituent is

clay—which the native smelters do not manage well—and this perhaps is the reason of their obtaining so little produce; the refiners also have *bad usages* in their refining process in common with other parts of India, and though it cannot be said that they are unable to make good iron if they please, yet it is a fact that they have an objection to make it good for bazaar sale, except in the shape of culinary or other utensils which yield a better profit; their furnaces both large and small, and also their refineries, are exactly the same as those of *Tendukaira* in form, and the only difference in their process consists in keeping the wind tubes separate, as at Jabalpur.

IRON MINES OF THE SAGAR DISTRICT

From the *Katola* mines, I shall proceed up the *Hirapur* pass and ascend the tableland, which being entirely composed of *sandstone*, and *trap* rocks, is not rich in iron ore; there are however a few spots where it is found in the Sagur district, but as it is not wrought in any part, to an extent sufficient to attract notice, I pass on to the mines of Tendukaira.

TENDUKAIRA

The Tendukaira mines are situated in a more westwardly position of the same valley, as those of Jabalpur, and are about one mile and a half distant from the village Tendukaira; they are near a low range of hills composed of *stratified quartz rock* which evidently contains felspar, and this rock is the gangue (No.1) of the ore; at times it assumes the character of *hornstone*, and when contiguous to the ore, it is penetrated by numerous slender veins, which although filled with the oxide of iron are very different from ordinary dendritic appearances, as they are always in shoots, intersecting each other, and never arborescent, and it seems quite impossible that they could have been produced by infiltration.

The ore is never found near the surface as at *Jabalpur* but always about 30 feet below it, and in large masses, or beds, in cavities between the strata of the rock, which in some cases seems to have sustained violence; it is the brown *hydro-oxide*, both fibrous, and compact; but the former is by far the most prevailing; its general character, and appearance is opaque, and earthy, but when it has a metallic lustre, its fibres are beautifully fine, and constantly radiated; its most common form is ir-

regular concentric lamellar, the lamellae of which are separated by a different colour, usually yellow, or yellowish brown; it is sometimes, though very rarely, crystallised, sometimes also it is mamillary and *botryoidal* but I have not met with any other imitative form; it contains manganese and silex, but sulphur is its principal vitiating constituent; its produce will be shown hereafter; but here it may be observed, that it yields most excellent malleable iron, fit for all uses, and also steel at nearly the same price as iron; there are five distinguishing names for it, which I shall give in the terms used by the native miners annexing thereto—their European synonyms: Gulkoo (No.2) includes all the waterworn pebbles which are embedded in diluvial gravel between the alluvium and the rock, under which the ore lies; it is a mixed and bad kind of ore.

Surma (No.4) is distinguished by its red appearance and is usually found mixed with the above, it perhaps contains arsenic and is always carefully picked out, and thrown away; *Peera* (No.3) or yellow ore, is the yellowish brown variety—always intermixed with the other kinds, and marking by its difference of colour their concentric lamellar form, it rarely occurs separate, its streak is yellow.

Kala (No.5) or black ore, is the compact earthy brown oxide, always dark coloured, generally approaching to black, sometimes but very rarely metallic (No.6) and crystallised (No.7), its streak is brown, and it is a very good kind of ore; *Devi Sahi* (No.8) or variegated, is the concentric lamellar variety (No.10 and 11) streaked with the yellow oxide; it has a fibrous tendency though opaque, but sometimes it is metallic as *Hemate* (No.9), and in this case its fibres are extremely fine, and of a silky lustre, its streak is yellowish brown and it is reckoned the best kind of ore, producing most abundantly, good malleable iron, and also tolerably good steel.

CHARCOAL

Charcoal is universally used in India for smelting iron, as the natives have no knowledge of coal, nor could they use it with their present refineries, because they are totally inadequate to the reduction of highly carbonised metal; they are fully aware of the effect of certain kinds of wood on the quality of iron and know from experience those which are best suited for their purpose; but as they cannot always obtain the trees they prefer—they use a mixture for their smelting process, excluding only

such as are notoriously pernicious; but in their refineries they use exclusively *teak, mowa,* or *bamboo*, to the last of which they give the preference; in their preparation of it, they are expert from habit and no men are able to make better charcoal; they usually allow a month for drying the wood after felling, and their method of piling it, for burning, is in conical heaps; the remainder of the process being exactly similar to the practice of Europe.

FURNACES

Their smelting furnaces, though crude in appearance, are nevertheless very exact in their interior proportions, and it has often surprised me to see men who are unquestionably ignorant of their principle, construct them with precision, in so simple a manner; their unit of measure is the breadth of a middle sized man's finger; 24 of which constitute their large and 20 their small cubit; thus there is a constant ratio of 6 to 5 prevailing throughout these furnaces, nor is it of the least consequence, that their dimensions are larger or smaller, so long as all the parts are in the same proportion; the length of these measures is on an average 19.20 English inches for the large cubit, and 16 English inches for the small one.

As they have no standard measure their fingers, their span, and their arm are substituted by which a piece of stick is measured which they use in practice; neither is the division of the cubit necessary though the large one is supposed to be divided into six parts and the small one into five, of four fingers each—as the measurement is invariably ascertained by their fingers; the length of these parts is on an average 3.20 English inches.

Geometrical Construction of the Furnace

To construct the outlines of the furnace geometrically (Diagram I: fig 1 and 2) rule an indefinite line A.B. which suppose equal to a large cubit of 24 digits or 19.20 English inches, and divide it into 6 parts; at C erect a perpendicular, then from C to E set off 6 parts and it will mark the central point of the greatest bulge, and consequently the point of greatest heat; next, from E to F set off 6 more points, and it will mark the point of cremation; then again from F to G, 6 parts more, will mark the line, where it is necessary to recharge the furnace, after the burden has sunk thus low, and from G to D—two parts more; will give the perpendicular height of the furnace, in 20 parts equal to 5 feet 4 inches of English measure.

To complete the figure, rule lines parallel to the base, through the points E, F, G, and D, and from D, fig 1, set off three parts to the left hand for the top; bisect it at J, bisect also the bottom at H, draw H, J, right angled at K, and it will be the oblique axis of the furnace (fig 1. K—J) bisecting all the parallels corresponding with CD (fig 2)—then make the parallels AB six parts,—E six parts, F five parts, and D three parts; rule lines through all these points, and the geometrical outline will be completed, the sum of the parallels in parts, corresponding with those of the perpendicular.

Practical Construction of the Furnace

To construct it practically—dig a fosse 3 feet deep in the annexed form (Diagram 3, fig 2) the semicircular part of which contains the furnace B, the walls CCC being composed of unburnt bricks of large dimensions; the first structure is crude, preserving only an approximation to the required form, the interior being afterwards cut away; a large stone capable of containing heat is placed at the bottom; and in this state it is suffered to remain until thoroughly dry; the next operation is performed by a more skilful artist who cuts away the interior, and plasters it with clay, using the measures above described to adjust its dimensions; he first finishes the top, and from the centre of the back part of it, he drops a plummet, to ascertain the spot where the centre of the front part of the stone is to rest; this plummet line corresponds with the perpendicular CD of the geometrical figures 1 and 2—and thus he obtains not only the required obliquity of the furnace, but the points most essential for the adjustment of all the rest.

When the furnace is thus far prepared it is again suffered to dry, and in the mean-time, other appendages called by the Indian smelters *Gudaira, Pachar, Garrairi*, and *Akaira* (names which have no synonyms in the English language), are constructed; the Akaira in particular is a most extraordinary implement, (Diagram I, figs 4 and 5; and Diagram 2, fig 1+); externally viewed it is a clumsy mass of clay enveloping the wind tubes (Diagram I, fig 9) but when it is considered that the complete fusion of this mass, and the perfect completion of the smelting process must be simultaneous results, the implement becomes the most important of all the appendages; thus for instance if it is too small, or too large, its effect will immediately be perceived; in the former case the masset of crude iron will be full of impu-

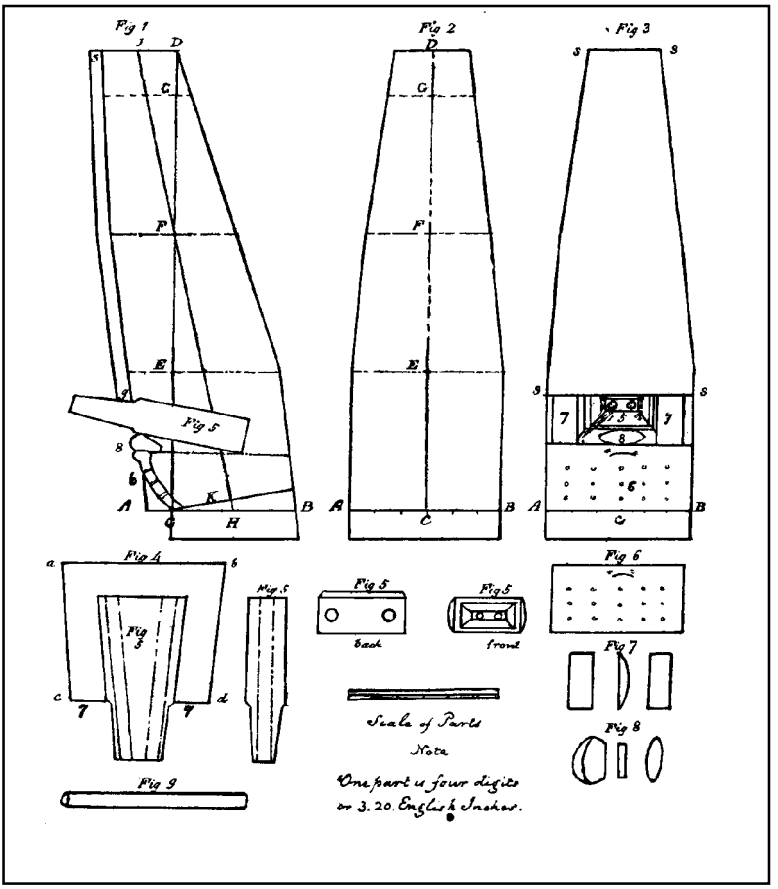

DIAGRAM I

rity, and in the latter the iron will be consumed, and if it cracks during the operation of smelting, there is no remedy for such an accident—short of dismantling the furnace and commencing the work again.

I found after numerous experiments that its mean length should be 4½ parts, its mean breadth 3 parts, and its mean thickness 1½ parts and it is somewhat remarkable that the product of these dimensions, should exactly equal a twentieth part of the cubic contents of the furnace when fitted for use; this coincidence may arise from the peculiar nature of the clay of

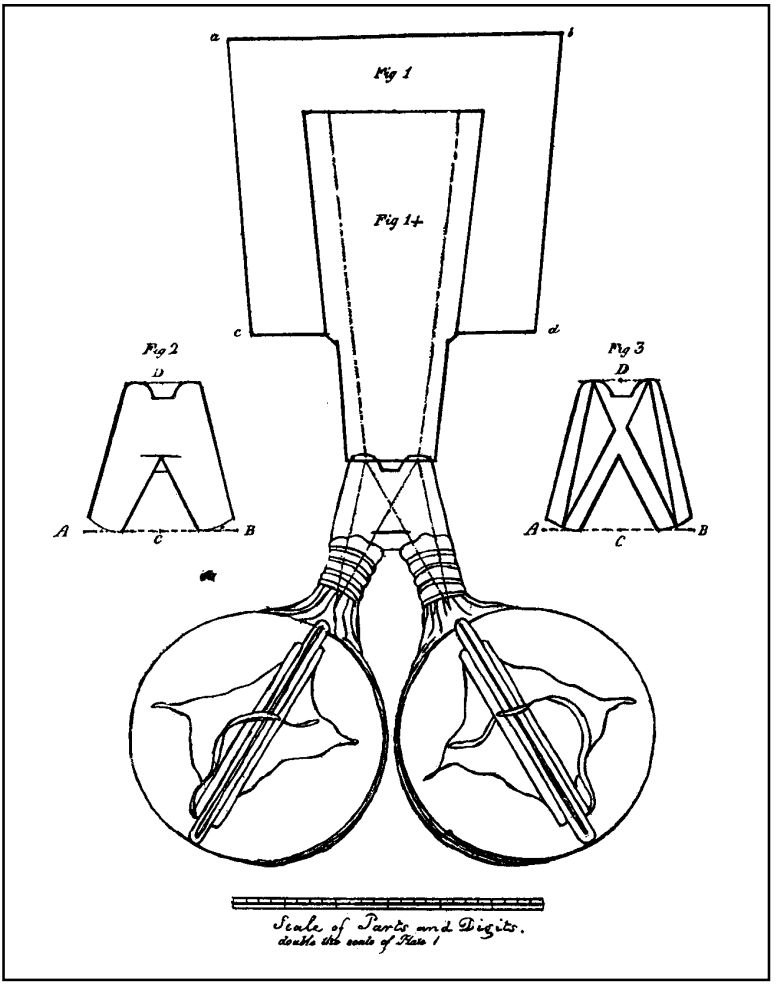

DIAGRAM II

Tendukaira,[3] the ingredients of which are well assorted, but the rule will nevertheless apply generally—because clay by admixture is susceptible of being rendered amenable to rule; and therefore this implement will be found in all Indian furnaces to have (or by tempering the clay may be made to have) the same corresponding dimensions.

3. *Note*: It may here be observed the nature of the clay is a material point with regard to this implement, and at Tendukaira it is well adapted, be-

The Guddaira is a wedge of clay used to adjust the vertical position of the Akaira when placed in the furnace; and the Pachar is an oblong plate of clay, used in walling up the orifice after the Akaira is placed, and adjusted; these figures and dimensions are given in Diagram I—fig 7 and 8; the Gurairy (Diagram I, fig 6) is a convex plate of clay; perforated with holes and used as a grate—through which the scoria are drawn off.

When the appendages are ready, and the furnace thoroughly dry, it is prepared for use in the following manner.

The front part is walled up from the top to the line SS—Akaira to the top (Diagram I, fig 1 and 3) which line is ascertained by the small cubit; one end being placed at C, the other will measure CB and CS (fig 1)—the grate is next put in, its lower edge resting upon the edge of the stone; and the space is filled—with a mixture of pulverised cow dung and Kodo straw—up to the dotted line (Diagram I, fig 1) upon which is placed the Akaira; its sides being every where 1½ parts distant from the walls of the furnace—as represented in Diagram I—fig 4 and Diagram II—fig 1+; where a, b, c, d, are the walls of the furnace, fig. 5 and 1+ the Akaira; the Gudaira[4] or wedge, is next introduced in order to adjust its vertical angle (Diagram I, fig 1) and this being placed satisfactorily, the Pachar is inserted and the whole has then the appearance represented in Diagram I, fig 3, where No.5, 6, 7 and 8, are the Akaira, Gudaira, Pachar, and Garrairi; nothing now remains but to lute the whole with clay, leaving the ends of the wind tubes open to receive the bellows.

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ing near the great trap-range, and reposing on a mass of cretaceous limestone belonging to the trap family; in all probability therefore it contains a small portion of lime; a few small grains of wacke may also be observed in it and in addition to these *Kodo* straw being mixed with it the potash derived from these materials facilitates the fusion of its silex, whilst the lime renders it a fusible compound, the ingredients of which are well assorted, and seem to be well adapted for use. The native smelters once deserted these mines on account of some pique, but the quality of the clay brought them back again.

4. *Note*: The broad end 3½, the narrow end 2½, the mean of which is 3 parts. These dimensions do not greatly differ from those of the native smelters, on the contrary they are founded on the mean of all the measures I could procure—and the difference consists in their being regular and fixed while those of the natives are irregular and often governed by caprice.

Bellows

The bellows are as singular in their construction as the Akaira, and are worked by the hand; they are made of a single goat skin, the dimensions of which ought to be 7 parts in breadth when doubled, and 8 parts in length; such proportions being required for circular bellows of 5 parts diameter, and which when worked by a man of ordinary strength will rise 6 parts in height—having 11¼ circular folds; the wooden nozzle through

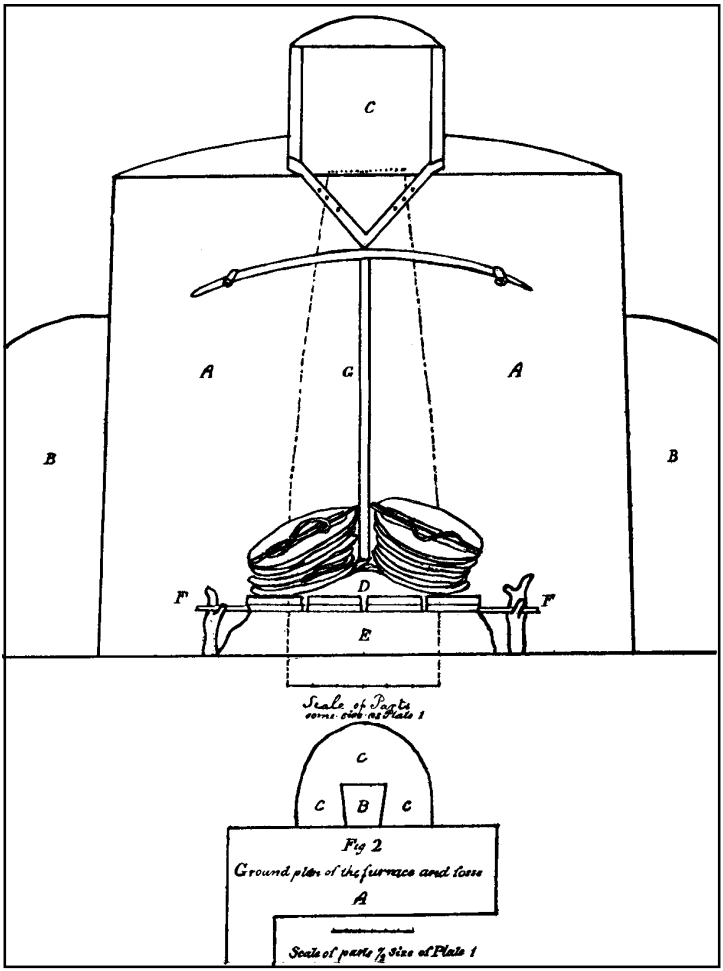

DIAGRAM III

which the blast is conveyed into the furnace surfaces the Akaira in its complex nature, and so little is its principle understood—that the art of making it was once lost at *Tendukaira*, and was again restored by the smelters of *Katola*.

Construction of the Nozzle of the Bellows

To construct its figure geometrically, rule a line AB equal 3 parts (Diagram II, fig 2) divide it into four, giving one of those divisions to each of the legs, and two for the space in the centre; set off a perpendicular from C to D equal 3 parts; bisect it and the middle point will mark the apex of the central angle; then through the point D rule a line parallel to AB and from it as a centre set off each way ¾ of a part making together 1½ parts; divide it also into four, giving one of each to the legs, and two for the space in the centre as before; and then by ruling lines to connect all these points, the outline will be complete; the exterior of the implement is plain but the interior is complex and cannot be described except by a reference to Diagram II: fig 3 which represents it, divided in the middle, to show its internal structure.

This curious appendage is fastened to the bellows by leathern thongs, and the blast is forced through it at an angle of 24 degrees but when it is luted to the wind tubes of the Akaira, the blast enters the furnace at an angle of 12 degrees, both vertically[5] and horizontally—because those tubes are placed so as to reduce that angle; Diagram II, fig 1+ represents the whole apparatus luted together and placed in the furnace the walls of which are marked a, b, c, d, and it exhibits at one view, the whole of the mechanism of this complex machinery; the furnace when closed up with clay, and the bellows luted in, is represented entire in Diagram III and IV; the dotted lines showing the chimney—A the outer walls, B, a mound of earth to strengthen the walls, C an upper chimney of moveable bricks, D planks laid across the trench to support the bellows and the man who works them, E a stone supporting one end of the plank, F forked branches supporting an iron bar on which the other end of the planks rests, and G a simple apparatus for preventing the bellows from rising from the planks when they are worked.

5. *Note*: The vertical angle is obtained by means of the wedge the thickness of which is adapted to the angle of 12 degrees, and the horizontal angle is obtained by keeping the ends of the wind tubes a certain number of fingers breadth as under when embedded in the Akaira. These quantities never differ much.

The above description is not founded on theoretical conclusions; the measurements given are derived from taking the mean of several and the results were proved in furnaces under my own superintendence; the coincidences of the several parts are very striking, thus for instance, the perpendicular and parallel lines of the geometrical outline are equal in quantity (Diagram I, fig 2); and the top, bulge and bottom being 3, 6, and 4½ parts respectively, show that the furnace is exactly constructed, and that it corresponds well enough with the most regular furnaces of Europe (Diagram I, fig 1); it is also curious, though perhaps of no importance to observe, that the mean of those numbers, being squared and multiplied by the terms of the perpendicular or axis, give the cubic area of the furnace, and show that it is twenty times larger than the cubic content, of the Akaira; the angle of the blast is also worthy of notice, as well as the simplicity by which both it and the obliquity of the furnace is obtained; all these serve to show that the original plan of this singular furnace must have been the work of advanced intelligence, and that its geometrical proportions have been preserved by simple measures; hence though its original form may be changed by caprice or ignorance, its principle never can be lost so long as hands and fingers remain.

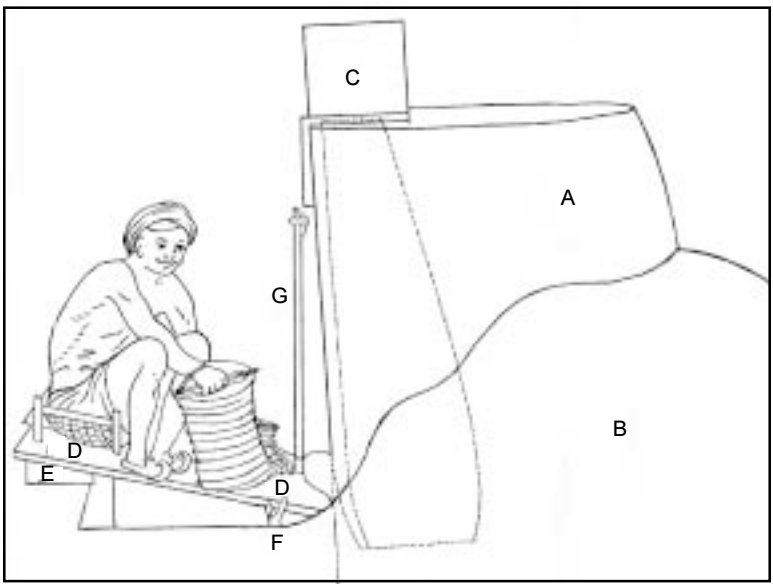

DIAGRAM IV

REFINERIES

The refinery is as crude in its appearance, and as novel in its construction as the furnace, to which it seems to have been purposely adapted: two refineries being required for one smelting furnace; to construct it they use the small cubit of 20 digits, or what is still more available, the space or distance between the tips of the thumb and little finger of a middle sized man when extended without force, two such spans being considered equal to the cubit; the first process is to arrange a number of square unburnt bricks, as in the ground plan (Diagram V, fig 1) in which a, a, a, a, are the walls—A is the chimney, B the refining furnace, C the seat of the refiner, and D the anvil; see also fig 2 for a side view of it—divided in the middle for the purpose of showing the interior structure, in which E is a piece of crude iron under the process of decarbonisation; the dimensions of the chimney are not material—but it is usually about one cubit broad, one deep and six in length; the oval part where the operator sits is altogether a fanciful appendage, being merely a mound of earth in which a log of wood is inserted for receiving the anvil—and its elevation serves the further purpose of giving the workmen a purchase in using the hammer; when the walls of the chimney are finished, the top is covered with unburnt bricks of an oval shape, flat below and convex above and these are luted together by a plastering of clay—fig. 3 is a front view—showing the opening of the furnace and Diagram VI exhibits the refinery complete, with the refiner at work on his seat, the bellows-man plying the bellows, and various implements lying about—A the outside of the chimney—B a mound of earth to strengthen its wall—C the refining furnace—D a piece of crude iron undergoing the process of decarbonisation (in dotted lines)—E the bellows-man plying the bellows—F the refiner with an iron spike in his hand regulating the operation (the dotted lines showing the interior of the furnace)—G a thick plate of iron placed at the bottom of the refinery (in dotted lines)—H a fosse for the hammerman—I the anvil—K implements, and L a heap of charcoal.

The furnace of the refinery is the only part which requires skill in its construction, and this is usually done by the operator himself; its geometrical outline is represented (Diagram V, fig 4) and its construction is as follows. Rule a line AB equal five parts, divide it into six—set off four of these divisions for the top—let fall a perpendicular from the centre C—set off three divisions from C to D for the depth—rule a line through D—par-

allel to AB and make it two divisions, now rule the outline—bisect the perpendicular and the centre parallel will be equal to three divisions.

The centre parallel is the most important part of the furnace and next to it is the accurate adjustment of the angle of the blast; I have frequently seen the Indian refiners obliged to discontinue their work on account of some error in this point; the usual measure for the former is the span above mentioned

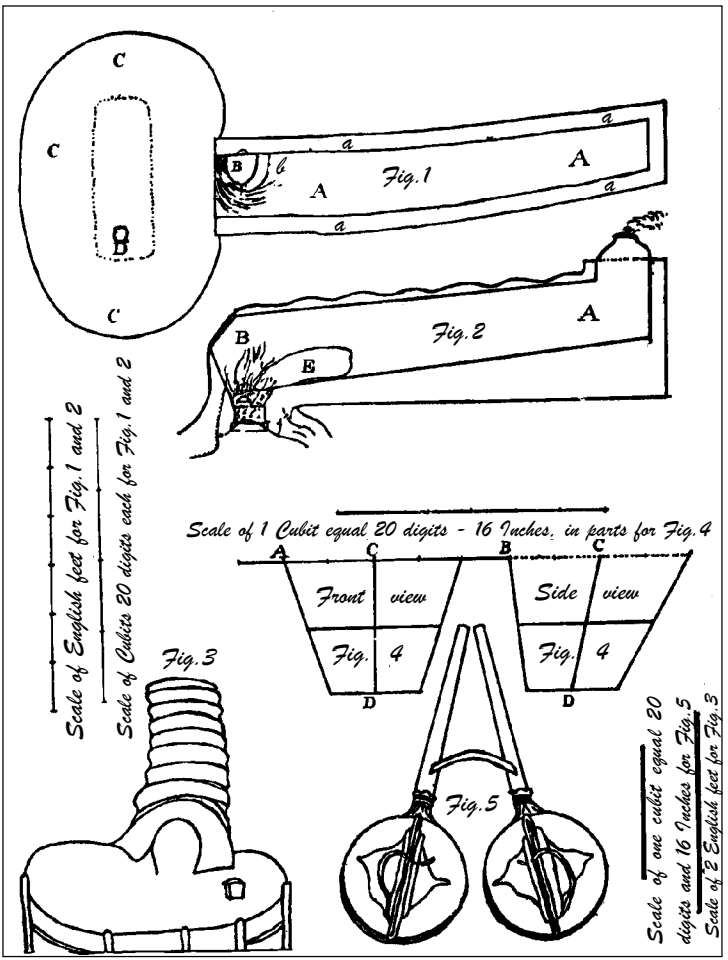

DIAGRAM V

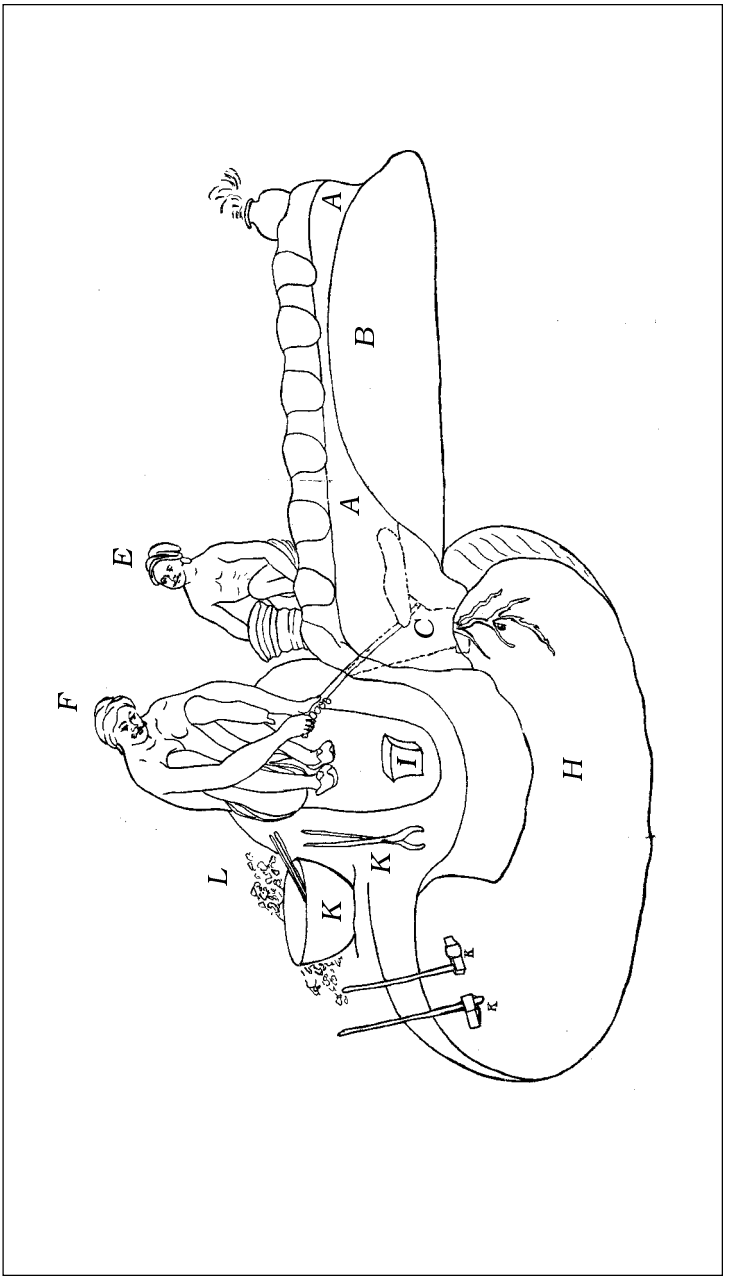

DIAGRAM VI

applied both longitudinally and transversely as in Diagram V, fig 1, B where a ground plan of the furnace is exhibited—the inner circle of which corresponds with the centre parallel of fig 4—this measure never differs much from 8 inches, and that quantity may be assumed as a fair average;—the outer circle *b* of the same figure is indefinite—the space between the two—being merely a slope, chamfering from the inner edge, and gradually expanding, until it is lost in the sides of the furnace, so that in fact it is reverberatory; with regard to the blast, it is absolutely necessary that it should be directed, at an angle of about 12 degrees, upon the opposite edge of the inner circle or to the point c fig 1, B; the natives have no instruments to enable them to do this exactly but the working of the furnace soon tells them where there is an error and they know well enough how to correct it;—the bellows resemble those of the smelting furnace, but instead of the wooden nozzle, they are furnished with long iron tubes—as in Diagram V, fig 5 which are so placed, that the angle of the blast thrown through them is 24 degrees, the same as that of the wooden nozzle.

SMELTING FURNACE

Diagram VII: fig 1 and 2 represent the front and back view of a small circular smelting furnace, which is very common in India—its measurement may be taken from the scale of the diagram either in parts or inches; the bellows are the same as fig 5: Diagram V, and the form of the interior or chimney is exhibited by dotted lines; fig 3 and 4 of the same diagram show another description of refinery used chiefly for decarbonising large masses for the manufacture of anvils & c. worked by two pairs of bellows—this refinery might be more extensively applied; such as for the manufacture of adletress* or other heavy work.[6] Fig 5 is a small field blacksmith's forge, constructed of the same kind of oval bricks, as those which are used for covering in the refinery, and luted together by clay; this apparatus may be constructed in half an hour; and is a useful field-smithy; fig 6 is a tube of clay, used in the refinery to preserve the ends of the bellows—fig 7 is a tube of the same kind used in the small circular furnaces.

6. *Note*: The refinery is convertible into a blacksmith's forge by taking out the iron plate and building up a wall in the middle so as to destroy the reverberating effect.

MODE OF SMELTING AND REFINING

In the process of their manufacture the Indian smelters use charcoal only; the ore is broken into pieces about the size of a walnut, but it is not washed, nor is it roasted although it is known to contain a large quantity of sulphur which might be dissipated by that method; they commence by filling the chimney of the fur-

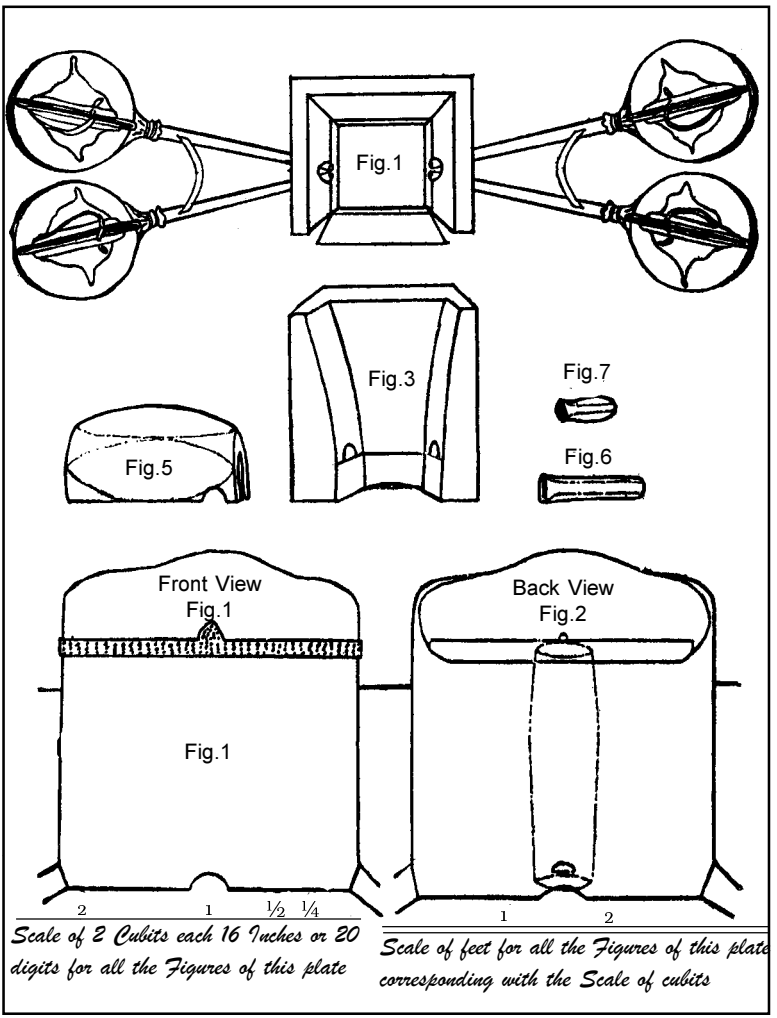

DIAGRAM VII

nace with charcoal which they suffer to burn until all moisture is expelled; they then throw in a small basket of ore, and upon it a larger one of charcoal, after which the burden is allowed to sink as low as the line G (Diagram I, fig 1 and 2) when it is again charged—and afterwards ore and charcoal are alternately given in the same proportions until the operation is complete; the scoria begin to flow within the space of an hour, and by that time, it is known whether the furnace will work well or ill—the scoria being a sure indication; it is let out by piercing the grate with an iron spike, and the orifice is again closed with clay as soon as it is drawn off; the bellows are worked by three men—who take it by turns; and they should be kept constantly playing until the process is completed; the time of which is ascertained by introducing a hooked piece of iron through the wind tubes, into the furnace, which shows how much of the Akaira remains; for as I have shown before, it is indispensably necessary that this appendage should be totally fused before the operation is complete, and when this is the case, it would be useless to continue longer, because the furnace would cease to work properly; it usually continues 12 hours but much depends on the bellows-man, and also on the working of the furnace.

The metal is never completely melted by this process—the heterogeneous mixture of the ore alone is fused and thrown off in scoria, and the iron being freed from it falls by its superior gravity to the bottom of the furnace, and there coagulates into a mass or masset; it is never very highly carbonised, and sometimes it is partially malleable even in its crude state; when the process is finished, the bellows are removed; the front part of the furnace demolished; and the red hot masset dragged out, and divided by large ades* before it has time to cool, hence it happens that the parts of the furnace thus broken up, require daily renewal.

This completes the business of the smelting furnace—the process of decarbonisation being performed in the refinery, and Diagram VI: fig. D, represents half a masset—properly placed in a refinery and undergoing that operation; as it becomes decarbonised, it drops into the hollow of the furnace upon the plate of iron G—and when a sufficient quantity has accumulated, it is taken out and hammered into more circular lumps which are seen in every bazar; the charcoal used in the operation is always of hard wood, such as teak (tectona grandis), mowa (fana latifolia)* or bamboo; this is the part of the manufacture in which the Indian manufacturers play tricks; for in the first place they

do not allow time for the crude mass to become properly decarbonised and then again they have a most pernicious practice of knocking off corners and small pieces from the masset in its crude state into the decarbonising fluid, and instead of waiting patiently until the whole of the masset is decarbonised they often throw in large lumps at the end of the process, mixing all these crude pieces with the other so that the cheat cannot be detected except on trial; thus they not only shorten the time of the operation, and thereby use less fuel, but contrive by this nefarious practice to sell a large portion of their crude iron at the same price as the malleable; they are also very sparing in their hammering lest they should force out too much of the Vitreous Oxide and thereby reduce the weight; so that upon the whole there seem to be causes which have justly affected the reputation of Indian iron—but as they are repairable errors, they ought rather to be placed to the account of the perversity of Indian habits—than arrayed against that fair repute to which the Indian metal under different management might lay claim.

PRODUCE

The produce of the ore of *Tendukaira* varied from 36 to 40 per cent—but as it was upon the whole nearer to 40 than 36—I am quite safe in fixing the average at 38 per cent; I tried by roasting the ore to obtain a greater quantity but without effect, neither was I satisfied with its result in another point of view, as will be shown hereafter; with regard to charcoal the consumption varied according to its quality—or, in accordance with the working of the furnace. The following diary contains a statement of the daily produce of four smelting furnaces, from which I assumed a mean, as a fair proof of their power of production. They were under my own superintendence from the 30th April to 6th June 1827 which is beyond all question the most unfavourable portion of the year for smelting iron, and the result therefore is the more enhanced in value.

From this statement it appears that each furnace yielded upon an average about 18½ *Panchseri*,[7] and that every hundred sers of crude metal yielded 63 sers of malleable iron; the total of the produce therefore is as follows: the ore yielded 38 per

7. The furnaces all varied in their produce but the mean is 18½ Panchseri—a Panchseri is 5 sers—eight of which or 40 sers are equal to a maund.

DIARY

Date	Produce in Panchseri	Weight when rendered malleable (in Panchseri)	Remarks
April 30, 1827	19	12¼	On the 8th of May, an attempt was made to alter the dimensions of the Akaira, and had it escaped detection a few days longer it would have occasioned a failure; as it not only diminished the produce of the furnaces but the massets contained so much impurity that the produce of malleable iron became greater.
May 1 1827	19	12¾	
" 2, "	19½	12¼	
" 3, "	16½	10¼	
" 4, "	18¼	10¼	
" 5, "	17½	10¼	
" 6, "	18½	12	
" 7, "	16	10¼	
" 8, "	14¼	9	
" 9, "	18¼	11¼	
" 10, "	19½	12¾	
" 11, "	20½	13¼	
" 12, "	21½	14	
" 13, "	20	13	The effect of the hot weather became very perceptible in June, and I found it expedient to discontinue smelting on the 7th of that month, but in order to satisfy myself that there was no trick in the diminution of produce, I gave ore and charcoal to the bellowsman to smelt for their own benefit; they tried their best to obtain as much as they could and they got 13, 14, 14¾ and 18—the mean of which is 15—about the same quantity as they got for me. I was, therefore, satisfied that the diminution of produce was owing to the heat of the weather alone as the thermometer ranged from 120° to 122° in the sun, and from 108° to 110° in the shade.
" 14, "	21¾	12¾	
" 15, "	21½	14	
" 16, "	22	13	
" 17, "	21¾	13	
" 18, "	20½	12	
" 19, "	19	11	
" 20, "	19	12¼	
" 21, "	19¼	12¾	
" 22, "	19¾	12	
" 23, "	17½	11	
" 24, "	18¾	12¼	
" 25, "	22	12¼	
" 26, "	18	10¼	
" 27, "	17½	11	
" 28, "	17½	10¾	
" 29, "	20	12¾	
" 30, "	19¾	12	
" 31, "	17	11	
June 1, "	17½	10	
" 2, "	15	9	
" 3, "	18½	11¾	
" 4, "	16¾	11	
" 5, "	14¾	9¾	
6, "	15½	10	
Total of one furnace	709	447	
Total of 4 furnaces	2836	1788	or 354½ & 223½ Maunds

cent—the crude metal 63 per cent—and the malleable iron yielded 56 per cent when wrought up into bars fit for use in a suspension bridge—as will be shown in the following paragraph.

QUALITY OF THE IRON

The iron was made over to Captain Presgrave of the Sagar Mint (an officer very capable of judging with regard to its quality). He wrought it up into bars and rods for an iron suspension bridge on which he was then employed and the following is his report to understand which it is necessary to refer to the note below.[8]

> The first six marks, afford bar iron (as far as my knowledge allows me to judge) of most excellent quality, possessing all the desirable properties of malleability, ductility at different temperatures and of tenacity for all of which I think it cannot be surpassed by the best Swedish iron; the second description consisting of the three last numbers in the accompanying statement has produced very good bars, but in forging and working it up, the iron appears somewhat harder, probably from it still containing a portion of carbon; the different marks varied in yielding from 50 to 60¼ per cent in bars, the average from the whole being rather more than 55¾ per cent.

It is necessary to add that the bar iron mentioned above, is not[9] common bar iron—but highly wrought bars, for use in a suspension bridge; the hardness alluded to in the three last numbers, was evidently occasioned by the metal 'still retaining a portion of carbon', and it is worthy of remark that this quality was confined to those specimens, the ore of which had been

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8. *Note*: I tried all the descriptions of ore and made experiments on roasting it—the result of which could only be ascertained by making the iron; the first six marks constituted the bulk of the quantity submitted for trial, and their iron result may be safely taken as a fair average; the other three are the result of my experiments on roasting the ore—previous to smelting.

9. The common English bar iron yields about 70 per cent of such highly wrought bars.

10. *Note*: The roasting of iron ore, previous to smelting is supposed to repay with advantage, the additional expense it occasions; and the reason of its ill success with me I can only explain as follows: The furnaces of Europe are I believe in general perpendicular that is—the ore and fuel

roasted.[10]

COST OF THE IRON

The cost of the iron was as follows. The excavation of a mine cost 30-12 Nagpur or 25 Calcutta Sicca Rupees; the construction of four smelting furnaces, two refineries, and one small round furnace, cost 34-12 Nagpur or 30 Sicca Rupees; and the purchase of skins and manufacture of seven pairs of circular bellows cost 30-5 Nagpur or about 25 Sicca Rupees—total of outlay 80 Sicca Rupees; but as my experiment lasted only five weeks, and the above outlay was calculated to last a whole season, a portion of it only is chargeable to the cost of the above iron; the hammers, anvils and other implements of iron, not being perishable articles—are chargeable only for reasonable repairs; thus the proper proportion of outlay is 15 Rupees, and the expense[11] of working the furnace was 441-0 Nagpur or 375 Sicca Rupees, the total of cost therefore for 225 maunds of malleable iron was 390 Sicca Rupees, or one rupee 12 annas per maund.

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fall perpendicularly and consequently their descent is more rapid; but in India the furnaces are oblique, and the descent of ore and fuel more gradual and hence sufficient time is gained for dissipating sulphur, or other volatile ingredients before it reaches the point of greatest heat; this appears to be the fact as the chimneys of these furnaces are always coated with sulphur; it would seem also that the metal acquires more carbon under the effect of both operations than the Indian refinery, constituted as it now is, can dispose of—and hence the hardness of the last three marks as observed by Captain Presgrave.

11. *Statement of Expense*

6 Men for each Smelting Furnace or 24 for 4 furnaces from 30th April to 6th June, or 1¼ month at 4 Rs. each per mensem	120-0
Charcoal for the Furnace for the same period	134-0
For digging ore	14-2
Carriage of ore	15-5
Carriage of charcoal	14-9
Head-Man	6-0
Total Cost of Smelting	304-0

continued on next page...

The iron was weighed by the standard of Nagpur—the maund of which place is about 3 lbs avoirdupois less than the factory maund of Calcutta; hence its weight is about 71 lbs 10 ozs avoirdupois, and 31¼ Nagpur maunds are nearly equal to one English ton; the value of the Calcutta Sicca Rupee is usually reckoned at 2 shillings and hence the cost of a ton weight of malleable iron in English money was five pounds nine shillings, and five pence, or in round numbers—five pounds ten shillings.

CONCLUSION

It was my intention to have compared this little furnace with some of the minor furnaces of Europe—but as my knowledge of the latter must have been derived from books, I prefer giving facts derived from actual experiment, and leave the comparison to those who are better able to make it: the quantity of crude metal smelted in my four furnaces from the 30th April to the 6th June, was[12] 354½ maunds, and its cost was 304 Nagpur or 260 Calcutta Sicca Rupees—hence its cost per maund was 11¾ annas, or two pounds, six shillings per English ton—and the produce per week of four furnaces was 71 maunds or 2¼ English tons.

These data show the cost of the iron both in its crude and malleable state and Captain, now Colonel Presgrave's report gives the latter so fair a character that it may be useful to follow up that report by another obtained from the Calcutta Mint on some pieces of *Jowli* and *Ageriya* iron which were wrought up to the state of English bar iron—and submitted to trial—the substance of the report is as follows:

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1 Lohar Mistry at 8 and five Lohars at 4 [Rs.] per mensem for each Refinery: this sum doubled for two and for a period of five weeks is		70-0
Teakwood Charcoal for the Refineries		63-0
Head-Man		4-0
	Total Cost of Refining	137-0
	Total Cost of Smelting	304-0
	Total Expense	441-0

12. *Note*: See Diary.

A piece of the Jowli iron being broken showed about half the surface of a fine blue tough appearance, the other half had a very brittle appearance of a glassy white colour resembling what the smiths in England call cold-short; this piece 1 inch broad and ¾ inch thick was put into a clam and a lever applied to it; it twisted with a fair resistance, and bore one revolution in 6 inches without showing a fracture; it was then warmed and a hole punched through it, which it bore in a way that would have been expected in a piece of good English iron and better than the general run of English iron purchased in the bazar would have borne it. An eye being turned at each end, the space of 10 inches long was drawn down to one third of an inch square, and dead weight scale fashion without the use of the lever applied and in the length of six inches it elongated:

1/10th	of an	inch	with	3378 lbs
2/10th	"	"		3624 "
3/10th	"	"		4795 "
5/10th	"	"		5127 "

and drew itself to near a point and broke with 5246.

A piece of the Ageriya iron, on being broke, showed a small portion of its fracture light blue tough vein, the remainder silvery white, showing very fine particles, and was what the smiths in England would say had an inferior appearance, it was 1⅛ inch broad by ⅞ inch thick, and was twisted cold one revolution in 6 inches without showing a fracture and appeared to be much stronger (to the twist in proportion) than the above piece from Jowli, though much softer; it was then heated, and punched which it bore in a manner sufficient to give it the character of very fair average iron; an eye being then turned at each end, the space of ten inches long was drawn down to one third and dead weight scale fashion without the use of the lever, applied and in the length of six inches—it elongated 1/20 of an inch, with 4748 lbs, and made a square break with 5376 lbs.

Though the Ageriya piece gave no notice of its approaching failure, whilst suspending a weight; yet when brought to the bend, it showed itself possessed of the power of elongating, and bore more bend without showing a fracture than the piece of Jowli and stood the bend better than the general run of English iron purchased in the bazar.

The above statement was addressed to Captain Forbes,

superintendent of the hon'ble Company's steam engines and machinery, to whom I applied to obtain a trial and the experiments were all made by one of the most able and practical men of the Mint—named Thomas Pigg.

Having now exhausted all my information which was obtained from actual experiment and impartial trial and proof I shall conclude with the following remarks—viz: that the Indian forge is able to make crude metal, for two pounds six shillings, and good malleable iron for five pounds ten shillings per English ton; it is moreover susceptible of improvement; it requires but little outlay; it is portable; and may be transported from place to place, the implements being the only things necessary to carry; it may be erected in places which combine the advantages of proximity of ore and fuel and where other furnaces requiring a large supply of water cannot be set up—and it may be erected for temporary purposes and abandoned when the object is fulfilled without material loss, the furnaces being the only part which would be lost and their cost is about 6 shillings each.

The employment of so simple a forge in England would be absurd—but considering it an instrument adapted to the existing condition of the country where it is used—it assumes a different character—for such is the cheapness of labour and fuel that I question whether any other furnace would compete with it—and if by improvement it can be made capable of working on a larger scale; arsenal materials, materials for bridges and other heavy work—it certainly is an object worthy of attention, as a great saving of expense might be effected by its use.

Another Reason

SCIENCE AND THE IMAGINATION OF MODERN INDIA

GYAN PRAKASH

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regarded both elite and subaltern responses as less than appropriate, as proofs of the dictum that natives will always be natives, they could not ignore these altogether. Seeking from Indians the recognition of Western knowledge's authority but unwilling to acknowledge them as knowing subjects, the British had to regard Indians as always less than adequate, always lacking some key attribute. This justified colonial dominance, but it also conceded that the colonial project would never achieve complete success, that Indians would remain unconquerable in the last instance. It was precisely at the site of colonialism's necessary failure to resolve its paradoxes and prevent its knowledge from "going native" that the career of science charted another course in British India.

Translation and Power

. . . all translation is only a somewhat provisional way of coming to terms with the foreignness of languages.
Walter Benjamin[1]

In 1896, a Calcutta journal published a poem entitled "The Blessings of Science," registering science's cultural power in the discourses of the Western-educated elite:

> Science! Thou mysterious Being! Through Thy aid we can know all:
> Man and Nature's mighty laws and what are hid in the Future's path.
> Through thy mighty aid we mortals filch the lightning from the clouds;
> Through thy aid immortalize our mortal voices low or loud,
> Through thy aid from hence I know what is made the lum'nous sun.
> By thy magic wand when 'tis touched light divides in seven hue:
> Red and violet, green and orange, yellow, indigo and blue.
> Through thy aid our fleeting shadows are imprisoned in the frame,
> Thus thou giv'st to "airy nothings" "habitation and a name."
> Through thy aid our optic powers are increased to such a height,
> Each of us, as it were, gifted with a second sight.[2]

Science's authority inhabits and animates the poem; its cultural force emerges as it brings the hidden out in the open, as it renames "airy nothings," as it redirects "our optic powers" to act as "second sight." Functioning as an aid for repositioning and reclaiming an already-present indigenous rationality, science surfaces and is itself reconstituted in the realignments of objects it achieves and authorizes. The dynamic at work in the poem invites us to view the institution of science's authority as a process of

translation, not imposition. Translation meant a realignment of power, a renegotiation of the unequal relationship between Western and indigenous languages. To view the elite discourse in such terms is not to fixate on its content but to understand it as a syntactical rearrangement of power and culture, not fasten onto the mere presence of science in that discourse but to focus on the conditions under which it was authorized.

Significantly, Western-educated intellectuals themselves approached translation as an issue of renegotiating power. Consider, for example, the views of Rajendralal Mitra, the prominent nineteenth-century Bengali Orientalist and intellectual. Confronting the problem of rendering Western science into Indian languages, Mitra wrote in 1877 that it could not be resolved by a "system of servile verbatim translation, like a Chinese copy, with patch and all."[3] Nor could it be done by a wholesale importation of Western technical terms into Indian languages, because that would "create a new language foreign to people at large, and give an exclusiveness to the professors of science not much unlike that of Cabalists and Gnostics."[4] Neither a "Chinese copy" nor a massive importation, translation had to aim at more than the reproduction of words: it had to transfer the "secret power" of language, which was frequently undefinable and intransmissible, and whose evaporation it could not prevent entirely. The delineation of one language into another, then, worked as a process of dissemination, not dialectic, from which neither one nor the other could reappear with its original position and meaning intact.

Dissemination was generative; it produced an altered authority and identity. For this reason, it was vitally significant to determine the nature of power's dispersal and transformation, particularly since it involved languages with unequal status—English and Indian languages. At stake was the integrity of the Indian languages, which did not participate in the creation of modern scientific discourses but were obliged to incorporate them. What were they to borrow and assimilate successfully without losing their fundamental character? Mitra proposed that indigenous interests guide the Indian languages' unequal encounter with English.[5] Regretfully, he acknowledged, the importation of technical and foreign terms could not be avoided entirely, but their evil could be minimized by making them simple, logical, and easily intelligible. He also recommended the use of "well-understood, and easily accessible native terms, with such a judicious mixture of foreign elements as may be absolutely necessary, taking care that, in the first instance, it is so manipulated as to render it fit for the purpose for which it is to be employed."[6]

There is an intimation here of another history—a history that emerges from science's authorization in the language of the other and consists of a process of cultural appropriation that bears the mark of a contestatory negotiation between unequal languages and subjects. The contestation surfaces in Mitra's insistence that Indian interests must govern the translation of Western science, that the process of dissemination and hybridization must be subjected to the pressure and agency of subaltern languages.

Mitra's perspective urges another reading of the enunciation of the discourse of science by the middle-class elite; it asks us to view the elite discourse as what Walter Benjamin called an interlinear, or between-the-lines, translation.[7] Understood as translation, the enunciation of the discourse of science becomes a far more complicated matter than the colonizer's victory over the colonized. Translation involves the undoing of binaries and borders entailed in the authorization of the discourse, and it locates the formation of a modern Indian elite as a counter-hegemonic force in those productive in-between strategies and spaces that come into existence when "our optic powers" are relocated as "second sight." To think of science's authority in India and the modern Indian elite as products of a translation between the lines is to bring another history into view—a history of an irreducibly different Indian modernity forged in the interstitial spaces opened by the process of translation. Viewed as a product of translation, the elite does not appear as a copy of the original, but as a ghostly double that resists identification as a copy by asserting difference. This is a history that sits oddly beside both the heady celebration of modernity as progress and its stinging denunciation as the

colonization of the mind, and reveals the emergence of the indigenous elite's counter-hegemonic aspirations in the translation of Western modernity.

The Distribution of Science's Authority

During the second half of the nineteenth century, the emergence and functioning of science as a form of cultural authority took a variety of forms in different parts of colonial India. New organizations were set up to foster a scientific culture, and existing public bodies included the promotion of science in their activities. Western-educated Indians published tracts on science with or without government patronage, and religious and social reform came to be seen through science's authoritative "second sight." From these organizations there emerged an elite, composed primarily of Western-educated upper-caste men of different regions, who represented themselves as an Indian "aristocracy of intelligence" engaged in the liberal project of cultivating and spreading new forms of thinking and living.

In this project, the establishment of the Asiatic Society of Bengal in 1784 marked an important watershed. Founded by British Orientalists and restricted to Europeans until 1829, it brought together the research of European Orientalists and the writings of British officials in a variety of different government bodies. It combined serious philological and textual scholarship with empirical reports on "tribes and races," folklore, and the flora and fauna of British India, prepared by the East India Company administrators and officers employed in such bodies as the trigonometrical and geological surveys, and medical and meteorological services. By the early nineteenth century, the Asiatic Society had established itself as the center of Western knowledge in India. It configured the new discipline of textual Hinduism and Hindu philosophy, influencing the emergence of the Bengali reformist intellectuals, and it set into place the investigation of India's natural history and the rediscovery of indigenous traditions in mathematics, medicine, and other sciences.[8] After it began admitting Indians in 1829, the Asiatic Society offered Western-educated Indians an opportunity to also pursue and publish academic studies. Among them, Rajendralal Mitra was the most prominent. He published a number of historical, archaeological, and linguistic treatises, and became the Asiatic Society's first Indian president.

The Asiatic Society, however, was an academic body; its activities offered little opportunity for Indians keen on propagating science as culture and as a sign of modernity. These goals were pursued instead by organizations established by Western-educated intellectuals to reform religion and society. The Brahmo Samaj, established in 1829 in the wake of the much celebrated Bengal renaissance, was the earliest and the most prominent of such organizations geared to reform Hinduism.[9] By the 1840s, the language of reform began increasingly to employ the belief in the universal laws of nature. As the most forceful and enthusiastic exponent of this view, Akshay Kumar Dutt, the editor of the premier Brahmo journal, *Tattvabodhini Patrika*, began a tireless campaign to demonstrate the fruits of science and technology. He taught natural sciences in the Brahmo Samaj school and translated text-books on physics and geography into Bengali.

The belief in the superiority of natural laws over "superstitions" also animated the famous reformer, Iswarchandra Vidyasagar. His organization, Tattvabodhini Sabha, and his campaigns for female education and widow remarriage in subsequent decades invoked rationalist arguments to justify their goals.[10] Such reformist activities of the upper-caste *bhadralok* (literally, "respectable folk," a term for the Bengali elite) men were directed at the growing middle class (*madhyabitta*), many of whom were located in district towns, where their income was drawn from government employment, new professions, and land tenures.[11] This middle-class constituted the social base of reform movements and participated energetically in the development of the new print culture. But the most prominent *bhadralok* intellectuals were centered in Calcutta where they attracted patronage and

participation from some of the city's great nouveau riche upper-class Indian families.[12]

The Brahmo Samaj was only one, though the most celebrated, reform organization. By the mid-nineteenth century, the project to reorganize culture—not just religious beliefs and social customs as in the case of the Brahmo Samaj—witnessed the formation of one organization after another in Calcutta and in the district towns. These drew into their fold prominent *bhadralok* intellectuals, members of the grand families, "enlightened" landlords, and sympathetic British officials. The objectives of these organizations, some of which lasted no more than a few years, varied—the diffusion of new forms of knowledge, religious and social reform, female education, the promotion of vernacular literature, the improvement of agriculture. But all of them were formed by and functioned with a sense of the rediscovery of reason.[13] As science was part of this rediscovery, the popularization of its authority emerged as one of the key aims of such organizations.

The Society for the Acquisition of General Knowledge, for example, was one among many short-lived bodies gripped by an enthusiasm for science. Established in 1838 and lasting until 1843, it counted over one hundred and fifty members, including the famous and wealthy Tagores, Dutts, Mitras, and Mullicks of Calcutta, as well as some lesser known provincial gentry.[14] During the five years of its existence, it hosted lectures in English—the language of reform among the *bhadralok*—for its members. Bengali students of the Medical College delivered lectures with such titles as "On the Anatomy of the Eye," "On the Anatomy of the Ear," and "On the Physiology of Digestion," while others read papers entitled "A Short Topographical Account of Chota Nagpoor," "On the Present Condition, and Future Prospects of the Educated Natives," "On Matter," and "Answers to Agricultural Queries."[15]

The enthusiasm for science as a language of reform seized even such organizations as the Bethune Society. Known primarily for its advocacy of female education, the Society was established by

the British and Bengalis jointly in 1851 to commemorate the memory of John Drinkwater Bethune, a senior colonial official who, like Iswarchandra Vidyasagar, was known for his advocacy of female education. The Bethune Society's Bengali membership, like that of the Society for the Acquisition of General Knowledge, consisted of the Calcutta elite.[16] Its regular meetings at the Medical College, where noted Europeans and Indians lectured on education, philosophy, arts and science, health and medicine, and sociology, attracted the educated Bengalis of Calcutta and visiting landed magnates from other parts of India.[17]

Intending to institute the bourgeois civil society, the Bengali elite, in addition to flocking to the meetings of the Bethune Society and the Society for the Acquisition of General Knowledge, formed organizations devoted to the public discussion of scientific knowledge. The earliest and most prominent of such bodies was the Burra Bazar Family Literary Club, formed in 1857.[18] Also notable was the Mahomedan Literary Society, established in 1863 by Abdul Luteef Khan. This body, like the Burra Bazar Family Literary Club, held addresses on science and demonstrations of scientific instruments and experiments, and organized regular "conversaziones" attended by Muslim "gentlemen" and the "*élite* of the European, Hindu, Parsee and Jewish communities."[19] The men who ran such bodies were not scientists themselves, but eminent Bengalis who regarded scientific knowledge and a scientific attitude as signs of enlightenment and education. Thus Khan, the most prominent Muslim in a Hindu-dominated Bengali elite, made lectures on science an integral part of the activities of the Mahomedan Literary Society, in order to develop well-rounded individuals who would not only grasp scientific concepts but also use them in their life and thought—like Khan himself.[20] A product of Western education and a government employee, he rose to become the Presidency Magistrate in 1877—no small achievement for an Indian under colonial rule at that time. His learning was broad and deep, and, like many of his contemporaries, his language of reform was profoundly influenced by science. Addressing the Bethune Society in 1865 on the

impending census operations and explaining the basis for his claim that the knowledge of the density of population would enable better town planning and municipal services, he said:

> Who that has paid any the least attention to physical science does not know that carbonic acid, or the air we expel from the lungs during the process of respiration, is one of the most destructive agents in nature, and produces fatal results, when diffused through the atmosphere in the proportion of only ten per cent? Is not the physical debility of the native of Bengal, in some measure, to be ascribed to a direct violation of the laws of nature, the inevitable consequence of numbers crowding together within the scanty limits of a miserable hovel?[21]

The writings and speeches of men like Abdul Luteef Khan, as well as the glittering gatherings of Europeans and the *bhadralok*, were the most visible manifestations of the general distribution of the discourse of science. Less visible, though no less important, were obscure organizations and lesser-known intellectuals whose activities gave science its authority. Take, for example, the enthusiasm for phrenology—a science, then current, which analyzed mental faculties and character by studying the shape of the skull. To advance the science, the Calcutta Phrenological Society was formed in 1845 under the direction of Kali Kumar Das, a *bhadralok* intellectual who participated in the discussions of the prestigious Bethune Society but was not otherwise prominent.[22] His organization, run primarily with the help of his relatives, was distinct from a society formed twenty years earlier, in 1825, by British enthusiasts of phrenology in India. Das's principal purpose was to popularize, through practical demonstrations and the publication of a Bengali journal, the knowledge and the practice of phrenological science in order to regenerate India's society, religions, and educational system.[23] Although very little information on the subsequent activities of this organization survives, phrenology's continuing currency in the 1870s prompted Mahendra Lal Sircar, the best-known Bengali promoter of science and a graduate of Calcutta Medical College, to pen a tract offering a

guarded endorsement of phrenology.[24] More important than the interest in phrenology, however, were the raging debates on the scientific claims of homeopathy that attracted many educated men, particularly after homeopathy was endorsed by Sircar.[25] Fed on these debates, minor Bengali intellectuals in Calcutta and elsewhere quietly promoted science as an instrument of social and cultural renewal. A good example can be found in the life of Pyare Charan Sircar. A descendant of a *banian* family employed by the famous booksellers, Thacker & Co., he was educated at the Hare School, where he wrote a prize-winning essay in 1844 on the effect of the steamship on India. He became a teacher in 1845 and was eventually appointed as a professor at the Presidency College. During his more than two decades of service in edcuation both in and outside Calcutta, he established an industrial school, instructed students on agriculture and botany, collaborated with district officials to give practical demonstrations on agricultural chemistry, planted a small botanical garden, practiced homeopathy, and subsidized the publication of Bengali tracts on this form of medicine.[26]

By the 1870s, so broad and deep was the distribution of science's prestige in the discourse of the *bhadralok* that it began to show up noticeably in the literary culture of Bengal. The conception of science as superior knowledge, for example, appears in the writings of the most canonical of all literary figures of nineteenth-century Bengal, Bankim Chandra Chattopadhyaya. Aside from contributing eleven widely read essays on popular science to the Bengali journal *Bangadarshan*, he wrote several novels, essays, and satires in which his belief in scientific reason in general and the influence of John Stuart Mill and Auguste Comte in particular are clearly expressed.[27] Although the appeal to scientific reason is present in virtually all his writings, a particularly pointed expression of science's authority occurs in his essay "Mill, Darwin and Hinduism" which, like many of his writings, was concerned with the subjection of Hindus and Bengalis to foreign rule, and provided an interpretation and defense of Hinduism through an appeal to science and rationality.[28] This essay, written to establish

the scientific basis of the Hindu belief in a trinity (as the creator, the preserver, and the destroyer), begins with a reference to Mill's argument on God's existence, goes on to invoke Darwin's theory of natural selection to establish that functions of preservation and destruction are different from that of creation, and concludes that the Hindu belief in the trinity of Brahma, Vishnu, and Shiva is valid even if its existence cannot be proven.

> [I]t is true that there is no scientific proof of the existence of the Hindu trinity, but it must be acknowledged that this Hindu worship of the three gods is more natural and more in accord with science than the Christian religion supported by the scientific European people. Although the worship of the three gods may not be based on science, yet it is not contrary to science. But in the judgement of Mill . . . it is evident that belief in the omnipotent, omniscient and all-merciful Christian God is contrary to science. If, like the Hindus, one accepts the doctrine of *karma* or *māyā*, it would then be in accord with science.[29]

In his time, Bankim was the most famous Bengali man of letters to espouse the authority of science and express positivist beliefs. However, there were many other *bhadralok* men in Bengal, both celebrated and obscure, who were so attracted to Auguste Comte's ideas that they formed an organization in the 1870s to popularize positivism.[30] Positivist doctrines began to appear in Bengali journals and inspired the foundation of the Bengal Social Science Association in 1867, which over the next several years became a center for the research and exchange of ideas on sociology and science. The organization not only drew into its fold the elite of Calcutta and Bengali's district towns, but also recruited members among the Western-educated men from other provinces who were active in promoting modern education.[31]

Crucial to the influence enjoyed by positivism and other such theories licensed as science was the rise of a literati around the developing Bengali print culture. Beginning to develop in the eighteenth century, modern Bengali literature and a literary

public had become forcefully present in the cultural life of the elite by the mid nineteenth century. This was reflected in the rapid growth in the number of published Bengali journals, literary magazines, and books. By the 1850s, the publications in Bengali included books by Akshay Kumar Dutt on Baconian natural philosophy; text-books on chemistry, medicine, anatomy and pharmacopeia; ancient Indian treatises on medicine and geography; and essays on agriculture and horticulture. During the next fifty years, the number of such publications grew substantially, and journals and tracts returned incessantly to reflect on science as a form of thought and on its relevance to religion and society.[32]

Building on the wide distribution of science's authority among the Bengali literati, the Indian Association for the Cultivation of Science (IACS) was founded in 1876 by Mahendra Lal Sircar. An important figure in the *bhadralok* milieu, he established the *Calcutta Journal of Medicine* in 1868 and worked along with Father Eugene Lafont, the Belgian missionary and professor of physics at the Calcutta St. Xavier's College, to popularize science. Often the featured speaker in the popular lecture-demonstrations on science that Lafont organized regularly, Sircar saw scientific training and research as crucial for national progress. Convinced that colleges, schools, and government bodies did not offer sufficient opportunity for nurturing and advancing scientific research and education,[33] he launched a campaign in 1869 to establish IACS as an institution that would both supplement existing institutions and function as an independent body devoted to promoting science for the national welfare. His efforts drew support from the same *bhadralok* intellectuals and wealthy families—along with a sprinkling of landed aristocracy—who supported nearly all elite projects of reform. Newspaper support poured in, and discussions were held at organizations to consider and further Sircar's scheme. With this backing, the IACS came into existence in 1876. Enlisting the support of the science faculty in Calcutta, the IACS organized a system of lectures for the students and teachers

of science in the city. The IACS received the patronage of the government and the *bhadralok* consistently, becoming the most prominent organization of scientists and enthusiasts of science in Bengal.[34]

While Bengal was first to witness the distribution of science's authority in the elite discourse, this phenomenon was also observable in other provinces after the mid nineteenth century. As Western-educated Bengalis relocated to North India in pursuit of employment opportunities in education, administration, and the railways, they took the language of reform with them. There they found like-minded local inhabitants who were also educated in new schools and colleges, and employed in colonial government and new professions. In Banaras, Ramkali Chaudhuri, a junior official in the judiciary, along with other "native gentlemen" founded the Benaras Debating Club in 1861. Renamed the Benaras Institute in 1864, it at first consisted entirely of Indian teachers and students of English from the local colleges and schools.[35] So successful was this venture that the raja of Banaras expressed his desire to join, as did several other "native gentlemen," including Siva Prasad, a government servant of some repute as a promoter of vernacular education. In 1864, the club opened its doors to Europeans, including missionaries, who participated in its series of lectures on education, sociology, sanitation and medicine, philosophy and literature, and science and art.

In Bihar, where the spread of Western education and the emergence of the new elite was limited, science's position as the syntax of reform was nevertheless also evident. In 1868 a group of educated Biharis and Bengalis employed in colonial administration formed the British Indian Association, later renamed the Behar Scientific Society, in Muzaffarpur, a small district town in north Bihar.[36] The principal force behind this organization was Sayyid Imdad Ali, a minor official in the colonial government. A Muslim like Abdul Luteef Khan of Bengal, he, too, was moved by the language of reform and progress. His organization, which included both Hindus and Muslims, was founded at a meeting on

the advancement of education that was attended by Indian officials, landlords, merchants, and "men of independent fortunes." By 1870 the Behar Scientific Society had four hundred members, including some British officials, with branches in two districts. With donations received from wealthy landlords, the Society sponsored translations of textbooks on natural philosophy, physics, chemistry, mathematics, astronomy, and geology into Hindi and Urdu.

The Behar Scientific Society was modeled on the Aligarh Scientific Society, an organization established in 1864 by Sayyid Ahmad Khan, the nineteenth-century Muslim reformer.[37] Khan belonged to the genteel North Indian Muslim *sharīf* culture of comfortable, large households served by a retinue of servants with long-term ties to the family. The men of this culture studied the recitation and memorization of the Qur'an, were educated in traditional schools in Persian and Urdu, and amused themselves with chess or parchesi, pigeon-raising, kite-flying, cockfights, poetry, music, and dance and music performances by courtesans. By the 1850s, however, the *sharīf* men were beginning to find a new cohesion as a group through their increasing involvement in the *kacaharī*, or courts, as minor officials, document writers, and legal agents—*vakils* and pleaders. Involvement in the *kacaharī* milieu brought about an appreciation for English education. However, men like Sayyid Ahmad Khan did not see English only as a key to employment; Khan championed English education because he drew from the 1857 revolt the lesson that political weakness could be removed only with the new knowledge imparted by Western education. The establishment of the Aligarh Scientific Society, facilitated by the network of donors and patrons available through the *kacaharī*, was an effort to remove this perceived political weakness through English education.

The Aligarh Scientific Society's activities consisted primarily of sponsoring Urdu translations of English textbooks on science. Most of these were texts on mathematics translated by Zakaullah of Delhi College, an intellectual associated with the reformist

ferment historians call the Delhi renaissance, of which Sayyid Ahmad Khan was an early representative and important figure.[38] This reformism, which preceded Western influence and is traceable to the eighteenth-century reformer, Shah Waliullah, responded positively to Western learning in the early nineteenth century and fostered an appreciation for science. One product of the Delhi renaissance was a simplified Urdu that the movement's intellectuals had developed as a vehicle for scientific thought to replace the courtly Persianized Urdu.[39] Zakaullah studied at Delhi College in the 1850s, where he came under the influence of Ramachandra, a Hindu convert to Christianity and a brilliant mathematician who wrote books and published journals in Urdu advocating the instruction of new sciences.[40] Although Zakaullah, unlike his teacher, did no original work in mathematics, he became a teacher of mathematics, joined the government's education service, translated mathematics textbooks into Urdu, and became an active promoter of scientific education in Indian languages.

By the late nineteenth century, the pervasive deployment of science's persuasive power in North India was no longer limited to the writings and activities of eminent individuals and exclusive bodies, but became discernable in the cultural milieu that was developing around Hindi language and literature, and Hindu revivalism. Originating in Banaras and Allahabad, the spread of this Hindi-centered intellectual culture through north Indian towns eclipsed the cultural influence and public leadership of the Bengalis in North India.[41] In the new environment, discussions and debates on Hindu religion and society acknowledged the authority of science as a privileged body of knowledge, and proceeded hand in hand with the vigorous growth of the Hindi language and literature.[42] Hindi journalism and literature proliferated all over urban North India, powered by the extraordinary literary productivity and creativity of men like Bharatendu Harishchandra. The Hindi literati mounted powerful campaigns advocating greater use of Hindi in education and administration, and also fostered the rapid growth of a print culture that engaged in spirited discussions of Hinduism and Hindi language and literature.[43] Such activities were aimed primarily at promoting Hindi as the language and literature of the learned. But, given that the knowledge of modern science was regarded as a sign of education and enlightenment, Hindi journals also published regular columns on the history and contemporary state of different sciences, written mostly, though not exclusively, by science teachers dispersed all over the region.[44] Explaining basic concepts of chemistry, natural philosophy, biology, physics, astronomy, and mathematics, these articles were popular expositions aimed at addressing and cultivating the scientific disposition that a Hindi-speaking literati was expected to possess.

This disposition could be cultivated and maintained only if Hindi became a language of science, equipped to convey and produce scientific knowledge. Therefore, the Nagari Pracharini Sabha of Banaras, an organization formed in 1893 to advance Hindi's claim as a self-sufficient modern language, sponsored translations of textbooks and the compilation of a scientific dictionary in Hindi.[45] Similar developments occurred in Allahabad, another emerging center of Hindi literature. Professors Ganganath Jha, Hamiduddin, Ramdas Gour, and Saligram Bhargava, who taught Sanskrit, Arabic, physics, and chemistry respectively at Muir Central College, formed an association, the Vigyan Parishad, in 1913 to further the dissemination of scientific knowledge in Hindi. The Vigyan Parishad drew support from the city's literary and social elite and from science teachers in schools and colleges to organize a popular lecture series, establish a Hindi journal, *Vigyan*, which is still in existence, and launch the publication of a series of introductory and specialized scientific tracts in Hindi.[46]

By the early twentieth century, then, the authority of science had become widely dispersed. Fields ranging from social and religious reform to literary writings, and urban spaces ranging from major colonial cities to small district towns witnessed the permeation of science as a grammar of transformation. This was manifested in the establishment of public bodies, the organization of

popular lectures, and the publication of journals. These institutional forms drew vigor from and also shaped the network of Western-educated men brought together by opportunities opened by new professions, the colonial administration, and landownership. Though limited in size and differentiated by religion, region, rank, and language, the class formed by these men came to represent modernity and to achieve prominence in colonial India.

The Institution and Alienation of Science's Authority

There is no doubt that the modern West permeated the discourses of Western-educated intellectuals in India and empowered them to represent themselves as forces of reform and progress. If we are to read this as a sign of the "colonization of the mind," then we should also be prepared to recognize the alienation inherent in its enactment. To enunciate the power of modern science in British India was to ask that it express itself in the menace of difference, that it court subaltern knowledges and subjects as the stage for its performance of dominance. Science was asked to open itself to and also contain the pressures of indigenous cultures, to dwell in the religious dispositions and literary writings of the "natives." Only then could there be an indigenization of science's authority—the imperceptible exercise of colonial domination. If these complex strategies of hybridization and translation confirmed science's authority, they also required it to address indigenous knowledges and subjects, resulting in a paradoxical legitimation: the establishment of science's power in its estrangement.

An early example of this process can be observed in a Hindi pamphlet, *Bhugolsār* (1841).[47] The origin of this text lies in an "interesting experiment" conducted in 1839 by a colonial official, L. Wilkinson. He organized a school for Hindu and Muslim boys who were taught, among other subjects, mathematics and astron-

omy from the body of ancient Sanskrit texts devoted to these subjects and known as *siddhants*. According to him, the latter were "wholly free from the fables of the Poorans" (the Puranas, myths and historical legends collected and compiled between 500 B.C.E. and 500 C.E.), and thus brought the student "just to the point to which the Science of Astronomy had been carried in Europe when Copernicus, Newton, and Galileo, appeared to point out and to establish that the sun and not the earth was the centre of our system."[48] Wilkinson attempted to expose the "absurd ideas, usually prevalent among the Hindoos from the authority of the Poorans," the first effect of which was "to rouse a very keen and general opposition among the Bramins in many parts of India," although opinion ranged from an outright and total defense of the Puranas to acceptance of certain classical Sanskrit texts as scientific.

Bhugolsār was written by Omkar Bhatt, himself a *jyotish* (astronomer), in response to this debate. Comparing Copernican astronomy with systems described in the Puranas and in *Siddhānta Śiromaṇi*, a twelfth-century text written by the astronomer-mathematician, Bhaskaracharya, the text asserts the superiority of Western knowledge through a dialogue between a guru and his disciple:

> *Disciple*: 'Revered guru, how is the earth defined?'
> *Guru*: 'The earth is defined in many ways; the Jains call it an infinite unity; and revered Vyasa in his *Bhāgvat* [one of the Puranas] calls the earth an expanse of 500 million *yojanās* and like a lotus leaf; and Bhaskaracharya calls the earth small and round in his *Siddhānta Śiromaṇi*; the British also judge it to be round.'
> *Disciple*: 'If the earth is one, then why are there so many opinions?'
> *Guru*: 'There are many kinds of men, and everyone speaks as he believes.'
> *Disciple*: 'Which one is true?'
> *Guru*: 'The truth is that the earth is round.'
> *Disciple*: 'What method establishes the truth that the earth is round?'

Guru: 'There are many ways, but the chapter on calculations of the sphere in *Siddhānta Śiromaṇi* establishes it in the following way. . . . If the earth was a mirror, and if the sun went around the earth, then we would have only days, no nights; the fact that this does not happen proves that the earth is round.'[49]

While presenting these different conceptions of the earth, the text declares its commitment to scientific understanding. It does not dismiss the sage Vyasa, but describes the Puranas, which he narrated, as great poetry and wonderful sketches of God's play, though not science. Bhaskaracharya's theory, on the other hand, is scientific not only because it converges with the British view but also because, as the text proceeds to claim, the origin of the *siddhants* goes back to Surya, the sun god, who narrated the *Sūrya Siddhānta* to Mayasur, a Puranic artisan-demon. Bhaskaracharya's *Siddhānta Śiromaṇi* improved on the earlier *siddhants*, correcting their imperfections just as the "Sahibs" further developed and perfected astronomy.[50]

Having identified astronomy as a science, distinct from the poetry of the Puranas, Bhatt proceeds to assert the superiority of Western astronomy by first anticipating a challenge: How could the Sahibs' knowledge be more accurate than the divinely revealed knowledge of *Sūrya Siddhānta*, even though it developed later than Hindu knowledge?

Disciple: 'While Hindu astronomy is ancient, the Sahibs' knowledge is more accurate, even though they acquired it recently and from several different countries; why is this so?'

Guru: 'Because the Sahibs, after observing the entire earth, traveling through and living in every country, have measured their latitude and longitude accurately. Because those who work hard are also right, their knowledge is more accurate. Cotton grows in India, the Sahibs take it across to their own country, weave it into cloth, then sell it in India, garnering everyone's appreciation; and selling more than indigenous cloth. In the same way, the Sahibs have taken knowledge from the Arabs, Greece, and India, and like cotton, they have woven the thread of knowledge gained from these very books into a better fabric of astronomy.'[51]

Colonial exploitation as the model for the progress of science, capitalist colonialism as the accumulation of knowledge—such was the re-presentation of history in discourse. The text identifies the work of empire as the desire for knowledge and improvement that animates the British importation of raw cotton for its textile industry. Staged here is the compulsion to represent the capitalist empire as an expression of the effort to weave "a better fabric of astronomy." To achieve this representation, the text opens colonialism's normalizing myth to questioning and contention. The text does not simply assert the authority of the Sahibs' science, but makes it emerge through the pupil's probing interrogation. How can the Sahibs' science be more accurate? How can it surpass Hindu knowledge? These questions allow the text to portray colonialism as a civilizing force, to depict the Sahibs' "traveling and living in every country" as the culminating stage in the onward progress of knowledge. It patches together a narrative of science's progress that assimilates the astronomy of Bhaskaracharya and the divine speech of Surya in the trajectory of the Sahibs' knowledge.

Assimilating the content of the subordinated's knowledge, however, does not erase the disturbing position given it in discourse; the subordinated, speaking sometimes through the divine speech of the gods and at other times in the archaic voices of ancestors and tradition, exercises a constant pressure on authoritative representations.

Disciple: 'The disrespect of tradition is improper because everyone accepts its testimony, but you violate the brilliant and boundless *Bhāgvat* and some of the *siddhants* to establish new principles, explain why.'

Guru: 'The error of the old and the truth of the new should be acknowledged when that is the case. Revered Bhaskaracharya followed this method too. . . . I have followed his direction, to the best of my understanding, in determining errors; besides,

> because the Hindu Puranic treatises on geography do not deal with proofs and have been written by poets, we should overlook their descriptions and set our sights on demonstrable proofs alone as astronomy recognizes observable demonstration only. . . . [T]he geography of the *Bhāgvat* is mere description, and not all geographical knowledge has been produced by the Hindus. The *siddhants* do not even describe travels south of the equator. . . . The Westerners have seen the entire globe; in 1497, Vasco de Gama Sahib of Portugal discovered the route around the Cape of Good Hope for his journey to India and circled Africa.'[52]

Here, the narrative of progress goes awry. As the text uses the pupil's unrelenting questioning to demonstrate that Hindu traditions cannot equal Western astronomy, it must pose and answer a troubling question: What justifies the violation of "the brilliant and boundless *Bhāgvat*"? This is not asked inadvertently, for the text's clearly visible purpose is to stage a rigged confrontation between indigeneous traditions and Western knowledge. This question is a critical moment that forces the discourse to turn against its progressivist narrative of astronomy and identify knowledge with power. Set to establish Copernican astronomy as a body of science consistent with and surpassing Bhaskaracharya's methods, the discourse ends up representing the superiority of Western knowledge in acts of Western explorations and expansion. It offers the West's navigation of the world south of the equator, its explorations of the globe, Vasco da Gama and Captain Cook's travels, and the British explorations of Africa as signs of Western knowledge and as proof of its superiority over Puranic poetry and cosmologies.[53] In asking its readers to reject poetry for science and Vyasa for Copernicus because Western expansion had proven the accuracy of Copernican science, the text brings Western astronomy face to face with the colonial mode of its universalization. There is something charmingly naive about Bhatt's telling of the tale of Western expansion as the story of astronomy's progress. But the narrative loses its innocence when

it opposes the poetry of the Puranas to the Sahibs' explorations and conquests. Staging the opposition between indigenous fables and alien science reflects the bitter reality that Western knowledge needed Western power to achieve mastery over indigenous traditions. Thus, to the pupil's persistent demand for the reason why Copernicus must supersede Vyasa, the teacher responds by pointing to the West as the victorious civilization, through the feats of its da Gamas and Captain Cooks.

Bhugolsār was not an isolated case. Insofar as the narrative of progress was compelled to identify knowledge and power in seeking to master the colonized, alienation was a general condition of its articulation. This was true even during the early decades of the nineteenth century, when intellectuals of the Bengal renaissance like Rammohun Roy sang the praises of British rule. Roy diagnosed the root of India's afflictions in its social and religious practices and, overlooking colonial oppression, portrayed the institution of British rule as the revival of the era of reason in India.[54] This was no different decades later when Mahendra Lal Sircar condemned the "despotism of traditional opinions"—that is, Hindu beliefs—and lauded British rule for having established liberty and free inquiry.[55] In much the same vein, Gosto Behary Mullick, the secretary of the Burra Bazar Literary Club in 1874, spoke of reviving

> the days of Elphinstones and Malcolms, Thomasons and Metcalfs, of Joneses and Wilsons and Bethunes . . . who came to India not for its rice or cotton, indigo or jute, shell-lac or lac-dye, sugar or salt-petre, but to raise from the depths of ignorance and superstition—fruits of years of foreign [Muslim] domination—a race whose venerable relics of literature and science play fantastically like the dazzling coruscations of a polar winter athwart the mysterious gloom that shrouds the dark night of ages.[56]

Obviously, the small Bengali Muslim elite, gathered in the Mahomedan Literary Society could not share the belief that the "years of foreign domination" had produced "ignorance and

superstition," but it, too, sang praises of British rule and claimed that the "new world of thought" had calmed the minds of the "ignorant and bigoted co-religionists."[57]

These celebrations of British rule were not blind to the colonial divide; but instead of succumbing to it, they restaged the British rule of India as an instrument of new knowledge. Crucial to this restaging was the idea that the truth of science did not depend on power. Father Lafont expressed this idea well in an address to the Burra Bazar Family Literary Club, in which he stated that he had chosen to speak on a scientific topic because "it was the safest topic to be discussed in meetings like this."[58] Science was "safe" because it was thought to be nature's self-evident truth, contained in its working, and, unlike faith, free from power.

Yet to claim, as Mullick did, that "Joneses and Wilsons and Bethunes" had been necessary to raise India from "the depths of ignorance and superstition" was to acknowledge power as the secret dynamic of the narrative of progress. There is something odd in his celebration of modern science as deliverance from despotism, as a sign of free inquiry, for he acknowledges at the same time that freedom resides in domination. This was no self-contradiction, but a deep division in the discourse produced by its functioning. The narrative of progress courted difference in order to demonstrate the necessity of implanting modern knowledge. Thus, Mullick spoke of the depths of ignorance and superstition in India so that he could portray the British Orientalists as savants motivated not by salt-petre but by scientific knowledge. Similarly, Sircar prefaced his plea for the establishment of the IACS by detailing the lapse of the Hindus into speculation and superstition. Science was expected to conquer their false beliefs and institute true knowledge of the laws of nature that would place devotion to the almighty on a new basis. But having normalized difference as superstition, the mocked traditions returned as a menace. Sircar claimed that the very success of science had bred lethargy and complacency, making people indifferent to the methods of science.[59] Condemned to achieve progress and recognition slowly, science faced the overwhelming power of complacency, superstition, and error. How could this error be controlled so that the authority of science could emerge? It is at this point that the discourse's attempt to contain and exclude the difference in which science was authorized ended up alienating the colonial ideal of science as free inquiry. Suddenly, British rule appeared necessary to establish free inquiry and to rescue the people from the depths of ignorance and superstition.

The narrative of progress, therefore, was not safe from the contagion of its colonial articulation. As the very enunciation of the narrative forced the idea of progress to speak in the languages of those sunk in the depths of ignorance and superstition, there emerged, along with the myths of Joneses and Wilsons, another story. Perched beside the heroic tales of Copernicus and the Sahibs' science, there appeared a troubled acknowledgment of the deep-seated incompatibility between modern science's image as free inquiry and its operation as an instrument of colonial domination.

Displacement and Renegotiation

Under colonial conditions, the ideal of science's freedom from power could not escape displacement. On the one hand, science was projected as a universal sign of modernity and progress, unaffected by its historical and cultural locations; on the other hand, science could establish its universality only in its particular history as imperial knowledge. Forced to speak in tongues, the colonial discourse was compelled to authorize the language of science in idioms of cultural and colonial difference. To recognize this division of science's position in the process of its institution is not to celebrate the boundless play of the signifier. Rather, the creation of difference or division, Homi Bhabha suggests, is "the sign of the productivity of colonial power, its shifting forces and fixities"; "the effect of colonial power is seen to be the *production* of hybridization rather than the noisy command of colonialist

authority or the silent repression of native traditions."[60] From this point of view, the hybridization of science's identity in the divine speech of Surya does not stand as the truth that exposes the myth of science's autonomy and originality. Instead, difference and dissemination displace the position from which the authority of science's truth is asserted. The truths of Western astronomy are rendered dependent on and shown to reside in their transferability and transformability. The Sahibs' knowledge becomes one that is "acquired recently and from several countries" and developed from the "knowledge taken from the Arabs, Greece, and India." Western astronomy acquires the status of truth as it travels, changes its shape, loses its origin, and installs itself in its colonializing explorations and exploits.

The dissemination of the narrative of science, then, was a charged event. As it split open and lost its autonomy and originality in the indigenization of its authority, a space opened for the renegotiation of science's status as truth. Such a space emerges in *Bhugolsār*, where the strategy to situate Western astronomy in the context of indigenous traditions demands that the text justify its transgression of traditional authorities. In response, the text cites colonial explorations and conquests as the basis for the West's superior knowledge. This produces a breach in the narration of science as a free accumulation of knowledge, as a matter of the replacement of error with truth. If the truths of Western science were gained in the exercise of Western power, then why should Hindu traditions give way to Copernican astronomy? It is remarkable that the text gives voice to these demands, but this reflects its subtlety as a project of legitimation. Thus the pupil, acknowledging Western power but questioning its cultural claims, asks: "How can you consider Western treatises true and doubt our own?"[61] The text steps into the breach opened by its own question to offer another basis for the cultural preeminence of Western astronomy.

> *Disciple*: 'Revered Guru, explain what are the fruits of instruction in geography and astronomy?'

> *Guru*: 'The knowledge of geography and astronomy offers many benefits in this world as also in the other world. First, let me tell you about its use in this world; it is certain that the Brahmins who study geography and astronomy will command greater respect than other astronomers. As people become aware that astronomy is the best of all knowledges, their doubts will disappear. Deeply held false beliefs—that there exists a country of one-legged people, and that Rahu [the Puranic name for one of the nine planetary deities] devours the moon at the time of the eclipse—will vanish. Now listen to how this knowledge makes God's greatness visible. The understanding of the movement of the sun and other planets, the difference between seasons, the marvellous movement of meteors will reveal God's greatness and help place our hearts at God's feet. This will free us from desire, anger, greed, and illusion, and make the heaven attainable.'[62]

The intrusion of theology into science, or vice versa, remarkable though it may appear today, was neither novel nor unique. Such interpenetrations can also be observed, for example, as early as the twelfth century in European naturalist texts.[63] Remarkable, however, was the mechanism of natural philosophy's expression in the colonial context. On the one hand, natural philosophy licensed *Bhugolsār* to mark the Hindus as people with "false beliefs," who were yet to realize the superiority of astronomy as a form of knowledge, unlike the Europeans who knew this already. On the other hand, the text inscribed the Hindus as people whose capacity to recognize that "astronomy is the best of all knowledges" rendered them fit to see God's greatness. Thus, natural philosophy appeared in discourse neither as a lingering survival of an old idea, nor as the adaptation of science to the cultural heritage of India. Its specific meaning was produced between the mark that stigmatized the Hindus as given to false beliefs and the re-mark that conferred on them the capacity to understand "the marvellous movement of meteors." The text renegotiated science's signification by relocating its cultural force as it spoke of science's "use in this world" and benefits "in the other world."[64]

The authorization of science in its functionality—its "use in this world"—was a manifestation and mechanism of its cultural relocation. This structure comes into view clearly in a lecture delivered to the Bethune Society in 1868 by Reverend K. M. Banerjea. Banerjea was one of the fire-brand followers of Henry Derozio's "Young Bengal" movement. A convert to Christianity, he was one of the most prominent *bhadralok* intellectuals, and wrote and delivered lectures frequently on a subject dear to Bengali intellectuals: the reform of culture. On this occasion, too, he spoke of reform. Inevitably, he turned to science, arguing that it must supplement the instruction in Oriental classics: "the one for introducing, the other for naturalizing the enlightenment of Europe in Asia."[65] Neither was complete in itself. The function of cultures in the discourse of reform emptied them of their purported wholeness and offered another basis for their reformed existence. Thus Occidental knowledge, dispersed as a supplement so that it could be naturalized in India, swiftly acquired the creative power to introduce enlightenment. Likewise, Oriental classics, rendered incomplete without the supplement, became, in a flash, the fecund ground of naturalization.

Such dispersals and reformulations of culture constituted the life of science as a grammar of reform in elite discourse. Thus, two years after Reverend Banerjea's address, the Bethune Society's deliberations at a meeting in 1870 witnessed the same process once again at work. Like many Society meetings, this one included a lecture-demonstration on a scientific subject—on this occasion on respiration. Following the lecture's conclusion, Kali Kumar Das, founder of the Calcutta Phrenological Society, rose to thank the speaker for having shown how the ignorance of common principles of ventilation were ignored in the construction of native houses. However, Das disagreed that respiration was an involuntary act. He cited the practice of yoga to argue that the ancient Hindu devotees of the practice had controlled respiration with their will, and went on to refer to an account published several years earlier of a *fakir* (religious mendicant) who had presented himself at the court of Maharaja Ranjit Singh of Punjab

and had himself buried on one occasion for forty days, and on another for ten months, and was still alive when disinterred.[66]

A somewhat similar expression of science in translation and the transaction of cultures occurred at a meeting of the Burra Bazar Literary Club featuring a lecture-demonstration by Father Lafont on heat, electricity, and magnetism. Ashutosh Dhar, a lawyer, enthused by the lecture as a demonstration of the unity of forces, called for the removal of the distinction between the organic and the inorganic. Father Lafont angrily rejected Dhar's demand that the mind's functioning be attributed to the action of physical forces and chemical reactions: "No amount of phosphorous ever made or will make a single thought; let us be sincerely and frankly spiritualists and rest satisfied with the noble use of *mind* to study and scrutinise *matter*, without confusion of two widely different departments of science."[67]

The call went unheeded. In fact, the confusion of a variety of categories permeated the discourse of the predominantly Hindu elite as they commissioned the cultural force of science to revive Hinduism. In the last decade of the nineteenth century, all over India, there ensued reassessments of the Vedic texts, the Puranas, and various textual commentaries and religious sects, and as this Hindu revivalism gathered force, the crossing of boundaries became increasingly common. Texts like *Bhugolsār* and discussions like the Bethune Society's conversation on yoga and science proliferated. The close of the nineteenth and the beginning of the twentieth centuries witnessed a vast explosion of pamphleteering and organizational activity that assumed and deployed science's authority to achieve a syntactical rearrangement of religion.

Translation and Hindu Modernity

The most striking element in these reshapings of Hinduism was the attempt to produce a rigorously monotheistic vision. This attempt was not new, of course. In the early nineteenth century, Rammohun Roy had declared that monism was the true teaching

of Hinduism and its classical texts. Religious reform in later decades had also invoked the ancient texts to place popular Hindu practices under intense scrutiny. The belief in the worship of multiple deities, the practice of a variety of rituals, the caste system, the status of Puranic myths—all of these had come into question. What was new as the nineteenth century drew to a close, however, was the force of the language of science. Under its influence, earlier formulations of monotheistic Hinduism acquired a new dimension.

Hindu intellectuals across India advanced the idea of a monotheistic Hinduism by asserting a fundamental indivisibility of science and religion. The influence of positivism was palpable here, and positivist philosophers were often cited to legitimate "dispositions" that, according to Hindu intellectuals, Hinduism itself contained.[68] These dispositions were defined increasingly, with citations from Herbert Spencer and Thomas Henry Huxley, as the belief in the oneness of all phenomena and in the existence of one supreme power; just as science had one truth, so did the "essential religion"—but not superstition masquerading as religion.[69] Hinduism as this essential religion, it was argued, did not reside in its symbols and rituals but in its recognition of the laws of nature in which the almighty manifested itself.

The belief in the indivisibility of science and religion pervaded powerful movements of Hindu reform, of which the Arya Samaj was the best known in North India. Established in the 1870s by the charismatic preacher Swami Dayananda Sarasvati, it quickly won a large following among the educated elite in the Punjab for its vision of a pristine Vedic Hinduism, shorn of superstitions.[70] It was premised on the belief that the Vedas contained and were based on the laws of nature, and it summoned the authority of science in advancing its project of reforming Hinduism, eradicating it of superstitious ideas and practices. So widespread was the notion in the milieu of religious reform that Hinduism and science were inextricable that it showed up in the views of even as bitter an opponent of Swami Dayananda and the Arya Samaj as Pandit Shiv Narayan Agnihotri. Himself at first a Brahmo Samaj

activist in the Punjab, Pandit Agnihotri clashed with Dayananda and the Arya Samaj, and eventually established his own organization, called the Dev Samaj, in 1887. The purpose of the Dev Samaj was to propagate a religion named Dev Dharma, defined as a doctrine "in Harmony with Facts and Laws of Nature and based on the Evolution or Dissolution of Man's Life-Power."[71] The Dev Samaj, like the Arya Samaj, advocated radical social reform, but developed a distinctive "science-grounded religion" that combined positivist ideas of the evolution of society and of stages of knowledge with a deep veneration and worship of Pandit Agnihotri.

No movement better illustrates the rediscovery of Hindu monism in the confusion of categories than the Theosophical movement. Theosophy, which became the most prominent vehicle for transmitting the belief in the indivisibility of science and Hinduism in South India, was different in tone and emphasis from the Hindu revivalism of the Arya Samaj. But it too assumed the authenticity of an archaic Hinduism authorized by science. Originating in the spiritualist movement in the United States, Theosophy was developed by Madame Helena Petrovna Blavatsky and Colonel Henry Olcott. It was formulated at the intersection of ancient religions and modern science, containing a heady mix of clairvoyance, mesmerism, and hypnotism. The Theosophists claimed that their doctrine surpassed the understanding offered by modern science and penetrated beyond the material realm to reveal underlying principles and consciousness.[72] Convinced that the origins of their occult science lay in Indian religions, particularly Buddhism and Vedic Hinduism, they brought Theosophy to India in 1878, traveling widely, delivering lectures, receiving great respect and response, and forming alliances with men like Swami Dayananda Sarasvati. In Dayananda's Arya Samaj the Theosophists saw a mission very similar to their own, namely, the reappropriation of ancient religions as a key to a rational and scientific understanding and restructuring of modern societies. However, their plan to incorporate the Arya Samaj into the Theosophical movement did not succeed because Dayananda re-

sisted and denounced their pluralism. Nonetheless, Theosophy began to gather impressive support after 1882, when Madame Blavatsky and Colonel Olcott turned their Adyar estate in Madras into the headquarters of their movement.[73]

From the Adyar estate, Blavatsky edited the periodical *The Theosophist*, in which she presented the turn to the Vedas as the return of modern science to its ancient roots. Or, as she wrote in one article, whatever explanations and hypotheses scientists may offer, "modern phenomena are fast *cycling* back for their true explanation, to the archaic *Vedas*, and other 'Sacred Books of the East.'"[74] While Blavatsky concentrated on developing the philosophical doctrine, Olcott worked as a tireless organizer, promoter, and practitioner of occultism. Traveling extensively in India and Ceylon, Olcott campaigned relentlessly for the Theosophist combination of ancient wisdom and scientism, and practiced mesmerism to cure patients suffering from such ailments as facial paralysis, glaucoma, deafness, and hysteria.[75] Olcott's tour of South India in 1883 to establish branches of the Theosophical Society was successful beyond his expectations. He was received by huge crowds, carried in open palanquins in torch-lit processions led by temple elephants, bell-bearing camels, and bands of musicians, and he addressed packed audiences in town halls and temples.[76] "I knew perfectly well that not one man in perhaps a dozen there could understand English or really know anything more about me than the fact that I was a friend and defender of their religion, and had a way of curing the sick that people called miraculous."[77] Theosophy's defense of Hinduism against missionary attacks added force to and also drew strength from the movement for Hindu renewal championed by the educated elite. As the Theosophists promoted Vedic authority and Sanskritic knowledge, they both expressed and advanced the elite's move from religious skepticism and suspicion of inherited cultural practices to a critical revival of Hindu religion and culture.[78]

The Tamil Brahmin and high-caste non-Brahmin elites who found themselves caught between the languages of science, positivism, and Vedic philosophy were drawn to Theosophy. Appre-

ciative of Hinduism's Western champions, they flocked to meetings and discussions conducted by Olcott and, after 1892 by Annie Besant. Thus began the enduring alliance between Theosophy and the "Mylapore elite" of Madras that proved to be of crucial importance in the 1910s when Annie Besant turned the regional branches of the Society into instruments of nationalist mobilization.[79] These branches had been formed in the 1880s and the 1890s when Olcott's tours sparked a great deal of interest in Theosophy among the small-town elite intellectuals.

N. K. Ramaswami Aiya was one such Brahmin intellectual. His autobiography offers a rich portrait of the discursive milieu in which Theosophy was thrust and prospered.[80] Aiya came from a deeply religious family; his grandfather was a *sannyasin*, a Hindu ascetic, and his uncle was a follower of Vedanta the philosophy based on the metaphysical portion at the end of the Vedas and Yoga philosophy. Growing up in Tanjore where his father was a deputy collector, Aiya was first attracted to Vedanta and the views of the eighth-century Hindu philosopher, Shankara, and then to Herbert Spencer, whose writings he read in college. In 1886, the year of his graduation from college, he "gave up religion and accepted Herbert Spencer's monism."[81] Later, he read Charles Bradlaugh and Annie Besant, and published his first philosophical work, *Multum in Parvo*,[82] in which he "attacked Religion and advocated Monism." In 1896 he began publishing a journal, *The Awakener of India*, to advocate Spencer's monism and refute Theosophy and Vedanta.[83] A chance meeting with Swami Vivekananda in 1897 convinced him that Vedanta and Theosophy accepted scientific monism, prompting him to reorient his journal. He began to study Vedanta and Theosophy, but this did not deter him from attacking Theosophy when he attended a discussion chaired by Colonel Olcott in Chittoor in 1898.[84] In 1903, at last thoroughly convinced that Vedanta and Theosophy were scientific, he joined the Theosophical Society. He continued to lecture and write on science and religion,[85] and continued to have mystical experiences that had begun in his youth; only now not only Shankara but also Masters M and K (the spiritual mahatmas who,

according to Theosophical legend, lived in Tibet) also appeared in his dreams.[86]

Aiya's frenetic movement between different bodies of thought and his mystical experiences make him a rather special case—indeed so special that the Theosophist leaders asked him to pen his experiences in an autobiography. But the volatility of his shifts and movements should not distract us from recognizing the combination of science and religion that characterized the Hindu revival extending from the Punjab to Madras. Powerful social movements and prominent reformists like the Arya Samaj Swami Dayananda as well as little-known intellectuals like Ramaswami Aiya blended positivism, classical Hindu texts, and modern science to authenticate a monotheistic Hinduism.

The significance of monism in the Hindu revival was that it permitted the discourse of reform to invade every area of thought and practice. The belief in the indivisibility of science and religion, formed in the confusion of knowledges and linking the condition of the human soul to the moral state of the social body, authorized an invasive program of reform. Swami Dayananda's program, for example, ranged from the elimination of idolatry to the eradication of the influence of astrology in the daily lives of the Hindus.[87] Pandit Guru Datta Vidyarthi, a leader of the militant wing of the Arya Samaj in the 1880s, prepared the philosophical ground for the program of total reform by offering a "scientific" explanation for a "central conscious being" called the *atman,* or the human spirit.[88] Such a scientific explanation then enabled him to offer "expanded intellect, and not prayer," as the cure for the afflictions in the "inner life."[89]

Arguments upholding natural laws and physiology as the basis for the understanding of mental phenomena and religious life had become quite common in the elite discourse.[90] In fact, even Mahendra Lal Sircar, no religious reformer himself, had argued in 1869, citing phrenological science, that physiology could place morality and religion on "stabler foundations."[91] About three decades later, the renowned physicist and hero of the Bengali *bhadralok*, J.C. Bose, addressing a literary conference, argued for the

unity of knowledge. Stating that while the West was known to compartmentalize knowledge, the "Eastern aim has been the opposite, namely that in the multiplicity of phenomena, we never miss their underlying unity.[92]

The insistence on the unity of forces and the oneness of phenomena had a powerful effect when deployed in the realm of religion. And because this view enabled a critique of a variety of existing religious and social customs in the name of science, the orthodox reaction was also compelled to invoke science. Thus, U. P. Krishnamachari, who represented himself as a proponent of "Aryan orthodoxy" and published a fortnightly journal called *The Orthodox Dynamo*, delivered a series of fourteen lectures published as *The Tribunal of Science Over Reformation Vs. Orthodoxy*.[93] He reviewed the charges that orthodoxy created disunity through the caste system, produced moral decay by telling obscene Puranic stories, promoted physical and moral degeneration by enjoining early marriage, and was responsible for intellectual decline by breeding superstition and idolatry. He cited Darwin, Spencer, Malthus, Adam Smith, Max Müller, and Huxley, among others, as authorities whose opinions supported his refutation of the reformist charges.[94] His text ended with a "Judgement of the Tribunal of Science" that acquitted orthodoxy of all charges. Orthodox Hindu practices were adjudged beneficial, practical, and in conformity with scientific laws.[95]

It was in these confusions of categories that the elites conducted the debate over the reform of Hinduism. Their transgressions of cultural borderlines empowered them to forge an invasive discourse. Both reformers and the defenders of orthodoxy required Hinduism to accommodate the laws of nature, and both placed the Hindu soul and Hindu practices at the service of modern science. If this colonized the indigenous culture, then it must also be admitted that colonization required the renegotiation of knowledge and power. The authority of science as a sign of Western power was lost as it was compelled to explain the Hindu atman. The signification of science as a sign of modernity was renegotiated as it was articulated with the archaic, the other. Fa-

ther Lafont recoiled in horror as he recognized the loss of science's Western provenance to the other—to the Muslim *fakir* and the Hindu yogi, to willed respiration and the unity of phosphorus and human thought. The science that resulted—indigenized, renegotiated, translated—appeared to Lafont as the production of an alien, grotesque difference. Confusion expressed and normalized the fear caused by the breach of cultural boundaries. Yet, it was precisely in such boundary-crossings that the discourse of science achieved its enduring insertion into the elite culture.

Cultural Transformation on the Borders

Towards the end of the nineteenth century a debate broke out among the Western-educated elite over the adoption of European habits and ideas by Indian young men. Many felt that the educated youth were following European fashions blindly. They had taken to tea and coffee, for example, with a zest that disregarded the ill effects of these beverages in the hot Indian climate. The *Calcutta Monthly*, a journal of the Mohammedan Sporting Club, published an article in 1896 criticizing the imitation of European practices:

> Now a word or two about the hard and fast rules which our ancestors (I mean the hardy Arabs and the primitive Aryans) observed. . . . Plain living and high thinking was their motto. . . . Our ancestors discarded all luxury and artificiality. The great benefit they derived by never drinking anything but water and milk cannot be estimated by the unthinking and the sceptic. It is only when one takes into account the prostrating influence of the *sherbet* (which produces languor and lassitude), the unnatural stimulating effect of tea and coffee and the various diseases brought on by intoxicating liquids (especially in a hot country like India), that the great scientific value of never drinking anything but water and milk becomes obvious.

> Again, take for example, the habit of our ancestors of wearing nothing but white apparel. . . . Of course, if you asked them why they did so, they would reply that because our ancestors did so, or because coloured clothes look childish. But look at the thing from a scientific point of view. White coloured substances reflect all radiant light and heat. Cotton is a bad conductor of heat. Such clothing is scientifically the best for both winter and summer.[96]

Evident here is a shift in perspective that discovers a modern scientific point of view secreted in the ancient faith of "hardy Arabs and the primitive Aryans." This shift away from traditional arguments to support cultural practices registers the extent of the distribution of science's authority: even the ancestral practice of drinking nothing but milk and water is now justified by its scientific value and the contemporary habit of consuming tea and coffee is criticized for its unnatural stimulating effect. But also registered is another subtle move: the legitimation of modern science in the startling language of ancestral reason and in discrete strategies to reform daily habits.

Encapsulated here is both the story of the powerful colonial transformation of the elite and an account of the elite's emergence as a force that called into question the terms of colonial dominance. It would be a mistake to characterize science's divided, hybrid authorization as a story of the cultural adaptation of Western knowledge to Indian conditions. "Adaptation" does not capture the contention and contingency of "translation"; it fails to recognize the renegotiation of knowledge and power forced upon Western science because its hegemony could not be established through imposition. To achieve hegemony, science was compelled to disavow dominance; it had to implode prior conceptions of Western and Indian identities and express itself in the media of the Hindu atman. What was remarkable in this process was not the strange content of the science of respiration that emanated from the breath of the buried *fakir*, but the estranged position from which the authority of modern knowledge was enunciated.

Hybridity refers to the implosion of identities, to the dispersal of their cultural wholeness into liminality and undecidability. Such a notion of a hybrid, non-originary mode of authority is profoundly agonistic and must be distinguished from the concept and celebration of hybridity as cultural syncretism, mixture, and pluralism. Hybridity, in the sense in which I have used it in this chapter, refers to the undoing of dominance that is entailed in dominance's very establishment. It highlights cracks and fissures as necessary features of the image of authority and identifies them as effects of the disturbance in the discourse that the "native" causes. Recall, for instance, Mahendra Lal Sircar's dispersal of Western science's identity as free inquiry when he defined colonial despotism as its enabling condition. Recollect also Father Lafont's recognition of the loss of science's safety to the contagion of confusion. Such dispersals and confusions formed the ground upon which the Western-educated elite wrenched free the science of Bhaskaracharya from the fable of the Puranas, spliced it with the Sahib's knowledge, and lauded its "use in this world" and benefits "in the other world." This was no free-floating hybridization, for what it renegotiated was power, what it advanced was the claim of the elite as a modern representative of indigenous traditions. Hybridization and translation addressed the relationship between languages and subjects positioned unequally.

To situate science in the language of the other was to hybridize its authority, to displace its functioning as a sign of colonial power. Hybridization, therefore, served as a counter-hegemonic ground upon which the elite pressed their entitlement to modernity even as they misrecognized their aspirations for power as imitation and loyalism. Late-nineteenth-century gatherings of Europeans and the *bhadralok* intellectuals in Calcutta may have been heavy with the air of gratitude and loyalty to British rule, but smoldering underneath it was the explosive cross-hatching of mind with matter, Vedanta with positivism. For, to locate the origin of reason centuries before the Enlightenment in Vedantic monism was to question Western claims. This was precisely what

the elite did as they realigned contradictory representations to produce a grammar of reform that penetrated the depths of their culture. By the turn of this century, fields ranging from literature to religion were opened to science's functioning as a project for a syntactical rearrangement of culture. Shaped by these changes, the elite came to occupy the center stage of colonial India. Though limited in size and circumscribed by their use of exclusive linguistic mediums (including English) and by their reliance on the printed word, the elite stood as a counter-hegemonic force. Themselves a product of the translation that gave them agency and intelligibility as subjects, the elite gave ideological direction and force to the emergence of an Indian modernity, and defined it in a predominantly Hindu and Sanskritic idiom. It was thus that the elite staked their claim to represent subaltern forms of culture and staged themselves as a force that would guide India's march to modernity.

M. K. GANDHI

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Hind Swaraj

and other writings

edited by

ANTHONY J. PAREL

University of Calgary, Canada

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Indian Home Rule

[or Hind Swaraj]

*

by

M. K. Gandhi

Being a Translation of '*Hind Swaraj*'
(Indian Home Rule), published in the
Gujarati columns of *Indian Opinion*,
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APPENDICES

Preface to the English translation

It is not without hesitation that the translation of 'Hind Swaraj' is submitted to the public. A European friend[1] with whom I discussed the contents, wanted to see a translation of it and, during our spare moments, I hurriedly dictated and he took it down. It is not a literal translation but it is a faithful rendering of the original. Several English friends have read it, and whilst opinions were being invited as to the advisability of publishing the work, news was received that the original was seized in India.[2] This information hastened the decision to publish the translation without a moment's delay. My fellow-workers at the International Printing Press shared my view and, by working overtime – a labour of love – they have enabled me to place the translation before the public in an

1 Hermann Kallenbach, Gandhi's close friend and donor of the Tolstoy Farm.

2 On 10 March 1910 *Hind Swaraj* (*HS*) was intercepted at Bombay and placed in the hands of the Gujarati interpreter of Madras High Court. On 15 March he submitted a 21-page typed résumé of the book to Sir H. A. Stuart, Secretary of the Home Department. 'I have given sufficient matter to form an opinion whether it is seditious or not', wrote the interpreter. 'Nowhere the author of the book advocates revolt or the use of physical force against the British Government in India. But he openly advocates passive resistance to subvert British supremacy. He advises all people not to cooperate with Government. If this idea takes hold of the mind of young inexperienced men, it might lead to systematic strikes among Government servants of various classes, as well as Public Works such as Railway, Post, Telegraph, etc. Surely a very dangerous thought to the safety of Government. The sooner it is suppressed the better.' On the basis of this recommendation, on 24 March 1910 the Governments of India, Bombay, Madras and Bengal banned the book. For the full text of the report, see Parel (1993, 240–54).

unexpectedly short time. The work is being given to the public at what is practically cost-price. But, without the financial assistance of the many Indians who promised to buy copies for themselves and for distribution, it might never have seen the light of day.

I am quite aware of the many imperfections in the original. The English rendering, besides sharing these, must naturally exaggerate them, owing to my inability to convey the exact meaning of the original. Some of the friends who have read the translation have objected that the subject matter has been dealt with in the form of a dialogue. I have no answer to offer to this objection except that the Gujarati language readily lends itself to such treatment and that it is considered the best method of treating difficult subjects. Had I written for English readers in the first instance, the subject would have been handled in a different manner. Moreover, the dialogue, as it has been given, actually took place between several friends,[3] mostly readers of *Indian Opinion*, and myself.

Whilst the views expressed in 'Hind Swaraj' are held by me, I have but endeavoured humbly to follow Tolstoy, Ruskin, Thoreau, Emerson and other writers, besides the masters of Indian philosophy.[4] Tolstoy has been one of my teachers for a number of years. Those who want to see a corroboration of the views submitted in the following chapters, will find it in the works of the above named masters. For ready reference, some of the books are mentioned in the Appendices.

3 These include Dr Pranjivan Mehta (*CW* 71: 238), Shyamji Krishnavarma (*CW* 6: 28, 40, 73, 83–4) and V. D. Savarkar (*CW* 32: 102).

4 'the masters of Indian philosophy': during his first jail term in South Africa (January 1908) Gandhi read Manilal Nabhubhai Dwivedi's *Rajayoga, Commentary on the Gita*. (Dwivedi attended the 1893 World Parliament of Religions, held at Chicago; the other to attend was Swami Vivekananda). During his second incarceration (October–December 1908) he read the *Bhagavad Gita* 'almost every day;' and during the third term (February–May 1909), the *Gita, Veda-Shabda-Sangana*, the *Upanishads, Manusmriti, Ramayana, Patanjal-Yoga-Darshan, Ahnika-Prakasha*, and Rajchand's *Sandhya-ni Gutika*. ('I memorised a portion of his [Rajchand's] writings and of the book on *Sandhya*. I would repeat them over and over again in my mind whenever I happened to wake up at night, and every morning I spent half an hour meditating on them' *CW* 9: 241–2).

Had I not known that there was a danger of methods of violence becoming popular, even in South Africa, had I not been called upon by hundreds of my countrymen, and not a few English friends, to express my opinion on the Nationalist movement in India, I would even have refrained, for the sake of the struggle, from reducing my views to writing. But, occupying the position I do, it would have been cowardice on my part to postpone publication under the circumstances just referred to.

M. K. Gandhi

Johannesburg
March 20th, 1910

Foreword

I have written some chapters on the subject of Indian Home Rule which I venture to place before the readers of *Indian Opinion*. I have written because I could not restrain myself.[5] I have read much,[6] I have pondered much, during the stay, for four months in London of the Transvaal Indian deputation.[7] I discussed things with as many of my countrymen as I could. I met, too, as many Englishmen as it was possible for me to meet. I consider it my duty now to place before the readers of *Indian Opinion* the

5 'I could not restrain myself': an indication of the inner intensity that prompted Gandhi to write *HS*. Writing to Henry Polak a few weeks before the writing of *HS*, Gandhi confessed how certain ideas were 'brewing in my mind' and how they 'had taken a violent possession of me' (*CW* 9: 478, 481; see also *CW* 32: 489).

6 During his first prison term (January 1908), Gandhi read or re-read the Bible, the Koran, Thomas Huxley's lectures, Carlyle's biographies of Burns, Johnson and Scott, Bacon's essays on civil and moral counsel, and the writings of Tolstoy, Ruskin and Plato (*CW* 8: 159). During his second prison term (October–December 1908) he read or re-read 'two books by the great Ruskin, the essays of the great Thoreau, some portions of the *Bible*, the life of Garibaldi (in Gujarati), essays of Lord Bacon' (*CW* 9: 181–2). During his third prison term (February–May 1909) he read or re-read Tolstoy, Emerson, Carlyle's *French Revolution*, Mazzini and portions of the Bible (*CW* 9: 208, 241); for a survey of Gandhi's readings after 1909, see Iyer (1986–7, 1, 66–198).

7 'The Transvaal Indian deputation': in the summer of 1909 the British Parliament was debating a draft bill for the creation of the Union of South Africa. To lobby for their interests, the Transvaal Asians sent a deputation consisting of Hajee Habib and Gandhi to London. The deputation spent four disappointing months (July–November 1909) in London, and returned empty-handed (*CW* 9: 288–301; Hunt 1978, 105–42).

conclusions, which appear to me to be final. The Gujarati subscribers of *Indian Opinion* number about 800. I am aware that, for every subscriber, there are at least ten persons who read the paper with zest. Those who cannot read Gujarati have the paper read to them. Such persons have often questioned me about the condition of India. Similar questions were addressed to me in London. I felt, therefore, that it might not be improper for me to ventilate publicly the views expressed by me in private.

These views are mine, and yet not mine. They are mine because I hope to act according to them. They are almost a part of my being. But, yet, they are not mine, because I lay no claim to originality. They have been formed after reading several books. That which I dimly felt received support[8] from these books.

The views I venture to place before the reader are, needless to say, held by many Indians not touched by what is known as civilisation, but I ask the reader to believe me when I tell him that they are also held by

8 A key to the interpretation of the influence of other thinkers on Gandhi. According to George Woodcock, 'Even the influence of Tolstoy and Ruskin can be exaggerated, and Gandhi himself was inclined to do so, partly from a principle of humility that made him reluctant to accept all the credit for his achievements' (Woodcock 1972, 25–6). Of the influences of the Buddha and Buddhism, Mahavira and Jainism, and Christ and Christianity on Gandhi, K. G. Mashruwala, one of his close associates, declared that, of the three, Buddha and Buddhism exerted relatively little influence on Gandhi; as for Mahavira and Jainism, he was attracted more to their doctrine of the many-sidedness of truth (*syadvada*), than to their theory of non-violence; by contrast, Christ and Christianity exerted a relatively strong influence on him. He recognised that there was a 'great difference between Christ's active non-violence coupled with humanitarian service and the retiring, inactive non-violence of Jainism and Buddhism'. The latter two religions did not have a concept of God, which presented him with a theoretical problem in dealing with his Buddhist and Jain friends. According to Mashruwala,

> Bapu [Gandhi] was often heckled about this. It led to Bapu's particular interpretation of the term God, by the proposition 'Truth is God' instead of such others as 'God is Truth' or 'God is Love', etc. He thereby sought to make God acceptable not only to Jains and Buddhists but also to Marxists. (Mashruwala 1983, 126–7)

thousands of Europeans.[9] Those who wish to dive deep, and have time, may read certain books themselves. If time permits me, I hope to translate portions of such books for the benefit of the readers of *Indian Opinion*.

If the readers of *Indian Opinion* and others who may see the following chapters will pass their criticism on to me, I shall feel obliged to them.

The only motive is to serve my country, to find out the Truth, and to follow it. If, therefore, my views are proved to be wrong, I shall have no hesitation in rejecting them. If they are proved to be right, I would naturally wish, for the sake of the Motherland, that others should adopt them.

To make it easy reading, the chapters are written in the form of a dialogue between the reader and the editor.

M. K. Gandhi
Kildonan Castle
November 22nd, 1909

9 An indication of the fact that Gandhi's criticism of modern Western civilisation is not inspired by any Indocentric animus.

CHAPTER VI

*

Civilisation

READER: Now you will have to explain what you mean by civilisation.[48]

EDITOR: It is not a question of what I mean. Several English writers refuse to call that civilisation which passes under that name. Many books have been written upon that subject. Societies[49] have been formed to cure the nation of the evils of civilisation. A great English writer[50] has written a work called 'Civilization: its Cause and Cure.' Therein he has called it a disease.

48 The Gujarati text adds: 'According to you, [modern] civilisation [*sudharo*] is not civilisation, but barbarism [*kudharo*].' The *sudharo/kudharo* dichotomy adds colour to the Gujarati text.

49 In 1906 Gandhi made contacts with officials of the Union of Ethical Societies in London. It had then fourteen member societies in London, and nine elsewhere in England. Henry Polak and his wife Millie Graham were members of the South Place Ethical Society. Miss Florence Winterbottom, who helped Gandhi with his lobbying in London, was the Secretary of the Union of Ethical Societies (Hunt 1986, 8–10). On his 1909 visit to London Gandhi gave a lecture to the Union of Ethical Societies at the Emerson Club (*CW* 9: 473–4, 475–6). On the same visit he also visited an ex-Tolstoyan Colony at Whiteway, near Stroud (ibid., 369). Gandhi was also familiar with the activities of 'New Crusade Society', a society based on the social teachings of John Ruskin, propagating the values of country life, agriculture, handicrafts, homespun clothes, and opposing the 'increasing dependence on machinery' and 'competitive mechanical production'. The moving spirit behind this society was Godfrey Blount, author of *A New Crusade: An Appeal* (1903). This book is listed in the Appendix to *HS*. A brief summary of its activities was also published in *Indian Opinion* (1905).

50 Edward Carpenter.

READER: Why do we not know this generally?

EDITOR: The answer is very simple. We rarely find people arguing against themselves. Those who are intoxicated by modern civilisation are not likely to write against it. Their care will be to find out facts and arguments in support of it, and this they do unconsciously, believing it to be true. A man, whilst he is dreaming, believes in his dream; he is undeceived only when he is awakened from his sleep. A man labouring under the bane of civilisation is like a dreaming man. What we usually read are the works of defenders of modern civilisation, which undoubtedly claims among its votaries very brilliant and even some very good men. Their writings hypnotise us. And so, one by one, we are drawn into the vortex.

READER: This seems to be very plausible. Now will you tell me something of what you have read and thought of this civilisation?

EDITOR: Let us first consider what state of things is described by the word 'civilisation'.[51] Its true test lies in the fact that people living in it make bodily welfare the object of life. We will take some examples. The people of Europe today live in better built houses than they did a hundred years ago. This is considered an emblem of civilisation, and this is also a matter to promote bodily happiness. Formerly, they wore skins, and used as their weapons spears. Now, they wear long trousers, and, for embellishing their bodies, they wear a variety of clothing, and, instead of spears, they carry with them revolvers containing five or more chambers. If people of a certain country, who have hitherto not been in the habit of wearing much clothing, boots, etc., adopt European clothing, they are supposed to have become civilised out of savagery. Formerly, in Europe, people ploughed their lands mainly by manual labour. Now, one man can plough a vast tract by means of steam-engines, and can thus amass great wealth. This is called a sign of civilisation. Formerly, the fewest men wrote

51 'Civilisation': what is meant here is the civilisation produced by the industrial revolution. 'Let it be remembered that Western civilisation is only a hundred years old, or to be more precise fifty. Within this short span the Western people appear to have been reduced to a state of cultural anarchy. We pray that India may never be reduced to the same state as Europe' (*CW* 8: 374).

books that were most valuable. Now, anybody writes and prints anything he likes and poisons people's mind. Formerly, men travelled in wagons; now they fly through the air in trains at the rate of four hundred and more miles per day. This is considered the height of civilisation. It has been stated that, as men progress, they shall be able to travel in airships and reach any part of the world in a few hours. Men will not need the use of their hands and feet. They will press a button and they will have their clothing by their side. They will press another button and they will have their newspaper. A third, and a motorcar will be in waiting for them. They will have a variety of delicately dished-up food. Everything will be done by machinery. Formerly, when people wanted to fight with one another, they measured between them their bodily strength; now it is possible to take away thousands of lives by one man working behind a gun from a hill. This is civilisation. Formerly, men worked in the open air only so much as they liked. Now, thousands of workmen meet together and for the sake of maintenance work in factories or mines. Their condition is worse than that of beasts. They are obliged to work, at the risk of their lives, at most dangerous occupations, for the sake of millionaires. Formerly, men were made slaves under physical compulsion, now[52] they are enslaved by temptation of money and of the luxuries that money can buy. There are now diseases of which people never dreamt before, and an army of doctors is engaged in finding out their cures, and so hospitals have increased. This is a test of civilisation. Formerly, special messengers were required and much expense was incurred in order to send letters; today, anyone can abuse his fellow by means of a letter for one penny. True, at the same cost, one can send one's thanks also. Formerly, people had two or three meals consisting of homemade bread and vegetables; now, they require something to eat every two hours, so that they have hardly leisure for anything else. What more need I say? All this you can ascertain from several authoritative books. These are all true tests of

52 Tolstoy's *The Slavery of Our Times,* and Taylor's *White Slaves of England* (both listed in the Appendix to *HS*) speak of the 'slavery' created by the new industrial civilisation.

civilisation. And, if anyone speaks to the contrary, know that he is ignorant. This civilisation takes note neither of morality nor of religion.[53] Its votaries calmly state that their business is not to teach religion. Some even consider it to be a superstitious growth. Others put on the cloak of religion, and prate about morality. But, after twenty years' experience, I have come to the conclusion that immorality is often taught in the name of morality. Even a child can understand that in all I have described above there can be no inducement to morality. Civilisation seeks to increase bodily comforts, and it fails miserably even in doing so.

This civilisation is irreligion,[54] and it has taken such a hold on the people in Europe that those who are in it appear to be half mad. They lack real physical strength or courage. They keep up their energy by intoxication. They can hardly be happy in solitude. Women, who should be the queens of households, wander in the streets, or they slave away in factories. For the sake of a pittance, half a million women in England alone are labouring under trying circumstances in factories or similar institutions. This awful fact is one of the causes of the daily growing suffragette movement.[55]

This civilisation is such that one has only to be patient and it will be self-destroyed. According to the teaching of Mahomed this would be considered a Satanic civilisation. Hinduism calls it the Black Age.[56] I

53 'neither of morality nor of religion': morality = *niti*; religion = *dharma*.

54 'irreligion': *adharma*, contrary to dharma.

55 During his 1906 and 1909 visits to London Gandhi established direct contact with the British suffragette movement. *Indian Opinion* carried reports on the arrests of Miss Cobden and Emmeline Pankhurst; while he was very sympathetic to their cause he disapproved of their violent tactics – the attack on the residence of Asquith, disruption of meetings addressed by Balfour and Winston Churchill, harassment of prison officials, hunger strike in jail, destruction of prison property, etc. (*CW* 9: 303, 324–5).

56 'the Black Age': *kali juga*. According to Hindu mythology the cycle of time is divided into *kalpa*, *mahayuga* and *yuga*. The four yugas – *krita*, *treta*, *dvapara*, and *kali* – constitute one *mahayuga* (supposedly 4,320,000 years); and 1,000 mahajugas constitute one *kalpa*. At the end of each *kalpa* the cycle starts again. Humankind at present lives in the *kali yuga*, the worst segment in the entire cycle of time. It is supposed to have started in 3102 BC and is supposed to last a

cannot give you an adequate conception of it. It is eating into the vitals of the English nation.[57] It must be shunned.[58] Parliaments are really emblems of slavery. If you will sufficiently think over this, you will entertain the same opinion, and cease to blame the English. They rather deserve our sympathy. They are a shrewd nation and I, therefore, believe that they will cast off the evil. They are enterprising and industrious, and their mode of thought is not inherently immoral. Neither are they bad at heart. I, therefore, respect them. Civilisation is not an incurable disease,[59] but it should never be forgotten that the English people are at present afflicted by it.

total of 432,000 years. During the *kali yuga* the sway of dharma is the weakest, compared to the other three yugas, and humans are normally led by violence and egoism (Zimmer 1963, 13–19).

57 The Gujarati text adds: 'This civilisation is destructive, and it is itself bound to perish.'

58 The Gujarati text adds: 'That is why the British Parliament and other parliaments are ineffective against this civilisation.'

59 'Civilisation is not an incurable disease': the Gujarati text reads, 'For them [the British] this civilisation is not an incurable disease.' The metaphor of disease occurs again in chs. VII and IX.

CHAPTER VIII

*

The condition of India

READER: I now understand why the English hold India. I should like to know your views about the condition of our country.

EDITOR: It is a sad condition. In thinking of it, my eyes water and my throat gets parched. I have grave doubts whether I shall be able sufficiently to explain what is in my heart. It is my deliberate opinion that India is being ground down not under the English heel but under that of modern civilisation. It is groaning under the monster's terrible weight. There is yet time to escape it, but every day makes it more and more difficult. Religion is dear to me, and my first complaint is that India is becoming irreligious.[64] Here I am not thinking of the Hindu, the Mahomedan, or the Zoroastrian religion, but of that religion which underlies all religions.[65] We are turning away from God.

READER: How so?

EDITOR: There is a charge laid against us that we are a lazy people, and that the Europeans are industrious and enterprising. We have accepted the charge and we, therefore, wish to change our condition. Hinduism, Islamism, Zoroastrianism, Christianity and all other religions teach that we should remain passive about worldly pursuits and active about godly pursuits, that we should set a limit to our worldly ambition, and that our

64 'irreligious': *dharma-bhrasht*, a people without dharma.

65 '... religion which underlies all religions': a very important concept in Gandhi's political philosophy. Throughout *HS* religion is understood in two different senses: as sect or organised religion, and as ethic, albeit one grounded in some metaphysic.

religious ambition should be illimitable. Our activity should be directed into the latter channel.

READER: You seem to be encouraging religious charlatanism. Many a cheat has by talking in a similar strain led the people astray.

EDITOR: You are bringing an unlawful charge against religion. Humbug there undoubtedly is about all religions. Where there is light, there is also shadow. I am prepared to maintain that humbugs in worldly matters are far worse than the humbugs in religion. The humbug of civilisation[66] that I endeavour to show to you is not to be found in religion.

READER: How can you say that? In the name of religion Hindus and Mahomedans fought against one another. For the same cause Christians fought Christians. Thousands of innocent men have been murdered, thousands have been burned and tortured in its name. Surely, this is much worse than any civilisation.

EDITOR: I certainly submit that the above hardships are far more bearable than those of civilisation. Everybody understands that the cruelties you have named are not part of religion, although they have been practised in its name; therefore, there is no aftermath to these cruelties. They will always happen so long as there are to be found ignorant and credulous people. But there is no end to the victims destroyed in the fire of civilisation. Its deadly effect is that people come under its scorching flames believing it to be all good. They become utterly irreligious and, in reality, derive little advantage from the world. Civilisation is like a mouse gnawing while it is soothing us. When its full effect is realised, we will see that religious superstition is harmless compared to that of modern civilisation.[67] I am not pleading for a continuance of religious superstitions. We will certainly fight them tooth

66 Gandhi takes the offensive now: today the real humbug is the modern *secular* culture.

67 Gandhi is responding to the nineteenth-century rationalist/secularist prejudice that religion promotes superstition; modernity is the superstition of the secularists.

and nail, but we can never do so by disregarding religion. We can only do so by appreciating and conserving the latter.

READER: Then you will contend that the *Pax Britannica* is a useless encumbrance?

EDITOR: You may see peace if you like; I see none.[68]

READER: You make light of the terror that the Thugs, the Pindaris, the Bhils were to the country.[69]

EDITOR: If you will give the matter some thought, you will see that the terror was by no means such a mighty thing. If it had been a very substantial thing, the other people would have died away before the English advent. Moreover, the present peace is only nominal, for by it we have become emasculated and cowardly. We are not to assume that the English have changed the nature of the Pindaris and the Bhils. It is, therefore, better to suffer the Pindari peril than that someone else should protect us from it, and thus render us effeminate. I should prefer to be killed by the arrow of a Bhil than to seek unmanly protection. India without such protection was an India full of valour. Macaulay betrayed gross ignorance when he libelled Indians as being practically cowards. They never merited the charge. Cowards living in a country inhabited by hardy mountaineers, infested by wolves and tigers must surely find an early grave. Have you ever visited our fields? I assure you that our

68 Gandhi here challenges the arguments of Utilitarians such as Fitzjames Stephen that *Pax Britannica* was an unmixed blessing for India (see Stephen 1883, 541–68).

69 'the Thugs': gangs of murderers inhabiting parts of Central India who made their living by plundering and murdering travellers. They practised a corrupt mixture of Islam and Hinduism, their principal deities being Devi, Bhavani, Durga and Kali. They were suppressed by the British between 1830 and 1850.
'the Pindaris': a professional class of free-booters, inhabiting parts of Central India. Good horsemen, they made their living by looting the cattle and property of their victims; what they could not carry, they burned and destroyed. Like the Thugs,they too practised a corrupt mixture of Islam and Hinduism; suppressed by the British in the first half of the nineteenth century.
'the Bhils': an aboriginal tribe, found mostly in Gujarat and Rajasthan, numbering about 600,000 at the turn of the twentieth century. Their religious practices were borrowed from primitive nature worship and certain forms of popular Hinduism.

agriculturists sleep fearlessly on their farms even today, and the English, you and I, would hesitate to sleep where they sleep. Strength lies in absence of fear, not in the quantity of flesh and muscle we may have on our bodies. Moreover, I must remind you who desire Home Rule that, after all, the Bhils, the Pindaris, the Assamese[70] and the Thugs are our own countrymen. To conquer them[71] is your and my work. So long as we fear our own brethren, we are unfit to reach the goal.

70 In 1921 Gandhi apologised to the Assamese for listing them among the 'uncivilised' tribes of India:

> It was certainly on my part a grave injustice done to the great Assamese people, who are every whit as civilised as any other part of India . . . My stupidity about the Assamese rose, when about 1890 I read an account of the Manipur expedition, when the late Sir John Gorst defended the conduct of the officials towards the late Senapati, saying that governments always liked to lop off tall poppies. Being an indifferent reader of history, I retained with me the impression that the Assamese were *jungli* [uncivilised] and committed it to writing in 1908 [*sic*]. (*CW* 21: 30)

71 'To conquer them': in the Gujarati text this reads 'To win them over'.

CHAPTER IX

*

The condition of India (cont.): railways[72]

READER: You have deprived me of the consolation I used to have regarding peace in India.[73]

EDITOR: I have merely given you my opinion on the religious aspect, but, when I give you my views as to the poverty[74] of India, you will perhaps begin to dislike me, because what you and I have hitherto considered beneficial for India no longer appears to me to be so.

72 The original Gujarati text does not have 'Railways' in the chapter heading; instead it has *Vishesha Vichar* (Additional Thoughts). The railways were first introduced into India in 1853; at the time of the writing of *HS* there were about 26,000 miles of railways in India.

73 The Gujarati text reads: 'You have shattered my illusions about the value of peace in India. You have left me with nothing that I can think of.'

74 Gandhi's criticism of the Indian railways takes place within the context of his views on Indian poverty, derived mainly from Naoroji and R. C. Dutt. The latter had argued that for the reduction of poverty in India, the development of irrigation was more important than that of the railways. But neither British private capital nor the colonial government saw the problem in this way. In the eyes of British investors the railways were more attractive, especially since in the early decades (1850–80) there was a guaranteed profit of 5 per cent charged on Indian revenue. It is true that the railways facilitated the movement of food in times of famine; but it is equally true that the railways did not *produce* food. For the production of more food, irrigation was crucial. Railways without irrigation did not solve the problem of poverty and famines; in a sense it aggravated them in that capital that could have been spent on irrigation was spent instead on the railways, which proved to be both extravagant and wasteful (R. C. Dutt 1904, 166–79, 353–71, 545–55). Naoroji also used the example of the railways to demonstrate his drain theory (Naoroji 1901, 170–3).

READER: What may that be?

EDITOR: Railways, lawyers and doctors have impoverished the country, so much so that, if we do not wake up in time, we shall be ruined.

READER: I do now, indeed, fear that we are not likely to agree at all. You are attacking the very institutions which we have hitherto considered to be good.

EDITOR: It is necessary to exercise patience. The true inwardness of the evils of civilisation you will understand with difficulty. Doctors assure us that a consumptive clings to life even when he is about to die. Consumption does not produce apparent hurt – it even produces a seductive colour about a patient's face, so as to induce the belief that all is well. Civilisation is such a disease,[75] and we have to be very wary.

READER: Very well, then, I shall hear you on the railways.

EDITOR: It must be manifest to you that, but for the railways, the English could not have such a hold on India as they have. The railways, too, have spread the bubonic plague. Without them, masses could not move from place to place. They are the carriers of plague germs. Formerly we had natural segregation. Railways have also increased the frequency of famines, because, owing to facility of means of locomotion, people sell out their grain, and it is sent to the dearest markets. People become careless, and so the pressure of famine increases. They accentuate the evil nature of man. Bad men fulfil their evil designs with greater rapidity. The holy places of India have become unholy. Formerly, people went to these places with very great difficulty. Generally, therefore, only the real devotees visited such places. Nowadays, rogues visit them in order to practise their roguery.

READER: You have given a one-sided account. Good men can visit these places as well as bad men. Why do they not take the fullest advantage of the railways?

EDITOR: Good travels at a snail's pace – it can, therefore, have little to do with the railways. Those who want to do good are not selfish, they are not in a hurry, they know that to impregnate people with good requires a

75 'such a disease': modernity is a hidden, but curable, disease.

long time. But evil has wings. To build a house takes time. Its destruction takes none. So the railways can become a distributing agency for the evil one only. It may be a debatable matter whether railways spread famines, but it is beyond dispute that they propagate evil.

READER: Be that as it may, all the disadvantages of railways are more than counterbalanced by the fact that it is due to them that we see in India the new spirit of nationalism.

EDITOR: I hold this to be a mistake.[76] The English have taught us that we were not one nation before, and that it will require centuries before we become one nation. This is without foundation. We were one nation before they came to India. One thought inspired us. Our mode of life was the same. It was because we were one nation that they were able to establish one kingdom. Subsequently they divided us.

READER: This requires an explanation.

EDITOR: I do not wish to suggest that because we were one nation we had no differences, but it is submitted that our leading men travelled throughout India either on foot or in bullock-carts.[77] They learned one another's languages, and there was no aloofness between them. What do you think could have been the intention of those far-seeing ancestors of ours who established Shevetbindu Rameshwar in the South, Juggernaut in the South-East, and Hardwar in the North as places of pilgrimage?[78] You

76 Gandhi rejects here an explanation of the rise of Indian nationalism purely in terms of the development of the modern means of communication. He asserts that a sense of Indian identity antedates the introduction of the railways. For Gandhi's notion of nation in *HS*, see Parel 1991, 261–82.

77 By contrasting the railways with the bullock-carts Gandhi drives home the point that speed by itself is not a value to be cherished. Here his ideas were influenced by early twentieth-century critics of the cult of speed, such as Thomas F. Taylor, whose *The Fallacy of Speed* is listed in the Appendix. Gandhi had Maganlal Gandhi of *Indian Opinion* translate this work into Gujarati (*CW* 10: 379).

78 The reference is to the traditional places of pilgrimage said to have been established in the East and West, South and North of India, by Shankaracharya (788–820). Gandhi claims that such places of pilgrimage have contributed greatly towards the forging of a common Indian identity. 'Shevetbindu Rameshwar' is Rameswaram in present-day Tamil Nadu. According to legend the

will admit they were no fools. They knew that worship of God could have been performed just as well at home. They taught us that those whose hearts were aglow with righteousness had the Ganges in their own homes. But they saw that India was one undivided land so made by nature. They, therefore, argued that it must be one nation. Arguing thus, they established holy places in various parts of India, and fired the people with an idea of nationality in a manner unknown in other parts of the world. Any two Indians are one as no two Englishmen are. Only you and I and others who consider ourselves civilised and superior persons imagine that we are many nations. It was after the advent of railways that we began to believe in distinctions, and you are at liberty now to say that it is through the railways that we are beginning to abolish those distinctions. An opium-eater may argue the advantage of opium-eating from the fact that he began to understand the evil of the opium habit after having eaten it. I would ask you to consider well what I have said on the railways.[79]

READER: I will gladly do so, but one question occurs to me even now. You have described to me the India of the pre-Mahomedan period, but now we have Mahomedans, Parsees and Christians. How can they be one nation? Hindus and Mahomedans are old enemies. Our very proverbs prove it.[80] Mahomedans turn to the West for worship, whilst Hindus turn to the East. The former look down on the Hindus as idolaters.[81] The Hindus worship the cow, the Mahomedans kill her. The Hindus believe in

town is said to have been founded by Rama, the hero of the epic *Ramayana*. After slaying the wicked Ravana, Rama purified himself here. 'Juggernaut in the South-East' refers to the Temple of Jaganaath ('world-lord') in Jagannath Puri, Orissa, which is in the East, not South-East, as the text has it here – an example of Gandhi's limited knowledge, in 1909, of Indian geography.

79 The Gujarati text adds: 'Doubts will still occur to you. But you will be able to resolve them yourself.'

80 The proverb, cited in the Gujarati text but omitted here, is as follows: 'A Miyan [Muslim] has no use for a Mahadev [Hindu].' Compared to the Gujarati text, the English text is especially careful not to exacerbate Muslim sensibilities.

81 The Gujarati text adds: 'Hindus worship images; Mahomedans are iconoclasts.'

the doctrine of non-killing, the Mahomedans do not. We thus meet with differences at every step. How can India be one nation?[82]

82 The Gujarati text reads: 'How can these differences at every step disappear and how can India be one?'

CHAPTER X

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The condition of India (cont.): the Hindus and the Mahomedans

EDITOR: Your last question is a serious one, and yet, on careful consideration, it will be found to be easy of solution. The question arises because of the presence of the railways, of the lawyers, and of the doctors. We shall presently examine the last two. We have already considered the railways. I should, however, like to add that man is so made by nature as to require him to restrict his movements as far as his hands and feet will take him. If we did not rush about from place to place by means of railways and such other maddening conveniences, much of the confusion that arises would be obviated. Our difficulties are of our own creation. God set a limit to a man's locomotive ambition in the construction of his body. Man immediately proceeded to discover means of overriding the limit. God gifted man with intellect that he might know his Maker. Man abused it, so that he might forget his Maker. I am so constructed that I can only serve my immediate neighbours, but, in my conceit, I pretend to have discovered that I must with my body serve every individual in the Universe. In thus attempting the impossible, man comes in contact with different natures, different religions, and is utterly confounded. According to this reasoning, it must be apparent to you that railways are a most dangerous institution. Man has therethrough gone further away from his Maker.

READER: But I am impatient to hear your answer to my question. Has the introduction of Mahomedanism not unmade the nation?[83]

83 The answer to this question forms an important part of his theory of nationalism. The spread of Muslim political power in India took place in three stages:

EDITOR: India cannot cease to be one nation because people belonging to different religions[84] live in it. The introduction of foreigners does not necessarily destroy the nation, they merge in it. A country is one nation only when such a condition obtains in it. That country must have a faculty for assimilation.[85] India has ever been such a country. In reality, there are as many religions[86] as there are individuals, but those who are conscious of the spirit of nationality do not interfere with one another's religion.[87] If they do, they are not fit to be considered a nation. If the Hindus believe that India should be peopled only by Hindus, they are living in dreamland.[88] The Hindus, the Mahomedans, the Parsees[89] and the Christians[90] who have made India their country are fellow country-

(1) The conquest of Sind and parts of the Punjab by the close of the tenth century; (2) the Delhi Sultanate from thirteenth to the sixteenth century; (3) the Moghul empire from sixteenth to the middle of the eighteenth century. The battle of Plassey (1757) saw the practical end of the Moghul empire and the formal beginning of British rule. The partition of India in 1947 answers Gandhi's question.

84 'religions': (dharma) used here in the sense of sect, not ethics.

85 'faculty for assimilation': the word used is *samas*. *Samas* is a grammatical technique of forming a new word by integrating two or more pre-existing words. For example the word *mahatma* is formed from *maha* and *atma*. Something of the old identity is retained in the new compound word, but the latter has a new identity of its own. When Gandhi says that the Indian nation has been created by a process of *samas* he means that though the nation is formed out of distinct ethnic, religious and linguistic groups, the new identity that emerges has an identity of its own. India in this sense is a nation. Gandhi is a cultural assimilationist in that all Indians, while retaining their sub-national identities, are supposed to share certain common values and symbols.

86 'religions': (dharma) used in the sense of ethics.

87 'religion': (dharma) used in the sense of sect.

88 The Gujarati text adds: 'The Mohamedans also live in a dreamland if they believe that there should be only Mohamedans here.'

89 'Parsees': descendents of Zoroastrians who, fleeing Muslim persecution in Persia, sought refuge in India in the eighth century. They settled mostly in what is today Bombay and Gujarat. The most distinguished Indian at the turn of the century, Dadabhai Naoroji, 'the Grand Old Man of India', was a Parsee.

90 The introduction of Christianity into India antedates that of Islam, Zoroastrianism and Sikhism. According to tradition Christianity is said to have been

men, and they will have to live in unity if only for their own interest. In no part of the world are one nationality and one religion[91] synonymous terms: nor has it ever been so in India.

READER: But what about the inborn enmity between Hindus and Mahomedans?

EDITOR: That phrase has been invented by our mutual enemy. When the Hindus and Mahomedans fought against one another, they certainly spoke in that strain. They have long since ceased to fight. How, then, can there be any inborn enmity? Pray remember this too, that we did not cease to fight only after British occupation. The Hindus flourished under Moslem sovereigns, and Moslems under the Hindu. Each party recognised that mutual fighting was suicidal, and that neither party would abandon its religion[92] by force of arms. Both parties, therefore, decided to live in peace. With the English advent the quarrels recommenced.

The proverbs you have quoted were coined when both were fighting; to quote them now is obviously harmful. Should we not remember that many Hindus and Mahomedans own the same ancestors, and the same blood runs through their veins?[93] Do people become enemies because they change their religion? Is the God of the Mahomedan different from the God of the Hindu? Religions[94] are different roads converging to the same point. What does it matter that we take different roads, so long as we reach the same goal? Wherein is the cause for quarrelling?

Moreover, there are deadly proverbs as between the followers of Shiva and those of Vishnu, yet nobody suggests that these two do not belong

introduced into Kerala by St Thomas the Apostle; Indian Christianity received a new impetus in the sixteenth century through the preaching of St Francis Xavier who arrived in Goa in 1542; and it received an additional impetus in the nineteenth century through the educational and social service activities of both Catholic and Protestant missionaries.

91 'religion': (dharma) used in the sense of sect.

92 'religion': (dharma) used in the sense of sect.

93 In his 1944 talks with Jinnah, the Indian Muslim leader and the future founder of Pakistan, Gandhi returned to the arguments based on the notions of 'same ancestors' and 'same blood'. (See Merriam 1980, 78, 96.)

94 'religions': (dharma) used in the sense of sect.

to the same nation. It is said that the Vedic religion[95] is different from Jainism,[96] but the followers of the respective faiths are not different nations. The fact is that we have become enslaved, and, therefore, quarrel and like to have our quarrels decided by a third party. There are Hindu iconoclasts as there are Mahomedan. The more we advance in true knowledge, the better we shall understand that we need not be at war with those whose religion we may not follow.

READER: Now I would like to know your views about cow protection.[97]

EDITOR: I myself respect the cow, that is, I look upon her with affectionate reverence. The cow is the protector of India, because it, being an agricultural country, is dependent on the cow's progeny. She is a most useful animal in hundreds of ways. Our Mahomedan brethren will admit this.

But, just as I respect the cow, so do I respect my fellow-men. A man is just as useful as a cow, no matter whether he be a Mahomedan or a Hindu. Am I, then, to fight with or kill a Mahomedan in order to save a cow? In doing so, I would become an enemy as well of the cow as of the Mahomedan. Therefore, the only method I know of protecting the cow is that I should approach my Mahomedan brother and urge him for the sake of the country to join me in protecting her. If he would not listen to me, I should let the cow go for the simple reason that the matter is beyond my ability. If I were overfull of pity for the cow, I should sacrifice my life to save her, but not take my brother's. This, I hold, is the law of our religion.[98]

When men become obstinate, it is a difficult thing. If I pull one way, my Moslem brother will pull another. If I put on a superior air, he will

95 'Vedic religion': the original, pure Hinduism based on the Vedas.

96 'Jainism': a religion founded by Mahavira Vardhamana Jnatiputra, (fl. sixth century BC), a contemporary of Buddha. Rajchandbhai, Gandhi's spiritual adviser in the 1890s, was a Jain.

97 Cow protection societies were established in 1875 by Swami Dayananda. The sacrificial killing of cows by Muslims became a cause of Hindu–Muslim riots (Parel 1969,179–203).

98 'the law of our religion': (*dharmic kaida*) religion in the sense of ethics.

return the compliment. If I bow to him gently, he will do it much more so, and, if he does not, I shall not be considered to have done wrong in having bowed. When the Hindus became insistent, the killing of cows increased. In my opinion, cow-protection societies may be considered cow-killing societies. It is a disgrace to us that we should need such societies. When we forgot how to protect cows, I suppose we needed such societies.

What am I to do when a blood-brother is on the point of killing a cow? Am I to kill him, or to fall down at his feet and implore him? If you admit that I should adopt the latter course, I must do the same to my Moslem brother.

Who protects the cow from destruction by Hindus when they cruelly ill-treat her? Who ever reasons with the Hindus when they mercilessly belabour the progeny of the cow with their sticks? But this has not prevented us from remaining one nation.

Lastly, if it be true that the Hindus[99] believe in the doctrine of non-killing and the Mahomedans do not, what, I pray, is the duty of the former? It is not written that a follower of the religion of Ahinsa[100] (non-killing) may kill a fellow-man. For him the way is straight. In order to save one being, he may not kill another. He can only plead – therein lies his sole duty.

But does every Hindu believe in Ahinsa? Going to the root of the matter, not one man really practises such a religion, because we do destroy life. We are said to follow that religion because we want to obtain freedom from liability to kill any kind of life.[101] Generally speaking, we may observe that many Hindus partake of meat and are not, therefore, followers of Ahinsa. It is, therefore, preposterous to suggest that the two

99 Gandhi here overstates the case of the Hindus. Neither Tilak nor Savarkar nor Aurobindo Ghose would agree with Gandhi on 'non-killing' as an essential Hindu teaching. See, for example, Aurobindo 1950, 36–42.

100 Although the modern spelling is 'Ahimsa', Gandhi consistently spelt it 'Ahinsa' and this latter spelling has been retained for authenticity.

101 This is a crucial point in interpreting Gandhi's position on *ahimsa*: 'religion' (dharma) is used here in the sense of ethics.

cannot live together amicably because the Hindus believe in Ahinsa and the Mahomedans do not.

These thoughts are put into our minds by selfish and false religious teachers.[102] The English put the finishing touch. They have a habit of writing history; they pretend to study the manners and customs of all peoples. God has given us a limited mental capacity, but they usurp the function of the Godhead and indulge in novel experiments. They write about their own researches in most laudatory terms and hypnotise us into believing them. We, in our ignorance, then fall at their feet.[103]

Those who do not wish to misunderstand things may read up the Koran, and will find therein hundreds of passages acceptable to the Hindus; and the Bhagavad-Gita contains passages to which not a Mahomedan can take exception. Am I to dislike a Mahomedan because there are passages in the Koran I do not understand or like? It takes two to make a quarrel. If I do not want to quarrel with a Mahomedan, the latter will be powerless to foist a quarrel on me, and, similarly, I should be powerless if a Mahomedan refuses his assistance to quarrel with me. An arm striking the air will become disjointed. If everyone will try to understand the core of his own religion[104] and adhere to it, and will not allow false teachers[105] to dictate to him, there will be no room left for quarrelling.

READER: But will the English ever allow the two bodies to join hands?

EDITOR: This question arises out of your timidity. It betrays our shallowness. If two brothers want to live in peace, is it possible for a third party to separate them? If they were to listen to evil counsels, we would consider them to be foolish. Similarly, we Hindus and Mahomedans would have to blame our folly rather than the English, if we allowed them to put us asunder. A clay-pot would break through impact; if not with one

102 'selfish and false religious teachers': the Gujarati text adds *shastris* and *mullahs* (respectively Hindu and Muslim religious teachers) to this list.

103 The Gujarati text has: 'We in our credulity believe all that they say.'

104 'the core of his own religion': (*dharmanu swaroop*), the ethical core of religion considered as sect.

105 'false teachers': in the Gujarati text, *shastris* and *mullahs*.

stone, then with another. The way to save the pot is not to keep it away from the danger point, but to bake it so that no stone would break it. We have then to make our hearts of perfectly baked clay. Then we shall be steeled against all danger. This can be easily done by the Hindus. They are superior in numbers, they pretend that they are more educated, they are, therefore, better able to shield themselves from attack on their amicable relations with the Mahomedans.

There is mutual distrust between the two communities. The Mahomedans, therefore, ask for certain concessions from Lord Morley.[106] Why should the Hindus oppose this? If the Hindus desisted, the English would notice it, the Mahomedans would gradually begin to trust the Hindus, and brotherliness would be the outcome. We should be ashamed to take our quarrels to the English. Everyone can find out for himself that the Hindus can lose nothing by desisting. That man who has inspired confidence in another has never lost anything in this world.

I do not suggest that the Hindus and the Mahomedans will never fight. Two brothers living together often do so. We shall sometimes have our heads broken. Such a thing ought not to be necessary, but all men are not equi-minded. When people are in a rage, they do many foolish things. These we have to put up with. But, when we do quarrel, we certainly do not want to engage counsel and to resort to English or any law courts. Two men fight; both have their heads broken, or one only. How shall a third party distribute justice amongst them? Those who fight may expect to be injured.

106 The Minto-Morley Reforms (1909) were introduced by John Morley, the Secretary of State for India, and Lord Minto, the Viceroy. Among other things, they gave Muslims a separate electorate.

CHAPTER XI

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The condition of India (cont.): lawyers[107]

READER: You tell me that, when two men quarrel, they should not go to a law court. This is astonishing.

EDITOR: Whether you call it astonishing or not, it is the truth. And your question introduces us to the lawyers and the doctors. My firm opinion is that the lawyers have enslaved India, and they have accentuated the Hindu–Mahomedan dissensions, and have confirmed English authority.

READER: It is easy enough to bring these charges, but it will be difficult for you to prove them. But for the lawyers, who would have shown us the road to independence? Who would have protected the poor? Who would have secured justice? For instance, the late Mr Manomohan Ghose defended many a poor man free of charge. The Congress, which you have praised so much, is dependent for its existence and activity upon the work of the lawyers. To denounce such an estimable class of men is to spell justice injustice, and you are abusing the liberty of the press by decrying lawyers.

EDITOR: At one time I used to think exactly like you. I have no desire to convince you that they have never done a single good thing. I honour

107 By training Gandhi was a lawyer. He was admitted to the Inner Temple (London) in 1888, and called to the Bar in 1891. After an uncertain start in a legal career in India, he was hired in 1893 as legal counsel to an Indian Muslim trading firm operating in South Africa. From 1894 until 1914 he practised law in South Africa, his income being 'five to six thousand pounds a year' (Fischer 1951, 74). He was disbarred from Inner Temple in 1922, but reinstated posthumously in 1988.

Mr Ghose's memory. It is quite true that he helped the poor. That the Congress owes the lawyers something is believable. Lawyers are also men, and there is something good in every man. Whenever instances of lawyers having done good can be brought forward, it will be found that the good is due to them as men rather than as lawyers. All I am concerned with is to show you that the profession teaches immorality;[108] it is exposed to temptations from which few are saved.

The Hindus and the Mahomedans have quarrelled. An ordinary man will ask them to forget all about it, he will tell them that both must be more or less at fault, and will advise them no longer to quarrel. They go to lawyers. The latter's duty is to side with their clients, and to find out ways and arguments in favour of the clients to which they (the clients) are often strangers. If they do not do so, they will be considered to have degraded their profession. The lawyers, therefore, will as a rule, advance quarrels, instead of repressing them. Moreover, men take up that profession, not in order to help others out of their miseries, but to enrich themselves. It is one of the avenues of becoming wealthy, and their interest exists in multiplying disputes. It is within my knowledge that they are glad when men have disputes. Petty pleaders actually manufacture them. Their touts, like so many leeches, suck the blood of the poor people.[109] Lawyers are men who have little to do. Lazy people, in order to indulge in luxuries, take up such professions. This is a true statement.

108 'immorality': *aniti*. In South Africa he discovered that 'when we go to court of law, some of us are only concerned how to win the case at any cost, and not how truth may prevail. In any case, it never does, so we think, in courts of law. But there are some in the Indian community who just do a little play-acting and make courts swallow any story that they choose. There is no doubt that this happens. It would be a great boon to the community if this habit disappeared' (*CW* 10: 147–8). Again, 'I realised that the true function of a lawyer was to unite parties riven asunder. The lesson was so indelibly burnt into me that a large part of my time during the twenty years of my practice as a lawyer was occupied in bringing about private compromises of hundreds of cases. I lost nothing thereby – not even money, certainly not my soul' (*CW* 39: 111).

109 The Gujarati text adds: 'It is a profession which cannot but result in the encouragement of quarrels.'

Any other argument is a mere pretension. It is the lawyers who have discovered that theirs is an honourable profession. They frame laws as they frame their own praises. They decide what fees they will charge, and they put on so much side that poor people almost consider them to be heaven-born.

Why do they want more fees than common labourers?[110] Why are their requirements greater? In what way are they more profitable to the country than the labourers? Are those who do good entitled to greater payment? And, if they have done anything for the country for the sake of money, how shall it be counted as good?

Those who know anything of the Hindu-Mahomedan quarrels know that they have been often due to the intervention of lawyers.[111] Some families have been ruined through them; they have made brothers enemies. Principalities, having come under lawyers' power, have become loaded with debt. Many have been robbed of their all. Such instances can be multiplied.

But the greatest injury[112] they have done to the country is that they

110 The inspiration for this idea comes from Ruskin: 'The teachings of *Unto This Last* I understood to be: . . . That a lawyer's work has the same value as the barber's, inasmuch as all have the same right of earning their livelihood from their work' (*CW* 39: 239). In 1928, replying to a correspondent from Texas, Gandhi stated:

> The question of reform of the legal profession is a big one. It does not admit of tinkering. I am strongly of opinion that lawyers and doctors should not be able to charge any fees but that they should be paid a certain fixed sum by the State and the public should receive their services free. They will have paid for them through the taxation that they would have paid for such services rendered to citizens automatically. The poor will be untaxed but the rich and the poor will have then the same amount of attention and skill. Today the best legal talents and the best medical advice are unobtainable by the poor. (*CW* 36: 84)

In 1938, addressing the Bar Association in Peshawar, he reminded his audience of his 'peculiar views' about lawyers and doctors which he had recorded in *HS*. 'A true lawyer,' he told them, 'was one who placed truth and service in the first place and the emoluments of the profession in the next place only' (*CW* 68: 97).

111 The introduction of the modern notion of rights-based modern law exacerbated Hindu-Muslim relations.

112 Gandhi's most severe criticism of the modern legal system is that it had become the handmaid of colonial rule.

have tightened the English grip. Do you think that it would be possible for the English to carry on their government without law courts? It is wrong to consider that courts are established for the benefit of the people. Those who want to perpetuate their power do so through the courts. If people were to settle their own quarrels, a third party would not be able to exercise any authority over them. Truly, men were less unmanly when they settled their disputes either by fighting or by asking their relatives to decide upon them. They became more unmanly and cowardly when they resorted to the courts of law. It was certainly a sign of savagery when they settled their disputes by fighting. Is it any the less so if I ask a third party to decide between you and me? Surely, the decision of a third party is not always right. The parties alone know who is right. We, in our simplicity and ignorance, imagine that a stranger, by taking our money, gives us justice.

The chief thing, however, to be remembered is that, without lawyers, courts could not have been established or conducted, and without the latter the English could not rule. Supposing that there were only English judges, English pleaders and English police, they could only rule over the English. The English could not do without Indian judges and Indian pleaders. How the pleaders were made in the first instance and how they were favoured you should understand well. Then you will have the same abhorrence for the profession that I have.[113] If pleaders were to abandon their profession and consider it just as degrading as prostitution, English rule would break up in a day. They have been instrumental in having the charge laid against us that we love quarrels and courts, as fish love water. What I have said with reference to the pleaders necessarily applies to the judges; they are first cousins, and the one gives strength to the other.

113 The Gujarati text adds: 'The main key to British power is the law court, and the key to the law court is the lawyer.' For the history of the legal revolution introduced into India by British rule, see Stokes (1959) and Maine (1876).

CHAPTER XII

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The condition of India (cont.): doctors

READER: I now understand the lawyers; the good they may have done is accidental. I feel that the profession is certainly hateful. You, however, drag in the doctors also, how is that?

EDITOR: The views I submit to you are those I have adopted. They are not original. Western writers have used stronger terms regarding both lawyers and doctors. One writer has likened the whole modern system to the Upas tree.[114] Its branches are represented by parasitical professions, including those of law and medicine, and over the trunk has been raised the axe of true religion. Immorality is the root of the tree. So you will see that the views do not come right out of my mind, but they represent the combined experiences of many. I was at one time a great lover of the medical profession. It was my intention to become a doctor for the sake of the country.[115] I no longer hold that opinion. I now understand why the medicine men (the vaids) among us have not occupied a very honourable status.

The English have certainly effectively used the medical profession for

114 'the Upas tree': *Antiaris toxicaria*: 'a fabulous Javanese tree so poisonous as to destroy life for many miles round . . . A baleful power or influence' (*OED*). Madame Blavatsky (1891, 178) mentions the Upas tree, but she does not expand on the meaning of the metaphor as Gandhi does here. *Unto This Last* also mentions the Upas tree.

115 This is discussed at some length in the *Autobiography* (*CW* 39: 35).

holding us. English physicians are known to have used the profession with several Asiatic potentates for political gain.[116]

Doctors have almost unhinged us. Sometimes I think that quacks are better than highly qualified doctors. Let us consider: the business of a doctor is to take care of the body, or, properly speaking, not even that. Their business is really to rid the body of diseases that may afflict it. How do these diseases arise? Surely by our negligence or indulgence. I over-eat, I have indigestion, I go to a doctor, he gives me medicine, I am cured, I over-eat again, and I take his pills again. Had I not taken the pills in the first instance, I would have suffered the punishment deserved by me, and I would not have over-eaten again. The doctor intervened and helped me to indulge myself. My body thereby certainly felt more at ease, but my mind became weakened. A continuance of a course of a medicine must, therefore, result in loss of control over the mind.

I have indulged in vice,[117] I contract a disease, a doctor cures me, the odds are that I shall repeat the vice. Had the doctor not intervened, nature would have done its work, and I would have acquired mastery over myself, would have been freed from vice, and would have become happy.

Hospitals are institutions for propagating sin.[118] Men take less care of

116 Here the Gujarati text reads differently: 'The pretensions of physicians also know no bounds. It was a British physician who played upon the credulity of the Moghul emperor. He was successful in treating an illness in the emperor's family and was in consequence honoured. It was again a physician who ingratiated himself with the Ameer (of Afghanistan).'

117 'vice': (*vishay*) meaning lust.

118 'Hospitals are institutions for propagating sin': surely one of the most intemperate statements in the entire book. Gandhi later tried to assure critics that he had not written in ignorance of the facts concerning the great positive contributions that modern medicine had made to humanity, and that in writing *HS* he had sought the advice of 'precious medical friends' (among them Dr Pranjivan Mehta). Though he regretted the 'language' with which he chose to express his 'views', he was prepared to change only the language, not the views (*CW* 23: 347–8; *CW* 26: 389). The views in question concerned the tendency of modern medicine to neglect the soul – i.e., the spiritual and moral foundations of bodily health. 'Medicine does often benumb the soul of the patient' (*CW* 23: 348). 'The advertisements that I see of medicines make me sick. I feel that

their bodies, and immorality increases. European doctors are the worst of all. For the sake of a mistaken care of the human body, they kill annually thousands of animals. They practise vivisection. No religion sanctions this. All say that it is not necessary to take so many lives for the sake of our bodies.

These doctors violate our religious instinct. Most of their medical preparations contain either animal fat or spirituous liquors; both of these are tabooed by Hindus and Mahomedans. We may pretend to be civilised, call religious prohibitions a superstition and wantonly indulge in what we like. The fact remains that the doctors induce us to indulge, and the result is that we have become deprived of self-control and have become effeminate.[119] In these circumstances, we are unfit to serve the country. To study European medicine is to deepen our slavery.

It is worth considering why we take up the profession of medicine. It is certainly not taken up for the purpose of serving humanity. We become doctors so that we may obtain honours and riches.[120] I have endeavoured

> physicians are rendering no service to humanity whatsoever but the greatest disservice by claiming every medicine as the panacea for all ills of life. I plead for humility, simplicity and truth' (*CW* 26: 389).
>
> > My quarrel with the medical profession in general is that it ignores the soul altogether and strains at nothing in seeking merely to repair such a fragile instrument as the body. Thus ignoring the soul, the profession puts men at its mercy and contributes to the diminution of human dignity and self-control. I note with thankfulness that in the West a school of thought is rising slowly but surely which takes account of the soul in trying to repair a diseased body and which, therefore, relies less on drugs and more on nature as a powerful healing agent. (*CW* 27: 222)
>
> It should be remembered in this context that (1) Gandhi had undertaken nursing training in South Africa; (2) he had voluntarily entered hospital and undergone surgery in 1924; (3) he took quinine to fight malaria; and (4) his *A Guide to Health* (1921) was his most widely read work for several decades.

119 The moral basis of this criticism is that modern medicine, taking a purely bodily view of health, ignores need for the health of the soul (the virtue of temperance), which is necessary for the maintenance of even bodily health.

120 Gandhi's criticism is that the modern medical profession was in alliance with modern pharmaceutical industries, and as such was becoming a 'profit'-driven profession. He would like to see it remain an 'honour'- or 'vocation'-driven profession, like that of the soldier.

to show that there is no real service of humanity in the profession, and that it is injurious to mankind. Doctors make a show of their knowledge, and charge exorbitant fees. Their preparations, which are intrinsically worth a few pennies, cost shillings. The populace in its credulity and in the hope of ridding itself of some disease, allows itself to be cheated. Are not quacks then, whom we know, better than the doctors who put on an air of humaneness?

CHAPTER XIII

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What is true civilisation?

READER: You have denounced railways, lawyers and doctors. I can see that you will discard all machinery.[121] What, then, is civilisation?

EDITOR: The answer to that question is not difficult. I believe that the civilisation India has evolved is not to be beaten in the world. Nothing can equal the seeds sown by our ancestors. Rome went, Greece shared the same fate, the might of the Pharaohs was broken, Japan has become westernised, of China nothing can be said, but India is still, somehow or other, sound at the foundation.[122] The people of Europe learn their lessons from the writings of the men of Greece or Rome, which exist no longer in their former glory. In trying to learn from them, the Europeans imagine that they will avoid the mistakes of Greece and Rome. Such is their pitiable condition. In the midst of all this, India remains immovable, and that is her glory. It is a charge against India that her people are so uncivilised, ignorant and stolid, that it is not possible to induce them to adopt any changes. It is a charge really against our merit. What we have tested and found true on the anvil of experience, we dare not change.

121 'machinery': ch. XIX deals with this topic. By introducing it here Gandhi alerts the reader to the tension that exists between 'true civilisation' and a civilisation based on machinery.

122 'India is still, somehow or other, sound at the foundation': this is the bedrock of Gandhi's defence of Indian civilisation in *HS*. That foundation is that *artha* and *kama* should be pursued within the framework of dharma. In modern civilisation *artha* and *kama*, according to Gandhi, assert their autonomy from dharma.

Many thrust their advice upon India, and she remains steady. This is her beauty; it is the sheet-anchor of our hope.

Civilisation is that mode of conduct which points out to man the path of duty. Performance of duty and observance of morality are convertible terms. To observe morality is to attain mastery over our mind and our passions. So doing, we know ourselves.[123] The Gujarati equivalent for civilisation means 'good conduct'.[124]

If this definition be correct, then India, as so many writers[125] have shown, has nothing to learn from anybody else,[126] and this is as it should

123 In this definition of true civilisation, central to the argument of the book, Gandhi connects the notions of self-knowledge, duty (*farajj*), morality (*niti*), mastery over the mind (*man*) and the senses (*indriyo*).

124 In 1911, in response to a question as to whether it would not have been more accurate to write 'The Gujarati equivalent for civilisation is good conduct (*sudharo*)', Gandhi wrote the following reply:

> If 'is' were to be used, the meaning would change. 'Is' is implied in 'equivalent' ... the Gujarati word generally used for 'civilisation' means 'a good way of life'. That is what I had meant to say. The sentence 'The Gujarati equivalent for civilisation is *sudharo*' is quite correct. But it is not what I intended to say. Were we to say, 'The Gujarati equivalent for civilisation is "good conduct"', according to the rules of grammar, 'good conduct' would have to be taken as a Gujarati phrase ... Please let me know whether it was for this reason or for any other reasons that you concluded that 'means' was the right word. (*CW* 11: 153)

125 'as so many writers': in the Gujarati text this reads: 'as so many British writers'. See *HS*, Appendix II.

126 'India ... has nothing to learn from anybody else': an obvious hyperbole, to be corrected by his other statements. Thus in 1911 he recommended that Chhaganlal Gandhi, his right-hand man at Phoenix Settlement, should go to London and 'imbibe' its particular atmosphere: 'My own idea was that you should live in London for a year and gather whatever experience and knowledge you could ... if you imbibe the particular kind of atmosphere that obtains there, the voyage to England will have, to my mind, fulfilled its purpose' (*CW* 10: 401–2). In 1929 he wrote: 'The "Western civilisation" which passes for civilisation is disgusting to me. I have given a rough picture of it in *Hind Swaraj*. Time has brought no change in it. It is not my purpose even to imply that everything Western is bad. I have learnt a lot from the West' (*CW* 40: 300). And in 1931 he wrote:

> European civilisation is no doubt suited for the Europeans but it will mean ruin for India, if we endeavour to copy it. This is not to say that we may not

be. We notice that mind is a restless bird; the more it gets the more it wants, and still remains unsatisfied. The more we indulge our passions, the more unbridled they become. Our ancestors, therefore, set a limit to our indulgences. They saw that happiness was largely a mental condition.[127] A man is not necessarily happy because he is rich, or unhappy because he is poor. The rich are often seen to be unhappy, the poor to be happy. Millions will always remain poor. Observing all this, our ancestors dissuaded us from luxuries and pleasures. We have managed with the same kind of plough as it existed thousands of years ago. We have retained the same kind of cottages that we had in former times, and our indigenous education remains the same as before. We have had no system of life-corroding competition.[128] Each followed his own occupation or trade,[129] and charged a regulation wage. It was not that we

> adopt and assimilate whatever may be good and capable of assimilation by us as it does not also mean that even the Europeans will not have to part with whatever evil might have crept into it. The incessant search for comforts and their multiplication is such an evil, and I make bold to say that the Europeans themselves will have to remodel their outlook, if they are not to perish under the weight of the comforts to which they are becoming slaves. It may be that my reading is wrong, but I know that for India to run after the Golden Fleece is to court certain death. Let us engrave on our hearts the motto of a Western philosopher, 'plain living and high thinking'. (*CW* 46: 55–6)

As late as 1936, Gandhi thought of London as being 'our Mecca or Kashi [Benares]'. In a letter of recommendation for Kamalnayan Bajaj written to H. S. L. Polak, he stated the following: 'However much we may fight Great Britain, London is increasingly becoming our Mecca or Kashi. Kamalnayan is no exception. I have advised him to take up a course in the London School of Economics. Perhaps you will put him in touch with Professor Laski who may not mind guiding young Bajaj. Muriel [Lester] has undertaken to mother him' (*CW* 63: 122).

127 The psychology of the mind adumbrated here is basic to Gandhi's moral theory and is derived from *The Bhagavad Gita*. Swaraj, or self-control, means control over the *mind*. On the *Gita's* teachings on the relationship of the mind to the body and the senses, and on how one may attain control over the mind, see Zaehner 1973, 423–5.

128 'life-corroding competition': following Ruskin, Gandhi wants to *moderate* competition by introducing 'social affections' into economic relations.

129 Here Gandhi defends the 'idea' of *varna* and rejects the 'historical' institutions of caste. This quasi-'platonic' approach to *varna* has not convinced critics such as B. R. Ambedkar and the more recent Dalit elite.

did not know how to invent machinery, but our forefathers knew that, if we set our hearts after such things, we would become slaves and lose our moral fibre. They therefore, after due deliberation, decided that we should only do what we could with our hands and feet. They saw that our real happiness and health consisted in a proper use of our hands[130] and feet. They further reasoned that large cities were a snare and a useless encumbrance,[131] and that people would not be happy in them, that there would be gangs of thieves and robbers, prostitution and vice flourishing in them, and that poor men would be robbed by rich men. They were, therefore, satisfied with small villages. They saw that kings and their swords were inferior to the sword of ethics, and they, therefore, held the sovereigns of the earth to be inferior to the Rishis and the Fakirs.[132] A nation with a constitution like this is fitter to teach others than to learn from others. This nation had courts, lawyers and doctors, but they were all within bounds.[133] Everybody knew that these professions were not particularly superior; moreover, these vakils and vaids[134] did not rob people; they were considered people's dependants, not their masters. Justice was tolerably fair. The ordinary rule was to avoid courts. There were no touts to lure people into them. This evil, too, was noticeable only in and around capitals. The common people lived independently,

130 Manual labour, extolled here, is not a valued activity according to the norms of traditional Indian civilisation. Gandhi came to appreciate it from his reading of Ruskin, Tolstoy and Bondaref. Promotion of manual labour became an integral part of the Gandhian revolution.

131 Gandhi saw in modern Indian cities a real threat to civilised living (*CW* 9: 476); 'Bombay, Calcutta, and the other chief cities of India are the real plague spots' (ibid., 479); 'To me the rise of the cities like Calcutta and Bombay is a matter for sorrow rather than congratulations' (ibid., 509). He idealised and romanticised the Indian village and hoped to reinstate it in a Gandhian India.

132 'Rishis and Fakirs': *rishis* are sages according to Hindu culture; *fakirs*, according to Muslim culture, are religious mendicants of great moral authority.

133 'within bounds': the bounds of dharma. This passage throws light on the real point of his earlier criticism of lawyers and doctors: modernity has 'freed' these professions from the restraints required by traditional morality.

134 'vakils and vaids': lawyers and doctors, respectively, of pre-modern Indian culture.

and followed their agricultural occupation. They enjoyed true Home Rule.

And where this cursed modern civilisation has not reached, India remains as it was before. The inhabitants of that part of India will very properly laugh at your new-fangled notions. The English do not rule over them, nor will you ever rule over them. Those in whose name we speak we do not know, nor do they know us. I would certainly advise you and those like you who love the motherland to go into the interior that has yet not been polluted by the railways, and to live there for six months;[135] you might then be patriotic and speak of Home Rule.

Now you see what I consider to be real civilisation. Those who want to change conditions such as I have described are enemies of the country and are sinners.

READER: It would be all right if India were exactly as you have described it, but it is also India where there are hundreds of child widows, where two-year-old babies are married, where twelve-year-old girls are mothers and housewives, where women practise polyandry, where the practice of Niyog[136] obtains, where, in the name of religion, girls dedicate themselves to prostitution, and where, in the name of religion, sheep and

135 '. . . go into the interior . . . for six months': Gandhi believed that home rule would mean something only if it improved the lot of the villagers. This is a belief that the modern Indian elite has not understood or accepted. Writing to Henry Polak from Wardha in 1936 he stated: 'I am trying to become a villager. The place where I am writing this has a population of about 600 – no roads, no post-office, no shop' (*CW* 63:122).

136 'Niyog': a custom permitting a man to have sexual intercourse with his brother's childless widow, or with the wife of an impotent kinsman, in order to raise children, without committing the sin of incest. Children born out of such unions were regarded as the issue of the woman's husband. Originally intended to provide legitimate heirs for childless relatives, in course of time the custom became corrupted, and became part of the 'privileges' of brahmins. While in some regions brahmins claimed the right to provide the issue upon a childless widow, in others they offered their 'services' even when the woman had other children and the husband was alive. Over the centuries, Niyoga remained a great affront to the dignity of Indian women.

goats are killed.[137] Do you consider these also symbols of the civilisation that you have described?[138]

EDITOR: You make a mistake. The defects that you have shown are defects. Nobody mistakes them for ancient civilisation. They remain in spite of it. Attempts have always been made, and will be made, to remove them. We may utilise the new spirit that is born in us[139] for purging ourselves of these evils. But what I have described to you as emblems of modern civilisation are accepted as such by its votaries. The Indian civilisation as described by me has been so described by its votaries. In no part of the world, and under no civilisation, have all men attained perfection. The tendency of Indian civilisation is to elevate the moral being, that of the Western civilisation is to propagate immorality. The latter is godless, the former is based on a belief in God. So understanding and so believing, it behoves every lover of India to cling to the old Indian civilisation even as a child clings to its mother's breast.

137 Gandhi gives a gruesome account of his 1902 visit to the Kali temple in Calcutta: 'On the way I saw a stream of sheep going to be sacrificed to Kali . . . We were greeted by rivers of blood. I could not bear to stand there. I was exasperated and restless. I have never forgotten that sight' (*CW* 39: 190).

138 The social evils enumerated in this paragraph constitute the subject matter of Gandhi's critique of Indian civilisation in *HS*.

139 'the new spirit that is born in us': a very important point . Gandhi does recognise the positive contributions made by colonialism. It made Indians self-critical and creative.

CHAPTER XIX

*

Machinery

READER: When you speak of driving out Western civilisation, I suppose you will also say that we want no machinery.

EDITOR: By raising this question you have opened the wound I had received. When I read Mr Dutt's Economic History of India,[213] I wept; and, as I think of it again, my heart sickens. It is machinery that has impoverished India. It is difficult to measure the harm that Manchester[214] has done to us. It is due to Manchester that Indian handicraft has all but disappeared.

But I make a mistake. How can Manchester be blamed? We wore Manchester cloth, and that is why Manchester wove it. I was delighted when I read about the bravery of Bengal. There are no cloth-mills in that Presidency. They were, therefore, able to restore the original hand-weaving occupation. It is true, Bengal encourages the mill industry of Bombay. If Bengal had proclaimed a boycott of *all* machine-made goods, it would have been much better.[215]

Machinery has begun to desolate Europe. Ruination is now knocking at the English gates.[216] Machinery is the chief symbol of modern civilisation; it represents a great sin.

213 Listed in Appendix I.

214 The cotton industry of Manchester.

215 During the 1905 Swadeshi movement in Bengal only British goods were boycotted.

216 'the English gates': There is an error in the translation here. There is no mention of England or 'the English gates' in the Gujarati text; instead it mentions that

The workers in the mills of Bombay have become slaves. The condition of the women working in the mills is shocking. When there were no mills, these women were not starving. If the machinery craze[217] grows in our country, it will become an unhappy land.[218] It may be considered a heresy, but I am bound to say that it were better for us to send money to Manchester and to use flimsy Manchester cloth, than to multiply mills in India.[219] By using Manchester cloth, we would only waste our money, but, by reproducing Manchester in India, we shall keep our money at the price of our blood, because our very moral being will be sapped, and I call in support of my statement the very mill-hands as witnesses. And those who have amassed wealth out of factories are not likely to be better than other rich men. It would be folly to assume that an Indian Rockefeller would be better than the American Rockefeller. Impoverished India can become free, but it will be hard for an India made rich through immorality to regain its freedom. I fear we will have to admit that moneyed men support British rule; their interest is bound up with its stability. Money renders a man helpless. The other thing as harmful is sexual vice. Both are poison. A snake-bite is a lesser poison than these two, because the former merely destroys the body, but the latter destroy body, mind and soul. We need not, therefore, be pleased with the prospect of the growth of the mill industry.

READER: Are the mills, then, to be closed down?

EDITOR: That is difficult. It is no easy task to do away with a thing that

machinery is threatening *India*: 'Machinery has begun to desolate Europe, and that whirlwind is now sweeping over India.' Instead of 'the English gates', the correct translation should read 'the Indian gates'.

217 'craze' : in the Gujarati text the word used is *wayaro* (whirlwind).

218 'unhappy hand' in the original.

219 In 1921 in the Preface to the Hindi translation of *HS*, Gandhi significantly modified the position taken here: 'My views in regard to mills have undergone this much change. In view of the present predicament of India, we should produce in our own country all the cloth that we need even by supporting, if necessary, mills in India rather than by cloth made in Manchester' (*CW* 31: 399, n.4). For more on Gandhi's changing attitude towards machinery, see pp. 164–70 below.

is established. We, therefore, say that the non-beginning of a thing is supreme wisdom. We cannot condemn mill-owners; we can but pity them. It would be too much to expect them to give up the mills, but we may implore them not to increase them. If they would be good, they would gradually contract their business. They can establish in thousands of households the ancient and sacred hand-looms,[220] and they can buy out the cloth that may be thus woven. Whether the mill-owners do this or not, people can cease to use machine-made goods.

READER: You have so far spoken about machine-made cloth, but there are innumerable machine-made things. We have either to import them or to introduce machinery into our country.

EDITOR: Indeed, our goods even are made in Germany. What need, then, to speak of matches, pins and glassware? My answer can be only one. What did India do before these articles were introduced? Precisely the same should be done today. As long as we cannot make pins without machinery, so long will we do without them. The tinsel splendour of glassware we will have nothing to do with, and we will make wicks, as of old, with home-grown cotton, and use hand-made earthen saucers for

220 'the ancient and sacred hand-looms': when he wrote this he did not know the difference between a loom and a spinning-wheel (*charkha*). The idea of the spinning-wheel which was to become such a powerful symbol of the Gandhian revolution came to him in a flash of insight rather than from empirical knowledge of the merits or demerits of the handloom industry. As he stated in 1925: '. . . I had put forward my arguments in its [the spinning-wheel's] favour in *Hind Swaraj* before ever having set my eyes on the spinning-wheel' (*CW* 25: 600). And in 1928: 'It was in London in 1909 that I discovered the wheel. I had gone there leading a deputation from South Africa. It was then that I came in close touch with many earnest Indians – students and others. We had many long conversations about the condition of India and I saw as in a flash that without the spinning-wheel there was no swaraj. I knew at once that everyone had to spin. But I did not then know the distinction between the loom and the wheel and in *Hind Swaraj* used the word loom to mean the wheel' (*CW* 37: 288). 'Even in 1915, when I returned to India from South Africa, I had not actually seen a spinning-wheel' (*CW* 39: 389). It was in Bagasara, Gujarat, that Gandhi first saw a loom (*CW* 26: 458).

lamps.[221] So doing, we shall save our eyes and money, and will support Swadeshi, and so shall we attain Home Rule.

It is not to be conceived that all men will do all these things at one time, or that some men will give up all machine-made things at once. But, if the thought is sound, we will always find out what we can give up, and will gradually cease to use this. What a few may do, others will copy, and the movement will grow like the coconut of the mathematical problem.[222] What the leaders do, the populace will gladly follow. The matter is neither complicated nor difficult. You and I shall not wait until we can carry others with us. Those will be the losers who will not do it; and those who will not do it, although they appreciate the truth, will deserve to be called cowards.

READER: What, then, of the tram-cars and electricity?

EDITOR: This question is now too late. It signifies nothing. If we are to do without the railways, we shall have to do without the tram-cars. Machinery is like a snake-hole which may contain from one to a hundred snakes. Where there is machinery there are large cities; and where there are large cities, there are tram-cars and railways; and there only does one see electric light. English villages do not boast any of these things. Honest physicians will tell you that, where means of artificial locomotion have increased, the health of the people has suffered. I remember that, when in a European town there was a scarcity of money, the receipts of the tram-way company, of the lawyers and of the doctors, went down, and the people were less unhealthy. I cannot recall a single good point in connection with machinery. Books can be written to demonstrate its evils.

READER: Is it a good point or a bad one that all you are saying will be printed through machinery?

221 Savarkar selected this passage for special ridicule, when he wrote that under the light of the wick lamps only ignorance and poverty would flourish (Keer 1966, 471).

222 'the coconut of the mathematical problem': the Gujarati text reads as follows: 'First one person will do, then ten, then a hundred, and so on, it will keep increasing, as in the story of the coconut.'

EDITOR: This is one of those instances which demonstrate that sometimes poison is used to kill poison. This, then, will not be a good point regarding machinery. As it expires, the machinery, as it were, says to us: 'Beware and avoid me. You will derive no benefit from me, and the benefit that may accrue from printing will avail only those who are infected with the machinery craze.'[223] Do not, therefore, forget the main thing. It is necessary to realise that machinery is bad. We shall then be able gradually to do away with it. Nature has not provided any way whereby we may reach a desired goal all of a sudden. If, instead of welcoming machinery as a boon, we would look upon it as an evil, it would ultimately go.

223 'machinery craze': the Gujarati text uses a different metaphor: 'the net of machinery' (*sanchani jal*).

CHAPTER XX

*

Conclusion[224]

READER: From your views I gather that you would form a third party. You are neither an extremist nor a moderate.[225]

EDITOR: That is a mistake. I do not think of a third party at all. We do not all think alike. We cannot say that all the moderates hold identical views. And how can those who want to serve only, have a party?[226] I would serve both the moderates and the extremists. Where I should differ from them, I would respectfully place my position before them, and continue my service.

READER: What, then, would you say to both the parties?

EDITOR: I would say to the extremists:[227] – 'I know that you want Home Rule for India; it is not to be had for your asking. Everyone will have to take it for himself. What others get for me is not Home Rule but foreign rule; therefore, it would not be proper for you to say that you have obtained Home Rule, if you expelled the English. I have already described the true nature of Home Rule. This you would never obtain by force of arms. Brute force is not natural to the Indian soil. You will have, therefore, to rely wholly on soul-force. You must not consider that violence is necessary at any stage for reaching our goal.'

224 The title of this chapter in Gujarati is *chhutcaro*, 'emancipation'.

225 The reference is to the two factions in the Congress, already referred to in ch. 11.

226 'party': *paksh*. Gandhi looks upon politics more as a form of *service* to the community than as a form of struggle for power.

227 What follows constitutes Gandhi's critique of the Extremists.

I would say to the moderates:[228] 'Mere petitioning is derogatory; we thereby confess inferiority. To say that British rule is indispensable is almost a denial of the Godhead. We cannot say that anybody or anything is indispensable except God. Moreover, common sense should tell us that to state that, for the time being, the presence of the English in India is a necessity, is to make them conceited.

'If the English vacated India bag and baggage, it must not be supposed that she would be widowed. It is possible that those who are forced to observe peace under their pressure would fight after their withdrawal. There can be no advantage in suppressing an eruption; it must have its vent. If, therefore, before we can remain at peace, we must fight amongst ourselves, it is better that we do so. There is no occasion for a third party to protect the weak. It is this so-called protection which has unnerved us. Such protection can only make the weak weaker. Unless we realise this, we cannot have Home Rule. I would paraphrase the thought of an English divine and say that anarchy under home rule were better than orderly foreign rule. Only, the meaning that the learned divine attached to home rule is different from Indian Home Rule according to my conception. We have to learn, and to teach others, that we do not want the tyranny of either English rule or Indian rule.'[229]

If this idea were carried out, both the extremists and the moderates could join hands. There is no occasion to fear or distrust one another.

READER: What, then, would you say to the English.[230]

EDITOR: To them I would respectfully say: 'I admit you are my rulers. It is not necessary to debate the question whether you hold India by the sword or by my consent. I have no objection to your remaining in my country, but, although you are the rulers, you will have to remain as servants of the people. It is not we who have to do as you wish, but it is you who have to do as we wish. You may keep the riches that you have drained

228 This constitutes Gandhi's critique of the Moderates.

229 Gandhi does not see any real moral difference between British colonial rule and the sort of home rule proposed by the Reader.

230 What follows constitutes Gandhi's critique of colonial rule in India.

away from this land, but you may not drain riches henceforth. Your function will be, if you so wish, to police India; you must abandon the idea of deriving any commercial benefit from us. We hold the civilisation that you support, to be the reverse of civilisation. We consider our civilisation to be far superior to yours. If you realise this truth, it will be to your advantage; and, if you do not, according to your own proverb, you should only live in our country in the same manner as we do. You must not do anything that is contrary to our religions. It is your duty as rulers that, for the sake of the Hindus, you should eschew beef, and for the sake of the Mahomedans, you should avoid bacon and ham. We have hitherto said nothing, because we have been cowed down, but you need not consider that you have not hurt our feelings by your conduct. We are not expressing our sentiments either through base selfishness or fear, but because it is our duty now to speak out boldly. We consider your schools and law courts to be useless. We want our own ancient schools and courts to be restored. The common language of India is not English but Hindi. You should, therefore, learn it. We can hold communication with you only in our national language.

'We cannot tolerate the idea of your spending money on railways and the military. We see no occasion for either. You may fear Russia; we do not. When she comes we will look after her. If you are with us, we will then receive her jointly. We do not need any European cloth. We will manage with articles produced and manufactured at home. You may not keep one eye on Manchester, and the other on India. We can work together only if our interests are identical.

'This has not been said to you in arrogance. You have great military resources. Your naval power is matchless. If we wanted to fight with you on your own ground, we should be unable to do so; but, if the above submissions be not acceptable to you, we cease to play the ruled. You may, if you like, cut us to pieces. You may shatter us at the cannon's mouth. If you act contrary to our will, we will not help you, and, without our help, we know that you cannot move one step forward.

'It is likely that you will laugh at all this in the intoxication of your power. We may not be able to disillusion you at once, but, if there be any

manliness in us, you will see shortly that your intoxication is suicidal, and that your laugh at our expense is an aberration of intellect. We believe that, at heart, you belong to a religious nation.[231] We are living in a land which is the source of religions. How we came together need not be considered, but we can make mutual good use of our relations.

'You English who have come to India are not a good specimen of the English nation, nor can we, almost half-Anglicised Indians, be considered a good specimen of the real Indian nation. If the English nation were to know all you have done, it would oppose many of your actions. The mass of the Indians have had few dealings with you. If you will abandon your so-called civilisation, and search into your own scriptures, you will find that our demands are just. Only on condition of our demands being fully satisfied may you remain in India, and if you remain under those conditions, we shall learn several things from you, and you will learn many from us. So doing, we shall benefit each other and the world. But that will happen only when the root of our relationship is sunk in a religious soil.'[232]

READER: What will you say to the nation?

EDITOR: Who is the nation?[233]

READER: For our purposes it is the nation that you and I have been thinking of, that is, those of us who are affected by European civilisation, and who are eager to have Home Rule.

231 Perhaps the most important point in Gandhi's critique of colonialism is that it is inconsistent with the teachings of Christianity. The suggestion here is that Great Britain should recover its Christian culture.

232 'in a religious soil': the original Gujarati is *dharmakshetrme* (in the field of dharma), a very evocative term, because it is also the very first word of *Bhagavad Gita*. When the British will integrate their modern culture within the framework of their traditional culture, and when Indians will integrate their modern culture within the framework of their traditional culture, both will be able to contribute significantly to universal culture.

233 In *HS* Gandhi uses the idea of nation (*praja*) in two senses: the first refers to the Indian people as a whole composed of Hindus, Muslims, Christians, Sikhs, Parsees, Buddhists and others. The second refers to the modern educated elite – the lawyers, the doctors, the wealthy, etc.

EDITOR: To these I would say:[234] 'It is only those Indians who are imbued with real love who will be able to speak to the English in the above strain without being frightened, and those only can be said to be so imbued who conscientiously believe that Indian civilisation is the best, and that European is a nine days' wonder. Such ephemeral civilisations have often come and gone, and will continue to do so. Those only can be considered to be so imbued, who, having experienced[235] the force of the soul within themselves, will not cower before brute force, and will not, on any account, desire to use brute force. Those only can be considered to have been so imbued who are intensely dissatisfied with the present pitiable condition, having already drunk the cup of poison.[236]

If there be only one such Indian, he will speak as above to the English, and the English will have to listen to him.[237]

These demands are not demands, but they show our mental state. We will get nothing by asking; we shall have to take what we want, and we need the requisite strength for the effort, and that strength will be available to him only who

1 will only on rare occasions make use of the English language;
2 if a lawyer, will give up his profession, and take up a hand-loom;
3 if a lawyer, will devote his knowledge to enlightening both his people and the English;
4 if a lawyer, will not meddle with the quarrels between parties, but will give up the courts and from his experience induce the people to do likewise;
5 if a lawyer, will refuse to be a judge, as he will give up his profession;

234 The nineteen points that follow are addressed to the modern educated elite. Implementation of these points would make them fit for true home rule.

235 The importance of 'experiencing' soul-force is stressed again. See ch. XIV.

236 The true Indian nationalist would have to become self-critical, especially with respect to his/her attitude towards modernity.

237 Cf: 'The great Thoreau has said that a worthy cause should never be deemed lost, that it is bound to triumph, so long as there is at least one sincere man to fight for it' (*CW* 10: 386).

6 if a doctor, will give up medicine, and understand that, rather than mending bodies, he should mend souls;

7 if a doctor, he will understand that, no matter to what religion he belong, it is better that bodies remain diseased rather than that they are cured through the instrumentality of the diabolical vivisection that is practised in European schools of medicine;

8 although a doctor, will take up a hand-loom, and, if any patients come to him, will tell them the cause of their diseases, and will advise them to remove the cause rather than pamper them by giving useless drugs; he will understand that, if by not taking drugs, perchance the patient dies, the world will not come to grief, and that he will have been really merciful to him;

9 although a wealthy man, regardless of his wealth, will speak out his mind and fear no one;

10 if a wealthy man, will devote his money to establishing hand-looms, and encourage others to use hand-made goods by wearing them himself;

11 like every other Indian, will know that this is a time for repentance, expiation and mourning;

12 like every other Indian, will know that to blame the English is useless, that they came because of us, and remain also for the same reason, and that they will either go or change their nature only when we reform ourselves;[238]

13 like others, will understand that, at a time of mourning, there can be no indulgence, and that, whilst we are in a fallen state, to be in gaol or in banishment is much the best;

14 like others, will know that it is superstition to imagine it necessary that we should guard against being imprisoned in order that we may deal with the people;

15 like others, will know that action is much better than speech; that it is our duty to say exactly what we think and face the consequences, and that it will be only then that we shall be able to impress anybody with our speech;

238 A theme underlying *HS*.

16 like others, will understand that we will become free only through suffering;

17 like others, will understand that deportation for life to the Andamans[239] is not enough expiation for the sin of encouraging European civilisation;

18 like others, will know that no nation has risen without suffering; that, even in physical warfare, the true test is suffering and not the killing of others, much more so in the warfare of passive resistance;

19 like others, will know that it is an idle excuse to say that we will do a thing when the others also do it; that we should do what we know to be right, and that others will do it when they see the way; that, when I fancy a particular delicacy, I do not wait till others taste it; that to make a national effort and to suffer are in the nature of delicacies; and that to suffer under pressure is no suffering.

READER: This is a large order. When will all carry it out?

EDITOR: You make a mistake. You and I have nothing to do with the others. Let each do his duty. If I do my duty, that is, serve myself, I shall be able to serve others. Before I leave you, I will take the liberty of repeating:

1 Real home-rule is self-rule or self-control.[240]

2 The way to it is passive resistance: that is soul-force or love-force.

3 In order to exert this force, Swadeshi in every sense is necessary.

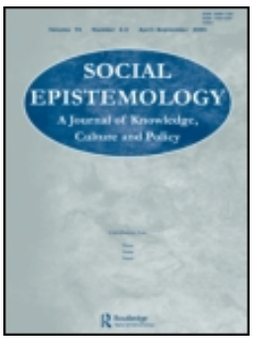
4 What we want to do should be done, not because we object to the English or that we want to retaliate, but because it is our duty to do so. Thus, supposing that the English remove the salt-tax, restore our money, give the highest posts to Indians, withdraw the English troops, we shall certainly not use their machine-made goods, nor use the English language, nor many of their industries. It is worth noting that

239 The Andaman Islands were India's penal colony, and many terrorists, including Ganesh Savarkar, the brother of Vinayak Damodar Savarkar, were in the Andamans at the time of the writing of *HS*.

240 The Gujarati text reads: 'One's rule over one's own mind is real swaraj.' The mind, again, is shown to be the key faculty in Gandhi's ethics.

these things are, in their nature, harmful; hence we do not want them. I bear no enmity towards the English, but I do towards their civilisation.

In my opinion, we have used the term 'Swaraj' without understanding its real significance. I have endeavoured to explain it as I understand it, and my conscience testifies that my life henceforth is dedicated to its attainment.



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A 'Broken People' defend science: Reconstructing the Deweyan Buddha of India's dalits

Meera Nanda

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A 'Broken People' defend science: reconstructing the Deweyan Buddha of India's dalits

MEERA NANDA

In his well-known essay, 'Science as a Vocation', Max Weber draws a distinction between two ways of deploying words and ideas: 'as plowshares to loosen the soil of contemplative thought; [or] swords against the enemies' (Weber, 1946, p. 145). It would be an outrage, Weber says, to invest an idea with political passions that befit swords raised against enemies, especially when what is called for is a determinedly dispassionate stance, so that the idea in question can serve as a ploughshare to turn the soil of the mind.

In recent years, social constructivist critics of science, along with their feminist and postcolonial allies, have not only discoursed about science with a passion that belongs more appropriately to a war, they have tended to reduce the worldview, the methods and content of modern science to a sword that the powerful wield against the powerless. Modern science, understood both as a body of knowledge and as a way of knowing, has come to be seen as a construct and an enforcer of Eurocentric and patriarchal norms in society. The interests of the oppressed, it is claimed, will be better served by developing alternatives epistemologies grounded in their own cultural values.

For example, Sandra Harding, a leading feminist epistemologist has recently claimed that it is merely a sign of 'civilizational Eurocentrism' on the part of the West to pretend that modern science is rational, objective and universal. In reality, the very methods and content of science are 'deeply and completely ... co-constructed' by the modern West's Eurocentrism and patriarchy (Harding, 1998, p. 54). What is more, Harding claims that the vulnerable groups in non-Western actually experience the purported value-freedom and objectivity of science as a 'rude and brutal cultural intrusion' because they 'do not value [value]-neutrality; they value their own Confucian, or indigenous American, or Islamic or Maori, ... or Judaic or Christian values' (1998, p. 61). It follows then that postcolonial people, especially the more oppressed among them, must develop an 'oppositional stance' toward the dominant ideology coded into the 'background assumptions, language, models and arguments and theories' of modern science (Longino, 1997, p. 117). Well-known postcolonial critic, Ashis Nandy echoes this sentiment, arguing that 'there must be scepticism against science [because] modern

Author: Meera Nanda, Philosophy Department, Columbia University, New York, NY 10027, USA.

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science is the basic model of domination of our times and is the ultimate justification for all institutionalized violence' (Nandy, 1988, pp. 121–122). Indeed, repudiation of science as an advance over other ways of knowing has become the first principle of post-colonial and post-development studies (see Rahnema, 1997 and Chaturvedi, 2000 for recent overviews, and Nanda, 2001 for a critique). For these 'new cynics', to borrow Haack's (1998a) apt epithet, modern science has ceased to be a source of organized scepticism against dogma, but has become a new dogma that requires a radically sceptical scrutiny from the standpoint of its 'victims'.

What is truly amazing about this neo-cynical agenda is that it fails to even acknowledge—let alone allow any substantive role in understanding the place of science in society—this simple but inconvenient historical fact. Namely, there are many instances in the non-Western world, when those who suffered the worst indignities and injustices heaped on them by 'their own' cultural-religious values, were the first to *embrace* modern science, connect it to their traditions of inquiry, and claim it as their own. One such example comes from India, where the victims of India's hierarchical caste order—the untouchables, or dalits (literally, the 'broken' or 'crushed' people)—have been among the most ardent advocates of a de-sacralized, scientific understanding of the natural world.[1] These victims of the traditional Hindu social order treat modern science as a ploughshare capable of turning over and reforming the core values of Hinduism that directly legitimize their social degradation. Far from experiencing the objectivity and value-freedom of science as a 'rude and brutal intrusion', important Dalit intellectuals have celebrated modern science as a source of freedom.

In this paper, I hope to bring to light a remarkable confluence between Dalits' aspirations for freedom, and the American pragmatists' call for subjecting all inherited worldviews and values to the test of scientific method. I will examine how the leading dalit intellectual of the 20th century, Bhim Rao Ambedkar (1891–1956), a man revered as a liberator by millions of his admirers, appropriated John Dewey's view of 'scientific temper' for challenging Hindu metaphysics and cosmology, and the ethics of natural inequality they sanction. Ambedkar studied at Columbia university (1913–1916) and was deeply influenced by Dewey, at that time a professor of philosophy at Columbia, and the nation's best-known public intellectual. Ambedkar attended Dewey's lectures, read his books and took his ideas home with him. Back in India, after many years of civil disobedience against caste discrimination, and after a long, frustrating fight against Mahatma Gandhi's paternalistic reformism, Ambedkar, along with nearly a million of his fellow untouchables, publicly renounced Hinduism and converted to Buddhism.

As I will try to show in this paper, Ambedkar carried his commitment to a Deweyan scientific temper into his understanding of the Buddha. I will offer a reading of Ambedkar's *Buddha and His Dhamma*, the bible of neo-Buddhists, to show that Ambedkar understood the Buddha as a Deweyan pragmatist and a scientific critic of the status quo. Ambedkar turned Dewey's call for reconstructing philosophy and society in the light of scientific inquiry into the central message of the life of the Buddha—with good justification, for the Buddha (563–483 BCE), after all, was a rebel against the mystical idealism of Brahmin priests in his own time. I will argue that Dewey's ideas helped Ambedkar make the historic rebellion of Siddharth Gautama relevant for his own quest for a civic religion of 'equality, liberty and fraternity' in India. Dewey was by no means Ambedkar's only inspiration: powerful 19th century anti-caste movements in his own province were important influences, as

were the histories of numerous heterodox, anti-Vedic, materialist sects/schools that have always existed on the fringes of Hinduism. I contend that Dewey, and his American experience more generally, served Ambedkar as a bridge between the past Dalit traditions of protest, and a self-consciously liberal and secular worldview. By emphasizing scientific temper as the central message of the Buddha, Ambedkar made respect for systematic inquiry a part of religious obligations of Dalit neo-Buddhists.

While Dewey's influence on the Chinese Enlightenment, the 4 May Movement is very well documented (Westbrook, 1991), as is his continuing influence in China today (Youzhong, 1999), his indirect connection with the aborted *Indian* Enlightenment is hardly known outside the small circle of dalit scholars and other students of Indian social movements. Unfortunately, even these scholars tend to treat Ambedkar's American experience and his great regard for Dewey as just one more biographical detail, 'counting for very little' (Zelliot, 1992, p. 85).[2] There is very little appreciation of either the formative influence Dewey's philosophical ideas had on Ambedkar's thinking, or of their possible relevance for the contemporary struggles for secularism and democracy in India. Even more problematic is the relativist talk of 'a different voice' for dalits that is making its appearance in some segments of dalit community, albeit not without strong protest from others.[3]

This paper is a contribution toward recovering the Dewey–Ambedkar-Buddha connection. The chief aim is not so much to add to the rich intellectual history of American pragmatism, although that would be a wonderful bonus. The motivation is to retrieve the ideas of Dewey—the original Dewey as Ambedkar understood him, and not the 'hypothetical' postmodernist Dewey made popular by Richard Rorty—in order to dispel the cultural despair that has befallen Indian intellectuals and their allies in Western academia.[4] I hope to ride the rising tide of pragmatism in North America and Europe to bring back a Deweyan respect for scientific temper to the continuing *Kulturkampf* in India against elements of Brahmanical Hindu cosmology that proclaim permanent inequalities to be built into the very nature of some categories of people, natural objects, foods, occupations and even gods themselves. Even more importantly, I hope to bring out the relevance of Ambedkar–Dewey synthesis for the creation of a secular and humanist civic culture, which can hopefully combat the rising religious nationalism in India today.

I will fill in the details of the Ambedkar–Dewey synthesis of scientific temper through an engagement with the feminist and postcolonial critics of science who argue for 'alternative sciences' based upon the values that the experience of marginality presumably confers upon women and other offshore underdogs. This may, at first glance, appear to be a rather tortuous way to recover Ambedkar, for surely this dalit Dewey can be understood in his own terms. Yet, a juxtaposition is necessary to highlight the uniqueness of Ambedkar's quest and to recover its radical potential in today's intellectual climate. Feminist and postcolonial critics have emerged as the leading theorists of 'emancipation'. Their understanding of the very rationality of modern science as inimical to a good society has come to dominate the imagination of academics and activists to such an extent that any defence of modern science as potentially emancipatory gets labelled as a throw-back to 'positivism' or 'Orientalism'. For the Ambedkar–Dewey synthesis to reclaim its understanding of modern science as a force for demystification and democratic inquiry, it has no choice but to dispute the terms of the debate set by the contemporary theorists of 'alternative' and 'emancipatory' science(s).

The first two sections will juxtapose the feminist and postcolonial view of experience and cognitive values with how Dewey understands them. The third section will describe Ambedkar's struggle against the Hindu legitimation of caste, and his eventual conversion to Buddhism. The fourth section will delineate three main teachings of Ambedkar's Buddha which sanctify inquiry carried out in a spirit conducive to modern science as a source of enlightenment and freedom: *prajna* or creative intelligence, 'religion of principles' against a 'religion of rules' and finally, the 'associated life' of civil society that is bound by, and defers to, prajna. The concluding section will examine the social and philosophical significance of Ambedkar's Deweyan Buddhism.

Turning the critics' augment for special standpoint epistemologies of the oppressed on its head, I will conclude that modern science *is* the standpoint of the oppressed. Modern science is a continuation—in an updated, systematized and more reliable form—of Dalits' own ways of knowing through which they have struggled long and hard to put the dominant Hindu (i.e. Vedic and Upanishadic) understanding of the natural order to a systematic and rigorous test of experience. Indeed, the non-Vedic, non-Brahmin knowledge traditions of the oppressed castes in India offer a powerful example of a trans-cultural and universal cultural value of veritism, or truth-seeking (Goldman, 1999), that is, of 'believing that which is true and not believing that which is false' (Maffie, 1995, p. 226). I hope that my account of the Deweyan Buddha of Ambedkar will show beyond any doubt that it is a closer approximation to the facts of the matter, and not an affirmation of their culturally constructed experiences, that the oppressed seek. Because their survival with dignity depends upon challenging the accepted beliefs, the oppressed, unlike their postmodern and social constructivist advocates, are not content to confuse truth with the stories their cultures tell about truth. For that reason, the interest of the oppressed is served by a cultivation of modern science and a scientific attitude, not its condemnation and nor its relativization—a conclusion with which both Ambedkar and Dewey would have heartily agreed.

1. *The authority of experience, or the importance of being an underdog*

> One of the tenets of feminist research is the valorization of subjective experience. (Longino, 1990, p. 190)

On the face of it, it seems perverse to juxtapose a feminist understandings of science against Deweyan pragmatism. Do not feminist critics, like Dewey, see science less as a set of abstract propositions but as a relationship between knower and the known, a situated knowledge at the nexus of nature and culture? Aren't these critics of science, like Dewey, pressing for a richer idea of experience that overcomes the duality between theory and practice, mind and body, a knowledge-experience in the laboratory and the work-a-day experiences as mothers, wives and workers? Have not feminists, like Dewey, argued relentlessly for all inquiry to serve emancipatory goals? Such commonalties have been invoked by those who see feminist epistemology as a continuation of the spirit of American pragmatism (e.g. Rooney, 1993; Seigfried, 1998).

But there are crucial differences. When faced with deprivation and ignorance born of historical and systematic oppression, Dewey would (as did Ambedkar) recommend a

thoroughgoing education in modern science—this supposedly 'Western' science of Newton and Darwin—as a source of refinement and enrichment of experience and values, of women and men, rich and poor, in West and East alike. For Dewy, the method of science was to repair the lost unity between facts and values that the pre-modern cultures located in the transcendental and supernatural realm. Rather than hanker after the unchanging and absolute knowledge, modern men and women would learn to learn from the success of science and allow it to give 'intelligent direction' to our values.[5] American pragmatists saw science as an exemplar of 'human capacity for experimental inquiry … [and] used this capacity as a foundation for the pursuit of a democratic ideal … in which the experimental qualities of individuals are allowed to express themselves in social and political life' (MacGilvary, 2000, p. 499). Dewey, in Hilary Putnam's succinct words, finds in science 'an epistemological justification for democracy' (1992, p. 182). Scientific inquiry, then, was a defining feature of modern experience for Dewey, as it was for his Indian student-admirer, Ambedkar.

The postmodernist critics, to the last woman and man, on the other hand, see a historical *antagonism* between the same enterprise of science that Dewey so admired, and the growth of a inclusive, egalitarian culture that they seem to want as much as Dewey. Rather than allow science to give intelligent direction to values, the critics envision socio-cultural values of selected (deserving?) groups of subaltern to provide political direction to science. Dewey saw modern science as resolving the distinction between facts and values by bringing them both under the preview of scientific method, which was his shorthand for institutionalized scepticism.[6] The critics, on the other hand, see the scientific method as a myth and a construct of hegemonic values, and seek to bring it under the preview of values derived from the experiences of 'the underdog' at home and 'offshore'.[7] While for Dewey science was a model of self-correcting knowledge, contemporary critics see it as incapable of rooting out community-wide social prejudices. Even the most well-established, universally valid scientific findings are still seen as essentially *Western* readings of nature (because based upon an essentially Western Judeo-Christian metaphysics and values), and thus only one among many other equally valid and equally universalizable laws of nature that can be derived from non-Western cultural assumptions (see Hess, 1997; Harding, 1998; Nasr, 1996; also Nader, 1996 among innumerable others). The only way the cultural construction of 'Western science' can be exposed and alternative laws of nature constructed is by self-consciously bringing in the alternative cultural values of those hitherto excluded: thus the call for 'strong objectivity' (Harding, 1998), 'situated knowledges' (Haraway, 1991) and 'doing science as a feminist' (Longino, 1996).

The critics feel justified in deliberately introducing what they think are underdog values into the domain of justification in natural sciences, because they accept the central dogma of post-Kuhnian theories of social constructivism. This dogma states, to paraphrase the 'strong programme' of sociology of scientific knowledge, that true beliefs in science are as much caused by the interpretation of data through our socially-embedded and race-, class- and gender- differentiated metaphors and values, as are false beliefs. In plain language, 'the technical is the social/political' (Hess, 1997, p. 160). As a corollary, no epistemologically significant distinctions can be made between the findings of modern science and any other knowledge system: all ways of knowing are equally local, all equally contingent upon social interests and cultural meanings, each creating its own 'nature' and 'facts' about what it takes to be nature (Barnes and Bloor, 1982; Hess, 1995; Turnbull, 1997; Harding, 1998).[8] Other

local knowledges and modern science do not stand as knowledges-traditions before and after the momentous disenchantment and rationalization of the humanity's view of the natural world ushered in by the Scientific Revolution and the Enlightenment. Rather, they are simply declared to be 'different but equal' ethno-sciences. If anything, the removal of god and other in-principle unknowable powers from nature is decried as a retrogression from the original organic unity of human beings with the cosmos.[9]

The idea of differential group experience, with an inverse relationship between social power and epistemic privilege, plays a crucial role in how we even think of some aspects of nature worth having beliefs about (agenda) and how we justify the beliefs we do have about the chosen aspects (warrant). In both these aspects, the contextual values that inquirers derive from the totality of their experiences in their everyday lives, as socially-embedded, culturally-shaped persons with distinct personal and group identities, are seen to make a decisive difference to what they would accepted as justified belief. Disclaimers to the contrary, no substantive distinctions are allowed between the values that function inside science, and the values that function outside in everyday life: as Longino puts it 'cognitive and epistemic cannot be contrasted to social and political' (1997, p. 121). Nor is the growth of knowledge in any field of science seen as self-reflexive enough to permit a revision of the extra-scientific values inquirers bring with them. The self-correcting role that was earlier assigned to public standards and internal criticism in the scientific community, especially by the more thoughtful critics like Longino, has been whittled away in the more recent 'advances' in feminist and cultural critiques.

The thrust of the 'activist wing'[10] of social constructivism has been to show that what the earlier philosophers and sociologists took to be truth-enhancing, or epistemic values, are only the cultural values of dominant social groups—male, white and capitalist scientists—masquerading as truth-enhancing values. What traditional philosophers of science took to be progress in science, is only a change in the dominant social conventions. Because social and cultural values are not considered incidental but *necessary* to the process of justification (chiefly due to under-determination of theories by all available evidence), how and what values we bring with us will decide what we will take to be the 'facts' of the matter. In the final analysis, cultural values 'co-construct' what we take to be nature, and what we accept as 'facts' of 'nature' (Latour, 1990; Hess, 1997; Haraway, 1991). (To be fair, the reverse is also admitted: what we take to be nature also co-determines what kind of culture and society we will have. However, the underlying problem with all these theories is their anti-realism: what we take to be nature remains a convention. The nature outside of our conventions is never allowed to exert a pressure on our beliefs about nature. Thus, in the final analysis, we remain prisoners of our conventions.)

Feminist and postcolonial critics seize upon the constitutive role of social values in science to argue for giving priority to the values of selected underdogs—women, third world people and all those united in an 'oppositional consciousness' to the dominant ideologies of the late-20th century including, above all, the possibility of an objective knowledge of the world. While no one denies that inclusion of hitherto excluded social groups will make for a richer *agenda* of science, the critics argue that such inclusion will produce different, non-masculine, local sciences, encoding different rationalities and warranting different facts about nature. To take an example cited by Harding (1998, p. 20), it is not the case that Newton's law of gravity will cease being a valid law, but alternative sciences will produce alternative explanations of gravity, which will be equally valid and equally universal and which need not necessarily

converge, in the long run, with Newton's laws (see also Kourany, 1998 and Jamison, 1994 for similar arguments).

These underdog sciences will be marked by all those characteristics that the conventional sciences presumably lack—complexity, interaction and wholism—a triad that is recognized as the guiding principle of feminist science and epistemology. Despite challenges, especially from postmodernist feminists who question *all* claims of essentialism (Haraway, 1991; Hekman, 1997), interactionism continues to be recognized as a hallmark of feminist knowledge which gives it authority as a 'better' and/or 'less distorted' *science* rather than just another perspective (Duran, 1998; Hirschmann, 1997). Interactionism as a feminist virtue claims that sciences done from a feminist standpoint—that is, a standpoint that treats women's social experiences under patriarchy as relevant to warranting scientific facts—will find dynamic, interactive, non-dualist relationships between elements of nature, rather than the reductionist, and hierarchical, 'master-molecule' models of control presented as 'facts' by science-as-we-know it. The meek shall put together what the powerful have torn apart.

The keywords 'experience' and 'oppression' are not rhetorical flourishes meant merely to display the theorists' political sympathies: they do real work. Without the assumption that material experience of oppression (Harstock, Harding), and the oppositional consciousness born out of a reflection on the experience of oppression (Haraway, Longino), actually confers a way of reasoning more conducive to obtaining less distorted knowledge, feminist or postcolonial epistemology simply becomes one more story, no better and no worse than, say, a story crafted by Hindu fundamentalists.[11]

Why should better science take the shape of wholism, interaction and complexity? Why should the underdogs see the whole in its totality and dynamism? The arguments for interactionism, combining various proportions of Marxian epistemology with objects-relations theory of psychoanalysis, occupy the pride of place in major feminist epistemologies (see Harstock, 1999 and Harding 1986 for a more Marxist version, and Keller, 1982 for a more psychoanalytic version): Because material life structures consciousness, women's subordinate role in the sexual division of labour has epistemological consequences. Because of women's experience as mothers and wives, their relationship with the world are necessarily less differentiated, more relational, more acutely sensuous and their unity with nature more complete than the mere instrumental interchange men have. Such a 'relationally defined existence,' results in a 'world-view to which dichotomies are foreign,' (Harstock, 1999, p. 120).[12] Women—especially women from traditional societies—are the original postmodernists, the first cyborgs. Unlike men, who abstract and objectify nature from the multiple strands of the cultural contexts, women experience forces of nature as a continuum with their own everyday experiences in producing and sustaining life. Unlike men, who become men because of their forced separation from their mothers, women do not feel the need to put emotional distance between themselves and the outside world. Unlike the masculine West, which is only now beginning to wake up to the inescapable hybridity of nature and culture, women and pre-modern cultures have always had this postmodern awareness of continuity. Abstraction is male, oppressive and Western, while interaction is female, liberatory and Eastern.

Others who are weary of valourizing a feminine or even a self-consciously female experience, biological, social or both, still end up endorsing the non-dualist,

interactionist agenda on purely political grounds of building a solidarity of 'oppositional consciousness' to the discourse of modernity and Enlightenment. A case in point is Longino's arguments for simply choosing to do science as feminists: if all science is inescapably shaped by background assumptions and values of a culture, then feminists should feel perfectly justified in bring in values that are 'consistent with the values and commitments we express in the rest of our lives' (1990, p. 191), without having to argue that these values are necessarily reflective of a female experience. In her more recent work, Longino (1995, 1996, 1997) has refined this choosing-to-do-science-as-a-feminist argument by drawing up a list of six 'feminist virtues' derived from a feminist reflection on women's experience under patriarchy. These virtues, she claims, are as indicative of truth/rationality of scientific theories as are the standard Kuhnian values that presumably carry politically conservative connotations.[13]

Longino argues that feminists need not aim for the time-honoured value of simplicity which aims to explain a maximum of observations with a minimum of entities and laws. Treating simplicity as a truth-enhancing value reflects reductionist, conservative and generally masculine political attitudes, Longino claims, because it reduces the entities and phenomenon being explained to mere epiphenomena of more fundamental ('privileged') laws. Because *women as social beings* have found their individual subjectivities subsumed under masculine traits parading as universals, *women as feminist scientists* should refuse to seek simple theories in the domain of nature as well. They must instead actively look for complex interaction between distinct particulars that cannot, by definition, be explained by any other more fundamental entity. The feminist antipathy to false universals in society must extend into the laboratory.

Even more startling is Longino's advice to feminist scientists to actively seek out novel theories and models that 'depart from accepted ones', purposefully 'disregarding consistency with other theories' (1997, p. 124, also 1995, 1996). Her argument is that it is legitimate for feminists to jettison the traditional value of consistency of new findings with what we already know because 'mainstream traditional frameworks have been used in accounts that neglect female contributions ... or treat as natural alleged male superiority' (1997, p. 122). In other words, because existing science is a social construct of patriarchal values, and serves patriarchal interests, feminists need not worry if their findings, as interpreted through feminist political-cum-cognitive values, contradict the existing body of knowledge in any field: as long as these findings are accord with feminist virtues, they are free to accept them as rational. At least one anthropologist of science, David Hess (1997, pp. 49–51) has interpreted Longino's call for novelty as a feminist virtue to argue that spiritism in Brazil need not concern itself with how it contradicts existing science; it can legitimately call itself a science. Longino's 'feminist virtues' enable Hess to wrap up magical thinking in a progressive cover and present it as something that those seeking a more humane world ought to support. Hess's example shows the endless potential that exists for extreme relativism if our social experiences, freed from the constraints of what we have already ascertained, are allowed to serve as legitimate determinants of what is to count as valid evidence.

At the risk of digressing from our focus on the relationship between experience and knowledge, it is important to point out how Longino's invitation to disregard external consistency with existing body of knowledge lethally weakens her own earlier emphasis on shared public standards as a constraint on subjectivism in science. If feminists and, *mutatis mutandis*, any other community of scientists are free to construct scientific theories by postulating 'different entities, processes,

different principles of explanation, alternative metaphors' (1997, p. 122), which are chosen *because* they contradict the existing stock of knowledge and the existing background assumptions, how can there be *any* shared, publicly recognized standards at all that can be used to evaluate the claims of these subcommunities? If feminists disregard the coherence and reasoned acceptance of their models and theories by the rest of the scientific community, are they not opting out of the process of 'transformative criticism' that was meant to keep subjective biases under check? With the gradual loosening of the constraints of accepted standards—novelty is only the culmination of Longino's slow-but-sure freeing of feminist epistemology from scientific consensus in the name of pluralism—feminist epistemology has in fact become an argument for *alternatives to science*, and not for *alternative science* in a feminist vein, as it was promised.[14]

Longino may not directly speak the language of experience and oppression, as Harding and others do. Far from 'de-essentializing' or de-linking feminist science from experiences that accrue to women because of their sex and/or their gender, Longino is only pushing it into the background. Her feminist virtues turn out to be precisely the virtues of interactionism that the more female-essetialist theorists recommend, including heterogeneity, mutuality, concern with social needs, among others. If one persists in asking what makes interactionist values particularly *feminist*, one hits the bottom-line: because *women as women* have experienced the exclusions legitimized by the classical cognitive values, *women as scientists* have good reason to be suspicious of the knowledge created by these values and try to re-describe nature from cognitive values that meet their aspirations for a fuller experience as women and as scientists. A similar picture emerges in Keller's (1997) recent accounts of the role of gendered metaphors in developmental biology. Keller seems to suggest that women may be over-represented in the more interactionist studies of the cytoplasm (as compared to studies of gene action) because of their experiential aversion, as women, to sexist metaphors. In both cases, in the final instance, it is their experience as women that makes the deciding difference in their cognitive experience as scientists.

The message to the underdogs is clear: cherish your experiences of life as underdogs, consciously interpret all the evidence of your senses through these experiences, and you shall have a better grasp of reality. Not only will your experiences of marginalization enable you to free or 'decolonize' yourself a reality defined by standards that affirm the oppressors' interests, but you will simultaneously enlighten the oppressors as well by exposing the constructedness of what they take to be truth. All 'facts' may be equally co-constructed out of nature and culture, but the culture of those at the bottom is still to be preferred, because it can not, and does not even try to, transcend the web of relationships and obligations and pretend it is the view from nowhere. The view from the bottom sees the world in all its complexity for it can see all the layers, while the view form the top only skims the surface, abstracts it from the context and pretends it is 'real'. Blessed are the meek, for they shall repair the world, or at least our dualist, objectivist view of it.

And in so repairing the world, they shall also inherit it. In the larger discourse of postcolonial science-studies that the theories of alternative epistemologies have spawned, it is assumed, *without an argument*, that challenging the universality, veracity and the method of science serves the material interests of the oppressed. This assumption has been actively fostered by elite intellectuals from ex-colonial societies, who tend to present their *entire* society as an underdog with respect to the

Enlightenment traditions of the West, completely overlooking the many victims of *internal* oppressions, who have everything to *gain* from the Enlightenment traditions that first found their expression in the West. Given India's long experience with colonialism and the high prestige of a populist, Gandhian anti-modernism, it is not surprising that Indian intellectuals have taken a lead in presenting the entire Indian (largely Hindu) culture as a subaltern knowledge tradition, capable of producing more adequate, more ecological and less oppressive sciences grounded in local conceptual categories (see Nandy, 1988; Marglin and Marglin, 1996; Chatterjee, 1986; and Prakash 1990, for representative writings). Indian knowledge traditions, moreover, are held up as the original postmodernist traditions, in the sense of being fundamentally non-dualist and context-sensitive (Coomarswamy, 1974; Ramanujan, 1990). Even the hard and unpaid labour of women in subsistence agriculture is turned into an exemplar of more embodied and ecological rationality, rooted in classical Indian ways relating to the world (Shiva, 1988).

Such is the reach of these ideas that even some dalit and 'backward'-caste intellectuals and their allies have begun to romanticize the special, holist knowledge traditions of dalits in comparison with the elite, abstract knowledge of the upper-castes (Ilaiah, 1996). Others sympathetic to eco-feminism (Datar, 1999) and Gandhian traditionalism (Nigam, 2000) have argued that dalits should treat the disembedding from traditional communities caused by modern technology and capitalism, and not the traditions themselves, as their primary cause of concern. These intellectuals seem to believe that modern ideas and institutions, in barely three hundred years of their combined history under and after colonialism, have already displaced the three-thousand years long hold of religious sanction that caste and gender hierarchies enjoy at multiple levels in the community they celebrate. Moreover, they accept the postcolonial argument that modern secular worldview is silencing the experiential knowledge that dalits and other poor people have accumulated through history in order to survive.

These identitarian tendencies are kept in check by Ambedkar-scholars who grant a very limited epistemological privilege to the raw experience of oppression. They admit that dalits 'talk differently', but only in so far as they are aware of problems that may not register as problematic to non-dalits. Given the preponderance of urban, upper-class/caste intellectuals in most of India's social movements, the concerns specific to dalits—especially the everyday indignities, violence and social apartheid—often get subsumed under the standard rhetoric about the working-class, the sisterhood, the environment, the rural sector, etc. (see Rege, 1998 for examples). It is this silence that dalit intellectuals are trying to break by pointing to the differential experience of dalits. But unlike feminist epistemologists who collapse all distinctions between discovery of new problems that experience might lead to, and the warrant for answers to these problems, these scholars ask if 'experiential knowledge of dalits adds up to a "knowledge system"? [Can it provide] tests of verifiability and validation?' (Guru and Geetha, 2000, p. 133). By and large, dalit scholars show a salutary weariness with feminist epistemology taken to its logical (and relativist) conclusion, for they fear that, 'to privilege knowledge-claims on the basis of direct experience, on claims of authenticity, may lead to a narrow identity politics' (Rege, 1998, p. WS44). While these intellectuals are most concerned that dalit voices should be heard at all levels of society, they hesitate in 'privileging' the existing dalit worldview as a source of a new and improved science.

2. *The enrichment of experience, or the importance of science to the underdogs*

> There is a first-rate test of the value of any philosophy which is offered us: does it end in conclusions which, when they are referred back to ordinary life-experiences and their predicaments, render them more significant, more luminous to us, and make our dealings with them more fruitful? ... Does it yield the enrichment and increase of power of ordinary things which the result of physical sciences afford when applied to every-day affairs? (Dewey, 1929, p. 7)

One wonders what Dewey—and more crucially, Ambedkar, whose entire project was motivated by the most vivid experiences of oppression—would make of the feminist and postcolonial valorization of the subjective experience of oppression, all in the name of the oppressed? Does it meet Dewey's 'test of value' of rendering the experience of the oppressed 'more luminous' to us, and more 'enriching' for the oppressed themselves?

There is plenty in Dewey's writings to suggest that he would see such valorization of experience as contributing to an 'immunizing strategy by which the rationales of oppression in other cultures can be protected from criticism' (Putnam, 1992, p. 185). Epistemologies that treat values derived from oppression as truth enhancing, and therefore scientific, can end up shielding the very sources of oppression from a critical examination. Both Dewey and Ambedkar would see the subjective experience of the underdog neither as *prima facie* 'epistemically privileged', nor an indictment of the existing corpus of knowledge, if the latter turned out to clash with what the underdogs may currently accept as true. They would instead treat the experience of oppression as a call for *enriching* the subjective experience of the oppressed with intelligence and controlled inference, using methods and standards that the history of humanity's collective inquiry has produced. As Bernstein (1971, p. 50) points out, for Dewey, the proper contrast, is 'not between experience and reason, but between experience that is funded by the procedures and results of intelligent activity, and experience that is not'.[15] Far from being inimical, Dewey finds modern science to be indispensable for enlarging and enriching the experience of ordinary people by enabling them to draw better tested, more reliable causal connections and explanations between their experience and the underlying reality.

Dewey's idea of experience is as situated and embodied as the best that feminist theorists have developed: the 'knowledge-experience' is never separated from the non-cognitive, affect-, habit- and tradition-laden spheres of social life. He shared the feminist antipathy to a positivist conception of experience as a passive mirror of nature, and stressed the active, selective and instrumental character of human experience. For Dewey, the data of science are not 'the given' but rather 'the taken', that is, they are selected from the totality of experiences by socially embedded human beings, with an express purpose of finding clues to the solution of the problem at hand (Dewey, 1929, p. 178).

No experience, and no values that we derive from reflection on that experience, can stand apart from what we already know about the world through science. To borrow a metaphor from Haack (1993), a well-respected interpreter of American pragmatism, science is a massive crossword puzzle we humans have been collectively trying to solve through all of known history. Our background assumptions—our guesses, worldviews and biases, derived from habit, cultural traditions, or explicit political commitments—must face and adjust to the already completed entries in the crossword, just as the latter must remain open to revision in the light of the new

clues our background assumptions lead us to discover. Given the crossword-like, multi-directional and mutual checks-and-balances between values and the already known facts, determination of how good some evidence is (i.e. warrant) is simply too deeply embedded in a whole web of other meanings and claims to be self-evident to *any* group of inquirers bound by a set of shared values and interests. Yet, social interests and values play a crucial role in influencing whether or not the warranted evidence will be *accepted* by a group of inquirers, and what *significance* and meanings would be given to a finding once it is accepted. Social interests do not serve as reasons for beliefs, but as causes for accepting or rejecting beliefs (Haack, 1998a, b).[16]

The hope that with the advancement of science, more and more of our accepted beliefs will be *also* be the most warranted, animates the entire corpus of Dewey's writings: rather than allow interests and passions to dictate what we will believe, beliefs tested through a collective and democratic process will gain the allegiance of all groups in an open society. Dewey insists upon and welcomes 'a certain purification of traditional beliefs' by making them face the tribunal of science (1950a [1930], p. 30, also 1929). To bring our values and metaphysical assumptions about the world in consonance with what and how we learn about the world was the whole point of Dewey's naturalistic humanism. As Dewey never tired of reminding his readers, ' the problem of restoring integration and cooperation between man's beliefs about the world in which he lives and his beliefs about the values and purposes that should direct his conduct is the deepest problem of modern life' (1929, p. 255). Human values and purposes need not, any longer, be dictated to us by any external power—be it the church, the state, the dictatorship of the proletariat, or custom and tradition. Rather, the success of science shows that human beings are capable of creating their own regulative standards out of their experiences, by subjecting the latter to a collective, democratically conducted inquiry. As we shall see, it is this prospect of 'purification' of traditional beliefs and a reconstruction of cultural values in a more rational and secular direction that Ambedkar retains from Dewey and finds a cultural ground for them in the teachings of the Buddha.

For Dewey—as for a host of non-Western reformers and internal critics of traditions including but hardly limited to Ambedkar and the dalits—there is nothing imperialistic or scientistic about interrogating the experiential knowledge of lay-people and non-Western cultures against the findings of modern science.[17] A Peircian pragmatist in his philosophy of science, Dewey judged the validity of science not by antecedents or origins but by consequences, judged not by accuracy of our representations of nature, but by success in predicting and controlling the course of nature. A naturalist in conviction, Dewey saw modern science as a continuation of natural rationality of human beings, in all historical epochs and in all cultures, with the difference that modern science had learned not to stop inquiry prematurely, but to make productive use of doubt. Science had institutionalized doubt by converting it into a positive ethic—what he calls 'scientific attitude' or 'scientific temper'—of constant inquiry of all situations that become problematic in the course of human intercourse with nature and with each other.[18] There was nothing 'privileged' or scientistic about scientific temper in Dewey's view, for he, like his fellow pragmatists, saw it not as a special attitude or method of scientists and experts, but only as a more systematized version of an attitude shared by *all* people when they engage in inquiry.[19]

Rather than take the experience of the subaltern (or of *any* other group) as a vantage point for creating new rules of inquiry, Dewey would call for extending the hypothetical stance of science to *all* 'primary experiences' of *all* social groups alike, so that they are

transmuted into 'secondary experiences', that are 'purified' and 'enriched' by a process of systematic doubt and 'regulated, reflective inquiry' by a democratic community of inquirers (see Dewey, 1929). Rather than treat everyday experiences, material practices and emotions as knowledge-experiences, or as at least relevant to belief formation, as feminist epistemologists do, Dewey insisted that these primary experiences need the aid of systematic inquiry in order to understand the connections and interrelations between the various objects of our experience. The objects and phenomena we encounter in our primary experiences are 'gross, crude and experienced as a result of minimum of incidental reflection' which are turned into 'more refined, derived objects' of secondary experience which '*explain* the primary objects, enable us to grasp them with *understanding* instead of just having a sense contact with them' (1929, p. 5, original emphasis).

Scientific inquiry can have this purifying and enriching result because it routinely does what feminist and social constructivist critics claim cannot be done: that is, it helps inquirers separate and differentiate between their beliefs caused by 'things being so,' and other beliefs caused by 'habit, weight of authority, imitation, prestige, instruction and the unconscious effect of language' (1929, p. 14). Science, Dewey continues in *Experience and Nature*, helps to 'de-personalize and de-socialize objects' of nature and in the process, emancipates the human imagination from the weight of social conventions. In a stark contrast to the critics we encountered in the previous section, who see scientific facts to be inseparable from social conventions, Dewey views the growing separation between social conventions and scientifically warranted facts of nature as the hallmark of scientific inquiry.

This purification of experience in scientific inquiry works by the same experimental logic of evaluation that Dewey proposes for ethics and morality. On a Deweyan understanding of science, we bring values we learn from our varied experiences in all aspects of our lives into construction of scientific facts, but our values themselves can be, and must be, warranted as any other judgement of fact. Or as Hilary and Anna Putnam (1990, p. 410) put it, 'any valuing can be evaluated', using the same laws of logic whether we are reasoning about an ethical question, or about a question in physics, or in history or any other field. Values, on Dewey's account, are not given to us by gods, nor are they mere individual whims or social conventions. Rather values are ideas that guide conduct (e.g. feminist values to seek complexity guide how an experiment will be designed) and in that capacity, they are means to solving a problem. They can therefore be rationally assessed in terms of their success or failure in solving the problem adequately. Thus, it should be an empirical question whether or not the values women, non-Western people and others derive from their experience of marginalization do indeed make for more rational means of conducting scientific inquiry.

The very idea that values can be rationally assessed highlights one crucial difference with the critics we encountered in the previous section. For feminist and others influenced by social constructivism, knowledge of facts presupposes social and cultural values. Dewey and other pragmatists accept this feminist insight, but add that knowledge of values, simultaneously presupposes facts of nature.[20] Dewey is an 'unlimited naturalist', to use Maffie's term (1990), because he treats both epistemic values (i.e., norms of inquiry) and meta-epistemic values (i.e. goals of inquiry) as amenable to rational evaluation using the established methods of natural science. This Deweyan naturalism is elaborated upon by Laudan (1996), a fellow unlimited naturalist, who treats epistemic values as 'hypothetical imperatives': they hypothesize

effective means for realizing cherished ends (Laudan, 1996, pp. 132–133).[21] Given that underneath the great cultural variety of beliefs and ways of knowing, all cultures do cherish, and try to maximize the reliability of their beliefs (Maffie, 1995, also Laudan, 1990), modern science does provide methods that have proven their reliability and can be used to assess the reliability of other methods favoured by other cultures.

As we will find in the following sections, Ambedkar clearly shared Dewey's faith that scientific knowledge about the natural world cannot remain limited only to specialized, technical fields but must influence the values and purposes of social life. He was drawn to science precisely because of his Deweyan belief in the possibility of rational evaluation and reconstruction of moral and ethical values. The stakes were much higher for Ambedkar. As a member of a community that had endured grave injustices legitimized by an objectively false understanding of nature's laws, Ambedkar saw cultural demystification as the first priority for any progressive social change in India. It is to Ambedkar's Deweyan Buddhism that we now turn.

3. *Ambedkar's 'Music in the Storm'*

> You took on the world
> You played with fire
> You played us music in the storm, (from 'Ambedkar: 1978. Equality for All, or Death for India', by Namdeo Dhasal (Zelliot, 1994))[22]

14 October 1956 holds a special significance for the dalit community in India. On that day, Bhim Rao Ambedkar, by all accounts the most influential dalit intellectual of the 20th century, publicly renounced Hinduism and converted to Buddhism. He was not alone in this 'rebirth' as he himself described it: close to half a million of his caste members accompanied him that day in taking the vows to stop praying to Hindu gods and to abide by the Buddha's teachings.[23,24] Ambedkar died shortly afterwards. He is reported to have spent his last hours on this earth putting the finishing touches to *Buddha and His Dhamma*, published posthumously, translated into Marathi and Hindi, and accepted as a sacred book by neo-Buddhists in India.

Ambedkar's turn to Buddhism came at the end of a long quest for a faith that would allow him to anchor his spirituality in a worldview that did not denigrate his community's humanity. Turning to a reconstructed Buddhism was for him a necessary step toward destroying the metaphysical and cosmological gloss the core values of Hinduism put on hierarchy and natural inequality. His American experience and his Deweyan scientific temper, along with the anti-caste struggle of other low-caste rebels who had gone before him, all led him to the Buddha.

The biographical details are well documented.[25] Ambedkar was born in the lowly Mahar caste in the Western state of Maharashtra in 1891. Mahars were general-purpose village servants whose caste-duties included cutting wood for cremation, removing dead cattle, washing wells, delivering messages over long distances, among other things. The touch of a Mahar was considered polluting, and they lived in segregated areas.

As the British did not observe caste, they had no hesitation in making use of caste divisions to serve their own interests.[26] In the process, they unintentionally opened up avenues of education and employment (e.g. soldiers, cooks, waiters etc.) that used to be closed to the lower castes. Given the general-purpose nature of their caste duties, the

Mahars were accustomed to trying out new occupations. As a result, a large number of Mahars enlisted in the British army.

Ambedkar was born in one such family. The army connection secured him an education in English, even though in segregated settings, complete with all the indignities reserved for his caste. He showed promise as a student. With financial help from an enlightened local royal, he was able to go to college first in Bombay, and later in the USA at Columbia University and in England at the London School of Economics.

Ambedkar spent three years (1913–1916) at Columbia University, where he worked for his PhD in economics. He seems to have availed himself of courses offered by 'as many top ranking professors at Columbia as he could, whatever their field', including Dewey, Edwin Seligman, James Harvey Robinson and Alexander Goldenweiser who gave him a 'broad and deep exposure to an optimistic, expansive and pragmatic body of knowledge' (Zelliot, 1992). But it seems that Dewey was the closest to a *guru* Ambedkar had: he not only followed his ideas all his life but, according to his wife, Savita Ambedkar, 'happily imitated John Dewey's distinctive class room mannerism—thirty years after he sat in his classes' (Zelliot, 1992, p. 79–85). (Columbia University acknowledged the contributions of its worthy alumnus and conferred an honorary doctorate on him in 1952. Last year, the university installed a bust of Ambedkar on campus.) It is not known, however, if Dewey was aware of the influence he had on Ambedkar, and through him, on the lives of millions of distant strangers. As far as I have been able to ascertain, the two were not in any direct communication, although there is some evidence that Dewey took sporadic interest in the anti-colonial struggles in India. After his Columbia years, Ambedkar went on to obtain a DSc from the London School of Economics and passed the bar exam, returning to India for good in 1923.

For more than a decade after this return, Ambedkar remained optimistic that political and economic changes—access to education, right to vote etc.—would suffice to integrate the lower castes into the national mainstream. Ambedkar, in other words, did not start out with the religious question. Like most other left-leaning social reformers of his day, he gave primacy to structural reform, expecting the religious and the cultural realms to fall in place. But the bitter struggles of untouchables to exercise their right to drink water from segregated village wells (the famous civil disobedience at Mahad), their right to enter Hindu temples hitherto closed to them (temple-entry movements of Pune and Nasik[27]) and his bruising debate with Mahatma Gandhi over the question of separate voting rights for outcastes (the famous Poona Pact of 1932 in which Gandhi prevailed) all led him to a realization that advancement of the untouchables was impossible without a prior reform of the core values of Hinduism. His disillusionment with Hinduism, and with largely upper-caste nationalism of Congress party which put political emancipation from the British above any urgency for internal social reform was complete by 1935 when he first declared his intent to renounce Hinduism. 'I was born a Hindu, but I will not die a Hindu', he is reported to have told Mahatma Gandhi. Whereas at the time of Mahad civil disobedience in 1927 (where he famously burnt the *Manusmriti*, a sacred Hindu law-book that prescribes draconian punishments for breaking caste rules), Ambedkar believed that by uniting all Hindus in one caste the untouchables were 'rendering the greatest service of the Indian national and the Hindu community'. By 1935, he was urging conversion to secure freedom from the Hindu community: 'Our aim is to gain freedom. To reform the Hindu society is neither our aim nor our field of action' (Ahir, 1997, pp. 4, 19). With

this disillusionment, his quest for a new faith that can anchor his values of 'liberty, equality and fraternity' began in earnest. Given his deeply religious temperament, Ambedkar could not bring himself to turn his back on religion, the course taken by the non-Brahmin, self-respect movement of Periyar in south India, and recommended by most Marxists. Ambedkar's quest ended, 20 years later, with his conversion to Buddhism.

What does this religious conversion have to do with questions regarding the place of science and scientific temper in social life—questions that we are interested in exploring in this paper? The short answer is *everything*, because Ambedkar's Buddha was reason and scientific method sacralized. In order to appreciate the centrality of reason and naturalism in Ambedkar's reconstruction of the Buddha, it is important to understand the philosophical source of his disillusionment with Hinduism.

In his short and bitterly angry book, *Annihilation of Caste* (1936), Ambedkar asks why upper caste Hindus tend to treat their fellow beings with aversion, refusing participation in the 'associated activities' in everyday life—eating together, living together, working together, praying together, marrying into each other's families? His answer: they shun social intercourse with fellow human beings not because they are 'inhuman or wrong headed … but because they are deeply religious' (1936, p. 111). The myriad hierarchies and taboos of caste have the 'sanctity of the *shastras* [Hindu scriptures] … people will not change their conduct unless they have ceased to believe in the sanctity of the *shastras*' (p. 112). The real enemy, Ambedkar declares, 'is not the people who observe caste, but the *shastras* that teach them this religion of caste' (p. 111).

Ambedkar launches a bitter attack on Gandhi's reformist attempts to just say no to untouchablity, while publicly *praising* the divinely sanctioned *chaturvarna* (the four basic varnas or castes) as a source of harmony and community, an antidote to the West's individualism.[28] Ambedkar argues that untouchablity is not an aberration of Hinduism that can be rooted out by good works, moral exhortations or new legal codes. Rather, untouchablity is a logical corollary of Brahmanical Hinduism's peculiar understanding of nature and its laws, namely the law of karma. For Hinduism, karma is a theory of cause and effect that transfers causation from the realm of consciousness/spirit to the realm of nature/matter and vice versa: thus immoral karma in this and/or past lives ('karmic crimes') activate different proportions of five elements of nature ('gunas') in each person that make him/her innately more or less pure.[29] Ambedkar arrives at this understanding of hierarchy as built into Hinduism's central dogmas through an exhaustive study of Hindu philosophical ideas, both as they appear in the sacred texts and as they circulate at the popular level.[30]

Given how Hinduism naturalizes and, at the same time, sacralizes inequality, Ambedkar argues, removal of untouchablity will require a 'notional change … a change in the state of mind' (1936, p. 111). But the law of karma occupies the same explanatory status in Hindu epistemology as a bona fide law of nature. Because the famously non-dualistic Hindu ontology does not separate matter or physical nature from spirit or the moral realm, actions in the moral realm are admitted as eliciting equal reactions in the physical realm. Thus, assorted 'karmic crimes' can bring about anything from birth as an untouchable, to natural disasters as earthquakes, floods, droughts, disease etc. This peculiar nature of Hindu metaphysics, which rationalizes injustices and misfortunes as the natural consequence of the workings of laws of nature, led Ambedkar to an appreciation of scientifically justified laws of nature that can challenge the Hindu ontology.

There are two aspects of Ambedkar's call for annihilation of caste that are of great relevance to our engagement with the contemporary critics of science. One, in a

complete refutation of those who condemn science and the Enlightenment as Eurocentric and colonial, Ambedkar was making a classic case for an Enlightenment-style critique of religious reason in India. He expressly and repeatedly invoked the ideals of the French Revolution—'Liberty, Equality and Fraternity'—as the suitable ideals for democratic movements in India. What is more, like the *philosophes* of the French enlightenment, Ambedkar strove to give primacy to scientific reason as the new standard for a 'constant revision and revolution of old values' (Ambedkar, 1936, p. 132). Far from non-Western culture valuing their own values over the value-freedom of science, as Harding claims, Ambedkar is unequivocal in his preference for the truth-enhancing values and methods of modern science of Galileo, Newton and Darwin, which he thought were fully commensurable with the teachings of the Buddha and the ancient non-Vedic materialists and sceptics.

He was not alone in this. Two other contemporary anti-caste movements—one led by Jotirao Phule, a 'touchable' but of backward caste, in Maharashtra, and the 'self-respect' movement, led by E. V. Ramasami (Periyar), in the Southern state of Tamil Nadu—had already emerged as a nucleus for an alternative form of nationalism which, unlike Congress, demanded not just freedom from the British, but also freedom from internal, homegrown oppressions. This is not the place to expand upon the historic connections between Ambedkar and these anti-caste movements.[31] What is relevant to us is the fact that modern science was understood by *all* these movements alike, not as just one among the many equally plausible ways to construct 'facts' about 'nature', but as a method that was an *advance* over the traditional Hindu epistemology, which assigned explanatory power to supernatural entities and forces that are in-principle unverifiable by human senses and reason. Indeed, Phule's high regard for natural philosophy and its use by radicals like Thomas Paine to challenge Christianity is well documented (O'Hanlon, 1985), as is Periyar's radical empiricism (Geetha and Rajadurai, 1998).[32] A *dis*enchantment of nature, *breaking* the continuity the divine spirit and the material, *separating* the real facts of nature from the dominant religious/cultural values were the urgent goals of these movements of the oppressed—all contrary to de-differentiation and wholism that the contemporary critics of science rate so highly in the name of the oppressed.

Secondly, at no point in his writings Ambedkar romanticized the experience of his fellow Mahars or any other oppressed caste, gender or tribe as a source of superior knowledge. His entire project was motivated by a great empathy and love for his long-suffering community, but this love never turned into a romance. The 'monster of caste' crosses *everyone's* path alike, every which way you may turn: 'you cannot have political reform, you cannot have economic reform, unless you kill the monster [of caste]' (Ambedkar, 1936, p. 5). Unlike some who claim that dalits' experience of oppression has made them egalitarian and non-patriarchal, entirely free from all Hindu legitimation of hierarchy (see Deliege, 1999 for a review), Ambedkar recognized that the experience of oppression has *also* left them deformed and in need of repair: 'tolerance of insults and tyranny … has killed the sense of retort and revolt. Vigor and ambition have completely vanished from you. All of you have become helpless, unenergetic and pale. Everywhere there is an atmosphere of defeatism and pessimism' (Ahir, 1997, p. 17). While he acknowledged that centuries of caste oppression gives the untouchable community a greater objective interest, than any other community, in annihilating rather than modernizing caste, he never forgot that untouchables had *also* internalized the Hindu world-view that naturalizes hierarchy, that they *also* recognized the distinctions of caste.[33] Indeed, that was one of

the reasons why he felt that socialism in India was not possible without a prior rationalization of social consciousness of the working classes (Ambedkar, 1936, p. 74), a position which put him at odds with both the Marxists and Gandhians.

On Ambedkar's account, the group interest of dalits in emancipation from social hierarchy gives them a greater urgency and a greater motive than any other social group in India to appropriate science, to learn its methods and its content and to give it a liberatory meaning by bringing it to question the ontological claims of Hinduism. Dalit interests, in other words, lead them not into a quixotic search for their own science that affirms their experiences and their values, but toward giving new emancipatory meanings of the sciences we have.

To summarize this section, Ambedkar answered the classic question facing all revolutionaries 'What is to be done?' with a bold call for annihilation of the worldview that allows and justifies caste. To accomplish this task he constructed a Deweyan Buddha.

4. *Ambedkar's Deweyan Buddha*

> Be your own guide
> Take refuge in reason
> Take refuge in truth. (The Buddha's last words, as interpreted by Ambedkar)

Ambedkar's Buddha teaches how to bridge the gap between facts and values, between how we know about the world we live in, and how we treat our fellow beings. In a statement that recurs throughout his speeches, interviews and writings, Ambedkar presents the Buddha as teaching *prajna* (understanding, as against superstition and naturalism, as against supernaturalism) in order to create bonds of *karuna* (love) and *samata* (equality). Of the three, prajna is central for without it, the other two can falter. Thus Ambedkar's Buddha teaches that 'the path of all passion and all virtue ... must be subject to test of prajna or intelligence, ... because without intelligence, generosity may end up demoralizing and love may end up supporting evil' (Ambedkar, 1957, p. 30). In more distinctively Deweyan terms, Ambedkar saw the Buddha as a prophet of a scientific ethos which, if given a chance to take root, can help create a civic culture that respects the fundamental values of 'liberty, equality and fraternity'.

It is how Ambedkar understands prajna and the centrality he assigns to it for democratic change where Dewey's presence is most palpable, and also where Ambedkar stands in stark contrast to all contemporary advocates of 'alternative epistemologies'. In *Annihilation of Caste* (henceforth *Annihilation*), written some 20 years before his magnum opus, *Buddha and his Dhamma* (henceforth *Dhamma*) he had already explicitly evoked 'Prof. John Dewey, who was my teacher and to whom I owe so much', to define his project of fostering 'notional change' through reflective thought.

Briefly, in *Annihilation* he urges his fellow Indians to forego the quest for certain and absolute knowledge of the ultimate Truth of Being, the kind of knowledge idealized by Brahmanical Hinduism. In words that distinctly echo Dewey's (see note 5), he proposes a new ideal of knowledge which embraces change, and which will learn to constantly revise all that is taken as settled. His argument is worth quoting in full:

> the Hindus must consider whether time has not come for them to recognize that there is nothing fixed, nothing eternal, nothing *sanatan* [sanskrit for eternal]; that everything is changing, that change is the law of life for individuals as well as for society. In a changing society, there must be a constant revolution of old values and the Hindus must realize that *if there must be standards to measure the acts and men, there must also be a readiness to revise those standards*. (p. 132, emphasis added).

Ambedkar bases his call for transvaluation of values on two long quotations from Dewey (without citing the source) to the effect that it is our duty '*not* to conserve and transmit the whole of our past achievements, but only as much as makes for a better future society' (p. 131) and that we should not make 'the past a rival of the present, and the present a more or less imitation of the past' (pp. 131–132). The contrast with underdog epistemologies is clear: inherited values are to be critically examined, not 'privileged' as sources of better truths.

What will break the spell of the *sanatan* or the eternal is reflective thought, which Ambedkar understands in a classic Deweyan manner. Most of our life is unreflective and habitual, he says. Only a situation that presents a dilemma forces us to reconsider our habits and the philosophical assumptions that support those habits (p. 121). He cites caste Hindus travelling in railway trains where it is impossible to maintain the customary caste distinctions as an example of such a dilemma. There are two ways, Ambedkar says, to deal with this crisis that modernity has engendered. One way is to follow what the Brahmanical scriptures commend, that is, to consult first the Vedas (the revealed knowledge), then the smritis (the law books) and only then sadachar (customary morality). This traditional 'solution' only legitimates a schizophrenic life in which 'a Hindu' accepts the modern technological conveniences like train travel, but then comes home and undergoes a *prayaschit*, or repentance, for breaking caste prohibitions. Following traditional values in a modern world will force 'a Hindu … to break caste at one step and to observe it at the next, without raising any questions' (p. 121).

Ambedkar is highly prescient here. Keeping the modern world of science limited only to technological gadgetry, but isolated from the values that guide the inner life and social ethics is now recognized as the major mechanism for the remarkable survival and continuity of traditional values in India (Singer, 1972; Roland, 1988). Although most Indians (at least in urban areas) no longer come home and do penance for breaking caste rules, compartmentalization of things scientific for the outside life of work, and traditional virtues (including caste and all the cultural baggage they carry) for the domestic life of marriages and friendships, life-cycle rituals remains widespread. Indeed, traditional 'virtues' are thriving with the aid of modern technology: information technology has made caste-based marriages easier to arrange, and horoscopes more 'exact' and easier to match. (Postmodern and postcolonial intellectuals who celebrate the survival of the traditional in the civil society, obviously don't wish to perpetuate caste prejudices. But they tend to hold the continued existence and growth of such traditional virtues a lesser evil than the breakdown of community caused by forces of modernity.)

Ambedkar's preferred solution to this compartmentalization of scientific knowledge and social values bears the stamp of Deweyan thinking. His solution calls for breaking down the compartments between the instrumental and ethical implications of science. Ambedkar argues for actively using the same scientific revolution that replaced the bullock-cart with a train to reshape the Indian society's understanding of natural laws and its preferred modes of fixing beliefs. He argues for the need to develop new principles of validating facts, and then using these principles to judge if

the traditional facts about the natural and social order are warranted (pp. 123–124). He accomplishes this in his interrogation in *Dhamma* of the traditional Hindu cosmology that treats karma—the sum total of good and bad deeds that that guides the immortal soul in its various rebirths—as a law of nature.

Before we look more closely at *Dhamma*, it may be useful to get a feel for this book. As mentioned before, this book serves as a holy book for Ambedkarite Buddhists, especially the more educated, urban Buddhists, and is used by them to solemnize marriages and births, etc. The book is written in the style of the Bible, with parables from the life and teachings of the Buddha, interwoven with Ambedkar's own interpretations. The parts where Ambedkar tells the story of Siddharth Gautama's renunciation and his Enlightenment are truly moving, and allow the humanity and earnestness of the Buddha as a young man to shine through. There are, however, parts where Ambedkar turns didactic and tries too obviously to put his own 20th-century spin on caste upon the Buddha. On these occasions, he is too rationalistic to satisfy theologians or even lay believers. In fact, some traditional Buddhists object to Ambedkarite Buddhism as blasphemy since it rejects the ideas of karma and rebirth, both of which are accepted by mainstream Buddhists. But one could argue that Ambedkar has applied the Buddha's injunction—to treat nothing as infallible and eternal—to the Buddha's own teachings and reinterpreted them for the contemporary world.[34] But in making the Buddha's historic rebellion against Brahmanical Hinduism contemporaneous, Ambedkar has remained faithful to the letter and the spirit of the original texts. The Buddhist scholar who translated Ambedkar's *Dhamma* from English into Hindi ascertained that, except for the part about the Great Renunciation, it is based upon classic Pali texts. The 464 references Ambedkar makes to Buddhist texts come from the Pali *Tripitaka* and *Dhammapada* (Ahir, 1994, p. 10) In other words, Ambedkar's Buddha is not a politically expedient fiction.

Let us now turn to the centrepiece of the Buddha's teaching, namely *prajna*, or understanding. Ambedkar presents the Buddha as giving permission to ordinary men and women, regardless of their station, to trust their experience over the authority of the learned Brahmins encoded in the Vedas and the Upanishads. At the same time, the Buddha encourages them not to treat even their own experience, at any time, as infallible and exempt from revision. As against the unchanging cosmic order of the Vedas and the Upanishads, the Buddha taught that *everything* is always changing and there is no continuous and coherent self that experiences an unchanging reality. To cling to the idea of permanence is the source of suffering, while cultivating an attitude of 'mindful contemplation' of the ever-changing reality is the way to master and overcome suffering. Ambedkar interprets mindfulness to mean that 'everything must be open to re-examination and reconsideration, whenever grounds for re-examination and reconsideration arise' (*Dhamma*, p. 89). A re-examination, backed by 'logic and proof', and conducted with a spirit of 'freedom of thought', will itself change what the inquirer will value: not the certain knowledge of ultimate reality, but reliable knowledge of here and now. The Buddha (like Dewey) offers a method, not a doctrine, as a source of enlightenment.

Ambedkar presents the Buddha's own renunciation and Enlightenment as nothing more than an exercise in *prajna*, with nothing pre-ordained or divine about them. In Ambedkar's retelling, Siddharth Gautama, the son of the chief of Shakyas, a north-eastern hill-tribe, turns his back on his family and on his tribe not as a fulfillment of a pre-ordained fate, as the Buddhist lore would have it, but as a conscientious objector to his caste duties. He prefers to renounce the world, than follow his duty as

a prince, which demanded that he fight a war against a neighbouring tribe. Ambedkar depicts him leaving home not in the dead of the night, stealthily, but openly, with a public affirmation of his pacifism, and in full consultation with his wife and his family. Not finding any of the existing philosophies helpful in explaining the cause of social conflict and suffering that he finds all around him, the young Siddharth resolves to 'examine everything for himself', to hold nothing as infallible and permanent, including the Vedas (p. 58).

First thing the novice renouncer looks for is a new way of understanding that will help him discover the source of sorrow. He wanders from guru to guru, learning the traditional practices of penance, meditation and asceticism, only to declare 'this is not the way to passionlessness, nor to perfect knowledge, nor to liberation' (p. 67). He stops mortifying his body, eats the famous bowl of rice pudding and through 'reason and investigation', aided by 'concentration … equanimity and mindfulness' (p. 75) achieves Enlightenment. His Enlightenment, in Ambedkar's retelling, amounts to discovery of a method by which to conquer the ignorance, the cravings and the hatreds that hold humanity in thrall.

In his first sermon at Sarnath, Ambedkar has the Buddha proclaim a rough paraphrase of the pragmatic maxim as a centrepiece of his Middle Path: 'you may ask, ye Parivrajatkas, why are these principles [of the Path of Purity] worthy of recognition as a standard of life', the Buddha asks. 'The answer to this question you will find for yourself if you ask, 'are these principles good for the individual? Do they promote social good?' (p. 123). This leads him to fashion a crude pragmatic maxim: if it makes no difference to our experience, it is meaningless (p. 257). The Buddha applies this rough and ready pragmatism to deny the existence of god, the immortal individual soul (atman) and universal soul (Brahma), and all supernatural forces (book III, part IV). Repeatedly, the Buddha refuses to answer any question about metaphysical matters, finding them 'not tending to edification' (p. 270). But the answers he does favour—those amenable to logic and proof, and those that also promote human well being—help him to radically redefine all the major conceptual categories of Hinduism of his time: purity (which simply becomes 'good conduct', p. 229), nirvana (which becomes 'control over passions through knowledge and understanding', p. 234), dharma ('energetic action', p. 239) and soul ('consciousness emerging from matter', p. 262). If there is one single commandment that the Buddha issues to his followers, it is to accept nothing—not even his own teachings—if it does not accord with reason and experience. This commandment recurs repeatedly, like a mantra, right through Ambedkar's *Dhamma*.

Ambedkar's most touching—and to some most controversial—reinterpretation remains that of the doctrine of karma. Buddhism, as is well known, rejects the idea of immortality of the soul, but accepts the idea of rebirth according to the laws of karma, which do not essentially differ from those of Hinduism. In the traditional Buddhist writings, the soul is simply replaced by unidentified immaterial constituents that carry over the traces of karma into the next birth. Thus, 'even though Buddhism rejects the existence of the soul, this makes little difference in practice, and the more popular literature of Buddhism, such as the Birth Stories (Jatkas) takes for granted the existence of a quasi soul which endures indefinitely' (de Bary, 1958, p. 92).

But Ambedkar seized upon this contradiction and asked: how can there be rebirth if there is no soul? Rather than take the traditional interpretations at face value, Ambedkar applies the Buddha's own pragmatic maxim to the contradiction. He argues that 'if there is anything that can be said with confidence [about the historical

Buddha] it is: He was nothing if not rational, if not logical. Anything, therefore, which is rational and logical, other things being equal, may be taken to be the word of the Buddha' (p. 351). Going by this interpretive principle, Ambedkar assumes that the Buddha would, if he could, agree with the findings of modern science. Thus we find Ambedkar committing the worst kind of presentism: he brings in the laws of Mendelian genetics and the laws of conservation of matter and energy to argue that karma cannot be inherited in the absence of the soul, and that all that is reborn is matter (pp. 329–344). Deny the immortality of the soul, Ambedkar interprets the Buddha as saying, you have to deny karma and rebirth, the latter decided by the karmic account of the soul's journey through all the past lives. Denuded of its metaphysics, and contained strictly within one life-time, karma simply becomes another name for humanism in the 'moral order rests on man's own actions and not on anyone else' (p. 243).

There is ample evidence that Ambedkar's turn to Buddhism was not a matter of political expediency: passages from *Dhamma* clearly show how deeply moved he was by the Buddha's humanity and kindness. But it is equally clear that Ambedkar is keen on finding and fore-grounding the social message of the Buddha. Thus prajna held a deeply political meaning for Ambedkar: it was the necessary first step toward the creation of a 'religion of principles' which free, equal and self-respecting people could practice, as against the 'religion of rules' which divides people, makes them cower in fear of unseen powers and robs them of an 'associated life' in the public sphere. Like Dewey in *A Common Faith*, Ambedkar is seeking to separate the religious attitude (the religion of principles) from its institutional trappings (the religion of rules). Prajna allows him to equate 'the cleaning of the mind as the essence of religion' (p. 105): a genuine religious attitude becomes simply to act mindfully, to act with consciousness and responsibility and not obey any rules laid out in advance.[35] He seems to believe, perhaps too optimistically, that once reason becomes the basis of a new morality, equality (*samata*) and fraternity/love (*karuna*) will follow. He had the Buddha's example before him. In a revolutionary break from the Brahmanical culture of his time, which limited access to the knowledge of Upanishads to a selected few, the Buddha made no distinctions of caste, class or gender. All were welcome to join his *sangha* (order) – and all came.

5. *The significance of Ambedkar's Buddha*

> If you meet the Buddha, kill the Buddha. (a Zen Buddhist commandment)[36]

Ambedkar's attempt to use the Buddha as a nucleus for scientific temper and a secular civil religion in India is revolutionary in more ways than meet the eye.

If, as Ambedkar observed, 'the history of India is nothing but a mortal conflict between Buddhism and Brahmanism',[37] then Brahmanism has had an upper hand in the civil society, down to the contemporary times. Ambedkar's turn to Buddhism is a valiant attempt to correct the imbalance. The new Buddhism, however, is not meant for neo-Buddhists alone. Its real significance lies in the challenge it poses to the cultural common-sense of the rest of the Indian society. In turning to the Buddha, Ambedkar is attempting to 'extend the reach of reason' into the moral sentiments of the Indian society at large, an Enlightenment-style *kulturkamph* that Amartya Sen (2000) has

recently argued for. Like his hero John Dewey, and like the philosophers of the European Enlightenment, Ambedkar is trying to make science relevant not just for new technologies, nor even for a new body of facts about nature, but for bringing about a change in the mode of thinking of the whole of Indian society. He is seeking a reconstruction of the conscious and unconscious taken-for-granted answers to questions regarding right and wrong, natural and unnatural, place of humans in the cosmos etc. Ambedkar's neo-Buddhism contains the seeds of Indian Reformation and Enlightenment rolled into one.

There is no doubt that a turn to Buddhism has given the ex-untouchables, especially those from Ambedkar's own Mahar community, a new self-confidence and a new culture, complete with less superstitious and simpler life-cycle rituals. Many autobiographical accounts (most recently, Moon, 2001) and sociological studies (contributions in Narain and Ahir, 1994) attest to the changes: replacing old idols, fasts and ceremonies with readings from *Buddha and His Dhamma* conducted by *anyone* with a short training as a Buddhist priest, an explosion of creative expression of new rationalist, humanist themes through song and poetry (Guru, 1997), and above all, a growing sense of self-worth and pride. According to Timothy Fitzgerald, a scholar of Japanese and Indian Buddhism:

> Buddhists have achieved a new identity, symbolized by their change of name. The new optimism is strongly connected to ideas about self-reliance, rejection of the old Hindu subservience and a rational approach to their own self-development. (1994, p. 20)

But all is not well. The ex-untouchables have found the Buddha, but they have not yet killed the Buddha. As Fitzgerald's field-studies (1994), and also the important study by Burra (1996) clearly show, the change in identity is not necessarily accompanied by a change in worldview, especially among the lower-income, rural neo-Buddhists. Their 'village Buddhism' (Fitzgerald's term) tends to make new gods out of the Buddha and Ambedkar and fit them into the Hindu pantheon. Old Hindu forms of idol-worship, ancestor worship and even the ideas of purity and pollution, directed at castes 'lower' than themselves remain widespread. Fitzgerald finds that it is the more educated, politically mobilized minority among neo-Buddhists who take the scientific temper of the Buddhist teachings into their lives.

Given that in India, it is not the bourgeoisie, nor the industrial working classes (those fabled carriers of modernity), but the deprived *castes* who stand to gain the most from a cultural revolution,[38] it is not surprising that Ambedkar's message should have taken hold of the imagination of dalits (notwithstanding its thinness among the poorer sections). Unlike in the West where the rising bourgeoisie took on the cause of the Enlightenment, the lower castes rallying under the flag of reason in India have no money, no institutional power, no social prestige. For this reason, Enlightenment in India requires a much greater input from secular intellectuals, than did similar movements in the 17th- and 18th-century Europe. Unfortunately, for a variety of complex historical reasons, mostly upper-caste secular intellectuals in India have had more sympathy either with the *anti-Enlightenment* strains of Western and indigenous social theory, or with the Enlightenment strains of Marxism which privileges class over caste relations. The necessary (although not sufficient) role of reason in bringing about a cultural revolution has not been fully appreciated by non-dalit, secular intellectuals (Nanda, 2001).

Even while Indian scholars wrote anguished tracts on the 'Orientalism' and 'violence' of modern science, they completely ignored Ambedkar's seamless fusion of the ideas of

John Dewey, the quintessential Yankee puritan, and the Buddha, the quintessential Asian philosopher. Ambedkar's Deweyan Buddha is a resounding affirmation of the universality of human aspiration for more truthful knowledge of nature in the service of human flourishing. Of course, non-Western people value their own cultural values, but it is simply not the case that they do not simultaneously value value-freedom, as Sandra Harding contends. What those at the bottom of non-Western societies are searching for is not an affirmation of their cultural values, just because they are 'their own'. What they seek is an affirmation of those aspects of their inherited cultural values that can help them gain some critical distance—which is another name for value freedom—from the values that have kept them in bondage. The life and the teachings of the Buddha are a living example that there has always been a reserve of scepticism and critical rationality toward dominant traditions in India. And the Buddha-Dewey synthesis is a living example that the veritistic traditions of premodern cultures are perfectly commensurate with the goals and methods of modern 'Western' science.

But the significance of Ambedkar's contribution goes beyond merely dispelling the postcolonial angst. His seamless blending of Dewey and the Buddha prepares the ground for recovering the pragmatic and naturalistic traditions that lie buried under the mystical idealism of Brahmanical trends in Hinduism. Recovery of these traditions and demonstrating their philosophical continuity with modern science offers a criterion for separating the core of authentic naturalist, rationalist traditions in Indian cultural heritage, from the Hindu fundamentalists' sham claims of 'scientificity' of Vedantic monism/non-dualism (see Feuerstein *et al.*, 1995 for a representative text).

Because the Buddha's pragmatism bears an uncanny resemblance with American pragmatism's anti-metaphysical bent, it may create a suspicion that it was smuggled into the Buddha's teachings by the America-educated Ambedkar. But there is good evidence that the historical Buddha was deeply influenced by anti-Vedic naturalist philosophies prevalent in pre-Buddhist India, that of Lokayata (literally, 'prevalent among the people') and Sankhya (literally 'reflection'), both of which had a strong anti-metaphysical and anti-Brahmanical bent. The non-Brahmin, lower-caste Lokayata philosophers were famous (or infamous, among the priestly castes) for insisting upon putting the teachings of the Vedas, including all the rituals and spells meant to bring about a desired result, to a 'test of practice' in everyday life. For the Lokayata 'that alone is true which proves itself to be so in practical life' (Chattopadhyaya, 1976, p. 235). Like their contemporaries in Athens before Socrates, the Lokayatas denied any notion of a self (i.e. consciousness or atman) over and above the material body, saw all consciousness as an attribute of matter itself, and tried to explain all observed phenomenon by natural laws: they admitted no God, no soul, no survival after death. It has been established that references to Lokayatas, both in positive and in critical vein, abound in early Buddhist texts (Chattopadhyaya, 1959, p. 47), including a quaint story of a sceptic who tried to detect 'a soul leaving a body by weighing the body before and after death'! (Werner, 1997, p. 115).

Likewise, there is evidence that Siddharth Gautama, before his Enlightenment, had studied with Sankhya philosophers in his own hometown.[39] The *original* Sankhya philosophy accepts non-sentient matter (*prakriti*) as the only and the first cause of all of nature, including sentience or consciousness (*purusha*) (Chattopadhyaya, 1959, p. 381). Like the Lokayata, Sankhya too holds that the regularities and laws of *prakriti* can be understood through evidence of experience in here and now. This position is in stark

contrast to that of the idealistic monism of Upanishads, which treats the *purusha* or the spirit as the first cause of all of nature, the latter having a status of mere illusion. True knowledge, the only kind of knowledge worth pursuing, according to these Brahmanical doctrines, is that of *purusha*, which being a part of the Absolute divine consciousness, is declared to be beyond the grasp of all mundane experiences of ordinary mortals.[40]

Thus, the pragmatism that Ambedkar highlights in the Buddha was always there in the Indian intellectual history. But—and this is crucial—it was always there as the repressed and the despised 'other' of the true, transcendental knowledge of the Brahmins. Time and time again, the mystic idealism of Brahmanism has ridiculed, absorbed and in other ways demoted the empirical, experimental understanding of nature as *avidya* or false knowledge before the transcendental knowledge of the spirit: 'Gods love the mystic', the *Satapatha Brahmana* taught, 'Gods are fond of the obscure and detest direct knowledge'. The available historical texts tell the grim tale of the victory of Brahmanism. All that we know of Lokayata comes from the scorn and ridicule that was heaped upon it by the exponents of Vedanta; Sankhya was forced to compromise with Brahmanism by gradually making consciousness (*purusha*) the cause of nature (*prakriti*) and by re-introducing thoroughly un-Buddhist metaphysical questions into the later Buddhism (Dasgupta, 1969; Chattopadhyaya, 1977). Transcendental knowledge, because it transcends mundane experiences accessible to ordinary people, remained strictly elitist. Indeed, the word Upanishads literally means 'secret knowledge', which was strictly denied to the unclean, 'once-born' castes.

The ideal of mystical over mundane, pragmatic knowledge has not changed much, even after India's encounter with modern science. Underneath the thin veneer of modernity in the public sphere, the traditional cultural codes survive in the private sphere and are gaining a new visibility even in the institutions of the state, schools and universities, the media and the police. (In April 2001, India officially instituted 'Vedic astrology' as a scientific discipline in colleges and universities.) Psycho-social (Kakar, 1981; Roland, 1988) and ethnographic (McKean, 1996) studies show high popular respect for mystical, magical knowledge of god-men, which is treated as the *really* real knowledge, as compared to the knowledge gained through ordering, categorizing and logical reasoning, as exemplified by scientists. Whereas the West rediscovered the naturalistic elements of its Greek heritage during the Renaissance and the Enlightenment, the Orientalist representations of India as essentially spiritual, combined with anti-colonialism led Indian nationalists to declare Vedantic idealism itself as a source of a more holistic science, superior in wisdom and insight than the 'reductionist' science of the West, a tendency that has now gained state backing under the Hindu nationalist government (Nanda, 2000). At no point in modern Indian history, have the fundamentally nature- and reason-denying assumptions of Vedanta been critically examined.[41] The trend in the last two decades, as discussed in section 1, has been to embrace the wholism of Brahmanical thought which—in a complete falsification of the actual history—is made to stand in for the standpoint of women and the oppressed.

It is this context that makes Ambedkar crucial for a refutation of the feminist and postcolonialist case for an alternative epistemology. True, a non-separation between subject and object, between body and mind, between reason and emotions is held up as an ideal in Indian traditions. But this is the ideal of Brahmanical Hinduism, which has legitimized the oppression of countless generations of men and women. True, the worldview derived from modern science is incommensurate with the basic axioms of the Hindu worldview, which gives primacy to consciousness as the creator and the

mover of matter. But this is the worldview that has for centuries discounted the ordinary sensory experiences of ordinary men and women and kept them in ignorance.

As his seamless weaving of modern science and the teachings of the Buddha shows, Ambedkar saw no incommensurability between the nature-endorsing and reason-affirming aspects of ancient Indian traditions and the ethos of modern science. He saw modern science only as a refinement and development of these nearly forgotten materialist and pragmatic traditions of the non-priestly, labouring castes in India. His Deweyan Buddha was a symbol of the unity of human reason and its still unfulfilled potential.

In conclusion, Ambedkar's embrace of Deweyan scientific temper turns all theories of alternative epistemologies on their head. Starting thought from the standpoint of the oppressed encourages the oppressed to embrace modern science. Modern science *is* the standpoint of the oppressed. They need not go chasing after any other emancipatory knowledge.

Notes

1. Dalits make up nearly one-sixth of India's billion people. B.R. Ambedkar was the first to use the word 'dalit' to describe his fellow untouchables: 'Dalithood is a kind of life condition which characterizes the exploitation, suppression and marginalization of dalits by the social, economic and cultural domination of the upper caste Brahmanical order' (quoted from Guru, 1998, p. 16). According to Guru, 'this mode of understanding implies an inherent denial of dignity, a sense of pollution within the framework of a theory of karma, justifying hierarchy'.

   Even though India's Constitution makes untouchablity a legal offence, the pollution line still exists in myriad forms. While a straightforward, unabashed and open imposition of high-caste authority has declined for the most part, upper-castes continue to feel a sense of entitlement to deference from the lower castes, especially the untouchables. For the state of dalits in contemporary India, see Human Rights Watch (1999), Mendelsohn and Vicziany (1998), Fuller (1996) and Srinivas (1996). The website http://www.ambedkar.org is another valuable resource for Ambedkar's writings, as well as commentaries by dalit intellectuals.
2. Eleanor Zelliot, the American scholar of dalit movements, goes the farthest in exploring Ambedkar's American experience. But even she gives it very little importance: 'American influence on Ambedkar really counted for very little. It is more likely that in those early years in America, his own natural proclivities and interests found a healthy soil for growth … and strengthened him in his lifelong battle for dignity and equality of his people' (Zelliot, 1992, p. 85).
3. For an overview of dalit intellectual activity, with a strong expression of concern with postmodernist tendencies, see Guru and Geetha (2000).
4. By now there is a large volume of critical literature that argues that the Nietzschean, postmodernist reading of Dewey made popular by Richard Rorty in his *Mirror of Nature* (1979) does not capture the spirit of Dewey or the rest of the pragmatists. Indeed, Rorty himself has acknowledged that his postmodernist Dewey is a ' hypothetical Dewey', and an 'imaginary playmate', who says the sort of things *Dewey would have* said had he made the linguistic turn (Westbrook, 1998, p. 128). See also Haack (1998a) for a critique of Rorty.
5. 'A philosophy of experience will accept … that social and moral existences are … in a state of constant flux. For the futile effort to achieve security and anchorage in something fixed, it will substitute the effort to determine the character of changes that are going on and … give them some measure of intelligent direction' (Dewey, 1955, p. 26).
6. For Dewey, everyday experience was also knowledge-experience but with a difference in the degree of scepticism: while 'the natural man is impatient with doubt and suspense … the scientific attitude is capable of enjoying the doubtful … scientific method is … a technique for making a productive use of doubt by converting it into operations of a definite inquiry' (Dewey, 1929, p. 228).
7. Stefan Collini (1988) offers four models of alienation that make for a good critic: the 'Persian visitor' model, the 'offshore' model, the 'lost tradition' model and the 'voice of the underdog' model.
8. In a previous essay, I have described this position of seeming generosity and open-mindedness to non-Western and other pre-scientific knowledge systems as 'epistemic charity' (see Nanda, 1998).
9. See Fuller (1997) for a sympathetic view of the postmodernist calls for re-enchantment of nature.
10. Robert Klee (1997, p. 179) distinguishes an activist wing of social constructivism. While academic constructivists are satisfied with simply pointing out the *social* in social constructivism, the activists stress the *constructivism* aspect.

11. Supporters of feminist standpoint epistemology agree that 'in order to count as a standpoint rather than a relativist "perspective" or an oppressive "ideology", it would have to establish itself as stemming from shared experiences of oppression' (Hirschmann, 1997, p. 87). But not *everyone's* shared experience of oppression would count: it has to be of those groups left behind by the dominant traditions of the West. Nancy Hirshman is quick to qualify that: '[an emancipatory epistemology] must include an understanding of (some group of) women's lived experience. Thus contemporary white men's claims of "reverse discrimination," for instance, fail to meet the criteria [for a standpoint] because they attend only to white men's experiences and interests' (Hirshmann, 1997, p. 87).
12. In her more recent reformulation, Harstock (1999, p. 239) only 'pluralizes but preserves' the basic idea that women's standpoint is that of interactionism and non-dualism.
13. In his well known essay, 'Objectivity, values and Theory Choice', Thomas Kuhn (1977) lists five values which scientists use to guide their judgments in choosing between competing theories: accuracy, simplicity, internal and external consistence, breath of scope and fruitfulness. Longino's (1996) list of feminist virtues includes: empirical adequacy, novelty, ontological heterogeneity, mutuality of interaction, applicability to human needs and diffusion of power.
14. Longino has progressively loosened the constraints of the existing community standards, allowing, in effect, chosen feminist/oppositional political values to serve as criteria for theory choice in science. In a 1993 publication, she argued for 'detaching scientific knowledge from consensus' (1993, p. 114) in order to make room for critical oppositional positions in mainstream science. In that paper she proposed that different 'subcommunities' in a given domain of inquiry be allowed to bring in their own models and metaphors that will allow them to 'map' the relations posited in these model onto some portion of the experienced world. This 'model theoretic theory of theories,' as Longino calls it, is meant to broaden the scope and function of science from mere prepositional knowledge to a map that allows inquirers to pick out those relations of the real world suggested by their models and background assumptions that are meaningful to them in their real life as gendered, embodied ethical persons. The point of this approach to knowledge is to allow different subcommunities to come up with different and incompatible maps of a domain that serve different and incompatible aims, without seeking consensus regarding one true story (1993, pp. 116–117). This approach, Longino admits, implies 'advocacy of subcommunities characterized by local standards' (117).

    In a bow to pluralism, Longino does not demand that the background assumptions/heuristic models of various 'subcommunities' should have passed through the social process of transformative criticism that she admits is the hallmark of science. It can be readily shown that many of the models and metaphors of subcommunities she herself allows in her later work (e.g. ecofeminists) and those that others allow using her work (e.g. Brazilian spiritism) have never faced the tribunal of transformative criticism she holds as necessary for ensuring objectivity in science. Yet, all of these are to be admitted as feminist and alternative epistemologies.
15. See also Joan Scott (1991) for a similar distinction.
16. A philosopher of science, Haack does not have much use for sociology, but her distinction between warrant and acceptance has close affinities with Max Weber's idea of 'elective affinity'. While Marx saw ideas as 'reflection' of class interests, Weber argued that different classes 'elect' (i.e. select, reinterpret, promote) those features of ideas with which they have an 'affinity'. Class interests do not determine the content of ideas, influence but their reinterpretation and popularization. For a good treatment of the importance of Weber for Third World intellectuals, see Sadri (1992).
17. For a recent statement of the importance of science for non-Western world, see the writings of Abdol Karim Soroush (2000), the 'Luther of Islam'.
18. Dewey defines scientific temper negatively 'as freedom from control by routine, prejudice, dogma, unexamined traditions, sheer self-interest' and positively as ' the will to inquire, to examine, to discriminate, to draw conclusions only on the basis of evidence after taking pains to collect all available evidence' (1955 [1938], p. 31).
19. See Susan Haack's reading of Charles Peirce's views on scientific attitude (Haack, 1998, chapter 3). I derive my understanding of the epistemology of American pragmatism from Susan Haack (1998a, 1999), Hilary Putnam (1990), Nicholas Rescher (2000), Larry Hickman (1998) and Steven Rockefeller (1991).
20. I was very pleased to find this idea highlighted by Hilary Putnam (1995), a chapter I read while I was putting the finishing touches to this paper.
21. Even though Laudan only very rarely mentions Dewey, I read his normative naturalism as an operationalization of Dewey's ideas.
22. Quoted here from Zelliot (1994). Namdeo Dhasal, a well-known dalit poet, is one of the founding members of Dalit Panthers, a militant dalit organization founded in 1972.
23. Most of the converts, including Ambedkar, expressed a feeling of liberation and starting afresh after the conversion (see Ahir, 1994).
24. Mass conversions continued until his death. The 1951 census lists merely 2500 Buddhists in India. The number jumped to 3 million in the 1961 census, a 1671 percent increase (cited from Deliege, 1999).
25. See for example the recent book-length biography by Gail Omvedt (1994) who places Ambedkar in the historical context of the rise of democratic movements on the subcontinent. See also the short but pithy chapter on Ambedkar in Deliege (1999), although Deliege seems to under-estimate the man's religious impulse.

26. Even though they did not give ideological support to caste, the British did not actively oppose it either. Under the pretext of respect for local religion and customs, the British allowed the Brahmin priests to define social norms. See Aloysius (1998) for an interesting analysis.
27. Temple entry was never Ambedkar's priority. He nevertheless went along and allowed temple entry movements to use his name and prestige because he thought such movements served to unify the dalits politically.
28. Gandhi's defence of caste as fundamentally good, but only corrupted at the extremes, has remained the hallmark of all Hindu revivalist movements, down to the Hindu nationalist BJP that is currently in power. Even some spiritually inclined 'alternative development' movements, which have won accolades for their development efforts, staunchly defend caste order as communitarian, even while they try to include the lower castes in their development projects. The well-known Swadhyaya movement of Pandurang Athavale is an example of this tendency (see Little, 1995).
29. Arvind Sharma (1988), a vigorous defender of neo-Hinduism, describes traditional Hindu explanations for widowhood and sati (widow immolation) as consequences of women's 'karmic crimes'. For a scholarly treatment of philosophy of karma and its role in social life, see Keyes and Daniel (1983).
30. At least two volumes (volumes 3 and 4) of his collected works are devoted to this study.
31. Omvedt (1994) is an excellent source for understanding Ambedkar in his historical context.
32. O'Hanolan describes how mostly Protestant missionaries found some elements of Protestantism, the 18th-century Enlightenment and the developing sciences which challenged Catholicism useful in their a critique of Hinduism, and introduced these ideas in mission schools. But to their great chagrin, their Indian students used these ideas to reject both Hinduism *and* Christianity.
33. This is an enormously contentious issue. It is well established that the 'untouchable' communities are not free from caste prejudice. Ambedkar's own Mahar caste, for instance, looked down upon the Mangs, a caste supposedly even more polluted. But, by and large, those at the lower end of caste hierarchy do not accept the karmic explanations of caste, which blame the victim for their innate pollution. This has led some to claim that the notions of karma and dharma are irrelevant for understanding the dynamics of caste and that untouchables have a separate, egalitarian culture of their own, unpolluted by Brahmanical categories of thought. But autobiographical accounts and closer anthropological studies show that lower castes may not use ideas of karmic pollution/purity to explain *their own* position, but they use these ideas to differentiate those lower than themselves, and to express their sense of honour and status. For an illuminating review of the debate and a balanced position which shows the ambiguity of the untouchables vis-à-vis hierarchy, see Deliege, 1999.
34. See Queen (1994) for an argument for Ambedkar's *Dhamma* as employing Buddhist hermeneutics.
35. 'Doing what is good by virtue of a rule, and doing good in the light of a principle are two different things. The principle may be wrong, but the act is conscious and responsible. The rule may be right, but the act is mechanical. A religious act may not be a correct act but must at least be a responsible act' (*Annihilation*, p. 124).
36. From Karen Armstrong's *Buddha*. Armstrong's biography of the Buddha contains one of the most lucid and insightful description of his Enlightenment.
37. Quoted here from Omvedt: http://www. Ambedkar.org
38. I agree with Gail Omvedt that the worldview of caste is not merely super-structural, but plays a direct role in enforcing exploitation of labour. Omvedt writes: 'if we realize that the caste system both constitutes units of struggle (castes or *jatis*) and that rules of hierarchy and domination are essential to their constitution, then *the lowest castes have an inherent interest not simply in rising in the system but in overthrowing it*' (1994, p. 31, emphasis added).
39. Sankhya originated in the same northeastern region of the Indian subcontinent, now in Nepal, where the Buddha came from. Buddha's birthplace, a village called Lumbini, was located near the ancient town of Kapilvastu, the abode of Kapila, the original Sankhya philosopher. This same region is also the home to other proto-materialist religions of mother right and tantra. Chattopadhyaya (1959) hypothesizes a pre-Aryan origin of these ancient naturalist philosophies.
40. For an illuminating exposition of all varieties of Indian idealism, see the classic work of Surendranath Dasgupta (1969).
41. The exceptions are two well-known Marxist historians, Debiprasad Chattopadhyaya and D. D. Kosambi, both of whom were deeply influenced by Joseph Needham and J. D. Bernal. However, this tradition has run aground against the new 'radical' sociology of science. There is hardly any active research program in this pre-social constructivist tradition of science studies.

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Telling Otherwise: A Historical Anthropology of Tank Irrigation Technology in South India

Esha Shah

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Telling Otherwise

A Historical Anthropology of Tank Irrigation Technology in South India

ESHA SHAH

Once upon a time, Dannayakan Mudda, the king of the Vijayanagara kingdom, went around his domain to find out about the welfare of his people. When he passed by a village of Haragnur he felt that it was a beautiful place, suitable for the construction of a tank. After twelve years of worship, the Mudda convinced the deity of the local temple—Anjaneyyaswamy—to help him build a tank. The god modified the Mudda's plan, which would have displaced twelve upstream villages and twelve downstream villages, to shift only three villages upstream and three downstream. The people from these villages formed a new village which was then called Haragnur.

The Mudda employed Vodda[1] *laborers from seven villages for the construction, but informed Anjaneyyaswamy that he did not have the money to pay them. Anjaneyyaswamy instructed him not to keep any accounts of the Voddas' employment and not to pay them. It took several years to complete the construction of the tank. On the day of payment, according to the instruction of the Anjaneyyaswamy, the Mudda called the Voddas together and made small sand mounds on the ground in front of them. To each he gave a stick and instructed them to pass it through the mound in front of them. As per Anja-*

Esha Shah is a Research Fellow with the Institute for Development Studies at the University of Sussex in the United Kingdom. She is an environmental engineer turned social scientist whose research and teaching focus on anthropology and the history of science and technology, with a particular emphasis on agrarian development in India. She is grateful to many unnamed villagers for allowing her to participate in their lives. She extends her sincerest thanks to Shankarnarayana Rao, Annapurna Garimella, Nishanth Nagawara, and Subbanna, whose cultural and linguistic translations of the featured folk songs have fundamentally shaped the arguments presented in this paper. She also thanks Peter Mollinga for his comments on the first draft of this article, as well as David Mosse, Wiebe Bijker, and Rohan Desouza for their comments and suggestions. She is especially grateful to Paul Richards, for never allowing her to forget that her investigation of the labor organization associated with tank construction was dropped from her dissertation. Finally, she thanks the three anonymous referees, whose constructive comments considerably reshaped the argumentative boundaries of this article.

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1. The Voddas, known as tank builders, belong to a lower caste.

neyyaswamy's advice, the Mudda told all the Voddas who complained about finding only a ghughari *(a sweet made with wheat and coconut powder) as their payment that this was because they had not worked hard enough, with both physical and mental devotion. Had they worked hard, they would have received instead a gold coin as per the god's wish.*

The tank was completed, but it did not receive enough water to fill it. The Mudda started to worry and again contacted the god. This time Anjaneyyaswamy said that the tank needed a human sacrifice and decreed that seven daughters of a family in the nearby village should be sacrificed in the tank. The father was contacted and, after some persuasion, agreed to sacrifice his daughters for the welfare of the village. Accordingly all the daughters were taken to the embankment in a festive procession. After worshipping the god, they were asked to enter small rooms made in the embankment and the doors were shut behind them. An idol of the youngest girl is installed on one of the sluices of the tank. The girl is worshiped and called Kaneramma.[2]

— A folktale about a tank, as told by a temple priest to the author in 1999

They are ubiquitous. Agrarian landscapes in the south Indian state of Karnataka are dotted with thousands of tanks (irrigation reservoirs), and so is the landscape of memory—marked by stories, songs, and legends about the pre-modern past of tanks. While researching the contemporary transformation of tank designs for my doctoral dissertation, every other step in my exploration of the topography of tanks, particularly those located in the semiarid region of south Karnataka, met with a story or a song.[3] I sympathetically listened to them, was fascinated by them, often ignored them, and at times struggled to direct my interlocutors' attention to the here and now. The oral narratives on tanks, rich in human drama, emotions, stories of love, longing, sacrifice, murder, kings, gods, *gowdas* (village chieftains), and daughters-in-law first sounded exotic and otherworldly until I was faced with a powerful contemporary discourse on the status of pre-modern tanks.

This discourse, which surrounds the practice of tank rejuvenation and development in the present day, is powered by the idea of a great divide between modern and pre-modern knowledge systems. Tank irrigation technology in south India is several centuries old. The number of tanks built in the colonial and post-independence periods is almost negligible compared to the number of tanks constructed during the previous centuries. Having survived for centuries, tanks are considered a commendable example of the cultural and environmental superiority of traditional knowledge.[4] A num-

2. Folktales like this one often omit crucial details; here, it is not clear why the reservoir didn't fill. There might have been a number of technical or weather-related reasons, the most likely of which would be insufficient rainfall and/or runoff.

3. Esha Shah, *Social Designs: Tank Irrigation Technology and Agrarian Transformation in Karnataka, South India* (Hyderabad, 2003).

4. Studies asserting the superiority of traditional knowledge systems include Nirmal Sengupta, "Irrigation: Traditional vs. Modern," *Economic and Political Weekly* 20, nos. 45–47 (1985): 1919–38; Uma Shankari, "Tanks: Major Problems in Minor Irrigation,"

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ber of policy and academic studies operate on the assumption that tank irrigation fell from the heights of its pre-modern grace as a result of the intervention of colonial rule and the apathy of the post-colonial state.[5] Retrieval of this lost tradition and rejuvenation of community institutions are central pillars of the policy and practices of tank rehabilitation and development, which are funded by the World Bank and the European Union. The development discourse on the present and future of the tanks is thus intimately based upon the way the pre-modern past is imagined or constructed. This is troubling, because the imagined history of tanks used in development policy is not based on rigorous scholarly analysis.[6]

These two narratives—folk literature on the one hand and policy discourse on the other—are not only incomparable in form and content but are also incongruent images of pre-modern tanks. By situating these two different acts of retelling and memory, this article seeks to tell the story of tank technology *otherwise* than it has been presented in development discourse. Taking folk literature as a meaningful source and using it in conjunction with conventional (yet insufficient) evidence like temple inscriptions, this article offers a new way to investigate the history of pre-modern tanks in south India.

Recent scholarship has posed important challenges to the epistemological dominance of the European Enlightenment and Western science, technology, and modernity. This article responds to one of the most prominent

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Economic and Political Weekly 26, no. 39 (1991): A-115–25; Uma Shankari and Esha Shah, *Water Management Traditions in India* (Chennai, 1993); Somashekara Reddy, *Forfeited Treasure: A Study on the Status of Irrigation Tanks in Karnataka* (Bangalore, 1991); and T. M. Mukundan, "The Ery Systems of South India," in *Traditional Water Harvesting Systems: An Ecological Survey*, ed. Bhuban C. Barah (New Delhi, 1996). For reviews of indigenous knowledge of water management, see Nirmal Sengupta, *User-Friendly Irrigation Design* (New Delhi, 1993), and Anil Agarwal and Sunita Narain, *Dying Wisdom: Rise, Fall, and Potential of India's Traditional Water Harvesting Systems* (New Delhi, 1997).

5. For further discussion of the decline of tanks, see P. Tippaiah, *Study of Causes for the Shrinkage of Tank-Irrigated Area in Karnataka* (Bangalore, 1997); S. Janakarajan, "Characteristics and Functioning of Traditional Irrigation Institutions," *Management of Renewable Resources* 19, no. 12 (1989): 81–101; MIDS, *Tank Irrigation in Tamil Nadu: Some Macro and Micro Perspectives* (Madras, 1983); Shankari, "Tanks: Major Problems in Minor Irrigation"; Nirmal Sengupta, "The Rise of the Bureaucracy in Tamil Nadu: Water Control vs. Management," *Water Nepal* 5, no. 2 (1997): 125–35; and T. M. Mukundan, "The Ery Systems of South India," *PPST Bulletin* 16 (1988): 38. The post-independence state has likewise been criticized for neglecting indigenous irrigation resources in favor of modern irrigation schemes; see, for example, Agarwal and Narain, *Dying Wisdom*.

6. David Mosse traces the origin of the imagined tradition to colonial times; see Mosse, "Colonial and Contemporary Ideologies of Community Management: The Case of Tank Irrigation Development in South India," *Modern Asian Studies* 33, no. 2 (1999): 303–38. For further discussion of the political, cultural, and ecological meaning of water management and tanks, see David Mosse, *The Rule of Water: Statecraft, Ecology, and Collective Action in South India* (New Delhi, 2003).

offshoots of this criticism, that pre-modern or "outside of modern" technologies and ways of knowing form a counter-hegemonic challenge and even, as some would insist, a viable or desirable alternative to modernity. Among critiques of the violence of modernity, the concepts of local, indigenous, traditional, pre-modern, and Eastern knowledge have found wide currency.[7] These forms of knowledge and practice are claimed to be substantively, epistemologically, and contextually superior to modern science and technology. At the same time, scholars also freely associate them with other desirable traits, such as decentralization, democracy, bottom-up planning, and even self-organizing spontaneity. Much of this literature supposes that the superiority of pre-modern knowledge systems and artifacts originated in a superior cultural context, hinting at their social shaping. However, pre-modern knowledge systems and artifacts are often made into reified objects of virtue irrespective of their social and historical location.

In a similar vein, some of the influential scholarly works of our time give a powerful discursive space to the idea of the pre-modern. For example, James Scott, in his influential book *Seeing Like a State*, proposes the Greek concept of *metis* to compare the local, implicit, embedded, practical experience of knowledge with the abstract, general knowledge deployed by state agencies. Although Scott does not label this form of knowledge "traditional," his critique of the modern state and his deployment of the concept of *metis* are nevertheless based on an idea of the pre-modern. Scott writes that "[the] pre-modern state was . . . partially blind; it knew precious little about its subjects, their wealth, their landholding and yields, their locations and their very identity. It lacked anything like a detailed map of its terrain and people . . . as a result its interventions were often crude and self-defeating."[8] Another influential scholar, Stephen Lansing, proposes that a holistic cultural approach that is attentive to indigenous systems of order can solve many contemporary political predicaments. Calling it a "perfect order," Lansing argues that the centuries-old traditional system of the water temple in Bali achieved a balanced ecology without recourse to centralized state power. Balinese irrigation is ecologically hierarchical but socially democratic, which, Lansing suggests based on a simulation model, might have been developed through spontaneous self-organization. His work argues that this culture, with its deep roots in pre-modern times, is an alternative rationality to the pervasive economization of modern times.[9] Yet another

7. For a tenacious challenge to the divide between indigenous and modern knowledge systems, see Arun Agrawal, "Dismantling the Divide between Indigenous and Scientific Knowledge," *Development and Change* 26, no. 3 (1995).

8. James Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, Conn., 1998), 2 (quote).

9. Stephen Lansing, *Priests and Programmers: Technologies of Power in the Engineered Landscape of Bali* (Princeton, N.J., 1991). See also Lansing's latest book on the same subject, *Perfect Order: Recognizing Complexity in Bali* (Princeton, N.J., 2006).

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leading scholar, Sandra Harding, has posed probing questions about whether natural sciences are multicultural, and to what extent modern science has origins in nonmodern cultures. She proposes that indigenous and non-Western scientific traditions should be strengthened, re-valued, and integrated as a model for the global and democratic sciences of the future.[10]

Despite the counter-hegemonic discursive space ascribed to them in this scholarship, the fact is that we know precious little about pre-modern knowledge systems and, significantly, their social shaping. There are two dominant approaches to the history of the pre-modern knowledge systems of south India: the post-colonial historiography of science and technology, and the general historiography of early south India. The post-colonial historiography of science and technology is sometimes portrayed as a "second revolution."[11] Another scholar says that "a thousand flowers bloomed" on the landscape of post-colonial science and technology studies.[12] While a number of these studies raise significant political and historical issues with respect to technological change, they throw very little light on the social shaping of pre-modern knowledge systems—a subject that barely exists in its own right. Knowledge systems and artifacts of the pre-colonial era largely emerge in these studies at best as fragments or facets that serve either as a benchmark against which the level of pre-colonial civilization is measured or as a way of exploring and charting the transformations brought about by colonizers.[13]

Such studies largely approach pre-colonial science and technology with the quintessentially colonial question: What was the level of sophistication of "Indian knowledge systems" before the British conquest? Against the background of the European experience, pre-colonial Indian science and technology emerge as a mirror image of the one generated by the hegemonic project of the British, albeit turned upside down. The post-colonial answer to the colonial question—namely, whether Indian science and technology were sophisticated enough—invariably ends up being affirmative. However, the detailed mapping of the social context of pre-modern science and technology remains elusive.

The second approach to pre-colonial knowledge systems and artifacts is the rich historiography of early south India. Inscriptions on the stone walls,

10. Sandra Harding, "Is Science Multicultural? Challenges, Resources, Opportunities, and Uncertainties," *Configurations* 2, no. 2 (1994), 301–30.

11. Ibid.

12. Dhruv Raina, *Images and Contexts: The Historiography of Science and Modernity in India* (New Delhi, 2003).

13. Deepak Kumar, *Science and the Raj* (New Delhi, 1997); Ahsan Jan Qaisar, *The Indian Response to European Technology and Culture: AD 1498–1707* (New Delhi, 1998); Zaheer Baber, *The Science of Empire: Scientific Knowledge, Civilisation, and Colonial Rule in India* (New Delhi, 1998); Deepak Kumar, ed., *Science and Empire: Essays in Indian Context, 1700–1947* (New Delhi, 1991); and Claude Alvares, *Decolonising History: Technology and Culture in India, China, and the West from 1492 to the Present Day* (Goa, India, 1991).

pillars, and pavements of its temples are the most important textual sources that historians have used.[14] These inscriptions record the donations of land, money, and a variety of other articles to religious institutions (temples) in return for ritual and reproductive rights, and hence they are gold mines of information for historians. However, historical inquiry that focuses almost exclusively on inscriptions represents, in the words of a leading historian, "only a very small picture of a much larger universe of human activities."[15] Those who gave lavish gifts to religious institutions were the cultural, economic, and political elites of their societies. As James Heitzman argues, "inscriptions embody gifts of power."[16] Nonelites and those on the margins are largely absent in these records. Those who built the tanks—not those who invested in their construction, but those who actually used their labor and skills to construct them—are rarely given space in the inscriptional eternity of the temple walls.[17] Likewise, although some research suggests that temples were likely institutions for "storing" knowledge and that, indeed, the temples could have been one of the agencies involved in building tanks, the idea that the elite institution of the temple would have mastered artisanal skills for this end is unconvincing.[18] In general, the theoretical and intellectual issues most frequently debated in south Indian historiography concern models of polity and society. Scholars have been much less concerned (or not at all) with technology and technological change. The purely technical side of a technology—the "opening of the black box," as it is metaphorically called in science and technology studies—has been peripheral in south Indian historiography and has therefore yet to be widely explored.[19]

14. The number of temple inscriptions runs in the tens of thousands during the millennium before the colonial conquest.

15. James Heitzman, "State Formation in South India: 850–1280," in *The State in India, 1000–1700*, ed. Herman Kulke (New Delhi, 1997), 165.

16. James Heitzman, *Gifts of Power: Lordship in an Early Indian State* (New Delhi, 2001).

17. It is not rare to come across the "we know little" claim in south Indian historiography. For example: "The largest of these irrigation works must have involved labor forces in their construction," but "[w]e have a limited understanding of how these laborers were recruited" (Carla Sinopoli and Kathleen Morrison, "Dimensions of Imperial Control: The Vijayanagara Capital," *American Anthropologist* 97, no. 1 [1995]: 83–96); "There are inscriptional references to the demand for compulsory labour, [but] it is not clear whether this demand was imposed on all members of subaltern classes" (Ravi Palat, "The Vijayanagara Empire," in *Early State Dynamics*, ed. Henri J. M. Claessen and Pieter van De Velde [Leiden, 1987], 177). David Ludden also fleetingly mentions that "[coerced labor] was not unique to the nineteenth century and perhaps was also convenient during temple and tank construction over the centuries," but he does not provide any evidence; see Ludden, *Peasant History in South India* (Princeton, N.J., 1985), 82–83.

18. Carol Breckenridge, "Social Storage and the Extension of Agriculture in South India: 1350 to 1750," in *Vijayanagara City and Empire: New Currents of Research*, ed. A. L. Dallapiccola (Stuttgart, 1985).

19. One debate that touches on the question of technological change arose in response to Burton Stein, *Peasant State and Society in Medieval South India* (New Delhi,

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It is also important to point out that the historiography of medieval and early south India and the post-colonial historiography of science and technology are resolutely separate. Historians of south India have rarely engaged with post-colonial claims for the epistemological superiority of pre-modern knowledge systems. Similarly, post-colonial historians of science and technology often keep their distance from the complex picture drawn by historians of early south India. All in all, the post-colonial historiography of science and technology and the historiography of early south India both suffer from a striking lack of a socially contextualized and richly technical understanding of pre-modern knowledge systems.

As a result, claims of epistemic and cultural superiority—or even substantive equality—between pre-modern and modern knowledge systems involve, in the words of Shigehisa Kuriyama, "asserting comparability without even comparing." "The only way to advance," Kuriyama further suggests, in response to Harding's multiculturalism, "towards a genuinely pluralistic appreciation of knowledge in different cultures is actually to study cultures, earnestly, humbly, in detail, over a long time. By itself, the most thoroughgoing critique of western universalism contributes nothing."[20]

This article draws a partial picture of the social shaping of some aspects of tank technology in pre-modern times by using folk literature as a primary source, in combination with other textual sources. This approach does pose methodological problems. Engraved on the temple walls for eternity, inscriptions are beyond time and space in terms of their historical accuracy. Folk literature, on the other hand, cannot be fixed in time and space. Here, I treat folk literature not as an inviolate historical record, but as something that resonates with lived practices as embedded in memory. What is explored here is how people make sense of their past through oral narratives, what is remembered as a living imagination, and why and how the past is sedimented on the present.[21]

Invoking Paul Ricouer, this essay recovers an interpretation of tank technology as a collective memory to draw an alternative history of pre-modern technology that is not told otherwise. Ricouer, reflecting on the ethics of memory, argues that the exercise of memory is an exercise in

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1980), 29, in which he argued that the technology of south India had remained fundamentally unchanged for a thousand years. For a critique of his position, see R. Champakalakshmi, "Peasant State and Society in Medieval South India: A Review Article," *Indian Economic and Social History Review* 18, nos. 3–4 (1981): 411–27.

20. Shigehisa Kuriyama, "On Knowledge and the Diversity of Cultures: Comment on Harding," *Configurations* 2, no. 2 (1994): 337–42.

21. For further discussion of oral history, see Michael Kenny, "A Place for Memory: The Interface between Individual and Collective History," *Comparative Studies in Society and History* 41, no. 3 (1999): 420–37; Alistair Thomson, "Fifty Years On: An International Perspective on Oral History," *Journal of American History* 85, no. 2 (1998): 581–95; and Patrick Hutton, "Recent Scholarship on Memory and History," *History Teacher* 33, no. 4 (2000): 533–48.

telling *otherwise*.[22] He asserts that the establishment of any community involves acts and events of violence. Collective memory, then, becomes a kind of *storage* for violent blows, wounds, and scars. This production of collective memory involves not simply *factuality*, but more importantly, *exemplarity*, as it defines the lessons to be taught to future generations, lessons that revise the past. Following Ricouer, this article relates a story of victimization that is not sufficiently explored in the historiography of medieval and early south India and investigates it from the point of view of the forgotten sufferers by tracing the scars of violence retained in collective memory. This story of victimization counters the romantic images of collectivity harbored in the development discourse regarding tanks and thereby hopes to open up pathways for an alternative imagination of the future. Put differently, this article interprets the historical context of tank technology through collective memory, and in the process, it offers an alternative history of pre-modern technology.

Pre-modern Tanks: State, Technology, Society, and Labor Organization

The kingdoms in early south India between roughly the eighth and sixteenth centuries AD rose and fell on their ability to extract and sustain agricultural production, which in turn rested on the effective control of water. The practice of constructing and using tank irrigation systems started in the early centuries of the first millennium AD.[23] Technically speaking, a tank can be described as a miniature version of a large dam. Water is impounded behind an earthen embankment and is released through sluices into canals to irrigate land. Excess water from the reservoir is allowed to escape through waste weirs. Figure 1 provides a schematic diagram of the technical principles of these tanks. Figure 2 illustrates two typical tanks with long embankments. Tanks usually receive water from a seasonal rivulet, a drainage channel, a tributary, or a canal. Unlike large dams, tanks are almost never constructed directly on perennial rivers. Further, they are usually constructed in chains so that the overflow from an upstream tank forms the inflow into a downstream tank. In other words, although tanks are spatially dispersed, they are actually hydrologically linked. At present there are thou-

22. Paul Ricoeur, "Memory and Forgetting," in *Questioning Ethics*, ed. Richard Kearney and Mark Dooley (London, 1999), 9 (emphasis in original).

23. The earliest written records available on the construction of tanks date from the third century BC. The earliest record of a tank in south India refers to the tank that existed at Inamgoan, near Pune, in 1500 BC. See T. M. Srinivasan, *Irrigation and Water Supply: South India, 200 BC–1600 AD* (Chennai, 1991); G. S. Dikshit, G. R. Kuppuswamy, and S. K. Mohan, *Tank Irrigation in Karnataka: A Historical Survey* (Bangalore, 1993); and R. Gurukkal, "Aspects of Reservoir System of Irrigation in the Early Pandya State," *Studies in History* 2, no. 2 (1986): 155–64.

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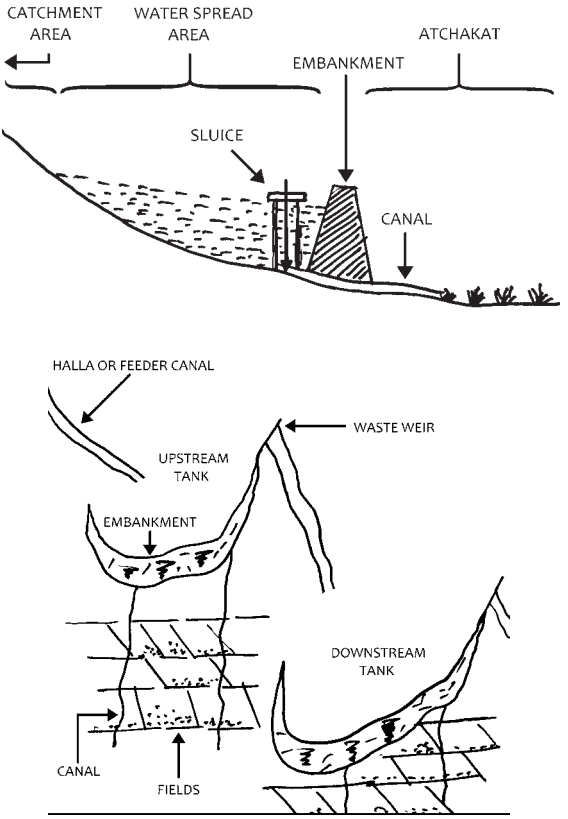

FIG. 1 The technical principles of tanks (not to scale). *Top:* cross-sectional view of a tank ("atchakat" refers to the irrigated area). *Bottom:* overhead schematic of two tanks in series. (Source: author illustrations.)

sands of tanks, irrigating anywhere from ten to a thousand hectares, scattered across south India. Roughly 38,000 are in the state of Karnataka alone, which, according to a survey done in 1986–87, supply 19 percent of the total irrigated area in the region.[24]

The period between the seventh and tenth centuries saw wider utilization and effective management of hydraulic technology in south India. This growth coincided with agricultural expansion, especially with the spread of irrigated rice paddy cultivation.[25] Tank construction reached its zenith dur-

24. These statistics are drawn from a survey conducted in 1986–87; see A. Vaidyanathan, *Tanks of South India* (Chennai, 1998), 6–7.

25. Organized forms of irrigation, such as short channels, seasonal dams, cisterns, sluices, and tanks, first emerged in the seventh and eighth centuries AD in Tamil-speaking south India. Before that, between the third and sixth centuries AD, rice paddy was

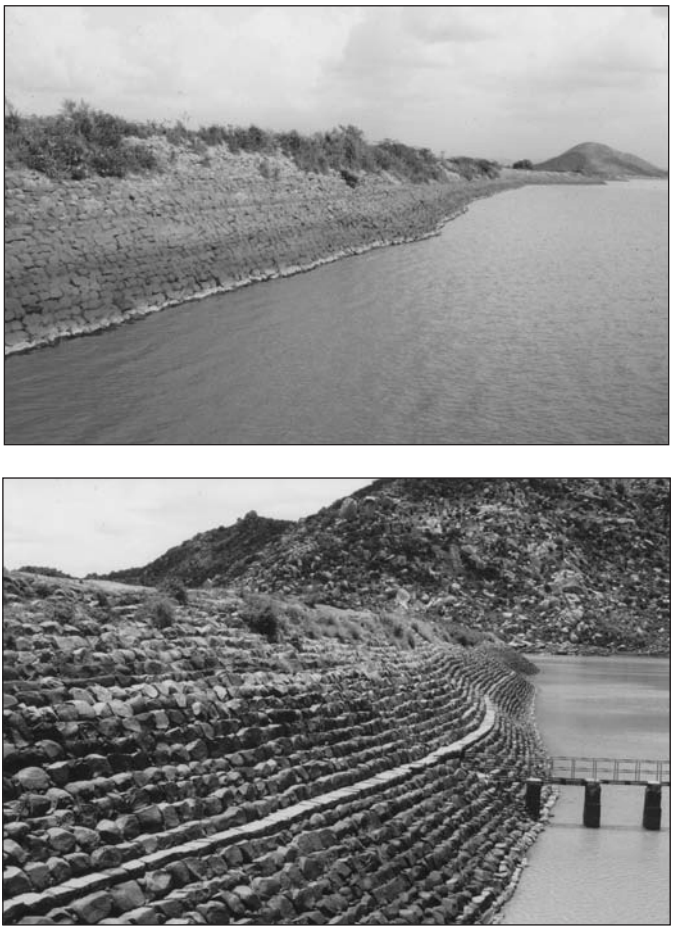

FIG. 2 Tanks with long embankments. (Source: author photographs.)

ing the Vijayanagara period (AD 1300–1750), when the tanks were expanded in upland regions across south India, particularly in the ecological areas that some scholars identify as "mixed zone" to distinguish them from other areas that were primarily wet or dry. These areas are considered marginal because they were less preferred for human settlement, and agriculture expanded to them only later.[26] Although different dynasties gave

cultivated in the lowlands by inundating fields with water diverted from rivers in various ways; see Ludden, *Peasant History in South India* (n. 17 above).

26. The historical literature on south India generally refers to three ecotypes: wet, dry, and garden (or mixed). Historians of the area argue that different ecotypes follow different courses of sociocultural history, and that the availability of water is a key determinant. For further discussion of the matter, see Stein (n. 19 above); Ludden, *Peasant*

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unequal priority to various locations, tanks and empire-building activities between the seventh and seventeenth centuries were primarily concentrated in the wet and mixed regions of southern and western Karnataka, corresponding to an expansion of rice paddy cultivation.[27]

Different dynasties ruled south India during the thousand-year period between the seventh and seventeenth centuries.[28] Some historians, however, argue that there existed a fundamental continuity during this time with respect to several important aspects of society and culture. Burton Stein called this a pyramidal, segmentary state, one that was integrated culturally but decentralized politically. It was religious and symbolic order, rather than military might, that bound the state together. In this pyramidal state, tanks and temples linked localities with central authority.[29] The period of the Vijayanagara empire, which claimed political hegemony over most of south India between AD 1300 and 1750, was marked by the expansion and intensification of agriculture, a process in which temples and tanks became linked together to create what Carol Breckenridge calls *social storage*.[30] Social storage involved two practices: creating tanks to store water for agricultural production, and using temples to collect, share, and redistribute agricultural surpluses, keeping some in reserve as insurance against hard times. Temples were at the helm of moral and economic transactions and provided an organizational framework for the creation and redistribution of agricultural surplus. The local elite (made up of institutions, corporate groups, and individuals) donated money and land to temples. These donations, or endowments, were used to construct irrigation networks and expand agriculture in the land granted to the temples. Part of the additional income generated by this expansion was offered to temple deities in accordance with donors' stipulations, and part was claimed by

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History in South India, 26; Heitzman, "State Formation in South India" (n. 15 above), 193; David Mosse, "The Symbolic Making of a Common Property Resource: History, Ecology, and Locality in a Tank-Irrigated Landscape in South India," *Development and Change* 28, no. 3 (1997): 467–504; and Breckenridge (n. 18 above), 50.

27. Shah (n. 3 above), chap. 2.

28. Historians of early and medieval south India have intensely debated three models of the state–society relationship: bureaucratic, feudal, and segmentary. While it is not possible to summarize the debate here, some of the key works relating to it include: Y. Subbarayalu, *Political Geography of the Chola Country* (Madras, 1973); Stein; James Heitzman, "Socioeconomic Formations in Premodern South India: Case Studies and Methodology," *Peasant Studies* 13 (1985): 47–60; Heitzman, "State Formation in South India"; Heitzman, *Gifts of Power* (n. 16 above); Ludden, *Peasant History in South India*; Sinopoli and Morrison (n. 17 above); Arjun Appadurai and Carol Breckenridge, "The South Indian Temple: Authority, Honour, and Redistribution," *Contributions to Indian Sociology* 10, no. 2 (1976): 187–211.

29. See Stein. Heitzman ("State Formation in South India"), following Stein, locates the agency of early state formation in the ecological and productive relationships within distinct ecotypes.

30. Breckenridge.

local elites as returns on their investments. Temples and tanks were therefore the backbone of social and agricultural expansion into the mixed zone.[31] Although the historical literature is thus rich when it comes to locating tanks within a certain social order, it rarely discusses the techniques and labor organization involved in tank construction.

The first evidence of who might have constructed the network of tanks comes from folk literature. Folk literature on tanks—stories, legends, and songs—originates from three sources. The first set of stories and myths I found were narrated to me by members of the artisan caste of Voddas, who are rarely mentioned in the inscriptional sources or in south Indian historiography but who figure prominently in folk accounts as tank builders. In the present day, Voddas no longer participate in tank construction; they are largely employed as menial laborers for road building, setting telephone lines and underground pipes, construction, stone work, and so on. They live in separate villages and are not closely associated with agricultural activities. The myths and stories remembered by Voddas are markers of their identity and thus are usually not associated with any particular tank. A second set of stories narrated by higher-caste farmers and temple priests, in which Voddas also figure significantly, are usually associated with specific tanks. The third type of folk literature consists of songs about the sacrifice of women in tanks, and these are usually sung during times of drought and water scarcity by Dalit women—formerly an untouchable, lower caste. Almost every tank in the semiarid region of south Karnataka has a story or a sacrifice song attached to it.

This literature depicts quite a different picture from the collective, communal project of construction some recent scholars assume. Instead, the labor for tank construction seems to come primarily from the Vodda caste. The stories narrated by higher-caste farmers and temple priests and the songs sung by Dalit women commonly describe the large number of Voddas employed for tank construction. For example, in the folksong "Kanne Viramba," a village chieftain invites seven hundred Voddas to build a tank. This song was sung to me by a group of Dalit women from the village Dannayakankere, which is located close to Hampi, the erstwhile royal capital of the Vijayanagara empire. In another such song, "Kere Hunnama," the chieftain enters into a lengthy and arduous negotiation with the leader of three

31. The social organization was slightly different in the upland areas, away from the fertile river valleys. Unlike in the mixed and wet zones, upland emperors granted the right to collect a share of the produce and taxes directly from the local elites, who had been recruited as royal officers or warrior chiefs called *nayakas*. In return, the local elites passed on a part of the surplus to the royal treasury and also contributed to and fought for the military establishments. Since the fifteenth century, when agriculture expanded to these marginal areas, the warrior chiefs competed to invest in local tank systems and asked for a direct share of the proceeds from the land in return for the military protection they provided to the cultivating communities.

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thousand Voddas.[32] Voddas from seven villages were invited to construct a tank in the story about folk hero Dannayakan Mudda narrated at the beginning of this article. A temple priest told me this story; however, the same folk hero also figures in the songs sung by Dalit women. None of the stories and songs suggests a collective, community-based construction of tanks.

While villagers' and temple priests' stories and songs clearly illustrate that Voddas built thousands of tanks over the span of several centuries, the Voddas' own narratives hint that they may have been under some form of coercion when they did so.[33] The recurring and central theme of the legends narrated by Voddas pertains to their grievances about not being paid, being paid inadequately, or receiving payments that have been disguised. The theme of Voddas making unreasonable or insatiable demands on their employers also recurs in other legends. One such story, recorded by a British ethnographer, goes like this:

> One sultry day, Siva and Parvati (a god couple) were walking upon the earth, when they got very hot and thirsty. The drops of perspiration which fell from Siva were changed by him into a man with a pickaxe and crowbar, while those falling from Parvati turned into a woman carrying a basket. The new pair of man and woman quickly sunk a well, and with the cooling waters god and goddess refreshed themselves. In gratitude, they promised the labourers certain gifts. The nature of the gift did not satisfy the man and the woman and both grumbled, which so incensed Siva that he cursed the pair and their descendants to earn their bread only by digging wells and tanks.[34]

In another story, the god offers the Voddas a disguised payment. Responding to the Voddas' pressing demand for payment, the god Siva hollows a measuring rod, fills it with gold coins, and gives it to the *maistry* (leader of a group of Voddas), who unwittingly pawns it in exchange for a *toddy* (a liquor). The god then plays another game with the unsuspecting Voddas. He buries a pumpkin filled with gold coins in the ground where the Voddas were digging. Noticing the raised mound caused by the buried pumpkin, they leave it untouched to show the depth of earth they had dug. A buffalo, which was grazing in the field close by, exposes the pumpkin, which the Voddas, unsuspecting of its contents, sell to a local shopkeeper. In these stories, Voddas present themselves as being eternally cursed by the gods: their situation is fated and not subject to changes in dynastic rule.

32. T. S. Rajappa, ed., *Kere Hunnamma Mattu Ittare Lavanigalu* (Bangalore, 1974).

33. The practice of some form of coerced labor seems more institutionalized in the stories that were told not by Voddas, but by the higher-caste farmers or by priests of local temples and in the folksongs now sung by the lower-caste women.

34. Paraphrased from Edgar Thurston, *Castes and Tribes of South India* (Bombay, 1909).

This folk literature describes characters and processes that resemble certain real people and practices of the Vijayanagaran era, as interpreted by traditional historiographic methods. Real-life historical entities masquerade as folk characters. For instance, the folk hero Dannayakan Mudda resembles the king of the Vijayanagara empire who constructed several important tanks around the royal seat at Hampi. The *gowda*—the village chieftain who either owns the village or has substantial rights over the produce from the village land—whose daughters or daughters-in-law are sacrificed in the tanks behaves in ways consistent with our understanding of the chieftains of the Vijayanagara period. Gods appearing as local deities like Anjaneyyaswamy can be read as the close involvement of local temples in the process of tank construction.

Various forms of these oral narratives point to the long-term continuity of the social and ideological context within which the Voddas' labor was extracted. There are indications in the historical literature on south India that the labor for construction activities was, in general, politically and ideologically controlled and even coerced by the elites since the early medieval period. What are still being debated are the nature and form of this forced labor. Should it be considered compulsory—labor extracted in lieu of tax payments, for example—or simply forced or coerced? For instance, Tejaswini Yarlagadda, in her study of inscriptions from the western Deccan (the heartland of tanks now located in the neighboring state of Andhra Pradesh), suggests that the practice of *visti*—the imposition of forced labor—began in the ninth century AD. The recipient of the land grant was given the right to impose forced labor and was provided immunity for doing so. Yarlagadda further observes that the frequency of the term *visti* in inscriptions increased in the period between the ninth and tenth centuries and disappeared in the period between the tenth and thirteenth. However, she argues, quoting other sources, that the disappearance of the term may be due to the commutation of forced labor into money payments and not to the elimination of the practice altogether.[35] Therefore both the folk and the historical literature provide strong evidence to suggest that tanks in the Vijayanagara period were not constructed collectively by communities. Instead, elites extracted the Voddas' labor through some form of coercion.

These aspects of labor organization in medieval south India are closely connected with the techniques of tank construction. The legends preserved by the elite and the Voddas reveal different aspects of the technical character of their work. While the legends of the elite retain detailed memories of negotiations over the locations of tanks, including how many villages were likely to be displaced by them, the Voddas' legends retain details about the

35. Tejaswini Yarlagadda, "Social Groups and Economic Change: 7th–13th Century A.D.," in *Social and Economic History of Early Deccan*, ed. Aparajita Parasher-Sen (New Delhi, 1993), 158–81.

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techniques and instruments used for their construction. For instance, Vodda legends describe the use of pickaxes, crowbars, rakes, and baskets—the four basic tools with which the vast network of tanks was created over the span of a thousand years. According to the legends, the drops of perspiration which fell from the god Siva were changed into a man with a pickaxe and a crowbar, while those falling from the goddess Parvati were turned into a woman carrying a basket. Folksongs such as "Voddar Boyi" and "Kere Hunnamma" lyrically describe the laborious process of "carving" a tank with just a rake and a basket. One wonders, however, whether these portrayals of a staggering number of tanks constructed all over south India using only rakes, pickaxes, crowbars, and shovels could be more symbolic than real.

Similarly, several generations of engineers since the British era have wondered about impeccably watertight tank embankments surviving for centuries without signs of post-construction settlement.[36] Puzzled civil engineers, both colonial and post-colonial, have imagined complicated procedures and sophisticated instruments to explain the technological character of tanks. They speculated that embankments were consolidated with sheep or goat feet (the method now used for consolidating large earthen dams involves a mechanically operated pestle made in the shape of a sheep's foot), or that builders used elephants for some of the large and important dams. Most engineers thought that the embankments were allowed to weather for a few seasons after construction before being filled, which would have ensured natural consolidation. While these speculations might be important, it is likely that neither giant elephants nor delicate sheep or goat feet, but rather the method of construction itself, guaranteed maximum watertightness and marginal post-construction settlement.

W. G. Bligh, a British engineer in charge of embankment construction in the Bombay presidency in the early years of the twentieth century, provides a description of a method of tank construction closer to the one depicted in the folk literature that he learned from local laborers during his tenure as an engineer. The method Bligh describes indicates that the entire embankment was constructed by progressively piling up soil into carefully made small basins filled with water. He explains how each layer of earth was thoroughly soaked to dissolve clods of dirt, so that the whole bank was composed of wet earth devoid of air spaces which did not require ramming or clod breaking. Consequently, when the tank was filled, there was no set-

36. The term *settlement* refers to the post-construction, subsequent shrinking of earthen structures caused by the slow elimination of the pores and voids that occur during construction. Because the process of consolidation or settlement is not controlled, and because it causes uneven movement of various structural parts, it could seriously endanger the safety of the structure. Post-construction settlement and the persistence of permeability are the most frequently encountered reasons for the breaching of earthen embankments.

tlement of the embankment.[37] Bligh also describes how it would be important to throw earth into the basins at an appropriate angle so that the earth would sink under water. This was possible, according to Bligh, only if the earth was carried in baskets on the heads of laborers. Kathleen Morrison's observation, in her archaeological study of the reservoir irrigation systems of the Vijayanagara metropolitan region, confirms this point. On the basis of her study of several tanks constructed during the Vijayanagara period, she reports that "the earthen embankment section consists of hundreds and thousands of soil lenses; presumably the result of innumerable headloads of soil laid down by a large group of labourers."[38]

Thus, other historical evidence corroborates the methods of tank construction that are often poetically and lyrically described in the folk literature. The precision with which the construction method was executed suggests that it must have been mastered after significant experimentation. Though laborious, what is significant about the method Bligh and Morrison describe—and the folk literature confirms—is that it needs no other form of material investment (e.g., rollers of any type, animals, or machines) except locally available earth, water, and some simple tools (i.e., pickaxes, rakes, crowbars, and baskets). Human skill and labor comprised the most significant investment—although these too might not have been costly, as the Voddas' oral narratives suggest.

The importance of the Voddas' skills for tank construction raises the question of how labor was organized during this era. Karl Wittfogel's theory of the centralized control over labor as a basis for oriental despotism was famously debated and is now usually considered a closed issue.[39] However, the debate that followed shifted its terms of reference from whole societies to communities, from construction itself to maintenance and management, from water control to local agriculture, and from past to present. As a result, this debate led to a number of excellent studies of local, community-level resource management.[40] However, it is my contention that this debate did not

37. W. G. Bligh, *The Practical Design of Irrigation Works* (London, 1907).

38. Kathleen Morrison, "Transforming the Agricultural Landscape: Intensification of Production at Vijayanagara, India" (Ph.D. diss., University of California, Berkeley, 1992), 87.

39. Karl Wittfogel, *Oriental Despotism: A Comparative Study of Local Power* (New Haven, Conn., 1957). Over the course of a decade several scholars refuted one of Wittfogel's main arguments: that the large-scale creation of an irrigation infrastructure needed a centralized bureaucracy and a despotic state to control coerced labor. E. R. Leach and other south Indian historians argued that although the irrigation works required a colossal investment of labor, their construction was haphazard, discontinuous, and spread over many centuries without requiring a centralized bureaucracy at any historical moment; see Leach, "Hydraulic Society in Ceylon," *Past and Present* 15 (1959): 2–26, and David Ludden, "Patronage and Irrigation in Tamil Nadu: A Long-term View," *Indian Economic and Social History Review* 63, no. 3 (1979): 347–65.

40. See, for example, Robert C. Hunt and Eva Hunt, "Canal Organization and Local Social Organization," *Current Anthropology* 17, no. 3 (1976): 389–410; M. S. S. Pandian,

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sufficiently engage with the institutional and organizational mechanisms for the construction of irrigation systems at the societal level in different historical and geographical locations. The absence of a "great designer" or, for that matter, of a centralized, despotic, or bureaucratized state invested in building irrigation facilities in pre-modern times does not rule out other forms of enactment, entrenchment, and diffusion of power, as is clear in the case of the tanks of Karnataka. It would be a great oversimplification to view the absence of a great designer as an unequivocal sign of decentralization or of self-organized, democratic community-collectives.[41]

The Social and Environmental Adaptability of Tanks

Tank technology has been acclaimed not only for its cultural embeddedness in the regions of south India, but also for its environmental sustainability. Tanks are considered a more environmentally appropriate form of water management than large dams, because they are small and store water in a dispersed and decentralized fashion. Without disputing the argument regarding the comparative advantage of tanks vis-à-vis large dams, I argue that tanks were also subject to serious environmental uncertainties (and still are), especially those constructed in the mixed-zone region of Karnataka.

As already discussed, tanks were increasingly constructed in mixed habitats, largely in south Karnataka, to expand rice paddy cultivation away from the fertile riverine areas during the Vijayanagara period (AD 1300–1750). This period was marked by the expansion and intensification of agriculture during a time of long-distance migration, constant warfare, and the resulting social instability, especially during the later centuries of the period. Tanks and temples during this highly volatile period became a source of *social storage*.[42] However, the requirements of social storage made tanks constructed in the mixed region vulnerable to the hydrological vagaries of alternate drought and flood, due to the highly erratic inflow of water.

This uncertainty about water availability in mixed-zone tanks was a major concern for British engineers. For instance, a British officer named R. E. Playfair wrote that "the small tank systems on tributary streams must

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The Political Economy of Agrarian Change: Nanchilnadu, 1880–1939 (New Delhi, 1990); David Hardiman, "Small-Dam Systems of Sahyadris," in *Nature, Culture, Imperialism*, ed. David Arnold and Ramchandra Guha (New Delhi, 1998).

41. This debate has been recently revived with regard to the question of whether the pre-modern Balinese state was involved in constructing and managing irrigation facilities, or whether management was decentralized, democratized, and spontaneously self-organized. See Stephen Lansing, *Perfect Order* (n. 9 above), and Brigitta Hauser-Schäublin, "The Precolonial Balinese State Reconsidered: A Critical Evaluation of Theory Construction on the Relationship between Irrigation, the State, and Ritual," *Current Anthropology* 44, no. 2 (2003): 153–82.

42. Breckenridge (n. 18 above).

fail: in the first place because the cost of storing the water is too great . . . and secondly, that as the supply of such tributary streams is likely to fail in seasons of drought, the tanks would be dry at the very time they would be most wanted." Colonel Playfair wanted to demolish all existing tanks and build them anew at more favorable locations.[43] In recent times, tanks in the mixed-zone region of Karnataka routinely fill up only once in three or four years. Those engaged in development policy routinely ascribe this hydrological volatility to the poor performance, deterioration, and decline of tank irrigation since the colonial period. Based on the assumption of deterioration and decline, a massive program of tank reform and modernization is being implemented in Karnataka. My argument is that the hydrological poor performance is not, as is often argued, a result of the recent apathy of the state in maintaining the infrastructure, but rather is more deeply historical in nature, an outcome of the social and production requirements for which tanks were constructed in the first place. Oral narratives suggest that since they were originally constructed for rice paddy cultivation, tanks in the mixed-zone region have faced hydrological marginality and the resulting uncertainty of water availability for a long time.

The tanks in many stories and songs are a source of anxiety either because they have not received any water, or because they are faced with the threat of flood. This hydrological irregularity had other consequences as well. Earthen embankments and foundations subjected to alternate drying and wetting become structurally weak and breach easily during heavy downpours, creating yet another source for the social anxiety depicted in stories and songs. The human drama in these stories and songs stems from the fact that the artifact around which the drama takes place is vulnerable to an unpredictable environment.

One genre of traditional ballads that tell the story of a woman about to be sacrificed in a tank is testimony to this hydrological irregularity and the resulting technological vulnerability.[44] The woman about to be sacrificed usually belongs to the family of the village chieftain, who has invested in constructing the tank and whose fortune would be at stake if it did not receive any water. There are several versions of these songs, each named after

43. R. E. Playfair, *A Paper on Irrigation in the Deccan and Southern Maratha Country* (Bombay, 1866).

44. Alan Dundes describes the traditional ballad as a narrative song whose drama depends upon acts of love and violence. He further argues that traditional ballads and folk legends about human sacrifice have Indo-European origins, where the foundation sacrifice motif tells of technological vulnerability in medieval times across the Indo-European region. In western and northern Europe, there are legends about the sacrifice of illegitimate or fatherless children in the foundations of bridges, dikes, monasteries, palaces, and churches, whereas in southeastern and eastern Europe it is always the sacrifice of women for similar purposes. See Dundes, "Preface," in *Walled-up Wife: A Casebook*, ed. Alan Dundes (Madison, Wisc., 1996), and Paul G. Brewster, "The Foundation Sacrifice Motif in Legend, Folksong, Game, and Dance," in *Walled-up Wife*, 35–62.

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the woman sacrificed. One, called "Kerege Haara," is famous in Karnataka and is considered an especially fine work of poetry; it occupies a prominent space in the Kannada literature (Kannada is the language of the people of Karnataka) and is considered a symbol of Kannada nationalism and identity.[45] There are also other versions—again, each named after the woman sacrificed and deified—such as Madagada Kenchamma, Kere Hunnamma, Anajee Honnamma, and Kaneramma.[46] Although these songs differ in terms of their content, style of narration, and the name and context of the social actors depicted, they all broadly narrate the pathos and plight, love, longings, and desires of the women about to be sacrificed. A brief overview of one such song, "Voddar Boyi," follows: The *gowda* (village chieftain) invites the Boyi, a leader of a group of Voddas, and asks him to build a tank in one week. The Boyi negotiates and agrees, but he returns in the third week and complains that the *bund* (embankment) did not stand. The voice of the tank asks the Boyi for a human sacrifice in order for the *bund* to stand. When the *gowda* asks who should be sacrificed, the Boyi first asks for the eldest son of the chieftain. The *gowda* refuses to give up his eldest son, and what follows is a lengthy negotiation. The Boyi then demands the youngest son, the youngest daughter-in-law, the *gowda*'s wife, and finally the *gowda* himself. The two finally settle on the eldest daughter-in-law. The rest of the song describes her life as she awaits her impending death.

Some of the songs also worship or deify the sacrificed woman. For example, "Kanne Viramba," a song sung by a group of Dalit women from Dannayakankere village, begins with a eulogy to the great victory and glory of a virgin goddess (a young girl sacrificed in a tank) and then tells the story of the tank being built (fig. 3). "Once upon a time," it begins, "a snake with seven hundred heads showed seven bushels of gold coins to the Muddanna [village chieftain] who invited seven hundred Voddas to build a tank. Seven sluices were built in seven years with seven human sacrifices and five more deaths." The song then sings the glory of Muddanna, declares that the tank was built based on moral truth and the principles of moral victory (*dharma*), and finally sings the glory of the virgin goddess and considers her sacrifice the most glorious among all the sacrifices in the tank.

Although songs about sacrifice in tanks at the time of floods are rare, I came across at least one popularly remembered story about the sacrifice of a lower-caste man to prevent the breach of an embankment during a time

45. A new genre began in Kannada literature with the independence movement (known as the Navodaya movement). In this renewed Kannada literature, the song "Kerege Haara" occupies a prominent place. For an English translation of it, see T. N. Srikantaiah, "'Kerege Haara'—A Tribute," in *Walled-up Wife*, 126–32. For Kannada versions of two songs, "Madagada Kenchamma" and "Kere Hunnamma," see G. S. Paramshivaiya and B. Hanumanthappa, eds., *Madagada Kenchamma* (Bangalore, 1994), and Rajappa (n. 32 above).

46. Some of these songs are published in Rajappa.

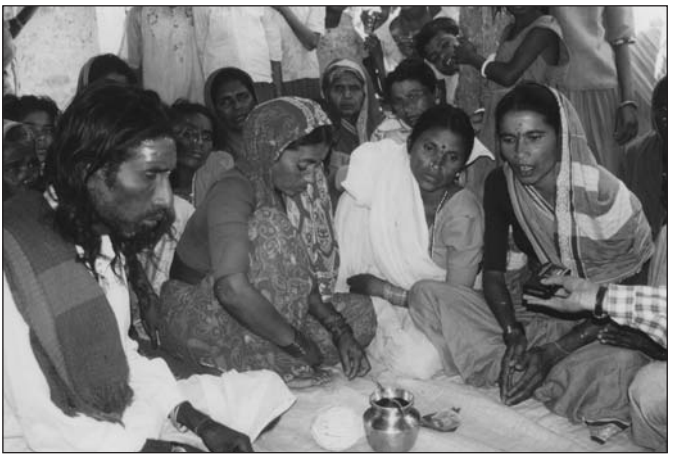

FIG. 3 A group of Dalit women singing a sacrifice song. (Source: author photograph.)

of heavy rain. A *neerghanti* (a lower-caste man employed to distribute water and to watch the physical structures) realized that the tank embankment might give way as a result of the heavy inflow of water due to the heavy rain. Worried, he pleaded with the *gangemma* (water goddess) not to break open the embankment. The *gangemma*, yielding to his prayers, promised that she would not break the embankment until he went to the village, informed the village leaders about the hazard, and returned. The *neerghanti* rushed to the village and informed the leaders about the *gangemma*'s promise. The leaders immediately held a meeting and quickly arrived at their decision: they killed the *neerghanti*, cut his body in three pieces, and threw his head to the north, his torso to the south, and his limbs to the west in such a way that his body could not be rejoined. To the *gangemma*'s rage, therefore, the man could never return to negotiate. In order to keep her promise to the *neerghanti*, however, the *gangemma* did not breach the embankment.

In certain parts of the mixed zone (the Kollar and Bellary districts), almost every tank has attached to it a story of a sacrifice made to alleviate drought, to save the tank from breaching, or to prevent the embankment from giving way. A small shrine may also exist on an embankment, usually in the name of the higher-caste woman sacrificed to the tank and then deified (almost never in the name of the lower-caste man killed to save the tank) (fig. 4). In rare cases, a temple may even exist on the embankment or in the village. Upon entering the dry region of Bijapur in the north and the wet region of Shimoga in the east, the shrines, temples, and sacrifice stories disappear, as uncertainty about water availability for tanks also significantly disappears.

The present-day uncertainty about water availability in the tanks of the mixed-zone region may not be a recent problem, as is often claimed in the

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FIG. 4 A shrine on an embankment to a woman sacrificed in the tank. (Source: author photograph.)

literature, but rather may be one that dates back to the earliest construction of tanks in this region. Traditional tank technology is therefore not necessarily entirely in harmony with the environment of the region. Tanks were constructed in a certain social and political context in order to support a certain form of agricultural production, and certainly not with any self-conscious concern over long-term environmental and cultural suitability or sustainability. Tanks were instead constructed on a terrain for which they were not entirely well suited in order to expand rice paddy cultivation during a socially tumultuous period. Hence they were highly susceptible to environmental uncertainties. Furthermore, while the stories lyrically represented in the songs center around a vulnerable artifact, the social actors in these tales also seem to be acting under duress, to which they respond with acts of social violence: the *gowda* asking the Vodda Boyi to construct a tank in a week; the king leaving his kingdom and camping in a village for twelve years to build a tank; a number of women murdered to alleviate water scarcity or to ensure the safety of an embankment; the ghastly murder of a *neerghanti* to save a tank from breaching. All of these suggest the presence of a high degree of social anxiety regarding tank irrigation, anxiety which results in acts of violence. The folksongs and stories popularly remembered and told by the villagers do not even remotely resemble an idyllic picture of a blissful community living on the banks of a bountiful tank in the premodern era.

Conclusion

A significant part of the influential critiques of modernity, the modern state, or modern science and technology—for example, in the works of James Scott, Stephen Lansing, and Sandra Harding—are premised on the assertion that the pre-modern was environmentally non-intrusive and harmoniously embedded within a culture. The way these critiques pose the substantive distinction between the modern and the pre-modern through the reading of technology and knowledge systems insufficiently engages, I argue, with the history of pre-modern technology and knowledge creation.

Tank irrigation technology, with all its presumed-appropriate attributes—small, decentralized, traditional, Eastern, and local—is often touted as an ideal example of an ecologically embedded and socially suitable pre-modern technology. This alternative hegemony, however, has not necessarily produced a democratic social order, either in the past or in the present. Even when the state and polity in pre-modern south India had little in common with the modern territorial state and its concepts of sovereignty, the exploration of the state–society–technology relationship reveals an increasingly extractive statecraft involving coerced labor; the expropriation of surplus by elites; and the spread of technological choices that could be environmentally unsound—and that often resulted in forced displacement, uncertainty, technological vulnerability, and social anxiety and violence. Thus, tanks as artifacts were socially embedded in societies and economies that were organized for warfare, sustained sharp social hierarchies, and were often violent to women and people from lower castes. Clearly, the tank as a technosociological artifact was integral to the forms of inequality and violence of the pre-modern social order in south India.

In modern times as well, tanks reinforce and reproduce the power relations at the heart of the agrarian economy, as does any other modern irrigation technology. Tank technology has been perfectly amenable to the significant transformations heralded by the Green Revolution—one of India's most important state-sponsored, modern science- and technology-driven development projects.[47] In fact, irrigation from tanks has intensified, expanded, and thrived since the introduction of the Green Revolution, and designs of tank technology have undergone modernization initiated and implemented by the farmers themselves in many parts of Karnataka. This shift in tank design since the Green Revolution has created, perpetuated, and reproduced new power relations.[48]

47. D. N. Dhanagare, "Green Revolution and Social Inequalities in Rural India," in *Social Inequality in India: Profiles of Caste, Class, Power, and Social Mobility*, ed. K. L. Sharma (New Delhi, 1995).

48. See several chapters in Shah (n. 3 above), which argue that tank technology and tank irrigation policy have changed as a result of the recursive—that is, mutually transforming—roles played by the state and society in the political economy of agrarian change.

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Based on my empirical inquiry into the social shaping of tank technology in the pre-modern historical period, it would be difficult to find any fundamental ontological contrast between a pre-modern and a modern technology. The fundamental problem with the great divide between modern and pre-modern knowledge systems is that such a concentration *attributes* values and ethics to the artifacts and knowledge systems and thereby reifies them, denying their social shaping. This article argues instead that values emerge from historically situated actors and not solely from the artifacts or knowledge systems themselves.

A plea to abolish the great divide between knowledge systems is not meant to suggest that technologies may not differ in their social implications. In fact, this article argues that technologies shaped in radically different social and political systems have different impacts upon society. A rigorous understanding of these differences is critical for comparing, assessing, and evaluating technologies of different eras. Ultimately, technological artifacts are not inert objects. They articulate with a complex mix of social tensions, relations, power, and ideology and transform with historical processes. Those who advocate pre-modern artifacts and knowledge systems as objects of value and virtue fail to capture their social and political scripting and ultimately deny the historical embeddedness of technology.

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Indigenous knowledges and development: a postcolonial caution

JOHN BRIGGS & JOANNE SHARP

ABSTRACT *As a result of the failure of formal top-down development, there has recently been increased interest in the possibilities of drawing upon the indigenous knowledges of those in the communities involved, in an attempt to produce more effective development strategies. The concept of indigenous knowledge calls for the inclusion of local voices and priorities, and promises empowerment through ownership of the process. However, there has been little critical examination of the ways in which indigenous knowledges have been included in the development process. Drawing upon postcolonial theory, this article suggests that indigenous knowledges are often drawn into development by both theorists and development institutions in a very limited way, failing to engage with other ways of perceiving development, and thus missing the possibility of devising more challenging alternatives.*

The rhetoric of indigenous knowledges has been heralded as seemingly offering a way out of the development impasse. In contrast to the past, when traditional knowledges were typically seen as obstacles to development, it is now claimed by some that these are pivotal to discussions on sustainable resource use and balanced development (Agrawal, 1995). Central to this rhetoric is the inclusion of the local knowledges of groups at whom development projects are aimed, rather than assuming and relying on the universal applicability and superiority of scientific knowledge and 'developmentalism' (Escobar, 1995). Such approaches appear to offer a positive way forward in that they take greater account of the specificities of local conditions, draw on the knowledge of a population who have lived experience of the environments in question, and provide peoples with ownership of the development process. While a consideration of the voices of marginalised people is a relatively new departure for development research—and more especially its practical application—this is an issue more thoroughly dealt with in the literature of postcolonial theory. Postcolonial theorists have critically examined the ways in which Western theory and knowledge have dealt with alternative voices and different ways of knowing. These can offer important challenges to development theories, notwithstanding Goss's (1996) concerns about the practical value of postcolonial theories to everyday development issues. This paper therefore presents a postcolonial engagement with notions of

John Briggs and Joanne Sharp are both in the Department of Geography and Geomatics, Centre for Geosciences, University of Glasgow, Glasgow G12 8QQ, UK. Email: jsharp@geog.gla.ac.uk.

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indigenous knowledges used in development discourse to suggest a number of cautions about the nature of this inclusion.

Indigenous knowledges

By the close of the 20th century development had become a deeply problematic concept which had lost much of its initial promise. Post- and anti-development theorists have argued that, rather than breaking away from the colonising attitudes of the past, there is greater evidence of continuity in the preservation of Western-centred attitudes, as well as an arrogant confidence in the almost unquestioned validity of science and Western knowledge (Escobar, 1995; Pretty, 1994; Nustad, 2001). Typically, 'development experts' from the West are brought in to analyse a development problem and to offer a solution based on scientific method. Just as in the colonial period, an assumption dominates that either Western science and rationality are more advanced or refined than other positions or, more simply, that they are the norm—'knowledge' in the singular form—from which others deviate in their fallibility. Voices that are local and indigenous to a particular area are deemed to face development needs as a result of their deviation from this norm (Escobar, 1995). Development can therefore only be achieved by bringing them into line with the universal knowledge of scientific truths, whether this refers to the management of soil or the management of people. This certainty in the scientific path out of underdevelopment has been shaken, of course, by the witnessing of continuing high rates of poverty, and growing economic differences between countries. The effects of development have not achieved their claim of drawing together all nations into the realm of development, but rather have witnessed ever increasing levels of poverty.[1]

Faced with this failure of development, some development theorists and practitioners have criticised modernisation approaches for being based on the uncritical transfer of science and technology from the North to the South (Peet & Watts, 1993; Escobar, 1995). A number of writers has come to question scientific approaches as being the best, or the only, solution to development problems (see, for example, Ellen & Harris 2000; Kalland, 2000; Leach & Mearns, 1996; Sillitoe, 1998). They argue that other knowledges—the indigenous knowledges of the people resident in particular places—can be of equal, or greater, value. Within this argument, Western (formal) science loses its universal position, and becomes one of a range of competing and contested knowledge systems (Homann & Rischkowsky, 2001; Mohan & Stokke, 2000). It too has to be regarded as a local or indigenous knowledge: one that is localised in the institutions of the West and has gained its apparent universality by being projected throughout the world through the formation of colonial and neocolonial power relations. Thus, the domination of Western knowledge is explained not though a privileged proximity to the truth, but as a set of historico-geographical conditions tied up with the geopolitics of power (Escobar, 1995).

The recognition of indigenous knowledges presented the development community with alternative experiences with which to challenge conventional development praxis and, indeed, with a way of potentially empowering hitherto neglected populations (see, for example, Leach & Mearns, 1996; Holland &

Blackburn, 1998). Increasingly, development writing and, to a lesser extent, practice, is channelling efforts to draw in the voices and understandings of those who are to be involved. In the 1980s Chambers (1983) was already signalling that local people were rarely consulted about their needs, priorities or local environmental or technical knowledges, let alone allowed to set the agenda. Hence the results of such 'development' were frequently inappropriate or even irrelevant. Although Richards (1985) took the debate about the utility of local knowledges significantly further forward, with his work clearly showing how West African farmers used local, indigenous knowledge systems as the basis for successful agricultural development, there remains a persistent reluctance among many in the development community to embrace some of these ideas. This may be thanks to the continuing dominance of a scientific world-view, as well perhaps as to the authority and prestige of the label 'expert' which science provides. However, the proliferation of academic study in the field of indigenous knowledge, highlighting the dangers of proceeding as if formal science alone could offer answers, makes it increasingly difficult for development practitioners to ignore this approach (see, for example, Bellon, 1995; Briggs *et al*, 1998; Lamers & Feil, 1995; Maddox *et al*, 1996; Tiffen *et al*, 1994; Reij *et al*, 1996; Sillitoe, 1998). Nevertheless, the extent to which various writers and practitioners have actually dealt with this issue is, as we shall see, variable.

While the debate about the inclusion of other voices and knowledges in development studies is relatively new, it has been more fully elaborated in the literature on postcolonialism. Analysis of the complicity between power and knowledge is central to postcolonial theory, an approach which seeks to examine how Western knowledge systems have become bound up with the construction of both colonial and postcolonial ways of knowing and acting in the West, but more significantly, also around the world (Said, 1978). Various postcolonial theorists have therefore examined the effects of Western domination of knowledge and attempted to formulate theoretical and practical strategies of resistance to this dominance. Despite the apparently vital connections between development studies and postcolonial theory, however, there has been very little in the way of cross-referencing between the two. This reflects differences in political attitude, wariness over motives and divergence in specialised languages used to articulate relevant issues. Many postcolonial theorists consider development studies still to be mired in modernist, or even colonialist, mindsets; to many involved with development work, postcolonialism is seen to offer overly complex theories ignorant of the real problems characterising everyday life in the majority world. The two approaches apparently have little in common. Sylvester (1999: 703) notes: 'development studies does not tend to listen to subalterns and postcolonial studies does not tend to concern itself with whether the subaltern is eating', a lament for the lack of communication between development studies and postcolonialism. However, precisely as a result of their divergent traditions, she suggests that a dialogue between development studies and postcolonialism offers great potential for an alternative conceptualisation of development. Certainly, there may well be elements of postcolonial critique which could be important to reconceptualisations of development around the notion of indigenous knowledge, just as much as there may be practical concerns in development

studies which provide an important grounding for the conceptual and theoretical concerns of postcolonial thinking.

Listening to other voices

Yet to receive much critical attention in development theory and practice is the *nature* of the inclusion of indigenous knowledges in development thinking. A central tenet of postcolonial theory is its concern with the ontological and epistemological status of the voices of subaltern peoples in Western knowledge systems, and a postcolonial interrogation of the inclusion of indigenous knowledges in development suggests caution. Indeed, Spivak (1988) has questioned whether 'the subaltern' can ever speak; even when apparently expressing her own views, the subaltern is not able to express her true self. Writing about attempts to recover the voices and experiences of the subaltern in South Asian historiography, Spivak has argued that the subaltern cannot speak, so imbued must she be with the words, phrases and cadences of Western thought in order for her to be heard. In order to be taken seriously—to be seen as offering knowledge and not opinion or folklore—the lifeworld of the subaltern has to be translated into the language of science, development or philosophy, dominated by Western concepts and Western languages. For Spivak (1988), the implications of this 'epistemic violence' mean that the ways of knowing the world and knowing the self in non-Western culture are trivialised and invalidated by Western scientists and experts. Hence the subaltern must always be caught in translation, never truly expressing herself, but always already interpreted.

Furthermore, postcolonial theorists (for example, Spivak, 1988; hooks, 1990; Goss, 1996) have questioned the degree to which academics and experts in the West really want to engage with people elsewhere, an engagement which requires a de-centring of themselves as experts. Some postcolonial theorists have already bemoaned the lack of true engagement with the knowledges and voices of the West's 'others' and, despite claims to be interested in others, suggest that the West is only interested in hearing its own voice (hooks, 1990; Spivak, 1988; Mohanty, 1988). Hooks' (1990) autobiographical approach tells a similar tale to Spivak in her attempt to be heard from the margins. For her, the margins are a site of 'radical possibility' which reject the politics of inside and outside, because 'to be on the margins is to be part of the whole but outside the main body' (hooks, 1990: 341). It is a hybridised indigenous knowledge which she believes offers a unique and important perspective undistorted by the power and prejudices of the centre. However, hooks has felt silenced by those who seek the experience, but not the wisdom, of the other. She argues that 'I was made "other" there in that space...they did not meet me there in that space. They met me at the center' (hooks, 1990: 342). The experiences of the marginalised are used in the West, but without opening up the *process* to their knowledges, theories and explanations. When there is a meeting, it is at the metropolitan centre, in the (predominantly) Western institutions of power/knowledge (aid agencies, universities, the pages of journals) and in the languages of the West (science, philosophy, social science, and so on, expressed in English, French, Spanish, and so on). So by approaching the institutions of knowledge, she has

been forced to the centre, a location both metaphorical in its control of authority and geographical in its physical presence. For local knowledge and narratives to be heard at all, they have to move to this central terrain, where they may be 'accepted' and subsequently appropriated. She claims to have met a reluctance to abandon the mark of authority, experiencing instead only a desire for material from which explanations can be made. Western researchers want to know about her experiences, but not her own explanations:

> No need to hear your voice when I can talk about you better than you can speak about yourself. No need to hear your voice. Only tell me about your pain. I want to know your story. And then I will tell it back to you in a new way. (hooks, 1990: 343)

By retelling her experience from a Western point of view, hooks' voice is included, but only as an example, or as data which the Western 'expert' alone can interpret. Moraga (1981, in Weedon, 2002: para 8; see also Escobar, 1995: 46) explains the effects of this appropriation:

> the white writing about Native peoples or cultures displaces the Native writer and often appropriates the culture instead of proliferating information about it. The difference between appropriation and proliferation is that the first steals and harms; the second helps heal the breaches of knowledge.

These arguments can be brought to the discussion of indigenous knowledges in development studies.

The knowledge of indigenous knowledges

Frequently, where there has indeed been some engagement with local knowledges by development practitioners, it has most often been at a technical or artefactual rather than fundamental or conceptual level (Briggs *et al*, 1999). Concern has typically been with technical issues related to cultivation, such as methods of indigenous soil management, water preservation and medicinal plant use. There has been rather less engagement with those knowledges underlying such indigenous technical and environmental knowledges. Indigenous knowledge is allowed to offer contained technical solutions that fit within the current scientific/development world-view, but not to challenge the content, structure or value-system of this view. There continues to be a suspicion and wariness about the extent to which indigenous knowledges are capable of challenging currently accepted ideas of development by pushing formal science to the margins. Formal science still represents a powerful body of knowledge, and it is still the language of authority and dominance in many development debates. Indeed, Pretty (1994: 38) has observed that 'the trouble with normal science is that it gives credibility to opinion only when it is defined in scientific language, which may be inadequate for describing the complex and changing experiences of farmers and other actors in rural development'. As a result, knowledges, other than those derived from formal science, are still eyed suspiciously by many in the development community, except where perhaps relatively straightforward and uncontroversial indigenous technical solutions can be incorporated into

development practice. Just as in hooks' example, the experts look for experiences to analyse, but not for the voice of the indigenous peoples which might offer different—and challenging—interpretations.

In part, this may be the result of where Western academics look and listen for the voices of the other, and how they do so. As Escobar (1995: 219) has argued, everywhere there is the production of alternatives to developmentalism, resistant practices, however mundane. Similarly, Scott (1985) has highlighted some of the 'hidden transcripts' of resistant action of the apparently powerless, what he calls the 'weapons of the weak'. The 'voices' are there if the methods of the researchers are appropriately tuned in to them. Moreover, the voices may actually be embodied performances, rather than the coherent articulations of speech or writing which the academic usually seeks. Escobar (1995: 223) argues that the 'subaltern do in fact speak, even if the audibility of their voices in circles where 'the West' is reflected upon and theorised is tenuous at best'. Rather than always expecting debate to come to the West then, it is important that Western research is itself de-centred.

In this context there has sometimes been a tendency to see indigenous knowledges as ideas that can be brought together with formal science in unproblematic ways (De Queiroz & Norton, 1992; Haburema & Steiner, 1997; Payton *et al*, 2003). Rather than seeing localised knowledges as offering potential challenges to formal approaches, there is an expectation that there exists a simple process of addition of a variety of knowledges to produce a better way of knowing. This may be a valuable end in itself, particularly when marginalised peoples can adopt and adapt those knowledges which fit their situation, but this approach can be naive of political power relations which ensure that never can all knowledges sit equally together. The exigencies of each situation mean that certain views and voices will be heard much more clearly. Liberal desires for the inclusion of a range of voices in the development process is a case in point. This offers an unproblematic call for the meeting of voices, ignoring the power politics of how this might actually occur in practice. Part of the liberal argument is that indigenous practices of, for instance, soil management, need to be understood to ensure that inappropriate development approaches are not introduced. However, attempts to deal with issues beyond this material or technical level are often unclear. How should there be a resolution of a conflict of interests, as in the examples Blaikie (1995) presents in his argument for a Third World ecology between Western conservationists who want to preserve large animals such as elephants, and local farmers who see them as a dangerous pest? He insists that all voices need to be considered. While this is all well and good, at no point does he indicate *how* this drawing together of voices should be managed. From whose perspective should competing views be judged? Who should decide which point is most valid? The examples he presents are resolved from the perspective of Western science, a 'good' version of this science which involves fieldwork, and attention to local detail, but a Western-centred understanding of environment and resources nevertheless (Blaikie, 1995). For Blaikie, problems only emerge with science once results and recommendations are passed on to politicians; this is where the distortions and misrepresentations emerge. The problem with views on indigenous knowledge

such as Blaikie's is that in a liberal (as opposed to a more radical) embracing of different voices, there is an obfuscation of the process through which conflicts are resolved and decisions are made and, more often than not, this disguises the ongoing dominance of Western knowledge and Western power. The common adoption of the abbreviation 'IK' seems to emphasise the view of indigenous knowledge as a technicality, hiding deeper ways of knowing behind this neat sign.

The recent adoption of the language of 'IK' by development institutions such as the World Bank further emphasises this point. The World Bank's 'Indigenous knowledge for development: a framework for action' (1998: i) appropriately argues that there is a need 'not only to help bring global knowledge to the developing countries, but also to learn about indigenous knowledge (IK) from these countries, paying particular attention to the knowledge base of the poor'. However, the framework continues by listing a range of mostly technical and discrete knowledges which can be identified (such as herbal medicine, p 1). There is no sense of dealing with embedded knowledges which are part of the wider world-view of the people involved, such as understandings of social justice, gender relations, familial responsibility, and so on. The World Bank's indigenous knowledge framework similarly reveals a displacement of the valuation process. When noting that not all indigenous practices are beneficial to sustainable development (using the well worn examples of slash and burn agriculture and female circumcision to make its point), it suggests that before adopting an indigenous knowledge,

> practices need to be scrutinized for their appropriateness just as any other technology. In addition to scientific proof, local evidence and the sociocultural background in which the practices are embedded also need consideration in the process of validation and evaluation. (World Bank, 1998: 6)

There is no indication of how this evaluation will take place. It is clear later in the document that essentially indigenous knowledge should not offer too great a challenge to the established order. The report states that 'IK should complement, rather than compete with global knowledge systems in the implementation of projects' (World Bank, 1998: 8). Thus, just as with Blaikie, it is still the scientific view, in all its wisdom, that can decide which indigenous knowledge is worthy of serious investigation and dissemination elsewhere. Indigenous knowledge is not being allowed to offer a fundamental challenge to development, just the opportunity to offer a few technical solutions, place-specific tweakings, and so on. Elsewhere in the World Bank's website,[2] this unproblematic view is reiterated, in that the 'IK Program promotes the *integration* of IK systems into World Bank-supported programs' (Gorjestani, no date, accessed 2003: 4, emphasis added). The illustration accompanying this article reinforces the idea of a seamless incorporation of ideas, with no sense of the conflict that alternative views of environment and development might produce (see Figure 1).

However, if indigenous knowledges are to be genuinely brought into conversation with Western notions of development, this does have to be a true exchange and cannot be a simple case of incorporation. Western science as a

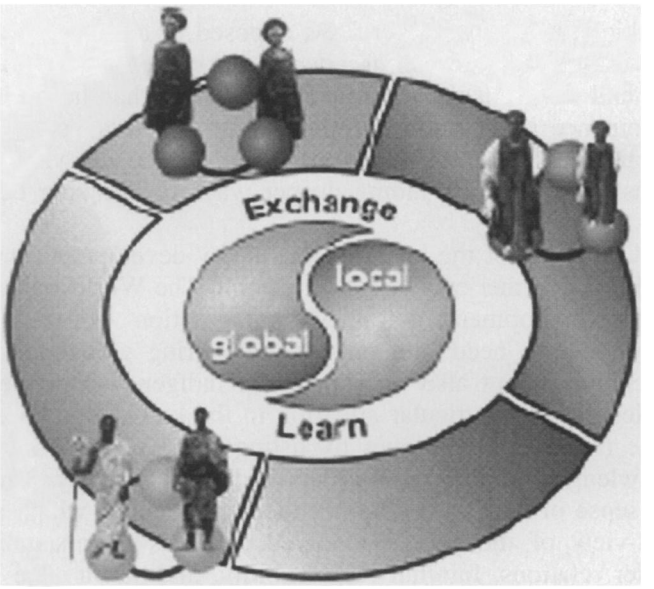

FIGURE 1.
Image from World Bank IK website, http://www.worldbank.org/afr/ik/ikpaper_0102.pdf.

knowledge must be open to change, however difficult this might be. In discussing scientists' fears that fully embracing the significance of indigenous knowledge might lead to the validation of approaches such as creationism and astrology, Nakashima and de Guchteneire (1999: 40) suggest that:

> we might consider that the discomfort of these scientists gives expression to a more fundamental concern...about the relationship between science and these other systems of knowledge, other understandings of the world. Of course, if indigenous knowledge is conceived as just another information set from which data can be extracted to plug into scientific frameworks of understanding, then we do not trouble the scientific worldview. However, this practical approach—that of the pharmaceutical industry or of conservation ecologists who validate traditional information and use it to attain pre-defined ends—may threaten the integrity of traditional knowledge systems. On the other hand, if science is seen as one knowledge system among many, then scientists must reflect on the relativity of their knowledge and their interpretations of 'reality'. For the survival of traditional knowledge as a dynamic, living and culturally meaningful system, this debate cannot be avoided.

This suggests a call for a much more significant reconceptualisation of development than the liberal views suggested by Blaikie (1995) and, even more so, by institutions such as the World Bank. Voices of others, Nakashima and de Guchteneire (1999) argue, must be allowed to criticise dominant world views, challenge terms of debate and propose alternative agendas, rather than simply being added in to an existing way of doing things. It is interesting that, although there is much discussion of the possibilities of shifting indigenous knowledges between different geographical locations and of the problems of place-

specificity, there is no discussion on these terms about the movement of Western science and development between differing economic, sociocultural and political places. There is little recognition of the embeddedness of these knowledge systems and the changes to them that will be effected with geographical movement. Nakashima and de Guchteneire (1999) suggest that this failure will either end up preserving indigenous knowledge as an unchanging artefact of a timeless culture, or will decontextualise it, distorting it out of all recognition to those who had depended upon it for daily life. The following examples exemplify these concerns.

Indigenous environmental knowledges

Some approaches to indigenous knowledge can lead to a freezing of traditional cultures and ways of knowing. Such treatment supports indigenous knowledge only if presented as an unchanging presence. Silvern (1995) explains how this is played out in terms of native American use of natural resources. He discusses European-American protests at the Ojibwe tribe's fishing practices in the lakes of northern Wisconsin. The Ojibwe have traditional rights to fish in this area as a result of the Wisconsin Treaty Rights but their spearing of the fish, especially in the spawning season, is seen as 'unsporting' by many other residents of the area. For some, their hunting would be acceptable only if it were ceremonial, 'and only if the tribes used spearing technology and methods that were available at the time of the signing of the treaties in the 19th century' (Silvern, 1995: 281). That the Ojibwe now use motorised boats, battery-powered lamps and metal harpoons marks them, and their knowledges of environmental management, as non-traditional, and there have been calls for them to return to birch bark canoes, pitch torches and wooden spears. Although the knowledges of conservation (rather than sport or profit) that underlie these technological advances remain, they are seen as irrelevant. For many, to recognise these claims to indigenous knowledge, Ojibwe practices would have to remain unchanged from some point in the 19th century which was considered 'traditional'.

It is also important to consider carefully the effect of incorporating different knowledges into Western knowledge. There may be unintended outcomes. Kalland (2000: 327) provides the following example concerning the appropriation of Indian and Oriental philosophies into 'a Western tradition of absolutism':

> This has produced environmentalist and animal rights discourses which are quite alien to the donor cosmologies. Not only has animal rights discourse—and to a lesser extent the environmentalist discourse—turned respect for game animals into 'intrinsic value', but also their missionary zeal stands in sharp contrast to the contextual approaches of many local peoples. Ironically, then, the environmentalist and animal rights discourses at times pose a threat to the life-styles of local people who depend on the utilization of animal resources.

Such mixing of notions of conservation can lead to quite ridiculous situations, leaving people's belief systems captured within a Westernised structure. An example can be found in Wadi Allaqi in the Eastern Desert in southern Egypt. In 1989, Wadi Allaqi was declared a Protected Area under Egyptian law, and

subsequently a UNESCO Biosphere Reserve in 1994. As part of the process, those Bedouin communities resident within the area were consulted about the proposals. Hence, liberal views of how indigenous knowledges might be incorporated were satisfied. Significantly, though, the key decisions were taken within the context of a Western environmental discourse. In particular, boundaries were drawn around different tracts of land, including core and buffer zones, as well as around the whole protected area. Within these boundaries there are particular conservation practices that should be legally observed. However, the idea of drawing a boundary around an area of land, the inside being resources to be preserved, the outside being an area where no conservation needs to be applied, is very different to Bedouin understanding and use of their local environment. For them, resources are defined in a more fluid manner. Conservation is practised according to need, regardless of location in or outside a particular area. It also reflects differing drought pressures on different vegetation resources at particular times, both on annual and significantly longer time-scales. It is a temporal practice for them, necessary at certain times of the year, or in particular seasons. Conservation practices also differ in times of drought, where there is by necessity less dependence on seasonal or ephemeral grazing, and a greater dependence on conserved tree stock. At other times, these resources may be fully exploited. This cyclical, temporal knowledge of conservation and resources is rather different from a Western spatial definition which constrains or excludes certain practices in defined geographic locations. It is this latter view, based firmly in Western conservation discourses, which dominates conservation practice in Wadi Allaqi.

This has resulted in some frustrating consequences for Bedouin living in the area. One example is illustrated by conflicting understandings of conservation of acacia trees by Bedouin and Western conservationists. Acacia trees, of which the two main varieties in the area are *Acacia raddianna* and *Acacia ehrenbergiana*, constitute an important economic resource for the Bedouin to be exploited in a sustainable way. They provide a source of feed for livestock from naturally fallen leaves, shaken leaves and fruit. They also provide an important source of wood for charcoal making; acacia is particularly valued for the quality of charcoal that can be made from it. Access to the various economic elements of acacia tress and bushes can be complex. From the same tree, one family may have claims to only naturally fallen leaves, while another may have access to those leaves which are dislodged when the plant is shaken, and a third to only the dead wood for charcoaling. For another tree, one family may have rights to all its production. The situation can be further complicated by the existence of some prohibitions against taking resources during some times in the year, whereas at other times resources can be removed without any such difficulty. This system, therefore, provides for the conservation of scarce resources, even though it may not necessarily meet the requirements of formal Western-based conservation practice. Bedouin conceptualisations of conservation are culturally and economically embedded, and managed on the basis of their community interests.

The issue about taking only dead wood from acacia trees becomes crucial. In 1998 the annual level of water in Lake Nasser rose to unprecedented levels. As

a result, about 12 mature *Acacia raddianna* trees, located relatively near to the lakeshore in Wadi Quleib, a side wadi of Wadi Allaqi, were inundated. Whereas other varieties of acacia (eg *Acacia nilotica*) can withstand occasional inundations, neither *Acacia raddianna* nor *ehrenbergiana*, being desert varieties, are able to do so. Inevitably, the trees died. In these circumstances, the trees would normally be used to make charcoal because they would never again produce new wood. However, as the trees had grown within the conservation area, there was a prohibition against their use by humans. And so, in order to comply with the regulations imposed by the conservation area label, Bedouin were expected to ignore the dead trees. Unsurprisingly, Bedouin saw little logic in the formal, Western position of conservation. There was a clear cultural divide between the two rather different views of conservation.

But it is also on a daily basis that these tensions arise. The fauna, as well as the flora, of the Wadi Allaqi Protected Area are also subject to Egyptian conservation law. Consequently, it is illegal to kill snakes and scorpions, yet, for Bedouin, these represent the two most pervasive and dangerous pests in the area. Children and older people are particularly at risk and there are regularly serious illnesses and even fatalities as a result of contact with snakes and scorpions. In practice, there is no dilemma for Bedouin, even though they are theoretically contravening conservation law. Yet again, there is a clear disjuncture between indigenous and Western conservation priorities and approaches.

Locating indigenous knowledge

Of course, fully embracing the potentials of indigenous knowledge is no easy task. Once the stable point of science or development has been challenged as a neutral position from which to judge the merits of different indigenous knowledge, the ground becomes difficult to stand upon with any certainty. Fear of imposing inappropriate judgements on different voices has led some to suggest relativism, and it seems that the fear of appropriating the voice of others has led some researchers to question their abilities to say anything about communities of which they are not a member (see, for example, England, 1994), creating a general anxiety around questions of representation. However, Radcliffe (1994) argues that this is not a solution to problems of power and (mis)representation. She argues that 'disclaiming the right to speak about/with Third World women acts...to justify an abdication of responsibility with regard to global relations of privilege and authority which are granted, whether we like it or not, to First World women (and men)' (1994: 28). In a world made up of complex interrelationships and dependencies, to talk of coherent communities, within which some are members (and therefore somehow able to represent their community) and others are outsiders (and therefore cannot), is simplistic and misleading (see Jones, 2000). Moreover, this view of discrete communities is not one that most postcolonial theorists would be willing to adopt when analysing the identities of groups other than academics and their research participants.

There has been further concern over the danger of what might be considered an extreme localism or what has been called, in a slightly different context, 'anthropological particularism' (O'Laughlin, 1995: 69). Work on indigenous

knowledges can lead to an impression that every situation is unique, and that each development struggle is entirely localised and specific. Spivak (1988: 290) has voiced this concern in relation to postcolonial studies which focus on particular constructions of power/knowledge, wondering whether this is at the expense of a global vision. Such a view insists that while the experiences of 'underdevelopment' may well be unique to each place, there are nonetheless important structures which link them together. In a similar vein, Harvey (1996) fears that recent concerns with an identity politics sensitive to each situation allows capitalism to operate at much larger scales, unexamined and unopposed. The effects of embracing notions of development around indigenous knowledges should not be at the cost of no longer theorising about the processes and systems through which the countries of the Third World are systematically resigned to poverty.

Such dilemmas are not confined to those who study global capitalism. Those concerned with understanding the workings of patriarchal power also face challenges in coming to terms with indigenous knowledge. Fear of being insensitive to locally constructed gender relations has led some feminists to question their attempts to theorise patriarchy. This has meant that often the social relations of gender 'are labelled as falling into the realm of culture and strong advocacy for a rethinking of gender relations would be seen as unwarranted "cultural interference" ' (Rathgeber, 1995: 207), although social relations based around class and income, for instance, are seen as open for criticism (Chant & Gutmann, 2000: 20). While this discussion of cultural imperialism is undoubtedly important, vital to ensuring that feminism does not go the way of other discourses of development in a colonising mentality, which suggests that the outside expert is always right, it should not silence critical engagement between women in different places:

> Women need to be free to act from their own analysis and priorities and not be manipulated by outsiders; yet the restrictions of internalised oppression, which limit women's options, must be challenged. (Rowlands, 1997: 134)

Thus, without imposing outside views on a population of women, 'a methodology should be adopted that will help women to perceive the limitations that they place on themselves' (Rowlands, 1997: 134). Only when the critique of current conditions comes from the women themselves can development processes effectively challenge the relations of patriarchal domination and achieve empowerment.

Thus, it is important to embed understandings of local processes of knowledge production within a greater awareness of systematic processes. Indeed, some authors have argued for the necessity of work in other places in order to ensure that Eurocentric biases are countered with other approaches (Duncan & Sharp, 1993; Sidaway, 1992). Sparke (1994:119) has argued that it is only the 'hard work of specific analyses' which ensures that academics (Western or otherwise) cannot resort to easy stereotypes and instead appreciate the complexity of each society.

To find these other voices (if indeed they want to be found[3]), it is necessary for Western academics to de-centre themselves: geographically, linguistically

and culturally. Rather than abandon fieldwork, it is perhaps now more than ever necessary to de-centralise Western centrism. This does not mean a naïve return to the field (see Nast, 1994). A number of authors fear the dangers of 'exoticising' the other, of choosing a difference to study, for its difference, rather than because of any particular commitment to the group in question. For example, Katz (1994: 68) uses a comparative approach, not only to foreground her relationship to those involved in the research, but also to allow the research to reflect upon larger-scale processes:

> By displacing the field and addressing the issue in rural Sudan and East Harlem, New York—settings that on the surface appear to have little in common—I am able to tell a story not of marginalization alone where 'those poor people' might be the key narrative theme, but of the systemic predations of global economic restructuring.

Hence Katz recognises her ambivalent position within the research process; she is neither part of the communities being researched, nor entirely separate from them. She explains that each of us is always already in the field. There are further strategies that can be adopted to increase this sense of connection, more obviously perhaps the importance of collaborative work, or engaging with local researchers at each stage of the research process, from project inception through to publication. This is one of the reasons why some have argued for the importance of authorship with Third World academics, or the inclusion of research subjects in the production of final reports and papers which will represent them and their communities (see McDowell, 1992; Scheyyens & Leslie 2000).[4]

Conclusions

It is important not to see indigenous knowledge as an artefact, simply something to be preserved (perhaps akin to the collection of genetic diversity) as a record of what has been lost to the seemingly inevitable march of Western science. This means a wariness of glib uses of concepts of indigenous knowledge in development discourse, and a wariness of what we are perhaps now seeing as an institutionalisation of indigenous knowledge in the World Bank, and elsewhere, as 'IK', an uncritical addition to development practice. Although there seems to be an implicit assumption in much of the literature that capitalism and Western science are inextricably bound to each other, it may well be that, if alternative knowledge systems offer potentially higher returns on capital than Western science, then capitalist interests will inevitably embrace such knowledges. Hence we have a possible explanation for the World Bank's recent interest in indigenous knowledge. However, the local knowledges of people on the receiving end of development practice must be allowed a more thorough challenge to the agenda.

Indigenous knowledges all over the world are malleable, altering in response to Western ideas and practices, but also to an ever-changing array of other ways of knowing and doing. This is due to economic and social change, especially as the result of modernisation. Thus we must not underestimate the significance

of material conditions which influence the need for different knowledges. Indigenous knowledge cannot ever be understood in isolation of the critical analysis of economic, social, cultural and political conditions. As Agrawal (1995) argues, indigenous knowledge is not simply about language and expression, but about these material conditions through which people must survive.

Notes

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[1] This was underlined in the UN *Human Development Report 2003* which showed that living standards had declined in 54 countries in the world between 1990 and 2001, 21 of which are in Africa.

[2] A disclaimer appears at the end of this article which states that 'The views expressed in this paper are entirely those of the author and should not be attributed in any manner to the World Bank, to its affiliated organizations or to members of its Board of Executive Directors or the countries they represent'. However, the prominence of this article on the World Bank's website suggests a degree of convergence of viewpoints.

[3] This set of arguments does assume that the subaltern want to be heard. However, there are suggestions that the identification of the 'hidden transcripts' of resistance makes them legible to the very people they seek to evade (Scott, 1985). Alternatively, some may want to adopt silence as a strategy of resistance. Katz does accept the possibility that there are times when the most appropriate method might be one of silence, acknowledging that 'ethnographic work can (inadvertently) expose sensitive practices of subaltern people to those who (might) use this knowledge to oppress them' (Katz, 1994: 71; see also Stacey, 1988).

[4] This, however, is an intention more often discussed than practised (Parpart, 1993: 455).

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