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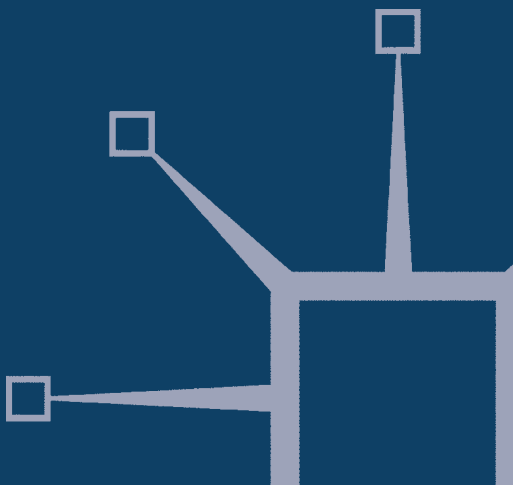
Relocating Modern Science

Circulation and the Construction of Knowledge in South Asia and Europe, 1650–1900

Kapil Raj



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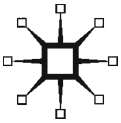

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For Anasuya and Arjoun

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Contents

List of Illustrations

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pp. 23–54; 'Refashioning Civilities, Engineering Trust: William Jones, Indian Intermediaries and the Production of Reliable Legal Knowledge in Late Eighteenth-Century Bengal' in *Studies in History*, vol. 17, no. 2 (2001), pp. 175–210; and 'When Human Travellers become Instruments: The Indo-British Exploration of Central Asia in the Nineteenth Century' in Marie-Noëlle Bourguet, Christian Licoppe and Heinz Otto Sibum, eds, *Instruments, Travel and Science: Itineraries of Precision from the Seventeenth to the Twentieth Century* (London & New York: Routledge, 2002), pp. 156–88. I thank the publishers for permission to reuse this material.

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Introduction

Modern science is widely considered a purely West European creation, originating in the 'scientific revolution' of the sixteenth and seventeenth centuries and owing nothing to other cultures or times. Accordingly, academic interest in the relationship of modern science to the rest of the world has traditionally focused mainly on two sets of issues.

The first pertains to the reasons for the putative emergence of modern science within the narrow boundaries of West Europe, a subject on which a plethora of writings by historians of science celebrating the epistemological, sociological, and economic uniqueness of the West has continued to appear ever since the establishment of the domain as a full-fledged discipline at the turn of the twentieth century.[1] Indeed, of all the questions dealt with by the history of science, this is probably

[1] Although European autarky has always underpinned history of science writing—see, for instance, Pierre Duhem, *Le système du monde*, 10 volumes (Paris: A. Hermann, 1913–59)—the *locus classicus* for this question is Herbert Butterfield, *The Origins of Modern Science* (London: G. Bell & Sons, 1949). See also Alexandre Koyré, *From the Closed World to the Infinite Universe* (New York: Harper, 1958); idem, *Metaphysics and Measurement: Essays in Scientific Revolution* (Cambridge, MA: Harvard University Press, 1968); A. Rupert Hall, *The Scientific Revolution 1500–1800: The Formation of the Modern Scientific Attitude* (London: Longmans, Green & Co., 1954) published in its second edition as *The Revolution in Science* (Harlow: Longman, 1983); Robert S. Westfall, *The Scientific Revolution in the 17th Century: The Construction of a New World View* (Oxford: Clarendon Press, 1992); and Marcus Hellyer, ed., *The Scientific Revolution: The Essential Readings* (Oxford: Blackwell, 2003). For a critical appraisal of this quest for origins, see Andrew Cunningham and Perry Williams, 'De-centring the "Big Picture": The Origins of Modern Science and the Modern Origins of Science', *British Journal for the History of Science*, vol. 26, no. 4 (1993), pp. 407–32; and Steven Shapin, *The Scientific Revolution* (Chicago & London: University of Chicago Press, 1996).

the one for which the discipline is generally best known. Perhaps the least hubristic—certainly among the most comparativist—reflections on the origins question have come from Joseph Needham. Like many intellectuals of his generation, Needham was convinced of the universality of science as a human enterprise—as the expression of an innate curiosity fundamental to human nature throughout time and space.[2] Intrigued by the momentous scientific and technological achievements of China till the fifteenth century, he asked why modern science did not rise there rather than in Europe. The answer to what has come to be called Needham's 'Grand Question' lay, according to him, in the resilience of China's agrarian bureaucratic culture which hindered the emergence of mercantile and industrial capitalism, a *sine qua non* for the emergence of mathematical rationality, the bedrock of modern science. Thus, Chinese, like Indian, or Arab, science was based on local, 'ethnic-bound', categories which allowed the diffusion of technical innovations but prevented that of their underlying theoretical systems. On the other hand, modern science, because it is founded on mathematical reasoning, can be completely appropriated by all humans and is thus 'ecumenical'. Yet, despite its uniqueness, modern science was not created *ex nihilo*. Rather, it subsumed the medieval learning of both West and East 'like rivers flowing into the ocean of modern science'.[3] For Needham, then, while modern science is uniquely Western in origin, it is culturally universal.

The second set of issues takes for granted the Western origins of modern science and is instead concerned with the modalities of its spread from West Europe to the rest of the world. George Basalla's are

[2] For the *Zeitgeist* of Needham's generation, see Gary Werskey, *The Visible College. A Collective Biography of British Scientists and Socialists in the 1930s* (London: Free Association Books, 1988).

[3] Joseph Needham, 'The Roles of Europe and China in the Evolution of "Ecumenical Science"', in idem, *Clerks and Craftsmen in China and the West* (Cambridge: Cambridge University Press, 1970), p. 397. Although Needham never did arrive at a definitive answer to his 'Grand Question', fragments of it are strewn in a number of passages of his magnum opus, *Science and Civilisation in China*, 7 vols (Cambridge: Cambridge University Press, 1954–2005) and in various essays, in particular Joseph Needham, *The Grand Titration: Science and Society in East and West* (London: George Allen & Unwin, 1969). For a critique of Needham's theses, see Nathan Sivin, *Science in Ancient China: Researches and Reflections* (Aldershot: Ashgate, 1995).

probably the best known, and undoubtedly the most controversial, thoughts on this question. In an epoch-making paper that appeared almost forty years ago, Basalla proposed a three-stage model of evolutionary progress for the globalization of what he simply called 'Western Science'.[4] A preliminary period of scientific exploration, where non-European (i.e. 'non-scientific') societies serve as passive reservoirs of data, leads to a second one of colonial dependence in which European scientific institutions encourage Western scientific activity outside Europe—by European colonists or settlers, or else by acculturated indigenes. Eventually, colonized societies gain maturity, a phase characterized by a struggle to establish independent, national scientific traditions based nonetheless upon Western professional standards. Basalla's model is a typical product of the Cold War era and echoes Rostow's anti-communist, five-stage model for economic development based on the American ideal. It has, thus—not surprisingly—attracted much critical response.[5]

The problems set out by both Needham and Basalla have, in their own way, dominated thinking among most historians and sociologists of science working on topics outside the West. Such scholars have in recent years loosely constituted themselves as an academic community

[4] See George Basalla, 'The Spread of Western Science', *Science*, no. 156 (5 May 1967), pp. 611–22; and idem, 'The Spread of Western Science Revisited', in Antonio Lafuente, Alberto Elena, and María Luisa Ortega, eds, *Mundialización de la ciencia y cultura nacional* (Aranjuez, Madrid: Doce Calles, 1993), pp. 599–603.

[5] Walt Whitman Rostow, *Stages of Economic Growth: A Non-Communist Manifesto* (Cambridge: Cambridge University Press, 1960). For critiques of Basalla's model, see, in particular, Roy M. MacLeod, 'On Visiting the "Moving Metropolis": Reflections on the Architecture of Imperial Science', *Historical Records of Australian Science*, vol. 5, no. 3 (1982), pp. 1–16; Ian Inkster, 'Scientific Enterprise and the Colonial "Model": Observations on the Australian Experience in Historical Context', *Social Studies of Science*, vol. 15, no. 4 (1985), pp. 677–704. See also various essays in Nathan Reingold and Marc Rothenberg, eds, *Scientific Colonialism: A Cross-Cultural Comparison* (Washington, DC: Smithsonian Institution Press, 1987); Deepak Kumar, ed., *Science and Empire. Essays in Indian Context* (Delhi: Anamika Prakashan, 1991); Patrick Petitjean, Catherine Jami and Anne-Marie Moulin, eds, *Science and Empires: Historical Studies about Scientific Development and European Expansion* (Dordrecht: Kluwer Academic Publishers, 1992); and Lafuente *et al.*, eds, *op. cit*.

called 'Science and Empire' studies.[6] Historical studies of science outside the West, particularly in India, have thus mainly centred on bringing to light the contributions of non-Western cultures to the 'ocean of modern science' on the one hand, and on the diffusion and response to modern science on the other.[7]

With Needham and Basalla, these studies share the belief that science is the embodiment of the basic values of truth and rationality, the motor of moral, social, and material progress, the marker of civilization itself. It is not surprising then that the history of science has become the site of controversy, with nationalist historians pressing the claim of scientificity for their indigenous knowledges and ways of

[6] The name 'Science and Empire', however, is as unsatisfactory as it is Eurocentric. Regions like China or Persia, or even the Ottoman empire, which were empires in their own right, are not the subject of investigation for this domain—they become so only when and inasmuch as they come into contact with modern West Europeans. Both the terms, 'science' and 'empire', are taken to apply only to modern West European enterprises. However, for an interesting attempt to study the Chinese scientific endeavour in an imperial context in its own right, see Laura Hostetler, *Qing Colonial Enterprise: Ethnography and Cartography in Early Modern China* (Chicago & London: University of Chicago Press, 2001).

[7] See, for instance, Morris F. Low, *Beyond Joseph Needham: Science, Technology, and Medicine in East and Southeast Asia*, *Osiris* (2nd series), vol. 13 (Chicago & London: University of Chicago Press, 1998). For South Asia, see in particular Devendra Mohan Bose, 'History of Science in India: How it Should be Written', *Science and Culture*, vol. 29, no. 4 (1963), pp. 163–6; David Kopf, *British Orientalism and the Bengal Renaissance: the Dynamics of Indian Modernization 1773–1835* (Calcutta: Firma K.L. Mukhopadhyay, 1969); Devendra Mohan Bose, Samarendra Nath Sen and B.V. Subbarayappa, *A Concise History of Science in India* (New Delhi: Indian National Science Academy, 1971); Deepak Kumar, ed., *op. cit.*; idem, *Science and the Raj, 1857–1905* (Delhi: Oxford University Press, 1995); Ahsan Jan Qaisar, *The Indian Response to European Technology and Culture (1498–1707)* (Delhi: Oxford University Press, 1999; orig. publ. 1982); and Pratik Chakrabarti, *Western Science in Modern India: Metropolitan Methods, Colonial Practices* (Delhi: Permanent Black, 2004). For other regions, and more generally, see Roderick Weir Home, ed., *Australian Science in the Making* (Cambridge: Cambridge University Press, 1988); Lewis Pyenson, 'Science and Imperialism', in Robert C. Olby, Geoffrey N. Cantor, John R.R. Christie and M.J.S. Hodge, eds, *Companion to the History of Modern Science* (London & New York: Routledge, 1990), pp. 920–33; Petitjean, *et al.*, eds, *op. cit.*; S. Irfan Habib and Dhruv Raina, eds, *Situating the History of Science: Dialogues with Joseph Needham* (Delhi: Oxford

knowing. In the hands of religious and political extremists, this has led to a lot of chauvinistic gerrymandering, if not pure historical falsification.[8]

We are then presented with the following dilemma. Are we to understand modern science purely as an emanation out of West Europe, constituting the Great Divide between the West and the Rest, and reaching non-European peoples only as they come into contact with Europeans and capitalism? Or are we to think solely in terms of competing nationalist narratives claiming precedence in scientific reasoning for their respective societies?

One way out of this predicament has been to question the moral and political values of modern science. Indeed, there have been plenty in recent times who have sought to denounce science—and all other institutions of modernity—as alienating and dehumanizing, and, in certain cases, to open up alternative visions of what science might be.[9]

University Press, 1999); and Roy M. MacLeod, ed., *Nature and Empire*, *Osiris* (2nd series), vol. 15 (Chicago & London: University of Chicago Press, 2000). There are, of course, a few exceptions to this admittedly schematic presentation: see, notably, James E. McClellan III, *Colonialism and Science: Saint Domingue in the Old Régime* (Baltimore: Johns Hopkins University Press, 1992).

[8] For a sample of such work in the Indian context, see K. Ramasubramanian, M.D. Srinivas and M.S. Sriram, 'Modification of the Earlier Indian Planetary Theory by the Kerala Astronomers (*c.* 1500 AD) and the Implied Heliocentric Picture of Planetary Motion', *Current Science*, vol. 66 (1994), pp. 784–90; Saroja Bhate and Subhash Kak, 'Panini's Grammar and Computer Science', *Annals of the Bhandarkar Oriental Research Institute*, no. 72 (1993), pp. 79–94; Subhash Kak, 'Computational Aspects of the Aryabhata Algorithm', *Indian Journal of History of Science*, vol. 21, no. 1 (1986), pp. 62–71; idem, 'The Astronomy of the Vedic Altars and the Rgveda', *Mankind Quarterly*, vol. 33 (1992), pp. 43–55; idem, 'Early Theories on the Distance to the Sun', *Indian Journal of History of Science*, vol. 33 (1998), pp. 93–100; B.N. Narahari Achar, 'On the Astronomical Basis of the Date of Satapatha Brahmana: A Re-Examination of Dikshit's Theory', *Indian Journal of History of Science*, vol. 35, no. 1 (2000), pp. 1–19. For a critique of nativist positions, albeit from a narrowly scientistic perspective, see Meera Nanda, *Prophets Facing Backward: Science and Hindu Nationalism* (Delhi: Permanent Black, 2005).

[9] Theodor W. Adorno and Max Horkheimer, *Dialektik des Aufklärung. Philosophische Fragmente* (Amsterdam: Querido, 1947); Herbert Marcuse, *One-Dimensional Man: Studies in the Ideology of Advanced Industrial Society* (London:

More recently, in the wake of Foucault-inspired arraignments of modern science, the latter is now seen in some quarters as a hegemonic 'master narrative' of Western power, a discursive formation through which the rest of the world was simultaneously subjugated and relegated to the role of Europe's binarily opposed Other. The spread of Western science is, in this view, achieved by means of the often violent imposition of 'rationality' on cultures originally endowed with 'another reason'. However, far from replicating those in Europe, the resulting practices are, according to this view, but hybrid or pale copies of the former, valid only locally, in contrast to the supposed universality of the original—a mere travesty of Western knowledges.[10]

Their political appeal notwithstanding, these critiques tell us nothing of the nature of putative non-Western 'reason(s)' which, if only through the Manichaean thrust of their argument, are assumed to have preserved a pristine innocence through the millennia preceding contact with Europeans. More importantly, they share with the more optimistic earlier positions the widely accepted idea that there is something essential and unified called modern science which, like modernity itself, originated in West Europe and subsequently spread to the rest of the world. But does historical investigation bear out these assumptions?

Recent scholarship tends to belie these commonly considered articles of faith. Indeed, in the past two decades the claimed unity of modern knowledge practices across European space has been convincingly

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Routledge & Kegan Paul, 1964). See also Daryl E. Chubin and Ellen W. Chu, eds, *Science off the Pedestal: Social Perspectives on Science and Technology* (Belmont, CA: Wadsworth, 1989); and, for a more constructive critique, Jeet Pal Singh Uberoi, *The Other Mind of Europe: Goethe as a Scientist* (Delhi: Oxford University Press, 1984); and idem, *The European Modernity: Science, Truth and Method* (Delhi: Oxford University Press, 2002). See also Ashis Nandy, *Alternative Sciences* (Delhi: Allied Publishers, 1980).

[10] A typical example is Gyan Prakash, *Another Reason: Science and the Imagination of Modern India* (Princeton: Princeton University Press, 1999). See also David Arnold, *Science, Technology and Medicine in Colonial India* (Cambridge: Cambridge University Press, 2000); and, in a more nuanced form, Christophe Bonneuil, 'Mettre en ordre et discipliner les tropiques: les sciences du végétal dans l'empire français, 1870–1940', unpublished doctoral dissertation, Université de Paris VII, 1997.

demolished. In place of a unique 'modern science', it is now accepted that there are many national and local knowledge traditions and dynamics spread across most of North and West Europe, with diverse, and at times contradictory, intellectual agendas and influences throughout the early-modern and modern periods.[11]

Furthermore, a number of prominent imperial historians, although focusing primarily on the British empire, have called into question the concept of a simple diffusion to the rest of the world of the fundamental values of modernity—values such as democracy, justice, and the welfare state. They have argued that modernity and its institutions are not simple emanations from a pre-existing centre, but are rather the result of 'a complex saga of the collisions, compromises, and comings together' of England with the many countries it came to dominate, including Ireland, Scotland, and India. By focusing on the processes of construction, they thus imply that Great Britain, its modern institutions, and its empire were co-constituted.[12]

In an unrelated but parallel tendency, colonial historians too have widened the focus of their studies from 'the colonized' to the contingent and shifting political terrain on which the very categories of colonized and colonizer have been shaped and patterned at different times and spaces through a dialectic of contestation and refashioning of European claims to superiority.[13] Although more sensitive to the

[11] See Roy Porter and Mikuláš Teich, eds, *The Scientific Revolution in National Context* (Cambridge: Cambridge University Press, 1992); and idem, eds, *The Enlightenment in National Context* (Cambridge: Cambridge University Press, 1981).

[12] I refer here to David Washbrook, 'From Comparative Sociology to Global History: Britain and India in the Pre-History of Modernity', *Journal of the Economic and Social History of the Orient*, vol. 40, no. 4 (1997), pp. 410–43; various writings of Burton Stein, David Cannadine and, most notably, Christopher Alan Bayly, *Imperial Meridian: The British Empire and the World, 1780–1830* (London: Longman, 1989). The quotation is from Linda Colley, 'Clashes and Collaborations', *London Review of Books* (18 July 1996), p. 8.

[13] For a critical review of recent literature on the impact of intercultural encounter on both colonizers and colonized, see Frederick Cooper and Ann Laura Stoler, 'Between Metropole and Colony: Rethinking a Research Agenda', in idem, eds, *Tensions of Empire: Colonial Cultures in a Bourgeois World* (Berkeley, Los Angeles, London: University of California Press, 1997), pp. 1–56.

politics of power, this trend in colonial studies finds a sympathetic resonance in recent and growing scholarship in the history and anthropology of encounter, the central underlying theme of which is that implicit understandings influence every culture's ideas about itself and others. These understandings, however, are changed by experience in a constantly shifting process in which both sides participate, and that makes such encounters complex historical events and moments of discovery.[14]

Finally, historians, sociologists, and philosophers of science have in the past decades radically undermined the traditional understanding that modern science has its own logic of development based on rigorous, immutable, explicit, and empirically tested rules and methods which lie beyond the pale of social and historical analysis. Moving away from a conception of science as a system of formal propositions or discoveries, these recent studies seek to understand the making, maintenance, extension, and reconfiguration of scientific knowledge by focusing equally on the material, instrumental, corporeal, practical, social, political, and cognitive aspects of knowledge. Systematically opting for detailed case studies of the processes through which knowledge and associated skills, practices, and instruments are created in preference to grand narratives or 'big-picture' accounts, they have demonstrated the negotiated, contingent, and situated nature of the propositions, skills, and objects that constitute natural knowledge.

This new scholarship has convincingly shown that scientific research is not based on logical step-by-step reasoning but on pragmatic judgement, much as in the practical crafts. More importantly, and perhaps more surprisingly, scientific knowledge turns out on this showing to be local everywhere. Indeed, locating knowledge making in precise contexts of time and place—typically in enclosed spaces like laboratories, observatories, museums, cabinets of curiosities, botanical and zoological gardens, libraries, and hospitals—has been one of the principal accomplishments of these recent studies of science.

[14] See Stuart B. Schwartz, ed., *Implicit Understandings: Observing, Reporting, and Reflecting on the Encounters between Europeans and Other Peoples in the Early Modern Era* (Cambridge: Cambridge University Press, 1994); Martin Daunton and Rick Halpern, eds, *Empire and Others: British Encounters with Indigenous Peoples, 1600–1850* (Philadelphia: University of Pennsylvania Press, 1999).

Accounting for the mobility of natural knowledges beyond their site of origin—their spread and eventual universalization—has accordingly become another major concern. Scholars in science studies have convincingly shown that scientific propositions, artefacts, and practices are neither innately universal (because of their epistemological force) nor forcibly imposed on others. Rather, they disseminate only through complex processes of accommodation and negotiation, as contingent as those involved in their production. As one scholar has aptly put it, there is no 'algorithmic recipe' for successful replication.[15]

At the same time, mathematics and natural and experimental philosophy, long held to epitomize scientific knowledge, have progressively lost their pride of place to a host of other domains of natural knowledge, and now share increasing historical attention with subjects like navigational astronomy, natural history, medicine, and geographical exploration.[16] And, although the laboratory still remains the predominant site of knowledge production for science studies, some scholars have recently turned their attention to knowledge-making activities outside the strict precincts of segregated spaces. Attention has thus

[15] For an excellent introduction to these new approaches in the history, philosophy, and sociology of science, along with a substantial bibliography, see Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science* (Cambridge: Cambridge University Press, 1998). Emblematic of the field is Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life* (Princeton: Princeton University Press, 1985); see also Adir Ophir and Steven Shapin, 'The Place of Knowledge. A Methodological Survey', *Science in Context*, vol. 4, no. 1 (1991), pp. 3–21; and Steven Shapin, 'Placing the View from Nowhere: Historical and Sociological Problems in the Location of Science', *Transactions of the Institute of British Geographers*, vol. 23 (1998), pp. 5–12. The quote is from Harry M. Collins, *Changing Order: Replication and Induction in Scientific Practice* (London: Sage, 1985), p. 143.

[16] See, for instance, Nicholas Jardine, James E. Secord and Emma C. Spary, eds, *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996); David Philip Miller and Peter Hanns Reill, eds, *Visions of Empire: Voyages, Botany and Representations of Nature* (Cambridge: Cambridge University Press, 1996); Marie-Noëlle Bourguet, Christian Licoppe and Heinz Otto Sibum, eds, *Instruments, Travel and Science: Itineraries of Precision from the Seventeenth to the Twentieth Century* (London & New York: Routledge, 2002); Pamela H. Smith and Paula Findlen, eds, *Merchants and Marvels: Commerce, Science, and Art in Early Modern Europe* (New York & London: Routledge, 2002).

turned to other sites of knowledge production, such as coffee houses, pubs, and breweries, albeit always within the European metropolis.[17] However, knowledge production in non-European spaces of modernity has not been studied by the social studies of knowledge tradition, having been largely left to anthropologists and other area studies specialists.[18]

Armed with these new findings, scholars have attempted to reframe our understanding of scientific activity in its complex relations with society, the state, and the economy. Science is thus not only taken to refer to the production of knowledge, but also to that of instruments, techniques, and services used in the production of knowledge. It refers equally to research for industrial applications and national prestige, to teaching and training of future generations of practitioners, and to the improvement of the public understanding of knowledge-making activities.[19]

This book lies at the intersection of these recent historiographical developments and understandings. It is an attempt to re-examine the nature of scientific knowledge making in the globalized space of early modernity in the context of European expansion. In particular, it looks at the role of intercultural encounter in the circulation of the specialized knowledges that constituted science in this period. It addresses the following questions: What was the nature of the vectors of knowledge transmission? Who were the agents involved in the transmission and appropriation of knowledge and skills in the spaces of intercultural encounter? Was this a simple process of diffusion and acceptance or was there an active process of reception and reconfiguration of the circulating knowledges and skills? If the latter, where—outside of European metropolitan centres—was knowledge being reconstructed

[17] See David E. Allen, *The Naturalist in Britain: A Social History* (London: Allen Lane, 1976); Anne Secord, 'Science in the Pub: Artisan Botanists in Early Nineteenth-Century Lancashire', *History of Science*, vol. 32, no. 3 (1994), pp. 269–315; Heinz Otto Sibum, 'Les gestes de la mesure: Joule, les pratiques de la brasserie et la science', *Annales HSS*, 53^{e} année, nos 4–5 (1998), pp. 745–74.

[18] See, however, Simon Schaffer, 'Golden Means: Assay Instruments and the Geography of Precision in the Guinea Trade' in Bourguet *et al.*, eds, *op. cit.*, pp. 20–50.

[19] See Michel Callon, ed., *La science et ses réseaux* (Paris: La Découverte, 1988).

and certified? What was the relationship of this knowledge with its metropolitan sibling? Were these knowledges transportable? If so, what happened in the process of displacement?

These questions are explored here by examining the historical record relating to one intercultural 'contact zone'—Europe–South Asia—between the late seventeenth and the late nineteenth centuries.[20] Given the range and duration of the encounter between South Asians and Europeans, as well as the existence of rich archival sources, this region provides the ideal opportunity to follow interactions between the different specialist cultures in the making of new knowledges.

By studying the construction of scientific knowledge in the contact zone itself, I hope not only to enlarge the scope of social studies of knowledge by bringing contact zones, along with novel historical source material, into their ambit as legitimate sites of scientific knowledge production, but also to show that important parts of what has been passed off as European, or Western, science were actually made elsewhere. This is part of the more general point that national and regional histories, especially since the first globalization of the sixteenth century, cannot be understood by limiting study to within their respective geographical boundaries.[21]

To be sure, this is not the first attempt to extend the locus of modern scientific knowledge construction beyond West Europe. In doing so,

[20] I take the term 'contact zone' from Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (London & New York: Routledge, 1992), pp. 6–7, as a convenient way to denote the space where peoples with different cultural and geographical origins and histories meet and establish ongoing relations, 'usually involving conditions of coercion, radical inequality, and intractable conflict'. As such, the 'contact zone' is an extension of the concept of the frontier in American historiography from a fixed geographical and temporal entity to a process of social, economic, and, sometimes, military intersection and interaction between different social and ethnic groups. See Richard White, *The Middle Ground: Indians, Empires, and Republics in the Great Lakes Region, 1650–1815* (Cambridge: Cambridge University Press, 1991); and James H. Merrell, *Into the American Woods: Negotiators on the Pennsylvania Frontier* (New York: W.W. Norton, 1999).

[21] This point is forcefully made in Serge Gruzinski, *Les quatre parties du monde. Histoire d'une mondialisation* (Paris: Éditions de la Martinière, 2004).

I follow the lead set by a small but growing number of scholars who have begun to study knowledge encounters in the context of the New World and the Pacific.[22] However, little attention has been focused on the other major contact zone, the Indian Ocean. And although inter-cultural scientific encounter in the South Asian context has recently been the subject of a major book, the discussion on science has been limited to debates *about* science and the status of scientific knowledge among learned South Asians and British in the nineteenth century—a second-order discussion and a step removed from the making of knowledge.[23]

The kinds of scientific knowledge considered here cover natural history, terrestrial surveying, map-making, law, linguistics, and public administration. Eclectic though the choice may at first sight seem to be, the grouping of modern legal, political, and administrative practices with the natural sciences is not fortuitous: recent research in the history of science has persuasively shown that quantitative objectivity in the modern sciences was significantly shaped by bureaucratic practices.[24]

Although none of its chapters addresses the subject directly, one of the aims of this book is to question the oft-used notion of 'colonial science' or 'colonial knowledge'. Such notions have been used to designate the classificatory and delineating discursive practices of European colonists relating to indigenous populations, languages, and objects in regions which they had come to dominate, practices that rendered

[22] See, for instance, Barbara E. Mundy, *The Mapping of New Spain: Indigenous Cartography and the Maps of the* Relaciones Geográficas (Chicago & London: University of Chicago Press, 1996); Merrell, *op. cit.*; Serge Gruzinski, *The Mestizo Mind: The Intellectual Dynamics of Colonization and Globalization* (New York: Routledge, 2002; French original published 1999); and Carmen Salazar-Soler, *Anthropologie des mineurs des Andes: Dans les entrailles de la terre* (Paris: Harmattan, 2002). For the Pacific, see Nicholas Thomas, *Entangled Objects: Exchange, Material Culture, and Colonialism in the Pacific* (Cambridge, MA: Harvard University Press, 1991).

[23] See Christopher Alan Bayly, *Empire and Information: Intelligence Gathering and Social Communication in India, 1780–1870* (Cambridge: Cambridge University Press, 1996).

[24] See Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton: Princeton University Press, 1995).

colonial rule possible.[25] The knowledges thus acquired are said to have a local or geographically circumscribed status, inasmuch as they apply specifically to each region and are thus not part of supposedly universal, or mainstream, science. As much through its stress on intellectual and material practices—rather than just on discursive ones—as through the variety of domains (both in the natural and social sciences) it examines, this book aims to advance an alternative vision of the construction and spread of scientific knowledge through reciprocal, albeit asymmetric, processes of circulation and negotiation, a vision at odds with current post-colonial thinking. The examples presented here try and demonstrate that South Asia was not a space for the simple application of European knowledge, nor a vast site for the collection of diverse information to be processed in the metropolis, nor indeed 'of complicated and complex knowledge created by Indians, but codified and transmitted by Europeans'.[26] On the contrary, South Asia was an active, although unequal, participant in an emerging world order of knowledge. As I shall endeavour to show, the contact zone was a site for the production of certified knowledges which would not have come into being but for the intercultural encounter between South Asian and European intellectual and material practices that took place here. In other words, although these knowledges had different trajectories in specialist communities in South Asia and Europe and were appropriated and integrated differently in the two regions (not least because of colonial domination), they partook of, and were constructed through, the same circulatory processes.

While drawing heavily upon the revisionist historiographies developed within recent imperial, colonial, and science studies, the perspective developed in this book nonetheless calls for a number of

[25] See, in particular, Bernard S. Cohn, *An Anthropologist Among the Historians and Other Essays* (Delhi: Oxford University Press, 1987); and idem, *Colonialism and its Forms of Knowledge: The British in India* (Princeton: Princeton University Press, 1996). See also Emmanuelle Sibeud, *Une science impériale pour l'Afrique? La construction des savoirs africanistes en France, 1878–1930* (Paris: Éditions de l'École des Hautes Études en Sciences Sociales, 2002).

[26] Bernard S. Cohn, 'The Command of Language and the Language of Command', in idem, *Colonialism and its Forms of Knowledge*, *op. cit.*, pp. 16–56; this quote p. 16.

displacements and relocations concerning the institutions, agents, practices, and objects so far studied, as well as a change in historiographical approach to take account of knowledge making in the globally distributed spaces of modernity.

In keeping with the shift from localities within the European metropolis to the contact zone without, attention needs to be turned away from the socially homogeneous enclosed spaces in which knowledges like pure mathematics and natural and experimental philosophy were formed, to the 'open air', where natural history and medicine, surveying and map-making, and linguistics and administrative sciences—domains characteristic of the extra-metropolitan context—were developed. I owe the expression 'open air' sciences to Michel Callon, who coined the term '*recherche de plein air*' to designate knowledge practices that necessarily involve negotiations between specialists and other heterogeneous groups in their very making and certification. These practices, as Callon stresses, are fundamentally different from 'field' sciences where practitioners simply take the world outside the confines of the laboratory to be an inanimate space for collecting data, which is then centralized and processed in the secluded calm of the laboratory.[27] Open air practices are, however, no less locally inscribed, inasmuch as knowledge constructed in one open air space has its specificities which distinguish it from others constructed in other open airs, in the same way as do knowledges constructed in different laboratories.

The areas of open air knowledge considered here, it is useful to remember, were often no less mathematically based than their indoor siblings and, with them, fed on a common core of material and social practices. Indeed, much important work even within European learned academies has focused on areas such as terrestrial surveying and mapping, for which institutions like the French *Académie Royale des*

[27] See Michel Callon, Pierre Lascoumes and Yannick Barthe, *Agir dans un monde incertain* (Paris: Le Seuil, 2001), p. 136 *et seq*. See also Henrika Kuklick and Robert E. Kohler, eds, *Science in the Field*, *Osiris*, (2nd series), vol. 11 (Chicago & London: University of Chicago Press, 1996); and Robert E. Kohler, *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology* (Chicago & London: University of Chicago Press, 2002).

Sciences was best known during the seventeenth and eighteenth centuries.[28]

However, it was not the learned academies and universities, the traditional loci of knowledge-making activity in Europe, which were directly involved in producing knowledge overseas, although they often planned and oversaw transcontinental, and trans-oceanic, exploratory expeditions. Our second displacement thus requires a shift in focus to overseas trading companies which, along with religious missions, accounted for the main European institutions involved in overseas encounters, in particular with South Asia. Surprising as this might at first sound, trading houses, like the various European East India companies, played a central role in the early-modern knowledge-making process.[29] It is useful to remember that Gresham College, the forerunner of the Royal Society, was founded by a group of traders—the Mercer's Company.[30] And recent research has clearly brought to the fore the important part played by trading companies—as patrons of technicians and philosophical demonstrators—in transporting natural philosophy from exclusive areas such as Gresham College into

[28] Josef W. Konvitz, *Cartography in France 1660–1848: Science, Engineering, and Statecraft* (Chicago & London: University of Chicago Press, 1987).

[29] The recognition of the importance of trading companies to modern scientific knowledge formation has been slow amongst historians. See, however, Johan Leonard Blussé and Ilonka Ooms, eds, *Kennis en Compagnie: De Verenigde Oost-Indische Compagnie en de moderne Wetenshap* (Amsterdam: Balans, 2002); and Richard W. Hadden, *On the Shoulders of Merchants: Exchange and the Mathematical Conception of Nature in Early Modern Europe* (Albany, NY: State University of New York Press, 1994) which argues that the quantification of modern science evolved from commercial book-keeping and reckoning practices developed by merchants in the sixteenth and seventeenth centuries, and that the mechanistic view of nature grew out of day-to-day practices of social and economic relations. See also Steven J. Harris, 'Long-Distance Corporations, Big Sciences, and the Geography of Knowledge', *Configurations*, vol. 6, no. 2 (1998), pp. 269–304; and Frank J. Swetz, *Capitalism and Arithmetic: The New Math of the 15th Century* (La Salle, Il.: Open Court, 1987).

[30] Christopher Hill, *The Intellectual Origins of the English Revolution* (Oxford: Clarendon Press, 1965), pp. 33–4; and Francis R. Johnson, 'Gresham College: Precursor of the Royal Society', *Journal of the History of Ideas*, vol. 1, no. 4 (1940), pp. 413–38.

the wider European metropolitan public space.[31] Indeed, corporate commerce was quick to recognize that the continued existence and expansion of European overseas trade was largely dependent on scientific expertise and associated material practices. Thus, right from their inception, the trading companies supported and even employed mathematicians, practical astronomers, and hydrographers for navigation, and medics for treating crews and identifying commercially viable plants or derived products overseas.[32] They were thus key actors in the early modern enterprise of knowledge making and use.

For all that, trading companies did not simply stand beside learned societies as agents for the spread of natural philosophy, natural history, and practical mathematics. Quite the contrary, the worlds of trade and learning were very closely intertwined. Men of science invested substantial sums of money in international commerce. To take the case of England once more, a number of eminent Fellows of the Royal Society, like Robert Boyle, Isaac Newton, and Joseph Banks, to name but some of the most well known, counted among the directors or major shareholders of the likes of the English East India Company (hereafter EIC)—the longest lasting and most powerful of the British trading groups—or the South Sea Company. Initially enticed by the attractive dividends, reaching up to 20 per cent, offered by these investments, such men also found in it a sure means of raising their credit.[33] This in turn led to a more structured and durable relation between corporate trading groups and learned societies. For example, the Royal Botanic Gardens at Kew, under the leadership of Joseph Banks (who was

[31] Larry Stewart, 'Other Centres of Calculation, or, Where the Royal Society Didn't Count: Commerce, Coffee-Houses and Natural Philosophy in Early Modern London', *British Journal for the History of Science*, vol. 32, no. 2 (1999), pp. 133–53; and Jerry Brotton, *Trading Territories: Mapping the Early Modern World* (London: Reaktion Books, 1997).

[32] Harold J. Cook, 'Physicians and Natural History', in Jardine *et al.*, eds, *op. cit.*, pp. 91–105.

[33] Credit is taken here to refer to trust, authority or honour, and, at the same time, to the new social relations between the stockholder and the merchant. See Simon Schaffer, 'Defoe's Natural Philosophy and the Worlds of Credit', in John R.R. Christie and Sally Shuttleworth, eds, *Nature Transfigured: Science and Literature 1700–1900* (Manchester: Manchester University Press, 1989), pp. 13–44.

also president of the Royal Society), played an essential part in the economic management of Bengal by the EIC, and of Polynesia and the West Indies by the British government: British botanists selected the most profitable species of plants and a part of South Asia's agricultural production thus served to finance the import of tea and porcelain from China.[34] Some learned societies were even founded by employees of the EIC. The Royal Astronomical Society founded in 1820 by Henry Thomas Colebrooke (1765–1837), senior merchant of the Company, surveyor, Sanskritist, and historian of Hindu astronomy, is a good example.

Throughout the eighteenth and nineteenth centuries, a growing number of graduates from Scottish and North European universities in search of employment were absorbed into the ever-expanding overseas services of trading groups to occupy senior technical positions. There, as diplomats and military men, many of them reinforced the nexus between large-scale international trade and science. As engineers, veterinarians, doctors, naturalists, and geographers they could acquire substantial antiquarian collections and herbariums, thus gaining sufficient credit in order to become gentlemen scholars on returning home, further reinforcing the links between trading companies and learned societies in the European metropolis.[35]

But trading companies were also major employers of less-well-educated young men seeking to make a quick fortune and pick up new skills which they might put to profit upon their return to the metropolis. Some of these were to become prominent men of science. Thus, for example, Alexander Dalrymple (1736–1808), perhaps the ablest

[34] See Lucile H. Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Gardens* (New York: Academic Press, 1979); and John Gascoigne, *Science in the Service of Empire: Joseph Banks, the British State and the Uses of Science in the Age of Revolution* (Cambridge: Cambridge University Press, 1998).

[35] Huw V. Bowen, *Elites, Enterprise and the Making of the British Overseas Empire* (London: Macmillan, 1996). See also P.E. Razzell, 'Social Origins of Officers in the Indian and British Home Army: 1758–1962', *British Journal of Sociology*, vol. 14, no. 3 (September 1963), pp. 248–60. The strong presence of Scotsmen amongst European medical practitioners overseas is revealed for instance in Dirom Grey Crawford, *A History of the Indian Medical Service, 1600–1913*, 2 volumes (London: W. Thacker & Co., 1914).

hydrographer of his day, learned his trade while a merchant in the employ of the EIC. Soon after returning to Britain in 1777, he served as hydrographer to the Company before acceding to the same office with the Admiralty in 1795. These men, both more and less educated initially, along with their indigenous counterparts, thus constituted an invaluable population of mediators, or go-betweens, in the intercultural knowledge encounter with South Asia; they were mediators without whom the encounter could not have been sustained.

In attending to the lives and careers of some of these men, this book further shifts the locus of interest in the nexus between corporate trade and science from the European metropolis to the contact zone and to the dynamics of intercultural encounter. In so doing it turns away from the customary history of science as a narrative of the lives and works of its well-known heroes operating within the networks of a putative (European) 'Republic of Letters'. By focusing on the itineraries of initially unremarkable employees of trading companies who acquired their knowledge skills half a world away from the traditional venues of European learning and who introduced these skills into the mainstream of early-modern science, I shall attempt to bring to light some of the less-well-known practices and processes through which both modern science and many careers in science were fashioned.

Instead, then, of looking at sedentary lives, this book turns its attention to transformations in knowledge practices and in the men who embodied them, as they circulated, negotiated, and reconfigured their skills in the contact zone. It is important to stress that most of these men left Europe between the ages of fourteen and eighteen, and their years spent in distant lands were crucially formative. As they moved across seas and continents and encountered different skilled practitioners, their own interests, ambitions, and skills were transformed. As representatives of commercial, and later colonial, institutions, the skills they embodied were also incorporated into these institutions, and, in that sense, their expertise did not impact on metropolitan science alone, but simultaneously produced effects on a global scale.

Because of their commercial activity, European trading companies were obliged to develop intimate connections with traders and trading groups in other parts of the world, particularly in the Indian Ocean world, where Europeans were one of many players in the thriving

regional commercial networks which pre-existed their appearance in the region. This gave rise to new groups of specialized intermediaries only through whom did European trading houses have access not only to local commodities, but also to specialized knowledges crucial to their survival and to sustained trade.[36] These knowledges included the identification and value of potentially lucrative products, ranging from plants, herbs, and animals, to manufactured commodities, their geographical distribution, accounting and trading conventions, the maintenance and repair of ships and navigation, to name but a few. It is important to notice that the geographies of trade and knowledge networks thus largely overlapped not only in Europe but also in the Asian and Indian Ocean worlds, and it is this crucial shared connection which underwrote the intercultural knowledge encounter in the region.[37]

By looking at the indigenous groups which interacted durably with Europeans, we shall also follow the manner in which these groups participated in the making of scientific knowledges, artefacts, and practices; how they appropriated and eventually deployed them strategically to renegotiate their positions in the emerging colonial regime. We shall also examine their attempts at setting up educational curricula to institutionalize the new learning.[38] It is important, then, to note

[36] On the ineluctability of intermediaries, see Georges Roques, *La manière de négocier aux Indes 1676–1691* (Paris: École Française d'Extrême-Orient, 1996).

[37] Indeed, this book is deeply inspired by the perspective of connected histories laid out by Sanjay Subrahmanyam. See his 'Connected Histories: Notes Towards a Reconfiguration of Early Modern Eurasia', *Modern Asian Studies*, vol. 31, no. 3 (1997), pp. 735–62; idem, *Explorations in Connected History*, 2 volumes (Delhi: Oxford University Press, 2005). See also Frederick Cooper, 'Conflict and Connection: Rethinking Colonial African History', *American Historical Review*, vol. 99, no. 5 (1994), pp. 1516–45.

[38] This last aspect has been the principal focus of S. Irfan Habib and Dhruv Raina's groundbreaking work on the response to, and appropriation and reconfiguration of, modern science in northern India. However, they have mainly concentrated on the second half of the nineteenth and the early twentieth centuries—at the end of the period studied in the present book. This work has been recently republished in a single volume: see Dhruv Raina and S. Irfan Habib, *Domesticating Modern Science: A Social History of Science and Culture in Colonial India* (New Delhi: Tulika Books, 2004).

that this book stresses how self-shaping of the mediating agents on both sides of the encounter took place in the same breath as the shaping of scientific knowledge, of the institutionalization of encounter, and of empire.[39]

One of the principal focuses of the chapters that follow is therefore the historical contingency and mutation of existing notions and practices that movement itself introduces.[40] Indeed, this focus on circulation itself as a 'site' of knowledge formation constitutes a major change in approach with respect to science studies orthodoxy. For, as outlined above, social studies of science have so far, albeit implicitly, separated three moments in the making of knowledge: the collection of information or objects; their accumulation and processing within the local and segregated space of the laboratory; and, finally, the spread—and eventual universal acceptance—of the knowledge thus engendered. If most science studies scholars, when following the peregrinations of materials acquired in the field to the laboratory, and then of machines, instruments, printed (or written) results from their site of invention to other places on the globe, do not actually take for granted the supposedly immutable nature of both input and output, they do not deal with their mutations in the course of these displacements.[41] However, it is precisely the *mutable* nature of the materials—of the

[39] The concept of mediating agent in intercultural encounter has been thematized in Louise Bénat Tachot and Serge Gruzinski, eds, *Passeurs culturels: mécanismes de métissage* (Paris: Presses Universitaires de Marne-la-Vallée and Éditions de la Maison des Sciences de l'Homme, 2001).

[40] In focusing in this way on circulation, I follow the lead set by Claude Markovits, Jacques Pouchepadass and Sanjay Subrahmanyam, eds, *Society and Circulation: Mobile People and Itinerant Cultures in South Asia 1750–1950* (Delhi: Permanent Black, 2003).

[41] See, for instance, David N. Livingstone, *Putting Science in its Place: Geographies of Scientific Knowledge* (Chicago & London: University of Chicago Press, 2003). And at least one eminent scholar has actually proposed the construct of 'immutably mobile inscriptions' to account for the possibility of spread and universalization of scientific knowledge. See Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Milton Keynes: Open University Press, 1986), chapter 6. A recent book on the subject of intercultural scientific encounter is also based on a similar model. See Fa-ti Fan, *British Naturalists in Qing China: Science, Empire, and Cultural Encounter* (Cambridge, MA & London: Harvard University Press, 2004).

men themselves and of the knowledges and skills which they embodied—as also their transformations and reconfigurations in the course of their geographical and/or social displacements, that the focus on circulation helps bring to the fore.[42]

This shift in attention to circulation does not, however, imply that localities lose their meaning. On the contrary, each chapter seeks to ground the circulation of knowledge and knowledge-related practices in specific localities, from the early European littoral trading settlements to the colonial and metropolitan states and, indeed, beyond—into the Transhimalaya. Indeed, it is one of the main contentions of this book that localities constantly reinvent themselves through grounding (that is, appropriating and reconfiguring) objects, skills, ideas, and practices that circulate both within narrow regional or transcontinental—and indeed global—spaces.

The book is composed of six chronologically arranged chapters relating to encounter in different knowledge domains. Every chapter is a case study of a major scientific work, personality, institution, or project. Each of the cases selected is highly significant in its own area of knowledge. Each represents a major event in the history of science, society, and politics in South Asia as much as in Europe—and thus claims to be representative (if even in their 'exceptional normality', as in the first chapter) of scientific development in the period under consideration.[43] As such, the chapters may be read independently of each other, but when read together my hope is that they contribute

[42] A burgeoning interest in circulation as a site of knowledge-making is attested to in at least two recent publications by eminent historians of science, technology and medicine. See Yves Cohen, 'The Soviet Fordson. Between the Politics of Stalin and the Philosophy of Ford, 1924–1932', in Hubert Bonin, Yannick Lung and Steven Tolliday, eds, *Ford, 1903–2003: The European History*, 2 volumes (Paris: PLAGE, 2003), vol. 2, pp. 531–58; and Maneesha Lal, 'Purdah as Pathology: Gender and the Circulation of Medical Knowledge in Late Colonial India', in Sarah Hodges, ed., *Reproductive Health in India: History, Politics, Controversies* (New Delhi: Orient Longman, 2006), pp. 85–114. See also Stéphane Van Damme, *Paris, capitale philosophique de la Fronde à la Révolution* (Paris: Odile Jacob, 2005). It is also significant to note that the last quadrennial joint meeting of the British, Canadian, and American history of science societies, held in Halifax, Canada, in August 2004 had as its theme 'Circulating Knowledge'.

[43] The term 'exceptional normal' was coined by the Italian microhistorian Edoardo Grendi to refer to out-of-the-way historical cases which, because of

to a big-picture account of the changing nature of this particular intercultural encounter—from the eighteenth-century pre-colonial context of informal networks based on individual relationships to the late-nineteenth-century colonial one of large, hierarchized institutions—and the specific problems of scientific knowledge construction to which they give rise. When read as a whole, this book then bears upon the questions posed by Needham and Basalla as to the making and spread of modern science. However, by disrupting the diffusionist centre–periphery framework (and blurring the dichotomy) which underpins these questions—and which is, indeed, implicit in much of the social studies of knowledge tradition when it comes to setting modern science in a global context—it points to a completely different set of answers. By following the conduits and heterogeneous networks of exchange through which transfers of knowledge passed, by locating the spaces of circulation between South Asia and Europe in which they acquired meaning, and finally by focusing on the appropriation and grounding of these knowledges in specific localities within these spaces of circulation, this book seeks to throw new light on the co-production of the local and the global.

Each case study also deals with at least one important aspect of knowledge making. For, alongside the radical redefinition of science by social studies of knowledge, new approaches, new divisions, and above all legitimate new lines of inquiry have emerged. Each case study is organized around one or more questions that have been at the heart of much recent research in science studies: trust, replicability, calibration, standardization, action at a distance, the relationship between instruments and embodied skills, and translation. Thus, while the book is mainly about the history of scientific knowledge, this sociological, cultural, and anthropological focus will, I hope, make a further contribution in bringing this traditionally isolated, and daunting, domain of history into the ambit of mainstream history and its debates.

The book opens in the last decades of the seventeenth century. Making inventories of local flora was crucial to European nations engaged

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their unique and non-representative nature, bring into greater perspective the prevalent norms and conventions of the period. See Edoardo Grendi, 'Microanalisi e storia sociale', *Quaderni Storici*, vol. 7 (1972), pp. 506–20.

in ever-increasing trade networks across the globe during the seventeenth and eighteenth centuries. A knowledge of plants and their uses was important not only for introducing new commodities on the European markets but also to maintain the health of the thousands of sailors and traders who found themselves in hostile climes when in the tropics. The Portuguese, the Dutch, the English, and the French prepared voluminous herbals of Asian plants. A fourteen-volume painted herbal containing more than 700 Indian plants painted by Indian artists, commissioned by a French surgeon in Orissa at the end of the seventeenth century, and the correspondence associated with this project, helps us better understand the character of the early Indo-European economic and social networks that made such works possible. It also brings to light the complex processes of intercultural negotiation and collaboration involved in the making and legitimization of this botanical and medical knowledge.

In opposition both to the dominant vision of colonial science as a hegemonic European enterprise whose universalization can be conceived of in purely diffusionist terms, and to the more recent perception of it as a simple reordering of indigenous knowledge within the European canon, the second chapter seeks to show the complex reciprocity involved in the making of cartography within the colonial context. Focused on the early decades of British colonial conquest in South Asia and the formalization of intercultural encounter through the creation of administrative, military, and technical institutions which employed both Europeans and South Asians, it examines the resultant knowledge practices that co-emerged in terrestrial surveying and cartography in India and Britain. While noting that these practices were significantly different in each region—the former depending crucially on the accounts of indigenous travellers and surveyors, the latter mainly on trigonometrical instruments—the chapter nonetheless shows that the knowledge created in each context, while local in nature, nevertheless participated wholly in the emergence of transnational cartography.

Recent research in the history and sociology of science has convincingly shown that the certification of knowledge is inextricably dependent on practical solutions to problems of trust, authority, and moral order. 'Scientific knowledge is as secure as it is taken to be, and

it is held massively on trust', writes Steven Shapin. 'The recognition of trustworthy persons is a necessary component in building and maintaining systems of knowledge, while bases of that trustworthiness are historically and contextually variable.'[44] The social construction of truth and objectivity has been the subject of much recent work in science studies, emphasizing the homogeneous social status of scientific practitioners, and shared norms of civility as the principal factor conferring legitimacy to truth claims in early-modern Europe. However, the reliability of knowledge constructed beyond the closed walls of learned societies—especially knowledge constructed outside Europe—was acutely difficult to establish, and peripatetic men of science and travellers devised various strategies to secure the truth status of their testimonies. The problem assumed a qualitatively different dimension for the British in South Asia in the late eighteenth century in view of the sheer mass and diversity of knowledge being constructed in the colonial context. The third chapter thus casts William Jones's contributions to jurisprudence and linguistics as strategies aimed at establishing the common origins of speakers of Sanskrit, Latin, and Greek—namely Indian pundits and British gentlemen—thus arguing the potential for establishing a common civility. In this way it was possible to legitimize the nascent multicultural administrative, scientific, technological, and legal institutions required for colonial rule. At the same time, it was, as will be seen, these very contributions through which Jones shaped himself in order to be recognized as the founder of comparative linguistics and the monogenetic ethnology of the early nineteenth century.

The end of the eighteenth century saw Great Britain and its empire under severe threat from revolutionary France, both through its military strength and the force of its egalitarian ideals. In 1800, in an attempt to halt the propagation of the 'erroneous principles' of the French Revolution among its European employees, the EIC founded a college at Fort William in Calcutta. There, the future functionaries of the Company were taught European science and literature as well as the languages, sciences, philosophies, and stratified structure of

[44] Steven Shapin, 'Here and Everywhere: Sociology of Scientific Knowledge', *Annual Review of Sociology*, vol. 21 (1995), pp. 289–321.

Indian societies, so as to inculcate in them the 'true principles of religion and government'. Students of this college had as teachers not only British orientalists but also Indian pundits and munshis. In 1806, part of the teaching was moved to England, and some of the Indian teachers were also transferred to teach alongside the likes of the political economist Thomas Malthus. This seemingly unnatural alliance partook of a larger movement in England where reformers, allied with men of science, propagated a social and political model founded on global inequality, diametrically opposed to the universalist ideals of the French Revolution. The fourth chapter seeks thus to show that British orientalism in Bengal, far from constituting a discursive formation through which the 'Orient' was subjugated and relegated to the role of the binarily opposed other of an omnipotent 'Occident', was a powerful rhetoric aimed at forging an alliance between the British and Hindu elites in order to confine and finally vanquish the French and their ideology.

This recasting of British orientalism, and the general background of centuries of collaboration between South Asians and Europeans, enable us also to observe the reconfiguration of knowledge within South Asian society. The book now turns to the founding of Hindu College in Calcutta in 1816. This is commonly presented as the result of the intellectual awakening of Bengali Hindu elites through the transmission of British orientalist ideals. Although the college was founded for the sole purpose of educating *bhadralok* boys in European arts and sciences, a close examination of the choice and content of the scientific subjects in the syllabus shows that these differed substantially from those taught at the time in Britain, or even at Fort William. The argument here is that, contrary to conventional diffusionist wisdom, the transmission and reception of knowledge is an active process significantly fashioned by historico-cultural *a priori* of the agents—in this case, through the ideals of science projected in English and Scottish Enlightenment thought and through the interpretation that the *bhadralok* gave to these in their bid to legitimize themselves in the colonial context.

Stress has been put in recent science studies upon the incarnate nature of scientific knowledge and the embodied vectors by which it travels, whether that embodiment reposes in skilled people, scientific

instruments, or the transactions between people and knowledge-making devices.[45] The last chapter shows how the intercultural encounter in knowledge making extended also to the modification and adaptation of already existing scientific instruments and apparatus as well as to the conception and construction of entirely new ones. It analyses the well-known story of the late-nineteenth-century Indo-British survey of Transhimalayan Central Asia immortalized in Kipling's *Kim* and shows how the colonial and larger geo-political contexts shaped the methods and instruments used in one of the largest and most accurate mappings of the period. Indeed, the whole system was structured around a reconfiguration of embodied and instrumental competencies as employed in the Great Trigonometrical Survey of India, perhaps the most prestigious scientific institution of the British empire. Thus, through its study of the redistribution of the functions of the podometer, the sextant, and the magnetic compass in the bodies and apparel of Indian surveyors disguised as Tibetan Buddhist monks, the chapter attempts to understand the way in which local and *prima facie* outmoded techniques can be made to produce highly accurate, reliable, and reproducible knowledge on the one hand, and to create an 'Anglo-Indian' identity on the other. In so doing, it shows the tools of empire in a slightly different light from the largely accepted vision.[46]

[45] See the classic study of Harry M. Collins and Robert G. Harrison, 'Building a TEA Laser: The Caprices of Communication', *Social Studies of Science*, vol. 5, no. 4 (1975), pp. 441–50. See also Simon Schaffer, 'Glass Works: Newton's Prisms and the Uses of Experiment', in David Gooding, Trevor J. Pinch and Simon Schaffer, eds, *The Uses of Experiment: Studies in the Natural Sciences* (Cambridge: Cambridge University Press, 1989), pp. 67–104; idem, 'Self Evidence', *Critical Inquiry*, vol. 18, no. 2 (1992), pp. 327–62; and idem, 'Late Victorian Metrology and Its Instrumentation: A Manufactory of Ohms', in Robert Bud and Susan E. Cozzens, eds, *Invisible Connections: Instruments, Institutions, and Science* (Bellingham, WA: SPIE, Optical Engineering Press, 1992), pp. 23–56.

[46] See Daniel R. Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (New York: Oxford University Press, 1981); idem, *The Tentacles of Progress: Technology Transfer in the Age of Imperialism, 1850–1940* (New York: Oxford University Press, 1988); and Michael Adas, *Machines as the Measure of Men* (Ithaca: Cornell University Press, 1990).

CHAPTER 1

Surgeons, Fakirs, Merchants, and Craftsmen: Making L'Empereur's *Jardin* in Early Modern South Asia

Introduction

In recent years there has been increasing interest in the strategies employed by Europeans for gathering natural-historical, ethnographic, and geographical knowledge beyond the confines of the metropolis in the context of European expansion. Academic attention has focused in two main directions. One examines the specificity of these modes of 'field' inquiry in contrast to the more common focus in science studies on knowledge making in the controlled setting of the laboratory.[1] The other looks at the genre of 'instructions to travellers'—often written by sedentary men of science in Europe—aimed at teaching travellers what to observe in foreign lands, how to regulate and standardize their gestures and techniques when collecting the requisite objects, and, finally, how to report on them.[2]

[1] See Henrika Kuklick and Robert E. Kohler, 'Introduction', in idem, eds, *Science in the Field*, *Osiris* (2nd series), vol. 11 (Chicago & London: University of Chicago Press, 1996), pp. 1–14.

[2] See Joan-Pau Rubiés, 'Instructions for Travellers: Teaching the Eye to See', *History and Anthropology*, vol. 9 (1996), pp. 139–90; Marie-Noëlle Bourguet, 'La collecte du monde: voyage et histoire naturelle (fin XVIIème siècle—début XIXème siècle)', in Claude Blanckaert, Claudine Cohen, Pietro Corsi and Jean-Louis Fischer, eds, *Le Muséum au premier siècle de son histoire* (Paris: Muséum National d'Histoire Naturelle, 1997), pp. 163–96; and John Law, 'On the Methods of Long-Distance Control: Vessels, Navigation and the Portuguese Route to India', in idem, ed., *Power, Action and Belief: A New Sociology of Knowledge?* (London: Routledge & Kegan Paul, 1986), pp. 234–63.

Although both approaches have opened a number of new and important questions for the history of science, each is riddled with serious difficulties. Thus, by opposing the heterogeneous space of the field sciences with the more uniform civilities of the laboratory sciences, the former approach fails to examine the relationship between the two spaces of knowledge making, between those 'out there' and their sedentary colleagues who often played a crucial role in validating knowledge claims made in the field. And, by focusing exclusively on the corporeal and labelling techniques that metropolitan savants recommended to workaday travellers (usually seamen, ships' surgeons or merchants, and, sometimes, missionaries), the latter set of studies suggest that it is enough to scrupulously follow instructions in order to gain knowledge of the outside world. They thereby imply that the sought after natural historical objects and knowledge were directly accessible to the travellers, and that the whole project of collecting nature was akin to present day space engineers programming planetary probes in order to retrieve relevant information from hostile environments. But the crucial difference between space probes and early-modern travellers is that the latter mainly visited populated lands and had to negotiate with indigenous peoples to find out about, and obtain, objects that were often accessible only through their mediation.

Many European men of science were well aware of this aspect, as even a cursory reading of their instructions makes clear. Robert Boyle's (1627–91) *General Heads for the Natural History of a Country* (1692), which he advertised as 'the only sure Foundation of Natural Philosophy', is a classic of the genre. His instructions range from hydrographical and topographical measurement, the reckoning of latitude and longitude, 'Specifick Gravity of the Air', 'Weights of the several Waters', recording astronomical phenomena, climate, and 'Soyls . . . Minerals, Vegetables or Animals' of the places visited, to the arts, mining and metal extraction techniques, laws, agriculture, economy, and medicine of their respective inhabitants—

> both Natives and Strangers, that have settled there; particularly their Stature, Shape, Features, Strength, Ingenuity, Dyet, Inclination, that seem not due to Education. As to their Women, their Fruitfulness or Barrenness, their easie or hard Labour, with their exercises and Dyet; the Diseases both

> Men and Women are subject to, peculiar to themselves, compared with their Dyet, Air *&c*. that do influence them.

They also included specific 'Enquiries about Traditions, concerning all particular things relating to [each] Country, as either peculiar to it, or at least uncommon elsewhere.' These countries included 'Turky', Poland, Hungary and 'Transilvania', Egypt, 'Guiny', Persia, 'Suratte, &*c*.' (which included the Indian subcontinent, South East Asia, China, Japan and the Philippines), Virginia, Bermudas, 'Guaiana', 'Brasil' and the 'Antisles (or Caribe Islands)'. In particular, Boyle directs travellers to 'enquire' into the 'Plants, Trees, Fruits, *&c*. with the Peculiarities observable in them . . . and what Soyls they thrive best in. What Animals, Terrestrial or Volatile, or Insects of all sorts they [the inhabitants] produce, and to what Use applyed by [them], as to Meat, Physick, Surgery, or Dying, *&c*.'[3]

As this passage implies, the role of the traveller was precisely to report on the social—and economic—significance of natural-historical objects, especially of flora and fauna, bringing to light their anchorage in the human cultures that surrounded them. The acquisition of this knowledge—hardly possible without the active participation of indigenous collaborators—was seen as an inevitable first step towards the commoditization of these objects within the regional and global economies that the Europeans sought to enter and reconfigure. Because of its strategic importance, it must be mentioned that this type of information was itself highly prized merchandise.[4]

[3] Robert Boyle, *General Heads for the Natural History of a Country, Great or Small, Drawn out for the Use of Travellers and Navigators* (London: J. Taylor, 1692), quotes from pp. 1, 8, 9, 13. That knowledge is to be gained through 'enquiry' is explicitly stated in the same section, pp. 11–12. See also Francis Bacon, 'Of Travel (1597)', in idem, *The Works of Francis Bacon*, ed., James Spedding, Robert Leslie Ellis and Douglas Denon Heath, 14 volumes (London: Longman & Co., 1861), vol. vi, pp. 417–18; John Woodward, *Brief Instructions for the Making of Observations and Collections, in order for the Promotion of Natural History in all Parts of the World* (London, 1696).

[4] Benjamin Schmidt, 'Inventing Exoticism: The Project of Dutch Geography and the Marketing of the World', in Pamela H. Smith and Paula Findlen, eds, *Merchants and Marvels: Commerce, Science, and Art in Early Modern Europe* (New York & London: Routledge, 2002), pp. 347–69.

To be sure, the interactive nature of knowledge gathering outside the metropolis has not escaped the notice of at least some historians, as attested to by recent research on the role of intermediaries in the construction of natural knowledge, although mainly in the context of the New World.[5] Little attention has, however, been focused on the other major contact zone—the Indian Ocean.

For the latter area, specific approaches and methods need to be developed. Despite many similarities, European encounters with the West and the East present significant differences, especially in the case of knowledge formation. Attracted to the East initially by the lucrative spice and luxury-commodity trade, Europeans discovered a world that was, all said and done, familiar to them, one already dominated by trade and the presence of Muslims, their perennial, yet well-known, rivals. However, it was also a world in which they formed but one very small commercial group among many long-established trading communities of different racial, religious, and regional origins, who constituted an intricate and dynamic world of commerce—based largely on botanical products—extending across the Indian Ocean.[6] European survival in the region thus depended on the development of an ongoing and durable relationship between their merchants, missionaries, and travellers, and various regional agents—rulers, merchants, bankers and interpreters, but also skilled workmen and savants. For in the Indian Ocean world, specialized knowledge, particularly relating to botany, medicine, and alchemy, was already formalized and circulated from the Arabian peninsula to China within constituted specialized communities, each with its own civility. And early-modern European

[5] See Jesús Bustamente García, 'Francisco Hernández, Plinio del Nuevo Mundo: Tradición clásica, teoría nominal y sistema terminológico indígena en una obra renacentista', in Berta Ares Queija and Serge Gruzinski, eds, *Entre dos mundos: Fronteras culturales y agentes mediadores* (Seville: Escuela de Estudios Hispano-Americanos, 1997), pp. 243–68; James H. Merrell, *Into the American Woods: Negotiators on the Pennsylvania Frontier* (New York: W.W. Norton, 1999); Antonio Barrera, 'Local Herbs, Global Medicines: Commerce, Knowledge, and Commodities in Spanish America', in Smith and Findlen, eds, *op. cit.*, pp. 163–81.

[6] See Denys Lombard and Jean Aubin, eds, *Asian Merchants and Businessmen in the Indian Ocean and the China Sea* (Delhi: Oxford University Press, 2000); and Ashin Das Gupta, *The World of the Indian Ocean Merchant 1500–1800* (Delhi: Oxford University Press, 2001).

physicians, surgeons, and, later, naturalists in the region readily acknowledged this fact.

This has led at least one scholar to assert that early-modern European botanizing in South Asia consisted essentially of compiling Middle Eastern and South Asian ethno-botanical knowledge, 'organized on essentially non-European precepts'.[7] However enticing—and refreshing *vis-à-vis* the received notion of botany being a European preserve—this interpretation begs many important questions.[8] What, for a start, were 'European' and 'non-European' precepts of knowledge in the early-modern world? How did Europeans and South Asians develop working relationships in knowledge-making enterprises? What was the nature of the wider material, economic, and symbolic transactions between indigenes and Europeans within which these knowledge-making encounters took place? How did these relate to the manufacturing and trading economies of the region? In what language(s) did they communicate? Was the knowledge that emerged a mere compilation of local knowledges? What was the relationship between this knowledge, its producers on the one hand, and metropolitan European savants and academies on the other? Finally, were there significant differences between the various European nations present in the region in their relationship towards foreign knowledge practices?

Curiously, an unknown manuscript herbal held at the *Muséum National d'Histoire Naturelle* in Paris, and related documents scattered among various French archives help shed new and valuable light on these questions.

From a Forgotten Codex in a Paris Archive . . .

Under the title *Ellemans botanique des plante du Jardin de Lorixa leur vertu et quallite, tans conus que celle qui ne le sont pas avec leur fleur fruis et grainne traduit de louria an frances* (Botanical Elements of the Plants

[7] Richard Grove, 'Indigenous Knowledge and the Significance of South-West India for Portuguese and Dutch Constructions of Tropical Nature', *Modern Asian Studies*, vol. 30, no. 1 (1996), pp. 121–43.

[8] For the traditional perspective, see Isaac Henry Burkill, *Chapters on the History of Botany in India* (Calcutta: Botanical Survey of India, 1965); and Ray Desmond, *The European Discovery of the Indian Flora* (Oxford: Oxford University Press for the Royal Botanic Gardens, 1992).

of the Flora of Orixa, Their Virtues and Qualities, Both Known and Unknown, with Their Flowers, Fruits, and Seeds, Translated from the Oriya into French) the *Muséum National d'Histoire Naturelle*'s library in Paris holds a fourteen-volume folio herbal, twelve of which contain 725 double-folio paintings of 722 plants species. The first two volumes contain a description, in French, of each of these plants with an index of their vernacular names transcribed in the Roman script and a classification according to their medical and, sometimes, economic, uses.[9] In addition, the first volume of the manuscript contains a 'Preface', an '*Avis au lecteur*' (Note to the Reader), and an intriguing frontispiece depicting five human figures, a potted tree in the foreground, and a Greco-Roman ruin in the background. The human figures are divided into two groups—three on the left, comprising an artist painting the tree, a man sitting next to him and a woman carrying plants in a basket on her head, and two on the right: an ascetic holding a manuscript, and a European standing behind him. The style of the frontispiece and the human figures it depicts, as well as that of the plant paintings, leave no doubt as to the South Asian origins of the herbal.

But the library's manuscript catalogue gives only two meagre bits of information: its author is a certain L'Empereur—in all probability the European in the frontispiece—and it dates from the eighteenth century. If the catalogue is laconic, the manuscript is more forthcoming. The title refers to a specific location in the Indian subcontinent: *Jardin de Lorixa* means 'Flora of Orixa' (the common eighteenth-century spelling for present-day Orissa). It also claims that the work is a translation from the Oriya into French. The volumes yield further clues. Their similarity to accounting ledgers, the paintings, the French-watermarked paper, and Indian parchment binding lead one to surmise that the work was executed in a European trading settlement with the requisite infrastructure, indigenous craftsmen, and other specialized communities.

From the 'Preface' and the 'Note to the Reader', we learn that their author, although not a savant, was probably trained in medicine.

[9] Muséum National d'Histoire Naturelle (hereafter MNHN), Central Library, Manuscripts collection, Mss. 1915, 1916, 1916bis, 1916ter, and 1917 to 1926: referred to hereafter as *Jardin de Lorixa*.

Fig. 1: The frontispiece of the *Jardin de Lorixa*. © Bibliothèque Centrale, Muséum National d'Histoire Naturelle, Paris.

L'Empereur modestly states that 'it was not with the ambition of rendering it perfect' that he commissioned the work: 'I only thought of making a start and leaving the glory of finishing it to whoever would like to take it up.' He concludes, 'I would be happy if, through my effort and expenditure, some poor invalid finds relief—that is the only

aim I had in undertaking this botanical treatise'—statements obviously directed to appeal to Catholic missionary sentiment.[10]

Fortunately, both trade and religious leads prove fruitful: following them helps unearth a substantial correspondence in various collections of commercial, scientific, and religious archives spread across France.[11] Among the many stories these documents tell, the most remarkable is the one concerning the conception, making, arrival in France, and ultimate fate of the *Jardin de Lorixa*. Briefly, we learn that it was started in Orissa in the late 1690s, completed in Bengal and shipped to Paris in 1725. But to fully appreciate the story a few words about the French presence in South Asia in the seventeenth and eighteenth centuries are necesssary.

. . . to Eastern India in the Seventeenth Century

Formally arriving only in 1664, with the foundation of the *Compagnie des Indes Orientales*, the French were latecomers to Asia. Indeed, they were the last of the major European powers to enter the Indian Ocean trading world, over half a century after the Dutch and the English, and more than 150 years after the Portuguese. However, unlike other European companies, the *Compagnie des Indes* was set up by royal edict, with capital raised from the royal family, courtiers, and financiers, and only reluctantly from France's merchant communities. This factor was to play a crucial role in all domains, including that of knowledge making and legitimization.[12]

The Indian subcontinent being the pivot of Asian maritime trade, and inter-European rivalry the mainspring of its dynamism, the French Company's purpose in finding a foothold there was to obtain those goods which were already being supplied to Europe by the Dutch

[10] MNHN, Ms. 1915: 'Preface', f. IIIv. This passage and all following have been translated by the present author.

[11] The Archives Nationales, Paris (AN); the Centre des Archives d'Outre-Mer, Aix-en-Provence (CAOM); the archives of the Laboratoire de Phanérogamie (LP), MNHN; the archives of the Missions Étrangères de Paris, Paris (MEP); and the archives of the Académie des Sciences, Paris (AS).

[12] For a comprehensive history of the French in Asia, see Philippe Haudrère, *La Compagnie française des Indes au XVIIIe siècle: 1719–1795*, 4 volumes (Paris: Librairie de l'Inde, 1989).

and the English. Textiles, pepper, coffee, saltpetre and a range of items covered by the term *drogues* formed the bulk of the cargoes bound for France, occasionally varied by wild animals—such as rhinoceroses for the royal menagerie—precious stones, books, and works of art. In order to obtain these commodities the French settled in close proximity to other Europeans, initially on the west coast in Surat, then on the east coast in Pondicherry, and finally in Chandernagore in Bengal, close to the important Dutch and English townships of Chinsura and Calcutta. As these settlements were on the Hooghly, the main but hazardous distributary of the Ganges, the Europeans set up lodges in the 1630s at the mouth of the great river, in Balasore in Orissa, in order to house pilots to guide their ships upstream to their trading centres. It was there, soon after the French established themselves in 1686, that L'Empereur found employment as a surgeon to the *Compagnie des Indes*.[13]

The Origins of the *Jardin de Lorixa*

Nicolas L'Empereur was born in Normandy around 1660. His writings and correspondence suggest that he received a reasonable elementary education. There is no record showing that he trained in any medical or surgical academy in France. Instead, he must in all probability have enrolled as a surgeon's apprentice on an East Indiaman—a common way of entering the profession until the end of the eighteenth century.[14] At the end of a ten-year apprenticeship, around 1688, he finally earned the title of surgeon major and settled down to a sedentary life. Unlike most of his fellow apprentices who went back to the French provinces, however, L'Empereur sought to make his living in the employ of the *Compagnie des Indes* and was posted at Balasore.

Here a decade later L'Empereur developed his plan for the herbal, first, because the herbs and medicines Europeans normally carried with them deteriorated at sea and lost their efficacy by the time they arrived in India. Second, Europeans met with a multitude of hitherto

[13] CAOM, Colonies, Série C^2 115, f. 358.

[14] Claude Chaligne, 'Chirurgiens de la Compagnie des Indes. Histoire du service de santé de la Compagnie, 1664–1793', unpublished doctoral dissertation, Faculté de Médecine, Université de Paris V, 1961, pp. 42–6.

unknown diseases in these distant, tropical climes. Third, the number of medicinal plants traditionally known to Europeans was relatively small, leading them to look for new remedies overseas.[15] It is important to note that maintaining health at sea was a major problem for Europeans until as late as the nineteenth century. Indeed, out of the 120,000 Frenchmen who sailed to the East between 1664 and 1789, whether as ordinary sailors or important officials, 35,000 died during the voyage.[16] In 1698, for instance, the very year that L'Empereur conceived of his scheme, a French naval squadron was ravaged by disease in the Bay of Bengal, losing over 600 men within days, including almost all its surgeons and medics.[17] L'Empereur reported on this catastrophe to his friend Gabriel Delavigne (1657–1710), who had returned to Paris from Asia the previous year to head the powerful *Société des Missions Étrangères de Paris*, a Catholic order set up by the French crown in 1664 in order to proselytize Asians. He went on to describe his plan to buy 'all the books on medicine that the people here have and find out how they use them. I plan to translate these into French so that we know all the cures, great and small, that are as yet unknown to Europeans. We will thereby be able to constitute a library of medical works for India as well as a pharmacy.'[18] The latter was all the more important because 'Indians usually compose their remedies themselves as and when they need them. There are no druggists because it is not worth their while except in Surat in Gujarat where one finds drugs imported by sea from far and wide.'[19] A couple of years later, he elaborated his scheme: 'This work will be of considerable size and, once printed, nothing [of Indian medicine] will be left unknown to the European surgeon.'[20]

[15] MNHN, Ms. 1915: 'Preface', f. IIIr.

[16] Chaligne, *op. cit.*, Dedication and p. 85. See also John Joyce Keevil, Charles Christopher Lloyd and Jack Leonard Sagar Coulter, *Medicine and the Navy, 1200–1900*, 4 volumes (Edinburgh & London: E. & S. Livingstone, 1957–63), vol. 2, pp. 1649–1714.

[17] Anne Kroell, 'Une escadre décimée par la maladie dans le Golfe du Bengale en 1698', *Chronique d'histoire maritime*, vol. 16 (1987), pp. 24–35.

[18] MEP, V 959, f. 153: L'Empereur to Delavigne, 20 January 1699.

[19] MNHN, Ms. 1915, 'Avis au lecteur', ff. IVr.

[20] MEP, V 990, f. 533: L'Empereur to Delavigne, 6 January 1701.

L'Empereur was, of course, not the first European to conceive such a plan. Already, during the sixteenth century, a number of Portuguese had begun gathering material on Asian natural history for similar reasons. The best known of these were Garcia da Orta (*c.*1500–*c.*1568) and Cristovão da Costa (or Christoval Acosta) (*c.*1515–*c.*1592) both of whom had spent many years on the Malabar coast. It is significant that the first non-religious book to be published in the Portuguese colony of Goa was da Orta's *Coloquios dos simples e drogas . . . da India . . .* in 1563—so strategically important was Asian botanical knowledge for Europeans.[21] It was almost immediately translated into Latin (1567) by Charles de l'Escluse (Carolus Clusius), perhaps the most eminent botanist of the sixteenth century and founder of the Leiden botanical garden.

Almost immediately upon establishing themselves in the Indian Ocean, the Dutch *Verenigde Oost-Indische Compagnie* (VOC) had set up in Batavia (present-day Jakarta) a surgeon's shop in the 1610s, followed by a proto-botanical garden to grow medicinal plants brought from various parts of South East Asia. In the 1670s, the Dutch Commander of Malabar, Hendrik Adriaan Van Reede tot Drakenstein (1636–91), had a gigantic work commissioned on the flora of this region.[22] Its pen-and-ink-wash drawings of some 720 species were accompanied by a detailed description of each. The herbal was published, partly posthumously, under the title of *Hortus Indicus Malabaricus* in twelve folio volumes in Amsterdam between 1678 and 1693 and was soon to become the standard reference work for the flora of south-western India. Indeed, Van Reede's work, and that of Paul Hermann (1646–95)—another Dutchman—on Ceylon, were to form

[21] Garcia da Orta, *Coloquios dos simples e drogas he cousas mediçinais da India e assi d'algunas frutas achadas nella onde se tratam algunas cousas tocantes a mediçina pratica e outras cousas boas pera saber compostos pello Dor. Garcia Dorta* (Goa, 1563); and Christoval Acosta, *Tractado de las drogas y medicinas de las Indias Orientales, con sus plantas debuxadas al bivo* (Burgos, 1578).

[22] Van Reede's family name has been variously spelt. I adopt the form used in Heniger's authoritative biography: Johannes Heniger, *Hendrik Adriaan Van Reede tot Drakenstein (1636–1691) and* Hortus Malabaricus: *A Contribution to the History of Dutch Colonial Botany* (Rotterdam & Boston: A.A. Balkema, 1986).

Linnaeus's main sources for the flora of Asia.[23] Mention must also be made of another VOC medic, Georg Eberhard Rumpf or Rumphius (1627–1702), who spent a large part of his life botanizing in the Molucca Islands, gaining renown as *Plinus Indicus.* The Dutch used their knowledge of the tropical flora of Asia to transfer plants to strategic stations in the region, like the Cape of Good Hope, Batavia, and Ceylon, in order to provide a distributed stock of medicaments, fresh vegetables, timber for ship-building and repair, and commercial crops like the areca palm for the regional market.[24]

The English, too, were busy collecting Asian plants and sending them back to London with whatever details they could gather of their therapeutic and other properties, sometimes even in local languages.[25] By the mid-seventeenth century both the Dutch and the English Companies had supplemented Asian luxury goods and spices with a vast range of exotic plants for sale on European medicinal markets.[26]

Dutch and English presence in Balasore, and perennial inter-European rivalry, played no small role in spurring L'Empereur to

[23] Paul Hermann's Herbarium is now held at the Natural History Museum, London. For the VOC's interest in scientific knowledge, see Johan Leonard Blussé and Ilonka Ooms, eds, *Kennis en Compagnie: De Vereigde Oost-Indische Compagnie en de moderne Wetenshap* (Amsterdam: Balans, 2002). More generally, see Kapil Raj, 'Eighteenth-Century Pacific Voyages of Discovery, "Big Science", and the Shaping of an European Scientific and Technological Culture', *History and Technology*, vol. 17, no. 2 (2000), pp. 79–98.

[24] See Peter Boomgaard, 'The VOC Trade in Forest Products in the Seventeenth Century', in Richard Grove, Vinita Damodaran and Satpal Sangwan, eds, *Nature and the Orient: The Environmental History of South and Southeast Asia* (Delhi: Oxford University Press, 1998), pp. 375–95.

[25] See Samuel Browne, 'An Account of Part of a Collection of Curious Plants and Drugs, lately given to the Royal Society by the East India Company', *Philosophical Transactions of the Royal Society*, vols 20, 22, 23 (1700–1), pp. 313–35, 579–94, 699–721, 843–58, 933–46, 1007–22, 1055–65, 1251–65, 1450–60; another surgeon, Edward Bulkley (1651–1714), sent home at least five volumes of dried plants, fruits, and drugs, with their local names sometimes transcribed in local characters. These are preserved in the Sloan Herbarium, Natural History Museum, London.

[26] See Harold J. Cook, 'Physicians and Natural History', in Nicholas Jardine, James A. Secord, and Emma C. Spary, eds, *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996), pp. 91–105, especially p. 95.

embark on his ambitious project. 'While we [the French] . . . are the poorest', he complained to Delavigne, 'the English flourish through their trade everywhere.'[27] In 1706 L'Empereur moved as senior surgeon to Chandernagore in Bengal, the most important French settlement in South Asia at the time. He was now at the nerve centre of European activity in eastern India and could report on it closely. 'The English send a large quantity of calumba wood to England each year', he writes to Antoine de Jussieu (1686–1758), professor at the *Jardin du Roi* in Paris, 'as they have taken the trouble to test it and spare no means to obtain all that is curious.' Or again: 'The Dutch buy 300 pounds of *redovar* [Telugu for spurge wort] each year, which they ship to Batavia for their own use, as well as to Europe.'[28]

While it was relatively easy to report on rivals' exports, knowledge of the properties and uses of these botanical products was difficult to obtain from fellow Europeans, who did everything in their power to keep it secret or to mislead the others. Thus, John Ovington (1653–1731), an English chaplain at Surat in the 1690s, was sceptical about the Dutch account of the propagation of nutmeg. 'They relate a passage somewhat strange and surprising concerning the nature of the nutmeg-tree', he writes,

> that it is never planted, and if it be it never thrives; but such of them as fructify and arrive at perfection, arise from a ripe nutmeg swallowed whole by a certain bird in those islands, which disgorges it again without digesting it, and this falling to the ground with that slimy matter it brought along with it, takes root and grows a useful tree: But this may be a subtle contrived story of the Dutch, to keep men from endeavouring to transplant them.[29]

Each nation spared no efforts to spy on the others. The Jesuit, Guy Tachard (1651–1712), Louis XIV's savant-ambassador to Siam in the 1680s, met Van Reede (who was at the time investigating the dysfunctions of the VOC in the Indian Ocean) several times during his fifteen-day halt at the Cape of Good Hope in June 1685. Tachard wrote a long

[27] MEP, V 958, f. 207: L'Empereur to Delavigne, 4 December 1702.

[28] MNHN, LP, GGA/52766/1: L'Empereur to Antoine de Jussieu, 25 December 1729.

[29] John Ovington, *A Voyage to Suratt in the Year 1689* (London: Oxford University Press, 1929, originally published 1696), p. 99.

report on the latter's progress in preparing a *Hortus Africus* (*sic*) along the lines of his *Hortus Malabaricus*. He even managed to entice one of Van Reede's draftsmen, Hendrik Claudius, to hand him the report of an expedition into the interior of South Africa, a map, and some drawings of plants and animals made in the process. Back in France, he lost no time in publishing the material in his own memoirs.[30] The in-discretion cost Claudius his job, disgrace, and banishment from the Cape colony.[31]

Ultimately, in order to garner natural knowledge, Europeans had to work their way into specialized local networks. Thus, Garcia da Orta who, besides practising medicine, was also a trader—chiefly in *materia medica* and jewels—and shipowner, depended chiefly on his Asian medical and trading partners for his knowledge, and on a vast network of paid correspondents and agents who sent him plants and seeds from all over Asia.[32] And it was as commander of the Dutch possessions in Malabar that Van Reede, who was not instructed in medicine or botany, used his relations with the Raja of Cochin and his institutional authority to mobilize the various human resources of the colony to make the *Hortus Malabaricus*.

Making the *Jardin de Lorixa*

In his 'Note to the Reader', L'Empereur explains how he obtained his botanical knowledge:

> There are fakirs who travel all their lives and many have a lot of wisdom. However, it is difficult to get them to share any of it, unless you know them intimately and offer them alms. Otherwise, . . . they inform you coldly that they are not interested in money. But I have been friendly with two of

[30] Guy Tachard, *Voyage au Siam, des peres Jesuites, envoyez par le roy aux Indes et à la Chine. Avec leurs observations astronomiques, et leurs remarques de Physique, de Géographie, d'Hydrographie, d'Histoire* (Paris, 1686), pp. 87–112.

[31] Mary Gunn and Lesley Edward Wostall Codd, *Botanical Exploration of Southern Africa* (Cape Town: Botanical Research Institute/A.A. Balkema, 1981), p. 118.

[32] Augusto da Silva Carvalho, 'Garcia d'Orta. Comemoração do quarto centenário da sua partida para a India em 12 de Março de 1534', *Revista da Universidade de Coimbra*, vol. 12, no. 1 (1934), pp. 61–246, particularly pp. 103, 126. See also Charles Ralph Boxer, *Two Pioneers of Tropical Medicine: Garcia*

> them for twelve or fifteen years and through them I meet other passing fakirs. Whenever I find a simple, they instruct me about its properties and uses.[33]

In a letter, he gives further details: 'The fakirs who have the best remedies come every winter to bathe in the Ganges. By giving them something and speaking to them in [Hindustani], directly without interpreters, they let you into their secrets. It was a fakir who thus taught me the great remedy for epilepsy.'[34]

In addition to his duties as surgeon major and member of the Council of Chandernagore, L'Empereur set himself up in private trade, selling uncut emeralds from South America bought for him in Europe, became part-owner of a small ship and bought and sold property for profit.[35] His daily experience with locally available simples convinced him of their efficacy and he began purchasing indigenous books on medicine through his peripatetic friends.[36] These works, which he informs us 'are very difficult to obtain',[37] circulated most commonly in the form of palm-leaf manuscripts in the various vernaculars of the Subcontinent, from the Dravidian languages of the South to the Sanskrit-based ones of the North. Judging from the plant names in the *Jardin de Lorixa*, some, like *china malli* (small jasmine), are clearly in Tamil. But L'Empereur seems not to be aware of this linguistic diversity, considering all his material to be in Oriya which, he declares, he translated into French.[38] The process was, however, more complex. By his own admission, L'Empereur did not know Oriya: he got everything translated into Hindustani, the main language of intercourse between Europeans and South Asians in the region. It was this that he himself

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d'Orta and Nicolás Monardes (London: The Hispanic & Luso-Brazilian Councils, 1963).

[33] MNHN, Ms. 1915: 'Avis au lecteur', ff. IVv–Vr.

[34] CAOM, F[5] 19: L'Empereur to the Abbé Raguet, 20 January 1727.

[35] MEP, V 990, ff. 533, 539: L'Empereur to Delavigne, 6 January and 29 January 1701, respectively; and CAOM, Inde, Notariat de Chandernagor, O 2: Power of Attorney, dated 7 September 1712.

[36] MEP, V 957, f. 153 and V 990, f. 533: L'Empereur to Delavigne, 20 January 1699 and 6 January 1701, respectively.

[37] MNHN, Ms. 1915: 'Avis au Lecteur', IVr.

[38] MNHN, Ms. 1915: Title page and Index.

then undertook to translate into French—'a tedious task', he writes, 'except for me since I speak Hindustani'.[39]

Yet not all the descriptions came from written texts. As mentioned earlier, L'Empereur also acquired medicinal plants, identifying them with the help of his ascetic friends. He had employed a number of gardeners whom he sent at considerable cost to the mountains and forests, sometimes more than 300 miles away, to bring back plants of medicinal and economic interest.[40] In time, he also established trade links with merchants as far away as Nepal, who would send him valuable plants. Some of these were unknown to the fakirs, leading him to start experimenting on local patients with compounds he himself produced. 'Monsieur Noguest [a French missionary suffering from leprosy] did not want to take the remedy that I wanted to give him', he complains to Delavigne. 'I had sent it to him after having successfully tried it out on a man from the country festered with ulcers. Indeed, I have treated a number of others to observe the different effects of this remedy.'[41]

L'Empereur organized his descriptions in a standardized format, starting with a physical description of each plant, its roots, flower, fruit, and seed, its habitat, and finally its properties and uses. But not all the plants were medicinal. Some were dyes, others aromatics, while a few had no apparent use at all. Some were even exotic—like the papaya, chili, custard apple and potato—introduced from South America in the sixteenth century by the Portuguese. However, L'Empereur, like other Europeans, did not distinguish between local and exotic varieties: he gives the distinct impression that they form part of the region's traditional flora. This is certainly not because they were not aware of plant transfer, as they themselves were involved in moving flora around the Indian Ocean—if not from the Americas to Asia. Instead, their purpose was to catalogue the *indigenous uses* of the plants in each region. The fact that within a century these new additions to the local fauna had already found therapeutic and economic uses is an

[39] MEP, V 990, f. 533: L'Empereur to Delavigne, 6 January 1701.

[40] MNHN, LP, GGA/52766/1: L'Empereur to Antoine de Jussieu, 25 December 1729.

[41] MEP, V 957, f. 153: L'Empereur to Delavigne, 20 January 1699.

interesting indication of the dynamism of the region's own specialized communities.

While collecting medical texts and plants, L'Empereur also set about employing local artists to draw and paint each plant, with its flowers and fruits, and a cross-sectional representation of the seeds at the bottom. Chandernagore being a major trading port, tens of thousands of Asian merchants, interpreters, bankers, and craftsmen worked for the European export market.[42] Many were painters who earned their livelihood executing floral designs on the painted cloth that formed one of the main Indian exports to Europe. L'Empereur thus found it 'easy to get natives to draw the plants. The paper and other materials cost a lot more.'[43] The 725 paintings on double folio sheets, pasted on separate slips, were finally bound into twelve volumes.

As the above account suggests, the *Jardin de Lorixa* is not a translation of indigenous texts in a purely linguistic sense. Furthermore, it differs from Indian palm-leaf *materia medica* in that the latter do not describe the plants, but enumerate their properties and uses and, above all, contain no illustrations. There was, of course, an established tradition, since the late sixteenth century, of illustrating natural history memoirs and albums for the South Asian nobility. The floral borders and stylized plant representations from these very soon found their way into a number of pictorial arts, from cloth printing and wall paintings to illustrations of popular tales and religious epics, but not into medical practitioners' *vade mecums*.[44]

The typically Indian style of the paintings and L'Empereur's own claims to having simply translated Oriya works notwithstanding, the

[42] See Monique Dussolin, 'Etude d'un groupe social: les Européens à Chandernagor, 1ère moitié du XVIIIe siècle', unpublished maîtrise dissertation, Université de Paris VII, 1971, pp. 60–90, especially pp. 67–8.

[43] MNHN, LP, GGA/52766/1: L'Empereur to Antoine de Jussieu, 25 December 1729.

[44] For further details on illustrated palm-leaf manuscripts, see Jeremiah P. Losty, *Krishna. A Hindu Vision of God: Scenes from the Life of Krishna Illustrated in Orissan and Other Eastern Indian Manuscripts in the British Library* (London: The British Library, 1980); and John Guy, *Palm-Leaf and Paper: Illustrated Manuscripts of India and Southeast Asia* (Melbourne: National Gallery of Victoria, 1982).

Jardin is also a recognizably European botanical work in its general organization and presentation: it is a hybrid work containing a number of disparate elements reconfigured into a new homogeneity. Of course, L'Empereur was no medical neophyte and knew the conventions of European medico-botanical treatises, but, as remarked upon earlier, there was a substantial corpus of such works that had been produced in Asia and it would be interesting to examine the relationship of the *Jardin* with this corpus.

The *Jardin de Lorixa* and the *Hortus Malabaricus*

The most obvious candidate is Van Reede's renowned *Hortus Malabaricus*, the last volume of which appeared just a few years before L'Empereur embarked on his own scheme. In addition to their remarkably similar formats and number of plant descriptions, they bear an uncanny resemblance in a number of other ways.

The first similarity concerns the heterogeneity of the agents involved in their construction. Like L'Empereur, Van Reede employed several different specialists—a council of at least four physicians from the Malabar coast to supervise the collection of plants, help identify them, and provide information on their medicinal uses, local arboriculturists and gardeners, a Luso-Indian translator, and a team of Dutch draftsmen. In the Preface to Volume 3 of the *Hortus Malabaricus*, a volume dedicated to the Raja of Cochin, he describes the construction of his herbal:

> By my orders, Brahmin and other physicians made lists of the best known and most frequently occurring plants in their languages. On this basis, others classified the plants according to the season in which they attracted notice for their leaves or flowers or fruit. This seasonal catalogue was then given to experts in plants, who were entrusted, in groups of three, with the collection of the plants with their leaves, flowers, and fruit, for which they even climbed the highest tops of trees. Three or four draftsmen, who stayed with me in a convenient place, would accurately depict the living plants as the collectors brought them. To these pictures a description was added, nearly always in my presence.[45]

[45] Van Reede, *Hortus Indicus Malabaricus*, vol. 3 (1682), p. viii.

The descriptions were then translated from the numerous local languages and dialects into Portuguese by a Luso-Indian interpreter, Emanuel Carneiro, and finally rendered into Latin, the language in which the work was ultimately published.[46] In Holland the descriptions were appended to engravings derived from the original ink-and-wash drawings of the plants and published in twelve volumes between 1678 and 1693. In order to lend credibility to the whole work, Van Reede included declarations engraved in their original scripts from each of the principal indigenous physicians and the Luso-Indian translator, testifying to the veracity of their respective contributions.

The *Hortus Malabaricus* also contains two other engravings executed in Holland: Van Reede's portrait and a frontispiece. This portrays a vast tropical garden, in the centre of which stands an ornamental summer house with two caryatids bearing an entablature whose tympanum is inscribed with the title of the work. In the foreground, beneath an arched pergola, sits the (apocryphal) goddess of Indian botany, holding a rake with a pruning knife at her feet, while four kneeling Malayali cherubs on the left offer her a potted tree.

At first sight, this engraving looks very different from the painted frontispiece of the *Jardin de Lorixa*. Any similarity seems to stop at the way the plants and human groups are placed in both: the central potted tree, the Malayali cherubs/group of artists, the goddess of botany/fakir, all under a pergola/an arch made by two flowering trees, a classical summer house/Greco-Roman ruin. However, on turning to the woman carrying plants in a basket on her head, we discover that she is a replica of the left caryatid of the summer house in the *Hortus Malabaricus*. L'Empereur's artists clearly had access to this work, but they tell a very different story from the allegory imagined by the Dutch engravers sitting in faraway Holland. In the same way as the caryatid carrying a sheaf of corn is brought to life as a real woman carrying in the plants to be painted and described, so too do all the other figures of the *Hortus* take on a real existence as the different actors involved in the making of the *Jardin*. The kneeling Malayali cherubs are metamorphosed into artists; the goddess into a fakir wielding his palm-leaf manuscripts instead of a rake and a pruning knife; the pergola into

[46] For more details on the making of the *Hortus Malabaricus*, see Heniger, *op. cit.*, pp. 144–51.

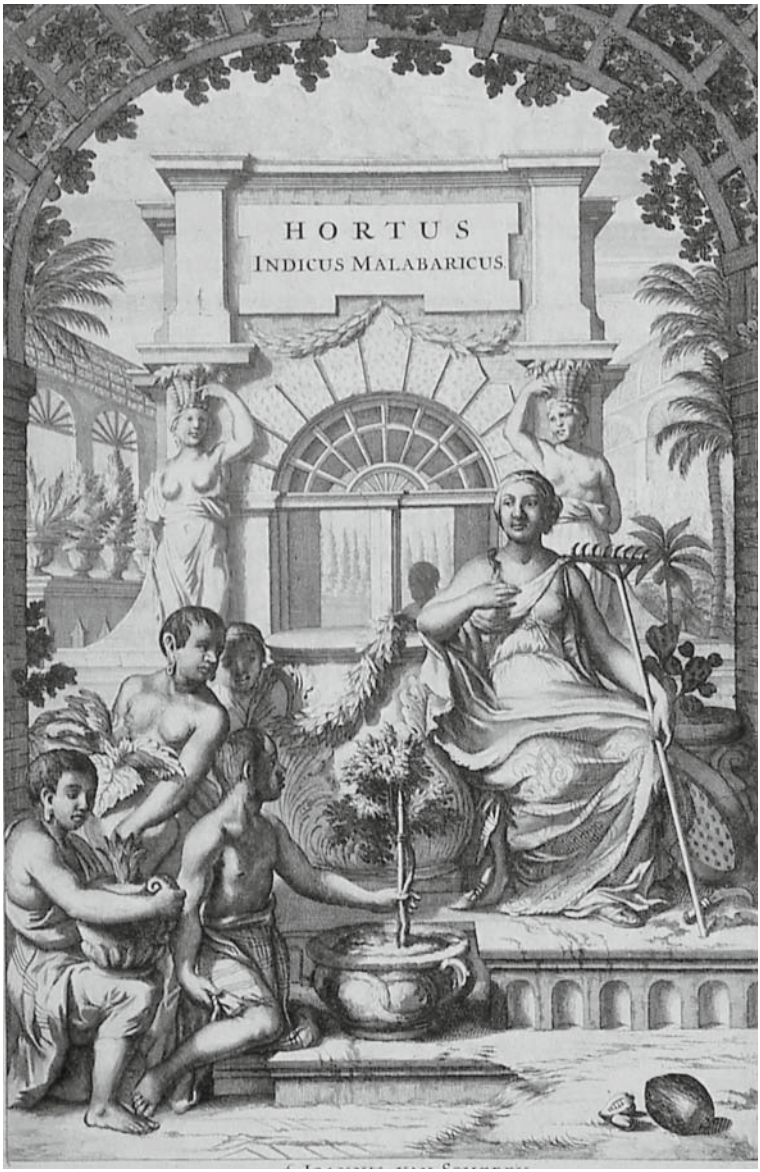

Fig. 2: The frontispiece of van Reede's *Hortus Malabaricus*.

an arch formed by flowering trees, inspired from traditional Indian paintings and embroidery; and the ornamental summer house into a Greco-Roman ruin. The central tree is now planted in a Chinese pot—a witness to the lively intra-Asian trade—and serves to demarcate the different groups, the manual workers to the left and the 'cerebrals' to the right. Thus, L'Empereur, as the patron, finds himself in front of the ruin, just above the Brahmin.

A close examination of the *Hortus* further confirms that it provided the template for European botanical conventions. For it is important to note that while painting floral motifs was the main livelihood of Indian artists, their painted calicoes did not, and were not meant to, respect any botanical conventions. These required, for instance, that seeds be shown apart, whole and laterally dissected. Flowers were also to be shown separately and roots were to appear with the plant. Not only do the paintings in the *Jardin* respect these conventions, some of them are more or less directly inspired by the engravings of the *Hortus Malabaricus*: as, for example, the banana, the papaya and the

Fig. 3: The banana tree in the *Jardin de Lorixa*. © Bibliothèque Centrale, Muséum National d'Histoire Naturelle, Paris.

jackfruit.[47] This, however, does not mean that L'Empereur's artists mechanically copied the illustrations from the printed book: the very fact that they coloured their illustrations, getting the colours of all parts right each time—the *Hortus Malabaricus* was in black and white—removes all doubt on the matter. Indeed, the artist's hand knew how to render the variety and subtlety of these colours and to convert the engraver's hatching into colour variations. Besides, many like *Strychnos Nux Vomica* are very differently represented in the two works.[48] Moreover, the vast majority of the plants described respectively in the two works are different, given that they referred to two regions of different climes and over a thousand miles apart. Once the local artists had understood what was wanted of them, they could follow the drift without having to directly copy from a 'pattern-book'.

Fig. 4: The banana tree in the *Hortus Malabaricus*.

[47] Cf. *Jardin de Lorixa*, vol. 3 (MNHN, Ms. 1917), plates 18, 19, 20, 21 and 22; *Hortus Malabaricus*, vol. 1, figures 12, 13, 14 and 15; vol. 3, figures 26, 27 and 28.

[48] Cf. *Jardin de Lorixa*, vol. 4 (MNHN, Ms. 1918), plate 9, and *Hortus Malabaricus*, vol. 1, figure 37.

Fig. 5: *Nux vomica* as represented in the *Jardin de Lorixa*.

This conforms to what is already commonly known of the capacity of Indian weavers and painters to execute floral patterns shown them by their foreign clientele into the chintzes and palampores that formed the staple export of Bengal and the Coromandel coast in the period.[49]

[49] On the circulation of floral and scenic patterns between Europe and India, and their incorporation into Indian cloth painting, see M.K. Brett, 'Indian Painted and Dyed Cottons for the European Market', in Pratapaditya Pal, ed., *Aspects of Indian Art* (Leiden: E.J. Brill, 1972), pp. 167–71.

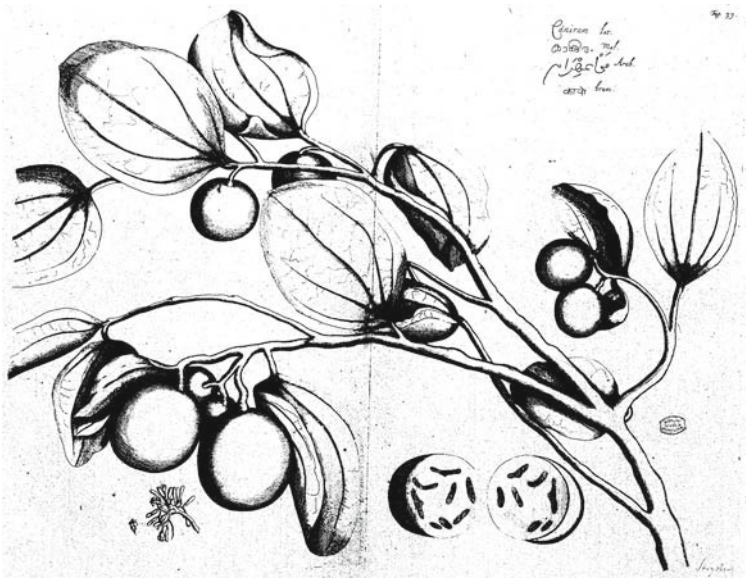

Fig. 6: Van Reede's representation of *Nux vomica*.
© Bibliothèque Centrale, Muséum National d'Histoire Naturelle, Paris.

In this respect, it is interesting to note the similarity between the versatility of these artists and the engravers working for European publishing houses.

The verbal descriptions in the two herbals only loosely resemble each other in that they systematically describe the different parts of the plant, its flowers, fruit, seeds and roots, its habitus and habitat, before giving their properties and uses—by then a well established convention in European botany. L'Empereur, however, systematically gives the dimensions of each plant in feet and inches and his account of the properties and uses is markedly different from that of Van Reede. But the latter transcribes the local names of the plants in the Roman script and also gives both the Malayalam names, in the Aryaezuthu and Arabic scripts, and the Konkani names, in Nagari; L'Empereur, as noted earlier, only records the local names he gathers (mostly, but not always, in Oriya) in the Latin script. And while the Frenchman borrows a hot/cold characterization of the plants from South Asian medical traditions, Van Reede evokes their effects on bodily humours.

Fig. 7: Early-eighteenth-century painted tent panel from eastern India with a floral pattern similar to the painted bedspreads that formed the staple export of the region to Europe.

Neither herbal gives the exact composition of remedies, stopping at a description of the uses to which the respective indigenous populations put the different parts of each plant. L'Empereur explicitly states that he 'do[es] not describe the dosage because they [Indian physicians] do not weigh the drugs. Only experience can teach one how to administer the medicines.'[50] Furthermore, while L'Empereur is a professional surgeon, Van Reede is a medical neophyte. Finally, while one uses French, obviously for his compatriots, the other publishes his work in Latin, the *lingua franca* of Europe's savant elites—but a language Van Reede himself does not master!

L'Empereur's *Jardin* Comes to Paris . . .

L'Empereur was confident of being suitably rewarded for his entrepreneurship. Already, in 1698, he had sent samples of his work to Paris with Delavigne, hoping he would find a suitable patron. The latter did not succeed in making much headway and, by 1701, L'Empereur's impatience was palpable. 'No one shall have my work unless I make a suitable profit from it', he wrote to Delavigne, informing him that he had started looking for alternative patronage: he was sending some samples of his work to a (mysterious) 'Monsieur Petit' in London and to his brother's friend in Dol, a retired canon who had once been tutor to the sons of Guy-Crescent Fagon (1638–1718), Louis XIV's personal physician and the head of the *Jardin du Roi* in Paris.[51] L'Empereur's indefatigable efforts did at some stage pay off. In 1719, through the good offices of the influential Abbé Jean-Paul Bignon (1662–1743), a member of the *Académie des Sciences*, editor of the *Journal des Savants*, and the King's librarian, L'Empereur received two gold medals, 'one of Louis XIV and the other of the Regent', as a token of royal patronage for the project and 'a promise to be suitably rewarded upon completing the work'.[52]

The flora was finally completed in 1725, and L'Empereur shipped it to the *Académie des Sciences* in Paris along with a wonder remedy for epilepsy. He was now 65 and eagerly looked forward to retiring on a sizeable reward. L'Empereur had lost his job with the *Compagnie des*

[50] MNHN, Ms. 1915: 'Avis au lecteur', f. IVv.

[51] MEP, V 990, f. 539: L'Empereur to Delavigne, 29 January 1701.

[52] CAOM, F^{5}A 19, ff. 83r–84v: L'Empereur to Abbé Raguet, 20 January 1727.

Indes, and had spent his every last penny on this gigantic work—so much so that he was reduced to bankruptcy and begging.[53] The volumes and remedy arrived safely and were handed over for expert examination to Antoine de Jussieu, a member of the *Académie*, professor of botany at the *Jardin du Roi*, and the *Compagnie des Indes*'s botanical expert. L'Empereur, however, received no acknowledgement, let alone material advantage. After a couple of unanswered letters to Jussieu,[54] he began complaining about the latter's behaviour to the directors of the *Compagnie* and to his numerous correspondents in Parisian high society—among others, Charles-François de Cisternay Du Fay (1698–1739) who was head of the *Académie des Sciences* and of the *Jardin du Roi* (1732–9), the Comte de Maurepas who was minister of the navy, the Abbé Bignon, and the Abbé Gilles-Bernard Raguet (1668–1748), ecclesiastical director of the *Compagnie des Indes* as well as Louis XV's personal confessor and geography teacher.[55] In 1733, the *Compagnie* reinstated L'Empereur as visitor of its godowns in Chandernagore, but, in spite of a number of intercessions on his behalf, Jussieu stubbornly refused to pay him his due, although he did admit that the various remedies were indeed effective.[56]

Nicolas L'Empereur died in anonymity in Chandernagore on 13 February 1742, aged 80, cared for to the last by his Bengali doctor, to whom he left part of his meagre savings.[57]

[53] CAOM, Colonies, C^2 74, ff. 45r–50v; also CAOM, F^5A 19, ff. 135r–137r: Pierre Christophe Lenoir to Abbé Raguet, 25 September 1728.

[54] Only a few of these letters have survived. See MNHN, LP, GGA/52766/1 & 2: L'Empereur to Jussieu, 25 December 1729 and 25 November 1733, respectively; and AS, Dossier Antoine de Jussieu, 'Extraits de la correspondance d'Antoine de Jussieu', f. 22.

[55] See CAOM, C^2 285, ff. 11r–12r: L'Empereur to the Directors of the Compagnie des Indes, 25 January 1737; F^5 19, ff. 83r–84v, 116r–117v, 140r–142v, 169r–171r, 161r–162r and 179r–180r: four letters from L'Empereur to the Abbé Raguet and two from Raguet to L'Empereur.

[56] CAOM, Inde, A102, pp.150–2: Letter, dated 21 January 1733, from the Directors of the Compagnie des Indes to the Chandernagore Council; F^5 19, ff. 179r–180v: Abbé Raguet to L'Empereur, 20 November 1730; and AN, Marine, B^2 307, f. 465r–v: Maurepas to Du Fay, 16 March 1739.

[57] CAOM, Inde, Notariat de Chandernagor, O 17 (1742) N° 39/13^e, unpaginated: declaration, dated 13 February 1742, by Nicolas L'Empereur of his debts before his death.

. . . and Gets Anonymized in the *Jardin du Roi*

Why the *Jardin de Lorixa* should have suffered a fate so different from that of the *Hortus Malabaricus* cannot be explained in terms of its contents or structure. Exotic herbals and pharmacopoeias were highly coveted as much for their use to naturalists and medics as for their commercial potential. By the eighteenth century, illustrated herbals had also made their place as prized items on the European art market. Personal animosity on the part of Jussieu, as L'Empereur seems to suggest, cannot entirely explain the *Jardin*'s failure.[58] A definitive answer to this intriguing question must await the discovery of Jussieu's full report on the *Jardin*. For the moment, one can only speculate in the light of circumstantial evidence.

At any rate, we can be certain that it was not out of disinterest for Asian flora that Jussieu was unmoved by the *Jardin de Lorixa*, for, as the botanical expert to the *Compagnie des Indes*, he was well aware of the Dutch monopoly over the European drug market, a monopoly which, by his own admission, 'they acquired by gaining a thorough knowledge of the natural history and uses of drugs in the lands they visit'. Consequently, if the French hoped to carve out a place on the drug market, they had to encourage the *Compagnie*'s servants overseas to collect useful plants, 'send them for expertise to Paris', and eventually 'transplant the most useful of them in our newly founded colonies'.[59] Jussieu maintained a regular correspondence with Frenchmen in the East and even secretly sent a certain Jean-Claude Barbé (born *c.*1700) to botanize in Chandernagore in 1725! (Upon the latter's sudden death in 1729, L'Empereur rummaged through his affairs and was furious to discover Jussieu's duplicity.[60])

However, Jussieu seems to have thought that knowledge outside of Europe could be gained without expense and was not embedded in the larger economy. L'Empereur did not lose the opportunity to point out to him the folly of this assumption :

[58] CAOM, C^2 285, ff. 11r–12r: L'Empereur to the Directors of the Compagnie des Indes, 25 January 1737.

[59] MNHN, Jussieu manuscripts, Ms. 284: 'Mémoire pour Messieurs de la Compagnie des Indes', undated.

[60] MNHN, LP, GGA/52766/1: L'Empereur to Antoine de Jussieu, 25 December 1729, *Post scriptum*.

> With 1200 *livres*, a botanist cannot do much considering that food, clothing, wine at 30 *sous* a bottle, the local doctor, housing, servants, interpreters and other domestics, and presents cost a lot more. Moreover, your botanists come during the monsoons, the worst time to botanize. Besides, they have to learn the language and buy books from the natives.[61]

Nor was he the only one to remind Jussieu that, as in Europe, knowledge even in these remote parts was part of the larger economy: Barbé, too, wrote to let him know of the snares of botanizing in Asia: 'You asked me for the Indian spikenard, for cinnamon, cloves, and nutmeg. I assure you that although we might be closer to Ceylon and the Molucca Islands, these trees are as unknown, if not more, to us here as they are to you. It is not easy to acquire them because they are the jealously guarded prerogative of the Dutch.' And, in reply to a request from Jussieu for plants from South India, Pierre Christophe Lenoir, governor of Pondicherry, wrote back explaining to him the intricacies of knowledge gathering and the need for local guidance.[62] The Asian world was as commercially organized and segmented as the European one. Jussieu, being ignorant of this, was not to make much headway in collecting nature at a distance in the East.

However, one of Jussieu's writings does throw direct light on his assessment of L'Empereur's herbal. '*Des avantages que nous pouvons tirer d'un commerce littéraire avec les botanistes etrangers*', a manuscript note most probably written in 1732, provides an interesting insight into Antoine de Jussieu's notion of the botanical enterprise. 'It is neither simple curiosity', he states,

> nor the desire to adorn one's garden with exotic and hitherto unknown plants that are the main reasons for corresponding with botanists abroad—no, if botany is to have any place in the progress of medicine and other arts, then it must be to establish comparisons between European flora and those sent by correspondents abroad. It is only thus that one can identify plants of the same type, know their uses in medicine and the arts, and finally improve the quality of the European flora.

According to Jussieu, it is this correspondence that helped establish that the Ipecacuanha was none other than the common violet, that the

[61] MNHN, LP, GGA/52766/1: L'Empereur to Jussieu, 25 December 1729.

[62] AS, 'Extraits de la correspondance d'Antoine de Jussieu', ff. 23, 24: letters from Barbé (27 December 1728) and Lenoir (10 January 1729).

'scammony is the turbith, these purgatives so much in use are nothing but imported bindweeds, and the plants from which Japanese paper is made are merely a species of white mulberry and althaea.'

Jussieu then goes on to give five practical examples to show the utility of such correspondence—the second being none other than that of Nicolas L'Empereur:

> The second letter, dated 20 January 1729, is from Mr L'Empereur, formerly surgeon at Chandernagore in the kingdom of Bengal. It contains a number of observations on the plants of that country drawn and painted by him in 12 folio volumes that he sent to the Academy and that are now with me. The observations are mainly on the uses in Bengal of most of the plants described in this collection, which is almost a corpus of medicine in this distant kingdom.
>
> However, an examination of the plants has led me to remark that most of those that grow there naturally and are, so to speak, wild, are to be found here among our vegetables which are cultivated and have thus developed a different taste.[63]

Surprisingly, Jussieu and L'Empereur concur on the performativity of botany, but what they mean by it is very different. For the former, knowledge of foreign flora was of interest only inasmuch as it helped compare foreign plants with local ones and thus establish concordances between them in order for France to find import substitutes and protect both its markets and powerful professional groups from Dutch competition. This was certainly not L'Empereur's purpose. His was a scheme, inspired from the Dutch model in the Indian Ocean, of gaining knowledge of regional pharmacopoeias in order to commodify them. At any rate, it was Jussieu who, as a senior civil servant and savant-expert in the network of French royal institutions, had the last word. He thus sounded the knell of the *Jardin de Lorixa*. Exiled from the world of certified knowledge, it lay in his personal library at the *Jardin du Roi*, before ending up as an anonymous, exotic curiosity in the *Muséum*'s library in the course of the nineteenth century.

Conclusion

The L'Empereur corpus, as also the works of other Europeans in Asia, all throw considerable light on the triangular relationship between

[63] MNHN, Jussieu manuscripts, Ms. 1116, undated.

Europeans at large, their indigenous interlocutors, and their armchair metropolitan colleagues. These also bring out the relationship between knowledge practices and the broader economic and political context, and help illustrate some of the principal themes of this book.

Early-modern South Asia and the Indian Ocean turn out to be spaces in which knowledge was intellectually and socially constituted prior to European contact. The knowledge that circulated there was not some form of popular knowledge but the prerogative of discrete, well-defined groups. This was clearly acknowledged by Europeans both outside and inside Europe. L'Empereur's enterprise, as much as that of Van Reede and da Orta, thus consisted not in gathering information held by undifferentiated, autochthonous groups, but in *reconfiguring* and *constructing* knowledge, skills and specialized practices—for the regional, as much as for the European, knowledge markets.

Using the market metaphor here is not out of place: it is used by the actors themselves—L'Empereur himself refers to trade and profit as does Jussieu ('literary trade', for example). It brings to the fore the material and economic dimensions of knowledge making and circulation. Science has so far been commonly presented as a special 'symbolic' economy distinct from other dimensions of human intercourse. Instead of freely circulating in an idyllic and seamless republic of letters, science in Europe, when observed from the vantage point of the Indian Ocean, moved in fragmented and bounded spaces conditioned by national political and economic interests, spaces shaped by different regimes of performativity within which alone can the meaningfulness of knowledge be determined.[64] L'Empereur's example and the others evoked here argue for an understanding of early-modern science as part of the market economy that partakes of the larger political economies of burgeoning nation-states, of early-modern mercantilism, and of nascent European colonialism.[65] It is only by considering

[64] Pierre Bourdieu, 'The Specificity of the Scientific Field and the Social Conditions of the Progress of Reason', *Social Science Information*, vol. 14, no. 6 (1975), pp. 19–47; Lorraine Daston, 'The Ideal and Reality of the Republic of Letters in the Enlightenment', *Science in Context*, vol. 4, no. 2 (1991), pp. 367–86. For the relationship between science, technology and the market, see Michel Callon, ed., *The Laws of the Market* (Oxford: Blackwell, 1998); and Dominique Pestre, *Science, argent et politique: Un essai d'interprétation* (Paris: INRA, 2003).

[65] This adds a material-economic dimension to Lorraine Daston's rather

it thus that we can begin to clarify the complex nexus between knowledge and power.

In addition, even more than L'Empereur's experience, that of da Orta, da Costa, Van Reede, Hermann, and Rumphius plead for studying knowledge construction in the Asian context not as an extension of its construction within Europe but as a phenomenon in its own right. Their experience brings to light the fact that these men gained their credibility not in providing information to European armchair savants, but by making and circulating knowledge through negotiations with local Asian groups. Each of them either published their work in Asia, as in the case of da Orta, or else, as in the case of Van Reede, Hermann, and Rumphius, made their name by circulating it in manuscript form within the Indian Ocean world, mainly through Batavia, without appealing to European metropolitan authority. Indeed, as Rumphius noted in the preface to his most major work, the *Herbarium Amboinense* (made between 1663 and 1697), he undertook it for the 'use and service to those who live in the East-Indies', a work that was not published in printed form in Europe until the mid-eighteenth century.[66]

The change in historiographical perspective attempted here thus makes it possible to begin to look at the site of knowledge production itself and ask what the dynamics of knowledge making sets in motion there. As we have seen, the translation from South Asian vernaculars to a European language was only one of the many translations that L'Empereur's enterprise involved. Indeed, L'Empereur's exercise was one that consisted in translating a motley of medical, religious, econo-

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abstract list of moral-cultural values of science that she thinks ought to be closely examined by science studies in her 'The Moral Economy of Science', in Arnold Thackray, ed., *Constructing Knowledge in the History of Science*, *Osiris* (2nd series), vol. 10 (Chicago & London: University of Chicago Press, 1995), pp. 2–26.

[66] Georg Eberhard Rumpf, *Herbarium amboinense: plurimas conplectens arbores, frutices, herbas, plantas terrestres & aquaticas, quae in Amboina et adjacentibus reperiuntur insulis . . . Omnia . . . belgice conscripsit Georg. Everhard Rumphius . . . Nunc primum in lucem edidit, & in latinum sermonem vertit Joannes Burmannus . . . qui varia adjecit synonyma, suasque observationes . . .*, 6 volumes (Amsterdam, 1741–50). The citation is from in E.M. Beekman's Introduction to Georgius Everhardus Rumphius, *The Ambonese Curiosity Cabinet* (New Haven & London: Yale University Press, 1999), p. lxxxi.

mic, social, and cultural skills and practices through a series of complex and contingent negotiations into a single work that obeyed no single pre-set idiom.[67] And, if L'Empereur failed to make it at the far end of the chain—in France—he did succeed at the near end, in South Asia, in pulling together and maintaining a complex network of savants, merchants, missionaries, and craftsmen. Indeed, his enterprise, like that of other Europeans, was to have a long-term effect on the local communities with which they interacted. Indigenous painters were to find natural history drawing and painting an increasingly lucrative business for the European market throughout the eighteenth century and were to start specializing in this art form. At first they did this on an individual basis, but with the British colonization of Bengal and the Coromandel coast a few decades later, a whole institutional space was to open up with the founding of botanical gardens and the various natural-historical and geographical surveys. Indian painters and draftsmen were now employed on a massive scale in these colonial institutions for executing maps, landscapes, and some of the great herbals of the late eighteenth and early nineteenth centuries.[68] Likewise, European naturalists were to start finding employment in South Asian princely courts to set up botanical and medicinal gardens.[69] Finally, this intercultural interaction certainly had long-term effects on the dynamics of medical and botanical practices in the region itself. Although difficult to apprehend, these would certainly repay working out and would be a valuable contribution to the history of Indian medicine.

[67] Translation in this sense bears a definite resemblance to its use in present-day actor-network theory. See Michel Callon, 'Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay', in John Law, ed., *Power, Action and Belief: A New Sociology of Knowledge?* (London: Routledge and Kegan Paul, 1986), pp. 196–233.

[68] See William Roxburgh, *Plants of the Coast of Coromandel; Selected from Drawings and Descriptions Presented to the Hon. Court of Directors of the East India Company*, 3 volumes (London, 1795–1820); and Henry J. Noltie, *Indian Botanical Drawings 1793–1868 from the Royal Botanic Garden* (Edinburgh: Royal Botanic Garden, 1999).

[69] For instance, Johann Gerhard Koenig (1728–85), a student of Linnaeus, made his name as a botanist in the service of the Nawab of Arcot in South India, before being employed by the EIC.

CHAPTER 2

Circulation and the Emergence of Modern Mapping: Great Britain and Early Colonial India, 1764–1820

Introduction

It is commonly believed that modern cartography and the surveying activity on which it is based are a purely Western invention introduced into the rest of the world in the course of European colonial expansion. To take an example, in his book on the British geographical surveys of South Asia in the eighteenth and nineteenth centuries, Matthew Edney states that 'cartographic culture' is the transplanting from Europe to India by the British elites of what he calls a 'spatial architecture rooted in non-Indian mathematics and structures'. 'For the British in India', he states,

> the measurement and observation inherent to each act of surveying represented *science*. By measuring the land, by imposing European science and rationality on the Indian landscape, the British distinguished themselves from the Indians: they did science, the Indians did not, unless in a limited way and then only at the express request of a British official . . . The practising of cartography—the making of surveys and the compilation of maps—was quintessentially at once a scientific and a British activity.

The survey thus asserted a British mastery over the Indian landscape, reducing the 'mystical, religious, Hindu space of India to a rational, scientific, imperial structure of space'. The survey operations in India are seen as constituting a scientific 'panopticon' designed to provide the colonizers with a comprehensive network of surveillance and control over the Indian countryside and population. As for the colonized Indians, they are presented either as subaltern automata for

those in the service of the British, or else as peasants revolting against an imperial order by disrupting surveying activities.[1]

This idea of surveying, and more generally of modern science, as an imposed rationality on the non-Western world is echoed in much recent post-colonial history writing, especially that concerning the Indian subcontinent.[2] According to this view, the spread of Western science is achieved by means of an often violent imposition of 'rational' practices on 'Other scientific' cultures.[3] However, the nature of the putative 'Other' scientific practices, their articulation with the social and power structures within which they are embedded, their history and encounter with European scientific practices, are questions rarely addressed in these writings.[4] And, although by focusing on the nexus between science and power they provide a healthy antidote to the widely held notion that modern science spreads purely because of the rationality of its propositions, these studies largely shape their interpretive arguments with suggestion, supposition, assertion, and sometimes appeal to 'political correctness' rather than through demonstration of their historical claims and theses.[5]

[1] Matthew Henry Edney, *Mapping an Empire: The Geographical Construction of British India, 1765–1843* (Chicago & London: University of Chicago Press, 1997). Quotes are from pp. 25 and 32 respectively. For resistance by Indians, see p. 325 *et seq*.

[2] See, for instance, the special issue on 'Colonial Ethnography' of *South Asia Research*, vol. 19, no. 1 (1999), and in particular Gloria Goodwin Raheja's contribution, 'The Ajaib-Gher and the Gun Zam-Zammah: Colonial Ethnography and the Elusive Politics of "Tradition" in the Literature of the Survey of India', pp. 29–52.

[3] A typical example is Gyan Prakash, *Another Reason: Science and the Imagination of Modern India* (Princeton: Princeton University Press, 1999).

[4] Although some scholars have touched on the relationship between Europeans and their native informants, the nature of the knowledge and expertise of the latter is eluded. As an example, see Nicholas B. Dirks, 'Colonial Histories and Native Informants: Biography of an Archive', in Carol A. Breckenridge and Peter van der Veer, eds, *Orientalism and the Postcolonial Predicament: Perspectives on South Asia* (Philadelphia: University of Pennsylvania Press, 1993), pp. 279–313.

[5] For a recent example of this trait, see Ian J. Barrow, *Making History, Drawing Territory: British Mapping in India, c. 1756–1905* (Delhi: Oxford University Press, 2003).

The issue of the spread of specialized knowledge and its practices is rendered all the more crucial in the light of recent work in the history and sociology of science. Exporting scientific produce beyond its site of production often entails the replication of instruments and material and intellectual skills, but it requires even more importantly that gestures, protocols, social rules, conventions, and regimes of civility associated with the scientific speciality in question be negotiated with respect to those of the host community, entailing their reconfiguration to fit the new environment. Moreover, these processes of negotiation and accommodation, far from being unidirectional, can also affect the nature of the scientific produce at its place of origin through processes of circulation and feedback.

The 'open air' sciences—such as geographical and revenue surveying, but also botany, forestry, agriculture, and anthropology—in the context of late-eighteenth- and early-nineteenth-century British colonial expansion present an ideal terrain to examine their formation and dissemination.[6] Indeed, this period saw the rise, both in Britain and in its colonies, of a number of open air sciences that at once fed on and reinforced the colonial order.[7] It also saw Britons themselves in the process of forging a national identity.[8] And, although colonial institutions in India grew out of pre-existing administrations of indigenous regimes and inherited many of their workforces, they were transformed by the new situation through mechanisms of accommodation and negotiation, producing novel forms of knowledge that were not simply linear developments of past practices and traditions. The study of colonial scientific and technological institutions thus calls for an approach that accounts for the complex character of knowledge making during this period.

[6] See the Introduction to this book for the choice of the term 'open air' sciences in preference to the more current 'field' sciences.

[7] Simon Schaffer, 'Field Trials, the State of Nature and British Colonial Predicament', paper presented at the 'Sciences et Empires' seminar, Centre de Recherche en Histoire des Sciences et des Techniques, Cité des Sciences et de l'Industrie, La Villette, Paris, 11 June 1999.

[8] See Linda Colley, *Britons: Forging the Nation, 1707–1837* (New Haven & London: Yale University Press, 1992). See also Roy Porter and Mikuláš Teich, eds, *The Scientific Revolution in National Context* (Cambridge: Cambridge University Press, 1981).

This chapter is an attempt to examine geographical surveying and map-making practices in India and Great Britain in the early colonial period. Its intention is to highlight the ways in which the circulation of competencies and objects and the attempts to control this circulation contributed to the emergence of modern-day map literacy and culture. By providing an alternative account of the cultural and political history of construction of geographical knowledge and practices based on historical evidence, I hope to show the untenability of the claims of recent social historical scholarship that European and Indian scientific practices were radically different at the time of colonization, and that 'Western' science was imposed on Indians by the British as part of the 'civilizing mission'.

Indeed, the case of the geographical exploration of British India in the late-eighteenth and early-nineteenth centuries provides a good illustration of the way in which British and Indian practitioners and skills met around specific projects, how they were reshaped, and how the modern map and its uses co-emerged in India and Britain through the process of colonial encounter. Large-scale terrestrial survey operations in South Asia were started in the wake of the British conquest of Bengal in the mid-eighteenth century, built on pre-existing indigenous surveying institutions and their workforces. As we shall see, the British depended crucially on their indigenous intermediaries and the role of South Asians, and local technical culture was not negligible in this history. The Survey of India, although named thus only in 1878, represents one of the oldest modern scientific and technological enterprises in the world, dating back to the mid-eighteenth century, and was arguably the technical backbone of the British administration in India. Known mainly for its maps, the Survey was also a pioneer in the invention and production of social statistics, made substantial contributions to geodesy, and undertook the conception, manufacture, and maintenance of sophisticated survey instruments. As the historian of Victorian science, Susan Faye Cannon, remarks: 'The Great Trigonometrical Survey of India shows the workings of British policy better than still another study of Macaulay's education minute . . .'[9]

Finally, this chapter is an attempt to contest the all-too-commonly accepted assumption that the history of science or, more modestly, the

[9] Susan Faye Cannon, *Science in Culture: The Early Victorian Period* (New York: Science History Publications, 1978), p. 251.

history of modern surveying and mapping, can be told as an autarkic West European story with no mention of concomitant developments in other parts of the globe and their influence on the course of the shaping of this history.[10] This assumption is based largely on conceit, for a number of studies in international journals and reputable academic works have documented the crucial contributions of autochthonous peoples to European terrestrial surveying and map-making since the beginning of European expansion.[11] More importantly, an increasing number of historians have in recent years convincingly developed the thesis that Britain and its empire were co-constituted.[12] I hope to show that the history of the modern geographical map is part of this general narrative and can only be meaningfully told as a connected and circulatory story, simultaneously involving and constructing metropolis and colony.[13]

Let us start then by briefly surveying the state of geographical practices in Britain and South Asia until the mid-eighteenth century, before following their redeployment and circulation in the light of expanding British territorial conquests in the Subcontinent. In the last

[10] See, for instance, Catherine Delano-Smith and Roger J.P. Kain, *English Maps: A History* (London: British Library, 1999).

[11] Barbara E. Mundy, *The Mapping of New Spain: Indigenous Cartography and the Maps of the* Relaciones Geográficas (Chicago & London: University of Chicago Press, 1996); Louis De Vorsey, 'Amerindian Contributions to the Mapping of North America: A Preliminary View', *Imago Mundi*, xxx (1978), pp. 71–8; G. Malcolm Lewis, 'Indicators of Unacknowledged Assimilations for Amerindian Maps on Euro-American Maps of North America: Some General Principles Arising from the Study of La Vérandrye's Composite Map, 1728–29', *Imago Mundi*, vol. 38 (1986), pp. 9–34; John Spink and Donald Wayne Moodie, *Eskimo Maps of the Canadian Arctic*, *Cartographica* Monograph, vol. 5 (1972); Anne Godlewska, *The Napoleonic Survey of Egypt: A Masterpiece of Cartographic Compilation and Early Nineteenth-Century Fieldwork*, *Cartographica* Monograph, no. 25 (1988).

[12] See, in particular, Christopher Alan Bayly, *Imperial Meridian: The British Empire and the World, 1780–1830* (London: Longman, 1989).

[13] For a thematisatization of the idea of 'connected' histories, see Sanjay Subrahmanyam, *Explorations in Connected History*, 2 volumes (Delhi: Oxford University Press, 2004); and Serge Gruzinski, 'Les mondes mêlés de la monarchie catholique et autres "connected histories"', *Annales HSS*, 56e année, no. 1 (2001), pp. 85–117.

section, we shall focus on the efforts of the EIC to control the circulation of maps in order to make them indispensable instruments for administration and mobility as we know them today.

Early Modern British and Indian Geographical Practices

Direct contact between England and India dates from the establishment of the EIC in 1600. Coming to participate in the lucrative spice and luxury-commodity trade, the English initially represented no more than a few hundred civilians and a couple of thousand troops. Even at the apogee of Empire in the twentieth century, British presence in India never exceeded a few thousand civilians, a number at all times too small not to rely heavily upon autochthonous intermediaries for most commercial, administrative and technical tasks. One estimate, for the Madras Presidency during the first half of the nineteenth century, puts the proportion of Britons to South Asians directly serving the Company's civil administration alone at 1 to 180.[14] As noted in the previous chapter, the Indian Ocean was crisscrossed with dense trade networks long before Europeans entered the region. The latter had thus to negotiate their way into these networks in a region that spanned from West Asia and East Africa to South East Asia and China, the Indian subcontinent being, both geographically and economically, an obligatory passage point. In fact, ever since their arrival in the Subcontinent, a collaboration was established between Europeans and a section of the region's population: *banians* (bankers), *munshis* (interpreter-secretaries), *harkaras* (intelligence agents), and skilled workmen such as weavers, jewellers, carpenters, shipbuilders, and sailors—and, not least, indigenous women who many Europeans married or lived with.[15] In the face of inter-European rivalries in the second

[14] See Robert E. Frykenberg, *Guntur District 1788–1848: A History of Local Influence and Central Authority in South India* (Oxford: Clarendon Press, 1965), p. 7.

[15] For South Asia, see Durba Ghosh, 'Colonial Companions: Bibis, Begums, and Concubines of the British in North India 1760–1830', unpublished doctoral dissertation, University of California, Berkeley, 2000; and William Dalrymple, *White Mughals: Love and Betrayal in Eighteenth-Century India* (London: HarperCollins, 2002). For South East Asia, see Johan Leonard Blussé,

half of the eighteenth century, especially *vis-à-vis* the French, this collaboration extended to the establishment of an army that included indigenous troops, artificers, and gunsmiths.

In the course of the seventeenth and eighteenth centuries the English, like other Europeans trading with the East, charted the seas and coasts between West Europe and Asia. Indeed, maritime maps and sailing directions, or rutters, were an indispensable tool for navigation and formed an essential part of the mariner's wherewithal at least since the thirteenth century.[16] However, Europeans did not generally invest in mapping the Asian hinterlands, partly because their settlements were situated either on the sea coast or, as in Bengal, up the mouths of rivers, but also because maps were not culturally part of the European land traveller's *vade mecum* until well into the nineteenth century. For the mainland, they relied mainly on information garnered from travellers and missionaries who themselves found their way through constant enquiry or, more commonly, by hiring local guides. The occasional map, like that of Jean-Baptiste Bourguignon d'Anville, who in 1752 published a *Carte de l'Inde*, was based on ancient geography updated by travellers' accounts—European map-makers hardly ever left their workshops.[17]

Strange Company: Chinese Settlers, Mestizo Women and the Dutch in VOC Batavia (Dordrecht: Foris, 1986); and idem, *Bitter Bonds: A Colonial Divorce Drama of the Seventeenth Century* (Princeton, NJ: Markus Wiener Publishers, 2002).

[16] For a history of the techniques of maritime navigation, see Eva Germaine Rimington Taylor, *The Haven-Finding Art: A History of Navigation from Odysseus to Captain Cook* (London: Hollis & Carter, 1956). Taylor notes that the first known European *portolan* chart, the *Carta Pisana*, dates from about 1275. At around the same time Marco Polo also remarked on the use of indigenous sea charts in the Indian Ocean. The Turks and Arabs are also known to have relied extensively on navigational maps and texts in the Mediterranean and Indian Ocean. See Gerald R. Tibbetts, 'The Role of Charts in Islamic Navigation in the Indian Ocean', in John Brian Harley and David Woodward, eds, *The History of Cartography*, vol. 2, book 1: *Cartography in the Traditional Islamic and South Asian Societies* (Chicago & London: University of Chicago Press, 1992), pp. 256–62.

[17] The only exceptions to this were the Jesuits. Since the earliest days of their mission in China, they took as a major goal the geographical delineation of the Chinese empire. The culminating point of this enterprise was the monumental atlas produced by the French Jesuits in the first half of the eighteenth century.

Territorial acquisition in South Asia changed needs. Following the Battle of Plassey in 1757, surveys of the new possessions were ordered to defend frontiers, chart inland and river, trade routes, ascertain the extent and revenue potential of cultivated lands, and ensure the safety and regularity of communications.[18]

However, not only were the British too few to undertake surveys, these few had little or no experience in terrestrial surveying. For instance, in the wake of Plassey, when the Bengal Council wrote to the navy for a surveyor, Admiral Charles Watson, commander of the fleet at Calcutta, replied:

> I have received your Letter of this Day's Date, acquainting me with the Necessity you are under of having an exact Survey, and regular Plan of the Lands granted the Company by the Nabob, and requesting I would assist you, from the Squadron with such Persons, as are properly qualified for such an Undertaking.
>
> It appears to me to be a Work, requiring so much Care and Exactness, that I know of none in the Squadron capable of it, and if there were, I am very certain such a Performance would require much more Time, than I shall continue here. But if upon an Enquiry in the Squadron, you find any one, who will answer your Purpose, and is willing to remain in India, I will give Orders for his being discharged.[19]

See Theodor N. Foss, 'A Western Interpretation of China: Jesuit Cartography', in Charles E. Ronan and Bonnie B.C. Oh, eds, *East Meets West. The Jesuits in China, 1582–1773* (Chicago: Loyola University Press, 1988), pp. 209–51. For the Indian subcontinent, the Jesuits also made regular astronomical observations, recording the coordinates of numerous places. These, in turn, were worked into maps by map-makers like Anville. See Jean-Baptiste Bourguignon d'Anville, *Éclaircissemens géographiques sur la carte de l'Inde* (Paris: Imprimerie royale, 1753).

[18] See British Library, Oriental and India Office Collections (hereafter OIOC), Bengal Public Consultations, 1 August 1757. P/1/29, f . 247 (letter dated 27 July 1757 from Robert Clive and members of Council at Muxudavad [*sic*] to the President and Council of Fort William). Also partially reproduced in James Long, ed., *Selections from Unpublished Records of Government for the Years 1748 to 1767 inclusive Relating Mainly to the Social Conditions of Bengal* (Calcutta: Superintendent of Government Printing, 1869), p. 99, document 244.

[19] Letter dated 3 August 1757 from Admiral Charles Watson to the President and Council of Fort William in OIOC, Bengal Public Consultations, 1 August 1757. P/1/29, f. 259. Also in Long, *op. cit.*, p. 99, document 245. In this citation,

Indeed, of the 184 British employees of the EIC—listed by Reginald Henry Phillimore in his comprehensive study of the records of the Survey of India—who were in any way involved with terrestrial surveying in the eighteenth century, none had any formal training in terrestrial surveying techniques. Since many of them were in the army, they did pick up the art of making road traverses and drawing route maps in the course of their careers.[20]

It is important to note that in the 1760s, when large-scale survey work was first undertaken in India, there was no unified detailed map of the British Isles—with the notable exception of a map of Scotland made by Scots under the direction of William Roy in the wake of the 1745 uprising. There was, however, no dearth of coastal, harbour, and fortification maps made for the Board of Ordnance, and route, estate, and county maps in the civilian domain. Powerful tools for aggressive governmental control of land as tax bases, natural resources, and national territories, the latter sort of maps were based on measurements made by estate and county surveyors whose skills and instruments (most commonly the chain and crosshead), besides being unavailable in South Asia, were inappropriate for the purposes of extensive surveying.[21] The Ordnance Survey of Great Britain and Ireland was founded only in 1791 and not until 1801 did the first ordnance map appear.[22]

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and those that follow, irregularities in spelling and grammar have been retained as they appear in the original works or translations and have not been identified in the text.

[20] Reginald Henry Phillimore, *Historical Records of the Survey of India*, 5 volumes (Dehra Dun: Survey of India, 1945–68), vol. I, pp. 307–400.

[21] For the uses of cadastral maps in early modern Europe, see Roger J.P. Kain and Elizabeth Baigent, *The Cadastral Map in the Service of the State: A History of Property Mapping* (Chicago & London: University of Chicago Press, 1992).

[22] For a history of the survey of Scotland and the techniques employed, see Raleigh Ashlin Skelton, 'The Military Survey of Scotland 1747–1755', *The Scottish Geographical Magazine*, vol. 83, no. 1 (1967), pp. 1–15. For the early history of surveying in England, see Charles Close, *The Early Years of the Ordnance Survey* (Newton Abbot: David & Charles reprints, 1969), and W.A. Seymour, ed., *A History of the Ordnance Survey* (Folkestone: William Dawson, 1980). For the instruments and procedures of English county surveyors, see James A. Bennett and Olivia Brown, *The Compleat Surveyor* (Cambridge: Whipple Museum of the History of Science, 1982), p. 10.

As in the case of England, there were no detailed maps of the whole of South Asia, although, according to one survey, there exist over two hundred maps prior to the nineteenth century, mainly of the north-western, central, and western parts of the Subcontinent.[23] Besides, detailed cadastral and route surveys were commonly undertaken all over the Subcontinent. It is recorded that Rajaraja I of Thanjavur (985–1011) 'carried out a careful survey of the land under cultivation, and assessed it'.[24] In fact, by the early modern period there were systems under which a record was kept of the area and ownership of cultivated land, and a tradition of land measurement almost throughout the Subcontinent for the purposes of establishing proprietary rights and fiscal dues—a rationale not very different from that operating in contemporary Europe. An early-eighteenth-century Sanskrit manuscript on land measurement from peninsular India, translated for Benjamin Heyne (Moravian naturalist and EIC surveyor), describes a method based on the use of corporeal and other techniques:

> The fundamental measure is that of an Inch which is determined in three different ways.
>
> *First*, By placing three rice corns in a line length ways—the place they occupy is called an Inch.
>
> *Secondly*, By measuring the circumference of the second joint of the thumb, half of the length of which is an Inch.
>
> *Thirdly*, By measuring the second joint of the middle finger, the half of which is called an Inch.
>
> 12 of these Inches are One Jana (literally translated as paw) 32 Janas are One Ghada (or Bamboo)—4 Ghadas (or One Square Bamboo) is One Kunta.
>
> These measures . . . are universally understood.[25]

[23] Susan Gole, *Indian Maps and Plans from Earliest Times to the Advent of European Surveys* (Delhi: Manohar, 1989); and Reginald Henry Phillimore, 'Three Indian Maps', *Imago Mundi*, vol. 9 (1952), pp. 111–14. For a general overview of South Asian maps and cartographic representations, see Joseph E. Schwartzberg, 'South Asian Cartography', in Harley and Woodward, eds, *op. cit.*, p. 400 *et seq*.

[24] *The Imperial Gazetteer of India—Madras*, vol. II, p. 134, cited by Phillimore, *op. cit.*, vol. I, p. 133.

[25] National Archives of India, New Delhi (hereafter NAI), Memoirs of the

In the Mughal empire, data collected were stored in the records of the *patwari*, or village accountant, and regularly checked by other state officials. For route surveys, the Jesuit António Monserrate (1536–1600), who spent many years in Akbar's court, describes the care with which the latter had his marches measured during an expedition to Kabul in 1581:

> The distance of each day's march is measured with a ten-foot rod by special officers, who are instructed to follow the King closely and to measure the distance from the moment he leaves his pavilion. These measurements are afterwards found very useful in computing the area of provinces and the distances of places apart, for purposes of sending envoys and royal edicts, and in emergencies. Two hundred lengths of the ten-foot rod make what is called in Persian a 'Coroo', but in the Indian tongue a 'Kos'. This is equal to two miles, and is the usual measure of distance.[26]

Similarly, another Jesuit, Joseph Tieffenthaler (1710–85), who lived and travelled extensively in the Subcontinent for over forty years, describes some of the measures used in computing distances in different parts of north India:

> In this country, the miles are measured with a cord 50 Royal Yards (*Gaze*) long: seven lengths of this cord make an Indian league. Another way of determining the mile is by taking 400 lengths (*Spithamas*) each of 12½ yards, measured against a long bamboo. These two means yield the same result: each gives 5000 yards or a league. Shershah, the Afghan king of Delhi, divided the league into 60 *Jugeras* each of 60 *Sekanderi* yards . . . which are shorter than the Royal Yard: they are used in the province of Delhi . . .[27]

Not only foreign observers reported on these mensural activities. The chronicler, Muhammad Hadi Kamwar Khan, who served under the

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Survey of India (1773–1866), vol. 3, f.2: 'The "Chetrie Ganietam"—A Sanskrit Work on Land Measurement Translated by Benjamin Heyne'.

[26] António Monserrate (ed. H. Hosten), 'Mongolicae Legationis Commentarius', *Memoirs of the Asiatic Society of Bengal*, vol. 3, no. 9 (1914), pp. 513–704. This quote is taken from idem, *The Commentary of Father Monserrate, S.J. on his Journey to the Court of Akbar*, translated from the original Latin by John S. Hoyland and S.N. Banerjee (Cuttack & London: Oxford University Press, 1922), p. 78.

[27] Translated by the present author from the original French published in Jean Bernoulli, ed., *Description historique et géographique de l'Inde*, 3 volumes (Berlin:

Mughal emperor Shah Alam I (reigned 1707–12), records appointments of surveyors (*Khush-manzil*) and their surveying activities (*mushakhkhas*) during one of the emperor's early campaigns.[28]

The distances measured were then mainly expressed in tabular form—sometimes in the form of maps (*naqsha*), suggesting a degree of map literacy among the Mughal bureaucracy—and included in gazetteers and manuals used for administration, revenue collection, and other purposes, like those mentioned by Monserrate.[29] These gazetteers provided systematic descriptions of provinces and their subdivisions, noting their general location and territorial extent, largely—though not exclusively—meeting the function of countrywide maps as we conceive it today (I shall come back to this question later in the chapter).[30] The most famous of these was the *A'in-i Akbari*, compiled by the publicist 'Abu 'al-Fazl ibn Mubarak (1551–1602) at the end of the sixteenth century.[31]

In addition to poles, ropes, foodgrains, and the human body, attention must also be drawn to the astrolabe, produced by Muslim instrument-makers in South Asia. This instrument was widely used by astronomers, Hindu and Muslim alike, at least since the early fourteenth century, to measure celestial and terrestrial coordinates, and

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Pierre Bourdeaux, 1786–8), vol. I: 'La Géographie de l'Indoustan, écrite en Latin, dans le pays même, par le Pere [*sic*] Joseph Tieffenthaler, Jésuite & Missionnaire apostolique dans l'Inde', pp. 23–4.

[28] Muhammad Hadi Kamwar Khan, *Tazkirat al-Salatin-i Chaghata*, ed. Muzaffar Alam (Bombay & New York: Asia Publishing House, 1980), pp. 19, 84, 90, 94, 101, 102. I thank Muzaffar Alam for bringing this text to my attention and for providing me with translations of the relevant passages.

[29] Ibid., p. 88.

[30] Indeed, as Jacques Revel points out, early attempts by the French state to accumulate territorial knowledge of France did not take the form of maps, and although visual techniques did exist, these were not applied to the national territory. See Jacques Revel, 'Knowledge of the Territory', *Science in Context*, vol. 4 (1991), pp. 133–61. See also Josef W. Konvitz, *Cartography in France 1600–1848: Science, Engineering, and Statecraft* (Chicago & London: University of Chicago Press, 1987).

[31] 'Abu 'al-Fazl ibn Mubarak, *Ain-i Akbari*, translated into the English by H. Blochmann (vol. I), and H.S. Jarrrett (vols II & III), 3 volumes (Calcutta: Asiatic Society of Bengal, 1873–94). In the historical and geographical description of the twelve subahs of Akbar's empire, 'Abu 'al-Fazl describes the different

texts on its use were translated from Arabic and Persian manuals towards the end of the century.[32] Finally, one can also mention massive masonry instruments of the sort found in Jaipur, Delhi, and Ujjain, testimony to the contact between South and Central Asia.[33] In fact, the so-called 'Samarqand School' of astronomy flourished in the Subcontinent under Mughal patronage. By the seventeenth century there is fair evidence of a general mingling of Islamic measuring and surveying techniques with those that existed previously as also of their widespread use.

At all events, far from being a geographical *tabula rasa*, terrestrial surveying, measuring, and representation were common in South Asia, constantly developing through processes of circulation and the negotiated adaptation of embodied skills and instruments, intimately linked with the culture and economics of pre-colonial regimes. In this respect, the development and uses of terrestrial surveying in South Asia were not very different from those in contemporary Britain.[34]

In the same way, then, as for other colonial activities, the British were led to rely on indigenous staff, on their skills and reckoning methods, for their survey operations in India.

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units of measure used in the empire for route, and cadastral surveys, vol. II, pp. 58–62 and 414–18. In the section on the beliefs and knowledge of the Hindus, he details the means used in the region to determine longitude and latitude, to which he appends a lengthy table of the coordinates of known places from the mid-Atlantic to the Far East, vol. III, pp. 33–6 and 46–105. See also Jadunath Sarkar, *The India of Aurangzib (Topography, Statistics, and Roads) Compared with the India of Akbar. With extracts from the* Khulasatu-t-tawarikh *and the* Chahar Gulshan (Calcutta: Bose Brothers, 1901).

[32] See David Pingree, *Jyotihsastra: Astral and Mathematical Literature* (Wiesbaden: Otto Harrassowitz, 1981), pp. 52–4; and Robert T. Gunther, *The Astrolabes of the World*, 2 volumes (Oxford: Oxford University Press, 1932), vol. I, pp. 179–228.

[33] George Rusby Kaye, *The Astronomical Observatories of Jai Singh* (Calcutta: Superintendent of Government Printing, 1918); and, more generally, Richard C. Foltz, *Mughal India and Central Asia* (Karachi: Oxford University Press, 2000).

[34] See Christopher Alan Bayly, *Empire and Information: Intelligence Gathering and Social Communication in India, 1780–1870* (Cambridge: Cambridge University Press, 1996), p. 20 *et seq*.

The Emergence of Large-scale Surveying in India and Britain

The European mapping of India started by mobilizing the available resources within the institutions where the encounter between South Asians and Europeans took place—mainly the army, judiciary, and revenue services—as also through individual relationships. Thus, Tieffenthaler entrusted a local person 'versed in geography with a compass and had him travel to the mountains of Kumaon and the cataracts of the Ghagra . . . to Patna and Deucara [*sic*] in order to measure the distances and determine their respective locations.' He also had three huge maps made of the courses of the Ganges and the Ghagra rivers by 'people of the country'.[35] The French savant-traveller Abraham-Hyacinth Anquetil-Duperron (1731–1805) has left the following amusing account of early European military route surveys:

> I have travelled in the interior of India alone, in a group, and with the army. The commanding officer spends the better part of the day sleeping in his palanquin. At dinner he asks his *Dubash* [interpreter] . . . what distance they have travelled and which places they have passed. The latter in turn asks the porters or else replies himself, for reply one must; and the distances and place names are inscribed on the itinerary, on the map . . . which, by the way, I found perfectly well made.[36]

James Rennell (1742–1830), 'undoubtedly the first great English geographer', can be considered the first Englishman to have systematized the use of these disparate traditions together with those of European terrestrial and coastal surveying in an on-site project.[37]

[35] Bernoulli, *op. cit.*, vol. I, p. 6 and vol. II, 'Des Recherches historiques and chronologiques sur l'Inde, & la Description du Cours du Gange & du Gagra, avec une très grande Carte, par M. Anquetil Du Perron de l'Acad. des Insc, & B.L. & Interpréte du Roi pour les langues orientales, à Paris', p. 267 *et seq*. A reduced version of the maps is published as an insert to this volume.

[36] Translated by the present author from ibid., pp. 466–7. It must be mentioned that the itinerary or map referred to by Duperron was a linear, route survey map, and not a topographical map, as one might be led to imagine on reading his description.

[37] The appreciation is from Clements Robert Markham, *Major James Rennell and the Rise of Modern English Geography* (London: Cassell & Co., 1895), p. 9.

Fig. 8: Major James Rennell

Born in Devonshire and orphaned at an early age, Rennell was taken charge of by Gilbert Burrington, the vicar of nearby Chudleigh. The latter ensured that the boy got an elementary education locally, securing him a job (at age 14) as an ensign on a British naval vessel at the start of the Seven Years' War (1756–63). Operating off the coast of

Brittany, the young James picked up the art of coastal and harbour surveying. Seeing greater opportunities for a more lucrative career, Rennell provided himself with a quadrant and a couple of drawing instruments and volunteered for service in the East Indies. During the following years, he perfected his competencies as a harbour surveyor on the Coromandel coast and found employment with Alexander Dalrymple in 1762 as draughtsman and surveyor on the latter's expedition to the Sulu Islands and China. In the course of this voyage he was able not only to sound the sea but also map the lucrative coastal trade and appreciate the increasing importance of opium in the commerce with China.

It was these skills, contacts, and social and economic knowledge of the region that Rennell was to use to great advantage from 1764 to 1777, when he managed to procure himself a place in India in the service of the EIC, first as probationer engineer and later as Surveyor General of Bengal. The first major task he was given was to make a survey of the Ganges delta in order to find 'the shortest and safest Channel leading from the great River to Channel Creek or Rangafulla'.[38] In fact, the British saw the survey of navigable rivers as of prime importance. Since the Ganges–Brahmaputra delta forms a large part of this territory, Rennell used the navigable distributaries in the same way as one would a sea coast, thereby tracing an outline of the myriad islands that made up the delta. In order to do this, he used the traditional methods of the coastal surveyor he had picked up during his service in the Royal Navy, informing himself in addition from the local people as to the navigability of the various channels and creeks he surveyed.[39]

Upon his return to England in 1777, when he decided to publish terrestrial maps of Bengal, Bihar, and Orissa, and later of the whole of the Subcontinent, Rennell used much of the material from his river

[38] 'Orders from the Hon'ble Henry Vansittart Esq., Governor of Fort William, dated 6 May 1764 to James Rennell', reprinted in Thomas Henry Digges La Touche, ed., *The Journals of Major James Rennell Written for the Information of the Governors of Bengal during his Surveys of the Ganges and Brahmaputra Rivers 1764 to 1767* (Calcutta: Asiatic Society, 1910), p. 9. Rangafulla is the name of the creek connecting the Hooghly with the Sundarbans.

[39] Ibid. See also Rennell's correspondence with his guardian the Rev. Gilbert Burrington, OIOC, Mss. Eur/D1073, and his manuscript maps held at the Royal Geographical Society Archives.

surveys. For the rest, although Rennell did personally conduct some terrestrial surveys (mainly around the delta region), he relied largely on the route marches of soldiers and surveyors, both British and Indian. From their journals and travel accounts, as well as those of other Asian and European travellers and missionaries, he began compiling his map of Bengal and then of the whole of the Subcontinent. Interestingly, he acknowledged all his sources in the Introduction to the *Memoir* that accompanied his first map of the Indian subcontinent, published in 1783. Foremost among these peripatetics were a 'Sepoy officer', Ghulam Muhammad, for 'the roads and country between Bengal and the Deccan', Mirza Mughal Beg for north-western India, and Sadanand—'a Brahmin of uncommon genius and knowledge', in Rennell's

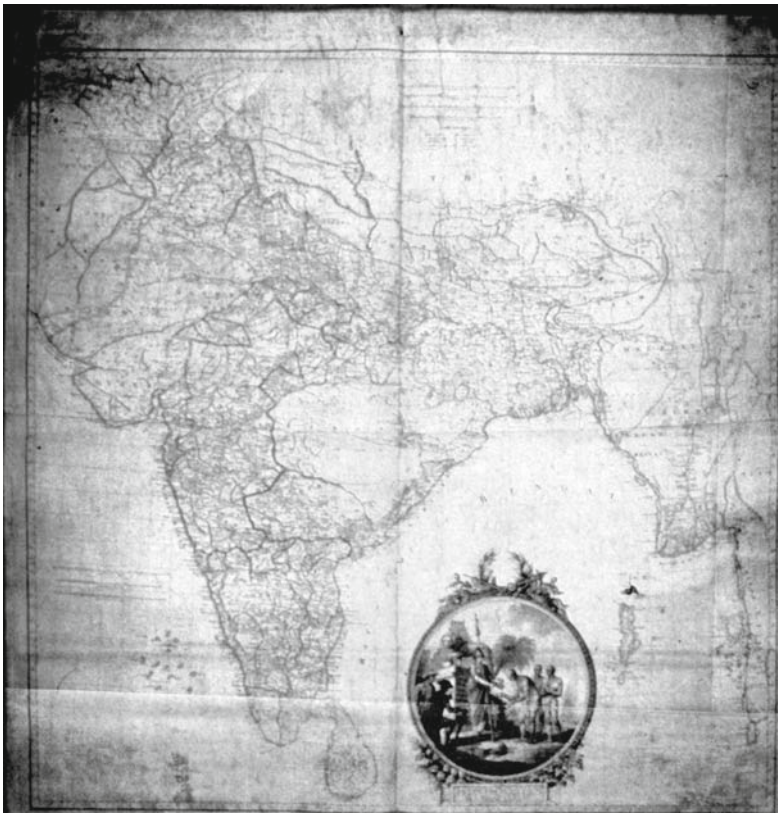

Fig. 9: James Rennell's *Map of Hindoostan*, 1782

words—for Gujarat.[40] His European informants consisted notably of the Jesuits Monserrate and Tieffenthaler, and Frenchmen in India like the Marquis de Bussy, Jean Law de Lauriston, Antoine Polier, and Claude Martin—who had themselves relied heavily on indigenous surveying skills.[41] And, of course, Rennell extensively used the tables of the *A'in-i Akbari*: in the Preface to the first edition of the *Memoir*, he writes: 'In the division of Hindoostan into Soubahs, &c. I have followed the mode adopted by the Emperor Acbar, as it appeared to me to be the most permanent one: for the ideas of the boundaries are not only impressed on the minds of the natives by tradition, but are also ascertained in the Ayeneh Acbaree; a register of the highest authority.'[42]

Moreover, in the emblematic cartouche in the lower right hand side of the first edition of the map of the peninsula, one sees an open acknowledgement of co-operation between South Asian and British elites, a Brahman giving sacred manuscripts ('*Shasters*') to Britannia while other Brahmans, carrying other manuscripts in envelopes, patiently await their turn.[43] Note that the wreath atop the cartouche is composed of opium poppies, a tribute to the increasingly central place opium was playing in the China trade.

Rennell's map was far denser with information than any hitherto made of Britain or of its overseas territories, and was to serve as a model of detail and accuracy for the future mapping of Britain itself. In recognition of his achievements, Rennell was awarded the Copley Medal of the Royal Society in 1791. On the occasion, Sir Joseph Banks, the Society's president, proclaimed:

> Would I could say that England proud as she is of being esteemed by surrounding nations the Queen of Scientific improvement, could boast of a general Map as well executed as the Majors [Rennell's] delineation of

[40] James Rennell, *Memoir of a Map of Hindoostan, or the Mogul's Empire*, 1st edn (London: 1783), pp. vi, 66n, 69; and idem, *A Bengal Atlas: Containing Maps of the Theatre of War and Commerce on that Side of Hindoostan* (London, 1781), p. x. For Rennell's description of Sadanand, see the 1793 edition of the *Memoir*, p. 185, n6.

[41] Bernoulli, ed., *op. cit.*, vol. I, p. ix.

[42] Rennell, *Memoir* (1st edn), p. iii.

[43] See 'Explanation of the Emblematical Frontispiece to the Map', in ibid., p. xii.

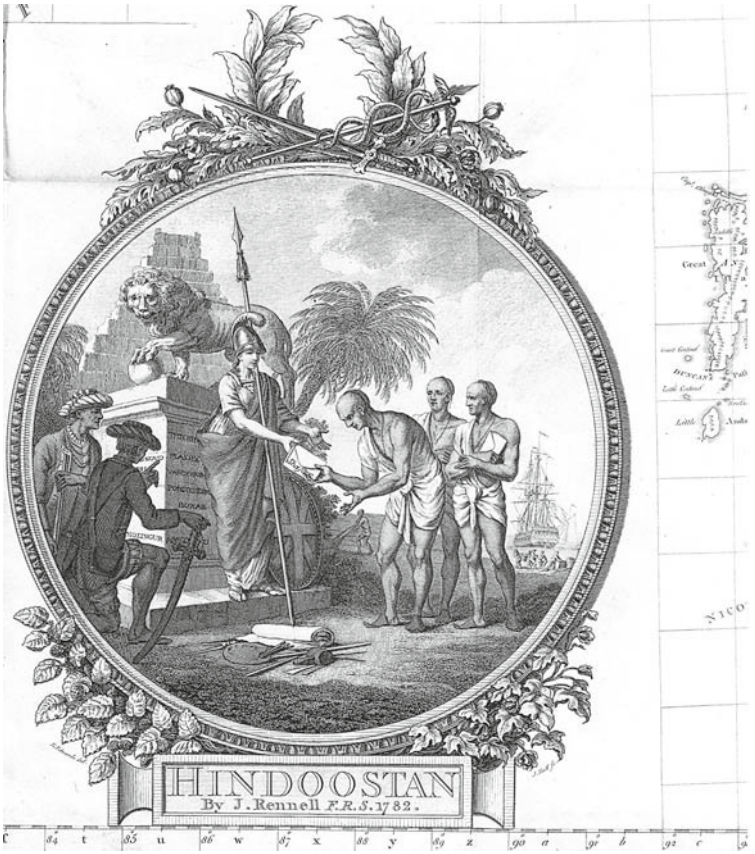

Fig. 10: Cartouche to James Rennell's *Map of Hindoostan*, 1782

> Bengal and Baher, a tract of Country considerably larger in extent than the whole of Great Britain and Ireland . . . the accuracy of his particular surveys stands unrivalled by the most laboured County Maps this nation has hitherto been able to produce.[44]

Indeed, Rennell and his friend William Roy, of the map of Scotland fame, had for some years already been egging public opinion to pressurize the government to undertake a uniform survey of the British Isles by ridiculing the current state of maps of Britain and its seas.[45]

[44] *Royal Society Journal*, book 34, 1790–3, pp. 389–90.

[45] See the Preface to the 2nd edition of Rennell's *Memoir*, pp. iv–v, n. Roy had

Now joined by Banks, their rhetorical pleas paid off that very year with the founding of the Ordnance Survey.

However, the surveying techniques and instruments used in Britain were to be very different from those developed in India. While triangulation, perfected mainly in France in the mid-eighteenth century as a procedure for extensive surveying, was adopted as the sole technique of countrywide surveying in Britain, it was not with the French repeating circle but with a 3-foot altazimuth theodolite, conceived of in England, that the surveys were actually conducted.[46] This reconfiguration is not surprising, given the difference in the respective compositions and traditions of the local communities involved in surveying in Britain, France, and India, notably their relationships with instruments, instrument-makers, and patronage networks.[47]

In India, it was the composite method of data collection that was extended and further developed by Rennell's successors. Thus, Thomas Call (Surveyor General of Bengal, 1777–88) employed at least forty Indians to collect information for his *Atlas of India*. He writes in 1783: 'I have for a year and half past, employed 6 munshies and 30 Hurcarrows at my own expence, to travell through the different parts of India to collect information . . . This I did with the permission of the Hon'ble the Governor General.'

And again, a year later: 'I have by order of the Governor General employed Munshys to survey some Roads between Places well ascertained in the Map, and have procured some very useful information.'[48]

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already tried twice, in 1763 and again in 1766, to persuade the government to make an official survey of the whole of Britain. See Delano-Smith and Kain, *op. cit.,* p. 218.

[46] See Close, *op. cit.*, and Sven Widmalm, 'Accuracy, Rhetoric, and Technology: The Paris-Greenwich Trangulation, 1784–88', in Tore Frängsmyr, John L. Heilbron and Robin E. Rider, eds, *The Quantifying Spirit in the Eighteenth Century* (Berkeley & Oxford: University of California Press, 1990), pp. 179–206.

[47] It is also interesting to note that while the plane table had been known in England since at least the eighteenth century, it was not used for extensive surveys there until the beginning of the twentieth century. In India, on the other hand, the plane table was introduced in the late eighteenth century in the Madras survey operations and was regularly used.

[48] OIOC, Bengal Public Consultations, 6 October 1783 and 29 November 1784, P/2/63 and P/3/7 respectively. A number of the maps from similar surveys are held in the British Library: see, for instance, Add. MSS 13907 (a, b, c, d, e).

Nor was this a stray phenomenon, or one used by relatively minor survey officials. On the contrary, this massive dependence on local surveying skills was widespread. The mathematician and astronomer Reuben Burrow (1747–92), one-time assistant to the Astronomer Royal Nevil Maskelyne, was another who collected routes through autochthonous agency.[49] Alexander Allan (1764–1820), who was to become a director of the EIC and Member of Parliament for Berwick (1814–19), was for a time commander of the fifty-strong indigenous Corps of Guides established in the Madras Presidency in 1780. The Guides, he wrote,

> have examined, and made every necessary remark upon, near 5000 miles of roads in the Carnatic and Mysore country, which they have compiled into the form of a book of roads . . . I consider it a duty I owe to the Corps of Guides . . . to request your Lordship [the governor of Madras] will transmit to the Hon'ble the Court of Directors their maps and field books, also their book of roads, which I have had translated into English.[50]

Needless to say, Allan, as much as his predecessors at the head of the Corps of Guides, had neither the competence nor the financial means or time (in view of the wars in the southern peninsula) to train the guides (mainly former *harkaras*) as surveyors.[51] In addition, many of them relied on Indian astronomers for stellar observations.

It is also important to note that, in addition to this massive deployment of indigenous personnel and their embodied skills for surveying and astronomical control, many Europeans had local texts on surveying and astronomy translated into English and made detailed notes on autochthonous surveying techniques and methods for determining latitude.[52] This exercise in translation carried on well into the

[49] OIOC, X/520.

[50] OIOC, Madras Military Consultations 12 December 1797, cited by Phillimore, *op. cit.*, vol. I, p. 287. A number of translations of field books maintained by Indian surveyors during the late eighteenth and early nineteenth centuries are preserved in the OIOC and in the Memoirs of the Survey of India held at the NAI.

[51] For the origin of the Guides, see OIOC, Mackenzie Mss. General Collection, Ms. 69: ff. 60–1: letter dated 31 January 1790 to the Governor in Council, Report on the proposed Guides.

[52] See, for instance, British Library, Add. MSS 22897: ff. 123–4, letter from

nineteenth century. And when triangulation was introduced into the Subcontinent, it remained for a long time just one, albeit important, technique used alongside others—such as pacing and reckoning distance as a function of time (with the day's march as the common unit).[53] The task of translating and arranging reports into maps was not a simple one, as a whole gamut of special procedures and protocols had to be constructed. Charles Reynolds (Surveyor General of Bombay 1796–1807), who organized a series of survey teams composed exclusively of South Asians to crisscross the Subcontinent, wrote to his superiors anxious at the size of his budget: 'The[ir] surveys cannot be rendered to use if they are taken down and translated by any other than a person conversant with the business.'[54]

In the following decades, the adaptation, maintenance and repair of existing instruments often involved modifying their structure and protocols for use, and hence their recalibration. The English perambulator was found to be 'flimsy, bad in principle, and incapable of working except on a smooth road or bowling green; across country they go to pieces in a mile or two'.[55] In the 1780s, a Captain John Pringle of the Madras Infantry designed an instrument that was more resilient and better suited to the stature and gait of local *lascars* (footmen). By the mid-nineteenth century the instrument, having undergone continuous modifications, was still in use but looked and operated very differently from its English cousin.[56] Novel survey

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Tiberius Cavallo to James Lind, dated 13 August 1791. I thank Simon Schaffer for providing me with this reference.

[53] South Asia was not the only place where pacing and the day's march were standard units of geographical distance: the same procedures were at work even in North America in the mid-eighteenth century. See James H. Merrell, *Into the American Woods: Negotiators on the Pennsylvania Frontier* (New York & London: W.W. Norton, 2000).

[54] OIOC, Bombay Military Consultations, 13 January 1807, cited in Phillimore, *op. cit.*, vol. I, p. 288.

[55] Ralph Smyth and Henry Landour Thuillier, compilers, *A Manual of Surveying for India, Detailing the Mode of Operations on the Revenue Surveys in Bengal and the North-Western Provinces* (Calcutta: Thacker, Spink & Co., 1851), pp. 360–1.

[56] For further details on the development and evolution of the perambulator in India, see Phillimore, *op. cit.*, vol. I, pp. 198–9.

methods had at times to be forged for circumstances and kinds of terrain that precluded the use of standard techniques—the mapping of Central Asia in the 1860s using the rigorously calibrated pace of Indian surveyors is a good example.[57]

Indeed, so distinct were the practices of the Survey of India from those prevalent in Britain that when, in 1851, the Thomason Engineering College was established in Roorkee to train surveyors, an entirely new manual had to be written, for 'scarcely any of the English works on Geodesy extant, touch on, or afford any practical insight into, the system of Survey, as carried on and as peculiarly applicable to this country'.[58] Radhanath Sikhdar, the Survey's chief computer, wrote more than half the chapters in the book. It might be worth pointing out here that, although survey operations everywhere in the Subcontinent depended upon indigenous agency, the communities, procedures, skills, and instruments involved had differed in the three presidencies until the establishment of the engineering college at Roorkee. A close study of the *Manual* reveals that, as a compendium of most of these 'local' operations and methods, it was an attempt to standardize and circulate them throughout an increasingly centrally administered territory.

The Emergence of the Map as an 'Objective' Geographical Representation

If it can be argued that the map-making practices that emerged in the course of this institutionalized interaction were indeed hybrid, resulting from the circulation of people, incorporated skills, instruments, procedures, etc., what can be said of the representation constituted by the modern map? Is not the map, as we know it, a representation that emerges from a uniquely European epistemology? What could maps, granted that they existed in other cultures, have represented for them? Finally, were maps always part of a European representation of terrestrial space, indispensable instruments for its visualization and mastery?

[57] See Kapil Raj, 'La construction de l'empire de la géographie. L'odyssée des arpenteurs de Sa Très Gracieuse Majesté, la reine Victoria, en Asie centrale', *Annales HSS*, 52[e] année, no. 5 (1997), pp. 1153–80; and chapter 6, below.

[58] Smyth and Thuillier, *op. cit.*, p. iii.

While it is true that maps, *qua* 'objective' topographical representations, are all-pervasive in today's world, constituting an indispensable medium of everyday orientation and communication, this idea is itself the result of a long process. We often tend to neglect the fact that maps themselves have a history that includes the evolution of social networks of map producers, their patrons, and map users, as well as epistemological questions concerning their function as 'accurate' documents.[59] And more importantly, we tend to ignore the fact that the EIC played a significant role in this historical process. In order to get a glimpse of this contribution, let us turn to what maps represented and the uses to which they were put, respectively, by South Asians and the British in the early decades of colonial rule, and how these uses changed through the colonial encounter.

As remarked upon earlier, a large number of maps are known to have existed in pre-colonial India. The variety of mapping styles displayed in these representations bears witness to the fact that South Asia is a region as large and as diverse as Europe, with age-old interactions with all the major old-world cultures. Interestingly, some of these maps use colour conventions: light brown for undifferentiated areas of land, dark brown for mountains, blues for rivers, ivory for oceans, etc.[60]

Now, although the exact uses of all these artefacts cannot be precisely determined, at least some of them had definite military, fiscal, and religious ends, like pilgrimage maps, and cosmographic globes and charts. There is at least one known world atlas, comprising thirty-four map sheets, made according to Persian cylindrical projection techniques, contained within a seventeenth-century (1647) encyclopaedic work, *Shahid-i Sadiq*, by Muhammad Sadiq ibn Muhammad Salih of Jaunpur (also known as Sadiq Isfahani): here it is important to remember that South Asia had by then been in constant contact with—and was indeed an important part of—the Islamic world for almost a millennium.[61] Also, at least half a dozen cosmographic globes,

[59] For a recent treatment of the ways in which maps have interacted with society in the English context, see Delano-Smith and Kain, *op. cit.* See also Jerry Brotton, *Trading Territories: Mapping the Early Modern World* (London: Reaktion Books, 1997), p. 19 *et seq.*

[60] See Schwartzberg, *op. cit.,* p. 356.

[61] One copy of the *Shahid-i Sadiq* is held in the OIOC (IO Islamic 1537 &

all largely based on the Puranas, are known to have existed and are held in various collections in Britain and India. The oldest and perhaps most fascinating of these is the *bhugola* of Ksema Karna, a globe-shaped brass container intricately etched to indicate the various components of the earth based on Puranic sources, but modified in the light of knowledge derived from post-Ptolemaic Sanskrit astronomers. It was most probably made to hold spices.[62] Certain Jain paintings have also been identified by art historians as pilgrimage route maps.[63] And, a seafarer's manual with sea charts, dating from the mid-seventeenth century, discovered recently, attests to the use of maps in navigation. A juridical use is described by Asad Beg Qazwini, a minor official at the Mughal court between the reigns of Akbar (reigned 1556–1605) and Shah Jahan (reigned 1628–58). In his memoirs, *Tarikh-i Asad Beg Qazwini*, Asad Beg recounts how he was deputed by Akbar to ascertain responsibilities in the escape of a recalcitrant Rajput prince from a besieged fort.

> A piece of cloth a few yards long . . . was brought and a sketch of the Iraj fort was made on it. It showed the river on one side, the walls and the doors on the three other sides. The encampments on all sides were indicated, and . . . the Bakhshi was told to write the names of each of the commanders at their proper place. Each man was to put his own seal, to demonstrate his assent to this drawing and its account. The place from which Bir Singh had escaped was also shown, as also the place where he had crossed the river. When all the nobles had placed their seal on the drawing, Asad Beg told them that this was the report he would send to the emperor.[64]

Egerton 1016). See Irfan Habib, 'Cartography in Mughal India', *Medieval India: A Miscellany*, vol. 4 (1977), pp. 122–34.

[62] See Simon Digby, 'The Bhugola of Ksema Karna: A Dated Sixteenth Century Piece of Indian Metalware', *Art and Archaeology Research Papers*, vol. 4 (1973), pp. 10–31. The globe is presently held at the Museum of the History of Science at Oxford.

[63] See, for instance, William Norman Brown, 'A Painting of a Jaina Pilgrimage', in idem, *India and Indology: Selected Articles*, ed. Rosane Rocher (Delhi: Motilal Banarsidass, 1978), pp. 256–8, and, more generally, Chandramani Singh, 'Early 18th-Century Painted City Maps on Cloth', in Robert Skelton *et al*., eds, *Facets of Indian Art* (London: Victoria & Albert Museum, 1986), pp. 185–92.

[64] Free translation from OIOC, Mss. Or. 1996. I thank Muzaffar Alam and

While the known Indian maps do not show a uniform scale or orientation, it seems important to point out that most detailed maps of South Asia made by Europeans prior to Rennell's map also lacked a fixed scale and orientation. For instance, Anville's *Carte de l'Inde*, the paragon of accuracy for its time, had six different scales of measurement. Indeed, even Rennell's successors in India continued to compile maps with varying and non-standardized scales, leading the former to regret of the two maps, drawn respectively by Captains Allan and Beatson, that he published to illustrate the marches of the British armies in peninsular India in the early 1790s: '[T]he public mind could not have obtained a clear idea of the operations of two distinct [military] campaigns, in different parts of the same country; and pointing by different routes to the same object; unless the geography of both, was made to coalesce: and the detail, as well as the general scope of both, brought into one point of view.'[65]

When considering European topographical representations—the map—we usually take them to be unproblematically scientific, representing the 'real' world, and an indispensable instrument for the terrestrial movement of Europeans in unfamiliar lands. However, an examination of the uses to which maps—produced in the Indian subcontinent for, or by, Europeans till the turn of the nineteenth century—were put, sheds considerable light on their complex nature.

Let us start with the maps of India prepared in 1770 for and by Jean Baptiste Joseph Gentil (1726–99) while he was French agent at the court of Oudh. Although this twenty-one sheet atlas, intended to illustrate Gentil's translation of the *A'in-i Akbari*, covered areas that were hardly known to Europeans (being often out of bounds to them till many decades later) and was thus much denser in information than any contemporary European atlas of South Asia, the two extant copies of the maps were primarily ornamental.[66]

Sanjay Subrahmanyam for bringing this manuscript to my notice and for providing me with this translation from the original Persian.

[65] James Rennell, *The Marches of the British Armies in the Peninsula of India, during the Campaigns of 1790 and 1791; Illustrated and Explained by Reference to a Map, Compiled from Authentic Documents* (London: 1792), pp. 4–5.

[66] They are now held in the prints and drawings collections of the OIOC and of the Bibliothèque Nationale in Paris.

It is worth noting that Rennell did not start his sojourn in India by embarking on a compilation of a map of any part of it. He was initially asked by Henry Vansittart, governor of Bengal, only 'to keep a very particular Journal of your Proceedings, noting the Appearance and Produce of the Countries thro' which you pass; the name of every Village, & whatever else may seem remarkable, of which Journal you will give me a Copy along with the drafts you are able to make of the Rivers and Creeks.'[67] It was only a year later, at the instance of Robert Clive, when he returned to India as Vansittart's successor, that Rennell undertook to make the first map of Bengal, not as an administrative or military instrument, but to illustrate the second volume of Robert Orme's *History of the Military Transactions of the British Nation in Indoostan from the Year 1745*. In his bid for the highly influential governor's patronage, Rennell also drew a number of maps for Clive's personal collection.[68] Even Anville's *Carte de l'Inde*, although compiled for the more map-literate French, was made only to hang in the offices of '*Messieurs les Commissaires du Roi à la Compagnie des Indes*' in Paris.[69]

The same story can also be told of many contemporary maps drawn by accredited surveyors of the EIC seeking position or pecuniary benefit. Indeed, these being unique hand-drawn objects, they were highly prized for their aesthetics, and a large number found their way into the private collections of members of Parliament, members of learned societies, and the EIC's directors and influential senior officials. There they adorned walls, juxtaposed with Mughal miniature paintings, and other works executed by Indian painters in the highly fashionable hybrid style that came to be known as 'Company Art'. So much so that the Company, anxious to have all the information they could collect about their possessions in India, began to show alarm at this 'flight' of maps. Already in 1766 the Court of Directors in London was writing to the governor of Bengal:

> A very slight respect has been shown to the frequently repeated Orders given for transmitting Copies of all such [Plans] as have been and shall be

[67] La Touche, *op. cit.,* p. 9.

[68] See John Malcolm, *The Life of Robert, Lord Clive*, 3 volumes (London: 1836), vol. II, p. 523. Some of the maps presented to Clive are now held by the Cambridge University Library (MS Plans. x.13).

[69] Anville, *op. cit.*, p. iii.

> made . . . yet it has appeared to us that such have been in private Custody here [in London], particularly the Survey of the Calcutta Lands. You will therefore be deemed highly culpable in forebearing to pay the attention due on this important point, by furnishing us with copies of all Draughts, Plans, and Surveys in your Custody, made of our Works, Lands, or of any other kind whatever.

And again, two years later, 'We shall be pleased to receive the Chart prepared by Captain Rennell, but at the same time must observe we think the Charts should be first sent to us, and no Copies given but by our permission, a Rule hitherto unattended to, as Lord Clive & Mr Vansittart are both in possession of Captain Rennell's Survey of the different Provinces.'

Soon they were expressing themselves even more strongly on the subject:

> When a survey is taken no one is to be permitted to take a copy of it, which leads us to repeat our Astonishment at the unfaithful Conduct of our Surveyors, in that they have sent us no one Production of their labors, tho' they have already put the Company to a very great Expence . . . [A]nd this neglect is aggravated by our finding that Maps of all the Provinces are in the Hands of Lord Clive and Governor Vansittart. We should have carried our resentment at their conduct as far as dismission, had not the advices by the last Ship assured us the Surveys will be compleated and sent out next year.[70]

These complaints and thinly veiled threats carried on until the turn of the nineteenth century. Maps, however, kept leaking out, not so much to enemy powers like France, but to influential members of the Company's own board, who either bought them or received them as gifts for past or future favours. Even Rennell's 'original surveys . . . were brought home by some of the highest authorities in India, and treated as private property, till they were accidentally discovered in the collection of a lady of rank . . . and purchased for the sum of one hundred pounds by the Court of Directors.'[71]

[70] OIOC, Court Despatches to Bengal, dated 19 February 1766, 16 March 1768, and 11 November 1768 respectively.

[71] Thomas Best Jervis, 'Historical and Geographical Account of the Western Coast of India', *Transactions of the Bombay Geographical Society*, vol. 4, no. 1 (1840), pp. 1–244, this quote p. 170.

But what of printed maps of the Indian subcontinent? Were these mass-produced objects not meant for a wider, map-literate public and officials on the field? The answer turns out that surprisingly even these had no stable target public or use in Great Britain until well into the nineteenth century. For instance, it was the rising interest in India among the British reading public—in the light of British conquests there, and thus a potentially lucrative market for information about South Asia—that prompted Rennell to publish his *Map of Hindoostan*. In the preface to the first two editions, he writes:

> Whilst the theatre of the British Wars in Hindoostan was limited to a particular province of it, little curiosity was excited towards the general Geography of the country: but now that we are engaged either in wars, alliances, or negociations, with all the principal powers of the Empire, and have displayed the British Standards from one extreme of it to the other; A Map of Hindoostan, such as will explain the local circumstances of our political connections, and the marches of our Armies, cannot but be highly interesting to every person whose imagination has been struck by the splendour of our victories, or whose attention is rouzed by the present critical state of our affairs, in that quarter of the globe.[72]

As for the map itself, Rennell stated that it 'is contained in two large sheets, which may either be joined together for the purpose of bringing the whole into one view, or bound up separately in an Atlas; as may suit the fancy or convenience of the purchaser'. However, given the ornate cartouche and engravings, it was clearly the former of the options that he had in mind. Moreover, the thick-laid paper on which the map was printed made it unsuitable as a simple insert in a book. As Rennell's French translator and publisher, Johann III Bernoulli (1744–1807), wrote in his preface:

> Mr Rennell's map consists, as I said, of *two sheets*. Intended, in my edition, for insertion into a bound book, these large sheets . . . would have been quite awkward. Experience has also taught us that thick and brittle paper normally used for such large sheets wears out all too soon along the folds. I thus initially planned to transfer the original map onto 4 sheets, and I had Mr Rennell's map of the *North*[ern part of the Subcontinent] copied onto two sheets . . . But on further reflection, I found that it was impractical to

[72] Rennell, *Memoir* (1st edn), p. i.

> divide the map of the peninsula, or the *southern* portion, into two, as each part would cover only a sixth of each sheet and one would have to juggle with them too often. I therefore decided to transfer the whole of the *southern* portion of Mr Rennell's map onto a single sheet and in order to maintain uniformity in the map's dimensions, the paper and ease of use, I thought I could conveniently omit certain accessories with which Mr Rennell has filled the empty areas in the *Eastern* portion of his map, i.e., a large allegorical cartouche meaningful only to the British.[73]

Bernoulli was indeed publishing the French edition of the *Map of Hindoostan* in a far more map-literate continental European context, where map use was much more stable than in the British Isles. He sheared the map of its ornaments and frills and printed the inserts on high rag-content, thin-laid paper that was more resistant to wear in the hands of a reading public used to handling fold-out maps. For those who might have wanted to hang the map on a wall, he maintained a uniform scale for each of the three parts of the map and printed them such that they could be stuck together.

Although the process through which these maps finally became univocal instruments of geographical representation and indispensable for terrestrial displacement in Great Britain and its empire is a long and complex one, and beyond the scope of the present chapter, it is important to point out that the story cannot be fully told from within the British Isles alone. Indeed, the circulation between India and Britain of geographical practices, practitioners, instruments, maps, and efforts to regulate circulation played a crucial role in this history. For instance, the Company sought to put an end to the flight of maps in 1809 by ordering that

> no publication of maps of India can on any account whatever be authorised . . . where the Surveys have been made at the Company's Expense . . . Considering it of the utmost importance that the Geographical and Topographical information regarding India . . . should be preserved exclusively for the benefit of the Company and the British nation, and having reason to apprehend that . . . many valuable surveys, plans, etc., have got into improper hands, we direct that the following regulations . . . be in future attended to . . . The Surveyor General is . . . not to suffer any

[73] Translated from Bernoulli, ed., *op. cit.*, vol. III, p. ii.

> copies of Papers in his Office to be made, except those ordered by the Governor General. All Surveys, Maps, &c., now in the possession of the different Offices or Heads of Departments, should be called in forthwith, and lodged in the Surveyor General's Office, and . . . no copies . . . on any account retained . . .[74]

In circulating these orders, the Surveyor General added 'as a standing regulation, that, together with the maps, plans, and Field Books, all surveyors are to give in a declaration that they have not retained or given copies of any of the papers relating to their surveys'.[75]

This prohibition on the publication and circulation of maps, especially revenue survey maps, and heavy budgetary constraints brought the Survey of India in due course almost to a total halt. Besides, owing to the change of strength of the ink and wash on the manuscript maps during the voyage to Europe, the maps printed in England '[bore] no analogy to the heights or magnitude of [hills and mountains], and consequently misl[ed] the judgment in a most important point'.[76] The arrival of a lithographic press in Calcutta in 1822 proved a windfall. Lithography, being a wet printing method in which the printed sheet was distorted, did not at that time qualify as a valid process for map reproduction, the prerogative of copper-plate engravers. The local authorities thus had little difficulty in persuading their principals in London to allow them to use this rough-and-ready process for everyday map reproduction. However, the process was quickly perfected and impressively accurate maps were soon coming off the fast increasing number of lithographic presses in India, effectively circumventing the prohibition on their reproduction.[77]

By this time the EIC had formed a core of map-literate army officers in its Military Seminary at Addiscombe (established in 1809), by

[74] OIOC, Despatches to Bengal, 21 April and 31 May 1809, cited in Phillimore, *op. cit.*, vol. II, p. 288.

[75] NAI, Survey of India Records, vol. 81, f. 182, cited in Phillimore, *op. cit.,* vol. II, p. 289.

[76] NAI, Survey of India Records, vol. 204, f. 87, cited in Phillimore, *op. cit.,* vol. III, p. 298.

[77] See Andrew S. Cook, 'The Beginning of Lithographic Map Printing in Calcutta', in Pauline Rohatgi and Pheroza Godrej, eds, *India: A Pageant of Prints* (Bombay: Marg Publishers, 1989), pp. 125–34.

training them in the drawing and use of maps during their two-year course. Maps thus began to become 'useful' and to progressively replace autochthonous guides. This in turn created a sustained demand within the various services of the Company in India and the establishment of standardized conventions for topographical representation. Large-scale reproductive techniques like lithography rendered maps much plainer, shearing them of their classical aesthetic appeal, and thus of the demands of the market for art. They also further democratized maps, requiring in turn other means of imposing security. In other words, a map culture, as we know it today, was imposed in a significant way through the control of map circulation, and the EIC played a significant part in this process.

As this all-too-brief discussion shows, there was no clear demarcation at any one level between European and South Asian topological and cosmological representations in the early-modern period. For both, maps represented a variety of disparate objects depending on the uses they were put to. This, however, is not to say that both had the same way of depicting and organizing space on two-dimensional media like paper or cloth—this last a subject that would repay detailed study.

Conclusion

This overview of the start of extensive terrestrial surveying under British colonial rule allows us to engage with other writings concerning surveying practices in colonial India. It is, first and foremost, easily seen that South Asia was anything but a 'mystical, religious, Hindu space', or a *terra incognita*. Nor was the act of measurement and observation inherent in land surveying in any way 'quintessentially at once a scientific and a British activity', discriminating Europeans from indigenous populations. Quantitative terrestrial surveying was as commonly practised in South Asia as it was in Britain in the pre-colonial period and these practices were, in both cases, linked to, and fashioned, the fiscal, administrative, royal, religious, and military needs of the respective regimes. The methods and procedures in the Subcontinent were varied, having already been reshaped and reconfigured through the centuries, notably through prolonged interaction

with the Islamic world. Moreover, the British were consciously aware of these skills, openly acknowledged them, and sought to massively redeploy them in their burgeoning military-fiscal institutions—by continuing to rely on *patwaris* and other revenue officials, by inducting Indian surveyors, and by translating specialized texts in surveying and astronomy.

The deployment of South Asians within surveying institutions in turn led to a vast reshaping of the specialized communities which practised activities that formed part of British-sponsored territorial surveying. This refashioning comprised the introduction of new members, like European surveyors and South-Asian foot soldiers and *harkaras*, and devices such as the perambulator, the sextant, and the altazimuth theodolite, as well as a renegotiation of the place of each component inside the new collective that was to go under the name of the Survey of India.

Shifting the object of study from science as an accumulation of knowledge quanta to that of the material, cultural, and circulatory processes involved in its making also opens up the complexity of its spread. As we saw above, the circulation of Muslim instrument-makers between Central and South Asia made for the dissemination of skills from one region to another; the itineraries of others like Rennell led to the transposition of techniques such as coastal surveying to the terrestrial domain, and related them to a heterogeneous bag of other techniques. The journey of a map from Bengal to London gave rise to country-wide mapping operations in Britain quite different in methods and procedures from those in use in other parts of the world, such as France or Bengal. The question of the spread of science cannot be posed in terms of the victory of 'better', or more 'accurate', techniques, theories, or skills. More generally, following the trajectory of scientific practices, practitioners, and artefacts shows rather that they reshape knowledge and society as much in the colonial 'periphery' as in the metropolis—at least in the case of imperial Britain.

Furthermore, this shift points to the importance of controlling circulation in order to unify procedures, or change the significance of practices in different contexts. Above all, it points to the inadequacy of any approach that claims to understand the historical processes of the making of a given science within a space which is arbitrarily geographically, politically, or socially limited. Instead, it seeks to illustrate

the crucial importance for historians to follow their historical actors and to modify their point of view in line with the actors' trajectories and spaces of circulation.

This method then focuses on actors' attempts and strategies to make a place for themselves in their world by reconfiguring it, changing its ingredients, introducing new objects and engendering a recomposition of the relationship between them and the social fabric. By following the destiny of the actors concerned, their degree of success in engendering changes and recompositions, this method allows for changes of scale in historical analysis, moving from singular lives to national and international levels.[78] It thus allows us the better to understand how scientific and technological practitioners and objects acquire the capacity to practically intervene in the workings of the modern world. It allows us, above all, to see how scientific objects, techniques, nations, empires, and national identities are co-constructed.

Finally, this shift in perspective allows one to see the colonial encounter as a locus of the emergence of certain types of knowledge which would not have appeared but for contingent circumstances. But this is not to assert, as Eugene Irschick would have it, that in the construction of knowledge in the colonial context the indigenous community 'exercised greater dominance than did the British'.[79] One must assent to the claim that this knowledge was constructed by the willed activity of the colonizer over the colonized. Indeed, the kinds of knowledge discussed here could only have been constructed and sustained within a strong framework of formalized institutions with their imperatives of teamwork and a stratified division of labour.[80]

[78] On this subject, see Michel Callon and Bruno Latour, 'Unscrewing the Big Leviathan: How Actors Macro-structure Reality and How Sociologists Help Them Do So', in Karin Knorr-Cetina and Aaron Victor Cicourel, eds, *Toward an Integration of Micro- and Macro-Sociologies* (Boston & London: Henley/Routledge & Kegan Paul, 1981), pp. 277–303. See also Jean-Claude Passeron and Jacques Revel, eds, *Penser par cas* (Paris: Éditions de l'École des Hautes Études en Sciences Sociales, 2005).

[79] Eugene Irschick, *Dialogue and History: Constructing South India, 1795–1895* (Berkeley, Los Angeles, London: University of California Press, 1994). This quote, p. 9.

[80] For an illustration of the crucial role of state-run institutions in the emergence and stabilization of large-scale field sciences, see Svante Lindqvist,

However, despite the asymmetrical relationship between colonizers and colonized, the instruments, procedures, specific human gestures, skills, knowledge (both explicit and tacit), social practices, learning processes, and so on—in short, all that constitutes scientific activity—had to be locally negotiated. The result was necessarily a hybrid culture, similar to the one that emerged in Britain and—might one add?—everywhere else in the world: this is just what characterizes the practice of science. Indeed, it is not through deduction from grand ideological positions but rather from multiplying studies of practices and their circulation in specific contexts, and connecting them across contexts, that a clearer picture of the broader history and dynamics of modern science will emerge.

'Labs in the Woods: The Quantification of Technology during the Swedish Enlightenment', in Frängsmyr *et al.*, eds, *op. cit.*, pp. 291–315.

CHAPTER 3

Refashioning Civilities, Engineering Trust: William Jones, Indian Intermediaries, and the Production of Reliable Legal Knowledge in Late-Eighteenth-Century Bengal

A Day in the Life of a Calcutta Judge

The crowing of the cock awoke Sir William Jones, puisne (or junior) judge at the Supreme Court at Calcutta, on the morning of 2 February 1786, as indeed it had every morning since his arrival in India barely two and a half years earlier.[1] Leaving his wife Anna Maria to her dreams, he rose silently from his bed and stepped out of his palatial garden house in the exclusive suburb of Garden Reach. Dawn had not quite broken as he walked up the road to Fort William, three miles to the north-east. A palanquin bore him from there to the Court House, where a cold bucket bath, dressing, and breakfast took up the next hour. At seven, Jones met Ramlochan, his sixty-six-year-old private Sanskrit teacher from Nadia and remained till eight with him reading the *Hitopadesa*, learning a few dozen more words from the *Amarakosa* and grammar from Durgadas's *Mugdhabodhatika*. Although he found Panini too abstruse in the original,

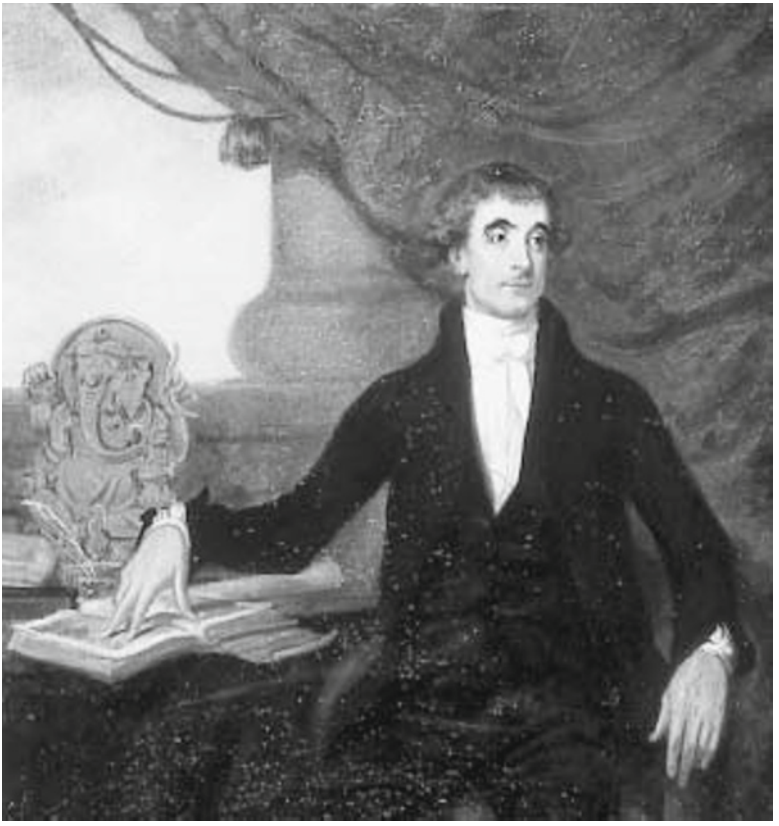
[1] The following reconstruction of a day in the life of William Jones in Calcutta is based on his own description of one in a letter dated 25 August 1787 to the Second Earl Spencer and on his pastiche of Edward Coke's lines in *Pandects*: 'Seven Hours to law, to soothing slumber seven,/Ten to the world allot, and *all* to Heaven.' The names of his indigenous collaborators are taken from William Jones's diaries. Indeed, Jones took great pains to record their names in his papers and notebooks (held at present in the Yale University, Beinecke Rare Book Library, Osborne Collection, and the National Library of Wales, Aberystwyth).

Ramlochan's patient introduction to Paninian grammar was decidedly original and exciting: within weeks of learning the notion of segmental morphemes he had applied it to the other classical languages—the results were startling and he was going to let the world know of them this very evening.

Eight o'clock, and time for an hour of Persian in the company of his Munshi, Bahaman. He really needed to get his accent straight for, although in Europe he was considered something of a prodigy in Persian, South Asians found Jones impossible to understand when he spoke to them in that language, taking it to be English.[2] (They had actually protested on at least one occasion at his lack of etiquette.) At nine, robed and ready for court, Jones received a score of local and European attorneys as a start to his harrowing five-hour duty on the bench. Goverdhan Kaul and Ramcharan, the court's official pundits, waited upon him with the expert advice on the day's impending cases, which they had prepared on the basis of their knowledge of traditional Hindu law. Jones had to find a fail-safe mechanism by which he could rely on the testimony of litigants here, and, although the day

[2] Indeed, it was not only his indigenous interlocutors who remarked on his dubious linguistic abilities: Lord Wellesley, in a note to the directors of the EIC, remarked that 'Sir William Jones was not intelligible to the natives of India, when he arrived at Calcutta, in any of the oriental languages.' (Richard Wellesley, *The Despatches, Minutes and Correspondence, of the Marquess Wellesley, K.G., During his Administration in India*, ed. Robert Montgomerie Martin, 5 volumes (London: W.H. Allen & Co., 1836), vol. II, p. 343n.). And a near-contemporary review of Indian affairs noted: 'The celebrated Sir William Jones, after several years intense study of the oriental languages in Europe, went to India, and when he reached that Country, was as unintelligible to the natives, in the Persian and Hindostanee languages, as if he had never opened a book upon the subject. This incapacity o[f] colloquial communication, continued for a considerable time and when Sir William visited Benares, the sacred City of the Hindoos, several months after his arrival in India, he was indebted for the information he so eagerly sought, by conversing with the learned natives, to the assistance of Mr. Fowke, the British Minister at Benares, who politely acted as interpreter to him. This is a convincing proof, if any proof were wanted, to how much more effect a language may be studied in a country w[h]ere it is generally used in writing and in speaking.' *Review of the Affairs of India, from the Year 1798, to the Year 1806; Comprehending a Summary Account of the Principal Transactions during that Eventful Period* (London: 1807), n. 43–4.

threatened to be a particularly busy one, he had to find time to discuss the nagging question of oath-taking in Hindu law with Goverdhan—he viewed Ramcharan's advice on this matter with some suspicion. He also had to find time to meet his two senior colleagues, Justices Chambers and Hyde, to discuss the fiery note he had drafted to remonstrate against the salary cut unilaterally imposed on the judges by the governor general, Sir John Macpherson: the Supreme Council's compensatory offer of Company bonds at a paltry 8 per cent interest, encashable only upon return to London, was absurd. At this rate, in order to put by the £30,000 Jones had come to India for, he would have to stay on for at least twice as long as the initially projected five years.



Hyde and Chambers thought he ought to soften the tone of the letter if he wanted them to sign it. Jones acquiesced, resolving to write a separate note to the governor general to air his own misgivings.

The day's work over, he returned home at three to dress and dine with Anna Maria. On any other day, the Joneses would have gone for a drive after sunset across the river to the Botanical Gardens. But today was not any other day. Sir William Jones's palanquin was waiting to take him back to the Court House, although not for court duties this time: as founder-president of the Asiatick Society, he was to deliver the third of his annual discourses. He spent the next couple of hours putting the finishing touches to his speech, and, at seven, stepped into the Grand Jury Room. A record audience of thirty-five waited impatiently to hear Jones's discourse on the Hindus, of which all that the world—or rather, the academic world—was to retain was the following sentence, popularly known as the philologer's passage:

> The *Sanscrit* language, whatever be its antiquity, is of a wonderful structure; more perfect than the *Greek*, more copious than the *Latin*, and more exquisitely refined than either, yet bearing to both of them a stronger affinity, both in the roots of verbs and in the forms of grammar, than could possibly have been produced by accident; so strong indeed, that no philologer could examine them all three without believing them to have sprung from some common source, which, perhaps, no longer exists: there is a similar reason, though not quite so forcible, for supposing that both the *Gothick* and the *Celtick*, though blended with a very different idiom, had the same origin with the *Sanscrit*; and the old *Persian* might be added to the same family, if this were the place for discussing any question concerning the antiquities of *Persia*.[3]

William Jones was a prolific writer with a special talent for getting his works known: the Asiatick Society, founded in 1784 by him and largely financed by the EIC, was to become a powerful and extremely efficient agency for publicizing his findings—in India and Europe, as also in North America. The Society's production was to have an undeniable influence well into the 1830s, not only on the Hindu elites of Bengal but also on the English and German Romantic movements. Jones

[3] William Jones, 'On the *Hindus*', *Asiatick Researches*, vol. 1 (1788), pp. 415–31. This quote pp. 422–3.

himself had a formative influence on James Cowles Prichard, one of the pioneers of monogenetic ethnology in early-nineteenth-century Britain. Little wonder, then, that he is one of the most celebrated of later-eighteenth-century intellectuals and has attracted a plethora of studies of his life, contributions, and influences, certainly a lot more than his no less illustrious friend Sir Joseph Banks.[4]

Indeed, over the last two centuries 'Jonesiana' has developed into a veritable industry, primarily devoted to presenting him as a lone, selfless, disembodied polymath cerebrating within the established canon of the French *philosophes*, his insights appearing as seminal contributions to the founding of various disciplines in the nineteenth century.[5] Mainly on the strength of the philologer's passage—certainly the best known of all his writings—Jones has been bestowed the title of 'father of scientific linguistics and comparative philology'. And because, in the same programmatic address, Jones also laid out his principles of

[4] Almost all of Jones's writings can be found in William Jones, *The Works of Sir William Jones*, ed. Charles John Shore, Lord Teignmouth, 13 volumes (London: John Stockdale, 1807), hereafter *Works*; and in idem, *The Letters of Sir William Jones*, ed. Garland Hampton Cannon, 2 volumes (Oxford: Clarendon Press, 1970), hereafter *Letters*.

[5] The literature on Jones is too vast to be cited at any length here. See, however, Soumyendra Nath Mukherjee, *Sir William Jones: A Study in Eighteenth-Century British Attitudes to India* (Cambridge: Cambridge University Press, 1968); Garland Hampton Cannon, *The Life and Mind of Oriental Jones: Sir William Jones, the Father of Modern Linguistics* (Cambridge: Cambridge University Press, 1990); Garland Hampton Cannon and Kevin R. Brine, eds, *Objects of Enquiry: The Life, Contributions and Influences of Sir William Jones* (*1746–1794*) (New York & London: New York University Press, 1995); David Kopf, *British Orientalism and the Bengal Renaissance: The Dynamics of Indian Modernization 1773–1835* (Calcutta: Firma K. L. Mukhopadhyay, 1969). For a more complete, though slightly dated, bibliography, see Garland Hampton Cannon, *Sir William Jones: A Bibliography of Primary and Secondary Sources* (Amsterdam: John Benjamins B.V., 1970). For the innovative nature of his method and its influence on nineteenth-century linguistics, see Hans Aarsleff, *The Study of Language in England, 1780–1860* (Minneapolis: University of Minnesota Press, 1967). For his influence on the fledgling discipline of ethnology, see George W. Stocking, Jr., *Victorian Anthropology* (New York: The Free Press, 1987), p. 50 *et seq*. See also Thomas R. Trautmann, *Aryans and British India* (New Delhi: Vistaar Publications, 1997). As to his influence on the European romantic movements of the

judging the affinities and diversities among the human nations according to their '*Languages* and *Letters* . . . *Philosophy* and *Religion* . . . the actual remains of their old *Sculpture* and *Architecture*; and . . . memorials of their *Sciences* and *Arts*',[6] he is said to have inaugurated Orientalism and Indology as disciplines in their own right. His attitude to Indians is held up as emblematic of Enlightenment humanism and, if ambivalent, is presented as incomparably more sympathetic than the cultural arrogance of his utilitarian successors. In short, William Jones is portrayed as a paragon of what has elsewhere been called the 'anti-conquest'.[7] The EIC's financial support to his project, if acknowledged, is explained away in terms of its legitimate role, Enlightenment *oblige*, as a patron of learning.

However, it is far from clear that Jones consciously made these contributions within any disciplinary perspective, and whether a disciplinary approach to his predilections even had any meaning for him and his contemporaries.[8] As we shall see, Jones explicitly refused to consider linguistics or philology as ends in themselves. Also, given the general avariciousness of the EIC (a private company of merchant traders, it must be remembered) in all other matters, particularly during its acute financial crisis in the last decades of the eighteenth century, it seems implausible that it should so willingly have extended its largesse to so esoteric a cause as Jones's orientalist project.

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early nineteenth century, see Ronald Taylor, 'The East and German Romanticism', in Raghavan Iyer, ed., *The Glass Curtain between Asia and Europe* (London: Oxford University Press, 1965), pp. 188–200; also Hugh George Rawlinson, 'India and European Literature and Thought', in Geoffrey Theodore Garratt, ed., *The Legacy of India* (Oxford: Clarendon Press, 1937), pp. 30–7; Garland Cannon, 'The Literary Place of Sir William Jones', *Journal of the Asiatic Society*, vol. 2, no. 1 (1960), pp. 47–61; and more generally, Raymond Schwab, *La renaissance orientale* (Paris: Payot, 1950).

[6] Jones, 'On the *Hindus*', p. 421.

[7] See Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (London & New York: Routledge, 1992), p. 7.

[8] Writing as late as 1821, Sir James Mackintosh described the new 'philosophy of languages', as opposed to classical 'philosophy of language', as 'a science so new as to be yet without a name'. See his 'Stewart's Introduction to the Encyclopaedia', *Edinburgh Review*, vol. XXXVI (October 1821), p. 264.

More recently, in the wake of Foucault-inspired arraignments of Orientalism as coextensive with European colonialism, this idealist portrait of Jones has been seriously called into question.[9] His work is now seen as one of the cornerstones of Orientalism, a hegemonic discursive formation through which 'Orientals' were reduced to inert objects of knowledge by the European knower.[10]

While the general idea that bodies of knowledge become intelligible and derive authority only within specific and historically situated contexts of power is defensible—on condition that one can satisfactorily work out the intricate complicity between the actors and the knowledge they produced in the imperial context—this in no way implies a sharp 'othering' of non-European peoples.[11] If anything, the surprising linguistic kinship between Sanskrit, Persian, Greek, Latin, Celtic, and Gothic posited in the philologer's passage suggests quite the opposite. More importantly, as hinted at in the reconstruction of a typical day in his life in Calcutta, the knowledge Jones produced was itself formed through a dialogic process involving interactions, albeit—and this must be stressed—unequal and asymmetrical, between him and his indigenous associates, both personal and institutional.

In short, the vast majority of studies involving William Jones have been guided more by ideology—positivist or Foucauldian—than

[9] Although it pays no serious attention to British Orientalism in South Asia, Edward W. Said's *Orientalism* (London: Routledge & Kegan Paul, 1978) triggered off this tradition, engendering a spate of specific writing on India. See, for instance, Carol A. Breckenridge and Peter van der Veer, eds, *Orientalism and the Postcolonial Predicament: Perspectives on South Asia* (Philadelphia: University of Pennsylvania Press, 1993) and Kate Teltscher, *India Inscribed: European and British Writing on India 1600–1800* (Delhi: Oxford University Press, 1995). See also Bernard S. Cohn, 'The Command of Language and the Language of Command', in idem, *Colonialism and its Forms of Knowledge* (Princeton: Princeton University Press, 1996), pp. 16–56.

[10] See, for instance, Breckenridge and van der Veer, eds, *op. cit.*

[11] In Foucault's own words: 'in thinking of the mechanisms of power, I am thinking rather of its capillary forms of existence, the point where power reaches into the very grain of individuals, touches their bodies and inserts itself into their actions and attitudes, their discourses, learning processes and everyday lives.' Michel Foucault, *Power/Knowledge: Selected Interviews and Other Writings 1972–77*, ed. Colin Gordon (Brighton: Harvester Press, 1980), p. 39.

by any serious empirical study, and this in spite of the fact that his works have now been in circulation for over two centuries.[12] I intend here to reconsider Jones's material, social, and intellectual life in the context of his age and its preoccupations, organizing my narrative around the twin problematics of trust and civility in the domain of knowledge production.

Trust and Civility in Knowledge Production

In a recent work on the social history of truth, Steven Shapin persuasively argues that testimony and the means by which it is accepted or suspected stand at the practical core of scientific knowledge; that the moral economy of a scientific community relies of necessity upon relations of trust. It is the moral community, not the individual, which constitutes the basic unit of science, and problems of cognitive order are, if not identical, at least coextensive with those of social order. Focusing on the history of the new experimental science in the Royal Society in seventeenth-century England, Shapin shows how it drew extensively on the civility of a gentlemanly culture: the essential characteristic of a gentleman was his independence, by which he was beholden to none and which in turn carried crucial implications for the perceived truthfulness of his utterances. This congruence between scientific and gentlemanly etiquette was held by virtue of the fact that the early Fellows of the Royal Society were themselves overwhelmingly genteel. Thus, the witnessing of experiments was the closely guarded prerogative of gentlemen. And, indeed, Robert Boyle, one of the most prominent experimental philosophers of the period, devoted much of his writing to theorizing on the etiquette and moral requisites of 'the experimental way of life'.[13]

[12] A rare exception to this grim appreciation is Trautmann, *op. cit.*

[13] Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago & London: University of Chicago Press, 1994); also Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985). For a comparative history of social norms and civility in early-modern France and England, see Christian Licoppe, *La formation de la pratique scientifique: le discours de l'expérience en France et en Angleterre (1630–1820)* (Paris: La Découverte, 1996).

Although, as Shapin suggests in the epilogue to his book, science continues to function on interpersonal trust, the civilities and social norms which sanction trust have, to say the least, changed and, what is more, multiplied with the internationalization of scientific practice during the last three centuries. Already, in the course of the eighteenth century, a number of Britons and other Europeans of varied social origin had acceded to the learned community, using diverse strategies of social promotion, such as patronage and sinecures, and employment in the navy or the major intercontinental trading companies. Indeed, the latter two provided an opportunity to travel (in Britain and its fast expanding empire) and thus to participate in the growing natural history, natural philosophy, and antiquarian networks which provided a port of entry into the world of polite, learned culture.[14] They also provided the opportunity to acquire the requisite fortune of around £40,000 to earn the title of gentleman.

In addition to extolling the virtues of the new philosophy, established men of science like Boyle (as remarked on in the first chapter) also wrote extensive instructions for travellers and collectors in order to teach them how to see the world.[15] As noted earlier, even a cursory reading of these instructions makes it clear that almost all knowledge produced outside the well-defined precincts of the metropolitan laboratory implied the active participation of indigenous collaborators. And, while following the instructions and recipes of social promotion enabled British producers of these new knowledges simultaneously to acquire gentlemanly civility and settle authority claims, there remained the thorny question of the 'other' civility—hence credibility—of indigenous interlocutors on whose linguistic means and testimony much new knowledge and associated material practices depended. Certain instructions to travellers quite explicitly required the enlisting of autochthonous cooperation: concerning Persia, for instance, Boyle exhorted travellers to enquire into

> the[ir] present Studies . . . and what kind of Learning they now excel in. What other Trades and Arts they are now skilled in, besides that of making

[14] We shall see in more detail below how this operated in the case of the EIC and William Jones.

[15] See Joan-Pau Rubiés, 'Instructions for Travellers: Teaching the Eye to See', *History and Anthropology*, vol. 9 (1996), p. 142.

> of Silk and Tapistry. Whether, there being already good descriptions in Words, of the excellent Pictures, and Basse Relieves, that are about *Persepolis* at *Chimilnar*, yet none very particular, some may not be found sufficiently skill'd, in those Parts, that might be engaged to make a Draught of the Place, and the Stories there Pictured and Carved.[16]

However, many European travel accounts quite skilfully hid the indigenous input behind the discursive mask of 'I-witnessing'. But this discourse was not always easy to sustain, since a number of writers were obliged, for a variety of reasons, to advertise the role of indigenous intermediaries in the production of non-metropolitan knowledges—not least in order to discredit their rivals' knowledge claims, an objective which sometimes involved discrediting the latter's native interlocutors—and to devise means of legitimating their own knowledge and the social order within which it was produced. The famous *Ezourvedam*, a French Jesuit forgery of the eighteenth century, is a case in point. Pierre Sonnerat, who in 1782 was the first to uncover the hoax, used the testimony of a 'learned but fanatic Bramin, [who] felt obliged to initiate me into [the] mysteries [of his religion]'.[17] Again, in his attempt to render credible the knowledge produced during his *Endeavour* voyage to the Pacific (1768–71), Captain James Cook, one of the best-known parvenus of the epoch, brought his principal collaborator, Omai, back with him to England and exhibited him publicly to prove his gentility, even having him play chess—to give 'a high idea of his capacity'—with a Fellow of the Royal Society—none other than William Jones![18]

William Jones serves as an ideal entry point into the problematic of trust and 'poly'-civility for a number of reasons. For a start, Jones himself was an *arriviste* whose primary ambition was to rise above his humble background and attain gentlemanly status.[19] Moreover, as a jurist

[16] Robert Boyle, *General Heads for the Natural History of a Country, Great or Small, Drawn Out for the Use of Travellers and Navigators* (London: J. Taylor, 1692), p. 101.

[17] Ludo Rocher, ed., *Ezourvedam. A French Veda of the Eighteenth Century* (Amsterdam & Philadelphia: John Benjamins Publishing Co., 1984), English translation, p. 13.

[18] *Letters*, vol. I, p. 176. See also 'Genuine Account of Omiah', *Annual Register, or, a View of the History, Politics, and Literature* (1774), pp. 61–3.

[19] 'Glory I shall pursue through fire and water, by night and by day', he once

he wrote widely on perjury and the nature of contracts. He was thus keenly aware of the conditions of producing reliable testimony.[20] In addition to providing a striking illustration of some of the possibilities of patronage available to—and the 'self-fashioning' of—English Enlightenment parvenus, Jones's trajectory is also that of a key player in the legitimation of knowledge produced in multi-cultural contexts. As is well known, he worked individually and institutionally with a number of non-Europeans and mentions the names of almost all his collaborators in his own writings.[21] It is also worth noting that the first four volumes of *Asiatick Researches*, which he personally edited, contain almost a dozen articles by Indians.

Approaching Jones through the prism of trust and civility also helps draw him and his work into mainstream history of science which, until recently, as I argue, has not paid enough attention to knowledge production outside the metropolis. However, as attested by his election to the Royal Society, Jones's intellectual orientation was very much part of the mainstream preoccupations of eighteenth-century science. Asiatic studies in Jones's time covered whatever had to do not only with

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wrote in a characteristic outburst of verbose candour. Letter to Charles Reviczki dated 5–6 March 1771, in *Letters*, vol. I, pp. 86–7. Cf. the proclamation of another eighteenth-century parvenu, Nelson, on the eve of the Battle of the Nile: 'Before this time tomorrow, I shall have gained a peerage or Westminster Abbey.'

[20] In setting out his new approach, Jones appealed to the trust of his audience: 'I am sensible, that you must give me credit for many assertions, which on this occasion it is impossible to prove; for I should ill deserve your indulgent attention, if I were to abuse it by repeating a dry list of detached words, and presenting you with a vocabulary instead of a dissertation; but, since I have no system to maintain, and have not suffered imagination to delude my judgement; since I have habituated myself to form opinions of men and things from *evidence*, which is the only solid basis of *civil*, as *experiment* is of *natural*, knowledge; and since I have maturely considered the questions which I mean to discuss; you will not, I am persuaded, suspect my testimony, or think that I go too far, when I assure you, that I will assert nothing positively, which I am not able satisfactorily to demonstrate.' *Works*, vol. III, pp. 111–12.

[21] The expression 'self-fashioning' comes from Stephen Greenblatt, *Renaissance Self-Fashioning: From More to Shakespeare* (Chicago & London: University of Chicago Press, 1980); and Mario Biagioli's account of the coproduction of Galileo's career and his science in *Galileo Courtier: The Practice of Science in the Culture of Absolutism* (Chicago & London: University of Chicago Press, 1994).

the antiquities, languages, literature, customs, and religions of the East but also with its mathematics, astronomy, geology, economics, geography, and botany. It should be pointed out that in the first twenty volumes of *Asiatic(k) Researches*, i.e. from 1788 to 1839, out of a total of 367 articles published, 222—or over 60 per cent—had to do with the latter set of knowledges.[22] Jones himself contributed many pieces on linguistic botany and natural history. Moreover, in the first twenty years of its existence the Asiatic Society had attracted as members or correspondents some of Europe's foremost natural philosophers—men like Cuvier, Delambre, and Lamarck.

Finally, the wider question of trust and civility addresses itself to imperial and colonial historians alike for it underpins the establishment of sustained relationships between rulers and ruled, without which colonial rule could not have been instituted let alone maintained for almost two centuries. In dealing with the establishment of sustained colonial domination, historians of all camps have mostly elided the question of trust, seeking to found their theories in the economic, political, or social superiority of Britain. However, in his work on the information and surveillance networks the British set up in South Asia, Christopher Bayly does allude to this problem—but only to highlight the mutual *wariness* which prevailed between each side, culminating in the 1857 Rebellion.[23] Nonetheless, it must be said that in spite of the failure of the EIC, British rule extended for almost a century longer without undoing many of the intelligence-gathering *institutions* the Company had set up in the preceding century.

It is my contention that Jones was one of the pioneers of the institutionalization of intercultural trust in the production of judicial knowledge, a crucial branch of administrative intelligence, and a model for its institutionalization in other sectors of the colonial 'information order'. It is from this perspective that I would like to reconsider the

[22] Cf. Publisher's Note to the reprint of *Asiatic Researches* (New Delhi: Cosmo Publications, 1979). The 'k' was dropped as the English language evolved in the years following the creation of the society.

[23] Christopher Alan Bayly, *Empire and Information: Intelligence Gathering and Social Communication in India, 1780–1870* (Cambridge: Cambridge University Press, 1996).

significance of the philologer's passage. As stated earlier, the key quotation from his work has been taken as the origin of disciplinary linguistics and Indology in 'tunnel' narratives of their history. I shall focus instead on the way Jones, his contemporaries, and the EIC perceived what they were doing within the context of the inner workings of the British administration in India itself. It is after all of some significance that Jones fashioned his career and thought within the framework of the EIC's territorial acquisition in India. Furthermore, he devoted himself to acquiring knowledge of Asia not in spite of, but because of, this position—within the official definition of his role, and with the full knowledge and approval of his superiors.

In particular, I shall try and put into the wider perspective of Indo-British history questions relating to the authority claims of the new kind of knowledge which Jones and his contemporaries were producing and their legitimating role in the administration's necessary relationship with indigenous intermediaries. Since we shall be considering the way in which a major part of this intellectual production was enmeshed in the power structure of the EIC, it might be in order to remind the reader about the Company's role in the making and practice of specilized knowledges.

Science and the East India Company

As noted in the introduction and shown in the earlier chapters, the continued existence and expansion of British overseas trade was largely dependent on the specialized skills of mathematicians, practical astronomers, hydrographers, surgeons, and medics. Besides, many eminent men of science counted among the EIC's directors or major shareholders. Moreover, all through the eighteenth century a growing number of European university graduates in search of employment were absorbed into the Company's ever-expanding colonial services to occupy senior technical positions. There, as engineers, military commanders, veterinarians, diplomats, doctors, naturalists, and geographers they could acquire substantial antiquarian collections and herbariums, thus gaining sufficient credit in order to become gentlemen scholars on returning home, further reinforcing the links between the Company and learned societies in the metropolis.

But the EIC was not just a public space within which aspiring Britons could realize their private ambitions. These ambitions were in their turn to refashion the public space which the Company administered by developing, through a rather chaotic process, forms of knowledge which are nowadays commonly referred to as Orientalism. As we saw in the previous chapters, their all-too-small numbers and lack of adequate specialized skills obliged Europeans abroad to rely heavily on indigenous intermediaries.

The conquest of Bengal in the middle of the century put the British firmly on the road to territorial and political power in India. However, the consciousness of this new role was slow in coming for, in the years that followed the conquest of Bengal, Company officials devoted all their attention to ruthlessly plundering and devastating the land.[24] But after ten million lives, or a third of the population of Bengal (almost all peasants and artisans), had been lost in the space of three years—victims of famine, in large measure as a direct consequence of the ruthless policies of the Company's servants—attention was turned to stabilizing the internal order of the province.[25] Under growing pressure from the British Parliament, which culminated in the Regulating Act of 1773, the Company and its agents grudgingly shifted from commercial plunder to more orderly and permanent forms of exploitation and government.

So it was that Warren Hastings, governor general of Bengal from 1772 to 1785, received orders from the Company's Court of Directors in London to take over and directly control the whole civil administration of Bengal. And since during this period the emerging state of Great Britain itself considered civil justice, public order, transport,

[24] A comprehensive list of these 'most atrocious abuses that ever stained the name of civil government' (Burgoyne Report, quoted in Narendra Krishna Sinha, *The Economic History of Bengal: From Plassey to the Permanent Settlement*, vol. 3 [Calcutta: Firma K.L. Mukhopadhyay, 1962], vol. I, p. 186) may be found in 'Reports from the Committee Appointed to Enquire into the Nature, State and Condition of the East India Company and of the British Affairs in East India', *Reports from Committees of the House of Commons, 1772–1773*, vol. III (London, 1803).

[25] Dharma Kumar, ed., *The Cambridge Economic History of India*, vol. 2 (Cambridge: Cambridge University Press, 1982), p. 299.

and communications as being intimately linked to taxation, Hastings took the Court's order to mean 'the entire management of the revenues' through the agency of the Company's (200-odd civil and 1000 or so military) servants.[26] To Hasting's mind, successful administration required drawing up a kind of Domesday Book of the Company's territories. 'Every accumulation of knowledge', he wrote, 'and especially such as is obtained by social communication with people over whom we exercise a dominion founded on the right of conquest, is useful to the state . . .'[27] In addition to taxation and law—since, apart from the conclusion and maintenance of legally viable commercial contracts with local traders and bankers, the Company was now obliged to administer civil and criminal law in the newly acquired territories—this knowledge was to include topography, natural history, antiquities, local customs, diet, and general living conditions: in short all that was, in the coming decades, to go under the name of statistics.[28]

Giving the highest priority to a knowledge of the region's languages, Hastings devised a policy of handsome monetary incentives to those of his officials who were willing to study the languages and other aspects of South Asian society. This policy constituted the first step in the transformation of the study of exotic peoples from an individual activity—mainly of European missionaries—into a massive and institutionalized activity reflecting the vital concern it represented for the emerging rulers of the Subcontinent. This was also the first step in the transformation of the emerging British empire from one held by force of arms to one held—at least in theory—by information. The collaboration between Britons and South Asians progressively broadened to include tax collection, administration of justice, and finally education.

[26] It is noteworthy that the transformation of state power in Britain during the latter half of the eighteenth century led directly to the creation of the Bank of England and the City. See John Brewer, *The Sinews of Power: War, Money and the English State 1688–1783* (London: Unwin Hyman, 1989).

[27] Warren Hastings, letter dated 4 October 1784 to Nathaniel Smith, Chairman of the EIC reprinted in Peter James Marshall, ed., *The British Discovery of Hinduism in the Eighteenth Century* (Cambridge: Cambridge University Press, 1970), pp. 184–92, this quote p. 189; also reprinted in Charles Wilkins, tr. *Bhagavad Gita* (London, 1785), Preface, p. 13.

[28] See Michael J. Cullen, *The Statistical Movement in Early Victorian Britain: The Foundations of Empirical Social Research* (New York: Harvester Press, 1975), pp. 10–11.

And, although the British set up a variety of new intermediary relationships with native South Asians, they had to maintain many of the existing local administrative structures, and most of the 'under civil servants'. Thus, the various revenue and judicial officials—*tehsildars*, *qazis*, *pargana sarrishtadars* or *qanungos*, *patwaris*, *amils*, *katibs*, etc.—inherited from the Mughal and other princely administrations continued to act in their official capacity as intermediaries between the British and local populations.

However, not all of the Company's agents had the wherewithal to respond to Hastings' incentives. For, it must be said that the vast majority of recruits to the EIC arrived in India between the ages of fourteen and eighteen with the aim of making a quick fortune.[29] In keeping with the tradition of the Company's service, those from England were usually younger sons from commercial, landed, or professional (mainly London-based banking) families which vied with each other for procuring highly lucrative careers in Bengal for their offspring. The only prerequisite for recruitment to the Company, as shown by the surviving educational testimonials of aspiring candidates, was 'the rule of three and merchants' accounts'.[30] Few had been to university, which was a costly affair normally reserved for elder sons or for those seeking academic or clerical careers. Engrossed in fortune making, most had little curiosity for South Asia's inhabitants, nor, indeed, the culture to acquire learning.

The Company had to turn mainly to Scotland to recruit its specialized employees. Indeed, in Scotland's more egalitarian Presbyterian tradition, many more went to university than in England and at a much earlier age. Moreover, Scottish education, both at school and university, was much broader than in England, covering (besides Latin and Greek) history, navigation, geography, mensuration, and natural and moral philosophy. However, Scotland did not have the capacity to absorb its qualified workforce, which consequently emigrated to England and beyond. A large number were absorbed into the Company's ever expanding services overseas, to occupy positions as engineers, soldiers, veterinarians, diplomats, doctors, and naturalists. Indeed, it

[29] OIOC, Court Minutes 1784–5, B/100, p. 216.

[30] Anthony J. Farrington, *The Records of the East India College Haileybury & Other Institutions* (London: Her Majesty's Stationery Office, 1976), p. 4.

was predominantly the Scots who manned the highly successful operational, scientific, and technological aspects of its activity in India.

Thus, Scottish medical officers of the Company were the first systematically to make meteorological recordings in India, while another Scot, Robert Kyd, set up the Botanic Gardens in Calcutta that William Roxburgh consolidated, assisted by William Hunter, James Anderson, and Francis Buchanan. John McCleland headed the first committee for the exploration of mineral resources. Buchanan and Colin Mackenzie were among the pioneers of large-scale topographical surveys in the Subcontinent, and, as we shall see in chapter 5, David Ross was called to teach natural and experimental philosophy when the Hindu College was set up in Calcutta in 1817. As army medics, Scots came to learn South Asia's many vernaculars. Many mastered Persian and Arabic, the court languages of Mughal India, and, with the help of Persian munshis, compiled bilingual dictionaries and translated texts. Diplomatic missions were thus often entrusted to them: Alexander Hannay to the Mughal court; George Bogle, Alexander Hamilton, and Samuel Turner to Tibet.[31]

Of the minority of Englishmen who had a penchant for intellectual pursuits in the leisure time their fortune-making activities left them, most were—in the fashion of the 'Great School' and Oxonian High Church elite to which, like Hastings himself, they generally belonged—obsessed with classical thought and scripture. Indeed, their education was dominated by the study of Greek and Latin.[32] Throughout the eighteenth century, the university continued to be supplemented by the Grand Tour in the gentleman's education almost as a matter of

[31] For material on Scots and the EIC, see Paul Wood, 'The Scientific Revolution in Scotland', in Roy Porter and Mikuláš Teich, eds, *The Scientific Revolution in National Context* (Cambridge: Cambridge University Press, 1992), pp. 263–87; for Scottish migrants, see Marika Vicziany, 'Imperialism, Botany and Statistics in early-Nineteenth-Century India: The Surveys of Francis Buchanan (1762–1829)', *Modern Asian Studies*, vol. 20, no. 4 (1986), pp. 625–60.

[32] See Robert Maxwell Ogilvie, *Latin and Greek: A History of the Influence of the Classics on English Life from 1600 to 1918* (London: Routledge & Kegan Paul, 1964), p. 46 *et seq*. For a description of the daily life of the British in India during this period, see Percival Spear, *The Nabobs* (Oxford: Oxford University Press, 1963).

course. Italy, with its relics of the classical past, was the chief attraction.[33] Bred in this tradition and 'impressed by the visible remains of the ancient world seen on their travels, young milords . . . easily saw themselves through the eyes of the Romans; their attitudes to politics and government, conduct, manners and style mirrored those of the world of Horace and Virgil and testify to the influence of the classical discipline in which they had been trained.'[34]

Not surprisingly then, their understanding of South Asia and its inhabitants was shaped by their education and training. Sanskrit, in their eyes, was to Indian vernaculars what Greek and Latin were to contemporary European languages and, like their virtuoso contemporaries in Britain and continental Europe who invested a great deal in recovering the works of ancient Greece and Rome, they concentrated, in their exploration of Indian learning, on ancient literary, philosophical, and scientific works, mainly those written in Sanskrit. 'Can you supply me with some poetical names of *places* in India', wrote William Jones in 1783, shortly after arriving in Calcutta, 'where Camdeo may be supposed to resort, like the *Cyprus* and *Paphos* of the Grecian and Roman deities?'[35]

Collecting manuscripts, stone inscriptions and other archaeological artefacts became a favourite pastime among this group of virtuosi. Naturally enough, they sought as informants and privileged interlocutors their South Asian counterparts—those of the literate castes who had mastered Sanskrit, and *asharif* maulavis and munshis adept in Arabic and Persian—a reliance which only reinforced their own classical inclinations. And in the same way as they cared little for the majority of their own countrymen or the contemporary Greeks and Italians that some of them had probably encountered, so too they held contemporary Indian society in disdain. '[I]t would be as ridiculous to hope for a true state of the religion and philosophy of the Hindoos

[33] See John Harold Plumb, 'The Grand Tour', in idem, *Men and Places* (London: The Cresset Press, 1963), pp. 54–66.

[34] John Lawson and Harold Silver, *A Social History of Education in England* (London: Methuen, 1973), pp. 217–18; see also George Charles Brauer, *The Education of a Gentleman: Theories of Gentlemanly Education in England 1660–1775* (New York: Bookman Associates, 1959), pp. 156–94.

[35] Letter from William Jones to Richard Johnson dated 15 December 1783, in *Letters*, vol. II, p. 624.

from . . . illiterate casts', wrote Alexander Dow, 'as it would be in a Mahommedan in London, to rely upon the accounts of a parish beadle, concerning the most abstruse points of the Christian faith; or, to form his opinion of the principles of the Newtonian philosophy, from a conversation with an English carman.'[36] Their understanding

of the contemporary society that they were supposed to govern was thus shaped by a scrutiny of classical Sanskrit, Arabic, and Persian texts and of texts specially commissioned to be written in these languages, by their indigenous collaborators.

One area where these texts appeared particularly crucial was in the administration of civil law, in part because of the rising flood of litigation between South Asians and Europeans ever since the new territorial conquest, and in part because British courts offered new legal possibilities to indigenous litigants.[37] John Derrett, an authority on Indian legal history, estimates the number of legal treatises produced for the British at about fifty, the most well known of these being the *Vivadarnavabhanjana* ('breakwater to the flood of litigation'), also known as the *Vivadarnavasetu* ('commentary on the flood of litigation'), compiled by eleven pundits between 1773 and 1775, translated into Persian by Zayn al-Din Ali Rasai and thence into English in 1776 by Nathaniel Halhed as *The Code of Gentoo Laws, or, Ordinations of the Pundits . . .*[38]

The Making of an Orientalist

William Jones's arrival in Calcutta in 1783 helped give shape to Hastings' efforts. Jones was born in London in 1746 of a family of commoners. His father, another William, a Welsh-born yeoman who

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The History of Hindostan: From the Earliest Account of Time, to the Death of Akbar, 2 volumes, tr. Alexander Dow (London: T. Becket & P.A. De Hondt, 1768), vol. I, p. xxxviii. For elite attitudes to common people in Europe, see for instance Tobias George Smollett, *Travels through France and Italy*, 2 volumes (London, 1766), especially vol. II, pp. 197–8.

[37] Warren Hastings, 'A Plan for the Administration of Justice, extracted from the Proceedings of the Committee of Circuit, 15th August 1772', in George William Forrest, ed., *Selections from the State Papers of Governors-General of India*, 4 volumes (Oxford: Blackwell, 1910–26), vol. II, pp. 295–6.

[38] For a list of expressly commissioned works, see John Duncan Martin Derrett, 'Sanskrit Legal Treatises Compiled at the Instance of the British', *Zeitschrift für vergleichende Rechtswissenschaft*, vol. 63 (1961), pp. 72–117. The topics contained in Halhed's *Code* were understood to confirm what Hastings believed was needed to effectively govern: debt, inheritance, civil procedure, deposits, sale of stranger's property, partnership, gift, slavery, master and servant, rent and hire, sale, boundaries, shares in the cultivation of lands, cities and towns and fines for

turned counting house assistant and then became a sailor, had finally settled in London, making a living teaching mathematics and writing books on navigation and gunnery theory.[39] These activities brought him into contact with Isaac Newton and Edmund Halley. His popularization of Newton's work and timely support of him in his controversy with Leibniz earned him a fellowship of the Royal Society in 1712. Upon his death in 1749 he left a meagre fortune, a library, a collection of rare shells and fossils, his widow Mary (*née* Nix), a daughter, a son—William—and a group of influential friends including the earls of Hardwicke and Macclesfield.

Brought up in hardship under his domineering mother's close supervision, William grew up in an environment where the shadows of Newton, Locke, and Milton loomed large. His curiosity invariably met with Mary Nix Jones's panacean dictum: 'Read and you will know!'[40] Already when he was four, she had made him learn speeches from Shakespeare and Gay's Fables by rote. Soon he could write *The Tempest* from memory. At seven William was enrolled at Harrow and soon distinguished himself in Latin and Greek, composing verses imitating Virgil and Sophocles. Indeed, the art of mimesis was to be the hallmark of all his later work. At Harrow he befriended a number of boys who were later, as prominent Whigs, to stand him in good stead: William Bennet, who was to become Bishop of Cloyne; Samuel Parr, Prebendary of St Paul's and Curate of Hutton; John Parnell, Chancellor of the Exchequer of Ireland; Joseph Banks, President of the Royal Society; and two future colleagues in India—Nathaniel Halhed and John Shore, Jones's first hagiographer.

Anticipating a literary career, Jones was admitted in 1764 to University College, Oxford, as a commoner to study Classics. He was first encouraged to learn Arabic by a fellow student but, instead of learning

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damaging crops, defamation, assault, theft, violence, adultery, duties, women, miscellaneous rules (including gaming, finding lost property, sales-tax, and adoption). See ibid., p. 86.

[39] William Jones, *A New Compendium of the Whole Art of Practical Navigation*, dedicated to the mathematician John Harris, F.R.S. (London, 1702); idem, *Synopsis Palmoriorum Matheseos: Or, a New Introduction to the Mathematics* (London, 1706).

[40] John Shore, Lord Teignmouth, *Memoirs of the Life, Writings and Correspondence of Sir William Jones*, printed as volumes 1 and 2 of *Works*, vol. I, p. 21.

it from the University's Arabic professor, Joseph White of Wadham, he chose to be instructed in it by Mirza, a Syrian from Aleppo whom he had met in London and brought to live with him in Oxford. Native instructors were indeed crucial to Jones's method of acquiring foreign languages and, as we shall see later, he was soon to become conscious of the importance of selecting trustworthy interlocutors. He spent a part of every morning with Mirza retranslating Antoine Galland's twelve-volume *Les mille et une nuits* into Arabic.[41] Happening to find a close resemblance between modern Arabic and Persian, he soon took to learning the latter language. Besides, as Persian was the *lingua franca* of Mughal India, the EIC's natural interest in his skills raised the possibility of patronage or placement.

However, in spite of his passion for oriental scholarship and languages, Jones knew that a career in the field for a fortuneless scholar was impracticable. Realizing that he had to devise his own ways in order to elevate his status, he accepted the post of tutor to the seven-year-old George John Spencer, Viscount Althorp (later First Lord of the Admiralty during the Napoleonic Wars), in 1765. The Spencer connection proved very fruitful for Jones's social promotion. It gave him the chance to fill some of the lacunae in his education and acquire the social graces of a gentleman—dancing, horse riding, fencing, and holidays on the Continent (as a stand-in for the Grand Tour). The Spencers also brought him into contact with prominent artists and literati, people like the Hungarian scholar Count Charles Reviczki, whose oriental library Earl Spencer had recently purchased; and Joshua Reynolds. A portrait done in 1769 by the latter, for which his mother paid £37, further contributed to completing the necessary attributes and bought him the patronage of the influential painter.

Through the Spencers he also met his future wife, Anna Maria Shipley, in 1766. The Shipleys were in turn to bring him into contact with the radicals and supporters of the American Revolution, notably Benjamin Franklin who was to become one of his closest friends, chess mates, and fervent admirers.[42] It was through the Spencers above all that, in 1768, the King of Denmark contacted him with a request to translate into French a Persian manuscript of the *Ta'rikh-i-Nadiri*, an

[41] Antoine Galland, *Les mille et une nuits*, 12 volumes (Paris, 1704–17).

[42] See Peter Pratt, *An Easy Introduction to the Game of Chess* (London: David Ogilvy & Son, 1806).

official history of the parvenu King Nadir Shah (1688–1747), that he had recently received. Jones accepted as 'it was hinted, that his compliance would be of no small advantage to him, at his entrance into life; that it would procure him some mark of distinction, which would be pleasing to him; and, above all, that it would be a reflection upon this country, if the king should be obliged to carry the manuscript into France.'[43]

The French translation, published in London in 1770, was to establish Jones as a specialist in oriental languages in Europe and to put him firmly on the road to fame and long-sought-after glory.[44] In 1773, at the age of 26, Jones was elected a Fellow of the Royal Society. The following year he was admitted to Samuel Johnson's Literary Club and was to become its president in 1780. These positions in turn helped render him the more conspicuous and widened his relations, especially amongst the Whigs.[45]

In 1770, realizing that his ward George John, now almost twelve, would soon have no need of a tutor, Jones, following the advice of his mother and close friends, turned now to law and politics. Accordingly, he left the Spencers to enrol at the Middle Temple and spent the next couple of years studying law and history. 'If you wish to know my occupations, read the beginning of Middleton's Cicero, pp. 13–18, and you will see my model.'[46] Indeed, so wholeheartedly had he plunged into law that he wrote to the Dutch Persianist Hendrik Albert Schultens: 'The die is cast: all my books, both printed and manuscript, lie idle at Oxford apart from those relevant to the law or the practice of oratory. I have decided to work hard for at least twenty years at only legal and political studies.'[47] He finally established himself in 1774 in London as a barrister. During these years he published an essay on the

[43] Shore, *op. cit.*, in *Works*, vol. I, pp. 70–1.

[44] William Jones, *Histoire de Nader Chah connu sous le nom de Thahmus Kuli Khan, Empereur de Perse, traduite d'un manuscrit persan, par ordre de sa Majesté le Roi de Danemark, avec des notes chronologiques historiques géographiques et un traité sur la poésie* (London: 1770).

[45] See Lawrence Fitzroy Powell, 'Sir William Jones and the Club', *Bulletin of the School of Oriental and African Studies*, vol. 11 (1946), pp. 818–22.

[46] Letter to W. Bennet, dated 10 November 1771 in *Letters*, vol. I, pp. 103–4.

[47] Letter to H. A. Shultens, dated 6 October 1774, translated, with the Latin original, in ibid., p. 166.

law of bailments and a translation of the speeches of Isæus on the Greek laws of succession.

However, life at the bar proved hard and Jones was not able to make enough money—'[T]he profession of the Law, without some other aid, is a tree that bears fruit only in twenty years', he confided to Lady Georgiana Spencer, his erstwhile ward's mother. And again a few years later:

> Your Ladyship has, perhaps, heard that there is a great probability of my being thought worthy of a seat on the bench of Judges in India. My predilection for the East and my desire to unite Persian and Law make me eager for the appointment; but I must confess that a salary of six thousand pounds a year to commence from the day of my embarkation and of which I know from the best authority that I need not spend more than two thousand, has contributed not a little to my eagerness; for, although my professional gains are very handsome and are continually increasing, yet I must be twenty years in England before I can save as much, as in India I might easily lay by in five or six; and on my return (if it please God to permit me) I might still be a young man with thirty thousand pounds in my pocket . . .[48]

Indeed, his interest in Asian literature had already drawn him towards the EIC. After having vainly tried to sell to it a Persian thesaurus and dictionary, he had (with the help of Richard Johnson's nephews) published a shortened version, *A Grammar of the Persian Language*, in 1771 for the use of the Company's employees—'it was found highly dangerous to employ the natives as interpreters, upon whose fidelity they could not depend', he wrote in the Preface. In 1782 he published a literal metrical translation of a summary of the law of inheritance according to the Shafi'i school, Ibn al-Mulaqqin's *Bhughyat al-bahith 'an jumal al-mawarith* (The Mohammedan Law of Succession to the Property of Intestates), also for the use of the Company.[49] Upon receiving a copy of Orme's *History of the Military Transactions of the*

[48] Letters to Lady Georgiana, dated 28 February 1774 and 24 May 1778, in ibid., pp. 143, 271.

[49] Published in London by John Nichols for Charles Dilly. Of this work it has been said that it is 'as obscure as the original'. Besides, being ignorant of the fact that the Shafi'i law of inheritance only prevailed in the Dutch East Indies, Jones also shows his ignorance of the distinction between the various schools of Sunni

British Nation in Indostan from the Year MDCCXLX (London, 1763), Jones sought to ingratiate himself with the Company's official historian by writing an encomium of it in Latin.[50] He made sure to address his writings to the governor general of India. In moments of despair he contemplated 'drop[ping] all thoughts of *Asia*, and, "deep as ever plummet sounded", shall drown my *Persian* books.'[51]

Nor did he ignore the possibility of a parliamentary appointment to India. For, the same Regulating Act which had resulted in the appointment of Warren Hastings as governor general of Bengal had also instituted a Supreme or King's Court in Calcutta to administer justice according to English law among the inhabitants of the city and, in particular, among Company servants and Europeans in the region. The jurisdiction for native Indians was to be the Mayor's Court. However, the neatness of this segregation proved impossible to maintain and the jurisdiction of the Supreme Court had to be revised by an Act of Parliament in 1781 which recognized the customs and usages of Hindus and Muslims in 'inheritance and succession to land rent and goods and all matters of contract and dealing between party and party'.[52] Jones followed the debates carefully. He began to study Indian law and succeeded in being consulted in the framing of this new act.

Jones in India

Years of perseverance helped by well-placed Whig acquaintances finally proved fruitful. In early 1783 William Jones was nominated a puisne (or junior) judge at the Calcutta Supreme Court with a basic annual salary of £6,000 and knighted. Jones married Anna Maria Shipley and landed at Calcutta with his bride on 23 September of that year with a lofty plan to study:

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law, of the predominance of the school of Abu Hanifa in India, and even of the fact that the word *Imam* is used by Sunnis and Shi'as with entirely different connotations. See Semour Gonne Vesey-Fitzgerald, 'Sir William Jones, the Jurist', *Bulletin of the School of Oriental and African Studies*, vol. 11, no. 4 (1946), pp. 807–17.

[50] Letter to Robert Orme, dated 10 April 1772, in *Letters*, vol. I, pp. 112–13.

[51] Letter to Edward Gibbon, 30 June 1781 in ibid., vol. II, p. 481. Also letter to Edmund Burke, 17 March 1782, in ibid., p. 521.

[52] Derrett, *op. cit.*, p. 82.

1. The laws of the Hindus and Mohammedans.
2. The History of the *Ancient* World.
3. Proofs and Illustrations of Scripture.
4. Traditions concerning the Deluge, &c.
5. Modern Politics and Geography of Hindustan.
6. Best mode of governing Bengal.
7. Arithmetic and Geometry, and mixed Sciences of Asiatics.
8. Medicine, Chemistry, Surgery, and Anatomy of the Indians.
9. Natural Productions of India.
10. Poetry, Rhetoric, and Morality of Asia.
11. Music of the Eastern Nations.
12. The Shi-King, or 300 Chinese Odes.
13. The best accounts of Tibet and Cashmir.
14. Trade, Manufactures, Agriculture, and Commerce of India.
15. Mughal Constitution, contained in the Defteri Alemghiri, and Ayein Acbari.
16. Mahratta Constitution.

To print and publish the *Gospel* of St. Luke in Arabic.
To publish Law Tracts in Persian and Arabic.
To print and publish the *Psalms* of *David* in Persian Verse.
To compose, if God grant me Life,

1. Elements of the Laws of England.
   Model—The Essay of Bailment—Aristotle
2. The History of the American War.
   Model—Thucydides and Polybius
3. Britain discovered, and Heroic Poems on the Constitution of England. Machinery. Hindu Gods.
   Model—Homer
4. Speeches, Political and Forensic.
   Model—Demosthenes
5. Dialogues, Philosophical and Historical.
   Model—Plato
6. Letters.
   Model—Demosthenes and Plato.[53]

In Bengal he soon discovered the handful of men who, responding to Warren Hastings' incentives, were acquiring South Asian languages

[53] 'Objects of Enquiry during my residence in Asia', dated 12 July 1783 and written on the frigate *Crocodile*, in *Works*, vol. II, pp. 3–4.

and knowledge in return for liberal monetary incentives. But each worked in isolation from the others and their efforts remained dispersed, eclectic, and little known. Realizing that 'such inquiries and improvements could only be made by the united efforts of many', and using his own experience in London's learned societies, Jones quickly set about channelling these efforts and a few months later, in January 1784, established the Asiatick Society of Bengal—with himself as president, and the governor general and the Supreme Council as patrons.[54] Right from the start, he imposed a rigorous discipline and a weekly schedule reminiscent of the Royal Society. Only original contributions were to be discussed; no simple translations of oriental texts or documents would be entertained; 'such unpublished essays or treatises as may be transmitted to us by native authors' would be accepted, although the question of enrolling 'any numbers of learned natives' as members was left open. The scope of the society was to be the 'geographical limits of Asia' and its object 'the study of MAN and NATURE; all that is performed by the one and produced by the other.'

Following Bacon, Jones recognized three main branches of learning:

> history, science and art: the first comprehends either an account of natural predictions, or the genuine records of empires and states; the second embraces the whole circle of pure and mixed mathematics, together with ethicks and law, as far as they depend on the reasoning faculty; and the third includes all the beauties of imageries and the charms of invention, displayed in modulated language, or represented by colour, figure, or sound.

At the practical level, he exhorted 'all curious and learned men' to

> correct the geography of *Asia* by new observations and discoveries . . . trace the annals, and even traditions, of those nations, who from time to time have peopled or desolated it . . . bring to light their various forms of government, with their institutions civil and religious . . . examine their improvements and methods in arithmetick and geometry, in trigonometry, mensuration, mechanicks, opticks, astronomy, and general physicks; their systems of morality, grammar, rhetorick, and dialectick; their skill in chirurgery and medicine, and their advancement, whatever it may be, in

[54] *Asiatick Researches*, vol. 1 (1788), p. x.

> anatomy and chymistry. To this you will add researches into their agriculture, manufactures, trade; and whilst you inquire with pleasure into their musick, architecture, painting and poetry, will not neglect those inferior arts, by which the comforts and elegance of social life are supplied or improved.[55]

But languages were not part of Jones's preoccupations: 'You may observe, that I have omitted their languages, the diversity and difficulty of which are a sad obstacle to the progress of useful knowledge; *but I have ever considered languages as the mere instruments of real learning, and think them improperly confounded with learning itself*.'[56]

In a letter dated 24 April 1784 to his friend Charles Wilkins, a senior merchant in the Company, he confirmed this view: 'You have been long enough at Benares . . . and are making, no doubt, considerable advances every day in the untrodden paths of Hindu learning . . . Happy should I be to follow you in the same track; but life is short and my necessary business too long for me to think at my age of acquiring a new language, when those which I have already learned contain such a mine of curious and agreeable information.'[57] However, not a year and a half later, Jones had set about learning Sanskrit, and within a few months made his famous speech on the striking similarities between Sanskrit, Latin, and Greek. What had transpired in the intervening period for Jones to not only change his mind about language learning but also to elevate Indian civilization to the same status as that of ancient Greece and Rome?

[55] William Jones, 'A Discourse on the Institution of a Society for inquiring into the History, Civil and Natural, The Antiquities, Arts, Sciences and Literature of Asia' *Asiatick Researches*, vol. 1 (1788), pp. xii–xiv. Reprinted in *Works*, vol. III, pp. 6–7.

[56] Ibid. (my italics). As to the inutility of languages in themselves, Jones had always held a Miltonian conception; witness the following sentence from *Lettre à Monsieur A*** Du P****: 'Ne savez-vous pas que les langues n'ont aucune valeur intrinséques? et qu'un érudit pourrait savoir par cœur tous les dictionnaires qui ont jamais été compilés, et pourrait bien n'être à la fin du compte que le plus ignorant des mortels?' William Jones, *Lettre à Monsieur A*** Du P*** dans laquelle est compris l'examen de sa traduction des livres attribués à Zoroastre* (London: P. Elmsly, 1771)—hereafter referred to as *Lettre à Monsieur A*** Du P***—p. 11.

[57] Letter to Charles Wilkins, dated 24 April 1784, in *Letters*, vol. II, p. 646.

During this period, Jones was quite simply confronted with British Indian reality, discovering to what extent his daily life—and that of all the British—in the Indian subcontinent depended upon an organic reliance on autochthonous intermediaries, especially in the administration of justice. His famous discourse 'On the Hindus' had, I shall argue, very directly to do with a resolution of the problem of mediated knowledge.

As remarked earlier, Jones was already aware of the role of native instructors in the acquiring of foreign languages—it was through Mirza that he had learned Arabic. When he had sought to learn German in 1767, while on a holiday with the Spencers, he looked for a native speaker at Spa but shrank away from the idea when he realised the unaffordable cost and had to content himself with a grammar book and dictionary.[58] And in the *Grammar of the Persian Language*, Jones based his method of language learning on the availability of a native speaker:

> Before I conclude this Preface it will be proper to add a few remarks upon the method of learning the Persian language, and upon the advantages which the learner may expect from it. When the student can read the characters with fluency, *and has learned the true pronunciation of every letter from the mouth of a native*, let him peruse the grammar with attention, and commit to memory the regular inflexions of the nouns and verbs . . . By this time he will find a dictionary necessary . . . He may proceed by the help of [Meninski's Persian dictionary] to analyse the passages quoted in the grammar, and to examine in what manner they illustrate the rules; *in the mean time he must not neglect to converse with his living instructor, and to learn from him the names of visible objects*, which he will soon imprint on his memory, if he will take the trouble to look for them in the dictionary: and here I must caution him against condemning a work as defective, because he cannot find in it every word which he hears; for sounds in general are caught imperfectly by the ear, and many words are spelled and pronounced very differently . . . *When he can express his sentiments in Persian with tolerable facility, I would advise him to read some elegant history or poem with an intelligent native, who will explain to him in common words the refined expressions that occur in reading, and will point out the beauties of learned allusions and local images*.[59]

[58] Cannon, *The Life and Mind of Oriental Jones, op. cit.*, pp. 13–23.

[59] William Jones, 'Preface' to *A Grammar of the Persian Language* (1771), in *Works*, vol. v, pp. 177–9 (my italics).

Indeed, Jones himself got significant help in deciphering the basic rules of Persian grammar from Mirza Sheikh I'tesamuddin, the Mughal emperor Shah Alam's ambassador to George III, who translated the section 'of the *Ferhung Jehangaree* that sets out the twelve rules comprising the grammar of the Persian language'. The Sheikh writes, 'Mr Jones . . . used it in compiling his Persian grammar, which has brought him fame and money.'[60]

However, this means of acquiring knowledge—and wealth—meant that one had to very carefully choose one's instructor. Jones was quick to realize the crucial nature of this choice. Indeed, the question of the credibility of native instructors was the nub of his fiery attack, in the same year, against the Frenchman Abraham-Hyacinthe Anquetil-Duperron, who had just published his translation of the *Zend-Avesta*.[61] Jones's main argument here centres around the necessity of being guided by native intelligence. However, the knowledge thus produced stands or falls depending upon the reliability of the native interlocutor. This point has been completely ignored by scholars who have blushed at Jones's misplaced philological arguments and loss of *sang-froid*. In his *Lettre à Monsieur A*** Du P****, Jones writes:

> D'ailleurs, êtez-vous bien sûr que vous possédez les anciennes langues de la Perse? Ignorez-vous qu'une langue ne saurait être comprise dans un seul ouvrage? Que tel homme qui lirait assez couramment les livres de Moise en Hébreu, avec le secours d'un Juif, ne comprendrait rien dans le Cantique des Cantiques sans ce secours ; et quand il le comprendrait, il n'en serait pas plus avancé pour l'intelligence des fables de Sandabar, écrites dans le même dialecte? On ne posséde une langue que lorsqu'on a lû un nombre infini de livres écrits dans cet idiome. C'est pourquoi on n'aurait jamais sçû l'Hébreu sans la langue Arabe, où presque toutes ses racines se sont conservées. Par la même raison on ne saura jamais, ne vous en déplaise, les anciens dialectes de la Perse, tandis qu'il n'existent que dans les prétendus livres de Zoroastre, qui d'ailleurs sont remplis de répétitions inutiles.

[60] Mirza Sheikh I'tesamuddin, *Shigurf Nama-i Vilayet*, originally published in English translation in 1827. The citation is taken from a recent English edition of the work, *The Wonders of Vilayet* (Leeds: Peepal Tree Press, 2001), p. 72.

[61] Abraham-Hyacinth Anquetil-Duperron, *Zend-Avesta, ouvrage de Zoroastre, contenant les idées théologiques, physiques & morales de ce législateur, les cérémonies du culte religieux qu'il a établi, & plusieurs traits importants relatives à l'ancienne histoire des Perses*, 3 volumes (Paris: 1771).

> Mais, direz-vous, me soupçonne-t-on d'avoir voulu tromper le public?' Non, Monsieur, *on ne dit pas cela*. Vous vous êtes trompé vous-même. Il était possible d'apprendre les caractéres Zendes sans sortir de l'Europe ; il était facile de traduire en Français ce que le révérend Docteur Darab vous dicta en Persan moderne, en le comprenant, peut-être, très peu lui-même . . .

Building on a series of what are now considered erroneous philological arguments, Jones concludes:

> Quand aux vocabulaires que vous avez traduits, il faut avouër que le révérend Docteur Darab a dû savoir les langues sacrées de sa nation : mais lorsque nous voyons les mots Arabes corrompus . . . donnés pour des mots Zendes et Pehlevis, ainsi que . . . pour du Parsi, nous disons hardiment que ce charlatan vous a trompé, et que vous avez taché de tromper vos lecteurs.
>
> Nous croions ici entrevoir la vérité. Vous n'avez appris qu'un peu de Persan moderne, et encore moins de l'ancien ; et vous avez traduits ces malheureux livres Zendes, avec le secours de ce Guébre, qui ne les entendait probablement lui-même que très imparfaitement. Vous avez fait en cela comme un homme que nous connaissons, qui traduisait les poëmes Arabes les plus difficiles sous les yeux d'un natif d'Alep, tandis qu'il ne pouvait pas lire le prémier chapitre de l'Alcoran sans ce secours ; et vous êtes semblable à un enfant qui flotte sur des vessies enflées, et se persuade qu'il nage à merveille.[62]

On the subject of the administration of justice, Jones, like his contemporaries, perceived India's territories as having two judicial systems, Islamic and Hindu. And while Islamic law was more or less fixed in Arabic or Persian texts, Hindu law varied according to regional, status, and caste boundaries and their jurisprudence relied more often on the oral expertise of Brahmin jurists—which was one of the two meanings of the Anglo-Indian term 'pundit'—than on written texts. The *Dharmasastra* held high prestige in many regions but, as customs and usages evolved over the years, native professors of the *sastra* were frequently consulted in a capacity of juriconsult. These scholars had been maintained through charitable endowments at Banaras and elsewhere and by way of posts in princely households. With the rise of British territorial power in the Subcontinent, many were inducted into the EIC's administration and law courts.

[62] Jones, *Lettre à Monsieur A*** Du P****, pp. 12–13 and 47–8.

In order to administer justice under such conditions, the English perceived the need to fix administrative and legal codes in book form: Hastings had already commissioned the *Vivadarnavasetu* which became Halhed's *The Code of Gentoo Laws*. This text, however, failed to deflect pundits from their normal sources of information, and merely added another to their many references. Jones found that

> whatever be the merit of the original, the translation of it has no authority, and is of no other use than to suggest inquiries on the many dark passages, which we find in it: properly speaking, indeed, we cannot call it a translation; for, though Mr Halhed performed his part with fidelity, yet the Persian interpreter had supplied him only with a loose injudicious epitome of the original Sanscrit, in which abstract many essential passages are omitted, though several notes of little consequence are interpolated from a vain idea of elucidating or improving the text.[63]

The Hydra-like monster of the credibility of intermediaries had sprung up again! For Jones then, in order to stabilize the law, the British had to stabilize a team of native experts whose testimony they could trust.[64]

But how was one to legitimize the testimony of people of a different civility, let alone that of a conquered culture? The problem was of crucial importance in an age when the overwhelming majority of English men of science, as we saw earlier, came from a very homogeneous milieu: women, servants, children and the insane were rigorously excluded from the world of reliable witnesses. The solution was to come to Jones progressively.

Already in March 1785 Jones was grappling with this problem, albeit within the traditional framework of private arrangements

[63] Letter to Lord Cornwallis, 19 March 1788 in *Letters*, vol. II, p. 797.

[64] In his letter to Lord Cornwallis of 13 April, 1788, Jones writes: 'Since I was favoured with your obliging letter dated the 19th of March, in which you do me the honour to express your reliance on me for the selection and appointment of the Hindu and Muselman lawyers, whose assistance will be necessary in compiling a Digest of their respective laws, I have made very diligent inquiries for persons eminently qualified to engage in the work; and I beg leave to recommend four, whom, pertly from my own personal knowledge of them, and partly from the information of those, in whose judgement I have perfect confidence, I believe to be Men of integrity and learning.' Ibid., pp. 801–2.

between individual Europeans and local intermediaries. The following extracts from his correspondence with British colleagues give us some idea of the different criteria he was using for vesting trust in local jurists. Thus, we find him writing to Charles Wilkins on the subject:

> Goverdhen Caul Pendit has just brought a certificate of his qualifications, to which I see the respectable signature of Cashynat'h, your Pendit: if I give my voice in favour of Goverdhen, it will be owing to the testimonial of the good man, who brought me three daisies at Benares, and of whose learning, since you employ him, I have no doubt. We have proposed that the candidate shall be examined by some learned Pendits. Will Cashynath be one of the number, and give his opinion fairly without being biassed by his good-nature? I shall be much obliged to you, if you will sound him, and discover his real opinion of the man. It is of the utmost importance, that the stream of Hindu law should be pure; for we are entirely at the devotion of the native lawyers, through our ignorance of Shanscrit.[65]

And a couple of days later: 'Will you have the goodness to ask Mahesa pundit [Charles Chapman's pundit] whether the university of Tyrhoot is still supported, and confers degrees in Hindu law? One of our pundits is dead, and we have thoughts of requesting recommendations from the universities of Hindustan, particularly from Benares, and Tyrhoot, if it exists; so that the new pundit may be universally approved, and the Hindus may be convinced, that we decide on their law from the best information we can procure.'[66] Or again, in this letter to Sir John Macpherson, acting governor general of Bengal in 1785, he writes: 'The regulation which you made concerning the Madrissa is so salutary, that few things would grieve me more than to see it frus trated. . . . Besides my approbation as a good citizen of your regulations, I have a particular interest in the conduct of Mujdudeen, who is Maulvy of the court, as such ought to be *Omni exceptione major*. I believe from my conversation with him, that he is not a man of deep learning; but his manners are not unpleasing.'[67]

And then, within two years of his arrival in India, Jones was confronted with the question of perjury. Heretofore, Hindus had to take

[65] Letter to Charles Wilkins, *c.* March 1785, in ibid., p. 666.
[66] Ibid., pp. 667–8.
[67] Letter to Sir John Macpherson, 26 May 1785, in ibid., pp. 675–6.

their oath upon the Ganges in British courts, but the oath did not seem to be in any way binding.[68] A court pundit had recently compiled a treatise to show that swearing on Ganges water was prohibited. The policy of commissioning texts to serve as a basis for administering justice had decidedly begun to boomerang on the British! Faced with massive refusals—and perjury—Jones sought to find an 'oath, if any, is held so solemn, that no expiation or absolution will atone for a wilful violation of it'.[69] 'The most intelligent Pundits' directed him to the eighth chapter of the *Manavadharmashastra*. On 10 June 1785 he delivered his second charge to the Grand Jury in which he took up the subject of 'the wilful violation of solemn oaths', announcing the pundits' translation of the relevant passages from Manu's work.[70]

So obsessed was he with the question of oath-taking among Hindus, that Jones, knowing 'few Europeans will ever learn [Sanskrit or Arabic], because neither of them leads to any advantage in worldly pursuits', undertook to learn the 'language of the Gods' through 'a pleasant old man [Ramlochan] of the medical cast, who teaches me all he knows of the Grammar; and I hope to read the *Hit Upadès*, or some other story-book with him. My great object is the Dharme Sastra, to which I shall arrive by degrees.'[71] In a letter to Robert Orme in October 1786 he writes: 'your favorite Virgil would make an indifferent appearance in a verbal translation [into Sanskrit and Arabic]; and the art of his composition can only be known to those, who, like you, feel the charm of his original versification. *But the discussion would lead me too far from the Sanscrit and Arabick law, which I find necessary to study; literature being only an amusement*.'[72]

[68] Letter to William Pitt the Younger, 5 February 1785, in ibid., p. 662.

[69] Letter to Charles Wilkins, 6 June 1785, in ibid., pp. 677–8.

[70] *Works*, vol. VIII, pp. 8–12.

[71] Jones to Charles Wilkins, 17 September 1785, in *Letters*, vol. II, p. 682. At this point Jones was still not convinced that he would find the answer in any book: 'Pray, have the goodness to ask the learned and pious Gyawals what is the *proper mode of taking evidence* from Hindu Witnesses, whether there is any *absolution*, of *expiation* . . . for bearing false witness, and whether it be *neccesary* or proper to *swear* by the *Gange*, or by any other holy thing or word. I am inclined to think, that the Hindus are, in this respect, like Quakers, and only *affirm*, but that a *false affirmation* in a court of Justice is *inexpiable* crime, except when a life is saved by it.' Letter to Thomas Law, 28 September 1785, in ibid., pp. 685–6.

[72] Letter to Robert Orme, 12 October 1786, in ibid., p. 716 (my italics).

It is in this context that his discourse 'On the Hindus', delivered barely four months after he started learning Sanskrit, takes on special importance. It is true that in this essay Jones was trying to kill many birds with the same stone; in particular, he aimed on the one hand to vindicate Biblical ethnology by seeking to establish the affinity of nations through an affinity of their languages, and on the other to establish Biblical chronology against the contentions of French radicals like Voltaire and Bailly. He also aimed to establish the antiquity of Indian civilization; and, through all these projects to give substance to his Promethean programme for the Asiatic Society.

However, in spite of the fact that one of its major effects, once circulated in Europe, was to engender a new comparative approach to the study of language, I would submit that, in assimilating Sanskrit-speaking South Asians to the Greek and Roman (ancestors of the English!), Jones himself was seeking to provide an ethnological legitimation, as opposed to the tradition of individual arrangements, for collaboration with Indian intermediaries. As Thomas Trautmann has convincingly argued, Jones's project, although couched in philological terms, was primarily ethnological rather than linguistic.[73] Indeed, Jones remained true to his instrumentalist view of language right up to the end. However, in contrast to Trautmann, who examines the effects of Jonesian ethnology on the rise and development of race theory, I shall focus here on the way this ethnological construction helped Jones and his contemporaries build a more reliable system of administration based on an hierarchy of heterogeneous civilities.

Let us then briefly consider the third anniversary discourse, an essay that seeks to 'solve the great problem, whether the [principal nations of Asia] had any common origin, and whether that origin was the same, which we generally ascribe to them'.[74] Jones's argument here is embedded in the wider problematic of Biblical ethnology based on the dispersal around the world of Noah's sons Ham, Shem, and Japhet. Jones takes as his immediate point of departure Jacob Bryant's *Analysis of Antient Mythology*, published in 1774–6, in which the latter, building on Newton's earlier chronology through a series of dubious etymological arguments, identified the Greeks, Romans, Egyptians,

[73] See Trautmann, *op. cit.*

[74] William Jones, 'On the *Hindus*', in *Works*, vol. III, p. 28.

and Indians as descendants of Ham.[75] Jones thinks Bryant was right but for the wrong reasons and sets about correcting his etymology. He chooses India because 'the sources of wealth are still abundant even after so many revolutions and conquests; in their manufactures of cotton they still surpass all the world . . . nor can we reasonably doubt, how degenerate and abased so ever the *Hindus* may now appear, that in some early age they were splendid in arts and arms, happy in government, wise in legislation, and eminent in various knowledge . . .'[76]

It is in this context that he propounds his surprising passage on deep structural similarities between Sanskrit, Greek, Latin, Gothic, Celtic, and old Persian. After having examined linguistic and literary evidence, Jones then goes on to analyse India according to the three other criteria for characterizing a people: philosophy and religion, sculpture and architecture, and sciences and arts. With respect to the last set of criteria, he claims:

> That the *Hindus* were in early ages a *commercial* people, we have many reasons to believe; and in the first of their sacred law-tracts, which they suppose to have been revealed by MENU many *millions* of years ago, we find a curious passage on the legal *interest* of money, and the limited rate of it in different cases, with an exception in regard to *adventures* at *sea*; an exception, which the sense of mankind approves, and which commerce absolutely requires, though it was not before the reign of CHARLES I. that our own jurisprudence fully admitted it in respect of maritime contracts.[77]

The kinship established is now clear: the Hindus and the English are not only of common descent but they are both a commercial people with similar laws. Already, in his essay on bailments of 1781, Jones had written: 'and although the rules of the *Pundits* concerning *succession* to *property*, the *punishment* of *offences*, and the *ceremonies* of *religion*, are widely different from ours, yet, in the great system of *contracts* and the common intercourse between man and man, the POOTEE of the

[75] Jacob Bryant, *A New System; or An Analysis of Antient Mythology*, 3 volumes (London, J. Walker, 1774–6). Isaac Newton, *The Chronology of Ancient Kingdoms Amended To Which is Prefix'd a short chronicle from the first memory of things in Europe, to the conquest of Persia by Alexander the Great* (London: J. Tonson, J. Osborn & T. Longman, 1728).

[76] 'On the *Hindus*', p. 32.

[77] Ibid., pp. 42–3.

Indians and the DIGEST of the *Romans* are by no means dissimilar.'[78] Now, having shown common ethnic origins, a large-scale *institutionalized* collaboration between the two in the administration of justice could be legitimately founded.

This of course did not mean that one could trust all Indians, but then Jones did not trust very many Englishmen either, and certainly no one from the lower orders of either society.[79] But this *did* mean that, because of structural similarities between the higher orders of the two societies—both in terms of their origins and their commercial characteristics—a collaboration could be instituted between members of each community rigorously disciplined to obey a common set of invented conventions. In each case, he thought a written legal framework with built-in safeguards would oblige defaulters to fall in line. Already, soon after landing in India, Jones had sent Edmund Burke a plan for the 'Best Practicable System of Judicature for India' in which he suggested that 'The natives must have an *effective* tribunal for their protection against the English, or the country will soon be rendered *worse than useless* to Britain'; and that 'the [British] judges in both courts [be] secured from want of dignity, and danger of corruption, by *liberal*, not extravagant, *salaries*.' Native intermediaries in their turn had to be 'selected and appointed with such stipends, as will entitle them to respect, and raise them above temptation'.[80]

[78] William Jones, *An Essay on the Law of Bailments* (London: C. Dilly, 1781), p. 114.

[79] For his attitudes towards common people in Britain, see his letters written around the time of the Gordon Riots (June 1780) in which he refers to the rioters as the 'populace' and advocates vigilantism on the part of the upper classes. *Letters*, vol. I, p. 402 *et seq*.

For those towards common Indians, see his Charge to the Grand Jury of 10 June 1787, particularly the following passage: 'Excessive luxury, with which the Asiaticks are too indiscriminately reproached in Europe, exists indeed in our settlements, but not where it is usually supposed: not in the higher, but in the lowest condition of men; in our servants, in the common seamen frequenting our port, in the petty workmen and shopkeepers of our streets and markets, there live the men, who to use the phrase of an old statute, sleep by day and work by night, for the purposes of gaming, debauchery and intoxication.' *Works*, vol. VII, p. 25.

[80] William Jones, 'The Best Practicable System of Judicature' (*c*. April 1784),

Jones could now propose a far more ambitious project. In March 1788 he laid out his plan to the governor general of Bengal, Lord Cornwallis to 'give the natives of these Indian provinces permanent security for the due administration of justice among them, similar to that which Justinian gave to his Greek and Roman subjects', a legal corpus 'after the model of Justinian's inestimable Pandects [on which English law was itself based], compiled by the most learned of the native lawyers, with an accurate verbal translation of it into English'. Confined to the laws of contracts and inheritances,

> the labour of [this] work would . . . be greatly diminished by two compilations already made in Sanscrit and Arabick, which approach nearly, in merit and in method, to the Digest of Justinian. The first was composed a few centuries ago by a Brahmen of this province, named *Raghunanden*, and is comprized in twenty seven books at least, on every branch of Hindu law: the second, which the Arabs call the *Indian Decisions*, is known here by the title of *Fetaweh Aalemgiri*, and, was compiled, by the order of *Aurangzib*, in five large volumes, of which I possess a perfect and well-collated copy.[81]

Two difficulties however attended this nonetheless gigantic task, the first of which was pecuniary: 'the *expense* of paying the [two] Pandits and [two] Maulavi's, who must compile the Digest, and the native writers, who must be employed to transcribe it.' In order to attract the most learned pundits and maulavis who would work full time on the project, 'conferring freely together on fundamental principles common to both, would assist, direct, and check each other', Jones suggested they be paid a comfortable Rs 200 as salary with Rs 100 each for six scribes

> skilled in the two several languages, that they might avoid gross errors in transcribing what the lawyers had written . . . The whole expense therefore would be a thousand Sicca rupees a month . . . but, lest the persons employed should protract their work in hopes of continued salaries for a long period, they should be apprized, that the whole compilation must be

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Sheffield Central Library, Wentworth Woodhouse MSS, Burke Notes 9*c*, quoted in *Letters*, vol. II, pp. 643–4.

[81] Letter to Lord Cornwallis, 19 March 1788, ibid., p. 795.

> finished and copied in three years, at the expiration of which their salaries would be stopped . . . [I]f the work be thought expedient, the charges of it should be defrayed by the government, and the salaries paid by their officers.[82]

A clear shift, then, from the traditional employment of munshis and pundits by individual Britons to an officialization of the relationship.

The second difficulty was 'to find a director of the work and a translator of it, who, with a competent knowledge of Sanscrit and Arabick, has a general acquaintance with the principles of jurisprudence, and a sufficient share even of a legislative spirit, to arrange the plan of a Digest, superintend the compilation of it, and render the whole, as it proceeds, into perspicuous English, so that even the translation may acquire a degree of authority proportioned to the publick opinion of his accuracy.' And who other than Jones himself could fulfil this task?—'I cannot but know, that the qualifications required, even in the low degree in which I possess them, are not often found united in the same person.'[83]

The Supreme Council approved the plan the same day and accorded 'from the public purse the moderate Monthly Sum that he required'.[84] Jones lost no time in selecting the principal authors and their collaborators 'partly from my own personal knowledge of them . . . partly from the information of those, in whose judgement I have perfect confidence' but also because they were 'highly revered by the Hindus in Bengal for [their] erudition and virtue': Radhacant Sarman, Sabur Tiwari, Muhammed Kasim, Sirajulhakk, Mahtab Rai, Haji Abdullah and, a couple of months later, the venerable Jagannatha Tarkapancanana.[85] The choice apparently went a long way in allaying mutual mistrust: in one of the rare moments of candour on the subject of trust conferred on the British by Indians, John Shore tells us that '[i]n the dispensations of Providence, it may be remarked, as an occurrence of no ordinary nature, that the professors of the Braminical

[82] Ibid., p. 798.

[83] Ibid., p. 799. Indeed, Jones had already portrayed himself on more than one occasion as 'the Justinian of India'! (See *Letters*, vol. II, pp. 699, 723.)

[84] Commonwealth Relations Office, Bengal Letters Received, vol. 27, pp. 288–9, quoted in *Letters*, vol. II, p. 803.

[85] Letter to the Supreme Council, April 1788, ibid., pp. 801–2.

faith should so far renounce their reserve and distrust, as to submit to the direction of a native of Europe, for compiling a digest of their own laws.'[86]

Apart from supervising the project Jones embarked on a translation of *Al Sirajiyyah, or the Mohammedan Law of Inheritance*, published in 1792, and of the *Manavadharmasastra* which he completed in 1793 under the title *The Institutes of Hindu Law or the Ordinances of Manu*. However, the writing of the digest proved far more ambitious than Jones had imagined and he never lived to see the finished result—he died in Calcutta in April 1794 of hepatitis, leaving a tidy fortune of over £50,000 to Anna Maria Jones—and a lasting, if posthumous, anchorage in gentlemanly society.[87] Jagannatha's *Vivadabhangarnava* ('treatise on putting an end to litigation') was completed in late 1794, shortly after Jones's death, and the task of translating it fell on Henry Thomas Colebrooke. The *Digest of Hindu Law on Contracts and Successions* appeared in four folio volumes in 1797 and 1798.

The Jonesian Legacy Revisited

The fate of the process initiated by Hastings and developed through Jones's ethno-legal syncretism, when considered from the perspective of the subsequent functioning of the EIC's administration in India, makes an interesting story. It has frequently been glossed over by presenting it as the creation of a mere 'discourse [Orientalism] . . . [which] had the effect of converting Indian forms of knowledge into European objects'.[88] However, the story is not so simple and clearly beyond the scope of this chapter. Nevertheless, in this section I shall outline some of its principal features as I see them. In order to do so, let us briefly turn our attention to Jagannatha's *Vivadabhangarnava*.

This text is the characteristic outcome of the new type of collaboration, for it is a hybrid text constructed through a negotiation between legal experts belonging to two distinct cultures and going beyond the scope of pre-existing Hindu law manuals. Derrett was

[86] Shore, *op. cit.* in *Works*, vol. II, pp. 154–5.

[87] For Jones's wealth on his death, see OIOC, Bengal Wills 1793–4, L/AG/34/29/8.

[88] Cohn, *op. cit.*, p. 21.

perhaps the first to remark, albeit condescendingly, on this trait of the *Vivadabhangarnava*:

> Jagannatha has some peculiar views, and harbours peculiar opinions for which no parallel can be found. His attitude to custom and usage is odd: it may be submitted that he accepts judicial practice as law, almost *communis error facit ius*. From where could such a notion have come? Obviously some English lawyer has been consulting with him, putting questions to him, guiding him as to where Hindu learning must somehow be forthcoming. Similarly his comments on a wide range of topics reveal intercourse with a western mind . . . He reveals his being influenced, in his discussions of assignment of debts, the status of 'kings', fraudulent litigation, fraudulent practices, the court's power to appoint guardians, land-revenue settlements, attachments of land and chattels and execution-sales in satisfaction of a decree for debt, 'marksmen', fraud and remedies therefor, fraudulent and mistaken transfers contrasted, also *bona vacantia* and voidable titles, illegal contracts and restitution, also the procedure to discover frauds in partition-accounts. He may have heard of testaments, a possible rationalization of which seems to occur.[89]

Because of its hybrid structure and the immense credit and authority its author commanded among his colleagues, pupils, and the Bengali public, Jagannatha's work was widely approved and used by court pundits and British judges alike. But the *Vivadabhangarnava* was not a legal panacea. For one thing, its author and his synod being Bengali, it had a strong bias towards *Mimamsa* philosophy and *Nyaya* dialectics which did not necessarily form the basis of legal practice elsewhere in the Subcontinent; for another, like any fixed legal text, it could not provide answers to a whole series of unfamiliar questions inevitably raised in a changing society. In the light of new demands, Jagannatha's text was to serve as a model for a spate of supplementary compositions by pundits in the employ of various British-administered courts.[90]

These works in turn formed a corpus prescribed in the syllabus of the Sanskrit College in Banaras, established in 1794 to breed a whole new generation of 'standardized' pundits 'to assist the European judges

[89] John Duncan Martin Derrett, *Religion, Law and the State in India* (London: Faber & Faber, 1968), pp. 247–8.

[90] Ibid., p. 253. Jagannatha's influence apparently reached as far afield as Madras Presidency—see ibid., p. 260.

in the due, regular, and uniform administration of [the] genuine letter and spirit [of Hindu law] to the body of the people', and, from 1805 onwards of 'judge-pundits' (native law officers of district courts).[91] As for Jones's own translation of the *Manavadharmasastra*, it too was to serve—at the College of Fort William and from 1806 onwards at Hayleybury—to 'standardize' the Company's future covenanted servants who, it was hoped, would thus have a firm grounding in Hindu mythography to better understand the complexities of the pundits' interpretations.

The eternal problem of trust for both sides could now hopefully be resolved by raising a whole new generation of 'standardized' Britons and Indians suckled on a standardized and commonly shared legal corpus and mythography. The same can also be said of the Islamic legal texts that emerged from the Jonesian enterprise: they were used to educate the maulavis of the Calcutta Madrassa. The large-scale activity of the production, circulation, and management of the new knowledge could only be carried out within the framework of centralized institutions, with their imperatives of team-work and a strong sense of hierarchy, which had the requisite authority and competence to exercise such control, create hybrid civilities, and thereby resolve the problem of trust.[92] Accordingly, the new corpus, with its accompanying procedures and institutions thus constituted a new, hybrid regime of knowledge, organizing and disciplining both Indian and British functionaries into trustworthy cogs in the machine of government, with commonly shared practices, and introducing among them a sense of security, loyalty and hierarchy along with an *esprit de corps*.

While it is well known that Jones was the butt of utilitarian criticism and late-eighteenth-century attitudes were no longer in vogue in

[91] Letter from Jonathan Duncan, Resident Benares, dated 1 January 1792, to the Earl of Cornwallis, Governor General in Council in Henry Sharp, ed., *Selections from Educational Records*, vol. 2, part 1, 1781–1839 (Calcutta: Superintendent Government Printing, 1920), p. 11.

[92] Svante Lindqvist, 'Labs in the Woods: The Quantification of Technology During the Late Enlightenment', in Tore Frängsmyr, John L. Heilbron and Robin E. Rider, eds, *The Quantifying Spirit in the 18th Century* (Berkeley, Los Angeles, London: University of California Press, 1990), pp. 291–314 deals with the crucial role of centralized institutions in large-scale knowledge production.

Britain by the 1830s, the hybrid civilities instituted by him carried on spreading in the Anglo-Indian administration in spite of the execrable attitudes of British functionaries *vis-à-vis* their native underlings. Indeed, while continuing to enjoy authority in the judicial domain until the abolition of the Supreme Court and the Sadr Diwani Adalat in 1862, terms like 'pundit', 'munshi', and 'maulavi' were progressively associated with new social, literary, and material practices. As we shall see in the next chapter, by the turn of the nineteenth century, pundits and maulavis, transformed from private language teachers and juriconsults to state-salaried officials, were being employed in a host of other Anglo-Indian administrative, educational, and technical institutions.

The loosely bonded personal relationships between individual Britons and their language teachers now gave way to salaried, trustworthy-because-standardized, Indians, who were making their careers within colonial institutions, loyal to them and involved in the production and dissemination of reliable hybrid knowledge. In the course of the nineteenth century, as the last chapter will bring out, callings like 'pundit', 'munshi' and 'maulavi' had found their way into other nerve centres of the Indo-British 'information order', like the highly prestigious Great Trigonometrical Survey of India.

For all its resemblance to the modern condition described by theoreticians like Luhmann and Giddens, who identify modernity precisely with this shift in the investment of trust from personal familiarity to the anonymity of faceless institutions, this new situation could in no way be assimilated to it.[93] It must be pointed out that these institutions were not open to all and sundry: potential entrants were carefully selected from narrow groups in each society that were worthy of trust bestowal, and patronage continued to play a crucial role.

Even as Jones's ethnology worked its way out of Britain in the second half of the nineteenth century to feed into Continental, especially German, race theory, the Anglo-Indian administrative machine continued to chant the credo of common ethnic origins, a credo which underpinned the very possibility of government based on a plurality of civilities.

[93] See Nicholas Luhmann, *Truth and Power: Two Works* (Chichester: John Wiley, 1979), and Anthony Giddens, *The Consequences of Modernity* (Stanford: Stanford University Press, 1989).

The currently fashionable picture paints Indians as mere 'informants', persuaded to reveal their traditions to the British conquerors who, in turn, reduced them to passive objects of what is termed 'colonial knowledge', opening the way to the imposition of European categories upon their traditional beliefs and social practices.[94] The present appraisal points instead to an active, though assymetrical, indigenous participation both in the *making* of new administrative knowledge—knowledge which would not have existed but for the new context—and in the moulding of British and Indian civilities in such a way as to render them commensurable. It thus implies a radically different anthropology from that commonly espoused—which conceives of cultures as organically unified or traditionally continuous; it treats them instead as negotiated, ongoing, and mutually entangled processes.[95] It also shows that the story of knowledge production in intercultural contexts is far more complex than has commonly been admitted: the manifold and problematic engagements of colonizers and colonized are part of a shared history with profound ramifications in the present—and Jones's itinerary and project help bring to light some of these complexities.

[94] See, in particular, the contributions of Rosane Rocher, David Ludden and Nicholas B. Dirks in Breckenridge and van der Veer, eds, *op. cit.*, and Cohn, *op. cit.* Even Bayly, who, in bringing to the fore native Indian collaboration in the culling of information in his *Information and Empire* is far more nuanced than the naively romantic position of these authors, finally betrays the same essentialist dichotomy between Indians and British: 'indigenous police descriptions and sociological understandings of the classes of beings were incorporated into the British canon by means of the testimony of native informants. Of course, this information was reclassified and built into hierarchies which reflected the world view of the Britons of the early nineteenth century. Nevertheless, Indian sociologies . . . were active, not passive elements within these constructs, and Indians almost immediately began to critique them from the inside.' *Empire and Information*, p. 179.

[95] See Nicholas Thomas, *Entangled Objects. Exchange, Material Culture, and Colonialism in the Pacific* (Cambridge, MA & London: Harvard University Press, 1991).

CHAPTER 4

British Orientalism in the Early Nineteenth Century, or Globalism *versus* Universalism

Introduction

The end of the eighteenth century is commonly considered crucial in the transition from the gentleman-amateur tradition based on private initiative in science in Britain (but also elsewhere in Europe) to one based on organized public instruction and research. This story is normally told as a purely European one, which then affected the rest of the world inasmuch as this newly institutionalized form of science was progressively deployed in the service of European empires and their hegemonic designs. As we shall see in this chapter, however, the College of Fort William in Calcutta, established in the context of the Napoleonic wars, was to be the locus of a crucial reorientation in the conception of science and government concomitant with a change in the nature both of the ruling elites in India and in Britain, and of society from agrarian to industrial. The college was to partake in this transition, whereby science became organized so as to serve as the grammar of an increasingly globalized industrial society, as its ideology, its set of rules, and, indeed, its working metaphysics.

I argue here that the institutionalization of Orientalism in India was also a way of redeploying the local (both in India and in Britain) and long-distance networks of the EIC to counter the perceived threat of the spread of French revolutionary ideas of liberty, equality, and fraternity. I thus also address the crucial question of science and empire studies—control at a distance.

Britain and the French Revolution

The aftermath of the French Revolution slowly but surely drove a wedge through British society at the close of the eighteenth century. Revolution societies and reform clubs alike saw the Revolution as the Gallic equivalent of the English Glorious Revolution of 1688 and took pride in the fact that it followed hard on the heels of the centenary celebrations in Britain. Many even openly adhered to the egalitarian ideals of the Revolution: in an address to the French National Convention, the London Corresponding Society founded by one Thomas Hardy (1752–1832) in 1792, declared: '[w]e can with confidence assure you . . . that at present all men ask each other—What is Liberty? What are our rights? Frenchmen, you are already free, but the Britons are preparing to be so.'[1] Others, like the Society for Constitutional Information, went even further, sending a thousand pairs of shoes to Calais for the French 'soldiers of liberty', paid for by 'patriotic donation', with a promise to 'continue sending a thousand pairs a week for at least six weeks to come'.[2] If not actually favourably disposed towards the French revolutionaries, many politicians, even among the Whigs, were at least neutral towards them. Many welcomed it simply because the upheaval was bound to weaken Britain's old rival. The prime minister, William Pitt the Younger (1759–1806), and his cabinet clearly looked for peaceful relations with France.

One of the few voices that rose as early as 1790 to criticize the French Revolution was that of Edmund Burke (1729–97). Although an ardent defender of both the Glorious and the American Revolutions—because they restored people's traditional and hereditary rights usurped by unjust rulers—Burke reacted sharply to the egalitarian and libertarian claims of the French revolutionaries and calls by English radicals and dissidents for deep social and political reform in Great Britain. In his *Reflections on the Revolution in France*, published in

[1] British Library, Burney Collection, vol. 841: *The London Chronicle*, LXXII, no. 5653 (10 November to 13 November 1792), p. 461. See also Michael T. Davis, ed., *London Corresponding Society, 1792–1799* (London: Pickering & Chatto, 2002).

[2] Public Records Office, London, TS 11.952.3496, John Frost and Joel Barlow to the Society for Constitutional Information, 29 November 1792.

1790, he argued that a society based on equality is against the very nature of things and thus impossible to realize. Moreover, proponents of egalitarian ideas do enormous wrong to society for, in claiming that real differences between individual humans are but illusory, they inspire 'false ideas and vain expectations into men destined to travel in the obscure walk of laborious life'.[3] Worse still, in the name of equality, they open the door to people of modest rank to functions of responsibility:

> The occupation of an hair-dresser, or of a working tallow-chandler, cannot be a matter of honour to any person—to say nothing of a number of other more servile employments. Such descriptions of men ought not to suffer oppression from the state; but the state suffers oppression, if such as they, either individually or collectively, are permitted to rule. In this you think you are combating prejudice, but you are at war with nature.[4]

As for liberty, Burke objected that it 'stands stripped of every relation, in all the nakedness and solitude of metaphysical abstraction'.[5] The dispatching of troops to act against separatist movements in Martinique and Saint Domingue (Haiti) and the decree depriving coloured people of their rights provided him with the opportunity to unmask the 'real' nature of the Universal Rights of Man founded on reason, or the 'Crimes from the Right of Man', as he noted elsewhere: 'As the colonists rise on you, the negroes rise on them. Troops again—Massacre, torture, hanging! These are your rights of men! These are the fruits of metaphysical declarations wantonly made, and shamefully retracted! . . . You lay down metaphysic propositions which infer universal consequences, and then you attempt to limit logic by despotism'.[6] And, indeed, the French declaration of war against Britain in 1793, a war that was to last for twenty-two years, surpassed Burke's worst

[3] Edmund Burke, *Reflections on the Revolution in France*, in idem, *The Writings and Speeches of Edmund Burke*, vol. VIII, ed. Leslie George Mitchell (Oxford: Oxford University Press, 1989), pp. 53–293; this quote pp. 87–8.

[4] Ibid., pp. 100–1.

[5] Ibid., p. 58.

[6] Ibid., pp. 268–9. The qualification of crime appears in Burke's annotation of his copy, held in the Bodleian Library, of Cormier's *Mémoire sur la situation de Saint-Domingue, A l'époque du mois de janvier 1792* (Paris, 1792), p. 23.

fears: it was no longer 'Liberty' and 'Equality' founded on Reason that had to be combated—rather, it was 'Equality' and 'Universality', imposed by the force of arms!

The war gave rise to unprecedented antagonisms within British society. Radicals and reformers continued to criticize the government for adopting a hostile attitude to France and for allying with a confederation of absolutist monarchs. Already confused and divided on various issues, the Whigs found their loyalties even further dissipated.

In the wake of runaway inflation, crippling taxes, and trade disruption, radical whisperings grew more audible, the Corresponding Societies made preparations for their own shadow cabinet (called the Convention), growing numbers protested against the war, giving rise to massive strikes—a third of the eighteenth century's strikes took place in the 1790s—and naval mutinies. In retaliation, the government responded by progressively abrogating constitutional freedom: suspension of the Habeas Corpus in 1794 and again in 1798; promulgation of the Treason and Sedition Act (1795), the Unlawful Oaths Act (1797), the Corresponding Societies Act (1799), and, finally, a ban on public meetings. But, however much British society was divided on the war, everyone in Britain seemed to agree that, in the light of the fragility of power in France, this was an ideal moment to capture profitable French colonies. Thus, along with the West Indies, the British lost no time in capturing all the French settlements in India.[7]

However, in pursuing these aims, Britain wastefully dispersed itself, and France not only held out but managed to swing the war to its advantage, taking control of the Mediterranean in the winter of 1796. In 1797, Britain found itself isolated in Europe. Its only ally, Austria, had capitulated; constrained to retreat from the Mediterranean, Britain narrowly escaped being invaded by a French expeditionary force operating in concert with Irish insurgents. A mutiny broke out in the Channel Fleet of the Royal Navy and soon spread to the Dutch and Spanish coasts and the Cape of Good Hope. And, although Burke died

[7] Henry Dundas, Chairman of the Board of Control and Secretary for War, wrote to Wellesley explaining his basic principle 'that the way to defeat France is to take all her colonies and to destroy her trade'. Board's Secret Drafts, 2, 31 October 1799. Quoted in Cyril Henry Philips, *The East India Company, 1784–1834* (Manchester: Manchester University Press, 1961), p. 101.

in the very year 1797, isolated and bitter, his ideas were already beginning to make their way into mainstream political and social thought, both Tory and Whig.[8]

India, Britain, and France at the Turn of the Nineteenth Century

It was in this political climate that Lord Mornington, better known by his real name, Richard Wellesley (1760–1842), was appointed governor general of the Indian territories of the EIC in 1797. A convinced free-trader, this Irish aristocrat, like his younger brother Arthur Wellesley (the future Duke of Wellington), was a fierce opponent of the French Revolution.[9] A fervent admirer of Burke's thoughts on this matter—and I would contend, in most others as well—he feared that the 'scoundrel Paine[s]' writings 'may do mischief in ale-houses in England, and still more in whisky-houses in Ireland', concluding that one ought to 'hang the fellow, if you can catch him'.[10] Moreover, having already served on the EIC's Board of Control, he was well abreast of the overall situation in the Indian subcontinent and of the territorial ambitions of the French there.

Disquieting news awaited the new governor general on his arrival at Calcutta in 1798: from the local press he learned of Napoleon's project of attacking India from Egypt.[11] He was also informed of the

[8] This thesis is most convincingly developed in Harry Thomas Dickinson, ed., *Britain and the French Revolution, 1789–1815* (Basingstoke & London: Macmillan, 1989). For a general history of this period, see Clive Emsley, *Britain and French Revolution* (London: Longman, 2000); John Harold Plumb, *England in the Eighteenth Century* (Harmondsworth: Penguin, 1950); and Roy Porter, *English Society in the Eighteenth Century* (London: Penguin, 1991, 2nd edn).

[9] See, for instance, his speech in Parliament to defend continuing the war with France in 1794, quoted fully in William Torrens McCullagh Torrens, *The Marquess Wellesley, Architect of Empire: An Historic Portrait* (London: Chatto & Windus, 1880), pp. 101–8.

[10] Historical Manuscripts Commission, Manuscripts of J.B. Fortesque, Drop-more Papers, vol. II, p. 126 (August 1791), quoted in Iris Butler, *The Eldest Brother. The Marquess Wellesley, the Duke of Wellington's Eldest Brother* (London: Hodder & Sloughton, 1973), p. 68.

[11] Walter Scott Seton-Karr, *Selections from the Calcutta Gazette*, 5 volumes (Calcutta: Military Orphan Press, 1864), vol. III, pp. 201–2.

landing of French troops and military advisors on the Malabar coast to help their most important Indian ally, Tipu Sultan, mount an offensive against British interests in the peninsula. A Calcutta newspaper carried a proclamation by Anne Joseph Hyppolite Malartic, governor of the Isle de France (present-day Mauritius), announcing a mutual defence alliance between the French and Tipu, and exhorting French officers to volunteer for service with the latter.[12] He learned likewise of the presence of Frenchmen at the head of the Nizam of Hyderabad's 14,000-man army.[13]

On 26 November 1798 the Secret Committee of the EIC sent Wellesley a despatch informing him of Napoleon's conquest of Egypt.[14] And in spite of the reassuring news of Nelson's victory at the Battle of the Nile, another letter, dated 19 April 1799, asked him to seriously consider a pre-emptive attack on Egypt to 'amuse [Napoleon] from the Red Sea with one of your Indian Brigades'.

Wellesley lost no time in acting.[15] He sent a 3000-strong force made up largely of Indian soldiers to Egypt in order to dissuade the French from any project of organizing a terrestrial invasion of India.[16] He despatched Mehdi Ali Khan, the Company's resident at Bushehr (in the Persian Gulf), and John Malcolm to Persia to persuade the Shah

[12] See Torrens, *op. cit.,* p. 155; and OIOC, Home Miscellaneous Series H/572, ff. 5–7.

[13] See James Kirkpatrick, 'A View of the State of the Deccan, 4th June 1798', British Library, Wellesley Papers, Add. MSS 13582.

[14] Despatch, dated 26 November 1798, from the Secret Committee to the Governor General in Council, and to the Governments in India, extracts from which are printed in *Review of the Affairs of India, from the Year 1798, to the Year 1806; Comprehending a Summary Account of the Principal Transactions during that Eventful Period* (London: 1807), p. 15. See also Despatch, dated 18 June 1798, printed in Richard Wellesley, *The Despatches, Minutes and Correspondence, of the Marquess Wellesley, K.G., During his Administration in India*, ed. Robert Montgomerie Martin, 5 volumes (London: W.H. Allen & Co., 1836), vol. I, pp. 61–4.

[15] OIOC, Home Miscellaneous Series, IOR/H/572, pp. 67–235: Governor General's Minute concerning the political situation in India and measures to be adopted in reference to Tipu.

[16] Letters from the Marquess Wellesley to Major General Sir David Baird, dated 10 February 1801, in Wellesley, *op. cit.*, vol. II, pp. 440–52.

to offer his aid in the eventuality of a French terrestrial invasion. He organized a pre-emptive attack on Hyderabad, taking the French commanders completely by surprise, holding them prisoner and liberating the Indian troops.[17] And, he entrusted his brother, Colonel Sir Arthur Wellesley, commanding officer of His Majesty's 33rd Foot Regiment, under the leadership of General George Harris with the task of containing the French militaro-universalist push in the peninsula. The British armies, massively assisted by the Nizam of Hyderabad's troops, attacked Mysore in March 1799. Tipu was killed at Seringapatam on the 4th of May and Wellesley definitively put an end to French schemes in India. Half of Tipu's territories were put under the direct rule of the Company and the rest restored to a puppet—the child heir of the erstwhile rajas of Mysore.

Taking personal charge of an offensive against the French on the ideological and political fronts, Wellesley set about promulgating new laws to contain radical thought in Calcutta by imposing a draconian censorship on the local press, and visas for all Europeans unofficially present in India.[18] And in order to check the spread of the egalitarian message of the French Revolution among the junior servants of the Company, he drew up an astonishing scheme, using the change in the Company's circumstances from a trading presence to a ruling administration as a springboard to launch it.

[17] Letter from the Earl of Mornington to the Court of Directors, dated 21 November 1798, in ibid., pp. 351–60.

[18] OIOC, Home Miscellaneous/H/537, pp. 339–59: Imposition of censorship 1799; and pp. 365–95: Special prohibitory orders issued 1801–8 to Editors and Printers of the *Calcutta Gazette, Asiatic Mirror, Hircarrah, Star, India Gazette, Morning Post, Oriental Star, Telegraph, Orphan*, and *Mirror*. See also Mornington to J. Lumsden, 23 December 1798, in Wellesley, *op. cit.*, vol. I, p. 386; Seton-Karr, *op. cit.*, vol. III, pp. 17–18, and H.E.A. Cotton, 'The Story of James Paull', *Bengal Past and Present*, XXVIII (July–December 1924), pp. 69–109, especially 77–9; and Charles Maclean, *The Affairs of Asia Considered in their Effects on the Liberties of Britain, In a Series of Letters, Addressed to the Marquis Wellesley, Late Governor-General of India; Including A Correspondence with the Government of Bengal, under that Nobleman, and a Narrative of Transactions, involving the Annihilation of the Personal Freedom of the Subject, and the Extinction of the Liberty of the Press in India: with the Marquis's Edict for the Regulation of the Press* (London: 1806, 2nd edn).

A College to Counter the French

In a note dated 10 July 1800, Wellesley laid out his plan to the EIC's Court of Directors in London.[19] He began, in much the same way as Burke had done twelve years previously when opening the impeachment of Warren Hastings, with an analysis of the Company.[20] Its conquests in eastern and southern India in the latter half of the eighteenth century, he stated, now constituted an enduring empire larger in size than most European states, and this had radically transformed the nature of its activities and responsibilities. In particular, they called for certain specific obligations on the part of the Company's employees:

> To dispense justice to millions of people of various languages, manners, usages and religions; to administer a vast and complicated system of revenue throughout districts equal in extent to some of the most considerable kingdoms in Europe; to maintain civil order in one of the most populous and litigious regions of the world; these are now the duties of the larger proportion of the civil servants of the Company. The senior or junior merchants, employed in the several magistracies and Zillah Courts, the writers or factors filling the stations of registers and assistants to the several courts and magistrates, exercise in different degrees, functions of a nature, either purely judicial, or intimately connected with the administration of the police, and with the maintenance of the peace and good order of their respective districts.

Wellesley then embarked on a description of the nature of court proceedings in Company-administered territories, pointing out that the pleadings were conducted in the various languages of the Subcontinent. Furthermore, the laws which the Company's servants had to administer were not those of Britain, but those 'to which the natives had long been accustomed under their former sovereigns, tempered and mitigated by the voluminous regulations of the Governor-General

[19] Richard Wellesley, 'Notes on the Foundation of a College at Fort William, 10 July 1800', in idem, *op. cit.*, vol. II, pp. 325–55.

[20] The resemblance in structure and content of Wellesley's note to Burke's speech when opening the impeachment of Warren Hastings is too great to be fortuitous. See Edmund Burke, *The Writings and Speeches of Edmund Burke*, vol. VI, ed. Peter James Marshall (Oxford: Oxford University Press, 1991), p. 280 *et seq*.

in council, as well as by the general spirit of the British constitution'. The same applied to the reckoning and collection of taxes as well as to commercial contracts. All this demanded an understanding and knowledge of administrative, trading, and banking conventions very different from those that operated in Europe.[21] Thus, training in the languages, laws, usages, and customs of the Subcontinent was henceforth indispensable for all servants of the EIC.

Although the 'denominations of writer, factor, and merchant' were now 'utterly inapplicable to the nature and extent of the duties discharged, and of the occupations pursued by the civil servants of the Company'—the more so since they were now required by solemn oath to abstain from any commercial activity—the vast majority of recruits to the EIC, arriving in India between the ages of fourteen and eighteen with only a rudimentary knowledge of merchant accounts, continued to carry these ranks and were thoroughly unprepared for this new role.[22] Moreover, without any education in traditional cultural and moral values, a large number of them succumbed to a life of 'indolence, dissipation, and licentious indulgence'.[23] In these circumstances, and in order to discharge their wide-ranging duties, a novel system of education had to be conceived of, 'involving the combined principles of Asiatic and European policy and government'.

All this led up to Wellesley's main mission: according to him, it was incontrovertible that,

> during the convulsions with which the doctrines of the French Revolution have agitated the Continent of Europe, erroneous principles of the same dangerous tendency had reached the minds of some individuals in the civil

[21] Wellesley, 'Notes . . .', pp. 327–8.

[22] Ibid., p. 326. Cf. Burke's observation that 'the India Company however still preserved traces of its original mercantile character; and the whole exterior order of its service is still carried on upon a mercantile plan and mercantile principles. In fact, it is a State in disguise of a Merchant, a great public office in disguise of a Countinghouse.' Opening of Impeachment, 15 February 1788, in idem, *op. cit.*, vol. VI, p. 283. The rule of three and some knowledge of merchant's accounts was all that was required of aspiring candidates to the Company's service. See Anthony J. Farrington, *The Records of the East India College Haileybury & Other Institutions* (London: Her Majesty's Stationery Office, 1976), p. 4.

[23] Wellesley, *op. cit.*, pp. 326–7. Cf. Burke's observation quoted above, note 22.

> and military service of the Company in India; and the state, as well of political, as of religious opinions, had been in some degree unsettled. The progress of this mischief would at all times be aided by the defective and irregular education of the writers and cadets; an Institution tending to fix and establish sound and correct principles of religion and government in their minds at an early period of life, is the best security which can be provided for the stability of the British power in India.[24]

The Indian part of these principles, in his scheme, was to be taught by indigenous savants. Echoing Burke's analysis of the strict hierarchical nature of Indian society in his opening speech on the impeachment of Warren Hastings, Wellesley argued then for an education to inculcate in the future writers of the Company the necessity of stable social structures, like those he and Burke perceived in the Indian subcontinent, to counter pernicious Gallic egalitarian ideas.[25]

For all these reasons, and because no appropriate educational institution existed at the time in Europe or in India to meet these desiderata, Wellesley wrote of his decision to found a college in Calcutta—at Fort William. The decree promulgating the College is dated 4 May 1800 . . . the first anniversary of the death of Tipu. Comparable in size and diversity of means to Oxford and Cambridge, it was formally inaugurated on 24 November 1800. Besides Latin and Greek, English and Natural History, Natural and Experimental Philosophy, Chemistry, Astronomy, Economics, Political Economy and Geography, the new recruits were to spend three years there from the day they set foot in India to learn Arabic, Persian, Sanskrit, six Indian vernaculars—Hindustani, Bengali, Telugu, Marathi, Tamil and Kannada—Hindu, Islamic and English law, European history—and Indian history and antiquities.[26] Many of these subjects were to be taught at Fort William by erudite indigenes.

[24] Wellesley, *op. cit.*, p. 346.

[25] It is interesting again to compare this idea of stable hierarchical social structures to Burke's description of Hindu society and the parallels he draws between the Brahmins and the English nobility. See Burke, *op. cit.*, vol. VI, p. 303 *et seq*. See also his speech on Fox's India Bill, 1 December 1783, in *op. cit.*, vol. V, pp. 389–90.

[26] Wellesley, 'Regulation for the Foundation of the College of Fort William in Bengal', *op. cit.,* pp. 356–61.

Although these domains had never figured on the curriculum of any university in Europe, a precedent for their study did exist in India. Indeed, as we saw in the previous chapter, Warren Hastings had devised a policy of large monetary incentives to encourage the Company's covenanted employees to gain knowledge of indigenous legal and fiscal thought and practices, as also of the region's antiquities, natural history, topography, local languages and customs, dietary habits, and general living conditions. However, this policy only had a limited success inasmuch as most of the Company's employees, besides not having the intellectual wherewithal to tackle them, were not interested in these questions. The few who did respond to Hastings' scheme learned about local lore and languages from their munshis who already served them as interpreters, bankers, and intermediaries in their everyday dealings with indigenous merchants.[27]

We also saw that the Asiatic Society of Bengal, founded in 1784, far from constituting a group of enlightened savants cut off from the materiality of the world and dedicated to the discovery of India's glorious past, was a powerful instrument in organically linking the administrative, economic, and political life of the emerging British empire to the mainstream of antiquarian and other knowledges that were emerging in Europe and North America in the late eighteenth and early nineteenth centuries.[28] And although no indigene was admitted as a formal member of the Society in the first decades of its existence, a number of them collaborated in its activities and a few texts written by them appeared in its journal. A large number of the contributions published in the first five volumes of *Asiatick Researches* published till the end of the eighteenth century dealt with the history, economy, classical languages, arts, and social structure of South Asia. They share two characteristics: Hinduism is a very old monotheistic religion, and

[27] On munshis, see Muzaffar Alam and Sanjay Subrahmanyam, 'The Making of a Munshi', *Comparative Studies of South Asia, Africa and the Middle East,* vol. 24, no. 2 (2004), pp. 61–72.

[28] For the development of Antiquarianism in Britain, see John Gascoigne, *Joseph Banks and the English Enlightenment: Useful Knowledge and Polite Culture* (Cambridge: Cambridge University Press, 1994); and Rosemary Sweet, *Antiquaries: The Discovery of the Past in Eighteenth-Century Britain* (London: Hambledon & London, 2004).

Fig. 13a: The Public Exchange and Coffee-House Building, behind Tank Square, where the College of Fort William was first housed before being shifted . . .

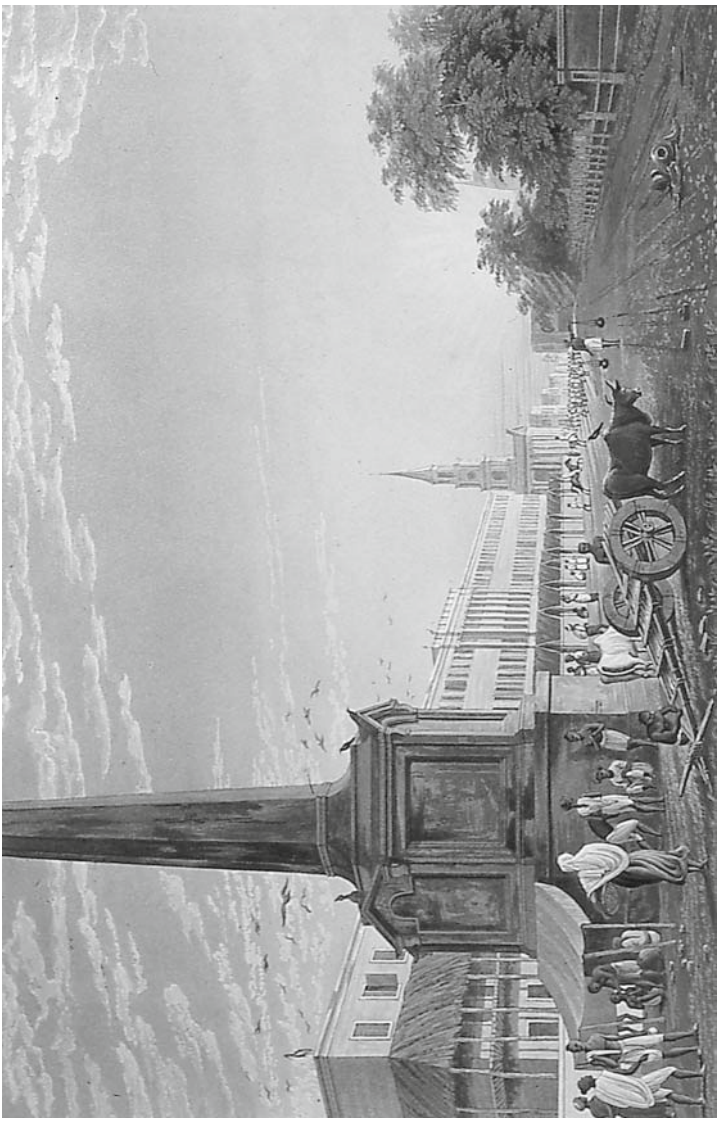

Fig. 13b: . . . to the Writers' Building on the other side of the Square

the hierarchical social structure (founded on inequality) makes India a fortunate society.

However, membership of the Asiatic Society was a personal affair, depending entirely on the inclinations of individuals and on the willingness of the Society's members to elect them to this select club. Besides, the Society offered no instruction in the domains it dealt with. Now, by the end of the century, it had become necessary to know the languages and laws of the land and it was no longer left to the goodwill of the civil servants of the Company to learn them. On 21 December 1798, Wellesley had already decreed that

> no Civil Servant should be nominated to certain offices of trust and responsibility until it shall have been ascertained that he is sufficiently acquainted with the laws and regulations enacted by the Governor General in Council, and the several languages, the knowledge of which is requisite for the due discharge of the respective functions of such offices. [N]o servant will be deemed eligible to any . . . offices [of responsibility], until he shall have passed an examination (the nature of which will be hereafter determined) in the laws and regulations, and in the languages, a knowledge of which is hereby declared to be an indispensable qualification for such respective office.[29]

In setting up his 'University of the Orient', Wellesley was seeking on the one hand to make up for this shortcoming in making instruction in 'Orientalism' obligatory and on the other to institutionalize the relationship between the British and their indigenous intermediaries, which until then had been constructed on an individual, and thus informal, basis. As instructors for this new institution, he chose members of the Asiatic Society and their autochthonous collaborators: British 'Orientalists' and South Asian savants shared the teaching. In addition to teaching, the College organized and encouraged expeditions into Company-administered territories in order to look for, and acquire, new manuscripts for its library. By 1805 its faculty had succeeded in systematizing the grammars and constructing dictionaries of a number of the region's vernacular languages. Thus, these languages were standardized in order to be taught to large numbers.

[29] Deliberation of Governor General in Council, Fort William, Public Department, 21 December 1798, in Seton-Karr, *op. cit.*, vol. III, p. 22.

During its first three years, the College had spent the pretty sum of £250,000, comparable to the expenses of the two English universities.[30] In its first year alone, the expenditure on its various activities had added up to £78,750, with the European professors earning around £320 a month and the Asian faculty between a fiftieth and a tenth of that sum.[31]

The College in the Context of British Institutions

One can, of course, reason—as indeed some historians have—that on crossing the Cape of Good Hope, many Britons underwent a mysterious transformation, rendering them as strange as the Orient they were headed for, and that all the aforesaid were the idiosyncratic doings of a British aristocrat, with effects limited to the Indian administration and without any wider repercussions on British society 'at home'.[32]

Three considerations help throw light on this question. The Board of Control was actually quite enthusiastic about the Fort William College project. Only a few evangelicals protested against the dangers of losing Christian values on an intensive exposure to those of the Subcontinent. Desirous of introducing a training in natural and experimental philosophy and anticipating the difficulty of finding a suitable teacher over there, the Company's directors sent a Scottish savant, James Dinwiddie (1746–1815), to Calcutta at their own expense. One of the Board of Trade's experts on the East, Dinwiddie was also abreast of the latest French innovations in explosives.[33]

Wellesley's inordinate spending in the early years of the College's existence understandably did not go down well with the Company's shareholders, already deprived of dividends because of a severe financial crisis. The governor general, however, received the unconditional

[30] Farrington, *op. cit.*, p. 6.

[31] NAI, Home Miscellaneous Series, 'Proceedings of the College of Fort William', DLIX (April, May, October 1801).

[32] See, for instance, Eric Stokes, *The English Utilitarians and India* (Oxford: Clarendon Press, 1959).

[33] William Jardine Proudfoot, *Biographical Memoir of James Dinwiddie LLD Astronomer in the British Embassy to China, 1792–1793* (Liverpool: Edward Howell, 1866), pp. 98–9; and James Dinwiddie, *Syllabus of a Course of Lectures on Experimental Philosophy* (London: A. Grant, 1789).

backing of fellow Irishman and conservative Lord Castlereagh, appointed chairman of the Board of Control in 1802, who was quick to appreciate its potential anti-Revolutionary value. Unable to put a complete stop to Wellesley's initiative, the shareholders settled for a compromise: the teaching of European culture was to be shifted to England and dispensed before the cadets left for India. In the words of one of the Company's directors, David Scott, 'the College was sacrificed to the private trade agitation'.[34] In spite of this, Wellesley's plan of associating European and Indian teachers was maintained. When, in 1806, the East India College opened at Haileybury, Indian instructors were brought over in order to participate in the training of the Company's future employees, alongside great English savants like the political economist Thomas Malthus. Wellesley's scheme reappeared in the curriculum of the new metropolitan establishment.[35] Between 1801 and its final dissolution in 1831, the College of Fort William received about forty cadets annually. After having spent anywhere between ten and twenty years in India, these men would return to Great Britain to live as 'nabobs', or to serve as senior functionaries of the EIC, or else as politicians—the more successful among them even got elected to Parliament—or, for some, as men of science. Lastly, it is important to note that the spearheads of the educational reforms of the early 1830s in Britain and India, in particular James Mill and Thomas Babington Macaulay, were all leading protagonists in the debates around the College of Fort William. Wellesley's scheme of the Fort William College finally led to the spawning of a new middle class whose loyalty was to a professional network—skilled function and organization being determinants of consciousness and identity.

With the dissolving of the EIC in 1858 and the closure of Haileybury, the training of Indian Civil Service probationers was shifted to Oxford. The Sanskrit inscription on the foundation stone of the Indian Institute, established there in 1883 and at present housing the

[34] British Library, Eur. MSS E.176, f. 698, 23 April 1802. Grant wrote: 'Wellesley himself inadvertently furnished the means of his defeat. His letter to the Court on enlarging the privilege of private traders arrived opportunely for that party to support their declining cause.' Cited in Philips, *op. cit.*, p. 127.

[35] Ibid., pp. 104–6.

university's Modern History faculty, acknowledged the common origins of worthy administrators on which the whole colonial apparatus was founded:

> This Building, dedicated to eastern sciences, was founded for the use of Aryas (Indians and Englishmen) by excellent and benevolent men desirous of encouraging knowledge. . . . By the favour of God may the learning and literature of India be ever held in honour, and may the mutual friendship of India and England constantly increase.

Even if the theory that the British in India were a deviant lot does not hold, at least in this case, and even if it cannot be thought beyond doubt that Wellesley's training schemes in India had a crucial effect on educational policy in Britain and its empire, I would like to warn the reader not to succumb to the lures of the opposing thesis—according to which colonial India served merely as a laboratory for the construction of modernity: that reforms were adopted in the metropolis only if they had been successfully applied in India.

In concluding, I would like to suggest a completely different interpretation. However avant-garde the project of the College at Fort William might seem, it was not unique in early-nineteenth-century Britain—it derived its essential character from factors far more pervasive than the desires of a single individual. Indeed, it partook of the same movement that prompted a number of English reformers to use the fears generated by the French Revolution to their advantage, coupled with the opportunities opened by that other revolution that was rocking Britain at the same time—the industrial revolution—in order to develop programmes of public instruction aimed at keeping the peace.[36] According to them, the application of the spirit of enterprise that the industrial revolution had given rise to would ultimately reduce rural poverty and hence the threat of social cataclysm. Science and religion were comfortable bedfellows: the Reverend William Paley, for example—whom John Maynard Keynes placed high among the intellectual influences shaping Malthus's political economy and believed his influence at Cambridge for a time was second only to

[36] See Eric J. Hobsbawm, *Industry and Empire* (London: Weidenfeld & Nicolson, 1968), p. 18.

Newton's—popularized the notion of hierarchy in nature as a scientific verification of hierarchy in society.[37] And, driven by utilitarian 'scientific philanthropy', both the Society for Bettering the Condition of the Poor and the Board of Agriculture tried to introduce programmes for public instruction.[38] Borne by a constellation of metropolitan and colonial institutions, this ideology was to determine the way British society and its ever-expanding empire sought to reorganize themselves in order to insure British supremacy during the course of the nineteenth century. The dual revolution had created new attitudes to knowledge, education, and social control, and the French Revolution was not just an interesting backdrop for the new institutions. Instead, it generated the need for a different kind of institution to respond to its challenges and influenced the nature of institutional activity.

The most successful institution of this type was undoubtedly the Royal Institution. Created in 1799 with private funds, the Royal Institution's 'proprietors' included a number of directors and shareholders of the EIC. Indeed, more than a third of the first set of fifty-eight

[37] John Maynard Keynes, *Essays in Biography* (London: Macmillan, 1933), p. 108. See also Dan Lloyd LeMahieu, *The Mind of William Paley: A Philosopher of his Age* (Lincoln, NE & London: University of Nebraska Press, 1976).

[38] David Owen, *English Philanthropy 1660–1960* (London: Oxford University Press, 1965), p. 105; For a clear and unambiguous expression of this philosophy, see Humphry Davy, 'Elements of Agricultural Chemistry, in a Course of Lectures for the Board of Agriculture; Delivered between 1802 and 1812', Lecture I: 'It is from the higher classes of the community, from the proprietors of land,— those who are fitted by their education to form enlightened plans, and, by their fortunes, to carry such plans into execution: it is from these that the principles of improvement must flow to the labouring classes of the community; and in all classes the benefit is mutual; for the interest of the tenantry must be always likewise the interest of the proprietors of the soil. The attention of the labourer will be more minute, and he will exert himself more for improvement, when he is certain he cannot deceive his employer, and has a conviction of the extent of his knowledge. Ignorance in the possessor of an estate, of the manner in which it ought to be treated, generally leads either to inattention or injudicious practices in the tenant or the bailiff. '*Agrum pessimum mulctari cujus Dominus non docet sed audit villicum*'. In idem, *The Collected Works of Sir Humphry Davy, Bart*. ed. John Davy, 9 volumes (London: Smith, Elder & Co, 1839–40), vol. VII, p. 197.

proprietors were associated with the latter.[39] Like the Calcutta college, the Royal Institution was created out of the same anxieties—to form a bulwark against the French Revolution by instilling into the poor appropriate political and social attitudes through scientific education. It is interesting to note that two of its proprietors and old East India hands, Richard Joseph Sulivan and John Cox Hippisley, put forward a scheme in 1799 for the training of future employees in the ever-expanding British empire, a scheme which sounds strangely similar in its general philosophy to that of Wellesley.[40]

In addition to providing scientific expertise to the Board of Trade and to the EIC especially with regard to questions related to the chemistry of gunpowder, agricultural products, and the preservation of leather, the Royal Institution had an ambitious programme of scientific lectures for the general public, the publication of a scientific journal, a collection of scientific instruments, and a laboratory for public demonstrations.[41] London society flocked to watch its 'wizard experimentalist', Humphry Davy (1778–1829). In making his inaugural address in 1802, the latter assured his audience that science proves that society is necessarily and rightly founded on the twin principles of property and inequality:

> The unequal division of property and of labour, the difference of rank and condition amongst mankind, are the sources of power in civilized life, its moving causes, and even its very soul; and in considering and hoping that

[39] Morris Berman, *Social Change and Scientific Organization: The Royal Institution 1799–1844* (Ithaca: Cornell University Press, 1978), p. 78.

[40] Ibid., pp. 83–4. It is commonly believed that it was the 'younger brother' who saved England from France. Richard's role is never mentioned, relegated to the Indian chapter of history. It is, however, also very much part of the history of Great Britain and its strategy of global connectedness against French hegemonic universalism. It is not common to see the College of Fort William, the Royal Institution and the Board of Agriculture as a triad, but it was the same set of social and economic developments that brought them into being and gave them a similar, if not common, agenda; and it was roughly the same group of men who sat on their governing bodies.

[41] For its role as scientific expert to the EIC, see OIOC, Home Correspondence, Miscellaneous Letters Sent, E/1/239, f. 141 William Ramsay to the Earl of Dundonald, 16 June 1803; Correspondence with India, Bombay Despatches, E/4/1019, f. 37, 13 January 1804.

> the human species is capable of becoming more enlightened and more happy, we can only expect that the great whole of society should be ultimately connected together by means of knowledge and the useful arts; that they should act as the children of one great parent, with one determinate end, so that no power may be rendered useless, no exertions thrown away.[42]

Indeed, in the face of British globalism, with its astonishing capacity to forge original and unexpected alliances, French revolutionary ideals were batting on a sticky wicket. However, if the British had for the moment won the first round and succeeded in containing French universalism within the Hexagon, they were going to be hoist with their own petard by the Indian elites when the latter started, in the second half of the nineteenth century, to want to be taken seriously as partners—and in accordance with the principles the British had brandished to contain the French!

[42] Davy, *op. cit.*, vol. II, p. 323. The epithet 'wizard experimentalist' is taken from Roy Porter, *op. cit.*, p. 353. See also David Knight, *Humphry Davy: Science and Power* (Oxford & Cambridge, MA: Blackwell, 1992).

CHAPTER 5

Defusing Diffusionism: The Institutionalization of Modern Science Education in Early-Nineteenth-Century Bengal

A College for the Instruction of Modern Science

On 14 May 1816 a group of more than fifty Hindus gathered at the house of Sir Edward Hyde East, chief justice in the Supreme Court of Calcutta, to discuss the foundation of a college in order to introduce into India 'the literature and science of Europe' in a liberal manner and without any reference to Christianity.[1] These men all came from Calcutta's rising Hindu elite who, like the city in which they lived, owed their *raison d'être* and prosperity to the EIC's conquest of Bengal. They included Gopee Mohun Tagore, the Mullicks of Burrabazar, Radhakanta Deb, Ramcomul Sen, and Maharaja Tejchand Bahadur of Burdwan. 'I first received some of the principal Hindoos in a room adjoining to that where the generality were to assemble', wrote East, describing the occasion to his friend and fellow judge John Herbert Harington, who was also professor of the laws and regulations of the EIC's government in India at the College of Fort William, on furlough (or 'home' leave) at the time.

[1] Rules of the Vidyalaya, or Hindoo College of Calcutta, approved by the Subscribers, 27 August 1816. Reprinted in *The Sessional Papers . . . of the House of Lords . . . in the Session 1852–3*, vol. XXIX: Government of Indian Territories, 'Second Report from the Select Committee of the House of Lords Appointed to inquire into the Operation of the Act 3 & 4 Will. 4, *c*. 85, for the better Government of Her Majesty's Indian territories . . . together with the Minutes of Evidence', London, 1853, pp. 250–2.

> There the Pundits, to most of whom I was before unknown, were introduced to me . . . the chief Pundit held out both his hands closed towards me; and as I offered him my hand, thinking he wished to shake hands in our English style, he disclosed a number of small sweet-scented flowers, which he emptied into my hand, saying that those were the flowers of literature, which they were happy to present to me upon this occasion, and requested me to accept from them . . . Having brought the flowers to my face, I told him that the sweet scent was an assurance to me that they would prove to be the flowers of morality, as well as of literature, to his nation, by the assistance of himself and his friends. . . . Nearly a lac of rupees [was] subscribed by the Hindoos, of which more than half has been paid in, and the rest is in the course of collection.[2]

The Hindu College of Calcutta formally started functioning on 20 January 1817, managed and financed by this urban Hindu elite (or the *bhadralok*, as they came to be called later in the century), and reserved exclusively for sons of 'respectable Hindoo families . . . to be taught, though not fed, together'.[3] It was initially divided into two sections: a school, or *pathshala*, which gave elementary instruction in English, Bengali language and grammar, and arithmetic; and a college, or *mahapathshala*. The original curriculum of the latter comprised not only 'reading, writing, grammar and arithmetic', in both English and Bengali, but also 'instruction . . . in history, geography, chronology, astronomy, mathematics, chemistry and other sciences'.[4] Emphasis was also to be placed on 'the English system of morals'.[5] It had twenty pupils on its rolls on the opening day. Within three months the number rose to sixty-nine, and by 1828 its enrolment figures had exceeded four hundred.[6] This establishment is particularly important

[2] The events leading to the creation of Hindu College are described in detail in William Wilberforce Bird's evidence to the House of Lords, in ibid., p. 235 *et seq*. In the course of his deposition to the Select Committee, Bird read out East's letter to John Harington, a copy of which the former had preserved so that 'the information it contained might not be lost to the world'. The citation in the text is from East's description, pp. 236–7.

[3] Ibid.

[4] Rules of the Vidyalaya: no. 2 in ibid., p. 250.

[5] Ibid., p. 236.

[6] University of Calcutta, Presidency College, *Centenary Volume, 1955* (Alipore: West Bengal Government Press, 1956), p. 1; and 'Appendix A—Analysis of Fisher's Memoir', in Henry Sharp, ed., *Selections from Educational Records*, vol. 2,

in the institutionalization of 'modern' education, especially of 'modern' science education and practice, in South Asia. Indeed, it was the first of its kind outside Europe and North America, and served as a model for the subsequent creation of schools and colleges elsewhere in the Subcontinent. Already, in the early 1830s, many graduates from the Hindu College had begun emigrating to the rest of colonial India, many establishing educational institutions there.[7] It was later to become the present-day institution called Presidency College and the nucleus of the University of Calcutta.

In 1816 a schoolbook society was also set up in Calcutta. Managed jointly by Indians—many of whom, like Tarinicharan Mitra, Radhakanta Deb, and Mrtyunjay Vidyalankar, were also closely associated with the Hindu College and with the College of Fort William—and a few British EIC officials, the Calcutta School Book Society played a crucial role in the introduction of modern science into education in Bengal, making available, either in English or in local vernaculars, a number of cheap secular textbooks, including many for the scientific subjects taught at the Hindu College. Significantly, one of its rules stated 'that it forms no part of the design of this institution to furnish religious books—a restriction, however, very far from being meant to preclude the supply of moral tracts, or works of a moral tendency, which, without interfering with the religious sentiments of any person, may be calculated to enlarge the understanding and improve the character'.[8] Indeed, moral education, in disjunction with religion, was deemed to be a very important part of the curriculum.

Received wisdom has it that European learning was foisted upon colonial India at the turn of the nineteenth century. This, however, is not borne out by the historical evidence. If anything, the British in

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part 1, 1781–1839 (Calcutta: Superintendent Government Printing, 1920), p. 183. See also Koustubh Panda, ed., *Nostalgia: An Illustrated History of Hindu-Presidency College, 1817–1992* (Calcutta: Sulagna Mukherjee, 1993).

[7] See 'Report of the General Committee of Public Instruction', prepared by Horace Hayman Wilson, quoted in letter dated 16 April 1834 from Court of Directors to the Governor General in Council, OIOC, Board's Collections, Bengal (no. 26), E/4/740, p. 903: on the Public Department of Native Education, no. 5.

[8] 'Preliminary Rules for the Calcutta School Book Society', 6 May 1817; Rule 2, in *The Sessional Papers of the House of Lords*, p. 252.

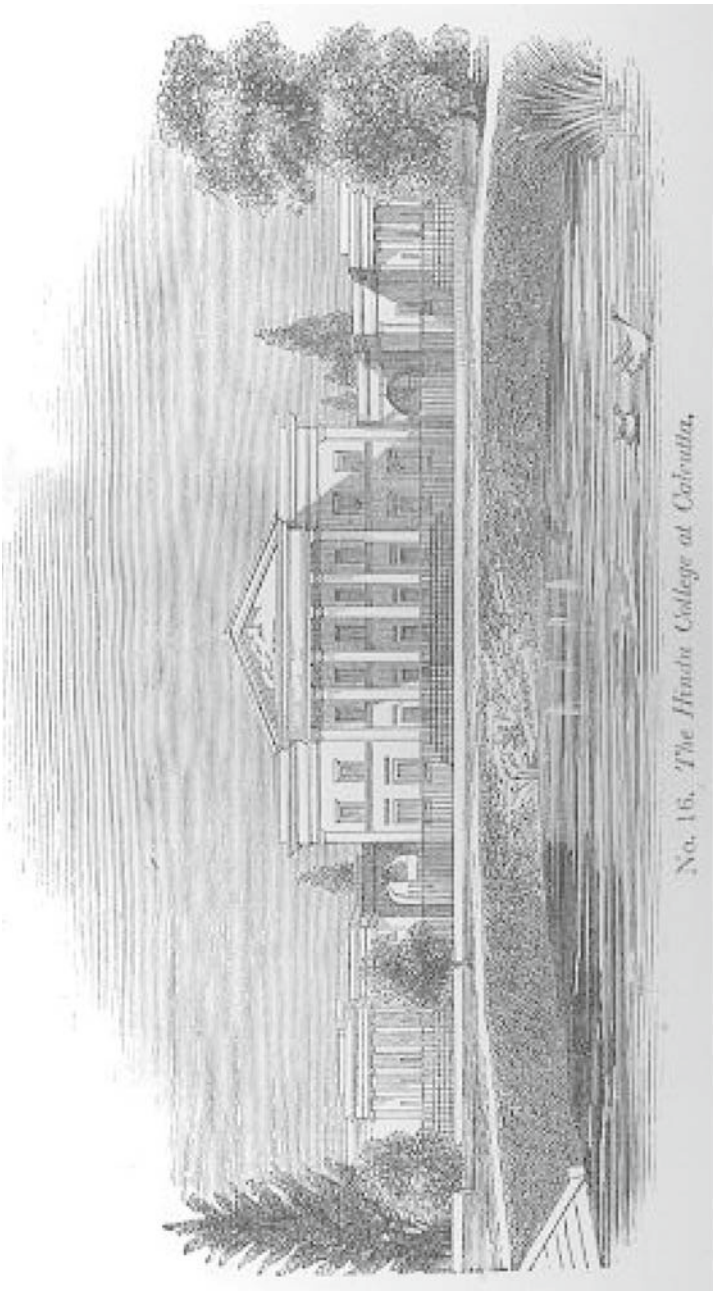


Fig. 14: The Hindu College, Calcutta

Fig. 15: A Student of Hindu College.
Source: British Library, Oriental and India Office Collections

India in the last decades of the eighteenth century and the beginning of the nineteenth were active in maintaining indigenous learning in the newly acquired territories. In 1781, in response on the one hand to a request from 'a considerable number of Mussulmen of credit and learning' to promote institutions of traditional learning which 'had been the pride of every polished court and the wisdom of every well regulated government both in India and in Persia [but of which] in India only traces . . . now remain, the decline of learning having

accompanied that of the Mogul Empire', and on the other 'with a view . . . to the production of officers for the courts of justice'—it must be remembered that Islam was the official religion of Bengal and Persian was still the court language—Warren Hastings had been instrumental in founding a *madrassa* in Calcutta.[9] The subjects taught were Arabic, Persian, and Islamic law, with later additions, such as natural philosophy, astronomy, geometry, arithmetic, logic, rhetoric, and oratory—'all according to Islamic culture'.[10] A few years later, in 1792, they had sponsored a Hindu College at Banaras for 'the preservation and cultivation of the laws, literature and religion of the Hindus'.[11] The course consisted of 'theology, ritual, medicine, music, mechanic arts, grammar, prosody, sacred lexicography, mathematics, metaphysics, logic, law, history, ethics, philosophy and poetry'.[12] David Kopf has quite convincingly traced the transmission, in the early decades of the nineteenth century, of 'oriental' learning by British Orientalists to South Asians who then reinterpreted it according to their own interests and self-image.[13]

Far from being forcibly thrust upon them, however, 'European' learning was actively sought by a section of the indigenous population of Bengal, as the evidence cited in the opening passages of this chapter makes amply clear. Indeed, it can be argued that the Bengali elite's fascination for formalized 'European' learning was the exact counterpart of that of the British for South Asian scholarship and developed through the circulation of knowledge and knowledge-related practices between the two communities. Indeed, many of the men associated with the Hindu College were, or were descendants of, munshis, banians, or other intermediaries for individual Europeans; or else were functionaries in the colonial administration. Some were even closely associated with the College of Fort William.

[9] Minute by Warren Hastings, dated 17 April 1781, in Sharp, ed., *op. cit.*, pp. 7–9 and 30.

[10] Ibid.

[11] Thomas Fisher's Memoir dated 7 February 1827, quoted in 'Appendix A—Analysis of Fisher's Memoir', in ibid., pp. 186–7.

[12] Ibid., p. 31.

[13] David Kopf, *British Orientalism and the Bengal Renaissance: The Dynamics of Indian Modernization 1773–1835* (Calcutta: Firma K.L. Mukhopadhyay, 1969).

Modern Science and the Self-fashioning of the *Bhadralok*

In setting up the Hindu College and the Calcutta School Book Society, this urban elite was trying to familiarize itself with British knowledge practices in the same way as the latter had been doing for South Asian knowledge ever since their arrival in the Subcontinent, but in a more organized form than during the previous three decades. This was clearly part of the *bhadralok*'s strategy to establish themselves as the new indigenous elite, with a clear identity as intermediaries (or *passeurs culturels*) between the European and indigenous populations.[14] Indeed, as Calcutta expanded from 'a straggling village of mud-houses' to become the largest clearing house of trade in Asia and the second largest city of the British empire, so too did this new elite. There, they made the money and gained the legal knowledge necessary to clinch their hold over the entire rural structures of Bengal and the new urban institutional structures—the offices, judiciary, schools, and other professions—opened up by the colonial administration.[15] It has been widely noted that a knowledge of English was economically essential to them—'People ignorant of English no doubt got berths, but berths to which only paltry salaries were attached.'[16] And by the first decade of the nineteenth century a number of private schools, run by indigenes or Europeans, had sprung up all over Calcutta. It was in such establishments that men like Radhakanta Deb, Ramcomul Sen, and Dwarkanath Tagore took their first lessons in English.

However, in setting up the Hindu College, these men were seeking more than just a language-teaching institution, as the curriculum shows. Given the rate of growth of Calcutta and the trend towards an

[14] For the notion of intercultural go-betweens, see Louise Bénat Tachot and Serge Gruzinski, eds, *Passeurs culturels: mécanismes de métissage* (Paris: Presses Universitaires de Marne-la-Vallée and Éditions de la Maison des Sciences de l'Homme, 2001).

[15] See Narendra Krishna Sinha, *The Economic History of Bengal: From Plassey to the Permanent Settlement*, 3 volumes (Calcutta: Firma K.L. Mukhopadhyay, 1965–70), vol. I, p. 101.

[16] Lal Behari Dey, *Recollections of Alexander Duff and of the Mission College which he founded at Calcutta* (London, 1878), pp. 40, 47. Quoted in Bruce Tiebout McCully, *English Education and the Origins of Indian Nationalism* (New York: Columbia University Press, 1940), p. 44.

institutionalization of learning and administration set up by the British—an early example of which we saw in the previous chapter—it was no longer possible, by the mid-1810s, to acquire the requisite knowledge informally, and on an individual basis, in order to perpetuate their privileged position in the newly emerging colonial society. It was time now for this elite too to standardize its education and training. Indeed, education itself was to become its very hallmark: 'The school is the one gate to the society of the *Bhadralok*', the Simon Commission was to observe a century later, in 1930.[17]

Because of the active interest of the Bengali elites in new forms of learning, the story of the introduction of European knowledge practices into the Subcontinent thus sits uneasily with the commonly held diffusionist image of their spread outside the West. Indeed, this story is not at all of diffusion, a passive notion, but of an active reception and reappropriation of a corpus of knowledge and associated practices. As we shall see in this chapter, even the expectations, as expressed in the aims of the Hindu College, did not correspond with the practices and conceptions of Europeans in India, nor with contemporaneous curricula in Great Britain.

While conceding immediately that much of this exchange was determined by the economic ambitions of the Indian protagonists and the asymmetry of the colonial situation—it is interesting to compare the paltry means of the Hindu College with those of the Fort William establishment and to keep in mind the fact that the former was financed privately whereas the latter had the funding of the world's richest long-distance joint-stock corporation and was sanctioned by the British Parliament—I would like to suggest that a part, at least, of this exchange was also fashioned by the self-fashioning ambitions and ideals of the new Bengali elite, seeking a new identity and legitimacy.

Although identity formation has been a highly studied phenomenon for a number of decades, I submit that one dimension of this process, especially for intellectual elites, means the defining of certain ideals of knowledge. I refer to these ideals as 'images of knowledge', by which I mean the place knowledge holds inside the value system of a

[17] Indian Statutory Commission [Simon Commission], *Review of the Growth of Education in British India* (London: His Majesty's Stationery Office, 1929), p. 24.

social group at any given time of its history. The 'image of knowledge' for a given group involves answers to questions such as: What counts as knowledge? By what means, both material and social, is it acquired or produced? How is it to be certified, and by whom? Whose word is to be trusted? By what means, oral or written for example, is it communicated? By whom is it communicated and to whom? Who, or which group, controls the knowledge? What power does it give them? More generally, what promise does this knowledge hold out for the wider society? And, so on.[18] This image forms part of, and plays a crucial role in, the social-interactive framework of a society and changes in this framework would call for a corresponding reconfiguration of the image of knowledge.

I had previously argued that the *bhadralok* fashioned an image based on a brahminical conception of knowledge—one of 'clean' activity, more devoted to abstract conceptualization than to the practical nitty-gritty of experiment which, by the nineteenth century, very much characterized scientific practice in Europe. Although Vedic Hinduism had changed drastically over the centuries, as also had political regimes, I insisted that this image of knowledge as a 'clean' activity had remained more or less unchanged and had finally resurfaced in the *bhadralok*'s quest for a self-identity.[19] This outline was roundly—and rightly—criticized inasmuch as it lent a static and monolithic mental scheme to South Asians as opposed to a historically mutating one to Europeans.

In revisiting this topic, I would like first and foremost to stress the fact that the Bengali elite's image of knowledge was not a pre-given, but was elaborated over the years as a result of controversies among its members precisely around the contents of the college's curriculum. The first indication of a conflict is contained in East's letter to Harington, where he recounts the following incident during the meeting at his house:

[18] My use of the term 'image of knowledge' is very similar to that of Yehuda Elkana, 'The Distinctiveness and Universality of Science: Reflections on the Work of Professor Robin Horton', *Minerva*, vol. XV, no. 2 (1977), pp. 155–73.

[19] See Kapil Raj, 'Hermeneutics and Cross-Cultural Communication in Science: The Reception of Western Scientific Ideas in 19th-Century India', *Revue de Synthèse*, IV^{e} série, N^{os} 1 and 2 (1986), pp. 107–20.

> Talking afterwards with several of the Company, before I proceeded to open the business of the day, I found that one of them in particular, a Brahmin of good caste, and a man of wealth and influence, was mostly set against Ramohun [*sic*] Roy . . . (who has lately written against the Hindoo idolatry, and upbraids his countrymen pretty sharply). He expressed a hope that no subscription would be received from Ramohun Roy. I asked why not? 'Because he has chosen to separate himself from us, and to attack our religion.' 'I do not know', I observed, 'what Ramohun's religion is'—(I have heard it is a kind of Unitarianism)—'not being acquainted or having had any communication with him; but I hope that my being a Christian, and a sincere one, to the best of my ability, will be no reason for your refusing my subscription to your undertaking.' This I said in a tone of gaiety; and he answered readily in the same style, 'No, not at all; we shall be glad of your money; but it is a different thing with Ramohun Roy, who is a Hindoo, and yet has publicly reviled us, and written against us and our religion; and I hope there is no intention to change our religion.' . . . This frank mode of dealing with them, I have often before had occasion to remark, is the best method of gaining their personal regard and confidence. Upon another occasion I had asked a very sensible Brahmin what it was that made some of his people so violent against Ramohun. He said, in truth, they did not like a man of his consequence to take open part against them; that he himself had advised Ramohun against it: he had told him, that if he found anything wrong among his countrymen, he should have endeavoured, by private advice and persuasion, to amend it . . . They particularly disliked . . . his . . . being continually surrounded by [Mussulmans], and suspected to partake of meals with them.[20]

The controversy between these men and Rammohun's ilk are a well-known part of Bengali history and have been much written about. I would only like to stress that what was largely at stake in this conflict in the context of education was the image of knowledge that the newly emerging elite should espouse. I shall thus try and illustrate my images-of-knowledge thesis without attempting to reconstruct mentalities in a mythical historical past, but through historical evidence of the early years of the Calcutta Hindu College.

[20] Edward Hyde East to John Herbert Harington, in *Sessional Papers . . . op. cit.*, p. 36. However, from other records we know that Rammohun Roy had already convened a meeting at his own house and had been instrumental in drawing up the plan that was submitted to East on 14 May 1816. See *Centenary Volume*, *op. cit.*, appendix III, p. 300.

But before doing so, I shall make a brief digression to take a look at the status of the sciences and their teaching in the context of contemporaneous Britain, the putative source of the initial ideas for the establishment of the Calcutta institutions. Let us start by saying a few words about the intellectual climate in the EIC at that time and among the British in Bengal, the most important vectors in the circulation of knowledges and knowledge-related practices within British imperial space.

Learning among the British in the Early Nineteenth Century

At the outset, it may be recalled that the vast majority of writers and cadets, as young recruits in the EIC's service were called, had not received any more than a rudimentary training in 'the rule of three and merchants' accounts', not to speak of a university education.[21] The few English in India who had a penchant for intellectual pursuits in the leisure time their lucrative commercial activities left them, were in the fashion of the 'Great School' and Oxonian aristocracy of the eighteenth century to which they generally belonged, obsessed with classical Greek and Latin thought.[22] On arriving in India, a handful of them were interested in Sanskrit, Persian and Arabic writings, especially in relation to the problems of property- and contract-related jurisprudence, and with Biblical chronology. The greatest attestation to their faith in Oriental learning came in 1800 when the Company authorities in India—as we saw in the previous chapter—set up a college at Fort William, Calcutta. And, doubtless, it was this institution that provided the first sustained institutional contact in domains of learning in the early nineteenth century between urban Bengalis and the British, and played no small role in the communication of their respective cultures—that is, all aspects except one: natural and

[21] Anthony J. Farrington, *The Records of the East India College Haileybury & Other Institutions* (London: Her Majesty's Stationery Office, 1976), p. 4.

[22] See George Charles Brauer, *The Education of a Gentleman: Theories of Gentlemanly Education in England 1660–1775* (New York: Bookman Associates, 1959), pp. 156–94; and Robert Maxwell Ogilvie, *Latin and Greek: A History of the Influence of the Classics on English Life from 1600 to 1918* (London: Routledge & Kegan Paul, 1964), p. 46 *et seq*.

experimental science. This branch of the colonizers' culture got little attention even in the curriculum of the college. The fact that the single unassisted professor for natural and experimental philosophy, James Dinwiddie, a Scotsman, is almost never mentioned in the reports and proceedings of the College of Fort William is a good illustration of this point.[23]

Turning to the EIC in Britain, the first thing one notices is the rising influence in its affairs of the evangelicals, especially of the Clapham Sect.[24] Under the leadership of Charles Grant, this group succeeded for example in asserting its authority at the Court of Directors of the Company in limiting the influence of the Calcutta Orientalists by establishing Haileybury College in England in 1807 as a counterweight to the College of Fort William. As far as India was concerned, the evangelicals saw education as a means of reinforcing Christian codes of behaviour, and wanted to use 'the simple elements of our arts, our philosophy and religion' to rid the Hindus of the moral depravity which was the cause of what the evangelicals perceived as their degeneracy.[25]

Quite unsurprisingly, their attempts did not exactly receive the expected enthusiasm from 'the Hindu subjects of Great Britain'. For, if there was a way of going about imparting new ideas to the latter, this was certainly not it. One could convince the Hindu upper castes of almost any of their other shortcomings but one could not get away with calling them morally depraved. Besides, as remarked at the outset,

[23] Ibid. Indeed, the only mention of Dinwiddie in relation to the College of Fort William that I found among the records in the OIOC, 0/6/12 (609) pertain to his expenses as professor of experimental philosophy. The other references to him have to do with (1) the experiments at the Calcutta botanical gardens to introduce Brazilian cochineal insects into India; (2) an evaluation of Indian 'deedwar' [*sic*] oil; and (3) the cultivation of hemp. OIOC, 0/6/10 (683–92) and 0/6/11 (411). On Dinwiddie, see Wiliam Jardine Proudfoot, *Biographical Memoir of James Dinwiddie LLD, Astronomer in the British Embassy to China, 1791–1793* (Livepool: Edward Howell, 1866).

[24] Cyril Henry Philips, *The East India Company 1784–1834* (Manchester: Manchester University Press, 1961).

[25] Charles Grant, *Observations on the State of Society among the Asiatic Subjects of Great Britain, Particularly with Respect to Morals; and on the Means of Improving It*, reprinted in Sharp, *op. cit.*, p. 83.

the latter were attempting to establish a system of modern liberal and moral education without any reference to religion. As the renowned orientalist Horace Hayman Wilson—Boden Professor of Sanskrit at Oxford, Librarian to the EIC, Oriental Visitor of Haileybury College and of Addiscombe, and one of the pioneers in the institutionalization of European learning in India—observed:

> The Hindus will not listen to one who comes amongst them strong only in his own faith and ignorant of theirs. 'Read these translations', said a very worthy clergyman to a sect of religionists at Benares, who were already seceders from idolatrous worship, and were not indisposed for argument upon the comparative truth of different creeds. 'We have no objection to read your books', was the reply, 'but we will enter into no discussion of their contents with you until you have read ours.' This was inconvenient or impracticable, and no further intercourse ensued. This is one instance out of many where precious opportunities have been lost, because the only means of communicating fully with the natives—conversancy not merely with their language but with their literature—has been wanting or incomplete; and with an acute and argumentative people like the Hindus you must satisfy them that they are in error before you can persuade them to accept the truth.[26]

Consequently, these attempts made little headway.

However, there was one facet of British activity in India where European science operated very successfully. This had to do with the general mapping of the newly conquered lands as well as with the logistics of maintaining power, and covered disciplines like botany, zoology, cartography, meteorology, human and veterinary medicine, and civil and military engineering. In keeping with the traditions of scientific training in Britain, this part of the colonial machine was manned predominantly by Doctors of Medicine and of Divinity from the Scottish and Northern European universities whose curricula ideally prepared their graduates to occupy senior technical positions—especially as engineers, military commanders, veterinarians, doctors, and botanists—in Britain's ever expanding colonial services. Indeed, it is estimated that by the mid-eighteenth century, more than a quarter

[26] Horace Hayman Wilson, *Two Lectures on the Religious Practices and Opinions of the Hindus; Delivered before the University of Oxford on the 27th and 28th of February, 1840* (Oxford: John Henry Parker, 1840), pp. 2–3.

of the EIC's army officers were Scotsmen.[27] And by the end of the century, their proportion had reached nearly a half.[28] However, the evidence at hand shows that this group of professionals was not particularly involved in the teaching of science to indigenous populations; rather, they were active in the making of new knowledges through interaction with specialist indigenous populations with whom they came in contact professionally.

On the other hand, the number of university graduates in science from the English universities, namely Oxford and Cambridge, was declining, and had been all through the eighteenth century. More and more savants were either self-educated or trained in the private academies.[29] At all events, science was still very closely linked to religion. And attempts to impart education in secular terms met with serious resistance from all sections of English society even as late as the founding of London University in 1828—eleven years after the establishment of the Calcutta institutions.[30]

Indeed, the standard bearers of popular science education in England were the dissenting academies, especially the Unitarians and Baptists. Of these last, some were to flee persecution in England and seek refuge in India. At the turn of the nineteenth century a small group of them, mainly William Carey, Joshua Marshman, William Ward, and William Yates, had succeeded in establishing themselves at Serampur, a small Danish colony on the outskirts of Calcutta. Under William Carey, indigo factory-owner, small-time tradesman, and professor of Bengali at the College of Fort William, the Baptists with their populist notions were to write and publish a number of textbooks

[27] P.E. Razzell, 'Social Origins of Officers in the Indian and British Home Army', *British Journal of Sociology*, vol. 14 (1963).

[28] This 'inordinate' rise in proportion of Scots in the services of the Bengal administration is one of the reasons for the impeachment of Warren Hastings. See John Reddy, 'Warren Hastings: Scotland's Benefactor', in Geoffrey Carnall and Colin Nicholson, eds, *The Impeachment of Warren Hastings* (Edinburgh, 1989).

[29] See Nicholas Hans, *New Trends in Education in the Eighteenth Century* (London: Routledge & Kegan Paul, 1951), pp. 32–6.

[30] See John Lawson and Harold Silver, *A Social History of Education in England* (London: Methuen, 1973), p. 226 *et seq*.

all through the nineteenth century. Indeed, their populism manifested itself in a strong interest for the vernacular languages of the region.[31]

So, what could the Bengalis have used from the palette of institutions and pedagogical tools available in Britain at the time? Doubtless, one sees that many of the books in use in Britain and Ireland naturally got translated or were republished from Calcutta in cheap editions, but some were actually also specially written for local use.[32]

Indigenous Representations of Science: Two Examples

Arithmetic was one subject where the Calcutta School-Book Society made a special effort to compile textbooks adapted for the region.

> We have no complete system of Arithmetic for the use of Bengalee schools. To deserve that title, the work ought (besides other requisites) to comprise all, or nearly all the arithmetical Tables in use among the natives, and to adopt from the native systems whatever may appear a real improvement. A work of this nature, besides its *intrinsic*, would possess an *adventitious* value, from the peculiar habits of thinking of this people, in whose esteem and attention Arithmetic fills a most important place, insomuch that many of them who can neither read nor write, have yet no contemptible practical acquaintance with mental arithmetic.[33]

Indeed, it was noticed and accepted, strangely enough for rationalists of today, that South Asians had a system of arithmetic of their own. Referring to the first decades of the nineteenth century in his evidence before the House of Lords, Horace Hayman Wilson expressed this quite clearly when, in answer to a question about the use of the 'head'

[31] Michael Watts, *The Dissenters from the Reformation to the French Revolution* (Oxford: Oxford University Press, 1978); Edward Palmer Thompson, *The Making of the English Working Class* (Harmondsworth: Penguin, 1980); Roy Porter, *English Society in the Eighteenth Century* (London: Penguin, 1991, 2nd edn).

[32] For a complete list of books published by the Calcutta School-Book Society, see the Annual Reports of the Society, 1817 onwards. See also Sushil Kumar De, *History of Bengali Literature in the Nineteenth Century* (Calcutta: Firma K.L. Mukhopadhyay, 1961).

[33] *Report of the Provisional Committee of the Calcutta School-Book Society* (Calcutta: 1817), pp. 2–3.

by Indians in calculating, he told his interrogators that they did indeed.

> Very much; in fact their process is objectionable on that account; although they [the Indians] write down the different operations on a slate, they rub out the process, and give nothing but the results . . . They have a process; but if you tell them to show you how they come to the conclusion, there is nothing but the conclusion to be seen; they have rubbed out everything but the result, and you have nothing before you to show their mode of going to work.[34]

One of the most remarkable products of the attempt to provide arithmetic textbooks based on local systems of calculation is Reverend Robert May's *Gonito*.[35] It is reported that this book was largely preferred to another widely available work published at the same time by the School-Book Society—John Harle's *Ganitanka* or *Arithmetic*—which, although likewise in Bengali, 'combin[ed] what is eligible in the native as well as European methods'.[36] So popular was May's book that the Second Report of the Calcutta School-Book Society regretted that it had printed only 500 copies in the first edition, for they were 'very soon exhausted through the avidity of the natives of all ranks to obtain it'.[37] And one of the members of the Society went on to remark that

[34] Evidence of Horace Hayman Wilson before the Select Committee of the House of Lords, 5th July, 1853, in *The Sessional Papers . . . op. cit.*, p. 261.

[35] Robert May, *Gonito, being a Collection of Arithmetical Tables, made under the superintendence of the Rev. R. May, of Chinsura; with Rules for their Application to Business, illustrated by examples* (Calcutta: The Calcutta School-Book Society, 1817). May was a member of the London Missionary Society. See Michael Andrew Laird, *Missionaries and Education in Bengal 1793–1837* (Oxford: Clarendon Press, 1792). I have not been able to trace any extant copy of the book in any major Indian or British library.

[36] John Harle, *Ganitanka: Arithmetic; comprising the Five Fundamental Rules* (Calcutta: The Calcutta School-Book Society, 1818). Although the book went into six editions, the second edition was not published until 1846. However, the four subsequent editions appeared in quick succession between 1871 and 1878. See James Fuller Blumhardt, *Catalogue of the Library of the India Office*, vol. II, part IV: Bengali, Oriya, and Assamese Books (London: Eyre & Spottiswoode for the King's Most Excellent Majesty, 1905), p. 182. The quotation is from *The Second Report of the Calcutta School-Book Society* (Calcutta: 1819), p. 3.

[37] Ibid., pp. 2–3.

> our Gonito compiled originally by Mr May has been very popular . . . It may be shewn that by giving the natives their own Arithmetic we pave the way for such improvements and additions as we can make. Moreover, the species of books should be multiplied, and that for many reasons. Sometimes a book has an appropriate sphere. Mr Harle's Arithmetic will be used in the Burdwan and Chinsura Schools, while Mr May's Gonito will be more acceptable to the bulk of independent School-masters.[38]

In the absence of a detailed comparison of the two books—as I have so far been unable to locate May's *Gonito*—we can at least note that in introducing modern science into India, new textbooks (which were neither purely 'Western' nor purely 'South Asian') had to be written taking into account indigenous ways of reasoning.

But what happened when British enthusiasts for education in India decided to take an active role in introducing what they thought was essential to a good training in science? An extraordinary chance to study this presents itself in the form of a donation of scientific instruments to the Hindu College by the London-based British India Society. Indeed, this Society, founded in 1821 'to promote the intellectual and moral improvement of the native inhabitants of British India and parts adjacent', had resolved that 'all practicable measures be adopted to encourage, aid, and support such Instructions, by occasional supplies of money, medical and chemical instruction, philosophical and surgical apparatus, &c.'[39] In consultation with the Calcutta School-Book Society, and in return for a consignment of Calcutta-printed textbooks—which included May's and Harle's Arithmetics—it had accordingly shipped 'several packages [of philosophical apparatus and books] . . . in the Honourable Company's ship Hythe' in early 1823.[40]

[38] Extract of a letter from Captain Francis Irvine, Recording Secretary of the Society to Dr Joshua Marshman, dated March 1819, in ibid., appendix X, p. 52. See also Thomas Fisher, 'Memoir on Education of Indians', appendix I of the *Report from the Select Committee of the House of Lords on the Affairs of the East India Company on the Renewal of the Charter, 1831–32* (London: 1833), pp. 194–348; reprinted in *Bengal: Past and Present*, vol. 18 (January–June 1919), pp. 73–156.

[39] *Fourth Report of the Calcutta School-Book Society* (Calcutta, 1821), appendix III, p. 26.

[40] *Fifth Report of the Calcutta School-Book Society* (Calcutta, 1823), appendix IV, p. 32.

We find the following account in Thomas Fisher's famous 'Memoir on Education of Indians' submitted to the Select Committee of the House of Commons on the Affairs of the EIC on the Renewal of the Charter, 1831–2.

> On the 3rd July 1823, John Herbert Harington, then a member of the Bengal Council, submitted to the Government a letter which had been addressed to him and the late Sir Henry Blossett by the secretary of the British India Society in London, advising the transmission to India, by permission of the Court of Directors of the East India Company, freight free, of an extensive philosophical apparatus, in order to its being placed at the disposal of the Calcutta Hindoo Sanscrit College, should the committee of that institution have the means of employing a competent lecturer.
>
> The apparatus was accompanied by a considerable number of books on scientific subjects designed for the use of the lecturer and others who might have occasion to refer to them . . .
>
> The apparatus consisted, among other articles of minor importance, of the following:

A complete set of mechanical powers.	A complete set of magnetical apparatus.
A complete whirling table and apparatus.	Ferguson's pyrometer lamps, &c.
A nine-inch cylinder electrical machine with appendages, *viz.*, insulated stool, thunder-house, three bells, magic picture, air pistol, spiral tube, copper plates and stand, head with hair, spider, swan and star, also a universal discharge, press and diamond jar, and a tin fire-house.	A large set of boxwood geometrical solids.
A set of eight musical bells.	A large size double barrelled air pump and receiver.
A set of saw-mills.	An improved table chemical furnace, together with a complete chemical apparatus for the same.

Models of water and forcing pumps.	An improved gasometer, tin and glass vessel.
An air pipe.	A set of stop-cock apparatus for experiments on glasses, bladders, &c.
A gunpowder apparatus.	Woulf's glass distillatory apparatus.
A set of weights for copper bottle.	A mahogany chest with 56 phials containing chemical tests, &c.
A fountain in vacuo.	A spirit lamp and brass sliding ring stand.
A fork balance.	An inflammable air-lamp.
Torricellian apparatus.	A pneumatic cistern.
A hydrostatic bellows, glass and brass tubes.	A glass alembic with head and stopper.
A hydrostatic balance.	A mercurial trough.
A galvanic trough and plates, together with four improved galvanic batteries complete.	Evaporating dishes.
A finished and complete tellurian, lunarium and planetarium.	An improved phantasmagoria lanthorn with slides.
A brass hemisphere.	A guinea and feather apparatus.
An improved equatorial.	A terrestrial 18-inch globe with appendages.
A selenographic 12-inch globe.	A celestial 18-inch globe with appendages.
A set of optical silk string models in case.	Adam's lectures in 5 vols. . . . Essay on electricity.
A glass prism, convex lens, and an opaque and transparent solar microscope.	Brand's Manual of Chemistry.

A 3½ achrometer telescope, with tripod stand and appendages.	Ure's Chemical Dictionary.
A set of 21 astronomical slides.	Mackenzie's 1,000 chemical experiments; together with several other scientific works.

> All the expenses . . . were, by order of the Bengal Government, charged to the East India Company; and a salary assigned for a professor or lecturer on experimental philosophy, so soon as a qualified person should be found to receive it.[41]

After some searching, the managers of the College and members of the newly founded General Committee for Public Instruction found a suitable teacher in the person of David Ross, an engineer and assistant assay-master at the Calcutta Mint. It was not uncommon in England for members of this profession to be involved in making and/or publicly demonstrating scientific instruments as well as helping popularize practical science.[42] However, as stated in the Presidency College's *Centenary Volume*, 'Science classes were started in 1824 by David Ross who was not much of a success and was nicknamed "Soda Shahib" for his frequent reference to that compound.'[43] That the failure was due to Ross himself is doubtful as the theoretical part of his teaching—on the properties of matter, laws of motion, mechanics, and magnetism—found a more enthusiastic public. Moreover, his classes at the Medical College, started some years later within the more traditional settings of the Sanskrit College, were quite a success. But then this institution catered for a different social group. Interestingly enough, the same *Centenary Volume* adds: 'The teaching of *Mathematics* improved with the appointment in 1828 of Robert [actually John] Tytler, an eccentric but talented teacher.'[44] James Kerr, reviewing the state of education in Bengal almost three decades later, also commented on this

[41] Fisher, 'Memoir . . .'. This quote from the *Bengal Past and Present* reprint, pp. 97–9. See also OIOC, Bengal Public Consultations, 3 July 1823 (no. 3) and 30 July 1823 (nos 12–14).

[42] See Hans, *op. cit.*

[43] Presidency College, *op. cit.*, p. 3.

[44] Ibid. My italics

unsuccessful experience: 'The interesting experiments,' he said, 'gave place to hard study and mathematical demonstration. At a later period the experimental lectures were revived; but after a few months they were discontinued, and for many years the Hindu College has not been enlivened by a single ray of experiment.'[45] Instead, what seems to have interested the Bengalis most were mathematics and parts of the natural sciences that they interpreted as a formal and closed system, not particularly amenable to use in further research.

But the British, still convinced that their Indian subjects, both from the 'learned and unlearned classes . . . continue to hold European literature and science in very slight estimation', opened yet another Sanskrit College, this time in Calcutta, in 1824, to teach Bengali children Sanskrit, rhetoric, sacred literature, law, and grammar. But this was not what interested the new elite.[46] Its spokesman, Rammohun Roy, in his now all-too-famous address of 11 December 1823, pleaded for the instruction of *European* sciences; and, when in 1827 the school introduced into its curriculum mechanics, hydrostatics, optics, astronomy, mathematics, anatomy, and medicine—all in English—almost half of its ninety-one students opted to study these, even though they were not required subjects.[47] An examination of the Sanskrit College manuscript records has revealed that 'on the whole, Hindu students trained in the traditional manner had no difficulty in responding to Western course-work.'[48]

[45] James Kerr, *A Review of Public Instruction in the Bengal Presidency from 1835 to 1851*, 2 volumes (London: William H. Allen & Co., 1853), vol. II, p. 22.

[46] *Report of the Colleges and Schools for Native Education under the Superintendence of the General Committee of Public Instruction in Bengal, 1831* (Calcutta, 1832), p. 72. Quoted in McCully, *op. cit.*, p. 23. Even as late as 1835, William Adam, in his first Report was to observe: 'Perhaps the most zealous friends of English education in this country are not aware of all the efforts and sacrifices of the natives themselves to provide their children and their countrymen with English instruction.' William Adam, 'First Report on the State of Education in Bengal—1835', in idem, *Reports on the State of Education in Bengal (1835 & 1838)*, ed. A. Basu (Calcutta: University of Calcutta, 1941), pp. 35–6.

[47] Address, dated 11 December 1823, from Raja Rammohun Roy in Sharp, ed., *op. cit.*, pp. 98–101; and Narendra Krishna Sinha, ed., *Days of John Company. Selections from Calcutta Gazette, 1824–1832* (Calcutta: West Bengal Government Press, 1959), p. 227.

[48] Kopf, *op. cit.*, p. 184.

Conclusion

In this chapter, I have, in the face of a widely held notion—which takes science to be a trans-cultural phenomenon and, because its logic is compelling, the transmission of scientific ideas to be non-problematic—and through recourse to a historical example, tried to make the following plea: that a community's traditional images of knowledge do, in a significant manner, influence its way of apprehending scientific discourse formulated in another tradition, and that the scientific practice that results in the receiving culture is not quite the same as that in the original culture. Also, by looking at this attempt at setting up a stable educational curriculum by indigenous groups who interacted durably with Europeans, I have tried to plot the manner in which these groups appropriated and eventually deployed new knowledge and practices in their strategies to renegotiate their positions in the emerging colonial regime.

It is important, finally, to note that this self-shaping of the mediating agents on both sides of the encounter was part of the same process as the shaping of scientific knowledge, the institutionalization of encounter, and empire.

CHAPTER 6

When Human Travellers become Instruments: The Indo-British Exploration of Central Asia in the Nineteenth Century

. . . the manners and sentiments of the eastern nations will be perfectly known; and the limits of our knowledge no less extended than the bounds of our empire.—-Sir William Jones, *A Grammar of the Persian Language*

'Yes, and thou must learn how to make pictures of roads and mountains and rivers—to carry these pictures in thine eye till a suitable time comes to set them upon paper. Perhaps some day, when thou art a chain-man, I may say to thee when we are working together: "Go across those hills and see what lies beyond." ' . . . But as it was occasionally inexpedient to carry about measuring-chains a boy would do well to know the precise length of his own foot-pace, so that when he was deprived of . . . 'adventitious aids' he might still tread his distances.—Rudyard Kipling, *Kim*

Kashmir, 1863

On a warm spring day in May 1863 two men, a South Asian and a European, are walking endlessly up and down a sinuous mountain path in the Himalayan heights somewhere to the east of Srinagar, the capital of Kashmir. A pilgrim's staff in hand, the former leads the way, the latter closely follows meticulously counting and measuring his companion's paces: yes, his two thousand steps do indeed make a mile. Suddenly they stop, light a small oil stove and place a copper vessel upon it—to make some tea, one might think. But,

as soon as the water begins to boil, the native produces a small boiling-point thermometer from the depths of his long woollen dress and plunges it into the pan. He watches it for a while and then whispers something to his fellow traveller. They start walking afresh. A few moments later, they stop again. This time the former lays down his staff and pulls out from under his dress a smoked glass and produces, almost from nowhere—very like a magician—a tiny sextant which he holds above the glass and begins to observe the sun. An instant later, he mumbles a number to his companion who, in spite of his forbidding look, lets slip from behind his large beard the slightest hint of a satisfied smile. Then the Indian examines a compass that materializes mysteriously onto his palm. Next, seeking the shade of a rock, he pulls out another thermometer which he exposes for some minutes before squinting at it and muttering something to the European. As the sun sets, the two men make their way to their camp tent. But, as soon as night falls, they come out again and begin to observe the stars through the sextant. Day after day, night after night, they repeat the same gestures. On 12 June, the European returns to Srinagar, while his native companion joins a dark-blue-uniformed troop column making its way towards Leh, the capital of Ladakh.

Contrary to what one might think, these two men were not rehearsing for some kind of theatrical performance. The European, Captain Thomas George Montgomerie of the Royal Engineers, was at the time in charge of the mapping of the kingdom of Kashmir, an area of more than 160,000 square miles.[1] In 1845, at the age of 15, this Scotsman from Ayrshire joined the EIC's Military Academy at Addiscombe to train as an engineer for the Company's domains in India. There, for four years, he was drilled and disciplined into the rigour of military marching, of course, but also into that of integral and differential calculus, the theory of equations, spherical trigonometry, and astronomy, winning the Pollock Medal awarded to the best student of the year.[2] He was commissioned second lieutenant in 1849, arrived in India in

[1] Clements Robert Markham, *A Memoir on the Indian Surveys* (London: Her Majesty's Secretary of State for India in Council, 1878, 2nd edn), pp. 113, 132

[2] Some scant details of the early life and education of Thomas George Montgomerie can be gleaned from his application to the military academy at Addiscombe, OIOC, L/MIL/9/215 folios 238–46, and from the Academy's monthly reports, February 1836 to May 1851, OIOC, L/MIL/9/341. See also

1851, and soon opted for the Great Trigonometrical Survey of India, one of the most prestigious departments of the Company's overseas services. The success of the triangulation operation of Kashmir, which he completed in 1864, earned him the Founder's Gold Medal of the Royal Geographical Society the following year.[3]

This region is one of the most hostile in the world. In his speech Sir Roderick Impey Murchison, then President of the Royal Geographical Society, said: 'When we reflected upon the remarkable facts that you had passed from the hot plains of Hindustan to the loftiest region on the face of the globe and that there, amidst enormous glaciers, you had made accurate scientific observations at stations, one of which was 5,000 feet higher than the summit of Mont Blanc, we could not fail to applaud and reward such noble feats, displaying, as they did, the great abilities and energy with which you conducted so arduous a survey.'[4] Indeed, so arduous was the Kashmir operation that it permanently affected Montgomerie's health: forced to retire and return to England in 1873, he died in Bath on 31 January 1878, at the age of 47. Author of a dozen articles in the *Journal of the Royal Geographical Society*, elected to the Royal Society in 1872, and promoted to the rank of Colonel in 1876, he represented the Royal Geographical Society and the British and Indian governments at the *Congrès international de géographie* held at Paris in 1875, where he was decorated '*Officier de l'Université de Paris et de l'Instruction Publique*'.

In May 1863, in the Himalayan heights somewhere to the east of Srinagar, Montgomerie was quite simply disciplining his companion, Mahomed-i-Hameed, in order to transform him into an intelligent instrument of measure. Thus metamorphosed, this under civil servant of one of the local administrations was to participate in a survey of the Central Asian regions north of the Himalayas, a vast *terra incognita*

Reginald Henry Phillimore, *Historical Records of the Survey of India*, 5 volumes (Dehra Dun: Survey of India, 1945–68), vol. v, p. 513.

[3] 'Montgomerie, Thomas George', in Leslie Stephen and Sidney Lee, eds, *Dictionary of National Biography from the Earliest Times to 1900*, 22 volumes (Oxford: Oxford University Press, 1917), vol. xiii, pp. 758–60.

[4] Quoted in Markham, *op. cit.*, p. 428. Readers might note that Mont Blanc always functions as the standard against which any other scientific climb, after Horace Bénédict Saussure's expedition, is compared.

Fig. 16: Captain Thomas George Montgomerie (standing, left).
Source: British Library, Oriental and India Office Collections

encompassing an area of almost 1,400,000 square miles which, on paper at least, was part of the Chinese empire.[5]

However China, extremely weakened in the light of the Opium Wars against the British, was pulling out of its most distant imperial possessions, allowing the ever-advancing shadow of Russia to spread to these regions, a shadow which had already spread across the Ottoman empire and northern Persia. Ever since Napoleon's defeat in 1812, the British had begun to consider Russia as their main rival in the race to corner trade in Central Asia. Some even went as far as to see in Russia's acts a grand design to invade India and wrest it out of British control. Russophobia reached its peak in the years following the 1857 rebellion in northern India, as Himalayan hill stations, such as Simla and Darjeeling, began acquiring strategic importance as political and

[5] I have, unfortunately, not been able to find any information about Hameed's life or career.

military headquarters of British India and/or of the provinces. From these highland resorts the British sought to dominate the Subcontinent, while at the same time isolating themselves from the mass of South Asian society.[6]

In this context, the problem of securing the Empire's northern frontiers took on a special urgency for, contrary to our received ideas, the Himalayas were not a naturally impregnable frontier: the Tibetans had been invading the lower Himalayas and the Indo-Gangetic plain since the sixth century, even ruling over Bengal from the seventh to the tenth centuries, and the Sikhs had attacked western Tibet and briefly occupied the region around Lake Manasarovar as recently as 1841. Consequently, the Transhimalaya had, by the mid-nineteenth century, become the scene of the Great Game, a tournament of shadows played out between British and Russian spies for the political control of High Asia and immortalized years later by Kipling in his novel *Kim* (published in 1901). Thus, to ensure the stability of their prize possession, the British felt they had at all costs to map out and stabilize this vast no-man's land that lay between them and the Tsarist empire. And in order to achieve this, what could, in Victorian eyes, surpass geography—that queen of imperial sciences which, in times of peace, was the continuation of politics by other means?

Between 1863 and 1885 no less than fifteen native Indians—almost all small-time functionaries of the Great Trigonometrical Survey of India—were to follow in Mahomed-i-Hameed's steps in order to meticulously map this region—Hindus and Buddhists to cover Tibet, and Muslims to crisscross what was then known as Eastern Turkistan. Two of them were murdered, one sold into slavery by his Chinese colleague; yet another, suspected of spying, spent seven months in a Mongolian prison. Almost all of them had near fatal encounters with bandits, but succeeded nevertheless in accomplishing their geographical mission. They were code named the 'Pundits' and became celebrities of the period, the subject of many an article in the British press and recipients of a number of awards from European scientific societies.

One could of course ask why Montgomerie, himself an international celebrity precisely for his survey of mountainous regions, could

[6] See Dane Kennedy, *The Magic Mountains: Hill Stations and the British Raj* (Berkeley, Los Angeles, London: University of California Press, 1997).

Fig. 17: Khirgiz tribesmen from the Oxus region holding the severed head of a European intruder—in all likelihood a geographer. From Januarius Aloysius MacGahan, *Campaigning on the Oxus, and the Fall of Khiva* (London: Sampson, Low, Marston, Low & Searle, 1874), frontispiece.

not go out and map these Transhimalayan lands. After all, during the century since they had first conquered any sizeable territory in South Asia, the British had succeeded in taking the measure of the whole Indian subcontinent—even those parts not yet under their direct control. But it was not the same for the Transhimalaya.

In spite of the weakening of their empire, the Chinese were nonetheless still present in the region and looked on the British with a jaundiced eye. The Tibetans, extremely jealous of their autonomy and identity, were even more suspicious of Europeans. Besides, a number of British emissaries to the few Central Asian khanates that were still outside the ambit of Tsarist power had met with a gruesome end, either hanged or beheaded in public or else murdered in their sleep. Ironically, the inventor of the phrase 'the Great Game', Captain Arthur Conolly, was himself one of the first to pay this deadly price: he was beheaded in Bukhara in June 1842. Geography being a continuation of politics by other means, the political situation in turn demanded the continuation of geography by other means.

Eastern Turkistan, 1863–4

Thus it was that Montgomerie's instructions during his mission to Kashmir explicitly mentioned that he 'obtain the means of rectifying our imperfect geographical knowledge of the regions beyond British influence', but warning him that 'it will neither answer to risk the safety of the party nor to entangle Government in political complications'.[7] While patiently triangulating his way through this remote mountainous state, Montgomerie kept these desiderata in mind. On 2 April 1862, in the course of a talk on the geography of Turkistan that he delivered to the Asiatic Society of Bengal, of which he was a member, he made the first public mention of 'the advisability of employing native agency' for the purpose of surveying the hostile Transhimalayan regions.[8] Having noticed how Himalayan merchants were allowed to pass quite freely into Tibet and Chinese Turkistan, he reasoned that

[7] NAI, Survey of India Records, Dehra Dun Volumes, Decade 1850–60, 641 (393), letter dated 9 June 1853 from Surveyor General to Montgomerie, quoted in Phillimore, *op. cit.*, vol. v, p. 480.

[8] *Proceedings of the Asiatic Society of Bengal*, vol. 2 (1862), pp. 209–13.

thus disguised his collaborators might also be able to slip into Trans-himalayan Asia. However, he also realized that even if he succeeded in enrolling a few natives into his scheme, they would not be able to use conventional surveying techniques. His idea was that they should measure distances by counting their paces. Each of his collaborators was to be disciplined to regulate the length of his stride, whatever the terrain or the incline. They were to count 2,000 paces to the mile, that is, to maintain a step of 31½ inches. He perfected his idea in a letter to the Asiatic Society dated 21 July 1862. The latter backed his project and forwarded it to the viceroy and the Council of India. The plan was most warmly approved and the Government of India 'agreed to support it liberally'.[9]

The moment he received the approval, Montgomerie began to look for his first collaborator, whom he found in Mahomed-i-Hameed, better known by his code name, the 'Moonshee'. Immediately after the month-long intensive training mentioned earlier, Montgomerie sought to test the feasibility of his plan by mounting a full-scale experiment.

Hameed reached Leh on 4 July 1863, having mapped his route from Kashmir. Reassured of the reliability of his new 'instrument', Montgomerie directed him to continue. Accordingly, on 24 August the Moonshee, disguised as a merchant accompanied by two servants and a ponyload of merchandise, joined a caravan heading for Yarkand. This destination was not chosen by chance. Yarkand was an oasis on the ancient silk route, and was thus a major crossroads for trade between China, India, and Central Asia. Although its position had been determined by French Jesuits at the beginning of the eighteenth century and again in the 1850s by the Schlagintweit brothers, Montgomerie—along with all his other British colleagues—believed their calculations to be false. Moreover, Yarkand was only fifteen days' march from the frontier of British India and, according to Montgomerie's estimation, lay almost due north of Leh. This last factor would greatly simplify things as longitude measurements at the time were a tricky affair. By way of equipment, Hameed carried a pocket sextant, a smoked-glass artificial horizon, a pocket compass, a prismatic compass, a pilgrim's staff with its knob flattened so as to provide a stable

[9] *Journal of the Royal Geographical Society*, vol. 38 (1868), p. 129.

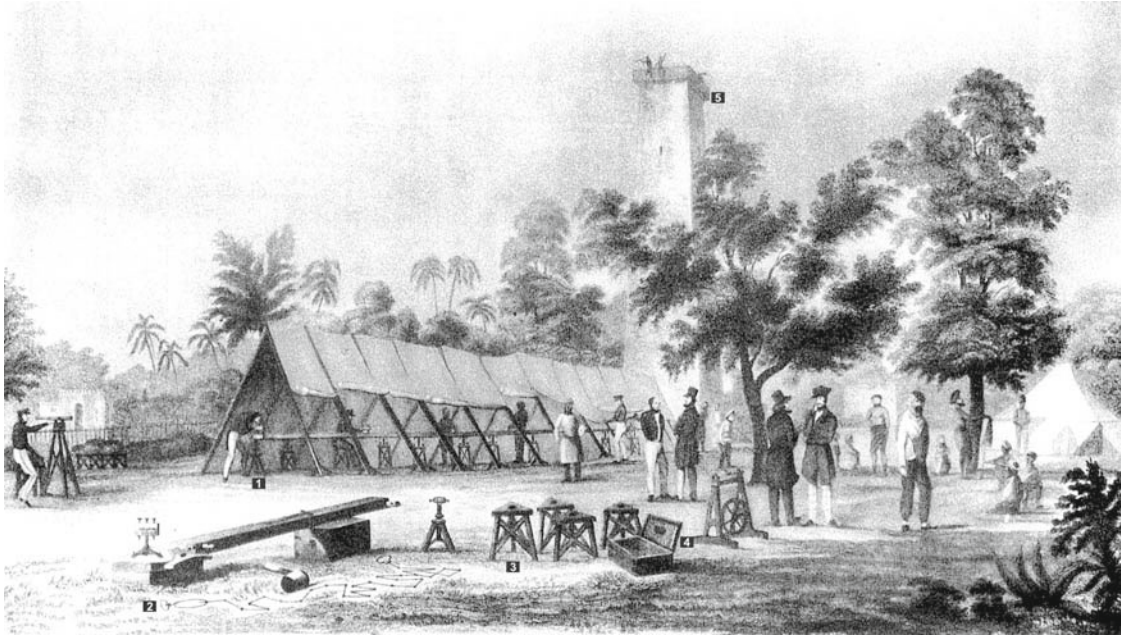


Fig. 18: As this drawing of the measurement of the Calcutta baseline in 1831 shows, conventional surveying techniques mobilized a host of men, instruments and costly constructions: (1) sheltered from the sun's rays, verifying the length of the baseline using a micrometer; (2) surveying chains; (3) various tripods; (4) transit apparatus; (5) observation tower. Adapted from a sketch by James Princep in the *Journal of the Asiatic Society of Bengal*, 1 (1832), p. 71.

base for compass readings, two thermometers, two silver watches, a copper jug and an oil stove to boil the thermometers, a lantern to help him read his instruments at night, and two pocket notebooks to record his observations.

The party arrived at its destination on 30 September. The Moonshee had meticulously traced his whole route, carefully noting all that he had observed on his way, especially the vegetation and human dwellings. He seems not to have had any difficulty in settling in Yarkand for the winter. The winter was harsh, the temperature rarely rising above –20°C during the months of January and February. Undeterred, Hameed assiduously wrote his thermometric and hygrometric observations into his notebooks: it snowed for only two days, 19 and 20 January. He drew a map of the city and even of the region, carefully identifying its major cities—Kashgar, Khotan, Sirikul . . .—plotting Tsarist encroachments into the territory as well as the positions of their fortifications.

He even had time to transcribe the history of the region as told by its own people. He described the local political structure, the nature of Chinese presence, and the size and organization of their troops. Sure enough, he took great care to hide his notebooks, along with all his other instruments, in the folds of his great robe. And, of course, he did not forget to take regular astronomical observations—eleven for Yarkand alone—the last dated 27 March 1864. On that day, the governor of Yarkand, whom Hameed had befriended, told him that the Chinese were becoming suspicious of his activities.

Hameed promptly packed his belongings and joined another caravan returning to Leh, accompanied by a cousin he had met during his stay in Yarkand. They crossed the most dangerous section of the route without great difficulty and reached British-controlled Indian territory towards the end of April. Unfortunately, just before arriving at Leh, the Moonshee and his cousin died, either as a result of eating poisonous rhubarb (according to his companions), or as victims of murder by Chinese or Russian agents—if one were to believe the suspicions of Montgomerie's assistant, William Johnson, the first to reach the scene of the tragedy.

Hameed's fellow travellers had meanwhile made off with his most saleable belongings. Fortunately for Montgomerie, no one had touched

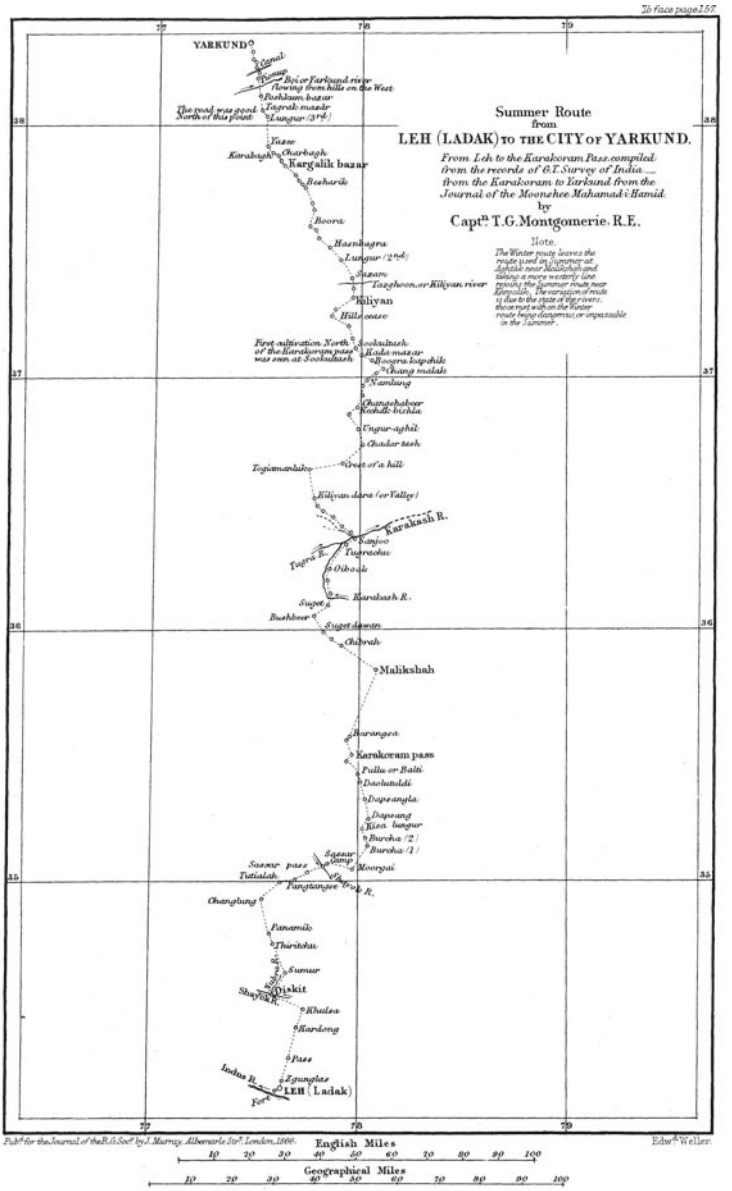


Fig. 19: Map of the summer route between Leh and Yarkand compiled by Montgomerie from Mahomed-i-Hameed's notebooks. From the *Journal of the Royal Geographical Society*, 36 (1866), facing p. 157.

his notes and instruments nor, curiously, his silver watches. All these were forwarded to Montgomerie, who transmitted the papers concerning the political situation in Yarkand and Eastern Turkistan to the Punjab government. Taking the rest of the Moonshee's notes and instruments with him, Montgomerie sailed for England on 20 February 1865 after thirteen years in India, using his leisure to draw a map of the route between Leh and Yarkand and correct the coordinates of the latter city: the French Jesuits had declared its latitude to be 38° 19', Hameed's observations put it at 38° 20'; its longitude was 76°16' according to the Jesuits, Hameed determined it at 77° 30'.[10] He was also able to estimate its altitude at approximately 4,000 feet, which, in Montgomerie's words, 'is perhaps within a few hundred feet of the truth'—it varied between 2,000 and 5,000 feet depending on the source.[11] He also made the most of his two-year furlough to prepare a presentation of the results of this experiment to the Royal Geographical Society on 14 May 1866.[12] This step, as we shall see later, was crucial to Montgomerie's future plans and, indeed, to the credibility of the whole project. For, in spite of Mahomed-i-Hameed's tragic end, Montgomerie deemed the expedition to have been sufficently successful to go ahead with plans to recruit more native agents. And already, before leaving on furlough, he had began to refine his techniques and train a whole generation of prospective Pundits at the headquarters of the Great Trigonometrical Survey of India.

Tibet, 1864–6

Montgomerie had in fact even sent out a new team, this time to Tibet, in order to trace the great road that traverses the country from west to east, from the commercial city of Gartok to Lhasa. This distance was reckoned to be between 700 and 800 miles. Till then the only places

[10] The most recent edition of the *Times Atlas* places Yarkand at 77° 16' longitude and 38° 27' latitude.

[11] *The Journal of the Royal Geographical Society*, vol. 38 (1868), p. 164.

[12] Extracts of the presentation with an account of the discussion which followed were published in *Proceedings of the Royal Geographical Society*, vol. x (1865–6), pp. 162–5. The complete text, Thomas George Montgomerie, 'On the Geographical Position of Yarkand, and Some Other Places in Central Asia', appeared in the *Journal of the Royal Geographical Society*, vol. 36 (1866), pp. 157–72.

that had been more or less located were the city of Shigatze, and Tashil-humpo, the lamasery which overlooks it. Their positions had been plotted a century before, in 1783, by Captain Samuel Turner. A comparison between the old and new measures would help perfect the calibration of the human probes. Besides, the position of the Tibetan capital of Lhasa was only a matter of guesswork. However, there were more important reasons for choosing this itinerary: the route between Gartok and Lhasa, the *Junglam*, was commonly held by the British to be the main artery of Tibet ensuring the flow of most of the country's trade and civil and military communications. Besides, the *Junglam* follows the Tsangpo, the great river which flows north of and parallel to the Himalayas, and of which neither source nor outlet were then known. Charting its course would help determine whether the river flowed into the Irrawaddy, which runs across Burma, or else into the Brahmaputra, which shares an enormous delta with the Ganges.

This new mission was entrusted to two *Bhotiya* cousins who came from the remote Himalayan region of Kumaon, on the borders of British India, Nepal and Tibet.[13] The *Bhotiyas* were reputed to be familiar with Tibet because they used traditionally to earn part of their livelihood trading with the Tibetans, crossing the border during the summer months to barter rice, wheat, and manufactured goods, mainly against salt, but also against borax, horses, wool, and gold.[14] The cousins, Nain Singh, a schoolteacher in his native village of Milum, and Mani Singh, the village *patwari*, or record keeper, were not likely to meet with any difficulty in crossing the frontier from Kumaon. Besides this decided advantage, they had already taken part in topographical surveys with the Schlagintweits and were thus familiar with geodesic and astronomical instruments.[15]

[13] *Bhotiya* is a generic term generally designating the Tibetan-speaking and mainly Buddhist peoples of the Himalayan regions.

[14] See Christoph von Fürer-Haimendorf, *Himalayan Traders* (New York: St. Martin's Press, 1975), chapter 7. See also Janet Rizvi, *Trans-Himalayan Caravans: Merchant Princes and Peasant Traders in Ladakh* (Delhi: Oxford University Press, 1999).

[15] Herman von Schlagintweit, Adolf von Schlagintweit, and Robert von Schlagintweit, *Results of a Scientific Mission to India and High Asia Undertaken between the Years MDCCCLIV and MDCCCLVIII, by Order of the Court of Directors of the Honourable East India Company*, 4 volumes (Leipzig: 1861–6), vol. I, p. 38.

Fig. 20: Pundit Nain Singh or 'Number One'.
Source: Royal Geographical Society

Apart from the same miniaturized instruments as used by the Moonshee,[16] the new Pundits carried a prayer wheel and a rosary—perfectly normal adjuncts, one would think, for two lamas on a pilgrimage to the holy city of Lhasa (which in Tibetan means 'God's abode'). In fact, these two outwardly innocuous objects constituted

[16] These consisted of two miniature sextants, pocket compasses, prismatic compasses, a pocket chronometer, air and boiling-point thermometers, and a watch.

instruments of a very special nature for their owners. The prayer wheel (or *mani-chakra*) consists of a hollow cylindrical box to which is attached a metal chain weighted at the other end. The whole device revolves around a spindle, one end of which forms the handle. A slight

Fig. 21: Tibetan prayer wheel as drawn by Pundit Sarat Chandra Das.
Source: Royal Geographical Society

movement of the wrist makes the box rotate and each revolution represents one incantation of the sacred verse of Tibetan Buddhists—*Om Mani padme hum* ('Hail! O, jewel in the lotus')—which is either engraved on the exterior of the wheel or else written on a scroll kept inside it. For Tibetan Buddhists, the prayer wheel is the very emblem of a precision instrument: it always ensures an error-free incantation—on condition, of course, that the prayer be correctly inscribed. In oral recitation, on the other hand, the slightest slip of the tongue constitutes not just a fault in terms of the ritual but a genuine catastrophe. Besides, owing to its sacred status, the prayer wheel could conceal small objects or inscriptions from curious frontier officials ever suspicious of the British and their native employees.

As for the rosary, it helped count paces: one bead for every hundred paces. The buddhist rosary has 108 coral beads; those of the cousins only had a hundred, every tenth bead being much larger than the others made of the dark corrugated seed of the *rudraksh*. A complete round represented exactly 10,000 paces or five miles.

Besides, Nain Singh and Mani Singh carried quicksilver in an empty coconut shell and a reserve in cowrie shells closed with wax. When poured out into the wooden bowl that the *Bhotiyas* always carry with them as a recipient for food and drink, the glistening surface of the mercury served as a far better artificial horizon than the late Moonshee's smoked glass. In order to complete their panoply of instruments, one must mention a six-inch Elliot sextant with a precision of ten seconds of arc. Too cumbersome to be hidden under their clothes, it was ingeniously secreted in a false compartment of their large wooden travelling chest. In spite of the risk and inconvenience of pulling it out and using it unseen, Nain Singh was able to use it ninety-nine times.

After months of rigorous drilling in the use of the sextant, compass, and other survey instruments and techniques, Nain Singh and Mani Singh left for Tibet in March 1864 and returned to Dehra Dun on 27 October 1866. Turned back at the Tibeto-Kumaoni border, they tried subsequently to enter Tibet through Nepal, all the while charting the route they followed. Despite the advantage of their origin, they had to use the most devious ploys in order to succeed in entering Tibetan territory: at times trying to pass off as merchants in search of Tibetan horses; on another occasion as the legal representatives of fellow *Bhotiyas* travelling to Lhasa to plead their case before the Dalai Lama;

ingratiating themselves with Tibetans by readily lending them money, curing their families of minor ailments; adopting different disguises including a pig-tail . . .

It took more than a year of the utmost perseverance for Nain Singh to succeed in entering Tibet alone, and on condition—under penalty of death—that he keep away from Lhasa. However, disguised as a pious tradesman, the resourceful Pundit managed to join a Ladakhi merchant's caravan on its way to Lhasa carrying presents from the Maharaja of Kashmir to the Dalai Lama. He passed through Shigatze, the second most important city of the region, and paid his respects to the eleven-year-old Panchen (or Teshoo) Lama, head of the great lamasery at Tashilhumpo. He even managed to gain access to the forbidden city of Lhasa and have an audience with the Dalai Lama in person. Short of money at various times, he was forced to earn his living teaching Hindu mathematics and accounting to local merchants. He was once even reduced to pawning his watch and servant so as to borrow money from Tibetan traders. On another occasion, he was forced to sell his bull's-eye lantern to curious Tibetan monks and had to content himself with an oil wick in this windy region to read the nocturnal measurements from his sextant and thermometers.

During his two-and-a-half-year expedition, Nain Singh walked 1,200 miles at a steadily maintained pace. He counted 2½ million paces on his rosary. He successfully measured the position of Lhasa and a number of other important Tibetan cities, thirty-one stations in all. He also mapped the upper course of the Tsangpo from its source to Lhasa, a distance of about 700 miles, and reported that according to his Tibetan interlocutors the Tsangpo and the Brahmaputra were the same river. Nain Singh did not confine his mission to the collection of geographical data. He also gained useful insights into Tibetan culture. He gave a detailed description of Tibet's general climatic conditions, its population, ethnology, cities and monasteries, agricultural production, economy, and trade, especially with China and Kashmir, the state of its roads, transport and communications, and of the Tibetan army.[17] The prayer wheel and the rosary served as a perfect alibi, giving the Pundit

[17] Thomas George Montgomerie, 'Extracts from a Diary kept by Pundit— during his Journey from Nepal to Lhasa, and from Lhasa through the Upper Valley of the Brahmaputra to the Source of that River near the Mansarowar Lake', *Journal of the Royal Geographical Society*, vol. 38 (1868), pp. 154–79.

a sufficiently pious look for him not to be bothered by his fellow travellers when he took his astronomical and meteorological readings.

Not having succeeded in entering Tibet, Mani Singh spent his time exploring western Nepal, which was also out of bounds to Europeans. But when Nain Singh returned to India, exhausted after having spent eighteen months at an average height of about 15,000 feet, Mani succeeded at last in entering Tibet. He bought back Nain Singh's watch and servant and completed the last hundred-odd miles of the *Junglam* that his cousin had had to abandon during the last stage of his odyssey.

High Asia, 1868–82

The success of this mission prompted Montgomerie to request further financial support for the purpose of organizing other Transhimalayan expeditions; the governmental authorities 'cordially approve[d] of the proposal to employ Asiatics in the exploration of the Trans-Himalayan Regions, and direct[ed] that it be intimated to each explorer who may be sent out by the Trigonometrical Survey that any important political intelligence he may bring back [would] receive a separate pecuniary acknowledgement, according to its value, from the Foreign Secretary'.[18] The way was now open for the large-scale extension of corporeal techniques to map all of Central Asia.

Between 1868 and 1875, three further expeditions were sent out to map the regions to the north-east of Afghanistan: the Hindu-Kush range, the Pamir, and Chinese Turkistan. Using the rosary, but abandoning the prayer wheel (one must remember we are in Islamic lands), and working in extreme conditions, the 'Mirza' (in 1868–9), the 'Havildar' (in 1870) and the 'Mullah' (in 1873–4, then in 1875–6 and in 1878)—such were their code names—accurately determined the hydrology of High Asia, mapped the course of the Upper Indus, and identified the sources and course of the Amu-Darya (the Oxus of the Greeks) which, following the Anglo-Russian agreement of 1873, was to constitute the frontier between Russia and Afghanistan. Hardly anything was known at the time about this river. They also charted

[18] NAI, letter dated 23 August 1867 from Foreign Department, Foreign Department Proceedings, March 1868.

the route between Kabul, Kashgar, and Yarkand, of which more than 300 miles were then unknown to Europeans, and determined the positions of various important geographical sites on their route. And, of course, they brought back crucial political information concerning the Central Asian khanates as well as tsarist activity in the region.[19] All returned safely to British India, except the Mirza, who met a tragic end on his second expedition in 1872–3 (murdered in his sleep while on his way to Bukhara).

Nain Singh ('the Pundit') himself returned to Tibet three times between 1867 and 1877 in order to complete mapping the *Junglam* right up to Leh and thus link the Tibetan survey with Montgomerie's triangulation of Kashmir, to visit the Tibetan gold mines, reckon their gold resources, and finally to explore the regions north of the Tsangpo valley. His ardour and skill won him a pension, a grant of land, the Companionship of the Star of India, as well as international fame—the Royal Geographical Society's gold watch in 1868, and gold medal in 1875. At the presentation ceremony it was said that 'his observations have added a larger amount of important knowledge to the map of Asia than those of any other living man.'[20] The system of corporeal techniques was by now well oiled and continued after Montgomerie's death in early 1878. His most brilliant 'instrument', the Pundit, or simply 'Number One' as he was sometimes called, became an instrument-reproducing instrument, instructing a new generation of native explorer-geographers in these novel surveying techniques.

But no account of this Transhimalayan survey would be complete if it did not mention Sarat Chandra Das, the best known of all the Pundits, for having written two books on his travels—a history of traditional Indian explorers to Tibet and a Tibetan–English dictionary—but above all as the inspiration for *Kim*'s Babu Hurree Chunder

[19] For a detailed account of these missions, see Thomas George Montgomerie, 'Report of "The Mirza's" Exploration from Caubul to Kashgar', *Journal of the Royal Geographical Society*, vol. 41 (1871), pp. 132–93; idem, 'A Havildar's Journey through Chitral to Faizabad, in 1870', *Journal of the Royal Geographical Society*, vol. 42 (1872), pp. 180–201; Anon., *Narrative of Surveys made, during 1876, by 'The Mullah', in connexion with the operations of the Great Trigonometrical Survey of India* (Simla: Government of India Press, 1877).

[20] *Journal of the Royal Geographical Society*, vol. 47 (1877), p. cxxvi.

Fig. 22: Self-portrait of Sarat Chandra Das returning on a yak from Tibet in 1879. Source: Royal Geographical Society

Mookerjee.[21] Nor would any account be complete without a mention of Pundit Kishen Singh, a cousin of Nain Singh, who travelled across the Tibetan plain and the Kunlun mountains between 1878 and 1882. In Lhasa, Kishen Singh, alias A.K., was delayed for over a year waiting for his caravan to leave. During his sojourn, he spent his time usefully, drawing a detailed map of the forbidden city. When his caravan did leave, he met with a succession of impediments. He was twice robbed on the road and imprisoned by the Mongolians for seven months on suspicion of being a spy. Finally freed by a Tibetan lama-merchant who bought his release on condition that A.K. work for him, he was forced by the former to ride a horse in order to survey the caravan, thereby preventing him from counting his paces. Kishen Singh got round the

[21] Sarat Chandra Das, *Indian Pandits in the Land of Snow* (Calcutta: Baptist Mission Press, 1893); idem, *Journey to Lhasa and Central Tibet* (London: John Murray, 1902); idem, *A Tibetan-English Dictionary* (Calcutta: Government of Bengal, 1902); idem, *Autobiography: Narratives of the Incidents of My Early Life* (Calcutta: K.L. Mukhopadhyay, 1969).

Fig. 23: Pundit Kishen Singh who transferred the pacing technique to animals by successfully calibrating the pace of his horse.
Source: Royal Geographical Society

problem by measuring the length of the horse's pace and counting the number of times the right foreleg hit the ground. When he arrived back in British India in 1882, he had travelled 2,800 miles and counted $5\frac{1}{2}$ million paces.[22]

Tibet, 1904

All the data collected by the Pundits was published over the years in learned journals, especially in the *Journal of the Royal Geographical Society*. It was also computed into a detailed map of the Transhimalaya. Thanks to this Promethean work, the British felt better armed to contain the tsarist spectre whose *Drang nach Osten* was reckoned to be advancing at the rate of fifty-five square miles a day.[23] In December 1903, convinced that the Russians and Chinese had concluded a secret agreement to hand over Tibet to the former, Curzon, then viceroy of India and longtime advocate of armed confrontation—or 'forward policy', as it was euphemistically termed—with Russia, decided to send a pre-emptive force to invade Tibet. Under the command of Captain Francis Younghusband, the expeditionary force comprising 1,000 soldiers, armed with sophisticated artillery, 10,000 porters, 7,000 mules and 4,000 yaks, entered Tibet in early 1904 and occupied Lhasa in July of the same year, having killed almost 5,000 Tibetan soldiers and civilians on the way. Much ado about nothing: the Russians, bogged down in a protracted war with the Japanese, did not have the means to retaliate. Two months later, the British packed their belongings and returned to India, the expedition having been deemed a fiasco.

Instruments, Travel, and Science

Although the saga of the Pundits has been saved from oblivion by a handful of chroniclers, it has usually been told within the restrictive framework of international espionage. Some authors have of course

[22] For a complete account of this mission, see John Baboneau Nicklerlien Hennessey, 'Report on Pandit Kishen Singh's Explorations in Great Tibet and Mongolia', in Sidney Gerald Burrard, ed., *Exploration in Tibet and Neighbouring Regions, Part 1, 1865–1879; Part 2, 1879–1892.* Records of the Survey of India, vol. VIII, 2 parts (Dehra Dun: Survey of India Press, 1915), part 2, pp. 215–324.

[23] Peter Fleming, *Bayonets to Tibet* (London: Rupert Hart-Davis, 1961), p. 23.

recognized it as a contribution to the history of geography, but have sought to place the narrative within the tradition of mid-Victorian heroic exploration as exemplified by British explorers of Central Africa in the 1860s and 1870s.[24] It must be said that the parallel is tempting. Apart from the coevality of the exploratory thrust into Central Asia and the Lake regions of Central Africa, there is a fascinating similarity in the hydrographical aims of the two projects: the search for the sources of the Tsangpo on the one hand, and the Nile on the other. Indeed, many contemporaries at the Royal Geographical Society quite overtly compared the Pundits and the explorers of the Central African lake regions: Sir Henry Yule, for instance, wrote of Nain Singh: 'to have made two such journeys adding so enormously to accurate knowledge . . . is what no European but the first rank of travellers like Livingstone or Grant have done.'[25]

However, the Pundits' travels cannot be assimilated into the paradigm of Victorian Central African exploration. Quite to the contrary, they contrast very sharply with the latter canon in some quite fundamental ways, shaping the very nature of the knowledge produced. The differences pertain as much to the mode of publication of their work as to their conditions of production and the nature and function of their respective audiences. But the Transhimalayan surveys differ most from all other contemporary surveys—including those being conducted in South Asia itself—in the nature of the instruments and techniques used and the specific civility (ethnic and social origins and culture) of the explorers as compared with other explorers. Although I shall take these differences up individually, it will become clear that

[24] See for instance, Thomas Hungerford Holdich, 'Tibet', in *Encyclopaedia Britannica*, 11th edn, vol. 26 (1911), pp. 916–28; John Norman Leonard Baker, *A History of Geographical Discovery and Exploration* (London: George G. Harrap, 1931); Indra Singh Rawat, *Indian Explorers of the 19th Century* (New Delhi: Government of India, Ministry of Information and Broadcasting, 1973); Kenneth Mason, *Abode of Snow: A History of Himalayan Exploration and Mountaineering from Earliest Times to the Ascent of Everest* (London: Diadem Books, 1987); Derek J. Waller, *The Pundits: British Exploration of Tibet and Central Asia* (Lexington: University Press of Kentucky, 1990); Jacques Pleydel-Bouverie, 'On a Wheel and a Prayer', *Geographical Magazine*, vol. 64, no. 5 (1992), pp. 12–15.

[25] See for instance the letter of Henry Yule to Rutherford Alcock, dated 18 July 1876, in the Royal Geographical Society Archives.

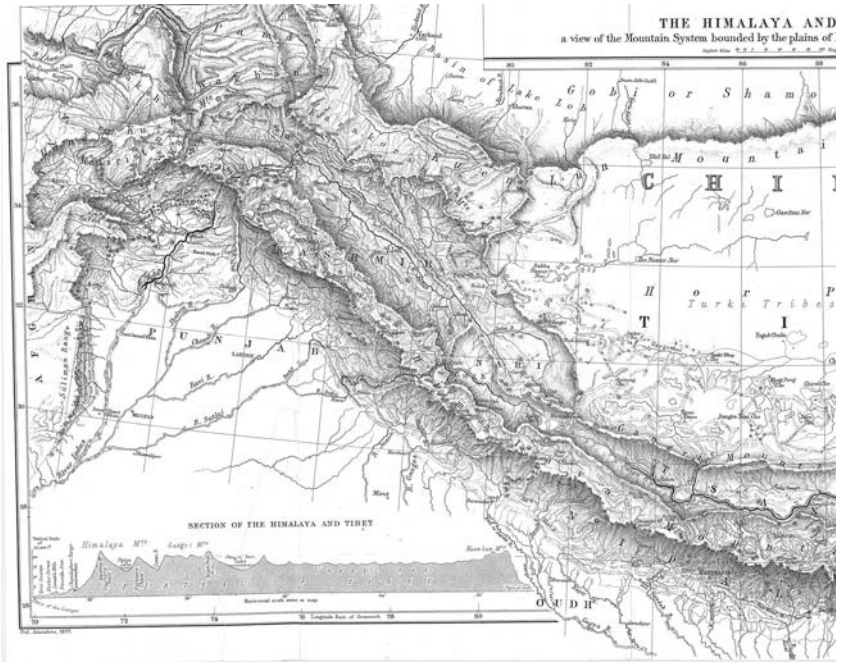
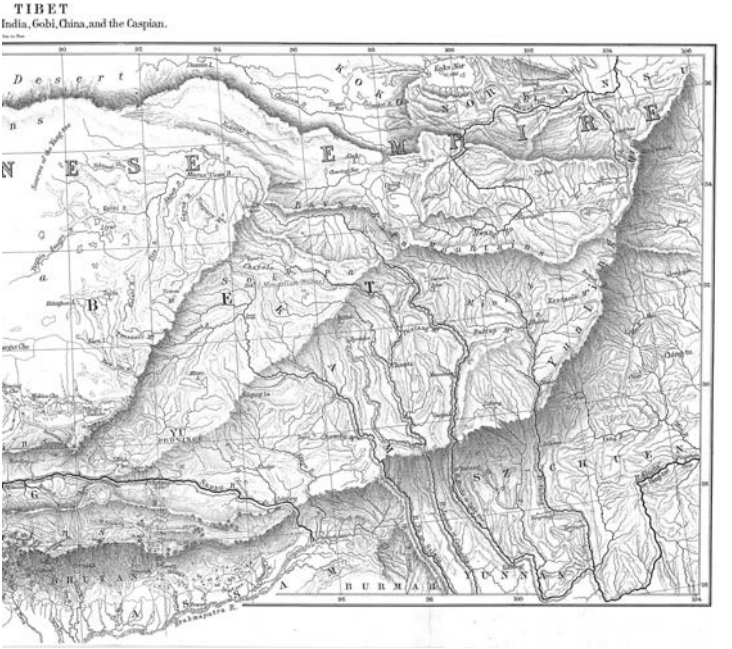


Fig. 24: One of the first of a series of maps of Tibet based on the information culled . . .



. . . by the Pundits. From Clements Robert Markham, *A Memoir of the Indian Surveys* (London: Her Majesty's Secretary of State for India in Council, 2nd edn, 1878).

they are inextricably connected and have to be taken together to truly understand each context and type of scientific activity implied: taken together, they point to the different institutional contexts in which the two sets of explorations were organized and which provide the very conditions for the possibility of each mode. Through this contrast, I do not seek to show the exceptional nature of the Transhimalayan project with respect to a Victorian expeditionary paradigm; rather that there were at least two canons which had completely different ends. Although the exploration of Central Asia was in a sense exceptional, it was certainly not peripheral to the exigencies of mainstream Victorian science and technology. Indeed, I hope through the discussion that follows to show how it mobilized some of the principal actors of Victorian science. More broadly I seek to show how—its peripheral origins notwithstanding—this survey enables us to understand some of the strategies and investments required for general methods and procedures in science and technology to be transferred from one site to another and replicated (blurring *en passant* the traditional distinction between 'centre' and 'periphery'). And because the Transhimalayan project was so different from other geographical surveys, it required certain crucial problems to be solved and some specific investments to be made in order for the knowledge produced to count as such.

The first difference lies in the means by which these works were rendered public. The Pundits' accounts were reported exclusively in official, and often confidential, reports of the Survey of India and in learned journals, most notably the *Journal of the Royal Geographical Society*. The purpose of these voyages was primarily to delimit and stabilize British India in the aftermath of the 1857 revolt by mapping and stabilizing its surrounding territories. This, as mentioned earlier, was perceived by the British to require the resolution of the geography of the Transhimalayan regions in order to bring them into the ambit of British trade, even if this implied military intervention. Although European newspapers covered their exploits, the primary audience of the core literature produced was the community of surveyors, professional geographers, the army, the Government of India, and the India Office. And in mid-Victorian Britain no better forum, could assemble all these different groups than the Royal Geographical Society, the office-bearers of which were largely drawn from the Survey of India or

from the Council of India. Terrestrial measurement, a description of the trade routes, trade flows, the state and preparedness of the various Central Asian armies, and the sociology of the towns, cities, and monasteries of the region are what one finds on reading the different reports. The Pundits' accounts typically form part of a genre that Mary Louise Pratt has called 'autoethnography', by which term she means 'to refer to instances in which colonized subjects undertake to represent themselves in ways that engage with the colonizer's own terms . . . Autoethnographic texts are not . . . what are usually thought of as "authentic" or autochthonous forms of self-representation . . . Rather autoethnography involves partial collaboration with and appropriation of the idioms of the conqueror.'[26]

The Victorian explorers of Central Africa, on the other hand, published their narratives either in the form of books or articles in popular journals like *Blackwood's Magazine*, or, in the case of the Anglo-American John Rowlands, alias Henry Morton Stanley, in leading English and American daily newspapers. In these intensely personal works aimed at a wide readership, the author pleaded his special cause, often with a note of religious and passionate conviction; he reached out, as it were, to his readers, stirring up their sympathy and indignation. And since these appeals were interlarded with themes of bravery and high adventure, the response was enormous.[27] While it is true that the Royal Geographical Society also played a major role in the diffusion and legitimization of these accounts, it did so more as the key sponsor of the African expeditions. The purpose of these accounts was quite overtly to resolve African geography in order to convert the endless stretches of untilled land into useful farms, to open up commerce, and to proselytize the natives out of their perceived animism and savagery—in short to possess the land and its resources rather than gain control over trade routes.[28]

[26] Mary Louise Pratt, *Imperial Eyes. Travel Writing and Transculturation* (London & New York: Routledge, 1992), p. 7.

[27] Alan Moorehead, *The White Nile* (London: Penguin, 1973), p. 65.

[28] The following quote from Paul Du Chaillu's *Explorations and Adventures in Equatorial Africa* (New York, 1861) superbly parodies this hegemonic goal: 'The murmur of the rapids below filled my ears, and as I strained my eyes toward those distant mountains which I hoped to reach, I began to think how this wilderness

The opposition between the two genres, their publics, and their legitimating strategies went hand in hand with two completely different ways of organizing their production. For while the Royal Geographical and other scientific societies seconded the British Foreign Office in sponsoring and funding most of the exploration of *terrae incognitae* and providing them with logistical support, the exploration itself was conducted by private individuals of high social standing who worked mainly in order to outdo their rivals and realize their personal ambitions.[29] Controversy was of the essence in order to ensure the dynamic of the geographical enterprise, each explorer trying through his popular writings to muster as much public support as possible in his ruthless quest for publicity, personal glory, and, eventually, royal patronage: 'If he was attacked by jealous rivals', writes Alan Moorehead in his popular history of the exploration of the White Nile, 'people sprang to his defence; and in the speculative and highly charged arena of African exploration there was a great deal of jealousy . . . It was as patriotic and as partisan as war.'[30]

This is most dramatically illustrated by the tragic dispute between Burton and Speke over the source of the Nile (discussed later). It was an acute awareness of this all-important role of controversy that led Stanley, the most successful of the Central African explorers, to carefully choose his European assistants for his second expedition (1874–7) from *working-class* families for their toughness and sense of discipline, precisely in order to preclude the possibility of their writing independent accounts of their adventures or dispute his views in the Royal Geographical Society. However, in the case of the Indo-British

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would look if only the light of Christian civilization could once be fairly introduced among the black children of Africa. I dreamed of forests giving way to plantations of coffee, cotton, spices; of pe[a]ceful negroes going to their contented daily tasks; of farming and manufactures; of churches and schools; and luckily, raising my eyes heavenward at this stage of my thoughts, saw pendent from the branch of a tree beneath which I was sitting an immense serpent, evidently preparing to gobble up this dreaming intruder on his domains' (p. 83, quoted in Pratt, *op. cit.*, p. 209).

[29] Henry Morton Stanley was the only exception in that he managed to get himself sponsored jointly by two newspapers, the *New York Herald* and the London *Daily Telegraph*.

[30] Ibid.

survey of the Transhimalaya, there are few signs of controversy: quite the contrary. As the foregoing narrative suggests, we are here confronted with a textbook account of consensual, cumulative knowledge formation, the success—and indeed the very possibility—of which required the foreclosure of all dispute, and a degree of control over the material and social world which was beyond the means of individuals. This sort of activity could only be carried out within the framework of centralized institutions, with their imperatives of teamwork and a strong hierarchized power structure.[31]

No less striking is the difference in the nature of instruments used. The use of humans as instruments seems at first sight to be a local, rather primitive, *ad hoc* arrangement concocted mainly because of the impossibility of transporting the adequate, but cumbersome, surveying equipment—theodolites, heliotropes, barometers, etc. However, it is important to remember that surveying had been the epitome of metrological precision for over a century, and since the end of the eighteenth century explorers, and above all scientific travellers, had been vying with each other in the number and sophistication of measuring instruments they used in their expeditions.[32] During his American expedition between 1797 and 1804, Alexander von Humboldt, the scientific traveller *par excellence*, carried chronometers, telescopes, sextants of all sizes, compasses, magnetic needles, a repeating circle, a theodolite, an artificial horizon, a pendulum, a magnetometer, barometers, thermometers, hygrometers, electrometers, eudiometers, aerometers, a graphometer, and a quadrant, all crafted by the best instrument makers in Europe.[33] And although Humboldt did admit the possibility of using corporeal techniques for measuring—on condition, of course, that the measurement had a determinable limit of

[31] Svante Lindqvist, 'Labs in the Woods: The Quantification of Technology During the Late Enlightnment', in Tore Frängsmyr, John L. Heilbron, and Robin E. Rider, eds, *The Quantifying Spirit in the 18th Century* (Berkeley, Los Angeles, London: University of California Press, 1990), pp. 291–314.

[32] See Sven Widmalm, 'Accuracy, Rhetoric, and Technology: the Paris-Greenwich Triangulation, 1784–88', in ibid., pp. 179–206. See also, S. Schaffer, 'Accurate Measurement is an English Science', in M. Norton Wise, ed., *The Values of Precision* (Princeton: Princeton University Press, 1995), pp. 135–72.

[33] Susan Faye Cannon, *Science in Culture: The Early Victorian Period* (New York: Science History Publications, 1978), pp. 75–6.

error—these techniques were valid according to him only for the naturalist because of his need for a much lesser degree of precision in surveying than the astronomer or geodesist.[34] Indeed, by the second half of the nineteenth century, metrology was at the centre of a ruthless battle between the British and the French, to determine which was to be the universal unit of linear measure, the imperial yard or the 'natural' metre.[35] According to the historian of Victorian science, Susan Cannon, the scientific spirit of the period, which she qualifies as Humboldtian, is characterized by:

1. A new insistence on accuracy, not for just a few fixed instruments, but for all instruments and all observations.
2. A new mental sophistication, expressed as contempt for the easy theories of the past, or as taking lightly the theoretical mechanisms and entities of the past.

[34] 'Cette assurance devient beaucoup plus grande encore, on peut mesurer jusqu'à 40t. de hauteur, en se servant plus près des objets de grandes bases, que l'on mesure très rapidement par ses pas ou par une longue perche que l'on jette successivement devant soi. De l'égalité du pas de l'homme. A quelle exactitude l'habitude peut porter. Mesures par le tems sans compter les pas. Mesures des angles de hauteur sans horizon avec une perche de 5 pieds de hauteur, qui sert de signal à la hauteur de l'oeil. J'ai trouvé l'horizon artificiel et ce signal souvent en harmonie à 5'–6' près. Tout ce détail paraît très minutieux. On peut s'inventer 10 méthodes pour une pour s'assurer à peu près de la grandeur des Objets. Mais ces à peu près ont leurs limites d'erreur, qu'il faut connaître pour l'expérience. On peut par telle ou telle méthode se tromper de 100 mais non de 2 ou 300 toises. Les besoins du Naturaliste (je le répète) ne sont pas ceux de l'Astronome. Le grand problème de la vie est de produire beaucoup en peu de tems et il est certain que si des méthodes de mesurer avec des moyens très simples fussent répandu dans le public, si l'attention des hommes qui vivent dans les champs, les forêts et les montagnes, était plus fixée sur la grandeur des objets et leur distance, qu'après tant de voyages et de recherches faites dans les 2 hémisphères nos idées géologiques (la partie la plus belle, la plus intéressante des connaissances humaines) seraient triplement avancées.' Alexander von Humboldt, Tagebuch 1, Bl. 81r, Deutsche Staatsbibliothek, Berlin. I am very grateful to Michael Dettelbach for providing me with this reference and also for explaining the context in which Humboldt thinks pacing is a valid measuring technique.

[35] See Simon Schaffer, 'Metrology, Metrication and Victorian Values', in Bernard Lightman, ed., *Victorian Science in Context* (Chicago: University of Chicago Press, 1997), pp. 438–74.

3. A new set of conceptual tools: isomaps, graphs, theory of errors.
4. An application of these not to laboratory isolates but to the immense variety of real phenomena, so as to produce laws dealing with the very complex interrelationships of the physical, the biological, and even the human.[36]

Indeed, the *raison d'être* of the Great Trigonometrical Survey (GTS) of India was the securing of extreme accuracy in its measurements. It was for this very reason that its staff was kept distinct at least on paper, from that of the Topographical and Revenue Surveys of India. In his memoir on the Indian surveys, their first historian, Clements Markham, himself an old GTS man and future president of the Royal Geographical Society, remarked that the 'mathematical attainments [of the trigonometrical surveyor] must be of the highest order, and he would have neither the time nor, as a rule, a special aptitude for the collection of topographical details for filling up the exact skeleton furnished by his scientific labours. The two kinds of work are distinct, and require a different training in many respects and a different turn of mind.'[37]

A major part of the training entailed the cultivation of extreme patience and a perfect mastery over the use, care, and daily recalibration of the great three-foot theodolite, zenith sectors, sextants, thermometers and watches, astronomical clocks, telescopes, and perambulators. Professional-cultural pressures and traditions apart, it is also not difficult to imagine the havoc that even the smallest error in determining the coordinates of Lhasa or Shigatze would have caused for the logistics of the Younghusband expedition. How then did this instrumental 'innovation' square with these exigencies?

In order to answer this question we first have to understand what this innovation actually consisted in and how it was made to fit in with other surveying techniques, thereby anticipating tensions between the protagonists of different metrological instruments.

Outmoded as it might seem, the technique of pacing is in fact an adroit transfer of some of the functions of the perambulator (sometimes also called a waywiser), the principal instrument of measure for long-distance traverse surveying, the chain being the standard

[36] Cannon, *op. cit.*, p. 104.
[37] Markham, *op. cit.*, p. 64.

instrument for estate and revenue surveys ever since the start of British surveys of the Indian subcontinent. Although based on the traditional European perambulator (which was found to be unsuitable for Indian conditions: 'flimsy, bad in principle, and incapable of working except on a smooth road or bowling green') the Indian instrument was from the start designed for South Asian conditions.[38] Thus the 'Madras-pattern 8-mile perambulator', designed in the mid-1780s by the Madras surveyor John Pringle and his autochthonous assistants, consisted of an iron wheel about seven feet in diameter, fitted with differential brass axle plates worked by an endless screw. The dial recorded revolutions in terms of miles, furlongs, yards, feet, and inches. It was propelled by two men with handles passing through the axis about breast high, but was not suited to rough ground.[39]

Many modifications were to be introduced into this instrument in the decades that followed, before it was replaced by the 'Everest 6-mile perambulator', devised between 1832 and 1836. The latter had a wheel of diameter just under three feet, with differential dials reading to miles and decimals of miles. It needed only one person to propel it, the handle being inspired by the South Asian plough; the wheel was made strong and handy for work over rough ground, and specially heavy so that it would be easier to wheel on the ground than carry idle on the head or shoulder—as was the case with the Pringle instrument.[40] Local gestures and customs were thus continuously inscribed into the changes wrought to the instrument. Montgomerie's Pundits were a reconfiguration of some of the principal functions of the perambulator: the circular motion of the wheel was translated into the paces of the operator (who was also the surveyor in that he himself measured his paces), the dials to his rosary.

This said, Montgomerie still had to standardize his human 'instrument' in order to render it replicable. We might recall that when he received the late Moonshee's possessions, Montgomerie retained the latter's notes and instruments. In the talk he gave to the Royal

[38] Ralph Smyth and Henry Landour Thuillier, compilers, *A Manual of Surveying for India, Detailing the Mode of Operations on the Revenue Surveys in Bengal and the North-Western Provinces* (Calcutta: Thacker, Spink & Co., 1851).

[39] Phillimore, *op. cit.*, vol. I, p. 199.

[40] Smyth and Thuillier, *op. cit.*, pp. 106–8.

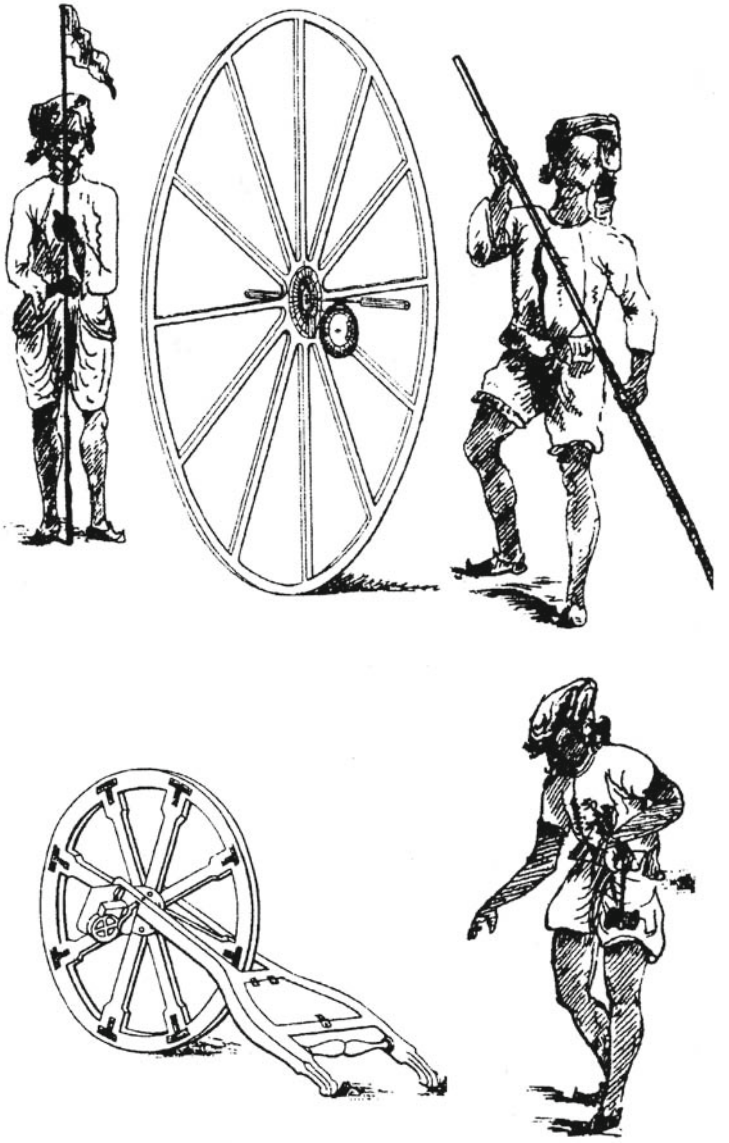

Fig. 25: Survey perambulators of the Survey of India: the Madras-pattern perambulator, above, and the Everest perambulator, below. Adapted by the author from R. Smyth and H.L. Thuillier, comp., *A Manual of Surveying for India* (Calcutta: W. Thacker & Co., 1851).

Geographical Society on 14 May 1866, he meticulously described the way he re-tested all of Mahomed-i-Hameed's instruments—his thermometers, sextants, watches, compasses, etc.—in a variety of conditions. He also ascertained the reliability of his human instrument. The Moonshee's performance did not vary between the simulated campaign in Kashmir and the real one in Chinese Turkistan—his pace was a constant 31½ inches.

> I . . . desired he should simply record the bearing and direction of the road as far as he could see along it at one time, and with his watch note the time he marched in that direction. By this means I trusted that a very fair route-survey might be obtained, if the value or rate per hour could be satisfactorily established. This rate I was able to determine from the average of his marches before and after reaching Leh. And again, beyond Leh, the regular survey had been carried three marches down the Turkistan side of the Karakoram Pass. The latter enabled me to follow the moonshee's work for 18 out of the 30 marches; and by this means it was easy to form an opinion on the amount of reliance that ought to be placed on his route-survey of the other 12 marches.
>
> The observations for latitude formed a further very valuable check, and prevented any great accumulation of error. A great number of observations were taken at Yarkand, and by combining the route-survey with the latitude, I think it may be concluded that the latitude and longitude of Yarkand have been determined within narrow limits.[41]

The Moonshee's gestures were indeed what Otto Sibum has referred to as 'gestures of accuracy'.[42] The demonstration was received with much enthusiasm by his colleagues at the Royal Geographical Society—Sir Andrew Scott Waugh, ex-Surveyor General of India, corroborated Montgomerie's interpretation of the Moonshee's observations; for Murchison this represented an exploit 'of the greatest importance for geographers'.[43] With this approval by the community of surveyors and geographers, his 'instrument' was now officially calibrated.

[41] Montgomerie, 'On the Geographical Position of Yarkand, . . .', *The Journal of the Royal Geographical Society*, vol. 36 (1866), p. 163.

[42] Heniz Otto Sibum, 'Reworking the Mechanical Value of Heat: Instruments of Precision and Gestures of Accuracy in Early Victorian England', *Studies in History and Philosophy of Science*, vol. 26, no. 1 (1995), pp. 73–106.

[43] *Proceedings of the Royal Geographical Society*, vol. 10 (1865–6), pp. 162–5.

This step was crucial for it is only through calibration that instruments or techniques developed in a given place can be compared with those developed in another place, that the results obtained through the one set can be compared with those obtained through the other set—and thus that contemporary science can claim to be universal. It was thus that Montgomerie could legitimately extend his techniques and instruments to other places. All instruments and methods have to be calibrated: a watch's dial or a thermometer's stem are marked with values which correspond to the movements of the hands or of the liquid for a known time or temperature. Scientists assume that any identical time lapse or temperature identical with that of an initial, or standard, source will produce an identical response in all other watches or thermometers. Assured of the calibration of his human instrument, Montgomerie could now legitimately link two distinct surveying techniques on the same map—classical triangulation and the geodetically and astronomically controlled route surveys of the Pundits. He could also envisage the extension of his corporeal techniques to map other places.[44]

The operation of calibration is crucial in survey practices, the more so in the Indian subcontinent. All surveyors are almost obsessed by it. Chains have to be recalibrated before, after, and during each use, and the same can be said for compensating bars, thermometers, sextants, and theodolites. In his *Account of the Measurement of an Arc of the Meridian between the Parallels of 18° 3' & 24° 7'*, published in 1830, for instance, George Everest, F.R.S., Surveyor General of India from 1830 to 1843, devotes nearly a dozen pages to a detailed description of the recalibration procedures for the great theodolite after its disastrous fall in 1808 from the top of the *gopuram* of the Tanjore temple. Montgomerie himself gave detailed accounts of his calibration activities in his narrative reports of the Kashmir survey operations.

Finally, of course, lies the problem of the very special civility of the explorers and the trust accorded to them. For, while almost all explorers, like all men of science of the time, were white and of high social standing, with the time and resources to engage in such risky pursuits, those engaged in this Transhimalayan project were (with one notable

[44] See Harry M. Collins, *Changing Order: Replication and Induction in Scientific Practice* (London: Sage, 1985), pp. 100–6.

exception of whom more later) all South Asians. It could, of course, be argued that the enrolment of colonized people to execute what their colonial masters were themselves not in a position to carry out is explicable through the rationality of imperialism—and the story of this exploration could at first sight lend itself to a narrative of the domestication of colonial bodies through the enforcement of discipline—this explanation alone cannot respond to a series of questions which arise in the light of the Indo-Victorian intellectual and social context in which this enterprise is embedded. This confidence in natives to record and narrate facts so vital for the survival of the British empire is especially surprising when one remembers that geography in the nineteenth century consisted not only in taking topographical readings but also in collecting cultural, ethnological, political, and commercial information.[45]

Although men of science had, since the seventeenth century, been conducting experiments on humans which required the subjects to relate their reactions, the subjects they chose for this type of experiment were very special—if not themselves, they were carefully chosen from among their (European) colleagues: 'for the two grand requisites of a witness', wrote Robert Boyle, the great theoretician of the experimental form of life, '[are] the knowledge he has of the things he delivers, and his faithfulness in truly delivering what he knows.'[46] Indeed, at least until the mid-nineteenth century, women, servants, children, the sick, and the insane were not considered to be reliable witnesses.[47] It might also be useful to remember that although native informants are crucial in the culling of much knowledge, they are hardly ever acknowledged in most narratives, and that, at precisely the

[45] It is useful to remember that Section E of the British Association for the Advancement of Science, established in 1851, was entitled 'Geography and Ethnology'.

[46] Robert Boyle, 'The Christian Virtuoso', in idem, *The Works of the Honourable Robert Boyle*, ed. Thomas Birch, 6 volumes (London: J. & F. Rivington, 1772), vol. 5, p. 529. Quoted in Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life* (Princeton: Princeton University Press, 1985), p. 58.

[47] See Simon Schaffer, *From Physics to Anthropology—and Back Again* (Cambridge: Prickly Pear Press, 1994).

same moment as Montgomerie was putting together his scheme, John Hanning Speke was embroiled in a fatal conflict with his arch rival and former colleague in the Survey of India, Richard Francis Burton, over the discovery of the source of the White Nile. At the heart of the controversy lay Burton's intense contempt for sub-Saharan Africans and thus for Speke's key informants. At one point in the duel, Burton was able to turn the tables on his rival by reversing the direction of a river that had been reported to flow into Lake Tanganyika and thus identify this lake (instead of Lake Victoria) as the source of the Nile. He argued quite simply that the originally supposed direction had been culled from local, therefore unreliable, sources. How then could any credibility be accorded to the testimony of a few South Asian underlings? What legitimized the Pundits as reliable producers of knowledge?

As noted in earlier chapter 3, ever since their arrival in the Indian subcontinent and for any continued presence there, all Europeans had had to rely on a close collaboration between them and native intermediaries. With territorial conquest in the Subcontinent in the mid-eighteenth century, this collaboration spread to tax collection and the administration of justice, then to education. For this, the British retained the traditional administrative structures and most of the under civil servants of the South Asian kingdoms and empires they took over. Thus, *tehsildars* (prefects), *kazis* (magistrates), *kotwals* (police officers), *pargana sarrishtadars* or *kanungos* (rural registrars), *patwaris* (record keepers), *amils* (tax collectors), *katibs* (scribes), *maulvis* and *pundits* (teachers), inherited from the Mughal and other princely administrations, served as intermediaries between the British and the local populations.[48]

This dependence on local intermediaries is perhaps nowhere more overtly exhibited than in the different surveys undertaken in the Subcontinent. The first detailed English map of the Indian subcontinent was, as we saw, published in 1783 by Rennell. In order to make it, Rennell had recourse to indigenous gazetteers like the *A'in-i*

[48] Few authors have examined the question of native intermediaries in colonial India. This lacuna has been filled by Christopher Alan Bayly, *Empire and Information: Intelligence Gathering and Social Communication in India, 1780–1870* (Cambridge: Cambridge University Press, 1996).

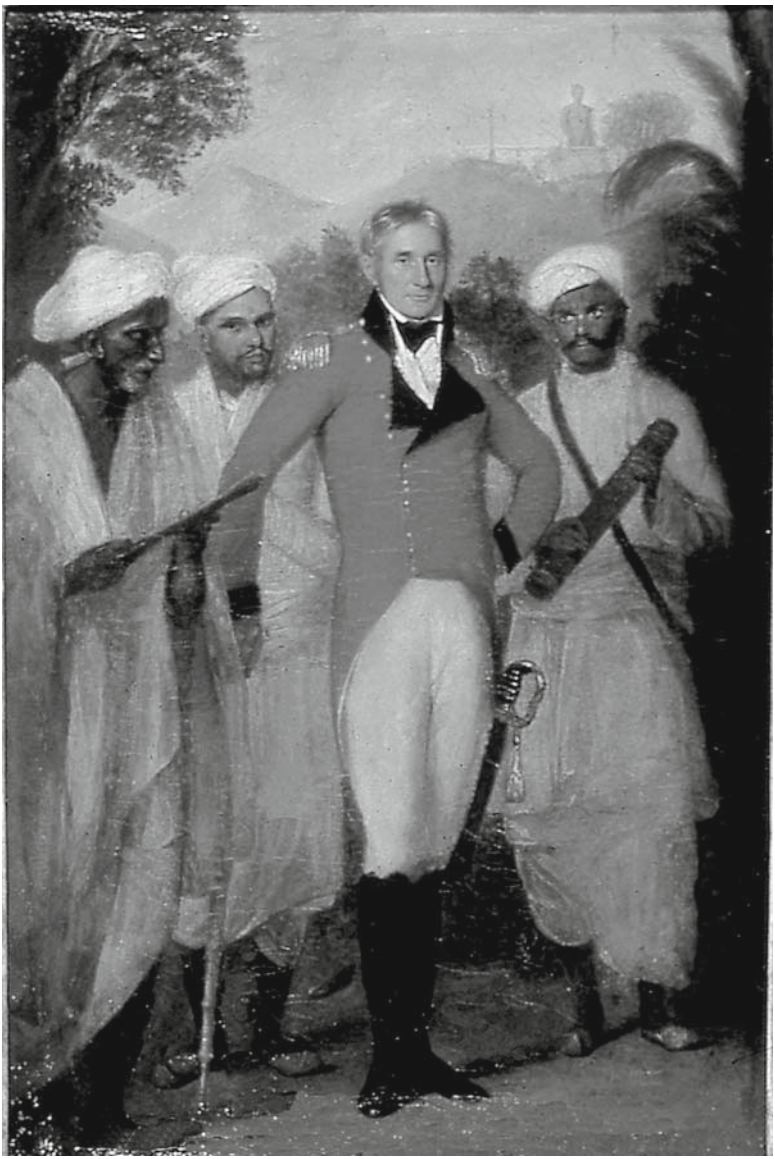

Fig. 26: Portrait of Colin Mackenzie by Thomas Hickey (1816).

Akbari, as well as indigenous route surveys.[49] This collaboration is also celebrated in contemporary portraiture. For instance, the portrait of Colonel Colin Mackenzie (1754–1821), Surveyor-General of India, painted by Thomas Hickey in 1816, is a good example. One sees the Scotsman surrounded by a Jain priest with a palm-leaf manuscript in his hand, his peon Kistnaji holding his telescope and, behind him, his Pundit, Kavali Venkata Lakshmaiah, who has only his—immaterial—knowledge to offer.[50]

Caste appellations and titles soon incorporated this new sense of specialist intermediaries in the emerging Anglo-Indian language, and by the mid-nineteenth century had wound their way into current English usage.[51] Now, one of the two legitimizing strategies deployed by Montgomerie consisted in carefully choosing Anglo-Indian code names that related to intellectual activities in traditional South Asian societies: *Pundits* after all is the Sanskrit for learned men; in Anglo-Indian it denoted an adviser to British judges on matters of Hindu law; *Moonshee* is the Persian for a scribe or a writer, and Anglo-Indian for a native teacher of Indian languages; and *Mirza* and *Mullah* the Persian for the learned and the cleric, respectively.[52] In Western traditions, the

[49] See chapter 2 above. On South Asian cartographic traditions in general, see Joseph E. Schwartzberg, 'South Asian Cartography', in John Brian Harley and David Woodward, eds, *The History of Cartography. Cartography in the Traditional Islamic and South Asian Societies*, vol. 2, book 1 (Chicago & London: University of Chicago Press, 1992), pp. 293–509.

[50] Phillimore, *op. cit.*, vol. II, plate 22 facing page 427. See also Marika Vicziany, 'Imperialism, Botany and Statistics in early Nineteenth-Century India: The Surveys of Francis Buchanan (1762–1829)', *Modern Asian Studies*, vol. 20, no. 4 (1986), pp. 625–60; and Nicholas B. Dirks, 'Colonial Histories and Native Informants: Biography of an Archive', in Carol A. Breckenridge and Peter van der Veer, eds, *Orientalism and the Postcolonial Predicament: Perspectives on South Asia* (Philadelphia: University of Pennsylvania Press, 1993), pp. 279–313.

[51] Of course, this mediation in the construction of knowledge had to be legitimized and the British were indeed conscious of this need. One of the main functions of British Orientalism was precisely this. See Kapil Raj, 'Du commerce à la linguistique', *La Recherche*, 300 (July–August 1997), pp. 46–9 and chapter 3 above.

[52] For the evolution of the meanings of these terms in English, see *The Oxford English Dictionary*, and Henry Yule and A.C. Burnell, *Hobson-Jobson: A Glossary*

credibility of a report normally lies in the nominal identity (and thus the credibility) of the reporter.[53] However, in the present case, these identities had to be kept secret. And although this could have been achieved by using banal code names or by simply changing the names of the native explorers, their reports could not have been legitimized. It was thus precisely through the use of Anglo-Indian appellations with intellectual connotations as code names that this credibility could be conferred.

The other strategy consisted in showing how, when compared with Europeans who had in some cases taken geodesic measurements of the same places as the Pundits, the latter were at least as accurate. In the article he published on Nain Singh's first mission to Tibet in the *Journal of the Royal Geographical Society* in 1868, Montgomerie writes: 'There is no doubt that the Pundit is an excellent and reliable observer.' Then he goes on to devote more than five pages in order to rigorously establish the credibility he accords to his 'instrument'. He compares Nain Singh's mapping of known territories with those made previously by British observers and shows that they are at least as accurate. For Tibet, Captain Samuel Turner, who had been sent by the EIC as an emissary to that country in 1783, had left a series of observations as well as a map of his route from Bhutan to Lhasa via Shigatze. Montgomerie scrutinizes these and concludes that they lack precision.

> Turner observed the latitude at Tashilumbo (Shigátze), and made it 29° 4' 20", the Pundit makes it 29° 16' 32". Turner's latitude of Chumulárí is 28° 5', the Great Trigonometrical Survey latitude is 27° 50'. Turner very possibly was not accustomed to take latitudes, and as the Surveyor (Lieutenant S. Davis) sent with him was not allowed to go beyond Tassísudon, it is not to be wondered that there are differences in his latitudes. The comparison of several latitudes now well-known, tend to show that the semi-diameter of the sun may well have been omitted by Turner, as his observations were to the sun only.
>
> The Pundit's observations at Shigátze extend over many days, and include thirteen observations to the sun and a variety of southern stars, as well as to the pole star. The latitudes derived from these observations

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of Colloquial Anglo-Indian Words and Phrases (London: John Murray, 1903; new edition: London: Routledge & Kegan Paul, 1985).

[53] See Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago & London: University of Chicago Press, 1994).

> agree capitally *inter se*. The Pundit was thoroughly practised in the method of taking latitudes, and as his determinations of many well-known points, such as Bareilly, Moradabad, &c., have proved to be correct with only a pair of observations, there can be no doubt about accepting his latitude of Shigátze, where he took so many. The Pundit followed the same river as Turner for 50 miles between Gyangze and Shigátze. They agree in making the bearing between those places 62° west of north. The bends of the river as given by them agree in a general way, but the distance by Turner is 39 miles, and by the Pundit 46 miles. As the former appears to have only estimated his distances by guess, while the latter paced them carefully, the result by the Pundit has been adopted as the most correct.[54]

With this, Montgomerie manages to elevate his collaborator from the rank of a simple instrument, a 'docile body', to that of a peer, comparable to, if not better than, his fellow countryman Samuel Turner. Indeed, the many European awards won by Nain Singh can be taken as much to be signs of recognition of the individual to whom they were awarded as a reinforcement of the legitimation of the knowledges and techniques mobilized to acquire them.

Thanks, then, to these investments in calibration and legitimation, the knowledge produced by the 'Pundit-instruments' was validated and travelled far out of their sites of production in the form of maps, anthropology, and linguistic texts, and texts on Central-Asian statecraft. But what was the fate of the human 'instruments' and their incorporated gestures? The itinerary of their displacement and appropriation is not a simple one to trace. However, two episodes might help throw some light on their dissemination.

The first relates to an attempted appropriation of corporeal surveying techniques by another imperial power—Russia. In large measure owing to the internationalism of the community of Victorian geographers, almost all the reports and technical publications relating to the Transhimalayan expeditions, along with the prayer wheel and rosary, were transmitted to their colleagues at the Imperial Russian Geographical Society at St Petersburg. However, in spite of at least seven attempts, the Russians could not use this knowledge, nor the

[54] Thomas George Montgomerie, 'Report of a Route-Survey made by Pundit *—, from Nepal to Lhasa, and thence through the Upper Valley of the Brahmaputra to its Source : Extracts', *Proceedings of the Royal Geographical Society*, vol. 12 (1867–8), p. 144.

instruments; for what was missing were the human instruments and the trust and complicity thanks to which the whole system functioned. The latter conditions had, as we have seen, been co-produced along with the British Indian empire and could not be transmitted to other empires.[55] If Montgomerie's scheme fed on the dual umbilical cord of the replicability of experiments and on investments of confidence and credibility in native agents, this was only conceivable within institutional traditions built through the preceding centuries.

The second example is that of Pundit Kintup from Darjeeling, who, because he was illiterate, was sent on his mission in 1880 under the command of a Chinese lama to determine the course of the Tsangpo downstream of Lhasa. The latter decamped after having sold Kintup to a Tibetan monastery. Kintup, however, bought back his freedom by working for the abbot of the monastery and continued his mission—which he completed successfully.[56] Obviously, the British had not been able to establish the required trust and complicity with the Chinese that they had with Kintup and the other Pundits.

[55] On this subject see the correspondence between Frédéric d'Osten Sacken, Secretary of the Imperial Russian Geographical Society, and General J.T. Walker, Superintendent of the Great Trigonometrical Survey of India, Archives of the Royal Geographical Society, London.

[56] For Kintup's story, see Henry Charles Baskerville Tanner, 'Kintup's Narrative of a Journey from Darjeeling to Gyala Sindong (Gyala and Sengdam), Tsari and the Lower Tsang-po, 1880–84', in Sidney Gerald Burrard, ed., *Exploration in Tibet and Neighbouring Regions, Part 1, 1865–1879; Part 2, 1879–1892*, Records of the Survey of India, vol. VIII, 2 parts (Dehra Dun: Survey of India Press, 1915), pt. 2, pp. 329–38.

CONCLUSION

Relocations

This book began with the observation that modern science is widely considered to be a purely West European creation and then went on to present a brief account of academic conceptions and debates of its relationship to other societies and cultures. These have centred either on the epistemological, sociological, and economic uniqueness of the West, or else highlighted the mechanisms of its worldwide spread. Adducing historical evidence around specific and indeed crucial moments in the history of science, this book challenges both the largely unsubstantiated article of faith that modern science was created in the West and the assumption that it was subsequently disseminated, or imposed, elsewhere. By shifting attention from the secluded space of the (almost invariably) Western laboratory, the favoured locus of most research in the history of science, to the intercultural contact zone—in this case that established between South Asians and Europeans in trading ports in the early modern period—the book relocates knowledge making in different and infinitely more heterogeneous milieus. In place of the civilizational and diffusionist models, and in contrast to traditional responses within 'Science and Empire' studies, it argues for the making of scientific knowledge through co-constructive processes of negotiation between different skilled communities and individuals from both regions, resulting as much in the emergence of new knowledge forms as in a reconfiguration of existing knowledges and specialized practices on both sides of the encounter. Indeed, it is one of the contentions of this book that knowledges that thus emerged were totally contingent on the encounter and that important parts of what passes off as 'Western' science were actually made outside the West.

While partaking of the social and anthropological turn characteristic of recent research in science studies, this book enlarges and renders more complex the crucial questions and problems of knowledge

making that this scholarship has raised. Interpersonal trust, calibration, translation, and the relationship between art and science and instruments and embodied skills are now no longer just considered within the confines of West Europe's savant-elites, but are addressed in the wider world in which so much of modern scientific knowledge was also being made. The answers that the present study points towards certainly reinforce the centrality of these issues for knowledge making and its replicability, but also highlight their complexity in intercultural contexts. They also call attention to the active part played by many actors in order to set up commonalities between the different cultures concerned so as to render their respective worlds commensurable. For example, as we saw in chapter 3 interpersonal trust between—certain—British and—certain—South Asians was predicated upon establishing their common genealogy, language, culture, and shared mercantile interests.

Indeed, relocating scientific knowledge making and certification within the context of long-distance commercial networks is another of the book's major contributions inasmuch as it brings to light the all-too-ignored role of global trade and trading companies in the rise and development of modern science. For, while the nexus between trade and knowledge networks has already been remarked upon by some scholars there seems to have been little detailed examination of this relationship—except in the context of the Dutch East India Company.[1] It is hoped that the case studies presented here have successfully shown how the circulation of knowledge, knowledge-related skills, and material cultures relied on the networks and sociabilities of early-modern commerce and how these networks mutually fed off and built on each other in their development. The focus on the trajectories of individual actors who navigated these worlds sheds further light on how many

[1] See Steven J. Harris, 'Long-Distance Corporations, Big Sciences, and the Geography of Knowledge', *Configurations*, vol. 6, no. 2 (1998), pp. 269–304; Larry Stewart, 'Other Centres of Calculation, or, Where the Royal Society Didn't Count: Commerce, Coffee-Houses and Natural Philosophy in Early Modern London', *British Journal for the History of Science*, vol. 32, no. 2 (1999), pp. 133–53; and Johan Leonard Blussé and Ilonka Ooms, eds, *Kennis en Compagnie: De Verenigde Oost-Indische Compagnie en de moderne Wetenshap* (Amsterdam: Balans, 2002).

important careers in science were built within trading companies, and helps further our understanding of the close and complex links between the latter and savant institutions and communities. The chronological arrangement of the case studies shows how, in the Euro-South Asian context, the transformation from commercial interaction to imperial domination was accompanied by the introduction of civil administration and statecraft as new domains (in addition to revenue collecting and trade) within which new forms of knowledge—especially surveying and mapping—were constructed.

The interaction between these different dimensions of human activity lends a more complex meaning to the concept of the contact zone. From its original use to study the encounter between geographically and ethnically distinct groups, it can now be usefully applied to that between different types of human activity—trade, statecraft, and knowledge-making—in the same or different geographical settings. This shift opens new vistas for research in the history of science. I shall come back to this shortly. Co-construction too takes on a broader sense, focusing not on knowledge-making alone but also on the co-development of knowledge, trade, nascent imperial and colonial states and imperial, colonial, and regional identities.

Perhaps the most important relocation proposed in this book concerns circulation. A well-studied phenomenon in many forms of history, especially in economic, social and cultural history, it forms a recurrent, though non-theorized, concept in the history of science. In this latter domain, circulation comes into play at two moments—firstly, in the collection and centralization of information or data from the outside world in some fixed, and usually secluded, place and, secondly, in the dissemination of the knowledge produced in this setting. Bruno Latour has famously dwelt on the collection and accumulation of information from sources outside the closed spaces that he terms 'centres of calculation'. Taking as a prime example the late-eighteenth-century French construction of the geography of the north-eastern Pacific rim, Latour posits that this knowledge could only emerge through the stabilization and undistorted communication to the European metropole of data collected in the far reaches of the planet. He calls these units of information 'immutable and combinable mobiles'. Thus, on Latour's telling, it is precisely because of the ability to

stabilize these units of information in order to prevent distortion—primarily by means of paper and print culture—collect them in one place, and combine them with other units of information garnered from elsewhere—that West Europe could claim to be a 'centre' and relegate the rest of the world to the periphery.[2] By using Latour's own method of following practitioners, skills, texts, maps, instruments, and ideas as they circulated between continents and communities, this book argues instead for the *mutable* nature as much of the men themselves, as the knowledges and skills which they embodied, in the course of their geographical and/or social displacements. In addition, hierarchies of power and the historically and geographically situated nature of encounter marked the processes of appropriation, resulting in a differential grounding of that knowledge in different localities.

Finally, this book suggests that circulation occurs within bounded spaces. The geography of these spaces of circulation changes historically—as we noticed in the chapter on surveying and map-making practices in pre-colonial and colonial South Asia, the space changed from being predominantly South-Central-West-Asian to one organically linked to Great Britain and its emerging empire. Likewise, the character of spaces of circulation is seen to change over time: from one closely linked to trade and commercial networks in early modernity in the case of South Asia, it gradually becomes more intimately related to the state-run institutions with the rise and development of colonial and imperial states.

However, given all these relocations and the restrictions they suggest in terms of the nature of the knowledge thus studied, one might question the relevance of the activities considered in this book for seriously challenging customary historical accounts of modern science as being a purely Western creation, narratives largely based on the history of mathematics, physics, chemistry, and occasionally biology—in short, what are commonly known as the 'hard sciences'. In other words, are the examples chosen here not too peripheral to do more than mildly question the hegemonic 'master narrative' of Western science as the foundation of modernity itself? The answer to this lies partly in the identification of what constituted knowledge amongst

[2] See Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Milton Keynes: Open University Press, 1986), chapter 6.

the savant communities of Europe in the early-modern period. It must be remembered that the present-day disciplinary divisions such as physics and chemistry grew in the course of the nineteenth century and are anachronistic terms for all but the last of the case studies presented here. And this, as we saw, far from portraying outmoded techniques of measurement, partook wholly of the Victorian scientific spirit and was, indeed, part of its very core. Contrary to the history of science discourse developed since the first decades of the twentieth century—itself part of the larger ideological discourse aimed at positing a Great Divide between the West and the Rest—it was precisely natural history, terrestrial surveying, ethnology, linguistics, and administrative skills that formed the major knowledge forms of the early-modern period, as recent and steadily increasing scholarship has convincingly shown.[3] Indeed, it is important to note that the French *Académie Royale des Sciences* was best known during the seventeenth and eighteenth centuries for its work in areas such as terrestrial surveying and mapping.[4] Besides, many men of science of the time specialized as

[3] See, for example, Lia Formigari, *Maupertuis, Turgot, Maine de Biron: Origine e funzione del linguaggio* (Bari: Laterza, 1971); Marie-Noëlle Bourguet, *Déchiffrer la France. La statistique départementale à l'époque napoléonienne* (Paris: Editions des archives contemporaines, 1988); Pietro Corsi, *The Age of Lamarck* (Berkeley: University of California Press, 1988); Alice Stroup, *A Company of Scientists: Botany, Patronage, and Community at the Seventeenth-Century Parisian Academy of Sciences* (Berkeley: University of California Press, 1990); John Brian Harley and David Woodward, eds, *The History of Cartography*, 2 volumes (Chicago & London: University of Chicago Press, 1987–94); Eric Brian, *La mesure de l'Etat: Administrateurs et géomètres au XVIII^e siècle* (Paris: Albin Michel, 1994); Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton: Princeton University Press, 1995); Nicholas Jardine, James E. Secord and Emma C. Spary, eds, *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996); Emma C. Spary, *Utopia's Garden: French Natural History from Old Regime to Revolution* (Chicago & London: University of Chicago Press, 2000); Richard Drayton, *Nature's Government: Science, Imperial Britain, and the 'Improvement' of the World* (New Haven & London: Yale University Press, 2000); Mary Terrall, *The Man who Flattened the Earth: Maupertuis and the Sciences of the Enlightenment* (Chicago & London: University of Chicago Press, 2002).

[4] Josef W. Konvitz, *Cartography in France 1660–1848: Science, Engineering, and Statecraft* (Chicago & London: University of Chicago Press, 1987).

much in astronomy, mathematics, natural philosophy as in natural history, ethnography and similar subjects which would today be called the social and human sciences. Interestingly, Newton's posthumously published ethnological history of mankind—*The Chronology of Ancient Kingdoms Amended* (1728)—was at least as widely read in the eighteenth century as his *Principia Mathematica*. It was indeed because of the global and 'open-air' nature of these forms of knowledge and their intimate links with international trade—precisely because of the relocations operated in this book—that the cases presented here constitute some of the key moments in this revisionist history of science and are central to an understanding of the development both of modern scientific knowledge and indeed of modernity itself. And many of the personae of the studies presented in this book were crucial figures in the emergence of the modern world. This said, recent research into the making of early-modern natural philosophy and astronomy shows that many important aspects even of the so-called core of modern science were the result of negotiations in the intercultural encounter between Europeans and other peoples.[5] Finally, it should be added that science is more than just the content of this or that subject. At least since the seminal work of Thomas Kuhn, it is now largely acknowledged that science is also a set of historically situated values, norms, sociabilities, social and gendered divisions of labour, regimes of proof, and so on. As this book endeavours to show, many of these constitutive values too were substantially forged through the intercultural encounter.

If this book has been intended, firstly, as a contribution to the history of science, the themes on which it dwells are also largely thoseof social and cultural history and anthropology. And much recent history-writing, especially that concerning South Asia, has touched on similar questions. Thus, historians such as Bernard Cohn, Nicholas

[5] See Simon Schaffer, 'Golden Means: Assay Instruments and the Geography of Precision in the Guinea Trade', in Marie-Noëlle Bourguet, Christian Licoppe and Heinz Otto Sibum, eds, *Instruments, Travel and Science: Itineraries of Precision from the Seventeenth to the Twentieth Century* (London & New York: Routledge, 2002), pp. 20–50; idem, 'Astrophysics, Anthropology and Other Imperial Pursuits', Plenary Talk at the Decennial Meeting of the Association for Social Anthropology, Manchester, July 2003.

Dirks, Eugene Irschick, Gyan Prakash, Thomas Trautmann, and Phillip Wagoner, to name but a few, have also addressed many of the issues raised here, particularly the role played by indigenes in the construction of what many amongst them refer to as 'colonial knowledge'.[6]

Two opposing evaluations have emerged amongst these historians. In the wake of Edward Said, one set, including Cohn, Prakash, and Dirks, contend that indigenes were deprived of all agency in knowledge production, playing a minimal role—at best as passive informants providing raw information to intellectually active Europeans who organized it according to their own modes of knowing. Arguing explicitly against this position, others like Irschick, Trautmann, and Wagoner contend that colonized South Asians played a determinant role in a dialogical process through which 'colonial knowledge' was constructed and even 'exercised greater dominance than did the British' in this process.[7]

Taking a much longer historical swathe, from the pre-colonial period until the end of the nineteenth century, this book shows that the knowledge-based encounter largely pre-dated colonization and that there was no great disjuncture between the early-modern European and South Asian worlds. Not only were South Asian societies not static and unchanging, they had varied specialist communities engaged in knowledge-making activities with logics and dynamics not totally

[6] Bernard S. Cohn, *Colonialism and Its Forms of Knowledge: The British in India* (Princeton: Princeton University Press, 1996); Nicholas B. Dirks, 'Colonial Histories and Native Informants: Biography of an Archive', in Carol A. Breckenridge and Peter van der Veer, eds, *Orientalism and the Postcolonial Predicament: Perspectives on South Asia* (Philadelphia: University of Pennsylvania Press, 2001), pp. 279–313; idem, *Castes of Mind: Colonialism and the Making of Modern India* (Princeton: Princeton University Press, 2001); Eugene Irschick, *Dialogue and History: Constructing South India, 1795–1895* (Berkeley, Los Angeles, London: University of California Press, 1994); Gyan Prakash, *Another Reason: Science and the Imagination of Modern India* (Princeton: Princeton University Press, 1999); Thomas Trautmann, 'Hullabaloo about Telugu', *South Asia Research*, vol. 19, no. 1 (1999), pp. 53–70; Phillip B. Wagoner, 'Precolonial Intellectuals and the Production of Colonial Knowledge', *Comparative Studies in Society and History*, vol. 45, no. 4 (2003), pp. 783–814.

[7] Irschick, *op. cit.*, p. 9.

unrelated to those of their West European counterparts. This, of course, is not to say that they did not have their specificities, but that there were also mutually recognizable similarities in specialist practices in both spaces. It further demonstrates that while indigenous actors played a determinant role in the making and spread of knowledge, there was an inherent asymmetry—power relations *oblige*—in the negotiation processes involved. Finally, instead of relegating the knowledge produced in the non-metropolitan context to the local or geographically circumscribed status of 'colonial knowledge', it argues, more in line with the work of many eminent present-day British historians, such as David Washbrook, Christopher Bayly, and Linda Colley, that this knowledge was central to the making of Britain and British society and, indeed, modern science, and modernity itself.

Nevertheless, while sharing the perspectives developed by this recent revisionist British and imperial history, the present work is at odds with one particularly influential book produced within this trend: Christopher Bayly's *Empire and Information*.[8] It thus seems worth dwelling upon the differences in some detail here. In a move away from the co-productivist perspective of his other works, Bayly here surveys the complex indigenous information-gathering networks of pre-colonial India—ranging from gossip-mongers in the bazaars, marriage-makers, and midwives to astronomers, physicians, and philosophers—and the historical contingencies that led to their partial, though informal, inclusion in the surveillance systems set up by the British following their rise to power in the latter half of the eighteenth century. 'The colonial information order', he states, 'was erected on the foundations of its Indian precursors . . . reclassified and built into hierarchies which reflected the world view of the Britons.'[9] However, riven by mutual suspicion, distortion, and violence between the British officials and their indigenous informants, the new colonial state's intelligence systems were fragile. The whole enterprise resulted in a monumental failure when the British were caught almost completely unawares by the popular rebellions and mutinies of 1857, which almost cost them their South Asian empire.

[8] Christopher Alan Bayly, *Empire and Information: Intelligence Gathering and Social Communication in India, 1780–1870* (Cambridge: Cambridge University Press, 1996).

[9] Ibid., p. 179.

Bayly, however, does not deal with the workings of other, more successful and resilient institutions devoted to knowledge-making and dissemination on which the colonial information order equally depended. Indeed, the late eighteenth century saw the rise, both in Britain and in its colonies, of a number of field sciences that at once fed on and reinforced the colonial and metropolitan order, such as geographical surveying, agriculture, botany, forestry, and anthropology.[10]

To be sure, he does discuss debates *about* science and the status of scientific knowledge among learned Indians and British in the nineteenth century, but this is a second-order discussion, one step removed from the making of new knowledge.[11] Moreover, Bayly's approach is inadequate for studying the development of these sciences during this period. For a start, as he himself so well knows, Britons themselves were in the process of forging a national identity; to speak of a single British episteme at the time into which indigenous knowledge was incorporated is anachronistic.[12] In addition, the field sciences developed in a much tighter, and more formal and stratified institutional context than the informal networks of intelligence gathering at the heart of *Empire and Information*. Indeed, the successful functioning of these institutions presupposed the stable imposition of a certain authority by the state over the material and social world, a task beyond the means of individuals and their informal networks.[13] And, although colonial institutions grew out of pre-existing administrations of indigenous regimes and inherited much of their workforces, they were—as this study shows—transformed by the new situation, producing novel forms of knowledge that were not simply linear offshoots of past

[10] Simon J. Schaffer, 'Field Trials, the State of Nature and British Colonial Predicament', paper presented at the 'Science and Empire' seminar, Centre de Recherche en Histoire des Sciences et des Techniques, Cité des Sciences et de l'Industrie, La Villette, Paris, 11 June 1999.

[11] Bayly, *op. cit.*, chapters 7 and 8.

[12] See Linda Colley, *Britons: Forging the Nation, 1707–1837* (New Haven & London: Yale University Press, 1992). See also Roy Porter and Mikuláš Teich, eds, *The Scientific Revolution in National Context* (Cambridge: Cambridge University Press, 1981).

[13] See Svante Lindqvist, 'Labs in the Woods: The Quantification of Technology During the Swedish Enlightenment', in Tore Frängsmyr, John L. Heilbron and Robin E. Rider, eds, *The Quantifying Spirit in the Eighteenth Century* (Berkeley: University of California Press, 1990), pp. 291–315.

practices and traditions. The study of colonial institutions thus calls for an approach which, by bringing negotiation and co-production back to centre-stage, accounts for the complex character of knowledge-making during this period—an approach closer to Bayly's earlier works and to recent scholarship in the history and sociology of science.

Although this book has focused primarily on one contact zone and is limited to half a dozen case studies, it has important ramifications for the broader history of intercultural encounter as such. It thus offers a perspective not only to South Asianists but also to scholars specializing in other regions, other periods, and other fields of knowledge—as well as to the emerging fields of transnational and world history—to extend the arguments developed here. In conclusion, I shall briefly focus on four possible themes and directions.

The Europe–South Asia knowledge encounter itself was much wider, spanning many more domains than those treated here. More cases of the co-construction of knowledge need to be studied in other fields, for instance, statistics, ethnology, astronomy, geology, and geodesy. One of the means of doing this would be by investigating the history of institutions like the Survey of India within which many of these fields developed and which still awaits a serious history. Major urban centres like Calcutta, Madras, Bombay, and Hyderabad can also be looked upon as contact zones—which they were par excellence—and their histories reworked in this perspective.

The contact zone would also repay extension to other geographically and historically different encounters which may or may not have included Europe in knowledge making. The contact zones and spaces of knowledge circulation between South, Central, and West Asia, or between South East Asia and China in the pre-modern and early-modern eras are possible areas of investigation with rich historical sources. Equally, the notion can be fruitfully applied to the encounter and interaction between distinct specialist communities in the making of knowledge even within Europe—as has been shown here for the contact zone between the worlds of trade and learning—or for that matter within disciplinary fields. For, specialized disciplines themselves are often constituted of interactions between knowledge communities with widely different specializations and, indeed, coming from diverse

social spaces. In bringing these practices together and thereby engendering new knowledges, the role of mediator, or go-betweens, has been shown to be crucial.[14] In a series of ingenious studies of James Joules, Otto Sibum, for instance, has shown how brewers' skills found their way into physics in the conception of the mechanical equivalent of heat.[15]

The notion of the co-construction of knowledge is an important one that counters the usual emphasis on 'Western' science impacting developments in the rest of the world. It needs to be extended to other imperial spaces, regions, and ages. As stated in the Introduction, this idea has already been adumbrated in knowledge production in the Americas during the Catholic Monarchy. However, more work needs to be done across all the Spanish territories and comparisons drawn between the different viceroyalities. More importantly, the book also points to the co-construction of scientific knowledge and national identities. This really needs to be thematized and worked on not only in the imperial spaces of modernity, but also within European nation-states as they were formed in the course of the eighteenth and nineteenth centuries.

Finally, the nexus between circulation and knowledge production, certification, legitimation, and reappropriation needs to be historicized. A start is made in this book to bring out the different networks and spaces within which knowledges and their mediators circulated and how they transformed between the seventeenth and nineteenth centuries from trade networks to those of civil and political administration. However, other domains, like industry, were also emerging and

[14] A keynote panel on precisely this theme—'Mediators and Knowledge Networks in Late Eighteenth-Century Imperial Experience'—was organized at the Fifth Joint Meeting of the British Society for the History of Science, the Canadian Society for the History of Science, and the [American] History of Science Society in Halifax, 5–7 August 2004, with papers presented by James Delbourgo, Lissa Roberts, Simon Schaffer and myself. We are at present preparing a book on the subject.

[15] Heinz Otto Sibum, 'Experimentalists in the Republic of Letters', *Science in Context*, vol. 16, nos 1–2 (2003), pp. 89–120; idem, 'Shifting Scales: Microstudies in Early Victorian Britain', *Isis*: forthcoming.

globalizing in the nineteenth and twentieth centuries, creating new networks and spaces within which knowledge and skills also circulated, were constructed and reconfigured. The nature and geography of the spaces of circulation were thus transformed over time and these need to be more carefully worked out both in the specific case of South Asian and in terms of a larger, world-historical perspective. In short, a long—and hopefully exciting—agenda.

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Index