BJHS **43**(4): 513–517, December, 2010. © British Society for the History of Science 2010
doi:10.1017/S0007087410001238 First published online 1 October 2010

Introduction: circulation and locality in early modern science

KAPIL RAJ*

The essays in this issue of the *British Journal for the History of Science* have been selected from the papers presented at an international conference on Circulation and Locality in Early Modern Science held in October 2007 at the William Andrews Clark Memorial Library in Los Angeles. It was initiated and organized by Mary Terrall and myself and hosted by the UCLA Center for Seventeenth- and Eighteenth-Century Studies.

The aim of the workshop was to examine the many ways in which scientific knowledge, instruments, texts and practitioners moved around the globe in the early modern period. This in itself is, of course, no novel theme. Indeed, as the positivist foundations of the history of science weakened in the 1970s and 1980s, attention radically shifted from recounting its inexorable progress grounded in a perception of knowledge as being disembodied and universal – an 'everywhere and nowhere' view – to demonstrating the crucial importance of the historical, cultural, social, gendered and geographical contexts of its production.[1] Contingencies of place thus came to acquire key importance in recent sociological and historical studies of science.[2] This trend was also in concert with, and indeed in significant measure inspired by, Harold Garfinkel's ethnomethodology on the one hand, and microhistorical approaches inaugurated by scholars such as Edoardo Grendi and Carlo Ginzburg on the other, as well as by Clifford Geertz's anthropological insights into the ever-local nature of knowledge across cultural divides.[3]

* Ecole des hautes études en sciences sociales (Centre Alexandre Koyré), 105 boulevard Raspail, 75006 Paris, France. Email: raj@ehess.fr.

1 Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life*, Princeton: Princeton University Press, 1985; Steven Shapin, 'Placing the view from nowhere: historical and sociological problems in the location of science', *Transactions of the Institute of British Geographers* (1998) 23, pp. 5–12; Donna Haraway, 'Situated knowledges: the science question in feminism and the privilege of partial perspective', *Feminist Studies* (1988) 14, pp. 575–599.

2 The questions, theories and assumptions underlying this work are excellently summarized in Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science*, Cambridge: Cambridge University Press, 1998. See also David Livingstone, *Putting Science in Its Place: Geographies of Scientific Knowledge*, Chicago: University of Chicago Press, 2003; and Charles W. Withers, *Placing the Enlightenment: Thinking Geographically about the Age of Reason*, Chicago: University of Chicago Press, 2007.

3 See Edoardo Grendi, 'Microanalisi e storia sociale', *Quaderni Storici* (1972) 7, pp. 506–520; Carlo Ginzburg (1976), *The Cheese and the Worms: The Cosmos of a Sixteenth-Century Miller*, London: Routledge and Kegan Paul, 1981; Clifford Geertz, *Local Knowledge: Further Essays in Interpretive Anthropology*, New York: Basic Books, 1983.

https://doi.org/10.1017/S0007087410001238 Published online by Cambridge University Press

In this postpositivist view, then, science is locally created, and only subsequently, through a series of investments and deliberate strategies, does it become transferable to the outside world. Some scholars have identified these investments and strategies in the standardization of methods and measurement, others in rendering the new knowledge immutable, while for yet others it is negotiability or open-endedness that are inherent properties of the knowledge, practice or device that seeks to impose itself in the outside world.[4] In consequence, the primacy of universality over locality has been reversed: the question of science's claim to universality – the process of the spread of ideas, texts, practices, norms, instruments, procedures and protocols from their site of invention to other parts of the globe – has been reformulated and has itself become an object of historical, social and political inquiry. Terms such as 'transmission', 'travel' and 'communication' – and more recently 'circulation' – have thus gained currency to designate the movement or spread of science taken in this broad sense.[5]

Concomitantly, but quite independent of these postpositivist developments, another ensemble of scholars, grouped under the banner of 'science and empire' studies, were also actively participating in the 'spatial turn' in the history of science. Reacting to the hubris in most science-history writing, which implicitly at least has celebrated the epistemological, sociological and economic uniqueness of the West, these scholars addressed the issue of the dissemination of modern science – between the West and the Rest.[6] They mainly questioned the diffusionism which underpins this relationship, seeking to link the spread to European imperialism (as the label itself suggests), without explicitly calling into question the epistemological universalism inherent to the positivist conception of science.[7] Although the 'localist' and 'science and empire' trends have rarely engaged with each other, they do share more than just the recognition of the centrality of space in the construction of knowledge. In both sets of studies, knowledge originates in a circumscribed space – typically the laboratory for the former, the West for the latter – the focus of historical and sociological interest then being on its

4 See, for instance, Harry M. Collins, *Changing Order: Replication and Induction in Scientific Practice*, London: Sage, 1985; Bruno Latour, *Science in Action: How to Follow Engineers through Society*, Milton Keynes: Open University Press, 1987, Chapter 6; Susan Leigh Star and James R. Griesemer, 'Institutional ecology, "translations" and boundary objects: amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39', *Social Studies of Science* (1989) 19, pp. 387–420; Peter L. Galison, *Image and Logic: A Material Culture of Microphysics*, Chicago, 1997, pp. 803–844.

5 For one of the first of the 'postpositivist' generation of scholars to dwell on the question of the manner in which knowledge and skills are communicated see R.G.A. Dolby, 'The transmission of science', *History of Science* (1977) 15, pp. 1–43. See also Marie-Noëlle Bourguet, Christian Licoppe and H. Otto Sibum (eds.), *Instruments, Travels and Science: Itineraries of Precision from the Seventeenth to the Twentieth Century*, London: Routledge, 2002; James A. Secord, 'Knowledge in transit', *Isis* (2004) 95, pp. 654–672.

6 See, for instance, Lucile H. Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Gardens*, New York: Academic Press, 1979; Roy M. MacLeod, 'On visiting the "moving metropolis": reflections on the architecture of imperial science', *Historical Records of Australian Science* (1982) 5, pp. 1–16; Deepak Kumar (ed.), *Science and Empire: Essays in Indian Context*, Delhi: Anamika Publications, 1991; Patrick Petitjean, Catherine Jami and Anne-Marie Moulin (eds.), *Science and Empires*, Dordrecht: Kluwer, 1992; Roy M. MacLeod (ed.), *Nature and Empire, Osiris* (2000) 15; *idem*, 'Focus: colonial science', *Isis* (2005) 96, pp. 52–87.

7 For the classic, and clearest, statement of the diffusionist view, see George Basalla, 'The spread of western science', *Science* (1967) 156, pp. 611–622.

https://doi.org/10.1017/S0007087410001238 Published online by Cambridge University Press

transfer beyond the precincts of its creation. And although the centre–periphery model, conceived independently by the American sociologist Edward Shils and the Argentinean developmental economist Raúl Prebisch, has been largely and uncritically taken on board and essentialized in studies of the non-Western world, it is also largely implicit in many postpositivist science histories.[8]

In an attempt to problematize the almost doctrinaire movement from the local to the global in science studies, as also to take on board questions concerning the movement of scientific ideas and practices across global spaces, we chose in this workshop to focus on the tension between locality and circulation, reversing the order in which they are traditionally considered. This was not to engender a chicken-and-egg controversy as to which of the two – circulation or locality – comes first. It was rather to focus on the problematic nature of circulation – on how local meanings and settings interacted with the imperatives of circulation across large, and not so large, distances – and the effect of the encounter with practices, instruments and knowledges in motion on localities themselves, wherever they be placed with respect to the putative origins of the knowledge or skill at issue. In so doing, we wanted to distance ourselves from earlier attempts at rendering the movement of knowledge, practices or instruments intelligible, attempts that sought to invest them with certain inherent qualities such as fluidity or the right mix of plasticity and robustness.[9] In contrast, one of the principal themes in the essays presented here is the historical contingency and mutation of scientific notions and practices introduced by movement itself. As the editors of a recent book on circulation and society stress in their introduction,

> Circulation is different from simple mobility, inasmuch as it implies a double movement of going forth and coming back, which can be repeated indefinitely. In circulating, things, men and notions often transform themselves. Circulation . . . therefore . . . implies an incremental aspect and not the simple reproduction across space of already formed structures and notions.[10]

It is precisely this mutational aspect of circulation in its interaction with specific localities – notwithstanding the investments to fix or standardize the knowledges and practices – that we set out to explore in this workshop and in the selection of essays presented here. As has been compellingly demonstrated in recent literature, science, while being locally specific, was already global in this period and local meanings and settings interacted with knowledge circulating either across large distances or across

8 See Edward Shils, 'Centre and periphery', in *The Logic of Personal Knowledge: Essays Presented to Michael Polanyi on His Seventieth Birthday, 11th March 1961*, London: Routledge and Kegan Paul, 1961, pp. 117–130; Raúl Prebisch, *The Economic Development of Latin America and Its Principal Problems*, New York: Economic Commission for Latin America, 1950.

9 For the fluidity of an object as a characteristic of its mobility, see Marianne de Laet and Annemarie Mol, 'The Zimbabwe bush pump: mechanics of a fluid technology', *Social Studies of Science* (2000) 30, pp. 225–263; For plasticity and robustness, see Star and Griesemer, op. cit. (4).

10 Claude Markovits, Jacques Pouchepadass and Sanjay Subrahmanyam, 'Introduction: circulation and society under colonial rule', in *idem* (eds.), *Society and Circulation: Mobile People and Itinerant Cultures in South Asia 1750–1950*, Delhi: Permanent Black, 2003, pp. 1–22, 2–3.

https://doi.org/10.1017/S0007087410001238 Published online by Cambridge University Press

geographically close, but professionally distinct, communities, resulting in reconfigured knowledge forms or practices.[11]

The essays that follow question the overwhelming, if not unique, importance given to institutions and other fixed spaces as the principal scientific sites in the history of science, one of the important contentions of Jane Murphy's contribution on the Napoleonic expedition to Egypt and on Ottoman–Arab savant practices in late eighteenth-century Cairo. While not denying the importance of major institutions, they bring to the fore the dynamics of circulation in the emergence of new knowledge in a range of cases involving different distance scales and practices of different types. Thus, by examining the itineraries of objects, representations, correspondence, books and people in eighteenth-century France, Mary Terrall demonstrates the crucial importance of following their trajectories in order to understand the emergence of new knowledge about insects.

Simultaneously, these studies push considerations of locality to include negotiations and practices that travel in all directions to distant locations, to be put to different uses, to be interpreted differently, and perhaps to come back transformed to interact in their turn with their 'locality of origin'. Catarina Madeira Santos compellingly argues that if the Portuguese Enlightenment project was significantly influenced by the circulation of ideas within western Europe, it was no less shaped by the circulation of administrative instruments and practices, such as maps and mapping or the systematization of information between Portugal and its Angolan colony. And, in her meticulous study of the circulation of inoculation practices developed by the Guatemalan medic José Flores in the late eighteenth-century Spanish empire , Martha Few brings to light the way local practices informed imperial public-health policies at the dawn of modernity.

One of the main issues is, then, to reconsider simple models of metropolitan centre and remote periphery by investigating how experiences of travel, encounter and exchange changed both the knowledges and practices at issue and their bearers, be they stay-at-home or peripatetic savants, their correspondents, missionaries, functionaries, administrators, merchants, assistants, translators or artists. This involves looking at colonial contexts and intercultural encounters – as in Few, Murphy and Santos – but also at provincial settings within Europe and the relations between province and capital, the focus respectively of Vogel and Terrall. Indeed, deftly pairing circulation and locality, Terrall convincingly shows that although the sedentary savant Réaumur was at the centre of a complex flow of correspondence, ideas, materials and practices between Paris and the French provinces, he did not constitute a Latourian centre of calculation. Rather, knowledge was being constructed at various points of this network whose dynamics were far more complex than the centre–periphery model would have us believe. And Jakob Vogel carefully analyses the geographies and specificities of each of the many

11 See, for example, Laura Hostetler, *Qing Colonial Enterprise: Ethnography and Cartography in Early Modern China*, Chicago: University of Chicago Press, 2001; Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age*, New Haven: Yale University Press, 2007; Simon Schaffer, 'The information order of Newton's *Principia Mathematica*', Hans Rausing Lecture, Uppsala, 2008; for knowledge circulating across geographically proximate but distinct groups of specialist practitioners, see H. Otto Sibum, 'Les Gestes de la mesure. Joule, les pratiques de la brasserie et la science', *Annales HSS* (1998) 53, pp. 745–774.

https://doi.org/10.1017/S0007087410001238 Published online by Cambridge University Press

types of knowledge network at play in the dispute around the nature of the spas of the Bohemian town of Carlsbad and of the salts extracted from them, a dispute which involved the town's inhabitants, medics, Habsburg officials, merchants and travellers.

The essays discuss many of the kinds of knowledge that went under the name of science in the early modern period, ranging from the more familiar physical ones to those which were no less practised – from the natural and medical to the administrative. In a move to deparochialize the history of early modern science, we have widened the net of spaces of circulation to respect the variety of contexts, milieux and localities both inside and outside western Europe, in the many places where knowledges were produced and where they moved. Early modernity was an age of empires and we have tried to provide as wide a geographical and imperial coverage as possible, given the constraints of time in the conference and space in the journal. We thus introduce essays on some of the lesser-studied empires such as the Portuguese, the Habsburg and the Ottoman. In so doing, we hope to bring together the history of science in European and non-European spaces to gain a better understanding not only of the problematic nature of circulation itself but also of the ways localities are constantly constituted within a history of circulation and entanglement between heterogeneous networks of peoples, objects and knowledge practices.[12] If we are successful in this, we shall have contributed to realizing the concluding desires of a justly celebrated essay by Adi Ophir and Steven Shapin on the place of knowledge:

> Perhaps the days in which ideas floated free in the air are truly nearing an end. Perhaps, indeed, what we believed to be a heavenly place for knowledge we will come to see as the result of lateral movements between mundane places.[13]

12 Based on a doctoral seminar I ran with my colleague Yves Cohen between 2002 and 2006 at the Ecole des hautes études en sciences sociales, we are in the process of completing a substantive methodological essay on circulation as a fruitful approach to transnational historiography, 'Localités et circulations: Pour des Etudes transnationales et mondiales ancrées', in which many of the themes mentioned here will be further developed.

13 Adi Ophir and Steven Shapin, 'The place of knowledge: a methodological survey', *Science in Context* (1991) 4, pp. 3–21, 16.

https://doi.org/10.1017/S0007087410001238 Published online by Cambridge University Press