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Materials and Expertise in Early Modern Europe. Between Market and Laboratory

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did not only derive from ideas found in ancient Greece, as it is commonly presented, but is also deeply indebted to ideas originating in *kalam* (*kalām*). He acknowledges that while the influential role of Maimonides and Averroes (Ibn Rushd) on European thought is well documented, the contribution of *kalam* atomism, on which they both wrote, has not been given its appropriate place in mainstream history of science.

Bala discusses the important role of Arabic sciences in integrating Greek and Indian traditions (Chapter 10). Although he overemphasises the importance of the school of Jundishapur (on the recent scholarship on Jundishapur/Gondešapur, see for example Peter Pormann and Emilie Savage-Smith, *Medieval Islamic Medicine*, Edinburgh, 2006, pp. 20–21), he presents an overview of Arabic achievements in philosophy, mathematics and medicine as synthesis of Hellenic and Indian ideas.

The broad scope Bala has taken, as well as the thoughtful methodological sections will be of great inspiration to any historian of science. The implications of Bala's main thesis are many—and go well beyond the fields of history and philosophy of science into current economic and political spheres. In essence, his argument refutes the underlying basis of both Fukuyama's hegemonic narrative and Huntington's 'clash of civilizations'.

The book is based primarily on secondary sources—this is quite understandable given the scope of the areas covered. Bala's important work is a reminder of how much more work is yet to be done in many of the areas he discusses. There is still much we need to find out about transmissions of knowledge in and across Asia in periods prior to those discussed by Bala. Work on those early primary sources across cultures in the history of science and medicine is often painfully difficult and slow, but is essential for important overviews such as this one, to continue to erode the Eurocentric illusions that still mark the history of science and medicine as a whole. Happily, the dialogical approach for which Bala is calling, is on the rise. With more works taking similar approaches, Arun Bala's book is bound to remain an important pioneer in the history of science for years to come.

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Scientific Revolution

URSULA KLEIN and EMMA C. SPARY, editors. *Materials and Expertise in Early Modern Europe. Between Market and Laboratory*. Chicago and London: The University of Chicago Press, 2010. xvii + 398 pp. ills. \$50.00. ISBN 3 978-0-226-43968-6.

'The dramatis personae of this book are materials' opens this rich and important volume. Can ink, milk or water have agency then? They do indeed. The useful substances that are the subject of the chapters in this volume bring together a wide variety of persons and practices, and incite all kinds of institutional, intellectual and industrial actions. But most of all they are stubborn, resisting routine manufacture, unequivocal understanding and standardized control. Materials may not be an obvious choice as protagonists in a historical narrative, but they turn out to be an excellent focus for analysing the broad and heterogeneous knowledge practices in

early modern times. A variety of people were involved in a variety of ways in their production, evaluation, regulation and consumption.

Materials thus provide an almost natural focal point to address historiographical issues regarding the interaction of different forms of knowledge, the relationships between material and intellectual production, commodification and institutionalization. This is particularly clear with regard to the notorious dichotomies of scholar/craftsman, theory/practice. By focusing on particular materials the various concerns of all people involved are mapped without the need for a prior categorization of people and pursuits. Different knowledge claims can then be juxtaposed and their interactions analysed without necessarily privileging one kind or another. A spectrum of theoretical claims appears, ranging from causal inferences based on philosophical systems to experimental techniques to classifications of substances, processes and products. These were not exclusive to learned men, and not exclusive to academic pursuits. Practitioners too proposed theoretical accounts, and they too did so for a variety of reasons. Theoretical claims were part of discussions about the production and consumption of materials in which their value in relation to other kinds of claims had to be proven. In many cases theoretical claims were an intervention in practical domains. Ultimately the question at stake was who counted as the expert to judge the quality of products and their manufacture. The dynamics of establishing experts and expertise is the central theme of this book.

The volume ties in with recent trends in history, philosophy and art theory to turn to material culture, such as Monika Wagner's *Das Material in der Kunst* (München, 2001). In history of science and technology, materials offer an innovative perspective on material culture. Ursula Klein explored this with Wolfgang Lefèvre in *Materials in Eighteenth-Century Science. A Historical Ontology* (Cambridge, 2007).

The specific focus on the culturally embedded practices of identifying and classifying materials is broadened considerably in *Materials and Expertise in Early Modern Europe*. In an exemplary introduction, editors Ursula Klein and Emma Spary explain the perspective and subject matter of the volume. It offers an insightful reflection on different forms of knowledge and the way early modern knowledge production can be studied historically. Rather than polemizing with this or that history, they carefully position their approach in the historiography of science and technology. They give a balanced account of the way the volume moves beyond existing histories of scientific objects, instruments and commodities. Particularly illuminating is their explanation of the limitations of such approaches, resulting from specific selections of sources that tend to put an advance bias to synthetic conclusions. The editors argue convincingly that taking materials as a focal point for analysing the production, circulation and appropriation of knowledge enables a symmetrical assessment of ideas and things, and of the variety of their producers.

The volume that follows comes up to the expectations raised by the introduction. Although not all chapters manage to implement the historiographical framework in full, almost all of them offer rich and original cases of early modern engagements with useful materials. The first chapter is at the same time the least satisfactory. After a longish conceptual excursion on knowing and making, Pamela Smith offers a rather anecdotal account of vermillion, before plunging into a wide argument about webs of associations around red materials. No such lack of detail about concrete dealings with matter in the next chapter, which gives an almost hands-on account of the skillfulness with which Bernard Palissy literally transformed snakes, snails and fish into earthenware. Hanna Shell argues that this material artistry was a display of

ceramic mastery and innovation as well as an inquiry into the nature and origin of living creatures. Christoph Bartels widens the scope from a single artificer to the social, economic and technological structures converging in the metal mining in the Harz. The long timeframe helps to assess the successive initiatives to improve the mining process by the divergent assembly of men portrayed in the second half of the chapter. If ink has been a prominent medium of modernity, its life is sparsely documented. Adrian Johns nevertheless manages to recover the main lines of its early modern production and handling, and the social, commercial and cultural infrastructures. It does not come as a surprise that Ursula Klein's chapter excels in integrating analytical acumen and historical richness. Taking the case of eighteenth-century ethers, she shows how both apothecaries and chemists were able to move to and from commercial production, pharmaceutical invention and natural inquiry because they shared a space of substances, instruments and techniques. Like the other materials performing in this volume, ethers defied definite answers about their composition, chemical action, production and application. In this way they remained open to interventions of heterogeneous actors, including efforts at analytical interpretation. Klein makes it clear that early modern chemistry ought not be identified with chemical theory, but that an encompassing view of the field of chemical production, experimentation, classification and explanation offers a much more fruitful perspective on chemical history. Barbara Orland takes a more traditional approach in her chapter, focusing on theories explicating the composition and value of milk. Milk offers an illuminating case of a substance that falls outside the common scope of the 'cutting edge of eighteenth-century chemistry' but nevertheless mobilized much chemical inquiry and illustrates the way chemical perspectives gained ground in the eighteenth century. Moreover, milk was subject to debates about health issues and initiatives for agricultural innovation, thus placing enlightened chemists in the thick of the domain of commerce and industry. Commodity is also found in the waters of Scottish spas when articulated by the learning of the local minister. Matthew Eddy's chapter offers a fine example of how conceptual work makes mobile the values of a marginal matter, making a town attractive for commercial visitors and creating a learned persona for its reporter. The idea of the volume does not entirely live up to its promise in Emma Spary's chapter on alcohols in Paris. Her argument as a whole is rather theory-driven on Latourian and Habermasian lines illustrated by historical examples. At its core is a savant debate about distillation, which stands rather loosely tied to the theme of tasteful liqueurs in the title. The various forms of connoisseurship are interesting, but the chapter concentrates on a not too convincing dichotomy between use and pleasure. Marcus Popplow turns the attention to distributed efforts to make learning subservient to society by portraying the myriad of economic societies that tried to improve agriculture in the German countries in a systematic way. This not only involved practices and ideas of natural inquiry but also changing conceptions of governance, while a gap between the well-intending contemplative elite and the men toiling in the field remained. Seymour Mauskopf offers a detailed account of the production of gunpowder and the efforts of the British army to secure a steady supply of high-grade explosives. The surveillance of the industry created room for a particular actor, the expert officer who mediated between producers and consumers. Tracing the writings of such men, the chapter seems to take for granted their view however, overlooking the possible contestedness of their particular knowledge claims. In the last chapter Agustí Nieto-Galan presents a wealth of material on the

knowledge and practices of early modern dyestuffs that remains, however, somewhat fragmentary. It does not synthesize the various perspectives of scholarly versus artisanal knowledge of dyestuffs and of state interventions in workshop organizations. This chapter also exposes a lack of integration in the volume as a whole. The division of the several kingdoms of nature that is taken for granted with regard to dyestuffs is substantially questioned in the case of milk. Pierre Joseph Macquer figures in several chapters, without much cross-reference and without his engagement with various materials being compared. The impact of different forms of governance in various localities is not subjected to an integrated reflection. Themes like these could have been treated in a conclusion, but there is none.

Notwithstanding such minor flaws, this is an important volume that opens a valuable and promising perspective on early modern knowledge production. The excellent introduction offers a textbook example of how to set up and demarcate a historical inquiry; the essays inquisitively illustrating this discourse.

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FLORENCE C. HSIA, *Sojourners in a Strange Land: Jesuits and their Scientific Missions in Late Imperial China*. Chicago: University of Chicago Press, 2009. xv + 273 pp. \$45.00. ISBN 978-0-2263-5559-7.

In the historiography of the scientific revolution the Jesuits have not traditionally played an important role, or at least not a positive one. Notorious for persecuting scientific geniuses like Galileo and for upholding already outdated Aristotelian natural philosophy, if anything, the Jesuits have been portrayed as hindering the development of science. However, when the focus of inquiry moves to the history of seventeenth and eighteenth-century China, the Jesuits become key players in the history of science; indeed, the period in which they transmitted European science into China is often celebrated as *the* central moment of modernization in that country. More recently, as historians of science have turned their attention from scientific genius to treat science as a form of cultural practice, the Jesuits have also risen to a new level of importance in the history of science in Europe. We now know that, although no doubt restricted by certain religious dogmas, they and their institutes constituted a major scientific network of the day, and they authored a good portion of scientific texts in Europe during this period. More significantly still, their network of educational institutions and collection of scientific information stretched outside of Europe. The contribution of Florence Hsia's book is firmly rooted in this vein of changing views about the Jesuits.

How the Jesuits in China constructed their scientific personae through textual practices constitutes the main theme of Hsia's book. The Jesuits were famous for their organizational management. They circulated information through an epistolary system and affirmed the collective identity of the Society through letter writing. Their letters, though addressed to a particular recipient, were collected and edited by the Society. Hsia's book details how the Jesuits in China fashioned their religio-