KATHARINE PARK and LORRAINE DASTON (eds.), **The Cambridge History of Science, Volume 3: Early Modern Science.** Cambridge: Cambridge University Press, 2006. Pp. xxvii + 865. ISBN 0-521-57244-4. £90.00 (hardback).
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Since the founding of their discipline by George Sarton, historians of science have increasingly shied away from broad survey works. *The Cambridge History of Science* – spanning science from antiquity to the beginning of the twenty-first century – supplies the need for a comprehensive modern survey. In virtue of the series' success so far, readers may wonder whether the discipline is being too hesitant in trumpeting its contributions to large-scale historical understanding. This splendid volume, the third of a projected eight, covers the period from 1490 to 1730 and contains thirty-three chapters written by leading specialists. No aspect of early modern science is left untouched and the editors have done an admirable job in reducing the potentially bewildering range of topics to order by means of four major divisions.

Part One ('The new nature') addresses shifts in modes of natural inquiry and explanation as well as changes in ontology. It opens with the separation of metaphysical foundational concepts from physics (Daniel Garber). Lynn S. Joy charts the changing notions of explanation and causation; Peter Dear offers a detailed discussion of the terms 'experiment' and 'experience'; and, concluding this part, R. W. Serjeantson examines the transformations in techniques of proof and persuasion. Part Two ('Personae and sites of natural knowledge') deals with people and places – 'who was making knowledge where' (p. 9) – with detailed attention given to every possible location, from the courtly *laboratoria* (Pamela H. Smith) to fashionable Restoration coffee houses (Adrian Johns). Part Three ('Dividing the Study of Nature') is by far the longest, aiming to present significant changes in natural inquiry across a broad spectrum of disciplines. The chapters address the emergence of specific disciplines and the resulting disappearance or displacement of traditional sciences. Among a multitude of changes, we see physic's transition from a science of causal reasoning to a science which dealt with 'notable examples of new cures that physicians could perform, whether they understood the reasons or not' (Harold J. Cook, pp. 407–8); the increasing differentiation of geography and cosmography, leading to the establishment of geography as an independent science (Klaus A. Vogel); the removal of astrology from the mathematical disciplines, traceable through ephemerides (H. Darrel Rutkin); and the gradual transformation of mechanics into the mathematically grounded science of motion (Domenico Bertoloni Meli). Due to the 'crosshatched and complex' relationship between the disciplines of Part Three and the personae and sites of Part Two, the editors recommend that Parts Two and Three be read in tandem (p. 10). Finally, Part Four ('Cultural meanings of natural knowledge') describes how the interactions of theology, art and literature with natural knowledge wrought broad cultural transformations. Also in Part Four, Dorinda Outram addresses the question of how far 'gender ideologies' contribute to an apparently minimal role for women in early modern natural inquiry. She notes that Londa Schiebinger and Alix Cooper (Chapters 7 and 9) argue that women's exclusion was 'patchy', and concludes that 'gender ideologies are important, but they are not hegemonic' (pp. 816, 817).

As is clear from the above, novelty is the major theme which serves to draw out connections between the chapters. In their introduction, the editors point out that the early modern period is characterized by 'the gusher of novelty that flooded … Europe [and] also reconfigured knowledge and careers' (p. 6). A more cautious attitude is evident when addressing the question of the emergence of what we now recognize as modern science. They note that the omission most likely to arouse surprise is in the title itself: 'Where is the Scientific Revolution?' (p. 12). According to Park and Daston, such a diversity of transformations cannot be subsumed under a single historiographical concept. Having said this, not all contributors apply safe synonyms for the period that was hitherto considered 'world-shaking' – some retain the term 'revolution'. But all manage

to sustain a delicate balancing act between early modern categories and modern ones. It is especially praiseworthy that individual contributions manage clearly and unambiguously to portray a period of unprecedented change whilst striving to avoid outmoded historiographical terms and foci. Even so, the volume is not entirely beyond criticism. Readers with detailed knowledge of the primary texts may be dissatisfied especially with the summary appraisals of major early modern thinkers such as Bacon, Boyle, Descartes, Harvey and Newton. In line with the reservations expressed over monolithic categories such as 'scientific revolution', the same caution might have been exercised when delivering commonplace and at times questionable depictions of figures regarded by many as the chief protagonists in transforming early modern natural inquiry.

My overriding perception, however, is that the editors have successfully integrated large-scale themes with detailed overviews of specific disciplines – an intimidating challenge in a volume of this size. One is left with the favourable impression that historical surveys make for stimulating and rewarding reading. No one seeking a developmental account of early modern disciplines will be disappointed by this encyclopedic resource. Familiar topics are extremely well served and the volume contains exceptional overviews of the nascent disciplines of modern science. Moreover, some of the most engaging accounts are to be found in the chapters on less familiar sciences. These illustrate the striking cultural impact of new knowledge and the novel ways in which it was presented. Thus context and broad themes serve to draw out fruitful connections between chapters and enhance the more traditional accounts. Among a phantasmagoria of urban consumerism, for example, William Eamon recounts the story of a shamanistic snakehandler successfully demonstrating his poison antidote to the Venetian health board. This association of natural history, miracle cures, expanding market economies and the interaction of diverse sites makes for fascinating narrative history. Undoubtedly this hefty volume is a necessary addition to the libraries of early modern scholars and to the bibliography of any course covering science in the early modern period.

Sophie Weeks
University of Cambridge

Sachiko Kusukawa and Ian Maclean (eds.), **Transmitting Knowledge: Words, Images, and Instruments in Early Modern Europe.** Oxford: Oxford University Press, 2006. Pp. xvi + 274. ISBN 0-19-928878-X. £100.00 (hardback).
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Descartes was certain that 'in the case of most books, once we have read a few lines and looked at a few of the diagrams, the entire message is perfectly obvious. The rest is added only to fill up the paper' (p. 97). As several of the essays in this volume argue, in many cases in early modern Europe the diagrams, images and frontispieces seem in fact to have been as, or more, persuasive than the text itself. Each of the nine essays in this fine volume presents a detailed case study on a different aspect of the transmission of scientific knowledge. In the cases treated here, most of the transmission occurs through images and instruments, but some of the essays also demonstrate the degree to which orally transmitted information played a crucial role in the process.

Each of the essays pays close and sophisticated attention to the context of the processes of knowledge transmission, for, as Alexander Marr remarks about book publication, 'transmission of knowledge in early modern Europe was not only scholarly; it was also rooted in skilled manual labour, governed by commerce, and orientated towards patronage and friendship' (p. 188). In his essay on optics, Sven Dupré shows the important role that patronage, as one aspect of the context, could play. He notes that new types of visual proof emerged in Renaissance optics because 'mathematicians appropriated a new type of knowledge (practical knowledge) and addressed a new type of audience (courtly patrons)' (p. 38). In the optical texts he discusses, this meant that