be doing in science in the future. The third volume takes the historical perspective. Several of the articles have already appeared in the periodical *Islam and Science*; others in Rashed's three-volume *Encyclopedia of the History of Arabic Science* (1996). The focus is on mathematics and astronomy, and thus the key 'witnesses' are David King, Roshdi Rashed, Christian Houzel, Emilia Calvo, Roser Puig and George Saliba. This volume looks at mathematics and astronomy from an internal Islamic perspective. The fourth volume, on the other hand, considers the passage of knowledge (again entirely mathematical and astronomical) from Greek into Arabic, its transformation within Islam, and its passage on to the West. In his introduction to the fourth volume, Muzaffar Iqbal makes an implied value judgement by saying that the translation of Greek, Syriac, Sanskrit and Pahlavi works into Arabic was a well-organized and well-funded translation process which took place primarily in Baghdad and lasted for approximately two hundred years from the middle of the eighth century; the passage of Arabic learning to the West 'was less focused and less organized and was spread over a large geographical area' (vol. 4, p. xi). Astrology was the spur to translating.

Most of the reprinted articles have been published in the last ten years, and Iqbal is not averse to mentioning recent scholarship which runs counter to long-held beliefs, such as the denial that the famous House of Wisdom was a foundation established for the translations of texts into Arabic (vol. 4, p. xii) – a denial elaborated by Dimitri Gutas and Kevin van Bladel in their recent contribution to the *Encyclopedia of Islam* 3, s.v. *Bayt al-hikma*). Iqbal refers to Sabra's use of the term 'aspecting' (which surely has an astrological origin), 'in order to refer to the way in which individuals in a given culture aspect another culture as they direct their gaze to the other from their own location' (vol. 4, p. xvi)

Iqbal gives as a reason for the concentration on astronomy the fact that 'recent studies in the history of Islamic scientific tradition have paid considerably more attention to astronomy than other branches' (vol. 4, p. xvii). This is hardly fair to the large amount of work that has been done in the field of medicine (not to mention philosophy).

Iqbal eventually wishes to reject and dispel the idea that Islam is irrational and intolerant, and that 'Greek learning never found a secure institutional home in Islam, as it was eventually to do in the universities of medieval Christendom' (quoting Roshdi Rashed, vol. 4, pp. xvii–xviii). Iqbal is clearly on a mission to alter the prevalent perspective on Islam and science. His aim is similar to that of the Gallimard publication *L'épopé de la science arabe* by Danielle Jacquart (2005) and the website muslim.heritage.com. Most similar, however, is a set of four volumes of articles collected by Peter E. Pormann under the title *Islamic Medical and Scientific Tradition*, and published by Routledge in 2010. Pormann introduces the articles with the statement that 'Islam is often perceived, and not only in the popular imagination, as being opposed to science and rationality. Some scholars even argue … that Islam was incapable of innovation and did little more than transmit, and at times disfigure, previous Greek knowledge' (p. 1). Pormann counters this perception by presenting articles, mostly written within the last ten years, mainly on medicine and natural science. Iqbal's collection provides a nice compliment to Pormann's in concentrating on astronomy.

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Sachiko Kusukawa, **Picturing the Book of Nature: Image, Text and Argument in Sixteenth-Century Human Anatomy and Medical Botany**. Chicago and London: The University of Chicago Press, 2012. Pp. xvii + 331. ISBN 978-0-226-46529-6. $45.00/£29.00 (hardback).
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Some studies promise much, claim more, and eventually deliver little. Sachiko Kusukawa's monograph is precisely the opposite: it clearly and modestly sets out its aims and limitations, while

investigating themes that have implications for the history of visual science that go well beyond the sixteenth century. Rather than trying to cover the whole field of scientific book illustration in the sixteenth century, Kusukawa has chosen to present an in-depth study of the works of three ground-breaking scientists of this century: the naturalists Leonhart Fuchs and Conrad Gessner (on plants), and the physician Andreas Vesalius (on anatomy). Nearly all of the men involved in the study of plants, animals and human beings in this age were physicians. This is a study, therefore, of how learned physicians who were fluent in Latin and bound by university education, and who shared attitudes to knowledge and authority, created new scientific knowledge by means of word and image. The key issue in her study is not an art-historical evaluation of their illustrations, although she does address themes such as naturalism, contemporary notions of *ad vivum* representation, and Renaissance (hyper-)realism that belong as much to art history as to cultural history. Her focus is rather on the use of images in relation to text, how particular kinds of image reflect what these scientists regarded as valid knowledge of plants or human bodies, and how images helped to construct an authoritative interpretation of such living beings.

One of the great qualities of this study is that Kusukawa places each of these men, their ideas and their works in a finely sketched and meticulously researched context; compares them with contemporaries; and thus vastly extends the range of this book, without ever stooping to facile generalization or downplaying the great differences between these scientists. Indeed, it is one of her important conclusions that heterogeneity (concerning the use and validity of scientific illustrations, notions of authoritativeness and types of representation) is the norm in the sixteenth century. That situation changed in the seventeenth century, when the more homogeneous format of scientific atlases and the 'true-to-nature' paradigm (shorthand for generalizing beyond the particular) became established.

The use of printed illustrations in the works of these scientists was by no means self-evident, as is amply demonstrated by the first section of this study, which is devoted to book printing and the making of illustrated books in this age. Nor was it a 'simple' reflection of observational practices, as is too often assumed when equating naturalistic representation with detailed observation. Fuchs's illustrations are no 'counterfeit' images: they do not depict individual plants, but generalize, unite characteristics from various stages of a plant's growth and even from different varieties of a species. They represent a whole plant species in the form of an *absolutissima* plant. Gessner, too, generalized in his images. His watercolours intended to represent the complete plant, which was often composed of highly naturalistic drawings of parts of different individual plants from the same species. Vesalius, finally, was in search of the canonical body. His illustrations do not represent a particular body, but are teleological, ignoring both unusual variations and completely normal body parts if they were 'non-functional' according to Vesalius's point of view. The methods followed by Fuchs, Gessner and Vesalius differed, but shared the common aim of demonstrating something essential about plants or human bodies.

Kusukawa argues that these attempts at visual generalizing should be seen as an integral part of the efforts of Vesalius, Fuchs and Gessner to elevate the status of their knowledge from what was called *historia* at the time (knowledge that was mainly descriptive in character) to *scientia*. That point is a crucial one, which hopefully will trigger further research and discussion, not least because some of the visual techniques developed for the first time by these scientists are still used in modern scientific illustration. But, as Kusukawa points out in detail, not all sixteenth-century naturalists and physicians shared either the desire to generalize or the positive attitude to the use of images shown by Vesalius, Fuchs and Gessner. Some took a stand against the use of illustrations in scientific books, while others experimented with different forms and formats of visual representation. Even the three protagonists of this study did not always use pictures in the same way in their works.

Gessner's plant drawings were never published. They functioned as a research instrument but, Kusukawa argues, their form was influenced from the start by his intention to use them as models for book illustrations. The innovative illustration strategies of Fuchs and Vesalius in particular ranged from combinations of *tabellae* and text to the insertion of numbers and letters in images in order to guide the reader's eye, and to layered images that helped the reader delve ever deeper into the human body. Indeed, for these learned physicians printed books were a key to thinking about nature and human anatomy, to divulging knowledge, settling disputes, and testing the opinions of colleagues. However true this may be, occasionally it is still good to remember that books were not the exclusive means available to them for understanding nature, that practice, face-to-face interaction and correspondence played their part, and that images did exist and circulate without ever being printed in a book.

All of the authors discussed here gave much thought to how their particular use of illustrations in combination with the text would influence the reader's reading practice. We can say the same of Sachiko Kusukawa and her publisher, since this is one of the most beautifully produced and richly illustrated volumes in this field to have appeared for a long time. This thoughtful and thought-provoking study deserves to become a point of reference for research on relations between text and image, the role of illustrations and that of visual evidence in the history of science. Hopefully it will lead to new debate on the plurality and inventiveness of sixteenth-century textual and visual science.

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Benjamin Wardhaugh (ed.), **The History of the History of Mathematics: Case Studies for the Seventeenth, Eighteenth and Nineteenth Centuries**. Oxford: Peter Lang, 2012. Pp. vi + 187. ISBN 978-3-0343-0708-6. £32.00 (paperback).
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That particular histories are written by particular authors in particular contexts for particular audiences, and that they might be so shaped by these circumstances, should surprise no one. From this banal overture, the contributors to this volume of case studies in the history of the history of mathematics engage in a thought-provoking conversation about the images, values, assumptions and purposes of historical writing about mathematics and (especially) mathematicians from the sixteenth century to the present.

A slim book without pretensions to comprehensiveness, the volume's intellectual core comes in its three middle chapters, each of which explores a different side of the contentious history of the invention of the calculus. First, Rebekah Higgitt draws on her ample expertise in the history of Newton biography to characterize a wide chronological range of portrayals of 'Newton the mathematician' in terms of their authors and contexts. Niccolò Guicciardini and Adrian Rice, in turn, offer detailed analysis of the positions of two authors – respectively Jean Etienne Montucla and Augustus De Morgan – on Newton's historiographically infamous priority dispute with Leibniz. Both Guicciardini and Rice use their authors and those authors' sources to provide compelling views of the dispute's historiography as viewed through the French eighteenth and English nineteenth centuries.

Preceding the volume's Newtonian core, Philip Beeley gives a rich unpacking of the content and contexts of John Wallis's *Treatise of Algebra*, while Benjamin Wardaugh surveys and contextualizes a variety of eighteenth-century claims about the origins and development of arithmetic. Following the Newtonians is the volume's lone essay to step entirely away from British figures and sources: Henrik Kragh Sørensen's fine encapsulation of his extensive recent work on the history of Abel-commemoration, which he presents by looking at the writings of (and sources available to) the Swedish mathematician Gösta Mittag-Leffler. The volume concludes with