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P. Klaus Hentschl and Axel D. Wittman (eds.)*, The Role of Visual Representations in Astronomy: History and Research Practice*, *Acta Historica Astronomiae*, 9. Thun and Frankfurt am Main: Verlag Harri Deutsch, 2000. Pp.148. ISBN 3-8171-1630-6. DM 24.00.

This small book unites nine papers (one of them an annotated 1843 reprint of Charles Piazzi Smyth's 1843 paper, "On astronomical drawing") from a 1999 colloquium in Göttingen organised by the Astronomische Gesellschaft. Not surprisingly for such a project, the papers vary in specificity and engagement with the title. Nevertheless, the eclectic elements comprise a satisfying sum, collectively exploring astronomical practice and meaning by focusing on visual representations of astronomical phenomena. The net for 'visual representations' is cast wide: the editors include drawing, engraving, photographing, plotting and printing processes. This provides considerable scope for the contributors.

Two contributions deal centrally with visual representation itself. Klaus Hentschel's introductory essay surveys trends in the history of visual representation in science and astronomy. This helps to situate the other contributions in a wider research context. Hentschel notes that conventional periodisation of the subject discusses imagery in terms of observing and recording technologies (e.g. telescopic, photochemical or CCD-based). He argues instead for an alternative periodisation based on available printing techniques (e.g. copper engraving, lithography and half-tone printing). Hentschel also vaunts the importance of visual cultures, notably comprising printing experts and visually-oriented scientists. Quite rightly, such a broad survey raises more questions than it answers, and the author concludes with desiderata for future research.

A second contribution that provokes deep questions about the meanings of visual representations is that of Andrea Loettgers, who discusses Samuel P. Langley's depictions of the infrared solar spectrum. Langley, during the last decades of the nineteenth century, devoted considerable energy and ingenuity in order to transform his bolometer readings into a more acceptable presentation for spectroscopists. He converted his "bolographs", or plots of detector response versus wavelength, into the more familiar form of line spectra. Loettgers questions how Langley sought to represent the intrinsically non-visible in visual terms, and why he attempted to do so. It is argued that the prevailing trends towards automation and objectivisation of measurement were important motivating elements in his work.

Two of the book's contributors focus on what might be called "historical astronomy" rather than the history of astronomy. They apply a modern perspective and analysis techniques to older materials. Axel Wittman investigates whether F. G. W. Struve observed the nucleus of Halley's comet in 1835. He motivates this historical detective story by noting a striking resemblance between Struve's drawing of the comet, depicting a "small, slightly yellowish glowing piece of coal" [p.79] and modern

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images taken with the Giotto space probe in 1986. Despite such a suggestive juxtaposition, Wittman shows that the telescopic resolution, the measured size (some 25 times larger than what Giotto later recorded) and the description point to Struve having actually observed the inner coma of the comet.

The second contribution in this vein of modern re-evaluation of old data is that of Peter Kroll and Hans-Jürgen Bräuer. The authors point to the existence (and neglect) of some two million photographic plates, collected and stored in vaults at observatories and universities across the globe, which were the product of sky surveys and patrols from the late nineteenth to mid twentieth century. They note that "the necessary skill of handling this medium is dwindling away" (p. 136). Even so, this has been an unrivalled and accessible storage medium for more than a century, certainly more than can be expected of modern media such as magnetic tape, disks and CD-ROMS.

The programme that motivated such industrial-scale data collection was the *Carte du Ciel* launched in 1887. Charlotte Biggs argues that the origins of this large astrometric project, involving hundreds of female "computers", lay in a proactive attempt to make the relatively poor Paris Observatory the centre of an international project. Her story highlights the rise of mechanisation and standardisation in astronomy. Another technique that became responsible both for large-scale astronomical surveying and automation of observation was photographic "out-of-focus photometry". Peter Habison shows that this method, developed by Karl Schwarzschild between 1897 and 1899, for the first time made non-visual photometry more precise than visual methods for determining stellar magnitudes.

Other contributions include descriptions of the design and operation of a renaissance celestial globe (Lajos Bartha), and of eighteenth century wood cut illustrations (Klaus-Dieter Herbst).

Given this disparate and complementary collection, the contents of this book – focusing on the technical practices and perceptual organisation of astronomical representations – should have a large readership. The collection illustrates the breadth and fertility of current research, and hints at how the study of visual representations can be extended to other areas of the history of science.

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