demonstrated that comets were above the moon. Jerratsch not only shows that it took time for this result to be accepted, but also points out that some 1577 pamphlets assume supralunarity without any reference to parallax measurements.

The narrative that Jerratsch puts in place, more or less, comes down to this. At the beginning of the sixteenth century, a new understanding of comets arises, integrating three earlier approaches: the meteorological theory of Aristotle, which explained comets as terrestrial exhalations; the astrological interpretation of comets, largely developed by medieval Arabic authors; and a theological understanding that saw comets as signs sent by God to warn sinners to repent. Jerratsch speaks here of an "augmented" or "integrated" view of comets, especially articulated in the work of Melanchthon. Comets were seen both as natural objects and divine warnings. They announced divine punishments but also caused such harm in a physical way.

Now, what happens in the course of the sixteenth and seventeenth centuries, according to Jerratsch, is not so much a rationalization or scientification, but rather a disintegration of the integrated view because of various inherent tensions. Whereas in earlier studies on the debate on comets the downfall of the Aristotelian worldview most often takes center stage, this appears only marginally relevant in Jerratsch's narrative. She prefers to highlight the gradual erosion of astrology. In the integrated view, astrology was an essential link: it demanded exact observation to get at causal explanations and was, so to speak, the glue that bound theology and physics together. In the seventeenth century, comets were still seen as omens, but rather than justifying this by astrological methods, authors did so by compiling historical examples. With the disappearance of astrology, theology and physics lost their common ground and went their own ways, seeking legitimation in their own principles rather than in the other domains.

This study is well delineated, meticulously researched, and clearly explained, although in a rather dense, academic style. Jerratsch has a detailed knowledge of her sources and her familiarity with the literature is impressive, although she seems more inclined to accommodate various views into one overall picture rather than sift them in a critical discussion. The book shows in an exemplary way the variety and richness of the early modern debate on comets and opens important new venues for further research.

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Making Marvels: Science and Splendor at the Courts of Europe. Wolfram Koeppe, ed. New York: Metropolitan Museum of Art; distributed by Yale University Press, 2019. 308 pp. $65.

Tiny mechanical insects. A set of solid silver furniture, made for a prince. Drinking vessels made from nautilus shells. Elaborate gilt clocks. A magic lantern. Gaming boards

inlaid with ivory, amber, and mother-of-pearl. An Aztec feather mosaic shield. These are just a few of the kinds of items in *Making Marvels*, the exhibition catalogue from the exhibit of the same name on view at the Metropolitan Museum of Art from November 2019 until March 2020.

Princes collected these objects and many others in the early modern period as a mark of their distinction, as a way to demonstrate their aesthetic refinement and scientific sensibility, and as evidence of their temporal and geographic power. The collections, often known by the places they were kept—*Wunderkammern* (rooms of wonder) or *Kunstkammern* (rooms of art)—highlighted natural abundance and variation, princely magnificence, and the astonishing virtuosity of the artisans who took nature's raw and sometimes strange materials and made them into ingenious and exquisite treasures. Eight essays and an introduction accompany the catalogue entries and are loosely organized around *Kunstkammern* generally, princely edification and amusement, and technology.

From instruments of observation and measurement to classification systems, to showcasing new materials and innovative techniques, knowledge of the natural world—its phenomena, constituent elements, and governing principles—was an organizing principle and driving interest behind these collections. Essays by Pamela Smith, Peter Plassmeyer, and Ana Matisse Donefer-Hickie take up the role of scientific knowledge in relation to *Kunstkammern* from perspectives both synthetic and particular. Smith's chapter on courtly marvels and the New Science based on experiment (however haphazard) deftly outlines two changes, epistemological and practical, that began over the course of the sixteenth century, and explains their impacts on princely collections. A more sustained, systematic interest in joining theoretical, syllogistic knowledge (*argumentum*) with natural knowledge from the sensorium and from working with materials (*ars*), and a greater interest among artisans and practitioners to write down their empirical knowledge both helped shape the conditions of possibility from which *Kunstkammern* emerged. Plassmeyer's chapter on scientific instruments as luxury objects amplifies Smith's argument about the increased interpenetration of different spheres of natural knowledge and social registers in this period, by examining the role of instrument makers, who often moved between the court, the university, and learned societies. The court, with interests in ballistics, metallurgy, agronomy, and medicine, was a space where theory and praxis commingled by necessity, and Donefer-Hickie clarifies how alchemy united multiple practical interests—distilling, glassmaking, metallurgy, and medicine—and why princes were patrons and practitioners of this art.

Although scientific knowledge was a focus of the exhibition and this catalogue, some of the other essays lack context and an awareness of recent historiography in the history of science and early modern studies. Many of the objects on display in *Kunstkammern* contained natural materials from places far from Dresden or Nuremberg, such as ebony, elephant ivory, Seychelles nut, coral, and tortoiseshell, and some manufactured items,

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like the Aztec feather mosaic shield, were trophies from distant, vanquished empires. Yet, aside from a few brief mentions of exploration and conquest, the remaining essays do not engage with recent scholarship that takes up the global turn in the history of science, in the history of empire, and of the early modern Atlantic and Indian Ocean worlds. The catalogue entries include several foreign items made specifically for the European elite, such as a late sixteenth-century Mexican feather mosaic depicting Saint Michael slaying the devil and a sixteenth-century chessboard made in Gujarat. But other than these entries, one gets little sense of the larger world intruding into these rooms of art, despite decades of scholarship that contextualize these non-European materials within networks of trade, Christianization, colonization, and enslavement. Two essays discuss the desire in this period to showcase items made from materials from Africa—elephant ivory and ostrich eggs—without mentioning that the increased availability of these materials stemmed from European incursions into West Africa for gold and human beings.

Overall, *Making Marvels* is positioned firmly within the *Kunstkammer*, with some interest in a few of the most highly paid artisans who served the prince's desires. How and why exotic materials traveled to the prince's court, what unquestioned imperatives rationalized the production of these luxury items, which invisible artisans kept the prince's astronomical instruments and distillation apparatus in working order—these questions are not within the scope of this volume. The items under discussion are beautiful and captivating, certainly, but they are also material witnesses to the forces and ideas that shaped their creation and use. By ignoring that greater context, *Making Marvels* uncritically recapitulates the point of these collections: to dazzle the viewer with luxury and virtuosity, and to naturalize the ideologies behind their creation.

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Thomas Harriot: A Life in Science. Robyn Arianrhod.
Oxford: Oxford University Press, 2019. viii + 361 pp. £19.99.

Thomas Harriot is one of the most unique personalities in the history of science. Polymorphic intellectual and scientist, he built his career in the service of influential English aristocrats with whom he shared the business and political vicissitudes of the Elizabethan era. Today he is an extensively studied author as well as the subject of specific conferences from which important contributions have emerged that have allowed us to frame and contextualize his work. There was, however, no work of synthesis that retraced his scientific production against the background of his patrons' biographies. No studies highlighted how Harriot's patrons shaped his work. Harriot, for instance, served time in prison for his connection to Henry Piercy (ninth Earl of Northumberland) and