study is full of illustrative evidence but leaves the implications largely to the reader. A few examples of the significance of this data for fresh historical interpretation, especially of some Reformation documents, would have been exciting. At any rate, Kristeller has provided another important interpretive insight for the historian's use.

Essay three, I suspect, has a largely rhetorical objective. Kristeller purports to prove that the contribution of the monks and friars to Renaissance culture "was much greater than is usually realized." If this reviewer's awareness of such a contribution is no more than average among scholars in the field, then Kristeller fails to meet his objective. As he notes himself, the article is a rather superficial treatment; really an introduction to the following two appendices on (a) libraries of Religious Orders and (b) a selective list of humanists and other scholars who were members of a religious order or congregation, between 1400 and 1530. The essay does wet one's appetite for more information on several points but on the whole is less innovative than the other two.

As the editor acknowledges, a major purpose behind the publication of this collection was to get the essay on "Thomism and Italian Thought" translated from the French and readily available to North Americans. This essay on Thomas Aquinas covers more than half of the book. In it, Kristeller attempts, first, by a quick survey, to distinguish the authentic thought of Thomas "from the transformations brought to it by his school and by the tradition that makes use of his name as well as of his authority." Following this, he systematically analyzes from a wide selection of literary sources the place of Thomism in the Italian thought of the Renaissance. Some data are handled thoroughly but some in a rather cursory fashion. For example, it is not convincing simply to identify, by fiat, Savonarola as a Dominican Thomist and as a significant contributor to Thomistic influence in the Renaissance. But on the whole, the author substantiates adequately that among some humanists Aquinas was quite well known and respected as a scholar and commentator on Aristotle and that Thomist thought continued to spread and develop; not all humanists followed Petrarch's aversion to Aquinas, though, as Kristeller still admits, many did. At lay levels, especially, contacts were "marginal." One might also question whether Aquinas' philosophical perspective was quite as neo-platonic and parallel to Ficino's as Kristeller implies.

Kristeller is not trying to invalidate or gloss over the distinctions that existed in fifteenth and sixteenth-century thought but rather again, in typical fashion for him, to point out with finesse and balance the greater inter-relatedness of the parts. An equally valuable contribution by this collection is its numerous suggestions for further research; it is a veritable gold mine. Also it is a joy to have the footnotes at the bottom of the pages where they belong. The Duke Monograph series has made an auspicious beginning with this volume.

KENNETH R. DAVIS, *University of Waterloo*

John W. Shirley, editor. *Thomas Harriot, Renaissance Scientist*. Oxford: Clarendon Press, 1974. Pp. x, 181. \$35.50.

Colin A. Ronan. *Galileo*. New York: G. P. Putnam's Sons, [c. 1974]. Pp. 264. \$14.95.

Harriot's name is most commonly known in connection with his *Briefe and True Report*

of the *New Found Land of Virginia*, printed in 1588, and the posthumous *Artis Analyticae* of 1631, an invaluable contribution to the origins of modern algebra. The wide disparity of the two titles shows that Harriot was active in many fields of early modern science. His voluminous manuscripts have been skimmed from time to time in the past, but only in recent years had a group of serious scholars in Great Britain and America begun to put them in order and explore them in depth. A symposium at the University of Delaware in April 1971 enabled specialists in several areas to interchange their results to date, in papers later expanded and annotated for this volume.

The appropriateness of the title of the book is shown by the scope of the topics treated. In addition to a general sketch of the Renaissance intellectual background of Harriot's science by Professor Edward Rosen, two papers deal with Harriot's voyages to the New World (Professors Shirley and Quinn); one with his associates, greatly expanding the study by Henry Stevens of Vermont at the turn of this century through careful study of the manuscripts (Mrs. R. C. H. Tanner); with Harriot's work on the theory and practice of mathematical navigation (J. V. Pepper); with the "New Philosophy" as seen in the English group (Jean Jacquot); and with Harriot's pioneer telescopic observations, anticipating those of Galileo in the study of sunspots (John North). Harriot's other scientific activities, which were manifold, remain to be set forth; they are known to include pioneer work in falling bodies and projectile motions with a different mathematical approach from Galileo's perhaps no less significant but allowed to fall into neglect by Harriot's literary executor, Nathaniel Torporley, who attended only to the purely mathematical work because of his antipathy to Harriot's atomistic philosophy.

Of the detailed analyses of Harriot's relations with Sir Walter Raleigh and of his expedition to Virginia as scientist with the company established to found a colony there, it suffices to say here that all previously unintegrated material has been assembled and greatly augmented in orderly and readable form. Harriot's manual of theoretical and practical navigation, embodied in a short treatise in 1594, displays his thorough familiarity with recent works of English, Spanish, and Dutch mathematicians and the development of original techniques that later yielded useful meridional tables compiled by Harriot in 1614. The solution of such problems, as important to cartography as to navigation, exhibits that characteristic concern of Renaissance science with technology and society that was epitomized in Leonardo and that contrasts strikingly with the abstract academic science of medieval scholars.

The New Philosophy which Donne found so shattering in England had its roots in the atomism and infinitism of Giordano Bruno. Harriot's espousal of it, as mentioned above, was to result in neglect of many of his manuscripts. The places of Harriot, Nicholas Hill, and John Warner in its development and its relations to the new sciences are established in the paper by Jean Jacquot in a way that provides an essential supplement to Robert Kargon's study of atomism in England a decade ago.

Of the greatest interest to historians of science is John North's study of Harriot's telescopic work, which began with a lunar observation made about the time that Galileo first heard of the invention in Holland of a new kind of spyglass (26 July 1609). One slip in this account should be pointed out; on p. 136 it is said that Galileo first saw Jupiter's satellites on 7 December 1609 (N.S.), an event that did not take place until 7 January 1610 (N.S.). Harriot's priority over Galileo and Christopher Scheiner in sunspot observations is established by a dated entry of 8 December 1610 in his manuscripts; the celebrated

controversy in Europe began only in 1612. Harriot also determined the period of solar rotation with greater accuracy than his continental contemporaries. But his neglect to publish these (and doubtless many other discoveries) kept them from influencing the development of telescopic astronomy in that period of great excitement that marked the close of Renaissance and the beginning of modern physical science.

Certainly this volume offers the occasion for a greater unification of hard science with practical affairs and with speculative philosophy in the Renaissance than has been achieved up to the present.

Ronan, a British astronomer, appropriately dedicates his book to the actor who played the part of Galileo in Brecht's play at London in 1960. Its reliability as a picture of Galileo and his work is about the same as that of the play. It is vastly inferior to previous biographies by J. J. Fahie (1903), E. Namer (1930), F. S. Taylor (1939) or L. Geymonat (1965). Of those, only that of Fahie is mentioned in Ronan's bibliography, which refers to no foreign book and to no journal article in any language, despite the prefatory statement that "I have made use of recent historical research."

Though Ronan correctly places Galileo's early schooling at Vallombrosa, he attributes it to the Jesuits, probably to dramatize some later Jesuit opposition to Galileo. Such bizarre distortions of simple fact should be kept in mind while reading the author's reconstructions of Galileo's private thoughts, motives, emotions, and imaginary conversations. His translation of *Dianoia Astronomica* as "Diana's Astronomy" and his gloss of "elementary bodies" as "[i.e., the stars and planets]" evince an unacquaintance with the logic and physics of Galileo's time perhaps pardonable in a modern astronomer, but hardly in a biographer. Even Galileo's astronomical positions are sometimes misrepresented, as when Aristotle's theory of comets as ignited vapors is called "Galileo's own," though he argued at great length against it in order to discredit parallax as a means of locating comets.

Historical folklore passed on in this book is exemplified by the treatment of Francesco Sizzi, the first writer to include scriptural objections among arguments against Galileo's telescopic discoveries. Ronan follows early biographers who assumed from this that Sizzi was a "young religious fanatic." The circumstances of Sizzi's execution in France would make any Renaissance student question this, even if a letter of Galileo's did not show his respect for the young Florentine's scientific potential. In due course Galileo was richly rewarded for his forbearance. The story has twice been told in English in recent years. So has that of the identification of Jean Tarde rather than Christopher Scheiner as the target of one particular reproach by Galileo, though the facts alone should have precluded Ronan's error here. Galileo could not have meant Scheiner as the man who pretended not to have seen his writings on sunspots, since Galileo wrote nothing on the subject until personally requested by Scheiner's publisher to do so, and then he wrote in the form of a reply to Scheiner.

These suffice as samples of the misrepresentations of Galileo's life, work, and personality that abound in Ronan's narrative, which was perhaps hastily composed to accompany the profuse illustrations, many of them in colour. Even those, however, mix fact with fiction. Thus the house shown as Galileo's birthplace and the purported portrait of his older daughter are apocryphal. The diagram shown as illustrating Galileo's manner of measuring the height

of a lunar mountain was drawn for a very different purpose, while the correct diagram, printed in the *Starry Messenger* of 1610, is omitted.

It may make an interesting and socially meaningful story to present Galileo as educated by Jesuits and later as hurling unfair charges against the particular Jesuit who precipitated Galileo's trial in 1633. Such historical yarns may continue to afford the standard portrait of Galileo, blessed by publishers of good repute, as in this case, and backed by the scientific credentials of authors like Ronan. Meanwhile those Renaissance scholars concerned with the intellectual currents of Galileo's time would do better to consult the work of J. E. Drinkwater-Bethune published in 1829 than this latest effusion in the school of Brecht and Koestler.

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John Dee. *The Mathematicall Praeface to the Elements of Geometrie of Euclid of Megara* (1570), intro. Allen G. Debus. New York: Neale Watson, Science History Publications, 1975. Pp. 33. \$8.95.

This book is a photographic reproduction of a sixteenth-century preface which sometimes appeared with the first English translation of Euclid. Before September 1550 there had been at least eleven printed editions of Euclid, of which three containing the first six books had appeared in Paris. There in the summer of that year the young John Dee "did undertake to read freely and publicly Euclid's Elements Geometricall, *Mathematice, Physice, et Pythagorice*"—on his own account lecturing to standing-room crowds. Twenty years later the first English translation was sponsored by Henry Billingsley and printed by John Daye in London; this gave John Dee the opportunity to write his long preface, a chart of the sciences, and annotations to the text.

Dee's total work has rightly attracted scholars who are attempting to explain the changing minds which brought scientific studies to the fore in seventeenth-century schools, established societies for sharing scientific observations and ideas, and made inventions and theoretical constructs which revolutionized learned views of nature and the cosmos. He was a figure whose style was attractive to the great and whose brilliance encompassed a wide range of interests, so much so that E. G. R. Taylor could write fully and accurately about him as a mathematician, whereas Frances Yates could place him squarely in the midst of a renewed Hermeticism. Between these two interpretations one must tread carefully. Peter J. French's bibliographical data (1972) give further aid in seeking a fair assessment of John Dee.

But it is misleading to present *The Praeface* as part of Dee's alchemical and astrological projects. Nearly all the over-thirty sciences outlined in the *Praeface* are based directly on Arithmetic and Geometry. Notable is *Statike* with long sections of arithmetical explanation for specific problems. (This prominence would be clear had the author's annotations to Euclid's text been included here, as they were in 1570.) Despite a disclaimer that "Dee's suggestions for a new approach to the study of nature are less prominent here than they are in the *Propaedeumata Aphoristica* in respect to astrology and in the *Monas Hieroglyphica* in respect to alchemy" (p. 23), Debus devotes many pages to just those matters. He